

GTM Health and Safety Manual

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Introduction

The Gas Transmission and Midstream (GTM) Health and Safety has been compiled to provide guidance for the prevention of events leading to personal injury, property damage and non-compliances. While the Manual is not meant to be “all inclusive”, comprehensive procedures are provided for recognized potential hazards for most work duties within Enbridge GTM (herein known as the “Company”).

Enbridge GTM includes:

- Accident Storage Field
- Aitken Creek
- Algonquin Gas Transmission Company
- Big Sandy Pipeline
- Bobcat Storage
- DCP Midstream and Dauphin Island Gathering Partners (DIGP) offshore facilities
- East Tennessee Natural Gas Company
- Egan Hub Storage LLC
- Leidy Storage
- Maritimes & Northeast Pipelines (M&NP)
- Moss Bluff Hub Partners LLC
- Oakford Storage
- Ozark Pipelines
- Saltville Gas Storage LLC
- Steckman Ridge
- Texas Eastern Transmission
- Westcoast Energy

Purpose

The GTM H&S Manual [referred to as the “Manual”] documents the minimum safety requirements to which Workers shall adhere to. The requirements shall:

- Meet or exceed applicable occupational H&S requirements for the jurisdictions where Enbridge operates
- Serve as a basis for creating and maintaining procedures
- Help establish safe work behaviors

Specific terms are used to indicate whether an action is mandatory or recommended. The following words have specific meanings:

- “Shall” is used where an action is mandatory
- “Should” is used where an action is recommended
- “May” is used where alternatives are equally acceptable

Acronyms, Terms and Definitions are found at the end of this Manual (in Appendices A and B). Definitions are bolded, italicized and in a darker font throughout this Manual.

Some additional terms are capitalized, but do not appear on the list of defined terms, such as the job titles of Enbridge personnel and departments.

Certain sections within this Manual are supported by additional policies, standards, practices, processes, documentation, and forms. These shall be referenced where applicable.

In some cases, the Manual calls out specific procedures which are referenced to provide further guidance on a specific topic that may be further complicated by:

- jurisdictional or regulatory requirements
- facility design criteria for Asset Areas, and/or operational controls

Scope

The Health and Safety Manual applies to all Enbridge Employees and Contractors engaged in design, construction, operation, maintenance, decommission and abandonment activities at Company facilities, as well as visitors to these worksites.

This Manual also applies to GTM operations, technical services, engineering and construction, and projects.

Exceptions

Company management recognizes that the establishment of an effective safety culture cannot be realized through this Manual alone. Employees at all levels, including Contractors and Visitors, must carry out their individual responsibilities to provide a safe and healthful work environment. Everyone must therefore become familiar with this Manual with respect to their work duties.

Safety Shared Services is responsible for the development, compilation and issuance of safety related procedures and guidelines contained in this Manual. The contents of this Manual are subject to further development and revision.

This Manual is issued electronically to all locations and departments within the Company. As updates are provided, the facility Supervisor is responsible for ensuring that Employees are informed of any changes.

Each Employee is encouraged and expected to take an active role in the implementation and future development of this Manual. This includes following the procedures and guidelines as well as providing oversight to Contractors and Visitors to follow the same practice.

Suppliers shall comply with Company H&S requirements set out in this Manual. If a Supplier has an H&S standard or policy that is materially different from Company's, the Supplier shall follow the most stringent

requirement between the two programs. When a specific form is noted in this Manual, Suppliers may utilize that form or an equivalent approved Supplier form where applicable.

Safety Principles

Enbridge's commitment to safety entails six core Safety Principles. The figure below explains each principle in detail.



Our Path to Zero

Safety principles at Enbridge **OUR COMMITMENT**

Enbridge is committed to ensuring everyone returns home safely at the end of each and every day, and that our assets are operated in a safe and reliable manner.

We base our commitment to safety on our care for employees, contractors, the communities in which we operate and the environment.

Our values of Safety, Integrity, Respect and Inclusion guide our decisions, actions and interactions individually and as a company. Our Safety Principles support our values and highlight the fundamental beliefs we share on our path to a zero-event workplace.

Safety. It's a core value that makes us Enbridge. It's our way of life.

Safety principles **OUR PATH TO ZERO**

1. All injuries, events and occupational illnesses can be prevented.

Enbridge is committed to protecting the health and safety of our employees, our contractors and the public. Our goal is zero injuries, events and occupational illnesses. Striving for anything less can lead to the false belief that injuries, events and occupational illnesses are inevitable and acceptable. In every instance, protecting the health and safety of workers and the public requires strict adherence to company policies and procedures, including Enbridge's Lifesaving Rules.

2. All operating exposures can be controlled.

Enbridge believes that all operating exposures and uncontrolled releases that may result in injury, illness or environmental damage can be prevented. Through the rigorous application of process safety requirements we strive to eliminate hazards and minimize risks by implementing effective safeguards. When it is not possible or practical to completely eliminate hazards, we implement engineering controls such as fail-safe control systems, warning and detection devices, and automatic safety devices to reduce the risk. Administrative controls and/or personal protective equipment serve as the last line of defense against the hazards we face.

3. Leaders are accountable for safety performance.

People leaders are accountable for safe operations and the safety and health of the workers under their care. This includes accountability for establishing and maintaining a safe work environment through the application of our Management System. As well, it includes establishing, regularly reviewing and updating policies and procedures using disciplined change management, providing the proper equipment, completing appropriate training, correcting deficiencies promptly, and ensuring approved procedures are followed.

4. All employees/contractors are responsible for safety.

People are the most important element of our health and safety program and ensuring our operational reliability. Enbridge expects employees and contractors to take personal accountability for their safety, that of their co-workers and the general public, and the safe operations of our assets. Further, workers have not only a right but a duty to stop and/or refuse work they feel is unsafe. Our success depends on all levels and all members of the organization being committed and accountable for consistently adhering to our company policies and procedures as well as all applicable regulations, codes and standards. Working safely is a condition of employment.

5. Assessment and improvement are a must.

Enbridge is committed to continuously improving our safety performance through field and operational assessments, and diligent application of quality and safety assurance practices and processes. Further, we employ disciplined root cause analysis and thoughtful exploration of human factors during event analyses to identify and learn from weaknesses in our safety systems. We promptly address deficiencies revealed through these activities, and communicate what we learn across the organization to strengthen our systems and make Enbridge even safer.

6. We promote off-the-job health and safety for our employees 24/7.

Our concern for the safety and health of employees extends beyond the workplace. An off-the-job injury is as painful and impactful as one suffered on the job. We encourage our employees to demonstrate their leadership and excellence in health and safety practices for the benefit of their families, friends and community. An engaged workforce is a key building block of a healthy safety culture.

We strive to create a vigilant and resilient safety culture, in which all members of our team keep themselves and others safe, leaders care for the health and safety of their people, and we learn from safety failures to prevent future events. Our Safety Principles are foundational to our safety culture and our long-term success as an organization.

Figure 1: Safety Principles and Our Path to Zero

Enbridge Lifesaving Rules

Purpose

At Enbridge we value the safety of our communities, customers, Contractors, Contingent Workers and Employees and believe that all injuries are preventable. Compliance with all policies, procedures and regulations is a requirement. Lifesaving Rules are a key focus area designed to protect Employees and Contractors and save lives.

The Lifesaving Rules are founded on real-life events at the Company and focused on areas of high risks and high consequences. They are intrinsic to our business, applicable to all Employees and Contractors and are communicated, clarified, and reinforced across all Business Units at the Company.

Each Lifesaving Rule consists of a simple icon and descriptive text, with additional detailed guidance to explain why the rule is important and what aspects Workers and People Leaders should focus on. Additional information can be found in the Lifesaving Rules Guidance Document. Each Lifesaving Rule is linked to controls and barriers which, if used properly, can prevent significant events. Lifesaving Rules are intended to supplement and support existing management systems, programs and policies. The rules focus on Worker and People Leader behaviors in the workplace by raising awareness of potentially dangerous activities if hazards and risks are not controlled.

Scope

The Lifesaving Rules apply to everyone at Enbridge and compliance is mandatory. Employees or Contractors who choose not to follow the Lifesaving Rules are choosing not to work for, or be assigned to, Enbridge.

Responsibilities

People Leaders shall:

- Follow the Lifesaving Rules
- Report potential Lifesaving Rule violations to Safety or a member of the GTM Lifesaving Rule Committee
- Participate in Lifesaving Rule violation analysis when requested
- Ensure direct reports and Contractors know, understand, and apply the Lifesaving Rules to their daily routine
- Attend Lifesaving Rules training upon hire and every two years thereafter

Employees and Contractors shall:

- Follow the Lifesaving Rules
- Report potential Lifesaving Rules violations
- Attend Lifesaving Rules training upon hire and every two years thereafter
- Participate in Lifesaving Rules violation analysis, upon request

GTM Lifesaving Rule Committee shall:

- Include the following core members:
 - Operations Safety Manager

- HR Manager
- Legal Counsel
- Member from Operational Services
- Labor Relations Representative (as requested for Union Employees)
- Regional Operations Director of Employee or area that hired Contractor
- Include the following Optional members at their discretion:
 - Operations VP/SVP
 - Safety and Reliability Director



Figure 2: Lifesaving Rules

1. **Hazard Management** - I will complete a hazard assessment prior to starting work and reassess if conditions change and new hazards are introduced.

A key component of keeping yourself and others safe is taking the time to identify and understand the hazards related to the tasks you are about to perform.

Examples of a hazard management process include, but are not limited to:

- Job Hazard Analysis (JHA)

- Field Level Hazard Assessment (FLHA)
- Completion of Safe Work Permits

Employees and Contractors must complete a hazard assessment prior to starting work, follow the procedures as identified and be trained in the current version of the applicable policy. This LSR is specific to conducting hazard assessment and identification, and reassessment of hazards when conditions change.

Hazard management is about executing and following the BU-prescribed hazard management processes. The work 'envelope' from a hazard management perspective is considered underway when tools and methods as noted below are commenced.

Examples of changing conditions that should trigger a reassessment of hazards include but are not limited to:

- Changing weather conditions
- Changing scope of work
- Changing operational conditions
- Shift change or change of personnel
- Uncertainty arising from the work/use of stop-work authority

Questions leadership may ask to determine if there is a potential LSR violation include:

- Did the worker(s) complete a hazard assessment prior to starting work?
- If conditions changed or new hazards were introduced after the initial hazard assessment, did workers reassess the hazards?

2. **Driving Safety** – I will only operate a motor vehicle or mobile equipment when free of adverse effects of alcohol or any substance that causes impairment.

Employees and Contractors shall be in conformance with the applicable Alcohol & Drug Policy. This Lifesaving Rule, and any other Enbridge policies that apply to Employees and/or Contractors, still apply if an Employee is outside of working hours and is driving a company vehicle or is driving a personal vehicle on company business.

Questions leadership may ask to determine if there is a potential LSR violation include:

- Did the worker operate a vehicle or equipment while under the influence of alcohol, drugs or any substance that causes impairment?
- Did the event involve a company vehicle?
- Did the event occur while the worker was on company time or performing company business?

3. **Confined Space Entry** - I will confirm the atmosphere has been tested, is monitored and a plan in place prior to entering a confined space.

This rule highlights three key actions we must take to manage the potentially deadly hazards present when working in confined spaces to protect Employees and Contractors. These actions are testing, monitoring, and planning—conforming with the business unit-prescribed confined space entry process, which outlines specific testing, monitoring, and planning requirements.

Questions leadership may ask to determine if there is a potential LSR violation include:

- Did the worker(s) confirm that the atmosphere had been tested/monitored prior to entering a confined space?
- Did the worker(s) confirm that a confined space entry plan was in place prior to entering a confined space if applicable?

4. **Ground Disturbance** - I will verify the location of buried utilities through surface locating and positive identification prior to conducting a mechanical excavation.

This rule highlights the key actions we must take to manage the potentially deadly hazards associated with ground disturbance prior to conducting a mechanical excavation: verifying the location of buried utilities using surface locating and positive identification. It applies to mechanical excavation (e.g., backhoes, mini excavators, directional drilling, etc.).

Questions leadership may ask to determine if there is a potential LSR violation include:

- Did the worker(s) surface locate buried utilities prior to conducting mechanical excavation?
- Did the worker(s) positively identify the buried utilities after surface location and prior to conducting mechanical excavation?

5. **Isolation of Energized Systems** – I will verify isolation before work begins on energized or pressurized systems (Lockout/Tagout).

This rule focuses our attention on the key actions of verifying isolation and zero energy before we work on energized or pressurized systems. The control of hazardous energy involves the specific practices and procedures used to safeguard Employees and Contractors from unexpected energization or start-up of machinery and equipment or release of hazardous energy during service and/or maintenance activities.

Zero energy means that all hazardous energy has been dissipated from the part of the system or the equipment that we are working on or near, or that energy within the system has been dissipated to a level that presents no potential hazard to workers.

When lockout to a full zero energy state is not practicable, or prohibits the completion of specific tasks, other procedures and control methods must be implemented that are adequate to ensure a safe work environment and to prevent the inadvertent release of hazardous energy (e.g., isolation procedures, working in gas atmosphere, hot work, mechanical energy from cables/cranes, etc.).

Questions leadership may ask to determine if there is a potential LSR violation include:

- Did the worker(s) verify isolation prior to commencing work on an energized or pressurized system?
- Did the worker(s) verify zero energy prior to commencing work on an energized or pressurized system?

6. **Reporting of Safety Related Events** - I will immediately report significant safety related events.

This rule focuses our attention on always reporting significant safety related events, including medical aids, lost time, motor vehicle events, line strikes and potential Lifesaving Rule violations.

Potential LSR violations even without loss or event is by their nature, high-potential events, and must be reported.

Event reporting is a vital part of Enbridge's safety culture. As such, each of us should understand what exactly an event is and how an event should be reported. An event is an unforeseen or undesired occurrence, which may include harm or damage to one or more of the following: people, property, environment, process, or a release. Events are typically categorized based on their actual severity as well as potential severity and investigated to determine the root causes and effective preventative actions to avoid similar events in the future.

LSR #6 requires us to report significant safety-related events, however every event and near miss gives us a chance to investigate, to learn more about the health of our safety systems, processes and procedures and to enhance our safety performance and build our safety culture.

Remember that all events and near misses should be reported to your people leader immediately.

A question leadership may ask to determine if there is a potential LSR violation:

- Did the worker(s) immediately, or as soon as reasonably possible, notify their people leader or an Enbridge representative of a significant safety-related event, (e.g., line strike, medical aid, lost-time event, MVI, or potential LSR Violation)?

7. ***Bypassing Safety Controls*** – I will obtain authorization before overriding or disabling safety-critical equipment or controls.

This rule focuses our attention on the key action that helps to manage the critical safety hazards associated with bypassing, overriding, or disabling safety-critical equipment or controls: obtaining proper authorization first.

We define safety-critical equipment and controls as those physical devices or systems that if overridden, disabled, or bypassed could result in serious injury, loss of life, and/or significant damage to property and/or the environment. Examples of safety-critical equipment and controls may include, but are not limited to:

- isolation devices
- emergency shut down valves
- Lockout / Tagout devices
- trip systems
- relief valves
- fire and gas alarm systems
- certain level controls
- alarms and detection devices
- crane limit switches
- in-vehicle monitoring systems
- markings/devices that define safe limits of approach (e.g., powerline crossing goalposts/barriers, etc.)

Bypassing Safety Critical Elements based on an approved and published procedure or standard does not need special authorization. However, required approvals and notifications within the procedure or standard shall be adhered to and will follow the relevant business process.

In all other cases, authorization must be obtained before safety-critical equipment or controls are bypassed, and this authorization must come from the appropriate leadership level and applicable functional areas, in keeping with approved procedures for the work being planned and the safety-critical equipment or controls being bypassed.

Ultimately, identification of safety-critical equipment and controls will vary depending on the work being planned and the configuration of the systems and work sites where the work is taking place. This highlights the importance of effective and diligent hazard assessment and management and means that workers and management must actively seek to identify all safety-critical equipment and controls relevant to the work being planned, with reference to engineering design and the original equipment manufacturer's specifications.

Our energy infrastructure assets and other equipment have many built-in safety-critical controls designed to prevent or automatically respond to dangerous, escalating scenarios. In our operations there are times when we must disable a safety-critical system or control so that we can complete work such as maintenance or testing. When such a situation arises, overriding or disabling safety-critical controls or equipment must only be undertaken with all appropriate authorizations in place beforehand and in strict accordance with applicable procedures and policies to eliminate the potential for serious injury, loss of life, and/or significant damage to property and/or the environment. It is recommended that if bypassing a safety device is identified during the hazard assessment process that the approved procedures are referenced.

A question leadership may ask to determine if there is a potential LSR violation:

- Did the worker(s) obtain authorization or follow an approved procedure/standard before overriding or disabling safety-critical equipment or controls?

Requirements

The following general requirements apply to all Enbridge and Contractor personnel that the H&S Manual applies to:

- The Lifesaving Rules are about safety, not discipline. Our first course of action whenever we believe that a Lifesaving Rule has been broken is the completion of a thorough analysis. This is in keeping with our values of Safety, Integrity, Respect, and Inclusion and with our desire to create a just safety culture at Enbridge in which we can learn from our mistakes.
- It is only after our analysis is complete and we apply our Human Performance Assessment Tool that we determine what discipline, if any, is appropriate. As with any violation of Enbridge policy or procedure, termination is a potential disciplinary outcome.
- It is important to note that there have been cases where our analysis determined that gaps in our policies, procedures or training were the root cause of the situations, and no discipline was warranted. In these cases, we are able to close the gaps and improve our programs to prevent a potential future recurrence. When we experience system-type failures they are not categorized as LSR violations, they are categorized as system-induced deficiencies and event investigators will identify appropriate corrective and preventative actions for the organization to implement to address the deficiencies.

- In cases where discipline is necessary, discipline may take many forms, ranging from verbal counseling to termination.
- The Operations and Integrity Committee (OIC), reviews Lifesaving Rule violations determined by the BU LSR Review Committees. The purpose of these reviews is to provide senior leadership line of sight to LSR violations, ensure we are learning from events and addressing identified gaps to improve our safety performance and strengthen our safety culture. Employee and Contractor adherence to the Lifesaving Rules is critical. The rules help protect all members of our team from injury or worse. They are a key part of meeting Enbridge's commitment that everyone returns home safe at the end of every day and that our assets are operated safely.
- Employees and Contractors should know and comply with the Lifesaving Rules, exercise their authority and obligation to stop unsafe work, and ensure that they report unsafe practices and situations so that Enbridge can investigate them, identify the root causes, and learn.
- All Employees and Contingent Workers are required to complete Lifesaving Rules training upon hire and every two years from the date of the previous training. Lifesaving Rules training is provided through the computer-based training module in the Learning Management System (LMS).
- Enbridge Lifesaving Rules training for Contractors is provided through project orientations as a part of project onboarding.

Documentation

- N/A

References

- Lifesaving Rules Guidance Document

Leadership and Governance

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Leadership and Governance

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1.1.

GTM Integrated Management System.....

2

1. Leadership and Governance

1.1. GTM Integrated Management System

1.1.1. Purpose

The Integrated Management System (IMS) is a management system structure that provides all Company Employees with the elements, expectations, and performance measures to effectively implement the Health and Safety (H&S) Program supported by this Manual.

The GTM IMS is a set of “plan-do-check-act” requirements that:

- Facilitate the identification and Management of hazards, risks, and compliance obligations
- Drive continual improvement
- Measure progress toward zero events and operational excellence
- Define “Systematic Management”

1.1.2. Scope

The GTM H&S Management Program will align to the IMS. Eleven key IMS elements form the basis of organization for this Manual:

- Leadership and Governance Element
- Risk Management Element
- Compliance Management Element
- Performance Management Element
- Operational Controls Element
- Management of Change Element
- Capability Management Element
- Documents and Records Management Element
- Assurance Element
- Stakeholder Engagement Element
- Management Review Element

1.1.3. Responsibilities

All Employees at all levels are responsible and empowered to ensure consistent and continuous implementation of the H&S Management Program.

Management shall:

- Provide the necessary resources and support to fulfill the requirements established in the Safety Principles and Commitment Statement
- Hold immediate reports accountable for the Company’s H&S performance
- Demonstrate and actively communicate their individual commitment to the H&S processes and procedures

- Establish H&S objectives and performance expectations and measurements in the form of leading and lagging indicators
- Ensure that Management, People Leaders and Employees understand their responsibilities and expectations and individuals are held accountable

People Leaders shall:

- Ensure that Employees are aware of their responsibilities and expected safety performance
- Abide by the requirements of the company H&S policies, programs, procedures, guidelines, and safe work practices
- Stop unsafe activities when they occur or are about to occur at a worksite
- Work with Contractors to promote the successful implementation of the Supplier Safety Program in connection with projects they are hired to execute
- Ensure Workers receive required training and are qualified to perform the task they are assigned
- Enforce the H&S requirements in this Manual and ensure the desired H&S outcomes are achieved
- Ensure that actual and potential hazards are mitigated
- Reinforce the expectation that each Worker is fit for duty (i.e., can perform the physical demands of the job in a safe and effective manner) and is free of impairment from such things, including without limitation, fatigue, alcohol, or drugs
- Reinforce Enbridge's Safety Principles and procedures

Employees and Workers shall:

- Comply with all Enbridge H&S policies, requirements, and Applicable Legislation.
- Immediately report all Events to their People Leader and/or the Person in Charge/Authorized Representative or Designate.
- Support analysis by providing full cooperation.
- Wear proper Personal Protective Equipment (PPE) and use appropriate tools and equipment.
- Stop work and report unsafe conditions or unsafe work practices/behaviors to the PIC and/or Permit Issuer should they occur.
- Complete required training and be competent in the performance of their work.
- Participate in Pre-Job Meetings and Hazard Assessments.
- Have the appropriate training and authorization to operate equipment.
- Be fit for duty by being able to perform the physical demands of the job in a safe, and effective manner, and are free of impairment from such things, including without limitation, fatigue, alcohol or drugs.
- In addition to the Worker responsibility to stop unsafe work, Workers also have the right and responsibility to refuse unsafe work without fear of retaliation.

Suppliers shall:

- Comply with Company H&S requirements set out in this Manual and applicable Company IMS Elements. If a Supplier has a H&S procedure or policy that is materially different from Enbridge's, the Supplier shall follow the most stringent requirement between the two programs. When a specific form is noted in this manual, Suppliers may utilize that form or an equivalent approved Supplier form where applicable. See Section 7, Contractor Safety Management, for additional support.

Safety Shared Services shall:

- Advise Senior Management on the establishment of H&S objectives and performance measurements in the form of leading and lagging indicators
- Assist Senior Management in measuring H&S performance through score-carding and auditing
- Serve as a resource for Management, Supervisor/People Leaders and Workers to effectively address H&S issues and concerns
- Advise Management and monitor applicable H&S regulations and laws to ensure Company compliance

1.1.4. Health and Safety Program Requirements

1.1.4.1. Management Program Oversight

The Safety Program Management team will:

- Complete and submit Health and Safety Monthly status reports
- Complete and submit quarterly status report to the Accountable Officer
- Complete an annual program self-assessment
- Conduct an annual staffing assessment

A program audit will be completed every three years to ensure continued compliance with the *Canadian Energy Regulator Onshore Pipeline Regulations*

1.1.4.2. Hazard Identification, Risk Assessment and Control

- The GTM Safety Manual is aligned to GTM IMS Hazard Identification and Inventory Process and GTM IMS Risk Management Process, which have been developed under the premise that hazard assessments are conducted at the regional level, and there is an established hazard inventory maintained by the Process Safety and Operational Risk Management Department.
- Hazard control activities include engineering, administrative procedures (including Occupational Hygiene monitoring activities), and the provision of personal protective equipment. These controls work in unison with the other elements of the H&S processes to eliminate and/or control safety hazards.
- The company has a process for identifying and analyzing all hazards and potential hazards that might affect the Safety Management Program. (OPR 6.5(1)(c), COHSR 19.1, 19.3, 19.4)
- The company has an inventory of the identified hazards and potential hazards. (OPR 6.5(1)(d))
- The company has a process for evaluating and managing the risks associated with the identified hazards. (OPR 6.5(1)(e), CSA Z662:19 3.1.2(f)(i), COHSR 19.4)

- The company has identified factors which may contribute to workplace violence and has assessed the potential for workplace violence. (*COHSR 20.4, 20.5*)

1.1.4.3. Health and Safety Procedures

- H&S Procedures are documents developed to provide employee direction and control over the different work activities.
- The Safety Shared Services team will review all procedures within this Manual annually.
- The completion of the annual reviews shall be documented in H&S Manual Review Memo.

1.1.4.4. Procedures and Engineering Standards

- The Company operations Procedures and engineering standards have been developed over time utilizing industry best practices, internal experiences, regulatory requirements, and positive input from the field.
- These standards set expectations and guides during facility operations and engineering design efforts.
- Where there are any discrepancies between the requirements of an approved Procedure and this Manual, the higher standard will prevail subject to a review of an approved GTM HS Manual Deviation Request Form to the H&S Manual or to a supporting Procedure.

1.1.4.5. Emergency Management

- GTM IMS Emergency Management Program provides the overall response, control, and recovery for emergencies that occur at the operating facilities.
- The facility emergency response plans include evacuation routes, muster points, notification instructions, and training requirements for individual sites.

1.1.4.6. Event Reporting, Analysis and Learning

- An effective safety management system requires that all events be reported, so that controls can be put in place to prevent the event from occurring again
- The event analysis process provides trending information that is used to prioritize resources and communicate Company performance metrics.

1.1.4.7. Contractor Safety Management

- Contractor Safety Management follows the five stages of the scope of work lifecycle as outlined in the GTM IMS Contractor Management Process.
- Supplier safety performance starts with the Supplier selection and approval procedure. Once a Supplier is approved and has been selected to be included in the ISN database, they may provide services to the Enbridge.

1.1.4.8. Inspections

- H&S inspections cover all areas of Enbridge’s physical facilities and equipment.
- H&S and facility Personnel both perform inspections formally and informally on a planned schedule or routinely during the workday. Various forms are used to formally document some of the required inspections.

1.1.4.9. Competency Assurance and Health and Safety Training

- H&S training needs analysis is used to identify occupational health and safety training programs that will be implemented to prevent injuries and illness
- Identification of Contractors qualifications (Covered Tasks), competencies and safety training requirements in accordance with the GTM IMS Contractor Management Process.
- Occupational Health and Safety (OHS) training is provided to develop skills, improve knowledge and Worker ability to prevent injury and illness.
- Competency assurance is using a variety of means to ensure Workers have the necessary qualifications, training, and experience to safely perform their work assignments. The health and safety training group will collaborate with the technical training group (TTG) and align their H&S Training and Competency requirements with the GTM IMS Capability Management Element, GTM IMS Competency Assurance Process and GTM IMS Training Process where applicable to Health and Safety Training.

1.1.4.10. Safety Meetings

- Departmental safety meetings are scheduled periodically.
- There is a wide range of flexibility in the scheduling of the safety meetings to meet the needs of the various work teams.
- Minutes are recorded at all the meetings and safety issues and/or action items are recorded, tracked, and responded to accordingly.

1.1.4.11. Audits and Assessments

- As per GTM IMS Audits, Assessments, and Inspections Process, audits and/or assessments are conducted to determine the effectiveness of the H&S Program and to check compliance with regulatory requirements and Company policies and procedures.
- Assessments are performed by the S&R Department on a planned schedule. Internally developed checklists are used to formally document the assessments.
- H&S Management Program Audits are performed on a formally planned schedule.

1.1.4.12. Program Review Cycle

- As per GTM IMS Assurance Element, this Manual document is controlled and is periodically reviewed to ensure it remains up to date with business and legal requirements – at a minimum, the Program document is reviewed every 24 months. The review process follows the requirements as described in the GTM IMS Assurance Element.

- At least every three years, the Safety Management Program undergoes a comprehensive review (Refer to Section 11 – Health and Safety Assurance, *Canadian Energy Regulator Onshore Pipeline Regulations Section 53/55 Internal Audit*).

1.1.5. Documentation

- GTM Safety Program Mapping Document
- GTM IMS Purpose, Structure and Scope Process
- GTM IMS Governance Process
- GTM IMS Roles, Accountabilities & Authorities Process
- GTM IMS Risk Management Element
- GTM IMS Hazard Identification and Inventory Process
- GTM IMS Risk Management Process
- GTM IMS Goals, Objectives and Targets Process
- GTM IMS Normal and Abnormal Operational Controls Process
- GTM IMS Contractor Management Process
- GTM IMS Competency Assurance Process
- GTM IMS Training Process
- GTM IMS Document Management Process
- GTM IMS Records Management Process
- GTM IMS Audits, Assessments and Inspections Process
- GTM IMS Corrective and Preventive Action Management Process
- GTM IMS Internal Communications Process
- GTM IMS Management Review Process



1.1.6. References

N/A

Hazard and Risk Management

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2. Hazard and Risk Management

Hazard and Risk Management supports Hazard Assessment and Control Process and GTM IMS Operational Risk Management Process. These Processes specify that Hazard Assessments are conducted at the regional level, and there is an established GTM Hazard Identification and Inventory document maintained by the Process Safety and Operational Risk Management Department.

The inventory maintains a historical record of identified known and potential hazards. The inventory includes hazards from the following information sources:

- Any hazardous occurrence investigation report (HOIR)
- Any first aid or minor injury report
- The Occupational Hygiene assessment reports
- Worksite Inspection Reports
- Hazards reported by Employees
- Any government or employer reports, studies and tests concerning the health and safety of any employee
- Any reports made under the Workplace Committees
- A record of hazardous substances or safety data sheets
- Ergonomic Assessments

2.1. Hazard Identification, Assessment and Control

2.1.1. Purpose

The following sections describe the hazard identification activities used by all Workers to systematically identify, control, or eliminate hazards, potential or imminent hazards. People Leaders and Workers can prevent hazards from causing harm when they:

- Eliminate the hazard
- Reduce the hazard, including substitution or isolation
- Engineer solutions to mitigate the hazard
- Use administrative controls such as procedures or applying training, or
- Wear personal protective equipment

2.1.2. Scope

There are many processes used in GTM to conduct hazard identification, assessment, and control activities. At the worksite, the best-known processes for hazard identification, assessment and control are:

- Job Hazard Analysis (JHA)
- Safe Work Permitting
- Precursor Analysis (Enbridge Enterprise)
- Field Level Hazard Assessments (FLHA)

- Safety Submissions - Hazard Identification / Safety Observation (No mandatory documented reporting required).

These processes and tools are used in the identification, and control of hazard associated with the work being performed. The Hazard Assessment and Control Process outlines further information and how to use the appropriate Hazard Control Process and/or supporting hazard control tools.

This section applies to Enbridge Employees, Contingent Workers and Contractors involved construction, operations, maintenance, abandonment, or emergency situations or providing oversight or work management functions to Contractors.

2.1.3. Responsibilities

People Leaders shall:

- Ensure that Workers are trained:
 - To identify, assess and control known, foreseeable, potential, or imminent hazards
 - To document the hazards and describe the controls used to prevent the hazard from causing harm
- Ensure Hazard assessments of work activities and worksites are completed as required
- Ensure that everyone involved in a work activity participates at some stage in the hazard assessment for that work
- Ensure that information silos do not develop by ensuring the results of hazard assessment activities are communicated effectively to the Workers conducting the work and/or implementing required controls
- Ensure that the training provided on hazard assessment is effective and sufficient
- Make suggestions for improvement to the hazard assessment and control process and ensure they are identified and implemented as part of continual improvement
- Ensure that documented hazard assessments are retained
- Ensure, through periodic review, that all Workers are adequately trained in the hazard assessment and control processes
- Ensure that FLHAs, JHAs and Safe Work Permits are accurately identifying known and potential hazards
- Assess work-in-progress to ensure that the processes are adequate to assess the hazards, and the controls implemented have reduced the risk associated with the work to As Low As Reasonably Achievable (ALARA) levels

Workers shall:

- Understand Hazard Assessment and Control Process and specific responsibilities as they apply to each Worker.
- Actively participate in Hazard Assessment and Control Process and ensure that an appropriate level of assessment is completed before the start of all work.
- Ensure that all Workers involved in the work participate in the hazard assessment process.
- Communicate the results to all Workers in the area who are affected by the work.

2.1.4. Requirements

- Operations and Management/Protection program representatives shall be made aware of all hazards, controls, and event trends in their area of accountability.
- In addition, those key stakeholders should provide feedback on additional hazards noted in the field that are not captured within the GTM Hazard Identification and Inventory.
- Hazard assessments shall be communicated to all Workers who may be affected by the work.
- Refer to the GTM Hazard Identification and Inventory when creating, reviewing, and approving Job Hazard Analysis (JHAs) to ensure all potential and actual hazards pertaining to the task have been addressed:
 - Assess the hazards with associated area assets and tasks, the identified controls, and determine adequacy and/or the best level of preventative measures required.
 - Operations and Management/Protection program representatives shall be made aware of all hazards, controls, and event trends in their area of accountability.
 - Ensure review of the hazard inventory is captured in policy committee and workplace committee meeting minutes.
- On an annual basis, a risk specialist from process safety and operational risk management department shall facilitate the hazard identification review meetings:
 - The risk specialist shall facilitate two hazard identification sessions.
 - All hazards shall be communicated to all applicable personnel as per the GTM IMS Stakeholder Engagement Element and GTM IMS Internal Communications Process.
- Projects shall obtain applicable JHA records from the GTM Hazard Identification and Inventory during project initiation and planning.
 - This will include information on the hazard controls and control owners for each hazard.
 - Where specific hazards are managed by a GTM IMS protection program, the project team shall contact appropriate Protection Programs to verify if any hazards are confirmed to be present at the specific jobsite and/or facility.
 - Project hazard identification and control requirements and associated responsibilities are identified in the Project Hazard Assessment and Control Process (see PGDL).
- Hazard assessments shall be documented for all work activities other than the below exceptions:
 - Office related work (e.g., computer use, training, meetings)
 - Travel between work locations
 - Housekeeping duties

These exceptions do not take away a worker's responsibility to assess the hazards in their work environment. Workers shall continue to practice cognitive hazard assessment techniques (e.g., stop, look, assess, and manage):

- The appropriate Director and/or Vice President shall approve any exemptions or deviations.
- The main hazard recognition methodology used is the energy based hazed wheel:
 - This wheel is representative of the various forms of energy that pose potential to cause harm to people, property, or assets.

- The energy wheel is used as a hazard recognition aid when conducting hazard assessments.
- The hazard recognition methodology has identified ten energy sources.

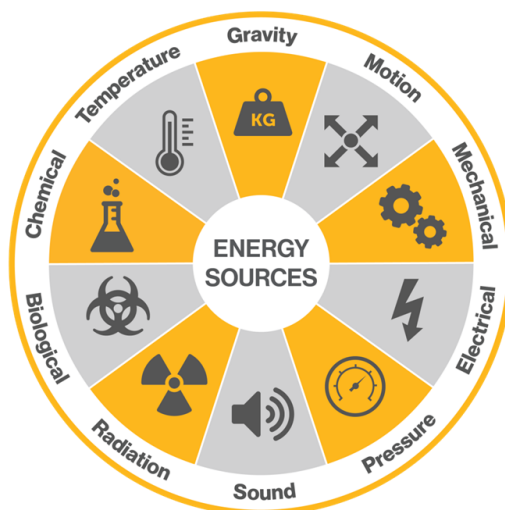


Figure 1: Energy Based Hazard Recognition Graphic

Energy based hazard identification tools are incorporated into the following documents:

- Field Level Hazard Assessment Form
- Job Hazard Analysis Form
- Precursor Analysis Forms (Enbridge Enterprise)

2.1.5. Documentation

- Hazard Assessment and Control Process
- Contingency Plan Development Process
- Project Hazard Assessment and Control Process (see PGDL)

2.1.6. References

- Contingency Plan Development Process
- Field Level Hazard Assessment Guide
- Job Hazard Analysis Guide
- Job Hazard Analysis Form
- Field Level Hazard Assessment Form
- Hazard Assessment and Control Process
- Attendance Record Form
- Canadian Energy Regulator Onshore Pipeline Regulations, *Section 6.5 (1) (c), (d), (e), (f)*

2.2. Job Hazard Analysis

2.2.1. Purpose

The purpose of a Job Hazard Analysis (JHA) is to systematically identify, control, or eliminate hazards, potential or imminent hazards associated with a job task, as part of the larger hazard identification, assessment, and control requirements.

2.2.2. Scope

This section applies to Enbridge Employees, Contingent Workers and Contractors involved construction, operations, maintenance, abandonment, or emergency situations or providing oversight or work management functions to Contractors.

The JHA process may be used at any time to assess the hazards of any job. The jobs which benefit most from this systematic hazard identification and control process include:

- Jobs where an event, hazardous condition, or exposure to harmful substances could cause serious injury, environmental and/or property damage.
- Jobs where the potential exists for severe injuries or illnesses (consequences of an accident, hazardous condition, or exposure to harmful substances are potentially severe).

The JHA process is mandatory prior to certain types of work and should be considered when planning work. Hazard Assessment and Control Process provides more information on the development, review, and steps for completing and storing JHAs within the GTM JHA Library.

2.2.3. Responsibilities

People Leaders or Person in Charge (PIC) shall:

- Ensure the JHA process is followed by monitoring the following:
 - Confirming Workers training and competency on the JHA Process
 - Identifying when projects or a given piece of work will require a JHA as part of work planning or work permitting processes
 - Confirming the JHA process is completed when mandatory
 - Review the quality of completed JHAs as required
 - Correct filing of JHAs following completion of work
 - Review and sign off on completed JHAs to ensure forms are complete
 - Review ongoing projects / jobs to identify and communicate jobs where JHAs will be required

Employees shall:

- Complete training and understand their roles and responsibilities regarding the JHA process
- Follow the JHA process as per the requirements below and as further outlined in asset area JHA requirements
- Actively engage in the JHA process to maximize the overall effectiveness of identifying related hazards and controls for the identified hazards
- Adjust active JHAs when warranted
- Upon completion of the job, return JHAs to appropriate Person in Charge (PIC)/Enbridge Authorized Representative or Designate or administrator for filing

Contractors shall:

- Create, review, or revise a JHA for the work being performed
- Have JHAs authorized by the Safe Work Permit Issuer and/or Person in Charge (PIC) / Enbridge Authorized Representative or Designate
- The JHA document utilized by Contractors can be either an Enbridge document or an equivalent approved Supplier form
- Upon completion of the job, return JHAs to appropriate Person in Charge (PIC)/Enbridge Authorized Representative or Designate or administrator for filing

HS Support shall:

- Proactively assist with developing JHA competencies
- Serve as a resource to answer questions related to the JHA process by area leadership and/or the Person in Charge (PIC)/Enbridge Authorized Representative or Designate
- Periodically validate the overall JHA process effectiveness via assessment or inspection processes

2.2.4. Requirements

2.2.4.1. When to Complete a Job Hazard Analysis

The creation and/or review of a JHA is required for all work with the exception of:

- General Light Housekeeping
- Building and Lawn Maintenance
- Fleet Vehicle Care and Maintenance
- General Tool Repairs and Maintenance
- Facility Inspections and Monitoring
- Line Locating Activities
- Any Low-Risk Activities Determined at the People Leader's Discretion

A JHA is not required if contractor work is a delivery or service (equipment service personnel, telephone, computer, etc.).

Project Work

If the work activity is being conducted by Projects or Non-Operations Division (e.g., Environment, ER, PI) on an Operations Asset or Facility, a JHA is required and is managed through the Projects or a Division of Projects.

- The Contractor completes a Job Hazard Analysis Form; Operations Provides a JHA or the Field Level Hazard Assessment Form may be utilized in lieu of the JHA for low-risk work activities at the discretion of Operations
- If Operations is providing the work oversight the Contractor completes a Job Hazard Analysis Form.
 - If the contractor does not have a JHA, Operations can provide a JHA or the Field Level Hazard Assessment Form may be utilized in lieu of the JHA for low-risk work activities at the discretion of Operations

- A JHA must identify any imminent hazards or elevated risk exposures (including those that exist even after the application of mitigative controls). This requirement applies to construction, operations, maintenance, abandonment, and emergency situations conducting the following types of work:
 - Any non-routine jobs that pose elevated hazards or risk of injury such as, but not limited to, changing out mole sieve, changing out large equipment, hot work in a hazardous area, etc.
 - Large jobs that involve multi-work teams and/or multi-suppliers such as, but not limited to, turnarounds, shutdowns and construction in an operating facility.
 - Routine, non-routine jobs, and abnormal operating conditions that pose elevated hazards or risk of:
 - Fire due to the opening of equipment or release of gas or vapor into the immediate work area.
 - Electric shock or arc flash due to the opening of energized electrical equipment.
- High risk work may require additional levels of approval before proceeding.
 - This determinization may be captured in the scope of work, the JHA or by the Enbridge PIC
- Where it is determined that despite the hazard and risk mitigation strategies captured on the JHA and any other work instructions, an unacceptable residual risk of an Abnormal Event remains, a documented Contingency Plan must be created and approved as per the Contingency Plan Development Process.

2.2.4.2. Hazard Assessment and Control Process

This Process outlines roles, responsibilities, and steps when creating, reviewing, and approving JHAs for specific assets within the JHA library.

Job Hazard Analysis Process

JHAs are created and/or reviewed when planning work, by breaking job down into smaller tasks/steps, with associated hazards and controls. A JHA library stores JHAs for specific jobs, assets, and location. workplace committees must review and approve all JHAs within their asset area annually and prior to any new or updated JHA(s) are added to the JHA library.

Job Hazard Analysis Library

The Job Hazard Analysis Library houses JHAs that are categorized by area, equipment, operation, job, and risk. All JHAs must be approved by the JHA quality control team and workplace committee for the respective area of operation.

2.2.5. Documentation

- Contingency Plan Development Process
- Job Hazard Analysis Form
- Job Hazard Analysis Guide
- Field Level Hazard Assessment Form
- Field Level Hazard Assessment Guide
- Hazard Assessment and Control Process

- Attendance Record Form

2.2.6. References

- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1)(f)
- Job Hazard Analysis, OSHA 3071 (2002 Revised)

2.3. Safe Work Permitting

2.3.1. Purpose

The purpose of the Safe Work Permitting section is to ensure that Enbridge workforce and Suppliers use a consistent approach for providing oversight and authorizing work using the Safe Work Permit and/or Work Authorization Process. The Safe Work Permit ensures there is a conversation between the PIC/Authorized Enbridge Representative providing oversight for the Enbridge work area and any worker(s) performing work in the area so that:

- The Hazards presented by the operation do not harm the worker(s)
- The work performed by the worker(s) does not harm the operation; and
- Both the SWP/Person in Charge of the operational area and the workers are clear about:
 - What work is authorized.
 - When work is authorized to begin and when it must end.
 - Where (and on what equipment) the work is to be conducted
 - Any conditions and restrictions under which the work must be conducted

2.3.2. Scope

This section applies to GTM Operations and Projects being completed for GTM.

Safe Work Permits (SWP) should not be regarded as a statement that all hazards and risks have been eliminated from the work area. The issuing of such a document does not, by itself, make a job safe. That can be achieved only by those preparing for the work and those carrying it out.

The Hazard Assessment and Control Process provides process steps for completing a SWP and the How to Complete a Safe Work Permit Guide provides guidance on how to complete each section on the Safe Work Permit Form.

2.3.3. Responsibilities

People Leader shall:

- Ensure Permit Issuers are competent in issuing permits
- Ensure clarity on who is authorized to issue Safe Work Permits, and what type of work they may issue permits for
- Verify the Safe Work Permit process is being conducted in compliance with the Safe Work Permit procedures for their asset area
- Ensure retention of Safe Work Permit related documents as per the asset area procedure
- Identify opportunities for process improvements and communicates ideas to Management

Permit Issuer shall:

- Understands the hazards associated with the area or facility in which work is to take place

- Verify required Contractor safety training and certifications
- Review of SOW, Hazards & Risks, and associated hazard control documentation (JHA, Procedures, etc.). Controls must be agreed to by both Contractor and Safe Work Permit Issuer.
- Issue Safe Work Permits
- May be designated as Person in Charge
 - This authority may be delegated to a competent designate (e.g., another Enbridge Authorized Representative/Inspector) under certain circumstances.
- Stop work in the event unsafe work conditions, work not being conducted in compliance with the SWP or this Manual, or imminent hazards arising in the course of work is reported to them
- Only restart work after a stop work event once they are satisfied that the unsafe work, noncompliance, or imminent hazard has been sufficiently addressed
- Carry sufficient responsibility for the work location/operational area where the work being permitted will be conducted to serve as Permit Issuer
- The issuer shall be trained and competent in the issuance of Safe Work Permits
- Confirm with the Permit Receiver any deviations on required mitigations and confirm with the Permit Receiver whether or not that deviation needs to be reported to a regulator prior to starting work (example: Lockout Tag out deviations must be reported by the Contractor to WorkSafe BC prior to entering a Confined Space)
- Be familiar with the work location and any operational or other site-specific hazards that may impact the Permit Receiver and communicates these with the Receiver
- Engage in a discussion with the Permit Receiver to determine what hazards may arise from the work that would impact the work location or ongoing operations
- Document any specialized instructions on hazard controls, scope of work, change of conditions that require follow up with the Permit Issuer, or other stipulations on the Safe Work Permit
- As required, engage in a walk down or inspection of the work location with the Permit Receiver to discuss scope and hazards
- Conduct initial atmosphere testing and documents results if applicable. Subsequent monitoring may be delegated
- Complete and sign the Safe Work Permit Form prior to any work beginning
- May inspect ongoing work at any point to determine permit conditions are being followed
- Inform the Permit Receiver of any changes of conditions or worksite issues that may arise during permitted work that may impact the permitted Workers and their tasks
 - The Permit Issuer may need to update or reissue the Safe Work Permit when new developments arise
- Ensure the permit close-out process is complete

Permit Receiver (Employee or Contractor) shall:

- Provide the Permit Issuer with the information they require related to scope of work, the nature of the work and any potential hazards introduced to the work location by the work itself
 - In certain cases, the Permit Receiver may be required to provide work planning for hazard assessment documents, like a JHA as a precondition to permitting.

- Review and agree to the conditions of the Safe Work Permit (as indicated by a signature on the permit)
- Communicate the requirements of the permit to all Workers involved in the work
- Conduct any type of hazard assessment exercise stipulated by the Permit Issuer
 - In certain cases, this may involve some form of JHA and/or FLHA
- Ensure the permit requirements are fulfilled
- Confirm understanding of deviations on mitigations and whether or not this requires reporting to a regulator prior to starting work (example: Lockout Tag out deviations must be reported by the Contractor to WorkSafe BC prior to entering a Confined Space)
- Keep a copy of the permit available at the work location
- Stop or suspends work and communicates immediately with the Permit Issuer and/or the PIC if the scope of work or conditions change, or any other stipulation set out by the Permit Issuer for suspending work
- Leave the work location in a safe condition prior to closing the Permit
- Close out the permit with the Permit Issuer.

If during verification activities an isolation point has been incorrectly identified physically tagged or labeled, any work taking place shall be temporarily stopped until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation and HS Manual Section 8 Management of Change.

2.3.4. Requirements

A Safe Work Permit is required for all work where a PIC/ Enbridge Authorized Representative is providing oversight of Contractor work. The Safe Work Permit does not apply to Contractors that are assisting in a task conducted by an Enbridge employee.

- Refer to other sections of this manual for specific permitting requirements:
- Confined Space Entry US – Section 4.9
- Confined Space Entry CAN – Section 4.10
- Critical and Serious Lifts – Section 4.12
- Excavation & Trenching – Section 4.14
- Hot Work – Section 4.22
- Electrical Safety Standard

Note: *If during verification activities an isolation point has been incorrectly identified physically (tagged or labeled), any work taking place shall be temporarily stopped until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation and HS Manual Section 8.0 Management of Change.*

- Suppliers and their subcontractors shall comply with Enbridge health and safety requirements set out in this Manual, as articulated within applicable Construction Safety Manual or Contractor Specifications.

If a Supplier or their subcontractor has a health and safety requirement or policy materially different from Enbridge's, the Supplier/subcontractor shall follow the most stringent requirement. Supplier and subcontractors are still obligated to meet the requirements of all applicable laws related to the Safe Work Permitting section of the H&S Manual.

In the event a Suppliers or subcontractor's requirements exceed the requirements of this H&S Manual, Enbridge may, in its sole discretion, choose to adopt the Suppliers or subcontractor's requirements for any given contract or work order.

All personnel issuing Safe Work Permits, and/or assume the role of the Person in Charge (PIC) / Enbridge Authorized Representative or Designate must complete the Safe Work Permit/Work Authorization training. Additional training may be required based on the scope of work, location, and associated hazards.

 UST and US Projects and Eastern Canada issue the following permit types:

- Asbestos Work Permit
- Permit Required Confined Space Entry
- Energized Electrical Work Permit
- Hot Work Permit

Westcoast:

- SWP required work:
 - Asbestos Work
 - Permit Required Confined Space
 - Energized Electrical Work
 - Hot Work

Employees or Contractors working in administrative areas or areas designated as non-operational areas by area management are not subject to the Safe Work Permit process.

Permits are not required for light housekeeping unless additional hazards are present that would normally require permitting.


Worker(s) (Employee or Contractor) shall follow the requirements identified on the appropriate Safe Work Permit.


A Safe Work Permit is only valid for the time stated on the permit.

Mobile crews are contractor crews that are required to perform a specific job function over a specified span of ROW or at multiple facilities without direct oversight by an Enbridge representative (e.g. pig trackers, cathodic protection, surveyors, vegetation control), Mobile crews may be issued a SWP at the originating location of the work for the duration of the job provided that:

A frequency of contact is established and implemented (this frequency of contact is the minimum requirement of how often the SWP Receiver shall contact the SWP Issuer. The SWP Receiver documents this communication under the "Frequency of Contact with Issuer or Designate" section on the SWP; additional documentation may be attached to the SWP should space not be available); and

A new FLHA is completed at the beginning of each day or shift and updated as required.

 For Offshore operations, the arrival of a second Worker onsite to conduct work is considered a change of scope and the Safe Work Permit process must be implemented.

 For Offshore operations, crews such as these may be issued with a Safe Work Permit at the originating location of the work for a maximum of five days provided that:

- A frequency of contact is established, implemented and documented on the permit.

- A JHA is completed at the beginning of each day or shift and updated as required.

Additional requirements for the Safe Work Permitting process for each Asset Area are set out in the asset area Procedures or Forms listed under “Documentation.”

2.3.5. Documentation

- Hazard Assessment and Control Process
- Safe Work Permit Form
- How to Complete a Safe Work Permit Guide
- Safe Work Permit Guide
- Electrical Safety Standard

 For UST operations, US Projects and  Eastern Canada, the following Procedures and Forms shall be followed:

- Hot Work Permits Procedure
- Hot Work Permit Form
- HSF-031 Asbestos Work Permit Form
- Confined Space Entry Permit

References:

- Canadian Energy Regulator Onshore Pipeline Regulations, *Section 6.5 (1) (q)*
- *NFPA 70E, Electrical Safety Requirements for Employee Workplaces*
- *29 CFR 1910.146 Confined Space Entry*
- *29 CFR 1910. 256 Welding*
- *29 CFR 1910.1001 Asbestos*

2.4. Field Level Hazard Assessment

2.4.1. Purpose

A Field Level Hazard Assessment (FLHA) is a documented hazard assessment exercise that assists Workers in identifying and controlling worksite hazards immediately prior to starting work, hazards not anticipated by the JHA or Safe Work Permit and controls for those hazards. This section supports GTM IMS Hazard Identification and Inventory Process.

If the work does not involve completing a Job Hazard Analysis Form or Safe Work Permit Form, the FLHA provides an opportunity for a pre-job hazard assessment and control exercise.

2.4.2. Scope

The Field Level Hazard Assessment Form (FLHA) must be completed by all workers at the field level as a hazard management tool and can be included in tailgate meetings. The Hazard Assessment and Control Process provides process steps for completing FLHAs.

2.4.3. Responsibilities

People Leader shall:

- Ensure the applicable FLHA process is used within their respective areas of responsibility

- Ensure applicable training is completed for Workers conducting the FLHA
- Communicate the requirement for an FLHA process as part of pre-job planning or safe work permitting requirements. Particularly, the People Leader should reinforce:
 - The requirement to physically walk down or be at the worksite for the FLHA
 - The need for all Workers involved in the job to participate in the FLHA
- Verify, as applicable and when possible, during work-in-progress, that FLHA requirements have been met and controls documented on the FLHA are appropriate and implemented.

Worker(s), Employee or Contractor shall:

- Actively participate in the FLHA process
- Complete all sections on the FLHA
- Ensure the Person in Charge (PIC) has been identified on the FLHA
- Ask questions about any concerns related to the work or hazards as part of the FLHA process
- Not begin work or stop work if:
 - A hazard or imminent hazard is identified, or a condition arises that requires further input from the Person in Charge (PIC) / Enbridge Authorized Representative or Designator to assess and/or remedy.
 - Controls identified in the pre-job planning documents, safe work permit or FLHA are not implemented.
- Follow any requirements documented on the FLHA

2.4.4. Requirements

There are several forms that may be used to complete the FLHA process including:

- FLHA forms or cards provided by Enbridge, or
- A Supplier form, if:
 - It provides a pre-job “stop and think” and triggers situation awareness prior to work beginning
 - There is a means of documenting that all Workers involved have participated in the FLHA prior to engaging in the work or
 - It is completed at the worksite itself where potential hazards can be visually spotted
 - Identifies the name and contact information of the PIC for the job
 - Identifies the SWP and/or WA number if applicable

All Workers involved in the hands-on work or may be affected by the work for a given job must complete and/or review FLHAs for a given job, and acknowledge they understand the hazards and controls.

Ensure all applicable sections have been adequately completed (i.e., muster point, person-in-charge).

2.4.5. Documentation

- Hazard Assessment and Control Process
- Field Level Hazard Assessment Form
- Safe Work Permit Form

- Job Hazard Analysis Form
- Field Level Hazard Assessment Guide

2.4.6. References

- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (c)

2.5. Work Authorization

2.5.1. Purpose

The Work Authorization is designed to streamline management oversight while ensuring hazard communication by operations when Contractors are involved in extended work.

2.5.2. Scope

This section applies to GTM Operations and Projects being completed for GTM.

The Work Authorization provides a formal way to acknowledge an extended work plan for Contractors on an Enbridge site and documents who (and how) Safe Work Permitting and/or JHA tasks will be managed during that work. In practice, it is primarily used for project work conducted by a Contractor who will:

- Take an extended period (weeks or months vs days) to complete work
- Benefit from the services of an Authorized Enbridge Representative that will issue daily Safe Work Permits (rather than a People Leader within the local operations)

2.5.3. Responsibilities

Operations People Leaders shall:

- Determine in advance of projects conducted by Contractors within or adjacent to active Enbridge facilities or ROWs that the Work Authorization process will be used
 - This should be part of a larger planning process applied to projects that will be completed by Contractors in an operating facility or ROWs.

Operations People Leader (Work Authorization Issuer) shall:

- Be knowledgeable of their responsibilities under the Work Authorization process
- Be knowledgeable of the area or facility hazards within their local operation
- As part of completing the Work Authorization Form, clearly communicate and document these hazards and any terms and conditions to the Enbridge Inspectors who will be issuing the Safe Work Permits to the named Contractors
- Ensure all Enbridge Inspectors that will issue Safe Work Permits under the Work Authorization process are named on the form

Permit Issuer / Authorized Enbridge Representative (Work Authorization Receiver) shall:

- Participate in the Work Authorization process with the People Leader
- Ensure they are named on the Work Authorization form prior to issuing Safe Work Permits
- Only issue Safe Work Permits as per the requirements set out in the Work Authorization Form
- Ensure they communicate applicable area hazards set out in the Work Authorization form to Contractor Workers as part of the permitting process

2.5.4. Requirements

All personnel issuing Work Authorizations, or receiving Work Authorizations, and/or assume the role of the Person in Charge (PIC) / Enbridge Authorized Representative or Designate must complete the Safe Work Permit/Work Authorization Training. Additional training may be required based on the scope of work, location, and associated hazards.

- Use the Work Authorization Form in any scenario where an Authorized Enbridge Representative will issue Safe Work Permits to Contractors working within Enbridge facilities or ROWs (i.e., Brownfield areas).
- The local Operations People Leader and assigned PIC/Authorized Enbridge Representative or project inspector must jointly complete the Work Authorization form. This ensures:
 - Clear communication of the area or facility hazards from local operations to the Enbridge Inspector and the Contractor prior to work beginning
 - Ongoing communication of hazards or issues as the PIC/Enbridge Representative and Work Authorization issuer must determine how frequently they will contact each other
 - Documentation of the terms and conditions for the work being conducted (e.g., restrictions or required hazard controls placed on the Contractor)
 - Start and end dates for the Work Authorization
 - Clarity on who will be authorized to issue Safe Work Permits to the named Contractor as all Enbridge Representatives with authorization must be named on the form
- The PIC/Authorized Enbridge Representative must issue Safe Work Permits and approve JHAs for the Contractor as per the requirements set out in the Work Authorization.
- The PIC/Authorized Enbridge Representative and Work Authorization issuer must hold contact meetings as documented on the Work Authorization form.
- The Work Authorization is not valid past its expiry date and the PIC/Authorized Enbridge Representative must not issue Safe Work Permits and/or JHAs beyond that date without an extension or new Work Authorization.
- The Work Authorization shall be suspended, and work stop under any of the following conditions:
 - Imminent Hazard or Abnormal Event
 - Site emergencies
 - Significant Scope of Work changes
 - Request to Stop Work
 - Activities not being conducted in accordance with this manual and/or the GTM Construction Safety Manual
- The time of suspension shall be documented on the Work Authorization by the receiver.
- Suspended safe work permits shall be revalidated, at a minimum, verbally by the SWP Issuer and the end of suspended work documented on the Work Authorization before work can resume.
- Suspensions due to significant scope of work changes cannot be revalidated, a new Work Authorization is required.

2.5.4.1. Documentation Requirements

Documentation requirements for Work Authorization Forms are as follows:

- White/top copy: Enbridge Inspector keeps or posts this copy at the work location while the work authorization is valid. Inspector returns this copy to the issuer when the Work Authorization is no longer valid.
 - If an event occurs during work, the white copy of the Work Authorization along with all other pertinent documentation shall be forwarded to the person responsible for the analysis and will be retained as identified in the requirements for Event analysis documentation.
- Yellow copy: Work Authorization issuer posts this copy at the worksite or similar site locality to identify work activities occurring at the site. Discard after the white copy is returned or give it to the Inspector if requested.

2.5.5. Documentation

- Hazard Assessment and Control Process
- Work Authorization Form
- Work Authorization Guide

2.5.6. References

- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (q)

2.6. Hazard Communication Program (HazCom)

2.6.1. Purpose

This section is designed to establish requirements and procedures necessary to communicate hazards by providing information concerning the chemical and physical hazards associated with chemical products in the workplace, and to protect Employees and Contractors against exposure to chemical and physical hazards. The HazCom Program is in alignment with GTM IMS Hazard Identification and Inventory Process and GTM IMS Internal Communications Process.

2.6.2. Scope

This section applies to all U.S. GTM and to all Employees who work with or around hazardous chemicals in performing operations and includes Contractors working on-site.

2.6.3. Responsibilities

People Leader shall:

- Maintain facility hazardous chemical inventory in a location readily accessible to all Employees and or visitors
- Provide Employees access to the Safety Data Sheet (SDS) database
- Ensure that Employees have been provided with hazard communication training
- Review Contractor work to determine what hazardous chemicals may be encountered by either the Contractor or Company Employees
- Ensure that PPE is provided as necessary to Employees working with hazardous chemicals
- Ensure that chemical containers on Company property are properly labeled

- Assess the method of control to ensure that OSHA PELs are not exceeded. Obtain and maintain SDS for all the hazardous chemicals currently being used in their workplace.
- Ensure all hazardous chemicals used and stored in the workplace are properly labeled or marked
- Ensure that labels, markings, and other forms of warning are:
 - Legible
 - In English
 - Prominently displayed on the container

Workers shall:

- Attend hazard communication training
- Use appropriate PPE provided for working with hazardous chemicals
- Review SDSs for chemicals used in job tasks
- Wash exposed skin promptly to remove accidental splashes of hazardous material
- Review the SDS before using a chemical for the first time
- Discontinue activity after any unexpected encounter with hazardous chemicals and report the event

2.6.4. Requirements

OSHA requires that an employer develop and implement a written hazard communication program to describe how the company meets the OSHA requirements for employee training, chemical hazard determination, SDS availability, labeling, and chemical information updates.

2.6.4.1. Safety Data Sheet (SDS) Availability

- SDSs are required to be written in the standardized 16-section format, which includes the following sections:
 - Section 1. Identification
 - Section 2. Hazard(s) identification
 - Section 3. Composition/information on ingredients
 - Section 4. First-Aid measures
 - Section 5. Fire-fighting measures
 - Section 6. Accidental release measures
 - Section 7. Handling and storage
 - Section 8. Exposure controls/personal protection
 - Section 9. Physical and chemical properties
 - Section 10. Stability and reactivity
 - Section 11. Toxicological information
 - Section 12. Ecological information
 - Section 13. Disposal considerations

- Section 14. Transport information
- Section 15. Regulatory information
- Section 16. Other information, including date of preparation or last revision
- At each facility or location where Workers report for work assignments, access to SDSs for all hazardous chemicals used or stored there must be available for quick reference.
- All facilities storing hazardous chemicals must have a printed Hazardous Chemical Inventory List that is accurate and readily available for review. This Hazardous Chemical Inventory List will be called Facility Chemical Inventory. The Facility Chemical Inventory can be generated from the 3E Protect by following these steps:
 - Access ELink / Business Application / Launch 3E Protect SDS Database Application Safety Data Sheets (SDS) at Enbridge
 - Under the Report Center tab, select “Inventory Reports”
 - Select Location – navigate to the desired location
 - Select Report – select the desired report
 - Click “Run Report”
- Review and update the Facility Chemical Inventory annually by March 1 in conjunction with SARA Title III – Tier II work activities.
- All facilities storing hazardous chemicals are to update the 3E Protect with the SDSs for those chemicals to maintain specific hazard communication information for each facility.
- Individual SDSs may be printed from the 3E Protect. This will ensure employees have SDSs readily accessible.
- Provide access to or copies of SDSs for the hazardous chemicals transported in Company vehicles to remote or temporary worksites.
- If you encounter an error in the system, please contact the [Service Desk](#), phone ext. 7373 or 1-844-362-6948, or put in a [MyService](#) request.

2.6.4.2. Mobile Access to SDS

The following are the steps to follow to access SDS via a mobile device:

- Open mobile web browser and type: **3eonline.com**
- Click ‘Log In’ under 3E Protect SDS & Chemical Management Tool
- Enter Username: Enbridge
- Enter Password: SDS
- Access any SDS in the system using the “Inventory” tab
- Select a “Region” and then select a “Facility”
- Click on the “Show” button
- Locate the SDS you require
- If you encounter an error in the system, please contact the [Service Desk](#), phone ext. 7373 or 1-844-362-6948, or put in a [MyService](#) request

2.6.4.3. Hazard Communication Pictograms

- The Hazard Communication Standard (HCS) requires pictograms on labels to alert users of the chemical hazards to which they may be exposed.
- Each pictogram consists of a symbol on a white background framed within a red border and represents a distinct hazard(s). See [Figure 2](#).
- The pictogram on the label is determined by the chemical hazard classification.










Flame Over Circle  <ul style="list-style-type: none"> • Oxidizers 	Flame  <ul style="list-style-type: none"> • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides • Desensitized Explosives 	Exploding Bomb  <ul style="list-style-type: none"> • Explosives • Self-Reactives • Organic Peroxides
Skull and Crossbones  <ul style="list-style-type: none"> • Acute Toxicity (fatal or toxic) 	Corrosion  <ul style="list-style-type: none"> • Skin Corrosion/Burns • Eye Damage • Corrosive to Metals 	Gas Cylinder  <ul style="list-style-type: none"> • Gases under pressure
Health Hazard  <ul style="list-style-type: none"> • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Toxicity Organ • Aspiration Toxicity 	Environmental (Non-Mandatory)  <ul style="list-style-type: none"> • Aquatic Toxicity 	Exclamation Mark  <ul style="list-style-type: none"> • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory) • Hazard Not Otherwise Classified (Non-Mandatory)

Figure 2: GHS Pictograms

GHS Labeling

- All hazardous chemicals delivery to a facility from a manufacturer or distributor must be in its primary containers with proper labeling.
- Reject and return unlabeled or incompletely labeled chemicals to the shipper.
- Each label should include the following:
 - Product identifier
 - Signal word
 - Pictogram
 - Hazard statement(s)
 - Precautionary statement(s)
 - Name, address, and telephone number (of the chemical manufacturer, importer or other responsible party)

2.6.4.4. Supplemental information

Workplace Labeling System

- Create workplace labels that provide all the GHS required information that is on the label from the chemical manufacturer, or
- The product identifier and words, pictures, symbols, or a combination thereof, which in combination with other information immediately available, provide specific information regarding the hazards of the chemical, or
- Facilities may continue to use an existing labeling system in conjunction with other information immediately available providing the information on all the health and physical hazards of the hazardous chemical are available. This workplace labeling system may include:
 - Signs
 - Placards
 - Process sheets
 - Operating procedures, or
 - Other such written materials to identify the hazardous chemicals

2.6.4.5. Additional Instructional Pictograms

- OSHA will allow additional pictograms that are non-GHS to be included on the label and examples are listed below:
 - Environmental pictograms
 - PPE pictograms (e.g., goggles denoting that goggle must be worn while handling the given chemical)
- National Fire Protection Association (NFPA) 704 Diamond and American Coating Association (ACA) Hazardous Materials Identification System (HMIS) Rating System

- The use of these systems is not consistent with the Classification and Hazard Category systems of the Revised Hazard Communication Standard but can be included on the workplace labels if the difference is explained to Employees.
- NFPA 704 is a standard system developed by the U.S.-based National Fire Protection Association (NFPA) for indicating the health, flammability, reactivity, and special hazards for many hazardous chemicals using the NFPA 704 Diamond. The NFPA rating system is meant primarily for fire fighters and other emergency responders.
- The ACA HMIS was originally developed to help employers comply with OSHA's *Hazard Communication Standard*. The system utilizes colored bars, numbers, and symbols to convey the hazards of chemicals used in the workplace. (See [Table 1.](#))

Table 1: Differences Between HMIS and NFPA labels

VARIABLE	DESCRIPTION
Target Audience	<ul style="list-style-type: none"> • HMIS label is intended to be used by employers and Workers • NFPA label is intended to be used by emergency response Personnel
Label Shape	<ul style="list-style-type: none"> • HMIS uses bar shape • NFPA uses diamond shape
Health Hazard Communication	<ul style="list-style-type: none"> • HMIS covers both acute and chronic health hazards • NFPA only covers acute health hazards
White Section	<ul style="list-style-type: none"> • HMIS uses this section to show the recommended PPE • NFPA uses this section to display other special hazards

2.6.4.6. Create GHS Labels

- Access the GTM Health & Safety Management Program Esites and click on “Safety Data Sheets”, or access ELink / Business Application / Launch 3E Protect SDS Database Application Safety Data Sheets (SDS) at Enbridge On the “Inventory” tab select “Select Location” or just search for a product.
- On the “Inventory” tab select “Select Location” or just search for a “Product”.
- Once you have located the product in the list, open the drop down “Action”.
- Click “Labels” and select the appropriate option and then “Process Label”.
- The next screen will allow for additional information and notes to be added and provide printing information.
- Click “View Label” then print label as required.

2.6.4.7. Information Updates

- Update the 3E Protect Facility Chemical Inventory when new hazardous chemicals are introduced to the site.
- Maintain a temporary copy of SDSs for chemical products brought on site by Contractors for the duration of the service being provided or activities being performed.
- Update the 3E Protect Facility Chemical Inventory, when Contractors introduce new hazardous chemicals into the workplace that will remain on site after the Contractor’s services are completed.

2.6.4.8. Consumer Products

- OSHA does not require that SDSs be provided to purchasers of household consumer products when the products are used in the workplace in the same manner that a consumer would use them (i.e., where the duration and frequency of use, and therefore exposure, is not greater than the typical consumer would experience). Those products are exempt from inclusion on the hazardous chemical inventory list and the 3E Protect SDS Management System.
- The exemption in OSHA's regulation is based however, not upon the chemical manufacturer's intended use of the product, but upon how it is used in the workplace. Employees who are required to work with household consumer products in a manner that result in a duration and frequency of exposure greater than what a normal consumer would experience have a right to understand the properties of those household consumer products.
- The following two questions must be answered when reaching a final decision as to whether an SDS must be submitted for household consumer products:
 - Will the product be used in greater quantities or concentration than it would be at home (i.e., outside the scope of manufacturer's intended use for general consumer use?)
 - Will the chemical be used at a greater frequency or for longer durations that it would be at home?

NOTE: If the answer to either of the above questions is "yes" or "potentially yes", then the respective product must be submitted for approval in the 3E Protect for the facility that will use this chemical.

Assigned Roles in 3E Protect

- At Enbridge, 3E Protect is the database system that houses the chemical inventory for the facility and the SDSs. This database uses assigned roles for updating and approving new chemicals at each facility. These roles are:
- **Facility Manager (FM):** this role is for users who are responsible for managing chemical inventories for one or more facilities. This person will be able to add/remove SDSs from the assigned facilities. This role is assigned to an individual by the facility Ops Supervisor.
- **Chemical Approval Manager (CAM):** this individual is responsible for the approval of new products at the required facility. This role is assigned to the HS Advisor supporting the specific facility.
- **Catalog Manager (CM):** this person will provide rights to FMs and CAMs to specific facilities. This role is assigned to HS Supervisors and OH Advisors. Ops Supervisors will require FM credentials for their area CM. If facilities need to be added/removed from the system, Ops Supervisors will require the CM to add/remove these facilities

2.6.4.9. Adding Hazardous Chemical to Location's Chemical Inventory

On the 3E Protect webpage, the assigned FM follows the steps below to add a product to a location's Chemical Inventory:

1. Ensure you have selected the location you wish to add the product to
2. Under the "Inventory" tab, select "Manage Inventory"
3. Click "Add New Product"
4. Choose a criterion to help locate the product you wish to add, click "Go"
5. Check the box next to "Action" for the appropriate product in the results to add the item

6. If the product you wish to add does not show up in the results, click the “Add New Item” button above the search results, fill in the “Product Catalogue Information” and click “Submit”

2.6.4.10. Hazardous Chemical Approval

- The CAM will review the SDS for the chemical product to determine if the product can be used at the facility. The SDS will be evaluated to determine if the product’s listed constituents will have health effects that can affect employees.
- Any chemical product containing a substance that is a known or suspect carcinogen shall not be allowed to be used by Company Employees or Contractors.
- Any chemical product containing a substance that will require the implementation exposure monitoring, medical surveillance, and respiratory protection may be rejected.
- If the use of a hazardous chemical is rejected a complete explanation for the rejection will be emailed to the individual initiating the chemical review.
- The Employee who submitted the product for approval should submit a less hazardous or toxic product for approval. Please contact HS Support for your facility to assist in finding a less hazardous or toxic product.
- If the rejection is the result of an incorrect or incomplete submittal, the Employee can resubmit the intended product for approval or contact your local Health & Safety Advisor or Occupational Hygienist.

2.6.5. Documentation

- Hazardous Material Shipping Paper Form

2.6.6. References

- 29 CFR 1910.1200 Hazard Communication Standard
- Environmental Procedure 14-H Unexpected Contamination Encounter
- NFPA 704M, Recommended System for the Identification of the Fire Hazards of Materials, NFPA
- Hazardous Materials Identification System (HMIS), American Coatings Association (ACA)

2.7. Workplace Hazardous Materials Information System

2.7.1. Purpose

This section is designed to establish requirements and procedures necessary to communicate hazards by providing information concerning the chemical and physical hazards associated with chemical products in the workplace, and to protect Employees and Contractors against exposure to chemical and physical hazards. This section aligns with GMS IMS Hazard Identification and Inventory Process and GTM IMS Internal Communications Process.

2.7.2. Scope

This section applies to all chemicals used in Canadian Operations.

- The Workplace Hazardous Materials Information System (WHMIS) regulations establish the safe work expectations and requirements relating to chemical handling, storage, disposal, and training for all workplaces and Workers in Canada.

- The United Nations developed the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). These recommendations cover the classification of hazardous products, labeling, hazard pictograms, and a standardized format for SDSs. Canada incorporated GHS into WHMIS in June 2015.
- The WHMIS 2015 – Hazardous Product Regulation incorporates a Globally Harmonized System (GHS) of hazardous product classification/labeling into the existing WHMIS Regulation, leading to the adoption of Safety Data Sheet (SDS) in replacement of Material Safety Data Sheet (MSDS). To comply with WHMIS 2015, 'SDS' will be used in this section.

2.7.3. Responsibilities

People Leaders shall:

- Take the WHMIS training
- Supervisors in charge of a worksite where chemical products are used, handled, or stored are responsible for:
 - Maintain facility Hazardous Chemical Inventory in a location readily accessible to all employees and or visitors
 - Educating and training employees on the hazards and safe use of products
 - Ensuring that hazardous materials are properly labelled
 - Ensuring materials are available to produce workplace labels as necessary
 - Providing employees with access to up-to-date SDSs for any hazardous products found in the workplace
 - Ensure that PPE is provided as necessary to employees working with hazardous chemicals
 - Ensuring appropriate control measures are in place to protect the H&S of all workers
 - Review Contractor work to determine what hazardous chemicals may be encountered by either the Contractor or Company employees

Workers shall:

- Take the WHMIS training
- Follow safe work procedures and guidelines set out by WHMIS to ensure that hazardous products are used, stored, labeled, and disposed of properly
- Review the SDSs prior to handling any chemical or hazardous product
- Follow local procedure for approval of the Deviation if a Deviation to safe work procedures is required
- Use the information provided on an SDS to protect from product hazards, to ensure safe handling and product use, and to ensure appropriate emergency response measures.
- Use appropriate PPE provided for working with hazardous chemicals
- Produce workplace labels as necessary
- Discontinue activity after any unexpected encounter with hazardous chemicals and report the event
- Ensure that the labels, markings, and other forms of warning are:

- Legible
- In English and French (CAN)
- Prominently Displayed on the Container

2.7.4. Requirements

2.7.4.1. Chemical Inventory

- Each Canadian Operations Area shall maintain an inventory of chemicals used in the workplace. This will become the Facility Chemical Inventory.
- Update the 3E Protect Facility Chemical Inventory when new hazardous chemicals are introduced to the site.
- Maintain a temporary copy of SDSs for chemical products brought on site by Contractors for the duration of the service being provided or activities being performed.
- Update 3E Protect Facility Chemical Inventory, when contractors introduce new hazardous chemicals into the workplace that will remain on site after the Contractor's services are completed.
- Before a new chemical can be used at any facility it must complete an HS review. SDS's for new chemicals should follow the chemical approval process in 3E Protect.
- Facility Chemical Inventories must be reviewed by field verification at each facility annually.

2.7.4.2. Chemical Product Labeling

- Labels provide key information about the product hazards and how to use the product safely.
- Labels must contain the following six elements:
 1. Product identifier
 2. Hazard symbol/diamond pictogram
 3. Signal word (danger or warning)
 4. Hazard statements
 5. Precautionary statements
 6. Supplier identifier
- All chemical containers - both primary and secondary - must have labels.
- When using, storing, or transporting chemical products, Workers must ensure the product container (primary) is correctly labelled. In cases where the label has become damaged or illegible, a replacement label may only be installed on the container when the contents can be absolutely assured.
- In cases of product decanting, all containers (secondary) still containing the decanted product are to be correctly labelled.
- The label elements will depend on the hazard class and the hazard category within that class.
- Product labels must be easy to read and durable. They must be in a language that is understood. If a label is damaged, lost, or no longer legible, then the product must be relabeled.
- If an incorrectly labelled chemical or a chemical container with missing label is encountered, the Supervisor must be notified.

- Do not use a chemical until a replacement label is provided.

2.7.4.3. Safety Data Sheets

- Reference should be made to the Safety Data Sheet (SDS), and any area specific workplace practices when handling chemicals.
- The company SDS is provided and shall be maintained at the Enbridge workplaces that produce hazardous chemicals such as NGLs, condensate, sweet natural gas (residue), etc. The company SDS will be available in English and French for Canadian customers (CAN).
- To locate SDSs, do one of the following:
 - Access ELink / Business Application / Launch 3E Protect SDS Database Application, Safety Data Sheets (SDS) at Enbridge or
 - Open mobile web browser, type: 3eonline.com and do the following:
 - Click “Log in” under 3E Protect SDS & Chemical Management Tool
 - Enter Username: Enbridge
 - Enter Password: SDS
 - Access any SDS in the system using the “SDS” or Inventory tabs
 - Select Location (optional)
 - Search for the product by selection a criterion (e.g., product name, manufacturer, etc)
 - Open the “SDS” by clicking on “Action” drop down and selection “View SDS & Attachments”
- If an SDS is not able to be found, please contact the [Service Desk](#), phone ext. 7373 or 1-844-362-6948, or put in a [MyService](#) request.

2.7.4.4. Assigned Roles in 3E Protect

At Enbridge, 3E Protect is the database system that houses the chemical inventory for the facility and the SDSs. This database uses assigned roles for updating and approving new chemicals at each facility. These roles are:

- *Facility Manager (FM)*: this role is for users who are responsible for managing chemical inventories for one or more facilities. This person will be able to add/remove SDSs from the assigned facilities. This role is assigned to an individual by the facility Ops Supervisor.
- *Chemical Approval Manager (CAM)*: this individual is responsible for the approval of new products at the required facility. This role is assigned to the HS Advisor supporting the specific facility.
- *Catalog Manager (CM)*: this person will provide rights to FMs and CAMs to specific facilities. This role is assigned to HS Supervisors and OH Advisors. Ops Supervisors will require FM credentials to their area CM. If facilities need to be added/removed from the system, Ops Supervisors will require the CM to add/remove these facilities.

2.7.4.5. Chemical Approval Process

- On the 3E Protect webpage, the assigned FM add a product to a Facility Chemical Inventory
- The assigned CAM will review the SDS for the chemical product to determine if the product can be used at the facility. The SDS will be evaluated to determine if the product's listed constituents will have health effects that can affect employees
- If the use of a hazardous chemical is rejected a complete explanation for the rejection will be emailed to the individual initiating the chemical review.
- The Employee who submitted the product for approval should submit a less hazardous or toxic product for approval
- Approved SDS will be added to the Facility Chemical Inventory

2.7.4.6. Health Effects of Chemicals

- Health effects may result when a chemical makes contact or is absorbed by the body through any or all these routes of entry: ingestion, inhalation, skin contact and eye contact.
- Depending on the nature of the chemical, route of exposure, dose, duration of the exposure and individual sensitivity, the health effects of chemicals include:
 - Irritation, swelling or redness at the point of contact
 - Internal harm depending on the toxicity and hazard level of the chemical
- The SDS contains details of the health and physical effects of a specific chemical and the mitigations to be implemented as a result.

2.7.4.7. GHS Labeling

Supplier Labels

- Supplier labels must be written in English and French. They may be bilingual (as one label), or available as two labels (one each in English and French).
- The supplier label must include the following information:
 - Product identifier – the brand name, chemical name, common name, generic name, or trade name of the hazardous product.
 - Initial supplier identifier – the name, address, and telephone number of either the Canadian manufacturer or the Canadian importer.
 - Pictogram(s) – hazard symbol within a red "square set on one of its points".
 - Signal word – a word used to alert the reader to a potential hazard and to indicate the severity of the hazard.
 - Hazard statement(s) – standardized phrases which describe the nature of the hazard posed by a hazardous product.
 - Precautionary statement(s) – standardized phrases that describe measures to be taken to minimize or prevent adverse effects resulting from exposure to a hazardous product or resulting from improper handling or storage of a hazardous product.
 - Supplemental label information – some supplemental label information is required based on the classification of the product. For example, the label for a mixture containing ingredients with unknown toxicity in amounts higher than or equal to 1% must include a

statement indicating the percent of the ingredient or ingredients with unknown toxicity. Labels may also include supplementary information about precautionary actions, hazards not yet included in the GHS, physical state, or route of exposure. This information must not contradict or detract from the standardized information.

- Initial supplier identifier – There are two exceptions to this requirement:
 - In a situation where a hazardous product is being sold by a distributor, the distributor may replace the name, address, and telephone number of the initial supplier with their own contact information.
 - In a situation where an importer imports a hazardous product for use in their own workplace in Canada (i.e., the importer is not selling the hazardous product), the importer may retain the name, address, and telephone number of the foreign supplier on the SDS instead of replacing it with their own contact information.
 - Refer to subsection under same heading in prior section Hazard Communication Program (HazCom).

2.7.5. Documentation

- N/A

2.7.6. References

- Hazardous Products Act and Regulations
- Canada Occupational Health and Safety Regulations
- Canadian Energy Board Onshore Pipelines Regulation (CER OPR)
- Canada Energy Board Processing Plant Regulation (CER PPR)
- Alberta Occupational Health and Safety Code
- British Columbia Occupational Health and Safety Regulation

Legal Requirements

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- Canadian Occupational Health and Safety Regulations
- Canadian Energy Regulator Onshore Pipeline Regulations

3.2.2. Documentation

- N/A

3.2.3. References

- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1)(h)

3.3. Occupational Injury and Illness Management and Recordkeeping

3.3.1. Purpose


The purpose of this section is to establish process for the management, tracking and recording of occupational injuries and illnesses.

3.3.2. Scope

This section applies to all Enbridge Employees.

3.3.3. Responsibilities


People Leader shall:

- Accompany (or assign a designate to accompany) an injured Employee to the physician to determine the extent of the injury and whether time off will be necessary
- Contact HS Support to report any occupational injury or illness
- Notify health services of all recordable and non-recordable medically treated injuries
-  Initiate the event analysis
- Enter event into the Event Database (EnCompass) within 24 hours of the event
- Entry into EnCompass does not substitute for contacting HS Support

Workers shall:

- Report all work-related injuries/illnesses to the Supervisor
- Assist in event analysis




HS Support shall:



- Ensure all events, and near misses (event without loss-Near miss) are investigated
- () only) Notify OSHA if event meets OSHA reporting criteria
- Verify and accept event information entered into EnCompass
- Assist in the analysis of all events with loss

3.3.4. Requirements

- All work-related injuries must be immediately reported to the Supervisor.
- Prompt and proper first aid or medical treatment must be administered to all work-related injuries and illnesses.
- The injured Employee will report the injury to the Supervisor and, if able, present them to a designated company physician for treatment
 - If unable to report the injury to themselves, a Co-Worker should call the appropriate local 911 emergency service and report it to the Worker's Supervisor.
- The Supervisor must enter the event in EnCompass within 24 hours of the event.
- The Supervisor can complete injury and personal information section in *Event Data Gathering Form* to aid and assist in the event analysis. This form should be completed within 24 hours of the event while information is fresh on the Employee's mind.
- If an emergency arises, whether in the presence or absence of the Supervisor, the injured Employee should seek medical treatment immediately. If the Supervisor is unaware of the circumstances, the Employee should try to contact the Supervisor as soon as possible.
- Should an Employee become aware of an injury (e.g., foreign body in eye) after the workday has been completed, the injury must be reported to their supervisor immediately or the earlier of the following:
 - When the Employee reports to the next scheduled work shift or the next day

3.3.4.1. Notification and Recordkeeping

- Notify HS Support as soon as possible but no later than 24 hours after the event.
- () HS Support will notify OSHA within eight (8) hours after in-patient hospitalization of one or more Employees because of a work-related event.
 - Contact the Area OSHA Office that is nearest to the site of the event or OSHA's toll-free number 1-800-321-OSHA (1-800-321-6742)
- () For Maryland locations: Contact MOSH Central Office at 1-888-257-6674.
- () For Tennessee locations: Contact Area Office of TOSHA (Tennessee Department of Labor and Workforce Development) that is nearest the site of the event. If the Area Office is closed or if unable to speak with someone use the TOSHA toll-free number (1-800-249-8510).

-  For Kentucky locations: Kentucky Labor Cabinet, Department of Workplace Standards, Division of Occupational Safety and Health Compliance at 502.564.3070. If unable to speak with someone in the Frankfurt office, report the event using the OSHA toll-free, central telephone number, 1-800-321-OSHA.
-  In the State of Kentucky, Region Health & Safety will notify within seventy-two (72) hours, Kentucky Labor Cabinet, Department of Workplace Standards, Division of Occupational Safety and Health Compliance.

3.3.4.2. Instructions for Reporting Work-Related Injuries






- On the date of injury, the Employee must immediately report their workplace event to their People Leader.
- To report the claim, the People Leader must contact Zurich Customer Care Center Claims Services at 1 -800-987-3373.
- Upon completion of reporting the claim, Zurich will provide the Worker and People Leader with a confirmation number and assign a Claims Handler.
- Zurich provides the following services:
 - Notification of the applicable state of the workplace event
 - Notifying Employee, People Leader and Health Services of the approval or denial of the claim
- The People Leader is required to enter the workplace event in EnCompass within 24 hours of the injury/accident.
- Additional information may be required upon arrival at an ER room and/or doctor's office. This may include personal, medical and insurance information. Enbridge Insurance information is listed below:
 - Company: Zurich American Insurance Company
 - Policy #: WC 9377907
 - Expiry Date: November 30, 2019
- For questions regarding this process, please contact [Health Services](#) or:
 - HS Support
 - Risk Management and Insurance Group
- Keep all records/documentation related to injuries/illnesses in secured files separate from other H&S files. For privacy and/or confidentiality reasons, these documents must be in a locked storage cabinet or room that has limited access and treated similarly to employee Personnel file. Documents include, but are not limited to:
 - Event analysis documents (that lists confidential information or are marked "Confidential" or "Privileged").

3.3.4.3. Lost Time Injuries

- Employees returning to work from lost time must follow procedure set by Division Management and Health Services.

- For information on managing Workers' Compensation Benefits, contact Risk Management and Insurance Group. For the Company's Sick Leave Policy and payment of benefits, contact Human Resources, Health Services and/or Payroll.

3.3.4.4. Fatalities

- The Supervisor will immediately notify his Supervisor/Manager who will, in turn, notify Legal Counsel, Risk Management and the Insurance Group.
-  The Supervisor will immediately notify HS Support, who will in turn notify the HS Support Manager and the applicable operating department.
-  HS Support will notify OSHA within eight (8) hours after the death of any employee from a work-related event.
 - Contact the Area OSHA Office that is nearest to the site of the event or use the OSHA toll-free central telephone number, 1-800-321-OSHA (1-800-321-6742)
-  For Maryland locations: Contact MOSH Central Office at 1-888-257-6674.
-  For Tennessee locations: Contact Area Office of TOSHA (Tennessee Department of Labor and Workforce Development) that is nearest the site of the event. If the Area Office is closed or if unable to speak with someone use the TOSHA toll-free number (1-800-249-8510).
-  For Kentucky locations: Contact Kentucky Labor Cabinet, Department of Workplace Standards, Division of Occupational Safety and Health Compliance at 502.564.3070. If unable to speak with someone in the Frankfurt office, report the event using the OSHA toll-free, central telephone number, 1-800-321-OSHA.
- All analyses for fatalities will be led by an internal consultant appointed by the H&S Director.
- Legal Counsel will provide legal advice to the analysis team on the fatality.
- The Supervisor and HS Support will participate on the Event Analysis Team.

3.3.4.5. Medical Personnel

- HS Support, in consultation with Insurance, Risk Management, and with assistance from the field operations supervisory staff, are responsible for identifying physicians and facilities which are geographically located near company facilities.
- In general, physicians that are approved by the Company, such as those that are listed as service providers in the Company's basic health insurance plans (medical, dental, etc.), are approved for use.
- Any Employee receiving an injury requiring a doctor's care must be examined by a Company-approved doctor unless a company approved-doctor is unavailable.
- An Employee receiving a major injury of any emergency nature should be examined and treated by the nearest physician and/or medical facility.
- An injured or ill Employee should be accompanied to the medical facility by the immediate reporting Supervisor or designated Employee.
- The injured Employee will notify their Supervisor prior to seeking medical treatment unless an emergency exists.
- An Employee will not change physicians without first obtaining approval from his Supervisor.

- The Supervisor will discuss the possible change of physicians with HS Support.

3.3.5. Documentation



- Employee Injury and Illness Report Form




3.3.6. References

- 29 CFR 1904.35 – OSHA Recordkeeping
- Enbridge GTM H&S Event Classification Guideline
- Enterprise HS Recordkeeping Guidelines
- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (v)
- (🇺🇸 midstream only) *OSHA Form 300 REGF-02-C8-SAF-004*
- (🇺🇸 midstream only) *OSHA Form 300A REGF-02-C8-SAF-005*

Administrative Controls – Normal

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4. Administrative Controls Normal – Health and Safety

4.1. Abrasive Blasting

4.1.1. Purpose

The section describes the minimum requirements that Workers will follow when performing abrasive blasting work.

Cleaning operations using abrasive blasting can present risks for Workers' health and safety, specifically in portable air blasting or blast room (booth) applications. There is a large amount of dust created through abrasive blasting from the substrate and abrasive.

4.1.2. Scope

This section applies to all operating pipelines and gas processing facilities in Enbridge GTM.

4.1.3. Responsibilities

People Leader shall:

- When required by applicable legislation, notify the appropriate agency or Authority Having Jurisdiction of abrasive blasting.
- Ensure that appropriate site and work controls are applied to prevent injury, illness, or damage

Workers shall:

- Be trained and qualified to perform their assigned tasks, duties, and responsibilities. This includes but is not limited to the Operator, the Attendant, and the Safety Watch.
- Ensure the site is prepared and controls are in place to prevent injury, illness, or damage from the abrasive blasting.
- Inspect equipment daily before use, including testing of safety shutdown and control (deadman) switches. Inspection details shall be documented. Safety shutdown and control (deadman) switches shall not be disabled for any reason.
- Wear additional PPE as required by the Hazard Assessment to protect against exposure to high velocity abrasive matter, airborne respirable particulates (potentially contaminated) and noise.

The Operator shall:

- Have the nozzle under control before the air is turned on.
- Not reposition from the immediate work area (e.g., lateral, or vertical body movement) while discharging blasting media.
- Have control of the nozzle's control (deadman) switch.
- When reasonably practicable, before leaving the worksite at the end of each day, remove and dispose of coveralls and shower where practical.

4.1.4. Requirements

- Only Enbridge-approved abrasive blast media shall be used. Recycled glass-based media is recommended.

- Do not use silica sand or other substances containing more than one percent crystalline silica as abrasive blasting materials. Substitute less hazardous materials
 - The entity performing the work (i.e., Enbridge or the Contractor) shall use reasonable efforts to collect spent abrasive blast media and is responsible for collecting, storing, testing, and disposing of spent abrasive blast media in accordance with the Waste Management Plan.
 - Intrinsically safe switches are to be used when applicable, or as determined by the Hazard Assessment.
 - Hoses shall have whip checks and clips/wires properly installed to prevent accidental decoupling.
 - Whenever possible, do not place hoses and lines on main roadways or walkways.
 - The blast nozzle control (deadman) switch shall be located near the nozzle in a position where the operator's hands will be when using the device. When released, the control switch shall immediately stop the flow of material.
 - The control switch shall be guarded, to prevent inadvertent activation.
 - Abrasive blasting equipment used to clean tanks shall have the blasting hose nozzle bonded electrically to the tank shell or the tank roof.
 - Site Preparation and Work Control shall include:
 - post warning signs within 15m (50 ft.) of the work area
 - where the abrasive blasting will affect other Workers, erect barricades, or rope off area to warn Workers and prevent access to work area
 - only Workers equipped with the required PPE shall enter the work area,
 - Workers not directly involved in the abrasive blasting operation shall stay up-wind whenever possible
 - conduct initial and continuous Atmospheric Monitoring in Hazardous and Restricted areas
 - equipment and vehicles should be protected from debris projected from the work area
 - do not allow abrasive blasting within 3 m (10 ft.) of any tank vent whether the vents are open, unless the tank has been cleaned and declared gas free by a Qualified Worker; if a tank has not been cleaned and declared gas free, clean areas within 3 m (10 ft.) of tank vents with hand tools such as scrapers, wire brushes and similar equipment
- EXCEPTION:** Abrasive blasting of external floating tank roofs may be performed in accordance with API RP 2027 and approval of the Enbridge Operations Representative
- When abrasive blasting for extended periods, a Worker rotation plan shall be implemented to reduce exposure time.
 - Ensure the abrasive blast pot is shut off and depressurized before being filled.
 - Do not re-use abrasive blast media.
 - Provide a designated area for the removal of PPE separate from the lunch/office space to eliminate cross contamination; establish and practice personal hygiene standards (e.g., wash before you eat).
 - Implement dust control/collection measures:

- line the bottom of the work area with 4 mm (mil) polyethylene sheeting (contact the Environmental Department for alternatives to this requirement based on blasting media and project scope)
- erect a shroud (e.g., tarpaulin) in densely populated areas, or if migrating dusts are problematic and/or as required by applicable regulations
- consider using a portable air filtration system with High-Efficiency Particulate Air (HEPA) filter when using a shroud or in a Confined Space
- consider using a negative pressure HEPA filter exhaust system when blasting within a tank
- stop work and collect spent abrasive blast media, as required
- Workers shall not use compressed air for cleaning themselves or their clothing.
- The entity performing the work shall contact the Enbridge Environment Department for assistance in obtaining the approved disposal methods, record retention requirements and approvals.
- The records shall contain the type and volume of abrasive blast media, laboratory results and disposal location.

4.1.5. Documentation

- N/A

4.1.6. References

- *Alberta OHS Code Part 18 – Personal Protective Equipment (Section 255 Abrasive blasting operations)*
- *WorkSafeBC Regulations Part 12 – Abrasive Blasting and High Pressure Washing*
- *OSHA 29 CFR 1910.134 Respiratory Protection*
- *OSHA 29 CFR 1910.95 (1926.52) Occupational Noise Exposure*
- *OSHA 29 CFR 1910.132 (1926 Subpart E) Personal Protective Equipment*

4.2. Aerial Work Platforms

4.2.1. Purpose

This section is developed to provide the minimum safety expectations for Employees engaged in the operation and use of Aerial Work Platforms (AWPs).

4.2.2. Scope

This section covers all facilities and Company ROWs.

4.2.3. Responsibilities

People Leader shall:

- Ensure all AWPs are inspected before use by Employees.
- Ensure that PPE is utilized to do aerial work.



- Ensure only trained (and if required licensed) Employees operate the powered aerial equipment.

Workers shall:

- Know and follow the safe techniques for operating the aerial equipment.
- Only operate aerial lift platforms they have been qualified to use.
- Pre-inspect all aerial lift equipment at the start of a work period.
- Wear required PPE.
- Remove keys when not in use.



4.2.4. Requirements

4.2.4.1. Pre-Job Requirements



-  Every AWP shall meet the standards set out in the applicable CSA Standard and be inspected, used, operated, and maintained in accordance with *CSA Standards B354.1, B354.2, B354.4, B354.5* as appropriate. Aerial lift equipment is designed to lift Personnel and limited work tools to elevated locations. AWP's are not to be used to hoist pipe, conduit, sheeting, or other objects/construction materials.
- Access to the work area under the elevated work platform shall be controlled using barricades, barrier tape and/or a Spotter.
- Temporary work platforms shall never be used where it is reasonably practical to use a permanent structure.
- AWP's are not to be used as elevators for accessing fixed elevated work areas.
- If this is required, then approval must be obtained from Management and the appropriate JHA must be reviewed, in detail, identifying how 100 percent fall protection is maintained.
- Pre-job planning will include expected loading of the lift platform, overhead obstructions, high voltage conductors and weather conditions.
-  AWP's are not to be operated within 7 m (21 ft.) of energized overhead powerlines without a safe work permit.

4.2.4.2. General

- Aerial lift equipment is designed to lift Personnel and limited work tools to elevated locations and is not designed to hoist pipe, conduit, sheeting, or other construction material.
- Pre-job planning will include expected loading of the lift platform, overhead obstructions, high voltage conductors and weather conditions.
- Aerial lift operators shall be trained and certified by a competent instructor.
- Aerial lift equipment shall be inspected by the operator before use to ensure proper operating condition and mechanical condition. Document inspection on SAF-58.9089, "Aerial Lift Inspection Form" or equivalent form.
- Unless specified by the manufacturer, handrails are not tie off points on the platform. Normal safety harness tie-off points are identified on the aerial lift.

- The aerial lifts lifting capacity and operating specifications shall not be exceeded.
- All aerial lifting equipment shall operate on stable ground in a level position.
- No aerial work platform shall be used if any safety device is inoperative.
- AWP's shall only be moved with the basket at slight elevation from ground level and with the help of a Spotter.
- All Personnel working from an AWP shall wear fall restraint equipment including an approved safety harness and lifeline tied off to the manufacturer identified anchor point. The lifeline shall be a fixed or retractable length to prevent the operator from extending over the edge of the platform.
-  All platforms must have a toe board that extends from the floor of the aerial work platform to a height of not less than 12.5 cm (5 in).
-  If the tools or other objects are piled to such a height that a toe board would not prevent the tools or other objects from falling, a solid or mesh panel shall be installed from the floor to a height of not less than 45 cm (17.7 in).
- Aerial work platforms shall be securely fastened in place, braced, if necessary, to ensure their stability and provided with cleats or surfaced in a manner that provides a safe footing for Employees.

4.2.4.3. Maintenance and Inspection

-  All AWP's used by East Canada Operations shall either be maintained by East Canada or be obtained from reputable rental establishments.
- Prior to use, review inspection records for the AWP.
- These records shall indicate that the AWP provider has maintained the AWP according to the manufacturer requirements
-  The maintenance record shall be signed and dated by a qualified Inspector.
- No person shall use an AWP that does not have proper inspection and maintenance records.
- Records shall be available for no less than two years.

4.2.5. Documentation

-  UST and U.S. Projects will use SAF-58.9089, "Aerial Lift Inspection Form"

4.2.6. References

- 29 CFR 1910.66 *Powered Platforms for Building Maintenance*
- 29 CFR 1910.67 *Vehicle-Mounted Elevated and Rotating Work Platforms*
- 29 CFR 1910.68 *Manlifts*
- 29 CFR 1926.453 *Aerial Lifts*
- *Alberta OHS Code Part 9 – Fall Protection (Section 156 Boom-supported work platforms and aerial lifts)*
- *WorkSafeBC Regulations Part 13 – Ladders, Scaffolds and Temporary Work Platforms (Division 5 – Movable Work Platforms)*
- *CSA Standards B354.1, B354.2, B354.4, B354.5*

- *Canadian Occupational Health and Safety Regulations Part 1 Elevating Devices*
- *CSA Standard B311-M1979, Safety Code for Manlifts*

4.3. All-Terrain and Off-Road Vehicles

4.3.1. Purpose

This section identifies requirements to aid in the safe operation and secure loading and unloading of All-terrain and Off-road Vehicles. Always reference the owner's manual for specific equipment safe practices and instruction.

4.3.2. Scope

This guide applies to all-terrain vehicles (ATVs) and utility terrain vehicles (UTVs) and Snowmobiles. This section does not address which type of vehicle to select for a job.

4.3.3. Responsibilities

People Leader shall:

- Ensure Operators are trained and competent.
- Ensure Operators wear the appropriate PPE.
- Ensure off-road equipment is maintained as per the manufacturer's instructions.

Operator shall:


- Carry appropriate license and registration.
- Assess the risk of tipping or rollover prior to use.
- Receive property owner's permission prior to operating on private land.
- Plan routes to avoid severe slopes and unstable ground conditions.
- Do not operate at excessive speeds or engage in horseplay.
- Remain on approved routes and operate within legal requirements.
- Inspect equipment before use, and at periodic intervals during the day, to ensure good condition.
- Inform others of departure and return times prior to leaving.
- Demonstrate operating competency to a qualified Supervisor or Instructor.
- Remove keys when not in use.
- When operating off-road equipment, the Operator, and any passengers (if allowed by the manufacturer) must wear:
 - Appropriate eye and hearing protection.
 - Clothing suitable for the operating conditions and environment (long sleeves and long pants to ankles and wrists).
 - Approved motorcycle helmet (a full-face helmet is recommended as it provides protection to the jaw area) must be worn.

- Hard hats may be worn when operating within an Enbridge facility fencing when traveling on smooth roadways at speeds under 15 km/hr.

4.3.4. Requirements

4.3.4.1. General

- All off-road vehicles shall be provided with:
 - adequate front and rear lights
 - adequate tire and braking systems for expected terrain
 - a winch that is adequately rated for emergency towing
 - for Enbridge owned off-road vehicles and for rentals when allowable.
 - a screen, shield, grill, deflector, guard, or other adequate protection for the operator where the operator may be exposed to the hazard of flying objects
 - where required, have license plates security attached in a visible location
 - be equipped with an aerial whip and flag, First Aid kit (if deemed necessary by hazard assessment), 5 lb. ABC fire extinguisher, plus portable communication equipment as required (e.g., hand-held radio, cellular or satellite phone)
 - be equipped with spark arrestors as required by Applicable Legislation
 - have an emergency kit depending on the conditions and use as required by the Hazard Assessment
- Off road equipment may only be used when the potential of tipping or rollover have been properly assessed and risks mitigated.
- Risks including terrain (smoothness/roughness), traction, grade, and space to maneuver must be considered by the Operator.
- All off-road vehicles shall carry no more than the number of people that the vehicle is designed to carry.
- Be aware that all off-road vehicles may have a blind spot that is constantly changing as the vehicle is moving.
- Ensure that adequate clothing is worn to provide protection from weather conditions.
- Wear appropriate eye protection – safety glasses at a minimum unless wearing a full-face helmet.
- Wear appropriate head protection:
 - Hard hats may be worn while riding on UTVs (equipped with Roll-Overprotective Structures (ROPS) and seat belts):
 - within fenced facilities or
 - outside fenced facilities while on level, improved roadways
 - Helmets are required while riding on UTVs in all other conditions
- Follow the manufacturer's rated vehicle capacity for loads when carrying or towing a trailer.

- Vehicle capabilities and responses vary. If changes are made to the off-road vehicle, then the Operator may require additional training.
- “Trike” use is strictly prohibited.
- Do not operate on highways (crossing a highway is permitted).
- Maintenance records must be kept and made available to the Operator.
- Proper servicing and maintenance appropriate to conditions of use includes restricting modifications to the structural supports of the drive train of these units.
- Pre-use inspections must be performed and documented.
-  ATV use is restricted. Exceptions must be authorized by the appropriate Vice-President.

4.3.4.2. Guarding

Operators must be protected from falling, flying, or intruding objects by means of suitable guards or structures (independently certified or manufacturer’s side doors and undercarriage skid plates).

4.3.4.3. Roll-Overprotective Structures (ROPS) and Seatbelts

- Due to use of UTVs on steep, uneven terrain, and all types of conditions, a certified ROP is required.
- If the vehicle is designed for it, ensure the engine is shut off and the parking brake is applied prior to loading/unloading the vehicle with Drivers and Passengers.
- Prior to driving or any vehicle motion, the Operator shall ensure all occupants are wearing any and all required personal protective equipment (PPE) and all seatbelts/restraint systems are utilized.
- The Operator shall ensure that the vehicle being operated is designed for the terrain and angle of inclination as stipulated in the manufacturer’s manual.

4.3.4.4. Loading and Unloading

- Loading and unloading on steep terrain should be avoided, and when possible, always park, load, and unload on flat ground.
 - Consider limiting occupants to the operator and one passenger in bench style seat when possible.
- Prior to loading / unloading any materials or equipment in or on the UTV or ATV, the vehicle will be shut-off, parking brake applied, and personnel removed from the vehicle.
- Personnel shall don all applicable PPE prescribed by the manufacturer or the vehicle and/or Enbridge’s requirements set forth by the job scope.
- Off-road transports must be well secured to the transport vehicle, with the transmission in gear and the parking brake set.
- The transporting vehicle must be of adequately rated capacity and have the capability to haul the equipment without exceeding the vehicle’s gross vehicle weight rating (GVWR).
- The off-road equipment shall be secured using a commercially manufactured restraining device or four tie-downs, two in front and two in back, to prevent forward, backward, and sideways movement. All tie-down straps must be in good condition, free of frays/splices.

- When transporting equipment in a pickup truck, it is strongly recommended that the tailgate always be completely closed. If the tailgate cannot be closed, all four tires of the ATV/UTV must always rest on the pick-up bed.
- When transporting off-road equipment on a trailer, the trailer must have the appropriate rating, ensuring that the load does not exceed combined gross vehicle weight and trailer rated capacity.
- Trailers are the recommended method for transporting off-road equipment.
- Trailers are required to be used to transport UTVs.
- Portable or detachable containers with hazardous materials contents, such as pesticide, flammable solids or flammable liquids shall:
 - Be secured separately from the equipment inside the bed of the truck to prevent movement. Tanks that are specifically manufactured to be solidly attached to the equipment for repeated use are not portable containers and do not have to be removed prior to transport. Such tanks may only contain small quantities of residual contents prior to loading or transport.
 - Be in good condition, free of leaks and residue on their exteriors, properly labeled, and meet DOT specifications for over the road transportation requirements.
- Any materials, equipment, or gear in the pick-up bed must always be secured from movement.
- Recommended hierarchy for loading off-road equipment into the back of a pick-up truck is:
 - One piece, bi- or tri-fold ramps that are securely strapped, chained, and/or bolted to the truck bed
 - Two individual ramps a minimum of 25.4 cm (10 in) wide and 183 cm (72 in) long; chains or straps must be used to secure the ramps to the vehicle and prevent rearward movement of the ramps during loading.
- Loading ramps must meet the following criteria:
 - Fabricated of aluminum or steel and of welded construction. Driving surface must have closely spaced crossed members or mesh construction with high traction surface.
 - May be of one or two-piece design, rigid or folding. Hinges must be factory installed.
 - Adequately rated to support the combined weight of the equipment, the rider, and any cargo that cannot be removed from the machine for loading.
- Loading ramps must be secured to transport vehicle with two tie-down straps, chains, steel cables, or mechanical fasteners, and capable of supporting the equipment and associated equipment.

4.3.5. Documentation

- N/A

4.3.6. References

- *Off-Road Vehicle (ORV) Regulations in British Columbia*

- If the UTV/ATV is being operated on Crown Land in British Columbia, the UTV/ATV must be registered under British Columbia's ORV Act. In addition, the following regulations apply to UTV/ATV operators:
 - The operator must wear a motorcycle helmet.
 - The operator must wear seatbelts if these are installed by the manufacturer.
- *Alberta Occupational Health and Safety Code*
- *British Columbia Occupational Health and Safety Regulation*
- *Canada Occupational Health and Safety Regulations (COHSR)*

4.4. Aviation Safety

4.4.1. Purpose

The purpose of this section is to ensure that Enbridge workforce and Contractors are using best in class safe work practices while working with helicopters or fixed winged aircraft and unmanned aircraft systems (UAS). Detailed standards are given for pre-trip guidelines, in-transit guidelines, emergency guidelines and training.

4.4.2. Scope

This section applies to all Employees and Contractors who perform work activities involving helicopters, fixed winged aircraft or UAS within projects or operations.

The Enbridge Aviation Department flight crews follow the governing aviation authority safety policy and regulations while performing their duties. If this section conflicts with the governing aviation authority, regulations shall take precedence. For UAS operations, refer to the UAS specific Procedure document for further safety information that is not covered within this section.

Use of commercial airlines is not within scope for this section.

4.4.3. Responsibilities

Pilot shall:

- The pilot is responsible for all aspects of the flight, including passenger safety.

People Leader / Management shall:

- Ensure that Employees who potentially use helicopters in Company activities receive the proper training.

Workers shall:

- Follow the established flight procedures and instructions from the pilot.
- Participate in helicopter activities only after receiving the proper training.
- Demonstrate a complete understanding of the safe work practices to be followed while moving around helicopters.
- Follow the pilot's instructions regarding the aircraft
 - Luggage storage
 - Seat belt

- Locate of oxygen masks (if applicable) and know how to start the flow of oxygen
- Always make eye contact with the pilot
- Wear a life jacket when flying over water

Rigger shall:

Note: *The rigger role is performed by flight crew members including the pilot depending on the work activity and/or the aviation company/carriers' policies and procedures. There may be opportunities where Enbridge Personnel or Contractors will support this work activity and maybe responsible for the expectations listed below. Prior to work execution, they must receive training from the flight crew members. The pilot in command has final authority as to who rigs loads and how a load is rigged. When rigging Personnel are provided by the carrier, Enbridge Personnel will not be responsible for the duties listed below and will be present only to oversee operations and coordinate the lifts with the carriers.*

- Be trained for rigging helicopter loads and for overhead crane loading including load preparations, securement, and procedures as per local/applicable legislation and/or carrier requirements
- Inspect the safety devices of all rigging equipment or installed rigging devices on equipment to be lifted. Only the pilot in command or flight crew members shall test the lifting equipment and ensure it meets legislative and engineering requirements
- Have experience consistent with the requirements of the lift to be made
- Be physically and mentally able to accomplish required rigging tasks
- Perform visual equipment inspections of rigging equipment to ensure cleanliness and that it is in good condition; remove all equipment from service that does not meet visual inspection until it can be verified to be in safe working condition in accordance with the manufacturer specifications, and
- Maintain a written record or logbook of these inspections when applicable.

Spotter/Signal Person shall:

Note: *The spotter's role may be performed by flight crew members depending on the work activity and/or the aviation company/carriers' policies and procedures. When spotter/signal person Personnel are provided by the carrier, Enbridge Personnel will not be responsible for the duties below and will be present only to oversee operations and coordinate the lifts with the carrier's Employees.*

- Will be familiar with helicopter lift hand signals and consult with the pilot in command on their preference for hand signal use.
- Complete any specific training required by applicable legislation and/or as required by the company in charge of the lift. Consult with the pilot in command to ensure operations are understood and that requirements are clear.
- Wear appropriate PPE to distinguish themselves from other Workers.
- Supervise the landing/loading area(s) to ensure Personnel do not enter the area while lifts are happening and halt operations if an unauthorized entry is made.
- Observe and communicate on the movement of the load or communicate any other information the pilot in command may need to know by either hand signals or radio.
- Ensure no Personnel are stationed in the flight path of a suspended load taking-off and/or being landed.

Helicopter Pilot shall:

- Be familiar with the requirements of this section along with the safety standards for charter air carriers.

Visual Observer (UAS) shall:

- Review the Visual Observer Briefing document and communicate any concerns directly with the pilot verbally
- Follow the instructions of the pilot in command at all times
- Assist the pilot with keeping the landing/take-off area clear when not required to be observing the UAV or during emergencies

UAS Pilot shall:

- Ensure that you have reviewed the Visual Observer Briefing with your visual observer and that they clearly understand their role
- Ensure that you have established a communication protocol with the visual observer

HS Support shall:

- Monitor the overall effectiveness of the program through periodic inspections, observations, and annual audits
- Aid with load testing information, other technical assistance, or equipment selection as needed.
- Provide or assist with arranging helicopter training for Employees

Safety Shared Services shall:

- Provide technical assistance in sourcing the required training.

4.4.4. Requirements

4.4.4.1. General

- Prior to each day's operation involving the use of a helicopter, a briefing shall be conducted which should include all passengers and the pilot's plan of operation.
- Good housekeeping shall be maintained in all helicopters loading and unloading areas.
- Loose fitting clothing shall not be worn around helicopter operations.
- Ground Personnel shall be instructed of all issues regarding visibility and if necessary special precautions shall be taken to eliminate hazards.
- Passenger entry and exit will only be completed when the aircraft rotor system is either stopped or is running at 100 percent. No passenger movement will be allowed while the aircraft rotor system is starting or stopping.
- Workers shall be instructed that when approaching a helicopter with blades in rotation, all Workers shall remain in full view of the pilot.
- Workers will wear safety glasses and earplugs when approaching a helicopter.
- There shall be reliable communications established between the pilot, passengers, and ground Personnel.

- Workers shall maintain a safe distance of at least 61 m (200 ft.) from a helicopter while it is lifting or landing a load.

4.4.4.2. Pre-Trip Guidelines

- Accurately report the weights of extra equipment and Personnel being carried on board the aircraft.
- Before approaching aircraft, secure any loose articles you may be wearing.
- Do not carry long items vertically while approaching aircraft. If carrying an object of 2 m (4 ft.) in length or longer, there must be a person on both ends of that object.
- Approach only the front of the aircraft, at a 45° (degree) angle, so the pilot will see you. Keep eye contact with the pilot as you approach the aircraft.
- Walk in a crouched position when the rotor blades are turning with the power off. The pilot will indicate when it is safe to approach the helicopter.
- At offshore locations, always walk within the boundaries of the helideck.
- Load gear into the aircraft only with the pilot's approval to ensure proper weight distribution.
- NEVER BRING BEAR SPRAY INTO A HELICOPTER. If you must carry it for work purposes, notify the pilot and ensure that it is stored properly for transport as per the pilot's directions.
- Never walk within the vicinity of the tail rotor. Do not go beyond the baggage compartment.
- Do not duck under the tail boom to get to the other side of the aircraft. Walk around the front of the helicopter.
- When entering the aircraft, be careful not to step on any float bags that may be present.
- Listen to the pilot's briefing before taking off.
- Familiarize yourself with the location of the emergency equipment and the exit nearest you inside the aircraft.
- Normally, helicopters are equipped with 2-way headsets for all passengers and the pilot. If you have questions, feel sick, or need to communicate with the pilot, use the 2-way headset.

4.4.4.3. Transport of Hazardous/Dangerous Goods by Air

- Enbridge Aviation does not transport hazardous/dangerous goods by air. If using a contracted carrier, the carrier must, at all times, hold the appropriate approval from the aviation authority in order to transport hazardous or dangerous goods by air for Enbridge.
- In the absence of aviation regulations that set a more stringent standard, the carrier must accept, handle, load, and transport hazardous or dangerous goods in compliance with the IATA Regulations (International Air Transport Association).
- The pilot in command MUST be informed of any dangerous goods cargo before the start of the flight.
- Lithium Polymer (LiPo) batteries used in UAS are considered dangerous goods. Check with the UAS Program Manager if you are not sure if a particular UAS or UAS battery can be shipped or transported by air and what paperwork may be required.

4.4.4.4. In-Transit Guidelines for Helicopters

- Seat belts, shoulder harness, and hearing protection shall always be worn while the aircraft is in motion. Ensure that the buckle of the seat belt is facing outward.
- If the flight will be over water, a PFD will be worn while the aircraft is in motion.
- All flights are designated “NO SMOKING.”
- Before take-off ensure all doors are closed and nothing is hanging out of the doors, windows, or baggage compartment.
- Always read the emergency briefing card before each flight.

4.4.4.5. Main Rotors

Safety Warning

The main rotors and tail rotors are dangerous. Main rotors can droop to within 1.2 m (4 ft.) of the ground and tail rotors are extremely difficult to see when operating.

- After landing, if the aircraft is to be shut down, passengers are to remain on board until the rotors have come to complete stop.
- This section does not preclude offloading passengers then repositioning the aircraft for shutdown.
- After landing, if the aircraft is to be shut down, passengers are not to be boarded until the rotors have come to a complete stop.
- During air medical operations, Air Medical crews, and other crew members, are exempt from this requirement.
- No one shall approach or depart the aircraft (under the rotor system) during initial start or rotor coast down.

4.4.4.6. Helicopter Doors

To ensure helicopter doors are not damaged, passengers must not:

- Lean against or use force on doors or windows
- Slam the doors or use force on door handles or latches
- Touch any moving parts or fragile protruding parts that are attached to the doors, such as antennas or lights

4.4.4.7. Flying Objects

Safety Warning

Winds more than 70 mph can be created when a helicopter is hovering

- Objects must not be thrown near or from a helicopter during flight.
- Light objects must be securely handled.
- Flying objects (e.g., paper, plastic bags, sand, gravel, stones, branches, or boards) can cause serious injury and helicopter damage, and paper or plastic can be drawn into the engine, causing engine failure.

4.4.4.8. Helicopter Long Lining (HLL) Activities

Helicopter long lining activities require the appropriate level of approval, dependent on the following risk matrix.

Table 1: Risk Matrix

Carrier	Load	Terrain	Approval Level (Rapid)	Potential Severity Level
<ul style="list-style-type: none"> • ASL Approved Contractor • ENB Aviation, up to date pre-qualification • Demonstrated Pilot Competency Program • Below the hook rigging training • Issued lift plan catalogue • Pre-flight HLL checklist • Focused Inspection • Work Practice Evaluation 	<ul style="list-style-type: none"> • Load design and implementation meets all criteria of approved HLL lift plan 	<ul style="list-style-type: none"> • No exposure to the public • No flight path over man-made structures • Low complexity terrain (elevation, congestion, pick up and drop zones) • No flight path over operating facilities 	D = Supervisor	Less than P2
<u>Carrier or Load</u> not meeting above criteria. Mitigation plan required to bring into tolerances			D=Manager R= Aviation I = Safety	P2
<p><u>More than one</u> category requires mitigation</p> <p>*Note: loads over population or operating facilities require Director level authorization due to reputational risk to ENB</p>			D =Director R = Aviation, Safety I= VP	P3 & higher

4.4.4.9. How to Approve HLL

Less Than P2 = Supervisor Authorization

- Carrier + Load + Terrain is optimal, no deviation from optimal work design with mitigations in place that are as low as reasonably practicable.
- Carrier – meets Enbridge Aviation specifications, produces pilot competency, plans the lift, and designs the assigned work as per their work practice
- Load – the object(s) to be transported are of a known weight and lift configuration, an appropriately approved lift plan is documented and transported successfully before
- Terrain – the flight path does not lift over people, operating facility of 3rd party infrastructure

P2 = Manager Authorization

Terrain is optimal but deviation is required for the Carrier or Load criteria

- Carrier – is sole sourced and only Contractor available in the location, requires mitigation to meet standards
- Load – no pre-determined lift plan produced by the carrier or load doesn't meet all the criteria of a carrier plan

P3 or Higher = Director Authorization, VP is informed

More than one criterion requires deviation Carrier, Load, Terrain

**Note: Loads over population or operating facilities require Director level authorization due to reputational risk to Enbridge*

4.4.4.10. Helicopter – Slinging Operations

- Helicopters (including those involved in slinging operations) shall be operated with a 5 percent power reserve. Pilots may reduce the 5 percent power reserve only in ideal flight conditions; if a lesser reserve is used, it shall guarantee adequate power for an abort in the event of changing flight conditions. However, the pilot shall maintain some power reserve.
- Workers working around helicopters during slinging operations shall:
 - keep the area free of loose articles
 - watch for Hazards, such as obstacles or hanging trees that may fall when dislodged by the helicopter rotors or by gusty wind conditions
 - stay alert and be aware of the positioning of loads
 - maintain visual contact with the load (and cargo hooks) until it clears the location
 - keep a safe distance from the loads
 - remain clear of incoming loads (and cargo hooks) until they are placed on the ground
 - determine an escape route that leads away from the load, and ensure it remains clear of objects or potential blockages
 - always stand uphill from the load, as it may roll when released
 - maneuver the load only when necessary and only by pushing it into position; do not reach for a load or cargo hook
- For slinging (long-line) operations, follow these requirements:
 - use only multi-stranded steel core long lines, cables, or lanyards
 - use long lines and lanyards swaged with steel; do not use cable clamps
 - attach only properly sized clevises to the helicopter hook (either the belly hook or the extended hook) and keep all screw-type clevis pins tight and lock-wired
 - use only the proper type of clevis pins (not bolts) and check clevises before and after each lift
 - complete record of inspection and logbooks
 - secure loads of loose articles in cargo nets
 - advise the pilot of the presence of any Hazardous Materials

- ~~do not~~ conduct long line operations overpopulated areas
- ~~do not~~ conduct long line operations within 100 m (110 yd.) of high-voltage power lines
- cease operations during electrical storms
- ground all loads to prevent a buildup of static electricity (static prevention is meant to prevent possible electrical injury to Spotters)
- Before commencing slinging operations, designate one person as Spotter and ensure that radio frequencies are established.
- The Spotter is the only person permitted to stand beneath the helicopter during slinging operations unless another person is required to help position the load.
- The Spotter is the only person permitted to use hand signals. The Spotter shall:
 - use standard hand signals when the helicopter is operating directly overhead and when it is impossible to use radio communication (see [Figure 1](#))
 - confirm that the pilot has visual contact of the Spotter by radio prior to using hand signals
 - ensure standard helicopter hand signals are practiced prior to the start of operations; this ensures signals are agreed upon and understood by both the pilot and Spotter (See [Figure 1](#))
 - use large movements when using hand signals, especially when using long lines this is necessary because the pilot may be as high as 45 m (150 ft.) above the Spotter
 - In addition to wearing basic PPE, the Spotter shall always wear the following PPE during slinging operations:
 - head protection with chin strap
 - protection from static (e.g., high-voltage gloves) during cold weather/low humidity
 - High Visibility Vest

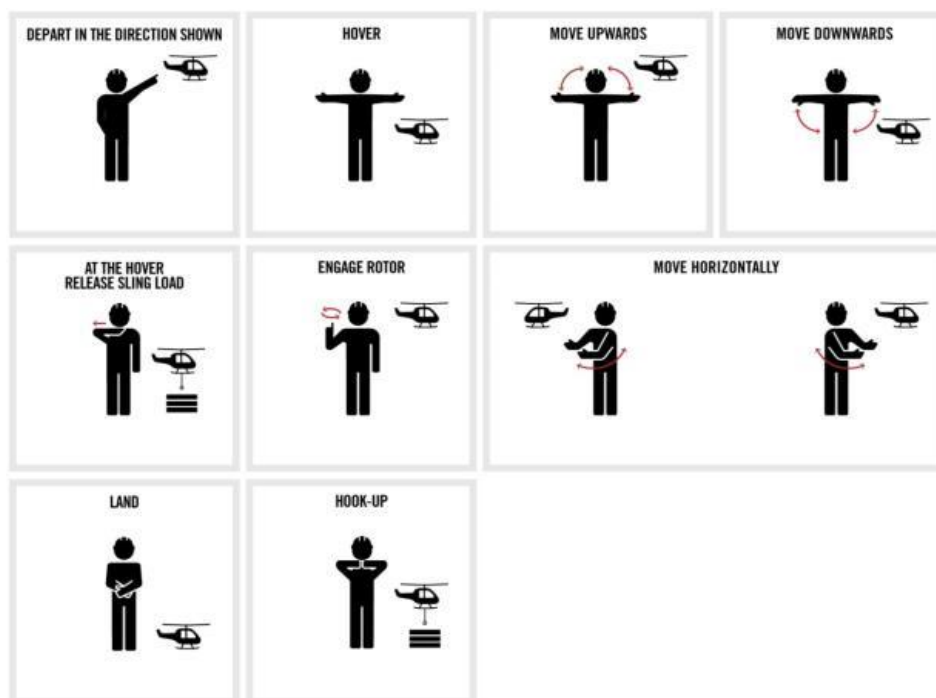


Figure 1: Helicopter Hand Signals

4.4.4.11. Emergency Locator Transmitters (ELT)

Operating ELTs

- Aircraft are equipped with an emergency locator transmitter (ELT).
- The ELT is a battery-powered radio transmitter that transmits an emergency signal to enable search aircraft or Search and Rescue satellites to find a downed aircraft.
- The following proper operation of the ELT in an emergency will assist in locating the aircraft:
 1. Turn the switch to ON
 2. The ELT is normally controlled by a three-position switch labeled OFF-ARM-ON
 3. The ELT does not transmit an audible signal
 4. Remove the ELT from the aircraft and place it on a high point in an open area, preferably on an aircraft panel, to amplify the signal

4.4.4.12. Emergency Equipment

- During the pre-flight briefing, the pilot must:
 - Identify the location of the emergency locator transmitter (ELT), survival equipment and first aid supplies
 - Explain the proper operation of the ELT
- The pilot must provide a life jacket for every passenger:
 - When operating from water

- For long flights over water
- Passengers must note the location of oxygen masks (if applicable) and know how to start the flow of oxygen.

4.4.4.13. Emergency Guidelines

Caution

In case of emergency, it is critical that each passenger be prepared to act decisively and correctly.

- Remain calm and follow the pilot's instructions.
- You will be flying a planned route and, if the helicopter makes an emergency landing, help should arrive soon.
- During an emergency event:
 - Listen to the pilot's instructions.
 - Remain calm and mentally review the emergency procedures that you have been taught.
 - Remove any sharp objects you may have in your pockets or around your heart area.
 - Re-tighten your seat belt.
- If the pilot notifies passengers of an emergency landing on water:
 - Assume the safety position – lean over and clasp your hands beneath your knees.
 - Remain in the safety position until aircraft movement has stopped.
 - Do not release the emergency exits or doors until instructed to do so by the pilot.
 - If the pilot is incapacitated, wait until all rotors have stopped before opening the cabin door/emergency exit.
- If the aircraft remains afloat:
 - Inflate your PFD after you have exited the aircraft.
 - Always remain with the aircraft because it is equipped with flotation gear and should stay afloat for a considerable amount of time.
 - Remember, you are flying a planned route and will be easier to find if you stay near the aircraft.
- If the aircraft begins to sink:
 - Wait until the cabin fills with water before the windows and doors are opened.
 - When the pressure has equalized, unlock, and open the door with a steady pressure.
 - Unfasten your seat belt and pull yourself toward the exit.
 - Swim clear of the aircraft before surfacing.
 - Inflate your PFD and group together with the other passengers.

4.4.4.14. Fixed Wing Aircraft

- When approaching and departing from a fixed wing aircraft stay in the pilot's field of view at all times. Approach only when the pilot indicates that it is safe to do so.

Safety Warning

The safety zones for approaching a fixed wing aircraft are different than for helicopters. Never approach the airplane while running unless instructed to do so and shown safe approach angles.

- Always beware of the propellers, particularly when engine/s is idling during warm up and brief stops to load or unload passengers, materials, or equipment. Never touch the propeller of a reciprocating/piston engine aircraft as the engine can turn over if the ignition switches are left on or are faulty. Never touch any part of the airplane unless instructed to do so by a crew member.
- The pilot is responsible for correct weight and balance of the aircraft. Only assist with loading heavy or bulky equipment or materials under the pilot's supervision.

4.4.4.15. Unmanned Aircraft Systems

- Unmanned aircraft systems (UAS) present a unique environment for personal safety that touches both traditional aviation and ground-based operations personal safety.
- The use of Unmanned Aerial Vehicles (UAV) also known as “drones” in the vicinity of Enbridge Locations requires approval from Aviation Services.
 - UAS Project Approvals Process must be completed prior to their use

4.4.4.16. Operational Hazards

- Unmanned Aircraft Vehicles (UAVs) have high RPM plastic or carbon fiber propellers that can cut human flesh to the bone in an instant. Do not approach a UAV unless the pilot advises that the controls are secure and that it is safe to approach. The landing/take off area for the UAV will be clearly delineated with cones and appropriate signage. UAVs may quickly return to land if a loss communication occurs. Listen to the instructions given by the pilot in command and ensure you stay clear of this area.
- Do not stand beneath a hovering UAV. A battery failure could cause the UAV to drop very rapidly and strike a person on the ground.
- Lithium Polymer (LiPo) batteries must be protected from physical damage and the contacts protected from short circuit. These events can cause very intense fires that are difficult to extinguish with traditional methods.

4.4.4.17. Planning for UAS Operations

- In planning the layout of a work site, the following minimum information must be considered when developing the pre-job or project plan:
 - Planned take off/landing areas and approach/departure paths with consideration of prevailing wind patterns, mechanical turbulence, built up areas, and obstacles if applicable (i.e., departure or approach near homes or farms with livestock),
 - Location of work areas for the various elements of the operation,

- Location of emergency landing areas,
- Location of landing areas,
- Location of any travelled roadway,
- Location of any potential hazards such as power lines, buildings, structures, or tall trees, and
- Known sources of potential radio interference (EMI/RFI).
- Workers must be informed of the work plan as well as the helicopter flight path to and from the helipad and/or landing zones. Flight paths and operational areas must be kept clear of equipment, or Personnel other than flight Personnel necessary to assist in landing and take-off.
- Workers must not be placed in an area where there are overhead hazards.
- Detailed UAS operations planning for pilots can be found in the Enbridge UAS Standard Operations Manual.

4.4.4.18. Personal Protective Equipment

When working with UAS, the pilot and visual observer are required to wear the following personal protective equipment:

- Approved safety footwear
- Class 2 HVSA to distinguish themselves from other Workers
- Approved hard hat with a chin strap
- Face shield or safety goggles where dust and flying debris may be present
- First Aid kit

It is recommended that the pilot and visual observer also have clothing that provides suitable protection against the weather.

4.4.4.19. Crew Communication Requirements

Good communication between the pilot and the ground crew is vital for carrying out helicopter operations in a safe and efficient manner. Before UAS operations begin, the visual observer, Supervisor and Workers involved in the operation must meet with the pilot in command to establish:

- Plans and procedures to be used
- Corrective measures required to minimize risks of injury to Workers
- Limitations and risks associated to the UAS
- Communication between the pilot and ground crew should be established by implementing the following minimum requirements:
 - Establish an effective system of voice communication signals between the pilot and the visual observers/ground crew (noise and distance may prevent verbal communication),
 - If available, two-way radio communication equipment shall be tested and the channels to be used established before operations begin. This is essential for UAS operations where direct verbal communications are not possible

- Established exact voice or hand signal commands to avoid any possibility of misunderstanding: all communication should be pertinent and brief
- Clearly marked location of cables and all known hazards in the way of anticipated flight paths on the plans and make the pilot aware of them

4.4.4.20. Spotter (Visual Observer) Requirements

The visual observer is an integral part of the UAV ground crew. Their role is to keep the pilot informed of other aircraft that could potentially enter the UAV flight operations area and to advise the pilot of any hazards that the UAV may be getting too close to or have the potential to cause a flight safety occurrence.

The visual observer shall:

- Remain within direct voice contact with the pilot at all times (by radio if remaining in close proximity to the pilot is not possible while performing their duties)
- Maintain visual contact with the UAV at all times with no exception
- Not perform any other duties other than those detailed in the Visual Observer briefing. They must not be distracted by other Workers or activities that would take attention away from their primary duties. It only takes a few seconds for a UAV to come in contact with an obstacle when operating in complex environments.

4.4.5. Documentation

- SAF-58.9012, “Long Line HTA Approval Request Form”
- UAS Project Approvals Process
- UAS Standard Operations Manual

4.4.6. References

- *29 CFR 1910.183 Materials Handling and Storage – Helicopters*

4.5. Boom Truck and Rigging

4.5.1. Purpose

This section is developed to provide the minimum safety requirements for the operation of boom trucks, including basic rigging, maintenance, and inspection. This section is compliant with the applicable OSHA regulations and the standards set out by the CSA.

4.5.2. Scope

This document applies to all Company owned and/or operated locations utilizing a boom truck.

4.5.3. Responsibilities

People Leaders shall:

- Ensure all boom trucks are inspected according to regulatory requirements.
- Ensure Operators of boom trucks are properly trained.
- Ensure Operators have the required jurisdictional certifications (i.e., state, or provincial).

- Ensure certification is current when Operator is operating equipment.
- Participate in developing specialized Lift Plans.

Employees shall:

- Operator must know and follow the operating procedures for boom trucks.
- Remove keys when not in use.
- Operator must have current proper certifications for boom truck operation.
- Do not exceed the lift capacity of the lifting equipment on the truck.
- Ensure a clear lift and operating zone which includes barricades if needed and clearances from hazardous equipment and electrical power lines.
- Rigger must know and follow proper rigging principles for a lift.

4.5.4. Requirements

4.5.4.1. Basic Operations

- All boom truck lifting equipment shall be visually inspected at the start of any lifting task.
- Visually inspect the area around the equipment and note any conditions that could contribute to an unstable foundation, such as:
 - Ground that appears soft, such as loose fill that has not been compacted.
 - Signs of utilities buried beneath the equipment, which may indicate voids underneath the equipment. If in a facility, use drawings to verify.
 - Lack of drainage from the set-up area so that rain may compromise the equipment's support.
 - Outriggers may not be set in the adjacent area of an excavation (the area to the sides of an excavation equal to its depth)
- All boom trucks shall be equipped with a load chart showing the rated load capacity at all boom angles and boom radiuses.
- All Serious or Critical Lifts must be performed in accordance with the Serious and Critical Lifts Section.
- All boom trucks shall be equipped with an effective back up alarm system.
- Unless the equipment operator has an unobstructed and clear view of the lift operation, a designed signal person must be used to communicate with the equipment Operator. This applies to all types of lifts.
- The equipment must not be used unless Ground Conditions are firm, drained and graded to a sufficient extent so that in conjunction (if necessary) with the use of Supporting Materials, the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met:
 - Outrigger support must be sufficient strength to prevent crushing, bending, or shear failure and be of such thickness, width, and length, as to completely support the float, transmit the load to the supporting surface, and prevent shifting, toppling, or excessive settlement under load

- At a minimum, outrigger support must be at least twice the square surface area of the outrigger float when used only for protection of firm surfaces such as asphalt or concrete. For larger cranes, or when outriggers are placed on less stable surfaces, the support should be three times the square surface area. Soils with low ground bearing capacity, or conditions that may contribute to an unstable foundation, may require additional support. Tech Staff engineering should be consulted as necessary.
- A variety of materials to ensure adequate support should be readily available to the crane operator.
- After equipment is set up and level, make a dry run of lift path with boom to ensure the outrigger support is not shifting, sliding, or sinking into the ground.
- Working from an aerial lift bucket requires the use of a full body harness with a lanyard attached to the designed point on the bucket.
- Rated load capacities for the boom shall be posted and visible to the Operator while at the control station.
- Boom trucks will not be operated where any part of the crane, jib, hoist, load, tag line or rigging will come within the minimum clearance distance of overhead power lines (see [Table 3](#) and [Table 4](#)).
- Basic rigging and load handling principles and minimal guidelines are listed as follows:
 - All lift rigging assemblies and spreader bars shall have a Working Load Limit (WLL)/Safe Working Load (SWL) that shall not be exceeded.
 - Alignment of the rigging slings shall be checked as the load is pulled tight on the rigging or sling before the actual load is lifted clear of any support.
 - Tag lines shall be used to control load swing, rotation and/or balance, when necessary, to prevent a hazard to Employees. When the bottom of the load is waist high or lower, tag lines are not required but can be used if additional stability is desired.
 - All wire rope and synthetic slings, lifting hooks, shackles, alloy chains and lifting eyes shall be visually inspected prior to any lift.
 - Damaged or suspect rigging equipment shall not be used and will be removed from service.
- Refer to and follow all sling capacity rigging charts for the proper sizing selection for each type of lift.
- Follow the practice of level load lifting to ensure the rated capacity of the slings or chains is not exceeded.

Table 2: Minimum Clearance Distances (U.S.)

Voltage (nominal, kV, alternating current)	Minimum Clearance Distance (ft)
Up to 50	10
Over 50 to 200	15
Over 200 to 350	20
Over 350 to 500	25

Voltage (nominal, kV, alternating current)	Minimum Clearance Distance (ft)
Over 500 to 750	35
Over 750 to 1,000	45
Over 1,000	(As established by the utility owner / operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

NOTE: The value that follows “to” is up to and includes that value. For example, over 50 to 200 means up to and including 200kV. [75 FR 48142, August 9, 2010]

Table 3: Minimum Clearance Distances (CAN)

Normal Phase-To-Phase Voltage Rating	Minimum Clearance Distance (m)
750 or more volts, but no more than 150,000 volts	3
More than 150,000 volts, but no more than 250,000 volts	4.5
More than 250,000 volts	6

* The wind can blow powerlines, hoist lines, or your load. This can cause them to cross the minimum distance.

4.5.4.2. Hoisting and Mechanical Lifting

- Hoisting equipment should be inspected before it is put into use, and it should be tested before being used on heavy loads.
- Baskets used for Personnel lifting will be designed and stamped by a certified Professional Engineer.
- The operator of hoisting equipment is responsible for the safe lift and shall determine whether the load to be lifted is within the capacity of the hoisting equipment and that the appropriate lifting device (i.e., chain, choker, sling, or bridle) is used.
- Synthetic slings are preferred to be used for hoisting rather than chains.
- All Employees should be alert and prevent anyone from walking under suspended loads or being near lines holding a strain.
- The operator and signal person must carefully observe the position of power cables, piping, valves pipelines, etc. before initiating the lift.
- The hoisting machine operator must keep their attention on the person giving the signals. The signal person must always keep their attention on the load.
- Only trained and authorized Personnel are permitted to operate hoisting equipment.
- Standing or riding on material hoists, crane blocks or crane loads is prohibited.
- When lifting pipe or any smooth-surfaced materials, slings (bridles and chokers) should be placed around the object with at least two turns or fastened choker fashion.
- Cables and fabric slings should be protected with pads (softeners) or blocks where they are placed around sharp edges.
- Loads should not be handled by any equipment beyond the capacity specified in the manufacturer’s chart.

- When handling heavy loads with pneumatic-tire mobile cranes or auto cranes which are provided with outriggers, the outriggers should be out on solid ground or good blocking and the machine on solid ground or mats.
- U-bolt clamps shall have the U-bolt on the deadline.
- Ropes should not be used for lifting. They should only be used for minor weight bearing activities, such as use as a tag line.
- Ropes which have been contaminated with oil, grease or chemicals should be properly discarded.
- Materials or equipment should not be left hanging on a hoist indefinitely. The item should be blocked and the tension on the lifting device slowly relieved after making sure the blocking or cribbing will support the load.
- Approved hand signals will be reviewed and used. A copy of the hand signal chart must be posted where the crane or hoist is used.

4.5.4.3. Cranes

- Only designated Personnel shall be permitted to operate a crane.
- Crane operation and Operators are required to adhere to OSHA crane regulations.
- The employer shall comply with the manufacturer's specifications and limitations applicable to the operation of all cranes and derricks.
- Rated load capacities, and recommended operating speeds, special hazard warnings, or instruction, shall be conspicuously posted on all equipment.
- Do not attempt to lift loads that exceed the rated capacity of the crane, hoist or lifting slings, rope, or chains. Remember, the smaller the angle on the legs of the sling or chain, the less lifting capacity.
- An accessible fire extinguisher of 5 BC rating, or higher, shall be available at all operator stations or cabs of equipment.
- Loads will be securely connected and balanced prior to lifting.
- Do not lift with kinks or twists in the wire rope or chains.
- Proper padding, blocking, and protective devices will be used to avoid sling damage.
- Check the area of lift and travel prior to the lift to ensure Personnel are notified and in safe positions and the area is clear of obstructions.
- No persons will be allowed under a lifted load.
- No persons will be allowed to ride the hook or load.
- Personnel must wear hard hats and any other personal protective equipment needed during hoisting operations.
- The Operator will not leave his position at the controls while a load is suspended from the hoist.

4.5.4.4. Normal and Heavy Service Levels

- Normal Service involves operation of lifting equipment with a randomly distributed load within the rated load limit or uniform load of less than (<) 65 percent of rated load limit for no more than 25 percent of the time for a normal work shift.
- Heavy Service involves operation of lifting equipment within the safe working load that exceeds normal service.

4.5.4.5. Slings – Safe Operating Practices

Whenever any sling is used, the following practices shall be observed:

- Slings that are damaged or defective shall not be used.
- Slings shall not be shortened with knots or bolts or other makeshift devices.
- Sling legs shall not be kinked.
- Slings shall not be loaded more than their rated capacities.
- Slings used in a basket hitch shall have the loads balanced to prevent slippage.
- Slings shall be securely attached to their loads.
- Slings shall be padded or protected from the sharp edges of their loads.
- Suspended loads shall be kept clear of all obstructions.
- All Employees shall be kept clear of loads about to be lifted and of suspended loads.
- Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.
- Shock loading is prohibited.
- A sling shall not be pulled from under the load when the load is resting on the sling.
- Each day before use, the sling and all fastenings and attachments shall be inspected for damage by a qualified person. Additional inspections shall be performed during use, where service conditions warrant.
- Damaged or defective slings shall be immediately removed from service.
- All slings should be stored in a well-ventilated, dry building or shed. Do not store them on the ground or allow them to be continuously exposed to the elements because this will make them vulnerable to corrosion and rust.

4.5.4.6. Alloy Steel Chain Slings

- Prior to use, any alloy chain sling that is new, repaired, or reconditioned must be proof tested by the sling manufacturer or equivalent entity. A copy of the certificate of proof testing must be maintained and available for examination.
- All alloy steel chain slings must have permanently attached durable identification. The identification must include the size, grade, rated capacity, reach and manufacturer.
- Hooks, rings, oblong links, pear shaped links, welded or mechanical coupling links or other attachments must have a rated capacity at least equal to that of the alloy steel chain with which

they are used, or the sling shall not be used more than the rated capacity of the weakest component.

- In addition to the “before each use” visual inspection required for all slings, a written periodic inspection of alloy chain slings must be made at least once every 12 months or more often, dependent upon use, conditions, and service.
- Alloy steel chain slings must not be used with loads more than the rated capacities prescribed in OSHA’s Guidance on Safe Sling Use ‘Tables and Figures’ (shown in [Table 4](#) and [Table 5](#)).
- If the chain size at any point of any link is less than that stated in OSHA’s Guidance on Safe Sling Use ‘Tables and Figures,’ the sling must be removed from service.
- Alloy steel chain slings with cracked or deformed master links, coupling links or other components must be removed from service.
- Slings must be removed from service if hooks are cracked, have been opened more than fifteen percent (15 percent) of the normal throat opening measured at the narrowest point or twisted more than ten degrees (10°) from the plane of the unbent hook.
- Clean and inspect the chain so that defects would be visible.
- Inspect each link for:
 - Twists or bends
 - Nicks or gouges
 - Excessive Wear
 - Stretch
 - Distorted or damaged master links, coupling links, or attachments
 - Defective Welds
- The periodic inspection must be documented and be available for examination. The record must include the most recent month and year the inspection was performed.

(Horizontal angles shown in parentheses)

Table 4: Rated Capacity (Working Load Limit), for Alloy Steel Chain Slings (in lbs.)

Chain size (inches)	Single branch sling–90° loading	Double sling vertical angle (1)			Triple and quadruple sling (3) vertical angle (1)		
		30° (60°)	45° (45°)	60° (30°)	30° (60°)	45° (45°)	60° (30°)
1/4	3,250	5,650	4,550	3,250	8,400	6,800	4,900
3/8	6,600	11,400	9,300	6,600	17,000	14,000	9,900
1/2	11,250	19,500	15,900	11,250	29,000	24,000	17,000
5/8	16,500	28,500	23,300	16,500	43,000	35,000	24,500
3/4	23,000	39,800	32,500	23,000	59,500	48,500	34,500
7/8	28,750	49,800	40,600	28,750	74,500	61,000	43,000
1	38,750	67,100	58,000	38,750	101,000	82,000	58,000
1 1/8	44,500	77,000	63,000	44,500	115,500	94,500	66,500

Chain size (inches)	Single branch sling–90° loading	Double sling vertical angle (1)			Triple and quadruple sling (3) vertical angle (1)		
		30° (60°)	45° (45°)	60° (30°)	30° (60°)	45° (45°)	60° (30°)
1 1/4	57,500	99,500	61,000	57,500	149,000	121,500	86,000
1 3/8	67,000	116,000	94,000	67,000	174,000	141,000	100,500
1 1/2	80,000	138,000	112,900	80,000	207,000	169,000	119,500
1 3/4	100,000	172,000	140,000	100,000	258,000	210,000	150,000

NOTES: (1) Rating of multileg slings adjusted for angle of loading measured as the included angle between the inclined leg and the vertical.
(2) Rating of multileg slings adjusted for angle of loading between the inclined leg and the horizontal plane of the load
(3) Quadruple sling rating is same as triple sling because normal lifting practice may not distribute load uniformly to all 4 legs.

Table 5: Minimum Allowable Chain Size at Any Point of Link

Chain size (inches)	Minimum allowable chain size (inches)
1/4	13/64
3/8	19/64
1/2	25/64
5/8	31/64
3/4	19/32
7/8	45/64
1	13/16
1 1/8	29/32
1 1/4	1
1 3/8	1 3/32
1 1/2	1 3/16
1 3/4	1 13/32

4.5.4.7. Wire Rope

- Wire rope slings shall not be used with loads that exceed the manufacturer's rated capacities. Rating tables are shown in OSHA's Guidance on Safe Sling Use 'Tables and Figures.' Slings not included in these tables shall be used only in accordance with the manufacturer's recommendations.
- Wire rope slings shall have permanently affixed and legible identification markings identifying the SWL, type(s) of hitch(es) used, the angle upon which it is based, and the number of legs if more than one.
- Wire rope slings shall be immediately removed from service if any of the following conditions are present:
 - Ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay.
 - Wear or scraping of one-third the original diameter of outside individual wires.
 - Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure.

- Evidence of heat damage.
- End attachments that are cracked, deformed, or worn.
- Hooks that have been opened more than 15 percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook.
- Corrosion of the rope or end attachments.

4.5.4.8. Synthetic Web Slings

- Each sling shall be marked or coded to show the rated capacities for each type of hitch and type of synthetic web material.
- Synthetic webbing shall be of uniform thickness and width and selvage edges shall not be split from the webbing's width.
- Fittings shall be:
 - Of a minimum breaking strength equal to that of the sling; and
 - Free of all sharp edges that could in any way damage the webbing.
- Attachment of end fittings to webbing and formation of eyes
- Stitching shall be the only method used to attach end fittings to webbing and to form eyes. The thread shall be in an even pattern and contain a sufficient number of stitches to develop the full breaking strength of the sling.
- Sling use: Synthetic web slings shall not be used with loads more than the rated capacities specified in OSHA's Guidance on Safe Sling Use 'Tables and Figures.' Slings not included in these tables shall be used only in accordance with the manufacturer's recommendations.
- When synthetic web slings are used, the following precautions shall be taken:
 - Nylon web slings shall not be used where fumes, vapors, sprays, mists, or liquids of acids are present.
 - Polyester and polypropylene web slings shall not be used where fumes, vapors, sprays, mists, or liquids of caustics are present.
 - Web slings with aluminum fittings shall not be used where fumes, vapors, sprays, mists, or liquids of caustics are present.

4.5.4.9. Hooks

- At least annually, hooks shall be visually inspected by a qualified person.
- Hooks found to have any of the following conditions shall be removed from service:
 - Any bending, deformation or twisting exceeding 10 degrees from the plane of the unbent hook.
 - Any distortion in the Throat opening of a hook causing an increase in the throat opening exceeding 15 percent.
 - Any wear exceeding 10 percent of the original section dimension of the hook or its load pin.
 - Cracks.

4.5.4.10. Inspections and Maintenance

- For equipment in normal service, inspect at least once per year, or as specified by the manufacturer.
- For equipment in heavy service, inspect at least every 6 months, or as specified by the manufacturer.
- For equipment that is idle for 6 months or more, a full formal inspection prior to use.
- Inspections of the hoisting equipment shall be made by a Qualified Person.
- Inspections based on manufacturer's recommendations shall be completed prior to each use and on regular intervals.
- Inspections shall be documented on the Overhead Crane and Truck Crane Inspection Form
- All boom truck / lifting equipment shall be regularly inspected according to the requirements on Overhead Crane and Truck Crane Inspection Form
- All maintenance repairs and routine service records will be retained at the area field office.
- All damage repairs to the lifting boom, once completed, will be inspected, and approved by a registered engineer.
- Records of all formal safety inspections will be retained at the area field office.
- All rigging equipment shall be inspected before each use.

4.5.5. Documentation

- SAF-58.9097, "Overhead Crane and Truck Crane Inspection Form"
- SAF-58.9136, "Job Hazard Analysis Form"
- Standard for Operation, Inspection, Maintenance and Testing of Overhead Cranes

4.5.6. References

- *OSHA 29 CFR 1910.180 Crawler Locomotive and Truck Cranes*
- *OSHA 29 CFR 1910.184 Slings*
- *OSHA Guidance on Safe Sling Use 'Tables and Figures'*
- *OSHA 29 CFR 1926.201 Signaling*
- *OSHA 29 CFR 1926.251 Rigging Equipment for Material Handling*
- *OSHA 29 CFR 1926.453 Aerial Lifts*
- *OSHA 29 CFR 1926.502 Fall Protection Systems Criteria and Practices*
- *OSHA 29 CFR 1926.550 Cranes and Derricks*
- *Standard for the Operation, Inspection, Maintenance and Testing of Overhead Cranes (Western Canada)*

4.6. Bonding and Grounding

4.6.1. Purpose

This section identifies information and requirements on how electric charges can build up on an object or liquid when certain liquids (e.g., petroleum solvents, fuels) move in contact with other materials. This can occur when liquids are poured, pumped, agitated, stirred or flow through pipes. This 'static' buildup of electrical charge can potentially discharge, causing an explosion when sufficient amounts of flammable or combustible substances are located nearby.

To prevent the buildup of static electricity and prevent sparks from causing a fire, it is important to bond or ground exposed metal. Bonding is done by making an electrical connection from one metal container to the other. Grounding is done by connecting the container to an already grounded object that will conduct electricity. This ensures that there will be no difference in electrical potential between the two containers and, therefore, no sparks will be formed.

4.6.2. Scope

This section covers all facilities and Company ROWs.

4.6.3. Responsibilities

People Leaders shall:

- Ensure that bonding and/or grounding equipment is readily available.
- Ensure tasks requiring the use of bonding and/or grounding are identified and communicated to Workers.

Workers shall:

- Wear appropriate hand protection when there is potential exposure to induced high voltage, including when handling pipe, valves, casing or measuring equipment.
- Avoid breaking, cutting, or detaching Bonding cables once they are in place, for as long as a fire hazard exists.
- Ground or electrically bond containers to each other when transferring liquids.
- Only fill portable fuel containers when they are on the ground (never do so in truck beds, on tailgates or in the trunks of vehicles).
- Immediately contact Qualified Workers if there are any concerns about induced high voltage and work equipment.
- Ensure each Bonding or grounding point is clean and free of paint, with a positive connection.
- Never use chains for Bonding or grounding purposes.
- Perform visual inspection of the cables and connection as required to ensure positive connection is maintained.

4.6.4. Requirements

4.6.4.1. General

- In some cases, such as where piping forms an electrical bond, it may not be necessary to install Bonding cables. Bonding cables shall meet Enbridge requirements set out in this Manual, industry standards and Applicable Legislation.
- Prior to use and during use, all portable equipment used in Bonding and Grounding work (e.g., welding units, generators, portable light plants, air compressors, etc.) shall be properly grounded, in accordance with manufacturers' specifications and Worksite requirements.

4.6.4.2. Bonding Cables

- When drawing oil or product samples from the line, or when loading or off-loading at sump tank locations, use an uncovered braided copper wire with an alligator clip brazed/clamped to each end (or use other suitable Bonding cable).
- Each pipeline crew shall have at least 2 prefabricated Bonding cables made of minimum 10-gauge stranded copper wire with a spade connector brazed/clamped on each end and at least 2 grounding clamps for attaching the Bonding cable to the pipe.
- Attach one end of the Bonding cable to a ground consisting of a copper ground rod.
- Type and depth of copper rod to be used shall be based on job planning requirements.
- Bond and/or ground when completing the following tasks:
 - cutting and separating a pipeline
 - separating flanges
 - loading or off-loading at sump tank locations
 - dispensing flammable liquids from bulk drums into a secondary container
 - removing an accessory attachment from a fixed Facility (e.g., a mixer from a tank)
 - using abrasive blasting equipment to clean tanks
 - hydrovacing
 - spray painting
 - when using compressors, pumps, and generators
 - drawing samples from a pipeline
 - drawing liquids from a pipeline into a pan
 - when AC voltage is present

4.6.4.3. Induced Voltage

- Where the pipeline follows a power line ROW, a hazard may exist if the pipeline lies within the electrical field generated by overhead transmission lines. The pipe can carry a hazardous AC voltage, known as induced voltage, which occurs due to stray electromagnetic field from the power lines. This hazard can also apply to pipe set up near high voltage sources on cribbing for welding. Where the hazard may exist, follow 2-2210 Induced Voltage and Fault Currents-Safety and Corrosion Procedure.

- Additional factors:
 - The voltage level depends on the current in the transmission lines, the geometric configuration of the pipeline with respect to the transmission lines, and the length of pipeline paralleling the transmission line.
 - Induced voltage caused by proximity to overhead transmission lines may continue to affect pipelines, even when the pipeline no longer parallels the transmission cables. Induced voltage can be a hazard for up to 16 km (10 mi) beyond the point of departure.
 - Once a Below Grade Facility is exposed, it shall be checked for induced voltage prior to commencing work on the Facility. The Facility shall be continually checked for induced voltage as required or monitored based on the Hazard Assessment.
 - The industry-accepted safe limit for induced voltage limit on pipelines, Appurtenances and other below grade facilities is 15V. Bonding and Grounding is therefore required to bleed off any charge more than 15V.
 - If further aid is required to reduce the induced voltage to below 15V, contact Operations Engineering to determine the need to install a grounding grid for Bonding and grounding Below Grade Facilities, vehicles, and equipment. If a grounding grid is installed, before starting work, ensure induced voltages on the bonded pipe, vehicles and equipment have been reduced to an acceptable level
 - Potential induction sites/areas (T-lines) shall be tested by a Qualified Worker.
 - Only Qualified Workers are to mitigate induced voltage hazards.
 - When the potential for induced voltage exists, a Hazard Assessment shall be completed and reviewed, with the involvement of the Workers doing the work.

(See [Table 6](#) below for installation requirements for Bonding Cables.)
- Contractors shall develop a safe work plan for controlling induced voltage. This plan shall include, but is not limited to, the following:
 - specialized PPE
 - measuring/testing
 - grounding requirements for planned work
 - work stoppage for adverse weather conditions

Table 6: Installing Bonding Cables

Task	Bond From	Bond To	Notes
Abrasive Blasting Equipment for Tank Cleaning	Blasting Hose Nozzle.	Tank Shell or Tank Roof.	N/A
Cutting, Installing and Separating of a Pipeline	<ul style="list-style-type: none"> • Grounding Clamp on one side of separation • Second cable from grounding clamp on one side of separation 	<ul style="list-style-type: none"> • Grounding Clamp on other side of separation • Grounding clamp on pipe section to be removed or installed 	<ul style="list-style-type: none"> • Ensure clamps contact clean, bare metal. • First cable shall be long enough to span the work area. • Second cable shall be long enough to clear the hazardous area when removing or installing pipe section.

Task	Bond From	Bond To	Notes
Drawing Samples from Pipeline	Attach alligator clip on one end of Bonding cable (unbraided copper) to sample point on pipeline (i.e., pipe, valve)	Other end of Bonding cable to alligator clip on metal sample container.	N/A
Draining Oil from Pipeline to Pan	Pipeline	Metal Drain Tray	For plastic drain trays, second end of Bonding cable shall always remain in contact with liquid being drained into tray.
Loading or Off-loading at Sump Tank Locations	Object being loaded/off-loaded	Sump tank or piping connection at loading / off-loading facility	For fiberglass sump tanks, attach second end to a specified bonding point.
Dispensing from Bulk Drums to Secondary Container	Bulk Drum	Secondary Container	One container shall be grounded, and the other container bonded to the grounded container.
Removing Accessory Attachments from Fixed Facilities	<ul style="list-style-type: none"> Clean, bare metal on accessory attachment Flange 	<ul style="list-style-type: none"> Fixed Facility Flange 	Bonding cable shall be long enough to clear the hazardous area when removing attachments or span of work area when separating flanges.
Hydrovacating Near Underground Electrical Wires	<ul style="list-style-type: none"> Wand/Gun Dig Tube Mat # 1 Mat #1 	<ul style="list-style-type: none"> Grounding Mat # 1 Grounding Mat # 2 Mat # 2 Hydrovac Truck 	For distances greater than (>) 1.8 m (6 ft.) from the Hydrovac truck, it may not be necessary to bond the mat to the truck (Step 4).

NOTE: Some tasks require more than one Bonding cable. The numbers listed in this table represent steps to be taken for proper Bonding (i.e., bond 1 to 1, and 2 to 2, etc.).

4.6.5. Documentation

- N/A

4.6.6. References

- CSA Z662:19 Part 10 Operating, Maintenance, and Upgrading
- NFPA 77 Recommended Practice on Static Electricity

4.7. Brush Cutting, Clearing and Vegetation Management

4.7.1. Purpose

This section outlines the minimum requirements for Workers maintaining the Right-of-Ways (ROWs) and facilities.

4.7.2. Scope

This section applies to all workers and contractors maintaining ROWs and facilities with the following equipment:

- Inclinometer/Clinometer** – Instrument for measuring angles of slope, elevation, or depression of an object with respect to gravity. Clinometers Measure both inclines (positive slopes, as

seen by an observer looking upwards) and declines (negative slopes, as seen by an observer looking downward) using three different units of measure and declines.

- **Power Take Off (PTO)** – The rotating torque portion or area of the machine, used to power equipment, such as blades, brush hogs, etc.
- **Roll-Over Protective Structure (ROPS)** – Compartment structure designed to protect equipment operator from injuries caused by overturns or rollovers attached to the tractor to prevent a turnover of more than 90 deg. And to prevent the driver from being crushed under the tractor.

4.7.3. Responsibilities

People Leader shall:

- Identify when brush cutting is a Ground Disturbance activity. (Must meet the criteria in the Ground Disturbance definition.)
- Ensure that Ground Disturbance precautions are in place prior to beginning brush cutting
- Ensure Workers are trained and competent

Workers shall:

- Be trained and competent to operate the motorized equipment used for cutting or clearing brush
- Wear the appropriate PPE

4.7.4. Requirements

- When using motorized equipment for cutting or clearing brush, Workers shall:
 - check the cutting area for any metal, large stones or other hard material that could damage the blades or cutter disc
 - regularly clean accumulated debris from the top of the cutter's fuel tank and from the engine, pumps, and axle protection plates on a regular basis
 - ensure other Workers do not approach the brush cutter's articulating joint when the brush cutter is operating
 - operate brush cutters with protective guards installed
 - wear additional PPE as required by the Hazard Assessment
 - ensure each brush cutter has protective guards and only operate brush cutters with the guards installed
 - dispose of brush and slash by mulching and spreading on an area designated by the Regional/Project Manager or an Enbridge ROW agent or landowner
- A Worker shall not operate a brush cutter when other Workers are within 91 m (300 ft.) of the front or sides of the brush cutter (refer to manufacturer's instructions for additional equipment-specific hazards).
- When mowing where human dwellings, vehicles, people, or livestock could be within 300 ft of the mower, such as a Class 3 Area, consider alternate equipment.
- Where alternate equipment is not feasible:

- Use double chain guards
- Maintain mower shields, side skirts, skid shoes, and blades in good operational condition,
- Raise cutting height to 6 inches minimum,
- Inspect area thoroughly before mowing to remove potential thrown object hazards,
- Never allow blades to contact solid objects like wire, rocks, post, curbs, guardrails, or ground while mowing.
- When overhead clearing of vegetation is being completed, all applicable precautions will be implemented.
- If clearing is required within limits of approach boundary to overhead powerlines a certified and / or licensed professional arborist will be utilized to perform the work. (Refer to the *Electrical Safety* section)

4.7.4.1. Equipment Safety – Riding Mowers and Tractors

- Prior to use, ensure ROPS are in good condition and raised into active position. If equipment does not have ROPS in place, check for unused bolt holes or brackets near the seat or frame to see if equipment should be equipped with ROPS. Never operate equipment if it is intended to be equipped with ROPS but ROPS is not in place.
- Provide and use approved seat belt assemblies on all equipment on which a ROPS has been installed.
- Where vertical clearance does not allow for ROPS to be raised, seatbelts shall not be worn. The ROPS shall be raised back to active position and seatbelt reconnected as soon as clearance allows.

Safety Warning

When ROPS is not raised the seatbelt shall not be worn.

- Riding mowers should be equipped with operator presence control system that shuts off the blades when the Operator dismounts or rises out of the seat.
- Riding mowers should be equipped with interlocks that ensure the engine cannot start while the mower is in gear or if the blade is engaged.
- Tractors should be weighted correctly for the work activities planned.
- Inspect the equipment before use and perform maintenance on schedule provided by fleet services.

4.7.4.2. Conditions for Safe Operation

- Survey the terrain (in advance of initiating work) for hazards prior to operations. Satellite imagery on EDGE may reveal erosion benches and/or roads not visible due to vegetation growth.
- Do not operate equipment on slopes that exceed the angle limits specified by the manufacturer. If the manufacturer limits are unavailable, evaluate the terrain and slope conditions to ensure the equipment is operated in a safe manner. Avoid operating on slopes

with an angle over 15 degrees when operating a riding mower or 20 degrees when operating a tractor if there is no other information available.

- Consider purchasing a slope indicator, also known as a clinometer or inclinometer, which can be attached to your equipment. Topographic maps or other means may be used to determine angle of known slopes in clearing area.
- When possible, back uphill and drive downhill. When driving downhill keep the equipment in low gear. Avoid mowing slopes you cannot back up unless you have equipment specifically designed and configured for crosscutting (i.e., slope mower).
- When stopping the mower or tractor:
 - Park on even ground, disengage the PTO (e.g., Bush hog) and lower all implements.
 - Place all control levers in neutral position, apply the parking brake, turn off engine and remove the keys.
 - Ensure the tractor has come to a complete stop before dismounting.
- Equipment should only be left unattended when it is on level ground with the brake set and the key removed.
- Do not operate equipment within 1.5 m (5 ft.) of the unprotected edges of retaining walls, embankments, levees, ditches, culverts, excavations, or similar locations that present an overturn or roll-over hazard.
- Do not mow wet grass on sloped surfaces. Reduced traction could cause sliding.

4.7.4.3. Equipment Safety – Chainsaws

Review manufacturer's instructions on the safe use, care, and maintenance of the chainsaw prior to use. Below are a few key items to remember:

- Use correct techniques to start chainsaw (on the ground or standing). Do not drop start or throw start the chainsaw.
- Wear proper apparel, especially chaps or leggings (to help avoid the most common cause of injuries related to chainsaws).
- Do not operate chainsaws from a ladder or above shoulder height (utilize saws with extended reach capabilities).

4.7.4.4. Personal Safety

- Utilize the Workplace Personal Protective Equipment Hazard Assessment Form to determine actual PPE requirements for locations and task(s).
- Personal Protective Equipment may include:
 - Gloves (preferably leather)
 - Safety glasses with side shields or safety goggles (Safety goggles should be used when dust or fine particles are present that can get around the edges of safety glasses or when a person is wearing prescription eyewear)
 - Face shield (chainsaw and weed trimmer)
 - Hard hats (chainsaws)

- Hearing protection
- Long pants
- Chaps (chainsaws)
- Safety shoes/boots
- Dust masks as appropriate
- Other equipment recommended by the manufacturer's operating manual
- Equipment Protective Guards and Systems includes:
 - Keeping all guards in place when the machine is in operation
 - Employees shall be protected from moving machinery parts
 - Employees are prohibited from altering/removing equipment guards and controls unless specified by manufacturer. (e.g., Temporary removal of ROPS)
 - Only hitch to the drawbar and hitch points recommended by tractor manufacturers.
- Other Safeguards for Workers
- Reference all owners' manuals for equipment being utilized. (Mowers, tractors, weed eaters, etc.)
- Utilize insect repellents (fleas, ticks, mosquitos, etc.).
- Take measures to protect from thermal stresses. (See Heat Stress or Cold Stress Section).
- Emergency plans should be developed before beginning work to include location of nearest medical facilities, directions or GPS coordinates for EMS if working in remote location, and a check-in system for lone operators.

4.7.5. Documentation

- Workplace Personal Protective Equipment Hazard Assessment Form

4.7.6. References

- N/A

4.8. Compressed Gas Cylinders

4.8.1. Purpose

The purpose of this section is to reduce the risk of injury and illness associated with the use of compressed gases.

4.8.2. Scope

This section applies to all Company locations where compressed gas cylinders are handled, maintained, and stored.

4.8.3. Responsibilities

People Leaders shall:

- Ensure gas cylinders are handled, maintained and storage meeting Company requirements

- Ensure that Workers are properly trained prior to using and handling of compressed gas cylinders

Workers shall:

- Use, maintain and store compressed gas cylinders according to the manufacturer's recommendations and Company requirements
- Recognize the potential hazards as well as the safety precautions, to prevent hazards from occurring when using, handling, and storing compressed gas cylinders

4.8.3.1. Compressed Gas Hazards

NOTE: *With so many compressed gas hazards, OSHA developed general compressed gas regulations as well as gas-specific regulations to eliminate and prevent injury and illness associated with compressed gases, regardless of content or packaging (cylinder, portable tank, or standing tank). OSHA regulates compressed gasses.*

- Under High Pressure: When a high-pressure cylinder accidentally ruptures or when a valve assembly breaks off, rocketing can occur. If the pressure of the contents increases enough, it can drive the cylinder, turning it into a missile that can blast its way right through a concrete wall.
- Flammable: Flammable gases catch fire easily and burn quickly. Hydrogen, acetylene, ethylene, propane, and natural gas are some examples. Gases that are both flammable and under high pressure are extremely dangerous.
- Asphyxiates (Inert): Inert gases displace oxygen for breathing and can lead to suffocation.
- Oxidizing: Oxidizing gases can explode violently when they react with organic and combustible materials.
 - It is important that containers of oxidizing gases or oxygen and associated equipment be free of oils, greases, and other hydrocarbon-based materials.
 - In addition, clothing which has been exposed to an oxygen-rich atmosphere is a fire hazard.
- Corrosive: Corrosive gases attack tissue and other materials. Workers should be aware that they will be required to wear special PPE and a self-contained breathing apparatus when handling these gases. Eyewashes and emergency showers must be available. Know their location.
- Toxic or Highly Toxic Poison/Gas: Toxic gases such as arsine, diborane, methyl bromide, nitric oxide, nitrogen dioxide, phosgene, and phosphine can only be handled by specially trained Personnel. Workers must be fully aware of the potential hazards involved and must wear the appropriate PPE to handle them.
- Cryogenic (Extremely Cold): A cryogenic liquid has a boiling point colder than -150 degrees Fahrenheit (-150 °F) at 14.7 psia.
 - Besides causing frostbite or burning the skin on contact, such a liquid can also be an asphyxiation hazard.
 - Cryogenic liquids require a higher level of PPE than other substances contained in pressurized tanks.

4.8.4. Requirements

4.8.4.1. General

- Facilities shall conduct a visual inspection to determine if compressed gas cylinders are in a safe condition prior to each use.
- Compressed gas cylinders, portable tanks, and cargo tanks shall have pressure relief devices installed.
- Compressed gas cylinders shall be secured in an upright position with the protective cap in place when the cylinder is not in use (e.g., cylinder storage rack).
- Store cylinders out of direct sunlight, when possible.
- Compressed gas cylinders shall have protected caps in place and be kept in an upright position except, if necessary, for short periods of time while cylinders are being:
 - hoisted or carried,
 - transported (provided they are adequately secured against movement and any TDG/DOT requirements are met)

Note: Acetylene and CO₂ compressed gas as well as cylinders containing pressurized liquid Oxygen, Nitrogen, or Argon must be kept in an upright position at all times.

- Cylinders being transported on the highway may require the vehicle to be properly placarded. The use of shipping papers, Hazardous Material Shipping Form, may be required.
- Cylinders 'in service' on welding trucks are not required to have protective caps in place if they do not protrude above the headache rack. Also, gauges need not be removed if an approved cart is used for cylinder movement.
- Cylinders equipped with gauges which will not be used for substantial periods of time, such as overnight, shall have the cylinder valves closed and cap secured.
- Before removing a regulator from a cylinder, the cylinder valves must be closed, and all pressure released from the regulators.
- Post conspicuous "NO SMOKING" signs around the flammable gas storage area.
- Pressure cylinders are in "storage" if they are not in use or connected for use.
- When stored, flammable gas cylinders and compressed oxygen cylinders shall be separated by at least 6 m (20 ft.) or by a non-combustible barrier 1.5 m (5 ft.) high with a fire-resistant rating of at least one-half hour.
- Oil or grease shall not be used on threaded portions of oxygen or acetylene cylinders or gauges.
- Empty cylinders shall be marked "Empty" or "MT" with chalk.
- Oxygen shall not be used as a substitute for compressed air.
- Oxygen cylinders shall be separated from flammable gas (fuel-gas) cylinders or combustible materials (especially oil or grease), a minimum distance of 6 m (20 ft.) or by a non-combustible barrier at least 1.5 m (5 ft.) high having a fire-resistance rating of at least one-half hour.
- Post conspicuous "NO SMOKING – OXYGEN" signs around the oxygen cylinder storage area.

- Keep all empty cylinders for the same kind of gas together.
- Separate full cylinders from empty ones.
- Review SDS of flammable or combustible product to determine the correct class prior to product use.
- Adequate precautions shall be taken to prevent the ignition of flammable vapors.
- Never store cylinder where the temperature may rise above 130°F.
- Never store cylinders near elevators, stairs, gangways, foot bridges, evacuation routes, operating cranes or where something might drop on them, hit them or knock them over.
- Inspect cylinders for corrosion, dents, and gouges and, if necessary, notify the Supplier to remove the cylinder from the worksite.

4.8.4.2. Transportation and Storage of Sample Cylinders

- DOT warning sticker (“Flammable Liquid”) shall be attached when shipping by common carrier.
- Sample cylinder shipments shall be made by common carrier or in non-passenger areas of company trucks.
- Exception: Cylinders or containers may be transported in helicopters from offshore locations.
- Samples should be stored under cover in ventilated, dry, cool areas free from open flame and not occupied by people.
- Full cylinders shall be separated from empty cylinders.
- Leaking cylinders shall be placed in a ventilated area away from sources of ignition.
- Ensure gauges are removed for transportation

4.8.4.3. Pressure Cylinder Handling

- Cylinders should be handled with great care, even when empty.
- Never try to refill cylinders to mix gases in a cylinder or transfer gas from one cylinder to another unless transferring breathing air.
- Never lift cylinders by their cap.
- Always wear leather protective gloves when handling cylinders.
- Cylinder valves must be capped before moving and loading.
- Avoid dragging or sliding cylinders.
- Where possible, use a mechanical lifting device, carts, mag-carts, or dollies to move and load cylinders.
- When using a crane or derrick to move a cylinder, a cradle, boat, or suitable platform shall be used. Slings or electric magnets shall not be used for this purpose.
- Take care to never drop cylinders or submit them to shock.
- Smoking is strictly forbidden when moving, loading, transporting, or unloading any cylinder, whether it contains flammable gas or not.

4.8.4.4. General Maintenance of Sample Cylinders

- Only trained Employees of the performing laboratory will repair leaking valves and replace ruptured discs as needed.
- “Caution” decals shall be attached to all leaking or damaged cylinders by either the performing laboratory or by facility Personnel.
- A stick-on label that states “Do Not Use a Wrench on These Valves” shall be attached by the performing laboratory.
- Working pressures of cylinders, tubing and fittings shall be equal to or greater than the source pressure.
- Areas shall advise performing laboratories of sample source and vapor pressure, if known.
- Cylinders shall be tested by a certified testing laboratory as specified in the Sample Cylinder Testing section. Records of the cylinder test dates must be maintained.

4.8.4.5. Disassembly of Piston Cylinder

- Vent both ends of the cylinder to atmospheric pressure before attempting to remove either end cap.
- Clamp the piston cylinder firmly to a steady work surface. Caution must be taken not to dent or bend the cylinder by applying excessive pressure.
- The area at either end of the cylinder must be clear before the end plug is loosened.
- Use a mechanical plunger to dislodge the piston from the cylinder. The plunger must be of suitable material so that it will not scratch the cylinder bore. Do not use fluid pressure.

Caution

Disassembly of the piston cylinder for maintenance presents a special hazard. Should either end cap be removed while pressure is on the cylinder, the end cap and the piston can be ejected with enough force to cause serious injury to Personnel and damage to adjacent equipment.

4.8.4.6. Pressure Cylinder Valves

Valve Operation

- Cylinder valves shall be closed:
 - When work is finished
 - On all empty cylinders
 - Do not use a hammer or wrench to open or close cylinder valves
 - If a valve is leaking or is stuck (cannot be opened or closed by hand):
 - Tag the cylinder
 - If indoor, move cylinder to a safe, ventilated location, preferably outdoors
 - Notify the Supplier ASAP to remove the cylinder from the worksite
 - Pressure Cylinder Regulators

- General Regulator Operation:
 - Use approved regulators or reducing valves only for the gas and pressures for which they are intended.
 - Inspect the regulator, union nuts and connections before each use to detect faulty seals that may cause leaks.
 - Replace damaged nuts or connections; do not use leaking regulators.
 - Return regulators to the Supplier for repair, calibration, or adjustment.
 - Before attaching a regulator to a cylinder and before opening the cylinder, fully release the regulator pressure-adjusting screw.
 - Always stand to the side when adjusting regulators.
 - Work procedures shall be followed when working with a flammable material or in a potentially explosive atmosphere.

4.8.4.7. Oxygen Cylinder Regulators

Safety Warning

Oil or grease on an oxygen regulator or its fitting may cause an explosion.

- Do not use oil or grease as a lubricant for regulators or fittings.
- Gauges used for oxygen service must be marked: “USE NO OIL”

4.8.4.8. Aerosol Cans

- Aerosol cans are widely used to apply paints, lubricants, insect repellent, or other contents. Some air horns are aerosol-activated.
- When exposed to heat, aerosol containers can either violently rupture or produce burning jets of flame; in either case, there is a risk of injury or property damage.
- The most effective method of preventing aerosol-related Events is proper storage:
 - Aerosols shall be stored under cover, protected from exposure to the weather and direct sunlight, and kept at least 3 m (10 ft.) from any source of heat or ignition.
 - Store aerosol cans at the correct temperature as recommended by the manufacturer.
 - Where aerosols are kept in distribution centers, they shall be stored within strong mesh enclosures (i.e., caged).

4.8.4.9. Propane Bottles and Accessories

- When a propane bottle is in use, fully open the valve, when not in use, fully close the valve. Do not use the valve to regulate the flow of propane.
- Store propane compressed gas Cylinders as follows:
 - outdoors on concrete or other non-combustible platforms
 - in an area that provides protection from tampering

- in an area free of vehicle or mobile equipment travel; if propane Cylinders are required to be temporarily stored in areas vehicle traffic is expected then they shall be protected by barriers
- away from a fire escape, stairs or building egress
- at least 7.5 m (23 ft.) away from buildings, unless in an approved storage cabinet; if using an approved storage cabinet, then store 1 m (3 ft.) away from buildings and 3 m (9ft.) away from air intakes
- at least 1 m (3 ft.) from other flammable compressed gas containers (e.g., acetylene)
- at least 6m (20 ft.) from containers or dispensers for Flammable Liquids and Combustible Liquids (e.g., gasoline and diesel fuel), or Cylinders of compressed oxygen
- Propane fueled, hand-held torches shall be used for their intended purpose, which is to be hand-held, and under constant supervision.
 - These torches shall only be used for pre-heating of piping and other specific intended purposes prior to welding.
 - They shall not be used for temporary heating and shall never be unattended.

4.8.4.10. Sample Cylinder Testing

- Sample cylinders shall be tested by a certified testing laboratory.
- Each sample cylinder shall be tested every five years.
- 500 cc stainless steel cylinders do not require testing.
- 1000 cc cylinders shall be tested every ten years.

4.8.5. Documentation

- Hazardous Materials Shipping Form

4.8.6. References

- *29 CFR 1910: Occupational Safety & Health Administration (OSHA) Standards*
- *29 CFR 1910.101, Compressed Gases (General Requirements)*
- *29 CFR 1910.105, Nitrous Oxide*
- *29 CFR 1910.110, Storage and Handling of Liquefied Petroleum Gases*

4.9. Confined Space Entry

4.9.1. Purpose

The Confined Space Entry section is to assist in the identification and control of hazards associated with entering and working in and/or around Confined Spaces within U.S. Gas Transmission and Midstream (GTM) operations facilities.

4.9.2. Scope

This section applies to UST facilities containing one or more Confined Spaces and to UST Projects and sets out:

- The criteria to distinguish between Permit-Required and Non-Permit Required Confined Spaces.
- The methods and process to re-classify Permit-Required Confined Spaces into Non-Permit Required Confined Spaces.
- The processes to manage the risk and hazards associated with Permit-Required Confined Space Entries.
- Determining whether a Standard or Alternate Entry Procedure may be used for a given Permit-Required Confined Space Entry.
- A step-by-step procedure for both Standard and Alternate Entry into a Confined Space.
 - The procedure outlines the steps in a Standard and Alternate Entry into a Permit-Required Confined Space.
 - The general restrictions on Enbridge Employees for these types of entries are listed in [Table 7](#):

Table 7: Confined Space Restrictions

Permit-Required Confined Space Entry (Standard Entry Required)	Permit-Required Confined Space Entry (Alternate Entry Allowed)	Non-Permit Required Confined Space Entry (includes temporarily reclassified spaces)
Enbridge Employees do not perform entry (i.e., Contractor with confined space program would conduct entry if required)	Enbridge Employees do not typically perform entry (i.e., Supplier with confined space program would conduct entry if required)	Enbridge Employees may perform entries.
If Enbridge Employee is required to perform entry, the following apply: <ul style="list-style-type: none"> • Special authorization by Enbridge Area Management / People leader • Coordination and consultation with H&S Support 	If Enbridge Employee is required to perform entry, the following apply: <ul style="list-style-type: none"> • Special authorization by the Enbridge Person in Charge (PIC) • Coordination and consultation with H&S Support 	

Note: *Confined Spaces within trenches and excavations are not covered in this section. See the Excavation and Trenching Safety section in this Manual.*

Definitions taken/adapted from OSHA 1910.146(b) applicable to this procedure include:

- **Confined Space:** A space that must meet all three of the following:
 - Is large enough and so configured that a person can bodily enter and perform assigned work?
 - Has limited or restricted means for entry or exit (e.g., tanks, vessels, vaults, and pits are spaces that may have limited means of entry)?*
 - Is not designed for continuous employee occupancy?

***NOTE:** *Vaults or valve pits with an open top (i.e., no restricted entry such as a manhole) and 1.2 m (4 ft.) deep or less do not meet these criteria and should not be considered a “confined space”.*

- **Hazardous Atmosphere:** A hazardous atmosphere is an atmosphere that may expose Employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is,

escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

- Flammable gas, vapor, or mist more than 10 percent of its Lower Flammable Limit (LFL) or Lower Explosive Limit (LEL)
- Airborne combustible dust at a concentration that meets or exceeds its LFL
- Oxygen concentration below 19.5 percent or above 23.5 percent
- Atmospheric concentration of any substance above OSHA's permissible exposure limits (PEL) (e.g., H₂S of 10 ppm or greater, CO of 50 ppm or greater), or
- Any other atmospheric condition that is immediately dangerous to life or health (IDLH)
- **Permit-Required Confined Space (PRCS):** A confined space with one or more of the following:
 - Contains or has the potential to contain a hazardous atmosphere
 - Contains a material that has the potential for engulfing an entrant
 - 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, or
 - Contains any other recognized serious safety or health hazard
- **Non-Permit Required Confined Space:** A confined space that does not:
 - Contain or have the potential to contain a hazardous atmosphere, or
 - Contain any hazard capable of causing death or physical injury
- **Entry Supervisor:** Person (Supervisor or their delegate) responsible for:
 - Determining if acceptable entry conditions are present at a Permit-Required Confined Space where Entry is planned
 - Authorizing and overseeing Entry operations
 - Terminating Entry
- **Attendant:** A trained individual stationed outside one or more PRCSs who monitors the Authorized Entrants and who performs all Attendant duties assigned in the Confined Space procedure.
- **Authorized Entrant:** A trained individual who is authorized by the Entry Supervisor to enter the PRCS to conduct work.

4.9.3. Responsibilities

People Leader shall:

- Ensure Permit-Required Confined Spaces are identified and marked appropriately with signs or labels when required.
- Ensure all facility or operating areas have an accurate inventory of Confined Spaces on their site(s) and that this is reviewed annually.
- Ensure Employees are trained for all Confined Space Entry Roles they will be required to fulfill.

- Support Confined Space hazard assessment processes and encourage and support implementation of effective control measures, with an eye to:
 - Eliminating hazards
 - Allowing spaces to be reclassified to allow Alternate Entry Procedures or Non-Permit Confined Space Entry Procedures and/or
 - Work to be completed without entry
- When a Contractor is used to conduct a Confined Space Entry, ensure that:
 - Only approved Contractors are used
 - Contractors are aware the procedure requirements and associated hazards
 - Contractors provide a written Confined Space Entry work plan
 - Contractors have evidence of proper training
 - All necessary safety equipment is provided by the Contractor and on-site
 - A formal transfer of control of the Permit Required Confined Space is conducted
- Ensure that the emergency rescue services provided for a Standard Entry into a Permit Required Confined Space is sufficient for the type of space and hazards it presents (e.g., SCBA/SABA outfitted rescue team, lifting devices for vertical entry, etc.).
- Involve H&S Support whenever planning a Permit Required Confined Space Entry.
- Ensure post-entry Confined Space Entry requirements are fulfilled, including:
 - Debrief of Authorized Entrants to determine if hazard controls were effective or unanticipated hazards were confronted and document these for future entry plans
 - Maintaining a record of all completed or cancelled Entry Permits and Reclassification Checklists
 - Review these records annually as part of a continuous improvement exercise for future entry planning

People Leader (Enbridge Representative, overseeing local Confined Space Entry) shall:

- Be trained in Confined Space Entry requirements
- Participate in (or at least is familiar with) the identification and signage of Confined Spaces within their facility or operating area and the corresponding inventory of Permit Required Confined Spaces
- Have knowledge of the following:
 - Hazards associated with the Confined Space(s) to be entered and the work to be performed
 - Atmospheric monitoring requirements and the equipment to be used
 - Emergency Response Plan (and individual Rescue Plan for a Standard Entry into a Permit Required Confined Space)
- Engage in the hazard assessment and entry planning process for entries and ultimately responsible for:

- Mandating required controls, including the isolation, de-energization, and Lockout/Tagout plan if required for a Confined Space
 - Setting acceptable entry conditions
- Engage in the communication process with any Contractors on site who will conduct an entry into a Permit Required Confined Space to ensure there is a full discussion on:
 - The hazards presented by the Confined Space
 - Any preparation or control activities already conducted on the Confined Space such as isolation Lockout/Tagout and mechanical ventilation
 - Additional control measures or activities that the Contractor is responsible to implement or conduct
 - Entry plans and any job planning documents (including JHAs performed as part of the preparation for Entry and work inside the Confined Space)
 - Which Confined Space Entry Permit system will be used (by default the Contractor's system is used for Contractor Entries)
 - Any additional permitting requirements (e.g., Hot Work Permit)
 - Coordination with any other work activities that may be ongoing just before or during entries
 - Rescue plans (whether provided by Contractor Personnel themselves or by another contracted third party)
- Verify that:
 - Contractor Confined Space Training requirements appear to be in order
 - Contractor has brought the necessary equipment on site to perform the entry and execute the documented rescue plan
- As part of Entry activities:
 - Verify completion of isolation, de-energization, and Lockout/Tagout and any other controls including ventilation are implemented as expected prior to entry activities.
 - Atmospheric testing is conducted and meets acceptable entry conditions.
 - If applicable, signs off on Confined Space Transfer of Control to Contractor.
 - Complete and sign permits as applicable, for example:
 - Safe Work Permit (if Asset Area requires use of a Safe Work Permit for work to be conducted inside a Confined Space)
 - Hot Work Permit (in event Hot Work is being conducted inside Confined Space)
 - Confined Space Entry Permit (if serving as Entry Supervisor for Enbridge Employees serving as Authorized Entrant)
- Debrief Contractor Personnel at the end of entry operations regarding procedures and any hazards confronted or created during entry operations and documents findings.

Contractor (General Duties) shall:

- Provide evidence on demand of appropriate training for any Personnel assigned to serve as Entry Supervisor, Authorized Entrant, Attendant, or Rescue
- Provide a written Confined Space work plan and any procedures that will be followed as part of any Permit Required Confined Space Entry
- Provide a copy of the Confined Space Entry Permit system they will use on site
- Confirm they will either provide rescue Personnel or contract rescue Personnel for any Standard Entry into a Permit Required Confined Space
- Engage in pre-planning activities and make their Personnel available for pre-entry meetings and post-entry debriefing activities

Entry Supervisor (may be a Contractor) shall:

- If applicable, sign off on Confined Space Transfer of Control to Contractor to accept responsibility for subsequent entry activities
- Confirm with Company PIC that all anticipated preparation activities and documented controls have been completed and implemented
- Confirm all pre-entry rescue preparation is complete including equipment deployed and Personnel on appropriate standby
- Complete or confirm any forms, worksheets, or checklists as required to confirm the confined space meets the requirement for an Alternate Entry Procedure or entry as a Non-Permit Required Confined Space
- Know the space-specific hazards including:
 - Acceptable atmosphere levels for explosive gases or vapors, oxygen, and toxic substances
 - The mode, signs, and symptoms of exposure to potential substances in the confined space
- Verify correct completion of the Confined Space Entry Permit, including ensuring per-entry atmospheric testing is completed and provides expected results
- Sign the Entry Permit prior to Authorized Entrants entering the Confined Space
- Terminate the Entry and cancels the Entry Permit when:
 - Entry operations covered by the permit have been completed
 - A condition that is not allowed under the permit arises in or near the Confined Space
- Remove any Unauthorized Person who enters or attempts to enter the Confined Space during Entry operations
- Whenever responsibility for an Entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, the Entry Supervisor must determine that Entry operations comply with the requirements of the Entry permit and that acceptable Entry conditions are maintained

Authorized Entrant (maybe Contractor) shall:

- Be trained in the Confined Space Entry program

- Be essential to the work planned within the Confined Space and has been authorized by the Entry Supervisor prior to entry
- Have knowledge of the following:
 - The hazards presented by the confined space being entered
 - The mode, signs, symptoms, and consequences of exposure to potential substances in the confined space
 - The proper use of all required PPE, monitoring equipment, and other safety equipment
 - The system used to communicate with the Attendant
- Wear all required PPE (as communicated by the Entry Supervisor) including any respiratory protection and harness with lifeline attached (as appropriate).
- Be considered to have entered a permitted confined space once any part of his body has broken the plane.
- Exit the permit space when ordered to evacuate and when a prohibited hazardous condition is recognized. In the event of exiting due to hazardous conditions arising, the entrant would also:
 - Immediately communicate this to Attendant/Safety Watch
 - Await determination if the permit is deemed void and a new one is issued before re-entry

Attendant (maybe Contractor) shall:

- Be trained in the Confined Space Entry program and duties of an Attendant.
- Be authorized by the Entry Supervisor to fulfill this role.
- Remain stationed outside the access opening of the Confined Space while it is occupied.
- Always maintain communications with entrants.
 - If the job does not allow the Attendant to be in visual contact with the Entrant(s), then prearranged lifeline signals or radios must be used.
- Maintain an accurate count of entrants.
- Have knowledge of the following:
 - The hazards presented by the confined space being entered
 - The mode, signs, symptoms, and consequences of exposure to potential substances in the confined space
- Monitor the atmosphere and physical hazards as per the Entry plan and Confined Space Entry Permit requirements
- Alert Workers of hazardous conditions or a change in conditions
- Initiate evacuation and rescue procedures
- May perform a non-entry rescue as per the rescue plan
- Not perform duties that might interfere with the primary duty to monitor and protect the authorized entrants
- Is empowered to:

- Refuse unauthorized entry into the permit space
- Direct entrants to evacuate the permit space
- Not leave their post until another attendant has been briefed and taken over the duties

Rescue Team Personnel (may be Contractor) shall:

- Be trained in the Confined Space Entry program, including requirements of an Authorized Entrant as well as their assigned rescue duties and Responsibilities
- Be trained on required PPE and rescue equipment for the Entry being conducted
- Be trained in basic first aid and CPR. At least one member must have current certifications available
- Participate in Confined Space rescue drills at least once every 12 months
- Inform of hazards they may experience when called to perform a Confined Space rescue
- Provide with access to and information for all Confined Spaces which may require rescue to allow for the development of an appropriate rescue plan and practice rescue operations
- Participate in the development or sufficiently review the rescue plan prior to Entry

4.9.4. Requirements

4.9.4.1. Identification and Management of Confined Spaces

- Identify all potential Permit Required Confined Spaces within each facility and field pipeline system. Spaces identified must be tracked through:
 - An inventory kept on file at each manned facility and at the field office for each pipeline system using the SAF-58.9006 Confined Space Log Form; or
 - Identification on a facility plot plan.
- Conduct an annual review of the Confined Space program within each facility and field pipeline system that consists of:
 - Determining if the existing inventory or plot plan is still up to date.
 - Reviewing entries conducted in the previous year to determine if there are lessons learned that should be applied to future Entry Plans or Entry Permits for that Confined Space or more generally.
 - The completion of this review must be documented.

4.9.4.2. Entry Prevention/Signage Requirements

- All spaces identified in a location's Permit Required Confined Space Inventory or plot plan must either be:
 - Secured against entry (e.g., bolted shut or locked), or
 - Identified by a sign at the entry point to indicate that this is a Permit Required Confined Space (or Confined Space) and that entry is not permitted without a permit
- The sign should contain wording such as shown in [Figure 2](#).

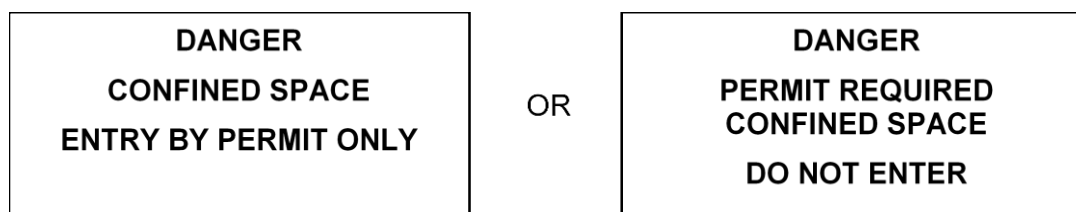


Figure 2: Example of Permit Required Confined Space Signage Requirements

- During entry activities when Confined Spaces normally bolted or locked shut may be left open, effective temporary or portable signs (as above) and barriers (e.g., cones, temporary fencing, barrier tape) shall be installed near the Confined Space to prevent unauthorized entry.
- If a Permit Required Confined Space is temporarily reclassified as a Non-Permit Confined Space, signs requiring permit should be covered or adjusted to prevent confusion. An appropriate type of sign is shown in [Figure 3](#).



Figure 3: Example of Non-Permit Confined Space Signage Requirements

4.9.4.3. Three Categories for Confined Space Entry

Within the OSHA Confined Space Regulations, there are three categories for Confined Space Entry:

- Standard Entry into a Permit Required Confined Space
 - All the requirements of permit space entries apply such as the use of a Permit, Attendant, Rescue Personnel, extraction equipment.
- Alternate Entry into a Permit Required Confined Space
 - A reduced level of controls may be applied if the only hazard within a Confined Space is a potentially hazardous atmosphere, and this can be successfully controlled with mechanical ventilation. In this case, the use of a Permit and pre-entry atmosphere testing still applies but an Attendant or Rescue Personnel are not required.
- Entry into Non-Permit Required Confined Space
 - For this type of work, serious hazards and the potential for a hazardous atmosphere have been fully eliminated (without any further need for mechanical ventilation), allowing work to be conducted without a Confined Space Entry Permit. If a space is only temporarily being classified as a Non-Permit Required Confined Space (i.e., under normal conditions or certain conditions it would be a Permit Required Confined Space), the remediation work to reclassify and testing to establish it is no longer a Permit Required Confined Space need to be documented.

- For Offshore, the Confined Space Entry Permit form provides a means to document a formerly Permit Required Confined Space is now (temporarily at least) a Non-Permit Required Confined Space.
- For UST and US Projects, use Confined Space Reclassification Checklist
- When considering work that must be performed inside a Confined Space, the following priorities should be followed:
 1. If possible, conduct the work from outside the Confined Space (i.e., avoid Entry altogether)
 2. If #1 is not possible, remove all hazards capable of causing death or physical injury and any potential for a hazardous atmosphere to permanently or temporarily classify the Confined Space as a Non-Permit Required Confined Space.
 3. If #2 is not possible, remove all hazards capable of causing death or physical injury and use mechanical ventilation as necessary to prevent a hazardous atmosphere to allow for an Alternate Entry into a Permit Required Confined Space.
- Whenever feasible, eliminate atmospheric or other hazards and confirm hazards have been eliminated from the confined space from outside the confined space to avoid entry.
 - Where entry is required to eliminate hazards and/or to confirm hazards are eliminated, the entry must be performed under the Permit Required Confined Space Standard Entry procedure.
- For further assistance in choosing an appropriate entry procedure, see [Table 8](#):

Table 8: Minimum Entry Conditions and Requirements for Confined Space Entry Procedures

Entry Condition & Requirements	Permit Required Confined Space Entries			Non-Permit Required Confined Space Entry
	Standard Entry		Alternate Entry*	
	Hot Work	IDLH		
Entry Permit	Yes	Yes	Yes	No
Toxic Gas / Vapor Oxygen	Toxic gases/vapors are < PEL O ₂ is 19.5 – 23.5%	Toxic gases/vapors are > PEL and/or O ₂ is <19.5% or >23.5%	Toxic gases/vapors are < PEL O ₂ is 19.5 – 23.5%	Toxic gases/vapors are < PEL O ₂ is 19.5 – 23.5%
Flammable Atmosphere	Zero LEL	< 10% LEL	< 10% LEL	< 10% LEL
Cleaning (if and as applicable)	<ul style="list-style-type: none"> Wash and/or steam. Remove any residual flammable substance. 	<ul style="list-style-type: none"> Wash and/or steam Remove all free liquids and solids that may off-gas. 	<ul style="list-style-type: none"> Wash and/or steam Remove all free liquids and solids that may off-gas. 	<ul style="list-style-type: none"> Wash and/or steam Remove all free liquids and solids that may off-gas.
Inert Purge (if and as applicable)	<ul style="list-style-type: none"> Initial purge to eliminate flammable atmosphere. 	<ul style="list-style-type: none"> Initial or continuous purge to eliminate flammable atmosphere. 	<ul style="list-style-type: none"> Initial purge to eliminate flammable atmosphere. 	<ul style="list-style-type: none"> Initial purge to eliminate flammable atmosphere.

Entry Condition & Requirements	Permit Required Confined Space Entries			Non-Permit Required Confined Space Entry
	Standard Entry		Alternate Entry*	
	Hot Work	IDLH		
Ventilation	<ul style="list-style-type: none">Ambient ventilation until safe, orForced air ventilation if necessary.	<ul style="list-style-type: none">Ventilate as needed to control flammable atmosphere.	<ul style="list-style-type: none">Continuous forced air ventilation.	<ul style="list-style-type: none">Mechanical ventilation not required to prevent a potentially hazardous atmosphere.
Respiratory Protection	<ul style="list-style-type: none">Wear APR as needed for welding gases/vapors.SCBAs for rescue.	<ul style="list-style-type: none">Wear Supplied Air Respirator.SCBAs for rescue.	<ul style="list-style-type: none">No respiratory protection needed.	<ul style="list-style-type: none">No respiratory protection needed.
Air Monitoring (Testing)	<ul style="list-style-type: none">Initial pre-entry test; continuous monitoring; periodic testing/recording.	<ul style="list-style-type: none">Initial pre-entry test; continuous monitoring; periodic testing/recording.	<ul style="list-style-type: none">Initial pre-entry test and continuous monitoring.	<ul style="list-style-type: none">Initial pre-entry test and continuous monitoring.
Attendant	Yes	Yes	No	No
Rescue Plan	Yes	Yes	No	No
NOTE: Alternate Entry Procedure can be used when the only hazard posed is a potential hazardous atmosphere. If possible, reclassify the Permit Required Confined Space as a Non-Permit Confined Space.				

4.9.4.4. Written Confined Space Entry Plan

Create or review a written Confined Space Entry Plan prior to conducting Permit Required Confined Space Entries using the Confined Space Entry Assessment/Checklist.

The plan must address:

- Identification of the site/location and spaces where work is to be performed
- Specific hazards associated with the Confined Space as determined through the evaluation
- SDSs of any chemical hazard which was present and/or eliminated
- How the space will be prepared
- How the hazards will be eliminated and/or controlled
- Consideration should also be given to activities to be performed in or around the Entry locations or other air intake locations which may have a potentially negative impact on atmospheric conditions within the Confined Space
- Monitoring requirements and equipment to be used during the Entry and who will conduct monitoring
- Acceptable entry conditions
- Entry procedures (including whether Standard, Alternate, or Non-Permit Entry procedures are anticipated during work activities)
- Communication methods (between Entrants and Attendants and Rescue Personnel)
- Emergency rescue plan and designated rescue entity
- PPE and other confined space entry equipment required considering the plan

- Review of potential new hazards introduced or discovered once entry activities are underway

4.9.4.5. Isolation

- If a confined space contains a flammable gas or vapor, purge the confined space with an inert gas (typically nitrogen) and then introduce air before the space is opened.

NOTE: *The goal of a purge is to prevent a flammable/explosive fuel/air mixture by sweeping out the flammable gas or vapor prior to the introduction of air. The nitrogen atmosphere, however, is a personal safety hazard as an oxygen deficient atmosphere and must be managed as such.*

- Where a Permit-Required Confined Space is a process or storage vessel or space enclosing fluid handling equipment that will be opened, the vessel and/or equipment must be completely removed from service and protected against the release of energy and material into the space by such means as:
 - Blanking or Blinding – disconnection of all inlet and outlet lines and installing blind flanges or slip blinds (skillets) between flanges.
 - Misaligning or removing sections of lines, pipes, or ducts; and/or
 - Double Block and Bleed – Closure of a line, duct, or pipe by closing and locking or tagging two inline valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.
 - If double block and bleed is used, ensure, and verify drain and/or vent is open and left open.
- Apply Lockout Tagout (see Lockout Tagout section)
- If Permit-Required Confined Space isolation cannot be obtained by Blanking or Blinding, misaligning or section removal, or Double Block and Bleed prior to Entry, ventilation must be used.
- Eliminate or control atmospheric hazards in the Permit-Required Confined Space by purging, inerting, and/or flushing.
- If this cleaning and natural ventilation cannot effectively eliminate or control the atmospheric hazard to an acceptable condition, mechanical ventilation must be used throughout the Entry operation.

4.9.4.6. Entry Equipment (for Permit Required Confined Space Entry)

- Use ventilation equipment to obtain acceptable entry conditions when:
 - The permit space preparation procedures (isolation of product and/or space cleaning) cannot eliminate all atmospheric hazards
 - The work being performed by the Authorized Entrants could pose an actual or potential atmospheric hazard. Examples would be welding, use of chemical in the space, etc.
 - Heat and heat stress could present an employee hazard
- Ventilation equipment must be used to obtain acceptable entry conditions when:
 - The permit space preparation procedures (isolation of product and/or space cleaning) cannot eliminate all atmospheric hazards

- The work being performed by the Authorized Entrants could pose an actual or potential atmospheric hazard. Examples would be welding, use of chemical in the space, etc.
- Heat and heat stress could present an employee hazard
- When work inside a Confined Space is underway, if necessary, use ventilation equipment to prevent the accumulation of toxic fumes or oxygen depletion due to the work being done, accumulation of dust or other particulates, and heat stress.
- Positive or negative pressure ventilation can be used to ventilate the Confined Space.
- Use direct-reading atmosphere testing/monitoring equipment (where technically possible) that is intrinsically safe and properly maintained (see further Atmosphere Testing and Monitoring).
- Provide sufficient lighting to enable the Entrants to work safely and to exit the space quickly.
- This lighting equipment must be explosion proof or intrinsically safe when being used in a Confined Space where there is a potential explosive atmospheric hazard.
 - Where possible, route electrical leads through an alternate opening other than the one used for employee Entry.
 - If not feasible, caution shall be taken to prevent an electricity related event associated with leads running through the entry/exit point.
- Use personal protective equipment (PPE) based on the existing or potential hazard(s) within the Confined Space (and documented as controls in Pre-Entry Plans and/or the Entry Permit), including applicable:
 - Head protection
 - Hand protection
 - Protective clothing
 - Eye and face protection
 - Respiratory protection
 - Foot protection
 - Other PPE, as deemed necessary
- Consult with H&S Support if the Confined Space has potential characteristics such as exposure to acid, alkali, carcinogenic material, or other atmospheric hazards where respiratory protection may be deemed necessary.
- Provide the Attendant, Authorized Entrant, and Rescue team with communications equipment to allow them to contact each other in event of an emergency.
 - This can be accomplished by line of sight, air horn, radios, sirens, lights, etc.
 - This should be identified in the written Confined Space Entry work plan.
- Provide an acceptable means of entering and exiting the Confined Space.
- Ensure the following rescue and emergency equipment is provided by the designated rescue Contractor (at minimum):
 - Chest or Body Harness (wristlets in certain situation where this provides for a better / safer means of extraction)

- Retrieval Line
- Testing / Monitoring Equipment for rescue Personnel (when not available at the site outside of Confined Space)
- Mechanical Retrieval Device (in vertical type Confined Spaces)
- Emergency Communication Equipment (see previous list for various means of communication)
- First aid supplies must be available and affected Personnel aware of the designated location.
- Ensure other equipment deemed necessary for a safe entry operation, as indicated on the Entry Permit, has been assembled and is available for use.

4.9.4.7. Atmosphere Testing and Monitoring

- Test the atmosphere inside a Permit-Required Confined Space to determine if acceptable entry conditions exist before authorizing entry.
- Conduct the atmospheric testing in the following sequence:
 1. Oxygen Content
 2. Flammable Gas/Vapors/Mists
 - a) Typically, “LEL” reading and usually requires standard O₂ levels for an accurate reading
 - b) Specialized testing equipment/head is required to measure flammable gases in oxygen depleted environments (e.g., if inert gas purging is applied).
 3. Hazardous Substances
 - a) CO [Carbon Monoxide] and H₂S [Hydrogen Sulfide] are most common
 - b) Other hazardous substances noted in the Pre-Entry Planning or Permit may also require testing, especially prior to an initial entry to determine effectiveness of purging or cleaning activities when the space was closed.
- Standard acceptable atmospheric conditions are:
 - Oxygen level between 19.5 percent and 23.5 percent
 - Flammable gas/vapor/mist less than 10 percent of the lower explosive limit (LEL)
 - Flammable gas/vapor/mist reading of 0 percent of the LEL if hot work is to be performed inside the Confined Space.
 - Hazardous substance concentrations below permissible exposure limit (PEL).
- Conduct periodic and continuous atmospheric monitoring whenever there is potential for atmospheric conditions measured prior to or during Entry to change while work is being conducted (e.g., the work itself produces atmospheric hazards, there is potential for other types of off-gassing, complete isolation is not possible or only single block isolation is physically possible, migrating gases from adjacent operations, etc.)
 - This requirement should be developed in the Pre-Entry Plan and documented on the Entry Permit.
- Testing/monitoring equipment must be:

- Calibrated per manufacturer's instructions.
- Bump tested per manufacturer's instructions prior to Entry.
- Equipped with audible alarms when continuous monitoring is required.
- Capable of remote sampling (i.e., internal, or external pump, real time readout, tubing, and probe).
- Testing/monitoring must be performed by Personnel trained to use equipment.
- Perform the initial test of the atmosphere inside the Confined Space:
 - With any forced ventilation turned off to determine potential atmosphere if ventilation fails and better determine hazard levels.
 - From outside of the Confined Space (using a pump/tubing assembly on the monitor)
 - At all levels of the space (top, middle, and bottom).
 - As such, tubing on the equipment to draw a sample from inside the Confined Space must be of sufficient length to reach well inside.
- Consult manufacturer on how long it takes the device to draw a sample through the tubing to allow sufficient time for the test.
- Document all testing, monitoring and calibration results on the Entry Permit.
- Include the time, date and initials or signature of person performing the monitoring activity (use back of Permit if additional space is required)
- Never proceed with an Entry if atmosphere readings do not indicate acceptable entry conditions (based on the Entry Plan) have been met.
- Additional mitigation must be undertaken, and/or a new Entry Plan drawn up taking into consideration the conditions presented.
 - Consult with H&S Support in this case.
- Maintain an SDS of any chemical hazard which was present and eliminated from the space with the Entry Permit and/or Authorized Entrant.

4.9.4.8. Emergency Services and Rescue Planning

- Create or ensure there is a rescue plan, rescue services, and adequate rescue equipment in place prior to any Standard Entry into a Permit Required Confined Space Entry.
- A Confined Space Rescue Plan Template is available and may be utilized in creating a Confined space rescue plan for the work task.

NOTE: *An Alternate Entry into a Permit Required Confined Space or Entry into a Non-Permit Required Confined Space does not require rescue planning or services. However, consideration must be given to whether a Standard Entry will be required as part of the process to reclassify the Confined Space to allow Alternate or Non-Permit Entry. In that event, the rescue plan, Personnel, and equipment need to be in place.*

- Rescue plans should be developed by the rescue services and/or in-house rescue trained Personnel (in applicable locations)
- The provisions in the rescue plan must provide assurance that all Authorized Entrants can be rescued in a timely manner based on the potential hazards within the Confined Space.

- Rescue plans shall include contact information for all responsible parties in case of an emergency (e.g., Supervisor, rescue service, fire Personnel, EMS, etc.)
- Rescue services may be supplied by any of the following, with local policy, practice, or availability dictating the preferred means of meeting Confined Space rescue requirements:
- Contractor performing Entry work provides a trained, in-house rescue service.
- Contractor performing Entry work subcontracts the rescue services from a third party.
- Company contracts the rescue services from a third party.
- Company trains local Employees to serve as Confined Space rescue Personnel.

NOTE: *Local Emergency 911 Services must not be used to provide primary rescue services for Permit Required Confined Space Entries.*

- The following items must be included in the pre-planning and should be reviewed prior to each Entry:
 - Methods of summoning rescue and emergency services:
 - These may include line of sight (voice), hand-held radio, air horn, and/or telephone notification.
 - Methods of Authorized Entrant rescue:
 - The mandatory or preferred method of rescue will be dictated by the hazards of the Confined Space, and these must have been included in the training and drills undertaken by the assigned rescue Personnel.
 - This must be noted both on the Entry Permit itself and the rescue plan attached to the Permit.
 - Emergency service availability:
 - Members of the rescue team must be trained in basic first aid and CPR and at least one member must have current certifications available. Telephone numbers for the nearest medical facility and other emergency services must also be readily available onsite for immediate use.
 - Method of preventing unauthorized Personnel from attempting a rescue:
 - A Safety Data Sheet (SDS) for any possible substance exposures that will need to be made available to the medical facility treating an exposed Authorized Entrant.
- Plan for and use a non-entry rescue method for a Standard Entry into a Permit Required Confined Space. This requirement may only be waived if the configuration of the Confined Space and entry point makes this type of rescue impossible (e.g., internal barriers), increases the overall risk of the entry (e.g., tangled lines, difficult access/egress), or would not contribute to the rescue. This will require:
 - Each Entrant to wear a full body harness with a retrieval line attached at the center of the back near the shoulders or above the head.
 - Wristlets instead of a full body harness if it can be demonstrated that a full body harness is infeasible or creates a greater hazard and the use of wristlets is the safest and most effective alternative.

- The outside end of the retrieval line attached to a mechanical device or fixed point outside the Confined Space to allow for an immediate rescue attempt.
- A mechanical retrieval device for any vertical entry into Confined Space more than 1.5 m (5 ft.) deep.

4.9.4.9. Hot Work or Other Specialized Requirements

Use the applicable permit and consult the applicable procedures if the work inside the Confined Space involves “Hot Work,” entry into an IDLH atmosphere, or other types of work with heightened risk.

4.9.4.10. Entry Permit Requirements

- Entry into a Permit Required Confined Space may only be authorized once the Confined Space Entry Permit is complete and authorized. For this to take place:
 - There may need to be a transfer of authority to the Contractor to allow the Contractor Entry Supervisor to complete the Entry Permit
 - For UST and US Projects, see Form Confined Space Transfer of Control to Contractor for this process.
 - There must be a verification that acceptable entry conditions have been met, including any hazard control measures implemented and applicable atmospheric testing.
 - All required signatures have been obtained on the permit, at minimum the Entry Supervisor (on all) and Attendant (for Standard Entry) and Authorized Entrants listed.
- Entry is only authorized for the period specified on the Entry Permit.
- The permit should not extend past a working day or change in work shift.
- Any Authorized Entrants not named when the permit was first issued, need to review the Entry Permit, and be added as entrants as applicable.
- For UST and US Projects, if a change in attendants is necessary, a new Entry Permit shall be issued.
- If the Entry Permit allows for extensions, any updating of the expiry time must be done by the Entry Supervisor.
- Post the completed Entry Permit with a few feet of the Confined Space entrance during all entry activities so it always available to consult while entry is underway. Where conditions may deteriorate the permit:
 - Place the permit in a weatherproof zip lock plastic bag or the like to protect it; or
 - The attendant positioned at the entrance may hold onto the permit.
- The Entry must be terminated, and the Entry Permit cancelled by the Entry Supervisor when:
 - Entry operations covered by the permit have been completed; or
 - Conditions that are not allowed under the Entry Permit arise in or near the Confined Space or if job scope changes.
- Cancelled, expired, and completed Entry Permits must be retained for a year for annual review purposes.

- Any problems encountered during an Entry operation must be noted on the permit for subsequent review purposes.

4.9.4.11. Concluding Entry Operations

Conduct the following activities as part of concluding entry operations:

- Ensure all Authorized Entrants have exited the Confined Space
- Return the Confined Space to its normal mode (including closing, barricading, and/or adding signage as appropriate)
- Have Entry Supervisor debrief all participants (Attendant and Authorized Entrants) to capture the following information:
 - Recap of planned activities.
 - Successes of controls and Entry and any challenges or issues encountered regarding or within the Confined Space.
 - Discrepancies or changes from original planned work.
 - Final status / configuration at the project completion.

Document all issues identified on or attached to the Entry Permit.

4.9.4.12. Steps in a Permit Required Confined Space Entry (Standard Procedure)

1. Pre-Entry Planning Activities, including
 - a) Assessing Confined Space hazards and hazards generated by work to be conducted in the Confined Space and corresponding controls, including preparation activities such as isolating, cleaning, etc.
 - b) All other elements required in the written confined space entry plan (see above).
 - c) Secure approved Contractor(s) as required for Entry and Rescue.
2. Confined Space Preparation
 - a) Isolate, apply Lockout / Tagout, and eliminate hazardous atmosphere (to extent possible) from Confined Space.
 - b) Open, install mechanical ventilation, and test atmosphere (as applicable and without entry).
 - c) Set up barriers and signage as required.
 - d) Implement any other hazard controls from the pre-entry plan that does not involve entry (e.g., scaffolding for entry, setting up mechanical retrieval device for non-entry rescue, etc.).
3. Hold Pre-Entry Meeting
 - a) This should include Company Representative, Entry Supervisor, Attendant, and Authorized Entrants, Rescue Personnel (and any other affected Personnel).
 - b) For multiple entries on larger projects, this meeting should be held daily.
 - c) Potential hazards, controls, monitoring requirements, acceptable entry conditions, work plan, communication systems, and any restrictions that will be on the Entry Permit should be discussed in the meeting.
 - d) Any other types of permitting (e.g., Hot Work Permit, Safe Work Permit, etc.) may be completed as part of this meeting.

4. Ensure communication system is working and rescue equipment properly staged (as required)
 - a) If using electronic communication means, test these.
 - b) If rescue team and/or Authorized Entrant(s) are using SCBA or SABA, this needs to be donned and ready for use.
 - c) Ensure non-entry extraction equipment is ready and Entrants are wearing harness correctly.
5. Final pre-entry atmosphere testing is completed and documented as per plan/permit requirements.
 - a) See above for correct procedure.
 - b) If mechanical ventilation has been turned off for testing purposes, it should be re-engaged once testing is complete prior to entry.
6. Entry Supervisor completes and signs Entry Permit and authorizes entry.
 - a) The permit is posted at the entry.
7. Authorized Entrants may now enter to conduct work.
8. Attendant fulfills required duties by:
 - a) Tracking all entries and exits on the Confined Space Entry Log.
 - b) Maintaining visual contact and/or monitoring communication system.
9. Attendant and/or Authorized Entrants maintain continuous and/or periodic atmosphere monitoring as per Entry plan and Confined Space Entry Permit.
10. In the event of hazards or issues arising, the Entry may be terminated, and Authorized Entrants exit immediately based on the observations/judgment of Entrant(s), Attendant, or Entry Supervisor.
 - a) Entry Supervisor must be contacted immediately if not on scene.
 - b) Entry Supervisor determines next steps.
11. At end of the Authorized Entrant(s) job, shift, or reaching the Entry Permit expiry time, the Authorized Entrant(s) exit.
12. The Entry Supervisor debriefs the Attendant and Authorized Entrants and documents any issues on/with the Entry Permit and permit is maintained for filing/retention.
 - a) See above for additional instructions on purpose and content of debrief.
13. The Confined Space is closed or otherwise barricaded and signed to prevent unauthorized entry.

4.9.4.13. Steps in a Permit Required Confined Space Entry (Alternate Procedure)

1. Pre-Entry Planning Activities, including
 - a) Assessing Confined Space hazards and hazards generated by work to be conducted in the Confined Space and corresponding controls, including preparation activities such as isolating, cleaning, etc.
 - b) All other elements required in the written confined space entry plan (see above).

2. Confined Space Preparation
 - a) The only significant hazard that may remain for an Alternate Procedure into a Permit Required Confined Space is a potentially hazardous atmosphere that can be successfully managed with continuous mechanical ventilation.
 - b) There must be sufficient monitoring and inspection data to establish the atmosphere hazard level to justify an Alternate Procedure.
3. Hold Pre-Entry Meeting
 - a) This should include the Company Representative, Entry Supervisor, and Authorized Entrant(s).
 - b) This must include a discussion on atmosphere monitoring requirements (continuous and periodic) and levels required to meet acceptable entry conditions.
 - c) Any other types of permitting may be completed as part of this meeting.
4. Final pre-entry atmosphere testing is completed and documented as per plan/permit requirements.
 - a) See above for correct procedure.
 - b) If mechanical ventilation has been turned off for testing purposes, it should be re-engaged once testing is complete prior to entry.
5. Entry Supervisor completes and signs Entry Permit and authorizes entry.
 - a) The permit is posted at the entry.
6. Authorized Entrants may now enter to conduct work.
7. Authorized Entrants maintain continuous and/or periodic atmosphere monitoring as per Entry plan and permit.
8. In the event of hazards or issues arising, the Entry may be terminated, and Authorized Entrants exit immediately based on the observations/judgment of Entrant(s) or Entry Supervisor.
 - a) Entry Supervisor must be contacted immediately if not on scene.
 - b) Entry Supervisor determines next steps.
9. At end of the Authorized Entrant(s) job, shift, or reaching the Entry Permit expiry time, the Authorized Entrant(s) exit.
10. The Entry Supervisor debriefs the Authorized Entrants and documents any issues on/with the Entry Permit and permit is maintained for filing/retention.
 - a) See above for additional instructions on purpose and content of debrief.
11. The Confined Space is closed or otherwise barricaded and signed to prevent unauthorized entry.

4.9.4.14. Steps in a Non-Permit Required Confined Space Entry

1. Pre-Entry Planning Activities, including
 - a) Assessing Confined Space hazards and hazards generated by work to be conducted in the Confined Space and corresponding controls, including preparation activities such as isolating, cleaning, etc.
 - b) All other applicable elements required in the written confined space entry plan (see above).

NOTE: *A key element for Pre-Entry Planning Activities is to determine the feasibility of managing or measuring potential hazards to allow the Confined Space to be classified (or re-classified) as a Non-Permit Required Confined Space. It is critical to determine if a Permit Required Confined Space entry will be required as a part of this remediation effort and to plan these earlier entries accordingly.*
2. Confined Space Preparation
 - a) For a Non-Permit Required Confined Space Entry, preparation of the confined space will be such that no hazardous atmosphere has the potential to occur in the space whenever any Authorized Entrant is inside the space.
 - b) If entry is required to remediate the space or establish a hazardous free environment to create the conditions for a Non-Permit Required Entry, this will be conducted under the appropriate Permit Required Confined Space Entry procedure.
3. Hold Pre-Entry Meeting
 - a) This should include the Company Representative, Entry Supervisor, and Authorized Entrant(s) as applicable. (Note an Attendant and local Rescue Personnel are not required for Non-Permit Required Confined Space Entry)

Note: *Where applicable, reclassification documentation may need to be completed and signed by participants in this meeting. See Documentation below.*

 - b) Any other types of permitting (for the work inside the space itself) may be completed as part of this meeting.
4. Final pre-entry atmosphere testing is completed and documented as per plan requirements.
 - a) See above for correct procedure.
 - b) If mechanical ventilation will be used for Worker comfort (i.e., as opposed to managing a potentially hazardous atmosphere), it needs to be turned off for testing purposes and should only be re-engaged once testing is complete.
 - c) If the confined space has been reclassified, appropriate documentation to that effect should also be posted at the job site for the duration of the job.
5. Authorized Entrant(s) may now enter to perform assigned tasks and warning provided to prevent unauthorized entry.
 - a) Applicable signage should now be in place or set up at this point (see above for Non-Permit Required Confined Space signage).
6. Continuous atmospheric monitoring should continue throughout entry.

- a) This should include measuring O₂, LEL and any applicable toxic gas (e.g., H₂S, CO) and may be done using a Personal Gas Monitor worn by entrants.
7. In the event of an unanticipated hazard or hazardous atmosphere arising, the following must be done:
 - a) All Authorized Entrants exit the space.
 - b) The source of any hazardous atmosphere arising must be determined.
 - c) Re-entry as a Non-Permit Required Confined Space can only take place if the hazard or the source of the hazardous atmosphere is discovered and eliminated (without entry). A re-evaluation of the space should be documented in this case.
 - d) If the hazard or hazardous atmosphere source cannot be discovered and eliminated without entry, a Permit Required Confined Space Entry will be required to complete any tasks.
 - e) The event needs to be documented and filed with the Confined Space Entry Permits for consideration in future entries and as part of the annual review.
8. The Confined Space is closed or otherwise barricaded and signed to prevent unauthorized entry.

4.9.4.15. Valve Pit and Vault Entry

- Valve pits and vaults are subject to an OSHA Standard Interpretation (May 25, 1994) that states that the OSHA Permit Required Confined Space standard will not be applied in the case of utility vaults subject to PHMSA regulation (49 CFR 192) if the only potential hazard is a flammable, toxic, or oxygen deficient atmosphere (see the OSHA website, Standard Interpretations page). As such, the following requirements and practices must be applied to vault and valve pit entries.
- The special provisions for valve pit and vault entries shall only be applied in the following circumstances:
 - The valve pits and vaults have been designed for human entry for inspection purposes or other operational duties.
 - The only potential hazard that could arise would be a hazardous atmosphere due to gas handling equipment failure.
 - There are no other “confined space hazards” such as entrapment or engulfment or other serious hazardous conditions.
 - The work is limited to operations such as routine inspection or maintenance or emergency response (i.e., not opening gas handling equipment to atmosphere).
- If a valve pit and vault entry meet the above requirements, the following steps must be applied:
 - The atmosphere inside the pit or vault must be tested prior to entry to determine it is safe using a gas monitor with hose (i.e., entry is not required to complete an accurate test). These atmosphere readings must be logged.
 - For UST and US Projects Personnel, this may be captured using a Confined Space Entry Permit (with a notation that this is a valve pit /vault entry and not a permitted entry)

- The entrant must wear a Personal Gas Monitor (PGM) while inside the space and exit immediately if the atmosphere becomes hazardous.
- If the valve pit or vault entry does not meet the above requirements or during the course of entry the atmosphere becomes hazardous, an assessment of the space shall be conducted, and standard confined space entry practices as outlined above must be followed.

4.9.5. Documentation

 For UST and US Projects, the following forms apply:

- Confined Space Entry Assessment / Checklist
- Confined Space Log
- Confined Space Entry Log
- Confined Space Entry Permit
- Confined Space Inventory Form
- Confined Space Transfer Control to Contractor
- Confined Space Reclassification Checklist
- Confined Space Evaluation Worksheet
- Confined Space Entry Annual Review

 For Offshore the following forms apply:

- Confined Space Inventory Form
- Confined Space Permit

4.9.6. References

- *OSHA 29 CFR 1910.146 Permit-Required Confined Spaces*

4.10. Confined Space Entry

4.10.1. Purpose

The Confined Space Entry standards and procedures will assist in the identification and control of hazards associated with entering and working in and/or around Confined Spaces within Canadian GTM operations facilities.

4.10.2. Scope

These standards and procedures have been developed to address health and safety hazards related to working in confined spaces as defined by federal and provincial Occupational Health and Safety legislation, specifically the Canada Labour Code (CLC), Canadian Occupational Health & Safety Regulations (COHSR), Part XI, and the British Columbia, Occupational Health & Safety (OHS) Regulation, Part 9.

Due to the number of GTM business operations That make up Enbridge, there are a number of confined spaces in different facilities and buildings that present various types of health and safety hazards that

fall under three hazard classifications (low, moderate and high), for more on confined space classifications, refer to subsection [4.10.4](#). The prominent health and safety hazards of concern are:

- Chemical – often related to the exposure to hazardous or explosive atmospheres (e.g., toxic gasses, chemical vapour emissions, respirable dust or fine particulate).
- Physical – often related to the exposure to liquids or materials that derive from, accumulate, or are released in confined and restricted areas (e.g., drowning/asphyxiation hazards if a vessel or low-lying area accumulates rapidly with liquids or materials); and
- Ergonomic or Safety – Struck by/struck against, tripping hazards and compromised emergency/first aid response capabilities due to limited space, cramped quarters (access/egress), if area not designed for sustained human occupancy

As a result of potentially life-threatening hazards, OHS regulations in Canada require additional hazard assessment and controls for any work inside a confined space.

The requirements set out in this section will ensure Confined Space Entry practice at Canadian GTM facilities and operations will meet or exceed COHS and local provincial confined space regulations.

NOTE: *Confined Spaces within excavations and trenches are not covered by this section of the Manual. See Excavation and Trenching Safety in this Manual.*

For Canadian Operations, the following definitions for Confined Space have been adopted.

- Enbridge has adopted the BC OHS Regulations and the federal COHS Regulations for Confined Space Entry and has taken a blended approach to ensure the safety of all workers involved in confined space activities. Provincial requirements shall be applied, where jurisdiction notifications are required to be made within the province that the work is being performed.

4.10.2.1. BC OHS Regulations, Part 9 Definition

A confined space is a workspace that:

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

NOTE: *All four criteria must be met for a workspace to be designated a Confined Space.*

4.10.2.2. COHS Regulation, Part 11 Definition

A **confined space** defines a space that:

- is enclosed or partially enclosed
- is not designed or intended for continuous human occupancy
- has a limited or restricted means of entry or exit or an internal configuration that could complicate provision of first aid, evacuation, rescue or other emergency response.

NOTE: *All criteria must be met for a workspace to be designated a Confined Space.*

A **hazardous confined space** means a confined space that, when entered, occupied, or exited by persons, presents hazards likely to cause injury, illness or other adverse health effects to persons entering, exiting, or occupying it because of:

- its design, construction, location or atmosphere
- the materials or substances in it or
- any other conditions relating to it

4.10.3. Responsibilities

People Leader shall:

- Ensure all facilities or operating areas maintain a Confined Space Inventory if confined space work area exist or may exist on their worksites (e.g., during maintenance activities).
- Provide the resources for and ensure completion of Confined Space Hazard Assessment Reports for all spaces listed in applicable Confined Space Inventories.
- Ensure Confined Spaces in the inventory are either secured against entry or are identified with a sign at their entry point preventing entry without a Safe Work Permit.
- Ensure Confined Space training requirements are sufficiently met for planned Confined Space entries (as applicable, Entrant, Attendant/Safety Watch, Rescue role training).
- Ensure sufficient resources for specialized PPE or rescue equipment for planned entries are provided as required when these are supplied by the Company.

Enbridge PIC or Designate / Permit Issuer shall:

An Enbridge PIC or Designate shall be dedicated to the confined space they are in charge of during the duration of the work unless a Work Authorization is in place.

- Ensure assessment and planning documents for a planned Confined Space Entry have been completed and assembled as required.
- Ensure isolation, Lockout/Tagout requirements, and any other preparation activities set out in the Confined Space Hazard Assessment Report and referenced documents have been completed prior to Entry.
- Ensure any rescue equipment required by a Confined Space Hazard Assessment Report is provided or made available.
- Ensure Confined Space training requirements are sufficiently met for planned Confined Space entries (as applicable, Entrant, Attendant/Safety Watch, Rescue role training).

NOTE: Actual provision of rescue equipment may in some cases fall to a Contractor providing rescue services.

- Ensure participants in the Entry have met minimum training requirements prior to entry.
- Conduct a pre-Entry meeting with all participants as per requirements below.
- Ensure pre-Entry atmosphere testing is conducted and meets the criteria set out in the Confined Space Hazard Assessment report.
- Manage and sign off the Safe Work Permit to authorize Entry.
- Ensure Rescue Personnel are alerted to the Entry activity as per requirements below.

- Manage any issues arising during Entry (e.g., change of atmosphere or conditions requiring Entrant evacuation, additional mitigation efforts, re-permitting, etc.).
- Ensure safe conclusion to Entry and proper Confined Space closure or signage following Entry.

Entrant shall:

- Complete required Confined Space Entrant training.
- Participate in pre-Entry meeting.
- Only enter the Confined Space once authorized to do so by a Safe Work Permit.
- Follow all the requirements set out in the Confined Space Hazard Assessment Report during Entry activities including:
 - Atmospheric testing and monitoring requirements.
 - Implementation of specified hazard controls.
 - Wearing all PPE required by the Confined Space Hazard Assessment Report.
 - Signing in and out of Entry Log when entering and exiting Confined Space.

Safety Watch shall:

- Complete required Confined Space Attendant / Safety Watch training.
- Complete and maintain (Standard level) First Aid Training qualifications.
- Complete required Confined Space Rescue training (if expected to directly participate in rescue activities).
- Participate in pre-Entry meeting.
- Fulfill monitoring of Entrant duties as per Atmosphere Hazard Level.

Rescue Personnel shall:

- Complete required Confined Space Rescue training.
- Complete and maintain (Standard level) First Aid Training qualifications.
- Ensure capability to fulfill Rescue Plan set out/referenced in the Confined Space Hazard Assessment Report.
- Based on Confined Space Entry Procedure either:
 - Remains at Confined Space entrance fully ready for entry for Confined Space deemed to have a High Hazard Atmosphere (IDLH atmosphere).
 - Monitors communication system when on standby during Entry.
- Fulfill rescue duties as per training and requirements below when called upon to do so.

HS Support shall:

- Support the work of keeping Confined Space Inventories up to date and ensuring completion of Confined Space Hazard Assessment Reports.

Qualified Confined Space Hazard Assessor shall:

- Meet the qualifications to sign off on a Confined Space Hazard Assessment Report

- Complete assessments of potential Confined Spaces on a worksite to ensure:
 - The Confined Space Inventory is completed correctly.
 - A Confined Space Hazard Assessment Report is completed for any workspace deemed a Confined Space prior to Entry into that space.

4.10.4. Requirements

4.10.4.1. Confined Space Inventory

A confined space inventory is a document that list all the classified Confined Space locations for a location or facility. Each work location must create and maintain the Confined Space Inventory using the Confined Space Inventory Form. The Confined Space Inventory is owned by the Facility Supervisor and must be:

- Retained onsite, as per Enbridge Record Retention Schedule
- Updated as processes, operations, equipment, and other circumstances change
NOTE: *This includes any modifications to any of these that may create or alter a confined space.*
- Reviewed every three years. This review should consider:
 - If all confined spaces on the worksite have been identified.
 - If all identified spaces fit the criteria of a Confined Space.
 - A Confined Space Hazard Assessment Report is required to make a final judgment on whether a space fits the technical criteria for a confined space.
 - See below for further criteria on preparing a Confined Space Hazard Assessment Report.
- In the event a space as normally configured as a Hazardous Confined Space, it shall be tracked as a Hazardous Confined Space within the inventory and must be treated as such during initial preparation (follow isolation and Lockout / Tagout requirements set out below) and any entry prior to mitigation that may move it into a non-confined space category. However, once alterations or mitigations are made that remove it from the Hazardous Confined Space category, it can be treated as a non-confined space for subsequent work. If the space will be returned to its normal configuration after work, it should remain in the inventory as a Hazardous Confined Space throughout the work.

Spaces Included in the Inventory

The inventory will contain all spaces that a Worker may enter and any space that has been assessed. As spaces are assessed the inventory should then clearly indicate whether:

- The space fits the criteria of a Hazardous Confined Space and will be subject to this procedure for Worker entry, or
- The space has been deemed to fall outside the criteria of a Hazardous Confined Space.

NOTE: *Spaces can be “grouped” and dealt with as a “type of space” for the purposes of the inventory and hazard assessment and procedures if they have the same configuration, function, and hazards.*

Hazard Classifications of Confined Spaces

Confined spaces are at most locations. Spaces that typically meet the definition of confined spaces on the company’s property include, but are not limited to:

- Tanks
- Vaults
- Culverts
- Pressure vessels
- Pits
- Some parts of machinery
- Ventilation systems
- Access openings (manholes)
- Pipes

All Confined Spaces shall be designated as High Hazard Atmosphere – IDLH Atmosphere until results of initial Atmospheric Monitoring are determined. Based on the results, a space may then be newly designated as Low Hazard/ Restricted Space, Moderate Hazard Atmosphere – Non- IDLH, or High Hazard Atmosphere – IDLH Atmosphere.

When determining if a space is a confined space, refer to definitions of “confined space” and hazardous confined space under “Scope” in section 4.10.2 or below for additional guidance.

Low Hazard Atmosphere (Restricted Space)

A low hazard atmosphere (restricted space) - low-hazard atmosphere is one where a hazardous atmosphere is not likely to exist. A low hazard atmosphere (restricted space) is where the actual and potential for the following to exist is unlikely while workers are in the confined space for the duration of the work activity:

- The development of a hazardous gas, vapour, dust, or fumes in normal conditions or
- Unsafe oxygen content less than 19.5% or more than 23% by volume.
- Typically, the risks are more associated with the physical configuration of the space, access/egress, etc. Under normal conditions, it is anticipated that this atmosphere is not likely to change during the work activity.

Note: *If ventilation is required to maintain a low hazard atmosphere, the space is considered Moderate Hazard (Non-IDLH) Atmosphere at a minimum*

The basis for determining that all Hazards in the space have been eliminated is documented on the Confined Space Hazard Assessment.

If a Hazard arises or occurs within a low hazard atmosphere (restricted space), each worker in the space shall exit the space. The space shall then be reassessed to determine if it shall be re-designated as a Moderate Hazard (Non-IDLH) Atmosphere or High Hazard (IDLH) atmosphere Confined Space.

Moderate Hazard (Non-IDLH) Atmosphere

A moderate-hazard (Non-IDLH) atmosphere is one where there is the potential for a hazardous atmosphere to exist i.e., a Confined Space which has been purged and ventilated and steps have been taken to provide and maintain a safe atmosphere and there has existed or was likely to have existed:

- A hazardous gas, vapour, dust, or fumes; or
- Unsafe oxygen content less than 19.5% or more than 23% by volume could develop if circumstances change.

These types of spaces have been known to have potentially hazardous atmospheres either before or during the work. An example could be a vessel containing a product. After isolation, cleaning, purging, ventilation, the fact it had something hazardous in there to begin with leads to a potential that an atmosphere could exist if something were done incorrectly or if other equipment fails (ex: ventilation fan). Hence, a Moderate-Hazard (Non-IDLH) Atmosphere confined space.

If an IDLH atmosphere is encountered during a Moderate Hazard (Non-IDLH) atmosphere entry; workers must vacate the space and additional controls should be implemented to mitigate the hazard and lower the levels below IDLH. If this cannot be achieved, then the Director's (or designates) approval is required to proceed with a High Hazard Atmosphere entry.

High Hazard (IDLH) Atmosphere

A high hazard (IDLH) atmosphere is one where a hazardous atmosphere does exist i.e., a Confined Space which cannot be ventilated to provide and maintain a safe atmosphere, and in which there now exists or is likely to exist:

- A hazardous gas, vapour, dust or fumes or
- An oxygen content of less than 19.5% or more than 23%

This is a type of space that, due to the unique circumstances of the particular space, the atmosphere cannot be purged and/or ventilated adequately to provide a safe breathable atmosphere. It could also be a situation where the atmosphere may be completely unknown, or the space be compromised by the ambient working environment. Therefore, it will be considered a High-Hazard Atmosphere confined space.

Planned work should not take place in IDLH environments. If an IDLH environment exists, or has potential to exist, then work shall stop until controls are in place to eliminate, control or minimize the hazards to an acceptable level. Entry into a confined space that has been classified as a High hazard (IDLH) Atmosphere – IDLH requires Director or designate approval of confined space entry plan, procedures, and Hazard Assessment, refer to the Immediately Dangerous to Life and Health Atmospheres procedure for process for working in an IDLH atmosphere

4.10.4.2. Confined Space Hazard Assessment

A confined space hazard assessment is a special type of hazard assessment that addresses the unique hazards presented by each:

- Confined space
- Work activity that may be performed inside a confined space

The final documented Confined Space Hazard Assessment Report should be completed. See an example of a Confined Space Hazard Assessment Form in [Figure 4](#).

SAF-58.9182

Confined Space Hazard Assessment Form



SECTION 1: SPACE LOCATION AND DETAILS			
Name of the Space		Date of Assessment	Click or tap to enter a date.
Location		Regulatory Reference	
Vessel Data Sheet			
Description (General Shape, Use/Function, Contents)			
Size of Space			
Entrance Sizes (Access/Egress)			
Specific Machinery Inside			
Adjacent Piping into Space			
Adjacent Piping Out of Space			
Other Confined Spaces Within			
Rescue Plan Reference			
Space Identification	<p>The following criteria are used in the identification of a confined space for both BC Part IX and COHSR Part 11 unless specifically noted:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Enclosed or partially enclosed <input type="checkbox"/> Not designed or intended for continuous human occupancy <input type="checkbox"/> Has a limited or restricted means of entry or exit [or an internal configuration]¹ that could complicate provision of first aid, evacuation, rescue, or other emergency response <input type="checkbox"/> Large enough and so configured that a worker can enter to perform work tasks² <p>¹ "or an internal configuration" forms part of the COHSR Part 11 Confined Space definition only and is not included in BC's OHS Regulation Part IX.</p> <p>² The fourth criteria in this list forms part of the definition of Confined Space under Part IX of BC's regulations only and is not included in COHSR Part 11, definition of Confined Space.</p>		

Figure 4: Confined Space Hazard Assessment Form Excerpt

4.10.4.3. Confined Space Hazard Assessment Report

At a minimum, the Confined Space Hazard Assessment Report must include:

- Conditions that may exist prior to entry due to the confined space's design, location, or use
- Conditions that may develop during work activity inside the space
- The potential for hazardous atmospheres including oxygen deficiency or enrichment, toxic or flammable gases, vapors, mists, or dust
- Any hazardous energy requiring isolation and lockout
- Any potential for engulfment or entrapment
- Any other hazardous conditions

To provide additional guidance, the Confined Space Hazard Assessment Report can also include:

- The location and technical identification of the space and, as applicable, a description of its role in any process (e.g., processing vessel)
- Photos and diagrams of the space as available
- The hazards listed above (required by OHS regulation)
- The preparation processes required prior to any human entry into the space. This includes:
 - Any purging or cleaning activities
 - Any isolation and lockout/tagout plan or requirements
- Atmospheric testing requirements prior to entry

- The atmosphere hazard level (low, moderate, high) and corresponding safety watch and rescue requirements as a result

Controls for initial entry and for specified tasks that may take place beyond initial entry, including:

- Ventilation calculations and requirements.
- PPE requirements.
- Permitting requirements (i.e., hot work)
- Rescue plan with the protection equipment and emergency equipment used by any person who takes part in the rescue of a person from the confined space or other emergency situations in the confined space
- Requirement for a first aid attendant

To provide additional guidance, the Confined Space Hazard Assessment Report can also include:

- The location and technical identification of the space and, as applicable, a description of its role in any process (e.g., processing vessel).
- Photos and diagrams of the space as available.
- The atmosphere hazard level (low, moderate, high) and corresponding safety watch and rescue requirements as a result.
- The hazards listed above (required by OHS regulation).

4.10.4.4. Report Management

- A Confined Space Hazard Assessment Report remains valid for a period of three years after the date of signature (by the “Confined Space Hazard Assessor”) on the report and is owned by the Facility Supervisor.
- The assessment must be reviewed and revised as appropriate if the space is physically altered, isolation requirements change, or previous hazards no longer exist, or new hazards have been introduced (e.g., a change in product flowed through a vessel).
- The review should consider if the atmospheric hazard classification (low, moderate, or high) of a confined space should be elevated or reduced.
- While efforts should be made to systematically update all confined space assessments on a three-year cycle, a review and revision of an outdated assessment is only mandatory when a space will be subject to entry again. In addition, the assessment must be made available to the Safety & Reliability Shared Services, or applicable workplace safety or specific confined space policy committee upon request.
- Retention schedules of confined space hazard assessment report, as per the “Records Retention Schedule.”

4.10.4.5. Qualifications to prepare a Confined Space Hazard Assessment Report

The Confined Space Hazard Assessment report must be prepared by a qualified person.

- The assessment must be prepared in consultation with the person assigned overall responsibility for administration of the confined space entry program and with the workplace OHSE committee.

To qualify to sign off on a Confined Space Hazard Assessment Report, a person must:

- Have taken training on the Confined Space Hazard Assessment Report tool (as per the training matrix), and are either:
 - A certified industrial hygienist (CIH), registered occupational hygienist (ROH), certified safety professional (CSP), Canadian Registered Safety Professional (CRSP) or professional engineer (P. Eng.) or
 - An Enbridge employee that is acceptable to WorkSafeBC through a combination of education, training, and experience and has completed the Confined Space Hazard Assessment training course and competency exam
 - In Eastern Canada, Enbridge has appointed qualified Personnel to carry out the hazard assessment specific tasks, review reports, and document findings of confined spaces

4.10.4.6. Confined Space Hazard Control Measures

As stated in the “Scope” subsection [4.10.2](#), GTM business operations include a number of confined spaces in different facilities and buildings that present various types of health and safety hazards. To mitigate, control or eliminate the variety of risks associated chemical, physical, and other health and safety confined space related concerns Enbridge follows the hierarchy of control methodology. The aim is first to eliminate hazards, then control and mitigate risks that cannot be eliminated using the control methods below:

- Engineering Controls used to eliminate, isolate, and mitigate hazard risk:
 - Energy Isolation and Lockout/Tagout
 - Ventilation Requirements
- Administrative and Personal Protective Equipment (PPE) in combination with engineering controls to mitigate hazards using include:
 - Signage & Preventing Unauthorized Entry
 - Entry Team Meeting
 - Safe Work Permits (Confined Space Entry Section)
 - Confined Space Entry Package
 - Hot Work and Insulated Equipment Requirements
- Controls influenced specifically by the Confined Space Hazard Assessment:
 - Atmospheric Testing and Monitoring (Pre-Entry and Continuous)
 - Safety Watch Requirements
 - Rescue requirements
 - PPE requirements
 - Confined Space Closure Requirements
 - Training and Competency Assurance,
 - Procedural - Entry Procedure Requirements:
 - Documentation During Entry Activities

- Entry Procedures (To apply the above-mentioned controls effectively and in its correct sequence)

4.10.4.7. Engineering Controls

Energy Isolation and Lockout Tagout Requirements

- Isolation and Lockout Tagout requirements should be captured as part of the Confined Space Hazard Assessment.
- Any piping flowing into or out of the confined space that contains a harmful substance, must be controlled by either:
 - Disconnecting the piping or
 - Using blinds or blanks or
 - A double block and bleed system
- Any piping inside the confined space must be assessed to determine if it presents a hazard to a Worker within that confined space. Control measures must be applied to ensure Workers are protected from these hazards.
- Blanks and blinds, unless certified by a professional engineer, must be ANSI rated for the anticipated pressure, temperature, and service requirements.
- If disconnecting pipe to isolate the confined space, either:
 - The space between the separated pipe ends must be 10 times the diameter of the pipe, or
 - The disconnected pipe moved out of line so that leaks will not bypass the disconnection and continue into the confined space or
 - If neither of these is possible, an engineered device designed for isolation purposes, suitable for anticipated pressure, temperature and service may be used to achieve isolation between the pipe ends
- If a double block and bleed system is used, the following apply:
 - The diameter of the bleed line must be no less than the diameter of the line being isolated (unless certified by a professional engineer)
 - The bleed on a liquid carrying pipe must be at a lower elevation than the block valves
 - All valves must be locked out in their proper open or closed position
 - The bleed must remain clear of obstruction
- The piping flowing substances into or out of the confined space should be isolated at the closest practicable, safely accessible point to the vessel.

Ventilation Equipment Requirements

Ventilation requirements will be set out in the Confined Space Hazard Assessment Report.

In the event constant ventilation is the only means by which a safe breathing atmosphere is created for the Entrant, there must be safeguards in place to warn any Entrants if ventilation fails. This may be done either by:

- Having the ventilation equipment equipped with an alarm that can be heard by the Entrant in the event of failure, or

- Having the Safety Watch monitor the ventilation equipment continuously and warn Entrants to exit the space if it fails.

4.10.4.8. Administrative Controls

Signage and Preventing Unauthorized Entry

All Confined Spaces in the Confined Space Inventory regardless of risk classification must either be:

- Secured against entry (e.g., bolted shut or locked) or
- Identified by a sign at the entry point to indicate that this is a Confined Space, and that entry is not permitted without a permit

A sign with wording along the lines of the following should be placed at the entrance to any confined spaces Workers can readily access during normal operations or spaces opened for permitted entries, as depicted below.



Figure 5: Example of Confined Space Signage Requirements in Canada

Bolted manways that are opened for an extended period for multiple entries may be locked out between entries without fully closing the manway by installing a manway T or cable on the bolt holes and secured with an operational or departmental lock as a way of managing the PIC or Designates control over entrance.

Entry Team Meeting

An Entry Team meeting must be conducted prior to any initial entry into a confined space and should include all applicable members:

- Worker(s) entering space
- Safety Watch Personnel
- Fire Watch Personnel
- Rescue Personnel
- Person in Charge / Permit Issuer
- Site or Worker Supervisor(s) that may direct the work of any of the above

In the event Personnel are added to the Entry Team that did not attend the pre-entry team meeting, the Person in Charge (PIC) must review the contents of the meeting with this person and be satisfied they are fully briefed on their role and Responsibilities in the entry activities.

The Entry Team should engage in cursory review of the contents of the Confined Space Package, with a primary focus on:

- Ensuring the stipulations set out in the Confined Space Hazard Assessment have been or will be met prior to entry, including

- Pre-initial entry preparations such as isolation, Lockout / Tagout, and any cleaning, purging, or ventilation activities
- Controls to be applied during entry or work within the space
- Ensuring familiarity with the procedure for initial and any subsequent entry under review.
- Review of the Rescue Plan and ensuring all members are clear on their Roles.
- All stipulated pre-entry preparation activities must be complete and verified prior to entry.

For subsequent entries to conduct tasks within confined spaces, the size, scope, and necessity of an Entry Team meeting needs to be based on:

- The level of hazards within the space and introduced by the tasks to be conducted.
- The existing familiarity of Entrants, Safety Watch, Rescue, and Person in Charge with the confined space and its hazards (e.g., are the same Personnel involved as those attending the initial entry meeting?).
- At minimum, prior to any entry to complete a task, the Person in Charge must go over the Confined Space Hazard Assessment Report for the task at hand with the Entrants as part of the Safe Work Permit process (in lieu of a full Entry Team meeting).

Safe Work Permit

A Safe Work Permit by the permit issuer (PIC) or designate must be issued to Entrants prior to entry.

- For British Columbia based worksites, if a confined space will contain an inert, nitrogen atmosphere during Worker entry, a Notice of Project to WorkSafeBC must be submitted at least 7 days prior to the work being conducted.
- The Permit Issuer must tick the “Confined Space Entry Procedure,” and the “Rescue Plan” checkbox in Section 11 of the Safe Work Permit Form (Safety Standards/Procedure Requirements) to indicate a review of the entry procedure and rescue plan (which must include the applicable Confined Space Hazard Assessment Report) has been completed.

Confined Space Entry Package

All relevant documentation should be compiled and available prior to entry into a confined space. This Confined Space Entry Package should include (as applicable):

Confined Space Hazard Assessment (will reference the following “attachments” to be included in the package):

- Piping and Instrumentation Diagrams (P&IDs)
 - Isolation drawings (identify isolation points, line breaks and blind locations)
 - LOTO form(s)
 - Blind Tag Log
 - Confined Space Entry Procedure and/or procedures for tasks to be conducted in Confined Space
- NOTE:** Include method of communication, if required (e.g., due to noise, line of sight etc.)
- Confined Space Rescue Plan
 - Safety Data Sheets (SDS)

- Occupational Hygiene Reports, including but not limited to:
 - Benzene Survey Form
 - NORMs Survey Form
 - Amine Survey Form
 - Mercury Survey Form
- Atmosphere Testing Log
- Confined Space Entry Log

4.10.4.9. Hot Work and Insulated Equipment Requirements

Electrical and Gas Tools and Equipment

Compressed gas cylinders are not permitted inside a confined space. Compressed air supply, handheld aerosol spray containers, fire extinguishers are exempted.

Unless a qualified worker has determined that work can be performed safely, hot work shall not be performed in a confined space that contains:

- an explosive or flammable hazardous substance in a concentration in excess of 10 percent of its lower explosive limit or
- oxygen in a concentration in excess of 23 percent

If these conditions are exceeded during hot work activities, the hot work shall stop and remain stopped until the conditions are deemed safe for work to continue. This determination shall be based on additional or subsequent air testing. For more information on air testing, see sub-section below on Atmospheric Testing and Monitoring.

Other hot work requirements within a confined space include having:

- A qualified fire watch person shall patrol the area surrounding the confined space until all fire hazards have passed per subsection [4.22](#) (Hot Work).
- Appropriately rated fire extinguishers are required in the immediate area per the Emergency Preparedness Standard.
- Torches and hoses used for welding, brazing, or cutting are to be removed from the confined space when not in use or when the confined space is vacated.
 - Alternative measures to be certain gas does not continuously leak out of hoses when removing the hose is not practical (e.g., disconnecting and tagging hoses removed at source).

For more on hot work permits, see subsections [4.21](#). (Hazardous/Restricted Areas and Portable/Personal Gas Monitors) and [4.22](#) (Hot Work).

Insulated Equipment

If the space is classified as a hazardous confined space (moderate or high hazard classified) location based on the potential for flammable vapors, tools and equipment used must meet the appropriate level of CSA approval for the classification of the space (as per the Canadian Electrical Code). Non-sparking tools may also be specified by the Confined Space Hazard Assessment.

Atmospheric Testing and Monitoring

Atmospheric testing prior to entry must be conducted as stipulated by the Confined Space Hazard Assessment / Procedure.

- Where any atmospheric or other hazardous substance testing results do not match those stipulated by the Confined Space Hazard Assessment:
 - A review of mitigation measures must be conducted prior to entry.
 - Additional measures may be applied.
 - If additional measures do not result in requirements being met, a new hazard assessment must be created.
- The assessment and/or procedure must stipulate pre-entry testing must be repeated within 20 minutes of entry if a confined space is vacated for more than 20 minutes.
 - This requirement may be waived for spaces that:
 - Have been deemed to have a “Low Hazard Atmosphere” (as per the Confined Space Hazard Assessment),
 - Have been sufficiently tested to prove out a “Low Hazard Atmosphere”, and
 - Are configured or isolated in such a way that it is not possible for a hazardous atmosphere to develop.

Continuous Atmospheric Monitoring

For confined spaces deemed to have a moderate or high hazard atmosphere, continuous monitoring of gases that present an ongoing risk to entrants is required.

- When confined space involves entry into process vessels or spaces where gases from process equipment may accumulate, continuous monitoring will typically be applied to the same atmospheric hazards covered by a personal gas monitor (O₂, H₂S, CO, and percent LEL).
 - The Confined Space Hazard Assessment Report will specify if additional substances require continuous monitoring.
- When continuous atmospheric monitoring is mandated, periodic recording of atmospheric measurements is required. At minimum, reading should be recorded hourly while entry is underway.

If more frequent recording is required, this will be specified in the Confined Space Hazard Assessment Report.

Safety Watch Requirements

Every confined space entry requires the use of a safety watch.

The duties and requirements for a safety watch vary with the Atmosphere Hazard Level as per [Table 9](#).

Table 9: Atmosphere Hazard Level

Requirement	Low Hazard	Moderate Hazard	High Hazard
Safety Watch	Yes		
Location and Attention of Safety Watch	Must be able to fulfill duties below	Must be stationed near space entrance	Must be stationed near space entrance and exclusively and continuously attend to safety watch duties
Rescue requirements for Safety Watch	Able to immediately summon rescue Personnel		Equipped and capable of performing rescue / fulfilling rescue duties
Safety Watch check on wellbeing of Worker(s)	Every 20 minutes	Minimum of every 20 minutes; more often based on hazards of space or task performed.	Continuous
Additional Duties of Safety Watch	N/A		Prevent entanglement of lifelines and other equipment
Workers contact with Safety Watch	A way for Worker to summon Safety Watch at any time	A way for Worker to summon Safety Watch at any time, including from inside the space	A way for Worker to summon Safety Watch at any time, including from inside the space

Rescue Requirements

Every confined space entry requires:

- The services of one or more rescue Personnel
- A documented Rescue Plan

Personnel assigned rescue duties must be notified before Workers enter a confined space and when all Workers have exited from the space.

- If multiple confined spaces are being entered, notifying rescue Personnel to be on an alert status is sufficient.
- In cases where there is a contract for rescue Personnel to provide 24-hour service (e.g., during plant shut down), individual notification is not required.

Assigned rescue Personnel must monitor any signaling system used to summon them while a confined space entry is underway or while on an alert status.

Where an entry-rescue into an IDLH atmosphere is a possible rescue scenario, the rescue team must remain at the confined space during the entry itself.

- The rescue team must have PPE donned, including SCBA or SABA with an escape bottle, and respirator masks at the ready.

A rescue Worker may not enter the confined space unless there is at least one additional Worker located outside to render assistance.

- The safety watch may serve as a rescue Worker and may perform a non-entry rescue using an attached lifeline.

- In the event rescuing an entrant involves physically entering the confined space, a rescue Worker in addition to an existing safety watch will be required to execute a rescue (i.e., one person enters to extract the entrant, the other remains outside to render assistance).

Once rescue is initiated, the Person in Charge with knowledge of the rescue procedure or (b) a qualified rescue Worker.

- Attend the rescue (but not directly involved) shall trigger the site-specific Field Emergency Response Plan.
- The qualified confined space rescue team retains control over the rescue itself until the entrant is extracted.
- Concurrently, the onsite event commander under the Field Emergency Response Plan is assigned and begins to execute the response plan as prescribed.

Rescue Personnel must wear SCBA or SABA with an escape bottle in any rescue within a confined space with an unknown or IDLH atmosphere.

- Workers entering a space assessed as a “High Hazard Atmosphere” must wear a safety harness securely attached to a lifeline.
- The lifeline must be securely anchored outside the confined space.
- The Safety Watch is responsible to assist in ensuring the lifeline does not become entangled during entry and work inside.
- The Safety Watch must be able to extract the Worker(s) without entering the space using the lifeline in an emergency and must be supplied with a mechanic device as required to facilitate this type of rescue.
- This requirement does not apply if the lifeline itself creates a hazard or extraction with the lifeline would be impossible due to the configuration of the space.

NOTE: These lifeline requirements may also apply in “Low” or “Moderate Hazard Atmosphere” spaces that have physical hazards (e.g., working at heights, engulfment, entrapment) that may be effectively controlled with a lifeline.

Rescue Plan

Confined spaces classified as “Low Hazard Atmosphere” may document the rescue plan on the Safe Work Permit.

- This may not apply if there are non-atmospheric hazards that would complicate rescue (e.g., heights, tight spaces, entrapment, or engulfment)

Confined spaces classified as “Moderate” or “High Hazard Atmosphere” must have a formal rescue plan developed prior to space entry and maintained with other confined space entry documents.

- This plan should be read and reviewed prior to initial entry by the Entry Team to:
 - Ensure familiarity with the plan for all participants (entrants, safety watch, and rescue team) with the plan.
 - Determine if any additional rescue provisions need to be prepared.
- A Confined Space Rescue Plan Template is available in the GTM GDL and may be used to create a rescue plan for the confined space entry

NOTE: A single rescue plan may be applicable to several confined spaces that share similar characteristics and hazards.

The Confined Space Rescue Plan for moderate or high-risk atmospheres shall be retained onsite, (past versions for ten years beyond its published date), as per Enbridge Record Retention Schedule.

Personal Protective Equipment (PPE)

Personnel may be required to wear an appropriate level of respiratory protection, full body harness, lifeline, and other PPE as necessary that is identified in the hazard assessment and as per company policy. A harness and lifeline should be worn to facilitate non-entry rescue at all times unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Guidance on proper selection of PPE is covered in HS Manual sections 4.35 Personal Protective Equipment, 4.15 Fall Protection and 4.40 Respiratory Protection.

Confined Space Closure Requirements

Once work is completed within a confined space, prior to space closure, the following should be done:

- Final visual inspections to ensure no Personnel are inside the space prior to closure.
 - This is captured on the “Clear for Closure” section at the bottom of the Entry Log.
- Ensure any active Safe Work Permit is formally closed with required sign-offs complete.
- Trigger the appropriate Pre-Startup Safety Review (PSSR) if the confined space is a process vessel or involves process equipment.

NOTE: By beginning the PSSR form while Entrants or others involved in confined space closure are on site, questions on equipment status on the form that pertain to the internal workings of the equipment or correct procedure in closing hatches or making connections (e.g., gaskets installed, torque values, etc.) can be answered by those involved in the process.

Training and Competency Assurance

Each person assigned duties or responsibilities related to a confined space entry must be adequately instructed in:

- The hazards of the space.
- The hazard controls / mitigations identified in the Confined Space Hazard Assessment and Entry Procedure (as they pertain to their specific duties).

Formal applicable training must be completed by those Employees and Contractors assigned the Roles of Entrant, Safety Watch (“Attendant”), and Rescue.

Annual practice drills are required for assigned rescue Personnel; records of these drills need to be maintained. If rescue services are contracted to a third party, the third-party company is responsible for training, drills, and records of their own Personnel.

NOTE: See First Aid Requirements for details on minimum first aid qualification requirements for “Confined Space Attendant” (i.e., Safety Watch) and “Confined Space Rescue Person.”

Procedural - Entry Procedure & Document Requirements

Every confined space needs a documented entry procedure prior to anyone entering the space. The procedure must be made available to the Safety & Reliability Shared Services or the workplace safety or confined space policy committee (if applicable) upon request.

A confined space or a group of confined spaces with similar characteristics and hazards, can have their own specific confined space entry procedure as long as it meets or exceeds the requirements of the Canada Confined Space Entry Procedure.

Confined Space Entry Procedure Requirements

The confined space entry procedure must incorporate the use of engineering, administrative controls and PPE requirements (explained in more detail above) that are identified in the Confined Space Hazard Assessment Report. This report specifies the preparation processes required prior to human entry, including:

- Isolation and Lockout Tagout requirements
- Purging, cleaning, and/or ventilation
- Atmospheric testing requirements prior to human entry
- Controls that must be applied for initial entry and any specified tasks beyond initial entry, including:
 - Ventilation during entry
 - Worker PPE

Confined Space Entry Procedures are to be created by Enbridge GTM operations as the standard bearer. The Confined Space Entry Procedures should be designed to work seamlessly with the Confined Space Hazard Assessment. The procedure must be retained onsite, as per Enbridge Record Retention Schedule. Refer to subsection “Confined Space Entry Procedure (step by step)” below for a general Confined Space Entry Procedure for developing specific procedures for spaces identified in the confined space inventory.

To meet the requirement for a “documented entry procedure”, the following is acceptable:

- **Enbridge Planned Entry** - A fully completed Confined Space Entry Hazard Assessment with the Confined Space Entry Procedure attached as well as any additional procedures for specific tasks to be conducted within the space.

***NOTE:** The Canada Confined Space Entry Hazard Assessment allows the option of additional procedures for specific tasks within the confined space to be captured within the assessment itself.*

- **Contractor Planned Entry** - A fully completed Confined Space Entry Hazard Assessment with a Contractor’s procedure attached (if entrants are the Contractor’s employees).

***NOTE:** The documented procedure provided by the Contractor must meet or exceed the requirements set out in the Canada Confined Space Entry Procedure.*

4.10.4.10. Canada Confined Space Entry Procedure Steps

1. The PIC or Designate reviews the applicable Confined Space Package and work plan for the confined space to ensure:
 - a) Known resources for the entry are available and/or assembled.
 - b) All required individuals are brought into the pre-initial entry meeting and any planned subsequent task pre-entry meeting.

***NOTE:** Initial entry and/or tasks requiring entry may involve contract companies. Where the contract company will be providing procedure documents for their tasks, these must be collected and included in the Confined Space Package for discussion at the pre-initial entry meeting.*

2. The PIC or Designate and other supporting Personnel prepare the Confined Space as prescribed by the Confined Space Hazard Assessment Report, including as applicable:
 - a) Purging/Cleaning (that does not involve physical human entry).
 - b) Mechanical/Blinding, Electrical and/or any other required isolation.
 - c) Lockout/Tagout

NOTE: Individual Entrants must later apply a personal lock as part of their LOTO requirements.

Posting of confined space entrance signage to prohibit non-permitted entry.

- d) Assembling any scaffolding or entrance aids and, if required, devices for rescue (e.g., winches or other mechanical aid).
 - e) Opening and naturally or mechanically ventilating the confined space.
3. The PIC or Designate and (as applicable) Entrant(s), Safety Watch, Rescue Team, and other Subject Matter Experts (SMEs) as the space or task may demand conduct a pre-initial entry meeting. This meeting involves a review and discussion of:
 - a) The Confined Space Hazard Assessment Report, with a special focus on:
 - i. Isolation, lock out, space preparation requirements. This review should take place even if already completed as an assurance exercise for all involved.
 - ii. Control measures specified in the assessment including ventilation, SABA/SCBA or other PPE requirements or other control equipment need to be reviewed and a plan in place to gather any items not yet assembled prior to entry.
 - iii. Atmospheric testing requirements before and during entries.
 - b) Entry procedure(s).
 - c) Role requirements and specific duties for the planned entry / entries, and especially specific duties for the safety watch and rescue team Personnel (as per the Rescue Plan).

NOTE: Steps 2 and 3 may not be strictly sequential.

The timing of the pre-initial entry meeting may vary:

- An earlier meeting (especially for complex entries) allows time for additional review or adjusting the plan based on meeting discussion.
- A meeting closer to entry time allows Personnel involved in the initial entry, or subsequent task-based entries, to attend and issues discussed in the meeting are fresh in the minds of those performing confined space entry duties.

NOTE: Typically, a pre-entry meeting will be held when a new task is undertaken within a confined space that involves the entrants performing that task. However, a single pre-initial entry meeting may cover the requirements for multiple entries for multiple tasks so long as:

- All entries are taking place within a relatively short period of time.
- All tasks are reviewed, and
- All Personnel involved in all tasks are included in the meeting.

Where there is a change of scope in tasks or an unanticipated change in conditions, an additional pre-entry meeting for task-based entries may need to be held and the Confined Space Hazard Assessment may need to be revised.

1. The PIC or Designate will test the Confined Space atmosphere prior to Entry.
 - a) The Confined Space Hazard Assessment Report will stipulate:
 - i. What substances must be covered by the testing.

- ii. Acceptable levels for each of these substances.
 - iii. Additional instructions for the testing protocol.
 - b) Pre-entry atmospheric testing should be conducted from outside the space using a hose and pump assembly for an initial reading of hazardous gases and oxygen levels. See the Confined Space Atmosphere Testing Procedure for further instructions. Certain types of tests may require entry.
 - c) The results of all pre-entry atmospheric tests shall be logged on the Atmospheric Testing Log (that will remain at the confined space entrance). If testing is combined with the permit issuing process, initial results may also be captured on the permit.
 - d) The results shall be compared to the anticipated results or atmospheric criteria set out in the Confined Space Hazard Assessment Report.
 - e) If any atmospheric testing level requirements defined within the Confined Space Hazard Assessment Report are not met, the mitigation measures shall be reviewed and adjusted until acceptable atmospheric levels are achieved.
2. The PIC or Designate will complete a Safe Work Permit for initial entry.
- a) The Safe Work Permit for a Confined Space Entry cannot be fully completed or signed until pre-entry atmosphere testing is completed and logged.
 - b) Unless specified otherwise (e.g., Work Authorization process), the Permit Issuer is an Enbridge PIC or Designate and the Permit Receiver is the lead of the single Entry or for multiple Entrants.
3. The PIC or Designate posts the required documents near the space entrance.
- a) The documents must include:
 - i. The Safe Work Permit issued for initial entry
 - ii. Any subsequent, active Safe Work Permit
 - iii. Atmosphere Testing Log and Entry Log
 - iv. Confined Space Hazard Assessment Report
 - v. Confined Space Rescue Plan
 - vi. Any entry procedure or other task-specific procedures not otherwise integrated into the Confined Space Hazard Assessment Report.
- NOTE:** Documents only need to be near the space entrance during permitted entries. They may be left in the care of the Safety Watch if the Safety Watch will remain at the space entrance.
4. Entrant(s) and Safety Watch should complete the Field Level Hazard Assessment just prior to entry.
- a. The FLHA may be completed as part of the pre-entry meeting or Safe Work Permitting process if these are also held just prior to entry near the confined space.
5. Entrant(s) or Safety Watch must put time of entry on the Entry Log.
6. Entrant(s) don required PPE and proceed with entry and execute assigned testing/hazard identification activities. The Safety Watch will execute duties to check on or continuously watch Entrant(s), based on atmosphere hazard level specified in the Confined Space Hazard Assessment Report. The Rescue Team will either be at the entrance or capable of being contacted at any time during Entry and ready to perform rescue as per the Confined Space Hazard Assessment Report and/or Rescue Plan.
- a) For initial entry, the Confined Space Hazard Assessment will specify any additional testing and inspections or hazard assessments within the space that needs to be conducted as a prerequisite to subsequent tasks or entries. Entrant(s) should always informally assess mechanical and physical hazards once inside.
 - b) All atmospheric test results from the initial entry should be captured on the Atmosphere Testing Log.

- c) Depending on the system used, a test or confirmation of the communication system between the Entrant and Safety Watch must be conducted immediately upon entry.
- 7. Upon completing required atmosphere tests and, if applicable, planned tasks to be completed during the initial entry, Entrant(s) exit the Confined Space, sign out on Entry Log, and inform Safety Watch of exit.
 - a) Depending on the work plan, a temporary barrier and/or sign over the entrance may be required.
- 8. The PIC or Designate closes the Safe Work Permit.
- 9. The PIC or Designate secures the space (as appropriate if additional task-based entry will not take place immediately).

In the event there are additional “Task Based Entries” following initial entry, the following steps apply:

1. The PIC or Designate holds a pre-entry meeting prior to entry for a specific task or set of tasks (if all Personnel doing all tasks can attend).

NOTE: *This step may not apply if completed in step 3 with all entrants.*

- a) This meeting involves a review and discussion of:
 - i. The Confined Space Hazard Assessment Report for the task(s), focusing on:
 - Reviews of isolation lock out, and space preparation already completed as an assurance exercise for all involved.
 - A review of control measures specified in the Confined Space Hazard Assessment Report for the task at hand including ventilation, respiratory, or other PPE requirements any plans or instruction for collecting or assembling control equipment
 - b) Atmospheric testing requirements before and during entries.
 - c) Entry procedure(s).
 - d) Role requirements and specific duties for the planned entry / entries, and especially specific duties for the safety watch and rescue team Personnel (as per the Rescue Plan).
- 2. The PIC or Designate tests the atmosphere prior to entry as per the requirements set out in the Confined Space Hazard Assessment Report for the task at hand.
 - a) If any atmospheric testing level requirements defined within the Confined Space Hazard Assessment Report are not met, the mitigation measures shall be reviewed and adjusted until acceptable atmospheric levels are achieved.

NOTE: *The classification of the confined space within the Confined Space Hazard Assessment Report for a specific task is based on the atmospheric levels specified in the assessment. If these cannot be achieved, the Confined Space Hazard Assessment Report must be reviewed and revised by someone qualified to complete a Confined Space Hazard Assessment Report.*

3. The PIC or Designate completes a Safe Work Permit for the task-based entry. (This may be started before or during the previous step)
 - a. The maximum length for a Safe Work Permit will be a single shift for the Entrants. As such it may cover multiple entries for a given task over that time.
4. The PIC or Designate must post the required documents near the space entrance (see Step 6 above for required documents list).
5. Entrant(s) and Safety Watch should complete the Field Level Hazard Assessment just prior to entry.

- a. The FLHA may be completed as part of the pre-entry meeting or Safe Work Permitting process if these are also held just prior to entry near the confined space.
6. Entrant(s) or Safety Watch put time of entry on the Confined Space Entry Log.
7. Entrant(s) don required PPE and proceed with entry and execute assigned task. The Safety Watch will execute duties to check on or continuously watch Entrant(s), based on atmosphere hazard level specified in the Confined Space Hazard Assessment Report. The Rescue Team will either be at the entrance or capable of being contacted at any time during Entry and ready to perform rescue as per the Confined Space Hazard Assessment Report and/or Rescue Plan.
8. Entrant(s) monitor the atmosphere while working in the confined space.
 - a. The Safe Work Permit will specify the level of atmospheric monitoring and testing that is expected (based on the Confined Space Hazard Assessment).
 - i. Unless under supplied air, continuous monitoring with a personal gas monitor with alarm (or equivalent level of protection) would be expected.
 - ii. Periodic recording of atmosphere levels of hazardous substances or oxygen on the atmospheric testing log offers an additional layer of protection by recording trends of rising or dropping levels.
 - b. Passive gas monitoring (i.e., no pump and hose assembly) is appropriate for local area monitoring within the confined space. A personal gas monitor may be used for this purpose if it measures all gases of concern.
9. Entrant(s) exit, sight out on Entry Log, and inform Safety Watch of exit.
 - a. If the permit covers multiple entries in each shift, the atmosphere testing (with pump and hose from outside the space) must be repeated prior to re-entry if the space is vacated for more than 20 minutes.
 - b. If the Confined Space Hazard Assessment has deemed the space as a “Low Hazard Atmosphere,” previous atmospheric testing has proven this out, and there is no way for a hazardous atmosphere to inadvertently develop, subsequent pre-entry testing is not required
10. The PIC or Designate closes the Safe Work Permit.
11. The PIC or Designate completes a “**Clear for Closure**” (found on the Confined Space Entry Log Form).
12. The PIC or Designate physically closes or secures the space as appropriate.
13. Trigger the appropriate Pre-Startup Safety Review (PSSR) if the confined space is a process vessel or involves process equipment.
14. The PIC or Designate closes the Safe Work Permit.
15. The PIC or Designate files and retains documentation as required.

Documentation Logs and Permits During Entry Activities

The following logs and permits must be maintained during active work within a confined space if applicable and its execution documented in the confined space hazard assessment:

- Atmosphere Testing Log (records all pre-entry and period tests within confined space)
- Confined Space Entry Log (records Worker entry/exit)
- The following documents must be posted or made available near the entrance to a Confined Space while active entry preparations or work is taking place:
 - Confined Space Hazard Assessment Report

- Entry Procedure or other task-specific procedures (may be integrated into the Confined Space Hazard Assessment Report)
- Confines Space Rescue Plan
- Active Safe Work Permit

For a complete summary of requirements based on the hazard classification of the Confined Space to be entered, refer to [Table 10](#).

Table 10: Confined Space Summary of Requirements

Requirements		Confined Space Hazard Type		
		Low Hazard Atmosphere (Restricted Space)	Moderate Hazard (Non IDLH Atmosphere)	High Hazard (IDLH Atmosphere)
ENG.	Energy Isolation/ LOTO	Determined by the Confined Space Hazard Assessment		Yes, if applicable
	Ventilation	Determined by the Confined Space Hazard Assessment		Yes, safeguards if ventilation fails
ADMIN.	Signage (Preventing Unauthorized Entry)	Yes		
	Entry Team Meeting	Required	Required	Required
	Confined Space Hazard Assessment	Yes		
	Safe Work Permit	Yes		
	Confined Space Entry Package	Yes		
	Confined Space Entry Procedure	Determined by the Confined Space Hazard Assessment	Yes	
	Hot Work & Insulation Equipment	Determined by the Confined Space Hazard Assessment	The use of non-spark or intrinsically safe electronic equipment in potentially flammable or explosive environments as defined by the Canadian Electrical Code	
	Confined Space Hazard Assessment	Yes		
	Pre-entry Atmospheric Testing	Determined by the Confined Space Hazard Assessment	Yes	
	Air Testing Log and Entry	Initially to classify atmospheric conditions as part of the Confined Space Hazard Assessment	Yes	Yes, at a per hour minimum

Requirements		Confined Space Hazard Type		
		Low Hazard Atmosphere (Restricted Space)	Moderate Hazard (Non IDLH Atmosphere)	High Hazard (IDLH Atmosphere)
	Location and Attention of Confined Space Attendant/ Safety Watch	Must be able to fulfill duties below	Must be stationed near space entrance	Must be stationed near space entrance and exclusively and continuously attend to Confined Space Attendant duties
	Confined Space Attendant Communication i.e., check on wellbeing of Worker(s)	Every 20 minutes	Minimum of every 20 minutes; more often based on hazards of space or task performed	Continuous
	Additional Duties of Confined Space Attendant	N/A		Prevent entanglement of lifelines and airlines
	Entrants contact with Confined Space Attendant	A way for Entrant to summon Confined Space Attendant at any time	A way for Entrant to summon Confined Space Attendant at any time, including from inside the space	A way for Entrant to summon Confined Space Attendant at any time, including from inside the space
	Rescue Team Requirements	Determined by Confined Space hazard assessment	Onsite and prepared to respond	Outside the confined space and available to provide immediate response
	Rescue Plan	Yes		
	Rescue and first aid requirements for Confined Space Attendant		Able to immediately summon rescue personnel	Equipped and capable of performing rescue / fulfilling rescue duties
PPE	PPE	Determined by the Confined Space Hazard Assessment	As required in the PPE, Respiratory Protection Standards	

4.10.5. Documentation

The Confined Space section has referenced the following support documentation:

- Confined Space Atmosphere Testing Procedure
- Confined Space Rescue Plan Template (Canada)
- Confined Space Atmosphere Testing Log
- Confined Space Entry Log Form
- Confined Space Hazard Assessment Report
- Benzene Survey Form
- NORM Survey Record Form

- Amine Survey Form
- Mercury Survey Form

4.10.6. References

- *Canadian Occupational Health and Safety Regulations Part XI*
- *WorkSafeBC, Occupational Health and Safety Regulations Part 9*
- *Alberta, Occupational Health and Safety Code Part 5*
- *Nova Scotia, Occupational Safety General Regulations Part 12*
- *New Brunswick, Occupational Health and Safety Act, General Regulation Part XVII*

4.11. Crane and Hoist Safety

4.11.1. Purpose

This section is developed to provide the minimum safety guidelines for the operation, maintenance and inspection of cranes and hoist.

4.11.2. Scope

This section applies to all Company facilities utilizing a crane or hoist.

4.11.3. Responsibilities

People Leaders shall:

- Ensure all cranes and hoists are inspected per the various regulatory requirements.
- Ensure Operators of the various cranes and hoist are properly trained.
- Ensure Operators have the necessary required state/provincial certifications.
- Participate in developing specialized lifting plans.

Workers shall:

- Know and follow the operating procedures for cranes and hoist.
- Have the proper certifications for crane and hoist operators.
- Not exceed the lift capacity of the crane or hoist.
- Ensure a clear lift zone which includes barricades if needed and clearances from hazardous equipment.
- Know and follow proper rigging principles for a lift.

4.11.4. Requirements

4.11.4.1. General Material Handling Requirements

- All Serious and Critical Lifts must be performed in accordance with the *Serious and Critical Lifts* section.
- Storage of materials shall not create a hazard.

- Bags, containers, bundles, etc., stored in tiers shall be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapsing.
- Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles at loading docks, through doorways and wherever turns or passage must be made.
- Aisles and passageways shall be kept clear and in good repair with no obstruction across or in aisles that could create a hazard.
- Permanent aisles and passageways shall be appropriately marked.
- Bagged materials stored in tiers are to be stepped back and cross-keyed at least every 10 bags high.
- Non-compatible materials are to be segregated in storage.
- Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage.
- Vegetation control will be exercised when necessary.
- Proper drainage of work and storage area shall be provided.
- Clearance limits and warning signs shall be provided.
- Covers and/or guardrails shall be provided to protect Personnel from open pits, tanks, vats, ditches, etc.
- Maximum safe load limits of floors (except floors or slab on grade) shall be conspicuously posted and not exceeded.
- Standard guardrails including top rail, mid rail and a toe guard should be installed to prevent stored materials from falling when applicable.
- Ramps, blocking or grading should be used to ensure safe movement of vehicles between different levels.
- Used lumber shall have all nails withdrawn and stacked to prevent falling.
- Piles of lumber that are worked manually are not to exceed 5 m (16 ft.) in height.
- Structural steel, poles, pipe, bar stock and other cylindrical materials, unless racked, shall be stacked, and blocked to prevent spreading or tilting.

4.11.4.2. Hoisting and Mechanical Lifting

- Hoisting equipment should be inspected before it is put into use, and it should be tested before being used on heavy loads.
- Baskets used for Personnel lifting will be designed and stamped by a certified Professional Engineer.
- The operator of hoisting equipment is responsible for the safe lift and shall determine whether the load to be lifted is within the capacity of the hoisting equipment and that the appropriate lifting device (i.e., chain, choker, sling or bridle) is used.
- Synthetic slings are preferred to be used for hoisting rather than chains.
- All Workers should be alert and prevent anyone from walking under suspended loads or being near lines holding a strain.

- The operator and signal person must carefully observe the position of power cables, piping, valves, pipelines, etc. before initiating the lift.
- The hoisting machine operator must keep their attention on the person giving the signals. The signal person must always keep their attention on the load.
- Only trained and authorized Personnel are permitted to operate hoisting equipment.
- Standing or riding on material hoists, crane blocks or crane loads is prohibited.
- When lifting pipe or any smooth-surfaced materials, slings (bridles and chokers) should be placed around the object with at least two turns or fastened choker fashion.
- Cables and fabric slings should be protected with pads or blocks where they are placed around sharp edges.
- Loads should not be handled by any equipment beyond the capacity specified in the manufacturer's chart.
- When handling heavy loads with pneumatic-tire mobile cranes or auto cranes which are provided with outriggers, the outriggers should be out on solid ground or good blocking and the machine on solid ground or mats.
- U-bolt clamps shall have the U-bolt on the deadline.
- Ropes should be used for lifting lightweight containers and other minor weight bearing activities, such as use as a tag line.
- Ropes contaminated with oil, grease or chemicals should be properly discarded.
- Materials or equipment should not be left hanging on a hoist indefinitely. The item should be blocked and the tension on the lifting device slowly relieved after making sure the blocking or cribbing will support the load.
- Approved hand signals will be reviewed and used. A copy of the hand signal chart must be posted where the crane or hoist is used.

4.11.4.3. Cranes

- Only trained and qualified Personnel as per local jurisdiction shall be permitted to operate a crane.
- Crane operation and operators are required to adhere to CSA or OSHA crane regulations.
- The Employer shall comply with the manufacturer's specifications and limitations applicable to the operation of all cranes and derricks.
- Rated load capacities, and recommended operating speeds, special hazard warnings, or instruction, shall be conspicuously posted on all equipment.
- Do not attempt to lift loads that exceed the rated capacity of the crane, hoist or lifting slings, rope, or chains. Remember, the smaller the angle on the legs of slings or chains, the less lifting capacity.
- An accessible fire extinguisher of 5BC rating, or higher, shall be available at all operator stations or cabs of equipment.
- Loads will be securely connected and balanced prior to lifting.
- Do not lift with kinks or twists in the wire rope or chains.

- Proper padding, blocking, and protective devices will be used to avoid sling damage.
- Check the area of lift and travel prior to the lift to ensure Personnel are notified and in safe positions and the area is clear of obstructions.
- No persons will be allowed under a lifted load.
- No persons will be allowed to ride the hook or load.
- Personnel must wear hard hats and any other personal protective equipment needed during hoisting operations.
- The Operator will not leave his position at the controls while a load is suspended from the hoist.
- Tag lines shall be used to control load swing, rotation and/or balance, when necessary, to prevent a hazard to Workers. When the bottom of the load is waist high or lower, tag lines are not required but can be used if additional stability is desired.

4.11.4.4. Normal and Heavy Service Levels

Normal Service involves operation of lifting equipment with a randomly distributed load within the rated load limit or uniform load of less than (<) 65 percent of rated load limit for no more than 25 percent of the time for a normal work shift.

Heavy Service involves operation of lifting equipment within the safe working load that exceeds normal service.

4.11.4.5. Slings – Safe Operating Practices

Whenever any sling is used, the following practices shall be observed:

- Slings that are damaged or defective shall not be used.
- Slings shall not be shortened with knots or bolts or other makeshift devices.
- Sling legs shall not be kinked.
- Slings shall not be loaded more than their rated capacities.
- Slings used in a basket hitch shall have the loads balanced to prevent slippage.
- Slings shall be securely attached to their loads.
- Slings shall be padded or protected from the sharp edges of their loads.
- Suspended loads shall be kept clear of all obstructions.
- All Workers shall be kept clear of loads about to be lifted and of suspended loads.
- Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.
- Shock loading is prohibited.
- A sling shall not be pulled from under the load when the load is resting on the sling.
- Each day before use, the sling and all fastenings and attachments shall be inspected for damage by a competent person designated by the Employer. Additional inspections shall be performed during use, where service conditions warrant.
- Damaged or defective slings shall be immediately removed from service.

- All slings should be stored in a well-ventilated, dry building or shed. Never store them on the ground or allow them to be continuously exposed to the elements because this will make them vulnerable to corrosion and rust.

4.11.4.6. Alloy Chain Slings

- Prior to use, any alloy chain sling that is new, repaired, or reconditioned must be proof tested by the sling manufacturer or equivalent entity. A copy of the certificate of proof testing must be maintained and available for examination.
- All alloy chain slings must have permanently attached durable identification. The identification must include the size, grade, rated capacity, and reach.
- Hooks, rings, oblong links, pear shaped links, welded or mechanical coupling links or other attachments must have a rated capacity at least equal to that of the alloy steel chain with which they are used, or the sling shall not be used more than the rated capacity of the weakest component.
- Alloy steel chain slings must not be used with loads more than the rated capacities prescribed in (OSHA's *Guidance on Safe Sling Use 'Tables and Figures'*)
- If the chain size at any point of any link is less than that stated in OSHA's *Guidance on Safe Sling Use 'Tables and Figures,'* the sling must be removed from service.
- Alloy steel chain slings with cracked or deformed master links, coupling links or other components must be removed from service.
- Slings must be removed from service if hooks are cracked, have been opened more than fifteen percent (15 percent) of the normal throat opening measured at the narrowest point or twisted more than ten degrees (10°) from the plane of the unbent hook.
- In addition to the "before each use" visual inspection required for all slings, a written periodic inspection of alloy chain slings must be made at least once every 12 months or more often, dependent upon use, conditions, and service.
- Clean and inspect the chain so that defects would be visible.
 - Twists or bends
 - Nicks or gouges
 - Excessive wear or stretching
 - Distorted or damaged master links, coupling links, or attachments.
 - Defective Welds
- The periodic inspection must be documented and be available for examination. The record must include the most recent month and year the inspection was performed.

4.11.4.7. Wire Rope

- Wire rope slings shall not be used with loads that exceed the manufacturer's rated capacities. Rating tables are shown in OSHA's *Guidance on Safe Sling Use 'Tables and Figures.'* Slings not included in these tables shall be used only in accordance with the manufacturer's recommendations.

- Wire rope slings shall have permanently affixed and legible identification markings identifying the SWL, type(s) of hitch(es) used, the angle upon which it is based, and the number of legs if more than one.
- The following are minimum lengths for slings:
 - Cable laid and 6x19 and 6x37 slings must have a minimum clear length of wire rope 10 times the component rope diameter between splices, sleeves, or end fittings
 - Braided slings must have a minimum clear length of wire rope 40 times the component rope diameter between the loops or end fittings
 - Cable laid grommets, strand laid grommets and endless slings must have a minimum circumferential length of 96 times their body diameter
- Wire rope slings shall be immediately removed from service if any of the following conditions are present:
 - Ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay.
 - Wear or scraping of one-third the original diameter of outside individual wires.
 - Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure.
 - Evidence of heat damage.
 - End attachments that are cracked, deformed, or worn.
 - Hooks that have been opened more than 15 percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook.
 - Corrosion of the rope or end attachments.

4.11.4.8. Synthetic Web Slings

- Each sling shall be marked or coded to show:
 - Name or trademark of the manufacturer
 - The rated capacities for each type of hitch and type of synthetic web material.
 - Rated capacity shall not exceed
- Synthetic webbing shall be of uniform thickness and width and selvage edges shall not be split from the webbing's width.
- Fittings shall be:
 - Of a minimum breaking strength equal to that of the sling; and
 - Free of all sharp edges that could in any way damage the webbing.
- Stitching shall be the only method used to attach end fittings to webbing and to form eyes. The thread shall be in an even pattern and contain a sufficient number of stitches to develop the full breaking strength of the sling.
- Synthetic web slings shall not be used with loads more than the rated capacities specified by the manufacturer or in OSHA's *Guidance on Safe Sling Use 'Tables and Figures.'*

- When synthetic web slings are used, the following precautions shall be taken:
 - Nylon web slings shall not be used where fumes, vapors, sprays, mists, or liquids of acids are present.
 - Polyester and polypropylene web slings shall not be used where fumes, vapors, sprays, mists, or liquids of caustics are present.
 - Web slings with aluminum fittings shall not be used where fumes, vapors, sprays, mists, or liquids of caustics are present.
- Synthetic web slings must be immediately removed from service if any of the following conditions are present:
 - Acid or caustic burns.
 - Melting or charring of any part of the sling surface.
 - Snags, punctures, tears, or cuts.
 - Broken or worn stitches.
 - Distortion of fittings.

4.11.4.9. Hooks

- At least annually, hooks shall be visually inspected by a qualified person.
- Hooks found to have any of the following conditions shall be removed from service:
 - Bending, deformation or twisting exceeding 10 degrees from the plane of the unbent hook.
 - Distortion in the Throat opening of a hook causing an increase in the throat opening exceeding 15 percent.

4.11.4.10. Inspections and Maintenance

- For equipment in normal service, inspect at least once per year, or as specified by the manufacturer.
- For equipment in heavy service, inspect at least every 6 months, or as specified by the manufacturer.
- For equipment that is idle for 6 months or more, a full formal inspection prior to use.
- Inspections of the hoisting equipment shall be made by a Qualified Person.
- Inspections based on manufacturer's recommendations shall be completed prior to each use and on regular intervals.
- All maintenance repairs and routine service records will be retained at the area field office.
- All damage repairs to the lifting boom, once completed, will be inspected, and approved by a registered engineer.
- Records of all formal safety inspections will be retained at the area field office.
- All rigging equipment shall be inspected before each use.

Portable hoist, come-along, chain falls, and binders shall be visually inspected before each use to determine the condition of the operating mechanisms, chains, ropes, cables, and the hooks. The rated load capacity of the portable lifting devices shall be marked and clearly legible.

4.11.5. Documentation

- SAF-58.9025, “Lifting Equipment Inspection Form”

4.11.6. References

- OSHA 29CFR 1910.179 Materials Handling and Storage – Overhead and Gantry Cranes
- OSHA 29CFR 1910.180 Materials Handling and Storage – Crawler Locomotive and Truck Cranes
- OSHA Guidance on Safe Sling Use ‘Tables and Figures’
- SP-00-02 Western Canada Engineering Standard for Operation, Inspection, Maintenance and Testing of Overhead Cranes

4.12. Critical and Serious Lifts

4.12.1. Purpose

This section details how to handle Serious and Critical Lifts. It also informs those involved of additional requirements in a Serious or Critical Lift that may not be necessary for basic lifts. This section is designed to ensure Personnel and equipment are protected by evaluating the lifting process and verifying the correct devices and equipment for the task are being utilized.

4.12.2. Scope

This section applies to all property owned and operated by Enbridge GTM.

Serious and Critical Lifts include any lift that could result in an accident that could cause death, injury, health impacts, environmental impacts, significant property damage or project delay. For these lifts a specific and detailed Lift Plan must be completed to perform these operations.

Critical Lift: Enbridge considers the following operations Critical Lifts:

- Any load handling equipment lift, when the load is greater than 75 percent of the manufacturer’s rating chart,
- Any tandem lift (multi-crane lift) involving two or more lifting devices lifting the same load simultaneously,
- Any lift where the load travels over or between overhead High Voltage power lines (this does not include cables in cable trays), and
- Any lift that is deemed a Critical Lift by the operator, Supervisor, Management Personnel, or Health & Safety Personnel.

Serious Lift: Enbridge considers the following operations Serious Lifts:

- Crane lift where Workers are being hoisted in a man-basket
- Lift where failure of the lift could endanger existing Facilities of one-of-a-kind equipment or processes
- Load where non-routine lifting or rigging equipment configurations are used
- Lift where the load or any part of the load handling equipment could come within the safe limits of approach to High Voltage equipment or a power line

- Lifts over existing permanent structures or operating equipment
- Blind lifts

All Serious and Critical Lifts require a Lift Plan. Most lifts are routine and present little harm in the form of personal injury or major impact to a facility or pipeline; but there are instances where extra precautions shall be taken to protect Personnel, equipment and/or materials.

4.12.3. Responsibilities

People Leaders shall:

- Ensure this document is followed any time a lift meets the definition of a Serious or Critical Lift or has been deemed to be a Serious or Critical Lift.
- Assign a competent delegate to oversee the entire lifting operation and ensure that all Serious or Critical Lifts follow the requirements outlined in this guide.
- Ensure that a Serious or Critical Lift Plan is developed and documented
- Ensure a Job Hazard Analysis is completed and documented on JHA Form, prior to beginning the lift.
- Ensure a pre-lift meeting with all involved Personnel is held to discuss the proposed Serious or Critical Lift. The Lift Plan, JHA and any areas of concern must be discussed at this meeting.
- Ensure Unauthorized Personnel are prohibited from entering the Lift Hazard Area during a Serious or Critical Lift.

People Leader or competent delegate of the Serious or Critical Lift operation shall:

- Ensure that the Lift Plan and JHA are completed.
- Ensure all involved Employees attend the pre-lift meeting.
- Be present at the time of the Serious or Critical Lift.
- Prohibit any Unauthorized Personnel from entering the Lift Hazard Area during a Serious or Critical Lift.

Other participants in the Serious or Critical Lift activity shall:

- Understand and follow the requirements of the Lift Plan.
- Follow all additional H&S requirements applicable to the Serious or Critical Lift being performed (Example: Electrical Safety Procedure, limit approach boundaries)
- Enbridge participants shall be made aware of the Contractor's Lift Plan.
- Alert the People Leader of the Serious or Critical Lift if Unauthorized Personnel attempt to enter the Lift Hazard Area during a Serious or Critical Lift.

Third-Party Contractor Crane Company shall:

- 3rd party Contractor(s) who perform lifting activities for Enbridge shall create and follow their own written Lift Plan for performing the task.
- Enbridge Personnel working with the Contractor must abide by the requirements and limitations of the Contractor's Lift Plan.

HS Support shall:

- Periodically review Serious or Critical Lift Plans to ensure Lifts are performed safely.
- Make additions/adjustments/recommendations to Serious or Critical Lift Plans to ensure tasks are performed safely.

Safety Shared Services shall:

- Periodically review the Serious or Critical Lift program and update/adjust based on gaps identified. (Review event reports and information received from the field)

4.12.4. Requirements

4.12.4.1. General Requirements

- Serious or Critical Lifts will be performed in accordance with all applicable regulatory and company requirements included in Boom Truck and Rigging, or Crane and Hoist Safety (depending on type of equipment used).
- The Serious and Critical Lift Plan Form, or approved Contractor form, must be completed and approved by the People Leader or competent delegate prior to beginning the Serious or Critical Lift.
- The JHA Form must be completed prior to beginning the Serious or Critical Lift.
- Crane Operator and Signal Person must discuss and agree to the signals that will be used to direct the Lift.
- All involved Personnel must attend a pre-lift meeting to discuss the Lift Plan, JHA, Lift Hazard Area and any areas of concern. Personnel that did not attend the pre-lift meeting are prohibited from being in the Lift Hazard Area during a Serious or Critical Lift.
- For serious and critical lifts, the minimum control measure required shall be completion of a lift plan. The lift plan shall be reviewed, agreed to, and signed off by all Workers involved in the lift at the pre-lift meeting.
 - At a minimum, the information recorded on the Serious Lift Plan shall include:
 - Weight
 - Radius
 - Equipment type
 - Percentage of load chart
 - Rigging components
 - Rating capacities
 - Adequate clearances to prevent contact with site-specific hazard(s) or obstructions during load handling activities
 - In addition to the requirements of the Serious Lift Plan, the Critical Lift Plan shall include:
 - Equipment layout and swing path schematic
 - Rig arrangement schematic
- Lift sequence

- Tag line(s) must be used. They must be adequately sized and sufficient in quantity to control load swing, rotation and/or balance, to prevent a hazard to Employees.
- Serious or Critical Lifts shall not be performed when environmental conditions create an additional hazard (lightning, wind exceeding manufacturer's recommendations, etc.)
- For Lifts performed near electrical power lines or distribution lines, no part of the crane, rigging or load must be allowed to come within the safe clearance distance from power lines
- If so equipped, crane limits must be set and verified prior to performing the lift.
- Power lines are presumed to be energized unless the utility owner / operator confirms that the power line is de-energized, continues to be de-energized and is visibly grounded at the worksite. Minimum clearance distances are listed in [Table 11](#).

Table 11: Minimum Clearance Distances

Voltage (nominal, kV, alternating current)	Minimum Clearance Distance (ft)
Up to 50	10
Over 50 to 200	15
Over 200 to 350	20
Over 350 to 500	25
Over 500 to 750	35
Over 750 to 1,000	45
Over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

NOTE: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

- All Serious or Critical Lifts must have a Lift Plan. Document the Lift Plan on Serious and Critical Lift Plan Form. When 3rd party Contractors develop the Lift Plan, their documentation can be used in lieu of the GTM Serious and Critical Lift Plan Form.
- The person developing the Lift Plan must:
 - have received formal crane operation training or recertification within the last five years
 - be familiar with and understand the limits of the lifting equipment that will be used
 - understand and be able to address the potential hazards of the lift including rigging (length, capacity, angles, spreader bar(s), etc.), load (weight, size, bulk, abnormal shape, multiple attachment points, etc.), adjacent vehicle traffic, communication, weather, work environment and load travel path
 - consult with Regional Technical Staff only if engineering support is required (Regional engineers are not responsible for developing the Lift Plan, only providing engineering support as needed)
- A third-party company meeting the criteria above must develop the Lift Plan when a Person in Charge (PIC) /Authorized Enbridge Representative(s) or designate are not available.
- The Lift Plan must be approved by the People Leader (Manager) or competent delegate prior to beginning the Serious or Critical Lift.

4.12.4.2. Lifting Personnel

- A boom truck or mobile crane shall not be used to lift Personnel unless other means such as scaffolds, ladders, aerial lifts etc. would be more hazardous or not possible due to the structural design or layout of the workplace.
- Personnel being lifted shall wear all required PPE including but not limited to hard hats, safety glasses, safety shoes and personal fall arrest systems.
- The Man Basket must pass inspection by a competent person at the beginning of each shift before lifting any Personnel.
- A trial lift with the unoccupied Man Basket loaded at least to the anticipated Lift weight shall be made from ground level, or any other location where Employees will enter the platform to each location at which the Man Basket is to be hoisted and positioned. [Source: 1926.1431(h)(1)]
- Operator shall not exceed 50 percent of the equipment's rated capacity at any time during the lifting of Personnel. [Source: 1926.1431(h)(3)(iv)]
- Operator shall not hoist Employees while crane is traveling, except where equipment travels on fixed rails; or it can be demonstrated that there is no less hazardous way to perform the work. [Source: 1926.1431(k)(12)(i)]
- When the Man Basket is in a stationary working position, all brakes (load, boom, swing, secondary, pawls, dogs, etc.) must be engaged.

4.12.4.3. Engineered Lift Plan

- Engineers developing an engineered lift plan must consult with the manufacturer of the crane, hoist or derrick that will be used for the lift.
- Each engineered lift must utilize a separate Engineered Lift Plan.
- Each engineered lift must comply with regulatory requirements including *ASME NOG-1-2015*.

Serious and Critical Lift Terminology

- Any Engineered Lift: A lift specifically designed by engineers for a specific piece of equipment.
- Hand Signals: A method used by the Signal Person to communicate with the crane Operator to direct crane movement.
- Lift Hazard Area: The area surrounding the Lift where an elevated hazard exists due to the activities of operating the lifting device and performing the Lift.
- Lift: The act of utilizing a crane, jib, boom truck or other device to move or position objects and/or Personnel.
- Lift Plan: Pre-job plan or procedure for safely executing a Lift.
- Man Basket: Device designed to lift Personnel in the air. A Man Basket shall have a plate or permanent marking conspicuously posted which indicates the weight of the platform, and its rated load capacity or maximum intended load.
- Operator: Person who manipulates the controls of cranes, jibs, or boom trucks to Lift, move, or position objects and/or Personnel.

- Rigger: Inspects and assembles all rigging devices that are to be used to lift and move equipment or material. This person must understand and follow the manufacturer's recommendations and capacity limitations of all rigging equipment.
- Routine Lift: Known, repetitive Lifts, familiar to all the lift team that do not satisfy any of the Serious or Critical Lift criteria. A Serious and Critical Lift Plan is not required but can be utilized for these operations.
- Signal Person: Person designated to communicate with the crane Operator regarding the disposition of the load.
- Unauthorized Person(s): Personnel that did not attend the pre-lift meeting and/or are not familiar with the hazards associated with the Serious and Critical Lift.

4.12.5. Documentation

- Job Hazard Analysis Form
- Serious and Critical Lift Plan Form (or third-party Lift Plan documentation)
- Electrical Safety Standard

4.12.6. References

- 29 CFR 1926.1431
- ASME NOG-1-2015

4.13. Electrical Safety

4.13.1. Purpose

This section outlines Electrical Safety issues such as Pipeline Induced Voltage, Limits of Approach, Overhead Power Lines, and the use of Cheater Cords.

4.13.2. Scope

This applies to all Company locations. Electrical safety requirements are based upon the expectations outlined in Enbridge engineering standards, as well as NFPA 70E and CSA Z462.

At a minimum, all Personnel performing activities with, or around electrical systems shall know, understand, and follow all the requirements contained within the Electrical Safety Standard.

4.13.3. Responsibilities

People Leaders shall:

- Ensure all Workers know and the Electrical Safety Standard.

Workers shall:

- Follow the Electrical Safety Standard

HS Support shall:

- Assist the Operations Technical Staff in the determination of areas and/or equipment that require specific warning signage, specific training for entry, specific PPE requirements, and in implementation of specific Control of Hazardous Energy procedures.

- Assist the Operations Technical Staff in determining Qualified and Non-Qualified Workers to whom this section applies.
- Assist the Operations Technical Staff with Employee training for the use and care of specific PPE.
- Review training records for qualified electrical Employees at each site as a part of a self-auditing process.

Safety Shared Services shall:

- Assist in the selection of appropriate electrical code compliant training programs for all levels of qualified Employees.
- In coordination with Operations, provide direction and oversight in application of electrical safe work practices.

Operations Technical Staff shall:

- Provide code interpretation and clarification of national standards and maintain Responsibility for revisions to the *Electrical Safety Procedure*.
- Selection of appropriate electrical code compliant training programs for all levels of qualified Employees.
- Provide technical guidance and assistance in the development of training programs in Electrical Safety and Employee Qualification program for all levels of Qualified Workers.
- Provide oversight and monitoring of electrical safety training.

4.13.4. Requirements

- Follow the Electrical Safety Standard for all electric work and tasks.
- Electrical safety requirements are based upon the expectations outlined in Enbridge engineering standards, as well as *NFPA 70E* and *CSA Z462*.

4.13.4.1. Pipelines and Induced Voltage

For pipelines in ROWs protected by AC Mitigation or has potential for induced voltage due to proximity to electrical stations or high voltage above or below ground lines, follow 2-2210 Induced Voltage and Fault Currents-Safety and Corrosion Procedure.

NOTE: In the U.S., performing Structure to Soil Potential testing is an OQ task.

Caution

If the initial voltage test results indicate a voltage reading greater than 15V for above ground piping or 50V for below ground piping, the mitigation must be performed under the supervision of Qualified Electrical Worker.

4.13.4.2. Limits of Approach Boundaries

- Workers shall maintain the Limited Approach Boundaries outlined in [Table 12](#). These boundaries apply to Workers as noted, including their work involving tools, vehicles, or equipment.
- A designated Signaler or Spotter shall ensure the minimum safe distances (i.e., Limited

Approach Boundaries, sometimes referred to as safe limits of approach) are maintained by all Workers and equipment in the area. As part of this duty, the designated Signaler/Spotter shall monitor movements of all Workers, tools, and equipment when work is in progress near Energized lines.

Table 12: Limited Approach Boundaries

Voltage of Power Line or Conductor		Min. Safe Limited Approach Boundary	
Phase to Ground AC Voltage	Phase to Phase AC Voltage	Non-Qualified Workers	Qualified Electrical Workers
425–12,000	735–20,780	3.0 m (10 ft.)	0.9 m (3 ft.)
12,000–22,000	20,780–38,105	3.0 m (10 ft.)	1.2 m (4 ft.)
22,000–50,000	38,105–86,600	3.0 m (10 ft.)	1.5 m (5 ft.)
50,000–90,000	86,600–155,880	4.5 m (15 ft.)	1.8 m (6 ft.)
90,000–120,000	155,880–207,845	4.5 m (15 ft.)	2.1 m (7 ft.)
120,000–150,000	207,845–259,805	6.0 m (20 ft.)	2.7 m (9 ft.)
150,000–250,000	259,805–433,010	6.0 m (20 ft.)	3.3 m (11 ft.)
250,000–300,000	433,010–519,615	7.5 m (25 ft.)	3.9 m (13 ft.)
300,000–350,000	519,615–606,215	7.5 m (25 ft.)	4.5 m (15 ft.)
350,000–400,000	606,215–692,820	9.0 m (30 ft.)	5.4 m (18 ft.)

Table 13: Approach Boundaries to Energized Electrical Conductors or Circuit Parts for Shock Protection, Direct-Current Voltage Systems

(1)	(2)		(4)
Nominal voltage conductor to ground	Limited approach boundary		Restricted approach boundary (includes inadvertent movement adder)
	Exposed movable conductor	Exposed fixed circuit part	
Less than 50V	Not specified	Not specified	Not specified
50V – 300V	3.0m (10ft 0 in)	1.0m (3ft 6in)	Avoid contact
301V – 1 kV	3.0m (10ft 0 in)	1.0m (3ft 6in)	0.3m (1ft 0in)
1.1 kV – 5kV	3.0m (10ft 0 in)	1.5m (5ft 0in)	0.4m (1ft 5in)
5.1 kV – 15 kV	3.0m (10ft 0 in)	1.5m (5ft 0in)	0.7m (2ft 2in)
15.1 kV – 45 kV	3.0m (10ft 0 in)	2.5m (8ft 0in)	0.8m (2ft 9in)
45.1 kV – 75 kV	3.0m (10ft 0 in)	2.5m (8ft 0in)	1.0m (3ft 2in)
75.1 kV – 150 kV	3.3 m (10ft 8 in.)	3.0 m (10ft 0 in.)	1.2 m (4ft 0 in.)
150.1 kV–250 kV	3.6 m (11ft 8 in.)	3.6 m (11ft 8 in.)	1.6 m (5ft 3 in.)
250.1 kV–500 kV	6.0 m (20ft 0 in.)	6.0 m (20ft 0 in.)	3.5 m (11ft 6 in.)
500.1 kV–800 kV	8.0 m (26ft 0 in.)	8.0 m (26ft 0 in.)	5.0 m (16ft 5 in.)

NOTE 1. All dimensions are distance from exposed energized electrical conductors or circuit parts to Worker. * Exposed movable conductor describes a condition in which the distance between the conductor and a person is not under the control of the person. The term is normally applied to overhead line conductors supported by poles.

NOTE 2. Adapted from: NFPA 70E, Standard for Electrical Safety in the Workplace. NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471, An International Codes and Standards Organization, 2015).

4.13.4.3. Overhead Power Lines

- Workers shall not place themselves or operate equipment within the Limited Approach Boundary of overhead power lines. As shown in [Table 13](#), the Limited Approach Boundary is 3 m (10 ft.) for systems up to 50 kV.
- For work within 6 m (20 ft.) of the Limited Approach Boundary of overhead power lines (see [Figure 6](#)), follow these requirements:
 - Site orientations, pre-job meetings, and daily tailgate meetings shall discuss assessed Hazards, SWPs and location(s) of the overhead power lines.
 - Workers shall be informed of the identified Hazards and any Control measures or precautions, in accordance with the Hazard Assessment.
 - A Signaler/Spotter shall be used when Workers and/or equipment are in proximity to the Limited Approach Boundary.
 - Delivery truck operators shall be cautioned about any overhead power lines present, and a Signaler/Spotter shall assist with loading or unloading operations (as appropriate, other vehicle operators shall be similarly cautioned, e.g., high vehicles)
 - Warning decals shall be posted on cranes and similar equipment, regarding the 3 m (10 ft.) minimum clearance.
 - Delivery or other vehicles that have emptied their material (e.g., dump trucks) shall not be permitted to leave the work location until the boom, lift or box is down and safely secured.
 - Vehicles with loads higher than 4.3 m (14 ft.) shall follow specific procedures to maintain safe working clearances when in transit below overhead power lines.
 - Warning cones / goal posts shall be used as visible indicators of the 3 m (10 ft.) Limited Approach Boundary. A safe work area shall be established before work commences. (See [Figure 6](#))
- If overhead power line voltages are unknown, a Qualified Electrical Worker or Utility Owner shall determine the voltages and the Limited Approach Boundary and shall take appropriate action to make the work area safe.
- When isolating third party electricity crossings ensure that verification of isolation is carried out by a Qualified Electrical Worker.

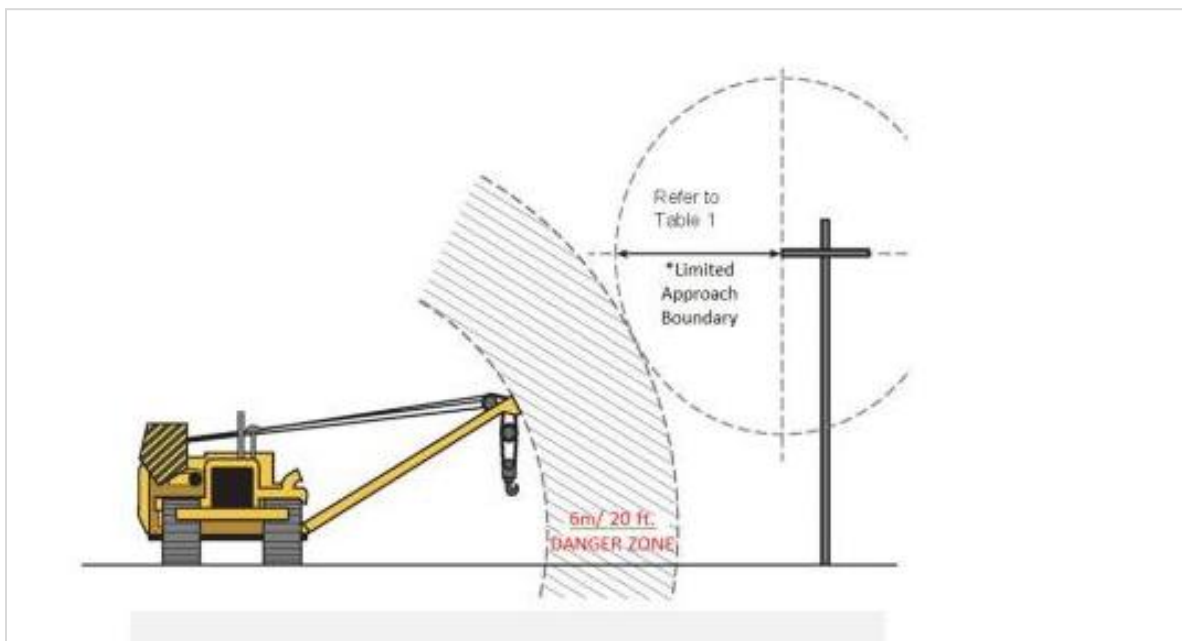


Figure 6: Signage and Signaler Required When Danger Zone Encroaches on Limited Approach Boundary

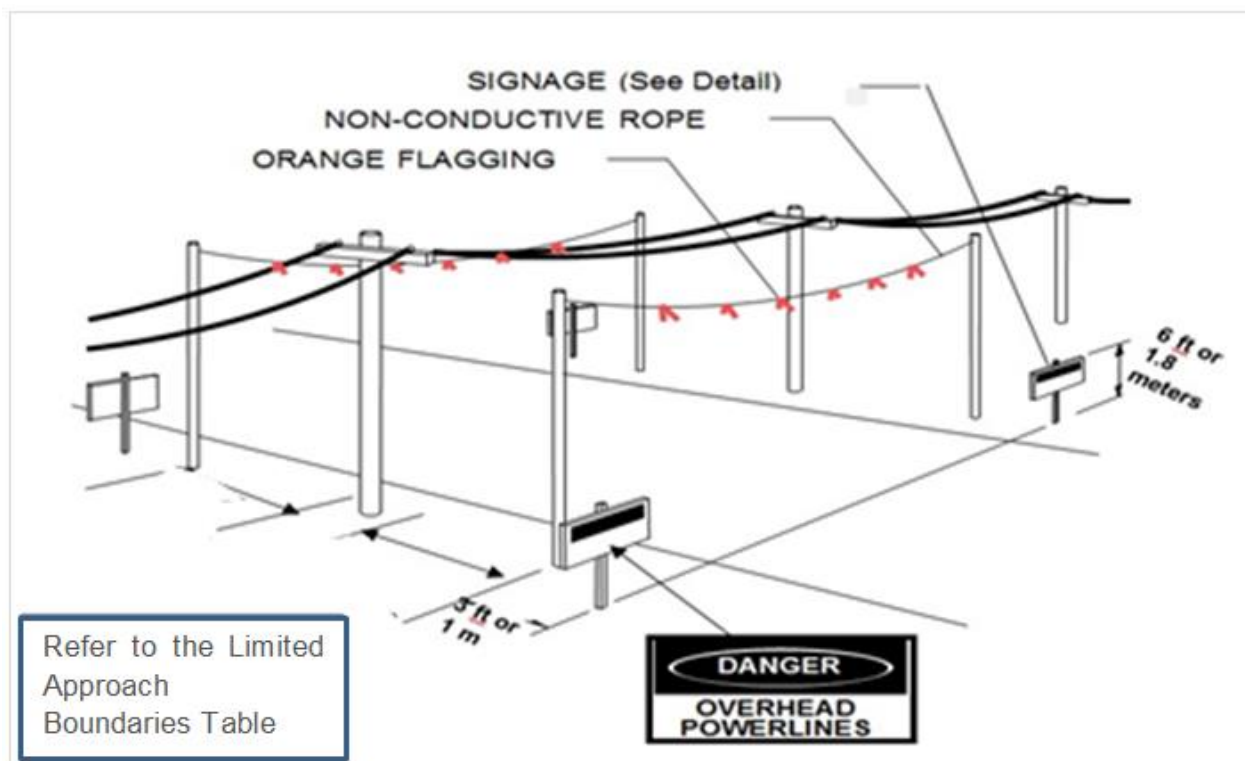


Figure 7: Typical Goal Post Setup

4.13.4.4. Use of Cheater Cords



This section describes the steps to follow to ensure that Cheater Cords (pigtails with electrical outlets) are safe to use.

- Must be inspected by a Qualified Electrician and that a safe work permit is issued prior to use.
- The facility must develop and maintain an inventory of all Cheater Cords at each location.
- Any cheater cords that are field-fabricated must be inspected by an electrician to ensure the cord is safe to use before first use.
- The electrician will attach a label to each cheater cord that clearly identifies the date of inspection.
- Any cord suspected of having any defects or damage shall not be used, and in such cases, the Worker notifies the area electrical department for further analysis / testing / action.
 - The electrician will destroy and dispose of any extension cord or cheater cord that is not safe to use.

When used in hazardous/classified areas:

- The Worker will identify the cheater cord on the safe work permit.
- The Worker will inform the permit issuer that they will be using a cheater cord.
- The permit issuer will review the safe work permit with the Worker using the cheater cord.
- Connect the non-explosion proof ends of the cord and the equipment being powered first and locked or taped together securely so they will not inadvertently pull apart, then connect the explosion proof plug-in.
- When disconnecting, the explosion proof plug must be removed first and then all other connections can be disconnected.
- The permit issuer will visit the work area to ensure that hazards have been identified and mitigated.
- All plugs-in must be disconnected at the end of the permit.

4.13.5. Documentation

- Electrical Safety Standard
-  UST and US Projects utilize Energized Electrical Work Permit Form
-  Eastern Canada utilizes the Energized Electrical Work Permit Form

4.13.6. References

- *OSHA 29 CFR 1910.137, Electrical Protective Devices*
- *OSHA 29 CFR 1910.147, The Control of Hazardous Energy*
- *OSHA 29 CFR 1910.331-335, Electrical Safety-Related Work Practices*
- *OSHA 29 CFR 1910.269, Electric Power Generation, Transmission, and Distribution*
- *NFPA 70, National Electrical Code (NEC)*
- *NFPA 70E, Electrical Safety Requirements for Employee Workplaces*

- *Code for Electrical Installations at Oil and Gas Facilities – Fourth Edition 2013*
- *WorkSafeBC – Working Safely Around Electricity*

4.14. Excavation and Trenching Safety

4.14.1. Purpose

This section is designed to assure the safety of Workers in or around excavations and trenches. This section is also designed to protect others who may work or travel near excavations on Company projects.

4.14.2. Scope

This section applies to all Company Employees and Contractors.

This section supports Ground Disturbance Standard, Onshore Pipelines and Meter Stations Construction Specification CS-PL1.12, Section 6 Trenching and Excavation, Onshore Compressor Stations CS-CS1.9 Section 7 Trenching & Excavation and TG-125 (Excavation Safety).

NOTE: *Ground disturbance, line locating, and one-call procedures are under the governance of the Damage Prevention Program.*

4.14.3. Responsibilities

People Leaders shall:

- Ensure new and existing Employees receive Trenching and Shoring training as applicable to their job duties.
- Assist in the assessing of hazards associated with excavations as part of a pre-job review.
- Ensure adequate hazard controls are identified and in place at all trenching and shoring worksites.
- Ensure all excavations are evaluated by a competent person.

Employees shall:

- Attend and participate in the shoring and trenching training.
- Report any unsafe trenching and shoring work activity immediately to the Supervisor.

HS Support shall:

- Conduct periodic visits to worksites containing excavations to observe and monitor the conditions and work practices.
- Arrange for the required training of Employees in Trenching and Shoring requirements and in the safe work practices surrounding excavations.
- Assist in the hazard evaluations of excavation locations identified by Managers and Supervisors.

Safety Shared Services shall:

- Monitor the regulatory requirements and will assist in the procedural updates pertaining to trenching and shoring.

4.14.4. Requirements

The following describes hazards, controls, and corresponding practices and guidelines.


4.14.4.1. One Call System Utilization

- The location of sewer, telephone, fuel, electric, and water lines as well as any other underground installations that may be encountered during excavation work must be located and marked prior to opening the excavation.
- Arrangements must be made as necessary by the Competent Person with the appropriate utility agency for the protection, removal, shutdown, or relocation of underground installations.
- If it is not possible to establish the exact location of underground installations, the work may proceed with caution using special detection equipment or other safe and acceptable means (e.g., using hand tools).
- Excavation work will be conducted in a manner that does not endanger underground installations or Employees engaged in the work.
- Utilities left in place must be protected by barricades, shoring, suspension, or other means.


4.14.4.2. Locating Pipelines and Utilities

- The location of utility installations, such as sewer, telephone, gas, electric, water lines, or any other underground installations, which may be encountered during excavation work, must be identified prior to digging.
- Never try to guess the route or location of a pipeline or utility from where the markers are placed.

4.14.4.3. Locating a Third-Party Pipeline or Utility

- Contact the state/provincial “one call” center no less than 48 hours before beginning any excavation, trenching, boring or other soil disturbing activity except in emergencies.
- Call the pipeline or utility company at the telephone number shown on the marker.
- Wait for the third-party pipeline or utility to send a Representative to mark the exact location and route of the pipeline or utility.
-  Line locating, and marking must be conducted within 14 days prior to the start of the ground disturbance. If more than 14 days has passed the line locating and marking must be re-done.

4.14.4.4. Locating Company Pipelines

- All facilities inside the dig area and facilities within 5 m (16.5 ft.) of the dig area must be surfaced located and staked or flagged.
-  All facilities must be marked at 3 m (10 ft.) intervals for 30 m (100 ft.) direction of the ground disturbance as is reasonably required.
- Review the Company recommended Operating Procedures Manual

4.14.4.5. Surface Encumbrances

- All equipment, materials, supplies, permanent installations (e.g., buildings, roadways), trees, brush, boulders, and other objects at the surface that could present a hazard to Employees working in the excavation must be removed or supported, as necessary, to protect Employees.


4.14.4.6. Site Evaluation

Before beginning the excavation, the site must be evaluated for the following potential hazards:

- Buried pipelines and utilities
- Vehicle and heavy machinery traffic,
- Nearby structures,
- Previously disturbed soil,
- Possibility of a hazardous atmosphere.

NOTE: Where workers may be exposed to hazardous atmospheres, a Confined Space Rescue Plan must be included with the Job Hazard Analysis (JHA).

Pre-planning must be done to determine the following:



- Will Personnel be working in the excavation?
-  What is the soil classification(s)? (See [Table 14](#))


NOTE: If the soil is not classified, Type C soil shall be used with a maximum allowable slope of 1½ to 1.

- What will be the depth and dimensions of excavation?
- Will the location require shoring or shielding equipment due to limited space?

Before work begins, contact the PIC responsible for the workplace.

4.14.4.7. Excavating Pipelines And Utilities

- Review the Company Recommended Operating Procedures Manual.
- Company Personnel, Company Inspector or approved Company Representative shall be on site when excavation activity occurs within 4.5 m (15 ft.) of the Company facility.
- A toothless excavator bucket or a bucket with a tooth guard is required when excavating all Company pipelines as well as when the Company is crossing another Company's pipeline.
- If it is not possible to establish the exact location of underground installations, the work may proceed with caution using special detection equipment or other safe and acceptable means (e.g., hand tools, probes, hydrovac).
-  Continually use an electronic pipe locator to verify pipe location and depth. Probe or hand dig as deep as possible over the pipe. Mechanically remove cover to 1/3 of the probed or hand dug depth. Repeat electronic pipe locating and pipe probe or hand digging. Continue mechanically removing 1/3 probed or hand dug depth followed by pipe probe until top and sides of pipe can be probed, or hand dug.
-  Company Representative shall be present to supervise mechanical excavation within 60 cm (24 in) of the top, bottom, or sides of a pipe.

-  During excavation, the bucket should not come within 30cm (12 in) of the top of pipe or either side of the pipe.

4.14.4.8. Protective Systems

Before Personnel enter an excavation, that is 1.2 m (4 ft.) deep or more, the Competent Person must assess the excavation to ensure that an approved protection system is being used unless the excavation is in stable rock as determined by the Competent Person.


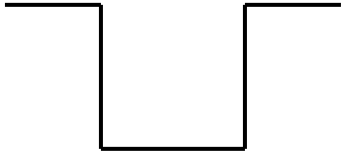

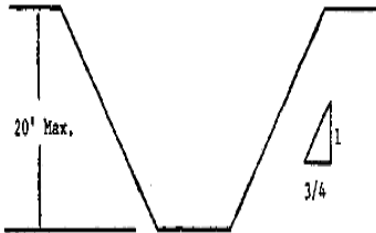
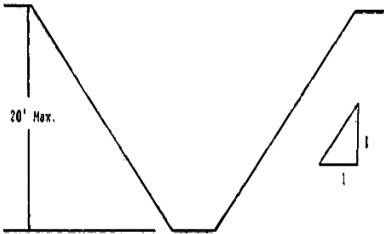
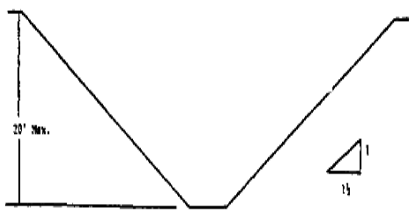
Examples of approved protection include:

- **Shoring:** a structure such as a metal hydraulic, mechanical, or timber system that supports the sides of the excavation to prevent cave-ins
- **Shielding:** also known as a “trench box” or “trench shield” is usually a pre-manufactured portable structure that can withstand cave-in forces and protect Personnel within the structure
- **Sloping:** excavating to form sides of an excavation that are inclined away from the excavation (see [Table 14](#))
- **Benching:** excavating the sides of an excavation to form a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels. The maximum height of any bench is 1.2 m (4 ft.). Bench widths should be as follows:
 - Workers are allowed on the bench: the width of the bench must be a minimum of 1.5 times the height of the bench.
 - Workers not allowed on the bench: A bench can have a minimum width equal to the height of the bench.


 Shoring is required when the slope of an excavation exceeds 45 degrees.

NOTE: If the soil is not classified, Type C soil shall be used with a maximum allowable slope of 1 ½ Horizontal unit (H): 1 Vertical unit (V).

Table 14: Sloping Requirements Based on Soil Types

SOIL TYPE*	SOIL QUALITIES	EXAMPLES OF SOILS	SLOPE OR BENCH** ANGLE	ANGLE EXAMPLE
Rock	Solid mineral matter	Stable granite, sandstone etc.	90 degrees  Requires shoring	
Type A**	Cohesive with compressive strength of 1.5 ton per square foot (tsf) or greater	Clay, Silty clay (1), Sandy clay, Clay loam (2), Caliche.	53 degrees $\frac{3}{4}H:1V$  Requires shoring	
Type B**	Cohesive with compressive strength >0.5 tsf but <1.5 tsf, granular cohesionless soils	Angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam, sandy clay loam. Also soils that would otherwise be 'Type A' but are fissured or subject to vibration.	45 Degrees $1H:1V$	
Type C	Cohesive with compressive strength <0.5 tsf, granular soils	Granular, soft, sandy, or loose soils including gravel, sand, and loamy sand; or submerged soil or soil from which water is freely seeping, or submerged rock that is not stable.	34 degrees $1.5H:1V$	
<p>NOTES:</p> <p>(1) Silt is loose sedimentary material with rock particles.</p> <p>(2) Loam is a mixture of mostly moist clay with some sand and silt.</p> <p>(*) If the soil is not classified, Type C soil shall be used.</p> <p>(**) Benching is only allowed in soil classified as Type A or B.</p> <p>A full explanation of sloping and benching, including exceptions, can be found in 29 CFR 1926.652 Subpart P – Excavations, Sloping and Benching – Appendix B</p>				

4.14.4.9. Worker Protection

- Any excavation, regardless of depth, that has unstable, sloughing, or flowing soil must be sloped, shored, or shielded.
-  A competent person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope where surcharge loads from stored material or equipment, operating equipment, or traffic are present.
- All surface obstructions that will create a hazard to Workers must be removed or supported, as necessary.
- All open excavations must be barricaded and marked for easy recognition.
- Workers must wear reflective vests if working in a high traffic area.
- No Worker will be permitted underneath loads handled by excavation equipment.
- Where Workers are required or permitted to cross over the excavation, walkways, or bridges with standard guard rails and toe boards must be provided.
- When working in the excavation, all Workers must remain within the protective system.
- No digging, lifting, or hauling equipment will be operated within the 'minimum distances' from the edge of the excavation while Workers are in the excavation. Minimum distances are listed in [Table 15](#).
- If the equipment operator does not have a clear and direct view of the edge of the excavation, a warning system, such as barricades, hand signals, or stop logs will be used.
- No pile driving operations or any other construction operations that could affect the integrity of the excavation will be permitted near or around the excavation while Workers are in the excavation.

4.14.4.10. Excavated Material

- Excavated material must be stacked such that it will not create a hazard to the Workers in the excavation.
- The minimum distance that materials shall be kept from the edge of an excavation is described in [Table 15](#).

Table 15: Minimum Distance for Materials from Edge of Excavation

Area	Minimum Distance Requirement
Canada	1 m (3 ft.)
USA	60 cm (2 ft.)

4.14.4.11. Underground Installations

Access and Egress

- Stairs, ladders, or ramps must be provided where Workers are required to enter trench excavations that are 1.2 m (4 ft.) or more in depth.
- The maximum distance of travel in an excavation to a means of egress must not exceed 7.6 m (25 ft.).

- Ladders must extend at least 1 m (3 ft.) above the top of the excavation and must be secured against movement and slippage.
- Ingress and egress must never be performed using a backhoe or any excavating equipment.

Falling Loads

- No Worker will be permitted underneath loads handled by lifting or digging equipment.
- Workers will be required to stand away from any vehicle being loaded or unloaded.

Mobile Equipment

- When mobile equipment is operated adjacent to the edge of an excavation, a warning system will be used when the operator does not have a clear and direct view of the edge of the excavation.
- The warning system must consist of barricades, hand, or mechanical signals, or stop logs

Hazardous Atmospheres

- Atmospheric testing must be conducted in excavations over 1.2 m (4 ft.) deep where hazardous atmospheres could reasonably be expected to exist (e.g., landfill areas, near hazardous substance storage, gas pipelines).
- Workers are not allowed to intentionally work in a known flammable atmosphere – a flammable gas/vapor concentration of 10 percent LEL or greater of its lower explosive limit (LEL).
- The Safe Work Permit must be completed before work begins on an excavation over 1.2 m (4 ft.) deep where oxygen deficiency, toxic or flammable atmosphere exists or has the potential to exist.
- Where oxygen deficiency, toxic or flammable atmosphere exists or has the potential to exist, the atmosphere must be tested before Workers approach the excavation to begin work and must be monitored continuously while Workers are inside the excavation.
- Forced ventilation or other effective means will be used to prevent exposure to an atmosphere containing a flammable gas.
- Atmospheric monitoring will be performed using a properly calibrated direct reading instrument with audible and visual alarms. Monitoring will be continuous where ventilation controls are used to reduce the level of atmospheric contaminants.
- Monitors will be maintained and calibrated in accordance with manufacturer's specifications.
- Unauthorized entry into a hazardous atmospheric environment is strictly prohibited which includes entering an excavation with blowing gas.

Water Accumulation


- Workers will not work in excavations that contain or are accumulating water unless precautions have been taken to protect Employees from hazards posed by water accumulation.
- The precautions taken could include, for example, special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or the use of safety harnesses and lifelines.

- If water is controlled or prevented from accumulating by using water removal equipment, the water removal equipment and operation must be monitored by a person trained in the use of the equipment.
- If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means will be used to prevent surface water from entering the excavation. Precautions will also be taken to provide adequate drainage of the area adjacent to the excavation.

Unattended Excavations

- All open excavations left unattended must be barricaded and marked for easy recognition.
- The only exception to this could be pipeline trenching.

Engineered Excavations

- A work plan identifying special provisions will be required when an excavation is:
 - over 6 m (20 ft.) in depth, or
 - in a swamp or muskeg, or
 -  over 30 m (100 ft.) in length, or
 - in an area where proper sloping cannot be achieved.
- The size, type, and configuration(s) of the material to be used in the protective system must be identified in the design.
 - A copy of the design must remain at the excavation site until the excavation is complete.

Emergencies

- If Personnel are trapped by a cave-in, the following should be performed immediately:
 - Initiate emergency response plan
 - Call 911 or the local emergency services as quickly as possible
 - Never dig out a victim with heavy equipment
- Do not enter the excavation to perform rescue until the walls are stabilized

4.14.4.12. Adjacent Structures

- Support systems (such as shoring, bracing, or underpinning) must be used to assure the stability of structures and the protection of Workers where excavation operations could affect the stability of adjoining buildings, walls, or other structures.
- Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to Workers will not be permitted except when:
 - A support system, such as underpinning, is provided to ensure the safety of Workers and the stability of the structure, or
 - The excavation is in stable rock, or
 - A competent person has approved the determination that the structure is sufficient for use in excavation


- A competent person has approved the determination that such excavation work will not pose a hazard to Workers

4.14.4.13. Loose Rock or Soil


Adequate protection must be provided to protect Workers from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection will consist of:

- Scaling to remove loose material.
- Installation of protective barricades, such as wire mesh or timber, at appropriate intervals on the face of the slope to stop and contain falling material.
- Benching sufficient to contain falling material.
- Using restraining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations.
- Materials piled, grouped, or stacked near the edge of an excavation must be stable and self-supporting.

4.14.4.14. Inspections

- A competent person will conduct daily inspections of excavations, adjacent areas, and protective systems for evidence of a situation that could result in possible cave-ins, failure of protective systems, hazardous atmospheres, or other hazardous conditions.
- An inspection shall be conducted prior to the start of work and as needed throughout the shift. Inspections shall also be made after each hazard changing event (e.g., rainstorm).
- These inspections are required when the excavation will be or is occupied by Workers.
-  Complete inspection form 7T-4041 per Transmission Procedure TG-125 and Ground Disturbance Standard.
- The Supervisor / Manager or a delegate shall maintain a written log of all inspections conducted. This log shall include the date, worksite location, results of the inspection, and a summary of any action taken to correct existing hazards.

4.14.4.15. Sloping and Benching

-  Complete slope excavation worksheet 7T-4040 per Transmission Procedure TG-125 and Ground Disturbance Standard
- The slope and configuration of sloping and benching systems shall be selected and when constructed will conform to the recognized engineering standards.

4.14.4.16. Support Systems

The design of support systems, shield systems, and other protective systems shall be selected and constructed in accordance with all the recognized engineering standards.

4.14.4.17. Additional Hazard Controls

- Traffic around the site must be controlled, and barricades, signs, and/or flag persons used as needed to control both vehicular and pedestrian traffic.

- Utilities on the site must be protected and suitable precautions taken if any utility will be disturbed by the work.
- Workers must use required PPE.
- Work that may impact existing utilities that may need to be locked and tagged out using procedures from the Lockout/Tagout Program.

4.14.4.18. Backfilling

- Excavations must not be left open any longer than needed after the job task has been completed.
- Backfilling must proceed together with the removal of support systems and in a manner that will prevent Worker exposure to the hazards associated with excavations.

4.14.4.19. Soil Mechanics

Several stresses and deformations can occur in an open cut or trench.

- For example, increases or decreases in moisture content can adversely affect the stability of a trench or excavation. The following diagrams show some of the more frequently identified causes of trench failure.
 - TENSION CRACKS usually form at a horizontal distance of 0.5 to 0.75 times the depth of the trench, measured from the top of the vertical face of the trench. See the accompanying drawing for additional details.

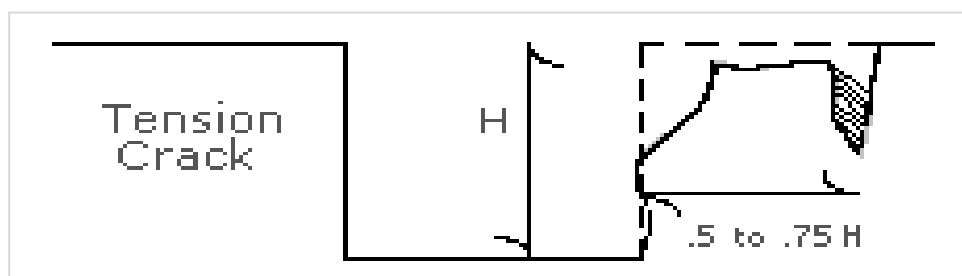


Figure 8: Tension Cracks

- SLIDING or sloughing may occur because of tension cracks, as illustrated below.

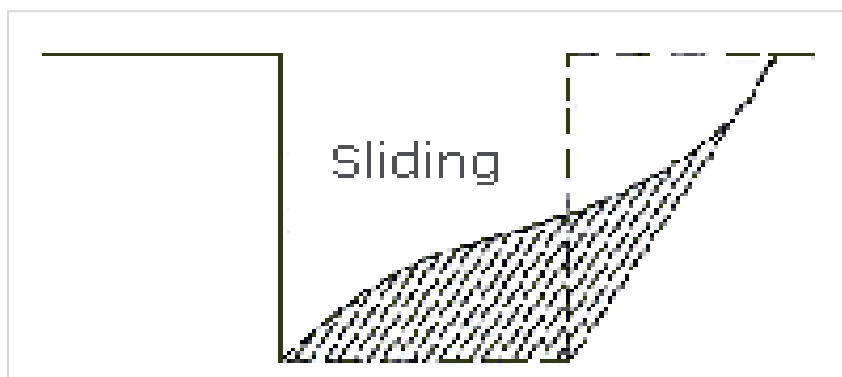


Figure 9: Sliding

- **HEAVING OR SQUEEZING:** Bottom heaving or squeezing is caused by the downward pressure created by the weight of adjoining soil. This pressure causes a bulge in the bottom of the cut, as illustrated in the drawing above. Heaving and squeezing can occur even when shoring or shielding has been properly installed.

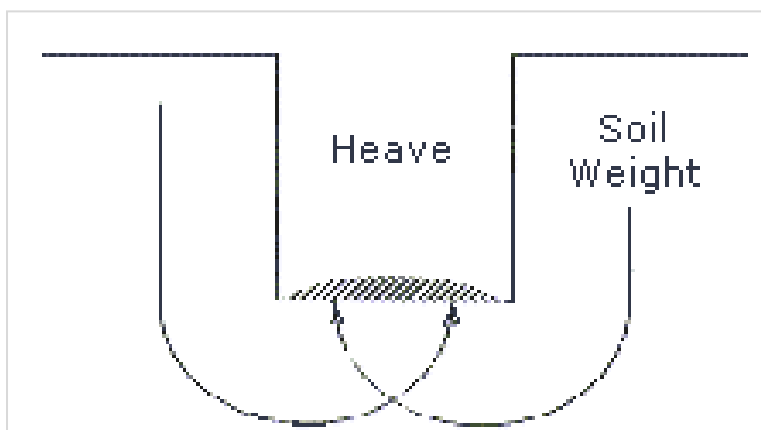








Figure 10: Heaving or Squeezing

4.14.5. Documentation

- Ground Disturbance Standard
- Ground Disturbance Permit Form
- GTM Working Excavation Checklist
-  *Excavation Safety*
-  Form 7T-4041 Inspections – Excavation Inspection Report
-  Form 7T-4040 Worksheet for Sloped Excavations
-  Onshore Pipelines and Meter Stations Construction Specification CS-PL1.12 Section 6 Trenching & Excavation,
-  Onshore Compressor Stations CS-CS1.9 Section 7 Trenching & Excavation
-  TG-125 (Excavation Safety)

-  EC-HS-36A Excavation Safety Plan Form
-  Excavation and Trenching Exclusion Criteria Template
-  Excavation and Trenching General Hazard Assessment Template

4.14.6. References

- *OSHA 29CFR 1926 Subpart P Safety and Health Regulations for Construction – Excavations*
- *Transmission TG-125 Excavation Safety*
- *Confined Spaces Part 9 Occupational Health and Safety Regulation*
- *Excavations Part 20.78 – 20.85 Occupational Health and Safety Regulation*

4.15. Fall Protection

4.15.1. Purpose

The purpose of this section is to protect Employees against fall hazards while they are working on elevated surfaces and ladders.

4.15.2. Scope

This section applies to Workers performing any duties on an unprotected, elevated work surface with a Fall Hazard, which Enbridge defines as:

- 1.2 m (4 ft.) or more above a lower level from a *Permanent* walking/working surface (horizontal and vertical surface) or
- 1.8 m (6 ft.) or more above a lower level from a *Temporary* walking/working surface (e.g., construction activities) or
- Any fall where there is an unusual possibility of injury (e.g., falling through an opening in a work surface)

4.15.3. Responsibilities

People Leader shall:

- Ensure that all requirements listed in the section for fall protection are met.
- Ensure new and existing Employees receive fall protection training as applicable to their job duties.
- Ensure fall protection equipment is provided for Employee use at all locations having unprotected fall hazards.
- Assist HS Support in identifying unprotected elevated work areas.
- Assist in the assessment of hazards associated with unprotected elevated work areas as part of pre-job checklists and planning.

Employees and Workers shall:

- Attend training sessions required for elevated work.
- Recognize situations in which fall protection is necessary.

- Inspect all fall protection equipment before using.
- Wear the fall protection (restraint/arrest) equipment when performing work at elevations.

HS Support shall:

- Arrange for the required training of Employees utilizing fall protection equipment.
- Assist in the evaluation of unprotected elevated work locations identified by Managers and Supervisors

4.15.4. Requirements

4.15.4.1. Evaluation of Fall Hazards

All facilities and operations shall evaluate and control potential fall hazards.

4.15.4.2. Control of Fall Hazards

Workers shall be protected from a fall or injury related to a fall by either:

- Elimination or Substitution (e.g., move work to ground level)
- Approved Guardrails
- Control Zones
- Personal Fall Restraint Systems (PFRS)
- Personal Fall Arrest Systems (PFAS)
- Safety Net System
- Other system(s) designed by an engineer

Approved Guardrail and/or Handrail is defined as meeting the *OSHA 1910.29 Standard* below:

- Standard railings consist of a 42" high top rail, 21" high mid-rail and 3 ½" toe-board. Top rail must withstand 200 lbs. of force in any direction. Mid-rails must withstand 150 lbs. of force outward or downward. (All height measurements are taken from top of component to walking surface)

4.15.4.3. General

- Employees must wear a PFAS or PFRS when working within 2 m (6.5 ft.) or less of a Fall Hazard, except when working in the following situations:
 - Permanent platforms enclosed by approved guardrails, providing work activities do not extend outside of guardrails.
 - Temporary scaffolding and walking surfaces protected by guardrails, providing work activities do not extend outside of guardrails.
 - Fixed cage ladders.
 - Portable ladders – where three points of contact can be maintained on ladders.

 Personal Fall Protection for Fixed Ladders:

- New Ladders greater than 24 ft: Permanent Personal Fall Protection or Ladder Safety System

Note: New Ladders are defined as being construction post 2017.

- Existing Fixed Ladders > 24 ft: Equipped with a cage, well, personal fall arrest system, or ladder safety system.
Note: Cages will be outlawed and replaced with Ladder Safety Systems by Nov 18, 2036.
- Examples of situations where fall protection may be required include, but are not limited to:
 - Unprotected sides and edges
 - Hoist areas or shafts
 - Ramps, runways, and other walkways (except for Employees working on permanent walkways, work platforms or tank landings equipped with top and mid-rails, and toe boards)
 - Excavations if not sloped
 - Near dangerous equipment
 - Wall openings (a gap or void, 75 cm (30 in) or more in height, and 30 cm (12 in) or more in width through which Employees can fall to a lower level)
 - Incomplete scaffolds / work platforms
 - Open top vessels, tanks, or roof of a building
 - Crane baskets
 - Personnel lift (aerial work platform or Elevated Work Platform)
 - Where three points of contact cannot be maintained on ladders without an enclosure

4.15.4.4. Fall Protection Systems

Fall protection systems may include one or more of the following:

- Approved Guardrails with mid-rails, and toe boards
- Guardrails with mid-rails, and toe boards
- Covers for holes in floors, roofs, and other walking/working surfaces
- Personal Fall 'Arrest' System or Personal Fall 'Restraint' System
- Positioning device system
- Control zones
- Protection from falling objects

4.15.4.5. Body Harness

- Full Body Harness must be used for arrest or restraint*.
- Ropes and straps (webbing) used in components of the body harnesses, lanyards and lifelines shall be made from synthetic fibers.

**Note: Safety Belts are permitted when used for horizontal Fall Restraint (applies when using ANS/ CSA approved waist-type safety belts, with safety lines).*

4.15.4.6. Lanyards

- Use only approved lanyards to secure Workers wearing a full body harness to an approved vertical or horizontal lifeline or fixed anchor point.

- Shock-absorbing lanyards are required when using a PFAS system
 - Where used for fall protection, lanyards must not permit a Worker to fall more than 1.2 m (4 ft.) vertically.
- Where lanyards are used for horizontal work restraint, suitably anchor lanyards to prevent wearers from slipping over a roof edge.
- Lanyards shall be rated for 5,000 lbs (22.2 kN), with double action snap hooks, and secured above the point of operation.

4.15.4.7. Self-Retracting Lifeline or Lanyard (SRL) Devices

- SRLs that limit free fall to less than 0.6 m (2 ft.) shall be rated for a minimum of 3,000 lbs. (13.3 kN).
- SRLs that do not limit free fall to less than 0.6 m (2 ft.) shall be rated for a minimum of 5,000 lbs. (22.2 kN).

4.15.4.8. Safety Lines

- ANSI/CSA approved safety lines (vertical or horizontal lifelines) may be used for fall restraint or fall arrest.
- Independently secure safety lines to approved structures of adequate strength.
- Use softeners where lines attach to structures and elsewhere as necessary to protect against chafing or abrasion from contact with sharp edges.

4.15.4.9. Equipment Anchorage, Tie-Off and Use

- Anchoring the fall arrest system is critical. The selection of the anchoring point should be made carefully. When the Worker is uncertain about the anchoring point, he/she is expected to consult with a Supervisor or competent person. Equipment anchorage, tie-off, and use must meet the following conditions:
 - Anchoring points must be permanently fixed objects;
 - Engineered anchor points, used in PFAS, must be able to support at least 5,000 lbs. (22.2 kN) for each attached Worker;
 - Non-engineered anchor points, used for attaching PFAS, must be a sound and stable structure;
 - When tying off, the Worker must tie off at a location where there are no obstacles in the potential path of a fall (including any obstacle in a swing fall);
 - The Worker must follow the anchoring tie off and equipment tie off procedures that are specified by the fall protection system manufacturer prior to getting into a position where they could fall.
- Where an engineered anchor point option is available it must be used.
 - Engineered anchor points must be inspected by a qualified person annually or as specified by the manufacturer.

4.15.4.10. Fall Protection and Work Restraint – Requirements

General Use

The manufacturer's procedures for the equipment must be followed. In addition, personal fall arrest equipment must comply with the following:

- Harnesses must be attached in the center of the back near shoulder level, above the wearer's head
- Personal fall arrest systems must limit the maximum arresting force on a Worker to 1,800 lbs. (8 kN)
- Systems must bring a Worker to a complete stop and limit maximum deceleration distance a Worker travels to 1 m (3.5 ft.)
- Systems must have sufficient strength to withstand twice the potential impact energy of a Worker free falling 1.8 m (6 ft.), or the free fall distance permitted by the system, whichever is less.
- Systems must be rigged in such a way that a Worker can neither free fall more than 1.8 m (6 ft.), nor contact any lower level.

4.15.4.11. Equipment Care and Storage

Follow the manufacturer's instructions and training protocols for equipment maintenance, cleaning, and storage.

- Do not store webbing and rope lanyards in direct sunlight.
- Storage areas should be clean, dry, and free of exposure to fumes or corrosive elements.

Periodic cleaning of properly maintained fall protection equipment is necessary. Consult the manufacturer's guidance for additional instruction on cleaning and maintenance.

4.15.4.12. Aerial Lifts (Scissor Lift, Articulating Boom, Lift Truck and Bucket Truck)

- When working from an aerial lift, use of Personal Fall Protection which includes a full-body harness attached to the factory installed anchorage point on the basket or floor is required.
- Employees shall not anchor to an adjacent pole, structure, or equipment when working from an aerial lift.
- Lanyards shall be adjusted to their shortest length to keep the occupant in the basket or bucket (Personal Fall Restraint System).

4.15.4.13. Rescue Planning

- Where Fall Arrest is used, a rescue plan will be established, written, reviewed, and communicated.
- The written plan shall include provisions for rescue of Employees in the event of a fall or ensure that Employees are able to rescue themselves.
- Appropriately applied Fall Restraint does not require a written rescue plan
 - Rescue considerations will vary according to the situation but may be as simple as having another person present when fall restraint is being used.

4.15.4.14. Inspections

- Periodic inspections include an annual inspection or as specified by the manufacturer, shall be conducted by a qualified person, and documented.
- Pre-use inspection of fall protection equipment (harness and lanyards) by the user shall be completed.
- Pre-use inspection is intended to identify excessive wear, damage, and deterioration. Inspections should include but not be limited to:
 - Cuts, cracks, tears, frays, broken strands, enlarged grommets, and other signs of wear that might affect strength in lanyards, belts, and lifelines. There shall be no additional punched holes.
 - Stitching and materials for degradation and evidence of corrosion due to contact with acids, caustics, welding holes, splatter, etc.
 - Metal hardware for breaks, cracks, fractures, loose anchorage, distortion, and corrosion.
 - Check D-rings and D-ring metal wear pads for distortion, cracks, breaks, and rough or sharp edges. The D-ring bar should be at a 90-degree angle with the long axis of the belt and should pivot freely.
 - Note any unusual wear, frayed, or cut fibers, or distortion of the buckles.
 - Rivets should be tight and unmovable with fingers.
 - Body side rivet base and outside rivets should be flat against the material.
 - Bent rivets will fail under stress.
 - Failing hook latches, absence of locking latches, or a change in shape of the metal.
 - The snap hook load indicator is in the swivel of the snap hook.
 - The swivel eye will elongate and expose a red area when subjected to fall arresting forces.
 - Do not use the unit if the load impact indicator has been activated.
 - Lifeline unit housing for loose fasteners and bent, cracked, distorted, worn, malfunctioning or damaged parts.
- Pre-use inspection of Self-Retracting Lifelines (SRLs) by the user shall be completed. Pre-use inspection is intended to identify excessive wear, damage, and deterioration. Inspections should include but not be limited to:
 - Retraction and tension shall be tested by pulling out several feet of the lifeline and allowing it to retract back into the unit.
 - Always maintain a light tension on the lifeline as it retracts.
 - The lifeline should pull out freely and retract all the way back into the unit.
 - Do not use the unit if the lifeline does not retract.

4.15.4.15. Braking Mechanism Inspection:

- Test for slippage of the lifeline while the brake(s) is engaged.
- Release tension to ensure the brake(s) will disengage, and the unit will return to the retractable mode.
- Do not use the unit if the brakes do not engage.
- Pre-use inspection of Vertical and Horizontal Lifelines is intended to identify excessive wear, damage, and deterioration. Inspections should include but not be limited to:
 - Energy absorber (condition)
 - Anchor points
 - Cable/rail condition
 - Grabs (as applicable)
 - Connecting hardware


4.15.4.16. Defective Equipment

- Defective equipment shall be removed from service immediately and destroyed or discarded. Notify the responsible Supervisor before the end of the work shift.
- Fall protection equipment subjected to impact loading shall be immediately removed from service and inspected by a qualified person and discarded where appropriate.

4.15.4.17. Storage Considerations

- Do not store webbing and rope lanyards in direct sunlight.
- Storage areas should be clean, dry, and free of exposure to fumes or corrosive elements.
- Periodic cleaning of properly maintained fall protection equipment is necessary. Consult the manufacturer's guidance for additional instruction on cleaning and maintenance.

4.15.5. Documentation

-  Fall Protection Equipment Inspection Form
- EnCompass Facility Inspection Form
- Fall Protection Plan Template

4.15.6. References

- *CSA Standard CAN/CSA Z259.1-95 Safety Belts and Lanyards*
- *CSA Standard CAN/CSA Z259.2.1-98 Fall Arresters, Vertical Lifelines and Rails*
- *CSA Standard CAN/CSA Z259.2.2-98 Self-Retracting Devices for Personal Fall-Arrest Systems*
- *CSA Standard CAN/CSA Z259.2.3-99 Descent Control Devices*
- *CSA Standard CAN/CSA Z259.10-M90 Full Body Harnesses*
- *CSA Standard CAN/CSA Z259.11-M92 Shock Absorbers for Personal Fall-Arrest Systems*

- *CSA Standard CAN/CSA Z259.12-01 Connecting Components for Personal Fall-Arrest Systems*
- *CSA Standard CAN/CSA Z259.13-04 Flexible Horizontal Lifeline Systems*
- *CSA Standard CAN/CSA Z259.16-04 Design of Active Fall Protection Systems*
- *OSHA Part 29 CFR 1926, Subpart M – Fall Protection*
- *OSHA 29 CFR 1910.269(g) – Personal Protective Equipment.*
- *OSHA 29 CFR 1926.502 – Fall Protection Systems Criteria and Practices.*
- *OSHA 29 CFR 1926.959 – Lineman’s Body Belt, Safety Straps, and Lanyards.*
- *ANSI Z359.1-2007 (R1999) – Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components*

4.16. Fatigue Management

4.16.1. Purpose

The purpose of this section is to ensure that all People Leaders and Employees understand what fatigue is, how to assess and recognize when it can become a risk and how to implement appropriate mitigation to minimize its impact at Enbridge.

NOTE: *A Fatigue Management Plan is recommended where Workers are working greater than 12 hours per day for 12 consecutive days – not including travel time.*

4.16.2. Scope

This section applies to Employees working at all Company facilities.

4.16.3. Responsibilities

Regional/Department/Project Manager shall:

- Provide written approval or disapproval of requested exceptions to this section.
- Understand the identified trends resulting from excess hours worked.
- Ensure corrective actions are taken in accordance with identified trends, as necessary.

People Leaders shall:

- Communicate this section to all Personnel under their supervision.
- Ensure this section is followed by all Workers.
- Ensure that Workers are educated on the obligations and Responsibilities of this section.
- Ensure to the extent possible, fatigue is considered in planning schedules.
- Ensure Workers do not exceed the number of hours permitted to work and are always able to safely conduct work.
- Consult with appropriate Personnel, arranging suitable alternate duties (where possible) and/or a safe location for a person impaired by fatigue to rest.

- Ensure all events are reported to the proper levels of Management.
- Ensure that fatigue is considered in the analysis of any event.
- Ensure that privacy and confidentiality is maintained.
- Refer Employees with non-work fatigue related issues to the Employee Assistance Program (EAP).
- Develop a Fatigue Management Plan when required.

Workers shall:

- Report to work fit to perform job duties.
- Immediately inform the Supervisor or Manager when it is determined that work performance will likely be affected by fatigue; or there is any risk to oneself or to others due to effects of fatigue.
- Use time off from work to recuperate to be fit and able for the next shift.
- Participate in education and training to gain an understanding of fatigue.
- Avoid behaviors and practices that contribute to fatigue, and which could place them and others at risk.
- Recognize signs of fatigue that could place health, safety, and well-being of themselves or others at risk and report this to their Supervisor.

4.16.4. Requirements

4.16.4.1. General

- Regional, Department or Project Management should implement a Fatigue Management Plan when Workers are at an increased risk from the effects of fatigue. Examples of working conditions that may warrant a fatigue Management plan include:
 - Workers will be working extended length of shifts worked (12 hours not including travel time)
 - Workers will be working (shifts) beyond 12 consecutive days
 - Workers travel time to and from the Worksite (total workday, including travel, exceeds 14 hours)
 - excessive physical effort is required as part of normal work activity
 - environmental extremes are anticipated (e.g., heat, cold, noise, vibration, lighting)
- The Individual Fatigue Assessment Tool may be used to further assist with quantitatively determining if a Fatigue Management Plan should be completed.
- The Fatigue Management Plan should consider the following:
 - identification of the factors that lead to Fatigue
 - assessment of the risks associated with the factors that contribute to Fatigue
 - identification of control measures to manage exposure to Fatigue
 - implementation of the selected control measures

- rehabilitation / return to work
- Management approval processes
- Contractors shall provide advanced notice to the Enbridge Representative of work that falls under the Fatigue Management Plan.
- All Regions, Departments, and Projects will comply with the appropriate, State, Federal or Provincial Employment Standards regarding hours of work.
- This does not supersede existing company policies or regulatory standards such as:
 - Commercial Vehicle Drivers Hours of Service Regulations
 - Control Room Management Plan
 - HR “fit for duty” references

4.16.5. Recognition of Fatigue

- Work schedules that require people to be awake and active at night, or to work for extended periods of time, disrupt circadian rhythms and increase the risk of fatigue.
- A person suffering from fatigue may in turn experience:
 - difficulty in concentration
 - impaired recollection of timing and events
 - poor judgment
 - reduced capacity for effective interpersonal communication
 - reduced hand-eye coordination
 - reduced visual perception
 - reduced vigilance
 - slower reaction times
- There are two main sources of fatigue (see [Table 16](#) for more details):
 - **Work-related fatigue:** associated with activities at the workplace
 - **Non-work-related fatigue:** associated with activities outside of the workplace

Table 16: Sources of Fatigue

Work-Related Fatigue	Non-Work-Related Fatigue
<ul style="list-style-type: none"> • Extended hours of work • Shiftwork • Commuting times (i.e., active driving time that is compensated by Enbridge) • Inadequate time between shifts for sleep • Time of day • Work design • Second jobs • Call outs 	<ul style="list-style-type: none"> • Family and social obligations • Community activities • Emotional issues • Age • Health and fitness level • Personal driving time

The provisions of this section cover Employees that are not covered by the following Plans and Procedures:

- Control Room Management Plan – Section 500 Fatigue Mitigation
- Storage Facility Control Room Management Plan – Section 500 Fatigue Management
- 10-1160 Controller Shift Change Procedure
- 10-1180 Control Room Management Deviation Procedure

4.16.5.1. Shift Lengths and Rotations

- Section C of the *Field Supervisors Manual* provides guidelines for Time on the Job and Time Away from Work.
 - Normal Work Week
 - Schedule Changes
 - Holidays
 - Vacation
 - Fitness for Duty
- Section D of the *Field Supervisors Manual* provides guidelines for Overtime.
- Section E of the *Field Supervisors Manual* provides guidelines for Offshore.

4.16.5.2. Identification

Identification of persons who may be affected by fatigue can occur because of:

- Voluntary disclosure by the person affected
- Direct observation of the affected person's behavior
- A workplace event analysis
- Monitoring compliance with this section

4.16.5.3. Fitness for Duty

Fitness for Duty is covered in Section C, Time on the Job and Time Away from Work, of the *Field Supervisors Manual*.

4.16.5.4. Fatigue Mitigation

Common jobs/conditions that may require Workers to exceed 14 hours of work include the following (but are not exclusive of other jobs):

- Pigging
- Anomaly Work
- Pipeline Emergencies
- Station Outages
- Station Relief (Operators/ Pipeliners)
- Natural Disasters (i.e., Flooding, Hurricanes and Tornadoes)

Listed below are recommended steps for common jobs that may require Workers to exceed 14 hours of work.

- Pre-Job Planning
- Develop a work plan and shut down/start up procedure to safely complete the work and minimize time
- Review fatigue status of Workers before performing critical/high risk procedures during the pre-job meeting
- Consider the following when performing a task:
 - Use two (2) Area crews
 - Ask for Workers to assist from other Areas
 - Request a Contractor
- Discuss fatigue with Workers at the pre-job meeting.
- Limit the number of hours worked the day before a pig run.
- Start work shifts at 6:30 am or later, if possible.
- Perform only tasks that are required at that time.
- Schedule critical / dangerous tasks during the day, if possible.
- Limit exposure in adverse environments (i.e., cold, heat and noise).

4.16.5.5. During the Job

- Release Workers to get rest and have them come back when really needed.
- Provide frequent rest breaks (10-15 minutes every 2-3 hours).
- Encourage sleep breaks (20 minutes to an (1) hour) if needed during pigging activities or while waiting for parts/equipment.
- Utilize shifts to limit work hours below 16 hours, where possible.
- Increase awareness and monitoring of fatigue related symptoms through observation and discussion with Workers.
- Update Regional, Department or Project Management of Worker fatigue status.

4.16.5.6. Post Job

- Review any remaining tasks at the end of the day with all stakeholders (i.e., Local, or Area, or Region staffs and Contractor).
- Extend job completion time, if possible.
- Complete residual cleanup work on the following / next day.
- Assess the fatigue status for all Workers at the end of the job.
- Provide transportation for Workers to a hotel, if needed.
- Provide sleeping arrangements at the worksite, if needed.

4.16.5.7. Additional Considerations

- Keep shift hours consistent (day-to-day) for Workers.
- Schedule time off for Workers prior to actual outages if the outage is planned.
- Keep Regional, Department or Project Management updated on status of crew fatigue.
- Provide training to recognize symptoms of fatigue.

4.16.5.8. Offshore Employees

The Field Supervisors Manual provides guidelines on “Offshore Work” in Section E, Offshore.

Regional Department or Project Management will monitor actual work hours to ensure conformance with this section.

4.16.5.9. Control Room Employees

Control Room Employees that are not covered by 10-1160 Controller Shift Change Procedure or 10-1180 Control Room Management Deviation Procedure are covered by this section.




4.16.5.10. Exceptions

- Responding to emergencies
- Employees responding to an initial emergency (including callouts) are exempt to allow sufficient staffing to safely sustain an effective response.
- During this period, Supervisors will use sound judgment and maintain a watchful eye on the Workers’ behavior.
- As soon as practical the Supervisor shall establish a sustained work plan.

4.16.6. Documentation

- Fatigue Management Plan
- Individual Fatigue Assessment Tool

4.16.7. References

-  *Field Supervisor Manual, Appendix C – Time on the Job and Time Away from Work*
-  *Field Supervisor Manual, Appendix D – Overtime*
-  *Field Supervisor Manual, Appendix E – Offshore*
- *Control Room Management Plan – Section 500 Fatigue Mitigation*
- *Storage Facility Control Room Management Plan – Section 500 Fatigue Management*
- *10-1160 Controller Shift Change Procedure*
- *10-1180 Control Room Management Deviation Procedure*

4.17. Flammable and Combustible Materials

4.17.1. Purpose

The section provides guidance and mitigation measures for the Employees who handle, store, use and work around flammable and combustible liquids. This information can be used to prevent the release of flammable and combustible liquids and prevent fires and explosions.

4.17.2. Scope

This section applies to Employees at Company facilities.

4.17.3. Responsibilities

People Leaders shall:

- Assure that flammable and combustible materials are properly stored at the facility.
- Assure that current material safety data sheets (SDS) are maintained material.

Employees shall:

- Review and use materials in accordance with the material SDS.
- After use, properly store all flammable and combustible materials to prevent fire hazards.

HS Support shall:

- Periodically during facility visits, monitor to determine if flammable and combustible material are being properly stored.

Safety Shared Services shall:

- Periodically review SDS database to determine and recommend chemical substitute for specific flammable / combustible material ingredients, which contain fewer desirable ingredients.

4.17.4. Requirements

NOTE: Flammable / combustible vapors with vapor densities greater than one (1.0) will remain close to the ground and follow ground contours. These vapors can go into basements, ground depression, etc., and are difficult to dissipate. Flammable or combustible vapors with vapor densities less than one (1.0) will rise and dissipate, unless obstructed by equipment or a building enclosure.

Caution

- It is the vapors from flammable / combustible liquids that burn or explode, not the liquids themselves
- In addition to the inherent fire hazards, flammable / combustible vapors can displace a sufficient amount of oxygen and cause a health hazard due to asphyxiation or the toxic characteristics of the vapors.

4.17.4.1. Solvents, Paints and Flammable Liquids

- Use and maintain adequate ventilation to remove flammable vapors when painting or using solvents.
- Safe types of mechanical air movers, explosion-proof electrical equipment, and static-grounded connections will be used when working in areas where flammable vapors or gases may exist.


- Employees should review the safety data sheets (SDS) of all chemicals prior to use.
- Wear appropriate hand protection (identified on the SDS) when working with commercial solvents, gasoline, and carbon tetrachloride.
- Do not use gasoline as a cleaning or degreasing agent.
- Do not use carbon tetrachloride as a cleaning or degreasing agent.
- To minimize exposure and to control hazards when using solvents, observe the following safe practices and procedures:
 - Store and dispense all flammable cleaners in approved safety cans.
 - Contaminated rags shall be stored and disposed in an approved manner.

4.17.4.2. General

- Review SDS of flammable or combustible product to determine the correct class prior to product use.
- The application of air pressure or compressed gas to any flammable / combustible liquid container (can, barrel or drum), for any purpose, is strictly prohibited.
- During transfers, dispensing and receiving containers must be grounded and bonded.
- Adequate precautions shall be taken to prevent the ignition of flammable vapors.
- Sources of ignition shall be controlled. Sources include, but are not limited to:
 - Open flames
 - Lightning
 - Smoking
 - Cutting and welding
 - Hot surfaces
 - Frictional heat
 - Static, electrical, and mechanical sparks
 - Spontaneous ignition, including heat-producing chemical reactions, or
 - Radiant heat
- Avoid storing flammable or combustible liquids in areas exposed to heat which may pressurize its container.
- Substances that may cause combustion when combined with flammable or combustible liquids shall not be stored near flammable or combustible liquids.
- Flammable or combustible liquids and aerosol cans shall be stored in approved cabinets or in a separate building used only for that purpose. The building should be at least 15 m (50 ft.) from compressor buildings unless the exposed wall has a two-hour (2-hr) fire rating.
- Cabinets should be Underwriter Laboratories (UL) listed and/or Factory Mutual (FM) approved, which is indicated by a permanent manufacturer's label on the cabinet.

- Approved cabinets should be vented outside of the building, if possible. If ambient temperature outside would cause freezing, vent approved cabinet inside of building.

NOTE: *NFPA does not require an exhaust ventilation system for storage cabinets, although most cabinets have plugged fittings that can be used for such purpose. Exhaust ventilation should only be provided when warranted by the materials in the cabinet, for example for particularly toxic or noxious materials. If provided the manufacturer's instructions should be followed. Typically, this will involve small diameter steel duct or pipe leading directly and by the shortest route to the exterior of the building. Exhaust must be taken from the bottom of the cabinet.*

- Storage cabinets must meet the requirements for design, construction, and capacity. This includes:
 - Not more than 60 gal (227 L) of Class I or Class II liquids, not more than 120 gal (454 L) of Class III liquids may be stored in a storage cabinet.
 - Storage cabinets shall be designed and constructed to limit the internal temperature to not more than 325°F when subjected to a 10-minute fire test.
 - All joints and seams shall remain tight and the door shall remain securely closed during the fire test.
 - Cabinets shall be labeled in conspicuous lettering, "Flammable-Keep Fire Away."
- Metal Cabinets: Those constructed in the following manner shall be deemed to be compliant:
 - The bottom, top, door, and sides of cabinet shall be at least No. 18 gage sheet iron and double walled with 3.8 cm (1½-in) air space.
 - Joints shall be riveted, welded, or made tight by some equally effective means.
 - The door shall be provided with a three-point lock, and the door sill shall be raised at least 5 cm (2 in) above the bottom of the cabinet.
 - Ensure grounding cables are adequately installed to cabinets.
- Wooden Cabinets: Those constructed in the following manner shall be deemed in compliance:
 -  Flammable and combustible materials shall not be stored in wooden cabinets.
 - The bottom, sides, and top shall be constructed of an approved grade of plywood at least 2.5 cm (1 in) in thickness, which shall not break down or delaminate under fire conditions.
 - All joints shall be rabbeted and shall be fastened in two directions with flathead woodscrews.
 - When more than one door is used, there shall be a rabbeted overlap of not less than 2.5 cm (1 in).
 - Hinges shall be mounted in such a manner as not to lose their holding capacity due to loosening or burning out of the screws when subjected to the fire test.
- Flammable gases or liquids, or substances of an unknown composition that could be flammable, may be transported in non-passenger areas of Company pickups or by common carrier.
- Flammable gases or liquids, or substances of an unknown composition that could be flammable shall not be transported by Company aircraft.

- If using a contracted carrier, the carrier must, at all times, hold the appropriate approval from the aviation authority in order to transport hazardous or dangerous goods by air for Enbridge.
 - The pilot in command **MUST** be informed of any dangerous goods cargo before the start of the flight.
- Use DOT-approved containers when shipping samples by commercial carrier.
- Do not carry standard safety cans with gasoline or other flammable liquids in passenger or luggage space of vehicles.
- Transport flammable liquids in standard safety cans with spring-loaded vents.
- Transport flammable liquids such as paint thinner, kerosene, and solvent in un-vented containers.
- Defective equipment or containers must be removed from service immediately. Contact an HS Support for disposal assistance of a container or its contents, if necessary.
- Flammable liquid containers contents shall be marked by the manufacturer or stenciled, plainly visible, on the side or top of the container.
- Storage containers for combustible or flammable liquids inside compressor buildings shall be labeled to identify contents and shall not have sight glasses for gauging liquids.

4.17.4.3. Container and Portable Tank Storage

This section applies only to the storage of flammable or combustible liquids in drums or other containers (including flammable aerosols) not exceeding 60 gal (227 L) individual capacity and those portable tanks not exceeding 660 gal (2498 L) individual capacity.

- Storage of flammable or combustible liquids in open containers shall not be permitted.
- Barrels and containers for flammable liquids shall be sealed after each use and when empty.
- Class I flammable and Class II combustible liquids shall be stored in approved safety containers of not more than 5-gal (19 L) capacity.
- The approved safety cans shall be stored in approved cabinets in minimum quantities or in a separate building used for that purpose.
- Portable tanks must be provided with one or more devices installed in the top with sufficient emergency venting capacity to limit internal pressure under fire exposure conditions to 10 psig, or 30 percent of the bursting pressure of the tank, whichever is greater.
- Flammable or combustible liquids should be shielded from direct sunlight, and away from heat sources.
- Flammable and combustible liquid containers must be in accordance with the sizes listed in [Table 17](#), except that glass or plastic containers of no more than 1-gal (3.8 L) capacity may be used for a Class IA or IB flammable liquid.

Table 17: Maximum Allowable Size for Containers and Portable Tanks

Container type	Flammable liquids			Combustible liquids	
	Class IA	Class IB	Class IC	Class II	Class III
Glass or approved plastic	1 pint	1 qt	1 gal	1 gal	1 gal
Metal (Other than DOT drums)	1 gal	5 gal	5 gal	5 gal	5 gal
Safety cans	2 gal	5 gal	5 gal	5 gal	5 gal
Metal drums (DOT specifications)	60 gal	60 gal	60 gal	60 gal	60 gal
Approved portable tanks	660 gal	660 gal	660 gal	660 gal	660 gal

4.17.4.4. Storage Tanks

- Storage tanks must comply with the SPCC Plan for those facilities that have one.
- Storage tanks must be labeled to properly identify the contents and chemical identity.

4.17.4.5. Rags and Burlap Sacks

- Promptly dispose of rags soaked in kerosene, mineral spirits, or other flammable fluids.
- Keep contaminated rags in self-closing metal labeled containers until they can be disposed of.
- Bales of rags and burlap sacks intended for future use shall be stored in well-ventilated, waterproof, non-combustible type buildings, and in such a manner as to allow air to circulate between individual bales. The bales shall be stored where they do not receive the direct rays of the sun through windows, and at a safe distance from any other source of ignitions, and a safe distance from flammable or combustible liquids.

4.17.4.6. Fire Control

- Fire extinguishers should be available at locations where flammable or combustible liquids are stored.
- Open flames and smoking are not permitted in flammable or combustible liquid storage areas.
- Do not store materials that will react with water in the same room with flammable or combustible liquids.

4.17.5. Documentation

- N/A

4.17.6. References

- *Facility Spill Prevention, Control, and Countermeasures (SPCC) Plan.*
- *29 CFR 1910.106 Hazardous Materials – Flammable and Combustible Liquids.*
- *National Fire Protection Association, NFPA-30, “Flammable and Combustible Liquids Code”, 2008.*
- *National Fire Protection Association, NFPA-251, “Standard Methods of Fire Tests of Fire Resistance of Building Construction and Materials”, 2006.*
- *CFR 195.438 Smoking or Open Flames*

4.18. General Equipment Safety

4.18.1. Purpose

This section is developed to provide an overview of the regulatory requirements directed at providing safe work equipment at Company facilities.

4.18.2. Scope

This section applies to all facilities.

4.18.3. Responsibilities

People Leaders shall:

- Ensure that the necessary work tools and equipment are provided.
- Ensure that deficient equipment is replaced and /or repaired in a timely manner.

Workers shall:

- Inspect work tools and equipment prior to using them.
- Take defective equipment out of service.
- Report defective equipment to Supervisor when taken out of service.

HS Support shall:

- Randomly monitor the use and condition of the equipment.
- Assist in the evaluation and selection of specialized tools when requested by area Management.


4.18.4. Requirements

4.18.4.1. General

- General hand tools will be kept in good condition and used for their intended purpose. Worn or damaged hand tools shall be taken out of service and replaced.
- Portable ladders shall be properly stored when not in use. All ladders will be visually inspected prior to use and if found defective taken out of service.
- Portable metal ladders shall not be used in or around electrical equipment.
- Scaffolds must be erected, moved, altered, or dismantled under the direction of a competent person.
- The scaffold shall have a signed and dated inspection/acceptance tag filled out by a competent person and attached to it before use.
- Power tools that come equipped with the manufacturer's point of operation guards shall not be operated with the guards removed. The manufacturer's specification guide will list the proper guard requirements and operational settings for any attachment.
- Power tools that are not double insulated will require a ground fault protection device be used with them.

- Portable hoist, come-along, chain falls, and binders shall be visually inspected before each use to determine the condition of the operating mechanisms, chains, ropes, cables, and the hooks. The rated load capacity of the portable lifting devices shall be marked and clearly legible.
- Wire rope chokers and synthetic slings shall be visually inspected before each use and taken out of service if any wear indicators are visible. Wire rope chokers and synthetic slings are manufactured to close tolerances and shall be properly cleaned and stored after each use.
- Alloy steel chains shall be visually inspected for cracked or deformed links before each use.
- Alloy Steel Chain Condition Report
- All hooks used on lifting devices shall be equipped with a self-closing safety latch.
- All rotating equipment shall be guarded with a fixed shield at the open points of rotation. This fixed guarding requirement includes bench grinders, table saws, and any shaft driven, or belt driven rotating equipment.
- Additional machine guarding shall be provided for any nip points, flying chips or sparks. The guards shall be constructed so that it does not create a hazard when operating the equipment.
- Air hoses used for compressed air to drive portable air tools shall be in good condition and pressure rated for the provided air pressure service. Air tool attachments shall be rated for that air pressure service and attached to the air tool with a retainer.

4.18.4.2. High Pressure Hose

- Store them indoors or in a PVC container, out of sunlight such that they are UV protected.
- Inspect visually prior to every use.
- Re-certification shall be performed as required by the manufacturer's guidelines.
- Frequency of replacement is dependent upon use.
-  Hydrostatic Testing of piping systems shall be done per *DP-CT1.3*

4.18.5. Documentation

- Alloy Steel Chain Condition Report

4.18.6. References

- OSHA 29CFR 1910.25 Walking-Working Surfaces – Portable Wood Ladders
- OSHA 29CFR 1910.26 Walking-Working Surfaces – Portable Metal Ladders
- OSHA 29CFR 1910.29 Walking-Working Surfaces – Manually Propelled Mobile Ladder Stands and Scaffolds (Towers)
- OSHA 29CFR 1910.212 Machinery and Machine Guarding – General Requirements for all Machines
- OSHA 29CFR 1910.242 Hand and Portable Powered Tools and Equipment, General
- OSHA 29CFR 1910.243 Guarding of Portable Powered Tools
- OSHA 29CFR 1910.244 Other Portable Tools and Equipment
- OSHA 29CFR 1910.305 Wiring Methods, Components, and Equipment for General Use

4.19. General Office Safety

4.19.1. Purpose

The purpose of this section is to provide a safe and healthy workplace by providing information on the potential hazards associated with working in field office facilities.

4.19.2. Scope

This section applies to all Workers in field offices and does not apply to corporate offices. (i.e., EC5 or Calgary).

4.19.3. Responsibilities

People Leaders shall:

- Ensure that work activities within their office areas are performed in a safe manner.
- Ensure Workers receive the proper training in office safety.

Workers shall:

- Take an active part in company safety processes.
- Follow the published safety rules and procedures.
- Report all workplace hazards, unsafe acts and/or behaviors to the Supervisor.

HS Support shall:

- Monitor office activities to assist in promoting compliance with the requirements of this section.
- Assist in providing revisions, and updates to procedures associated with Worker exposures in the office.

Safety Shared Services shall:

- Assist in providing training tools, and procedures that support a safe working environment in the office.

4.19.4. Requirements

4.19.4.1. Hazards in the Office

Many people have the misconception that office work is not hazardous and consider office injuries inconsequential.

The following are some examples of events and injuries which can occur in the office environment:

- Falls from chairs
- Slips, trips, and falls on the same level or from elevations
- Lifting or moving heavy or bulky objects
- Repetitive and/or awkward movements (ergonomics)
- Falling objects or encounters with fixed or moving objects
- Pinches, mashes, cuts, or abrasion
- Eye strain or muscle aches

4.19.4.2. Safety Training

Office Workers must participate in safety training as directed by the Company.

Safety meetings will be held at regular intervals by office team leaders, Supervisors or the H&S Department.

4.19.4.3. Field Visits

Office Personnel going to field locations should be aware of the training and PPE requirements for their visit:

- Ensure you bring the PPE yourself or arrange for the field to furnish the equipment
- Contact the Field Supervisor for any site-specific PPE requirements

4.19.4.4. Emergency Procedures

- Be familiar with the location of the fire alarm station nearest to your workstation or office.
- Become familiar with emergency procedures and know the appropriate evacuation route for your workstation or office:
 - Evacuation routes for each floor and building area are clearly marked
 - The host is responsible for visitor orientation and evacuation
- All physically challenged persons with either a permanent or temporary physical condition should notify the Fire Warden assigned to their floor or office.
- During fire alarms:
 - Fire Wardens will make last minute searches of their areas to ensure all Personnel are evacuated
 - Help the Fire Wardens by clearing the area quickly, and aid them if they request assistance
 - If a Fire Warden requests you to leave an area, do so
 - Close the door on your way out
- During evacuations:
 - Do not use elevators; use the stairways, following the nearest exit signs and evacuation drawings
 - Remove high heels to avoid falling downstairs
 - Check closed doors for temperature and smoke before opening

4.19.4.5. Housekeeping

- Keep all passageways, entryways, aisles, storerooms, service rooms and work areas clean, orderly, sanitary, and well maintained, with no obstructions
- Aisles and hallways shall provide unobstructed movement and immediate access to emergency exits and to fire protection equipment
- Safely stack material/boxes to avoid creating a hazard

4.19.4.6. File Cabinets and Bookcases

- File drawers and desk drawers should not be left open
- Do not overload top drawers so that files tip over.
- Secure file cabinets and bookcases as appropriate.
- Keep heavy files in lower drawers.
- Do not open a file drawer if someone is working underneath.
- Secure or anchor file cabinets or bookcases taller than 162.5 cm (64 in) to the wall to prevent toppling over.

4.19.4.7. Electrical Safety

- Use of extension cords should be minimized and arranged to avoid:
 - Tripping hazards
 - Electrical overload
- Do not pull an electrical cord to shut off power to any equipment.
- Disconnect (unplug) the power source before trying to remove jammed materials from a machine.
- Office machines with moving parts, high temperature hazards, and electrical shock potential shall not be operated without proper safeguards in place.

4.19.4.8. Fire Prevention

- Keep flammable or combustible material and residue in a building or operating area to a minimum. Store in metal safety cans or storage cabinets that meet Underwriters Laboratories, Inc., or Factory Mutual approval.
- Keep food, drink, and excessive combustible materials away from electrical equipment, computers, or workstations. Damage to circuitry or destructive fires may result.

4.19.4.9. Cutting Tools

- Secure paper cutter blades in the down position when not in use.
- Store knives, thumbtacks, and other sharp objects in proper containers or with the blades and points covered or shielded. Secure edges before disposing these items.

4.19.4.10. Desk Chairs

- Properly position a chair before sitting down and once seated, always keep at least 0.3 m (1 ft.) and all chair legs on the floor.
- Do not roll across the floor while sitting in a chair and do not lean sideways from a chair to pick up an object.

4.19.4.11. Material Handling

- Use only stools or stepladders to reach materials stored above eye level.
- Rolling stools and ladders should be equipped with brakes that operate automatically when weight is applied.

- Chairs are unacceptable to use as climbing devices.
- When moving equipment, furniture, or boxes, use proper carts, dollies, or trucks.
- When carrying material from one floor to another, use the elevator whenever possible.
- Use plywood to spread out the load when moving heavy loads across raised floors.
- Check for raised or unsecured floor tiles to prevent tripping hazards.
- When material must be carried, use proper lifting and carrying techniques.

4.19.4.12. Security

- All Workers must be alert to the preservation of office security, which includes prevention of unauthorized entry into the building and protection of the outside facilities.
- Keep all unattended doors and gates locked and report any strange activity to Supervision.

4.19.4.13. Office Ergonomics

- Ergonomics involves adjusting work processes or stations to fit workspace needs.
- Review literature on the best work methods to avoid the cumulative trauma disorder warning signs associated with poor work practices.

4.19.4.14. Noise

Noise levels in all work areas shall comply with the requirements listed in the Section 5.6 *Hearing Loss Prevention*.

4.19.4.15. Office Lighting

- Lighting is one of the most important factors affecting personal comfort on the job. The best lighting system is one in which the lighting level is designed to the specific office task, and where ceiling, wall, and floor surfaces minimize the surrounding glare.
- Regular maintenance of the lighting system should include cleaning the fixtures, replacing blinking or dim bulbs and repairing faulty lamp circuits.

4.19.4.16. Hazardous Materials

- Review the SDS prior to use of any chemical.
- Those who work with potentially hazardous chemicals or substances are required to participate in the Hazard Communication training annually and receive job specific training from their Supervisor in accordance with the *Hazard Communication Section*.
- Contact HS Support for disposal of hazardous materials.

4.19.5. Documentation

- N/A

4.19.6. References

- *ENB Houston Office Safety Handbook L10 MANL-03C1-SAF-002*
- *Westheimer Office Health and Safety Manual (for 5400 Westheimer, Hobby Hanger, and DC office Employees)*

- *Enterprise Office Safety Guidance Document*
- *29 CFR 1910.38 Emergency Action Plans*
- *29 CFR 1910.165 Fire Protection – Employee Alarm Systems*
- *29 CFR 1910.1200 Hazard Communication*

4.20. Hand and Portable Power Tools

4.20.1. Purpose

The purpose of this section is to establish requirements for the proper use, care, maintenance and safeguards of hand and portable power tools.

4.20.2. Scope



This section applies to all Company facilities. All hand and portable power tools will be used and maintained in accordance with applicable safety standards and regulations and in accordance with the manufacturer's suggested safe operating procedures and preventative maintenance requirements.

4.20.3. Responsibilities

People Leaders shall:

- Ensure Workers are equipped with proper tools and equipment to perform assigned work activities.
- Ensure all tools and equipment provided meet Company requirements.
- Ensure Employees are properly trained prior to using any tool or equipment.

Workers shall:

- Select the proper tool for the job to be performed.
- Use and maintain tools according to the manufacturer recommendations.
- Keep the work area clean and when operating tools should maintain secure footing.
- Recognize the potential hazards as well as the safety precautions, to prevent hazards from occurring when using tools.
- Inspect tools prior to use and maintain in good operating condition
 -  each facility maintains a log that records all manual material handling equipment (may be electronic or physical)
 -  each piece of manual material handling equipment is subject to an annual visual inspection that is documented
 - inspection logs are kept on site physically or electronically with other site –specific inspection or maintenance records
- Remove from service and tagged “DO NOT OPERATE” when required (e.g., when defective).
- Ensure proper guards where there are moving parts.
- Never modify tools - use solely for their intended purpose.

HS Support shall:

- Remain current on tool technologies from a H&S perspective (i.e., ergonomics, etc.).
- Assist Area/Regional Management with tool selection, if requested.

Safety Shared Services shall:

- Remain current on tool technologies from a H&S perspective (i.e., ergonomics, etc.).
- Assist Region with tool selection, if requested.

4.20.4. Requirements

4.20.4.1. General Requirements

Caution

The greatest hazards posed by hand and power tools are misuse and improper maintenance.

- Alert other Personnel working in the area before using tools or equipment to prevent exposure to possible hazards.
- Never leave machine-operated tools or equipment running unattended.
- All tools, accessories and equipment must be inspected for defects or other unsafe conditions prior to each use.
- Unsafe or defective tools shall be reported and tagged “DO NOT USE” until repaired or replaced.
- Decontaminate all hand and power tools that have been used in an environment where asbestos, lead, poisonous plants, or other hazardous materials were present.
- Guards or other protective devices shall not be removed, defeated, bypassed, or altered under any circumstances.
- Tools shall not be placed in pockets or held in hands when climbing ladders. Use a strong bag, bucket, or similar container to hoist tools between the ground and the job.
- Tools shall be handed from one person to another, never thrown.
- Edged or pointed tools will be placed in carrying cases or with the handle toward the receiver.

4.20.4.2. Hazard Recognition

- Workers must learn to recognize and eliminate the hazards associated with the different types of tools being used.
- Noise is a hazard. Working with noisy tools requires proper and effective use of hearing protection.
- Consult manufacturer’s instruction to determine other potential hazards with each tool.
- Electric cords and tools will be properly grounded and maintained in good condition.

NOTE: All hazards involved in the use of power tools can be prevented by following five basic safety rules:

- Keep all tools in good condition with regular maintenance.
- Use the right tool for the job.

- *Examine each tool for damage before use.*
- *Operate according to the manufacturer's instructions.*
- *Provide and use the right protective equipment.*

4.20.4.3. Ergonomic Considerations

- When acquiring tools for regular use consider the following ergonomic features:
- Tools should be light-weight and handles designed to allow a relaxed grip so the wrists can remain straight.
- Tools should be designed for use with either hand or be of various sizes, so they are appropriate for all Workers
- Tool handles should be shaped so that they contact the largest possible surface of the inner hand and fingers. Avoid tool handles with sharp edges and corners.
- Use power tools to reduce the amount of human force and repetition required.
- Purchase low-vibration tools to reduce tool vibration, and, if necessary, fit absorbent rubber sleeves over the tool handle.

4.20.4.4. Abrasive Blast Equipment

- Abrasive blast cleaning nozzles shall be equipped with a valve which must be held open manually during operations.
- The blast nozzle shall be bonded and grounded to prevent the build-up of static charges.

4.20.4.5. Air Compressors

- Set and maintain the air compressor regulators according to the manufacturer's instructions.
- Do not adjust pressure relief and regulating valves to allow the air compressor to operate above the manufacturer's recommended rating.
- Ensure that all belts and pulleys are enclosed in a guard.

4.20.4.6. Air Grinders

- Operate air grinders at the manufacturer's recommended air pressure.
- Do not operate air grinders unless all manufacturer's guards are in place and working properly

4.20.4.7. Air Movers

- Air movers' function as portable blowers or exhaust units to remove hazardous concentrations of gases or toxic vapors from confined areas, pipelines, trenches, and bell holes (see [Figure 11](#)).
- Since they have no electrical or moving parts, when properly grounded the air mover is suitable for use in potentially explosive atmospheres.
- Keep air compressors that are supplying air movers outside the area where hazardous vapor concentrations exist and away from where they are exhausted.
- Ensure flow of induced air through annular orifice.
- Noise levels generated by an air mover may exceed permissible levels, use hearing protection for exposure over extended periods.

- Air movers shall not be shop-made / home-made.

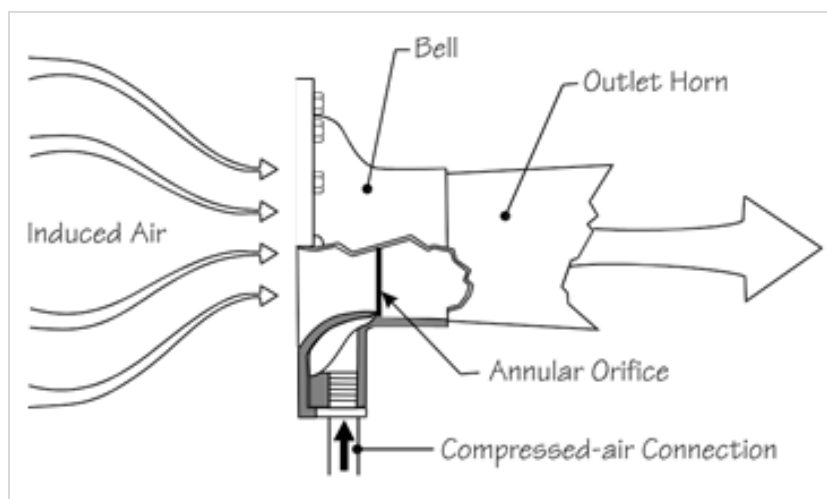


Figure 11: Air Mover Ventilator

4.20.4.8. Air Receivers (volume tanks)

- Air receivers must be protected from over pressure with a safety relief valve which is tested at regular intervals
 - Where a stop valve exists between a tank and safety valve, this shall be locked in an open position. A procedure shall be in place to ensure it is not left closed after maintenance/testing and that the pressure is constantly monitored while closed.
- Air receivers will have a drain which is checked periodically for accumulations of water and oil.
- Air receivers will be equipped with an indicating pressure gage.
- Never point an air tool at another person.
- Safety glasses with side shields or goggles will be worn when operating air tools. Depending on the work being performed, a face shield may also need to be worn (e.g., chipping, grinding, and brushing).
- Ensure the tool's operating lever is properly functioning and is in the OFF position before attaching the air hose.
- Air tools should be secured to the air hose by some positive means to prevent the tool from becoming accidentally disconnected.
- When changing tools or parts, adjusting them, or when the tool is not in use, shut off and bleed down the air supply.

4.20.4.9. Bench Grinders

- When using a grinder, the abrasive grinding wheel can disintegrate, sending jagged pieces outward at high speed.
- Bench grinders shall be bolted down to the work surface.
- Inspect the following before each use of the bench grinder:

- Look for loose bolts on the grinder base, flange, and spindle guards.
- Check the abrasive wheel for cracks and any other visual damage.
- Check the tool rests and tongue guards and re-adjust to the maximum allowable distance from the wheels:
 - 0.6 cm ($\frac{1}{4}$ in) for tongue guards.
 - 0.3 cm ($\frac{1}{8}$ in) for tool rests.
- Before installing a new abrasive wheel:
 1. Perform a “ring test”; gently tap the abrasive wheel with a non-metallic object, such as a screwdriver handle or wooden hammer handle. You should hear a ringing sound. If you hear a dull thud or dead sound, then the wheel could be damaged and should not be used.
 2. Check the abrasive wheel for the correct size and type for the grinder.
 3. Also, check that the wheel is approved for more revolutions per minute (rpm) than the grinder.
- Abrasive grinding wheels and wire buffing wheels shall have tool rests.
- The tool rest shall be a maximum of 0.3 cm ($\frac{1}{8}$ in) from the face of the wheel (this will prevent work from catching between the wheel and the tool rest).
- Do not use grinders to shape wood as sawdust clogs the pores of the grindstone, causing it to overheat, expand and rupture.
- Do not use the side of the wheel for grinding unless the stone is designed for side grinding.
- When operating a grinder, stand to the side when starting the grinder.

4.20.4.10. Chain Saws

- Wear hard hat and hearing protection, safety glasses with side shields and face shield, safety toed footwear, gloves, heavy pants with long-sleeved shirt.
- Before starting, inspect the saw for loose parts.
- Keep the chain sharp and inspect it for proper tension and condition.
- Keep the chain well oiled (oil reservoir is full).
- When starting, always place the saw on the ground with one foot through the rear handle and one hand on the handlebar grip to hold securely.
- Never drop start a chain saw.
- Start the saw at least 3 m (10 ft.) from the fueling area.
- When operating maintain a firm grip on the saw with both hands.
- Always cut at high speed and do not cut with the nose or tip of the bar.
- Do not cut at heights above the shoulders.
- Do not stand directly in line with the chain (maintain sure footing).
- Do not cut while someone is standing in front of the cutting area.

- Never carrier the saw from place to place with it running.
- Always carry the chain saw with the bar pointed backwards.
- Do not transport a chain saw in the vehicle cab.
- During fueling always fuel the chain saw in a well-ventilated area.
- Always use a funnel to avoid fuel spillage.
- Do not fuel while the engine is hot or running.
- Kickbacks occur when the nose of the bar encounters an object or when wood closes around the chain and pinches the saw.
- Tip contact in some cases may cause a lightning-fast reverse reaction, kicking the saw back and up towards the operator.
- Pinching the chain on top of the bar may push the saw back toward the Operator.

4.20.4.11. Cheater Bar or Pipe

The use of cheater bars or pipes (pipe extensions) is not considered a safe work practice and is not recommended.

4.20.4.12. Chipping Hammers and Jackhammers

- Make sure the tool bit is locked in place. If the tool bit does not lock, ensure it is in place before operating.
- Always keep a firm grip on the tool.

4.20.4.13. Compressed Air Used for Cleaning

- Compressed air used for cleaning purposes shall be reduced to less than 30 psig.
- Compressed air must not be used to remove materials from skin or clothing.
- Only approved air nozzles are acceptable for use. Modification of nozzles is strictly prohibited.

4.20.4.14. Drum Handling Equipment

- Use drum lifter to lift or lower a drum from an upright position, team lifting may be required when a drum lift is not available.
- Use a drum dolly to move a filled drum.

4.20.4.15. Electric Power Operated Tools

- Wear safety glasses with side shields and no loose clothing when using electric power tools.
- Ensure electric tools and equipment switches are in the OFF position before being plugged in.
- Unplug the tool when attaching or removing bits, blades, or other accessories.
- Loosen and tighten drill chucks with a chuck key, not with pliers or a pipe wrench.
- Use approved electrical equipment to power the tools.
- Inspect equipment prior to use and ensure equipment is in safe operating condition with all manufacturer guards are in place.

- Immediately tag as defective and remove from service any electrical cords and plugs with mechanical damage (e. g., exposed wiring; cords with frayed or deteriorated insulation; bent or broken prong of a plug, etc.)
- Immediately repair or replace any electrical cords or plugs tagged as defective.
- Ensure portable electric equipment is grounded or double insulated.
- Ensure extension cords are approved three-wire type, with appropriate Conductor insulation and an overall jacket not susceptible to damage at low temperatures.
- Ensure cords are not permanently secured to any structure or used for hoisting tool.
- Ensure power cords are elevated where possible, to prevent tripping Hazards or being damaged by vehicles / equipment.
- Ensure all tools and equipment are set to the “OFF” position prior to plugging them in.
- Use Ground Fault-Circuit Interrupter (GFCI) protection when using portable tools outdoors or when water, moisture or wet conditions are encountered.
- Store electrical equipment and cords to avoid damage (e.g., mechanical, thermal, UV exposure, etc.).
- Use approved ground-fault circuit interrupters for all 120-volt, single-phase, 15- and 20-ampere receptacle outlets which are not a part of the permanent wiring of the building or structure. Receptacles on the ends of extension cords are not part of the permanent wiring and shall be protected by GFCIs whether the extension cord is plugged into permanent wiring.
- If an extension cord is to be used, keep the cords connection out of any standing water, and use a heavy-duty extension cord with components rated for use in wet locations.
- Only Qualified Electricians may cut or splice power cords or extension cords.
- In addition to the above, Workers shall also follow these requirements:
 - Unattended temporary electrical equipment (such as lights, heaters, etc.) that will be left on in a Hazardous Area or Restricted Area shall be approved and installed for Class 1, Div. 2 area classifications.
 - Metal measuring tapes, aluminum ladders, or ropes having metal threads woven into the fabric shall not be used near exposed, live electrical parts.
 - Portable generators used on the worksite shall be grounded, in accordance with manufacturers’ specifications.
 - All voltage and current testers shall be rated for the circuits and equipment to which they are connected.
 - Safety ground cables used in electrical cubicles and substations shall be stored in a central location.

4.20.4.16. Safety Ground

Safety ground cables shall be:

- An appropriate size for the location.
- Fitted with 400-amp clamps on each end, and suitable for connecting to switchgear or substation equipment, and to ground.

- Fitted with approved crimped ferrules (installed on wire ends to attach to clamps).
- Kept as short as possible.
- Attached in a phase to phase to ground concept, where possible.

Only Qualified Electrical Workers can:

- Inspect or repair defective portable electrical equipment.
- Arrange temporary wiring for a power supply (e.g., where needed for portable electrical tools, equipment, and lighting units).

4.20.4.17. Equipment and Machine Guarding

- No equipment or machine shall be operated unless the guards and protection (e.g., protective devices) are installed operating in accordance with their intended purpose and properly maintained. Provide a method of machine guarding to protect Workers from Hazards created by point of operation, ingoing nip points, rotating parts, or other Hazards.
- Guards are important to protect Workers from direct contact with moving parts, flying chips and sparks and rotating parts.
- Guards and protection shall:
 - meet manufacturer's specifications and Applicable Legislation
 - be in good working order and inspected regularly
 - not be modified or removed
 - be replaced if damaged
 - be the correct size
 - be secure, and tamper-proof
 - prevent falling objects
 - allow for safe maintenance and inspection
 - create no new Hazards or interference
 - provide a method to protect Workers from Hazards created by point of operation, ingoing nip points and rotating parts.

4.20.4.18. Fuel Powered Tools

- Fuel powered tools, such as chain saws, water pumps, blow torches, etc., shall be stopped while being refueled, serviced, or maintained.
- Fuel shall be transported, handled, stored, and properly identified in approved containers.

4.20.4.19. Grinders and Buffers

- Workers using hand-held grinders and buffers shall:
 - not use the side of a wheel unless it is designed for side-grinding
 - stand to the side when starting the grinder, out of the line of fire
 - adopt a stance to one side of a steel wire wheel, where possible

- unplug the tool when changing wheels or guards
- not use the tool to shape wood
- A Qualified Worker shall check air grinders for maximum speed by dismantling the wheel and using a speed counter. If the speed exceeds the maximum revolutions per minute (rpm), reset the governor.
- Prior to use, the grinder or buffer shall be inspected to ensure:
 - the wheel is free of cracks
 - the wheel does not vibrate excessively
 - the buffing wheel has no loose wires or excess wear
 - the disc is the correct size and type for the grinder, and is approved for more revolutions per minute (rpm) than the grinder
 - all components are properly secured and in place
 - all manufacturer's guards are in place, secure and not damaged
 - there is no dead-man/locking switch (these are prohibited)
- Fixed grinding wheels shall have tool rests that are a maximum of 3 mm (1/8 in.) from the face of the stone and project 6 mm (1/4 in.) on either side of the grindstone. The angular exposure of the grinding wheel periphery and sides for safety guards shall not exceed 90 degrees or one-fourth of the periphery.

4.20.4.20. Hand Tools

- Knives and other sharp tools shall be carried and stored in a safe manner with the sharp edge covered.
- The wooden handles of hand tools shall be kept free of splinters and/or cracks and will be kept tight.
- Impact tools, such as drift pins, wedges, and chisels, shall be kept free of mushroomed heads and splinters.
- Never use files without handles.
- Keep chisels sharp and ground to a 60° angle. Chisel heads shall be dressed when they start to check or mushroom.
- Use hack saw blades recommended by the manufacturer appropriate to the type metal to be cut.
- Use files with a smooth, crack-free handle. Never clean by striking files against metal, use a file card.
- Snips shall be heavy enough to cut the material with one hand on the snips.
 - The other hand will be used to keep the cut material pulled aside.
 - Protective gloves will be worn.
- Woodcutting tools with sharp edges or blades shall be used so that, if a slip occurs, the direction of force will not be toward the body.

- Protect sharp edges of woodcutting tools with a sheath or metal guard when not in use.
- Do not use open-end box wrenches with sprung or cracked jaws.
- Adjustable wrenches shall be “pulled,” not “pushed,” with the open jaw facing the user.
- Never strike a wrench with a hammer unless it is an approved hammer wrench.
- Do not use a wrench as a hammer.
- Tool handles must be insulated when working on live circuits.
- Screwdrivers shall not be used for punches, wedges, pinch bars, or pries.
- A hammer or sledge must have a securely wedged handle suited to the type of head used. The handle will be smooth, free of oil, shaped to fit the hand, and of the correct size and length.
- Do not use a steel hammer on a hardened steel surface. Heads will be dressed whenever they start to check or mushroom.
- When sledges or other heavy hammers are used, the Worker holding the tool being struck shall use a tool holder.
- Wooden or fiberglass handled tools should not be taped or painted to check for handle cracks, splinters, or other defects. Cracked handles should be replaced prior to use.

4.20.4.21. Hand Trucks

- When using a hand truck, always face the direction the truck is heading.
- Hand trucks will be pushed rather than pulled when possible.
- Hand trucks will not be used to carry people.
- Hand trucks shall be inspected before each day’s use.
- While descending a ramp or incline, the operator shall be on the uphill side of the hand truck.

4.20.4.22. Hydraulic Power Tools

- The fluid used in such tools shall be fire resistant fluid and approved for use by the manufacturer of the tool.
- The manufacturer’s safe operating pressures for hoses, valves, pipes, filters, and other fittings shall not be exceeded.

4.20.4.23. Impact Wrenches

- Ensure the directional lever is in the correct position prior to loosening or tightening a bolt or nut.
- If a locking mechanism is required, use a one-piece neoprene retaining ring when attaching a socket to a larger impact wrench.
- Before attempting to loosen or tighten a bolt or nut, check that the directional lever is in the correct position for the job.
- When installing a socket on larger impact wrenches, make sure the locking pin is in place and the rubber O-ring is firmly seated.

- Make sure assistance is available, and that operators have a firm footing and adequate working clearances (especially when operating larger impact wrenches).
- Steel locking pins with separate rubber O-rings may cause serious injury. If the O-ring becomes dislodged, it causes the steel locking pin to protrude during operation.
- Workers using compressed air equipment shall wear PPE and ensure the working area is cleared of other Workers. In addition, compressed air equipment shall:
 - Include safety nozzles, plus effective chip guarding
 - Never be used for cleaning Workers or their clothing
 - Not exceed 30 psi when cleaning equipment or floors
 - Not be adjusted to allow the compressor to operate above the manufacturer's specified rating

4.20.4.24. Jacks

- The Operator shall make sure that the jack used has a rating sufficient to lift and sustain the load. (The requirement does not apply to engine barring jacks.)
- The rated load shall be legibly and permanently marked in a prominent location on the jacket by casting, stamping or other suitable means.
- Jacks shall have a positive stop to prevent over travel.
- A jack should only be used to lift a load, not support it.
- Hydraulic jacks exposed to freezing temperatures shall be supplied with adequate antifreeze liquid.
- In the absence of a firm foundation, the base of the jack shall be blocked. After the load has been raised, it shall be cribbed, blocked, and secured.
- Jacks shall be properly lubricated at regular intervals. The lubricating instructions of the manufacturer shall be followed, and only recommended lubricants shall be used.
- Jacks which are out of order shall be tagged accordingly and not used until repairs are made.
- Each jack shall be thoroughly inspected in accordance with the following:
 - For constant or intermittent use at one locality, prior to each use or at a minimum at least once every six months.
 - For jacks sent out of the shop for special work, when sent out and when returned.
 - For a jack subjected to abnormal load or shock, immediately before and immediately after.

4.20.4.25. Mowers, Blowers and Weed Eaters

- Wear hearing protection, safety glasses with side shields, steel toed footwear and heavy pants with a long-sleeved shirt when operating mowers and weed eaters.
- Before cleaning, inspecting, adjusting, or repairing the equipment unplug electric powered mowers, weed eaters or blowers.
- Do not clean, inspect, adjust, or repair the equipment while the blades are in motion.
- Before reaching under mowers with hands remove the ignition wire from the spark plug.

- Ensure all guards and safety devices are in place and functioning properly.
- Before starting the job, inspect and remove small loose objects from the area that could become projectiles if struck by the blade or cable.
- Do not allow anyone to loiter in the immediate vicinity of the work.
- When mowing a slope or incline, mow across the face of the slope.
- Do not fuel the engine while it is running or while it is hot.

4.20.4.26. Nail Guns and Staplers

Nail Guns, staplers, etc., provided with automatic fastener feed and operating at more than 100 psig pressure at the tool shall have a safety device on the muzzle to prevent the tool from ejecting fasteners if not in contact with the work surface.

4.20.4.27. Open Bladed Work Knives

Caution

This section does not apply to kitchen utensils.

- Open blade knives (e.g., locking blade utility knives) shall not be used unless a Hazard Assessment is completed to determine that alternate tools cannot be used to complete the task for which the open bladed knife is required. The Hazard Assessment shall review the scope of work, the cutting tool to be used and specific PPE (e.g., cut-resistant gloves or gauntlets).
- When it is determined that an open bladed knife is the only tool that can be used to complete a task the following criteria shall be met:
 - specific PPE shall always be worn when using an open bladed knife
 - material being cut is secure
 - approval is noted on any applicable Safe Work Permit Form
 - a working space appropriate to the task allows the Worker to work with the open bladed knife in a safe manner without endangering themselves or other

4.20.4.28. Pneumatic Power Operated Tools

NOTE: There are several dangers encountered in the use of pneumatic tools. The main danger is getting hit by one of the tool's attachments or by some type of fastener that a Worker is using with the tool.

Caution

High pressure (>100 psig) equipment not specifically mentioned here shall be operated in accordance with the manufacturer's specifications. Employees shall be trained in the hazards of operating all such equipment.

- Safety glasses with side shields or goggles will be worn when working with compressed air. Face shields are required unless a hazard assessment determines the face shield introduces a greater hazard.
- Do not use compressed air to clean workbenches or work areas.
- Set the air supply properly for the tool being used.

- Shut off the air supply and drain the air prior to disconnecting tools.
- Safety restraints must be used to secure the tool to the hose.
 - AERO-Quip and other approved pressure activated retaining connectors may be used to meet this requirement.
 - This will prevent the hose from whipping if the tool is accidentally disconnected.
- A safety clip or retainer must be installed to prevent attachments, such as chisels on a chipping hammer, from being unintentionally shot from the barrel.
- Compressed air guns should never be pointed toward anyone. Users should never “dead-end” it against themselves or anyone else.
- The manufacturer’s safe operating pressure for hoses, pipes, valves, filters, and other fittings shall not be exceeded. Adjust service air to manufacturer’s specifications for tool to be used.
- The use of hoses for hoisting or lowering tools is prohibited.
- Hoses exceeding 1.3 cm (½-in) ID shall have a safety device at the source of supply or branch line to close off pressure in case of hose failure.
- Nailers, staplers, etc., provided with automatic fastener feed and operating at more than 100 psig pressure at the tool shall have a safety device on the muzzle to prevent the tool from ejecting fasteners if not in contact with the work surface.
- Guards shall have a maximum exposure angle of 180 degrees and shall be located between the operator and the wheel on right angle grinders.

Pneumatic hoses shall:

- Be appropriately rated for the maximum pressure produced in systems.
- Have excess flow valves or chokes installed on all airlines at the compressor or header, to prevent high-volume air release.
- Not be used to raise and lower tools.
- Not be crimped to shut off the air supply, except in an emergency.
- Be checked periodically for wear or damage and replaced if necessary.
- If possible, be suspended from above to eliminate possible tangles, tripping hazards, unnecessary wear and damage by vehicles and carts.
- All hoses exceeding 1.3 cm (½-in) inside diameter shall have a safety device at the source of supply or a branch line to reduce pressure in case of hose failure.
 - In addition, pneumatic hoses shall have temporary and quick connections secured, using whip checks on the following connection points:
 - compressor to hose
 - hose to hose
 - have safety pins where the connection point is designed for their use
 - have safety clips or retainers used at the attachment point on pneumatic impact percussion tools
- be protected from tangles, unnecessary wear, and damage

4.20.4.29. Portable Circular Saws

- Equip portable, power-driven circular saws having a blade diameter greater than 5 cm (2 in) with guards above and below the base plate or shoe.
- The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work.
- When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to covering position.
- All portable electric tools that are damaged shall be removed from use and tagged “DO NOT USE.”

4.20.4.30. Post Pounders

- Any work involving post pounders are required to have written procedures or job hazard analysis for the installation and removal of T-posts and must include:
 - Types of T-Post drivers and pullers approved by the Contractor
 - Safe removal of frozen or stuck t-posts
 - Condition of T-posts (free from excessive rust, straightness, etc.)
 - Requirement of a painted section near top of post for a visual indicator that the driver is being lifted too high.
 - Ground Disturbance requirements, if applicable
 - T-post spade to be driven in completely or removed
- The Design of the post pounder itself must be designed to address the risk of hand safety from the pounder coming off the post with effective Ergonomic principles applied.
- Examples of this may be through manual post pounders having an elongated nozzle to make it unlikely that a Worker could lift it over an upright post or through mechanical means such as slide hammers or air actuated hammers which guard the Worker from moving the Cylinder.

4.20.4.31. Powder-Actuated Tools

- Only Workers who have been trained to operate a specific tool in use shall be allowed to operate a powder-actuated tool.
- The Operator of powder-actuated tools will wear hearing protection, safety goggles or other face and eye protective devices.
- The tool shall be tested each day before loading to see that safety devices are in proper working condition in accordance with the manufacturer’s recommended procedure.
- Tools shall not be loaded until just prior to the intended firing time and loaded tools shall not be left unattended.
- At no time shall loaded or empty tools be pointed at Workers.
- Hands shall be kept clear of the open barrel end.
- Only powder-actuated charges, studs, pins, or fasteners designed and recommended for use in a specific tool by the tool manufacturer will be used.

- Fasteners shall not be driven into hard or brittle materials including but not limited to cast iron, glazed tile, surface hardened steel, glass block, live rock, face brick or hollow tile.
- Driving into easily penetrated materials shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.
- Tools shall not be used in an explosive or flammable atmosphere.
- Tools shall be used with the correct shield, guard or attachment recommended by the manufacturer.

4.20.4.32. Pressure Washing and Steam Cleaning

- The following PPE must be worn for each temperature range:
 - Up to 50° C or 120° F: Safety glasses with side shields and face shield
 - 50° to 80° C or 120° to 180° F: Safety glasses, face shield, rubber gloves, rubber boots and a slicker suit (the slicker suit trousers will always be worn over the boots)
 - 80° C or 180° F to boiling: Wear a face shield, goggles, hard hat, rubber gloves, rubber boots and a slicker suit (the Operator must not have exposed skin.)
- All steam and water lines should be equipped with a check valve to prevent pressure from backing up into the cold-water system.
- Hose to pipe connections should always point downward and be installed as low as possible.
- Any water heater or steam generator should be equipped with safety valves of the temperature-pressure type to accordance with the *ASME Boiler and Pressure Vessel Code*.
- Only high-pressure armored or wire-reinforced steam hose should be used.
- Hose connections should be kept in good working condition.
- Nozzles should have insulating grips for coolness.
- Operators should always lead the hose out in a large loop so there are no turns or kinks.
- When hot water or steam is used near electrical equipment, the equipment should be completely covered if it is not moisture or weatherproof.
- High-velocity steam may generate static electricity in passing through the nozzle.
- To help prevent a spark when flammable vapors may be present, the nozzle should be grounded to the tank or container being cleaned.

4.20.4.33. Switches and Controls

- All hand-held powered circular saws, having a blade diameter greater than 5 cm (2 in), electric, hydraulic, or pneumatic chain saws, and percussion tools without positive accessory holding means shall be equipped with a constant pressure switch or control that will shut off the power when the pressure is released.
- All hand-held gasoline powered chain saws shall be equipped with a constant pressure throttle control that will shut off the power to the saw chain when the pressure is released.
- All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 5 cm (2 in) in diameter, disc sanders with discs greater than 5 cm (2

in) in diameter, belt sanders, reciprocating saws, saber, scroll, and jig saws with blade shanks greater than a nominal 0.6 cm (¼-in), and other similarly operating powered tools shall be equipped with a constant pressure switch or control. These devices may have a lock-on control if turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

- All other hand-held powered tools, such as, but not limited to, platen sanders, grinders with wheels 5 cm (2 in) in diameter or less, disc sanders with discs 5 cm (2 in) in diameter or less, routers, planers, laminate trimmers, nibblers, shears, saber, scroll, and jig saws with blade shanks a nominal 0.6 cm (¼-in) wide or less, may be equipped with either a positive “ON-OFF” control, or other controls as described by the first two bullets above (i.e., first two bullets in this section).

4.20.5. Documentation

- Safe Work Permit Form

4.20.6. References

- *ANSI/ASSE, A10.3-2006, American National Standard – Construction and Demolition Operations: Safety Requirements for Power-Actuated Fastening Systems*
- *American National Standards Institute / American Society of Safety Engineers*

4.21. Hazardous/Restricted Areas and Portable/Personal Gas Monitors

4.21.1. Purpose

The purpose of this section is to establish basic work practices and use of equipment in hazardous and/or classified areas at all Company facilities.

4.21.2. Scope

This section applies to Workers at all Company facilities. It covers work and use of some portable electronic devices in hazardous (classified) locations as defined by the Operations Technical Staff. Work conducted in these areas must be controlled in a consistent manner. A work permit or hot work permit may be required to achieve this goal.

This section sets requirements for performing work in locations based on the properties of the flammable vapors, liquids, gases, combustible dusts, and fibers that may be present and the likelihood that a flammable or combustible concentration or quantity is present.

These hazardous classified locations are assigned six designations as follows:

- Class I, Division 1
- Class I, Division 2
- Class II, Division 1
- Class II, Division 2
- Class III, Division 1
- Class III, Division 2

NOTE: *The only definitions relevant to this document are for Class 1 Division 1 and Class 1 Division 2.*

4.21.3. Responsibilities

People Leaders shall:

- Ensure that all Workers can identify hazardous (classified) areas at a facility and communicate safe working procedures within those areas.
- Review and approve any changes to the equipment functional check and/or calibration procedures.
- Ensure all personal / portable gas monitors are inspected and calibrated in accordance with manufacturer's specifications

Workers Shall:

- Identify hazardous (classified) areas at all facilities where work is being performed.
- Understand equipment used to monitor hazardous (classified) areas to determine safe work conditions.

Contractors shall:

- At their own expense provide appropriate Atmospheric Monitoring and detection equipment unless otherwise noted within the bid documents or at the Request for Proposal (RFP).
- When necessary, specific atmospheric Hazard measurement devices shall also be provided by the Contractor if mono-styrene, acetone, benzene, or other Hazards are present. Enbridge shall inform the Contractor when there is the potential for respiratory Hazards or contaminants that may not be detectable by standard 4-head monitors.

HS Support shall:


- Review and approve any changes to the equipment functional check and/or calibration procedures.
- Remain current on technologies for atmospheric monitoring equipment.
- Train Workers in the use, care, and maintenance of personal gas monitors.




4.21.4. Requirements

4.21.4.1. General Requirements and Information

Caution

Hazardous areas may increase in size according to the nature of the work involved. Areas not normally hazardous may be temporarily classified as hazardous because of the nature of the work involved (e.g., leak repair, hot tap).

- All work in hazardous locations requires gas testing and monitoring.
- All work in hazardous locations requires a Job Hazard Analysis.
- A Safe Work Permit is required in all locations, except UST and U.S. Projects.
-  For UST and U.S. Projects, a Hot Work Permit must be completed as per *5-8010 Hot Work Permits Procedure*

-  For Eastern Canada, a Hot Work Permit must be completed as per *5-8010 Hot Work Permits Procedure*.
- The work atmosphere in a hazardous location must be monitored to ensure it is maintained below the procedure specific requirements (e.g., Confined Space).
- Hazardous / Classified location shall be identified with the appropriate signage and shall be posted to ensure clarity for Workers entering the area.
- Identification of hazardous locations shall also be reviewed as part of the work planning and execution process.
- Fire resistant clothing shall be worn as required in the Personal Protective Equipment (PPE) section of this Manual.
- Use extreme caution during activities that may produce a source of ignition within hazardous classified location. Serious injury or death may occur.
- Post “NO SMOKING” and equivalent signs to identify hazardous locations. Absence of such signs does not imply that the site is non-hazardous.
- Motor vehicle spark producing equipment and ignition sources are not allowed in hazardous locations unless authorized. See *Ignition Sources* section for Positive Air Shut Off requirements
- When possible, locate equipment upwind of hazardous locations.
- Spark-less and pneumatic tools are recommended for use in hazardous locations.
- Only Personnel trained to use personal/portable gas monitors will test areas for flammability and authorize work after testing is completed.
- The work atmosphere must be monitored to assure it is not in the explosive range before and during welding, cutting, or other open flame operations.
- Only Personnel performing and/or inspecting work during welding, cutting or other open flame operations can be in the immediate area of the work.
- At least two dry chemical fire extinguishers shall be continuously available and manned during cutting or welding activities.
 -  Two 30-lbs (14 kg) extinguishers
 -  Two 20-lbs (9 kg) extinguishers
- Inspect extinguishers shortly before use on fire-watch.
 - Confirm extinguishers are pressurized before actual use.
- Smoking and lighting materials are prohibited in hazardous locations.
- Smoking will be allowed only in designated and posted locations.
- Spark controls shall be established where appropriate using blankets and/or fireproof enclosures.
- PVC and other spark producing materials shall be removed from hazardous locations.
- Where practicable, all combustible materials shall be removed from hazardous locations.

4.21.4.2. Hazardous Area Classification Legend

Class I Locations

Class I locations are those in which flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

Class I, Division 1

A Class I, Division 1 location is a location:

- (1) flammable liquid–produced vapors, or combustible liquid–produced vapors can exist under normal operating conditions, or
- (2) gases, flammable liquid–produced vapors, or combustible liquids above their flash points may exist frequently because of repair or maintenance operations or because of leakage, or
- (3) processes might release ignitable concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors and might also cause simultaneous failure of electrical equipment in such a way as to directly cause the electrical equipment to become a source of ignition

Class I, Division 2

Class I, Division 2 location is a location:

- (1) produced vapors, or combustible liquid–produced vapors are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems or in case of abnormal operation of equipment, or
- (2) flammable liquid–produced vapors, or combustible liquid–produced vapors are normally prevented by positive mechanical ventilation and which might become hazardous through failure or abnormal operation of the ventilating equipment, or
- (3) that is adjacent to a Class I, Division 1 location, and to which ignitable concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid produced vapors above their flash points might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided.

Model: Default User: enbr Version: 1.0	<p>NOTES:</p> <ol style="list-style-type: none"> 1. ANY AREA WITHIN A 5 FOOT RADIUS OF A DEVICE WHICH VENTS GAS, UNDER NORMAL OPERATIONS, IS CLASSIFIED AS A CLASS 1, DIVISION 1 AREA. 2. ANY AREA GREATER THAN 5 FEET BUT LESS THAN 15 FEET FROM A DEVICE WHICH VENTS GAS, UNDER NORMAL OPERATIONS, OR ANY POTENTIAL LEAK SOURCE IS CLASSIFIED AS A CLASS 1, DIVISION 2 AREA. 3. THE SPACE AROUND WELDED PIPE AND EQUIPMENT WITHOUT FLANGES, VALVES, OR SCREWED FITTINGS, IS NON-CLASSIFIED. 4. DERIVED FROM AGA XL1001. <p style="text-align: center;">LEGEND</p> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="width: 50px; height: 50px; border: 1px solid black; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 10px;"></div> <div>CLASS 1, DIVISION 1 GROUP D</div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="width: 50px; height: 50px; border: 1px solid black; background: repeating-linear-gradient(-45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 10px;"></div> <div>CLASS 1, DIVISION 2 GROUP D</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 50px; height: 50px; border: 1px solid black; background-color: white; margin-right: 10px;"></div> <div>NON-CLASSIFIED</div> </div>																		
Drawing: E:\standards\Approved\stds\Elas\truce\stds\stds.dgn Title: 1/18/2018	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"></td> <td style="width: 20%; text-align: center;">HAZARDOUS AREA CLASSIFICATION LEGEND</td> <td style="width: 10%; text-align: center;">DESIGN MANAGER</td> <td style="width: 10%; text-align: center;">DRL</td> <td style="width: 10%; text-align: center;">1-18-18</td> <td style="width: 20%; text-align: center;">STANDARDS</td> </tr> <tr> <td style="text-align: center;">LG.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">INITIALS</td> <td style="text-align: center;">DATE</td> <td style="text-align: center;">DWG.</td> <td style="text-align: center;">REV. 1</td> </tr> </table>		HAZARDOUS AREA CLASSIFICATION LEGEND	DESIGN MANAGER	DRL	1-18-18	STANDARDS	LG.								INITIALS	DATE	DWG.	REV. 1
	HAZARDOUS AREA CLASSIFICATION LEGEND	DESIGN MANAGER	DRL	1-18-18	STANDARDS														
LG.																			
		INITIALS	DATE	DWG.	REV. 1														

Figure 12: Area Classification Legend

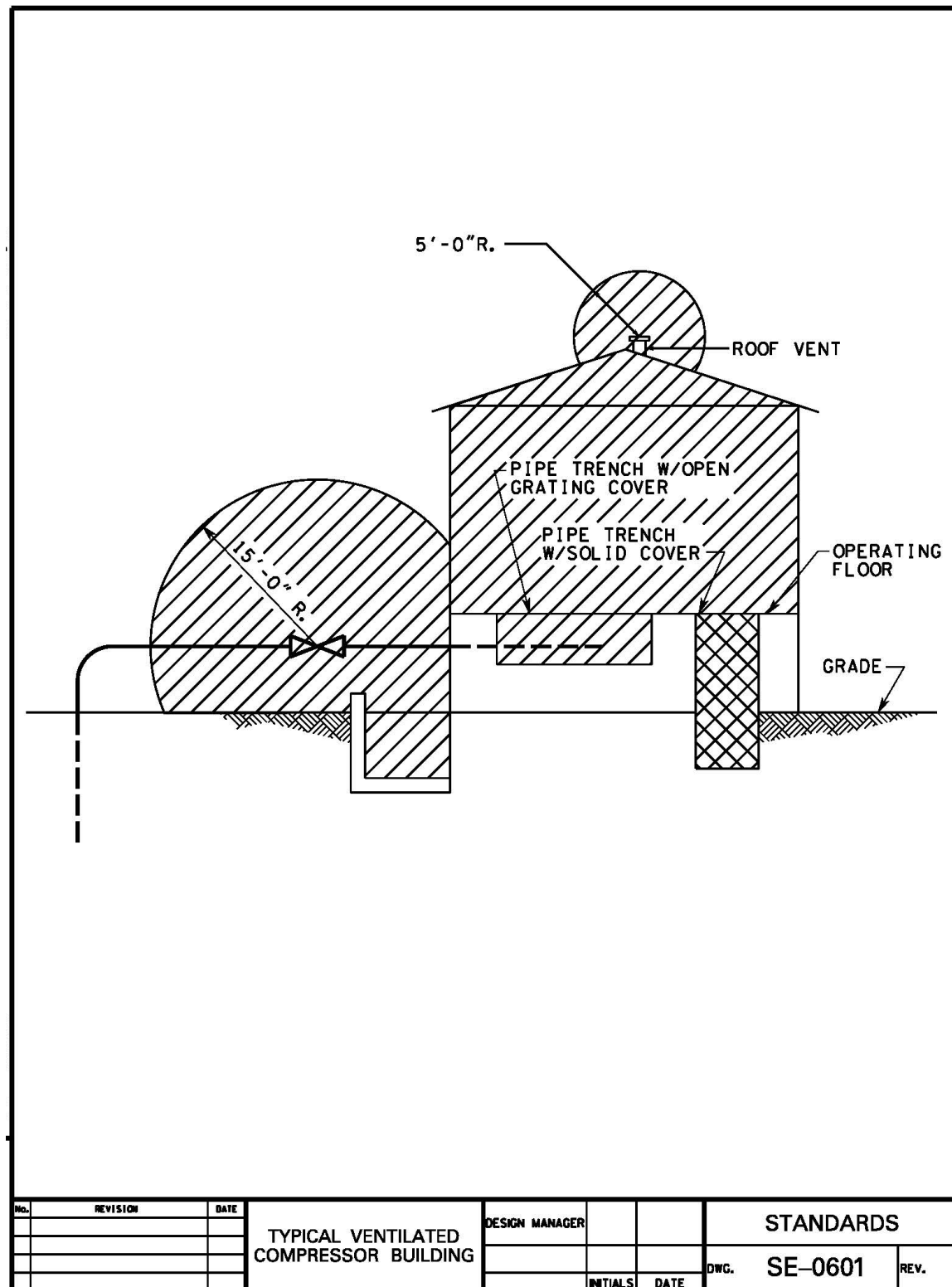


Figure 13: Typical Ventilated Compressor Building

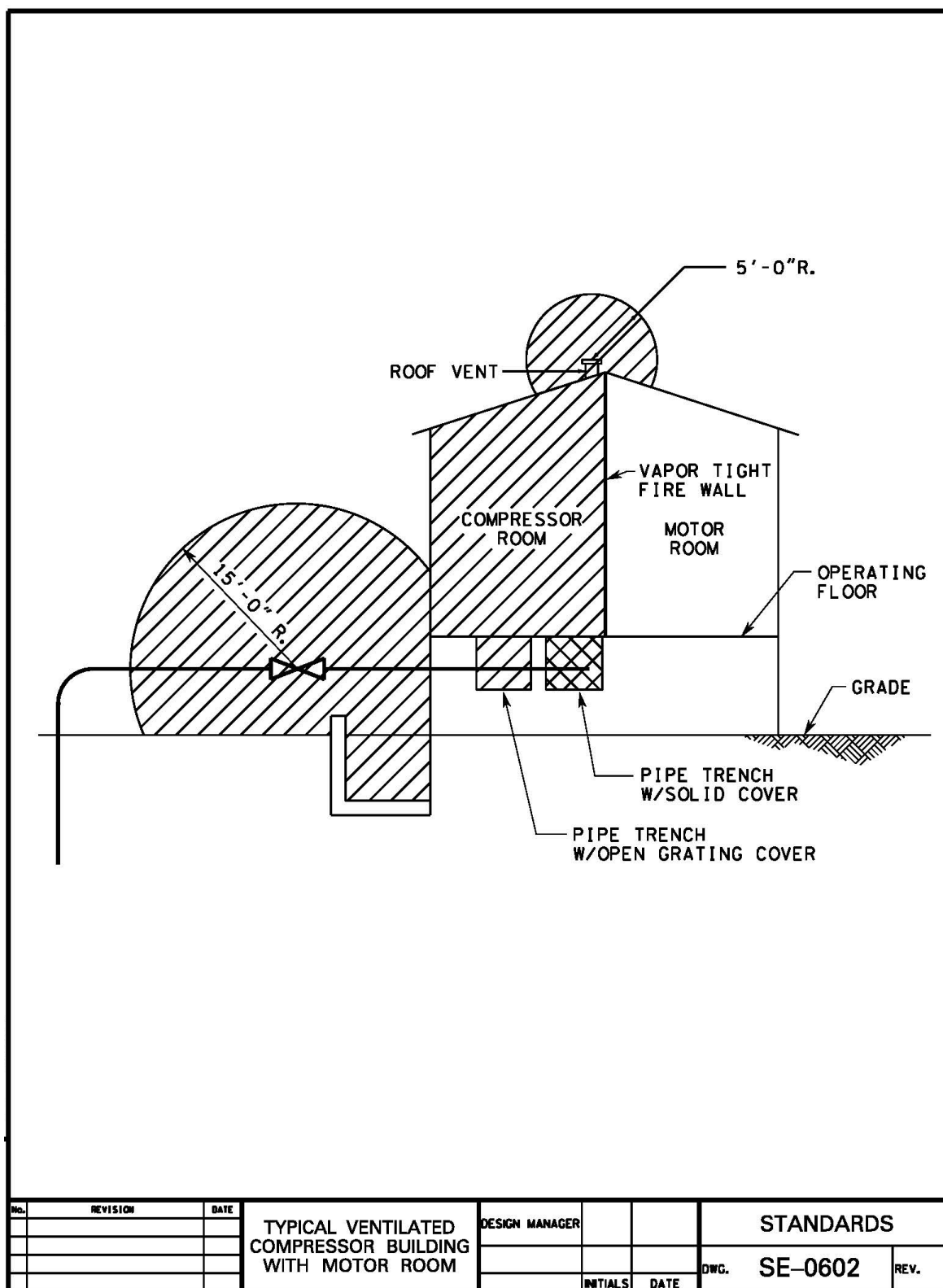


Figure 14: Typical Ventilated Compressor Building with Motor Room

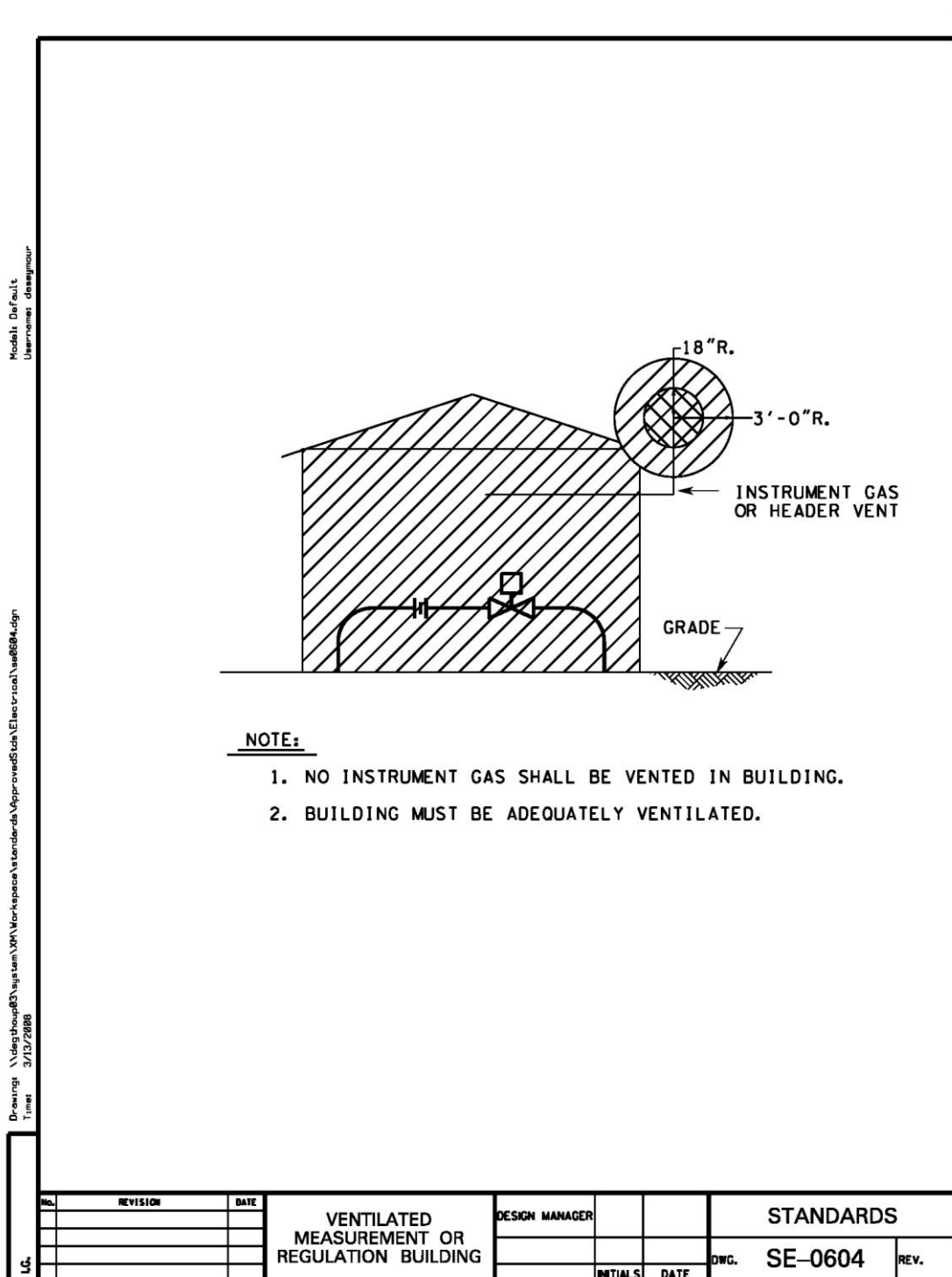


Figure 15: Ventilated Measurement or Regulation Building

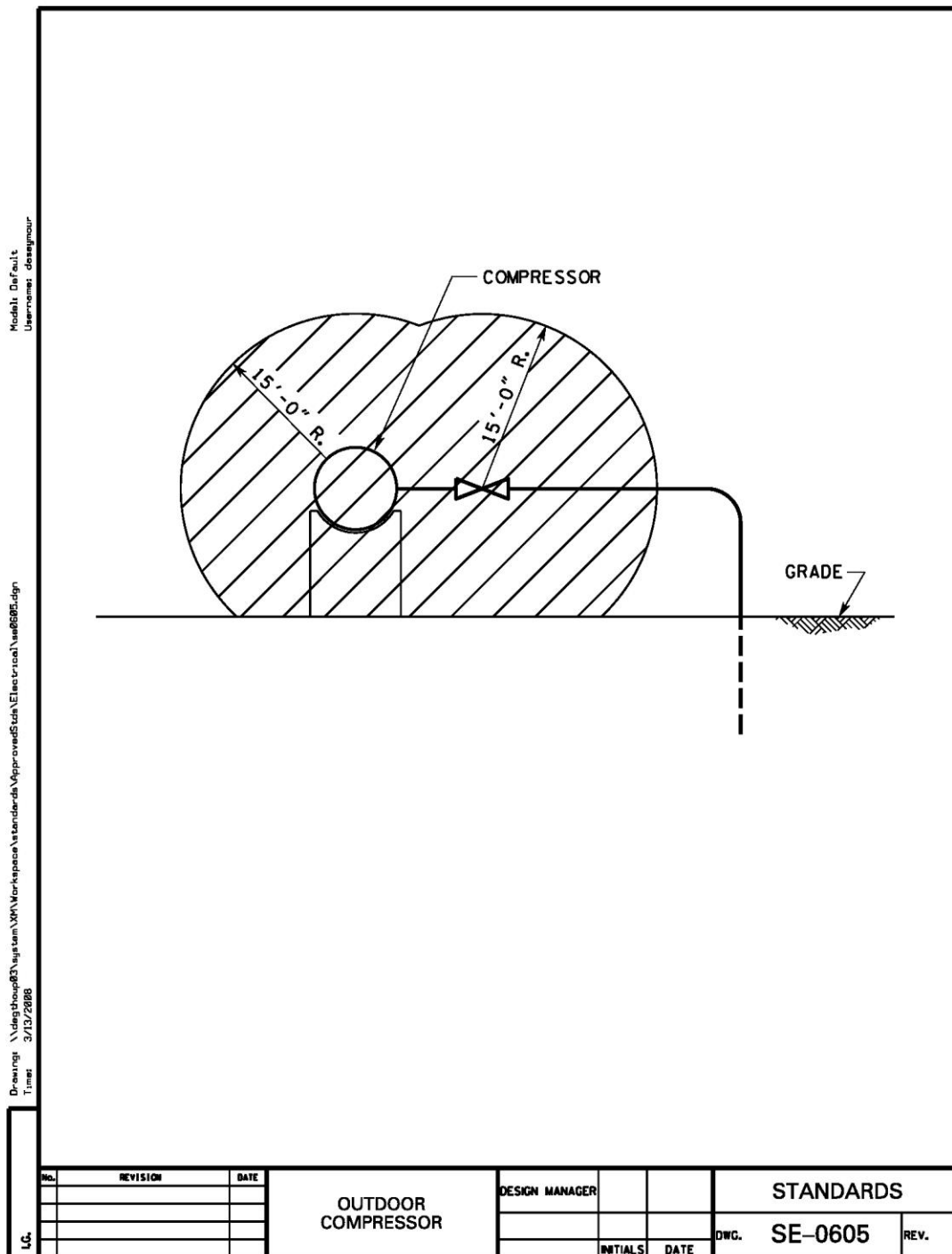




Figure 16: Outdoor Compressor

4.21.4.3. Personal Communication Devices and Computers

NOTE: *Non-intrinsically safe electronic devices such as laptop computers, tablets, cameras, two-way radios, and cellular telephones that have the potential to create an ignition source in a hazardous area.*

 As a normal course of business, these devices are not allowed in Classified Areas. However, where a business need dictates, these devices may be used in a Classified Area provided the individual(s) utilizes a Personal / Portable Gas Monitor. These instances do not require a Hot Work Permit.

 Laptop computers are permitted in areas classified Class 1, Division 1 with a Hot Work Permit, continuous combustible gas monitor or personal combustible gas monitor. (East Canada)

4.21.4.4. Personal / Portable Gas Monitors

Personal monitors shall be worn by each individual when:

- working in Confined Spaces
- removing storage tank seals, tank manways or tank mixers
- entering tanks that have not been cleaned and freed of gas
- work associated with Open Systems, such as scraper traps and provers
- spill or leak containment, clean-up, and repairs
- required by as noted on a safe work permit
- when required based by a Hazard Assessment
- when performing work in a hazardous / classified location







NOTE: *Personal Gas Monitors should not be worn when working in any environment that will exceed the instrument set points.*

Table 18: Types of Monitoring Instruments

Hazard	Monitoring Instrument
H ₂ S	Detector tubes and personal, portable, and stationary monitors
Benzene	Detector tubes and personal badges
CO	Portable monitors
Oxygen	Portable monitors
Combustible vapors and gases	Portable and stationary Lower Explosive Limit (LEL) monitors
Fire	Stationary ultraviolet and/or infrared flame detection

- Multi-gas monitors recommended for (as a minimum):
 - Sweet gas facilities – LEL, CO & O₂
 - Sour gas facilities – H₂S, LEL, CO & O₂
- The alarm set points of portable gas monitors are listed in [Table 19](#).

Table 19: Portable Gas Monitor Alarm Set Points

Alarm Set Point	H ₂ S	LEL	CO	O ₂
Low Alarm	 10 PPM	10% LEL	25 ppm	19.5%
	 5 PPM			
High Alarm	 20 PPM	20% LEL	100 ppm	 23.5%
	 10 PPM			 23%

Personal Gas Monitors shall:

- have multi-head functionality.
- be worn within 45 cm (18 in) of the Breathing Zone (area around mouth and nose).
- not be placed into shirts, coveralls, or jacket pockets unless the pockets are specially designed to hold portable gas monitors (i.e., mesh pocket).
- provide a visual and audible alarm that is equipped with low and high alarm points.
- be recharged in a safe area, away from the area being monitored; carry out recharging as soon as possible after the low-battery indicator activates, to ensure the monitor does not shut down.

4.21.4.5. Area Monitoring

- An Area Monitor consists of at least one individual wearing a monitor who always remains in the affected area during the work activity. Area Monitors shall:
 - monitor the potential Hazard
 - be equipped with a visual alarm (i.e., red indicator that lights when alarm levels are reached) in addition to an audible alarm, where possible
 - be placed where the atmospheric Hazard is likely, based on the substance (e.g., placed at lower levels when monitoring for substances heavier than air)
 - be used where there is potential for exposure to atmospheric Hazards, including, but not limited to:
 - Confined Spaces
 - Open Systems
 - venting systems
 - leak sites
 - Hazardous Areas
 - Restricted Areas
 - when actively working within 30 m (100 ft.) of Ground Disturbance work which is taking place within 3 m (10 ft.) of operating Facilities (e.g., gas or oil pipelines, above or below ground); in such cases, there shall also be continuous gas monitoring, as determined by the Hazard Assessment
- Combustible gas monitors do not provide accurate readings in an oxygen-deficient atmosphere.

- Passive monitors assess the atmosphere without the use of a pump. Active monitors have internal pumps that draw atmospheric samples from the immediate area or from a distance (e.g., inside a pipe, sump, booster pit).

4.21.4.6. Sampling Equipment

Sampling equipment (including multi-head continuous gas monitors) shall:

- be capable of sampling according to the potential Hazard
- be positioned within a few feet of the work area and not interfere with the task, including:
 - at the source of the gas or vapor
 - low areas (for petroleum vapors and H₂S)
 - the most Representative location for Workers at the site
 - areas with the highest potential for exposure

When using grab sampling equipment such as detector tubes (e.g., Drager CMS) and photo ionization detectors (e.g., UltraRae).

Workers shall:

- obtain multiple grab samples to obtain Representative exposure information
- always follow manufacturer's guidelines for testing time limits and specifications, but combine with Atmospheric Monitoring best practices
- stop Atmospheric Monitoring and leave the work area (following applicable safety procedures) when alarms are activated before specified length of time for measurement (i.e., one minute)
- For respiratory protection during the initial Atmospheric Monitoring of Open Systems and until work area has proven safe atmosphere:
 - The level and type of respiratory protection shall be based on the potential composition, volume, and pressure of the gas or vapor that may potentially be released during the break or opening.
 - When opening systems where a known potential for exposure exists, all Workers in the immediate work area shall wear the appropriate RPE, in accordance with the completed Hazard Assessment until a safe atmosphere has been verified.
 - If the composition and/or concentration of the contaminant is unknown or there is a potential for a Hazardous Atmosphere, assume the atmosphere is hazardous, perform exposure assessments and use RPE in accordance with the Respiratory Protection section of this manual.
 - If there is a potential for an atmosphere above 5 ppm of H₂S (>5ppm H₂S) or an oxygen level below 19.5 percent in the Worker's breathing zone during the job:
 - Workers must use supplied air (SCBA or SABA) as respiratory protection.
 - A Safety Watch out of range of a toxic atmosphere but within sight of the Worker(s) must be used.
 - The Safety Watch must don SCBA or SABA but does not need to put on mask unless performing a rescue.

- refer to Confined Space section for initial Atmospheric Monitoring and ongoing testing requirements in Confined Spaces section of this manual
- A functional test is a brief exposure of the monitor to a concentration of gas(s) more than the lowest alarm set point for each sensor. This test verifies sensor and alarm operation.
- Follow manufacturer's specifications regarding operation, servicing, bump testing and calibration.
- If an instrument fails a bump test or a calibration check, the Workers shall perform a full calibration on it before using it. If the instrument fails the full calibration, the Worker shall remove it from service.

Functional bump testing shall:

- be performed in accordance with the manufacturer's specifications before each day's use
- for the mainline systems, use pentane or pentane equivalent gases; when pentane equivalent methane is used for calibration, then methane can be used for bump testing
- for the vector system, use pentane or pentane equivalent gases for calibration, and methane for bump testing
- calibrate to the manufacturer's specifications

Contractors shall maintain bump test and calibration logs at the Site and make the logs available at the request of the Enbridge Representative.

Workers who calibrate Gas Detectors shall:

- calibrate to the frequency indicated in the manufacturer's specifications
- bump test portable gas monitors and verify calibration before every Confined Space Entry
- attach a gas detector inspection tag to each gas monitor, including calibration date and initials of the Worker who calibrated the monitors; no tag is required if an auto-calibration station is used for personal multi-gas monitors; however, the Worker shall follow Enbridge calibration requirements and the manufacturer's specifications for calibration
- tag the calibration record for multi-gas monitors and grab sampling equipment when shared with a group of Workers
- record calibration results of manually calibrated portable gas monitors in the Monitor Inspection and Calibration Log and retain as per the record retention requirements. It is not required to maintain a Monitor Inspection and Calibration Log for portable gas monitors capable of self-monitoring calibration cycles indicating when calibration is required
- All calibration and maintenance activities, including the Monitor Inspection and Calibration Log, shall be documented and retained according to the record retention requirements.

Personal monitors shall not be used when:

- they are past calibration date
- they have not been bump-tested
- there is a faulty sensor

Considerations for cold weather operation:

- Most manufacturers of gas detectors place the design lower limit at -10 to -20 °C; be sure to check the operating manual
- LCD screens will dim at temperatures from -15°C to -25°C. Keeping the monitor inside your coat and attaching a pump will allow you to still read the screen
- The chemical reactions that occur in the gas detector begin to slow down at temperatures below -20°C longer monitoring is required to get a good reading
- Use of a hand warmer in the gas detector carrying case will help speed the reactions slightly, they will keep the LCD screen reading longer and they will help speed up the chemical reactions
- At temperatures -35 to -40°C, it is recommended to take a sample to the gas detector in a warm well-ventilated building

4.21.4.7. **Personal/Portable Gas Monitors**

(See section 5.0 Personal / Portable Gas Monitors in 5-8010 Hot Work Permits Procedure)

- The scope of monitoring and testing relates to Employees working in the following areas of operation and/or under the following conditions, but not limited to:
 - Confined Space Entry
 - Hydrogen Sulfide
 - Leak Repairs
 - Leak Surveys
 - Oxygen Deficient Atmospheres, or
 - Hot work
- The conditions listed above are not all inclusive. The Supervisor will determine when other conditions not listed above require the use of portable gas detection equipment.
- Only trained Personnel may perform calibration checks on personal/portable gas monitors.
- Prior to use the condition and working order of the device must be checked according to the manufacturer's instructions, but at a minimum must include:
 - Charge /battery check.
 - Verify sensors for the type of gases required to monitor.
 - Check for physical damage.
 - Run self-diagnostics (if available).
 - Check operation – Bump test is required prior to each use.
 - If a condition renders the device inoperable or unreliable and it cannot be corrected during the bump test, cease use, and have the device repaired.
- Monthly (one time each month), the bump test is recorded in the Enterprise Asset Management (EAM) Solution database or documented manually and stored on site.

- Annual calibration with manufacture recommended gas is required and is recorded in the EAM Solution database.
- If a condition renders the device inoperable or unreliable and it cannot be corrected during calibration, cease use, and have the device repaired.
- The Company's purchasing practices as indicated in the Company purchasing procedures are to be followed when replacing or buying new equipment.

NOTE: *The schedule set forth in the manufacturer's instructions for operational checks (i.e., bump tests) and calibration tests of gas detection instruments are minimum requirements.*

Caution

Gas monitoring or testing does not relieve the responsibility of using extreme caution and safety while working.

4.21.4.8. Personal/Portable Gas Monitors Section (Western Canada)

- Every Worker that enters a hazardous location must wear a four-head personal gas monitor as part of their PPE.
- Personal gas monitors are not required on green field project sites.
- All Personnel using a personal gas monitor must be trained on care and use of the monitor, bump testing methods and requirements and calibration intervals.
- Personal gas monitor area administrators must be trained on the system set-up (hardware, software, and procedures).
- Personal gas monitors must be bump tested and fully pass the bump test before use. The monitor must not be used if any of the four head sensors fails the bump test.
- Personal gas monitors must be calibrated according to the frequency specified by the manufacturer.
- Pentane gas must be used for bump testing and calibration of personal gas monitors.
- Contractors may use other compliant personal gas monitors while working in hazardous locations.
- Trained Workers must accompany visitors entering operating areas and must have a ratio of 1 personal gas monitor per 3 visitors while touring an operational area unless otherwise specified by a site-specific requirement. Visits include audits, safety tours, and regulatory inspections.
- If, while wearing a personal gas monitor, the monitor alarms (vibrates, blinking red light and audible beeping tone) it is an indication that the monitor has detected an environment that exceeds pre-set standards. The Worker(s) must respond by leaving the hazardous location immediately.
- Monitors record important exposure data that must be traceable back to the user. If individuals are assigned a specific personal gas monitor, this must be recorded. Employees and Contractors that do not assign a personal gas monitor to individuals must have a sign out record book. The record must be kept at the docking or bump stations. The record will contain the name of the Worker using the monitor, the unit or serial number, the date and time signed

out, and the date and time signed back in. The local area will keep the log sheets for 60 days and then file them in file net.

4.21.4.9. Personal/Portable Gas Monitors Section (Eastern Canada)

(See section 5.0 Personal, Portable Gas Monitors in Hot Work Permits Procedure.)



Site/Building Alarm Response

- If while wearing a personal gas monitor, the monitor alarms (vibrates, blinking red light and audible beeping tone) it is an indication that the monitor has detected a gas in the air around the monitor at a level equal to or above the set lower alarm level for that gas.
- The required responses are as follows:
 1. Leave the area immediately.
 2. Check if the personal gas monitor battery is low, a regular intermittent alarm may indicate that the battery level is low and needs a recharge.
 3. Determine if the alarm is valid.
 4. Ribbon off and tag the area to warn others of the hazard.
 5. Using the right PPE, assess the area for potential causes for the alarm (e.g., exhaust from mobile equipment/machines, leaking process equipment, etc.).
 6. If you cannot control the source of the alarm, report it to the Supervisor.
 7. Personal gas monitors are not to be used for gas leak detection please use the appropriate gas monitoring equipment to search out leaks.

Training

- Gas test training shall cover the theoretical knowledge and a practical skills demonstration. At a minimum it will cover:
 - Explosive range and flash point
 - Threshold limit values and occupational exposure limits of substances
 - Knowledge of gas testing instruments
 - Oxygen requirements
- Gas test training is required for explosively, oxygen and hazardous chemical tests for safe work permits covering hot and cold work. This includes:
 - Practical demonstration in proper use of all gas testing equipment; and
 - Written knowledge/understanding competency test.
- Confined space entry gas testing includes the above. It is combined with confined space entry training and includes:
 - Review of legal requirements for confined space entry
 - Review of testing considerations for confined spaces
 - Written knowledge/understanding competency test

4.21.5. Documentation

-  UST: Hot Work Permits Procedure
-  Eastern Canada: Hot Work Permits Procedure
- DS-EA 1.4 – Hazardous Area Classification

4.21.6. References

- 29 CFR 1910.307 Hazardous (Classified) Locations
- 29 CFR 1926.407 Hazardous (Classified) Locations
- National Fire Protection Association, NFPA 70E, Standard for Electrical Safety
- Requirements for Employee Workplaces, 2009 Edition, Article 235 “Hazardous (Classified) Locations”
- API 505, Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified at Class I, Zone 0, Zone 1 and Zone 2
- Alberta Occupational Health and Safety Regulations and Codes
- British Columbia Occupational Health and Safety Regulations
- Canada Occupational Health and Safety Regulations
- Canadian Energy Regulator Onshore Pipeline Regulations

4.22. Hot Work

4.22.1. Purpose

This section establishes the minimum requirements for safely carrying out work involving welding, cutting, grinding, or the use of non-intrinsically safe electric tools and equipment in a hazardous/classified location.

These requirements are necessary to assure the H&S of Personnel and the preservation of Company facilities. There is an exception for permanently designated welding areas as assigned in an approved procedure or inside the maintenance shop. Routine shop and fabrication work in non-classified areas shall not require a Hot Work Permit.

 This section supports Hot Work Permits Procedure for Hot Work in UST.

 This section supports Hot Work Permits Procedure for Hot Work in Eastern Canada.

4.22.2. Scope

This section is applicable to all Company Personnel, Inspectors, Contractors, Subcontractors, and Visitors who may perform or be involved with welding activities and/or other hot work tasks.

- GTM distinguishes between two categories of “Hot Work,” both of which are addressed below:
 - **Category #1:** Welding, cutting, grinding, open flame (i.e., an ignition source will be created)

- **Category #2:** Use of non-intrinsically safe tools, cameras or other electronic devices or opening electrical panels in a classified hazardous area (i.e., a potential ignition source may be created)
- The “Hot Work” designation only applies when:
 - Category #1 or #2 is conducted in a classified / designated hazardous area
 - The hazardous area includes any area classified as Class 1 Division 2 or higher, or Zone 2 or higher.
 - If an area is not normally classified but may develop a flammable atmosphere due to the nature of the operations in the area, it would be treated the same as a classified hazardous area.
 - Category #1 in an area with combustible materials within 11 m (35 ft.).
 - Routine shop and fabrication work in non-classified areas fall outside the scope of “Hot Work” and hot work permitting requirements.



NOTE: Vehicle entry into a hazardous/classified location are dealt with separately in this Manual.

4.22.3. Responsibilities

People Leader shall:

- Ensure proper planning, coordination, permitting, and supervision of hot work activities conducted in operating areas under their control.
- Be prepared to address, evaluate, and sign off as appropriate hot work plans and procedures that present a heightened risk profile (e.g., >0 LEL, isolation challenges, inert atmospheres, etc.)


PIC and/or Safe Work Permit Issuer shall:




- For Hot Work, Category #1, will notify Management and other operating authorities or Personnel as appropriate of the planned hot work activities to determine if there are any unforeseen hazards from other operations underway or if other operations will heighten the hot work hazards.
 - Part of this consultation and planning process should include consideration on whether the work can be done in a different way that is safer (e.g., cutting with a saw versus a torch).
 - Will notify all affected Personnel that Hot Work is being performed in the area.
- Will direct the Safe Work Permit process, including:
 -  Ensuring the completion of a JHA for Hot Work, Category #1 activities.
 -  Ensuring completion and/or review of the JHA, JHA, or procedure that addresses Hot Work hazards and controls as per the Safe Work Permit, section 5; and confirming the applicable FLHA will be conducted.
 - Identifying and confirming the Worker serving as Fire Watch
- For Hot Work, Category #1, walks down the work area with work performer(s) and Fire Watch to:
 - Inspect any preparation of the work area to remove or otherwise manage combustibles.

- Provide an opportunity to notice or have additional work area or task-based hazards noted by the group.
- Provide instructions on further preparation required before introducing an ignition source.
- Confirm work performer(s) / Permit Recipients have a clear understanding Permit conditions (including especially controls or mitigation, atmospheric monitoring requirements and terminating work if conditions change, use of specialized PPE, etc.)
- Ensure firefighting equipment is available and properly located in the work area.
- Record pre-work atmosphere testing results.
- Signs off on the work permit.
 - In the event there are ongoing concerns about hazards or LEL readings are >0 (whether the job was planned as such or if measures to reduce LEL to 0 were not successful), the Facility or Area Manager needs to be included in the planning and sign off process.
- Checks in on the work as appropriate to ensure Permit requirements and conditions are being met and the work is proceeding safely.
- Upon completion of the work, ensure Fire Watch continues for an appropriate length of time based on the hazards and nature of the work, any hot metal is clearly identified, and other Workers prevented from accidentally touching (e.g., barricade), and that work area is left in a safe condition.



4.22.4. Requirements

4.22.4.1. Safe/Hot Work Permit and JHA

- Hot Work can only be performed after a Permit is issued.
 - This applies to both categories of “Hot Work”
 - Category #1: Welding, cutting, grinding, open flame (i.e., an ignition source will be created)
 - Category #2: Use of non-intrinsically safe tools, cameras or other electronic devices or opening electrical panels in a classified hazardous area (i.e., a potential ignition source may be created).
-  **NOTE:** *UST and US Projects do not require a Hot Work Permit to be issued for the use of cameras or personal communication devices within classified hazardous areas. This is only allowed if there is a genuine business need and the individual carrying these devices must be wearing a Personal Gas Monitor.*
- The “Scope” section above provides details on when Category #1 or #2 activities need to be permitted as “Hot Work”:
 - Any time the work or tools that introduce an ignition hazard are within a designated / classified hazardous area, permitting applies.
 - For Category #1, permitting also applies if the work is being done in an area with combustible materials within 11 m (35 ft.) (even if not technically or normally a classified hazardous area).
 - Additional Safe Work Permit instructions as they apply to Hot Work are covered in Procedures for JHA, Safe Work Permit (SWP), and FLHAs

-  The applicable permit or a copy of the permit must be posted in a conspicuous location in the work area where any Hot Work, Category #1 work is taking place.
-  The Permit Issuer will ensure task hazards and area hazards are addressed through the Safe Work Permit process including:
-  Section 5 of the Safe Work Permit that ensures completion and/or review of the JHA or procedure that addresses the Hot Work hazards and controls, and
- Completion of an FLHA.

4.22.4.2. Managing Flame Detectors

- Electric powered tools or other flash or open flame events can activate flame detectors and, consequently, activate the station or local ESD system. Managing Hot Work may require taking flame detectors out of service.
- If flame detection equipment is taken out of service for the duration of permitted Hot Work, a system must be in place to remind and ensure that the flame detector is returned to service as soon as possible.
-  For UST, follow the Stationary Gas & Fire Detection Systems Procedure.
-  For Western Canada, the following may be used to return flame detectors to service:
 - Safe Work Permit Form allows any safety system bypass to be noted in Section 10 of the Safe Work Permit Form.
- The FLHA offers a space to write in a requirement to reactivate safety systems in the Job Completion Checklist

4.22.4.3. Welding or Cutting

4.22.4.4. PPE

- Anyone welding, cutting, or grinding (and their helper) must wear the appropriate eye, face, and hand protection as well as the appropriate work clothing.
- The Fire Watch is required to wear the appropriate eye protection.
- If the hot work is being done from work platforms, scaffolds, etc., the Workers must be protected against falling by using railings, a fall protection, or work restraint system.

4.22.4.5. Work Area

- Cutting or welding is permitted only in areas that are or have been made safe for the hot work job.
- Follow the applicable *Line Breaking and Equipment Opening* section when:
 - Blowing down, venting and/or purging, into the immediate work area, vessels, tanks, equipment, components, piping systems or pipelines, which contain or potentially contain, flammable and/or sour gas, vapor and/or fluid.
 - Breaking and opening vessels, tanks, equipment, components, piping systems or pipelines that contain or have the potential to contain flammable and/or sour gas, vapors and/or fluid.

- Hot work shall not be permitted in the presence of flammable or explosive atmospheres that may develop inside unclean or improperly prepared vessels, containers, tanks, or equipment which have previously contained flammable or explosive materials.
- If the work task involves welding or cutting on an elevated work platform of 2.4 m (8 ft.) or higher above the floor, a flame-retarding tarp may be required to catch or deflect sparks.
- Degreasing and other cleaning activity involving hydrocarbons shall not occur in an area where welding, cutting or other hot work activities are in process.

4.22.4.6. Flammable and Combustible Materials

- Combustible materials near the Hot Work must be removed or covered.
- Inspect the general surrounding area within 11 m (36 ft.) of the hot work location to determine the presence of flammable and combustible materials and designated hazardous areas.
 - Remove all combustible materials and flammable liquids if possible, and if not, protect them with flameproof tarps or shield them with metal or flame retarding curtains.
 - Determine if wall and floor openings shall be covered or protected within 11 m (36 ft.) of the work area.
- Oxygen and fuel-gas cylinders must be kept far enough away from welding and cutting operations so that sparks, hot slag, or flame will not reach them, or if that is not possible, fire-resistant shields shall be used.
- If the work task involves work on walls/ceilings, always inspect the other side of the wall or ceiling for combustibles and flammable materials.
 - This may require additional relocation, isolation, and/or protection.

4.22.4.7. LEL Monitoring

- LEL monitoring is required before and always during hot work operations in a designated / classified hazardous area.
- LEL monitoring shall be performed, not only inside opened equipment, but also thoroughly monitor the area looking over, under, in between and around equipment.
- Also monitor for LEL in low lying or down gradient areas near the work area.
- If monitoring results in a detectable level of LEL, then special precautions and considerations shall be identified and discussed such as additional cleaning and/or purging of equipment.

4.22.4.8. LEL Testing

- LEL monitors need to be calibrated and operated in accordance with the manufacturer's requirements and receive a start-of-shift bump test to ensure any LEL readings prior to and during hot work are accurate. Always check oxygen levels when doing an LEL check as an oxygen deficient atmosphere may lead to an inaccurate LEL reading with certain monitors.
- Continuous LEL testing requirements for Hot Work, Category #2 may be managed by using a Personal Gas Monitor if the work does not involve opening the system or a line break (i.e., your personal alarm will go off in the event of an unanticipated gas leak or explosive vapors accumulate).

- A second Gas Monitor should be used for Hot Work, Category #1, or Category #2 where there are gas and vapor hazards to allow for spot testing, troubleshooting the source of LELs, and recording periodic readings.
- Stationary building gas detection devices (i.e., permanently installed monitors) are not acceptable for specific area detection.

4.22.4.9. Fire Watch

- A Fire Watch must be posted for all welding and cutting operations (Category #1) when it takes place:
 - In a designated hazardous/classified location; or
 - Where there are combustible and flammable materials that cannot be removed, protected, or shielded within 11 m (36 ft.).
- The Safe Work Permit Issuer may also post a Fire Watch during other hot work activities or require an additional Fire Watch if they think it is necessary for the protection of Personnel, equipment and the surrounding area (e.g., more volatile combustibles, combustibles out of sight of a single Fire Watch, etc.).
- The Fire Watch must be trained and competent to carry out their duties.
- If the hot work will produce sparks or an open flame in a designated hazardous/classified location, two fire extinguishers should be available for the job.
- The duties of the Fire Watch include:
 - Watch for fire in all exposed areas.
 - Never leave the site of the hot work without a replacement.
 - Have fire-extinguishing equipment readily available.
 - Know how to use fire-extinguishing equipment.
 - Know how to summon emergency help.
 - Only try to extinguish a fire when it is obviously within the capacity of the equipment available or otherwise sound the alarm immediately.
 - Do not perform any other tasks while on fire watch duty.
 - Immediately stop the work when conditions change.
 - A Fire Watch is required to be present during work breaks and at least 30 minutes after the completion of welding or cutting operation.
 - The Safe Work Permit should only be closed after it is determined any fire hazard has passed and the Fire Watch is free to leave.

4.22.5. Task Specific Requirements

4.22.5.1. Electrical Work/Electronic Equipment and Tools

A Permit for Hot Work is required when work is taking place in a designated hazardous/classified location and:

- Explosion proof or sealed Class 1, Division 1 or Division 2 electrical enclosures or conduit is opened.
- Work on electrical equipment could possibly produce a spark.
- Non-intrinsically safe tools and extension cords are being used (e.g., general service tools like drills, extension cords, pigtails, etc.)
- Non-intrinsically safe electronic devices are being used.

Electrical work is typically Category #2 hot work. Some requirements expected for Category #1 hot work do not apply (i.e., Fire Watch or removal of combustibles) while others remain in place (i.e., continuous LEL monitoring with a Personal Gas Monitor).

4.22.5.2. Portable Containers

- A Permit is required when hot work is performed on used drums, barrels, or other containers that have contained flammable or combustible materials.
- These types of containers must be made safe to be certain there are no flammable or toxic materials present which might produce flammable or toxic vapors when heated by welding or cutting or other Hot Work. Before any heat is applied, used drums or containers must have been:
 - Vented and thoroughly cleaned or filled with water, or
 - Purged with inert gas, or
 - Made safe by other approved methods.
- Containers must also be vented to permit the escape of air or gases before and during preheating, cutting, or welding.
- Any pipelines or connections to the containers must be disconnected or blinded (blanked).
- Hot work cannot start until an LEL reading of zero is confirmed and LEL must be monitored during this type of hot work.

4.22.5.3. Vessels (Scrubbers, Tanks, Heaters, etc.)

- Vessels, tanks, or other stationary containers must be made safe to be certain there are no flammable or toxic materials present which might produce flammable or toxic vapors when heated by welding or cutting or other hot work. Before any heat is applied, they must have been:
 - Vented and thoroughly cleaned or filled with water, or
 - Purged with inert gas, or
 - Made safe by other approved methods
- When preparations involve the blowing down, venting and/or purging, into the immediate work area of a flammable gas or vapor the Line Breaking and Equipment Opening safe work practice will be followed.
- Isolate the vessel by disconnecting lines, blinding, or double-block-and-bleed.
- Purge, clean or ventilate to clear the vessel of all toxic and flammable vapors and gases.
- Hot work cannot start until an LEL reading of zero is confirmed (inside and outside the vessel).

- LEL must be continuously monitored during hot work (also both inside and outside the vessel).

4.22.5.4. Hot Work in Confined Spaces

- In addition to the usual confined space requirements, the following must be applied when the task inside the confined space is Hot Work:
 - Proper cleaning and ventilation to prevent the buildup of flammable or toxic gases once heat is applied.
 - Mechanical ventilation is also required to prevent a buildup of toxic vapors or gases from the welding operation itself.
 - The gas cylinders or welding machines must be left on the outside of the space.
 - The gas supply of a torch must be positively disconnected at some point outside the confined area whenever the torch is not to be used for a substantial period such as during the lunch hour or overnight (to prevent accidental gas leaks inside the space).
 - Where practicable, the torch and hose shall also be removed from the confined space.
- For Welders in particular, if the confined space is entered via a manhole or other small opening, a quick exit / non-entry rescue method should be applied if possible. This requires:
 - The Welder to wear a full body harness
 - Lifelines and a mechanical device to pull the lifelines with the welder attached in such a way they do not get jammed in a small exit opening.
 - An attendant to monitor lifelines (and other gas or electric lines running into the space) to prevent entanglement and ready to extract the Welder.
- After welding operations are complete, the Welder shall mark the hot metal or provide some other means of warning other Workers.
- Hot Work cannot start until an LEL reading of zero is confirmed (inside and outside the vessel).
- LEL must be continuously monitored during Hot Work (also both inside and outside the vessel).

4.22.5.5. Hot Tapping

- If welding or cutting is to be conducted on piping or vessels still carrying or containing flammable substances, this falls into the category of “Hot Tapping.”
- Hot Tapping requires compliance with engineering procedures specific to piping or equipment that are supported by a specific safety procedure.

4.22.6. Documentation

- Hot Work Permit Form
- Purge Report Form
- Pre-Job Safety Meeting Form
- Stationary Gas & Fire Detection Systems Procedure
- Purging Procedure
- Hazardous Energy Control (Lockout/Tagout) Procedure

- Hot Work Permits Procedure
- Hot Taps Using Reinforcement Fittings Procedure

4.22.7. References

- OSHA 29 CFR 1910.252I(2)-I (12) *Welding, Cutting, and Brazing*
- API 500, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified at Class I, Division 1 and Division 2*
- API 505, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified at Class I, Zone 0, Zone 1 and Zone 2*

4.23. Housekeeping

4.23.1. Purpose

This section identifies good housekeeping practices and shall be maintained at all GTM Locations including administrative and region/field offices, staging areas, on or off-site storage areas and construction Right-of-Way (ROWs).

4.23.2. Scope

Good housekeeping as it applies to all Company offices, facilities, assets, and properties.

4.23.3. Responsibilities

People Leader shall:

- Ensure that all Company locations are maintained in a neat and orderly manner and that housekeeping is performed to prevent conditions that will result in injury to Workers or the public.
- Assign housekeeping duties and monitor that they are being executed.

Workers shall:

- Perform housekeeping duties
- Report any condition that may result in injury
- Participate in inspections to identify any housekeeping hazards.

HS Support shall:

- Schedule inspections to check that all worksites are being maintained to prevent conditions that could contribute to injury are not permitted to develop.

4.23.4. Requirements

- Garbage shall not be allowed to accumulate on a construction ROW.
- Ensure waste receptacles are emptied regularly and all garbage is collected and removed as required.
- Waste receptacles in operational areas must have lids.
- Food shall not be consumed or stored in operational areas.

- Waste shall be properly segregated, and flammable oil-soaked materials must be stored in a designated receptacle.
- Wildlife risks need to be assessed when determining waste receptacle and removal criteria.

4.23.4.1. General Housekeeping

- Keep worksites clean and orderly.
- Housekeeping is a direct reflection of the overall operation and commitment to a safe operation.
- Keep restrooms and eating areas clean and sanitized.
- Realize that good housekeeping is an on-going process.
- The use of industrial style dumpsters is recommended in areas where large volumes of waste can be expected.

4.23.4.2. Walkways, Pathways and Exits

Keep interior and exterior walkways, pathways and exits free of tripping and slipping hazards by utilizing the following:

- Clean snow off walkways.
- Use sand or rock salt on icy walkways.
- Immediately clean-up oil leaks and spills from floors.
- Consider non-skid paint in areas where the floors have the potential to stay wet or oily
- Place non-skid mats on painted floors inside entrance doors.
- Keep ramps, exits, stairs, walkways, and pathways clear of tripping hazards such as hoses, ropes, cords, portable tools, spare parts, trash, and debris.
- Take the necessary precautions to prevent tripping hazards when hoses, ropes or cords are strung along or across walkways and pathways.

4.23.4.3. Emergency Equipment

Never place any materials that block access to emergency equipment such as:

- Fire extinguishers
- Eye wash stations and showers
- Emergency Shut Down (ESD) stations and valves
- Safety warning signs
- Electrical switches and disconnects (at least 3 ft. or 0.9 m of clearance)
- Life rings, life preservers, life rafts and escape capsules.

4.23.5. Documentation

- N/A

4.23.6. References

- Environmental Procedure #11A Offshore Waste Management

4.24. Hydrostatic and Pneumatic Testing

4.24.1. Purpose

This section provides the minimum safety requirements for hydrostatic and pneumatic testing activities.

4.24.2. Scope

This section applies to all Employees and Contractors at all Company facilities and ROW locations.

4.24.3. Responsibilities

People Leader shall:

- Ensure Employees, contractors and subcontractors under their control are aware of and comply with this section.

Workers shall:

- Understand and implement expectations of this section.
- Report any abnormal condition during the testing phase (including pressurizing and depressurizing).

HS Support shall:

- Provide advice, support, and assistance in the implementation of this section.

4.24.4. Requirements

4.24.4.1. General

For worksite(s) where a section of piping is being tested, an Enbridge Representative shall be on-site.

At the testing location there shall be:

- A safe means of access and egress to the system being tested
- Adequate lighting when night work is necessary and a fire extinguisher at both ends of a test section
- Adequate heating and lighting facilities as required for test Workers located a minimum of 15 m (50 ft.) away from any testing facilities

Other requirements include:

- Ensuring that only the Workers directly involved in the testing are in the immediate vicinity of test heads, pressure pumps or exposed piping during testing
- Preventing them from moving or violently separating, ensure temporary piping or hoses used during pressuring and depressurizing activities are anchored or secured by such method(s) as whip check connections, steel braid line wrap, or staking to the ground

- Ensuring the use of appropriate hoses, piping, fittings, valves, etc., and that such equipment has an adequate pressure rating for the service; inspect the equipment before use, to ensure it is in good condition
- Ensuring persons not directly involved in the testing shall be kept back a minimum of 30 m (100 ft.) from the pipeline, by the use of signs, fencing, and verbal warnings
- Verifying pressure on both sides of check valves when hydrotesting and depressurizing
- Providing a safe means to release pressure from both ends of the piping section; pressure shall be released prior to loosening or removal of fittings

4.24.4.2. Hydrostatic Testing

- Two zones shall be established around any hydrotest: a 15 m (50 ft.) Exclusion Zone and a 30 m (100 ft.) Zone. These requirements shall be followed during all hydro-tests. Unique circumstances may require additional measures to ensure the safety of Workers and the public.
- For testing being conducted only on the ROW, expand the 15 m (50 ft.) Exclusion Zone requirements to the 30 m (100 ft.) Zone dimensions.
- If leaks are observed (through gauge drop or visual inspection) then the pressure must be reduced to zero pounds per square inch (PSI) prior to entering the Exclusion Zone. No adjustments of any kind are to be performed while the system is pressurized.
- Fuel containers, propane tanks, and other fuel storage shall not be permitted within the 15 m (50 ft.) Exclusion Zone. Testing trailers shall be parked with the entrance facing away from the test area. The testing trailer door(s) shall remain closed during testing operations. If it is necessary to test indoors, the 15 m (50 ft.) Exclusion Zone shall encompass the entire room in which the test is completed.

4.24.4.3. 15 m (50 ft.) Exclusion Zone

- On Company property, signs shall be placed by the Contractor on the day of the test. These signs, which are to remain in place until after the piping system has been depressurized, shall read as follows:

Safety Warning

**DANGER – RESTRICTED ENTRY – HIGH PRESSURE TESTING AREA
AUTHORIZED PERSONNEL ONLY”**

- All unnecessary equipment and Workers shall stay out of this zone when the pipe is pressurized above normal operating pressures.
- Ensure the 15 m (50 ft.) Exclusion Zone applies over the entire length of the pipeline, spools or fittings being tested.

Note: *Within populated areas, traffic control is required and shall be identified in the Hazard Assessment and/or Permit.*

- Workers shall stay in their vehicles if they are within this zone monitoring the pipeline during the hydro- test, with the exception of checking for leaks or opening or closing valves.
- Hydro test signs shall be placed on public access points and located at a point 15 m (50 ft.) from the pipeline.

4.24.4.4. 30 m (100 ft.) Zone

- Facilities for test Personnel and equipment shall be outside the 30 m (100 ft.) Zone.
- This zone will not be marked; the public and other Workers shall stay at least 30 m (100 ft.) away from the pipe.
- This zone applies over the entire length of the pipeline section being tested.
- The public shall be kept out, except when crossing the pipeline in vehicles where identified in the Hazard Assessment and/or Permit.
- Landowners along the right-of-way shall be notified in advance of the hydro-test and those living within the 30 m (100 ft.) zone shall be offered relocation assistance.
- In the event additional piping or facilities (not associated with the system being hydrotested) are present in the test area or within 30 m (100 ft.), of the pressurized components, the area shall be flagged and remain off limits to all Workers during the test.
- When testing trailers or vehicles are parked implement extra precautions as necessary (e.g., stage behind large equipment).
- When testing in buildings, all points of entry are to be manned or blocked. All Personnel working in the building must be appropriately notified.

4.24.4.5. Pneumatic Testing

- Must adhere to Engineering's specifications for pneumatic testing.
- Distinct warning signs shall be posted during air pressure testing, such as "DANGER, AIR PRESSURE TESTING IN PROGRESS."

4.24.5. Documentation

- N/A

4.24.6. References

- N/A

4.25. Ignition Sources

4.25.1. Purpose

This section identifies information and requirements for recognizing and controlling Ignition sources that have the potential to cause fires and/or explosions in areas where flammable vapors/gases are potentially present in the air. Ignition sources are typically created during Hot Work activities but there are other sources of ignition that need to be managed.

4.25.2. Scope

This section applies to all Hazardous Locations. For the purposes of this section, this is any location where an explosive gas atmosphere is present, or may be present, in the air in quantities that require special precautions to control ignition sources. More specifically, this includes:

- Any building or area that is classified as a Class 1, Division 2 or Class 1, Zone 2 or higher hazardous location based in the Canadian Electric Code, Section 18 or OSHA 29 CFR

1910.307 Hazardous (classified) locations (i.e., Class 1, Division 2 or Class 1, Zone 2 or higher).

Ignition Sources include:


- sparks (e.g., from electrical tools and equipment; welding, cutting, and grinding; static electricity)
- use of lighters, matches, cigarettes
- open flames (e.g., portable torches and heating units)
- surfaces with enough heat to vaporize a combustible material (e.g., catalytic converter of an automobile in dry grass)
- combustion engines or sources (e.g., vehicles/equipment, generators, compressors, mowers)
- non-intrinsically safe electronic devices (e.g., cell phone, camera, etc.)

4.25.3. Responsibilities


People Leader shall:

- Ensure site-specific procedures are in place to identify ignitions sources prior to work in restricted or hazardous areas.
- Ensure that Workers are adequately trained to identify ignition sources and document the control of those sources on a Hot Work Permit Form.

Workers shall:


- Utilize Hot Work Permits to identify and document the controls used to mitigate the hazards from ignition sources
- Perform and document checks for Positive Air Shut Off (PASO) devices on diesel powered equipment entering “hazardous locations.”
-  Perform atmospheric testing prior to issuing permit and continuous atmospheric monitoring.

4.25.4. Requirements


- Prior to entering a Restricted or Hazardous Area, Vehicles and equipment shall be shut off and not permitted to enter until Atmospheric Monitoring confirms the absence of hazardous vapors.
-  Diesel engines shall be equipped with a Positive Air Shut-off.
- When in Hazardous and Restricted Areas:
 - test for oxygen levels and flammable atmospheres prior to introducing ignition sources and continuously monitor these areas while ignition sources are present
 - if a flammable atmosphere is present, use only explosion-proof electrical installations and explosion-proof electrical equipment
 - use only intrinsically safe electronic devices unless the air is initially tested and continuously monitored for flammable vapors and the equipment is listed on the safe work permit
 - shutdown vehicles and equipment when not in use or when left unattended (~~do not~~ restart the vehicle or equipment until Atmospheric Monitoring confirms the absence of a flammable atmosphere)

- use non-sparking tools that are kept clean and free from ferrous or other contaminants which may hamper non-sparking properties
- control all potential ignition sources
- ground and bond as required in Bonding and Grounding section

4.25.4.1. Positive Air Shut Offs (PASO)

- PASO is a device that cuts off the air supply to a diesel-powered engine, effectively shutting off an engine that has begun run or race out of control on hydrocarbon vapors (e.g., natural gas, propane) entering the engine's air intake.
-  PASO for diesel engines is required on all Canadian facilities that have restricted or hazardous Areas. [CER Safety Advisory SA 2015-02]
- Diesel-powered vehicles / equipment being utilized in areas where flammable / explosive vapors may be present must have controls in place to prevent the vapors from entering the engine and causing a fire or explosion.

NOTE: A PASO system must be tested and working for all diesel-powered engines. The Operator will be requested to turn the engine off and toggle the PASO in the closed position. If the PASO is operational, the engine will not engage. If the engine engages, the PASO is not functional. The diesel-powered engine must not be permitted to enter the hazardous or restricted area.

-  Each Canadian facility will develop site-specific procedures to ensure that:
 - the hazard of fire and explosion from vapors entering diesel engines is identified and controlled using the hierarchy of controls
 - describes the methods used to confirm that PASO devices are installed on all diesel-powered engines, and that they function prior to entering any hazardous area
 - Workers are adequately trained to look for and check the functionality of the PASO
 - the PASO is inspected, tested, and maintained according to the manufacturer's instructions

4.25.4.2. Pyrophoric Iron Sulfide

- Pyrophoric iron sulfide is a black deposit that can build up in locations such as storage tanks, seal pots, filters, piping, and metal sumps. It develops when sulfur encounters iron. When the deposit dries, it can ignite spontaneously. Precautions include:
 - identify equipment where iron sulfide is suspected
 - tanks and vessels shall be purged of hydrocarbon vapors before opening
 - when iron sulfide is suspected to be present, provisions shall be made to keep the inner surfaces of opened equipment wet
 - disposal of accumulated iron sulfide shall be handled quickly and carefully to avoid creating a hazard
- Pyrophoric iron sulfide deposits may develop in tanks where sour crude oil or refined products have been stored. These deposits can ignite spontaneously when they dry out. Use water spray to soak iron sulfide at least once every 24 hours, or more frequently if considered necessary by Operations Management. Approved products that are designed and intended to decontaminate/eliminate pyrophoric iron sulfide may also be used.

- In cone roof tanks, iron sulfide deposits may develop above the normal level of oil in the tank, or in the sludge at the bottom of the tanks (through scale from the roof having flaked off). Iron sulfide in the sludge at the bottom of the tank is not a spontaneous ignition hazard in the tank, but it will ignite spontaneously if allowed to dry out in the sun.
- On tanks with pantograph seals, iron sulfide deposits may develop in the vapor space between the sealing ring and the shell of the tank. Spray water into the vapor space at least once every 24 hours, or as often as necessary to keep this space damp. Other types of floating roof tanks do not require wetting down unless there is reason to suspect pyrophoric iron sulfide may be present.

4.25.4.3. Portable Catalytic Heaters

Portable catalytic heaters shall:

- require continuous monitoring when used in an explosive or Hazardous Atmosphere
- be approved for use in an explosive or Hazardous Atmosphere; approval shall be from an applicable, recognized authority, such as the American Gas Association or the Canadian Gas Association.
- have adequate ventilation to prevent a build-up of exhaust fumes and prevent the fumes from being drawn through the heater and into the space being heated
- have carbon monoxide monitors when required
- have only explosion-proof electrical fittings attached
- have a regulator between the propane bottle and the heater to reduce the pressure of gas to the heater, to a level specified by the manufacturer
- have a thermostatic block valve installed on the propane line where it enters the heater; this serves as an automatic, positive shutoff on the line when the heater is not in use, preventing gas from escaping through the heater to the atmosphere
- not be used in electrical enclosures where there are open relays, as the vapors leave an insulating residue on open contacts that is difficult to remove
- be used only in accordance with manufacturer's instructions

No portable heating devices are permitted for use by Workers in Enbridge administrative offices in Edmonton, Calgary, Duluth, Superior and Edina. Please refer to Enbridge's Portable Heating Device Policy.

4.25.5. Documentation

- 1-5030, "Pigging and Pig Trap Operation Procedure"
- Handling of Pipeline Solids Procedure

4.25.6. References

- *Canada Occupational Health and Safety Regulations*
- *Canadian Electrical Code, Section 18*
- *BC OHS Regulation, Part 23 Oil & Gas, 23.8 Control of ignition sources*
- *Alberta Occupational Health and Safety Code, Part 10 Fire and Explosion Hazards, Section 166, 169*

- *Canadian Energy Regulator Onshore Pipelines Regulation*
- *Canadian Energy Regulator Safety Advisory SA 2015-02, Positive Air Shutoff Devices on Diesel Engines.*
- *OSHA 29 CFR 1910.307 Hazardous (classified) locations*

4.26. Isolating Line Breaks and Equipment Opening

4.26.1. Purpose

The purpose of this section is to provide minimum requirements that must be followed when performing planned work activities that involve a line break or equipment opening with the following characteristics:

- The piping or equipment contains or potentially contains flammable gases, vapors or liquids or high levels of a toxic gas such as H₂S
- The piping or equipment has been purged with an inert gas (e.g., nitrogen) to remove such gases or vapors, or
- Air is being introduced for the first time into piping or equipment that contains or contained flammable or toxic gases, vapors, or liquids


4.26.2. Scope

This section applies to isolating line breaks and equipment openings at all Company facilities, stations and locations that contains, or once contained, flammable or toxic gases, vapors, or liquids. This applies to construction, operations, maintenance, abandonment sites or emergency situations.


Examples of activities that apply to these requirements include:

- Blowing down, venting, and purging, with a planned release of gas/vapor into the immediate work area. For example:
 - A filter coalescer is blown down for a filter change
 - A meter run is shut-in and blown down
 - A pipeline is blown down into the immediate work area to be repaired
 - A pipeline continues to vent vapor from a blowdown due to condensate in the line
 - A pipeline is continuously purged with an air mover to prevent the accumulation of gas/vapor in the line
- Opening vessels, tanks, equipment, components, or piping systems for maintenance, service, or repair. For example:
 - Compressor valve cap is removed to replace a hot valve
 - Filter coalescer lid is opened to change out filters
 - Packing and plunger is replaced on an NGL pump
 - Valve replacement on a piping system
 - Tank manway cover is removed to perform a PRCS entry
- Opening pipelines for pipe and equipment repair or replacement. For example:

- Installing clamps to repair pipe leaks where the line is blown down
- Cutting, fitting, prepping, and welding pipe where the line is blown down
- The replacement of block valves
- Routine operational activities involving lines or equipment that are designed or engineered to be opened or disconnected as part of a regular maintenance or operating duties will have an equipment or task specific procedure that must be followed. As such they are exempt from the practices set out below. Examples may include:
 - Opening rail car or truck lids, domes, or doors
 - Connecting or disconnecting hoses used for loading or unloading and that are equipped with quick disconnects
 - Opening of tank thief hatches for the purposes of gauging tanks
 - Opening and closing pig barrel doors (see requirements under “Pigging” section)
 - Opening instrument supply gas/air lines from the manifold to the instrument or actuator
 - Catching samples from pressurized lines
 - Installing or removing an orifice plate using a senior orifice fitting
 - Draining filter coalescers

 Within UST and U.S. Projects, additional requirements within the following Procedures apply, and these detailed procedures should be consulted for any applicable work activities:

- Hazardous Energy Control (Lockout/Tagout) Procedure
- Gas Pipeline Shutdown Procedure
- Measurement and Regulation Station Startup or Shutdown Procedure

 Within Eastern Canada, additional requirements within the following Procedure applies, and this detailed procedure should be consulted for any applicable work activities:

- Hazardous Energy Control (Lockout/Tagout) Procedure

4.26.3. Responsibilities

People Leader shall:

- Ensure any JHA, procedure, or Region, or equipment specific procedure for line breaking or equipment opening provides, at minimum, the same level of safety as the practices outlines below.
- Ensure resources (time, expertise, equipment, equipment specification / P&IDs) are available to:
 - Properly plan and hazard assess any line breaking or equipment opening job.
 - Create and execute an isolation and LOTO plan that ensures Workers opening a system and/or later working on or around open systems are sufficiently protected.
 - Fulfill the PPE requirements for the planned work (e.g., SCBA/SABA, personal gas monitors and portable area monitors)

- Ensure all Workers that will be performing line break or equipment opening tasks on GTM sites are aware of the requirements set out below.
- Ensure required hazard assessment activities have been conducted prior to a line breaking or equipment opening job beginning and controls meet the minimum requirements set out below.
 - Identify all safety-critical equipment and controls relevant to the work being planned
 - This must include walking down the work area and, depending on regional requirements, may include creating or reviewing a JHA, Safe Work Permit, and/or Field Level Hazard Assessment.
 - Ensure appropriate authorizations are in place, if the work requires the overriding or disabling of safety-critical controls or equipment.
- Ensure planned isolation and LOTO that were required prior to line breaking or equipment opening have been executed as planned.
- Ensure work areas that may experience a hazardous atmosphere are free and clear of any other Personnel prior to any gas or vapor release.
- In the event scope or conditions change, ensure hazard assessment, or permit documents are rewritten or re-issued as required to meet the new scope and conditions prior to work beginning again.
- Ensuring ongoing atmosphere monitoring and recording as required when working around open pipe or equipment with a potential to release gases or vapors.
- Ensure clear communication to all Workers involved and any other Workers in the area under what conditions evacuation of the area must occur.

Workers shall:

- Must participate in hazard assessment activities prior to work (e.g., JHA creation/review, discuss Safe Work Permit, FLHA, etc., as set out below).
- Must apply all controls set out in the work plan / hazard assessment documentation, including PPE requirements (e.g., FR outer layer and SCBA/SABA if >5ppm H₂S in breathing zone)
- Obtain authorization and follow approved procedures before overriding or disabling safety-critical equipment or controls
- Must wear and use gas monitors as required below (and as per JHA/Safe Work Permit) and exit the work area when atmosphere readings warrant or alarms sound (as communicated by PIC and/or Safe Work Permit Issuer).




Safety Watch:

- This role is required for line breaking or equipment opening where there is a possibility of an atmosphere with more than 5 ppm of H₂S in the Workers' breathing zone.
- Must participate in pre-job hazard assessment or tailgate meeting.
- Must be out of range of possible hazardous atmosphere but in constant line of sight of Workers.
- Must have SCBA/SABA donned but mask may remain off.

4.26.4. Requirements

4.26.4.1. General

The following represents minimum practice requirements for line breaking and equipment opening. Where unique equipment configurations or other local factors require a Deviation from these practices or additional procedures or practices must be mandated to create safe working conditions, Area Management must ensure these procedures provide, at minimum, the same level of safety as the practices outlined below.

- Line breaking and equipment opening work must be subject to a hazard assessment that includes documented work steps, hazards, and required controls.
- The hazard assessment activity must include a walk down of the work area.
- This requirement may be fulfilled as follows:
 -  For Offshore and UST this requires completing a JHA
 - For regularly performed jobs, reviewing a standing JHA for the job is acceptable
 - A Safe Work Permit is also required
 -  For Eastern Canada, a Safe Work Permit and JHA is required
 -  For Western Canada, this requires completing a JHA or reviewing an existing JHA (or equivalent), procedure (that includes hazards and controls) and a Safe Work Permit
- If the scope or conditions of the work changes (after the hazard assessment and/or permitting), the job must be shut down and the hazard assessment and permit (as applicable) review and potentially rewritten/reissued.
- Workers must use the following if performing a line break or equipment opening or are working in the immediate vicinity of the line break:
 - Fire-resistant (FR) clothing as an outer layer, worn as directed by manufacturer (e.g., buttoned up, sleeves rolled down, etc.)
 - Respiratory protection during the initial line break or opening until isolation is proven and work area has proven safe atmosphere.
 - The level and type of respiratory protection is based on the potential composition, volume, and pressure of the gas or vapor that may potentially be released during the break or opening.
 - When opening systems where a known potential for exposure exists, all Workers in the immediate work area shall wear the appropriate RPE, in accordance with the completed Hazard Assessment until a safe atmosphere has been verified.
 - If the composition and/or concentration of the contaminant is unknown or there is a potential for a Hazardous Atmosphere, assume the atmosphere is hazardous, perform exposure assessments and use RPE in accordance with the Respiratory Protection section of this manual.
 - If there is a potential for an atmosphere above 5 ppm of H₂S (>5ppm H₂S) or an oxygen level below 19.5 percent in the Worker's breathing zone during the job:
 - Workers must use supplied air (SCBA or SABA) as respiratory protection.

- A Safety Watch out of range of a toxic atmosphere but within sight of the Worker(s) must be used.
- The Safety Watch must don SCBA or SABA but does not need to put on mask unless performing a rescue.
- The work must be conducted with continuous monitoring for flammable (LEL) and toxic atmospheres (especially H₂S) and oxygen deprived atmospheres.
- At minimum, personal gas monitors must be worn by all participants in the work.
 - In the event personal gas monitors are removed by Workers under supplied air to prevent damage to H₂S sensor heads, another means to continuously monitoring for flammable atmospheres (LEL) must be used.
- Portable gas monitors (e.g., unit with pump and hose to find leaks or portable area monitor) may be required based on the nature of the job.

If during verification activities an Isolation point has been incorrectly identified physically (Tagged or labeled), any work taking place shall be temporarily stopped until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation and HS Manual Section 8.0 Management of Change.

- Periodic recording of atmosphere readings is also required if work is performed under a Safe Work Permit.
- The work should be planned and conducted to minimize the volume of flammable or toxic gas, vapor, or liquid released and the period in which there is potential for any release.
- Once isolation is established (any further gas, vapor, or liquid release is fully contained) and the area atmosphere is proven safe, respiratory protection may be removed but continuous area atmosphere monitoring should continue (see above) with periodic recording as set out in the Safe Work Permit (if applicable).

NOTE: During the planning phase, if an isolation point has been identified as incorrectly physically tagged or labeled, work shall not proceed until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation and HS Manual Section 8.0 Management of Change.

4.26.4.2. Safety Critical Equipment and Controls

If isolating line breaks or equipment opening requires the bypassing of safety critical equipment and controls, authorization must first be obtained. Authorization must come from the appropriate leadership level and applicable functional areas, with approved procedures for the work being planned and the safety-critical equipment or controls being bypassed.

Examples of safety-critical equipment and controls may include, but are not limited to:

- isolation devices
- emergency shut down valves
- Lockout / Tagout devices
- trip systems
- relief valves
- fire and gas alarm systems
- certain level controls

- alarms and detection devices
- crane limit switches
- in-vehicle monitoring systems
- markings/devices that define safe limits of approach (EG: Powerline crossing goalposts/barriers, etc.)

It is recommended that if bypassing a safety device is identified during the hazard assessment process that the approved procedures are referenced.



Rule 7:
Bypassing safety controls

Figure 17: Rule 7 - Bypassing Safety Controls

Get authorization

I will obtain authorization before overriding or disabling safety-critical equipment or controls

4.26.4.3. Isolation

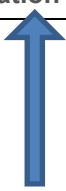
- Isolation, de-energizing, proving de-energized state, and applying Lockout / Tagout needs to be planned and documented at some stage in the work planning or hazard assessment process.

Note: During the planning phase, Isolation points have been incorrectly identified physically (tagged or labeled), work shall not proceed until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation and HS Manual Section 8.0 Management of Change.

- The potential hazards presented by gases, vapors, or liquids in lines and applicable controls need to be considered in this process (e.g., Is the fluid hot, toxic, flammable or flashes off flammable vapors, under pressure or more than one of these?).
- Isolation and LOTO must be completed using the appropriate Procedure, Process, and Form.
- When planning mechanical isolation (for both upstream and downstream of the equipment), consideration should be given to the “Levels of Isolation Methods” (shown in [Table 20](#)), to achieve a level of isolation and assurance of de-energized state that provides sufficient protection given the nature of the fluid being isolated (within the limits of the equipment configuration).

Table 20: Levels of Isolation Methods

Isolation Level	Mechanical Isolation	Energized State
Highest Level	Air Gap	Positive Isolation

Isolation Level	Mechanical Isolation	Energized State
	Double Block Bleed and Blind	
	Single Block Bleed and Blind	
	Double Block and Bleed	
	Single Block and Bleed	Proved Isolation
Lowest Level		

4.26.4.4. Levels of Isolation Methods

Blowing down, venting, or purging are effective controls as part of line breaking and equipment opening and must be considered prior to opening equipment. The risks they create, however, also require planning and additional controls which should be documented on the JHA, Procedure, Safe Work Permit, or other planning documents reviewed just before the job starts. For example:

- Nitrogen as an inert gas is ideal for removing flammable gases from pipes or equipment without creating a flammable atmosphere but can create an oxygen deprived atmosphere if not carefully managed.
- Venting of any gas should always be done with consideration to where the vented gas will linger or migrate to—facility vents and flare systems are preferable to venting near or into a work area if possible.
- Steam or air movers used as part of a purging strategy also require assessing any risks arising (e.g., possible optimal air/gas mixes presenting a fire or explosion hazard, thermal hazards, etc.)

The following procedure steps are provided to assist in developing JHAs or procedures for line break or equipment opening activities to prevent a flash fire and/or exposure to toxic gases (especially H₂S). Where a region or equipment specific opening procedure does not exist, these are the minimum requirements for safe operations.

1. Blowing Down, Venting and Purging Procedures

- Assess the weather conditions, such as wind direction.
- Assess the characteristics of the gas or vapor to be released.
- Done appropriate PPE, i.e., Hearing protection, eye protection, etc.
- Determine if there is fluid in the pipeline or equipment that could continue to vapor off.
- Restrict entry to the release area; give the area time to clear of gas or vapor.
- Approach the release area from upwind with a gas monitor that continuously measures LEL and H₂S levels.
- Verify a safe atmosphere by thoroughly monitoring the area moving over, under, in between, and around the pipeline or equipment at different levels.
- Evacuate Personnel from the work area if the monitor alarms.
- Once a safe atmosphere has been verified, work can continue.

2. Pipeline Opening Procedures



- Shutoff, disconnect or install a jumper, grounding, or bonding to help prevent a possible spark from electrical static, stray or cathodic current,
- Assess the weather conditions, such as wind direction.
- Assess the characteristics of the gas or vapor to be released.
- Determine if there is fluid in the pipeline that could continue to vapor off.

- e) Don applicable PPE (e.g., SCBA/SABA if required for potential H₂S above 5 ppm in breathing zone) and apply any other applicable planned controls prior to breaking the pipeline seal.
- f) If gas or vapor is expected to be released or is being released:
 - i. Leave the immediate area once the pipeline seal is broken.
 - ii. Restrict entry to the release area; give the area time to clear of gas or vapor.
 - iii. Approach the release area from upwind with a LEL/ H₂S monitor.
- g) Verify a safe atmosphere by thoroughly monitoring the area moving over, under, in between, and around the pipeline at different levels.
- h) Evacuate Personnel from the work area if the monitor alarms.
- i) Once a safe atmosphere has been verified, complete the opening of the pipeline.
- j) Continuously monitor the immediate work area for LEL/ H₂S while the pipeline is open, evacuating Personnel if necessary.

4.26.4.5. Equipment Opening Procedure

- a) Assess the weather conditions, such as wind direction.
- b) Assess the characteristics of the gas or vapor to be released.
- c) Determine if there is fluid in the equipment that could continue to vapor off.
- d) Don applicable PPE (e.g., SCBA/SABA if required for potential H₂S above 5 ppm in breathing zone) and apply any other applicable planned controls prior to breaking the equipment seal.
- e) Check all sources to ensure pressure is blown down before breaking the equipment seal.
- f) Consider leaving several bolts and/or nuts in place, but snug, when breaking the seal just in case there is still pressure present.
- g) Position yourself out of the line of fire; use proper body positioning to limit potential exposure.
- h) If gas or vapor is expected to be released or is being released:
 - i. Leave the immediate area once the equipment seal is broken.
 - ii. Restrict entry to the release area; give the area time to clear of gas or vapor.
 - iii. Approach the release area from upwind with a LEL/ H₂S monitor.
- i) Verify a safe atmosphere by thoroughly monitoring the area moving over, under, in between, and around the equipment at different levels.
- j) Evacuate Personnel from the work area if the monitor alarms.
- k) Once a safe atmosphere has been verified, complete the opening of the equipment.
- l) Continuously monitor the immediate work area for LEL/ H₂S while the equipment is open, evacuating Personnel if necessary.

4.26.5. Documentation

-  UST and U.S. Projects:
 - Hazardous Energy Control (Lockout/Tagout) Procedure
 - Gas Pipeline Shutdown Procedure
 - Measurement and Regulation Station Startup or Shutdown Procedure
 - Purging Procedure
 - General Pipeline Repair Procedures
-  Eastern Canada

- Hazardous Energy Control (Lockout/Tagout) Procedure

4.26.6. References

- N/A

4.27. Journey Management

4.27.1. Purpose

The purpose of journey management is to eliminate driving related events, identify and manage hazards, and minimizing exposure to unnecessary travel, which will significantly minimize the potential for harm to people or damage to vehicles and equipment.

This section provides guidance for People Leaders and Workers when completing a journey management plan.

4.27.2. Scope

This section applies to all workers and facilities.

4.27.3. Responsibilities

People Leaders shall:

- Ensure a journey Management plan is used where applicable in cooperation with the travelling Employee.
- Follow any established check-in with the Employee.
- Initiate appropriate emergency response protocol if an Employee is unreachable.

Employees and Workers shall:

- Inform their People Leader if they believe an upcoming trip could be within the scope of this section.
- Participate in the development of a journey management plan with their People leader.
- Follow any established check-in with the People leader.

4.27.4. Requirements

Where a Hazard Assessment determines the need for a journey management plan, the plan shall include:

- Contact information and travel schedule (identifying the route, timeline of travel and stops to be made)
- Emergency contacts and emergency response guidelines
- Communication frequency
- Weather and travel considerations
- Changes to travel plans

- If the Employee's journey is hindered by weather or other emergencies, the individual's top priority should be to move to a safe location, contact emergency Personnel, if necessary, then contact their People Leader as soon as reasonably possible
- In cases where an employee travels for extended periods of time as part of their regular job duties (extending the total workday beyond 12 hours), a travel management plan should be developed as part of the facility hazard management plan

4.27.5. Documentation

- Journey Assessment and Approval Form

4.27.6. References

- *IOGP (2011d) OGP Land transportation safety recommended practice, Guidance note 10 – Journey management process London (UK): International Association of Oil and Gas Producers.*
- *National Safety Code (NSC) Standard 13, Schedule 1*
- *National Safety Code (NSC) Standard 1*

4.28. Ladder Safety

4.28.1. Purpose

This section provides guidance and mitigation measures to prevent injury or harm to Workers when using ladders.

4.28.2. Scope

This section applies to Workers at Company facilities.

4.28.3. Responsibilities

People Leaders shall:

- Provide ladders to assist in accessing areas.
- Ensure ladders are in safe operating condition.

Workers shall:

- Use ladders for their intended purpose and in a safe manner.
- Conduct visual ladder inspections.

4.28.4. Requirements

4.28.4.1. General Requirements

- Portable ladders shall be properly stored when not in use.
- All ladders will be visually inspected before use and if found defective taken out of service.
- Portable metal ladders shall not be used in or around electrical equipment.
- Use both hands when climbing up or descending ladders.

- Do not load ladders beyond their maximum intended loading limits.
- The area around the top and bottom of ladders must be kept clear.
- Never run hoses, extension cords, or ropes on a ladder.
- Wipe shoes of oil, grease, or mud before climbing a ladder to avoid slipping.
- Only one person is allowed on a ladder at one time.
- Keep the trunk of the body between the rails of the ladder.
- Never move, walk, shift, or extend a ladder when it is occupied.
- Never use a step ladder as a straight ladder.
- Step ladders are to be fully opened, spreaders locked and placed with level footing.
- Where practical, step ladders over 3 m (10 ft.) in length should have the top tied off. If not possible, someone must hold the base of the ladder.
- Never use the top step or the top of the ladder as a step.
- Never use the back section cross bracing for steps on a step ladder.
- Ladders carried on vehicles shall be secured to prevent damage and falling off vehicle.
- Ladders shall not be placed in front of doors openings, unless the door is blocked upon, locked, or guarded.
- Ladders shall not be placed on boxes, barrels, or other bases to obtain additional height.
- All wood parts of a ladder shall be free from sharp edges and splinters.
- Low density wood shall not be used in the site construction of ladders.

4.28.4.2. Portable Ladders

NOTE: *Portable ladders should meet requirements from OSHA 1910.23 Ladders.*

- Only CSA or ANSI approved ladders of commercial grade with visible/legible load ratings shall be used.
- Portable stepladders longer than 6 m (20 ft.) shall not be used.
- Stepladders shall be equipped with a metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in an open position.
- Single ladders longer than 9.1 m (30 ft.) shall not be used.
- Extension ladders longer than 18.3 m (60 ft.) shall not be used.
- Keep ladders clean and free of dirt, paint, oil, grease, or slippery materials.
- Ladders shall always be maintained in good condition.
- Ladders shall be inspected before use and those that have developed defects shall be withdrawn from service for repair or destruction and tagged or marked as “Dangerous, Do Not Use.”
- Ladders shall be placed with a secure and level footing, tied off, or held in position.

- Ladders used to gain access to a roof or other area shall extend at least 0.9 m (3 ft.) above the point of support.
- The foot of a ladder shall be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is one-quarter of the working length of the ladder (the length along the ladder between the foot and the support).
- Always face the ladder when climbing up or down.
- Short ladders shall not be spliced together to make long ladders.
- Ladders shall never be used in the horizontal position as scaffolds or work platforms.
- Metal ladders shall never be used near electrical equipment.
- On two-section extension ladders, the minimum overlap for the two sections in use is listed in [Table 21](#).

Table 21: Minimum Section Overlap on Two-section Extension Ladders




Size of Ladder	Overlap m (ft)
Up to and including 10.9 m (36 ft.)	0.9 m (3 ft.)
Over 10.6 m (36 ft.) up to and including 14.6 m (48 ft.)	1.2 m (4 ft.)
Over 48 up to and including 18.2 m (60 ft.)	1.5 m (5 ft.)



Extension ladders, which are also known as non-self-supported ladders, are probably one of the most used and misused pieces of access equipment. They are versatile tools with plenty of limitations and inherent dangers. This type of ladder should be used for short-term light work, for no more than 30 minutes.

Choosing the right ladder and knowing how to use it is important. Research gathered by the Bureau of Labor Statistics show that falls are one of the top four causes of fatal occupational injuries from 1992 through 2009.

4.28.4.3. Fixed Ladders

NOTE: All fixed ladders shall be constructed and installed so that they comply with OSHA regulations 1910.23.

- A fixed ladder with a length of more than 6 m (20 ft.) to a maximum unbroken length of 9 m (30 ft.) shall be equipped with cages or a ladder safety device.
- Cages shall extend a minimum of 1.06 m (42 in) above the top of a landing unless other acceptable protection is provided.
- Cages shall extend down the ladder to a point not less than 2.1 m (7 ft.) or more than 2.4 m (8 ft.) above the base of the ladder.
 -  New height requirement. Fall protection is required on ladders taller than (or that extend beyond) 7.3 m (24 ft.).
 -  New equipment specification. As of November 18th, 2018, cages are no longer considered compliant fall protection in newly installed ladders. To meet OSHA standards, a personal fall arrest system or a ladder safety system is required.
 -  Repair/replacement specification. As of November 18th, 2018, a personal fall arrest system or ladder safety system will be used to replace any damaged or nonfunctioning section, cage or well previously installed on a fixed ladder.

-  OSHA is giving general industry a heads-up and deadline. As of November 18th, 2036, cages will no longer be accepted as a form of fall protection, and all fixed ladders taller than (or that extend beyond) 7.3 m (24 ft.) high must use a personal fall arrest system or a ladder safety system.
- When fixed ladders are used to ascend to heights exceeding 6 m (20 ft.) (except on chimneys), landing platforms shall be provided for each 9 m (30 ft.) of height or fraction thereof, when cages are used, except that, where no cage, well or ladder safety device is provided, landing platforms shall be provided for each 6 m (20 ft.) of height or fraction thereof.
-  When a ladder exceeds 6 m (20 ft.) and has no cages or exceeds 9 m (30 ft.) without a landing platform, an alternative means of fall protection shall be implemented.
- Ladder safety devices may be used on tower, water tank, and chimney ladders over 6 m (20 ft.) in unbroken length in lieu of cage protection. No landing platform is required in these cases.
- The preferred pitch of fixed ladders shall be considered to come in the range of 75 degrees and 90 degrees with the horizontal. Fixed ladders shall be considered substandard if they are installed within the pitch range of 60 and 75 degrees with the horizontal.
- Substandard fixed ladders are permitted only where it is found necessary to meet conditions of the installation. This substandard pitch range shall be considered as a critical range to be avoided, if possible.
- Ladders having a pitch of more than 90 degrees with the horizontal are prohibited.

4.28.4.4. Inspection and Maintenance

- All fixed ladders require an annual documented inspection.
- All ladders shall be maintained in a safe condition.
- A visual inspection shall be conducted on all ladders before each use.
- Inspect ladders for the following items:
 - Loose or missing rungs or cleats
 - Loose nails, bolts, or screws
 - Cracked, broken, split, dented, or badly worn rungs, cleats, or side rails
 - Splinters
 - Corrosion of metal ladders or metal parts
- All ladders must be maintained with special attention given to the following:
 - Joints between steps and side rails are tight
 - Hardware and fittings must be securely attached.
 - Moveable parts must be free and operable
 - Moveable bearings must be lubricated
 - Frayed or worn rope replaced
 - Safety feet must be operable
 - Rungs and steps must be kept clean and free of defects

- Ladders that have developed defects shall be withdrawn from service for repair or destruction and tagged or marked as “Dangerous, Do Not Use.”
- Safety feet and other auxiliary equipment shall be kept in good condition to insure proper performance.
- If ladders tip over:
 - Inspect ladder for side rails dents or bends, or excessively dented rungs
 - Check all rung-to-side-rail connections
 - Check hardware connections
 - Check rivets for shear

4.28.4.5. Ladder Use Guidelines

NOTE: To mitigate the Hazards potentially involved when using ladders over regulation height, consider using alternatives such as scaffolding, work platforms or elevating devices.

- Place portable ladder base on secure footing (firm and level).
- The proper angle for setting up a ladder is to place its base a quarter of the working length of the ladder from the wall or other vertical surface (4:1 ratio).
- The top of portable ladders must be placed so that the side-rails or beams are supported.
- Secure a straight ladder or extension ladder by tying the top portion to a fixed support.
- When working on a portable ladder above 1.8 m (6 ft.) the ladder must be held by a person when it is not secured.
- Use fall protection at heights above 1.8 m (6 ft.), unless:
 - the ladder is situated directly in front of the work and the Worker does not need to lean to conduct the task (e.g., moving their body’s centerline ‘outside’ of the side-rails or beams), or
 - you can maintain three-point contact, or
 - the work is considered light duty and short duration work
- Barricade the area around ladders or position a Worker in front of the ladder if it is placed in an aisle or other location where a person or an object could strike it.
- Lock or otherwise secure immediately adjacent doors prior to working on a ladder.
- Secure portable ladders at the base where a kick-out hazard exists.
- Fully open stepladders before climbing.
- Secure locking ladder hooks before ascending or descending an extension ladder.
- Do not stand on rungs above a landing against-which a portable ladder is placed.
- Face the ladder and use three-point contact when ascending and descending.
- Keep your body near the middle of the rungs (body centerline stays between the side rails or beams).
- Climb ladders by grasping the rungs and not the side rails or beams.

- Keep both feet on the ladder rungs when stationary.
- Stay off a ladder already occupied by another person and do not walk underneath a ladder being ascended or descended.
- Ladders used to reach another work surface must extend three rungs beyond the level accessed.
- Do not use portable ladders in strong winds.
- Do not use portable ladders to form a walkway between two platforms or surfaces.
- Place small tools in a tool bag and hoist with a rope to keep hands free for ascending and descending.
- Face the ladder when ascending and descending.
- Carry portable ladders below shoulder level.
- Portable ladders need to be insulated or have non-conductive side rails or beams where there is a risk of electrical hazard.
- Metal ladders shall be labeled, “Non-electrical Work.”
- Wood ladders are not permitted in hazardous / classified locations.

4.28.5. Documentation

- 
- EnCompass Facility Inspection Form

4.28.6. References

- *29 CFR 1910, Subpart D: Occupational Safety and Health Standards – Walking Working Surfaces*
- *29 CFR 1910.23 Occupational Safety and Health Standards –Ladders*
- *ANSI-ASC A14.1-2017: Ladders – Wood Safety Requirements*

4.29. Lockout Tagout

4.29.1. Purpose

This section provides the requirements for safely completing Lockout/Tagout of hazardous energy sources in the prevention of injury to Workers, and damage to equipment when working on company facilities and worksites by ensuring:



- Equipment does not start up or pressurize unexpectedly during maintenance
- Line flow, pressure and secondary energy sources are isolated
- Workers are protected against the unexpected release of stored, thermal, chemical, electrical, mechanical, pneumatic, or hydraulic energy

4.29.2. Scope

This section applies to all company owned and operated facilities and is designed to meet requirements established in *OSHA 29CFR 1910.147* and *Canadian Standard CSA Z460-13*.

4.29.3. Responsibilities

People Leader shall:

- Ensure lockout tagout permits are properly filled out and filed after the completion of LOTO jobs.
- Ensure that Personnel understand the hazards to which they are exposed, and the safety related work practices they are to use.
-  UST US Projects, and Offshore: Ensure that LOTO procedures are being followed correctly by performing an annual periodic review using the Annual LOTO Procedure Review Form *detailed in the Hazardous Energy Control Lockout/Tagout Procedure*.
-  Ensure that LOTO procedures are being followed correctly by conducting periodic inspections of lockout activities.
 - Document on the Lockout/Tagout Evaluation Form

 Affected Employees shall:

- Follow the direction of the Authorized Employee as it affects the operation of the equipment being locked and tagged.

 Work Performer shall:

- Ensure personal lock is placed on the isolation points or lock box prior to working on any equipment.
- Remove personal lock(s) when task is complete or prior to leaving site (whichever comes first).
- Follow the direction of the PIC as it relates to the LOTO activities.
- Stop and/or correct work if LOTO procedures are not being followed.

 Authorized Employees / Responsible Person shall:






- Understand and comply with this Manual and equipment-specific procedures, including:
 - The application of LOTO on the equipment
 - Ensuring the security of the lock and key during the LOTO
 - Following all safe shutdown and startup procedures
 - Communicating to all Affected Employees and other Authorized Employees
 - Ensuring that an adequate Group Lockout procedure is in place when a group of Employees and/or Contractors are working on the same equipment
 - Sign Lockout Tagout permit.

People Leader/Person in Charge shall:

- Ensure all Workers involved in the Lockout Tagout job sign the permit.
- Sign Lockout Tagout permit.

- Perform periodic inspection of the Lockout Tagout procedures.
- Ensure Lockout Tagout permits are completed prior to the start of the job.
- Develop a written plan of execution and communicate that plan to all Authorized and Affected Personnel.

Employees and Workers shall:




- Workers will follow the Electrical Safety Procedure and associated forms.
-  Workers in UST, US Projects and Offshore will follow *Hazardous* Energy Control Lockout/Tagout Procedure and associated forms.
-  Incorporate the Contractor's Lockout/Tagout program into the Company program.
-  Contractors will apply their own locks on equipment or a group lock box (depending on type of lockout) where they are an Authorized Employee.
-  Workers in Eastern Canada will follow *Hazardous* Energy Control Lockout/Tagout Procedure and associated forms.
-  Workers in Western Canada will follow the Western Canada Lockout/Tagout Procedure and applicable forms

 Contractors shall be trained in their Company's lockout requirements that must comply with Occupational H&S legislation as well as the Enbridge Company Lockout/Tagout program

All Affected Personnel, both Contractor and Company, shall be notified when a Lockout/Tagout is applied and removed from their work area.

4.29.4. Requirements

Workers are expected to follow the applicable LOTO Procedure:

-  UST, US Projects and Offshore will follow the *Hazardous* Energy Control Lockout/Tagout Procedure and associated forms.
-  Eastern Canada will follow the Hazardous Energy Control Lockout/Tagout Procedure and associated forms.
-  Western Canada will follow the Western Canada Lockout/Tagout Procedure and applicable forms.

4.29.4.1. Lockout/Tagout Evaluations

LOTO Evaluation is to confirm that all isolation points and related assets are up to date, identified and accurate with current standards, procedures, and processes.

If an Isolation point has been incorrectly identified physically (Tagged or labelled), work shall be temporarily stopped until a resolution can be implemented.




When change management is required to revise existing programs or documentation, the following processes will be followed:

- HS Manual Section 8 Management of Change:
 - Complete the GTM Governance Document Management Service Request and follow GTM IMS Document Management of Change Process.

- Engineering Design Specifications & Standards (EDSS) Governance Standard - EDSS Change Request Form

For procedure changes that do not fall into the above categories, contact your people leader.

4.29.5. Documentation

- Electrical Safety Procedure
-  UST, US Projects and Offshore:
 - Hazardous Energy Control Lockout/Tagout Procedure
 - Attendance Record
 - Energy Isolation Form – Lockout Tagout
 - Energized Electrical Work Permit
 - Job Hazard Analysis Form
 - Annual Lockout Tagout Procedure Review
-  Eastern Canada
 - Hazardous Energy Control Lockout/Tagout Procedure
 - Attendance Record Form
 - Energy Isolation Form – Lockout Tagout
 - Energized Electrical Work Permit
 - Job Hazard Analysis Form
 - Annual Lockout Tagout Procedure Review
-  Western Canada
 - Single Operating Authority Lockout Procedure (Westcoast)
 - Group Lockout Tagout Procedure (Westcoast)
 - Lockout Tagout Procedure (Westcoast)
 - Lockout/Tagout Form
 - Lockout Alteration Authorization Form
 - Personal Lock Removal Form
 - Personal Lock Tracking Form
 - Lockout/Tagout Evaluation Form

4.29.6. References

- *29 CFR 1910.147, The Control of Hazardous Energy*
- *Z460 Control of Hazardous Energy – Lockout and Other Methods*
- *Z462 Workplace Electrical Safety*
- *COHSR Part 8 – Electrical Safety*
- *COHSR Part 13 – Tools and Machinery*

- *Alberta OHS Part 15 – Managing the Control of Hazardous Energy*
- *British Columbia OHS Part 10 – Lockout and De-Energization*

4.30. Machinery and Equipment Guarding

4.30.1. Purpose

The purpose of this section is to create an awareness of the hazards associated with moving and rotating equipment.

4.30.2. Scope

This section applies to all Workers at Company facilities.

4.30.3. Responsibilities

People Leaders shall:

- Ensure equipment has proper machine guarding.

Workers shall:

- Recognize the potential hazards of working around unguarded equipment.
- Only operate equipment if machine guarding is in place and properly protects from moving/rotating parts.
- Remove any equipment from service that is not properly guarded.

HS Support shall:

- Provide technical guidance on equipment and machine guarding equipment.

4.30.4. Requirements

4.30.4.1. Guard Material Specifications

NOTE: *Appropriate PPE, including face and eye protection, shall be used.*

- Guards shall be constructed from expanded metal, perforated or solid sheet metal, wire mesh on a frame or angle iron on sheet or iron pipe securely fastened to the floor or to the frame of the machine.
- Guards shall be constructed of a strength to support the weight of a Worker if in a place that requires the Worker to step on the guard or push against it.
- Toe boards shall be used where guardrails are provided around openings on equipment that is exposed to falling hazards.

4.30.4.2. General Requirements for All Machines

- One or more methods of guarding (examples: barrier guards, two-hand tripping devices, electronic safety devices, etc.) shall be provided to protect the Operator and other Workers in the machine area from hazards such as those created by point of operation, in-going nip points, rotating parts, flying chips and sparks.

- Guards shall be affixed to the machine where possible and secured elsewhere if, for any reason, attachment to the machine is not possible.
- The guard shall be such that it does not become an accident hazard itself.
- Guarding devices shall be designed and constructed to prevent the Operator from having any part of their body in the danger zone during the operating cycle.
- Removal, alteration or defeating of guards on machinery or equipment is prohibited except for inspection, repair, or replacement purposes.
- Machinery or power tools that are not equipped with proper guards should not be operated.

4.30.4.3. Fans

- When the periphery of the fan blades is less than 2.13 m (7 ft.) above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than 1.25 cm (½ in).
- Use of barrier guards, such as fencing for fin fan units (fan blades), that are less than 2.13 m (7 ft.) from the floor or working level is acceptable only under the following conditions:
 - When barrier guards are secured such that removal / entry requires special procedures such as through a locked gate.
 - The machine is isolated per 29 CFR 1910.147 Control of Hazardous Energy (Lockout/Tagout) procedures.
 - If multiple fans are enclosed by a common barrier guard, then all fans must be isolated per 29 CFR 1910.147 Control of Hazardous Energy (Lockout/Tagout) procedures.

4.30.4.4. Anchoring Fixed Machinery

Machines designed for a fixed location shall be securely anchored to prevent moving (e.g., drill presses, pedestal grinders, lathes, milling machines).

4.30.4.5. Woodworking Machinery Requirements

- Each machine shall be constructed to be free from sensible vibration when the largest size tool is mounted and runs idle at full speed.
- All belts, pulleys, gears, shafts and moving parts shall be guarded in accordance with specific requirements, which are detailed in a later portion of this section entitled Mechanical Power Transmission Apparatus.

4.30.4.6. Machine Control and Equipment

- A mechanical or electrical power control shall be provided on each machine to make it possible for the Operator to cut off the power without leaving their position at the point of operation.
- On each machine operated by electric motor, positive means shall be provided for rendering such controls or devices inoperative while repairs or adjustments are being made to the machines they control.
- Permanently wired woodworking machinery shall be equipped with a disconnect switch that can be locked in the off position.

4.30.4.7. Hand-Fed Ripsaws, Cross-Cut Table Saws and Radial Saws

- Each saw shall be provided with a guard that will protect the Operator from flying splinters, broken saw teeth, and sawdust.
- Each saw shall be provided with non-kickback fingers or dogs and spreaders.

4.30.4.8. Band Saws

- All portions of the saw blade shall be enclosed or guarded except for the working portion of the blade.

4.30.4.9. Jointers

- Each hand-fed planer and jointer with a horizontal head shall be equipped with a cylindrical cutting head, the knife projection of which shall not exceed 0.3 cm ($\frac{1}{8}$ in) beyond the cylindrical body of the head.
- Each hand-fed jointer shall have an automatic guard that will cover the sections of the head on the working side of the fence or gauge.

4.30.4.10. Inspection and Maintenance of Woodworking Machinery

- All saws, knives and cutting heads shall be kept sharp.
- Push sticks or push blocks shall be provided at the workplace.
- Frames and all exposed non-current carrying metal parts of portable electric wood-working machinery operating at more than 90 volts to the ground shall be grounded.
- Electric power-operated hand tools shall be of the approved double insulated type or grounded using a separate ground wire and polarized plug whenever there is more than 90 volts to the ground.

4.30.4.11. Mechanical Power Transmission Apparatus

- Power transmission equipment shall be regularly inspected and shall be kept in good working condition.
- Rotating shafts shall be kept in alignment.
- Hangers shall be inspected to make sure supporting bolts and screws are tight.
- Pulleys shall be inspected for loose bolts or nuts.
- Belts and fasteners shall be inspected and kept in good repair.
- Lubrication shall be performed per manufacturer's recommendations.
- Flywheels shall be enclosed with sheet, perforated, or expanded metal, or mesh wire on a metal frame.
- Flywheels protruding through a floor shall have a guardrail placed not less than 38 cm (15 in) or more than 51 cm (20 in) from the rim. Standard toe boards shall be provided.

EXCEPTION: *An adjustable guard may be provided on a gas engine to be used when starting to make running adjustments. A slot opening for jack bars will be permitted.*

- Guard exposed pulleys, belts and friction drives, gears, sprockets, and chain drives.

EXCEPTION: *Hand operated gears such as a hand operated winch do not require guards.*

- Keys, set screws and other projections in revolving parts, must be removed, made flush, or guarded with metal covers.
- Revolving collars shall be cylindrical.
- Screws or bolts used in collars and couplings shall not extend beyond the largest diameter of the collar or beyond the flange of the coupling unless covered with a metal sleeve.
- Exposed parts 2.13 m (7 ft.) or less from the floor or working platform, except runways used exclusively for oiling or running adjustments, shall be protected by a stationary casing that encloses shafting completely or by a trough that encloses sides and top or sides and bottom of shafting as location requires.

Caution

The following types of machines usually require point of operation guarding: Shears, Milling machines, Power saws, Jointers, and Portable power tools.

4.30.4.12. Grinding and Buffing Wheels

Caution

Wheel inspection shall include the “Ring Test.”

- Perform ring test on grinding and buffing wheels:
 1. Tap lightly with a non-metallic instrument.
 2. If the wheel sounds dead or does not ring; it is cracked or defective and must not be used.
 3. Discard wheel.
- Adjust the tool rest, if necessary, so it is within 0.3 cm ($\frac{1}{8}$ -in) of the wheel; make no adjustment while the wheel is in motion. Also, adjust the tongue guard so it is within 0.6 cm ($\frac{1}{4}$ -in) of the wheel.
- The safety shield must always be kept in place and be clean.
- Hand protection shall be used when grinding stock that could cause injury to hands.
- Respiratory protection should be worn when grinding items that produce dust or fumes.
- Ensure the face of the wheel is properly dressed and the guard is in place.
- When it is necessary to change a wheel, inspect the new wheel for cracks or other imperfections to make sure it has not been damaged.
- Unplug power to the grinder and place power cord in view before replacing the used grinding wheel.
- A safety washer must always be installed between the grinding wheel and the securing flange. The protective shield should always be replaced after changing the wheel.
- After a new grinding wheel has been installed, stand to the side, and conduct a test run of one minute.

- Always wear safety glasses with side shields or goggles and a face shield when operating a grinder or buffer.
- Hold the work in such a manner that hands will not be injured in case of slippage.
- Apply the work gradually so abrupt contact with the grinding wheel can be avoided.
- Do not operate the wheel at a speed more than its design speed.
- Do not use the side of a wheel for grinding unless it was designed for that purpose.
- Make sure the composition or type of grinding wheel is compatible with the material being worked on.
- Defective grinders should be reported to the Supervisor, and an appropriate “Do Not Operate” tag should be installed until the defect is corrected.

4.30.5. Documentation

- N/A

4.30.6. References

- *29 CFR 1910: OSHA Standards, Subpart O – Machinery and Machine Guarding and Subpart P – Hand and Portable Powered Tools and Hand-Held Equipment*
- *29 CFR 1910.147: OSHA Standards, The Control of Hazardous Energy (Lockout/Tagout)*

4.31. Manual Handling of Materials and Back Safety

4.31.1. Purpose

This section describes the requirements Workers should follow when manually handling materials to protect their backs from injury.

4.31.2. Scope

This applies to all field operations.

Since the weight, size, shape, toxicity or other characteristic of materials, goods or things, the manual handling of materials, goods or things may be hazardous to the health or safety of a Worker, the Employer shall issue instructions that the materials, goods, or things shall, where reasonably practicable, not be handled manually. This guideline applies to all field operations.

4.31.3. Responsibilities

People Leaders shall:

- Ensure this section is implemented with sufficient resources for training and mechanical lifting equipment where applicable.
- Communicate this section to all Personnel under their supervision.
- Not require a Regional or Project field office Worker whose primary tasks (i.e., administrative roles) do not include manual lifting or carrying, to manually lift or carry materials, good or things more than 50 lbs (23 kg).

Workers shall:

- Utilize mechanical lifting devices when available and when the size, shape and weight of the object justify their use.
- Utilize team lifting when necessary.
- Complete the required training and use sound lifting techniques when manual lifting.
- Communicate this section to all Personnel under their supervision.

HS Support shall:

- Monitor manual and mechanical lifting tasks as needed to ensure compliance with safe lifting techniques.

Safety Shared Services shall:

- Review event trends for back injuries to ensure this section is effective on a regular basis.

4.31.4. Requirements

Caution

Size up the load before lifting. Test by lifting one of the corners or pushing. If the load is too heavy or feels too clumsy, get a mechanical aid, or help from another Worker. When in doubt, do not lift alone!

4.31.4.1. Wear PPE

Workers involved in materials handling will use the appropriate PPE. Gloves or other hand protectors, aprons, eye/face protection should be worn to prevent hand, body, and face injuries especially when handling material with sharp edges, wooden material, or corrosives.

4.31.4.2. Back Injury Prevention

- If a load is too heavy for one Worker to lift, get help or use mechanical lifting equipment.
- Workers should always use mechanical lifting devices when available and practical, but when a manual lift is required, the following practices shall be used:
 1. Plan Your Lift. Think about the item you are going to lift and ask yourself:
 - a) Can I do this alone?
 - b) Is it too awkward for one person?
 - c) Is the path clear?
 - d) How heavy is it?
 - e) Can the load be moved by mechanical means?
 2. Never lift a load beyond your ability – GET HELP!
 - a) Inspect the area around the object to be lifted.
 - b) Plan the lift.
 - c) Scan expected travel routes for any obstruction or spillage.
 - d) Identify the final placement for the load.
 - e) Inspect the object for burrs, jagged edges, rough, or slippery surfaces.
 - f) Wipe off any grease, water, or dirt from the surface and wear gloves (where appropriate.)

3. Keep fingers away from pinch points, especially when setting down the objects.
4. Never attempt to catch or try to control falling or shifting object – let it fall.
5. Take extra care when lifting an uneven load.

4.31.4.3. Proper Lifting Technique

Where an Employee is required to manually lift or carry loads weighing more than 22 lbs. (10 kg), the employee shall utilize the following basic lifting technique:

1. Get a firm footing with your feet about shoulder width apart for a stable base, point toes out.
2. Always bend your knees keeping the principles of leverage in mind. Don't bend at the waist. Maintain the three natural back curves.
 - a) Get a firm grip on the object.
3. Tighten your stomach muscles using intra-abdominal pressure to support your spine when you lift, offsetting the force of the load. Train your muscles to work together.
4. Lift with your legs by bending your knees and letting your leg muscles do the work of lifting. Do not rely on your weaker back muscles.
 - a) Do not twist the body while lifting and carrying the load.
5. Keep the load close throughout the lift. Do not hold the load away from your body. The closer it is to your spine, the less force it exerts on your back.
6. Keep your back upright when lifting the load. Don't add the weight of your body to the load.
 - a) When setting down the load, keep your back upright, keep the load close, do not twist and bend your knees.
 - b) Set the load at around hip level when possible.

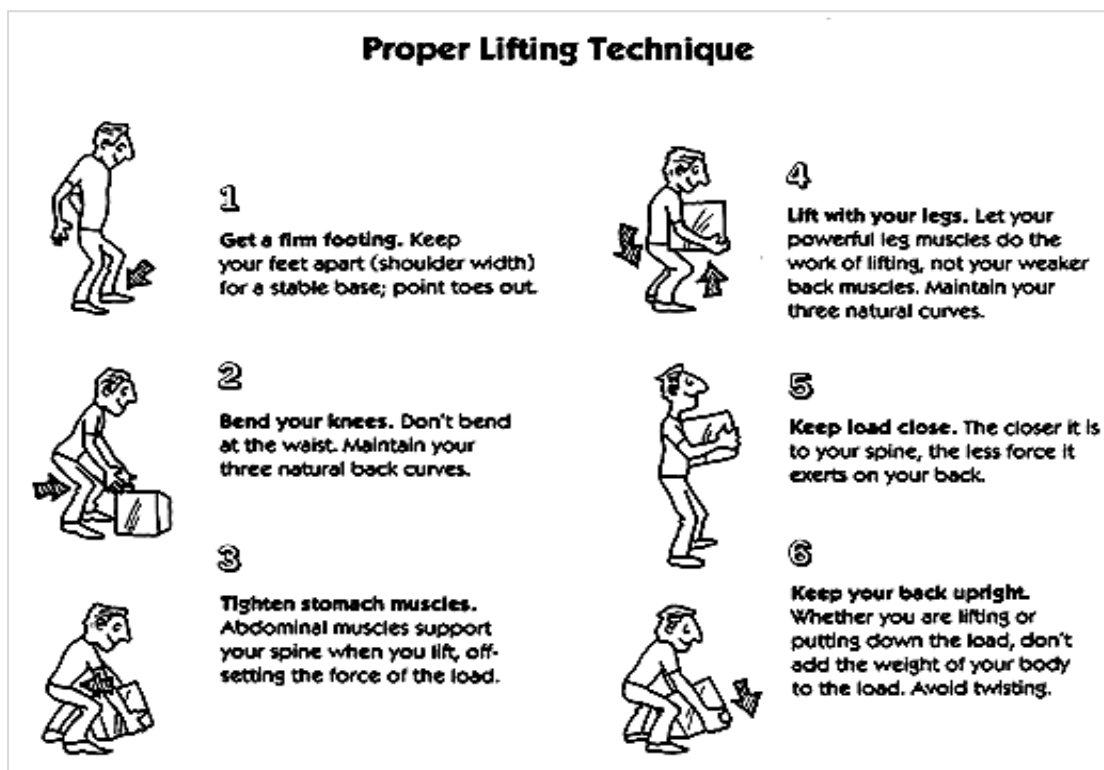


Figure 18: Proper Lifting Technique

For additional information on the recommended weight limit 50lbs (23 kg) that can be lifted safely at different vertical and horizontal distances please see the associated chart below:

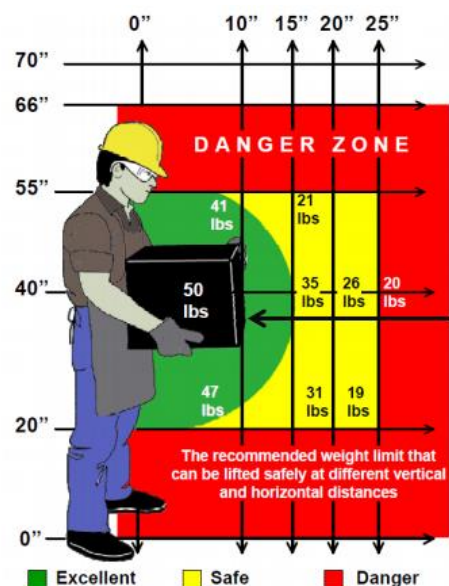



Figure 19: Recommended Weight Limit

Employees are discouraged to manually lift or carry loads weighing in excess of 99 lbs (45 kg) or weights they are not comfortable lifting by themselves. Where possible utilize a dolly, cart, pallet jack or similar.

Where feasible, lifting aids (lift tables, mechanical or powered assists, hoists, etc.) should be used to move heavy or bulky loads.

Where an employee is required to manually lift or carry loads in excess of 99 lbs (45 kg), a field level hazard assessment must be completed prior to task commencement.

 Where an Employee is required manually to lift or carry loads weighing more than 99 lbs (45 kg), the Employer shall give instructions to the Employee that are:

- set out in writing
- readily available to the Employee
- kept by the Employer for a period of two years after they cease to apply

4.31.4.4. Team Lifting and Carrying

- Adjust the load to share the load equally between each person.
- Adjust carrying height so that the object is level.
- Walk in a unison step motion.

4.31.5. Documentation

- N/A

4.31.6. References

- *Canadian Occupational and Health and Safety Regulations Division III, Part 14.46 to 14.49*

4.32. Marine and Offshore Operations Safety

4.32.1. Purpose

This section has been developed to describe the minimum safety procedures to be followed by Company Employees whose duties include offshore marine operations.

4.32.2. Scope

This section applies to all Company Employees who can potentially be involved in offshore marine operations.

4.32.3. Responsibilities

People Leaders shall:

- Ensure that Employees who are involved in offshore marine operations receive the required Marine Survival training.
- Ensure all necessary equipment is provided for Employees required to work in the offshore marine operations.
- Aid in obtaining the Transportation Worker Identification Card Personnel identification cards.

Employees and Workers shall:

- Follow the established offshore marine procedures for wearing the proper PPE, boarding crew boats and platforms and working on the platforms.

- Participate in offshore marine work activities only after receiving the proper required training.
- Follow all instructions of the Captain of any vessel used for transporting to offshore facilities.
- Participate in all emergency drills at the discretion of any ship's Captain or Platform Manager.
- A JHA shall be completed and reviewed with all Personnel prior to commencing swing rope transfer activities. Only one JHA is required to be completed and reviewed per swing rope transfer event. If anyone deems the transfer to be unsafe, the Captain is expected to abandon the transfer. Employees are also authorized to use their Stop Work Authority (SWA) if they perceive conditions that are unsafe, or they object to the activity based upon a lack of understanding of these procedures. There will be no repercussion to the person(s) who stops the transfer exercising their SWA.

HS Support shall:

- Monitor the overall effectiveness of the offshore marine program through periodic inspections, observations, and audits.
- Assist with the scheduling of required marine survival training, technical assistance, or equipment selection as needed.

Safety Shared Services shall:

- Periodically monitor maritime regulations to ensure the published marine procedures comply.

4.32.4. Requirements

4.32.4.1. General

- Proper slip resistant safety shoes are always required. Walking and working surfaces at the docks, on the transport vessels, LNG/cargo tankers and work platforms are slippery and hazardous due to water spray and especially during freezing weather.
- All Employees assigned to marine operations will wear a PFD (Personal Flotation Device) when being transferred between vessels, on outside decks of LNGs and on any platform dock or barge that has unguarded sides next to the water.
- Swing rope transfers from one vessel to another, to a dock, or to a platform can be hazardous; therefore, the procedures outlined above shall be adhered to mitigate the hazards associated with Personnel transfers utilizing a swing rope.
- Personnel Basket transfers over water are hazardous; therefore, these transfers are to be used only when the Captain of the vessel has approved them. The following procedures shall be followed when using this form of Personnel transfer:
 - Do not exceed the rated capacity of the transfer basket.
 - Wear your PFD.
 - Secure your hard hat and glasses.
 - Hold on to the basket ropes or rigging with both hands facing inward.
 - Store all small loose items in the center of the basket. Large items are to be transferred by a cargo net.
 - Step off the basket only when it has completely landed.

- Vessels, docks, barges, and platforms are classified areas and restrict the use of open flames, flashlights, cameras, cell phones or any spark producing items. Smoking may be permitted in designated areas only.
- Offshore travel requires planning on each individual's part.
 - Remember that the electrical services and voltages are different on some vessels, weather conditions change suddenly, and transportation services back to shore may be restricted.
 - The purpose of the travel offshore will influence the amount of detail to your trips plan.

NOTE: *Employees may be required to attend training classes on specific customer platform or rig safety requirements prior to being transported to the customer's location.*

4.32.4.2. Pre-Trip Guidelines

- Check you clothing requirements including inclement weather gear.
- Ensure electrical equipment you are bringing will work on the electrical services provided on the ship or platform.
- If you are taking a medication and are medically cleared to work offshore make sure you have an ample supply of that prescription medication

NOTE: *If traveling to a vessel, upon arrival, inform the Captain you are taking a medication.*

4.32.4.3. In-Transit Guidelines for Vessel Travel

Follow the Captain's instructions to ensure the safety of Personnel on board.

4.32.4.4. Transit by Helicopter

The provided text outlines guidelines and requirements for helicopter operations and safety procedures, particularly for personnel traveling offshore in the Gulf of Mexico (GoM). Here's a breakdown of the key points:

Helicopter Safety Procedures

Attire Requirements for Passengers:

- Passengers must wear long pants, sleeved shirts, and closed-toed and closed-heeled shoes.
- The shoe must securely stay on the foot using a fully enclosed heel or a strap made of durable material such as leather or rubber.

Prohibited Items and Actions:

- Caps/hats are not allowed while boarding, departing, or traveling on a helicopter.
- E-cigarettes cannot be carried in baggage due to fire hazard concerns as per FAA regulations.
- Zippo-type lighters and matches are not permitted in checked baggage or to be carried on the aircraft.

Behavior Around Helicopters:

- Personnel must stay in the passenger staging area until the helicopter has landed safely.

Travel Requirement Details

Offshore Water Survival Training:

- Personnel traveling offshore by helicopter must have completed Offshore Water Survival Training, which includes Helicopter Underwater Egress Training (HUET).
- This training must be renewed every four years.
- Employees, visitors, or tour groups who are escorted may be exempt from the HUET requirement if they are at a facility that has received prior approval from the respective Management.

4.32.4.5. Emergency Guidelines

Caution

In case of emergency, it is critical that each passenger be prepared to act decisively and correctly.

- Remain calm and follow the captain's instructions.
- During an emergency event:
 - Listen and remain calm and follow the emergency procedures that you have been taught in marine survival training.
 - Check your PFD and ensure it is secured.

4.32.4.6. Swing Rope Transfers

- All Employees who are reasonably expected to use a swing rope shall pass a swing rope test prior to being allowed to do so, and every four (4) years thereafter.
- Recommended Rope Specifications:
 - 3-Strand 1.9 cm ($\frac{3}{4}$ in) Poly Dacron or Nylon rope with 5 knots standard, spaced 0.6 m (2 ft.) apart. Wrapped with 1.3 cm ($\frac{1}{2}$ in) synthetic rope between knots and dipped in polyurethane. Follow manufacturer's Rope Usage and Care guidelines
 - Minimum load strength/capacity of the rope shall be 3 times the largest person or cargo to be transferred.
 - Rope Inspections. The rope shall be visually inspected by each individual prior to use.
- Visually inspect the rope for:
 - Pull or tug on the rope to test the connections for strength.
 - Observe the rope for visible cuts, fraying, or unravelling.
 - Observe any metal connections or hardware for rust.
 - Observe any oil, mud, paint, or chemical coatings that may be on the rope.
 - Check for degradation (brittleness) such as from UV damage (sun) or chemical exposure.
 - Check for pad eye and other associated linkage for cracks, physical damage from impacts, and attachments.

- Test the strength of the rope by applying body weight over secured area before initiating the swing transfer.

NOTE: *If there is any concern about the strength/capacity of the rope, do not use it.*

- Annual documented inspection of company owned Swing Rope shall be documented on the *swing rope annual inspection form*.
- During adverse weather conditions such as:
 - high/choppy seas
 - high winds
 - water temperature below 12.7°C (55°F)
- All Personnel will conduct a risk assessment and evaluate the hazards to determine if it is safe to proceed with the Personnel transfer.
 - Input from the Captain of the vessel should be requested as part of the risk assessment.

NOTE: *When water temperatures are below 12.7°C (55°F), hypothermia can occur within a short period of time. See cold weather travel survival below for more requirements.*
- Transfers shall be conducted with another person to observe/assist the transfer. They will be responsible for:
 - Assuring that the boat is in the proper position before swinging. The captain/crew must maintain the engine to keep the boat an acceptable distance from the platform during the transfer.
- When transferring from the boat to the platform, the transfer should be made when the boat is at its highest position. Never start a swing when the boat is lower than the landing platform.
- When transferring to the boat, the transfer should be made when the boat is on its way up from its lowest position.
- A deck hand must also be present to assist the person being transferred.
 - Issues the “Man Overboard” and keeps a visual location of any person who falls into the water.

4.32.4.7. Conducting a Transfer

- Personnel shall wear their PFDs during Personnel transfer operations. Grab the knot on the swing rope high enough to assure clearing the landing.
- Place the rope outside of the legs. Avoid having the rope between the legs.
- When the boat is in the proper position for the transfer, push yourself off of the boat or platform with enough force to complete the swing.
- If the attempt is not successful on the initial swing, the person shall continue to hold onto the rope and return to the launch site.
- After successfully landing on the platform / boat, assist the next person onto the landing area.
- Rescue operations. If someone falls into the water during a transfer, rescue operations will immediately commence.
 - A life ring shall be available for rescue operations as required.

- Accompanying Personnel shall sound out the “Man Overboard” call.
- Designated person shall continue a visual location of the downed person.
- Available Personnel will conduct the rescue and safe return of the person to a secure surface.

4.32.4.8. Offshore Survival

- Personal Flotation Device – Wearing a Personal Flotation Device (PFD) increases the chances of survival but is not a guarantee. Ideally, any such device should be in the correct position at all times.
 - PFDs (life preservers, life jackets, or work vests) worn by each Affected Employee must be United States Coast Guard (USCG) approved pursuant to 46 CFR part 160 (Type I, II, III, or V PFD) and marked for use as a work vest, for commercial use, or for use on vessels.
 - A Type I, Off-Shore PFD provides the most buoyancy. It is effective for all waters, especially open, rough, or remote waters where rescue may be delayed. It allows an employee to keep still and adopt the Heat Exchange Lessening Posture (HELP) to conserve body heat. It is designed to turn an unconscious wearer to a face-up position in the water.
- Personal flotation devices shall be maintained in safe condition and shall be considered unserviceable when damaged in a manner that affects buoyancy or fastening capability.

4.32.4.9. Non-required Additional Personal Protective Equipment to Consider

- Flotation Coat – Flotation coats are insulated coats that include flotation. They provide warmth and at the same time double as a life jacket that will float an employee who falls in the water.
 - Float coats are recommended for boaters who boat year-round in moderate temperatures but where the water stays cold. If you boat in extreme cold temperatures, a flotation coat will not provide enough hypothermia protection if you fall into the water.
- Immersion or Survival Suit – An immersion suit, otherwise known as a survival suit, like a Mustang Survival suit is recommended.
 - Survival suits provide warmth and protection from the elements.
 - They provide flotation and hypothermia protection if you are submersed in the water. Wearing a survival suit can increase survival time in cold water before hypothermia sets in.
- Dry Suit – Dry suits can be instantly drawn tight to prevent water from entering; however, hypothermia prevention depends entirely upon properly layering the clothing worn beneath the dry suit.
- Dress in Thermal Layers – Dressing in layers to provide maximum protection and warmth. Whether you wear a flotation coat, an immersion suit, or a dry suit, dress in thermal layers. Wool is one of the best types of material to use, but other synthetic materials are available. Be sure to include a hat to protect your head from heat loss.
- A Personal Position Locator Beacon – Otherwise known as a PLB, a personal position locator beacon is a scaled down version of the Emergency Position Indicating Radio Beacon (EPIRB).
 - When immersed in water or manually activated both an EPIRB and a PLB transmits a signal that allows rescuers to pinpoint an employee’s location.

- A Personal Emergency Locator Light – An emergency light you wear and activate if you are in the water can attract the attention of rescuers, providing a much larger and more visible target than an employee’s head in the water.
 - The bright, flashing light can be visible for great distances, depending on the make and model of the light, which increases chances of being spotted by rescuers or a passing boater.
- A Whistle – Attracting attention will increase chances of surviving in the water. Rescuers are trained to turn off the boat engines and listen for a period of time while they are on search and rescue missions, or a nearby boater may hear the signal.
 - Conventional whistles don’t work if the “pea” inside is wet, so choose a waterproof model.
- Flares – Store hand-held and/or parachute flares in your immersion suit pockets, secured with a lanyard. Be familiar with how to use the flares to signal distress.

4.32.4.10. Lifeboat/Raft

- Life rafts usually fall into two categories: coastal and offshore.
 - Pick a raft that can hold as many of the folks you plan to have aboard as possible, and it must stow away in a readily accessible place.
 - It also must be easy to deploy, and easy to get into, even in the most unfavorable conditions. A good raft also allows for an easy exit once rescuers arrive on the scene.
- Coastal rafts are engineered and designed for areas where the U.S. Coast Guard is within a reasonable rescue distance; but they are still safe and can be used offshore. For open-ocean transit, long-distance journeys and international travel, offshore-class rafts need to keep survivors safe at sea for longer periods of time, when rescue Personnel are farther away.

4.32.5. Documentation

- Swing Rope Inspection
- Offshore Annual Facility Security Inspection Form

4.32.6. References

- *Department of Homeland Security – Port Security Identification Requirements*
- *USCG Standards and Guidelines for Offshore Travel*
- *DOT- 49CFR Chapter1 Subpart D*

4.33. Material Handling and Storage

4.33.1. Purpose

This section provides the minimum safety guidelines for the proper material storage and handling at Company facilities.

4.33.2. Scope

This section will cover all Company owned or leased facilities and Company Right-of-Way (ROW).

4.33.3. Responsibilities

People Leaders shall:

- Ensure all materials are safely and properly stored on owned or leased Company property.
- Ensure that the proper equipment is utilized to handle the storage of bulk materials.
- Ensure that the proper storage techniques, distances, and conditions of order are maintained during the storage and handling of materials.
- Ensure only trained and if required licensed Employees will operate the material handling equipment.

Employees shall:




- Know and follow the safe techniques for storing the various types of materials.
- Only operate material handling equipment they have been qualified to use.
- Pre-inspect all handling equipment at the start of a work period.
- Attend and participate in any required training.

HS Support shall:

- Inspect storage areas as per general inspection procedure.
- Periodically observe work practices during loading and unloading operations at material storage yards.
- Provide material storage technical assistance as requested.

4.33.4. Requirements

4.33.4.1. General

-  All materials, goods and things shall be stored in the workplace in such a manner that the maximum safe load carrying capacity of the floor or other supporting structures is not exceeded.
-  All shelves will display their load rating or have ready the manufacturers load rating guide for the shelving.
-  All materials, goods or things shall be stored and placed in such a manner that Employees are not required manually to lift materials, goods or things in a manner that would lead to overextension of or excessive strain on the body.
- The storage of materials shall be segregated as to kind, size, length and then placed in neat, orderly stacks that are secured from collapse or movement.
- If the stacks of material are deemed high, they shall be stepped back as the height increases.
- Access to walkways, aisles, and emergency equipment should be kept clear of stored material.
- When unusual material handling operations are planned, special safety considerations should be developed and reviewed by the crew assigned the job.

4.33.4.2. Bulk Storage in Tanks, Drums, or Cylinders

Products delivered in tanks, drums or cylinders shall be stored in a safe manner protecting the identification labels and following any special storage requirements for the individual products.

4.33.4.3. Pipe Storage

- Pipe shall be stored on specially designed dirt and sand sills or racks.
- Load ratings must be visible on pipe storage racks.
- All pipes containing asbestos pipe wrap material must be stored on plastic sheeting in order to protect the environment.
- All pipes shall be safely blocked, if the dirt sill or storage rack cannot prevent the individual pipes or pipe stack from moving.
- See additional pipe storage procedures in *Environmental Procedure 8 D-3 Storage*.

4.33.4.4. Flammable Liquids and Compressed Gas Storage

- Only approved containers shall be used for the storage and dispensing of flammable liquids.
- Compressed gas cylinders shall be racked, identified, stored upright, and secured.
- Compressed gas cylinders of Oxygen must be stored away from other cylinders.
- All containers used for dispensing flammables shall be grounded and bonding shall be used when transferring flammables from one container to another.
- Compressed gas cylinders shall have protected caps in place and be kept in an upright position except, if necessary, for short periods of time while cylinders are being:
 - hoisted or carried
 - transported (provided they are adequately secured against movement and any TDG/DOT requirements are met)

NOTE: Acetylene and CO₂ compressed gas as well as cylinders containing pressurized liquid Oxygen, Nitrogen, or Argon must be kept in an upright position at all times.

4.33.4.5. Material Handling

- Advanced planning for material handling and layout shall include the size, shape, type, and weight of the various materials.
- All equipment operators shall be properly trained and certified/ licensed for the various types of handling equipment.

4.33.4.6. Hand Truck for Manual Handling

There are a variety of accessories available for aiding manual handling of material. All devices will be kept in good repair and used only for the job for which they are designed.

- When using a hand truck, always face the direction the truck is heading.
- Hand trucks will be pushed rather than pulled when possible.
- Hand trucks will not be used to carry people.
- Hand trucks shall be examined before each day's use.

- Operators of hand trucks shall not go ahead of hand trucks, pushcarts, etc., when descending a ramp or incline.

4.33.4.7. Manual Drum Handling

- Determine the weight of the contents.
- Use a drum lifter to lift or lower a drum from an upright position and use team lifting when a drum lift is not available.
- Use a drum dolly to move an individual filled drum.
- To roll an empty drum, grasp the chime with both hands.
- Lean the drum slightly inward and roll slowly on bottom chime, rotating hands as the drum rolls.
- Return the drum to an upright position to change direction and with the drum facing in the new direction, reposition hands and begin roll procedure.

NOTE: Various shapes, sizes, and weights of objects will be encountered, such as pipes, gas cylinders, bags of material etc. In these cases, employ mechanical lifting devices, good lifting techniques and teamwork as much as possible.

4.33.5. Documentation

- N/A

4.33.6. References

- OSHA 29CFR 1910.101 Hazardous Materials – Compressed Gases
- OSHA 29CFR 1910.106 Hazardous Materials – Flammable and Combustible Liquids
- OSHA 29CFR 1910.176 Materials Handling and Storage – Handling Materials, General
- OSHA 29CFR 1910.178 Materials Handling and Storage – Powered Industrial Trucks
- OSHA 29CFR 1910.179 Materials Handling and Storage – Overhead and Gantry Cranes
- OSHA 29CFR 1910.180 Materials Handling and Storage – Crawler Locomotive and Truck Cranes
- Canadian Occupational Health and Safety Regulations Division IV Section 14.50 (1) to (3) (f)

4.34. Mechanical Heavy Equipment Safety

4.34.1. Purpose

This section establishes basic guidelines for the safety of Employees and Contractors when using or working around mechanized equipment to excavate, level, clear or bore on all Company facilities or Company projects, including Right-of-Way (ROWs).

4.34.2. Scope

This section applies to Workers that will use mechanized equipment, including (but not limited to) track hoes, backhoes, excavators, bulldozers, and tractors at all Company facilities or Company projects, Right-of-Way (ROWs).

4.34.3. Responsibilities

People Leaders shall:

- Ensure that heavy equipment operation at locations is performed only in accordance with Company procedures.
- Ensure that heavy equipment operators are trained in the safe operation of their equipment based on type and manufacturer.
- Be accountable for identifying hazardous environments that may impact equipment selection and operation.
- Ensure load limits and marking on equipment are present and legible.
- Maintain general site housekeeping to facilitate safe equipment operation.
- Ensure all Company owned, leased, operated heavy equipment is inspected before use and maintained in a safe condition. Company owned equipment must be inspected annually. Contact Fleet Services for assistance regarding inspection and maintenance.
- Ensure Employees take into consideration marked and unmarked terrain hazards which could inhibit the safe operation of mechanized equipment.
- Assist with technical assistance, or equipment selection as needed.
- Verify that keys have been removed when not in use.

Employees shall:

- Operate mechanized equipment in a safe manner at all times.
- Operate equipment only after receiving training and demonstrating a complete understanding of the safe work practices to be followed while operating equipment.
- Remove keys when not in use to prevent unintended use by an unqualified Operator.
- Wear all required PPE.
- Always wear seatbelts while operating equipment.
- Assure that site conditions (e.g., grades, weather, and electrical lines and other physical obstructions) are conducive to safe equipment operation prior to equipment use.

HS Support shall:

- Review Company and Contractor mechanized heavy equipment events to determine opportunities for improvement.

Fleet Services shall:

- Be responsible for collecting, maintaining, and updating inventory of mechanized equipment, including but not limited to those identified in the scope of this section.
- Be responsible for ensuring notifications are sent regarding scheduled maintenance and annual inspections.

Safety Shared Services shall:

- Monitor the overall effectiveness of the program through audits and annual reviews to ensure the program meets the legal and business requirements.

4.34.4. Requirements

4.34.4.1. General Safety Practices

- Only trained and qualified Employees may operate mechanized heavy equipment.
- Inspect all mechanized heavy equipment prior to each use.
- Equipment shall have seat belts for the Operator when seated in the normal seating arrangement.
- Seat belts must always be used.
- Heavy equipment shall be provided with ROPS.
- Do not start the equipment or operate the controls from any position other than the driver's seat.
- No one except the Operator may ride in or on the mechanized heavy equipment.
- Shut down the engine when filling the fuel tank. When filling the fuel tank on the mowers, rest the fuel can on the tank or metal funnel to eliminate static electricity.
- When mobile lifting equipment or excavation equipment is used near energized overhead power lines or stationary electrical equipment at least 3 of 5 layers of safety controls will be used. Refer to the Electrical Safety Standard.
- Do not exceed the maximum lifting capacity of the equipment that is displayed on the mechanized equipment.
- Before moving a load, verify that:
 - Cables, chains, slings, and other attachments are properly applied and secured, and safety latches are functional on all hooks.
 - Load is properly balanced and free from entanglement.
 - No one is in danger of injury from movement of the load or line.
- Do not allow anyone to work or stand underneath loads suspended from lifting or digging equipment.
- Allow only one Worker to give signals to the equipment Operator. The Operator must obey a "stop" signal given by anyone.
- Remove all keys when the machine is unattended and not in use.

4.34.4.2. Work Area Controls

- All Personnel approaching operating equipment must establish eye contact with the equipment Operator and have the Operator acknowledge that they indeed see them.
 - This practice shall be exercised from a safe distance of at least 6 m (20 ft.) away from the equipment.
- An exclusion zone shall be established around all mechanized equipment. This includes control of swing zones and any area over which a suspended load could travel.
- All Workers in the general area shall wear High Visibility Safety Apparel (HSVA) in accordance with the PPE section.

- No person shall enter the exclusion zone without permission from the Operator and/or Spotter.

NOTE: *All heavy mechanized equipment has an Operator's blind spot which constantly changes as the equipment is moving. To aid in protecting Personnel, maintain an exclusion zone to ensure non-essential Personnel are clear of the work*

4.34.4.3. Selection of Equipment

- The selection of heavy equipment shall be made according to the scope of work being completed.
- All mobile equipment used on GTM sites shall be constructed and maintained to manufacturer specifications.
- At a minimum, all heavy equipment shall be equipped with:
 - An audible back-up alarm and a manually operated horn.
 - The horn must be distinguishable from the surrounding noise level.
 - Operate the horn as needed when the vehicle is moving in either direction.
 - Keep the horn in operative condition.
 - Adequate front and rear light
 - Adequate braking system for tasks being performed
 - A screen, shield, grill, deflector, guard, or other adequate protection for the Operator where the Operator may be exposed to the hazard of a flying or intruding object.
- Do not operate earthmoving or compacting equipment with an obstructed rear view in reverse unless:
 - The equipment has a reverse signal alarm distinguishable from the surrounding noise level; or
 - A Spotter signals that it is safe to do so.
- Before leaving the Operator's seat, lower the boom to a safe position with the bucket on the ground, and turn off the equipment.
- Adhere to Fleet Services schedule regarding maintenance and annual inspections or service.
- Verify the location of underground utility lines by using the "One Call System" before starting any excavation or underground boring activities.
- After completing excavation or trenching activities, ensure that spoil piles are correctly placed, stable, and that booms, buckets, loaders, blades, etc. are in the correct stable position.

Excavators and Track Hoes

- Support and protect any exposed underground installations while the excavation is open or remove them as necessary to protect Personnel.
- When mechanized equipment must operate near an excavation and the Operator does not have a clear, direct view of the edge of the excavation, place barricades or stop logs around the perimeter of the excavation or use a Spotter and hand signals to assist the Operator.
- To avoid cave-ins:
 - Position excavator at a safe distance from the edge of an excavation or trench.

- Take special precautions if an excavation or trench is accumulating water.
- Place removed material far enough from the excavation or trench to prevent overstressing the trench walls and to maintain a clear work path – refer to [Table 15](#).

Bulldozers

- Bulldozers with a winch will be equipped with a protective guard over and at the rear of the Operator. The guard must be constructed of at least 0.3 cm (1/8-in) steel plate or at least 0.6 cm (1/4-in) woven wire mesh with openings no larger than 2.5 cm (1 in).
- Block or completely lower the bulldozer blade when the bulldozer is not in use.
- Ensure that substantial cribbing is in place before working on or under a raised blade. The height of the cribbing must not exceed the width of its base.
- Ensure that all persons are in the clear before moving the machine. Do not operate the machine on a ROW until all Workers are in the clear.
- Stop the engine and shut down equipment before making repairs or greasing the machine.

Backhoes

- Before using the loader, be sure the backhoe is in the transport lock position.
- Do not use the bucket as a work platform or Personnel carrier.
- Carry the backhoe bucket low to avoid obstructed vision and to maintain maximum stability while traveling.
- Do not operate equipment if anyone is within the backhoe swing pivot area.
- Drive straight up and down the slope.
- Avoid turning on a slope if possible.
- If necessary, make a wide, slow turn on the slope and carry the bucket low.
- Driving across a steep slope is prohibited.
- Swing the bucket to the uphill side to drop the spoil, if possible, when operating on a slope.

Loading and Unloading Equipment


- All equipment is not loaded the same way. Always follow the procedures recommended by the manufacturer. (Reference documentation obtained from Technical Vehicle Operations training to ensure proper securement of cargo.)
- Ensure the truck and trailer are of adequate size and weight capacity for the piece of equipment to be hauled.
- Ensure trailer is parked on level stable ground.
- Do not park the truck, trailer, or lowboy under power lines for loading / unloading.
- Ensure the brakes are set on the transport and the wheels are chocked.
- Use a spotter, do not load or unload equipment on a truck, trailer, or lowboy alone.
- Once equipment has been loaded it must be properly secured using a minimum of four tie downs.

- All accessory equipment such as booms, blades, buckets, bush hogs, etc. must be completely lowered and secured.

Operator Safety

- Operators shall be qualified based on experience and training received to operate the equipment they are using.
- Operators must complete daily inspections of equipment and be prepared to present this upon inspection.
- Spotter shall be used whenever appropriate to ensure that inadvertent contact is not made with any person or other piece of equipment.
- The Operator shall never exceed what the heavy equipment is capable of performing according to manufacturer limitations and safety factors.
- Operators shall complete FLHA prior to any work. This shall include, but is not limited to review of excavation hazards, material handling, access and egress to the equipment, electrical hazards, proper rigging of loads, and load limitations.
- Ensure that equipment is properly disengaged and configured when leaving the equipment – even for short periods of time.

4.34.5. Documentation

- Maintain records of annual inspections and periodic servicing as determined by Fleet Services.
- Electrical Safety Procedure
-  US Projects may use HS-300 Mobile Equipment Pre-Movement & Spotter Guideline

4.34.6. References

- *29 CFR 1926.600 Equipment*
- *29 CFR 1926.604 Site Clearing*
- *29 CFR 1926.650 Excavations*
- *29 CFR 1926.651 Specific Excavation Requirements*
- *29 CFR 1926.652 Requirements for Protective Systems*
- *29 CFR 1926.956 Underground Lines*
- *29 CFR 1926.957 Construction in Energized Substations*
- *49 CFR 393 Subpart I Protection Against Shifting and Falling Cargo*

4.35. Personal Protective Equipment (PPE)

4.35.1. Purpose

The purpose of this section is to establish the PPE to be used at Company facilities. The purpose of PPE is to prevent harm to Workers and reduce the severity of injury and illnesses.

Personal Protective Equipment (PPE) is one of the most common controls used to reduce the impact of hazards to a Worker's health and wellbeing.

4.35.2. Scope

This section applies to all the Company Employees, Contractors, and Visitors while on location at Company facilities or worksites.

4.35.3. Responsibilities

People Leaders shall:

- Provide Enbridge employees with appropriate and properly fitting PPE.
- Ensure Employees, Contractors and Visitors wear the proper PPE in designated areas.
- Ensure locations/site-specific PPE hazard assessment is completed.
- Ensure PPE requirements are reviewed with visitors to the site – additional information on site-specific orientations can be found in Health and Safety Orientations.

Workers shall:

- Ensure that PPE is maintained in a sanitary and reliable condition.
- Wear Company provided PPE when potentially exposed to workplace hazards and when required by this section.
- Inspect their PPE routinely; if equipment is found to be defective it should be removed immediately.
- Report PPE malfunctions to Supervisors or another appropriate person.
- Workers visiting facilities belonging to another Company will adhere to the PPE requirements in force at that facility.
- Assist in conducting PPE hazard assessments.
- Review applicable and most recent location-specific PPE Hazard Assessments when conducting Pre-job Safety Meetings.
- Store PPE in a manner that protects against dust, sunlight, heat, extreme cold, excessive moisture, chemicals exposure and physical damage.
- Complete required PPE training.
- Before performing work requiring the use of PPE, Employees shall demonstrate an understanding of the following:
 - Selecting the appropriate PPE to control identified hazards
 - When to use PPE
 - Limitations of various types of PPE
 - How to don, doff, adjust, and wear the PPE
 - Proper care, maintenance, and useful life of PPE
- Employees shall be re-trained when:
 - Changes in the workplace render previous training obsolete
 - Changes are made to the Employee's job requiring new PPE
 - Changes in the types or manufacturer of the PPE

- Obvious inadequacies in an employee's understanding and use of PPE

Contractors/Visitors shall:

- Provide Workers with required PPE and the appropriate training to perform duties in compliance with this section.

HS Support shall:






- Review the available PPE for applicability at facilities.
- Assist facility in initiating and/or conducting the PPE hazard assessments.

Safety Shared Services shall:

- Review new PPE technologies and assess new PPE requests.

4.35.4. Requirements

4.35.4.1. Hazard Identification, Assessment and Control

- Each facility, operating area, or project shall conduct an initial PPE Hazard Assessment using a PPE hazard assessment form to determine if current or potential hazards are present which require using PPE.
 -  UST and US Projects may use Workplace Personal Protective Equipment Hazard Assessment
 -  Offshore may use the PPE Certification of Hazard Assessment Form
 -  People Leaders shall be responsible for ensuring PPE Hazard Assessments are completed as necessary to site safety for Personnel.
 -  People Leaders shall sign the completed PPE Hazard Assessment Form.
 -  HS Support Personnel shall provide guidance and assistance to People Leaders as needed to complete Hazard Assessments and ensure follow-up adjustments to site PPE requirements as warranted.
- Reassessments shall occur every three years or when changes occur in the workplace, which render the previous assessments obsolete.
- Workers shall be aware of all additional PPE requirements and observe sign postings when hazards are present.
- When PPE is specified for certain work assignments or locations, its use is mandatory.
- Additional hazard assessments will be performed at all worksites to determine if hazards are present or are likely to be present which necessitates the use of additional task specific PPE.
- If such hazards are identified, affected Workers must have and use the type of PPE that will protect them from the hazards identified.
- Similar worksites (such as tank batteries, small compressor stations, pipeline meter stations, etc.) may be assessed individually or grouped.
- Records of PPE hazard assessment and reassessments are required to be kept for the life of the facility.

4.35.4.2. Eye and Face Protection


- Workers will wear safety glasses while performing work in a plant, compressor station, pipeline facility or ROW location, shop and on a platform.
- All Workers must meet the Minimum Requirements for Eye and Face Protection when carrying out the listed activities that present eye and face hazards.
- Workers are not required to wear safety glasses while sheltered in the office or break area, warehouse (unless a hazard assessment identifies a risk of eye injury), living quarters or a motor vehicle.
- Eye and face protection must meet either ANSI Z87.1 (US) or the CSA Z94.3 (Canada) standard.

NOTE: This includes the specific markings on the eye and face protectors with information required by the above-mentioned standards.

4.35.4.3. Prescription Safety Glasses

 Where there is a danger of impact, safety glasses must have polycarbonate lens.

4.35.4.4. Subsidies

- Where eye protection is required, the Company will purchase or reimburse prescription safety glasses as per applicable benefits program.
- The maximum amount to be expended on prescription safety glasses is determined within the location's Employee benefit package or defined with an alternate agreement.
-  Processing, controlling, and verifying the occupational lens prescription, frame measurement, dispensing and fitting will be paid for by the Company to the optometrist through Provincial Occupational Vision Care services.

4.35.4.5. Eligibility

The prescription safety glasses program is available to:

- All field operating and maintenance Employees, including temporary help, Supervisory Personnel and Summer Students.
- Office Employees whose duties involve work in field locations if the Employee's Manager or Safety Advisor determines that eye protection is warranted based on the merits of each case, with the frequency of field visits taken into consideration.

4.35.4.6. Frequency of Purchase

Qualifying Employees may order replacement eyewear as per their regional agreements unless the lenses become damaged to the point where vision is impaired, or a prescription change warrants replacement.


4.35.4.7. Frames

- Frames must meet the following specifications to be eligible for coverage:
 - Detachable or fixed side shields
 - The requirements specified in ANSI Z87.1 (for US) or CSA Z94.3 (for Canada)
- Employees are encouraged to select side shields that provide both top and side protection.

- Metal frames may not be appropriate where electrical hazards are common.

4.35.4.8. Lenses

- Polycarbonate, plastic, and glass lenses must be marked in accordance with *ANSI Z-87.1, Industrial Eye and Face Protectors*.
- Polycarbonate lenses have the highest resistance to impact and are preferred by Vendors and the Company.
- Glass is least preferred due to potential shattering on impact.
- Scratch resistant coating, anti-reflective coating and ultraviolet coating are permitted options for lenses.
- Tinting is an acceptable option subject to the following restriction:
 - #1 lens tint for indoor use only
 - #2 and #3 tints for outdoor use only
- Video display terminal (VDT) option packages, which usually include ultraviolet coating, slight tint, and anti-reflective coating, are not recommended for field Workers, since they are often susceptible to scratching.
- Photochromic lenses are not covered unless pre-authorized.
- The use of tinted or variable tinted lenses when a Worker must pass from a brightly lit area to an area with low illumination is prohibited (e.g., a forklift operator passing from outdoors to indoors).
- Bifocal lenses are a permitted option subject to the following qualifications:
 - Full-field multifocal are generally not recommended; if recommended by the doctor or eyeglass dispenser, polycarbonate lenses should be obtained.
 - Progressive power lenses (no-line bifocals) should be used with caution by uninitiated Employees, who may have problems with depth perception.

 Contact lenses do not provide eye protection in the industrial sense and must be worn only with approved safety eyewear. Furthermore, contact lens use should be restricted in the presence of fumes, vapors, splashes, intense heat, or highly particulate atmosphere(s).

 Contact lenses are permitted if:

- Appropriate eye protection is worn.
- Workers inform their supervisors so that proper care may be administered in an emergency.

Table 23: Minimum Requirements – Eye and Face Protection

Activity	Eye and Face Protection Required
Abrasive blasting	<ul style="list-style-type: none"> • Blasting hood
Chipping, hammering metal, sledge hammering, jack hammering, using compressed air, operating gas, electric or hand saws, concrete work	<ul style="list-style-type: none"> • Safety glasses with side shields, or • Impact goggles • Face shields are required unless a hazard assessment determines the face shield introduces a greater hazard.
High-voltage work	<ul style="list-style-type: none"> • Face shield¹ (switching hood recommended over 5 KV), and • Safety glasses with side shields

Activity	Eye and Face Protection Required
Low-voltage work	<ul style="list-style-type: none"> Safety glasses with side shields
Removing asbestos materials	<ul style="list-style-type: none"> Face shield and safety glasses with side shields, or Goggles or Full face respirator
Handling liquid hazardous substances (e.g., toluene, NGL, wet cell batteries)	<ul style="list-style-type: none"> Chemical splash goggles, and any additional protective equipment indicated on container labels or SDSs Face shield when handling large quantities, exposed to liquid spray, or transferring liquids
Mowing	<ul style="list-style-type: none"> Safety glasses with side shields
Operating chainsaws, using weed trimmers	<ul style="list-style-type: none"> Face shield or safety glasses with side shields, or Impact goggles Mesh face shields are recommended when operating chainsaws
Arc Welding	<ul style="list-style-type: none"> Welder <ul style="list-style-type: none"> Welding helmet and safety glasses with side shields, or Welding mono-frame goggle. As per OSHA 1910.252, shaded lenses must be shade 10-14 based on type of welding, shade 4 – 8 for gas welding Helper <ul style="list-style-type: none"> Same as above, or Face shield along with shaded² safety glasses with side shields, or Face shield and shaded² welder/cutter goggles.
Oxy-acetylene welding, brazing, or soldering or cutting,	<ul style="list-style-type: none"> Welder <ul style="list-style-type: none"> Welding helmet and safety glasses with side shields, or Face shield and shaded² safety glasses with side shields, or Shaded² mono-frame welder/cutter goggles. Helper—same as Welder
Wire brushing, buffing, grinding (electric and pneumatic), cut-off saws and concrete saws	<ul style="list-style-type: none"> Standard: CSA Z94.3 (Canada) / Hi-Impact Z87 (US) Safety glasses with side shields Face shields
Working in windy conditions	<ul style="list-style-type: none"> Protection as required

NOTE: Face shield should have dielectric properties and ultraviolet protection. Minimum shade of three (3).

4.35.4.9. Safe Removal of Eye and Face Protection

Use the following method as a guide to safely remove your hard hat, face shield and safety glasses/goggles.

1. Bend over (be mindful of your back)
2. Some loose particles should fall off
3. First, grab the back of the face shield and hard hat
4. Pull forward away from your head
5. Finally, pull down and away from your face
6. Next, grab the arms of your safety glasses close to your ears
7. Avoid grabbing the frame around the lenses that are close to your eyes
8. Pull the safety glasses down away from your face:
 - a. Tap your face shield to remove any remaining particles.

- b. Tap your hard hat to remove any remaining particles.
- c. Tap your safety glasses to remove any remaining particles.

4.35.4.10. Head Protection Requirements

Hard Hats



- Always wear an approved, industrial hard hat while on Company property, such as in gas treating stations, compressor stations, on offshore platforms, on pipeline ROWs, and at other pipeline facilities such as meter stations, pig launchers and receivers, tank batteries, etc.
-  Hard hats shall meet ANSI Z89.1, Type 1, Class E.
-  Hard hats must meet CSA Z94.1 or ANSI Z89.1:
 - Class G for general use. (Proof tested to 2000 volts); operating plants and pipelines
 - Class E for electrical trades involved in high voltage work. (Proof tested at 20,000 volts.)
 - Class E Type 2 (Side Impact Model) (CSA Z94.1-2005 or ANSI Z89.1-2009) for Contractors working on project worksites; new pipeline and plant construction or those Workers exposed to risk of a side impact hazard
 - Winter liners should be flame resistant
- Each hard hat must be marked with the information specified by ANSI Z89.1 for that type of protector and for the hazard involved.
- Never alter or modify the shell or suspension of the hard hat (drill holes in, paint, etc.).
- Hard hats shall be worn properly – as the manufacturer intended (e.g., not turned backwards unless manufacturer has designed hard hat to be worn this way).
- Regularly inspect hard hats and replace at the first sign of. Color fading, breakage, cracks, crazing, discoloration, flaking, delamination, chalky appearance, stiffness/brittleness.
- See [Table 22](#) for the maximum recommended replacement schedule by the manufacturer (replace sooner if hard hat condition dictates).

Table 22: Manufacturer Recommendation for Hard Hat Replacement

Manufacturer	Hard hat Shell	Hard hat Suspension
MSA	5 years	12 months
3M	2 – 5 years (depending on work environment)	12 months
Other	Manufacturer Recommendation	Manufacturer Recommendation

Hard Hat Exemptions

- Hard hats do not need to be worn when sheltered in a motor vehicle, helicopter, cabin of a boat, equipment with enclosed cabs, buildings, or break areas (unless otherwise posted or if exposed to head contact hazards).
- Hard hats are optional for Employees actively engaged in welding or when wearing an SCBA when the site Hazard Assessment indicates that overhead and falling object hazards are controlled or not present.

- A hard hat exemption may be granted for specific tasks based on the hazard assessment for that task and approved by the Site Supervisor. With this exemption, hard hats must still be worn when reasonably practical.

Helmets

- Motorcycle helmets shall be worn while operating all-terrain vehicles (ATVs), utility terrain vehicles (UTVs) and Snowmobiles as required in the *All-Terrain and Off-Road Vehicles* section of this manual.
- Motorcycle helmets are not approved industrial head protection and are not acceptable as substitute protection.
 - Workers required to enter work areas or perform work activities where they are exposed to head contact hazards must remove helmets and wear approved hard hats, unless actively operating an all-terrain vehicle.

4.35.4.11. Hearing Protection – Requirements

- Hearing protection devices with a minimum Noise Reduction Rating (NRR) of 25 dBA shall be furnished by the Company and must always be properly worn within areas posted as “hearing protection required” areas, and in areas where sound levels exceed 85 dBA. Examples include but are not limited to:
 - Operating jack hammers
 - Lawn mowers
 - Lawn trimmers
 - Other high noise level equipment.
- Dual hearing protections (ear plugs and earmuffs) must be worn in areas where sound levels exceed 100 dBA. Examples include but are not limited to:
 - Blowing down sections of line
 - Working in compressor rooms
 - Operating air compressors.

4.35.4.12. Hand Protection – Requirements

- The Company provides the appropriate type of hand protection for all work activities.
- Supervisors will arrange for the appropriate hand protection.
- All Workers must meet the minimum requirements for hand protection when carrying out the listed activities that present a hazard to the hands (see [Table 23](#)).

Table 23: Minimum Requirements for Hand Protection

Activity	Hand Protection Required
General work and housekeeping	<ul style="list-style-type: none"> • Cotton or leather gloves
Abrasive blasting	<ul style="list-style-type: none"> • Leather gloves
High-voltage work	<ul style="list-style-type: none"> • ANSI/ASTM-approved rubber gloves of appropriate voltage rating worn under leather gauntlet gloves¹



Activity	Hand Protection Required
Low-voltage work	<ul style="list-style-type: none"> ANSI/ASTM-approved rubber gloves of 1000 volt rating worn under protective leather gauntlet gloves²
Handling acids or caustics (including acid batteries)	<ul style="list-style-type: none"> Neoprene or nitrile gloves
Handling NGL (risk of spray)	<ul style="list-style-type: none"> Neoprene gloves and protective sleeves
Handling pipe, valves, and casing, and measuring equipment where exposed to induced voltage	<ul style="list-style-type: none"> ANSI/ASTM-approved low voltage lineman's rubber gloves and protective leather gauntlets
Handling toluene	<ul style="list-style-type: none"> Nitrile gloves
Operating chainsaws	<ul style="list-style-type: none"> Leather gloves
Vibrating/high impact equipment	<ul style="list-style-type: none"> Vibration-dampening gloves
Washing and cleaning using detergents.	<ul style="list-style-type: none"> Rubber gloves
Welding and associated activities	<ul style="list-style-type: none"> Leather gauntlet-type gloves

NOTES: Rubber gloves must be at least 450 mm (18 in) long and extend 25 mm (1 in) past the leather gauntlet for every 10,000 V. Gloves may not be necessary if insulated hand tools rated at 1000 V are used. The leather gauntlet gloves may be removed if finger dexterity is required and the rubber gloves are not subject to damage.

4.35.4.13. Foot Protection – Requirements

- Always wear approved, safety toed (steel or non-metallic) work footwear while in a plant, compressor station, pipeline facility and on a platform.
- Safety toe, work footwear does not need to be worn when sheltered in:
 - Control rooms, lunchrooms, living quarters, offices
 - Motor vehicle, boat, helicopter
- Canvas or synthetic fiber cloth shoes are prohibited footwear for Workers working in non-office environments and are not allowed.
- Athletic looking shoes meeting either *ASTM F2413 (US)* or *CSA Z195-02 (Canada)* standards **are not covered** under the protective footwear allotment program and are not allowed at a Company worksite:

4.35.4.14. Safety Footwear



- Safety footwear must comply with the following standards:
 -  ASTM F24 13
 -  CSA Z195-02
 - Grade 1 protective toe cap to provide protection against impact to the toes
 - Protective sole plate to protect against penetration of sharp objects into the bottom of the foot
 - Oil and acid-resistant soles
 - Protective footwear provides ankle support
 - Non-slip soles where there is a hazard of slipping

- Each pair of footwear must be marked with the information specified by the above-mentioned standards for each specific type of footwear.
- Consider the work environment and the potential for foot or ankle injury when choosing a type and style of safety footwear.
- Where icy walking surfaces exist ice cleats shall be worn.
- The work environment shall determine the choice of:
 - Shoes or boots (ankle support, hot or cold environment),
 - Sole (e.g., puncture resistant, nonskid, stitched vs. vulcanized, cold resistant, electric shock-resistant, chemical resistant.)
 - Fastenings (e.g., laced versus unlaced, closed top versus open top),
 - Accessories (e.g., metatarsal plate).
- Protective footwear should be replaced if:
 - Soles are worn so that the slip resistance of the footwear has been drastically reduced.
 - Soles are cracked, leather is cut, or toe caps are exposed as this damage reduced the protective qualities of the footwear.

4.35.4.15. Footwear Exemptions

Workers and visitors on a supervised or controlled tour of a facility, or whose occasional visits are of an administrative nature may be exempt from the requirement for safety footwear, but only if they do not have the potential to be exposed to any hazard.

4.35.4.16. Subsidies

- Company Employees (regular, full time) as well as temporary Employees (subject to supervisory approval) are eligible to purchase the approved protective footwear.
- Each Employee is responsible for following these guidelines when purchasing protective footwear:
 - Employee must purchase comfortable protective footwear for their use only.
 - Employee may order or buy the protective footwear from a Vendor of their choice. Merchandise returns will be at the expense of the Employee.
-  Where CSA approved safety-toed shoes, boots or winter boots are required, the Company will purchase or reimburse CSA approved safety-toed shoes, boots, or winter boots as per applicable benefits program.
-  Where protective footwear is required, the Company will purchase or reimburse protective footwear as per applicable benefits program.
- During protective footwear purchases, Employees should consider other H&S risk as identified from the location specific PPE Hazard Assessment. The identified risk can be mitigated by other available protective footwear features designed into the approved footwear. These features include, but are not limited to:
 - Electrical hazards (EH)
 - Slip resistant (SR)

- Non-metallic toe cap (NU)
- Puncture resistant (PR)
- Waterproof
- Metatarsal guard (MG)
- Firm ankle support (6-in /15 cm shoe top)
- 1.3 cm (½-in) heels
- Location-specific PPE Hazard Assessment may require special footwear for unusual jobs. In these special cases the footwear will be provided by the Company. These unusual jobs and/ or activities may include, but not limited to:
 - Rubber knee or hip length boots
 - Rubber pull over booties for electrical hazards
 - Special weather conditions (cold weather and ice)
 - Chemical resistant boot covers

4.35.4.17. Safety Footwear Exceptions

- Escorted Tours:
 - Escorted tour groups may be exempt from wearing protective footwear at a specific facility that has been previously approved by the respective Site Management. The Protective Footwear Exception Form must be completed.
- Medical Clearance:
 - Should an employee have a medical condition which prohibits the wearing of protective footwear, he or she shall submit the completed Protective Footwear Exemption Form to the People Leader and shall be handled within the HR guidelines for *Health Insurance Portability and Accountability Act (HIPAA)*.

The People Leader of the Worker granted a medical clearance exemption must:

- Restrict Worker from jobs and/or areas that require foot protection or
- Provide special footwear to adequately protect against the hazard. Contact HS Support for assistance.

4.35.4.18. Protective Clothing – Requirements

- Disposable chemical protective gear used in FRC specified areas must also be flame resistant.
- When working around rotating or reciprocating machinery, observe the following precautions:
 - Ensure gloves, ties, and loose clothing does not become entangled in equipment. Button or properly roll up long sleeves and tuck in shirt tails.
 - Do not wear loose jewelry (e.g., necklaces, chains, cords) outside clothing.
 - Drawstrings on clothing (e.g., hoodies) shall be removed to prevent risk of entanglement.
 - Long hair shall be tied back or otherwise secured to prevent any risk of entanglement.

- Do not wear, do not store with food, do not launder with other clothing or store with clean clothing any personal or protective clothing that becomes saturated with oil, solvents, or hazardous or toxic substances.

Table 24: Requirements for Protective Clothing

Activity	Body Protection Required
Handling NGL (risk of spray)	<ul style="list-style-type: none"> • Neoprene apron
Removing asbestos materials	<ul style="list-style-type: none"> • Disposable hooded coveralls (preferably Tyvek brand) with elastic fittings • Rubber boots or disposable boots (preferably Tyvek brand) • Elasticized shoe covers
Steam cleaning or high-pressure washing	<ul style="list-style-type: none"> • Rubber apron or slicker suit • Rubber boots
Handling acids, caustics, or other hazardous chemicals (large quantities)	<ul style="list-style-type: none"> • Neoprene or nitrile apron or slicker suit
Operating chainsaws	<ul style="list-style-type: none"> • Approved leg chaps • Heavy pants • Long-sleeved jacket or shirt
Mowing and weed trimming	<ul style="list-style-type: none"> • Heavy pants • Long-sleeved jacket or shirt
Abrasive blasting	<ul style="list-style-type: none"> • Heavy pants, • Long-sleeved jacket or heavy shirt
PCB Exposure	<ul style="list-style-type: none"> • Suitable chemical and/or oil-resistant gloves (see the glove manufacturer's specifications for suitability) • Goggles if there is potential for a chemical or oil splash hazard • Protective clothing such as a coverall or work apron
Spill Clean-up	<ul style="list-style-type: none"> • Level A, B, C, or D as designated by the Event Commander
Welders and welder's helpers (radiant energy)	<ul style="list-style-type: none"> • Heavy pants, • Long-sleeved heavy shirt
High voltage electrical equipment maintenance, service, repair, testing and operation	<ul style="list-style-type: none"> • Flame-Resistant Clothing

4.35.4.19. Welders and Welder's Helpers

- All Welders and Welder's Helpers should wear clothing that will provide sufficient cover and is made of suitable materials that will minimize skin burns caused by sparks, spatters, and radiation.
- All Welders and Helpers should wear leather gauntlet-type gloves with seams on the inside to prevent stitches from burning.
- Welding helmets or mono-frame goggles shall protect the face, forehead, neck, ears, and eyes.
- Goggles, with the appropriate filter shade (at least 3), or a welding helmet shall be worn during oxyfuel gas welding and cutting operations.
- Welders and Helpers should take precautions to avoid breathing the fume plume by positioning the work where it is not directly under their face, or by ventilation.
- An air purifying respirator may be worn, if necessary.

4.35.4.20. Flame-Resistant Clothing (FRC)

General Requirements

- FRC provides a measure of protection against unexpected exposure to flash fire for relatively short periods of time, typically three seconds or less.
- FRC can serve to reduce the severity of a burn injury but cannot completely prevent an injury.
 - **Approved FRC:** Flame resistant clothing (FRC) that meets the performance requirements of the following standards.
 - NFPA 2112 Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire
 - ASTM F2733 Flame-Resistant Rainwear for Flame Hazards
 - ASTM F1891 Standard Specification for Arc and Flame-Resistant Rainwear
 - CAN/CGSB-155.21-2001 Recommended Practices for the Provision and Use of Workwear for Protection Against Hydrocarbon flashfire, or
 - CAN/CGSB-155.20 Workwear for Protection Against Hydrocarbon Flashfire

FRC Requirement

FR clothing is required to be worn by all Enbridge employees, contractors, and visitors when working in or around areas where the following tasks/activities are being performed:

- Working within 15 ft. of a planned release of flammable liquids or gases to the environment including but not limited to:
 - Pipeline and facility releases during gas blowdowns, gas evacuations and gas purges
 - Blowing down valve bodies
 - Blowing down, evacuating and purging launchers and receivers
 - Installing leak clamps
- Working in an area where there is an increased risk of an unintentional release of flammable liquids or gas, including but not limited to:
 - During a leak investigation when working within the vicinity of the expected leak and/or investigating potential pipeline damage
 - Assembling and disassembling truck connections for flammable liquid transfer
 - Removing or inserting a pig into a pig barrel
 - During hot and cold cutting of live lines
 - While installing a stopple or hot tap
 - During hot and cold cutting of live lines
 - When working within 15 feet of an operating air mover that is being used to pull potential leaking gas away from a work area
- Performing or monitoring hot work under the issuance of a permit or when entering a classified area where a hot work permit has been issued.
- Where required when working at 3rd party facilities.

In addition to the above requirements, 100% Natural Fibers clothing (e.g., cotton) is required for daily work wear.

Note: For electrical equipment operations, maintenance, service, repair, and troubleshooting, refer to electrical safety standard for additional FRC requirements.

Wearing FRC

FR clothing shall be worn and maintained accordingly:

- Multiple layers of acceptable FRC provide more protection.
- FRC shall be worn as described in the manufacturer's instructions.
- Long sleeved FRC shall be worn in designated FRC areas / jobs.
- Personnel shall wear FRC as the outer-most garments except when other personal protective clothing is required.
- Only approved FR outerwear is permitted to be worn over flame-resistant garments.
- Personnel should not wear synthetic blends such as nylon, polyester, rayon, polyethylene, etc. under the FRC.
- Only natural fibers such as 100 percent cotton or wool or FR are recommended to be worn underneath FRC.
- FRC shall be worn in such a manner as to completely cover the torso, arms, and legs (sleeves rolled down, shirt tucked in and body fully zipped or buttoned up). In addition, appropriate hand protection the appropriate gloves should be worn whenever FRC is required. FR smocks are not allowed.
- FRC should be inspected, laundered, repaired and/or taken out-of-service per the manufacturer's recommendations.
- Where there is a risk of exposure to heat stress, FRC should be constructed of lighter weight FR materials.

Exceptions to FRC Due to Extreme Heat or Cold

- A worker's supervisor has the discretion to waive the FCR requirement on a case-by-case basis when the potential hazards posed by weather conditions outweigh the risk of a flash fire. The exception may also include waiver of 100% natural fiber material when work is outside of gas handling facilities and is not pipeline related work.

Flame-Resistant Clothing Styles

[Table 25](#) lists the acceptable styles of FRC.

Table 25: Acceptable Flame-Resistant Clothing Styles

Fire Resistant Clothing	Examples
Shirts	<ul style="list-style-type: none"> • Long sleeve FRC shirts.
Pants	<ul style="list-style-type: none"> • Long FRC pants or FRC denim.
Coveralls	<ul style="list-style-type: none"> • Long sleeve FR coveralls may be worn as a single layer. When worn over FRC or non-FRC, they will provide more protection.
Bibs	<ul style="list-style-type: none"> • FRC bibs must be worn in conjunction with an upper level of FRC (i.e., FRC long sleeve shirt or FRC jacket).

Fire Resistant Clothing	Examples
Jackets	<ul style="list-style-type: none"> FRC Jackets may be worn lined or unlined. If the lining is FRC, it may be worn as outerwear.
Other	<ul style="list-style-type: none"> Rainwear, High Visibility Vest, Welders Aprons, etc.

Laundering, Care and Inspection

- FRC must be kept clean and in good condition.
- FRC that is damaged, torn, or threadbare must be repaired in accordance with the manufacturer's instructions or retired.
- Soiled or contaminated FRC shall be removed from service and cleaned.
- Keep FRC reasonably free from grease and oil.
- Do not use chlorine bleach when laundering FRC.
- FRC shall be laundered or dry-cleaned in accordance with the manufacturer's instructions.
- FRC should be systematically inspected before each use for damage, soiling or contamination.
- Operations and/or H&S Personnel will periodically inspect FRC to ensure it meets the requirements found in this section.

Arc Flash PPE for Electrical Work

For electrical equipment operations, maintenance, service, repair, and troubleshooting please refer to the *Electrical Safety* section for additional FRC requirements.

For electrical work, test and check voltage rated rubber gloves as follows:

- before each use, check for cracks and air leaks.
- discard arc-rated rubber gloves that fail an air leak test.
- test for voltage at least twice a year (time between tests not to exceed 6 months)
- testing shall be done at a specified voltage by an authorized testing company.
- voltage-rated rubber gloves that have been tested for voltage shall be marked with the date of the test and the test voltage (see [Table 26](#))

General electrical PPE requirements are illustrated below.

Table 26: Voltage-Rated Rubber Gloves

Class	Use
Class 00	Use for circuits up to 500 volts AC
Class 0	Use for circuits up to 1000 volts AC
Class 1	Use for circuits up to 7,500 volts AC
Class 2	Use for circuits up to 17,000 volts AC
Class 3	Use for circuits up to 26,500 volts AC
Class 4	Use for circuits up to 36,000 volts AC

<h2 style="text-align: center;">ARC FLASH PPE GUIDE</h2> <p style="text-align: center;">Guidance on Selection of Arc-Rated Clothing and Other PPE for Use When Incident Energy Exposure Is Determined For more detailed information or other options refer to NFPA 70E 2015 Edition, Table H.3(b) or CSA Z462 Table H.2</p> <p style="text-align: center;">FR Garments for electrical workers shall meet the minimum ATPV of 8 cal/cm² (HRC 2) and increase as required by Arc Flash hazards. Workers should wear only clothing made with a natural fiber (e.g., cotton, wool) or approved FR undergarments below FR outerwear.</p>		
Incident Energy Exposure < 1.2 cal/cm²	Untreated natural fiber Shirt (long sleeve) Pants (long) or coverall Face shield for projectile protection (as needed) Safety glasses or safety goggles Hearing protection Heavy-duty leather gloves or rubber insulating gloves with leather protectors (as needed)	
Incident Energy Exposure ≥ 1.2 to 12 cal/cm² Arc-rated clothing and equipment with an arc rating equal to or greater than the determined incident energy*	Arc-rated long-sleeve shirt Arc-rated pants or arc-rated coverall or arc flash suit Arc-rated face shield and arc-rated balaclava or arc flash suit hood Arc-rated jacket, parka, or rainwear (as needed) Hard hat Arc-rated hard hat liner (as needed) Safety glasses or safety goggles Hearing protection Heavy-duty leather gloves or rubber insulating gloves with leather protectors Leather footwear	
Incident Energy Exposure > 12 cal/cm² Arc-rated clothing and equipment with an arc rating equal to or greater than the determined incident energy*	Arc-rated long-sleeve shirt Arc-rated pants or arc-rated coverall and/or arc flash suit Arc-rated arc flash suit hood Arc-rated jacket, parka, or rainwear (as needed) Hard hat Arc-rated hard hat liner (as needed) Safety glasses or safety goggles Hearing protection Arc-rated gloves or rubber insulating gloves with leather protectors Leather footwear	


*Arc ratings can be for a single layer, such as an arc-rated shirt and pants or a coverall, or for an arc flash suit or a multi-layer system consisting of a combination of arc-rated shirt and pants, coverall, and arc flash suit.

12/10/2015

Figure 20: Arc Flash PPE Guide

4.35.4.21. Personal Flotation Device (PFD) – Requirements

Working Over or Near Water

- Workers working over or near water, where the danger of drowning exists, will be provided with a PFD such as U.S. Coast Guard approved life preserver or buoyant work vest except when using a safety harness and lanyard or lifeline.
- Work vest will be stored in a separate location from life preservers.
- Prior to and after each use, PFDs shall be inspected for defects which would alter their strength or buoyancy.
- Defective units will not be used and will be replaced as-soon-as possible.
- A PFD will be worn when:
 - Riding in a boat other than in an enclosed cabin
 - Transferring from a boat to or from the platform or dock
 - Working in areas above the water such as barges, bottom walkways and decks without a guardrail or if working outside a guardrail
 - Descending to the Plus 12 Level (lowest deck) of an offshore platform
- Entry into the water shall only be permitted when:
 - A diver is to perform specific work
 - An abandon platform order is given
-  Personal flotation devices meeting *CGSB Standard 65-GP-14M* is to be worn by all Personnel when working near water and there is a risk of drowning.

Offshore Specific

- An approved life preserver will be provided for each person on manned and un-manned platforms.
- The life preservers will be stored in easily accessible places.
- Each life preserver will have a personal flotation device light securely attached to the front shoulder area of the life preserver.
 - Replace the light or the replaceable power source for the light before its expiration date.
- Each life preserver will have retro-reflective material attached on its front side and back side and on each of its reversible sides.
- All life preservers will be marked with the name or number identifying the facility on which placed.
- Ring Life Buoys
 - Ring life buoys with at least 23 m (75 ft.) of line will be provided and readily available for emergency rescue operations.
 - Each manned and un-manned platform will have at least four approved ring life buoys.
 - One ring life buoy will be placed on a suitable rack on each side of a manned platform in an accessible place.

- The ring life buoys will always be capable of being cast loose and may not be permanently secured in any way.
- Each ring life buoy will have a water light attached to the ring life buoy by a 12-thread manila or equivalent synthetic lanyard not less than 1 m (3 ft.) nor more than 2 m (6 ft.) in length.
- All ring life buoys will be marked with the name or number identifying the facility on which placed.
- Life Rafts
 - Life rafts will be provided for emergency rescue and abandonment operations.
 - The equipment required for a life raft is:
 - Boat hook
 - Lifeline
 - Paddles and steering oar
 - All life rafts, together with paddles or oars, will be marked with the name or number identifying the facility on which placed.

4.35.4.22. High Visibility Safety Apparel (HVSA) Requirements

- High visibility apparel is personal protective safety clothing that is intended to provide conspicuity during both daytime and nighttime usage.
- All HVSA worn by company Personnel shall meet the performance requirements for *Class 2* (or *Class 3* for identified tasks below) of the ANSI / ISEA 107 American National Standard for High-Visibility Safety Apparel and Headwear.
 - Class 3 HVSA shall for worn:
 - When working on or next to roadways with traffic speeds above 80 km/hr. (50 mph),
 - By traffic control Personnel, and
 - As determined by the hazard assessment.
- HVSA can include:
 - Vests
 - Shirts
 - Jackets or coats
 - Coveralls
- HVSA shall be worn when performing work tasks:
 - Where there is exposure to vehicle traffic such as on the ROW of a private, county, state or federal road or highway.
 - At a construction site where heavy equipment, such as cherry pickers, backhoes, track hoes, etc. are being utilized.
 - As the designated Signaler or Spotter.

- Flame-resistant (FR) high visibility vests are required (when exposed to vehicle traffic) when in the immediate area of the above defined section on Specific Hazards that Require FR.

4.35.5. Documentation

- Workplace Personal Protective Equipment Hazard Assessment Form
- Offshore Certification of Hazard Assessment Form FORM-03-C1-SAF-31

4.35.6. References

- *29 CFR 1910.132 PPE General Requirements*
- *29 CFR 1910.133 -136 Eye and Face, Respiratory, Head, and Foot Protection*
- *29 CFR 1910.138 Hand Protection*
- *ANSI Standard Z358.1 Eye Wash Stations*
- *ANSI Standard Z87.1 Occupational and Educational Eye and Face Protection*
- *ANSI Standard Z89.1, Industrial Head Protection*
- *ANSI Laboratory Safety Manual*
- *ANSI / ISEA 107 American National Standard for High-Visibility Safety Apparel and Headwear*
- *CSA Standard CAN/CSA Z94.1-15 Industrial Headwear*
- *CSA Standard CAN/CSA Z94.2-14 Hearing Protection Devices – Performance, Selection, Care and Use*
- *CSA Standard CAN/CSA Z94.3-14 Eye and Face Protectors*
- *CSA Standard CAN/CSA Z94.3.1-16 Protective Eyewear: A User's Guide*
- *CSA Standard CAN/CSA Z94.4-18 Selection, Use and Care of Respirators*
- *CSA Standard CAN/CSA Z195.1-16 Protective Footwear*
- *CSA Standard CAN/CSA Z195.1-16 Guideline on Selection, Care and Use of Protective Footwear*
- *CSA Standard CAN/CSA Z96-22 High-Visibility Safety Apparel*
- *NFPA 2112 Flame-Resistant Garments for Protection of Industrial Personnel Against Flashfire 2017 Edition.*
- *NFPA 2113 Standard on Selection, Care, Use and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Flashfire 2019 Edition.*
- *NFPA Fire Protection Handbook 2008 Edition*

4.36. Pigging

4.36.1. Purpose


The purpose of this section is to outline general practices that impact H&S outcomes during typical pipeline operations.

Pipeline pigging operations require opening pipeline systems and managing pressurization and depressurization activities that create the following hazards: toxic exposure, fire and explosion hazards, and pressure.

4.36.2. Scope

This section assumes that specific written pigging procedures have been developed and are reviewed at a local area and equipment or system-specific level and training on these procedures is managed through the applicable Operator Qualification program.

For UST, pigging procedures must meet the requirements set out in the Pigging and Pig Trap Operation Procedure.

 For the Western Canada, pigging procedures must meet the requirements set out in BC Pipeline and Field Services Procedure Pipeline Pigging – General, Sending and Receiving.

4.36.3. Responsibilities

People Leader shall:

- Ensure local area procedures are in place for pigging that:
 - Provide sufficient detail on equipment or system-specific requirements.
 - Address known hazards and controls related to this equipment and local pipeline product hazards.
- Ensure training requirements for pigging operations are met and only trained, qualified pigging operators conduct operations (as per below).
- Ensure any permitting requirements for pigging operations are known and executed.

Gas Control/Control Room Operators shall:

- Serve as essential point of contact and control for Pigging Operators during pig sending/receiving operations.

Employees and Workers shall:

- Perform pigging operations as per the local procedure and plan and in coordination with Gas Control / Control Rooms as applicable and required.
- Apply hazard controls outlined in the requirements below including:
 - Avoiding the line of fire created by the barrel and door.
 - Preventing ignition sources in the hazardous location when barrel door is open.
 - Wearing applicable respiratory protection, FRC and other required PPE.
 - Making use of gas monitors to establish a safe atmosphere.
 - Report and manage leaking valves as per requirements below.

If during verification activities an Isolation point has been incorrectly identified physically (tagged or labeled), any work taking place shall be temporarily stopped until a resolution can be implemented.

4.36.4. Requirements

All pigging operations must have a written procedure that sets out the following minimum requirements:

- Detailed operational steps.

- Hazards and controls required for each step (as well as any general hazards and controls that apply)
 - This includes hazards arising from pressures, known product, or residual products that may be captured by pigs (e.g., iron sulfides)
- Full instructions on communication requirements (e.g., with Gas Control, Control Room, adjacent facilities, or operations, etc.).

Pigging operations may only be conducted by or under the immediate supervision of a Worker trained and qualified to perform the particular pigging operation.

- Where permitting requirements apply (e.g., Safe Work Permits or environmental permits, etc.), these must be completed and be made available on site as applicable.

NOTE: *During the planning phase, if an isolation point has been identified as incorrectly physically tagged or labeled, work shall not proceed until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation and HS Manual Section 8.0 Management of Change.*

Where handwheel valve operations are required or potentially required in the pigging procedure, any requirements regarding these should be specified in the procedure to ensure operator and equipment safety, including consideration such as:

- Correct isolation of motor operator valve when using a handwheel to prevent unintended engagement of the motorized valve when an operator uses the handwheel.
- Requirements to remove handwheels following operations as applicable.

NOTE: *If during verification activities an Isolation point has been incorrectly identified physically (tagged or labeled), any work taking place shall be temporarily stopped until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation and HS Manual Section 8.0 Management of Change.*

Avoid the line of fire generated by the pig receiving or sending barrel and the barrel door. This includes:

- Minimizing activity in front of the door and ensuring individuals are not in the line of fire when barrel is being pressurized during sending or receiving activities.
- When practical, standing on the side of the pig barrel opposite of the closure hinges. This is especially the case when first opening the barrel.
- Ensuring any non-essential Personnel are not near the pig loading/receiving operation. At minimum, this should include the 8 m (25 ft.) perimeter from the barrel door (see hazardous area requirements below).

The pigging crew must have assurance that the pigging barrel is fully vented, and all pressure fully blown down prior to opening the pig barrel door.

- Pressure gauges (where installed) to ensure depressurization should be consulted and must be functioning and of suitable resolution and accuracy to ensure full depressurization before opening.

For respiratory protection during the initial opening of the barrel and until work area has proven safe atmosphere:

- The level and type of respiratory protection shall be based on the potential composition, volume, and pressure of the gas or vapor that may potentially be released during the break or opening.

- When opening systems where a known potential for exposure exists, all Workers in the immediate work area shall wear the appropriate RPE, in accordance with the completed Hazard Assessment until a safe atmosphere has been verified.
- If the composition and/or concentration of the contaminant is unknown or there is a potential for a Hazardous Atmosphere, assume the atmosphere is hazardous, perform exposure assessments and use RPE in accordance with the Respiratory Protection section of this manual.
- If there is a potential for an atmosphere above 5 ppm of H₂S (>5ppm H₂S) or an oxygen level below 19.5 percent in the Worker's breathing zone during the job:
 - Workers must use supplied air (SCBA or SABA) as respiratory protection.
 - A Safety Watch out of range of a toxic atmosphere but within sight of the Worker(s) must be used.
 - The Safety Watch must don SCBA or SABA but does not need to put on mask unless performing a rescue.

FR clothing as an outer layer, worn as directed by manufacturer (e.g., buttoned up, sleeves rolled down, etc.)

- Gloves and eyewear (and if required additional splash protection PPE) that sufficiently protect against the products or materials that contaminate pigs or collect and/or flow from barrels.

Personal gas monitors (PGMs) and/or portable area monitors are required to establish LEL and other toxic levels as part of opening and closing procedures.


- In the event it is necessary for pigging operators to remove their PGM to protect H₂S heads from damage from overexposure to H₂S (e.g., in high H₂S environments where Workers perform all open barrel activities with supplied air), an alternative means of measuring LEL hazard needs to be implemented.
- Respiratory protection can only be removed by Workers once a monitor reading establishes a safe atmosphere.

The area surrounding the pigging barrel must be treated as a hazardous location when the barrel door is open, or any local atmospheric vents are open.

- The size of the hazardous area (Class 1, Division 2 or Class 1, Zone 2 or higher) will be based on an engineering judgment (see the **Hazardous Locations** definition in Appendix B) but will never be less than 3 m (10 ft.) from the barrel door or vent opening(s).
- Only essential Personnel wearing PPE must be allowed in the hazardous area when the door is open.
- Only intrinsically safe tools may be used during opening and closing procedures.
- Catch basins and retrieval apparatuses or devices to retrieve pigs from barrel must be permanently or temporarily bonded when in use to prevent a static charge ignition source.
- Catch basins are required for all pig barrel openings and must be sufficiently cleaned and maintained to protect both Workers and the environment.
- Pigging Operators must report any leaking valves upon discovery. Pigging operations using barrels with leaking valves must be suspended pending repair or a further assessment and mitigation strategy approved by Area Management.

- Where iron sulfides (from H₂S) are known to present a hazard, the local or equipment specific procedure should specify the requirements for dealing with these (e.g., supply of water or fire/heat suppressing material available, etc.).
- In the event unsuspected iron sulfide is found, the barrel door should be closed immediately to prevent accidental ignition until a mitigation plan is developed.

4.36.5. Documentation

- Pigging and Pig Trap Operation Procedure
- 1-5040 Handling of Pipeline Solids Procedure
-  For Western Canada, see BC Pipeline and Field Services Procedure Pipeline Pigging – General, Sending and Receiving.

4.36.6. References

- *BC OHS 23.6-23.8*

4.37. Pipe Labeling Requirements (Only)

4.37.1. Purpose

The purpose of pipe labeling is to inform Personnel of the potential hazard associated with the pipe contents, where piping serves a safety purpose (e.g., emergency response) and to meet legislated requirements associated with labeling pipes and piping systems.

4.37.2. Scope

In Canada, every assembly of pipe, pipe fittings, valves, safety devices, pumps, compressors, and other fixed equipment that is used for transferring a hazardous substance from one location to another shall be:

- marked, by labeling, color-coding, placarding or any other mode, to identify the hazardous substance being transferred and, if appropriate, the direction of the flow; and
- be fitted with valves and other control and safety devices to ensure its safe operation, maintenance, and repair.

4.37.3. Responsibilities

People Leaders shall:

- Ensure pipe labeling is in place, as required.
- Ensure that missing or damage labeling is replaced and/or repaired in a timely manner.

Employees and Workers shall:

- Visually inspect workplaces to ensure pipe labeling is intact.
- Be familiar with the products and hazards relating to the products identified on pipe labeling.

4.37.4. Requirements

Diagrams and tables within this section reference CSA Z662:19 Oil and Gas Pipeline Systems Standard and ANSI/ASME 13.1-22 Scheme for the Identification of Piping Systems for guidance on ways to label piping.

Western Canadian operations has made a regulatory commitment to label piping systems and other fixed equipment that is used for transferring a substance from one location to another. This labeling shall identify the substance transferred therein, and where appropriate, the direction of the flow.

- For compressor stations over 750kW, the ‘function’ of the piping system shall also be labeled.
- For all other asset areas piping systems can be labeled with the following information:
 - Pipe contents
 - Normal flow direction
- New Workers will receive orientation on the contents, hazards, and operation of unlabeled piping systems in their workplace.

[Table 27](#) provides guidance for pipe labeling.

Table 27: Pipe Labeling Guide

Requirement	Description
List of pipe contents	<ul style="list-style-type: none"> • Obtain a list of all pipe contents in the plant, facility, or field area.
Standard content and system information	<ul style="list-style-type: none"> • Gather additional information for the pipe contents: <ul style="list-style-type: none"> ○ outside diameter of pipe (including insulation) ○ pressure ○ temperature ○ direction of Flow ○ function (e.g., discharge, suction, blow down, vent, recycle, etc.). <p><i>*NOTE: Function labels are required to comply with CSA Z662:19 Oil and Gas Pipeline Systems Standard subsection 4.14.2 Design of compressor stations over 750kW. In other locations, this is a best practice.</i></p>
Locations for label	<ul style="list-style-type: none"> • The markings shall be applied on: <ul style="list-style-type: none"> ○ straight pipe runs, ○ close to all valves, fittings, or junction boxes, ○ adjacent to all changes in direction, and ○ where pipes pass through walls or floors. • If a straight run of pipe exceeds 25 m (82 ft.), then additional labels are recommended.
Determine label background colors	<ul style="list-style-type: none"> • The color used to identify materials contained in a piping system shall be consistent at the plant, facility, or location. A color scheme example is shown in Table 28.
Determine label text and text color	<ul style="list-style-type: none"> • Material contained in a piping system shall be identified by label text made of clearly legible letters and/or numbers, giving the name or identifier of the material. The label text shall be placed on the background color and shall be in black or white to contrast with the background color. Guidance is provided in Table 28.
High Temperature contents	<ul style="list-style-type: none"> • Piping systems containing materials at high temperature shall include the temperature and/or the word “Hot” as part of the text.
High Pressure contents	<ul style="list-style-type: none"> • Piping systems containing materials at high pressure shall include the pressure and/or the word “pressurized” as part of the text. • Steam pipes shall include the word “Steam” as part of the text.
Additional label information	<ul style="list-style-type: none"> • For any material, if applicable, the words “Liquid” or “Gas” may be included as part of the text.

Requirement	Description
Emergency valves and controls	<ul style="list-style-type: none"> Emergency valves and controls (equipment controls) shall be clearly identified by signs.
Flow Direction	<ul style="list-style-type: none"> Arrows shall be used to indicate the direction of flow; double arrows being used for reversible flow. The arrows shall be large enough to be readily distinguishable and shall be the same color as the text. Examples are shown in Table 29.
Text size on label	<ul style="list-style-type: none"> The suggested minimum height of the text is 13 mm (½ in). For identification of small pipes (less than 19 mm diameter, ¾ in) the use of tags or wall markings is recommended. See Table 29
Pictograms	<ul style="list-style-type: none"> Controlled products contained in a piping system shall be identified by pictogram(s), which shall be identical to the GHS symbols. If necessary, more than one pictogram may be used to identify the controlled product. The minimum side length of a pictogram shall be 13 mm (½ in). The specific order of placement shall be determined by conditions on-site. An example is shown in Table 28.
Label placement on pipe, vessel, or system	<ul style="list-style-type: none"> Identification shall be placed in areas where it would be most visible to Personnel, as shown in Table 28.
Abandoned or Unused piping, vessels, or systems	<ul style="list-style-type: none"> It is recommended that abandoned or unused piping be thoroughly cleaned of all material residues and stripped of previous identification. It should then be relabeled “Not in Use.” If unable to clean thoroughly, include in the re-labeling “Previously Contained [name of product previously contained.]”
Missing labels	<ul style="list-style-type: none"> When inspection and maintenance activities identify that pipe labeling is missing, the finding shall be provided to the local operations so the labeling can be replaced as soon as possible.

Table 28: Background and Text Color

Material	Background Color	Text Color	Background and Text Sample
Flammable fluids (1)	Yellow	Black	Text
Potable, cooling, boiler feed, steam, and other water	Green	White	Text
Fire quenching fluids (2)	Red	White	Text
Toxic and corrosive fluids (3)	Orange	Black	Text
Combustible fluids (4)	Brown	White	Text
Compressed air	Blue	White	Text
To be defined by user	White	Black	Text
To be defined by user	Gray	White	Text
To be defined by user	Black	White	Text
To be defined by user	Purple	White	Text

Additional Information

- Flammable:** This classification includes fluids, which under ambient or expected operating conditions, are a vapor or produce vapors that can be ignited and can continue to burn in air (e.g., gasoline).

- **Fire Quenching:** This classification includes water foam, and CO₂ used in sprinkler systems and firefighter piping system.
- **Toxic and Corrosive:** This classification includes fluids that are corrosive or toxic or will produce corrosive or toxic substances when released.
- **Combustible:** This classification includes fluids that can burn but are not flammable (e.g., diesel).

Table 29: Examples of Pipe Labels

NATURAL GAS
ACID GAS
ISO-BUTANE
COOLING WATER
STEAM CONDENSATE 80°C
DOMESTIC WATER
FIRE WATER
CO ₂
SULFURIC ACID
HYDROCHLORIC ACID
LUBE OIL
AMINE
MOLTEN SULFUR
AIR 100 PSIG
COMPRESSED AIR

Table 30: Height of Letters and Numbers

Outside Diameter of Pipe or Covering, mm (in)	Minimum Length of Label, mm (in)	Height of Letters and Numbers, mm (in)
19 to 32 (¾ to 1¼)	203 (8)	13 (½)
38 to 51 (1½ to 2)	203 (8)	19 (¾)
64 to 150 (2½ to 6)	305 (12)	32 (1¼)
200 to 250 (8 to 10)	610 (24)	64 (2½)
Over 250 (over 10)	813 (32)	89 (3½)

NOTE: Smaller diameter pipe systems – less than 19 mm (¾ in) – may require the use of tags or wall markings (if appropriate) to identify pipe content information.

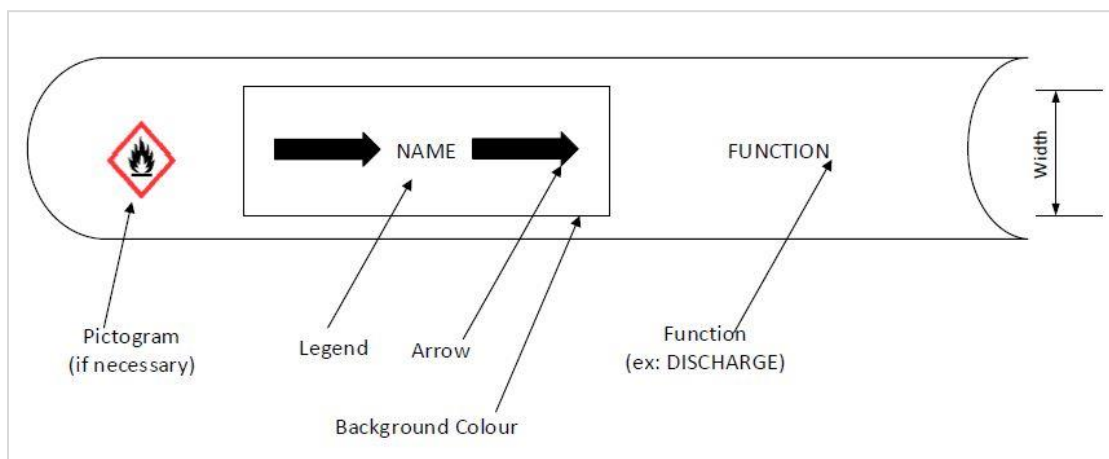


Figure 21: Example of Piping System Identification

NOTE: “Function labels” are required to comply with CSA Z662:19 Oil and Gas Pipeline Systems Standard subsection 4.14.2.11 “Design of compressor stations over 750kW.” In other facilities and locations, this is a best practice.

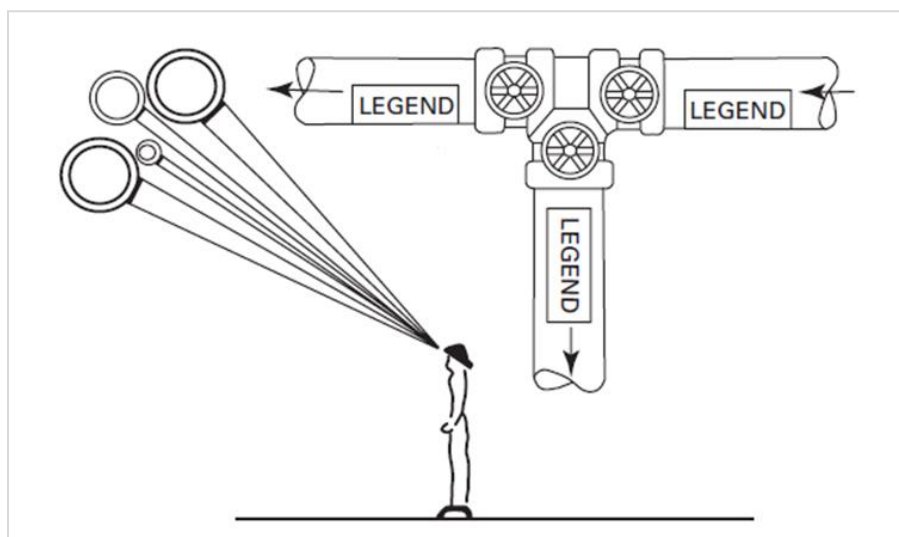


Figure 22: Example of Visible Areas to Personnel

NOTE: Pipes shall be marked: at both sides of floor or wall penetrations, adjacent to changes in direction, adjacent to all valves and flanges (as shown above), and every 25 m (82 ft.) to 50 m (164 ft.) on straight runs of pipe.

4.37.5. Documentation

- N/A

4.37.6. References

- Canadian Occupational Health and Safety Regulations Part 10.24
- CSA Z662:19 Oil and Gas Pipeline Systems Standard subsection 4.14.2.11 Design of compressor stations over 750kW
- ANSI/ASME 13.1-22 Scheme for the Identification of Piping Systems

4.38. Powered Industrial Truck

4.38.1. Purpose

This section establishes requirements for powered industrial trucks (i.e., forklifts, tractors, platform lift trucks, motorized lift trucks). The procedures here establish uniform requirements designed to ensure that powered industrial truck safety training, operation, and maintenance practices are communicated to and understood by all affected Workers.

4.38.2. Scope

This section applies to all Workers where forklifts are operated.

The following is a listing of forklift classifications:

- **D Units** – Units that are diesel engine powered instead of gasoline engine powered.
- **DS Units** – Diesel-powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where a D Unit may not be considered suitable.
- **DY Units** – Diesel powered units that have all the safeguards of the DS units and in addition do not have any electrical equipment including the ignition and are equipped with temperature limitation features.
- **E Units** – Electrically-powered units that have minimum acceptable safeguards against inherent fire hazards.
- **ES Units** – Electrically-powered units that, in addition to all of the requirements for the E Units, are provided with additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures. They may be used in some locations where the use of an E Unit may not be considered suitable.
- **EE Units** – Electrically-powered units that have, in addition to all of the requirements for the E and ES Units, the electric motors and all other electrical equipment completely enclosed. In certain locations the EE Unit may be used where the use of an E and ES Unit may not be considered suitable.
- **EX Units** – Electrically-powered units that differ from the E, ES, or EE Units in that the electrical fittings and equipment are so designed, constructed, and assembled that the units may be used in certain atmospheres containing flammable vapors or dusts.
- **G Units** – Gasoline-powered units having minimum acceptable safeguards against inherent fire hazards.
- **GS Units** – Gasoline-powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of a G Unit may not be considered suitable.
- **LP Unit** – Similar to the G unit except that liquefied petroleum gas is used for fuel instead of gasoline.
- **LPS Units** – Liquefied petroleum gas powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of an LP unit may not be considered suitable.

4.38.3. Responsibilities

People Leaders shall:

- Ensure that all forklift/truck Operators are properly trained to operate the specific equipment which they will be expected to operate and have a valid operator's license/certification.
- Maintain the training records via hardcopy or electronically.
- Assist in identifying hazardous environments that may impact the forklift equipment selection and operation.
- Ensure all forklifts/trucks are inspected annually and before use.
- Ensure all forklifts/trucks are maintained in a safe condition.

Operators shall:

- Be trained and evaluated on the specific class of forklift they will be qualified to operate.
- Always operate forklifts/trucks as per manufacturer's instructions and in a safe manner. This includes operating the equipment within the pre-established load limits.
- Complete the initial training and subsequent years required training before operating an industrial forklift /truck.
- Wear the proper required personal protective equipment when operating a forklift/truck.
- Always wear seatbelts while operating forklifts and prohibit additional riders on the equipment.
- Keep a valid operator's license/certification card (if applicable) in their possession when required to operate a forklift/truck.
- Inspect and document inspection on the applicable Pre-Use Inspection Form (Forklift or Telehandler-Zoom Boom) at the start of each shift that the equipment will be used.
- Ensure forklift or truck is taken out of service if a problem is detected which would compromise safe operation of the forklift and notify Supervisor as soon as possible thereafter.
- Personnel who do not operate a class or forklift for which they were qualified for more than 12 months shall be re-evaluated prior to operating.
- Remove keys when not in use to prevent unintended use by unqualified Operators.

HS Support shall:

- Monitor the overall effectiveness of the forklift/truck safety program through audits and annual reviews.
- Provide Management with technical assistance on equipment selection and procurement as needed.
- Where internal combustion powered forklift trucks are proposed for use indoors, assist Management at user facilities in establishing precautions to preclude the buildup of carbon monoxide in the work atmosphere.
- Provide training or training resources for the forklift/truck equipment operator training and evaluation.

4.38.4. Requirements

4.38.4.1. General

- Only Qualified Personnel are permitted to operate a forklift.
- No person shall be allowed to stand or pass under the elevated portion of any truck, whether loaded or empty.
- Use forklifts in accordance with the manufacturer's specifications.
- Obtain written manufacturer's approval prior to forklift making:
 - Modifications and additions which affect its capacity and safe operation.
 - Changes affecting capacity, operation, and maintenance instruction plates, tags, or decals.
- Identify forklifts equipped with front-end attachments other than factory installed attachments with information to show the approximate weight of the forklift and any attachment combination at maximum elevation with load laterally centered.
- Maintain legible nameplates and markings on all forklifts.
- Maintain safe clearances, clear aisles, and other facility conditions safe for forklift operation in accordance with the Section 11.3 *General Facility Safety Inspection Section*.
- Forklifts may only be used in applications and atmospheres according to its design designation.
- Wheels must be blocked if the truck is parked on an incline.
- Never add fuel of any type to the forklift/truck while the engine is running. Keep a fully charged fire extinguisher mounted on the forklift/truck.
- When a powered industrial truck is left unattended, load engaging means shall be fully lowered, controls shall be neutralized, power shall be shut off, keys removed, and brakes set.
- Stunt-driving and horseplay are not allowed.

4.38.4.2. Material Handling Requirements

- Do not move loads with broken pallets or loads beyond the capacity of the forklift or loads that are unbalanced.
- Stack, block, and interlock bags, containers, bundles, and limit the height of storage to ensure stability and security against sliding or collapsing when picking up with a forklift/truck.
- Crib and securely block structural steel, poles, pipe, bar stock and other cylindrical materials stored on the floor or ground.
- When moving loads keep them as low as possible and slightly tilted back.
- If required to unload trailers from a loading dock, ensure the trailer is chocked and if unattached from a tractor, supported with stands.
- Dockboard or bridge plates shall be properly secured before they are driven over. Dockboard or bridge plates shall be driven over carefully and slowly and their rated capacity never exceeded.
- Safe clearances must be allowed for aisles at loading docks, through doorways and wherever turns or passage must be made.

- Clearance limits and warning signs must be provided.
- For more information on *Materials Handling and Storage*, see section 4.33 in this Manual.

4.38.4.3. Maintenance

- Maintain and inspect forklifts monthly, or every 200 hours (whichever comes first) and document on the Powered Industrial Trucks Inspection Form.
- Inspect and document inspection on the applicable Pre-Use Inspection Form (Forklift or Telehandler-Zoom Boom) at the start of each shift that the equipment will be used.
- Remove forklifts from service and tag out the unit if a visual examination or inspection shows any condition affecting the safety of the vehicle.
- Repairs must be made by Authorized Personnel with parts equivalent as to safety and the original design.
- Industrial trucks must not be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any parts.
- Locate battery charging installations for battery operated forklifts/trucks in proper designed and designated areas for that purpose.
- If possible, all Forklift/truck repairs should be made outside of the operating area.
- Maintenance file information should provide a source for comparing present and past equipment conditions. This comparison will help determine whether existing conditions show a trending pattern of wear, deterioration, or other conditions that may compromise continued safe use of the equipment.

4.38.4.4. Inspections

Inspect and document inspection on the applicable Pre-Use Inspection Form (Forklift or Telehandler-Zoom Boom) at the start of each shift that the equipment will be used.

Things to inspect include (but not limited too):

- Check the fork pins and stops to make sure that they are in place.
- Check all cowling and body parts.
- Check the wheels and tires for excessive wear.
- Look for any broken or loosened parts.
- Check the fuel level, crankcase oil level, radiator water level.
- Check the engine air cleaner, the fan belt, the hydraulic fluid level, and the battery water level.
- Check the hour meter and record it. This is important for maintenance scheduling.
- With the engine running, check operation of the hour meter, headlights, taillights, and warning lights.
- Check the oil pressure gauge, the water temperature, ammeter, and sound the horn.
NOTE: If the clutch is working properly, check incapability, the hydraulic controls, and any other controls on the lift system.
- Check and test braking system.

- Conduct functional test for the lifting/attachment operation being performed.
- Document “before use” inspections using Powered Industrial Truck Inspection Form.
- Documented inadequacies determined to be a hazard, must be corrected prior to further use. These reports must be filed as per Section 10.2 *Records Management Section*.

4.38.4.5. Equipment Qualification

To qualify for operation, a forklift should have the following:

- A record of successful inspection and maintenance
- A frequent (pre-use) inspection instruction available to the Operator
- A Qualified Operator
- The proper type of designation for working in a classified hazardous area, if applicable

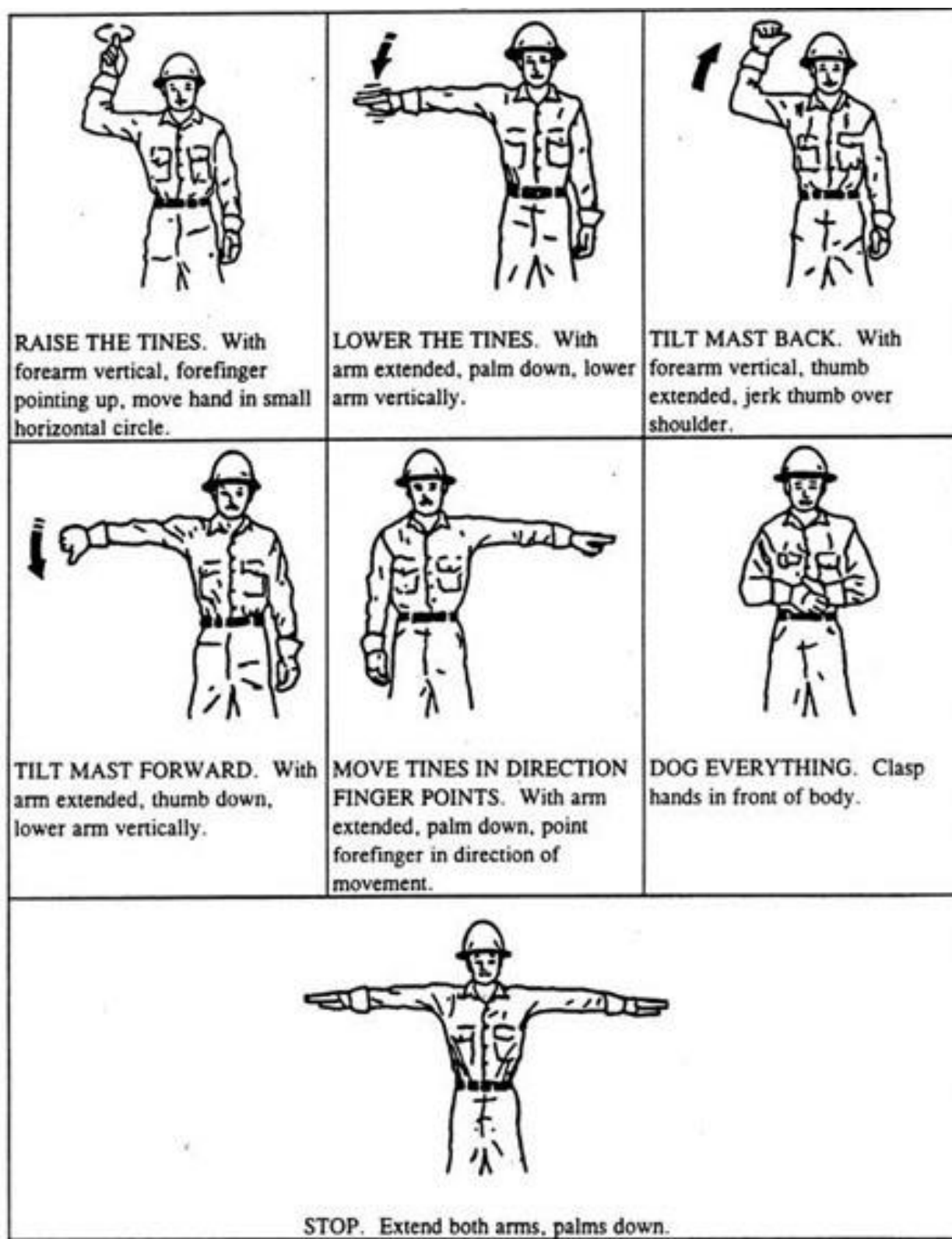


Figure 23: Standard Hand Signal for Controlling Forklift Operations

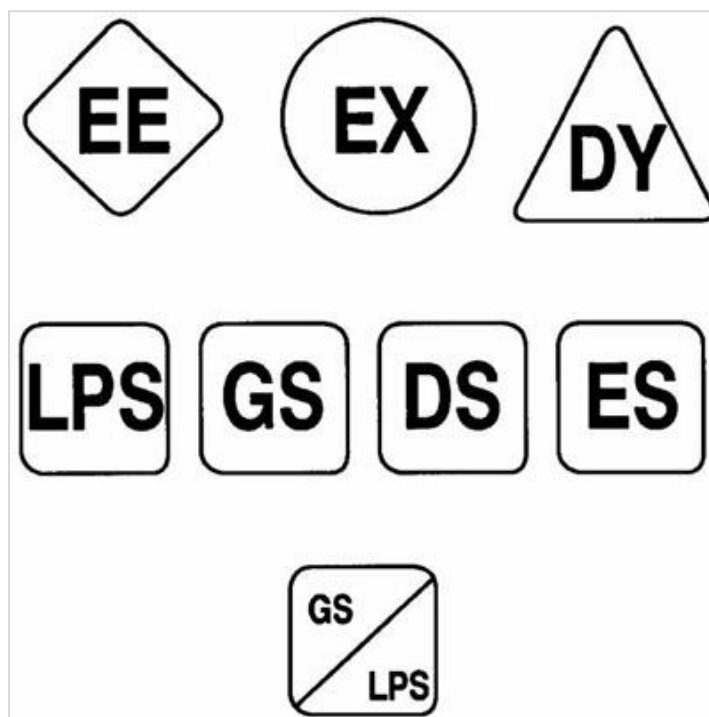


Figure 24: Markers to Identify Type of Industrial Truck

NOTE: The markers for EE, EX and DY are 12.7 cm (5 in.) high. The rest are 10 cm (4 in.) square. The signs shall have black borders and lettering on a yellow background. For Marker definitions see Forklift Trucks in Hazardous (Explosive) Atmospheres below.

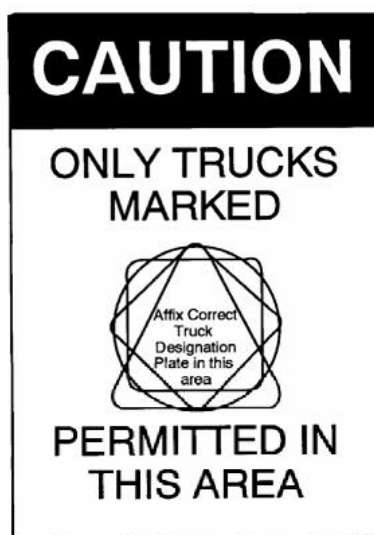


Figure 25: Signs for Posting at Entrance to Hazardous Areas

NOTE: The minimum width of the sign is 28 cm (11 in.); the minimum height is 40 cm (16 in.). The sign shall have the word CAUTION in yellow letters on a black background. The body of the sign shall have black letters on a yellow background. A marker identical to the one used on the side of the truck as shown in Marker to identify the type of industrial truck above shall be installed on the sign.

4.38.4.6. Forklift Trucks in Hazardous (Explosive) Atmospheres


Hazardous Area Equipment

- It is essential to use proper equipment in hazardous (explosive) areas. Trucks approved for use in hazardous areas shall have the manufacturer's label or some other identifying mark indicating approval for the intended use by a recognized national testing laboratory (e.g., Underwriters Laboratories [UL] or Factory Mutual [FM] or Underwriters Laboratories Canada [ULC]).

Truck Designation

- Durable markers indicating the designation of the type of truck for use in hazardous areas shall be applied to each side of the vehicle in a visible but protected area. These markers shall be distinctive in shape (see *Markers to Identify Type of Industrial Truck* section).

Hazardous Area Signs

- The entrance to hazardous areas shall be posted with a sign to identify the type of forklift truck permitted.
-  Refer to the "Signs for Posting at Entrance to Hazardous Areas" figure.

Hazardous Area Classification

- The responsible People Leader with assistance of the HS Support (if necessary) shall classify hazardous locations where a powered forklift truck is to be used. Location classifications are described as follows:
- Class I – locations in which flammable gases or vapors are present or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.
- Class II – locations that are hazardous because of the presence of combustible dust.
- Class III – locations where easily ignitable fibers or filings are present but are not likely to be suspended in quantities sufficient to produce ignitable mixtures.
- Unclassified – locations not possessing atmospheres defined as Class I, II, or III locations.

Non-Hazardous Areas

The following units are not suitable for use in hazardous areas because they include only minimum safeguards against inherent fire hazards:

- Type D Forklifts—diesel-powered units having minimum acceptable safeguards against inherent fire hazards.
- Type E Forklifts—electrically powered units having minimum acceptable safeguards against inherent fire and electrical shock hazards.
- Type G Forklifts—gasoline-powered units having minimum acceptable safeguards against inherent fire hazards.
- Type LP Forklifts—liquefied-petroleum-gas-powered units having minimum acceptable safeguards against inherent fire hazards.
- Type G/LP Forklifts—gasoline- or liquefied-petroleum-gas-powered units having minimum acceptable safeguards against inherent fire hazards.

Hazardous Areas

The following units are suitable for use in hazardous areas because they are equipped with additional safeguards (i.e., special exhaust, fuel, or electrical systems) or other modifications against inherent fire hazards:

- Type DS Forklifts—diesel-powered units that are provided with all the requirements for the type D units and that have additional safeguards to the exhaust, fuel, and electrical systems.
- Type DY Forklifts—diesel-powered units that have all the safeguards of the type DS units except that they do not have any electrical equipment, including ignition; they are equipped with temperature-limitation features.
- Type ES Forklifts—electrically powered units that are provided with all the requirements for the type E units and that have additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures.
- Type EE Forklifts—electrically powered units that are provided with all the requirements for the type E and ES units, and that also have electric motors and all other electrical equipment completely enclosed.
- Type EX Forklifts—electrically powered units that differ from type E, ES, or EE units in that the electrical fittings and equipment are designed, constructed, and assembled so that the units may be used in atmospheres containing specifically named flammable vapors, dusts, and, under certain conditions, fibers; type EX units are specifically tested and classified for use in Class I, Group D, or for Class II, Group G locations as defined in *NFPA 70, National Electrical Code*.
- Type GS Forklifts—gasoline-powered units that, in addition to all the requirements for the type G units, are provided with additional safeguards to the exhaust, fuel, and electrical systems.
- Type GS/LPS Forklifts—gasoline- or liquefied-petroleum-gas-powered units that, in addition to all the requirements for the type G/LP units, are provided with additional safeguards to the exhaust, fuel, and electrical systems.
- Type LPS Forklifts—liquefied petroleum gas powered units that, in addition to the requirements for the type of LP units, are provided with additional safeguards to the exhaust, fuel, and electrical systems.

4.38.5. Documentation

- Forklift Operator Monthly Inspection Checklist
- Powered Industrial Truck Inspection
- Forklift Operator Evaluation Checklist
- Powered Industrial Truck Job Performance Measure

4.38.6. References

- *OSHA 29 CFR 1910.178 Materials Handling and Storage – Powered Industrial Trucks*
- *OSHA 29 CFR 1926.602 Material handling equipment*
- *Canadian Occupational Health and Safety Regulations Part XI s. 14.*

4.39. Public Work Area Traffic Management Guide

4.39.1. Purpose

This section outlines the minimum requirements to follow for managing traffic hazards when completing work on and near public roads and highways.

4.39.2. Scope

This section applies to all instances where the management of public traffic is required for Company work associated with Operations, Maintenance and/or Project work activities, being performed by either Company or Contractor Personnel.

4.39.3. Responsibilities

People Leaders shall:

- Ensure that all Workers who work around vehicular traffic have been informed of and are trained on the Traffic Control Plan and have completed any other training identified by the governing jurisdiction's legislative requirements.

Workers shall:

- Have a duty of care, to their work team and others, in relation to the execution of their work.
- Be responsible for reviewing, understanding, attending any training, and reviewing any updates to the Traffic Control Plan.
- Be aware of the hazards identified in the Traffic Control Plan.
- Understand their role in the Traffic Control Plan and associated hazards.
- It is paramount that any Worker engaged in a Traffic Control function has received the appropriate training and that they are comfortable and competent to carry out their duties.

Traffic Control Persons (TCPs) shall:

- The Responsibilities of TCPs when performing work zone traffic control are to:
 - Protect Workers and the motoring public by safely regulating traffic flow and directing traffic through the work zone
 - Stop traffic whenever required by the progress of the work; otherwise, keep traffic moving at reduced speeds to avoid tie-ups and delays
 - Allow construction to proceed safely and efficiently
 - Warn Workers of any impending danger
 - Focus on monitoring and controlling traffic, ensuring no other task is performed while doing so

4.39.4. Requirements

- *Traffic Control Devices* – All signs, signals, markings and other devices used to regulate, warn or guide traffic placed on, over or adjacent to a street, highway, pedestrian facility, bikeway or private road open to public travel by authority of a public agency or official having jurisdiction, or in the case of a private road, by authority of the private owner or private official having jurisdiction.

- *Traffic Control Plan / Traffic Protection Plan* – A detailed plan for the control of traffic during construction, maintenance, or utility operations on a roadway, considering the organized, systematic, safe conduct of the project, including, as applicable, detours, staging sequences, work vehicle access to and egress from worksites, temporary barriers, removal of old pavement markings and selection and planned implementation of appropriate typical layouts for traffic control.
- Traffic Control Plans should be developed for all instances where the Management of public traffic is required for Company work associated with Operations, Maintenance and / or Project work activities.
- For larger projects where, multiple Contractors are performing Company work, it is expected that those Contractors will develop and maintain Traffic Control Plans prior to and during the execution of construction activities.

4.39.4.1. Before Beginning Work

- The Company Representative responsible for overseeing the work will ensure a Traffic Control Plan (TCP) is developed which takes into consideration the hazards specific to the worksite, such as but not limited to:
 - Evaluating the anticipated traffic patterns
 - Traffic volumes
 - Traffic speeds
 - Alternative routes
 - Changing seasonal conditions – snow, varying amounts of day light, etc.
 - Working hours – Worker fatigue
 - Time / duration of the job (daylight, dusk, high traffic, few hours, multiple days)
 - Project yard or staging area locations
 - Project schedule
 - Duration of the project
 - Changing project conditions
- Contractors are responsible for developing Traffic Control Plans for their work. The Company Representative overseeing this work will review, to their satisfaction, the Contractor's Traffic Control Plan prior to work commencing.
- The Traffic Control Plan will be prepared in accordance with the governing jurisdiction's legislative requirements. All required permits, if applicable, must be obtained prior to the commencement of the work.
- To develop a Traffic Control Plan the following should be considered:
 - Determine the location of the proposed work area and identify the required degree of encroachment into the roadway.
 - Determine the duration of the work to be undertaken.
 - Evaluate the need for traffic flow control.

- Select the most appropriate traffic control layout for the work based on the site evaluation and work area requirements.
- Review the traffic control layout to ensure that all site-specific conditions are adequately accommodated. If the layout is not appropriate, modify or design a new layout in accordance with sound traffic engineering principles and the governing jurisdiction's legislative requirements.
- Plan for the safe movement of pedestrians, cyclists, and other vulnerable road users, ensuring that vehicle and pedestrian movements are separated.
- Determine schedule of traffic control devices, including sign sizes and quantities in accordance with the local jurisdiction's legislative requirements.
- For long duration work, determine whether existing pavement markings need to be removed and replaced by temporary pavement markings.
- Develop an emergency and event management traffic control plan, which facilitates emergency vehicle access to work zone locations as necessary.
- Ensure that the Traffic Control Plan is understood by all responsible parties before the site is occupied. Any changes to the Traffic Control Plan should be approved by the Company Representative responsible for the work.
- Determine if paid duty Officers are required.

4.39.4.2. During the Job

- The Traffic Control Plan, when required, will be written, communicated to all Workers involved in the execution of work and reviewed as part of the Field Level Hazard Assessment (FLHA) or Job Hazard Analysis (JHA).
- During the execution of work activities, Traffic Control Devices shall be inspected, at least daily, and the integrity of the Traffic Control Plan reviewed and adhered to. Any concerns should and will be reported and corrected immediately. Traffic flow will be monitored, and the traffic plan adjusted as conditions warrant.

4.39.4.3. After Completing Work

- After work has been completed, reintroducing regular traffic requires controls to ensure the Safety of Workers and the Public.
- Traffic Control Devices will be covered if not required or removed, in the opposite order that they were installed, and in a manner that will not endanger the Workers tasked with their removal.
- Positive barriers (trucks/jersey barriers) should be maintained where possible.
- Collect the Traffic Control Devices and disassemble them on the side of the vehicle which is away from the traveled part of the highway.
- Leaving the site should be done so in slow and cautious manner, and only when it is safe to do so.

4.39.4.4. Factors to Consider During Plan Development

- Public Awareness Initiatives
- For longer duration, higher traffic, or for work of greater complexity, a public awareness communication plan is recommended and should be included with the Safety Execution Plan / Pre-Job Assessment, as necessitated by a risk assessment and discretion of the Company Representative responsible for the work. Media outlets, including local radio and print, should be retained to broadcast project related traffic information to locals. Road users should be provided with accurate and up-to-date information on the work, duration, and locations. Company Representatives should interface with Local Authorities to ensure they are aware of the project and the extent of the work scope.
- Mobile digital message boards, where required, should be dispatched to all high traffic entry, and exit points (i.e., pipe yard, construction yard, public roadway turn offs to projects, etc.) and intersections. The message boards will be positioned and located in accordance with the governing jurisdiction's requirements and will remain in place until the completion of the applicable scope of work. The traffic plan detailing the positioning and standard operating procedure will be reviewed by the Company Representative responsible for the execution of the work.

4.39.4.5. Traffic Movement

- Ensuring the safe and effective movement of public traffic, and construction site traffic is critical to a safe traffic plan. Ensure that you are familiar with and comply with the governing authority's requirements. Frequent or unnecessary changes in the roadway configuration that might lead to risky maneuvers, such as sudden lane narrowing, lane closure or reduction in speed should be avoided. Special precautions must be taken to ensure that construction equipment can be safely operated without making it hazardous to passing traffic. Roadway occupancy and work completion time should be minimized to reduce exposure to potential hazard. Scheduling should also be taken into consideration, to plan work for periods of lower vehicle volumes.
- Roadway work zones should be designed with the following considerations:
 - Worker safety
 - Road user safety (motorist, pedestrian / cyclist, and others)
 - Road user's ability to traverse through the work zone
 - Pedestrian paths shall, as far as is reasonably practicable, be separate from vehicle roadways and clearly delineated. Physical separation should be used wherever possible.
 - Advanced warning (provision of advanced notice to road users that they are approaching a work zone)
 - Worksite identification (visible identification of the work area by passive and / or active traffic control devices to show road users where work is taking place)
 - Positive guidance (provision of information to road users required to avoid hazards, when and where this information is needed, will be conveyed using uniform traffic control devices)
- These elements should be designed into the work execution plan and not applied as an afterthought.

4.39.4.6. Traffic Control Devices and Traffic Control Monitoring

- Risk to road users and Workers can be reduced by providing a predictable and familiar roadway environment. Consistent and appropriate use of Traffic Control Devices (i.e., signage, signal persons, pylons, etc.) throughout all work zones will increase the probability of road users exhibiting desired behaviors and reduce the potential of unfavorable events from occurring.
- These devices will conform to the governing authority's requirements. Further resources for traffic control devices can be found in the reference section.
- The elements and devices of the traffic control system should be continually monitored by all project Personnel to ensure that they remain in place, are visible, and undamaged. Individuals responsible for traffic plan execution must regularly inspect the traffic control devices to ensure that the traffic operations in the work zones are working as planned.
- Design, placement, operation, maintenance, and uniformity are aspects that should be carefully considered to maximize the effectiveness of traffic control device. Vehicle speeds should be carefully considered with the design, operation, placement, and location of various traffic control devices. Reference will be made to the governing authority's requirements to ensure compliance.

4.39.4.7. Inspection and Documentation

- The ongoing inspection of work zones is important to ensure that the appropriate traffic control devices are in place and functioning, throughout the duration of the shift / project. The Company Representative will ensure that records of traffic control inspections are kept at the work location. The following should be considered:
- Inspect the work zone by driving through it in the daytime and at night, as appropriate, after the temporary traffic control devices for the work zone have been installed.
- Observe and record actions and reactions of drivers through the work zone (such as speeds, conflicts, late lane changes, frequent breaking).
- Correct any deficiencies as they are identified and ensure any changes to the Traffic Control Plan are documented.
- Inspect the work zone traffic control devices over the life of the project, as specified by the governing authority (at least daily), while traffic controls are in effect.
- Ensure that traffic control devices that are no longer needed, whether on a long-term or short-term basis, are either removed from the roadway, removed to the other side of the shoulder, covered, or turned, so that they are not visible to passing motorists.
- For work being performed by a Contractor, the inspection and documentation of the work zone and traffic control devices is the responsibility of the Contractor. Records are to be kept at the work location and made available to Company Representatives for review and audit.

4.39.5. Documentation

- *Enbridge Traffic Control Protection Plan (template)*

4.39.6. References

- *Ontario Traffic Manual, Book 7*

- *U.S. Department of Transportation – Federal Highway Administration – Manual of Uniform Traffic Control Devices 2009*
- *Manual of Uniform Traffic Control Devices for Canada*
- *Alberta Highway Guide and Information Sign Manual 2006*

4.40. Respiratory Protection

4.40.1. Purpose



This section is designed to protect Workers from respiratory hazards by providing the minimum requirements for the selection, use, maintenance, and training of respiratory protection equipment.

4.40.2. Scope

This section applies to all Company locations that have or potentially could have hazardous atmospheres caused by work activities or the work environment.

4.40.3. Responsibilities

People Leaders shall:

- Ensure PPE Hazard Assessment is conducted to identify work areas, processes or tasks that require Workers to wear respirators and to determine proper protection is selected for given tasks.
- Determine Employees who will use Respiratory Protection (i.e., Medical Qualifications, Fit Testing etc.)
- Conducting qualitative/quantitative fit testing.
- Select respiratory protection options.
-  Provide MSHA/NIOSH certified respirators.
-  Provide respirators that meet CSA Standard Z94.4 and CSA Standard Z180.1.
- Ensure Workers wear the proper respiratory protection when exposed to respiratory hazards.
- Monitor respirator use to ensure that respirators are used in accordance with their specifications.
- Ensure all Employees required to utilize respiratory protection are properly trained.
- Ensure proper storage and maintenance of respiratory protection equipment.
- Assist in the elimination of breathing hazards through engineering controls as the primary approach to Worker protection.

Employees and Workers shall:

- Wear the appropriate respiratory protection when working around a potential respiratory hazard.
- Obtain medical clearance where jurisdictionally required or through self-identification (e.g., medical signs or symptoms related to ability to use respirator) prior to respirator use.
- Participate in the required respirator training activities.

- Inspect, maintain, and store the provided respiratory protection equipment.
- Apart from a trimmed mustache, Workers who may be required to wear a respirator must always be clean shaven.

HS Support shall:

- Assist Managers/Supervisors in identifying respiratory hazards that may require respiratory protection.
- Assist Managers/Supervisors with the fit testing procedures.
- Assist Managers/Supervisors with selection and purchasing of respiratory protection equipment.

Safety Shared Services shall:

- Administer the medical surveillance program.
- Maintain records required by the section.
- Evaluate the section.
- Update the written section, as needed.
- Provide oversight in the hazard assessments and PPE evaluations of Worker work areas with potential exposures to hazardous atmospheres.
- Aid in determining engineering controls and conducting work method evaluations to reduce or eliminate respiratory hazards.
- Provide oversight for the medical evaluations and fit testing.
- Establish and maintain contract with Vendors to provide mobile testing services.
- Aid in developing the required respiratory protection training.

4.40.4. Requirements

4.40.4.1. General

- This section applies to all Workers who are required to wear respirators during normal work operations, as well as during some non-routine or emergency operations, such as a spill of a hazardous substance.

NOTE: *An effective facial seal will require the wearer of the respirator to be clean shaven.*

- In addition, any Employee who voluntarily wears a respirator when one is not required (i.e., in certain maintenance and coating operations) is subject to the medical evaluation, cleaning, maintenance, and storage elements of this section, and will be provided with necessary training. Workers who voluntarily wear filtering face pieces (dust masks) are not subject to the medical evaluation, cleaning, storage, and maintenance provisions of this Manual.

4.40.4.2. Voluntary Respirator Use When Not Required

- Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators' limitations. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or

respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

- Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
- Keep track of your respirator so that you do not mistakenly use someone else's respirator.

4.40.4.3. Hazard Assessment

- Respirators are to be selected based on the respiratory hazards to which Workers may be exposed in the workplace. A hazard evaluation must be conducted for each operation, process, or work area where airborne contaminants may be present in routine operations or during an emergency. A log of identified hazards should be maintained (See *Workplace Hazard Assessment Form for Respiratory Protection*). The hazard assessments shall include:
 - Identification and development of a list of hazardous substances used in the workplace by department or work process.
 - Review of work processes to determine where potential exposures to hazardous substances may occur. This review shall be conducted by surveying the workplace, reviewing the process records, and talking with Workers and Supervisors.

4.40.4.4. Exposure Monitoring to Quantify Potential Hazardous Exposures

The proper type of respirator for the specific hazard involved will be selected in accordance with the manufacturer's instructions.

4.40.4.5. Updating the Hazard Assessment

- The hazard assessment must be revised and updated as needed (i.e., any time work process changes may potentially affect exposure). If a Worker feels that respiratory protection is needed during an activity, they are to contact their supervisor. The potential hazard shall be evaluated. The results of the assessment should be communicated to all affected Workers. This communication must be documented. Examples may include but are not limited to the Procedure updates, monthly safety meeting, safety committee meetings, morning kick-off meeting etc.
- If it is determined that respiratory protection is necessary, all other elements of the respiratory protection program will be in effect for those tasks, and the respiratory section will be updated accordingly.

4.40.4.6. Respirator Selection and Use

- Selection of the types of respirators used for site specific breathing hazards must be made by area supervision working with the local Safety Advisor.
- Respirators are divided into two general types: 1) air purifying; and 2) air supplying.
- ***Air purifying respirators*** are dust masks, half mask with canisters, and full-face mask with filters and canisters.
- ***Air supplying respirators*** comprise the tight fitting and loose-fitting airline respirators and the self-contained breathing apparatus (SCBA).

4.40.4.7. Air Purifying Respirators

- Disposable air purifying respirators are individually assigned and are considered single use respirators.
- Single use dust respirators can be used in concentrations up to 5 times the exposure guideline (PEL, TLV, etc.) if the exposure guideline is greater than 0.05 mg/m³.
- Air purifying cartridges (i.e., vapor cartridges) are used on a single use basis and will be changed out prior to use during the next work shift.
- The appropriate cartridge, canister, or filter for protecting against the air contaminant shall be used.
- Air purifying respirators can be used for contaminants with poor warning properties if the contaminant concentrations have been measured and the filter media has been shown to remove the contaminant in a laboratory test.
- Half-face respirators can be used in concentrations up to 10 times the exposure guideline.
- Full-face respirators can be used in concentrations up to 50 times the exposure guideline.
- Full-face respirators shall be specified if the contaminant can irritate the eyes at the expected concentration.
- Workers using full face respirators that require vision correction will request and be provided special spectacle kits.

NOTE: Air purifying respirators are never used in atmospheres that are oxygen deficient or Immediately Dangerous to Life or Health (IDLH).

4.40.4.8. Atmosphere-Supplying Respirators

- Only Pressure Demand Regulators shall be used.
- When using in an IDLH or oxygen deficient atmosphere, a 5 minute (minimum) auxiliary escape cylinder and safety harness shall be used. (Five-minute escape packs are not considered an auxiliary air supply.)
- Standby Personnel shall be available when someone else enters an IDLH or oxygen deficient atmosphere. The standby shall be in communication with the entry person and have reserve breathing equipment available.

NOTE: All standby Personnel will meet the approval and training requirements of this Manual.

- Abrasive blasting situations requires the use of an air supplied respirator equipped with a loose-fitting hood or helmet with a minimum air flow rate of 6 cfm.
- Waist belts for air supplied respirator systems shall be used so that the mask tailpiece is fastened to a ring or the belt. This is to prevent having the mask inadvertently pulled from the user's face.
- In IDLH or O₂ deficient atmospheres, persons using air supplied respirator systems shall be equipped with safety harnesses.

4.40.4.9. Respiratory Selection Guide

See Respirator Selection Reference Guide table.

- The tables mentioned above list the minimum level of respiratory protection requirements for tasks and substances that are (remember, a higher level of protection may be worn):
 - Hazardous to human health
 - Regularly performed by Workers
 - Specific to plant and pipeline operations and maintenance
- For tasks not listed, consult the following regarding the selection of respiratory protection:
 - Safety Data Sheet (SDS)
 - Your People Leader
 - HS Support
- The *Respirator Selection Guide* can be used to select the proper respirator for a specific worksite or task. In selecting respirators for individual Workers, the Supervisor shall evaluate the following additional information:
 - Any unusual conditions associated with the work or activity.
 - Anticipated respirator use time.
 - Chemical, physical, toxicological, and warning properties of the air contaminant.
 - Air contaminant concentration likely to be encountered.
 - User's ability to seal the selected respirator.
 - User's perceived comfort of the respirator.
- No Worker shall wear a respirator in an atmosphere where the contaminant concentration exceeds the Maximum Use Concentration (MUC) for the respirator being worn.
- The MUC is the product of the OSHA Permissible Exposure Level (PEL) for the contaminant in question and the Assigned Protection Factor (APF) for the type of respirator being used.
- Each respirator class is given an APF that represents a minimum level of protection which will be achieved if the respirator is used according to the manufacturer's specifications and the user can properly seal the respirator.
- Some typical APF are listed in [Table 31](#).

Table 31: Assigned Protection Factor (APF)

Respirator	APF
Single use dust mask	5
Half-face, negative pressure	10
Full-face, negative pressure	50
Powered Air-Purifying (PAPR)	1000
Full-face, air supplied, pressure demand	1000
Full-face, SCBA, pressure demand	10000
MUC = OSHA PEL x APF	

- If the calculated MUC is higher than any use limitation specified on the NIOSH approval label for the cartridges or filter being used, the concentration appearing on the NIOSH label will take precedence over the calculated MUC.
- The user's perceived "comfort" of a respirator is a most important yet often ignored aspect of respirator selection. The comfort factor can be extremely important when determining overall effectiveness of a respirator even though there is little correlation with respirator sealing efficiency. If a respirator is perceived as uncomfortable, it may not be used 100 percent of the required use time. Even a few minutes of non-use can dramatically and negatively impact exposure.
- Respirators should be individually assigned whenever possible. Each individually assigned respirator shall be personally identified in a way that does not interfere with the respirator performance.
- After each use, air purifying respirators should be washed with warm, soapy water or disinfecting wipe, and allowed to air dry. Proper cleaning and disinfecting of SCBA, abrasive blasting hoods or airline equipment should be performed according to manufacturer's recommended procedures only.
- If an air purifying respirator filter is to be used for more than one day the filter media shall be dated when installed and replaced as specified by the manufacturer.
- Workers using full face respirators and requiring vision correction may use special spectacle kits, if needed. Contact lenses are not to be worn with respiratory equipment. To obtain special spectacle kits, see *Personal Protective Equipment*. This will be done in a manner to ensure good vision, comfort, and proper sealing of the face-piece. Fit testing will be conducted with the spectacle kits in place.

4.40.4.10. Medical Approval

- Medical evaluations where required by jurisdiction (frequency of use, potential exposure, and or type of respirator) and respirator training will be completed prior to the fit testing.
- Employees that are required to obtain medical clearance will not be allowed to engage in work activities or into work areas where respiratory protection is required until medical clearance has been provided.

4.40.4.11. Administration of the Medical Evaluation

- The Medical Evaluation will be administered annually for those Employees required to wear respirators by their jurisdiction.
- A Physician or Other Licensed Health Care Professional (PLHCP) will be used to perform medical evaluations.
- The medical evaluations will be administered confidentially during the Employee's normal working hours or at a time and place convenient to the Employee.
- The medical evaluation will be administered in a manner that ensures the Employee understands its content.
- The employee will be given an opportunity to discuss the questionnaire and examination results with the PLHCP, if requested.

- A written recommendation regarding the Employee's ability to use the respirator will be obtained from the PLHCP.

4.40.4.12. Additional Medical Evaluations

- Additional medical evaluations are required under certain circumstances such as:
 - Employee reports medical signs or symptoms related to ability to use respirator
 - The PLHCP, H&S Rep or Supervisor recommends re-evaluation.
 - Information from the respiratory procedure, including observations made during fit testing and procedure evaluation indicates a need.
 - Change occurs in workplace conditions that may substantially increase the physiological burden on an Employee.

4.40.4.13. Follow-Up Medical Examination

- The People Leader will ensure that a follow-up medical examination is provided for an Employee whose initial medical examination demonstrates the need for a follow-up medical examination.
- A follow-up medical examination will include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

4.40.4.14. Supplemental Information for the PLHCP

The following information must be provided to the PLHCP before the PLHCP makes a recommendation concerning an employee's ability to use a respirator:

- Type and weight of the respirator to be used by the Employee.
- Duration and frequency of respirator use (including use for rescue and escape).
- Expected physical work effort.
- Additional protective clothing and equipment to be worn.
- Temperature and humidity extremes that may be encountered.

Any supplemental information provided previously to the PLHCP regarding an Employee need not be provided for a subsequent medical evaluation if the information and the PLHCP remain the same.

If requested, the company will provide the PLHCP with a copy of this Respiratory Protection Section and a copy of the OSHA 29 CFR Part 1910.134 Respiratory Protection regulation.

4.40.4.15. Fit Testing

Employees who pass the medical evaluation and wear tight fitting respirators will be fit tested prior to use.

Two types of fit testing, qualitative and quantitative, can be administrated dependent on the type of respirator to be used.

- **Qualitative Fit Test** – A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.
- **Quantitative Fit Test** – An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage around the face seal of a respirator.

Fit testing must be conducted annually or more frequently if an Employee's facial or medical conditions change.

Conduct a quick positive/negative respirator pressure check prior to starting to work requiring a cartridge or canister type respirator. This check is performed by putting on the respirator and breathing in and out and at the same time alternately blocking the canister ports and exhaust ports checking for respirator seal leaks.

4.40.4.16. Respirator Maintenance and Inspection

- Individual and multiple people use respirators shall be cleaned and disinfected after each use.
- Single use disposable respirators and filter mask shall be disposed of by approved methods and not reused.
- Supplied air respirators and breathing equipment shall be inspected routinely before each use and at least monthly.
- Following the manufacturer's recommended procedures.
- All respirator equipment shall be properly stored in a clean sealable bag, in a dust free area out of the sunlight and weather.
- It is recommended that respirators be stored without canisters or cartridges attached.
- All respirator equipment repairs are to be performed by Qualified Personnel or Vendor.
- All non-disposable respirator equipment must be inspected monthly. (See *Form HSF-025 Respirator Inspection Record*)

4.40.4.17. Breathing Air Quality

- All compressed air used for breathing purposes shall be uncontaminated and shall meet, as a minimum, the standard of the *ANSI/Compressed Gas Association (CGA), for Type I Grade D Breathable Air*.
- Company and rental compressors used to provide breathing air must meet these standards.
- Breathing air used from air compressors as a source must be filtered and must be monitored for carbon monoxide.
- Visually inspected and the following determinations made prior to its use by Workers:
 - Make certain the high temperature alarm is operational.
 - Determine the number of hours since the oil/air separator (if present) was last replaced and have the dealer replace prior to renting if unknown or if the operating hours exceed the manufacturer's instructions.
- The compressor oil and filter operating hours should be determined, and both changed prior to rental if unknown or if the operating hours exceed one-half (1/2) of the manufacturer's instruction.
- All rental equipment must appear to have been carefully maintained.
- Rented piston-type air compressors should never be used to supply breathing air to Workers.

- Breathing air from compressed gas cylinders must be Grade D and have a certificate of analysis indicating the gas contained in the cylinder meets ANSI/Compressed Gas Association Grade D standards.
- The certificate of air analysis for each cylinder shall remain at the worksite if the cylinders are in service and on location.
- In addition to the Vendor certification, all compressed air cylinders must be checked for oxygen and moisture content prior to first use. The oxygen content must be between 19.5 and 23.5 percent. The moisture content in the cylinder must not exceed a dew point of -50 °F at 1 atmosphere of pressure.
- Cylinder valves and valve stems must have the protective caps in place when the cylinders are not in use.
- Cylinders should be secured in an upright position to prevent toppling and lessen the exposure to trip and fall hazards.

4.40.4.18. Plant Air

Plant air shall not be used as a source of breathing air unless inline safety equipment has been installed which removes moisture, oil mists, particulates, organic vapors, and monitors for carbon monoxide. (Prior to the purchase and installation of this inline safety equipment, it is recommended that HS Support be contacted.)

4.40.4.19. Voluntary Use of Respiratory Equipment (Not Required)

Workers wishing to use respiratory equipment where hazards exist at lower levels below permissible exposure limits are encouraged to do so but must adhere to the following requirements. Workers must:

- Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations.
- Choose respirators certified by NIOSH for use to protect against the contaminant of concern.
- Not wear respirators into atmospheres containing contaminants for which their respirator is not designed to protect against.
- Keep track of individual respirator and do not mistakenly use someone else's respirator.

Employees using tight fitting respiratory equipment not mandated by this section must be medically able to use that respirator. Therefore, even with voluntary use, Employees must be scheduled for and satisfactorily pass a medical review prior to use of any tight-fitting respiratory equipment.

Employees must ensure that the respirator is cleaned, stored, and maintained so that its use does not present a health hazard to the user.

NOTE: Those Employees whose only use of respirators involves the voluntary use of filtering facepieces (dust masks), within an atmosphere having exposure limits set below OSHA standards, are not required to be included in this written respiratory section. This includes fit test or medical evaluation.

4.40.4.20. Section Evaluation

- Managers and Supervisors will review this section with their Employees and submit draft changes if required to the Safety Shared Services.
- Items to review are changes in:
 - hazards found in the workplace

- procedures which require respiratory protection,
- procedures which affect Employee exposure or stress
- operations which affect emergency procedures.

4.40.4.21. Recordkeeping

Medical records for each Employee must be preserved and maintained for at least the duration of employment plus 30 years.

4.40.4.22. Fit Testing

Fit test records must be maintained for each Employee until the next fit test is administered.

4.40.5. Documentation

- Fit-Test Procedure and Records
- Workplace Personal Protective Equipment Hazard Assessment Form
- Respirator Inspection Record
- *Respirator Selection Reference Guide table*
- Employee Notification of Personal Air Sampling Results
- Attendance Record
- Respirator Fit Test Record
- Monthly Safety Equipment Inspection - Respirator

4.40.6. References

- *29 CFR 1910.134 Respiratory Protection Standard*
- *G.7.1-2018 Commodity Specification for Air Seventh Edition*

4.41. Safe Handling of Pipeline Liquids

4.41.1. Purpose

This section is developed to provide minimum safety guidelines for the handling of natural gas pipeline liquids.

4.41.2. Scope

This section applies at all Company facilities.

4.41.3. Responsibilities

People Leaders shall:

- Ensure that pipeline liquids are handled as a hazardous chemical.
- Ensure that all Employees handling pipeline liquids are trained in the proper PPE use, proper sampling techniques and/or proper handling or disposal methods.

Employees and Workers shall:

- Follow established safe procedures for handling pipeline liquids.
- Review the SDSs associated with the chemicals present in pipeline liquids.
- Wear the proper PPE for handling pipeline liquids.
- Report any changes in characteristics of the pipeline liquids.

HS Support shall:

- Periodically monitor the handling of pipeline liquids to ensure proper sampling and disposal procedures are followed.

Assist with the Hazard Assessments for PPE and respiratory protection when taking pipeline liquid samples, handling, etc.

Safety Shared Services shall:

- Monitor the chemical analysis of the pipeline liquids periodically to determine if there are any changes in the composition of the liquids.
- Communicate any changes of the liquid composition to the field.
- Provide the necessary Occupational Hygiene resources to assist in the exposure monitoring of pipeline liquids and respiratory Hazard Assessments.

4.41.4. Requirements

4.41.4.1. Guidelines for Handling

- Natural gas pipeline streams typically contain varying quantities of pipeline liquid. These liquids are made up of different ingredients that have a broad range of hazard ranking both in toxicity and flammability.
- Pipeline streams which are known to have traces of H₂S require special handling during a liquids sampling or liquids draw down.
- For the safe handling of liquids containing H₂S the individual SDS for that material shall be reviewed.
- Toxicity of the gas pipeline liquids can vary due to the percentage of the hazardous ingredients found in a particular line segment. Proper PPE must be worn when handling these liquids.
- Some natural gas pipeline liquids are extremely flammable due to the low flash point; therefore, sampling or liquid transfers shall be handled following the established safety procedures for flammable liquids which include grounding, non-sparking tools/equipment, explosion proof equipment and no open flames.
- The specific types of PPE to be worn are identified from the Hazard Assessments for personal protection and respiratory protection recommended for the job specific task of sampling pipeline liquids.
- Organic vapor chemical cartridge respirators are available for non-routine operations or emergencies where there is a potential for air concentrations of pipeline liquid vapors to exceed the OSHA PEL for any of the hydrocarbon ingredients. Selection of the chemical cartridge is based on the respiratory hazard assessment.

4.41.5. Documentation

N/A

4.41.6. References

N/A

4.42. Safeguards, Barricades and Warning Signs (Temporary)

4.42.1. Purpose

This section describes the temporary use of general safeguards, barricades and signs found at GTM.

4.42.2. Scope

This section applies to all owned and operated company facilities.

To describe the common safeguards, barricades and signs used to inform Workers and others of hazards at our facilities.

4.42.3. Responsibilities

People Leaders shall:

- Communicate this section to all Personnel under their supervision.
- Ensure this section is followed by all Workers.

Employees and Workers shall:

- Follow this section.
- Workers shall not enter sign, flagged or Barricaded areas until they:
 - obtain permission to enter from Workers in control of the area,
 - understand the Hazards within the area, and
 - take necessary safety precautions.

4.42.4. Requirements

- Unprotected temporary openings in floors or elevated work platforms shall:
 - be covered with plywood that is at least 2 cm (¾-in) in thickness
 - have secured coverings capable of supporting twice the maximum intended load
 - only be removed to perform a particular task
- Coverings shall only be removed to perform a particular task. Coverings shall be replaced immediately after the task is complete or as appropriate during the task if other Workers are present near the work area.
- Suitable safeguards, flagging or barricades with warning signs or flashing lights shall be used to protect Workers from any work activity that may endanger them. Examples of such activities include sand blasting, open excavations, temporary openings in floors, construction, welding arc flash in prefab areas, pressure testing or overhead work.

- Barricades shall be inspected periodically to ensure protection for Workers is adequate, and that barricades are still present and in good condition.
- Flagging shall be used as a warning to Workers of hazards that exist in work areas. Flagging tape shall be:
 - installed to completely encompass the work area containing the potential hazard, including access from levels above or below
 - prominently placed when conditions or activities may or do present a hazard to Workers or the public
 - placed to ensure Workers cannot enter the area where the hazard exists, without prior knowledge of the hazard
 - removed when the potential hazard no longer exists
- The following types of flagging shall be used:
 - RED – “Danger Do Not Enter” – Red with black lettering. This type of flagging is used where there is danger of a hazard, such as falling objects. Only Workers involved in the work and aware of the hazards are allowed in these areas. All others must obtain prior permission from the flagging owner (i.e., Worker who installed the flagging).
 - YELLOW – “Caution” – Yellow with black lettering. This type of flagging provides a warning that a hazard exists in the area. Yellow flagging can be crossed by Workers other than those who installed it, but awareness of the surrounding work areas is required.
- A flagging tag shall be attached to all flagging tape. Multiple tags may be required depending on work area and hazards. The Worker installing the tape shall complete the tag with the following information:
 - name of the person who installed the flagging
 - phone number or radio channel for contact
 - date on which the flagging was installed
 - reason for the use of flagging
- Instead of flagging and barricades a Safety Watch may be used to prevent Workers from entering the hazardous area, but only if the area is small enough to be easily managed and the Safety Watch remains in place until the hazard no longer exists.
- Warning signs identifying known hazards shall be posted to warn Workers and others in the area of the specific hazard. All signs shall be constructed in a professional manner and shall meet applicable legislation and engineering standards.
- Warnings signs include, but are not limited to:
 - Directional Signs
 - Installed as required
 - No Trespassing/Open Ditch
 - The signs shall be:
 - posted at all entries to the ROW

- face the intersecting road/highway, where construction activities are being conducted
 - display a contact telephone number for unauthorized Workers to contact
- Construction Warning Signs
 - All crossings of any interstate, highway, municipal or private roads shall be posted with construction warning signs, which are designed and positioned in accordance with the requirements of the applicable legislation. Such signs shall be clearly visible to traffic, as appropriate to the crossing, e.g., visible from two or more directions
- High Pressure Testing Signs
 - Shall be posted:
 - at all entries to the ROW, public access points, while sections are under test
 - facing intersecting roads/highways
- Smoke Warning Signs
 - Warning signs shall be used to warn traffic of poor visibility due to smoke from brush burning operations. All such warning signs shall be in accordance with applicable legislation.
- Other warning signs shall be erected as required by applicable legislation or by GTM to warn Workers and/or the public of a range of potential hazards such as:
 - traffic hazards (e.g., stop, slow, curve, steep hill, noise hazards, caution, work crews ahead, suggested speed restrictions, trucks turning, work in/over navigable waters)
 - signs indicating venting in progress during any venting activities (like opening pig traps)
 - “Caution Open Hole” or similar when there is an opening
 - overhead hazards
 - respiratory hazards
 - other PPE requirements (e.g., hard hat, hearing protection, eye protection required)

4.42.5. Documentation

N/A

4.42.6. References

N/A

4.43. Scaffolding

4.43.1. Purpose

This section establishes requirements designed to protect Workers from the hazards associated with work performed on or near scaffolding and scaffolding equipment.

4.43.2. Scope

This section applies to Workers and provides information related to the design, erection, inspection, use, and dismantling of scaffolds typically used by the pipeline business units (i.e., manually propelled mobile scaffolds, tubular-welded frame scaffolds, and tube and coupler scaffolds).

4.43.3. Responsibilities

People Leaders shall:

- Ensure adequate funds are available and budgeted for the purchase or rental of safe scaffolds as required in their respective areas.
- Obtain and coordinate the required training for the affected Employees.
- Prohibit any Employee who has not received the required training to perform any of the tasks or activities related to scaffold erection, inspection, or dismantling.
- Ensure Workers are provided with required PPE for their job.
- Ensure a Competent Person is in charge of scaffold erection according to the manufacturer's specifications.
- Ensure scaffold designed by Qualified Person and build to load design.
- Coordinate and consult in advance with the responsible HS Support on the need and intended scaffold use.

Qualified Person – Scaffolding shall:

- Oversee the scaffold selection, erection, use, movement, alteration, dismantling, maintenance, and inspection.
- Knowledgeable about proper selection, care, and use of the fall protection equipment.
- Evaluate connection points to support loads and prevent sway.
- Assess hazards and exercise “stop work” if unsafe conditions are detected throughout the scaffold lifecycle.
- Perform inspections for visible defects before each work shift and after any occurrence that could affect the structural integrity of the scaffold.
- Provide direct supervision of the dismantling of scaffolds.

Workers shall:

- Workers using scaffolds, swing stage scaffolds and non-mobile elevated work platforms shall use personal fall protection systems when working at heights greater than 1.8 m (6 ft.) without proper guardrails.
- Comply with all applicable guidelines contained in this safety section.
- Report damaged scaffolds, accessories, and missing or lost components.
- Immediately report any unsafe act and condition to Facility Management.
- Assist with inspections, as requested.

HS Support shall:

- Provide prompt assistance to Managers, Supervisors, or others as necessary on any matter concerning this safety section.
- Assist as necessary in the purchasing and renting of scaffolding equipment to ensure that all scaffolds comply with current safety regulations.

4.43.4. Requirements

4.43.4.1. General

- Scaffold work practices and rules should be based on:
 - Sound design.
 - Selecting the right scaffold for the job.
 - Assigning Personnel.
 - Fall protection.
 - Guidelines for proper erection.
 - Guidelines for use.
 - Guidelines for alteration and dismantling.
 - Inspections.
- Installation, maintenance, and storage.
 - Scaffolds must be erected, moved, altered, or dismantled only under the direction of a Qualified Person, or as requested for corrective reasons by H&S Personnel.
 - When scaffolding hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, PPE, and proper training regarding Scaffolds will be implemented.
 - Duties performed on or around scaffolds shall be done by experienced and trained Employees.
- Do not erect, use, alter, dismantle, or move scaffolds close to energized power lines (see [Table 32](#) for minimum distances).

Table 32: Minimum Scaffold Distances to Energized Power Lines

Line Voltages	Minimum Distances
Less than 50 kV	10 ft.
50 kV or greater	10 ft. + 4 in. for each 10kV over 50 kV

- Do not block access to equipment, doors, and pathways used for emergencies.
- Determine the type of pedestrian, vehicle, or equipment traffic that will be in the area.
- Follow the requirements in this section and the manufacturer's recommendations for scaffolds.
- The footing or anchorage for scaffolds must be sound, rigid, and capable of carrying the maximum intended load without settling or moving.

- Objects such as barrels, boxes, loose brick, or concrete blocks must not be used to support scaffolds or planks.
- An access ladder or equivalent safe access must be provided.
- Scaffolding more than 3 m (10 ft.) above the ground or floor must have guardrails and toe boards installed at all open sides and ends, excepting needle beam scaffolds and floats.
- Guardrails must be made of not less than 5 x 10 cm (2 x 4-in) lumber (or other material providing equal protection) and must not be less than approximately 91 cm (36 in) or more than approximately 107 cm (42 in) high.
- Guardrails must have a mid-rail of at least 2.5 x 15.2 cm (1 x 6-in) lumber or other material giving equal protection.
- Supports must be at intervals not to exceed 2.4 m (8 ft.).
- Toe boards must be a minimum of 10 cm (4 in) in height.
- Toe boards and guardrails shall extend along the entire opening.
- Where persons are required to work or pass under a scaffold, a screen consisting of No. 18 gauge U.S. Standard wire 1.3 cm (½-in) mesh, or the equivalent, must be installed between the toe board and the guardrail covering the entire opening.
- Scaffolds 1.2 to 3 m (4 to 10 ft.) high and having a minimum horizontal dimension in either direction of less than 45" must have standard guardrails installed on all open sides and ends of the platform.
- Tubular welded frame scaffolding legs must be set on adjustable or plain bases and placed on mud sills or other foundations adequate to support the maximum rated load.
- Tubular welded frame scaffolding cross braces must be long enough to be automatically square and align vertical members.

4.43.4.2. Types of Scaffolds

- There are many different types of scaffolds. The three major categories are:
 - Self-supporting Scaffolds
 - Suspension Scaffolds
 - Special Use Scaffolds
- **Self-supporting scaffolds** are one or more working platforms supported from below by outriggers, brackets, poles, legs, uprights, posts, frames, or similar supports. The types of self-supporting scaffolds include:
 - Fabricated Frame
 - Tube and Coupler
 - Mobile
 - Pole
- **Suspension scaffolds** are one or more working platforms suspended by ropes or other means from an overhead structure(s). The types of suspension scaffolds include:
 - Single-Point Adjustable (Boatswain's Chairs)

- Two-Point Adjustable (Swing Stage)
- Multiple-Point Adjustable
- Multi-Lend
- Category
- Float (Ship)
- Interior Hung
- Needle Beam
- **Special use scaffolds** and assemblies are capable of supporting their own weight and at least 4 times the maximum intended load. The types of special use scaffolds include:
 - Form and Carpenter Bracket
 - Roof Bracket
 - Outrigger
 - Pump Jack
 - Ladder Jack
 - Window Jack
 - Horse
 - Crawling Boards
 - Step, Platforms, and Trestle Ladder

4.43.4.3. Inspection of Scaffold and Components

NOTE: *To be certain scaffold components are in good condition, a Qualified Person must inspect all parts before and during its assembly. Defective components could affect the structural integrity of the whole scaffold.*

- Scaffolding and components shall be inspected for visible defects by a Qualified Person before each work shift and after any occurrence that could affect the structural integrity of the scaffold.
- This includes changing weather conditions and prolonged work interruptions.
- Before using a scaffold, inspect it for visible defects. Pay close attention to the footing, planking, guardrails, toe boards, connections, welds, and ladders or other access means.
- Planks and wooden components must be free of rot, splintering, splits, and painted surfaces that could hide defects.
- All members or parts of steel components must be straight and free of bends, cracks, dents, and rust.
- Do not mix scaffold components from different manufacturers unless they fit together without force or modification, and the scaffold's structural integrity is maintained.
- Do not use scaffold components made of dissimilar metals, unless approved by a Qualified Person.
- Any defective components must not be used.
- Immediately repair or replace damaged scaffolds or scaffold accessories.

- Do not straighten or reuse defective parts.
- Document inspections on scaffold inspection tag or other documentation method.

4.43.4.4. Construction of Supported Scaffolds

- Supported scaffolds have one or more platforms that are supported by beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support.
- All load-carrying timber members of scaffold framing shall be a minimum of 1,500 fiber (Stress Grade) construction grade lumber.
- Wire, synthetic, or fiber rope used for scaffold suspension shall be able to support at least 6 times the intended load.
- All planking must be Scaffold Grades, or equivalent, as recognized by approved grading rules for the species of wood used. The maximum permissible span for 5 x 23 cm (2 x 9-in) or wider planks is shown in [Table 33](#).

Table 33: Scaffold Planking Material Requirements

Full Thickness Undressed Lumber				Nominal Thickness Lumber	
Working Load (psf)	25	50	75	25	50
Permissible Span (ft.)	10	8	6	8	9

- The maximum permissible span for 3.2 x 23 cm (1¼ x 9-in), or wider, plank of full thickness shall be 1.2 m (4 ft.) with medium duty loading of 50 psi.
- When erecting scaffolds, make sure the first unit of any scaffold is plumb, aligned, and level.
- Plank the platform as tightly as possible with no spaces for materials or equipment to fall through. If full planking is not possible, ensure no space is more than 2.5 cm (1 in) wide.
- The front edge (edge closest to the work) of the platform must not be more than 35.5 cm (14 in) from the face of the work unless guardrail systems are erected along the open edge and/or personal fall arrest systems are used.
- Overlap planking a minimum of 30.5 cm (12 in) and secure planks from movement.
- Scaffold plank must extend over their end supports not less than 15.2 cm (6 in).
- Each end of a platform 3 m (10 ft.) or less in length shall not extend over its support more than 30.5 cm (12 in).
- Platforms greater than 3 m (10 ft.) in length must not extend over its support more than 45.7 cm (18 in).
- Platforms and walkways must be at least 48 cm (19 in) wide unless the configuration of the application area makes this impractical and guardrails or personal fall arrest systems are used.
- Each abutted end of a plank must rest on a separate support surface.
- When a platform changes direction (e.g., turn a corner), any platform that rests on a bearer at an angle other than a right angle (90 degrees) must be laid first. Other platform planks that rest at right angles and over the same bearer will be placed second.

- Guardrails must be installed along all open sides and ends of scaffolds that are more than 3 m (10 ft.) above a lower level.
- The top edge height of top rails must be installed between 96.5 cm (38 in) and 114.3 cm (45 in) above the platform.
- Scaffold poles, legs, posts, frames, and uprights shall bear on base plates, mud sills, or other firm foundations.
- Never use cinder blocks, bricks, gravel, loose fill, or other means for leveling uneven surfaces or providing a foundation for the base plate.
- The entire scaffold shall be tied to and securely braced against the building or structure at intervals not to exceed 9 m (30 ft.) horizontally and 8 m (26 ft.) vertically.

4.43.4.5. Casters

- Casters and wheel stems shall be pinned or otherwise secured in scaffold legs. Casters and wheels must be positively locked if in a stationary position.
- Tube and coupler scaffolds shall be tied to and securely braced against the building at intervals not to exceed 9 m (30 ft.) horizontally and 8 m (26 ft.) vertically.

4.43.4.6. Movement of Manually Propelled Mobile Scaffolds

When moving manually propelled mobile scaffolds:

- Stabilize the tower during movement.
- Apply force as close to the base as practical, but not more than 1.5 m (5 ft.) above the supporting surface.
- Move the scaffold on level floors and avoid areas with obstructions and openings.
- Do not ride on mobile supported scaffolds unless the following conditions exist:
 - The floor or surface is level and free of pits, holes, or obstructions.
 - The height-to-base ratio does not exceed 2 to 1 (height is twice as long as the base is long/wide).
 - All tools and materials are secured or removed before scaffold is moved.
 - Workers are not on any part of the scaffold which extends outward beyond the wheels, casters, or other supports.

4.43.4.7. Access and Egress

- Always use a ladder or other proper means of accessing scaffolds.
- When assembling or dismantling tubular-welded frame scaffolds, end frames with horizontal members that are parallel, level, and not more than 22" apart vertically may be used as climbing devices.

4.43.4.8. Load Capacity

- The scaffold and each of its components must be capable of supporting 4 times the maximum intended load.

- Scaffolds must be designed by a Qualified Person and built and loaded according to that design.
- Avoid excessive deflection of the scaffold platform by spreading the load out, if possible.
- If you notice any structural damage, settling, or anything else that could affect the stability, halt work until the discrepancy is resolved.

4.43.4.9. Nature of Hazards/Procedures for Dealing with Hazards

- Whenever working on a scaffold, be aware of the potential dangers that exist.
- The three most common types of scaffold hazards are:
 - Electrical – Many Workers are electrocuted each year from contact with energized power lines.
 - Falls – Falls account for a high percentage of injuries and fatalities experienced by scaffold Workers. Fall hazards can be eliminated through the use of engineering controls, personal fall arrest systems, and safe work practices.
 - Falling Objects – Another type of hazard associated with scaffolds is falling objects. Employees who work on or around scaffolds must be protected from falling tools, debris, and other small objects through engineering controls and safe work practices.
- Do not erect, use, dismantle, alter, or move scaffolds such that the scaffold or any conductive material handled while on the scaffold comes closer than 3 m (10 ft.) (lines under 50 kV) and 3 m plus 10 cm (10 ft. plus 4 in) for every 10 kV over 50 kV (lines over 50 kV).

Safety Warning

Electrocution can occur without direct contact with the energized source. Any conductive material that contacts an electrical source can lead to electrocution.

- Tag lines shall be used to hoist materials to prevent contact.
- If electrical arc welding or other similar jobs are performed on a scaffold, the scaffold must be insulated and/or grounded.
- No welding, burning, riveting, or open flame work shall be performed on any staging suspended by means or fiber of synthetic rope.
- Only treated or protected fiber or synthetic ropes shall be used for or near any work involving the use of corrosive substances or chemicals.
- Suspension ropes shall be protected from contact with heat sources (welding, cutting, etc.) and from acids or other corrosive substances.
- Never work on exterior scaffolds during severe weather/ thunderstorms.
- If a safe distance from energized power lines cannot be maintained, call the utility company to have the source de-energized or relocated.
- Guardrails must be installed along all open sides and ends of scaffolds and walkways that are more than 3 m (10 ft.) above the lower surface.
- Never use a ladder, box, or other object to elevate your height while on scaffolds.

- Always keep three points of contact when climbing a ladder – climb with your hands free.
- If a scaffold is covered with ice or other slippery material, discontinue working on the scaffold until the hazard is alleviated.
- Keep all walkways and working surfaces clear of tools and debris.
- Never jump from one platform to another.
- Do not use cross braces to climb onto the scaffold or another level of the scaffold.
- Personal Fall Arrest Systems (PFAS) must be used when guardrails are not feasible, or while working on suspended scaffolds.
- A basic and commonly used PFAS includes a body harness, lanyard, and anchor point.
 - Refer to *Fall Protection* section for further details.
- Where tools, materials, equipment, etc., are intended to be stacked higher than the toe board, or where their falling could strike Employees below, do one or more of the following:
 - Barricade the area with hazard warning tape, and do not permit unauthorized entry.
 - Install toe boards, screens, or canopies.
 - Wear hard hats while working on and around scaffolds.
- Overhead protection must be provided for Workers on a scaffold exposed to overhead hazards.
- Always place materials and tools away from the platform's edge.
- Practice good housekeeping.

4.43.4.10. Dismantling Scaffolds

- Scaffolds must be dismantled under the direct supervision of a Qualified Person.
- Before dismantling scaffolds, confirm that the scaffolding was assembled properly and that no structural alterations were made.
- Seat planks correctly to prevent falling when other pieces of the deck are removed.
- When a scaffold must be left partially disassembled, place barricade tape at each point of access.
- Lower all components to the ground by rope, hoist, or hand-hand.

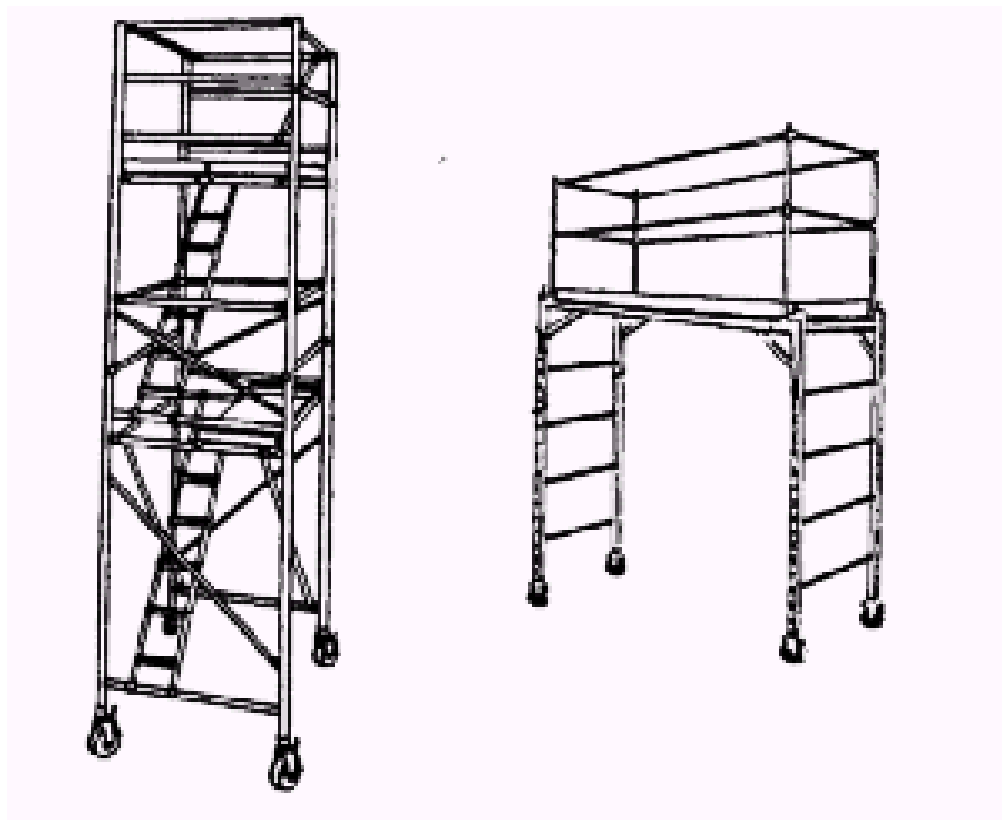


Figure 26: Manually Propelled Mobile Scaffold

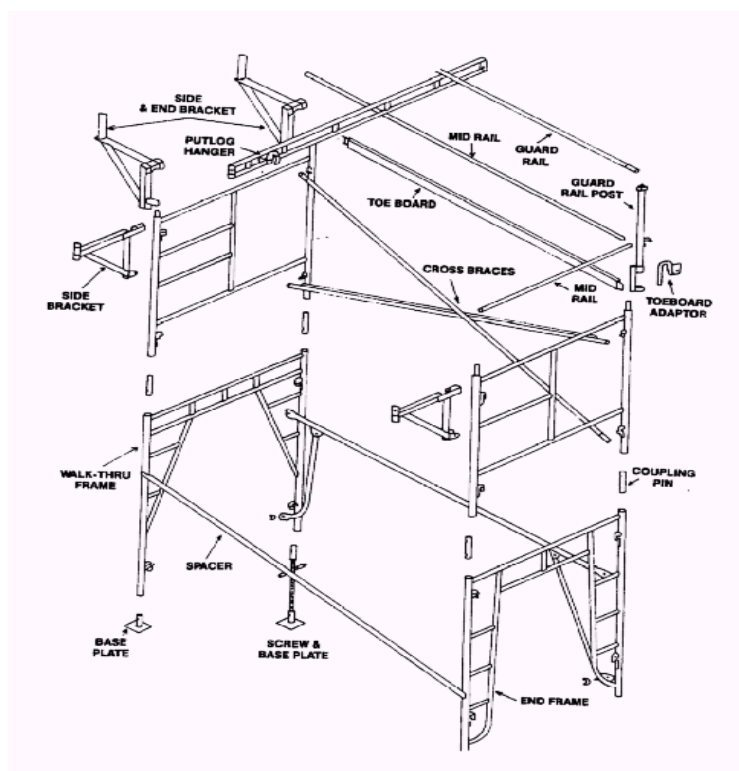


Figure 27: Tubular-Welded Frame Scaffold

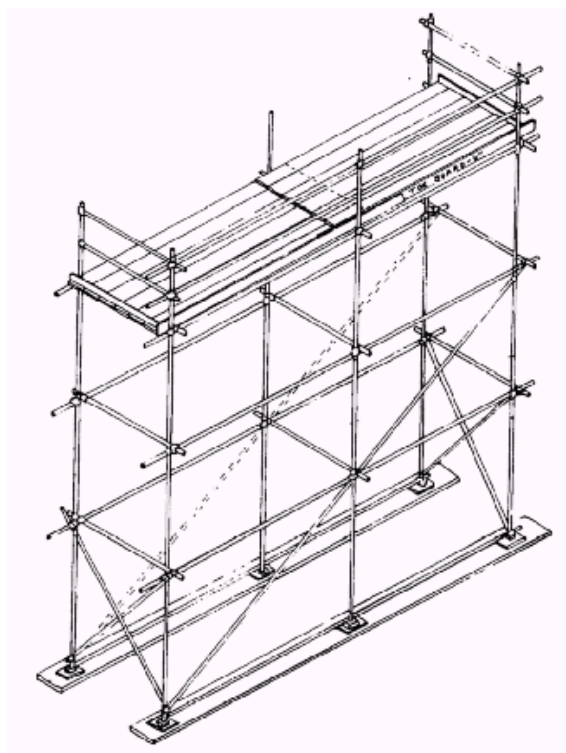


Figure 28: Tube and Coupler Scaffold

4.43.5. Documentation

- N/A

4.43.6. References

- 29 CFR 1910.28 – General Industry, Safety Requirements for Scaffolding
- 29 CFR 1926.451 – Construction Industry, General Requirements for Scaffolds

4.44. Severe Weather

4.44.1. Purpose

This section outlines the steps to take to plan for and respond to severe weather in order to protect Workers from injury or illness.

4.44.2. Scope

This section applies to all Company facilities.

4.44.3. Responsibilities

People Leaders shall:

- Communicate this section to all Personnel under their supervision.
- Ensure this section is followed by all Workers.

Workers shall follow this section.

4.44.4. Requirements

- If potential or imminent severe weather is forecast, the Hazards due to severe weather need to be identified and controls implemented. Controls can include, but are not limited to:
 - Have Workers work remotely
 - Send Workers home from GTM Locations to avoid travel in severe weather
 - Close offices and Worksites
- Severe weather considerations include:
 - Lightning:
 - If lightning is visible or thunder is heard, initiate shut down of all outside work activities and seek shelter.
 - Outside work shall not recommence until 30 minutes after the final observation of lightning or thunder.
 - If lightning is visible or thunder is heard, the following indoor work shall be stopped:
 - All testing or grounding for mitigating induced voltage.
 - Work in or around structures (e.g., tanks, side-booms, cranes, dozers, etc.)

- Where practicable, use lightning detectors to supplement visual and auditory detection of electrical storms; use the detector's specifications to determine detection ranges and action plans
- Heavy Rain:
 - Avoid driving on flooded access roads or ROWs
 - Avoid crossing bridges if water level is high and fast flowing
 - Stay out of trenches, excavations and below ground level unsheltered entry points
- Heavy Snow and Ice:
 - To prevent slips, trips and falls, clear snow, and ice from walking surfaces as quickly as possible after a winter storm. When walking on snow or ice is unavoidable, Workers should be trained to:
 - Wear footwear that has good traction and insulation (e.g., insulated and water-resistant boots or rubber over-shoes with good rubber treads),
 - Use traction aids where their use does not present additional hazards (e.g., hazardous locations), and
 - Take short steps and walk at a slower pace to react quickly to changes in traction.
 - When driving in heavy snow, drive below posted speed limits because they are intended for ideal driving conditions. Other best practices include:
 - Be alert. Black ice will make a road look like shiny new asphalt. Pavement should look grey-white in winter,
 - Do not use cruise control. Winter driving requires you to be in full control at all times,
 - Reduce your speed while approaching intersections covered with ice or snow,
 - Allow for extra travelling time or delay a trip if the weather is inclement,
 - Drive with low-beam headlights on. Not only are they brighter than daytime running lights but turning them on also activates the taillights. This lighting makes your vehicle more visible,
 - Lengthen your following distance behind the vehicle ahead of you. Stopping distance on an icy road is double that of stopping on a dry one. For example, when driving at the speed of 60 km/h (37.3 mph) stopping distance is from around 45 m (140 ft.), which increases to 80 m (over 260 ft.) on an icy road surface,
 - Steer with smooth and precise movements. Changing lanes too quickly and jerky steering while braking or accelerating can cause skidding,
 - Be aware and slow down when you see a sign warning that you are approaching a bridge. Steel and concrete bridges are likely to be icy even when there is no ice on the ground surface (because bridges over open air cool down faster than roads which tend to be insulated somewhat by solid ground),
 - Consider getting off the road before getting stranded if the weather is worsening,
 - Keep a safe distance back from snowplows and salt/sand/anti-icing trucks, and

- Never pass a snowplow due to whiteout conditions and ridge of snow created by the plow.
- Hail/Freezing Rain:
 - Take cover during hailstorms
 - Expect slippery walking and driving conditions
 - Be aware of possible damage to trees and power lines due to ice buildup
 - Avoid travel in these conditions
- Extreme Heat/Heat Stress:
 - Consult the climatic condition reports from your local weather service during Hazard Assessment
- High Wind:
 - When wind conditions exceed 50 km/hr. (30 mph), the Hazard Assessment shall be reviewed and adjusted to take the wind conditions into consideration, or the activity shall be suspended until wind conditions are more favorable
 - Consider other Hazards such as dust and debris, secure any loose materials
 - Geographic work locations that can be prone to earthquakes, hurricanes and/or tornados
- Working after Sunset and before Sunrise:
 - Work after dusk shall not be permitted unless the following conditions are met:
 - For Contractor work, prior approval shall be obtained from the Enbridge Representative,
 - There is a minimum of two (2) Workers, or communications exist to outside areas to request assistance if required,
 - Adequate lighting is provided to illuminate the work, and
 - For Contractor work, regular “night shift” work shall require prior project approval.
 - Night security Workers shall:
 - Not work alone, unless they have an adequate communication plan in place to contact other Workers or emergency assistance as needed, and
 - Maintain communications and check in at least every two hours with a control room or other Workers familiar with the Worksite and the Emergency Response Plan for that project and/or operating Facility.
- Refer to existing emergency management plans for guidance in specific severe weather conditions.

4.44.5. Documentation

- N/A

4.44.6. References

- N/A

4.45. Transportation of Hazardous Materials (Only)

4.45.1. Purpose

This section provides guidelines to ensure proper packaging, labeling, marking, manifesting, and placarding is completed prior to transporting or offering for transportation any Department of Transportation (DOT) “hazardous material”.

4.45.2. Scope

This section applies to all Workers involved in the packaging, transportation, or shipment of any hazardous material from any US-based Company facility.

This section is applicable to both interstate and intrastate transportation of hazardous material via public roads or by third party shipment.

4.45.3. Responsibilities

People Leaders shall:

- Provide appropriate material to properly mark/label, package, and ship hazardous material in accordance with requirements of this section.

Workers shall:

- Mark/label, package, and ship hazardous material in accordance with the requirements of this section.

4.45.4. Requirements

4.45.4.1. General

- Company vehicles which contain hazardous materials must be attended by the driver. A vehicle is attended when the driver is within 30.5 m (100 ft.) of the vehicle and has an unobstructed view.
- Company vehicles carrying hazardous materials must be parked 1.5 m (5 ft.) off the traveled portion of a public street or highway except for brief periods when the necessities of operation require the vehicle to be parked and it is impractical to park elsewhere.
- Unless there is no practical alternative route, the operator of a vehicle containing hazardous materials must operate the vehicle over routes which do not go through or near heavily populated areas, places where crowds are assembled, tunnels, narrow streets, or alleys.
- No person may smoke or carry a lighted cigarette, cigar or pipe on or within 7.6 m (25 ft.) of a motor vehicle containing explosives, flammable or oxidizing materials or a vehicle that has an empty tank which has been used to transport flammable liquids or gasses.
- When fueling a vehicle containing hazardous materials, the engine of the vehicle must not be operating and the person in control of the fueling process must be at the point where the fuel tank is filled.
- Identification, placement, and placarding requirements are dependent on the hazardous material being transported and the quantity of material being transported.

4.45.4.2. Hazardous Material Definition

- The DOT has published a list of substances designated as being hazardous. The *Hazardous Materials Table (49 CFR Part 172.101)* designates specific materials as hazardous for transportation.
- A list of hazardous materials commonly transported can be found in *Hazardous Material Classification, Labeling and Placarding*.

4.45.4.3. Hazardous Material Classification

- Classes of hazardous materials which may include:
 - Explosives
 - Flammable and non-flammable compressed gases
 - Flammable liquids
 - Oxidizers
 - Toxic materials
 - Corrosives
- The hazardous classification does not apply to petroleum products that are in the process of being used as lubricants or fuels. For example, the gasoline in a vehicle's fuel tank would not fall under these requirements.
- The DOT classification numbers for hazardous materials are provided in *Hazardous Material Classification, Labeling and Placarding*.

4.45.4.4. Reportable Quantities

Hazardous substances are assigned reportable quantity (RQ) limits. The RQ limit is the minimum amount of that substance which, if released, requires the notification of federal agencies.

4.45.4.5. Shipper and Carrier Responsibilities

- The DOT places specific responsibilities on the “shipper” and the “carrier” of hazardous materials.
- In cases where the company uses third-party companies (e.g., FedEx or UPS) to transport hazardous materials, it is defined as the “shipper.”
- Avoid overnight shipments of hazardous materials by third party carriers. Shipments by these carriers may also require specific training prior to shipment.
- In those cases where company vehicles are used to transport hazardous materials, the Company is defined as both the “shipper” and “carrier.”
- Shipper responsibilities include assurance of proper:
 - Labeling
 - Marking
 - Placarding
 - Packaging of hazardous materials offered for shipment

- Shipping papers
- Carrier responsibilities include the assurance of adequacy of:
 - Shipping papers
 - Vehicle marking
 - Placarding
 - Safe loading and unloading of hazardous materials being shipped

4.45.4.6. Hazardous Materials Identification

- Proper identification, packaging, labeling, marking, and shipping papers shall be met for each hazardous material (see Hazardous Material Classification Labeling and Placarding).
- These requirements will vary depending on mode of transportation and carrier.
- Communication of the hazards associated with the transportation of hazardous materials is required. This communication may be accomplished through the use of:
 - Shipping papers
 - Markings (includes information on packaging)
 - Labeling
 - Placarding

4.45.4.7. Shipping Papers

- A shipping paper accurately describing the hazardous material must accompany shipments of hazardous materials when it is transported on a state or federal road and by air, except for Materials of Trade (see “Materials of Trade Exceptions” section of this section).
- The following are exempt from shipping paper requirement:
 - Materials of Trade
 - Limited Quantities – which includes hazardous material
- Not over 66 lbs. (30 kg) for solids or 8 gal (30.3 L) for liquids in Packaging Group II, III, or ORM-D materials. This includes the following materials:
 - Gasoline, paints, paint related materials, hexanes, pipeline liquids, methanol, diesel fuel, kerosene, batteries fluid, flammable liquid n.o.s., and environmentally hazardous substances, solid, n.o.s.
- Division 2.1 or 2.2 that do not exceed 165 lbs. (75 kg). These would include the following materials: acetylene, flammable and non-flammable aerosols, compressed air, compressed gases, helium, hydrogen, methane, nitrogen, oxygen, and propane.
- Total gross weight of all hazardous materials used as materials of trade must not exceed 440 lbs. (200 kg) to use the exemption.
- Shipping papers are not necessary when transporting products only on lease roads within a field.

- The shipper is responsible for completing the Hazardous Material Shipping Paper Form for any hazardous material or dangerous goods carried on vehicles unless exempted as “materials of trade”.
- Shipping papers include as applicable, hazardous materials manifest and a shipper’s certification. The papers must contain the following minimum information:
 - Proper shipping name
 - Hazard class or division
 - Identification number
 - Packing group
 - Reportable quantity
 - Total Quantity (i.e., weight, volume, number, etc.)
 - Certification (includes signature)
 - A 24-hour emergency response number
- If the hazardous materials do not appear on the Hazardous Material Shipping Paper Form, use the Hazardous Materials Table, 49 CFR Part 172.101 in the Hazardous Materials Compliance Pocketbook to properly identify and classify the material or contact HS Support.
- The Hazardous Material Shipping Paper Form is provided for guidance and contains the required DOT information for hazardous material commonly shipped by the Company.
- A carrier may not transport a hazardous material unless it is accompanied by shipping papers.
- When transporting hazardous materials, the shipping papers should be kept in an envelope marked or stamped, “Hazardous Material Papers.”
- The hazardous material shipping paper(s) must be located within one of three places inside the vehicle.
 - Driver’s door pouch with other material transfer or shipping reports.
 - Clear view and within easy reach of the driver while seat-belted in the seat.
 - On the driver’s seat if the driver leaves the vehicle.

4.45.4.8. Marking

- In addition to the shipping paper requirement, containers of hazardous materials must be marked.
- Marking consists of the proper shipping name and identification number (preceded by UN or NA, as appropriate) of the hazardous material contained in a package.
- Marking should be durable, in English, and not obscured by other markings or labels.
- Markings are required for containers with a capacity of less than 118.9 gal (450 L) or 1000 lbs. (454 kg). See Hazardous Material Classification Labeling and Placarding for marking requirements.

4.45.4.9. Labels

- Containers such as drums that are used to transport smaller quantities of hazardous materials on public roads must be properly labeled.
- Labels are color-coded and allow for quick recognition of a hazard. There are specific labels that must be placed on each container generally corresponding to the hazard class or division of the hazardous material.
- The DOT specifies the design (a square) and size (4"x4") of each label, and these labels may only be used. See Hazardous Material Classification Labeling and Placarding for DOT hazardous material label information.
- Labels are required for containers with a capacity of less than 118.9 gal (450 L) or 1000 lbs. (454 kg). See Hazardous Material Classification Labeling and Placarding for required labels.

4.45.4.10. Placarding

- Placards correspond very closely with the shape, color, and design of labels; and they are required for shipments of hazardous materials over 118.9 gal (450 L) or 1,000 lbs. (454 kg). See Hazardous Material Classification Labeling and Placarding for placarding instructions.
- Some extremely hazardous materials require placards when they are shipped even in very small quantities, but these types of materials are not generally used by the Company. Placards alert persons to the potential dangers associated with the larger quantities of hazardous material(s) and serve to guide emergency Personnel in their actions.
- Placards include the proper name of the material, United Nations (UN) number and hazard class.
- Placards should be placed on all four sides (required on at least two sides) of a motor vehicle, rail car, or freight container.
- Placards must be correct and in place before the material is transported. It is the Shipper's responsibility to ensure placards are correct and in place.
- Vehicles transporting a properly marked portable (not secured to vehicle) tank containing less than or equal to 118.9-gal (450 L) or 1,000 lbs. (454 kg) aggregate of hazardous materials do not have to be placarded.
 - Portable tanks must be marked with the proper shipping name of the contents on two opposing sides along with the hazardous materials identification number (UN 10 number) specified for that material in Hazardous Material Classification Labeling and Placarding.
- If a cargo tank (i.e., a tank secured to the inside of the pickup's bed) containing more than 118.9 gal (450 L) or weighing more than 1,000 lbs. (454 kg) and containing hazardous materials is being transported, the vehicle must be placarded.

4.45.4.11. Securing and Segregating Shipments

- Properly segregate the transported material to assure incompatible materials are kept apart by precautions such as separation by specific distances and/or raised off the floor and supported, etc. Some incompatible material cannot be carried on the same load under any circumstances. See *HS-59B Loading and Unloading* for segregation guidelines.
- All loads must be loaded and equipped to prevent shifting during transportation. See *HS-59C General Rules for Protection Against Shifting or Falling Cargo*.

- Any tank, barrel/drum, cylinder, or other packaging not permanently attached to a motor vehicle which contains any flammable liquid, compressed gas, corrosive material, poisonous material, or radioactive material must be secured against movement within the vehicle on which it is being transported.
- Compressed gas cylinders must be transported in one of the following ways to prevent them from overturning:
 - Securely lashed/chained in an upright position.
 - Loaded into racks securely attached to the motor vehicle.
 - Loaded in a case in a horizontal position and securely braced.
- Transport natural gas sample cylinders in DOT approved cases secured inside the vehicle with the shipping papers properly completed before vehicle movement.
- Smoking is NOT allowed when loading or unloading any explosive, flammable solid or flammable compressed gas.

4.45.4.12. Packaging

- Regulated materials must be packed to prevent spillage, leaks, or escape of product into the environment.
- Packaging is defined in two categories: non-bulk and bulk.
 - A **non-bulk package** means a single tank with a capacity of less than 118.9 gal (450 L) or a total weight of less than 1,000 lbs. (454 kg).
 - A **bulk package** means a single tank with a capacity greater than 118.9 gal (450 L) or a total weight greater than 1,000 lbs. (454 kg).
- DOT approved packaging should be used for both non-bulk and bulk shipments of regulated hazardous materials to prevent breakage and/or spillage during transport.

4.45.4.13. Vehicle Inspection

- Prior to moving a motor vehicle for hazardous material transportation, verify it is good working order and check shipping papers, labeling, marking, and placarding (if required) for accuracy.
- A copy of the SDS for the hazardous materials being transported and/or a copy of the Emergency Response Guidebook should be inside each vehicle.
- Refer to HS-58 DOT Driver Safety for more details on DOT vehicle inspection requirements.

4.45.4.14. Materials of Trade Exception

- Material of Trade is defined as a hazardous material (other than hazardous waste) that is carried on a motor vehicle for driver's safety, operation of the vehicle or direct support of the Company's principle business.
- Material of Trade Exception is intended to allow the transportation of limited quantities of hazardous materials by motor vehicle to support the principle business without the need to comply with the Hazardous Materials Transportation regulations.
- The aggregate weight of all hazardous materials classified, as a Material of Trade may not exceed 440 lbs. (200 kg) (gross weight including container and packaging) per vehicle.

- See *Hazardous Material Classification, Labeling and Placarding*. specific Materials of Trade Exception quantity limits for hazardous materials commonly transported.

4.45.4.15. Cylinders

- Flammable and Non-Flammable Gases such as natural gas sample cylinders, compressed nitrogen, oxygen, and acetylene may be transported under the materials of trade exception, provided all three of the following conditions are met:
 - The gross weight does not exceed 220 lbs. (100 kg) for any single container.
 - The aggregate weight of all “Materials of Trade” transported does not exceed 440 lbs. (200 kg) gross weight total for the vehicle.
 - Materials of Trade are all packaged and secured for shipment according to the requirements set forth by this section.
- Company Employees may carry up to 12-cases of natural gas spot and/or CP sample cylinders without exceeding the 440-lbs (200-kg) Materials of Trade Exception quantity threshold.
- If more than the specified quantity is transported, the Materials of Trade Exception does not apply, and shipping papers are required.
- Transportation of nitrogen or other cylinders decreases the quantity of sample cylinder cases that may be transported without exceeding the 440-lbs (200-kg) Materials of Trade Exception threshold.

4.45.4.16. Chemicals

- Up to 8 gal (30.3 L) of gasoline, methanol or antifreeze may be transported by the Company under the Materials of Trade Exception.
- Multiple 8-gal (30.3 L) containers may also be transported provided the total quantity does not exceed 440 lbs. (200 kg) (weight of contents plus containers) per vehicle.
- If more than the specified quantity is transported, the Materials of Trade Exception does not apply, and shipping papers are required.
- The transportation of gasoline must be in an OSHA-approved metal container as prescribed in the *Flammable and Combustible Materials* section.

4.45.4.17. Driver License Requirements

- A Class C – Commercial Driver’s License with Hazardous Material endorsement is required for any employee involved in the operation of a vehicle that is placarded and transporting a single tank with a capacity greater than 118.9 gal (450 L) or 1,000 lbs. (454 kg) of a hazardous material.
- A normal Class D license will suffice when transporting smaller quantities.
- Refer to *HS-58 DOT Driver Safety* for more details on DOT driver’s license requirements.

4.45.5. Documentation

- Hazardous Material Shipping Paper Form
- DOT Driver Safety Procedure
- DOT Security Procedure

- Hazardous Material Classification Labeling and Placarding
- Loading and Unloading
- General Rules for Protection Against Shifting or Falling Cargo

4.45.6. References

- *49 CFR Parts 100 – 199: Pipeline and Hazardous Materials Safety Administration, Department of Transportation*
- *49 CFR 172: Hazardous Materials Table, Hazardous Materials Communication, Emergency Response Information, and Security Plans*
- *49 CFR 172, Subpart B: Table of Hazardous Materials and Special Provisions*
- *Hazardous Material Transportation Safety Reauthorization Act of 2001*
- *North American Emergency Response Guidebook (current edition)*

4.46. Vehicle Safety

For vehicle safety and commercial motor vehicle driver requirements, refer to the following standards:

- Vehicle Operations Standard
- Commercial Motor Vehicle Drivers - Canada
- Commercial Motor Vehicles (DOT Drivers) - US
- Driving Safety Elink page

These standards provide the minimum safety requirements that apply to drivers and the vehicles they operate. Employees driving Company-owned, leased, or rented vehicles must be properly trained and aware of their safety Responsibilities. Drivers must drive defensively to save lives and avoid accidents regardless of the actions of others and the surrounding conditions.

In addition to driver training, correctly equipped and maintained vehicles are vital to Employee safety. Drivers must comply with all applicable federal, state, provincial and municipal traffic laws, codes, handbooks, and reporting requirements.

4.47. Working Alone

4.47.1. Purpose

This section provides the minimum requirements which are to be incorporated into site-specific safe work procedures and tasks while Working Alone.

4.47.2. Scope

This section applies to GTM Operations and Projects being completed for GTM.

A person is alone at work when they are on their own, when they cannot be seen or heard by another person, and when they cannot expect a visit from another Worker. Working alone also includes Workers who may go for a period of time where they do not have direct contact with a co-Worker. While it is not always hazardous to work alone, it can be when other circumstances are present. Whether a situation

is a high or low risk will depend on the location, type of work, or the consequences of an emergency, accident, injury, etc. This wide variety of circumstances makes it important to assess each situation individually.

This section applies to all Workers who:

- are alone or working alone
- do not have assistance readily available if there is an emergency, or is injured or ill
- are conducting work for GTM, representing GTM, or traveling to undertake work for or representing GTM.

Having assistance readily available means that another person is ready, willing, and able to respond to a call for help and attend to the Worker within a few minutes and that person is in sight or can be summoned by voice or by electronic means that are within reach of the Worker. Also, assistance is considered to be readily available when two or more Workers of different employers are working together, as it is reasonably expected that they can help one another.

4.47.3. Responsibilities

People Leaders shall:

- Establish a general level of awareness of the contents and location of this section with all Workers.
- Ensure that competencies are established and verified in those Workers expected to implement and comply with this section.
- Monitor and motivate compliance with the section, including periodically verifying that Workers use all safety and communication equipment identified in safe work practices for working alone.
- Actively evaluate and improve on this section over time.
- Train all Employees on working alone procedures.
- Ensure that appropriate planning and assessments are completed for the work.
- Ensure that all safety equipment is available as needed.

Workers shall:

- Comply with the assigned requirements of this section.
- Take all reasonable steps to assist in the implementation of this section with Management, Co-Workers, and Contractors as appropriate.
- Actively evaluate implementation of this section and recommend improvements to Management and HS Support as appropriate.
- Complete a Pre-Job Hazard Analysis in accordance with this section.
- Report potentially harmful or unsafe conditions to area supervision.
- Use safety and communication equipment supplied in accordance with training instructions.

HS Support shall:

- Assist in the active promotion and implementation of this section across GTM.
- Assist with the assessment and control of additional risk due to working alone.

4.47.4. Requirements

4.47.4.1. Hazard Identification

Working alone is a hazard that shall be considered during the planning of work.

Assessments made regarding the risk of working alone shall, at a minimum, consider the following before making the decision to begin or continue to work:

- Hazard(s) involved with the work (including electrical, temperature extremes, hazardous atmosphere)
- Isolation from immediate First Aid and Emergency Medical Services; (> 20 minutes)
- Lack of or limited ability to call for help
- Travelling alone
- Meeting with stakeholder/landowner away from their office
- Working in areas with known security problems and/or
- The effectiveness of existing safety measures

4.47.4.2. Minimum Requirements

Workers may not work alone under hazardous conditions. The following conditions or activities are examples when working alone is prohibited:

- In hazardous atmosphere (i.e., >5ppm H₂S, ≥10 percent LEL; <18-23 percent < O₂; above ACGIH thresholds)
- Confined Space Entry
- Pipeline Section Repair
- Purging Pipelines or Tanks
- Hot Work, (Category 1)
- Hot Taps or Repairing Live Valves
- Loading or pulling pipeline pigs
- Critical or Serious Lifts
- Working at heights requiring fall protection equipment
- When travelling on an ATV or snowmobile
- Entering a building after an intrusion alarm where it is apparent that an intruder may be present
- Dealing with potentially violent landowners or Co-Workers
- Confronting criminals (break and entry)
- Types of electrical work (i.e., High Voltage work)

4.47.4.3. Travel to Remote Locations

- For the purpose of this section, a remote location is defined as a place where notification could not otherwise be made in the event of an emergency and/or a location where it would be difficult for responders to find a Worker in the event of an emergency.

- Workers travelling alone to or through remote locations shall inform their Supervisor or designate of their travel plans. Upon arrival at the destination the Worker shall make contact and provide an update.
- The Supervisor or designate shall log all the information regarding the employee's travel plans and arrival time and status. It is the Responsibility of the Supervisor to initiate a response in the event that communications have failed to be met.

4.47.4.4. Working Alone Controls

Working alone controls may include, but are not limited to:

- The Buddy System – When using the buddy system, each Worker acts as the contact person for the other. To use the Buddy System, the involved Workers must:
 - Plan their work activities at the start of the day and communicate these work activities to their buddy
 - Establish check-in intervals appropriate for the hazards, risks and location of the work
 - Provide details of the arrangement to the Supervisor, Administrative Assistant or designate
 - Arrange to check in with their buddy at the agreed intervals throughout the workday
 - Keep with them:
 - An up-to-date list of contact numbers for their buddy, Supervisor and emergency services
 - The description of their buddy's motor vehicle and its license plate number
 - Information on the location, duration and type of their buddy's work activities
 - Advise their buddy if work plans change
 - Provide at each check-in:
 - The location you are calling from
 - Where you plan to be during the next check in interval
 - Confirmation when the next check in time will be
 - Record the actual contact times and relevant information
 - Confirm that their buddy has checked in at the end of the day
 - Initiate an Overdue Worker Search Procedure if their buddy cannot be reached as scheduled
- Mutual Aid Agreement with another oil field company which has qualified and competent Workers to act as buddies is permitted with prior approval from the Supervisors of each buddy
- "Man down" or lone Worker alarm or pendant
- "Check-ins" with a designated contact person that:
 - are visual or two-way contacts (or a one-way system may be acceptable if it allows the Worker to call or signal for help and will send a call for help if the Worker does not reset the device after a predetermined interval)

- are of a frequency determined to be acceptable based, on a hazard assessment (factoring location and activities involved)
- activates the escalation strategy if contact cannot be made, or there are unusual delays in re-establishing contact
- Provision for emergency rescue and first aid Personnel.
- Auto notification and location device (Satellite GPS Messenger) in the event of an emergency in a remote location where response is required.
- Agreements with other employers: If two or more Workers of different employers are working together or in the same vicinity and each Worker is capable of and willing to assist in a timely manner, this can qualify as assistance that is readily available. Mutual aid agreements need to ensure that the Workers of both employers are capable of, and willing to help. Where mutual aid agreements are in place, Workers need to be aware of the arrangement.
- Control Centre (Gas Control or third-party call service) Employees travelling alone to or through remote locations can inform the nearest Control Centre of their travel plans. Upon arrival at the destination the Worker must inform the Control Centre. The Control Centre shall log all the information regarding the Worker's travel plans and arrival time. It is the Responsibility of the Supervisor to inform and dispatch others to locate any overdue parties.
- Lone Workers must be checked on at a frequency which is dependent upon the job being performed. In no case should the frequency be less than once each workday.

4.47.4.5. Effective Means of Communication

Effective means of communication include, but are not limited to:

- portable or cell telephone
- walkie-talkie
- personal alarm or pager
- periodic site visits
- electronic methods, such as online web applications
- check-in system and requirement for updating an individual's status while working alone
- GPS-based communication device (e.g., SPOT Messenger) use of software or hardware to assist with communication in circumstances of poor network coverage

4.47.4.6. Overdue/Missing Worker

A Worker would be considered missing if they fail to respond at the designated contact time and continuing attempts to contact them over the next fifteen (15) minutes have been unsuccessful. If such a situation arises, the contact person shall:

1. Check in with the area district office to determine if the Worker has checked in, or if anyone knows the whereabouts of the overdue Worker.
2. Call the Control Center as appropriate to see if they have spoken with the overdue Worker recently and if they know of their whereabouts.
3. If 1 and 2 are unsuccessful, report the situation to that Worker's Supervisor, who in turn will initiate the Emergency Response Plan (ERP).

4. Continue to attempt to contact the Worker by radio, phone and/or pager.
5. Advise the Supervisor or their designate if you are successful in locating the overdue Worker.

The Supervisor or their designate shall:

1. Report the situation to their respective Manager if attempts to contact the overdue Worker have been unsuccessful for more than 5 minutes. The Supervisor or their designate will then implement the Emergency Response Plan.
2. Attempt to contact other parties or persons (Customers, Contractors, Suppliers, nearby facilities) to determine if they have any information of the overdue Workers whereabouts.
3. Contact the local police detachment and inform them of the missing Worker.
4. If the overdue Worker's whereabouts is unknown, determine the missing Worker's likely location(s) and the likely route(s) to and from that location, and only if weather permits dispatch Worker(s) to those likely areas. Ensure that these persons are equipped with radios and/or cell phones so that they can communicate their status to other members of the search party; and
5. Advise Enbridge Management and the local police when the overdue Worker has been successfully located.

4.47.5. Documentation

- N/A

4.47.6. References

- "An Explanation of the Working Alone Requirements," WorkSafe AB, March 2004
- "Working Alone Safely, A Guide for Employers and Employees," Alberta Human Resources and Employment, September 2000
- Alberta Occupational Health and Safety Act, Regulation and Code Part 28, 393(1), 393(2), 394(1), 394(1.1)
- British Columbia Occupational Safety and Health Regulations Parts 4, 4.20.1, 420.2 (1)(2)(3) (Working Alone or in Isolation)
- Canadian Occupational Safety and Health Regulations 4.2 (Working Alone or in Isolation)

4.48. Working on Ice or Near Water (🇨🇦 Only)

4.48.1. Purpose

The purpose of this section is to prevent the risk of drowning or injury while working at the edge of any body of water and either on or near any frozen body of water.

This section provides the minimum requirements which are to be incorporated into site-specific safe work procedures and tasks while working on ice or near water.

4.48.2. Scope

This section applies to work in proximity to bodies of water where there is a hazard to drowning for GTM Operations and Projects being completed for GTM.

4.48.3. Responsibilities

People Leaders shall:

- Develop and ensure safe implementation of site-specific safe work procedures that support this section.
- Ensure adequate safety equipment is available as required by this section.

Workers shall:

- Follow the requirements of this section and, if Deviation is required, follow section for approval of the Deviation.

4.48.4. Requirements

4.48.4.1. Working Near Water

The following guidelines shall be followed when working near water:

- Perform hazard assessment to determine the restricted area near the water. As part of the hazard assessment, consider water: temperature, depth, and flow rate (if applicable).
- Restricted areas (control zone) shall be a minimum of 2 m (6.5 ft.) from the edge of an unguarded body of water or plastic liner of lagoon/pond/basin.
- Restricted area shall be identified by signs reflecting “Restricted Area, Permit Required, Do Not Enter.”
- The following recommendations should be considered in the hazard identification review:
 - a Personal Floatation Device (PFD)
 - a safety net or fall protection system
 - emergency equipment shall be provided and held in readiness
 - a person who is qualified to operate all the emergency equipment provided shall be available
 - if appropriate a powered boat shall be provided and held in readiness
 - written emergency procedures shall be prepared by the employer containing
 - a full description of the procedures to be followed and the responsibilities of all person granted access to the workplace
 - the location of any emergency
- Where a workplace is a wharf, dock, pier, quay or other similar structure, a ladder that extends at least two rungs below water level shall be affixed to the face of the structure every 60 m along its length.

4.48.4.2. Working on Ice

The following guideline (see [Table 34](#)) shall be followed when working on ice:

- Develop a safe work plan
- Involve an engineer to review site-specific safe work procedures when the conditions listed in the table below apply.

Table 34: Working on Ice Guidelines

Minimum ice thickness for loads parked for more than 2 hours and less than 7 days

- To know how long a load or vehicle can remain in one place on the ice, you need to know the GVW and ice thickness.
- Load in place more than 2 hours but less than 7 days
- After two hours under a load, ice begins to sag and bend, until the ice cover fails. Greater ice thickness usually means a load can be on the ice cover longer, if it's clear, good quality ice.
- If the load in place for more than 7 days, the plan must be reviewed by a professional engineer.

Person standing	15 cm
Snowmobile: machine & rider < 500 kg	25 cm
Loaded vehicle: GVW 500 to 1,000 kg	32
Loaded vehicle: GVW 1,000 to 2,000 kg	41
Loaded vehicle: GVW 2,000 to 3,000 kg	46
¾-ton 4x4 vehicle: GVW up to 5,000 kg	55
Loads over 5,000 kg	Refer to Best Practice

4.48.5. Documentation

- N/A

4.48.6. References

- *Canada Labour Code Part 11*
- *Canadian Occupational Safety and Health Regulation Part X11, Section 12.11.1 “Protection Against Drowning”.*
- *Alberta Occupational Health and Safety Code, Part 9, Section 142 (Water Danger)*
- *British Columbia Workers Compensation Board Part 8.26, 8.27, 8.28*
- *Best Practice for Building and Working Safely on Ice Covers in Alberta*
- *A Field Guide to Ice Construction Safety – Northwest Territories Transportation*
- *Engineering Guidelines and Best Practice for Working on Floating Ice and Frozen Muskeg*

4.49. Walking and Working Surfaces

4.49.1. Purpose

The purpose of this section is to establish the minimum requirements and responsibilities for Workers when walking on working surfaces, including elevated work platforms, and rooftops.

GTM is committed to protecting Workers from fall hazards while they are walking and working on elevated surfaces.

4.49.2. Scope

This section applies to all the Workers who perform any work activities for GTM Operations and Projects being completed for GTM that expose them to slips, trips or falls greater than 1.2 m (4 ft.) through unguarded floors and wall openings, floor holes, and falls from elevated work platforms and roofs.

4.49.3. Responsibilities

People Leaders shall:


- Ensure Workers are provided with the proper walking and working surfaces training.
- Ensure Employees are trained by a Qualified Person.
- Ensure Employees receive fall protection system training as applicable to their job duties.
- Ensure fall protection system equipment is provided for employee use and is used by each employee at all locations with fall hazards.
- Prohibit Workers from erecting, assembling/disassembling, inspecting and/or using fall protection systems (including scaffolding) for which they have not been trained.
- Assist HS Support in identifying areas that require fall protection.
- Assist in the assessment of fall hazards as part of pre-job checklists.
- Ensure all work areas have a means of access/egress (structure, stairs, ladders, scaffolding, etc.) that minimizes employee exposure to fall hazards.
- Ensure all walking/working surfaces, ladders and stairs at facilities are in safe operating conditions.
- Ensure adequate funds are available and budgeted for the purchase or rental of safe scaffolds and/or fall protection systems as required in their respective areas.
- Ensure a Qualified Person oversees scaffold erection and/or disassembly according to the manufacturer's specifications.
- Ensure all scaffolds are designed by a Qualified Person and built to load design.
- Coordinate/consult in advance with HS Support on the need and intended scaffold use.
- Ensure a system is in place to inspect all walking/working surfaces regularly and as necessary.
- Ensure a system is in place so that all walking/working surfaces are maintained in a safe condition.
- Immediately take measures to ensure walking/working surfaces that are not in a safe condition are barricaded, isolated and/or usage is prevented.
- Prohibit Personnel from using walking / working surfaces that are not in a safe condition.
- Assist HS Support in identifying unprotected elevated work areas.
- Assist in the assessing of hazards associated with unprotected elevated work areas as part of pre-job checklists.

Employees shall:


- Attend required training sessions.
- Recognize situations in which fall protection is necessary.
- Inspect ladders and fall protection system equipment before using and remove any defective equipment from service. Immediately report damaged fall protection equipment, ladders, scaffolding, accessories, and missing or lost components to supervision.
- Use ladders, scaffolds and fall protection systems for their intended use and in a safe manner.

- Refuse to use fall protection systems for which training has not been received.
- Immediately report non-injury and injury falls to supervision and remove from service any fall protection equipment subjected to a fall.
- Immediately take measures to barricade, isolate or prevent usage of walking/working surfaces that are not in a safe condition, and report condition to supervision.

Contractors shall:

-  Contractors working at GTM facilities and worksites within the US are required to comply with the 29 CFR 1926.501 and other applicable OSHA workplace safety regulations
 -  Contractors working at GTM facilities and worksites within Canada are required to comply with the applicable provincial regulations for the province in which they are operating.

HS Support shall:

- Arrange for the required training of Employees utilizing fall protection equipment.
- Ensure that Workers utilizing fall protection equipment have received proper training on fall hazard recognition, fall prevention measures, and the use of fall protection equipment.
- Ensure that provisions for prompt rescue of fallen Workers are planned.
- Assist in the evaluation of fall hazards identified by Managers and Supervisors.
- Ensure that fall protection equipment is used in compliance with this work instruction including manufacturer and regulatory requirements.
- Periodically review documentation to ensure all fall protection equipment is inspected.
-  Maintain training to be a qualified Fall Protection Subject Matter Expert

4.49.4. Requirements

4.49.4.1. General Requirements

- Fall protection equipment shall always be worn and used when working from an Elevating Work Platform (EWP).
- All walking/working surfaces shall be kept clean, dry (where possible), and orderly.
- Every floor, workplace, and passageway shall be kept free from protruding nails, splinters, holes, or loose boards.
- Walking and working surfaces must have the strength and integrity to support Workers.
- Covers and/or guardrails shall be provided to protect Personnel from the hazards of open pits, tanks, vats, ditches, etc.
- The floor or roof of a building shall not be overloaded with materials and/or equipment over the approved load limits.
- Elevated storage and other platforms shall be marked with the load bearing weight.
- All permanent aisles and passageways shall be clearly marked, have adequate space for passage of both moving equipment and Workers, have safe clearances at all turns, doors, and passageways, and shall not be obstructed by physical barriers or stored materials.

4.49.4.2. Protection from Falling Objects Requirements

- Standard toe board shall be 9 cm (3.5 in) in vertical height from its top edge to the level of the floor, platform, runway, or ramp. It shall be securely fastened in place with not more than 0.6 cm (¼-in) clearance above floor level.
- Workers shall use one or more of these control measures to protect from falling objects:
 - Install screens, mesh, or solid panels from the top of the guardrail system to the walking/working surface.
 - Erect a canopy to catch falling objects from upper levels.
 - Barricade the area to prohibit Employees from entering the falling object hazard area.

4.49.4.3. Inspection of Walking Working Surfaces

- Walking-working surfaces are inspected, regularly and as necessary, and maintained in a safe condition.
- When any correction or repair involves the structural integrity of the walking-working surface, a Qualified Person performs or supervises the correction or repair.

4.49.4.4. Floor Openings, Wall Openings and Holes

- Every floor opening or platform shall be guarded by a standard railing.
- Standard railing shall consist of a 107 cm (42-in) high top rail, an intermediate rail, and posts spaced at 2.4 m (8 ft.) or less.
- All rails and posts shall be at least 3.8 cm (1½ in) nominal diameter pipe or 5 x 5 x 1 cm (2 x 2 x ¾ in) angle or other metal shapes of equal strength.
- Anchoring of posts and framing of members shall be able of withstanding a 200 lbs. (91 kg) load applied in any direction at any point on the top rail.
- Height of handrails shall be 76 to 86 cm (30 to 34 in) measured from top of handrail to surface of tread in line with face or riser or to surface of ramp.
- Handrails and wall opening rails shall be constructed of at least one and 1.3 cm (½-in) nominal diameter pipe and be able of withstanding a 200 lbs. (91 kg) load applied in any direction at any point on the rail.
- Toe boards must be installed around floor openings of floor holes and wall openings and where the potential exists for tools and other materials to fall on Personnel working below.
- All floor and wall openings, including manholes, trapdoors, pits, ladder-way floor openings, and chute openings, must be safely covered or blocked from access.
- When an opening is not covered or blocked from access, a person must be assigned for constant attendance to the opening until the cover is replaced.
- Covers must be sound, solid, not easily opened, and cannot project more than 2.5 cm (1 in) above the floor or surface level. All hinges, handles, bolts, or other parts must set flush with the floor or cover surface.
- Barricades that are designed to prevent someone from falling into the opening must be visually noticeable and cannot have additional openings that create additional fall hazards.

- Floor surfaces surrounding the opening shall be free of clutter and slippery material.
- Grab handle shall not be less than 30.5 cm (12 in) in length and shall be mounted to give 7.6 cm (3 in) clearance from the side framing of the wall opening. The grab handle shall be able of withstanding a load of at least 200 lbs. (91 kg) applied at any point of the handle.
- Trench covers, conduit covers, and their supports shall be designed to carry a 20,000-lbs (9,072-kg) truck rear axle load when located in plant roadways.

4.49.4.5. Aisles and Passageways

- Aisles and passageways shall be kept clear and in good repair with no obstruction across or in aisles that could create a hazard.
- Permanent aisles and passageways shall be appropriately marked.
- Where mechanical handling equipment is used, aisles shall be sufficiently wide.
- Runways 1.2 m (4 ft.) or more above floor or grade level shall be guarded by a standard railing. Standard toe boards shall be provided whenever tools, machine parts, or materials are likely to be used on the runway.
- Special purpose runways (used for oiling, shafting, etc.) may have the railing on one side omitted where the operating conditions necessitate if the falling hazard is minimized by providing a minimum 45.7 cm (18 in) wide runway.

4.49.4.6. Other Working Surfaces – Duckboards (Bridge Plates)





- Portable and powered duckboards must be of sufficient strength to carry the load imposed on them.
- Portable duckboards must be secured in position by being anchored or equipped with devices that prevent slippage during use.
- Handholds, or other effective means, shall be provided on portable duckboards to permit safe handling.

4.49.4.7. Fixed Industrial Stairs

- Standard stair railings and handrails shall be provided on stairs with four (4) or more risers.
- Standard railings, including top rails, mid-rails, and toe boards shall be provided on the open sides of all exposed stairways and stair platforms.
- Handrails shall be provided on at least one side of closed stairways, preferably (as a minimum) on the right-side descending.
- Fixed stairways must be designed and constructed to carry a load of five (5) times the normal live load anticipated at any one time and be able to safely carry a moving concentrated load of 1,000 lbs. (454 kg).
- Fixed stairways shall have a minimum width of 0.5 m (22 in).
- Fixed stairs shall be installed at angles to the horizontal of between 30° and 50°.
- Stairway platforms shall not be less than the width of a stairway and must be a minimum of 0.75 m (30 in) in length measured in the direction of travel.
- Adequate headroom of 2 m (80 in) must be maintained above stair tread.

- Stairs shall be free of clutter, and treads must be reasonably slip resistant.

4.49.4.8. Guardrail Systems

- The upper edge of top rails must be the following height above the walking/working level:
 -  99-107 cm (39-42 in)
 -  102-112 cm (40-44 in)
- Standard railings consist of a 42" high top rail, 21" high mid-rail and 3 ½" toe-board.
- Top rail must withstand 200 lbs. of force in any direction.
- Mid-rails must withstand 150 lbs. of force outward or downward. (All height measurements are taken from top of component to walking surface)
- Guardrail systems must be surfaced to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.
- Guardrail systems used on ramps and runways must be erected along each unprotected side or edge.
-  Toe boards must be 9 cm (3.5 in) in height from its top edge to the level of the walking/working surface.
-  Toe boards must be 12.5 cm (5 in) in height from its top edge to the level of the walking/working surface.
- Toe boards must be securely fastened in place and with not more than 0.6 cm (¼ in) clearance above the walking/ working surface level.
- Where wooden guardrails are used, construct railings, as a minimum, of 5 x 10-cm (2 x 4-in) uprights and 5 x 10-cm (2 x 4-in) railings, with either a 2.5 x 15-cm (1 x 6-in) or 5 x 10-cm (2 x 4-in) mid-rail rail and toe-boards at least 10 cm (4 in) high.
 - Where material is piled to such height that a standard toe board does not provide protection, paneling from floor to intermediate rail, or to top rail must be provided.

4.49.4.9. Stairways, Exits, Landings and Openings

- Stairways, Exits, Landings and Openings shall be designated and kept clear of hazards, debris, snow, and ice.
- Stairways, landings and exits shall have hand and guard rails when over 1.2 m (4 ft.) that comply with applicable legislation, including building codes
- All floor, walkway, vault, handrail, and ground openings that present a fall hazard of over 1.2 m (4 ft.) shall be properly marked and guarded when Workers could be present.
- Exposed duct banks and conduit shall not be used as walkways.
- Building exits shall be marked and shall have emergency lighting where required by Applicable Legislation.

4.49.4.10. Floor Loading Protection

It shall be unlawful to place, or cause, or permit to be placed on any floor or roof of a building or other structure, a load greater than that for which such floor or roof is approved.

4.49.4.11. Protection for Floor Openings

- Standard railings shall be provided on all exposed sides of a stairway opening, except at the stairway entrance. For infrequently used stairways, where traffic across the opening prevents the use of a fixed standard railing, the guard shall consist of a hinged floor opening cover of standard strength and construction along with removable standard railings on all exposed sides, except at the stairway entrance.
- Ladderway floor opening or platform shall be guarded by a standard railing with standard toe board on all exposed sides except at the entrance to the opening, with the passage through the railing either provided with a swinging gate or so offset that a person cannot walk directly into the opening.
- Hinged floor opening covers shall have standard railing on three sides. When not in use, the cover shall be closed, or a removable standard railing installed.
- Floor openings may be covered rather than guarded with rails. When the floor opening cover is removed, a temporary guardrail shall be in place, or an attendant shall be stationed at the opening to warn Personnel.
- Every floor hole to which individuals can accidentally walk shall be guarded by either a standard railing with toe board, or a floor hole cover of standard strength and construction.
- While the cover is not in place, the floor hole shall be constantly attended by someone or shall be protected by a removable standard railing.

4.49.4.12. Protection of Open-sided Floors, Platforms, and Runways

- Every open-sided floor or platform 1.2 m (4 ft.) or more above the adjacent floor or ground level shall be guarded by a standard railing (or the equivalent) on all open sides, except where there is an entrance to a ramp, stairway, or fixed ladder.
- The railing shall be provided with a toe board wherever, beneath the open side's individuals can pass, there is moving machinery, or there is equipment with which falling materials could create a hazard.
- Every runway shall be guarded by a standard railing (or the equivalent) on all sides 1.2 m (4 ft.) or more above floor or ground level. Wherever tools, machine parts, or materials are likely to be used on the runway, a toe board shall also be provided on each exposed side.

4.49.4.13. Stairway and Work Platform Design Standard

- Stairways shall be a minimum of 56 cm (22 in) wide and not greater than 223.5 cm (88 in) wide.
- Work platforms shall be sufficient width to provide adequate passage and working areas.
- Stair tread and work platform grating shall be 5 cm (2 in) high, 12-gauge, 4-diamond serrated.
- Handrails shall be 5 x 5 x 0.95 cm (2 x 2 x 3/8-in) steel angle.
- Stairway railing on both sides is required on stairs having four or more risers.
- Standard railing is required on the non-engine side of work platforms that are more than 1.2 m (4 ft.) above finished grade.
- Stair and work platform grating are to be galvanized or primed or painted. All other members of stairway and work platforms including handrails shall be primed and painted. The stair tread

leading edge shall be painted safety YELLOW, so the leading edge may be readily identified by Personnel descending the stairway.

- Handrails shall be bolted to stairways and work platforms with galvanized or cad plated bolts and washers.
- Toe boards shall be 4" strap steel with no more than ¼ "clearance above the floor.
- Moving concentrated load shall not exceed 1,000 lbs. (454 kg).
- Work platform loading shall not exceed 200 lbs./ft² (91 kg/m²).
- Railings are to be constructed to withstand at least 200 lbs. (91 kg) of force exerted on the top rail in any direction
- Not less than 7.6 cm (3-in) clearance are required between the stairway handrail and any other object.
- Platforms and stairways shall be anchored in concrete with 1.3-cm (½-in) anchor bolts or securely welded to the compressor skids.
- Stairways and platforms to be constructed in accordance with OSHA's latest edition.

Table 35: Step Rise and Angle Requirements

Angle to Horizontal	Rise (inches)	Tread Run / Depth (inches)
30'35	6 ½	11
32'08'	6 ¾	10 ¾
33'41'	7	10 ½
35'16'	7 ¼	10 ¼
36'52'	7 ½	10
38'29'	7 ¾	9 ¾
40'08'	8	9 ½
41'44'	8 ¼	9 ¼
43'22'	8 ½	9
45'00'	8 ¾	8 ¾
46'38'	9	8 ½
48'16	9 ¼	8 ¼
49'54	9 ½	8

NOTE: This table applies to stairs installed prior to January 17, 2017. Stairs installed on or after January 17, 2017, the minimum Tread Depth shall be 9 ½ inches.

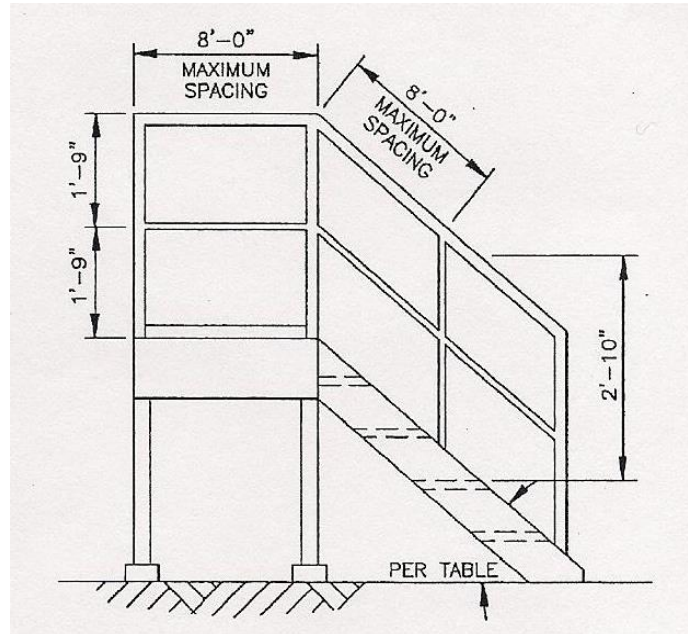


Figure 29: Step Rise and Angle

4.49.5. Documentation

- Fall Protection Inspection – Harness Inspection
- EnCompass Facility Inspection Form




4.49.6. References

- OSHA 29 CFR 1910.269(g) – *Personal Protective Equipment*
- OSHA 29 CFR 1910.25 – *Subpart D – Walking-Working Surfaces*
- OSHA 29 CFR 1926.502 – *Fall Protection Systems Criteria and Practices*
- OSHA 29 CFR 1926.959 – *Lineman's Body Belt, Safety Straps, and Lanyards*
- ANSI/ASSP Z359.1-2020 – *Fall Protection Code*

Occupational Hygiene

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5. Occupational Hygiene

5.1. General Requirements

5.1.1. Purpose

The purpose of the Occupational Hygiene program is to anticipate, recognize, evaluate, prevent, and control the environmental factors arising in or from the workplace, which may cause sickness, impaired health, or significant discomfort among Workers due to chemical hazards, physical hazards, and biological hazards.

5.1.2. Scope

The Occupational Hygiene program applies to all Workers performing work at Company facilities and worksites. It involves a continual process of collecting information, prioritizing controls, and gathering follow-up information.

5.1.3. Responsibilities

People Leader shall:

- Ensure Personnel understand the hazards to which they are exposed and the safety related work practices they are to use to mitigate the risk of overexposure
- Contact the H&S department to coordinate exposure assessments in areas of concern
- Review exposure assessments with Workers perform and respond to findings

Workers shall:

- Communicate exposure concerns to the Supervisor
- Wear monitoring equipment for data collection

HS Support shall:

- Support baseline exposure assessment surveys
- Support compliance with sampling
- Communicate personal exposure data to monitored Workers
- Communicate report findings and recommendations to area Management

Occupational Hygienist shall:

- Coordinate/conduct baseline exposure assessment surveys
- Coordinate compliance with sampling strategies
- Coordinate sample analysis with accredited laboratories
- Communicate personal exposure data to monitored Workers
- Communicate report findings and recommendations
- Manage data records

5.1.4. Requirements

- Recognize hazards through facility surveys, chemical inventory, confined space assessments, process, and equipment review (e.g., PHA/Hazard Review).

- Evaluate hazards by conducting exposure assessments:
 - Collect, review, and interpret data
 - Ensure test equipment's calibration is current
 - Ensure shelf life of sample media has not expired
 - Comply with sampling protocol as directed by sample media manufacturer
 - Use monitor/survey equipment as manufacturer specifications
 - Use NIOSH Manual of Analytical Methods or OSHA Methods for analysis
 - Use AIHA-LAP accredited labs for analysis
- Control hazard through design and/or recommended administrative and engineering controls.

5.1.5. Documentation

- See individual Occupational Hygiene procedures.

5.1.6. References

- Fundamentals of Occupational Hygiene, National Safety Council
- NIOSH Manual of Analytical Methods
- OSHA Methods for Analysis

5.2. Asbestos Management

5.2.1. Purpose

The purpose of the asbestos management program is to reduce or eliminate the risk to Workers' health from exposure to asbestos through the proper identification, tracking, maintenance, handling, and disposal of asbestos-containing materials (ACM).

This section provides for the proper management of ACM and defines the steps for the safe removal of ACM.

5.2.2. Scope

This section applies to all GTM Operations and Projects being completed for GTM.

This asbestos management program applies to:

- All ACM at company-owned facilities and leased buildings in which the company exercises control over the management and recordkeeping functions related to the facility.
- Maintenance, repair, construction, demolition, and removal activities when ACM may be encountered.

5.2.3. Responsibilities

People Leader shall:

- Provide resources (financial, Personnel, and time) required to ensure the identification and tracking of ACM within area operations and facilities is conducted and that any operations involving or potentially involving ACM disturbance or handling meet the requirements set out within the asbestos management program.

- Ensure applicable asbestos related training is assigned and completed by Workers potentially exposed to asbestos in the workplace and/or through tasks involving asbestos handling.

HS Support shall:

- Support area operations in generating awareness about asbestos, its health effects, and asbestos management program and training requirements.
- Assist as applicable, appropriate, and qualified in:
 - The identification of ACM
 - Sampling/testing of potential ACM
 - Air monitoring for asbestos fibers
 - Hazard and risk assessment activities for work or projects that contain an asbestos exposure hazard
 - Preparing regulatory permits and notices as per local requirements for projects with an asbestos exposure hazard


Occupational Hygienist shall support area operations in:

- Generating awareness about asbestos, its health effects, and asbestos management
- Coordinating/conducting asbestos exposure assessment surveys
- Coordinating compliance with sampling strategies
- Coordinating sample analysis with accredited laboratories
- Reviewing report findings and recommendations
- Managing audit records

Workers shall:




- Complete all required asbestos management related training to a level applicable to the type of task they will conduct
- Only engage in tasks with asbestos hazards for which they have current, valid training

5.2.4. Requirements

- ACM and potential ACM in all GTM operational areas or facilities must be identified and documented (i.e., signage, inventory) and managed in accordance with the applicable Asset Area Procedure and legal requirements.
- All Workers who face a potential exposure to asbestos must receive training applicable to their potential level of exposure based on the tasks they are expected to perform.
- At minimum, Workers should have sufficient knowledge to identify asbestos exposure hazards that may exist in their work assignments and either know how to control these hazards or know who to contact to assist in controlling these hazards.
- Regulatory reporting (e.g., permits or notices) requirements for work involving asbestos handling or disposal must be completed as required.
-  The UST and Offshore Asset Areas must follow the requirements of UST HS-24 Asbestos Management Procedure.

-  The Western Canada and Eastern Canada Asset Areas must follow the requirements of the Asbestos Management Process.

5.2.5. Documentation

-  For UST and Offshore Asset Areas, the following documents apply:
 - UST HS-24 Asbestos Management Procedure
 - UST HS-24A: Asbestos NESHAP Applicability Diagram Procedure
 - UST Form HSF-031: Asbestos Work Permit Form
 - UST Form HSF-032: Asbestos Purchase/Use Approval
 - UST Form HSF-033: Contractor Certificate of Compliance, Asbestos
 - UST Form HSF-004: H&S Event Data Collection Form (Asbestos fiber release)
-  Western Canada Asbestos Handling Related Procedures:
 - Asbestos Air Sampling Procedure
 - Asbestos Bulk Sampling Procedure
 - Asbestos Covered Wire Removal Procedure
 - Asbestos Gasket Removal Procedure
 - Asbestos Glove Bag Procedure
 - Asbestos High-Risk Work Activity Procedure
 - Asbestos Moderate Risk Work Activity Procedure
 - Asbestos Special Issues Checklists
-  For Western Canada and Eastern Canada Asset Areas, the following documents apply:
 - Asbestos Management Procedure
 - ACM Risk Assessment and Prioritization Tool
 - Asbestos Management Checklists
 - Asbestos Event Emergency Response Plan
 - Asbestos Briefing Notes

5.2.6. References

- OSHA 29 CFR 1910.1001 Asbestos
- EPA 40 CFR 763 Subpart E- AHERA
- EPA 40 CFR 763 Appendix C to Subpart E – EPA MAP
- EPA 40 CFR 61 Subpart M- NESHAP
- State Asbestos Regulatory Requirements Summaries
- AGA Asbestos Containing Coal Tar or Asphaltic Enamel Wrapped Pipe Voluntary Guidelines (December 2007)
- COHSR SOR/86-302 10.26.1-11 Asbestos Exposure Management Program

- British Columbia OHS Regulation 6.1-32 Asbestos
- Alberta OHS Code (2009) Part 4 Chemical Hazards, Biological Hazards and Harmful Substances (especially 28-40)

5.3. Bloodborne Pathogens (Only)

5.3.1. Purpose

The purpose of this section is to protect Workers and Visitors against exposure to bloodborne pathogens such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and other bloodborne viruses. This Exposure Control Plan was developed in accordance with regulatory standards.

5.3.2. Scope

This section applies to any Worker who provides first aid or medical assistance where there is a potential risk of infection, illness, or injury, due to exposure to body fluids, blood, and Bloodborne Pathogens.

This section serves as the exposure control plan.

5.3.3. Responsibilities

People Leaders shall:

- Identify the Workers with potential risk of occupational exposure to bloodborne pathogens
- Ensure that Employees at risk receive the required training
- Verify that the Hepatitis B Vaccine Declination Form is completed and filed for Employees who decline taking the vaccination
- Ensure that bloodborne pathogen kits are inspected monthly

Workers shall:

- Report any bloodborne pathogen exposures to supervision before the end of the shift or within 24 hours
- Employees trained in First Aid/CPR shall be vaccinated for Hepatitis B or sign the SAF-58.9035, Hepatitis B Vaccine Declination Form

HS Support shall:

- Ensure that reported bloodborne pathogen events are recorded properly
- Assist in the analysis of exposure events

Safety Shared Services shall:

- Be responsible for the review and maintenance of this exposure control plan at least annually and when the regulations change

Health Services shall:

- Serve as a medical information resource for all Company facilities

5.3.4. Requirements

5.3.4.1. Exposure Determination

The following is a list of job duties used for determining the potential exposure to bloodborne pathogens by Workers and the associated task/procedures performed by these Workers:

- Workers handling human waste disposal
- Workers who perform certain janitorial task
- Workers who respond to an injury accident or participate in an injury accident site cleanup

5.3.4.2. Exposure Controls

- Use engineering controls and work practice controls to eliminate or minimize Worker exposure to Bloodborne Pathogens in the workplace.
- Where the potential for exposure remains after an Event, the following controls must be implemented, including the use of PPE:
 - Responders must analyze each potential medical situation and use good judgment to determine the necessary PPE for the situation.
 - Appropriate PPE must be worn by the Employees trained to administer first aid.
 - Measures should always be taken during medical response to minimize exposure to Workers and surrounding Personnel.
 - Limit the number of persons attending to the injured person.
 - Keep spectators at a reasonable distance and enforce other control measures of this manner.
- Workers should wash their hands after removing their protective gloves and or clothing with soap and water following any contact with blood or bloodborne pathogens.
- Antiseptic wipes should be used if a hand washing facility is not readily available.
- Eating, drinking, smoking, applying cosmetics or lip balm and handling contact lenses is prohibited in situations where there is potential for exposure to bloodborne pathogens.
- Contaminated materials are to be placed in appropriately labeled designated leak-proof waste disposal bags for handling and disposal.
- If outside contamination of a primary waste disposal bag occurs, that bag is to be placed within a second leak-proof disposal bag and appropriately labeled for handling disposal.
- PPE should be near (if not in) the location's first aid kit.
- Workers performing cleanup and equipment decontamination must wear PPE. PPE should be the last items removed and discarded in the disposal bag.
- All contaminated material that cannot be decontaminated will be disposed of in the biohazard disposal bags. Typical items that would be decontaminated are work area surfaces, safety glasses, etc.
- The disposal bag should be tightly sealed with masking or duct tape.

- Contact should be made with your local waste disposal company for proper disposal of the waste as bio-hazardous regulated waste. Document the local waste disposal company accepting the waste, the date, contact information and invoice for the service.
- Contaminated clothing soiled with blood or bodily fluids should be removed as soon as possible and washed before clothing is re-worn or properly disposed.

5.3.4.3. Exposure to Sharps

- One of the main infection Hazards for Workers is exposure to sharps (e.g., used needles). To help prevent exposures to sharps and reduce the risk of sharps injuries, GTM Locations shall have specific containers for safe disposal of sharps.
- The following precautions shall be taken when handling sharps:
 - a sharps container shall have a clearly defined maximum capacity (i.e., have a fill line that indicates when the container is $\frac{3}{4}$ full) and shall be sturdy enough to resist punctures under normal conditions of use and handling.
 - a person shall not re-cap a used needle.
 - each used needle shall be safely disposed of in a sharp's container.
 - sharps containers shall be emptied when they become $\frac{3}{4}$ full so that the containers can be disposed of properly.
- Any Worker who is potentially exposed to Bloodborne Pathogens while on the job shall immediately receive a confidential medical evaluation.

5.3.4.4. Controls

- GTM shall provide hand washing facilities readily accessible to Workers who may be potentially exposed while providing first aid or medical assistance; if washing facilities are not provided, antiseptic cleansers shall be provided.
- To prevent potential exposure to body fluids, blood, and Bloodborne Pathogens, Workers involved in providing first aid or medical assistance shall:
 - Wear appropriate PPE, which includes eye and face protection, hand protection and protective clothing (i.e., coats, gowns, or jackets)
 - Wear disposable latex gloves when hand contact with blood, body fluids or bloodborne pathogens is anticipated
 - Discard gloves if they are cracked, peeling, torn or punctured, or when their ability to function as a barrier is compromised
 - Remove any PPE or other clothing that is penetrated by blood, body fluids or bloodborne pathogens; immediately, or as soon as reasonably practical

5.3.4.5. Hepatitis B Vaccination

- The Company has implemented a Hepatitis B Vaccination Program, as well as procedures for post-exposure evaluation and follow-up should exposure to bloodborne pathogens occur.
- The Hepatitis B Vaccination consists of a series of three inoculations over a six-month period.

- Vaccinations are to be performed under the supervision of a licensed physician or other health care professional.
- Cost for Hepatitis B Vaccination will be paid for by the Company.
- Provision for the full Hepatitis B Vaccination series shall be made available after the Employee has received the required training and within 10 working days of initial assignment to all Employees who have occupational exposure.
- The Employee can decline the vaccination for the following reasons:
 - The Employee elects not to receive vaccination
 - The Employee has previously received the complete Hepatitis B Vaccination series
 - antibody testing has revealed the Employee is immune to the virus
 - The vaccine is contraindicated for medical reasons
- Employees who decline to take the Hepatitis B Vaccination will be required to sign the Hepatitis B Vaccination Declination. Necessary follow-up care will be provided.
- Employees who initially decline the vaccination can request the vaccination later if that Employee is covered by this section.

5.3.4.6. Personal Protective Equipment

- The following list of PPEs will meet all requirements under the section:
 - Pair, latex exam-quality gloves
 - Eye and face shield with ear loop mask (for non-CPR-related care)
 - CPR barrier device (CPR-face piece)
 - Germicidal wipes
 - Protective body clothing (disposable gown or Tyvek suit)
 - “Universal” red biohazard disposal bags or plastic disposal bag and biohazard stickers with twist tie
- Medical hygiene equipment will be provided and used after completion of medical care in which exposure could have occurred, including:
 - Gloves – a pair of surgical gloves shall be worn by each Employee
 - Mask, eye protection, and face shields – masks, in combination with eye protection devices such as goggles or safety glasses with solid side shields, will be worn wherever splashes, spray, spatter or droplets of blood or other potentially infectious materials may generate nose or mouth contamination. First aid situations requiring this PPE would include (but not be limited to) major traumatic injuries where there is massive blood loss.
 - Gowns, aprons, and other protective body clothing – appropriate protective clothing such as, but not limited to, gowns, aprons, lab coats, clinic jackets, or similar outer garments shall be worn in certain occupational exposure situations. First aid situations requiring this PPE would include (but not be limited to) major traumatic injuries where there is massive blood loss.
 - CPR face piece – used when performing CPR.

- Antiseptic wipes – provided for use in cleaning hands if a hand washing facility is not readily available
- Bio-hazard disposal bags – provided to dispose of any material that was contaminated with blood and cannot be decontaminated for reuse (i.e., gauze, bandages, CPR face pieces, masks and gloves, wipes or absorbing material used in cleanup, etc.). This can be the “universal” red biohazard disposal bag or plastic (garbage type) bag with the biohazard label.

Workers shall not:

- Reuse contaminated gloves, nor wash them or decontaminate them
- Eat, drink, smoke, chew gum or tobacco, apply cosmetics or lip balm, or handle personal contact lenses where there is a potential of exposure to blood, body fluids or bloodborne pathogens
- Where a potential exposure to or contact with blood, body fluids or bloodborne pathogens has occurred, the Worker shall:
 - Wash their hands with soap and water immediately, or as soon as reasonably practical, or wash their hands immediately after removing potentially contaminated gloves or any other potentially contaminated PPE
 - Wash any area of the body as soon as possible after exposure or contact
 - Flush mucous membranes with water, as soon as possible after exposure or contact
- Additional preventive measures shall include:
 - Equipment or surfaces that may be contaminated by blood, body fluids or bloodborne pathogens shall be decontaminated using appropriate disinfectant, preferably by the Worker involved, if able to perform this task (e.g., a Worker is cut, but able to apply their own bandage and wash the affected surfaces)
 - If a Worker is unable to wash a contaminated surface or area, then another trained Worker shall conduct the decontamination, using PPE and appropriate disinfectant, in accordance with procedures
 - All contaminated or potentially contaminated material (including PPE) shall be placed by the involved Worker(s) in a designated receptacle for collection and disposal, prior to leaving the work area
- All GTM Locations shall post warning signs and label storage or collection containers, as required by procedures associated with this Section. Warning signs shall be fluorescent orange, with lettering and symbols of a contrasting color. Storage or collection containers shall be identifiable (e.g., red bags or other suitable, labeled containers).

5.3.4.7. Standard Precautions

Standard Precautions are based on the premise that all blood and bodily fluids are considered infectious and shall be treated as such.

Workers shall:

- Wash their hands as soon as possible after any exposure to blood or bodily fluids, including their own

- Cover cuts and scrapes effectively and completely with bandaging to prevent the transmission of their own blood and bodily fluids, and to also prevent their own exposure to blood or bodily fluids from other sources
- Apply fresh bandaging to their own cuts/scrapes as needed during a work shift discard single-use items once application is complete

5.3.4.8. Records

Any medical recordkeeping will be maintained in the *Company Medical Records*. These records will remain a part of the employee's CONFIDENTIAL records.

5.3.5. Documentation

- Hepatitis B Vaccine Declination Form

5.3.6. References

- 29 CFR 1910.1030 Bloodborne Pathogens

5.4. Ergonomics (🇨🇦 Only)

5.4.1. Purpose

The purpose of this section is to provide guidance on what is required to meet the general duties of Section 125(t) of the *Canada Labour Code Part II* and section 19 *Canadian Occupational Health and Safety Regulations*.

5.4.2. Scope

This section applies to all Canadian facilities and Personnel. Legislative requirements include the need to ensure that the machinery, equipment, and tools used by Workers during their employment meet prescribed ergonomic standards and are safe under all conditions of their intended use.

East Canada Operations is also required by regulation to consult the HS Support Representative(s) to identify and assess ergonomic hazards, establish, and implement preventive measures, educate Employees, and monitor effectiveness.

5.4.3. Responsibilities

People Leaders shall:

- Establish a general level of awareness of the contents and location of this section
- Ensure that competencies are established and verified in those Employees expected to implement and comply with this section
- Monitor and motivate compliance with the section
- Actively evaluate and improve on this section over time

Workers shall:

- Comply with the assigned Requirements of this section
- Take all reasonable steps to assist in the implementation of this section with Management, Co-Workers, and Contractors as appropriate
- Actively evaluate implementation of this section and recommend improvements to Management and HS Support as appropriate

- Complete the required training for ergonomic hazard identification and control
- Assist in the proactive identification of ergonomic hazards in the workplace
- Utilize all preventive measures established under this Manual
- Provide feedback to People Leader and HS Support Representative

HS Support shall:

- Assist in the active promotion and implementation of this section across Canadian Operations
- Actively monitor and make recommendations for improvement to Management and Safety Shared Services
- Develop and implement tools for the logging of information related to the identification, assessment, and control of ergonomic hazards
- Actively monitor the adequacy and effectiveness of preventive measures related to ergonomic hazards

Safety Shared Services shall:

- Share learnings and improvement opportunities across Operations and other business units
- Assign and review assessments of this section toward continuous improvement
- Revise and approve procedures and other changes to this Manual
- Develop/assign training and facilitate implementation via HS Support Representative
- Review the event trends for ergonomically related injuries to ensure this section is effective

5.4.4. Requirements

5.4.4.1. Hazard Identification and Assessment

- Utilize existing tools/frameworks provided in the procedures on hazard identification to identify and assess all ergonomics-related hazards, considering the nature of the hazard, Worker exposure to the hazard and its effects, preventive measures, and event data.
- In the case of ergonomics-related hazards, specific consideration shall be made for:
 - The physical demands of the work activities, the work environment, the work procedures, the organization of the work and the circumstances in which the work activities are performed
 - The characteristics of materials, goods, persons, things and workspaces and the features of tools and equipment

5.4.4.2. Preventive Measures

- Preventive measures taken to address the assessed ergonomic hazard must be made in the following order of priority:
 1. Elimination of the hazard by way of engineering controls which may involve mechanical aids, equipment design or redesign that consider the physical attributes of the Worker
 2. The reduction of the hazard, including isolating it

3. The provision of PPE, clothing, devices, or materials
 4. Administrative procedures, such as the management of hazard exposure and recovery periods and the management of work patterns and methods.
 5. Where appropriate, those controls established to address ergonomic hazards shall be routinely evaluated as part of a preventive maintenance program to avoid failures that could result in a hazard to Worker.
- No preventive measure shall create a hazard.
 - The preventive measures shall include steps to address ergonomics-related hazards that are identified when planning implementation of change to the work environment or to work duties, equipment, practices, or processes.

5.4.4.3. Section Evaluation

- The effectiveness of the ergonomics hazard prevention program shall be reviewed annually or:
 - Whenever there is a change in conditions in respect of the hazards
 - Whenever new hazard information in respect of a hazard in the workplace becomes available to the employer.
- The evaluation of the effectiveness of the prevention program shall be based on event/injury data, program audits, workplace inspections, Worker interviews and document assessments.

5.4.5. Documentation

- N/A

5.4.6. References

- Section 125(t) of the Canada Labour Code Part II
- Section 19 Canadian Occupational Health and Safety Regulations

5.5. Exposure Assessment for Hazardous Substances (🇨🇦 Only)

5.5.1. Purpose

This section provides the minimum requirements for exposure assessment for hazardous substances.

There are a range of hazardous substances in almost every workplace. The risk posed to Workers depends on the toxicity of the substance, exposure intensity/frequency/duration and vulnerability of the Worker. All exposures must be understood and reduced to minimize risk. Some hazardous substances are further regulated as “Controlled Products” under the Workplace Hazardous Material Information System (WHMIS). The proactive identification, evaluation and control of these exposures are the focus of this section.

5.5.2. Scope

This section is to be followed in all Canadian facilities to ensure Worker exposure to all chemical, physical, and biological agents that are classified as hazardous substances are monitored, evaluated, and controlled. Other procedures in this Manual identify additional specific control measures and

considerations for task/agent specific hazards. All assessments conducted in support of this section are transferable to the H&S Risk Register.

Hazardous Substance – a chemical, physical or biological agent in the workplace that poses, or has the potential to pose, risk to Worker H&S.

5.5.3. Responsibilities

People Leaders shall:

- Establish a general level of awareness of the contents and location of this section with all Employees
- Ensure that competencies are established and verified in those Employees expected to implement and comply with this section
- Monitor and motivate compliance with the section
- Actively evaluate and improve on this section over time
- Allocate appropriate resources for the identification, assessment, and control of hazardous substance exposure
- Ensure corrective actions are identified and resolved in a timely manner.

Workers shall:

- Comply with the assigned Requirements of this section
- Take all reasonable steps to assist in the implementation of this section with Management, Co-Workers, and Contractors as appropriate
- Actively evaluate implementation of this section and recommend improvements to Management and HS Support as appropriate
- Identify hazardous substance exposures to Management
- Participate in the assessment of exposure and development of controls
- Comply with policies/practices developed to establish exposure control
- Provide immediate feedback regarding health symptoms identified and participate in Company programs for medical monitoring

HS Support shall:

- Assist in the active promotion and implementation of this section across Canadian Operations
- Actively monitor and make recommendations for improvement to Management and Safety Shared Services

5.5.4. Requirements

5.5.4.1. Records

- Management shall keep and maintain an up-to-date record of all hazardous substances that exist in the workplace.
- All hazardous substance analysis reports completed by a qualified person shall be kept and maintained for 30 years.

- Quantitative assessments of hazardous substance exposure shall be kept for a minimum of 3 years.
- Training records associated with hazardous substance control shall be kept for two years.
- In Western Canada an exposure management plan is maintained for the operating plants and pipelines.
- In Western Canada – Exposure assessments are stored on the Occupational Hygiene Assessments web page.

5.5.4.2. Assessment

- If a Worker has the potential to be exposed to a hazardous substance, HS Support will ensure an assessment is completed that:
 - Characterizes the hazardous substance(s) based on properties
 - Identifies possible pathways and routes of exposure
 - Reviews potential acute and chronic health effects
 - Assesses exposure and risk potential using qualitative methods and, if required, quantitative methods in accordance with ACGIH/NIOSH or other accepted methods
 - Evaluates exposure based on thresholds for acceptable exposure found in the ACGIH TLV Indices, Safety Codes, ANSI, CSA, or other references as deemed appropriate by the Qualified Person
 - Recommends controls as appropriate including elimination, substitution, engineering controls (e.g., ventilation), administrative controls, and/or PPE
- Frequency of assessment is based on normal operating conditions and may be adjusted, or sampling may occur at the request of a Worker, health care provider (based on potential illness), Workplace Committee or regulator.

5.5.4.3. Medical Examinations

- Where an assessment recommends medical examination, a physician shall be consulted to confirm the need for assessment.
- All medical examinations shall result in a report of
 - Fit to work, or
 - Fit to work with restriction(s)

5.5.4.4. Hazard Controls

Where an analysis recommends controls, HS Support shall be consulted in the development of:

- Signage and warnings
- Employee education
- Process isolation procedures where hazardous exposures are expected
- Access to SDS and other hazard specific information

5.5.4.5. Ventilation Plans

- Ventilation plans shall consider Part 6 of the National Building Code, ACGIH Industrial Ventilation, and *ANSI Z9.2-2018 Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems* as amended.
- HVAC inspections, tests and maintenance shall be established and conducted by a Qualified Person.
- Where practical, automated warning systems are used to monitor and alarm if dangerous levels of a hazardous substance are detected.

5.5.4.6. Controlled Products

- All controlled products used in Canada operations must be approved by HS Support.
- An up-to-date Safety Data Sheet (SDS) shall always be accessible for controlled products via the SDS database.
- Each controlled product container must have either a:
 - Supplier label that complies with the Hazardous Product Act requirements, or
 - Workplace label that includes product identifier, hazard information and reference to SDS availability.
- Any controlled product produced from Canada operations must have an SDS created by Safety Shared Services in accordance with requirements of the *Canadian Hazardous Products Act* and *Controlled Products Regulations*.
- Where a controlled product is hazardous waste, a label or sign shall be used to communicate the hazard.
- Controlled products shall be stored in accordance with the *National Fire Code* requirements for:
 - Maximum volumes, control of ignition sources, ambient conditions, housekeeping, storage arrangements, separation from other hazardous substances, corrosion protection, flooring, fire suppression, smoke venting, spill control, fire department access, labels, placards, training, authorized access control, storage of combustibles and oxidizers.
 - Indoor storage of compressed gases, poisonous, corrosive, or oxidizing gases.
 - Outdoor storage including storage areas, clearance, separation, training, general safety precautions.
 - Compressed gas storage and handling.
 - Flammable liquids and combustible liquids storage and handling.

5.5.4.7. Hazardous Substances

There are a wide variety of hazardous substances in the workplace. The following provides a list of examples in the East Canada Operations.

- **Hydrogen Sulfide** poses no acute health risk to East Canada Operations as all product transported is required to be <6 mg/m³ H₂S. There are some rare but potential exposure scenarios (e.g., where test gas is used) for H₂S levels to exceed regulated limits. Analysis will establish controls as appropriate.

- **Mercury** is a heavy metal that is liquid at room temperature. It easily vaporizes into air and can be inhaled. Mercury has been used in switches, transmitters, paints and thermostats. It is also a natural component of natural gas and can accumulate in liquids, filters, traps, etc. Potential exposures should be evaluated to confirm adequacy of protective equipment.
- **Mold** may be present wherever there is standing water.
- **Bioaerosols** of many types can be generated from these areas and/or ‘soured’ liquids. Assessments of suspect areas can be completed to identify the need for remediation or the use of biocides in processes.
- **Mercaptan** (e.g., Scentinel E Odourant) is injected into process gas. Exposure to this substance is controlled by engineering and administrative strategies. Analysis will establish controls as appropriate.
- **Asbestos** is a hazardous substance that is heavily regulated due to the potency of the agent and potential for exposure in many workplaces. Qualitative assessments are used to screen presence/absence and availability for Worker exposure. Quantitative assessments are performed to assess speciation and/or exposure concentration and required controls. Analysis will establish controls as appropriate.
- **Lead** exposures can evolve if lead containing materials are found in the workplace. Of concern may be cleaning of tools that have encountered lead, cutting, or blasting lead containing materials, or general clean-up of lead containing debris. These scenarios shall be identified and evaluated by Management as appropriate for the workplace. Analysis will establish controls as appropriate.
- **Bloodborne pathogens** have the potential to cause infectious disease through unintentional transmission. Typical scenarios include first aid, handling of solid waste, testing/maintenance of septic systems. Workers having the potential for exposure must be protected and trained. Analysis will establish controls as appropriate.
- **Radioactive sources** are used in the natural gas industry to test material integrity. Personnel conducting these tests are highly trained and regulated. NORM is another source of radiation in the industry that can be carried from upstream to transmission via particulate. Elevated exposures can occur during PIG receiving or inlet maintenance work. Analysis will establish controls as appropriate.
- **Black powder** is formed from chemical reactions producing iron sulfide and iron oxide particulate. Pyrophoric iron sulfide oxidizes exothermally when exposed to air as free sulfur is released.
- **Benzene** and other volatile organic compounds (VOCs) can be found in natural gas liquids that are in solution with the gas or precipitate out onto the inner walls of the pipe. Accumulation and potential exposure to NGLs are of concern around pigging and liquids handling operations.

Table 1: Canada Hazardous Substances Exposure Monitoring List

Occupational Exposure	Frequency of Assessment	Exposure Limit		
Naturally Occurring Radioactive Materials (NORMs) or Radiation Sources	Initial, 3 years, on request and prior to a confined space entry, or other	Affected Group	Annual Effective Dose Limit (mSv)	Five Year Cumulative Dose Limit (mSv)

Occupational Exposure	Frequency of Assessment	Exposure Limit	
	associated maintenance activities	Occupationally Exposed Workers 20	100
		Eventually Exposed Workers 1	5
		General Public 0.3	5
Radiation – Gamma Radiation Derived Working Limits		Incremental Gamma Dose Range (nSv / hr)	Recommended Control
		<150	No Action Required
		150-500	NORM Management Plan (Eventually Exposed Workers)
		>500	Dose Management Plan (Occupationally Exposed Workers)
Asbestos	Initial, 3 years, or upon request or prior to associated maintenance activities	8-hour OEL [f/cc]	
		0.1	
Benzene	Initial, 3 years, on request or prior to a confined space entry, or other associated maintenance activities	8-Hour OEL [ppm]	12-hour Adjusted OEL [ppm]
		0.5	0.25
Coal tar pitch volatiles	On request or prior to potential exposure associated with maintenance activities	8-hour OEL [mg/m ³]	
		0.2	
Hydrogen sulfide	Fixed detection systems, and post event involving exposures.	8-Hour OEL [ppm]	Ceiling Occupational Exposure Limit [ppm]
		1	5
Sulphur Dioxide	Fixed detection systems, and post event involving exposures.	Short Term Exposure Limit [ppm]	
		0.25	
Carbon Dioxide	Fixed detection systems, and post event involving exposures.	8-Hour OEL [ppm]	
		5000	
Carbon Monoxide	Fixed detection systems, and post event involving exposures.	8-Hour OEL [ppm]	
		25	
Lead and lead compounds	Initial, or prior associated maintenance activities	Risk level	Potential airborne lead concentration [mg/m ³]
		Low	<0.05
		Low-moderate	0.05-0.50
		Moderate	>0.50-1.25
		Moderate-high	<1.25-2.50
		High	>2.50
Silica-crystalline, respirable	On request or prior to associated maintenance activities	8-hour OEL [mg/m ³]	
		0.025	
Butane	On request or prior to associated maintenance	8-hour OEL [ppm]	

Occupational Exposure	Frequency of Assessment	Exposure Limit	
	activities, or post event analysis	1000	
Ethyl Benzene	On request or prior to associated maintenance activities, or post event analysis	8-Hour OEL [ppm]	12-hour Adjusted OEL [ppm]
		20	10
Toluene	On request or prior to associated maintenance activities, or post event analysis	8-Hour OEL [ppm]	12-hour Adjusted OEL [ppm]
		20	10
Xylene	On request or prior to associated maintenance activities, or post event analysis	8-Hour OEL [ppm]	12-hour Adjusted OEL [ppm]
		100	50
Amines Monoisopropanolamine (MIPA)	On request or prior to associated maintenance activities or post event analysis	8-Hour OEL [ppm]	12-hour Adjusted OEL [ppm]
		2	1
Amines Diisopropanolamine (DIPA)	On request or prior to associated maintenance activities or post event analysis	8-Hour OEL [ppm]	12-hour Adjusted OEL [ppm]
		10	5
Amines Sulfolane	On request or prior to associated maintenance activities or post event analysis	8-Hour OEL [ppm]	12-hour Adjusted OEL [ppm]
		0.37	0.185

5.5.5. Documentation

- N/A

5.5.6. References

- Canada Occupational Health and Safety Regulations
- A Strategy for Assessing and Managing Occupational Exposures. Third Edition. American Occupational Hygiene Association
- OHS IPG Measurement of Lighting Levels in the Workplace – Canada Occupational Health and Safety Regulations, Part VI-928-1-IPG-039
- ANSI Z9.2-2018 Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

5.6. Hearing Loss Prevention

5.6.1. Purpose

Working in loud industrial environments can lead to long term hearing loss, especially with prolonged exposure. In Canada and U.S., hearing protection measures and hearing loss prevention programs are mandated by OHS regulators.

5.6.2. Scope

HLP at GTM is managed by the S&R Occupational Hygiene (OH) department and implemented jointly by the S&R OH department and S&R Safety. There are two governing documents for HLP, including the:

- Hearing Loss Prevention Management Specification
- Hearing Loss Prevention and Noise Control Plan

The Specification is an Enbridge enterprise-wide document that applies to all Business Units (BU) and Central Functions (CF) operations and sites, that stipulates that “Enbridge shall establish, implement, and maintain a hearing loss prevention program (HLPP) in accordance with this Specification”. The Plan provides direction on how GTM adheres to the HLP Specification and can be accessed from the GTM GDL.

The Plan outlines the following:

- Scope and Application
- Definitions
- Responsibilities
- Requirements (i.e., Noise Recognition, Evaluation, and Control, HLPP implementation)
- Documentation (i.e., records management)
- Training
- Standard Review

5.6.3. Responsibilities

The Plan lists the roles and responsibilities of impacted employees. Employees responsible for applying the Plan at GTM Enbridge operations and work sites, include:

- S&R Shared Services Safety Advisors & Business Unit (BU) and Project Safety Advisors
- Occupational Hygiene (OH) Advisors
- Operations Team leaders/supervisors
- Enbridge employees and contractors conducting work at GTM operations and work sites.

5.6.4. Requirements

The Plan ‘table of contents’, outlines HLP requirements into elements listed in the figure below. Critical elements covered include the:

- Recognition of Noise Hazards & other contributors to hearing loss
- Evaluation of Noise Hazards
- Control of noise hazards, including Engineering Controls and the Hearing Loss Prevention Program (HLPP)

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Figure 1: HLP Plan Requirements

5.6.5. Documentation

- GTM Hearing Loss Prevention and Noise Control Plan
- SP-100-16 Station Construction - Acoustical Insulation, Enterprise-Wide Specification
- GTM – SP-100-16 Station Construction – Acoustical Insulation
- GTM – Sound Engineering and Administrative Controls Documentation

5.6.6. References

- Hearing Loss Prevention Management Specification

5.7. Hydrogen Sulfide

5.7.1. Purpose

The purpose of this section is to address the primary H&S risk presented by the presence of H₂S within the gas and liquid products handled by GTM operations. As such the following are in scope:

- Inhalation hazards presented by H₂S gas within a Worker's breathing zone
- The ignition hazards presented by Iron Sulfide (FeS) deposits within equipment that contained H₂S

Hydrogen Sulfide (H₂S) exposure risk is present at varying levels across GTM operations. The H₂S section has been developed to assist those operations that face a significant H₂S exposure risk in raising

awareness, identifying sources of H₂S exposure risk, and systematically managing and controlling H₂S related exposure hazards and risk.

5.7.2. Scope

This section applies to all GTM Operations and Projects being completed for GTM.

The secondary safety hazard created by the effects of H₂S on equipment integrity are significant but fall outside the purview of this Manual and will be managed by Asset Integrity.

The H₂S program is designed to ensure full compliance with federal regulation in both the United States (OSHA) and Canada (COHSR) as well as provide documentation that meets the following provincial regulatory requirements:

-  an “exposure control plan” (ECP) under BC OHS Regulations 5.54
-  a “code of practice” under Alberta OHS Code 26(1-2)

The H₂S program requirements are only applicable to those operating areas and facilities that present a risk of H₂S exposure above the ACGIH limits (i.e., the facility or operating area must process, store, or transport a gas or liquid product that could produce with any type of loss of containment a Worker’s breathing zone exposure to a TLV-TWA above 1 ppm; or a TLV-STEEL averaged over 15 minutes above 5 ppm not more than four times per day with at least 60 minutes between successive exposures).

Line Break and Equipment opening describes the steps all Workers will follow when working on pipe and vessels that may contain H₂S.

5.7.3. Responsibilities

People Leader shall:

- Know whether the areas or facilities under their direction carry an H₂S exposure risk
- Know the H₂S Program elements, procedures, and practices that are applicable to their operations
- Provide sufficient resources and direction to ensure the following:
 - Training on the hazards presented by H₂S and mandated controls including gas monitoring, use of respiratory protective equipment (including use of SCBA/SABA) is completed as required
 - Workers and facilities are equipped with the required respiratory protective equipment on a standby basis (e.g., emergency SCBA packs) and supplying sufficient Personnel and equipment for projects with a known H₂S exposure risk
 - Inspections and maintenance of this respiratory protective equipment remains up to date
 - Applicable signage and wind direction indicators are fully implemented and maintained, and emergency response procedures established for the location
 - local H₂S risks, controls, and emergency response procedures are communicated in site orientations for any new or transferred Employees, Visitors and Contractors
 - procedures designed to manage H₂S exposure risk are being consulted and followed by Workers when conducting tasks with this risk

Workers shall:

- Complete and maintain applicable H₂S related training as mandated, based on site exposure risks and job description
- Remain aware of where and how they may encounter H₂S exposure risk within the operating area or facility in which they are working
- Know and follow any procedures designed to manage H₂S exposure risk
- Know and follow pre-determined emergency response procedures for H₂S release events




Visitors shall:

- Receive a site orientation that informs them of local H₂S hazards and what to do in the event of an H₂S release event
- Remain escorted within operating areas or facility by local Personnel if not a trained Employee or Contractor with knowledge of the site

HS Support shall:

- Assist in the active promotion and implementation of this section across Operations
- Actively monitor and make recommendations for improvement to Management and Safety Shared Services
- Provide technical support as requested from Operations in the identification, control, and mitigation of H₂S exposure

5.7.4. Requirements

- The goal of H₂S exposure control measures is to prevent individual Workers from being exposed to concentrations of H₂S exceeding the ACGIH exposure limits within their breathing zone.
- These limits are as follows:
 - TLV-TWA of 1 ppm (average over 8 hour).
 - TLV-STEL of 5 ppm (averaged over 15 minutes and not repeated more than 4 times per day with at least 60 minutes between successive exposures in this range).
- In practice, triggers for a variety of controls or responses to H₂S exposure or H₂S exposure risks vary based on local regulations and these may be found in the applicable Asset Area Procedure (see *Documentation* below).
- Any operating area or facility where there is potential for a respiratory exposure above the ACGIH limits (due to the nature of the gases or liquids produced, processed, transported, or stored) must follow the applicable H₂S Program for their Asset Area. These programs are:
 -  For UST and Offshore: Hydrogen Sulfide Safety Procedure
 -  For Western Canada: Western Canada Hydrogen Sulfide Procedure
 -  For Eastern Canada: EC-HS-29 Hydrogen Sulfide Safety Program
- Basic information on H₂S exposure hazards needs to be readily available and regularly reviewed (e.g., annually or prior to operation with H₂S exposure risk) with Workers on any sites subject to an H₂S Program, including:

- Properties, symptoms, and consequences of H₂S exposure, as depicted in the figure below:

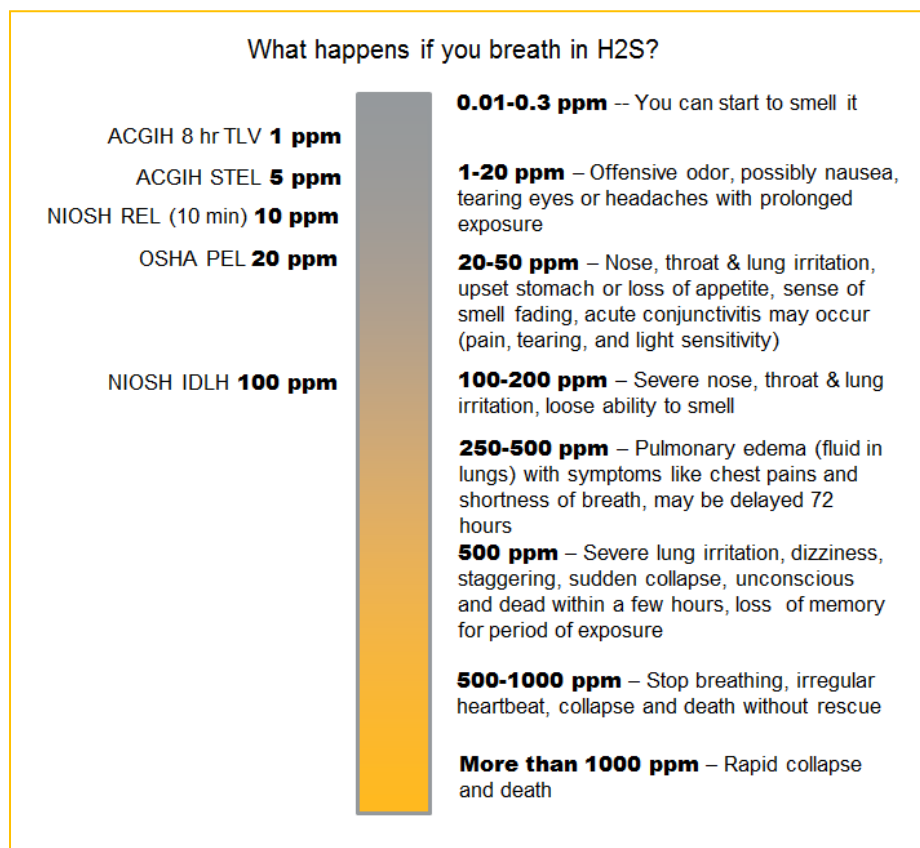





Figure 2: Consequences of H₂S Exposure

- Site locations or types of operations that create an H₂S exposure risk, for example:
 - Leaks/spills from gas pipelines, piping, equipment, and processes
 - Working on pipes or equipment that process sour products
 - Vents or thief hatches on sour liquids storage tanks
 - Breaking equipment integrity (changing filters/pigging, repairs, or routine maintenance)
 - Gauging tanks
 - Entering confined spaces, low-lying or berm areas
 - Sampling with open or closed container
 - Maintaining purged equipment
 - Flaring sour gas or acid gas and unintended migration from common flare systems
 - Transfer and trucking of any sour fluids (e.g., sour produced water and condensate)
- Mandated Asset Area or local procedures, including personal gas monitor requirements that are critical preventing H₂S exposure risk.

- Emergency response procedures, including the importance of knowing wind direction, muster points, and rescue requirements.
- Visitors to sites with H₂S exposure hazards must be informed of the hazard, basic emergency response, and escorted in areas with H₂S exposure hazard by an authorized person unless an Employee or Contractor already familiar with H₂S related procedures and local H₂S hazards.

5.7.5. Documentation

-  UST and Offshore Asset Areas follow the Hydrogen Sulfide Safety Procedure
-  Western Canada follow *Hydrogen Sulfide Procedure*
-  Eastern Canada follows *EC-HS-29 Hydrogen Sulfide Safety Program*

5.7.6. References

- OSHA 29 CFR 1910 Subpart Z: Toxic and hazardous substances
- COHSR SOR/86-302 Part 10: Hazardous Substances

5.8. Lead Management

5.8.1. Purpose

The purpose of a Lead Management Program is to ensure:


- Awareness of the possibility and consequences of lead exposure hazards from lead paints and coatings that may exist within certain GTM facilities
- Effective control measures are applied during any activities where lead paints and coatings are disturbed, removed, or disposed of

Paints or coatings containing lead may be found in GTM facilities. Lead exposures that present a human health hazard may occur when these lead-based paints are disturbed, releasing the lead to become airborne and inhaled or find other routes of entry (e.g., ingested while eating, etc.) or spreading the contamination further.

5.8.2. Scope

This section applies to all GTM Operations and Projects being completed for GTM.

The Lead Management Program is designed to ensure full compliance with federal regulation in both the United States (OSHA) and Canada (COHSR) as well as provide documentation that meets the following provincial regulatory requirements:

-  an “exposure control plan” (ECP) under BC OHS Regulations 5.54
-  a “code of practice” under Alberta OHS Code 26(1-2)

The Lead Management Program requirements are only applicable to those operating areas and facilities that present a risk of lead exposure due to having lead containing paints or coatings on structures or equipment.

Nearly all operating facilities will have some risk of lead-based paints and coatings in certain areas—however, any older facility that has not undergone a lead abatement program must be presumed to carry a higher risk of lead-based paints and coatings.

5.8.3. Responsibilities

People Leader shall:

- Know whether the areas or facilities under their direction have lead containing paints and coatings on structures or equipment
- Know (or review when applicable) the Lead Management Program elements, procedures, and practices that must be followed during any activities that may disturb lead containing (or possibly lead containing) paints or coatings
- Provide sufficient resources and direction to ensure the following:
 - Training on the hazards presented by lead paints and coatings and mandated controls is completed as required
 - Workers use required respiratory protective equipment (which may require fit testing) and apply controls set out in the Lead Management program procedures during activities that disturb lead paints and coatings
 - Clean up and waste disposal following any activities that disturb lead paints and coatings follow the Lead Management program requirements




Workers shall:

- Complete and maintain applicable lead hazard awareness or Management training as mandated, based on site exposure risks and job description
- Report any potential lead exposure risks, known lead exposure risks, or any known lead exposure immediately to their supervisor
- Know and follow any procedures designed to minimize exposure to lead, including as required area isolation, signage, and/or ventilation, respiratory protection and other PPE requirements

HS Support shall:



- Support lead hazard awareness, lead identification and hazard mitigation efforts to minimize lead exposure potential and support compliance with the Lead Management program

5.8.4. Requirements

-  UST and Offshore Asset Areas follow the Lead Control Procedure.
-  Eastern Canada and Western Canada Asset Areas follow Western Canada Lead Management Procedure.
- People Leader must ensure they are sufficiently aware of paints and coatings that contain lead or may contain lead to ensure Lead Management Program requirements are met if work activities will involve disturbing these lead-containing paints or coatings:
 - Workers regularly working in areas with lead-based paints or coatings should be informed of this hazard.
 -  In Canadian facilities and operating areas, lead paints and coatings must be physically identified with signs and labels.
- All Workers should be made aware of lead hazards if their work will involve potentially disturbing or working around activities that are disturbing lead paints or coatings.

- This may be managed through a variety of communication channels including general training on hazardous substances and in pre-job hazard assessment and control activities.
- Any activity that may involve disturbing, removing, disposing, or otherwise handling paint or coatings that contain lead needs to be conducted in accordance with the applicable Asset Area for Lead Management Procedure.
 - Different types of activities create higher or lower levels of risk and control measures are mandated based on the type of activity and the potential exposure to lead that could come from that activity.

5.8.5. Documentation

-  UST and Offshore Asset Areas follow the Lead Control Procedure
-  Eastern Canada and Western Canada Asset Areas follow Western Canada Lead Management Procedure

5.8.6. References

- OSHA 29 CFR 1926.62 Lead
- COHSR SOR/86-302 Part 10: Hazardous Substances
- Alberta OHS Code (2009) Part 4 Chemical Hazards, Biological Hazards and Harmful Substances (especially 28-30)
- British Columbia OHS Regulation 6.58-69 Lead

5.9. Naturally Occurring Radioactive Material (NORM)

5.9.1. Purpose

The NORM section (and US NORM Program where applicable) exists to ensure activities related to the detection, control, decontamination, and/or disposal of materials or equipment contaminated at Enbridge owned or operated sites/facilities are conducted as required and Personnel conducting these activities do so safely.

Naturally Occurring Radioactive Material (NORM) may be found in production fluids (gas, oil, or water) and may accumulate and contaminate any equipment containing these fluids: downhole equipment, piping, tubulars, flowlines, filters, gas processing vessels and equipment, valves, and pumps. As such, workplace regulations require that GTM facilities at risk of NORM contamination have a program to detect and manage the risk to Worker health from NORM.

Note: *NORM emissions do not typically emit the large doses of radiation that can create a health hazard simply by working near the contamination. NORM emissions may, however, be hazardous to a Worker's health if inhaled or ingested because of scale released or dust generated when performing equipment inspection, maintenance (e.g., filter changes), or repairs.*

5.9.2. Scope

NORM requirements are only applicable at facilities and locations at risk of NORM containing or NORM contaminated equipment meeting regulatory thresholds for NORM radiation levels.

- NORM surveys may in some cases be required and conducted to rule out the risk of NORM contamination (e.g., initial surveys in new operations or as part of the acquisition, transfer, decommissioning or disposal of used processing or storage equipment).

5.9.3. Responsibilities

People Leader shall:

- Be aware of the potential for NORM generally and of any specific locations or equipment on their worksite with an established risk of NORM contamination
- Know (or review when applicable) the NORM Program elements, procedures, and practices that must be followed during any activities with a potential for NORM exposure
- Provide sufficient resources and direction to ensure the following:
 - Training on NORM is completed, as required
 - Workers are aware of and use applicable respiratory protective equipment and other PPE and personal hygiene practices during activities that may involve NORM exposure
 - NORM surveys are conducted to meet regulatory compliance
 - Records, signage, and permit/license requirements for NORM contaminated equipment and areas are implemented and maintained to meet regulatory compliance

Workers shall:

- Complete and maintain applicable NORM training as mandated, based on site exposure risks and job description.
- Know and follow any procedures designed to minimize exposure to NORM and reduce overall NORM exposure when conducting activities with a NORM exposure risk.

HS Support shall:

- Support NORM Program elements to assist operations to remain compliant, including especially any NORM survey requirements.

Safety Shared Services, Industrial/Occupational Hygienists, Radiation Safety Officer shall:



- Provide expert guidance and, as applicable, to Operations and HS Support to fulfill their NORM Program requirements.

5.9.4. Requirements


- Area Management must ensure that all operating areas and facilities under their direction have fulfilled their NORM survey requirements.

NOTE: *This will vary by jurisdiction (including between individual states or provinces) and HS Support should be consulted as required to determine these requirements.*

- NORM Management practices will vary between jurisdiction based on local requirements. All programs, however, will provide the following elements:
 - Identifying equipment and areas that carry a risk of NORM exposure (based on a NORM survey)
 - Signage for any equipment found to exceed regulatory radiation limits
 - PPE and personal hygiene practices required if there is potential of handling NORM contaminated material or equipment
 - Training requirements (at various levels depending on role in NORM program)

- Storage and disposal requirements for NORM and NORM containing or contaminated equipment
- The following NORM Programs must be followed by their respective Asset Areas:
 -  For all U.S. operations: NORM Personnel and Equipment Policy and Procedure
 -  For all Canadian operations: Western Canada NORM Management Procedure

5.9.5. Documentation

- NORM Personnel and Equipment Policy and Procedure
-  For all Canadian operations: Western Canada NORM Management Procedure and related support documents:
 - Western Canada NORM Management Process
 - NORM Contaminated Refractory Safe Work Procedure (Thorium)
 - NORM Contaminated Equipment Safe Work Procedure
 - Operational Areas with Potential for NORM

5.9.6. References

- N/A

5.10. Heat Stress or Cold Stress

5.10.1. Purpose

This section provides information for Workers on how to protect themselves from the potential hazards associated with cold and heat in their work environments.

5.10.2. Scope

This section applies to all Company work under conditions where Workers may be exposed to or affected by environmental or radiant heat or cold. In areas where heat stress is likely, Contractors shall have a heat stress plan to protect Workers.

5.10.3. Responsibilities

People Leaders shall:

- Ensure preventative measures are implemented when extreme weather conditions are anticipated
- Ensure Workers have adequate personal protection from thermal extremes including clothing and work location
- Ensure adequate work schedules are developed to allow for modified rest periods during the extreme weather
- Ensure workload and work activities are arranged to better fit the climate exposures
- Ensure that water and/or replacement liquids are available to prevent dehydration during extreme thermal weather conditions
- Re-allocate or rotate staff duties to reduce individual employee exposure to extreme heat or cold conditions

- Routinely assess the risks associated for Personnel working in cold or hot climates

Workers shall:

- Immediately notify supervision and/or the HS Support of any suspected incidences of thermal stress (e.g., heat exhaustion, frost bite)
- Follow the rest or work break schedules during extreme weather conditions
- Increase liquid intake to stay hydrated during extreme hot or cold weather conditions
- Monitor each other for signs of overexposure to thermal extremes

HS Support shall:

- Offer strategies for engineered or administrative controls for thermal stress
- Provide thermal stress awareness reminders prior to the onset of heat waves or extreme cold weather conditions
- Advise area supervision of industry-recommended work/rest schedules for Employees working under heat/cold stress conditions
- Request assistance from Safety Shared Services for monitoring thermal stress situations

Safety Shared Services shall:

- Assist in providing specialized training for thermal stress if requested

5.10.4. Requirements

5.10.4.1. General

- Workers should be aware of the signs and symptoms of heat and cold stress and follow work-rest schedules. Any Worker experiencing signs and symptoms of heat and cold stress should leave the area immediately, contact 911 for emergency response, and obtain medical assistance.
- All Workers should be aware of signs and symptoms in co-Workers.
- Dress appropriately; when it is hot, wear light-weight clothing which will meet the PPE clothing requirements, and which will allow perspiration to evaporate; when it is cold, wear multiple layers of clothing, with an inner layer which will draw moisture away from the skin.
- Drink plenty of water, fruit juices, and, in hot environments, electrolyte replacement beverages. In cold weather, drink warm non-caffeinated beverages such as cider or herbal teas.
- In hot weather, eat cool, light meals. In cold weather, eat warm meals.
- Limit the consumption of coffee, or caffeinated sodas, as these beverages lower resistance to both heat and cold thermal stresses.
- Do not take salt tablets except under the supervision of a physician.

NOTE: The tables below provide a summary of cold-related and heat-related conditions, symptoms, and corresponding first aid measures.

5.10.4.2. Engineering Controls

- Use insulating and reflective barriers to control heat as practical.
- Control the exhaust of hot air and steam produced by specific operations.
- Reduce the temperature and humidity through air cooling.
- Provide climate conditioned rest areas for cold and heat extremes, such as radiant heaters to warm Workers or air conditioning to cool them.
- Increase air movement by providing fans for spot cooling.

NOTE: *If the air temperature is above 35° Celsius (95° Fahrenheit), improving air movement may increase a Worker's risk of heat stress. When the air temperature exceeds 35° Celsius (95° Fahrenheit), air movement can decrease our body's natural cooling mechanisms, and this may increase the heat load on the body through convective heating.*

- Shielding work areas from drafts or wind will reduce the wind chill in extremely cold environments.
- Reduce the physical demands of work tasks with mechanical devices (e.g., use hoists, lift-tables, etc.).
- Consult with HS Support or Safety Shared Services to assist with evaluating options.

5.10.4.3. Administrative Controls

Extreme Heat Guidelines

- Assess the demands of all jobs, have monitoring, and control strategies in place for hot days.
- Obtain the Humidex values by measuring temperature (dry bulb) and relative humidity and factoring them into the Humidex table below (see [Table 3](#)). For precise measurement use this method.
 - Obtaining heat index from a reliable weather service forecast may also be used as a point of reference.
- Determine the amount of cloud cover, the exertion level of the work being conducted, and the type of clothing being worn to calculate the correction factor (see [Table 4](#)).
- Apply the correction factor.
- Follow Response Plan as indicated in [Table 2](#) for Humidex 1 or 2 as apply.
- Repeat the Hazard Assessment process whenever climatic conditions change more than +/- 5 °F or +/- 3 °C
- Additional controls to be applied:
 - Reduce the physical demands of work (e.g., excessive lifting, digging with heavy objects)
 - Provide recovery areas (e.g., air-conditioned enclosures, rooms for rehydration)
 - Use shifts (e.g., early morning, cool part of the day, night work)
 - Use relief Workers
 - Use Worker pacing

- Take steps to protect Workers from exposure to UV radiation such as sunscreen, PPE, and clothing with UV protection and wide brims
- Assign extra Workers and limit Worker occupancy or the number of Workers present, especially in confined or Enclosed Spaces
- Train Workers to recognize the signs and symptoms of heat stress; and to know and follow heat stress prevention measures
- Provide water nearby on the Worksite (Workers should drink about one cup of water every 20 to 30 minutes, even if they are not thirsty)
- Consult the Occupational Hygienist for addition actions to consider

Table 2: Humidex Based Heat Response Table

Humidex 1	Response	Humidex 2
25 – 29 °C 77 – 85 °F	Supply water to Workers on an “as needed” basis.	32 – 35 °C 90 – 95 °F
30 – 33 °C 86 – 92 °F	Post Heat Stress Alert notice. Encourage Workers to drink extra water. Ensure recording hourly temperature and relative humidity.	36 – 39 °C 96 – 103 °F
34 – 37 °C 93 – 99 °F	Post Heat Stress Warning notice. Notify Workers that they need to drink extra water. Ensure Workers are trained to recognize symptoms.	40 – 42 °C 104 – 108 °F
38 – 39 °C 100 – 103 °F	Work with 15 minutes relief per hour can continue. Provide adequate cool (10 – 15 °C or 50 – 59 °F) water. At least 1 cup (240ml) of water every 20 minutes Worker with symptoms should seek medical attention.	43 – 44 °C 109 – 112 °F
40 – 41 °C 104 – 106 °F	Work with 30 minutes relief per hour. Can continue in addition to the provisions listed previously.	45 – 46 °C 113 – 115 °F
42 – 44 °C 107 – 112 °F	If feasible, work with 45 minutes relief per hour. Can continue in addition to the provisions listed above.	47 – 49 °C 116 – 121 °F
45 °C or over 113 °F or over	Only medically supervised work can continue.	50 °C or over 122 °F or over

NOTES: Humidex 1 – corresponds to the ACGIH Action Limit and applies to moderate workloads (e.g., pushing and lifting) for unacclimated Workers, or heavy workloads (e.g., shoveling sand) for Workers acclimatized to heat (see also OHS Guideline G7.28(1)).

Humidex 2 – corresponds to the ACGIH TLV® and applies to moderate work for acclimatized Workers or light work for unacclimated Workers.

Table 3: Heat Index from Dry Temperature and Relative Humidity Readings

Relative Humidity	Actual Temperature °F (°C)								
	70 (21.1)	75 (23.9)	80 (26.7)	85 (29.4)	90 (32.2)	95 (35.0)	100 (37.8)	105 (40.6)	110 (43.3)
0%	70 (21.1)	75 (23.9)	80 (26.7)	85 (29.4)	90 (32.2)	95 (35.0)	100 (37.8)	105 (40.6)	110 (43.3)
10%	70 (21.1)	75 (23.9)	80 (26.7)	85 (29.4)	90 (32.2)	95 (35.0)	100 (37.8)	105 (40.6)	110 (43.3)
20%	70	75	80	85	90	96.8	102.2	109.4	116.6

Relative Humidity	Actual Temperature °F (°C)								
	70 (21.1)	75 (23.9)	80 (26.7)	85 (29.4)	90 (32.2)	95 (35.0)	100 (37.8)	105 (40.6)	110 (43.3)
	(21.1)	(23.9)	(26.7)	(29.4)	(32.2)	(36.0)	(39.0)	(43.0)	(47.0)
30%	70 (21.1)	75 (23.9)	80.6 (27.0)	87.8 (31.0)	95 (35.0)	102.2 (39.0)	109.4 (43.0)	118.4 (48.0)	125.6 (52.0)
40%	70 (21.1)	77.0 (25.0)	84.2 (29.0)	91.4 (33.0)	98.6 (37.0)	107.6 (42.0)	116.6 (47.0)	125.6 (52.0)	
50%	71.6 (22.0)	80.6 (27.0)	87.8 (31.0)	95 (35.0)	104 (40.0)	113 (45.0)	122 (50.0)		
60%	75.2 (24.0)	82.4 (28.0)	91.4 (33.0)	98.6 (37.0)	109.4 (43.0)	118.4 (48.0)	129.2 (54.0)		
70%	77.0 (25.0)	86 (30.0)	95 (35.0)	104 (40.0)	113 (45.0)	123.8 (51.0)			
80%	80.6 (27.0)	87.8 (31.0)	98.6 (37.0)	107.6 (42.0)	118.4 (48.0)				
90%	82.4 (28.0)	91.4 (33.0)	100.4 (38.0)	111.2 (44.0)	122 (50.0)				
100%	84.2 (29.0)	95 (35.0)	104 (40.0)	114.8 (46.0)	127.4 (53.0)				

NOTE: This table is based on working conditions with little or no radiant heat; Workers wearing regular summer clothing; un-acclimatized Workers doing moderate work or acclimatized Workers doing heavy work.

Table 4: Correction Factor for Radiation Heat, Clothing, and Workload

Clothing	100% Cloud Cover		60% Cloud Cover		30% Cloud Cover		0% Cloud Cover		Work Type
	°F	°C	°F	°C	°F	°C	°F	°C	
FR + Vest	11	0.5	2	1	4	2	4	2	Light work
	2	1	3	1.5	4	2	5	2.5	Moderate work
	4	2	4	2	7	3.5	8	4	Heavy work
FR + Regular Tyvek2 + Vest	4	2	6	3	8	4	9	4.5	Light work
	6	3	8	4	9	4.5	11	5.5	Moderate work
	9	4.5	10	5	12	6	15	7.5	Heavy work

NOTES: The numbers in the above table indicate an increase in the heat index as a correction factor to reflect cloud coverage, clothing, and type of work. For example, performing heavy work with FR clothing + vest with 100 percent cloud coverage would add 4°F to the heat index to obtain the final heat index. The work rest schedule would have to be determined based on the final heat index.

Regular Tyvek suit is made of polypropylene. This is considered a breathable fabric. (Chemical resistant suits are coated with polyethylene. This type of garment is impermeable with no breathability. Examples of work types:

- Rest – Sitting
- Light work – Sitting with light manual work with hands or hands and arms and driving. Standing with occasional walking
- Moderate work – Normal walking, sustained moderate hand and arm work, moderate arm and leg work, moderate arm and trunk work, light pushing and pulling

- Heavy work – intense arm and trunk working carrying, shoveling, and manual sawing, pushing, and pulling heavy loads
- Very Heavy – Very intense activity at fast to maximum pace, e.g., shoveling wet sand

5.10.4.4. Extreme Cold Guidelines

- Wear layers of warm clothing and cover as much exposed skin as possible.
- Train Workers to recognize signs and symptoms of cold related conditions in other Workers.
- Take 10-minute warm up breaks, as required in the table below, calculating for wind chill.

Table 5: TLVs Work/Warm-up Schedule for Outside Workers based on a 4-Hour Shift

NOTE: These TLVs are applicable to Workers in dry clothing.

Air Temperature – Sunny Sky		No Noticeable Wind		5 mph (8 km/h) Wind		10 mph (16 km/h) Wind		15 mph (24 km/h) Wind		20 mph (32 km/h) Wind	
°C (Approx.)	°F (Approx.)	Max. Work Period	No. of Breaks ¹	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to – 19°	(Norm breaks) 1		(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4
-29° to -31°	-20° to – 24°	(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4	30 min.	5
-32° to -34°	-25°to – 29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease	
-35° to -37°	-30° to – 34°	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease			
-38° to -39°	-35° to – 39°	40 min.	4	30 min.	5	Non-emergency work should cease					
-40° to -42°	-40°to – 44°	30 min.	5	Non-emergency work should cease							
-43° & below	- 45° & below	Non-emergency work should cease									

NOTE: 2013 TLVs and BEIs – Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH), 2013-page 202.

- Increase the frequency and length of rest breaks as needed.
- Schedule hot jobs to cooler times of the day and cold jobs to warmer times of the day, if possible.
- Train Workers to recognize the signs and symptoms of thermal stress caused by heat-related or cold related conditions.

5.10.4.5. Personal Protective Equipment

- PPE for Hot Weather Conditions:
 - Wear light, summer clothing meeting the minimum PPE clothing requirements

- If working outside, apply sunscreen with a sun protection factor (SPF) of at least 15
- For very hot environments, consider air, water or ice cooled insulated specialty vest worn with normal clothing
- PPE for Cold Weather Conditions:
 - Wearing appropriate clothing and being aware of how your body is reacting to the cold are important to preventing cold stress

NOTE: *During extremely cold weather wear at least three layers of clothing. An outer layer to break the wind and allow some ventilation. A middle layer of down or wool to absorb sweat and provide insulation even when wet. An inner layer of synthetic weave to allow for ventilation.*
 - Wear a hard hat liner. Up to 40 percent of your body heat can be lost when the head is left exposed
 - Wear gloves and additional foot protection such as insulated boots
 - Keep a change of dry clothing available in case work clothes become wet
 - Do not wear tight clothing. Loose clothing allows better ventilation.

5.10.5. Documentation

- N/A

5.10.6. References

- Heat Stress Card. OSHA Publication 3154, (2002)
- Protecting Yourself in the Sun. OSHA Publication 3154, (2003)
- Protecting Workers in Hot Environments. OSHA Fact Sheet 95-16, (1995)
- The Cold Stress Equation. OSHA Publication 3156 (1998)
- Emergency Preparedness and Response: Safety and Health Guides – Cold Stress. OSHA (2005, February 23)

5.11. Sanitary Facilities

People Leaders or the Contractor shall:

- Ensure adequate sanitary facilities at or near the Worksite for the size and type of Workforce to be employed
- provide Workers with sufficient drinking fluids and provide access to toilets and hand washing facilities in accordance with Applicable Legislation
- Ensure that the Ground Disturbance Standard is referenced prior to securing a portable facility into the ground

Workers shall:

- Use the facilities provided
- Ensure that all facilities are adequately serviced and properly stocked
- Ensure facilities are adequately secured against unintentional movement

Administrative Controls – Abnormal

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6. Administrative Controls – Abnormal

6.1. General Requirements

6.1.1. Purpose

This section is developed to support the company's requirement to have an Emergency Response Program and aligns with the GTM Emergency Management Program and supporting processes, procedures and plans.

6.1.2. Scope

This section describes the requirements for each area of operations and/or project site to have a site-specific Emergency Response Plan.

6.1.3. Responsibilities

People Leader shall:

- Communicate this section to all Workers and Visitors under their supervision
- Ensure the site-specific emergency response plan is readily available for all locations
- Ensure that emergency evacuation maps, phone contacts and other support documents are current and posted in prominent locations or available at each Company facility
- Understand and follow the crisis communication and media response procedures

Employees and Contractors shall:

- Attend emergency response training, as required
- Provide feedback following emergency drills or exercises

HS Support shall:

- Ensure site specific emergency plans per OSHA and CER requirements are available at all facilities


Emergency Response Program shall:

- Ensure development of site-specific emergency plans per OSHA and CER requirements for all Company facilities

6.1.4. Requirements

6.1.4.1. General

- Each operating site must have a written emergency response plan that addresses major unplanned events or exposures that could threaten the facility or project.
- The emergency response plan must conform to the requirements set forth by regulatory agencies and emergency response program requirements.
- Refer to the appropriate Enbridge Gas Transmission Emergency Response Plan
- The emergency contact list shall be reviewed quarterly to confirm the accuracy of the emergency response phone numbers and accuracy of individual names.

-  The Environmental SPCC map contains the emergency contact list, evacuation routes and assembly points for each facility. If a facility isn't required to have a SPCC plan per EPA regulatory requirements, contact HS Support to develop a similar plan which contains the emergency contact list, evacuation routes and assembly points.
- Emergency planning provisions will be incorporated into each facilities orientation training.
- All facilities shall conduct an emergency drill at least annually as outlined in the Transmission North ERP and Transmission South ERP
- All facilities shall conduct an emergency drill at least annually as outlined in the USA North Area ERP and USA South Area ERP
- Following the emergency drill, the involved Workers shall be debriefed, and the site emergency plan revised as appropriate.

6.1.4.2. Cardiopulmonary Resuscitation/First Aid Responders

- A current list of Employees trained in first aid and cardiopulmonary resuscitation (CPR) shall be maintained and posted at each location.
- At least one first-aid trained Worker shall be assigned to each shift and with each field group working on Company facilities.

6.1.4.3. Emergency Equipment Inspections

- All emergency equipment must be inspected per *Emergency Equipment Inspection section*.
- Safety Showers shall be inspected as per the *Emergency Safety Shower section*.
- First Aid equipment shall be inspected as per the appropriate *First Aid Equipment section*.
- Fire Extinguishers shall be inspected in accordance with the *Fire Extinguishers section*.
- Gas alarms and emergency alarms shall be tested in accordance with applicable OSHA and CSA standards.

6.2. AED Emergency Response (Only)

6.2.1. Purpose

This section provides information and requirements when operating an Automated External Defibrillator (AED) machine that can monitor heart rhythms. If required, it can deliver an electric shock to the heart to correct heart arrhythmia.

6.2.2. Scope

This section applies to all Company facilities where AEDs are located.

At permanent GTM office locations where emergency medical response times are more than 4 minutes, an AED shall be kept with the First Aid Kit as part of the standard first aid supplies.

6.2.3. Responsibilities

People Leaders shall:

- Ensure this section is implemented with sufficient resources and trained emergency responders.
- Communicate this section to all Personnel under their supervision.

- Consider placement of an AED at additional Sites or locations, in cases where:
 - The Site or location has 6 or more Employees
 - The emergency medical response time for that location is greater than 20 minutes
 - The project safety plan determines their need
- Ensure a facility specific medical prescription for the AED is obtained and maintained.
- Notify local Emergency Medical Services (EMS) of the AED availability at the facility.
- Ensure the AED equipment is inspected monthly.

Employees shall:

- Complete the required AED training in addition to the first aid/CPR training requirement, where applicable

HS Support shall:

- Coordinate and assist in the purchase and management of AED
- Coordinate the training of Personnel in the use of AED

6.2.4. Requirements

- Sudden Cardiac Arrest (SCA) is a time sensitive emergency and treatment is therefore critical to emergency response. For these reasons, the company has elected to place AEDs at strategic locations within administrative areas.
- When an event occurs, first call for emergency medical services (911) and/or for local emergency responders.
- AEDs cannot be used inside compressor stations or other facility areas that are considered NEC classified (i.e., NEC classed Group1 Division1 or Group1 Division 2 Hazardous Gas Area).

6.2.4.1. Additional Requirements

- If a project is legally required to have a first aid room, an AED shall be kept in the room.
- Each AED shall be mounted on a wall or stored in a cabinet with proper signage and protective casing.
- Only Workers trained in the use of an AED are authorized to use an AED.
- AEDs are not intrinsically safe and shall not be stored in Hazardous Areas.
- Inspect AEDs in accordance with manufacturer's specifications.
- Before purchasing an AED model, please contact HS Support to confirm approved AED models for purchase.
- All US facilities must maintain a copy of the AED medical prescription on site.
- The original will be maintained in the Medical Services Department.
- US Facilities must notify all their emergency medical service providers responsible for responding to the facility of the presence and availability of an AED.
- The notification documentation must be filed.

6.2.5. Documentation

- N/A

6.2.6. References

- N/A

6.3. Emergency Equipment Inspections (🇺🇸 Only)

6.3.1. Purpose

This section defines the requirements to ensure that all emergency equipment is available and kept in its proper working order should the need arise for its immediate use.

6.3.2. Scope

Emergency and fire protection equipment at all Company locations will be inspected as outlined in this section. This section is limited to the following equipment:

- Self-Contained Breathing Air Units (SCBA)
- Emergency Eye Wash Bottles
- Emergency Lighting Units

6.3.3. Responsibilities

People Leaders shall:

- Ensure all emergency equipment is inspected in accordance with this section
- Ensure the required documentation is maintained
- Ensure that deficiencies on the inspection reports are corrected

Employees shall:

- Inspect the listed emergency equipment per the established schedules
- Record and maintain all required inspection data on the forms provided
- Highlight and report deficiencies noted on the inspections

HS Support shall:

- Periodically review the monthly emergency equipment inspection reports
- Provide support for all emergency equipment needs and assessments
- Periodically conduct Emergency Equipment Assessment to assure available emergency equipment meets the facility needs

6.3.4. Requirements

6.3.4.1. Self-Contained Breathing Air (SCBA) Units Protocol

- Inspect emergency breathing equipment monthly.
- Check the equipment to ensure:
 - Pressure gauges read within the safe limits of pressure

- Unit face pieces are inspected, marked, and tagged
- Document emergency breathing equipment inspections electronically in the Work Management system or by using the Monthly Emergency Equipment Inspection Form.
- All breathing air equipment service work shall be by an approved Vendor.
- All SCBA cylinders require periodic hydrostatic testing as required by *49 CFR 180.205*. The frequency of the maintenance depends upon the cylinder material.
- Steel cylinders should be tested every five years. They have an indefinite service life until they fail a hydro test.
- Aluminum cylinders (not including hoop-wrapped) should be tested every five years. They have an indefinite service life until they fail a hydro test.
- Hoop-wrapped cylinders should be tested every three years. Hoop-wrapped cylinders have a 15-year service life.
- Fully wrapped fiberglass cylinders should be tested every three years. They have a 15-year service life.
- Fully wrapped Kevlar cylinders should be tested every three years. They have a 15-year service life.
- Fully wrapped carbon fiber cylinders should be tested every five years. They have a 15-year service life.
- A non-destructive label shall be affixed to side of the cylinder with the date of manufacturer and the date of subsequent testing.
- Obtain written documentation from the approved Vendor on the types and extent of the inspection and/or repairs completed.

6.3.4.2. Emergency Eyewash Bottles

- Emergency eyewash bottles support plumbed and self-contained units but shall not replace them.
- Emergency eyewash bottles are classified as a secondary (personal) device and are intended to supplement and not replace a 15-minute flush capability primary device.
- Emergency eyewash bottles should be available where eye hazards are possible and eyewash stations are not readily available.
- Instructions and the expiration date, if applicable, shall be permanently affixed to the unit. All personal eyewash units shall be inspected and maintained in accordance with the manufacturer's instructions.
- Formally inspect and document the safety showers and eye wash stations monthly:
 - Mark equipment inspection tag indicating the date of inspection
 - Document inspection electronically in EAM or by using the Monthly Emergency Equipment Inspection Form
 - Repair or replace any defective equipment immediately

- If an outside Vendor is required to repair the equipment obtain written documentation on the type and extent of the repairs

6.3.4.3. Emergency Lighting Units Protocol

Perform a monthly 30 second function test on all emergency lighting units located at the facility.

NOTE: *Newer self-testing battery operated units will automatically perform the test – ensure the fault light located on these automatic units is not indicating.*

6.3.4.4. First Aid Kits

- Employees shall be trained in the location of first aid kits.
- First aid kits must be inspected monthly for cleanliness and for an adequate supply of contents. A list of contents should be placed inside the kits.
- Replace any missing supplies or malfunctioning equipment immediately.
- The numbers and types of items to be purchased depend on the size of the facility, number of Employees and the specific hazards expected to be encountered.
- Mark the kit inspection tag indicating the date of inspection and all supplies are in the kits and fit for service.
- Document inspection electronically in Work Management system or by using the Monthly Emergency Equipment Inspection Form.

6.3.4.5. Bloodborne Pathogen Kit Protocol

- Visibly inspect Bloodborne Pathogen Kits at least monthly. Inspect for expired dates on supplies, missing supplies/equipment, and inadequate supply quantities.
- Replace any missing supplies or malfunctioning equipment immediately.
- The bloodborne pathogens section requires that additional PPE be maintained either close to or in the first aid kits, depending on the nature and location of the work in progress.
- Refer to *Bloodborne Pathogen Exposure Control Plan* for a list of contents in the Bloodborne Pathogen PPE Kit.
- Document inspection electronically in EAM or by using the Monthly Emergency Equipment Inspection Form

6.3.4.6. Burn Kit Protocol

- Visibly inspect Burn Kits at least monthly. Inspect for expired dates on supplies, missing supplies/equipment, and inadequate supply quantities.
- Replace any missing supplies or malfunctioning equipment immediately.
- Burn kits shall be maintained either close to or in first aid kits, depending on the nature and location of the work in progress.
- Document inspection electronically EAM or by using the Monthly Emergency Equipment Inspection Form

6.3.4.7. Automated External Defibrillators

- Visibly inspect AEDs at least monthly.
- Document inspection electronically in EAM or by using the Monthly Emergency Equipment Inspection Form
- Document annual AED inspection on the Annual Automated External Defibrillator Inspection Form.

NOTE: See AED Emergency Response Section for additional information on this equipment.

6.3.4.8. Miscellaneous Emergency Equipment Protocol

- The following emergency equipment shall be inspected at least monthly to ensure the equipment is operable, always ready for service and in good condition:
 - Portable gas metering equipment
 - Emergency use flashlights
 - Burn free fire blankets
 - Emergency use tool kits (Brass sledgehammer, 15" Adjustable Wrench, 18" Pipe Wrench, Pressure Gauge with fittings, Thread Tape, Flashlight, Bolt Cutters, Leak Detection Equipment, PPE)
- Inspections shall be performed by the delegate of local management.
- The inspection frequency for all miscellaneous emergency equipment will be monthly and documented.
- The inspection will verify that equipment is in its designated space and/or mounted location, is clearly marked, is free from obstruction to access or visibility, and is in good operating order.

6.3.5. Documentation

- Monthly Safety Equipment Inspection – Fire Fighting Inspection Form
- Monthly Safety Equipment Inspection – Respirator Inspection Form
- Quarterly Safety Equipment Inspection Form
- Monthly Emergency Equipment Inspection Form
- Annual Automated External Defibrillator Inspection Form
- Hydrostatic Test Certification Form (vendor documentation can be used in lieu of Form)
- Hepatitis B Vaccine Declination Form

6.3.6. References

- ANSI/ISEA Z358.1-2014 Standard for Safety Showers and Eyewash Stations

6.4. Emergency Eyewash and Shower Stations

6.4.1. Purpose

The purpose of this section is to outline the requirements for the installation, inspection, use, and maintenance of emergency eyewash and shower equipment.

6.4.2. Scope

The section applies to all Workers at Company facilities where corrosive chemicals or materials are stored, transferred, or used. These work areas include, but are not limited to aqueous ammonia storage tanks, battery storage areas, inhibitor tanks, skids, or any other place where corrosives are available onsite. Implementation of this section can minimize probability of injury to the eyes or skin occurring because of exposure to hazardous chemicals or materials.

6.4.3. Responsibilities

People Leaders shall:

- Ensure that the necessary emergency eyewash and shower equipment are located on the same level as the hazards
- Ensure unobstructed access to the safety shower/eyewash equipment so that it requires no more than 10 seconds to reach (no more than 16.8 m or 55 ft. walking distance)
- Ensure that all Employees and Contractors who may need emergency eyewash and shower equipment are trained on their location and use
- Ensure that plumbed emergency eyewash and shower equipment are activated, and a weekly activation log is maintained
- Ensure monthly (at a minimum) visual check of all self-contained eyewash units
- Ensure emergency equipment is properly maintained and replacement parts are readily available
- Ensure out-of-service emergency equipment is properly labeled as such and repaired immediately, with temporary or replacement equipment or measures in place in the interim

Employees shall:

- Participate in the training provided on the use of emergency eyewash and shower equipment
- Conduct monthly (at a minimum) inspections all emergency eyewash and shower equipment
 - Weekly activation for plumbed eyewash/shower stations, maintain weekly activation log
- Report defective equipment to the People Leader and tag equipment out of service

HS Support shall:

- Ensure that all Workers have received instruction regarding the operation and maintenance of emergency eyewash and shower equipment as needed
- Assist with the selection of proper emergency eyewash and shower equipment to meet requirements

6.4.4. Requirements

6.4.4.1. General

- GTM locations shall have eyewash and shower stations available in work environments where Workers may be exposed to chemical Hazards.
- Contractors are responsible to provide adequate quantities of eyewash stations, based on the type and quantity of chemicals present on the Worksite, and in accordance with the information or directions on the applicable SDSs, plus the Hazard Assessment for that Location.
- Based on the ANSI/ ISEA Z358.1-2014 “Emergency Eyewash and Shower Equipment” standard, GTM requirements for Contractors and GTM Locations include:
 - locate an eyewash station within 7.6 m (25 ft.) of harmful chemicals (e.g., strong acids or caustics) or where the Hazard Assessment determines an eyewash station is required.
 - all types of eyewash stations shall be clearly identified and readily accessible. Do not block access; areas around the station shall be kept clear.
 - supply tepid (lukewarm) potable water for fixed plumbed systems. Placement of portable systems should consider the availability of access to potable water.
 - inspect plumbed, self-contained, and portable eyewash equipment monthly. All models shall have approved nozzle caps (to prevent foreign matter buildup) and be cleaned and mounted correctly.
- For self-contained eyewash stations and unsealed portable eyewashes, change the flushing fluids quarterly, or as specified by the manufacturer. If using water, add a preservative to maintain freshness; there are commercial additives that can help prevent freezing and micro-organism build-up.
- At isolated or remote work areas, at least one portable eyewash (squeeze bottle) shall be available anywhere there is a potential Hazard from chemicals.
 - Locate squeeze bottles close to the chemical Hazard and protect each bottle from the elements (e.g., prevent freezing).
 - When working with single or small number of batteries with liquid electrolyte (i.e., meter stations), portable eyewash bottles that equal one gallon of solution is appropriate.
 - Where there is a low possibility of exposure to electrolyte, portable eyewash bottles that equal a minimum of 1 gallon of solution is appropriate.
 - When working with sealed batteries that are non-spilling, portable eyewash is not needed unless visual inspection shows that a case is damaged and contact with internal components is possible.
- During inspection, ensure the eyewash equipment is clean with nozzles protected from airborne contaminants; placed in its designated location. Also ensure sufficient eyewash fluid is available. When inspecting portable eyewashes, ensure the seal is not broken or past the expiry date. If expired, replace immediately or as soon as possible.
- Fixed eyewash stations may be plumbed into the potable water system or have a reservoir. In addition:

- Fixed eyewash stations should be mounted so the discharge nozzles are between 74-91cm (29-36 in.) off the ground.
- Remote fixed eyewash stations that do not have a constant potable water supply shall also have an emergency eyewash station capable of providing approximately 15 minutes of continuous flushing.
- During each inspection of a fixed eyewash station, flush the line and verify proper operation.

6.4.4.2. Weekly Activation (for plumbed systems)

- Plumbed emergency showers, eyewashes, eye/face washes, and drench hoses must be activated weekly for a period long enough to verify operation and ensure that flushing fluid is available. This is needed to:
 - Flush out sediment and microbes
 - Make certain flushing fluid is available at the shower head and the overall device is in working order
- Self-contained emergency showers, eyewashes, eye/face washes and drench hoses, must be visually checked monthly (at a minimum) to determine if flushing fluid needs to be changed or supplemented.

6.4.4.3. Annual Inspections

- All equipment (i.e., emergency showers, eyewashes, eye/face washes, and drench hoses) must be inspected annually to ensure the device conforms to installation requirements, using Emergency Eyewash and Shower Equipment – Annual Inspection Checklist.
- All personal wash units must be inspected annually to assure conformance with having the capacity to deliver immediate flushing fluid without being injurious to the user.
- Annual inspection is necessary to ensure the equipment functions properly and to ensure any changes in the area have not affected the safe use and operation of the equipment.

6.4.5. Documentation

- Emergency Eyewash and Shower Form - Monthly Safety Equipment Inspection
- Emergency Eyewash and Shower Equipment – Installation Inspection Checklist
- Emergency Eyewash and Safety Shower – Weekly Activation Checklist
- Emergency Eyewash and Shower Equipment – Annual Inspection Checklist

6.4.6. References

- OSHA 29 CFR 1910.151 Medical Services and First Aid
- OSHA 29 CFR 1910.178 Powered Industrial Trucks
- OSHA 29 CFR 1926.441 Batteries and Battery Charging
- ANSI / ISEA Z358.1-2014, or most recent edition, American National Standard for Emergency Eyewash and Shower Equipment

6.5. Fire Extinguishers (🇺🇸 Only)

6.5.1. Purpose

The purpose of this section is to assist in training Employees in the proper selection, maintenance, and safe use of portable fire extinguishers in a fire emergency.

6.5.2. Scope

This section applies to all Employees who may respond to a fire at U.S. Company facilities.

6.5.3. Responsibilities

People Leaders shall:

- Assure that fire suppression systems are adequately placed and maintained at facilities
- Assure Employees are trained to perform their duties and take appropriate action in the event of fire emergencies

Location Fire Warden shall:

- Ensure all fire suppression equipment is inspected monthly
- Ensure all fire suppression equipment has not exceeded the hydrostatic test requirements

Employees shall:

- Only fight early-stage fires

HS Support shall:

- Assist in fire suppression system selection and placement at new and existing facilities
- Assist with hands-on fire extinguisher training while coordinated by the facilities
- Stay abreast of fire suppression system technologies, recalls and other pertinent information

6.5.4. Requirements

6.5.4.1. Fire Class and Symbols

Caution

Using the wrong type of extinguisher can intensify a fire.

- It is important to use the properly rated fire extinguisher only on the classes of fire which are printed on the nameplate of the extinguisher cylinder.
- Fire classes and materials in those categories are shown in [Table 1](#).

Table 1: Fire Class Symbols

Class A Ordinary Combustibles	Class B Flammable Liquids	Class C Energized Equipment	Class D Combustible Metal
Green – Triangle	Red – Square	Blue – Circle	Yellow – Star

6.5.4.2. Hazard-Appropriate Extinguishers

- **Class A** – Extinguishers used for protecting Class A fire hazards shall be selected from the following:
 - Pressurized water-type
 - Multi-purpose dry chemical
- **Class B** – Extinguishers used for protecting Class B fire hazards shall be selected from the following:
 - Aqueous Film Forming Foam (AFFF)
 - Film Forming Fluoroprotein Foam (FFFP)
 - Carbon dioxide
 - Dry chemical
 - Halogenated
- **Class C** – Extinguishers used for protecting Class C fire hazards shall be selected from the following:
 - Carbon dioxide
 - Dry chemical
 - Halogenated
- **Class D** – Extinguishers used for protecting Class D fire hazards shall be types approved for use on specific combustible – metal hazards, such as dry powder.

6.5.4.3. General Requirements

Caution

Portable fire extinguishers are not designed to fight large fires.

- With a portable fire extinguisher, the extinguisher agent can be exhausted in as little as eight (8) seconds. Even for small fires, extinguishers are useful only under the right conditions.
- For large fires, immediately evacuate the area and report to the primary emergency assembly area. Let the local fire department fight the fire.
- Never fight a fire if it is spreading beyond the immediate area or is already too large or may overwhelm the capabilities of the portable fire extinguisher. The spread of fire can block your escape route.
- Select the correct class of extinguishing agent for the type of fire.
- Training to use a fire extinguisher must be given before fire occurs.
- Complete the monthly inspection of the extinguisher for readiness and signs of tampering or physical damage.
- Evacuate fire areas or where there is a danger of the fire spreading.
- Evacuate the area and keep others away.
- If a fire involves a flammable or combustible liquid and is in an enclosed vessel, do not begin suppression activities without the ability to control or cut off the fuel supply to the fire.

6.5.4.4. Proper Extinguishment Procedures

Caution

Portable fire extinguishers are not designed to fight large fires. The extinguishing agent can be exhausted in as little as eight (8) seconds. Even for small fires, extinguishers are useful only under the right conditions.

NOTE: Employees will fight only early-stage fires.

- Remain calm.
- Call local emergency services (i.e., fire department) for assistance.
- Activate the building alarm system or notify others of the fire.
- Evacuate the building or area involved in the fire.
- Never turn your back on a fire while extinguishing the flames. Always back away from fire, keeping the extinguisher between you and the fire.
- Always fight fires that allow safe egress from the immediate area of the fire. This usually means keeping your back toward the exit or discharge from the building or area.
- Follow the PASS (Pull, Aim, Squeeze, and Sweep) system.
- This section is not always used, so it is important to check the directions printed on the individual extinguisher before the fire occurs.

- The PASS (Pull, Aim, Squeeze, Sweep) system consists of the following:
 - PULL the ring pin. This will cause the breakaway seal to fail. Some require pressing a puncture lever or releasing a lock latch.
 - AIM low. Point the nozzle at the base of the fire. Remain approximately 2.4 to 3 m (8 to 10 ft.) from the fire.
 - SQUEEZE the handle. This releases the extinguishing agent into the air.
 - SWEEP from side to side. Keep the extinguisher aimed at the base of the fire and sweep back and forth. Continue until the entire extinguishing agent is expelled.
- If the fire does re-ignite, repeat the PASS process.
- Report fires and fire extinguisher usage immediately to the Area Manager, location Fire Warden, and HS Support.

6.5.4.5. Components of Most Portable Hand Fire Extinguishers

NOTE: *There are many types and models of portable hand fire extinguishers. Please consult the manufacturer's information on components, specific selection, use, inspection, and maintenance manuals (e.g., pressurized water, halon.)*

- Fire extinguisher components:
 - Seal of independent testing laboratory (examples, Underwriters Laboratory [UL], Factory Mutual [FM]). This is usually found on the cylinder of the extinguisher.
 - Extinguisher rating consists of a letter preceded by a numeral that indicates relative extinguishing effectiveness
 - The following are physical components of a fire extinguisher:
 - the nozzle where the chemical is discharged under pressure in the direction of the fire at the base of flames.
 - the pressure gauge shows whether the extinguisher is properly charged. (on stored pressurized types only)
 - indicator fill cap (on cartridge operated types only)
 - the discharge lever/nozzle which causes the chemical to be released from the cylinder
 - cartridge receiver with stainless steel puncture pin (on cartridge operated types only)
 - compressed/sealed nitrogen cylinders used to expel extinguishing agents (on cartridge operated types only)
 - the carrying handle which makes the extinguisher easier to move around.
 - the ring pin which prevents accidental discharge of the extinguishing agent.
 - the breakaway seal which keeps the ring pin in place.
 - the mild steel cylinder which stores the chemical extinguishing agent
 - the siphon tube that the extinguishing agent flows through to reach the nozzle.
 - the inspection record tag is attached to the cylinder neck showing the date the unit was last serviced or recharged.

6.5.4.6. Selection and Distribution of Portable Hand Fire Extinguishers

NOTE: *The number of fire extinguishers needed to protect a property shall be determined as prescribed. Consider the area and arrangement of the building or occupancy, severity of the hazard, anticipated classes of fires and distances to be traveled to reach extinguishers.*

- Conduct assessments of each facility to determine the proper class, size, and mounting location of the hand portable fire extinguishers.
 - Facilities shall install 20lbs or 30lbs fire extinguishers with a discharge rate of 1lb per second or more (stored pressure or cartridge operated).
 - Facilities shall install 20-lbs (9 kg) type fire extinguishers for electrical fire hazard areas.
 - All units with welding machines, oxy/acetylene cutting torches, blowdown trailers, charcoal trailers, and methanol tank trailers (Accident, MD) shall be equipped with at least one 30-lbs (14 kg) extinguisher with either Class BC or ABC-rated extinguishing agent.
 - At least two 30-lbs (14 kg) dry chemical fire extinguishers must be on every welding job involving gas handling.
 - Employees assigned to “fire watch” duty during welding, cutting or braising operations requiring additional fire protection will wear appropriate PPE as per the hazard assessment:
 - At a minimum, one hand portable fire extinguisher shall be installed on all field motor vehicles, except cars determined to not require a fire extinguisher by Area/Regional Management and HS Support
 - At a minimum, one 30-lbs (14 kg) extinguisher with either Class BC or ABC-rated extinguishing agent shall be installed within 7.6 m (25 ft.) of an outside flammable or combustible liquids storage area
 - Extinguishers assigned to permanent locations shall not be taken to the field for standby use
 - Extinguishers for flammable liquids hazards of appreciable depth (Class B) [the depth of a liquid greater than 0.6-cm (¼-in)], such as dip tanks, shall be provided based on one numerical unit of Class B extinguishing potential per square foot of flammable liquid surface of the largest tank hazard within the area
- NOTE:** *Travel distance is not merely a simple circle radius matter but is the actual distance the user of the extinguisher will need to walk. Consequently, partitions, location of doorways, aisle piles of stored materials and fixed machinery, etc. will affect travel distance.*
- The maximum distance between permanent mounting locations shall be:
 - Class A Extinguishers: 23 m (75 ft.)
 - Class B Extinguishers: 15 m (50 ft.)
 - Class C Extinguishers: Based on individual assessment
 - Class D Extinguishers: Based on individual assessment

6.5.4.7. Mounting and Marking Requirements

- Portable hand fire extinguishers that weigh more than 40 lbs. (18 kg) shall be bracket or hanger mounted, with the top of the extinguisher no more than 107 cm (42 in) above the ground.
- A clearance greater than 10 cm (4 in) must always be maintained between the bottom of the extinguisher and floor.

- Extinguishers shall not be obstructed or obscured from view. Where visual obstructions cannot be completely avoided, one or more of the following methods may be used:
- Paint a 30.5 cm (12-in) wide red band approximately 1.5 m (5 ft.) above the top of the extinguisher on the wall or building structure indicating its location.
- Install flat signage approximately 1.5 m (5 ft.) above the top of the extinguisher.
- Install multi-directional signage approximately 1.5 m (5 ft.) above the top of the extinguisher.
- Extinguishers exposed to the environment or subject to possible physical damage may be mounted in cabinets or protected with a red vinyl cover.
- Extinguishers mounted in cabinets or wall recesses or set on shelves shall be placed in a manner that the extinguisher operating instructions face outward.
- Cabinet mounted and/or wall recessed extinguishers shall follow the same marking requirements as wall mounted units.
- Extinguishers mounted on vehicles or trailers shall be accessible, visible, and covered with a protective red vinyl cover but should not block the vehicle operator's view.
- The extinguisher shall be mounted with a heavy-duty rugged truck bracket (Model HD-30-E, part 30889, or similar) and may be mounted vertically or horizontally.
- Extinguishers should not be located at remote facilities such as M&R Stations unless required by state or local regulations. The vehicle-mounted extinguisher located on vehicles should be used in these instances.
- Fire extinguishers that contain hazardous chemicals must be labeled in accordance with 29 *CFR* 1910.1200(f)(5). In most cases, the manufacturer's label satisfies this requirement. However, fire extinguishers manufactured prior to 1991 and extinguishers charged by GTM Personnel require additional consideration.
- Fire extinguishers that contain hazardous chemicals must be labeled.
- Fire extinguishers that contain compressed gas at greater than 40 psi must be labeled.
- When the manufacturer's label does not reflect the hazards/contents of the extinguisher, an additional hazard identification label (HMIS, GHS, ANSI, NFPA or similar) may be used to identify the hazards/contents. This label must be affixed to the front of the extinguisher and must not cover/block the manufacturer's label.

6.5.4.8. Fire Extinguisher Inspection Protocol

- Inspect the fire extinguishers monthly by trained internal Personnel or an approved Vendor.
- Document fire extinguisher inspections electronically in EAM or by using the Monthly Emergency Equipment Inspection Form.
- During each inspection, check to ensure:
 - The seal tag and other tamper indicators are intact and there are no signs of tampering or that the unit has not been discharged. That pressure gauge or indicator is in the operating range or position.
 - The extinguisher is in the proper location according to the number assigned to the location for the fire hazard potential

- The extinguisher number and the location number are matching and is properly marked
- The extinguisher accessibility is not blocked by stored materials or fixed objects
- Fullness is determined by weighing or hefting for self-expelling-type extinguisher and cartridge operated type extinguishers
- Condition of tires, wheels, carriage, hose, and nozzle for wheeled type extinguishers
- Verify that operating instructions on nameplates and HMIS information are legible and face outward
- Examination for obvious physical damage, corrosion, leakage, or clogged nozzles
- Mark the affixed fire extinguisher tag

6.5.4.9. Fire Extinguisher Maintenance Protocol

- Conduct annual fire extinguisher service by an approved Vendor to ensure a thorough examination of the basic elements of the fire extinguisher and components.
- Applicability: Cartridge Operated, Loaded Stream and Stored Pressure Type.
- Each fire extinguisher shall have a tag or label securely attached that indicates the month and year the maintenance was performed, identifying the name of the person and agency performing the maintenance.
- Each fire extinguisher that has undergone maintenance or re-charged shall have a verification-of-service collar located around the neck of the shell and shall not interfere with the operation of the unit.
- Cartridge or Cylinder Operated fire extinguishers are exempt from this requirement.
- All Carbon Dioxide extinguisher type extinguishers shall have an annual conductivity test performed on the hose assembly.
- A non-destructive label with the month, year and name of person performing the test shall be affixed to the hose assembly.
- All fire extinguisher repairs shall be by an approved Vendor.
- Obtain written documentation from the approved Vendor on the type and extent of inspection and/or repairs completed.

6.5.4.10. Fire Extinguisher Recharging Protocol

- All stored pressure type fire extinguishers shall be recharged after each use, indicated need after inspection or when maintenance is performed.
- All Cartridge Operated fire extinguishers shall have the pressurizing cylinder replaced and extinguishing agent refilled after each use, indicated need after inspection or when maintenance is performed.
- Verify the label properly identifies the hazards/contents of the extinguisher.
- Locations shall maintain an adequate supply of parts, extinguishing agent for the type of fire hazard protection required for that facility.
- Only properly trained Personnel shall re-charge fire extinguishers.

6.5.4.11. Fire Extinguisher Hydrostatic Testing Protocol

- Fire extinguishers shall be hydrostatically tested as per the frequencies listed in the table below.
- All fire extinguisher repairs shall be by an approved Vendor.
- Obtain written documentation from the approved Vendor on the type and extent of inspection and/or repairs completed.
- Document hydrostatic testing on *Test Certification* (Vendor documentation can be used in lieu of *Form*).

Table 2: Fire Extinguisher Hydrostatic Testing Frequency

Extinguisher Type	Test Interval (Number of Years)
Stored Pressure Water, Loaded Stream, and/or Anti-freeze	Five
Wetting Agent	Five
AFFF (Aqueous Film Forming Foams)	Five
FFFP (Film Forming Fluoroprotein Foam)	Five
Dry Chemical with Stainless Steel Shell	Five
Carbon Dioxide	Five
Dry Chemical, Stored Pressure with Mild Steel Shells, Brazed Brass Shells or Aluminum Shells	Twelve
Dry Powder, Stored Pressure, Cartridge Operated with Mild Steel Shells	Twelve
Halogenated Agents	Twelve

6.5.4.12. Fire Hose Inspection Protocol

- Inspect fire hose and nozzles monthly.
- Check the hose and nozzle for:
 - Visible damage or obstruction and access being blocked
 - Document hose and nozzle inspection electronically in SAP or by using Monthly Emergency Equipment Inspection
- All fire hose pressure test and repairs shall be serviced by an approved Vendor.
- Obtain written documentation from the approved Vendor on the type and extent of repairs completed.

6.5.5. Documentation

- Fire Extinguisher Inspection Record
- Hydrostatic Test Certification (Vendor documentation can be used in lieu of Form)

6.5.6. References

- National Fire Protection Association 10, Portable Fire Extinguishers, 2022 Edition

- Occupational Health & Safety Administration, Sub Part L, Fire Protection and 29 CFR 1910.157, Portable Fire Suppression Equipment
- Occupational Health & Safety Administration, Sub Part Z, Toxic and Hazardous Substances and 29 CFR 1910.1200, Hazard Communication
- ANSUL Red Line Maintenance Guide, 1994-2009
- ANSUL, Extinguisher Maintenance Guide for Portable and Wheeled Fire Extinguishers
- National Fire Protection Association 921, Guide to Fire and Explosion Analysis, 2021
- CFR 195.430 Firefighting Equipment

6.6. First Aid Preparedness (🇺🇸 Only)

6.6.1. Purpose

The purpose of this section is to inform and assist in providing adequate and timely medical response at U.S. facilities.

6.6.2. Scope

This section applies to Employees at U.S. facilities.

6.6.3. Responsibilities

People Leader shall:

- Ensure this section is implemented with sufficient resources and trained emergency responders
- Communicate this section to all Personnel under their supervision
- Ensure the first aid kits are inspected monthly

Employees shall:

- Be prepared to respond to a medical emergency
- Notify appropriate facility Personnel when first aid supplies are used from the kit to assist with replacements, if necessary

HS Support shall:

- Assist in the evaluation of first aid supplies, equipment, or technical support, when requested
- Remain abreast of new first aid preparedness equipment, requirements and/or concepts

Safety Shared Services shall:

- Medical First Aid administration
- Remain abreast of new first aid preparedness equipment, requirements and/or concepts

6.6.4. Requirements

6.6.4.1. Emergency Response Written Plans

The Enbridge Crisis Management Plan provides the overall response, control and recovery for emergency situations that occur at the operating facilities.

The following information provides guidance for Personnel and equipment needs for medical situations that may result from an onsite crisis.

6.6.4.2. Cardiopulmonary Resuscitation/First Aid Responders

- A current list of Employees trained in first aid and cardiopulmonary resuscitation (CPR) should be maintained at each location.
- There shall be at least one first aid trained Employee on each shift and with each group working on pipeline facilities.

6.6.4.3. First Aid Kits

- Employees shall be trained in the location of first aid kits.
- First aid kits must be inspected monthly for cleanliness and for an adequate supply of contents. Document inspections electronically in EAM or by using the Monthly Emergency Equipment Inspection Form.
- Inspections shall be performed by the delegate of local management.
- The inspection will verify that equipment is in its designated space and/or mounted location, is clearly marked, is free from obstruction to access or visibility, and is in good operating order.
- A list of contents should be placed inside the kits.
- The standard items commonly found or available in first aid kits are listed in Table 46. The numbers and types of items to be purchased depend on the size of the facility, number of Employees and the specific hazards expected to be encountered.
- The location of first aid kits is denoted on the facility's SPCC (*Spill Prevention Control and Countermeasures*) plan.

Table 3: First Aid Kit Contents

10 Unit First Aid Kit		16 Unit First Aid Kit	
Quantity	Item	Quantity	Item
1 unit	Plastic Adhesive Bandages, 1"x 3½"	1 unit	Plastic Bandages, 1"x 3½"
1 unit	PVP Iodine Swabs	1 unit	PVP Iodine Swabs
1 unit	4" Bandage Compress	2 unit	3" x 5 yds, Self-Adherent Wrap
1 unit	Triangular Bandage, 40", sterile	1 unit	2" Bandage Compress
1 unit	Sting Kill Swabs	1 unit	4" Bandage Compress
1 unit	Pain Relieve Gel	1 unit	3" x 3" Gauze pads, sterile
2 unit	Cold Pack	1 unit	4" x 4" Gauze pads, sterile
2 unit	Burn spray	1 unit	Triangular Bandage, 40", sterile
10 unit	Metal case	1 unit	Sting Kill Swabs
		1 unit	Pain Relieve Gel
		2 unit	Cold Pack
		2 unit	Burn Spray
		16 unit	Metal case
24 Unit First Aid Kit		36 Unit First Aid Kit	
Quantity	Item	Quantity	Item

1 unit	Plastic Bandages, 1"x 3¾"	1 unit	Plastic Bandages, 1"x 3¾"
1 unit	PVP Iodine Swabs	1 unit	PVP Iodine Swabs
2 unit	4"x 5 yds, Self-Adherent Wrap	2 unit	4" x 5 yds, Self-Adherent Wrap
1 unit	2" Bandage Compress	1 unit	2" Bandage Compress
1 unit	4" Bandage Compress	1 unit	4" Bandage Compress
1 unit	2" x 2" Gauze Pads, sterile	1 unit	2" x 2" Gauze Pads, sterile
1 unit	3" x 3" Gauze Pads, sterile	1 unit	3" x 3" Gauze Pads, sterile
1 unit	4" x 4" Gauze Pads, sterile	1 unit	4" x 4" Gauze Pads, sterile
1 unit	Triangular Bandage, 40" sterile	1 unit	Triangular Bandage, 40", sterile
1 unit	Wire Splint	1 unit	Wire Splint
1 unit	Sting Kill Swabs	1 unit	Sting Kill Swabs
1 unit	Pain Relieve Gel	1 unit	Pain Relieve Gel
2 unit	Cold Pack	2 unit	Cold Pack
2 unit	Burn Spray	1 unit	Burn Spray
24 unit	Metal Case	36 unit	Metal Case

Small Burn Kit (Water-Jel)		Large Burn Kit (Water-Jel)	
Quantity	Item	Quantity	Item
1 unit	4" x 16" Burn Dressing	3 unit	4" x 16" Burn Dressing
2 unit	4" x 4" Burn Dressing	3 unit	4" x 4" Burn Dressing
2 unit	2" x 6" Burn Dressing	3 unit	2" x 6" Burn Dressing
1 pair	Latex Gloves	5 unit	8" x 18" Burn Dressing
1 unit	3" x 5 yds, Self-Adherent Wrap	2 pair	Latex Gloves
1 unit	Metal Box with Burn Kit Logo	1 unit	3" x 5 yds, Self-Adherent Wrap
		1 unit	Metal Box with Burn Kit Logo

6.6.4.4. Automated External Defibrillators

- Automated External Defibrillators (AEDs) are provided at company facilities to assist medical responders in providing aid during sudden cardiac arrest (SCA) medical emergencies.
- Refer to *AED Emergency Response*, for more detailed-on AEDs.

6.6.4.5. Bloodborne Pathogens

- The Bloodborne Pathogens section requires that additional PPE be maintained either close to or in the first aid kits, depending on the nature and location of the work in progress.
- Refer to *Bloodborne Pathogen Exposure Control Plan*, for a list of contents in the Bloodborne Pathogen PPE Kit.

6.6.4.6. Records

- AED prescription and communication of location
- Current list of Employees trained in first aid and CPR should be maintained at each location.

6.6.5. Documentation

- First Aid Kit Inspection Manned Location Form*
- Monthly Emergency Equipment Inspection Form

6.6.6. References

- N/A

6.7. First Aid Requirements (🇨🇦 Only)

6.7.1. Purpose

This section identifies the First Aider's role to recognize first aid emergencies, call emergency medical services, and act according to their skills, knowledge, and comfort level.

According to the Canadian Red Cross, First Aid is the immediate care that you give to an ill or injured person until more advanced care can be obtained. The First Aider's role is to recognize the emergency, call emergency medical services, and act according to their skills, knowledge, and comfort level.

6.7.2. Scope

This section applies to all federally regulated workplaces in Canada where there are six or more occupants, at remote sites where there are two or more Employees working, or for work involving high voltage hazards.

6.7.3. Responsibilities

People Leaders shall:

- Establish a general level of awareness of the contents and location of this section with all Employees
- Ensure that competencies are established and verified in those Employees expected to implement and comply with this section
- Monitor and motivate compliance with the section
- Actively evaluate and improve on this section over time
- Ensure Employees receive the proper training in first aid
- Ensure resources are assigned to confirm that all First Aid equipment is inspected, compliant and that records of inspection are maintained
- Ensure that occupational injuries and/or illnesses are reported to Health Services immediately upon notification of a workplace event, complete the required Workers compensation board report and submit to Health Services
- Promptly provide employee with Short Term Disability paperwork when notified of a non-occupational injury or illness involving lost time from work. Complete Employee Notification on-line for submission to the Third-Party Administrator
- When notified of a non-occupational injury or illness involving modified work but not involving lost time, contact the Health Services Department immediately
- Provide Offer of Modified Work and the Modified Work Form to the employee before they visit their doctor (as required) on same day of event
- Ensure Employee is aware of the Return-to-Work process
- Work with the Enbridge Health Nurse or Enbridge Health Services as required to identify suitable modified work opportunities

- Maintain regular contact with Employee during their absence from work and monitor their progress upon they return to work
- Contact Occupational Health Nurse or Enbridge Health Services with concerns
- Identify and arrange and offer reasonable modified work opportunities to accommodate Employees who are disabled due to injury or illness
- Monitor the progress of Employees in modified work programs and meet with them regularly to ensure they will be successful in achieving their return-to-work goal
- Annually review permanent modified Employees with Occupational Health Nurse and notify of any concerns
- Verify that the event has been entered into EnCompass

Employee shall:

- Comply with the assigned Requirements of this section
- Take all reasonable steps to assist in the implementation of this section with Management, Co-Workers, and Contractors as appropriate
- Actively evaluate implementation of this section and recommend improvements to Management and HS Support as appropriate
- Respond to emergency injury situations in a manner that protects life and our environment first and then the integrity of company processes and assets
- Assist in the response as required by procedure and requested by Management and Public Responders
- If an Occupational First Aid Attendant (OFAA) is available, employee reports directly to OFAA for immediate assessment and possible treatment
- If an OFAA is not available, immediately and before leaving the site, inform your Supervisor and the HS Support face-to-face or by phone call and email
- Report any occupational injury/illness immediately to Manager/Team Lead or designate
- Seek medical attention from a Qualified Health Practitioner and have the Modified Work Form filled out by the Qualified Health Practitioner
- Advise Manager/Team Lead or designate immediately and Inform Qualified Health Practitioner that return-to-work opportunities are available in the workplace to accommodate your limitations and restrictions and provide a copy of the offer of modified work letter and modified work form
- Return the completed, signed Modified Work Form to the Occupational Health Nurse, Health Services
- Take an active role in developing a return-to-work plan
- Cooperate and perform the assigned work tasks in a safe manner consistent with the Modified Work Plan
- Inform Occupational Health Nurse of any concerns or changes in your condition
- Communicate regularly with your Manager/Team Lead or designate through your recovery period and cooperate with the company in finding suitable return to work opportunities

- Comply with treatment recommendations; attend all medical and rehabilitation appointments
- Report any concerns with the Modified Work Plan to your Manager/Team Lead or designate and Occupational Health Nurse
- Refer to the Occupational Health Nurse as your primary contact for any Return-to-Work concerns and updates of your progress
- Attend and actively participate in any scheduled Return to Work progress meetings
- Obtain and provide an updated Modified Work Form as outlined in the Modified Work Plan and/or as requested by Occupational Health Nurse and/or Manager/Team Lead or designate
- Participate in a Functional Abilities Evaluation (FAE) or Independent Medical Examination (IME) as requested by Occupational Health Nurse
- British Columbia – Complete the Workers Report of Injury Form 6A and provide copy to employer, physician, and Enbridge Health Services

First Aid Attendant shall:

- Assess injury and treat to level of knowledge
- OFAA informs Employee's Supervisor of workplace injury
- Start the injury treatment and arrange for transport to home or hospital as appropriate
- Complete the first aid record and provide a copy to Employee, physician, and health services
- A copy of all redacted First Aid records and documents will be provided to the HS Support to upload into the event management system
- Contact HS Support immediately to support the Supervisor, and Employee

HS Support shall:

- Assist in the active promotion and implementation of this section across Canadian Operations
- Facilitate training of First Aid in Canadian Operations
- If receiving a report of injury, contact the employee to verify that injury management is taking place and contact the area Manager/Team Lead to discuss support
- If required or requested accompany the injured/ill employee to the hospital
- Review, accept or reject event express the event Management system
- Complete Event Analysis with the workplace committee and ensure that the analysis findings are entered into the event management system
- If requested by Management – conduct Root Cause Analysis of event analysis findings and enter root causes into the event management system.
- Work with Area Management team to implement corrective and preventive actions and ensure corrective actions are recorded in the event management system
- Update and maintain all documentation of the injury event in the event management system

6.7.4. Requirements

6.7.4.1. First Aid Attendant

On a worksite with six (6) or more Workers at any time, a first aid attendant shall:

- Be assigned
- Be readily available and accessible to Employees during working hours
- Render first aid to injured/ill Employees
- Accompany Employees to a medical treatment facility, as required
- Oversee providing care for injured/ill Employees until they are under the care of an equally or more qualified caregiver
- Not be assigned duties that interfere with the prompt and adequate rendering of First Aid

6.7.4.2. First Aid Stations

At least one first aid station shall be provided for every workplace, including vehicles where Employees perform work. First aid stations shall be:

- Clearly identified by a conspicuous sign and readily available during all working hours
- Inspected monthly to verify that contents are clean and dry
- Where a First Aid Room or medical treatment facility is located at a worksite, a First Aid Station is not required

6.7.4.3. Communication of First Aid Services

A posting should be made in a conspicuous location (e.g., workplace safety bulletin board and first aid station) to identify Attendants, location(s) of first aid stations, emergency contacts, and basic instruction that align with First Aid training.

6.7.4.4. First Aid Supplies and Equipment

All first aid supplies and equipment shall be checked and logged on to an inspection form. The requirements for first aid supplies and equipment are based on the number of Employees at the worksite. These are listed in Section 16.7 of the *Canadian Occupational Health and Safety Regulations* (COHSR) as well as applicable provincial OHS Regulations (Alberta, British Columbia, New Brunswick, and Nova Scotia). For the purposes of consistency across Canada First Aid Supplies and Equipment will be maintained to the COHS requirements unless the facility is under provincial jurisdiction. If the federal requirements do not meet the level of expectation that the provincial jurisdiction requires; then the provincial requirements will also be addressed. COHSR – Western Canada First Aid Supplies, Equipment, Facilities and Attendants Requirements and the COHSR Specific First Aid Kit Requirements outlines the federal requirements for first aid.

6.7.4.5. Automated External Defibrillator (AED)

- All AEDs shall be checked annually and must be:
 - Provided in all permanently occupied locations

- Approved for sale as medical devices by Health Canada, Medical Devices Bureau (MDB). The manufacturer is required to license the AED. Labels must state indications and conditions for AED use including a requirement that they are used only by Qualified Persons.
- A Worker using an AED must be adequately qualified through training received in Emergency, Standard or CPR/AED First Aid courses.
 - If a Worker requires an AED for first aid, ensure that the Worker is removed from a potentially flammable atmosphere prior to using the AED. An AED should not be used in a flammable atmosphere.

6.7.4.6. First Aid Record

- All first aid treatment provided to an ill or injured Worker will be documented. If First Aid is rendered, the First Aid Attendant who renders first aid shall create a first aid record that includes:
 - Date and time of the report
 - Name of injured/ill Employee
 - Date and time of occurrence
 - Brief description of injury/illness
 - Brief description of first aid rendered
 - Brief description of arrangements made for transportation
 - Names of witnesses
- Entry of this information into EnCompass meets these criteria and creates an electronic signature. Following any significant event requiring emergency medical attention, the emergency response and first aid process will be reviewed for effectiveness.
- Persons with access to first aid information shall keep the information confidential.

6.7.4.7. Training Requirements

- Eastern Canada – Standard First Aid training is only delivered by approved organizations such as Red Cross and St John's Ambulance.
- Western Canada – The level of first aid training is described in the training determination tool and assigned by the Area Management Team-based on their specific needs and regulatory requirements. Facilities have assigned first aid training for the Workers as determined by the Safety Training Selection Tool by the Supervisor.

6.7.4.8. Identified Roles and Training Requirements

Western Canada – has described training requirements within the Safety Training Selection Tool. In the case of first aid the key questions for assigning first aid training are listed in the table below.

Table 4: First Aid Training Requirements

Training Course	Trigger Questions
First Aid – AB – Advanced WEI-H&S-0098	Has the Worker been assigned to the Emergency Medical Responder (EMR) role?
First Aid – AB – Level A CPR WEI-H&S-0100	Does the Worker work in Alberta? Has the Worker been assigned to the first aid role?
First Aid – BC – Level 1 WEI-H&S-0029	Does the Worker work in BC? Has the Worker been assigned to the Level 1 first aid attendant role?
First Aid – BC – Level 2 WEI-H&S-0099	Does the Worker work in BC? Has the Worker been assigned to the Level 2 first aid attendant role?
First Aid – BC – Level 3	Does the Worker work in BC? Has the Worker been assigned to the Level 3 first aid attendant role?
First Aid – BC – Transportation Endorsement	Does the Worker work in BC? Will the Worker be expected to transport injured Workers?

Other key factors involved in the determination of a role requiring first aid training include the following:

6.7.4.9. Lone or Remote Workers

Any Worker that is expected to regularly work or travel alone is required to train and maintain Emergency or Level 1 First Aid level certification as a minimum.

6.7.4.10. Workers within an Operating Facility (Western Canada)

- Workers designated as first responders are required to train and maintain Standard First Aid level or Level 1 certification as a minimum.
- First Aid training is also required in the following situations:
 - New hires or transfers into an area where First Aid training is required, as defined in the Training Determination Tool must have training if they do not have a current certification
 - Individuals required to have first aid training, as defined by the Training Determination Tool must take retraining as required to keep certification current
 - Retraining is also necessary if there are changes in the workplace or in the legislation rendering previous training obsolete
 - Individuals who are required to fulfill the following roles outside of their normal position:
 - **Electrical Safety Person:** an electrician who is immediately available and in line of sight of a Worker conducting work on high voltage electrical components.
 - **Confined Space Attendant/Safety Watch:** a person who is assigned to monitor the wellbeing of an individual within a confined space and provide immediate assistance in the event of a medical emergency.
 - **Confined Space Rescue Person:** a person assigned the role to conduct rescues for Personnel within a confined space.

6.7.4.11. Workers within Western Canada Offices

The number of Workers designated as first aiders shall comply with the *COHSR Part 16* or the numbers defined by the emergency response planned determined within the building's management company

emergency response plan. First aiders will initially be chosen from volunteers; based on their likelihood of being in the office on a regular basis.

6.7.4.12. Maintenance and Construction Projects

- Western Canada GTM has determined that all pipeline and construction work is considered high hazard work. Due to potential delays such as when an emergency transportation route to hospital access is over a railway crossing, the transport time is always more than 20 minutes.
- The project teams must ensure the Contractor provides an adequate level of first aid attendants and equipment as required by the provincial jurisdiction of each project. Contractor First Aid Training Guidance Table (Operational Work – does not include office work) and Contractor First Aid Supplies and Equipment Requirements provides the minimum requirements for First Aid Services on these sites.

6.7.4.13. Community Support

- Western Canada GTM believes that first aid training is beneficial not only for the workplace but also within the community. If an Employee is in a role which does not have a specific requirement for first aid training, Western Canada GTM will pay for the training, but Employee will need to take flex time, or take the training on an evening or weekend, as the time for the training will not be covered by Western Canada GTM.
- If there is any doubt as to whether an employee's role has a requirement for first aid training, the employee should consult with their Leader/Supervisor and review this document as well as the *Safety Training Selection Tool* for guidance.

6.7.5. Documentation

- COHSR – Western Canada First Aid Supplies, Equipment, Facilities and Attendants Requirements
- COHSR Specific First Aid Kit Requirements
- Contractor First Aid Supplies and Equipment Requirements
- First Aid Station Inspection Form
- Safety Training Selection Tool

6.7.6. References

- Canadian Occupational Health and Safety Regulations, Part 16 First Aid.
- British Columbia Occupational Health and Safety Regulation Part 3 Occupational First Aid.
- Alberta Occupational Health and Safety Code, Part 11 First Aid.
- New Brunswick requirements are found in Regulation 2004-130 under the Occupational Health and Safety Act.
- Nova Scotia requirements are found in Regulation 104/2001 under the Occupational Health and Safety Act.

Contractor Safety Management

Section 7: Table of Contents

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7. Contractor Safety Management

7.1. Purpose

The purpose of this section is to establish, communicate and apply standards for the safety qualification, selection and performance monitoring of Suppliers and Contractors.

Everyone at a worksite must be aware of the practices and procedures necessary for their safety as well as the safety of others. This section describes the actions required at all GTM worksites to ensure all Suppliers and their Subcontractors are aware of the Company safety requirements. This section supports the GTM IMS Contractor Management Process.

7.2. Scope

This section applies to all work completed by Suppliers, Contractors, and Subcontractors at GTM worksites (offices, operations, maintenance, construction, commissioning, abandonment, and emergency situations). This section outlines the safety requirements applicable to work performed by Contractors and Subcontractors.

This section outlines the roles and responsibilities for the prequalification and selection of Suppliers. This section outlines the roles and responsibilities of all Suppliers, Contractors and Subcontractors retained by the company to undertake work on any GTM worksite. This section outlines how the GTM business unit will meet the corporate requirements for Contractor Safety Management. This section does not apply to the hiring of provisioned, contingent Workers, or Personnel hired through third party staffing agencies.

Projects identifies and communicates applicable GTM safety requirements and associated responsibilities within the Project Hazard Assessment and Control Process document (see PGDL).

This section is developed for the GTM business unit. This process satisfies the following regulatory and/or corporate requirements – *Canadian Energy Regulator Onshore Pipeline Regulations 6.5 (1) j, k, l*.

7.3. Responsibilities

GTM is committed to:

- Setting Supplier expectations, requirements, metrics, and targets
- Consistently managing Suppliers and their safety performance
- Conducting Supplier safety prequalification
- Ensuring Suppliers have a Subcontractor management process where required
- Overseeing, monitoring, and verifying Suppliers performance to contract, work order, and legislative health

Planner, Project Manager or Designate shall:

- Receive the initial information requesting work and develop the details required to facilitate the development of the scope of work (SOW) to complete a supply chain management (SCM) requisition
- Ensure a completed service requisition is provided to SCM

If applicable, ensure any approved Supplier/Contractor Safety and Variance/Exclusions are provided to SCM as an attachment to the requisition

Person in Charge (PIC)/Authorized Enbridge Representative(s) or designate shall:

- Have a clear understanding of their responsibilities, the scope of their duties and the understanding of authority
- Ensure Enbridge's safety requirements are administered and followed
- Provides contractor performance management, which includes oversight, monitoring of activities, quality of work, and contractor evaluation / feedback
 - Responsible for oversight of activities including but not limited to: Confined Space, Lockout Tagout (LOTO), Isolation, Hot Work, and Critical Lifts
- Must be competent to oversee performance of work
- Have a clear understanding of their responsibilities, the scope of their duties and the understanding of authority
- Confirms contractors' applicable certificates for covered tasks. (Westcoast Transmission) [e.g., trade certificate.]
- Confirms applicable Contractor OQ Plan Covered Task verifications
- Communicates with the Supplier related to all items within the SOW (i.e., hazards, risks, controls, qualification expectations)
- Has Stop Work Authority
- Awareness to the contract details, SOW, and procedures
- Review of SOW & associated JHAs
- Consult HS Support for assistance as required.
- Initiates Supplier Variance and Exclusion requests when necessary.
- Ensure a Site-Specific Safety Orientation is delivered to the Contractors.
- Ensure regulatory posting requirements, including authorizations for construction and environmental permits are completed.
- Serve as Enbridge Authorized Representative and authorize work through the Safe Work Permit system (where applicable).
- Perform regular documentation checks on hazard management documentation.
- Participate and/or ensure inspections are conducted as required with additional involvement by other Personnel.
- Complete Supplier evaluations as required.
- Be the point of contact for ensuring communication with the Supplier.

Note: *Planner, Project Manager or Designate may be identified as the Contract Owner (Requestor), responsible for creation of a detailed Scope of Work as part of the work order or project submittal to SCM.*

Suppliers shall:

- Ensure Workers comply with Enbridge safety requirements as outlined in this manual

- Ensure Workers comply with all applicable legislation
- Ensure Workers participate in premobilization (pre-work/kick off) meetings
- Ensure that hazards are identified, assessed and controlled
- Ensure Workers report all events, unsafe conditions, and near misses to the Person in Charge (PIC) / Authorized Representative or Delegate
- Ensure Workers operate equipment only with proper training and authorization
- Ensure Workers are fit for duty
- Ensure all Workers under the Supplier's direction are adequately trained for the services being performed
- Ensure Subcontractors are held to the same standards as the Supplier
- Identify and communicate any specific Supplier procedures to be followed – ID on permit/approval

Contractor's People Leader shall:

- Act as the point of contact for communication of work direction from the Enbridge Person in Charge (PIC)/Authorized Enbridge Representative or Delegate
- Ensure that all responsibilities of the Supplier, and Contractors, are performed
- Identify any perceived issues relating to safety, Health or Environment to Enbridge personnel immediately
- Ensure their Workers stop and report all unsafe work to the Person in Charge (PIC) / Enbridge Authorized Representative or Designate immediately
- Provide active assistance and support for the GTM safety procedures in the following ways:
 - Provide subject matter expert (SME) input into pre-job Meeting and site-specific orientation materials (as required)
 - Ensure attendance of Workers at the pre-job meeting
 - Ensure their Workers complete orientation requirements prior to work
 - Participate in inspections (as appropriate)
 - Organize and provide leadership for required hazard management activities including meetings, JHAs, FLHAs, or equivalent hazard assessment documents
 - Serve as permit receiver when leading or working with a group of Workers in each task
 - Communicate permit details to direct reports

Supplier and Subcontractor Workers shall:

- Comply with Company safety requirements
- Comply with all applicable legislation
- Participate in premobilization meetings
- Follow hazard identification, assessment and control procedures

- Report all events, abnormal events, unsafe conditions, and near misses to the Person in Charge (PIC) / Authorized Enbridge Representative or Designate
- Stop all unsafe work immediately and report to the Person in Charge (PIC)/ Authorized Enbridge Representative or Designate
- Identify to Enbridge any specific Supplier procedures to be followed – ID on permit/ approval

Field Safety support shall:

- Provide support to the authorized Enbridge Representative/PIC in the interpretation and execution of supplier/contractor safety management
- Provide support to the Person in Charge (PIC) / Authorized Enbridge Representative or Designate in the development of the pre-job meeting as requested or required
- Provide guidance and information on GTM safety procedures and requirements as issues or questions arise
- Assist and/or participate in the safety inspection process (as applicable)
- Participate in hazard identification, assessment, and control activities
- Attend kick-off and tailgate meetings as required
- When required, review and support in the completion of the Supplier/Contractor Safety Variance/Exclusion Form

Safety & Contractor Safety Management Team shall:

- Support and respond to inquiries from Suppliers and their Enbridge Stakeholders
- Offer advice on supplier registration and safety pre-qualification process, statuses of a specific supplier or if and how supplier safety variance or exclusions have been executed

Supply Chain Management shall:

- Ensure Health & Safety (H&S) requirements are included in Safety Prequalification
- Ensure H&S requirements are included as part of the executed contract

Supplier safety representatives:

- The degree of Supplier-supplied safety representation required will be determined, by Enbridge, in advance of mobilization to site, prior to award and identified in the bid documents



NOTE: *Regardless of the degree of Supplier safety representation required, the accountability of on-site Contractor safety performance rests with the Supplier's supervision.*

In determining the appropriate level of safety representation required to provide adequate field presence, the following factors should be considered:

- Scope, complexity, and length of the Work
- The geographical location of the Work
- Total number of Contractors and Subcontractor Workers on site
- The number of crews and how they are spread out
- The risks/hazards associated with the Work

- The type and nature of work activities being performed

There are two levels of representation required by Enbridge:

- Level 1:
 -  A combined supervisor or worker/safety representative is required to have the OSHA 510/30 hour (current within the last five years) or approved equivalent training on projects with 15 or less people on site.
 -  A combined supervisor or worker/safety representative is required to have, at a minimum, safety leadership training or approved equivalent training on projects with 15 or less people on site within 5 years of the start date of their scope of work.
- Level 2:
 - A minimum of one full time safety representative with NO OTHER field construction duties is required for any project with 16 or more people on site (or equivalent).
 - In addition, Enbridge may approve other comparable qualifications after a review of the person's combination of training and experience.
 - The Suppliers safety representative's resume of qualifications and experience shall be submitted prior to work for approval by the respective Enbridge safety advisor.
 - Additional Supplier safety representatives will be required when the workforce exceeds 51 personnel and at every interval of 50 after that. Additional safety personnel may be required as specified in the bid documents. For Mainline construction work one senior safety person, two field safety representatives and one safety administrator for a sizeable pipeline spread.
 - GTM reserves the right, at its sole discretion, to change the number of required Supplier safety representatives assigned to the Work, accept, or reject the suitability of any Supplier safety representative and when making a change or rejecting a Supplier safety representative, GTM will provide the Supplier with written justification of that decision.

The Supplier safety representative shall coordinate the requirements of the Supplier's safety procedures and the GTM Construction Safety Manual and advise the Supplier on matters related to OHS.

7.4. Requirements

7.4.1. Scope of Work

The Project Manager, Planner or Designate must develop a clearly defined scope of work for the services to be performed by the Supplier prior to approval to hire. A clear scope of work will include (as minimum):

- Purpose
- Location
- Duration of work with proposed start and end dates
- Description of the work or services required
- Preliminary hazards identified based on SOW activities
- Risk of service as outlined below
- Estimates of Supplier services, equipment, and materials

- Enbridge supplied services, equipment, and materials
- Work method/permitting requirements
- Contractor training and qualification requirements
- Specifications, drawings, plot plans, etc. as required
- Emergency preparedness and response requirements
- Key deliverables
- Document requirements

7.4.2. Determination of Supplier Risk

- Supplier risk is determined through a risk based evaluation of the scope of services to be performed, location, duration, scale, costs (time and material), identified hazards and known environmental aspects.
- Risk is categorized into two categories:
 - Low Risk – The work involved in this level of risk does not have the potential to affect the integrity and operation of the facility or pipeline. Low risk work may occur within restricted/operating location.
 - Medium/High Risk - This work is typically field based, performed in a facility or on the pipeline, and/or has potential to affect the integrity of the pipeline.
- Planner, Project Manager, or Designate completes and submits a Contractor Management Planning Form (CMPF) to SCM during the creation of a service requisition.
 - The CMPF identifies the scope of work / work type, which is used by SCM for determining the level of risk the supplier will be prequalified for.
- Projects follows the Project Hazard Assessment and Control Process (see PGDL) for determining Supplier Risk.

7.4.3. Communicating Safety Requirements

GTM will communicate safety requirements to connected Suppliers through ISNetwork. Additionally, the GTM H&S Manual as well as project specific scope documentation and pre-job meetings are used to communicate to all Suppliers.

7.4.4. Communication of Safety Hazards

Every employer (the Supplier) is required to ensure that all Workers are made aware of known, identified, foreseeable and potential H&S hazards to which they are likely to be exposed by their work.

7.4.5. Safety Prequalification

Safety prequalification shall be performed to ensure Suppliers meet the GTM H&S requirements, the minimum legislative requirements, and industry best practices and to determine the Suppliers ability to safely perform the proposed service prior to selection and work commencement.

The level of safety prequalification correlates to the level of risk determined within the scope of work.

7.4.6. Low Safety Risk Suppliers

Suppliers listed as 'Low Risk Services' on the Consolidated Safety and Reliability Work Type Risk Classification will be pre-qualified by completing a desktop review of:

- Valid Supplier workers' Compensation Account (CAN)
- Experience Modifier Statement (US)
- The Suppliers written health and safety procedure to confirm that local regulatory requirements and Company best practices, including hazard assessment, training requirements, and emergency preparedness procedures are implemented
- OHS related orders/OSHA Citations, stop work orders and/or fines if applicable
- Past safety performance

7.4.7. Medium/High Safety Risk Suppliers

Medium/High Risk Suppliers must subscribe to ISNetworld (a 3rd party service selected to assist in pre-qualification reviews) and be connected to GTM before performing any of the types of work listed in the Consolidated Safety and Reliability Work Type Risk Classification.

Any Supplier can be recommended to enroll with ISNetworld. Only suppliers who are being registered as an Approved Supplier or are bidding on work are connected to the GTM ISN Suppliers list.

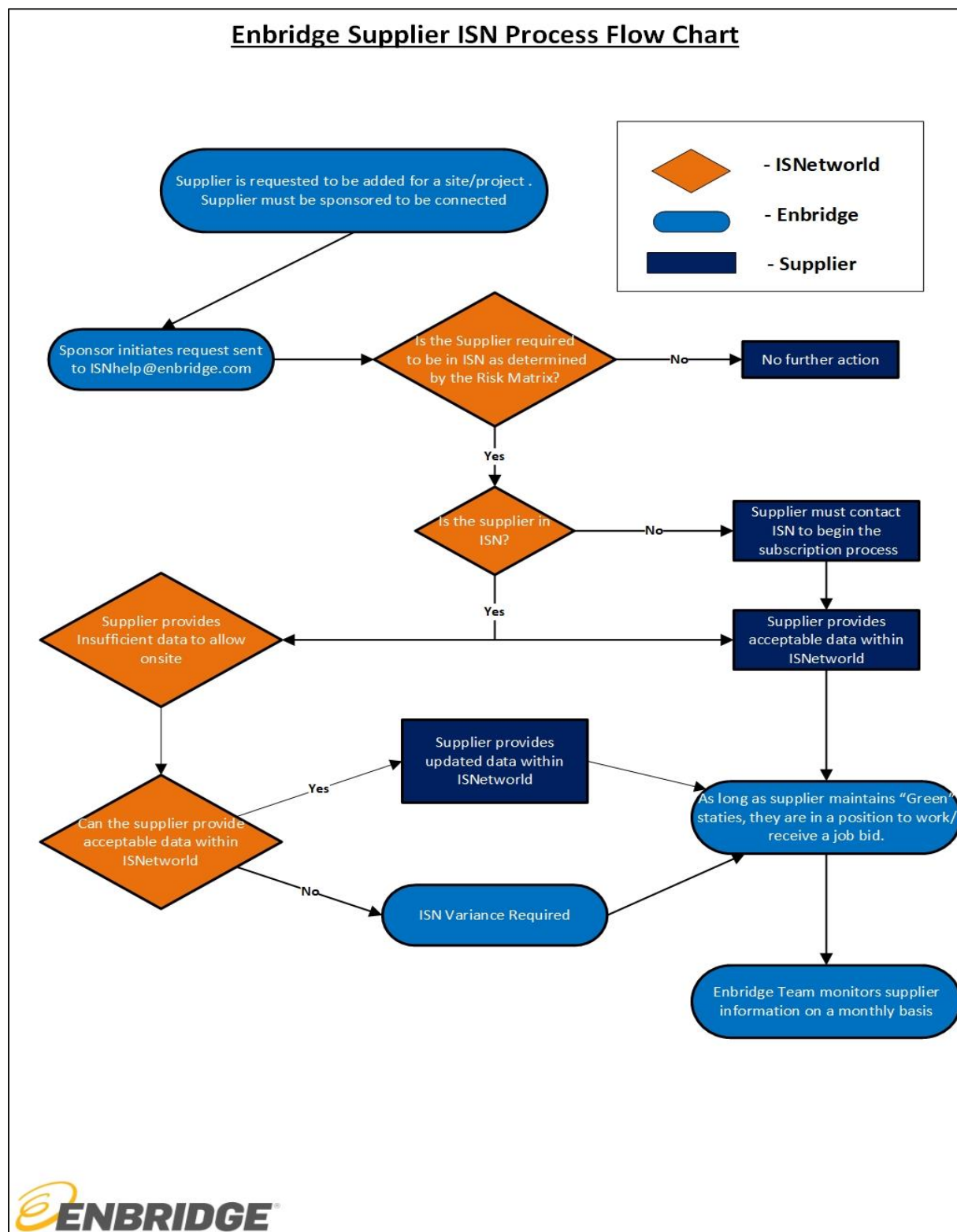


Figure 1: Supplier Process Flow Chart

7.4.8. ISNetworld Review, Verification and Grading

ISNetworld collects, reviews, and verifies the following safety information provided by the Supplier:

- Enbridge Management Systems Questionnaire (MSQ Questionnaire)
- Suppliers written Health & Safety Programs
- Proof of Workers Compensation Account (CAN)
- Workers Compensation Premium Rate Statement (CAN)
- Experienced Modifier (US)
- Recordable Events, Fatalities and Hours Worked
- Previous Citations, Stop Work Orders & OHS charges
- NCMS DOT OQ Contractors (US) if applicable
- Subcontractor Management Program

The information uploaded into the ISNetworld subscription is reviewed and verified by ISN on behalf of GTM. The information is weighted to calculate a grade used to determine the safety competency of the Supplier. The grade distribution is as follows:

- Event statistics – 20 percent
- Workers' compensation percent deviation – 10 percent
- Safety prequalification requirements – 20 percent
- Citations – 10 percent
- Safety procedures (Review and Verification System) – 40 percent

7.4.8.1. Pre-qualification Grade Threshold

The table below shows the Supplier pre-qualification grade threshold.

Table 1: Pre-Qualification Grade Threshold

GRADE	RANGE	EXPLANATION & CONSEQUENCE
Green	(80 to 100)	Considered "in good standing", few or no deficiencies. No restrictions.
Yellow	(60 to 79)	Considered "not in good standing", sufficient deficiencies exist that require a Supplier Variance and Mitigation Plan to be approved for work.
Red	(59.99 or less)	Considered "not in good standing", numerous or significant deficiencies exist. A Supplier Variance and Mitigation Plan would be required for work.

NOTE: Contact ISN.help@enbridge.com for assistance with the GTM ISN Suppliers list or the GTM ISNetworld account

7.4.8.2. Pre-qualification Total Recordable Frequency (TRIF) Threshold

The table below shows a Supplier's pre-qualification total recordable (TRIF) threshold:

- Event Statistics (TRIR/TRF) – Maximum Points Received 20
- Last three years – more weighting on most recent year (40-30-20) and last four quarters (10)

Table 2: Pre-qualification Total Recordable Frequency (TRIF) Threshold

Thresholds	Maximum Points Received
TRIR – TRF <=1	(20)
1<=1.75	(15)
1.75<=2.5	(10)
2.5<=5	(5)
>5	(-1)
Not in Business	(-1)

7.4.9. Veriforce Registration

 GTM US Assets (Operations, Projects, etc.) Veriforce Supplier Registration:

- All Suppliers providing OQ services on Gas Transmission (GTM) – US assets will need to be registered with Veriforce in accordance with the GTM IMS Contractor Management Process. Veriforce database maintains the Operator Qualification requirements (OQ records) of GTM US Registered Suppliers. To become a registered supplier in Veriforce other databases support/maintain this status, such as ISNetworld Grading (RAVS), DOT Drug and Alcohol Compliance Status and the Approved Suppliers List (ASL) requirements.
- To add a new Supplier for registration, a Contractor Information Verification (CIV) form will need to be submitted by the Enbridge Representative (Planner, Project Manager, Person in Charge, or Enbridge Designee).
- Supply Chain Management will support and gather the Supplier information to complete the registration process including accounts payable information, ISN subscription number and Oracle.
 - ISN number is provided to supply chain by the person requesting the supplier.
- Safety confirms the requested suppliers ISN connection if required, variance process and if work types align with the scope of work.

7.4.10. Projects Suppliers Performance Review

Project team provides a list of potential Suppliers to the projects HS support to complete a Suppliers performance review, as outlined in the Supplier Contractor Safety and Variance Exclusion Guide.

7.4.11. ISNetworld Safety Pre-qualification Exceptions

There are occasional situations in which a supplier/contractor has been graded yellow, or even red in ISNetworld and may require an ISN Variance. There are other circumstances in which a Med/High Risk Supplier might qualify for an Exclusion from being ISN Safety Prequalified.

7.4.11.1. Supplier ISN Variance

A variance is a process (with form and approvals) and outcome used in cases where a supplier/contractor is required for work, but they have a yellow or red scorecard grade that cannot be improved.

- In order for a supplier with ISN grade anything other than Green (i.e. Yellow or Red) to perform work a Supplier/Contractor Safety Variance/Exclusion Form is to be completed by the Requestor and appropriately approved.
 - This typically occurs when another suitable supplier/contractor cannot perform the work due to cost, schedule, expertise, etc.


-  For any GTM US Contractor with a Variance who is performing OQ related tasks, Enbridge Contractor Safety must upload the approved Variance into the Contractor's ISNetwork account and select "Approved with Conditions" status within the Contractor's Veriforce account.

Table 3: Pre-Qualification Variance Table

Grade	Scorecard Points Range	ISN Variance Approvals Required
Yellow	60 to 79	<ul style="list-style-type: none"> • Supplier/Contractor Representative • Regional Safety Advisor • HS Operations Support Supervisor/Manager Safety Projects • Regional Operations/Projects Manager
Red	59.99 or less	<ul style="list-style-type: none"> • Supplier/Contractor Representative • Regional Safety Advisor • HS Operations Support Supervisor/Manager Safety Projects • Regional Operations/Projects Manager • Regional Operations/Projects Director • Director of Safety • Vice President of Safety & Reliability • Vice President Operations

7.4.11.2. Suppliers Excluded from ISN Subscription

An exclusion (encountered during new supplier/contractor onboarding) is a specific criterion that allows a supplier/contractor to perform medium/high safety risk work activities to be onboarded and listed as an approved supplier/contractor without the required ISN subscription. This criterion is outlined below:

- Low safety risk suppliers (performing low risk services)
- Small local suppliers
- Original Equipment Manufacturers (OEM)
- Short duration
- Emergency Work

7.4.12. Low Safety Risk Suppliers

Those listed as 'Low Risk Services' on the Consolidated Safety and Reliability Work Type Risk Classification will be excluded from ISN review and verification if they meet one or more of the following criteria:

- Work that poses minimum H&S risk and has minimal identified hazards associated and has a specific work instruction, procedure, or job hazard analysis (engineering design, desk top work, consulting)
- The Supplier's work is not occurring in a live operating facility or on a live pipeline and has no interaction with GTM assets (catering)
- The Suppliers core business is completely unrelated and not at all integral to GTM core business (off site 3rd party waste disposal, janitorial)
- The work is completed at the Suppliers physical location prior to transport and delivery to an GTM facility (Off site services)

- The supplier must have Workers Compensation in the jurisdiction where the work is being performed.

7.4.12.1. Small Local Suppliers and Original Equipment Manufacturers (OEM)

Small Local Suppliers and OEMs are not required to be prequalified through ISNetworld. The process to pre-qualify a small local Supplier or an OEMs must include a desktop review by the requestor of the following:

- Proof of Workers' Compensation Account (CAN)
- Experience Modifier Statement (US)
- The Supplier's written health and safety procedure to confirm that local regulatory requirements and Company best practices, including hazard assessment, training requirements, and emergency preparedness procedures are implemented
- OHS related orders/OSHA Citations, stop work orders and/or fines if applicable
- Past safety performance

This safety prequalification update or review can be completed annually or as needed by the Supplier. The pre-qualification must be documented and approved on the Supplier/Contractor Safety Variance/Exclusion Form as part of the development of the scope of work.

7.4.12.2. Exclusion Criteria

Small Local Supplier Exclusion Criteria

Small local Suppliers who meet all the following criteria are exempt from ISNetworld subscription if they meet all the following conditions:

- Less than 10 Full Time Employees
- Work address is in the local area
- Less than \$25,000.00 USD of work in a single activity
- No Subcontractors
- No Pipeline or Process Plant work if applicable.
- Not owned or operated by current Enbridge Employees and does not employ current Enbridge Employees

Original Equipment Manufacturer (OEM) Exclusions

Original Equipment Manufacturers who meet all the following criteria are excluded from ISNetworld subscription if they meet all the following conditions:

- Provide documented work instructions, procedures or a JHA for the service provided
- All OEM Personnel can provide evidence of required H&S training
- Perform work under the supervision of an Enbridge People Leader or Permit Issuer
- Perform all work under a safe work permit (as required)
- All OEM Personnel provide the required personal protective equipment

Short Duration Services Exclusions

Work does not exceed 5 days or 40 hours in a calendar year

NOTE: The Safety Pre-qualification for excluded Suppliers must be documented and approved on the Supplier/Contractor Safety Variance/Exclusion Form for each project or scope of work.

7.4.12.3. Emergency Response Situations

In an emergency a Supplier can be utilized that has not submitted information for the registration process. Proper documentation will be required after the event to submit the Supplier for registration if it is deemed likely that Enbridge will work with the Supplier again.

7.4.13. Supplier and Subcontractor Safety Management

7.4.13.1. Sub-Contractors

Suppliers that will be using Subcontractors must ensure and demonstrate that its Subcontractors meet, comply, or exceed GTM's minimum Safety pre-qualifications criteria.

- The Supplier will document and be able to provide such documentation upon request to the Company as evidence that each Subcontractor has been pre-qualified utilizing Subcontractor Safety Checklist.
- If a Subcontractor does not meet the Safety pre-qualification requirements, the Supplier will document (on the appropriate Enbridge form) and provide the Company with the following information:
 - Areas that don't meet the criteria
 - What the Suppliers corrective actions and or additional safety control measures for managing the Subcontractor for the intended work will be
- Applicable Company Representative will accept or reject the usage of all Subcontractors.
- Subcontractors performing OQ tasks are responsible for registering within Veriforce.

7.4.13.2. Suppliers Competency, Training and Qualification

- Supplier shall, at the request of GTM, provide validation of its qualifications and records of training for all Contractors performing Work. Suppliers shall keep current training records readily available for review by GTM at its request.
- Contractors must provide evidence of training and qualification records to the GTM worksite for verification.

7.4.13.3. Pre-Work Activities, Mobilization and/or Kick Off Meetings

All Contractors involved in hands-on work or management and supervision of hands-on work on the worksite must attend/complete:

- A Pre-Job Meeting prior to engaging in work on the site:
 - For smaller projects and work efforts, this may be a single meeting with all involved Personnel.
 - For larger projects, there may need to be multiple meetings to capture various work parties over the lifecycle of the project.

- In either case, a Worker is typically only required to attend one of these meetings.

NOTE: *If during the pre-job meeting an Isolation point has been incorrectly identified physically (Tagged or labelled), any work taking place shall be temporarily stopped until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation*

- Enbridge H&S orientation:
 - This must be completed prior to engaging in work on any GTM worksite.
 - Once complete, the Enbridge H&S orientation is valid for a year for any GTM worksite.
- Site-specific orientation:
 - This needs to be completed prior to engaging in work at a specific operation or facility for the first time and subsequently if there are significant changes in local conditions since a previous visit that necessitate a new site-specific orientation.
 - Attendance records are kept for any pre-job meetings.
 - A system is in place to confirm completion of H&S orientation by any Worker on the site.
 - The pre-job meeting must include communication of safety and emergency preparedness and response requirements.
 - Enbridge HS Support Personnel providing support services on the worksite should attend and may assist the Enbridge People Leader or designate facilitate the pre-job meeting.
 - The Enbridge People Leader is responsible for ensuring any regulatory permits or postings are posted in an appropriate location as required by the applicable regulator.

NOTE: *If during pre job/tailgate meetings, an isolation point has been identified as incorrectly physically tagged or labeled, work shall not proceed until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation and HS Manual Section 8.0 Management of Change.*

7.4.13.4. Pre-Work/Kick Off Meeting Topics

A guideline for topics to be covered in the pre-work/kick off meeting includes the following, but not limited to:

- Contractual terms, conditions, scope of work
- Hazards and risks associated with the scope of work
- Enbridge Lifesaving Rules
- Enbridge Safety Principles (Path to Zero)
- Roles and responsibilities
- Drug and Alcohol Policy
- Schedule and scope of safety activities to be performed
- Safety documentation expectations
- Orientation, training and/or certification requirements and record verification
- Actual and potential hazards and risks specific to the work environment and scope of work
- Safe Work Permit, Job Hazard Analysis and Field Level Hazard Assessment expectations
- Use of specialized tools and equipment

- Review and coordination of emergency plans
- Overview of subcontractor safety management expectations
- Proper use and maintenance of safety equipment and personal protective equipment
- Stop Work Authority
- Event reporting requirements
- Site specific emergency response plans

7.4.13.5. Site Safety Management Processes

The asset area in which the work is taking place and results of the pre-work/kick off Meeting will determine the specifics of the Site Safety Management Processes that will be used for a specific project.

Daily shift work requires the following hazard management steps:

- Tailgate Meeting
 - This is a daily meeting held and led by the Supplier for all Workers who will work on a given job.
 - This meeting should include a discussion of anticipated hazards and controls in the work ahead.
 - In certain circumstances, where a pre-work walk through of the worksite is feasible, this meeting may also be used to develop a JHA, discuss an issued SWP, or complete an FLHA.
 - Attendance records must be created for all tailgate meetings.
- Safe Work Permit (SWP) and/or specialized permits
 - Depending on the asset area, either a Safe Work Permit, specialized permit (e.g., Energized Electrical Work Permit, Hot Work Permit, etc.) are required prior to Contractors beginning work.
 - The Person in Charge (PIC) / Enbridge Representative or Designate issues the SWP or specialized permit.
 - The Contractors People Leader that will participate/directly oversee other Workers on a joint task is the Permit Receiver.

7.4.13.6. Field Level Hazard Assessment (or equivalent)

Immediately prior to work, Contractors must complete a Field Level Hazard Assessment or equivalent to identify and address any immediate area hazards arising that were not anticipated in previous hazard management activities.

7.4.13.7. Safety Observation

The purpose of the safety observation is to reduce at-risk behaviours through the observation, feedback, coaching, and cooperative problem solving.

The Company People Leader may request Contractor participation in a safety observation section.

The Safety Observation Process is a simple process in which:

- One Worker observes the behaviors of another Worker performing a work task

- The observer provides feedback and coaching on ways to reduce at-risk behaviors and reinforce safe behaviors
- Post Work/End of Shift Documentation

As per the Asset Area procedure, Contractors must return SWPs for sign off, along with completed or revised JHAs, FLHAs (or equivalent) as applicable for archiving purposes.

Attendance records for tailgate meetings also need to be retained.

7.4.13.8. Event Reporting and Analysis

Contractors will immediately report to the Person in Charge (PIC) / Enbridge Authorized Representative or Designate all events, including subcontractor work related injuries and illnesses, vehicle, property damage, near misses, spills and releases, fires, or explosions arising from the Suppliers execution of work. Examples include:

- injuries and illnesses including minor First Aids
- damage to company and Supplier property
- fires, explosions, blowouts, ruptures
- overpressures
- abnormal events
- vehicle events including heavy equipment that occur on company property, ROW, or projects
- unauthorized releases to air, land, and water
- security threats
- workplace violence
- theft
- all public and landowner complaints
- all contact with government agencies and public officials concerning the project or any work activities

The Supplier shall provide an initial written report to the Company of its analysis of the event within 24 hours. Within seven days a final report is required and shall include the following information:

- who reported the event?
- date reported
- worksite location
- date and time the event occurred
- indicate the event type:
 - injury/illness
 - Environmental
 - Vehicle
 - Complaint

- security
- near misses
 - description of the Event including any immediate actions
 - the final determination of cause of event and corrective actions

The Supplier may be asked to participate in the company event analysis and will implement all agreed to corrective actions.

The Company can request that all Contractors with direct involvement in the event be drug and or alcohol tested at the Suppliers expense.

7.4.13.9. Records

The Company will retain a copy of all Supplier event reports.

7.4.13.10. Worksite Inspections

The Enbridge People Leader or designate must conduct or ensure H&S inspections are completed and documented for all Supplier worksites that extend beyond five working days.

Quality Assurance Checks:

- HS Support to regularly assess the quality of the Supplier(s) hazard identification processes completed at the field level (FLHA, JHA, etc.).
- Every assessment is reviewed with the Supplier(s) as a coaching and improvement opportunity.
- HS Support complete a set amount of these assessments each month, at a minimum 1 per month for each Supplier and their Subcontractors.
- Assessments are stored as evidence of reviews on a secure network SharePoint system by project or area.
- Minutes of morning planning meeting or weekly safety meeting must include a review of completed FLHAs and JHAs.

7.4.13.11. Supplier Evaluation and Feedback:

- Following a project, Enbridge will perform a review of the Suppliers performance using the Suppliers Evaluation and Feedback application.
- This should include input from Enbridge Personnel that were on site.
- This should include any safety or safety performance concerns (in addition to other performance issues such as scheduling or budget, etc.).
- All non-compliant items identified during onsite inspection activities must be included in the summary documentation.
- The Suppliers Evaluation and Feedback may also be:
 - Shared with the Supplier
 - Viewed by Enbridge Personnel (all business unit)

7.4.14. GTM Construction Safety Manual

The GTM Construction Safety Manual is the supporting manual for work being performed by Contractors and identifies the Construction roles and responsibilities for hazard management. The Construction Safety Manual is aligned to the GTM Health and Safety Manual. The GTM Construction Safety Manual, like the GTM Safety Specifications, are to be included in all contractual documents to outline supplier expectations and are to be used on applicable pipeline projects as the GTM Construction Safety Manual.

7.4.15. GTM Contractor Safety Specifications

The GTM Contractor Safety Specifications reflect the requirements set out in the GTM Safety Manual with specific operational controls strictly associated with employees removed. The Contractor Safety Specifications are intended to provide contractual expectations to contractors providing services in the US and are included with GTM contracts since the GTM Contractor Safety Specifications have been developed.

7.5. Documentation

- GTM Contractor Safety Specifications
- HS Training Matrix for Contractors Guide
- Project Hazard Assessment and Control Process (see PGDL)
- Subcontractor Safety Checklist
- Consolidated Safety and Reliability Work Type Risk Classification
- Supplier/Contractor Safety Variance/Exclusion Form
- Canadian Contractor Alcohol and Drug Policy
- United States DOT Contractor Drug and Alcohol Policy
- United States Non-DOT Contractor Drug and Alcohol Policy
- Contractor Man Hour Report – Weekly
- Contractor Management Planning Form (CMPF)

7.6. References

- Canadian Energy Regulator Onshore Pipeline Regulations, Section 18 (1) Construction Safety
- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) j, k, l

Management of Change

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Management of Change

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8.1.

General

2

8. Management of Change

All Document Management of Change requests follow the GTM IMS Document Management of Change Process and GTM IMS Document Management Process approach and the minimum requirements for the consistent Management of governance documents including Document Management of Change (D-MOC) across GTM Operations.

8.1. General

8.1.1. Purpose

This section outlines the GTM IMS Document Management of Change Process that is in place to address the risks introduced into the workplace through changes (e.g., materials, people, Vendors, procedures).

Management of Change is a systematic approach to ensuring proposed changes are assessed for risk, and that change is effectively implemented to achieve targeted results.

A disciplined Management of Change identifies and mitigates risks associated with changes to operations, procedures, legal requirements, site standards, facilities, and the organization to ensure that risks associated with change are well understood and addressed.

8.1.2. Scope

This section applies to changes for requests to procedures in this Manual.

This section is supported by the US Projects Management of Change Process.

8.1.3. Responsibilities

People Leaders shall:

- Follow all management of change procedures.

Workers shall:

- Follow the management of change section to request changes to H&S procedures.

HS Support shall:

- Assist in the active promotion and implementation of this section across Operations.

Safety Shared Services shall:

- Manage identified document changes through the management of change procedures.

8.1.4. Requirements

8.1.4.1. Review and Sign-Off

GTM Health and Safety Manual Section

Change management within this Health and Safety standards and procedures requires:

1. A change is initiated by completing the GTM HS Manual Change Request Form. The writer is responsible to develop a given change in the Manual. Once the draft is complete it will be copied and moved to the “Requires Asset Area Verification” folder.
2. Requires asset area verification: each change is required to be verified as applicable to each asset area. This is to ensure that the steps in the change will work in a practical sense and

implications and potential impacts are analyzed. When the change has been Asset Area verified and all the required corrections have been made the change, the documented change can then be moved into the “Requires Group Review” folder.

3. Requires group review: The draft change is placed in the “Review Group” folder to indicate that it is ready and requires a group review. At this point the change will be reviewed in a group setting to ensure that it meets the proper intent and format. It is recommended that the writer and at least one representative of each Asset Area be present for all group reviews. Once the review is completed the change will be moved to the “Group Review Complete” folder.
4. Requires stakeholder signoff: The change will be reviewed by the identified Asset Area People Leader, and the Director of Safety as a minimum. If this is a change in process rather than simply a formatting/administrative change it will be reviewed at the Policy Committee. The goal is to have all signatures complete within 90 days of circulation. It is the writer’s responsibility to make the required changes once all the signatures are in place. Once the revisions are complete the change will be moved to the “Requires Final Approval” folder.
5. Requires final approval: At this point the proposed change will need to be signed off by the Director of Safety. It will then be properly formatted by the administrative staff. Once the change has been signed off it is incorporated back into the Health and Safety section or procedure.
6. Approved: Once all the approval signatures are completed, the change is placed in Health and Safety section or procedure. Since the approved copy will be in a PDF format, it is also saved as a copy, in word format, in the “Native Document” folder to allow for future revisions.
7. Communicate change(s): Based on the impact of the change, this will be communicated to affected stakeholders by means of one or a combination of the following: notices, alerts, bulletins, OHSE committees, newsletters, training, or other suitable means to communicate the change.

Stakeholder Sign Off Process

1. Stakeholders are responsible for:
 - a) review each procedure in a timely manner.
 - b) all stakeholder sign-off need to be completed within 21 days):
 - i. provide input/comments and initial each.
 - c) sign-off the GTM DMOC Change Management Planning Form when complete.
2. Update “Stakeholder Tracking/Sign Off Sheet” in the appropriate folder.
3. H&S Support consults safety shared services to initiate the document management of change process as per IMS Document Management of Change Process and IMS Element Document Management Process documents located in the GTM Governance Document Library.
4. After the 21-day process the procedure will be pulled from circulation and the document owner will manage all missing signatures.

8.1.4.2. HS Manual Deviation Request

Deviations are designed to address an immediate safety issue(s) that may require an interpretation of a H&S section or procedure.

Criteria for Identifying Need for Deviation

- Risk – Is there an immediate and high potential risk (i.e., severity, population impacted, recurrence rate) that we should avoid?
- Regulatory requirement – Is there a regulatory deadline that we must meet to be compliant?
- Timing – Is there an immediate concern that must be mitigated that may take some time to work through the rules and procedures process?

Procedure

- If your work group wants to propose deviation, send a written request to the Director of Safety. Provide as much background and supporting information as possible to justify the rationale for the deviation (i.e., change the maximum load that can be manually lifted by an individual).
- In some cases, the submitter may not have a clear stance on the issue to be submitted. In these cases, submit the issue and why it is of concern (i.e., the maximum load that can be manually lifted by an individual).

Process Steps

1. Director of Safety will forward to request Area or Regional Management.
2. Safety Shared Services will research the issue and review the draft.
3. On all issues directly related to operations, the area/region manager will make sure the deviation is reviewed by all members of the Operations HS Committee (OHSC).
4. The process of review will be as follows:
 - a) Presentation of deviation
 - b) Identification of benefits
 - c) Identification of concerns
 - d) Addressing the concerns
 - e) Agree on the next steps
5. Area Management will make appropriate changes to the draft deviation. The final draft of the deviation is to be approved by no less than two members of the OHSC.
6. Draft deviation is submitted to Safety Shared Services for distribution. Distribution is as follows:
 - a) Operational deviations will be distributed to the H&S Manual owner and to all supervisors
 - b) Business Unit deviations will be distributed to the H&S Manual owner and to all regional employees
 - c) H&S SharePoint ESite under Interim Rules & Procedures
 - d) All deviations must have a review date to determine if it is still needed. If needed, its content will be formally incorporated into applicable GTM rules or procedures manual. If not needed, the interim directive will be voided.
 - e) The Director of Safety is accountable for the review process.

8.1.5. Documentation

- GTM HS Manual Change Request Form
- GTM IMS Document Management of Change Process
- GTM IMS Element Document Management Process

8.1.6. References

- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (o)

Training and Competency

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9. Training and Competency

9.1. Competency Assurance

9.1.1. Purpose

The purpose of competency assurance activities is to ensure Workers on Enbridge worksites are sufficiently qualified, trained, and experienced for the duties they are assigned; or that they are receiving sufficient supervision, training, and experience for duties they will be expected to perform in the future.

Competency assurance is using a variety of means to ensure Workers have the necessary qualifications, training, and experience to safely perform their work assignments.

9.1.2. Scope

The health and safety training group collaborates with the technical training group (TTG) and align their H&S Training and Competency requirements with the GTM IMS Capability Management Element, GTM IMS Competency Assurance Process and GTM IMS Training Process where applicable to Health and Safety Training.

Under the H&S program, it is H&S related Worker competency that is of concern. As such, the OSHA definition for a “competent person” provides a meaningful guide to the scope of H&S related competency assurance.

“Competent Person” means one who can identify existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to Employees, and who has authorization to take prompt corrective measures to eliminate them. (CFR 1926.32[f])

Further to the above description, ‘competent’ means adequately qualified, suitably trained and with sufficient experience to safely perform work without supervision or with only a minimal degree of supervision.

9.1.3. Responsibilities

People Leaders shall:

- Assess the competency of Workers who report to them through a variety of means as applicable, including but not limited to:
 - Confirming any specialized and/or regulated qualifications for work assignments has been achieved by the person assigned this type of work
 - Performing an annual review of H&S training requirements, matching training assignments to the work assigned, and ensuring training was completed as per required deadlines
 - Participating in and/or reviewing spot checks, inspections, or audits of hazard and risk management activities by their Workers (e.g., reviews of JHA’s, Safe Work Permits, FLHAs)
 - Regular worksite visits and/or inspections to allow for firsthand observation of Worker competency
- Ensure that new, inexperienced, or transferred Workers work under the direct supervision of another Worker who is sufficiently competent until such a time as they are deemed to be competent in the work assigned at a given worksite.
- Ensure Workers are encouraged to raise concerns about competency, especially if they believe they are not qualified or sufficiently experienced to manage the hazards of an assigned task.

Suppliers shall:

- Provide Workers with sufficient competency for the work they are assigned. To that end, Contractors must provide proof of qualification and training records for individual Workers upon demand through the applicable Contractor Management Systems.

Workers shall:

- Participate in competency assessment or assurance exercises as requested.
- Report to their People leader(s) or Person in Charge (PIC) any concerns regarding competency issues, especially if they believe they may not be sufficiently qualified or experienced for an assigned task and the hazards it represents or if a required qualification has or is about to expire.

9.1.4. Requirements

- Workers must be deemed competent by their People Leader in an assigned task to be allowed to perform this task independently.
 - Workers not yet deemed competent may only perform this task under the supervision of another Worker who is deemed competent.
- People Leaders shall assess the H&S competency of Workers under their control. This should include activities such as:
 - confirming existing qualifications, training, and experience through the onboarding process for new or transferring Workers.
 - performing an annual review of H&S training requirements for individual Workers, matching training assignments to the work assigned, and ensuring training was completed as per required deadlines.
- Enbridge People Leaders should also proactively work with Workers to ensure any necessary qualification or certification for their work does not expire.
 - participating in and/or reviewing spot checks, inspections, or assessments of hazard and risk management activities, for example through reviews of JHAs, SWPs, FLHAs, or other hazard management activities.
 - conducting regular worksite visits and/or inspections to allow for firsthand observation of Worker competency.
 - reviewing H&S events and H&S assessments for any indications that Worker H&S competence needs addressing.
- Suppliers must provide Workers with sufficient competency for the work they are assigned.
 - Suppliers must provide evidence for the competency of their Workers through the Suppliers Safety Management processes

9.1.5. Documents

- SWP, JHA and FLHA Review Checklists

9.1.6. References

- British Columbia OHS Regulations 3.22-3.25
- COHS Regulations SOR/86-304 10.14
- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (j)

9.2. Health and Safety Training

9.2.1. Purpose

The purpose of this section is to establish expectations for H&S Training. This section will assist in ensuring Enbridge Workers receive appropriate H&S training. As well as ensuring:

- Regulatory requirements for H&S related training are met
- Enbridge Workers have an adequate knowledge of:
 - Hazards they may face in their workplace
 - Ways in which these hazards must or may be controlled to prevent harm
 - H&S related policies, procedures, systems, and expectations that will affect them as Enbridge Workers

9.2.2. Scope

This section applies to all Employees, including Field and Office Workers.

Only training that falls under the direct responsibility of Safety Shared Services is addressed below. This would include:

- Training mandated in occupational health and safety regulations (i.e., OSHA, CLC & COHS, state and provincial workplace safety regulators)
- Training pertaining to H&S program elements (i.e., any of the topics covered by this manual)

Other types of training provided by GTM may have positive H&S outcomes, but these are out of scope for the H&S Training Program, including:

- Operator Qualification (OQ) programs
- Technical training (e.g., occupational skills training, equipment specific training, etc.)

Orientation processes may be managed through the GTM Learning and Development systems, but specific orientation requirements are dealt with under *9.3 Health and Safety Orientations*.

9.2.3. Responsibilities

People Leaders shall:

- Ensure Workers under their direction are assigned and complete the H&S training that is:
 - Required for all Workers by Safety Shared Services
 - Required based on the type of work they do or where they do their work
- Ensure training is completed before the Worker is exposed to a specific hazard (e.g., asbestos handling course prior to doing this work or confined space entry training prior to participating in a confined space entry).
- Support Learning and Development processes and requirements related to training completion records.
- Provide feedback to Safety Shared Services manager on:
 - Whether the required and optional H&S training is relevant and meeting the needs of Workers under their direction

- Whether additional or different H&S training offerings are required to meet the needs of these Workers

Workers shall:

- Complete the training assigned to them within the required timelines.
- Alert Supervisor if they believe their training on a specific workplace hazard or topic is insufficient for the work they do.
- Provide feedback on the training programs they complete.

HS Support shall:

- Provide support as needed for area operations to:
 - Deliver instructor led training as required
 - Exercise due diligence when assigning H&S training to Employees.
 - Comply with H&S training requirements.
 - Assist with H&S training delivery issues.
 - Provide feedback on existing H&S training and H&S training needs arising that should be addressed by Safety Shared Services and/or Area Management or People Leaders.
 - Provide support in assessing the quality of H&S training content and delivery

Safety Shared Services shall:

- Revise the H&S Training Matrix in consultation with:
 - Area operations
 - HS Support
- Ensure applicable regulatory requirements regarding training may be met by H&S training program.
- Provide oversight on H&S training content to ensure accuracy, quality, and consistency.
- May, under certain circumstances, coordinate and/or conduct H&S training.

9.2.4. Requirements

- The HS Training Catalogue shall provide the following for each course or training activity in the HS Training Selection Tool:
 - description of course or training activity
 - applicable pre-requisites
 - training Determination Question (to ensure training is assigned where applicable)
 - stipulations on timing and frequency (e.g., completed prior to going to worksite or attempting task, completed within x months of starting, refresher every year, triennial recertification, etc.)
- HS training requirements will be set out in the HS Training Selection Tool. This tool provides the following:
 - HS training requirements for Employees by operations type and role. Individual training courses or activities will be broken into two categories:

- **Everyone:** This includes any HS training that is mandatory for all Employees or a broadly defined and readily identifiable group of Employees (e.g., U.S. Field Employees, Canadian office-based Employees, etc.) due to core Company commitment (e.g., LSR) or a risk or regulation that affects all Workers in that subset.
- **Risk based:** These are any training activities that are only applicable to a subset of Workers based on the exposures within their facility or area or the types of tasks they are expected to complete. For example, NORM awareness training would only be applied to Workers in facilities with a known potential for NORM exposures.
- These are assigned by People Leaders for Employees that report to them based on the direction provided by the course or activity determination question. If the determination question applies, the Employee is assigned the training and must complete this training to meet their H&S training requirements (i.e., this is not “optional” training).
- People Leaders must review the training assigned to Workers under their direction:
 - at least once a year and timed to allow assignments to take affect the following calendar year.
 - whenever operations change, and new hazards introduced or when Workers under their direction change their role or duties.
- The HS Training Matrix for Contractors Guide outlines the training requirements for specific job roles. Contractors providing one or more job roles will automatically push the minimum training requirements listed on the applicable matrix under the associated job role(s).
- Additional training may be necessary depending on hazard information, specific tasks being performed or regional/department requirements. The Project Manager, Planner or Designate and Supplier should work together to determine if additional training is necessary.
- Project Managers, Planners and or Designates can use the HS Training Matrix for Contractors Guide *to assist in determining appropriate HS training requirements for Contractors working on behalf of Enbridge.*
- All completed HS training by an Employee must be electronically recorded.
- The specific processes and requirements for electronic recording are specified by Learning and Development.
- Hard copy training documentation may be used as part of instructor-led training, but all records must be transferred to the learning and development electronic system to allow for accurate H&S training reporting.
 - In the event evidence of training is in hard copy (e.g., training sign-in sheet), these should be maintained at the trainees’ local area office or facility and in accordance with any applicable H&S record retention requirements.
 - In the event a regulator requires additional record keeping requirements, learning and development will make provisions for this.
- Safety Shared Services must perform a review of the H&S training requirements and potentially individual courses or training activities:
 - At least once a year and timed to allow any changes made to take affect the following calendar year
 - In consultation with H&S operations support and area operations input

- When any of the following occurs:
 - new regulatory requirements
 - revised procedures
 - HS event reviews, analysis findings, or action plans
 - audit results

9.2.5. Documentation

- H&S Training Selection Tool
- HS Training Catalogue
- HS Training Matrix for Contractors Guide

9.2.6. References

- *OSHA 2254-09R 2015 Training Requirements in OSHA Standards* for references to training requirements across OSHA regulations.
- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (k)(j)
- COHS Regulations SOR/86-304 10.14

9.3. Health and Safety Orientations

9.3.1. Purpose

The purpose of H&S orientations is to provide Workers and visitors to GTM worksites the following types of information (as applicable) prior to performing work or touring a worksite:

- GTM H&S requirements that impact work or work requirements on GTM sites.
- Awareness of general and/or site-specific hazards and any requirements to control these hazards.

Health and Safety (H&S) orientations ensure critical H&S information is provided to new Workers and Visitors in advance of work on or a site visit to a GTM facility or operating area. This section supports the GTM IMS Contractor Management and GTM IMS Capability Management Element.

9.3.2. Scope

This section only sets out H&S program elements delivered through the H&S orientation and may be delivered along with other types of orientations or onboarding activities and orientation completion tracked through a variety of systems for Suppliers in particular.

This section is supported by projects H&S orientations for site-specific project activities.

9.3.3. Responsibilities

People Leaders shall:

- Ensure new Workers under their direction complete all applicable GTM H&S Orientation requirements.
 - this requires ensuring sufficient time for the orientation to be completed prior to beginning work duties

- this includes Workers new to Enbridge or Workers new to a facility or operating area
- this may be integrated into other onboarding activities administered by Human Resources
- Ensure the following are available and used in individual facilities or operating areas (as applicable) for Visitors and Contractors:
 - GTM General Safety Orientation
 - Site-specific Safety Orientation

HS Support shall:

- Support as applicable and as required the development of local area and facility site specific H&S orientation materials.

New or Transferred Employees shall:

- Complete GTM H&S Orientation requirements as part of new Employee onboarding or, if transferred to a new facility or operating area, prior to beginning work in the facility/area.

Visitors and Contractors must:

- Complete the and the appropriate Enbridge H&S Orientation and site-specific orientation as per instructions on arriving at an Enbridge facility.

9.3.4. Requirements

There are three main elements to the GTM H&S orientations. These elements must be applied as set out in the tables below.

Table 1: H&S Orientation Expectations

GTM HS Orientation Element	Enbridge Employees/Contingent Workers		Contractors	
	New to Enbridge or transferred to operation or facility	Visiting a site for the first time*	Annual renewal when working on Enbridge site *	First time working on different Enbridge site
HS Program Awareness	YES	N/A	N/A	N/A
General HS Orientation / Annual Online Contractor Orientation (Contractors)	YES	N/A	YES	(Evidence of completion only)
Site Specific Orientation(s)	YES	YES	YES	YES

NOTE: * If a site visitor (Employee or Contractor) will not enter an operating area or will always be closely accompanied while touring the area or facility, a full site-specific orientation is not required. The tour host is responsible to provide verbal instructions on site hazards and basic emergency procedures.

Table 2: Orientation Frequency

GTM HS Orientation Element	Enbridge Employees/Contingent Workers		Contractors	
	New to Enbridge or transferred to operation or facility	Visiting a site for the first time*	New to Enbridge or transferred to operation or facility / Annual renewal	Visiting a site for the first time
HS Program Awareness	Onboarding and When H&S Program Requirements change.		N/A	
General HS Orientation / Annual Online Contractor Orientation (Contractors)	Onboarding only	N/A	Prior to starting work and yearly renewal after that.	N/A
Site-specific orientation(s)	Onboarding and for each operation or facility where new or transferred Employee will work.	First time at an operation or facility or if conditions change at a facility since last visit.	First time at an operation or facility or if conditions change at a facility since last visit.	First time at an operation or facility or if conditions change at a facility since last visit.

9.3.4.1. Delivery Method

- The three H&S Orientation Elements will be delivered using the following methods:
 - HS Program Awareness
 - HS Program Awareness CBT
 - For new hire / transfer and annual renewal
 - HS Program Discussion Checklist
 - Completed by Supervisor and new hire during onboarding
 - Copy of completed checklist kept on file
 - For new hire / transfer only, no annual renewal

9.3.4.2. General HS Orientation

- Computer Based Training available online and at each location for “on the spot” on demand delivery if required.
- Suppliers may manage this requirement through existing Supply Chain Management processes.

9.3.4.3. Site-specific Orientation

- Templates provided to areas and facilities to create PowerPoint or printed versions of Site-specific orientations.
- Delivery is by an individual who is familiar with area or facility hazards and controls and any recent activities or conditions that have generated new hazards.
- Correlating Asset Area Orientation Elements with New GTM Orientation Requirements to see how the existing orientation programs within the Asset Areas fit into this structure during the transition to a new orientation program.

9.3.4.4. Required Content

The required content for the GTM HS Orientation training is listed in the table below.

Table 3: Required Content in GTM H&S Orientation Element

GTM H&S Orientation Element	Required Content
H&S Program Awareness	<ul style="list-style-type: none"> HS Program Awareness CBT: <ul style="list-style-type: none"> Enbridge HS Policy Overview of IMS and H&S Manual Key HS topics / Responsibilities and navigating GTM systems to find further information or forms, etc., to fulfill these (e.g., H&S training, event reporting, SDSs, PPE, Ergonomics, Vehicle Safety / Travel Management, Safe Work Permitting / Hazard Assessment). HS Program Discussion Checklist: <ul style="list-style-type: none"> Checklist will mirror topics of H&S Manual Each checklist item will be noted as “Discussed” or “N/A” and any specific questions raised, or additional information provided will be captured in brief notes section of checklist.
General H&S Orientation / Annual Online Contractor Orientation (Contractors)	<p>The following will be covered at an introductory level (total ~15 minutes):</p> <ul style="list-style-type: none"> Regulators Corporate Policies Personal/Worker Rights Life Saving Rules Hazards Safe Work Planning/Permitting Lockout / Tagout Personal Protective Equipment Personal Gas Monitors Slips, Trips and Falls Mobile and Heavy Equipment Vehicle Safety Stop Work requirements Emergency Preparedness Site Security Reporting Events
Site-specific Orientation(s)	<p>Templates will include placeholders for the following as applicable:</p> <ul style="list-style-type: none"> Stop Work, Imminent Hazard, right to refuse unsafe work, Stop Work Authority Aerial / Plot Plan of Facility (includes muster points, evacuation routes, windsocks, emergency equipment locations, etc.) Emergency & Safety Equipment requirements Site-specific Procedures (this includes site-specific H&S, Emergency and Security program procedures) Site-specific Hazards and Controls Environmental permitting-all contractors and Enbridge staff must be aware of any environmental permits (works in/about water, amphibian salvage, etc.) that are associated with this project, and must abide by the terms of those permits. Environmental requirements- all contractors and Enbridge staff must be aware of any environmental considerations (topsoil salvage, wildlife concerns, etc.) that were identified in advance OR are identified as the project progresses. All staff and

GTM H&S Orientation Element	Required Content
	contractors are responsible for limiting environmental impacts from activities and are to be aware of changing environmental conditions.

9.3.5. Documentation

- N/A

9.3.6. References

- British Columbia OHS Regulations 3.22-3.25
- Canadian Energy Regulator Onshore Pipeline Regulations, section 6.5 (1) (k)

9.4. Safety Observation

9.4.1. Purpose

The purpose of Safety Observations is to reduce at-risk behaviors through observation, feedback, coaching, and cooperative problem solving.

9.4.2. Scope

Safety observations can be performed by all levels of Workforce Personnel.

9.4.3. Requirements

9.4.3.1. General

The safety observation is a simple conversation in which:

- One Employee observes the behaviors of another Employee or Contractor performing a work task
- The Observer provides feedback and coaching on ways to reduce at-risk behaviors and encourage safe behaviors
- The most important part of safety observations is the feedback and coaching that takes place during and after the observation

Observing and then discussing good, safe work habits is considered a safety observation.

9.4.3.2. Critical Success Factors

- Observe behaviors, not individuals.
- Stay focused on teamwork.
- Eliminate at-risk behaviors.

9.4.3.3. Process

- Use constructive feedback to support safe behavior by:
 - providing feedback one-on-one in private
 - providing feedback as soon as possible after the observation
 - identifying the safe behavior(s)
- Use correcting feedback to decrease at-risk behavior:

- give feedback one-on-one in private
- give feedback as soon as possible after the observation
- begin with acknowledgement of safe behavior(s) observed
- identify the at-risk behavior(s) observed
- discuss the safe alternative to the at-risk behavior(s)
- indicate concern for the person's welfare
- request commitment to avoid the at-risk behavior(s)
- Thank the individual for commitment to continuous improvement

9.4.4. Documentation

- Formal documentation of Safety Observations is not mandatory.

9.4.5. References

- N/A

Documents and Records Management

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10. Documents and Records Management

10.1. Document Control

10.1.1. Purpose

The purpose of this section is to outline the requirements for retaining all safety related documentations to comply with regulatory requirements and Company policies.

Hard or electronic copies of documentation must be readily available.

10.1.2. Scope

The section applies to safety related material at all Company facilities. Onsite retention establishes a trend of compliance and safety review. Once a record has exceeded its onsite retention period, the records management department begins the process of offsite record retention.

Please contact records management for all questions regarding offsite record retention at GTRM@enbridge.com.

10.1.3. Responsibilities

People Leaders and Supervisors shall:

- Request changes to procedures or practices when required.
- Ensure all required documentation is stored at facility locations.
- Ensure all documentation is readily available in hard copy or electronically.
- Contact records management department once onsite document retention period has expired.

Employees and Contractors shall:

- Know the location where documentation is stored.
- Store documentation in the correct location.

HS Support shall:

- Assist in the evaluation of changed procedures or practices.
- Assist operations with safety documentation storage. (Location, length of time to keep records etc.)

Deviations:

- Any Deviation to a section, practice or requirement from this Manual is required to be approved by the appropriate Director or designate responsible for the work.
- All Deviations are applicable only to a specific project or requirement and do not create policy.
- All Deviations shall be reviewed during annual reviews of the Manual. Supplier Deviations shall be reviewed as part of the Supplier H&S management program assessment.
- A Deviation shall always comply with applicable legislation.

10.1.4. Requirements

- The current version of the H&S Manual is created in Microsoft Word (write protected/read only) and published in PDF format.
- The electronic version of the Manual is available to all Company Personnel.

- Printed copies of the documents are available, however, once printed they are considered “uncontrolled” copies. Refer to the GTM GDL TeamSite to confirm that the printed copy agrees with the controlled copy (e.g., compare revision numbers and dates).
- Revisions to the H&S Manual will be announced via electronic mail in a timely manner.
- A revision summary document will be provided to define significant changes to the Manual.
- Draft copies of all new or revised sections of the Manual will be circulated electronically to all relevant Personnel to ensure requirements are satisfied and they can be applied.
- Agreed upon changes to the draft will be made and the document approved by the appropriate approval authority.
- All sections of the Manual will be designated with a date of issue and as revisions are made will have the revision number and new issue date displayed.
- Original documents are maintained by Safety Shared Services and are available on the GTM GDL TeamSite.
- When a controlled copy is revised, the obsolete hard copy versions in the field must be removed from use. This can be done by the document holder being instructed to remove and destroy the old document and replace it with the new one.
- Field issued Health and Safety Manuals will be audited periodically to ensure all current revised procedures are in place.
- Any user of the Manual may request changes or additions to the documentation. Changes may be required to reflect changes in regulations, H&S practices, or because new hazards and risks have been introduced into the operation.
- All documents will be maintained in accordance with the Company’s Record Retention Policy.
- All procedures will be reviewed annually by Safety Shared Services. The completion of the reviews shall be documented on the HS Manual Review Memo.
- All procedures will be reviewed for scope, purpose, responsibilities, requirements, and version control.

10.1.5. Documentation

HS Manual Review Memo

10.1.6. References

Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (o)

10.2. Records Management

10.2.1. Purpose

The purpose of this section is to establish expectations for the management of H&S records in accordance with GTM IMS Records Management Process.

10.2.2. Scope

This section applies to all H&S records identified in this Manual.

10.2.3. Responsibilities

People Leaders shall:

- Set up H&S Filing System for facilities.
- Ensure H&S records are maintained in accordance with the filing system.

Workers shall:

- Audit H&S records management section periodically
- Provide feedback on training program.

HS Support shall:

- Audit H&S records management section periodically.
- Review operations H&S Filing System structure annually.

Safety Shared Services shall:

- Update and revise existing filing system as Company policies/procedures or regulatory requirements change.
- Schedule an inspection on record retention as part of the Safety Program's annual assessment plan. The scope of the inspection will be determined each year.

10.2.4. Requirements

10.2.4.1. Records Audit

- The Company will audit SWP, JHA, and safety observations for compliance and quality assurance.
 - SWP:
 - All required sections complete
 - Work scope/description contains sufficient detail
 - Is it documented that required PPE has been identified and communicated
 - It is documented that operational and/or site-specific hazards have been reviewed and discussed
 - Attached permits/documentation/work order # are identified
 - Gas testing/monitoring results are in permissible exposure limit
 - Issuer and receiver have signed
 - JHA:
 - All sections requiring information are filled out
 - Job description aligns with the SWP
 - Job site matches the SWP job site
 - Contractors company name identified
 - Each task assigned to an individual
 - Hazards and controls are identified

- A person (or position) has been identified to put the controls in place for each hazard identified

10.2.4.2. H&S Records Retention

The table below identifies the classification and retention schedule of safety documents. For more information on how to categorize records, see Records Retention Schedule.

Table 1: H&S Records & Transitory Material Retention Guideline

Safety Document Type	Retention Classification	Retention
Safety Permits/Work Authorization types of forms	C3E6	Life of project + 10 years
Pre-use Inspection forms	C3E6 – Unless Inspection of identified Asset then C3	Life of project + 10 years
Facility Inspections	C3	Life of asset + 10 years
Any Equipment Inspections	C3	Life of asset + 10 years
Authorizations	C3 or C5 - Depending on what is being authorized.	C3 - Life of asset +10 years C5 - End of year to which the records relate + 10 years
Incident reports	C7	Indefinite
All contractor Prequalification	C3 – If Used as Supporting evidence of the integrity of pipelines or other assets	Life of asset + 10 years
General Qualifications	H4 – If in general to show qualifications – As part of the Employee file	Termination + 10 years
Safety Hazard Assessment type forms (e.g., FLHAs)	Transitory	T + 3 Months

10.2.4.3. Access to Employee Exposure and Medical Records

- Each Employee has the right to access:
 - Records which measure or monitor the amount of possible exposure to chemicals or physical agents in the work area.
- Their personal medical records that the company has resulting from medical and employment questionnaires, medical examinations, first aid records or any records of medical treatment from on-the-job injuries or illnesses.
- Each analysis using exposure or medical records concerning the Employee's working conditions or workplace.
- Upon written request, the company will provide the information pertaining to exposure, medical records, and analysis to the Employee.
- Any Employee who wishes to access exposure or medical records should contact their supervisor for further instructions.
- New Employees shall be informed during orientation and annually thereafter of:
 - The existence, location and availability of any exposure and medical records.
 - The person responsible for maintaining and providing access to exposure and medical records.
 - Each Employee's rights of access to exposure and medical records.

10.2.5. Documentation

Health and Safety Filing System Directory


10.2.6. References

Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (p)

Health and Safety Assurance

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11. Health and Safety Assurance

11.1. Event Reporting, Analysis and Learning

11.1.1. Purpose

The purpose of this section is to ensure that Enbridge workforce use accepted methods to report, conduct event analysis and learn from occupational health and safety events (People, MVI, and select Property Damage). This process is not for Operational, Environmental, Fire/Explosion, Release/Leak/Spill, Security, System Control or Compliance events.

Contractors performing work for Enbridge will report events immediately to an Enbridge representative. Contractors are expected to investigate events according to their own incident investigation/event analysis policy. Enbridge may, at its discretion, be involved in a contractor's incident investigation/event analysis process where there is a high actual or potential severity.

For events that may involve potential LSR Violations, please refer to the Enbridge Lifesaving Rules, specifically the use of the Human Performance Assessment model by the LSR Review Committee.

11.1.2. Scope

This section applies to all Employees, Contractors, and Subcontractors directly supporting Enbridge activities. This section also applies to all events and sets the minimum requirements for events with an actual or potential Level 2 (A2P2) and higher, as described in the event severity tables in Appendix C of the "GTM Event Analysis Process" document.

GTM shall have specific procedures to apply Regulatory Law & Affairs to:

- File the applicable event reports with regulators (e.g., AER/BCER/CER/PHMSA/provincial OH&S)
- Support analysis as required
- Liaises with regulators

11.1.3. Responsibilities

The following responsibilities for leadership and employees are in addition to the "GTM Event Analysis Process" and is aligned with the S&R "Framework Standard – Safety Management."

People Leaders shall:

- Ensure the application of the Event Reporting process
- Ensure this manual's section is communicated to all Employees under their supervision and Contractors
- Ensure the scene is secure after an event occurs
- Ensure all events are reported to the proper levels of management
- Ensure events reportable to a regulator are promptly reported to the Regulatory Law & Affairs.
- Ensure the H&S and Environmental events are entered into the event database (actual data entry is typically entered by Safety and Reliability personnel with the people leader's input, once the event has been communicated)

Workforce personnel shall:

- Immediately report all events to their People Leader, or in the case of a Contractor, to an Enbridge representative.

11.1.4. Requirements

11.1.4.1. Event Notifications and Analysis Timelines

All work-related People, MVI and Property Damage events of which a worker becomes aware shall be reported immediately to a People Leader or, in the case of Contractor personnel, to an Enbridge representative. Once reported, the People Leader or another individual delegated by the People Leader, such as a Safety Advisor or the Regulatory Compliance Advisor, must initiate the internal and external notification (i.e., via Encompass or the S&R Reporting App).

The event notification process for EnCompass shall be completed as soon as possible but no later than 24 hours after the occurrence of an event has been reported for:

- Any recordable or lost time injury
- Any injury that is going to be reclassified to a recordable or lost time injury
- Any PSM events that will garner substantial internal or external attention - event is not a safety related event, for reference only
- Any events that have a material impact to our customers (force of nature or other extraordinary events where customer will be without service or other where customer will be without service or have limited service). Event is not a safety related event, for reference only.
- At the people leader's discretion, where it is thought the early learnings of an event or near miss will be valuable to share with additional work groups/areas/regions

For all other events, the event notification process shall be completed within 48 hours of the event being reported when possible.

The intent of the initial notification is to:

- Provide notification that an event has occurred, triggering appropriate leadership governance and oversight, as well as mobilization of analysis resources (personnel) as necessary
- Raise awareness to others who may be affected by a similar circumstance
- Provide known details about the event
- Outline interim preventive actions until the analysis has been completed

External notifications to agencies shall be determined and completed by the applicable Enbridge Department depending on the nature of the event. It is important to remember that some external notification timelines are immediate or within two hours. It is important to confirm requirements as quickly as possible. Regulatory Law and Affairs may need to be contacted as soon as possible.

Regulatory Notifications for H&S include the following:

- For Canadian Reporting Criteria refer to the CER Event Reporting Guideline and the GTM On Call Event Reference Binder.

In the USA, follow the OSHA, Federal Motor Carrier Safety Administration (FMCSA) and Pipeline and Hazardous Materials Safety Administration (PHMSA) reporting criteria.

11.1.4.2. Event Owner

After an event has been identified and reported, the event ownership must be established.

The event owner shall have an appropriate level of knowledge and accountability for the area in which the event occurred (i.e., Region/Project People leader, Manager or Director). Once the event has been reported, the Event Owner will utilize “GTM IMS Event Analysis Process” to ensure events are analyzed in a manner that create learnings. For further information, see the “GTM IMS Event Analysis Process.”

11.1.5. Event Analysis Process

GTM has adopted the Enbridge “Framework Standard – Event Analysis” in its entirety which is reflected in the “GTM IMS Event Analysis Process” document found on the GTM GDL.

11.1.6. Documentation

- EnCompass Library
- Motor Vehicle Event Report
- Notice for Suspension of Operations
- Event Reporting Supervisor Email Summary Template
- Detailed Event Report (DIR) template
- Vehicle Damage Report

11.1.7. References

- Canadian Energy Regulator Onshore Pipeline Regulations
- Reporting Guidelines
- Event Classification Guideline based on jurisdictional requirements Enbridge Enterprise Injury and Claims Management Procedure
- GTM On Call Supervisor Event Reference Binder Enterprise Guideline for High Value Learning Events

11.2. Internal Health and Safety Inspections

11.2.1. Purpose

This section describes the process for conducting internal inspections. Inspections are one of the best tools available to identify unsafe conditions, hazards, and equipment defects in the workplace; so that they can be proactively corrected, ultimately preventing events.

Workers conducting internal inspections are to verify current controls are in place and working.

11.2.2. Scope

This section applies to internal H&S inspections conducted at any facility (including pipeline right of ways).

11.2.3. Responsibilities

People Leader shall:

- Ensure required inspections are completed.
- Establish the frequency of the inspection.
- Appoint Employees to inspect the facility.

- Ensure safety hazards or deficiencies are identified.
- Ensure corrective actions are closed out.

Employees shall:

- Perform inspections, as assigned.
- Implement corrective actions, as assigned.
- Implement temporary controls on identified uncontrolled hazards.
- Report any uncontrolled hazards to their People Leader.

Asset/Project Owners shall:

- Develop corrective actions for any deficiencies identified.
- Ensure corrective actions are completed in a timely manner.

S&R Safety shall:

- Periodically inspect work areas (Including right of way) for uncontrolled hazards.
- Assist People Leaders in developing effective controls for hazards.
- Participate, when requested, in internal inspections.
- Complete H&S Compliance Evaluations

11.2.4. Requirements

- H&S inspections and audits ensure workplace hazards are systematically identified, documented, and controlled.
- Comprehensive H&S inspections should be conducted at facilities and sites as well as required inspections on equipment such as ladders, hoist, respirators, etc.
- Any infractions or hazards that might be found must be addressed with Site Supervisor as soon as possible.
- H&S inspection checklists are available on the GTM GDL and/or the EnCompass library.
- If during inspection activities, if valves and equipment labels are missing or labeled according to the P&ID, ensure to document within the EnCompass Inspection platform, with associated action plan for resolution prior to any work being performed on the mislabeled equipment. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation and HS Manual Section 8.0 Management of Change.
- Protocol on documentation, actions taken, and distribution of inspection results should be consistently followed as outlined in this Section.

11.2.4.1. Process

Inspection Preparation

- Verify that action items from the previous inspection were addressed and that H&S checks were completed (refer to the location-specific inspection record sheet, if available).
- Review H&S inspection classes and categories.
- Consider the potential site hazards and identify applicable inspection categories.

- Review the H&S requirements for the applicable inspection categories.

Field Inspection

- For each applicable category, record the practice or condition observed and the location on the Facility Inspection checklist.
- The person responsible for the site or project must immediately address any serious infraction.

NOTE: Submit the Facility Inspection Checklist to the person responsible for the site or project.

Assign a classification to each item

- (S) Satisfactory – Meets H&S requirements
- (U) Unsatisfactory – Fails to meet H&S requirements, action is needed.
- (N/A) Not Applicable – No activity or conditions pertaining to a specific category.

Debriefing

- Record the target date for correcting the items requiring action (“U” items) and the name of the person assigned each action item.
- Complete the cover page of the Facility inspection checklist.
- Distribute the H&S inspection form as determined by Operations Management, Office Management or the Engineering team for the facility or project.

Follow-up

- Record the date of correction for class “U” items.

11.2.4.2. Types of Inspections

- H&S Compliance Evaluation (Inspection):
 - Description: A comprehensive review of the regulatory compliance of an asset or project.
 - Completed by: HS Support
 - Frequency: One third of manned facilities annually so that all facilities are inspected every three years.
 - Documentation: GTM Safety Internal Assessment Checklist
- General Asset Inspection:
 - Description: A checklist review of the controls at a specific asset
 - Completed by: Committee member and/or operational staff
 - Frequency: Annually in US. In Canada, all or part of the workplace will be inspected monthly, so that every part of the workplace is inspected at least once a year
 - Documentation: Encompass Facility Inspection Checklist or CER Inspection Checklist (Westcoast)
- Project Inspection:
 - Description: A checklist review of the controls at a specific Project
 - Completed by: People Leader or assigned designate.

- Frequency: At least once, and weekly as needed, for every Supplier worksite that extends beyond five working days.
- Documentation: Project Safety Inspection Form
- Equipment or Tool Inspection:
 - Description: Inspections specific to a type of equipment or tool
 - Completed by: Worker using the tool
 - Frequency: Pre-use or as per regulatory requirements (eyewash, fire extinguisher, etc.)
 - Documentation: Specific checklist or Maximo, as required in this manual. If not specified, visual inspection only.
- Leadership Visit:
 - Description: An informal review of controls by Operational Leadership during a field visit
 - Completed by: Operational Leadership
 - Frequency: Quarterly to semi-annually
 - Documentation: None
- Informal Inspection:
 - Description: A visual inspections for hazards as part of a Workers regular tasks, this includes pre-use inspection. Worker's report identified hazards through the Workplace Hazard Prevention Program.
 - Completed by: Workers
 - Frequency: Daily
 - Documentation: None
- Completed facility inspection checklists must be forwarded to the local Supervisor.
- Maintain a copy (hardcopy or electronic) onsite for at least three (3) years in a place accessible to Employees.
- The reports may be discussed during regularly scheduled H&S meetings and posted on the local office bulletin board.

11.2.5. Documentation

- N/A

11.2.6. References

- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (u)

11.3. Management of Canadian Regulatory Inspections (🇨🇦 Only)

11.3.1. Purpose

This section describes the process for managing and responding to regulatory visits and inspections in Canada.

Canadian Regulatory agencies are authorized to visit or inspect worksites to assess compliance with standards issued by the agency. Regulatory inspections can occur post event, in response to a complaint, as part of a planned inspection program. Inspections can be announced or unannounced.

11.3.2. Scope

This applies to any regulatory visit or inspection at any pipeline facility (including pipeline right of ways). This section reviews the role of the Regulatory Official, their powers, and the rights and responsibilities that Canadian Personnel have with respect to the attendance of the Regulatory Official at the workplace.

11.3.3. Responsibilities

People Leaders shall:

- Establish a general level of awareness of the contents and location of this section with all Employees.
- Ensure that competencies are established and verified in those Employees expected to implement and comply with this section.
- Monitor and motivate compliance with the section.
- Escort the Regulatory Official during the inspection (for safety reasons, this can be delegated to HS Support).
- Notify Asset Owner, GTM Law Department and S&R Safety, by phone, after the inspection, if the Regulatory Official identifies any deficiencies or violations during the inspection.
- Document the inspection in EnCompass, if a corrective action requires a change to physical assets a work order will be generated in the organizations work management system.

Employees shall:

- Comply with the assigned Requirements of this section.
- Take all reasonable steps to assist in the implementation of this section with Management, Co-workers, and Contractors as appropriate.
- Actively evaluate implementation of this section and recommend improvements to Management and HS Support as appropriate.
- Make notifications to Management upon arrival of a Regulatory Official.
- Do not question Regulatory Officials.
- Always tell the truth and do not speculate – respond to questions in an objective and professional manner.

HS Support shall:

- Record Regulatory Official requests and make duplicates of documents/photos/samples taken, if any.
- Provide advice/support on follow up actions required.

Safety Shared Services shall:

- Provide technical support in response to Regulatory Official requests and/or orders.
- Provide business unit interpretation of regulatory matters and response strategy.
- Review of procedures/process regarding response to regulatory inspections.

- Ensure that learnings are shared across the business unit in Canada and the United States.

Legal shall:

- Participate in meetings with People Leader and Health and Safety Representatives to address any citations.
- Assist HS Support and facility with understanding legal requirements and resolving regulatory issues identified during an inspection.

11.3.4. Requirements

11.3.4.1. Regulatory Agency Visits

- Immediately report the arrival of a Regulatory Official at a facility or location to your People leader.
- The People Leader is responsible for notifying the Asset/Project Owner as well as the S&R Safety Regional Support.
- Document all Regulatory Official visits in EnCompass.
- Forward a copy of the Regulatory Agency Report to the Asset Owner, Law Department and GTM S&R Safety.
- If jurisdiction is unknown, assume the Regulatory Official has jurisdiction until otherwise directed by Asset Owner.

11.3.4.2. Receiving Regulatory Officials

- Whenever possible, the Asset/Project Owner should receive all types of Regulatory Officials.
- Politely request to see the Regulatory Officials credentials.
- Document: name, address, telephone number, date, time of arrival, and departure time.
- Politely ask the reason for their attendance.
- Have the Official sign into the Office/Site visitor logbook.
- Have the Regulatory Official complete a site safety orientation.
- Ensure Regulatory Official is accompanied throughout the course of the inspection.
- Throughout the course of the visit, record times, names, observations, etc.
- Obtain duplicates of any photos or samples taken.
- Take your own photographs during the inspection or as soon as possible after the Compliance Officer has left.

11.3.4.3. Findings

- The Asset Owner ensures that copies of findings are posted at or near their respective places of alleged violation.
- Post findings assigned to a mobile crew at the location where those Employees report to work.
- Maintain postings for at least three working days or until the violation has been resolved, whichever is greater.

- Initiate an event analysis into the cause (s) of the findings and generate corrective and preventive actions.
- Share significant findings with the rest of the organization through operations support meetings and high value learning events or safety bulletins.

11.3.4.4. Notifications and Follow-up

- The Written findings (Orders, Directions, or Citations) must be forwarded to the Asset/Project Owner, Regulatory team, Legal, and GTM S&R Safety.
- The Asset/Project owner ensures that all inspection information is entered into EnCompass.
- The Asset/Project owner ensures Corrective and Preventive Actions (CAPA) follow the “GTM IMS Corrective and Preventive Action Management Process.”
- All regulatory inspections are recorded in EnCompass. Attach any photographs or other information related to the inspection.

11.3.4.5. Canada Energy Regulator (CER)

- The Canada Energy Regulator (CER) is a federal agency created under the Canadian Energy Regulator Act.
- The CER regulates, among other things, interprovincial pipelines. The CER reviews and approves applications for new pipeline projects. The CER also audits and inspects the construction and operation of pipelines.
- When conducting an inspection, CER Officers have broad powers under the Canadian Energy Regulator Act and Canada Labour Code (CLC). Section 120 of the Canada Labour Code provides a list of Officer powers that range from taking tests, samples, and photos to directing other people to produce documents, make statements, and accompany the Officer.
- The CER shares responsibility with the Transportation Safety Board of Canada (TSB) for event analysis. The CER investigates pipeline events to determine whether its regulations have been followed and if those regulations may need to be changed. The TSB investigates the cause and contributing factors. The CER also monitors excavation activity by third parties near pipelines to ensure compliance with existing regulations.
- The CER may issue an “Assurance of Voluntary Compliance” (AVC) for findings of non-compliance with the Canada Occupational Health and Safety Regulations (COHSR).
- The CER may issue a “Notice of Non-Compliance” (NNC) for findings of non-compliance

11.3.4.6. Transportation Safety Board of Canada (TSB)

- The Transportation Safety Board of Canada (TSB) is an independent agency that functions under the Canadian Transportation Accident Investigation and Safety Board Act (the “Act”)
- The TSB can assign individuals or full teams of investigators to perform independent event analysis of pipeline transportation related events.
- The TSB does not find fault or determine civil or criminal liability. No other regulatory agency will interfere with a TSB led event analysis. Section 19 of the Act provides significant powers to TSB investigators to enter, search and seize.

11.3.4.7. Office of the Fire Marshal (East Canada)

- The Offices of the Fire Marshal in New Brunswick and Nova Scotia carry out the provisions of the Fire Safety Acts in each province.
- These agencies conduct fire inspections, review fire safety plans, etc. to ensure and enforce compliance with National Building and Fire Codes, Fire Safety Acts and Regulations.

11.3.4.8. Provincial Occupational Health and Safety Officers

- Provincial Occupational Health and Safety Officers may visit Canadian sites if there are provincially regulated Suppliers performing work.
- There are also work areas in Canada that are not federally regulated and thus default to provincial jurisdiction. An example of this would be non-operation work areas such as offices.
- If jurisdiction is unknown, then assume the visiting Official has jurisdiction until it has been otherwise formally established by management.

11.3.4.9. Legal Authorities During Their Investigation

- In general, inspections are welcomed visits that help Enbridge verify compliance.
- In contrast, an investigation (except in the case of TSB) triggers a more protected rights granted under the Canadian Charter of Rights and Freedoms including:
 - The right to retain legal counsel
 - Freedom from unreasonable search and seizure
 - Freedom from unlawful detention
 - Right to remain silent if asked for a statement or confession

NOTE: Due to the possibility of charges being laid against persons or the company, if Employees become aware of an event analysis, they should contact their People Leader and Legal Services immediately. Legal has additional training/information available to assist Employees who may interact with a Regulator.

- During an event analysis, individuals are 'cautioned' and advised of their right to legal counsel by the OH&S Officer.
- OH&S Officers do not have the power of arrest. If the Officer wishes to detain a person for questioning, the person has the right to retain legal counsel.
- If the OH&S Officer requires a formal statement, then a determination should be made of whether the individual is at risk of being charged personally with an offence.
- If the OH&S Officer cannot give assurances that the person is not subject to possible charges, then legal advice should be obtained.
- OH&S Officers rarely use the power of a search warrant to obtain evidence. However, if they have reasonable and probable grounds to believe that an offence has been committed, they are obliged to seek this authority to secure documents and other evidence. If this occurs, legal counsel should be contacted immediately.

11.3.4.10. Orders or Directions

- Written orders or directions issued by a Regulatory Official indicate that the officer believes a contravention of OH&S law has occurred and shall be taken seriously.

- Issued orders or directions should be reviewed by legal counsel to determine if they potentially impact future liability of the corporation or other recipient of the order or direction.
- As per OH&S regulatory requirements, copies of orders or directions must be posted at or near their respective places of alleged violation. If an order or direction is assigned to a mobile crew, then it is posted at the location where those Employees report to work. These postings remain until the violation has been resolved or for three working days, whichever is greater.
- Every jurisdiction provides for the appeal of orders or directions. It is important to commence an appeal with the legally prescribed time limits.

11.3.4.11. Notifications and Follow-up

- All inspection information is entered into Event Learning and Prevention system.
- The S&R Safety Department and Shared Services are all notified of the findings of the inspection.
- If a Regulatory Official requires Enbridge or an employee to respond to an order or direction in writing within a time that the officer specifies, a copy of the response shall be provided to the H&S Representative.
- If an order or direction is issued then the Facility Supervisor must immediately send a copy to Regional Management, S&R Safety, Shared Services, and Legal for review and follow-up.

11.3.5. Documentation

- Environmental Health & Safety Compliance Inspection Form
- GTM IMS Corrective and Preventative Action Management Process

11.3.6. References

- Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (u)
- Canada Occupational Health and Safety Regulations

Stakeholder Engagement

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12. Stakeholder Engagement

12.1. Internal Communications

12.1.1. Purpose

This section outlines guidance for Employee engagement in the aim to in the prevention of events leading to personal injury, property damage, and noncompliance issues. HS Internal Communications outlines the responsibilities and methods for effectively communicating with internal stakeholders regarding the protection of people, property, and the environment. This section supports the GTM IMS Internal Communications Process.

12.1.2. Scope


This section applies to all internal communications regarding HS goals, objectives, targets, policies, processes, procedures, practices, hazards, risks, events, lessons learned, new/revised controls, safety responsibilities to impacted Employees and Workers. The following tools are used as needed for internal HS communications:

- Safety Committees:
 - Policy Committee
- Safety Recognition:
 - Stellar Tool
- Safety Meetings:
 - Field and Office
 - Pre-job/Tailgate
 - Contractors
- Electronic Communication:
 - Email
 - Teleconference / Virtual Meeting

12.1.3. Requirements

12.1.3.1. Safety Committee

The purpose of the Safety Committee is to:

- Encourage Employee participation
- Strive for continual improvement in H&S compliance of all facilities
- Promote the commitment to the safety and well-being of all Employees by providing a safe and healthy work environment with a goal of zero events.
-  US Operations, and Projects will establish Safety Committee Charters for:
 - Operations Environment Health and Safety Committee Charter
 - Regional Safety Committee
 - Local Safety Committee

Each existing safety committee will develop a safety committee charter or terms of reference that will include the following:

- Purpose
- Scope
- Objective
- Rules of Procedure
- Chairs of the committee
- Committee members
- Safety Committee Structure

The Safety Committee can be actively involved in, but not limited to:

- Perform inspections
- Complete Job Hazard Analysis for routine jobs and tasks
- Report unsafe conditions and suggest corrective actions
- Review workplace events and near misses, looking for trends
- Initiate feedback on H&S related problems
- Contribute ideas and suggestions for improvement in safety
- Communicate safety committee activities and promote safety involvement, awareness, and continuous improvement
- Be free to express concerns
- Meet on a regular basis, to be determined by the committee



12.1.3.2. Geographical Organization

The Safety Committee can be organized:

- On a corporate, district or regional level or
- As best determined by Management and the H&S Department

12.1.3.3. Committee Membership

The following recommendations are made concerning Safety Committee membership:

-  One Representative from each department can volunteer or selected by Management
-  Shall consist of at least two persons and at least half of the members shall be Employees who:
 - Do not exercise managerial functions
 - Have been selected by the Employees (in adherence with any applicable collective bargaining agreement).
- The committee size can be six to eight Representatives
- Members should understand safety basics

- Attend specialized training / education if necessary
- Serve on the committee for up to two years
- Rotate committee members on a yearly basis
- Attain a good mix of experienced committee members and new committee members by rotating one or two new members onto the committee, and
- Avoid a complete committee turnover if possible
- Select at least the following Safety Committee positions:
 - A Chairperson who will serve a one-year term
 - A secretary or scribe to prepare:
 - Minutes of each safety committee meeting
 - Make minutes available to review by all Employees

12.1.3.4. Management, Participation and Commitment

- Committee members must be allowed time away from their regular job to deal with safety committee functions and duties.
- To ensure the success of the Safety Committee, Management will:
 - Attend organizational meeting to provide support
 - Assist in the prioritization of action items
 - Keep safety committee updated on the changing expectations; and
 - Evaluate safety committee on at least an annual basis.

12.1.3.5. Policy Committee

In accordance with the *Canada Labour Code part II*, the H&S Policy Committee has the established for addressing H&S matters that apply to the work, undertaking or business at Enbridge GTM.

12.1.3.6. Duties of the Policy Committee

The Policy Committee shall:

- Participate in the development of H&S policies and programs.
- Consider and expeditiously dispose of matters concerning H&S raised by members of the committee or referred to it by a workplace committee or HS Support.
- Participate in the development and monitoring of a program for the prevention of hazards in the workplace that also provides for the education of Employees in H&S matters.
- Participate to the extent that it considers necessary in inquiries, analyses, studies, and inspections pertaining to OHS.
- Participate in the development and monitoring of a program for the provision of personal protective equipment, clothing, devices, or materials.
- Cooperate with the Minister.
- Monitor data on work accidents, injuries, and health hazards.

- Participate in the planning of the implementation and in the implementation of changes that might affect OHS, including work processes and procedures.
- The Policy Committee may request from an employer any information that the committee considers necessary to identify existing or potential hazards with respect to materials, processes, equipment, or activities in any of the Employer's workplaces.
- Have full access to all the government and employer reports, studies and tests relating to the H&S of Employees in the workplace, or to the parts of those reports, studies and tests that relate to the H&S of Employees but shall not have access to the medical records of any person except with the person's consent.
- Meet during regular working hours at least quarterly and, if other meetings are required because of an emergency or other special circumstance, the committee shall meet as required during regular working hours or outside those hours.

12.1.3.7. Safety Recognition

- Safety recognition is used to encourage compliance with HS requirements, by providing incentives with regards to outstanding safety performance, demonstrating an understanding of the safety programs, policies, procedures, and safe work practices.
- Employees will be held accountable through performance evaluations which impact salary and incentives.
- Safety and health goals and objectives will be set on an annual basis and will be tied to the incentive program.
- Safety awards can also be used to provide added incentive and awareness to Employees.
 - Safety awards should be focused on proactive measures versus reactive, lagging indicators.
- These award and recognition programs will be based on actual safety performance such as participation on safety committees, safety programs and personal safety attitude/awareness, etc.
 - Consult HS Support when establishing a safety incentive plan.

12.1.3.8. Safety Meetings (Field and Office)

- Field, facility, and office groups will hold periodic (monthly) safety meetings.
- Attendance at safety meetings is mandatory; an immediate Supervisor must approve absences.

12.1.3.9. Safety Meeting Coordinator

- The Site Supervisor serves as a Safety Meeting Coordinator.
- The Safety Meeting Coordinator can perform or appoint someone to perform the following:
 - Prepare safety meeting agendas
 - Conduct field safety meetings
 - Forward a copy of the minutes and training records to HS Support

12.1.3.10. Field and Office Safety Meeting Agenda

- Field and office safety meeting agendas should include:

- A Review of the Monthly Safety Newsletter
- Open with a safety moment (recent issue or concern)
- Cover the environmental, health, safety and/or compliance (H&S) topic(s)
- Review the manuals and policies relating to the H&S or compliance topics
- Review the current year-to-date leading and lagging safety indicators (safety statistics)
- Review any recent events (injuries, Motor Vehicle Events, near misses, etc.)
- Review any recent HVLE
- Review safety issues, concerns, suggestions, and action items from the previous meeting
- Give participants an opportunity to discuss any new safety issues, concerns, and suggestions

12.1.3.11. Pre-Job Meetings/Tailgates

- The following types of work shall have a specific pre-job meeting with Workers involved in the task to discuss the specific Hazards associated with the job:
 - High Voltage Electrical work
 - Serious and Critical lifts
 - Confined Space Entry
 - Excavation and Trenching
 - Work around overhead power lines
 - Open systems work
 - Pigging
 - Tie-ins
 - Specific one-off jobs that are hazardous
- Pre-job meetings must include all work groups involved in job planning and job execution. For example, if Operations has conducted the lock out for a PLM job, Operations must attend the pre-job meeting to review the lock out.

NOTE: *If during pre-job/tailgate meetings an isolation point has been identified as incorrectly physically tagged or labeled, work shall not proceed until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation and HS Manual Section 8.0 Management of Change*
- Daily, at the start of each shift, a “tailgate” safety meeting must be conducted to review the daily work permit and H&S issues associated with the day’s work, or in some cases, prior to a specific high-risk task.
- Where required on Project work, on a weekly basis, or one per work rotation, the Supplier will conduct a formal safety meeting to review all H&S issues and forward a copy of the written minutes to the Enbridge Inspector for review.
- If during the pre-job meeting an Isolation point has been incorrectly identified physically (Tagged or labelled), any work taking place shall be temporarily stopped until a resolution can be implemented. Refer to HS Manual Section 4.29.5 Lockout/Tagout Evaluation

12.1.3.12. Safety Meetings – Suppliers

- Safety meetings shall be conducted in accordance with this manual, and as required by Applicable Legislation.
- At a minimum, Suppliers shall conduct and document:
 - a daily “tailgate” safety meeting; to review work permits and H&S issues associated with the day’s work, and/or in some cases, prior to a specific high-risk task.
 - a weekly (or once per work rotation), formal safety meeting to review all H&S issues; the Contractor shall provide a copy of the written minutes of this meeting to the Enbridge Representative

12.1.4. Documentation

- Job Hazard Analysis Form
- Safety Meeting and Training Record
- Western Canada Policy Committee Terms of Reference

12.1.5. References

- *Canada Labour Code Part II s. 134.1(1) through (7)*
- *Canadian Energy Regulator Onshore Pipeline Regulations, Section 6.5 (1) (m)*

12.2. Post Event Leadership Review (PILR)

12.2.1. Purpose

The Post Event Leadership Review (PILR) is a quality control process whereby the Committee Members review and evaluate the analysis process.

The objectives of the PILR are to:

- Validate:
 - Appropriate utilization of resources
 - Adequate documentation of event details and evidence
 - Correct Root Causes identified
 - Corrective actions address causal factors
 - Appropriateness of recommendations to prevent future events
- Identify:
 - Coaching opportunities
 - Opportunities for improvement of the analysis process
 - Sharing of the lessons learned from the event analysis with others including the H&S Committee

The PILR findings may result in corrective action recommendations which, when implemented, will help eliminate unsafe behaviors, work practices and conditions.

12.2.2. Scope

All events are subject to PILR review.

12.2.3. Responsibilities

The committee is comprised of the following members:

- Region/Area Director
- Region/Area Management
- Director H&S
- H&S Manager
- H&S Supervisor
- H&S Representative
- PSM Manager/Representative
- Operations Vice President (optional)

Committee Members shall call upon the following as needed:

- Involved Company Employees
- Technical Experts (Engineering, Integrity, etc.)
- Program Managers
- Event Management Representatives
- Projects Management (Construction, H&S, etc.)
- Involved Contractor Representation

12.2.4. Requirements

12.2.4.1. PILR Initiation

Note: See *Severity Matrix*

- Conduct an PILR if an event is a Severity Rating of A3 or P3 and higher on the Severity Matrix.
- An Operations Manager or H&S Manager can initiate an PILR review for any event that is less severe but has companywide implications.

12.2.4.2. PILR Proceedings

The Operations Director and/or Manager H&S Operations Support or delegate will:

- Determine which event analysis to review
- Set a date, time, and location for the review
- Distribute the PILR agenda
- The Manager H&S Operations Support or delegate will:
- Prepare event analysis data for review (reports, drawings, photos, etc.)
- Distribute the event analysis data to the committee members at least one week in advance of the PILR

- Use the PILR Scoring Tool when reviewing analysis

12.2.4.3. PILR Recommended Action Items

- The Area Management is accountable for seeing that all PILR recommended action items are completed and documented within an approved timeline as agreed upon during the PILR.
- PILR recommended action items will be added and tracked on the H&S Support Tracking worksheet or system.
- PILR recommended action items applicable to additional locations outside the event location will be assigned an owner who will use all available resources, such as, but not limited to the H&S and Asset Integrity/Technical Services Departments, to help complete the corrective action items,
- PILR recommended action items, and any pertinent findings can be added to the final Event Analysis Report, as needed.

12.2.4.4. PILR Summaries

- H&S Support will develop a PILR summary after each PILR Meeting giving a brief description and overview of the event discussions and/or outcomes. This summary is provided to the Operations Directors to present at the OH&SC Meeting.
- This summary will be sent the Region/Area Director approximately one week after the PILR meeting.

12.2.4.5. PILR Information Sharing

- Learnings from PILR event reviews will be shared via other communication avenues such as High Value Learning Events (HVLEs), Safety Bulletins, Safety Newsletters, etc. as determined by the PILR Committee.
- These communications will be distributed in a timely manner and are geared to share learnings broadly across the GTM organization.

12.2.5. Documentation

- N/A

12.2.6. References

- GTM IMS Event Analysis Process

12.3. Workplace Committees

12.3.1. Purpose

The purpose of this section is to establish expectations for roles and responsibilities and structure of H&S Committees.

12.3.2. Scope

This section applies to all Employees on location at Company facilities.

Workplace Committees have been established to ensure that there is structured and open dialogue between Employees, Workers and Management on all H&S issues.

The Committees identify strategies that are effective and agree on corrective actions where improvements can be made. Actions are documented and tracked over time.

East Canada leverages this existing structure to embed the legal role of HS Support into their Committees. This approach meets the needs of Enbridge while also ensuring compliance with requirements for 'H&S Representatives' under the *Canada Labour Code* (s. 136).

Western Canada has established Workplace Committees in all operating plants and pipeline areas. Those committees adhere to the requirements of the *Canada Labour Code* (s. 135. (1)).

12.3.3. Responsibilities

People Leaders shall:

- Establish H&S committees within designated locations/areas.
- Review H&S committee minutes to ensure issues are being resolved in a timely manner.
- Communicate H&S issues and concerns requiring additional resources to Environment, Health & Safety for resolution.
- Approve the appointment of Environmental / Safety Team Leaders and H&S Committee Members.
- Establish workplace Safety Committees in British Columbia, Nova Scotia, and New Brunswick.
- Ensure H&S Representatives receive training.
 - H&S Representative – means a person who is appointed as a H&S Representative under Section 136 of the Canada Labour Code.

Committee Chairperson (this may be the H&S Representative in Canadian H&S Committees) shall:

- Schedule meetings and notify members.
- Prepare an agenda for the meeting.
- Invite HS Support or resource persons as required.
- Preside over meetings.
- Ensure all discussion items end with a positive decision.
- Review and approve minutes for distribution to Area Management.
- Arrange for reporting and follow-up on suggestions and recommendations.

Committee Secretary shall:

- Prepare and distribute minutes of the meetings.
- Maintain and report on the status of suggestions and recommendations.
- Distribute the minutes after approval.
- Disseminate safety information to members.
- Assist the chairperson as required.

Committee Members shall:

- Attend all H&S committee meetings
- Always promote H&S in their area of work

- Receive, consider, and resolve employee H&S complaints
- Receive, review, and provide feedback on employee's suggestions
- Promote and monitor conformance with Company H&S requirements
- Participate in the identification and control of hazards
- Participate in facility inspections and the development of corrective action plans
- Participate in event analysis and inquiries
- Make recommendations to improve H&S at location
- Monitor effectiveness of HS program

Environmental/Safety Team Leaders shall:

- Complete Environmental/Safety Team Leaders Orientation
- Assist in the implementation of H&S initiatives
- Review and communicate event learning opportunities (i.e., injuries, vehicle, spills, Notice of Violation (NOVs) and Near Misses) at location
- Participate and assist in providing H&S training at their location
- Assist in facilitating workplace facility inspections, assessments and audits
- Communicate with HS Support to receive the latest regulatory changes
- Attend annual H&S team leaders meeting
- Influence other Employees to work safe
- Assist in conducting monthly H&S meetings
- Participate as member of local H&S Committee
- Communicate H&S best practices identified in local H&S Meeting with HS Support
- Elevate H&S issues which cannot be resolved at a local level to HS Support
- This may be the H&S Representative in Canadian H&S Committees

Employees and Workers shall:

- Submit H&S issues and concerns to the H&S Committee members for discussion in committee meetings

HS Support shall:

- Resolve area and region-specific H&S issues with follow up communications to the respective local community with a broader audience as deemed necessary
- Elevate systemic H&S issues to Safety Shared Services
- Assist with the development Environmental/Safety Team Leader Orientation Training
- Conduct Environmental / Safety Team Leaders Orientation

Safety Shared Services shall:

- Support the resolution systemic H&S issues in collaboration with applicable departments

Health and Safety Representative shall:

- Meet all legal Responsibilities of a H&S Representative listed in paragraph 136(5) of the *Canada Labour Code*:
 - Complete *Canada Labor Code* training for H&S Representatives
 - Receive and respond to employee complaints regarding H&S
 - Ensure adequate H&S records are maintained
 - Meet with Management as necessary to address H&S matters
 - Participate in the H&S program including all elements of hazard recognition and control, program development, Management of change, PPE selection
 - Participate in inquiries, analyses, studies, and inspections pertaining to HS
 - Cooperate with H&S Officers
 - Inspect all or part of the workplace each month so that the entire workplace is inspected over the year
 - Request H&S information of Enbridge as required

12.3.4. Requirements

H&S Representative (Eastern Canada) shall:

- Be selected by the Employees at the workplace who do not exercise managerial functions.
- Serve a maximum term of two years. A H&S Representative may be selected by the Employees to serve more than one term of two years
- May request from Management and/or H&S, any information that the H&S Representative considers necessary to identify existing or potential hazards with respect to materials, processes, equipment or activities.
- Have full access to all government and employer reports, studies and tests relating to the H&S of Employees, or to the parts of those reports, studies and tests that relate to the H&S of Employees but shall not have access to the medical records of any person except with the person's consent
- Not be personally liable for anything done or omitted by the Representative in good faith.

The Workplace Committees of Western Canada shall:

- Consider and expeditiously dispose of complaints relating to the H&S of Employees
- Participate in the implementation and monitoring of a program for the prevention of hazards in the workplace that also provides for the education of Employees in H&S matters related to those hazards
- Participate in all inquiries, analyses, studies and inspections pertaining to the H&S of Employees, including any consultations that may be necessary with persons who are professionally or technically qualified to advise the committee on those matters
- Participate in the implementation and monitoring of a program for the provision of personal protective equipment, devices, clothing, or materials

- Ensure that adequate records are maintained on work accidents, injuries and health hazards related to the H&S of Employees and regularly monitor data relating to those accidents, injuries, and hazards
- Cooperate with the H&S Representatives
- Participate in the implementation of changes that might affect occupational H&S including work processes and procedures
- Assist the employer in investigating and assessing the exposure of Employees to hazardous substances
- Inspect each month all or part of the workplace, so that every part of the workplace is inspected at least once per year
- Establish its own Rules of Procedure in respect of the terms of office, not exceeding two years of its members and the time, place, and frequency of regular meetings of the committee, and may establish any rules of procedure for its operation that it considers advisable
- Meet during regular working hours at least nine (9) times a year at regular intervals and, if other meetings are required as a result of an emergency or other special circumstance, the committee shall meet as required during regular working hours or outside those hours
- In respect of the workplace for which it is established, request from an employer any information that the committee considers necessary to identify existing or potential hazards with respect to materials, processes, equipment or activities
- In respect of the workplace for which it is established, have full access to all of the government and employer reports, studies and tests relating to the H&S of the Employees, or to the parts of those reports, studies and tests that relate to the H&S of Employees, but shall not have access to the medical records of any person except with the person's consent
- Submit the Workplace Committee Report (Form Number ESDC LAB 1058) to the H&S department in Calgary no later than February 15 of each year. Post a copy of the report for two months on the OHSE bulletin board following the date of submission
- Communicate activities and initiatives to locations or departments not directly represented by a member; by posting of meeting minutes, providing opportunities to contribute ideas and raise concerns through any Committee member
- Review the local Hazard Inventory at least once per year to validate that the hazard reported and identified are applicable to the local area

12.3.4.1. Training

- Within six (6) months of appointment the H&S Representative shall complete the following training:
 - H&S Representative training as required by *Canada Labour Code Part II*
 - Local H&S Committee Chair training

12.3.5. Documentation

- Safety Committee Meeting Minutes
- Attendance Record
- Western Canada OHSE Workplace Committee Terms of Reference

- OHSE Workplace Committee Rules of Procedure Form (Western Canada)
- OHSE Workplace Committee Meeting Agenda and Minutes Form

12.3.6. References

- Canada Labour Code Part II, s. 135 through s.136

Document Control, History of Changes and Appendices

Section Table of Contents

Click on a title to navigate to the desired section.

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Document Control and Maintenance

This section details how this document will be controlled and maintained.

- Changes to this document and related documents will be conducted in accordance with GDM-81.201, “GTM IMS Document Management of Change Process.”
- The archival, retention and disposition of this document and related documents will be conducted in accordance with the Records and Information Management (RIM) Governance Suite.

The following table outlines specific document control details.

Table 1: Document Controls

Control	Description
Business Authority	Director, Safety Management
Periodic Review Frequency	Annually
Effective Date*	2019-01-17
Controlled/Published Location	GTM Governance Document Library
GDL Document Number	550
Referenced Internal Document Links	Published Enbridge documents referenced in each Documentation section of the Manual can be found in the Safety Management section of the GTM Governance Document Library.
Referenced ELink and Internal SharePoint Links	Encompass
Referenced External Documents	Listed in each section as “References” subsection.

History of Changes

Changes made to this document are tracked in the following table.

Table 2: History of Changes

Date	Version	Revised By	Summary	Document SME	Approved By
2017-11-17	1.0	Initial Draft	Integrated and harmonized all legacy H&S procedures into the Enbridge GPP H&S Manual.		Roy McKnight, Manager H&S Programs
2018-01-22	1.0	GTM H&S Operations Support Teams Can / US	Integrated all comments from H&S SMEs.		Roy McKnight, Manager H&S Programs
2018-01-22	1.0	HS Program	Sent to the Technical Writer for grammar and style clean up.		Roy McKnight, Manager H&S Programs
2018-01-24	1.0	HS Program	Removed Flags – upon recommendation of the technical writer. Removed all Appendices – will be maintained outside of the Manual.		Roy McKnight, Manager H&S Programs
2018-01-26	1.0	HS Program	Consolidated definitions and added acronyms.		Roy McKnight, Manager H&S Programs
2019-01-17	2.0	Safety Management Systems	Published document. Superseded documents identified in the relevant sections.		Jeff Safioles, Manager Safety Shared Services
2019-03-17	3.0	Safety Management Systems	Published document. Updates based on comments/feedback from implementation period.		Jeff Safioles, Manager Safety Shared Services
2019-05-30	4.0	Safety Management Systems	Aligned SLiA target with 2019 Scorecard and Safety Traits with Safety Culture Framework Updated documentation and regulatory references Minor language and grammar edits		Jeff Safioles, Manager Safety Shared Services
2020-03-31	5.0	Safety Management Systems	Updated to include Alliance documentation references, minor language and grammar edits, updated area classification diagrams, added references to GTM Procedures		Jeff Safioles, Manager Safety Shared Services
2020-12-11	5.0	Safety Management Systems	Conversion into DRM template and initiation of the DMOC process.		Jeff Safioles, Manager Safety Shared Services
2021-01-01	5.1	Safety Management Systems	Lifesaving Rules Hazard and Risk Management Critical and Serious Lift		Jeff Safioles, Manager, Safety Shared Services

Date	Version	Revised By	Summary	Document SME	Approved By
			Fall Protection, Ladder Safety, Walking Working Surfaces, Health and Safety Assurance Hazardous / Restricted Areas and Portable / personal Gas Monitors Contractor Safety Management Management of Change Post Event Leadership Review (PILR)		
2021-06-28	5.2	Governance Document Management	Updated to add disclaimer about which Regions this Manual is applicable to.		N/A
2021-11-09	6.0	Safety Management Systems	Updated to add clarity on the proper use of safety belts		Jeff Safioles, Manager, Safety Shared Services
2021-11-16	6.1	Safety Management Systems	Provided more clarity to the section		Jeff Safioles, Manager, Safety Shared Services
2022-06-27	7.0	Safety Management Systems	Consolidated forms between UST, WC and M&NP		Murray Evenson, Supervisor Safety Management Systems
2022-08-16	7.1	Governance Document Management	Removed disclaimer from cover page; removed US flag from section 4.14.2 and added hyperlinks to GD Permit Form and GTM Working Excavation Checklist to Section 4.14.5.		Break/Fix
2022-08-25	7.2	Governance Document Management	Updated hyperlink to Overhead Crane and Truck Crane Inspection Report in section 4.5. Updated numbering to TOC.		Break/Fix
2022-09-14	7.3	Governance Document Management	Correct section numbering error		Break/Fix
2022-11-22	7.4	Governance Document Management	Changes to section 12.3: Removed Canadian flag and the word "Regulated" from title. Deleted "Canadian federally required" text from Scope. Clarified language regarding pressurized extinguishers in section 4.21.4 Per IAR form, no reviews required for this update.		Murray Evenson, Supervisor Safety Management Systems
2023-01-27	7.5	Governance Document Management	Remove a review comment that appeared in the Terms & Definitions table in error.		Break/Fix

Date	Version	Revised By	Summary	Document SME	Approved By
2023-03-24	8.0	Safety Management Systems	Updates made to following sections: 4.26 – revised language for clarity 4.46 – added distracted driving requirements and Driving Policy link. 11.6 – Linkage Assessment and Corrective Action System added		Murray Evenson, Supervisor Safety Management Systems
2023-11-01	8.1	Governance Document Management	<ul style="list-style-type: none"> • Migrated document to SharePoint Online • Updated links to referenced documents • Updated IMS document references • Changed Safety Terminology from Incident to Event, Witness to Observer and Investigation to Event Analysis. 		Break Fix
2024-03-08	9.0	Jason Lays, Sr. Advisor, Safety	<p>Associated with CAPA 1447. The following updates where made:</p> <ul style="list-style-type: none"> • Addition made to bulleted list in Introduction • Section 4.29 to update form names and added offshore 		Troy Croft, Supervisor, Safety Management Systems
		Carlandrea Clark, Technical Writer, Governance Document Management	<p>Additional changes made during QAQC:</p> <ul style="list-style-type: none"> • Remove all Alliance references • Eliminated document numbers from referenced documents to ensure consistency and enhance readability • Removed ServiceNow references • Corrected any broken hyperlinks • Updated formatting • Moved definitions in section 4.45 to Appendix B – Terms and Definitions 		
2024-06-18	10.0	Jason Lays, Sr. Advisor, Safety	<p>The following changes were made in this version:</p> <ul style="list-style-type: none"> • Section 4.17.6 – add CFR reference for smoking/open flames • Section 6.5.6 – add CFR reference for firefighting equipment • Section 10 – revise table and rename 		Troy Croft, Supervisor, Safety Management Systems
		Kimberly Jackson, Manager, Operations Programs			

Date	Version	Revised By	Summary	Document SME	Approved By
			<ul style="list-style-type: none"> Section 11 – revisions to accommodate the creation of the GTM Event Analysis Process document. <ul style="list-style-type: none"> Removal of the step-by-step process sections Elimination of most of the roles and responsibilities that will now be captured in the Event Analysis Process Referral to the Event Analysis Process document for more details on Event Analysis process and roles and responsibilities Replaced references to “7T-311 EHS Scope and Risk Communication Form” with “Contractor Management Planning Form” 		
2024-09-10	11.0	Derrick Zimmerman, Safety Advisor, Safety Management Systems	Updates made to Section 7 and the definition of Double Block and Bleed in Appendix B.		Troy Croft, Supervisor, Safety Management Systems
2024-10-16	11.1	Carlandrea Clark, Technical Writer, Governance Document Management	Updated template and formatting; removed all links for the body of document to align with current template standards.		Break Fix
2024-10-29	12.0	Jason Lays, Sr. Advisor, Safety	The following changes were made in this version: <ul style="list-style-type: none"> Section 4.10 updated to include additional information for clarity Updates made to reflect changes in levels of approval Safety Advisor Roles and Responsibilities updated to support contractor safety management. Minor editorial changes and additions to align with current GDM template format. 		Troy Croft, Supervisor, Safety Management Systems

Date	Version	Revised By	Summary	Document SME	Approved By
2025-05-12	13.0	Jason Lays, Sr. Advisor, Safety	<p>The following changes were made in this version:</p> <ul style="list-style-type: none"> • Section 2.3 - Safe work permit requirements updated. • Section 2.6 - Figure 4: GHS Pictogram updated. • Section 4.13 - Updated references to the Electrical Safety standard – 58.401. • Section 4.14 – Updated excavation measurements for CAN from 15cm (in) to 30cm to align with Ground Disturbance Standard. • Section 4.29 – Updated document references. • Section 4.32 - Added Section 4.32.4.4: Transit by Helicopter. • Section 4.35 - Section 4.35.3 Updated (Responsibilities for People Leaders). • Section 4.35.11.2 – FRC Requirements Updated. • Section 4.38 - Drafted new Pre-Use inspection forms. • Section 4.40 - US and CAN now use the same Respirator selection guide. • Section 4.46 - Removing all content in section 4.46 (including commercial motor vehicle section). • Section 5.11 – New section added called Sanitary Facilities. • Section 6.5 - Section 6.5.4.6 wording changed to: Facilities shall install 20lbs or 30lbs fire extinguishers with a discharge rate of 1lb per second or more (stored pressure or cartridge operated). • Various Sections - Removed references to the 'Canadian Energy Regulator Processing Plant Regulations'. 	Jason Lays, Sr. Advisor, Safety	Troy Croft, Supervisor, Safety Management Systems

Date	Version	Revised By	Summary	Document SME	Approved By
			<ul style="list-style-type: none"> Various Sections - Removed formalized references to use EnCompass for safety submissions tracking. Various Sections: Removed any reference to the Walking Working Surface Assessment Form as it was obsoleted. Minor editorial changes and additions to align with current GDM template format. Periodic Review 		
2025-06-17	14.0		<ul style="list-style-type: none"> Included section 4.47, "Working Alone," which was inadvertently omitted in version 12.0. Included section 4.1 "Abrasive Blasting" to Table of Contents. Updated broken links in document. 	Jason Lays, Sr. Advisor, Safety	Troy Croft, Supervisor, Safety Management Systems

Appendix A – Acronyms and Abbreviations

Table 3: Acronyms and Abbreviations



Abbreviation	Full Term
ACGIH	American Conference of Governmental Hygienists
ACM	Asbestos Containing Material
AED	Automated External Defibrillator
AFFF	Aqueous Film-Forming Foam Concentrate
ALARA	As Low as Reasonably Achievable
ANSI	American National Standards Institute
API	American Petroleum Institute
APR	Air Purifying Respirator
ATPV	Arc Thermal Protection Value
ATV	All-Terrain Vehicle
AWP	Aerial Work Platform
CAPA	Corrective and Preventive Actions
CBT	Computer Based Training
CFR	Code of Federal Regulations
CMV	Commercial Motor Vehicle
CPR	Cardiopulmonary Resuscitation
CSA	Canadian Standards Association
DOT	Department of Transportation
EAM	Enterprise Asset Management
E&C	Engineering and Construction
H&S	Environment, Health and Safety
FAE	Functional Abilities Evaluation
FAN	Field Audit Network
FLHA	Field Level Hazard Assessment
FFFP	Film Forming Fluoroprotein Foam
FMCSA	Federal Motor Carrier Safety Administration
FRC	Flame Resistant Clothing
GDL	Governance Documents Library
GHS	Global Harmonized System
GTM	Gas, Transmission & Midstream
HAZCOM	Hazard Communication
HAZMAT	Hazardous Materials Transportation
HAZOPS	Hazard and Operability Studies

Abbreviation	Full Term
HEPA	High Efficiency Particulate Air
H&S (HS)	Health and Safety
HVSA	High Visibility Safety Apparel
IDLH	Immediately Dangerous to Life or Health Concentrations
ILR	Event Leadership Review
IME	Independent Medical Examination
IMS	Integrated Management System
ISN	ISNetwork
LEL	Lower Explosive Limit
LFL	Lower Flammable Limit
LOTO	Lockout/Tagout
MOC	Management of Change
MVI	Motor Vehicle Event
CER	Canada Energy Regulator
NFPA	National Fire Protection Association
NGL	Natural Gas Liquids
NIOSH	National Institute of Occupational Safety and Health
NOV	Notice of Violation
OEL	Occupational Exposure Limit
OEM	Original Equipment Manufacturers
OFAA	Occupational First Aid Attendant
OHS	Occupational Health and Safety
OPIM	Other Potentially Infectious Material
OQ	Operator Qualification
OSHA	Occupational Health and Safety Administration
PEL	Permissible Exposure Limit
PFAS	Personal Fall Arrest System
PFRS	Personal Fall Restraint System
PFD	Personal Floatation Device
PHA	Process Hazard Analysis
PHMSA	Pipeline and Hazardous Materials Safety Administration
PIC	Person in Charge
PLHCP	Physician or Other Licensed Health Care Professional
PLM	Pipeline Maintenance
PPE	Personal Protective Equipment
RPE	Respiratory Protective Equipment

Abbreviation	Full Term
ROPS	Roll-Overprotective Structures
ROW	Right-of-Way
RSO	Radiation Safety Officer
SAR	Supplied-Air Respirator
SABA	Supplied Air Breathing Apparatus
SCBA	Self-Contained Breathing Apparatus
SDS	Safety Data Sheet
SME	Subject Matter Expert
SRL	Self-Retracting Lifeline (or Self-Retracting Lanyard)
STEL	Short Term Exposure Limit
SWL	Safe Working Load
SWP	Safe Work Permit
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value (ACGIH)
TWA	Time Weighted Average
UAS	Unmanned Aircraft Systems
UAV	Unmanned Aircraft Vehicle
USCG	United States Coast Guard
UTV	Utility Terrain Vehicle
WHMIS	Workplace Hazardous Material Information System
WLL	Working Load Limit
WMP	Waste Management Plan

Appendix B – Terms and Definitions



Table 4: Terms and Definition



Term	Definition
Abnormal Event	An abnormal event is defined as an occurrence or change of specific circumstances related to the malfunction of a component or deviation from normal operations that may: <ul style="list-style-type: none"> (a) Indicate a condition exceeding design limit; or (b) Result in a threat(s) to persons, property, or the environment.
Abnormal Operating Condition	A condition identified by the operator that may indicate a malfunction of a component or deviation from normal operations that may: <ul style="list-style-type: none"> (a) indicate a condition exceeding design limit; or (b) result in a threat(s) to people, property, or the environment.
Acclimatization	The physiological adjustment process that occurs when a healthy Worker accustomed to a temperate environment begins to work in a hot or cold environment. These adjustments should take place over a period of days (up to 1-2 weeks), during which time spent may be gradually increased safely.
Air Purifying Respirator (APR)	A respirator with an air purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air purifying element.  OSHA 1910.134  CSA Z94.4-11
All-Terrain Vehicle (ATV)	Also known as a quad, quad bike, or four-wheeler. A vehicle that travels on low-pressure tires, with a seat that is straddled by the operator, along with handlebars for steering control. Any off-road vehicle that does not have factory equipped roll-overprotective structures (ROPS) and seatbelts is considered for purposes of this Manual to be an ATV.
Anomaly	A possible deviation in the properties of the pipe or a discontinuity in the material of the pipe, typically reported by non-destructive examination.
Appurtenances	All attachments to piping (e.g., valves, plugs, fittings, stopple fittings, welded fittings, flanges, vents, branch piping, known abandoned Below Grade Facilities, etc.)
Aqueous Film-Forming Foam Concentrate (AFFF)	A substance that is based on fluorinated foam surfactants plus foam stabilizers and usually diluted with water to a 3% or 6% foam solution. The foam solution acts as a barrier that excludes air or oxygen and develops an aqueous film on the fuel surface capable of suppressing the evolution of fuel vapors. The foam solution is suitable for combined use with dry chemicals.
As Low as Reasonably Achievable (ALARA)	The point at which the cost and resources required to reduce risk any further is disproportionate to the benefit gained.
Assigned Protection Factor	The workplace level of respiratory protection that a respirator or class of respirators is expected to provide to Employees when the employer implements a continuing, effective respiratory protection section.
Atmospheric Monitoring	Atmospheric Monitoring that continuously monitors atmospheric content and results are typically determined in real-time (e.g., use of a handheld instrument).
Authorized Worker	A Qualified Worker authorized by Enbridge to perform a specific task (i.e., LOTO of a machine/equipment to perform maintenance on that machine/equipment).
Automated External Defibrillator (AED)	A device that, once activated, automatically performs an analysis the heart rhythm and, if it detects a problem that may respond to an electrical shock, it permits a shock to be delivered to restore normal heart rhythm.
Below Grade Facility	Refers to existing below grade or underground operating facilities, utilities, structures and supports, such as pipelines, cables, conduits, casings, concrete piles, or concrete foundations.
Benching or Benching System	A method of protecting Workers from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels.
Bill of Lading	Contract for transportation and receipt for cargo that a carrier gives to a seller when the carrier transports that seller's goods,



Term	Definition
Bleed	A drain or a vent.
Blind	A solid plate installed through the cross section of a pipe, usually at a flanged connection. (i.e., Spectacle blinds, Spades, Spacers)
Blind Flange	A solid plate installed at the end of a pipe on a flange which has been physically disconnected from a piping system at that point.
Block Valve	Gate, plug, or ball valve that blocks flow and isolates pressure to the downstream side when in a closed position. It could be single or double seated and either unidirectional or bidirectional.
Blood	Includes human blood, human blood components, and products made from human blood.
Bloodborne Pathogen	Viruses, bacteria, and other microorganisms in human blood or other potentially infectious materials that can cause disease in persons who are exposed to blood or other potentially infectious materials containing the pathogens. These microorganisms can cause diseases such as Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Human Immunodeficiency Virus (HIV), and many others.
Bonding	The process of connecting two or more conductive objects together by means of a conductor.
Borehole	A hole in the ground created by drilling, auguring, boring, or other similar operation.
Brace	With reference to scaffolding, a brace is a tie that holds one scaffold member in a fixed position with respect to another member. Brace also means a rigid type of connection holding a scaffold to a building or structure.
Breathing Zone	Volume surrounding a Worker's nose and mouth from which they breathe air over the course of a work period. This zone can be pictured by inscribing a sphere with a radius of about 25 cm (10 in.) centered at the Worker's nose.
Brownfield	Any existing Enbridge Operational Facility (Including processing equipment and underground pipelines), where operations have care, custody and control accountabilities, operations can delegate accountabilities to the projects group when formally agreed to (i.e., activities inside or adjacent (within 3m (10ft.)) of an operational location).
Cardiopulmonary Resuscitation (CPR)	The emergency substitution of heart and lung action to restore life to someone who appears not to have breathing capability
Cargo Manifests	Document describing the contents of a shipment.
Carrier	All vehicles that transport hazardous materials on public roads and by air, water, and rails.
Cave-In	The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.
Ceiling Occupational Exposure Limit	An Exposure Limit which should not be exceeded at any time.
Choppy Seas	Seas forming large waves 1.9-2.7 m (6-9 ft.) high that are irregular and broken with an increased frequency making it difficult to maintain balance on a flat surface.
CO₂ System	A type of fixed fire extinguishing system that releases carbon dioxide from cylinders into an enclosed space. Operation is triggered automatically or manually.
Cold Stress	A general term applied to strain on the body caused by prolonged exposure to cold air or water, or by a short-term exposure to extremely cold air or water.
Cold Work	Any work activity or process that is unlikely to ignite flammable vapors (e.g., does not involve a spark, an open flame, or a hot surface).
Combustible Liquids	 Liquids that can burn, classified by a flashpoint $\geq 37.8^{\circ}\text{C}$ (100°F) and $< 93.3^{\circ}\text{C}$ (200°F). Combustible Liquids can burn at temperatures that are usually above working temperatures.  Any liquid having a flashpoint at or above 100°F (37.8°C). OSHA 1910.106(a)(18)
Competency	The ability for an individual to demonstrate of both the knowledge and practical skills and training to consistently perform a given task to a pre-determined standard.



Term	Definition
Conduction	The transfer of heat between materials that contact each other. Heat passes from the warmer material to the cooler material. For example, a Worker's skin can transfer heat to a contacting surface if that surface is cooler, and vice versa.
Conductor	Cable, bus or any conductive material or piece of electrical equipment.
Confined Space	An enclosed or partially enclosed area that meets all of the following: is not designed or intended for continuous Worker occupancy (e.g., tanks, pipes). has restricted means of entry and exit that may compromise the provision of first aid, evacuation, rescue, or other emergency response (e.g., manholes, electrical vaults, boreholes, pits, sump tanks, vertical and horizontal culverts); and is large enough so that a Worker's entire body can enter the space
Confined Space Entry	Occurs when any part of a Worker's body enters a Confined Space.
Contingent Worker	<ul style="list-style-type: none"> Provides services that allow the company to meet short-term, temporary, and other staffing needs to assist with various projects and specialized tasks Execute work as directed by an Enbridge People Leader. Adheres to all H&S training requirements.
Contingency Plan	A plan that sets out the steps to be taken in the event that existing hazard and risk controls fail and an Abnormal Event occurs. A formal, documented Contingency Plan is created when it is determined that an unacceptable residual risk of an Abnormal Event due to planned work remains despite the application of existing hazard and risk controls.
Contractor(s)	<ul style="list-style-type: none"> Workers employed by a Supplier performing activities to perform a scope of work. Executes the Scope of Work. Has the responsibility to stop work when they are unfamiliar with Hazards or are concerned about the control of a hazard that is applicable to their scope of work
Contractor Management	Systematic Process(es), which define requirements for coordinating and controlling operational activities of a Contractor that enable them to perform the Scope(s) of Work in a manner that is safe, ensures the security of the facility and protects the environment.
Control	A mechanism or process that minimizes the risk of the hazard becoming actual, so it protects people, property, or the environment from the identified hazard.
Convection	The transfer of heat in a moving fluid. Air flowing past the body can cool the body if the air temperature is cool. On the other hand, air that exceeds 35°C (95°F) can increase the heat load on the body.
Competent	Competent Qualified, trained, and experienced to perform the required duties. [CSA Z662-15]
Corrective Action	A reactive process to address concerns or issues after they have occurred. It assumes that a non-conformance or problem has been identified and has been reported by Employees of the organization or by other stakeholders.
Coupler	With reference to scaffolding, a coupler is a device for locking together the component tubes of a tube and coupler scaffold.
De-energized	Disconnected or otherwise isolated from all energy sources and not containing residual or stored energy.
Dismounted	When the operator of an industrial truck is dismounted and within 25 ft. of the truck still in view, the load engaging means shall be fully lowered, controls neutralized, and the brakes set to prevent movement.
Double Block and Bleed	An isolation system that separates an isolation point from a pressure source by using two blocking seals between the isolation point and the pressure source with an operable bleed-off between the two seals. This system can consist of two in-line block valves with an open vent or drain valve between them or single valve with DIB-1 seats and an open body cavity bleed fitting.
Downstream	The side of the valve with lower or no pressure.
Enbridge	A generic term used for Enbridge Gas Transmission & Midstream applying to design, construction, commissioning, operations, maintenance and decommissioning, and other legal entities under the control of Gas Transmission & Midstream.

Term	Definition
Enbridge Employee	Individuals filling full or part-time positions that have been established for an undefined period of continuous employment. Individuals filling temporary or casual full time or part time positions that are established for a limited, predetermined period, usually less than one year in length.
Enbridge Locations	All Enbridge sites, workplaces, worksites, facilities, terminals, stations, and administrative and project offices.
Enbridge Operations Representative	A generic term that refers to the Employee responsible for the location (e.g., Site Supervisor, PLM Coordinator/Supervisor, Technician, Terminal Supervisor) or designate.
Enbridge Representative	An Enbridge Employee or third-party hire representing Enbridge for specific Contractor work or project.
Enbridge Inspector	An Enbridge Employee or any third-party hire overseeing Enbridge projects on behalf of Enbridge and who is responsible for the inspection of work. May include trade specific Inspectors.
Enbridge Workforce	See Workforce.
Enclosed Space	Enclosed or partly enclosed area that is not designed nor intended for frequent and lengthy occupancy, has unrestricted means of entry and exit (e.g., pump shelters and densitometer, instrument, and sample buildings), and that may aggravate ordinary job hazards.
Energized	Connected to an energy source or contains residual or stored energy.
Energized Equipment	Conductors and conductive parts of electrical equipment that are not locked out and verified energy free. High-voltage equipment is considered energized until grounded.
Energy Isolation Device	Mechanical device that physically prevents the transmission or release of energy.
Energy Source	Any origin of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other force.
Ergonomics	Scientific study of people and the work they perform with the goal of minimizing risk of injury/illness through improved workstation design; reducing non-value-added motions and improving Worker moral, productivity, and product quality.
Evaporative Cooling	Takes place when sweat evaporates from the skin. High humidity reduces the rate of evaporation and thus reduces the effectiveness of the body's primary cooling mechanism.
Excavation	Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
Excavation Area	The area in which any type of excavation is expected to occur. The perimeter of the Excavation Area is to be demarcated with pink and white striped flagging.
Exposure Limit	Workplace standard below which is believed that nearly all normal and healthy Workers may be repeatedly exposed, day after day, for working lifetime without adverse health effects.
Extinguishing Agent	A substance (e.g., dry chemical powder, foam) that interrupts the chemical chain reaction that produces fire by removing heat, removing fuel and/or removing or diluting oxygen (i.e., a substance that can put out a fire).
Facility	Any above or below grade appurtenances (e.g., Pipelines, piping, valves, communication or electrical equipment, conduits, power lines, guide wires, poles, towers, casings, piles, foundations etc.) or the site on which such appurtenances are located (e.g., Pump / Compressor stations, valve sites, pipeline right of way), as the context may require
Fall Hazard	Any potential fall distance of: <ul style="list-style-type: none"> • 1.2 m (4 ft.) or more above a lower level from a <i>Permanent</i> walking/working surface (horizontal and vertical surface) or • 1.8 m (6 ft.) or more above a lower level from a <i>Temporary</i> walking/working surface (includes construction activities) or • Any fall where there is an unusual possibility of injury (e.g., falling through an opening in a work surface)
Fall Protection	Protection devices used at elevations that would allow a fall of a short distance (uses an anchorage point).

Term	Definition
Fatigue	Weariness or exhaustion due to extended periods of physical and/or mental exertion or illness.
Field Level Hazard Assessment (FLHA)	A form used just prior to the start of work to identify, assess and control the field-based hazards of the work being performed, and site or environmental conditions that may adversely affect the work (e.g., icy conditions, simultaneous operations, pedestrians).
First aid (CAN)	First aid refers to medical attention that is usually administered immediately after the injury occurs and at the location where it occurred. It often consists of a one-time, short-term treatment and requires little technology or training to administer. First Aid can include: <ul style="list-style-type: none"> • initial response to a medical emergency, • cleaning minor cuts, scrapes, or scratches, • treating a minor burn, • applying bandages or dressings, • applying a cold compress, cold pack, or ice bag, • applying a splint, • changing a bandage or dressing after a follow-up observation visit.
First aid (US)	First aid refers to medical attention that is usually administered immediately after the injury occurs and at the location where it occurred. It often consists of a one-time, short-term treatment and requires little technology or training to administer. First aid can include cleaning minor cuts, scrapes, or scratches; treating a minor burn; applying bandages and dressings; the use of non-prescription medicine; draining blisters; removing debris from the eyes; massage; and drinking fluids to relieve heat stress. OSHA's revised recordkeeping rule, which went into effect January 1, 2002, does not require first aid cases to be documented. For example: A Worker goes to the first-aid room and has a dressing applied to a minor cut by a registered nurse. Although the registered nurse is a health care professional, the employer does not have to report the accident because the Worker simply received first aid (OSHA Website).
First aid attendant (CAN)	A holder of a valid first aid certificate (emergency or level 1 or standard or level 2). Sometimes referred to as the OFAA.
First aid station	A place, other than a first aid room, at which first aid supplies or equipment is stored.
Flagging Tape	Colored, non-adhesive ribbon used for tagging, roping off, or other marking applications
Flame Resistant Clothing	Clothing made from material with flame resistance properties, i.e., combustion of the clothing is prevented, terminated, or inhibited (slowed). Also known as FRC
Flammable Liquids	<p> Liquids that can burn, classified by a flashpoint below 37.8°C (100°F).</p> <p> Any liquid having a flashpoint at or below 199.4° F (23°C). Flammable liquids are divided into four categories:</p> <ul style="list-style-type: none"> • Category 1: Include liquids with a flashpoint <73.4° F (23° C) and a boiling point ≤ 95° F (35° C). • Category 2: include liquids with a flashpoint <73.4° F (23° C) and a boiling point >95° F (35° C). • Category 3: include liquids with a flashpoint ≥73.4° F (23° C) and ≤140° F (60° C). When a Category 3 Liquid with a flash point ≥ 100° F (37.8° C) is heated for use to within 30° F (16.7° C) of its flashpoint, it shall be handled as if it was a Category 3 Liquid with a flashpoint <100° F (37.8° C). • Category 4: include liquids with a flashpoint >140° F (60° C) and ≤199.4° F (93° C). When a Category 4 Liquid is heated for use to within 30° F (16.7° C) of its flashpoint, it shall be handled as if it was a Category 3 Liquid with a flashpoint <100° F (37.8° C). When a liquid with a flashpoint >199.4 °F (93 °C) is heated for use to within 30 °F (16.7 °C) of its flashpoint, it shall be handled as if it was a Category 4 flammable liquid.
Floor Hole	An opening measuring less than 30.5 cm (12 in) but more than 2.5 cm (1 in) in its least dimension, in any floor, platform, pavement, or yard, through which materials but not individuals may fall; such as a belt hole, pipe opening, or slot opening.
Floor Opening	An opening measuring 30.5 cm (12 in) or more in its least dimension, in any floor, platform, pavement, or yard through which individuals may fall, such as a hatchway, stair or ladder opening, pit, or large manhole.

Term	Definition
Frost Bite	Caused when the fluid surrounding the cells becomes frozen when exposed to extremely low temperatures. The nose, ears, fingers, toes, and cheeks are most vulnerable. Symptoms: loss of color, hardness of tissues, numbness.
Gas	A compressible, formless material that will completely occupy an enclosure irrespective to its quantity. It is a physical state that be changed to a solid or liquid state only by increasing pressure or reducing temperature, or both (e.g., H ₂ S).
Greenfield	Areas within the confines of project boundaries that contain no above or below ground facilities.
Ground	In relation to electrical work a ground is a conductor that provides an electrical path for the flow of current into the earth.
Ground Disturbance	<p> Only: Any work, operation or activity that results in a disturbance of the earth, including without limitation, surveying, excavating, digging, trenching, plowing, drilling, tunneling, auguring, blasting, backfilling, topsoil stripping, land leveling, peat removing, quarrying, clearing, grading, hydrovac and fencing. Note: It is not a ground disturbance when:</p> <ul style="list-style-type: none"> • Adding material to the undisturbed ground surface • Agricultural cultivation to a depth of less than 45 cm below the ground surface; or <p>Any other activity to a depth of less than 30 cm and that does not result in a reduction of the depth of earth cover over the pipeline less than that provided when the pipeline was constructed.</p> <p> Only: Any work, operation or activity that results in penetration of the earth (e.g., excavating, digging, trenching, plowing, tunneling, auguring, boring, drilling, backfilling, blasting, cultivation, topsoil stripping/leveling, stumping, peat removal, quarrying, fencing, clearing/grading, hydrovac) with the following exceptions:</p> <ul style="list-style-type: none"> • survey staking, line locating and marking, • disturbance less than 30 cm (12 in.) in depth provided the location and original depth of cover for all facilities is known.
Halon	A material used to extinguish fires, typically used in fixed extinguishing systems to release halon from cylinders into an Enclosed Space. Operation is triggered automatically or manually.
Handrail	A single bar or pipe supported on brackets from a wall or partition, as on a stairway or ramp, to furnish individuals with a handhold in case of tripping.
Hazard	Source or situation with a potential for harm in terms of injury, ill health, damage to property, damage to workplace and environment, or any other definitions as set out by regulations and codes.
Hazard Assessment	Methodology used to identify, assess, and control hazards in order to eliminate or reduce risk to an acceptable level. Includes FLHA, Process Hazard Assessment (or Analysis), HAZOPS, Job Hazard Analysis, Facility Hazard Assessments, etc.
Hazardous Area	An area in which there is significant potential for a flammable or toxic atmosphere to be present or develop.
Hazardous Atmosphere	<p>An atmosphere which exposes an individual to a risk of injury, illness, disablement, or death due to one or more of the following causes:</p> <ul style="list-style-type: none"> • A flammable gas/vapor concentration of 10% or greater of its lower explosive limit (LEL) • An atmospheric oxygen concentration below 19.5% or above 23%. • An atmospheric concentration of any substance above the exposure limits established by the governing regulatory body or as indicated on the Safety Data Sheet (SDS) • Any atmosphere which is recognized as Immediately Dangerous to Life and Health (IDLH).
Hazardous Energy	Any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, or kinetic energy source that if released uncontrolled, could cause injury or loss.

Term	Definition
Hazardous Locations	This any location where an explosive gas atmosphere is present, or may be present, in the air in quantities that require special precautions to control ignition sources. More specifically, this includes: <ul style="list-style-type: none"> Any building or area that is classified as a Class 1, Division 2 or Class 1, Zone 2 or higher hazardous location based in the <i>Canadian Electric Code</i>, Section 18 or <i>OSHA 29 CFR 1910.307</i> Hazardous (classified) locations (i.e., Class 1, Division 2 or Class 1, Zone 2 or higher).
Hazardous Material	A material, other than hazardous waste, that because of its quantity, concentration and physical or chemical characteristics, either individually or in combination with other substances is or poses a threat to the environment, humans, or other living organisms.
Hazardous Waste	A substance or material which is no longer used for its original purpose and requires disposal, and by reason of its properties is considered a potential or existing hazard to human health or the environment and therefore, requires special management. The specific classification of a hazardous waste in Canada varies by province/territory.
Heat Cramps	Painful cramping of the legs, arms, or stomach muscles, often occurring when relaxing after work. Caused by a loss of salts through sweating. Symptoms: sudden onset; hot, moist skin; normal pulse; normal to slightly high body temperature.
Heat Exhaustion	Extreme fatigue caused by a loss of body fluids and minerals. Symptoms: heavy sweating; intense thirst from dehydration; cool, moist skin (clammy and pale); weak and rapid pulse (120-200); low to normal blood pressure; fatigue; weakness or loss of coordination.
Heat Stress	General term applied to the strain placed on the body when its cooling system must work too hard.
Heat Stroke	A serious medical emergency caused by a complete breakdown of the body's cooling system. Victim's temperature rises to dangerously high levels. Symptoms: high body temperature (above 103° Fahrenheit); absence of sweating (in most cases); hot, red (flushed), dry skin; rapid pulse; difficult breathing; constricted pupils; high blood pressure; headache or dizziness; confusion or delirium; bizarre behavior; weakness; nausea or vomiting. Advanced symptoms: seizure or convulsions; collapse; loss of consciousness; deep coma; no detectable pulse; body temperature over 108 °F (Fahrenheit).
Hierarchy of Controls	A system used to implement controls based on the level of effectiveness to minimize or eliminate exposure to hazards. Elimination of the hazard or risk is the most effective form of control. <ol style="list-style-type: none"> 1. Elimination 2. Substitution 3. Engineering 4. Administrative (e.g., work practices) 5. Personal Protective Equipment
High / Medium Risk Suppliers	Determined on the Suppliers Risk Classification List.
High Efficiency Particulate Air (HEPA) Filter	A filter that is at least 99.97% efficient in removing mono-disperse particles of 0.3 micrometers in diameter. Including filters used for personal respiratory protection, vacuum cleaners, or heating/ventilation/air conditioning systems.
High Voltage	 Greater than (>) 1000 V (VAC or VDC)  Greater than (>) 1000 VAC and >1060 VDC
High Winds	Sustained winds greater than 50 km/hr. (30 mph).
Hot Work	Any process that can be a source of ignition when flammable material is present or can be a fire hazard regardless of the presence of flammable material.
Hydrovac	The use of pressurized water or air to loosen soil, then the use of a vacuum to extract the loosened soil. This includes all activities performed by a vacuum truck including but not limited to "hydrovac," "shot gunning," "day lighting," "potholing," "water washing." It is sometimes referred to as vacuum excavation.
Hypothermia	Lowering of the body's core temperature caused by prolonged exposure to low temperatures. As the body temperature gets lower, the metabolic functions of the body

Term	Definition
	slow down, causing shivering, incoherence, memory lapse, and drowsiness. Severe hypothermia may lead to death.
Immediately Dangerous to Life or Health Concentrations (IDLH)	An atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous/hazardous atmosphere.
Imminent Hazard	Any hazard, condition or activity that could reasonably be expected to be an imminent or serious threat to the life or health of a person exposed to it before the hazard or condition can be corrected or the activity altered.
Event	An unplanned activity or situation that resulted in or had the potential to result in, an adverse or undesirable environmental, health, safety, or business consequence.
ISNetworld (ISN)	A Supplier informational database used to manage, evaluate, verify, and standardize Supplier safety prequalification information. Suppliers upload safety program information, statistical data, and records of compliance with regulatory requirements for review and verification into the ISNetworld database.
Isolated	Sources of energy have been disconnected or controlled.
Isolation	Pre-defined system for securing one or more isolation points to stop or prevent flow of energy.
Isolation Point	Location where the energy isolation device is installed.
Journey Management	A plan and systematic strategy to reduce transportation-related risks within a company's operations. Trip management is one component of journey management.
Lifting Device	Supplementary device used to handle certain types of loads (i.e., hook, sling, clevis). The weight of lifting devices is considered part of the rated load.
Load	Total weight of an object plus the weight of the rigging equipment.
Lock	a device used to secure an isolation device in the appropriate position to prevent accidental energizing or startup of the machine/equipment.
Lockout	Physical placement of a lock on an energy-isolating device to ensure the equipment being controlled cannot be Energized until the lock is removed.
Low Risk Suppliers	as determined on the Suppliers Risk Classification List.
Low Voltage	 Less than or equal to 1000 V (AC or DC)  Less than or equal to 1000 VAC; 1060 VDC
Lower Explosive Limit (LEL)	The lowest concentration (percentage) of a gas or a vapor in air capable of producing a flash of fire in presence of an ignition source (arc, flame, heat). At a concentration in air below the LEL there is not enough fuel to continue an explosion. Concentrations lower than the LEL are "too lean" to explode but may still burn with great heat and light. Exact values can be found on product's SDS. Also referred to as LFL (Lower Flammable Limit).
Lower Flammable Limit (LFL)	See Lower Explosive Limit (LEL).
Document/Management of Change (D/MOC)	A systematic approach to ensuring proposed changes are rigorously assessed for risk and impact, and that change is effectively managed prior to implementation to achieve targeted results
Material of Trade	A hazardous material (other than hazardous waste) that is carried on a motor vehicle for the purpose of the driver's safety, operation of the vehicle or in direct support of the Company's principal business.
Medical treatment facility	means a hospital, medical clinic, or physician's office, at which emergency medical treatment can be dispensed.
Modified Work	Any work-related injury or illness that prevents a Worker's ability to perform their regularly assigned duties, but are medically able to perform alternate, modified, or restricted work.
Near Miss	Any event, which under slightly different circumstances, may have resulted in injury or ill health of people, or damage or loss to property, plant, materials, or the environment.
Negative Pressure Regulator	A regulator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.
Non-classified Area	An area where flammable or toxic atmosphere is unlikely to develop or exist.

Term	Definition
Non-Permit Required Confined Space	A Confined Space that has been checked, inspected and its atmosphere has been monitored and is being continuously monitored to ensure it does not have (or does not have the potential to have) any of the characteristics required to be classified as a permit required Confined Space.
One-Call (First Call)	A One-Call is a notice given to a local One-Call Centre/authority that an excavation will be taking place. Legislation varies by location, but anyone performing an excavation is typically legally obligated to contact the One-Call Centre/authority 2-5 days prior to commencing excavation. The One-Call Centre/authority notifies its members (owner/operators) that their Below Grade Facilities are near the excavation.
One-Call Member	A Facility Owner/ operator who subscribes to the One-Call Centre/authority and is notified when a One-Call is placed if the Excavation Area is near the members Below Grade Facilities.
Open System	Any part of the pipeline system open to the atmosphere that has been isolated.
Operations Employee	Generic term used to refer to all Operations Employees, including Technicians.
Operations Management	Regional Managers, Team Leaders, and designates.
Operator Qualification (OQ)	A set of programs that qualify an operator for specific tasks. e.g.: Technical training (e.g., occupational skills training, equipment specific training, etc.)
Overseeing	To watch over, observe and manage Enbridge requirements of the Supplier.
Oxygen Deficient Atmosphere	An atmosphere with oxygen content below 19.5% by volume.
Partition	A portable safety screen, complete with stand-alone lightweight frame that is used to enclose Hot Work activities (available in singular or multi-panel arrangement of various widths and heights).
People Leader	Anyone who has direct report(s).
Permissible Exposure Limit (PEL)	An occupational health standard instituted to safeguard Workers against exposure to toxic material in the workplace
Permit Required Confined Space	A Confined Space that is hazardous or that may become hazardous due to one or more of the following: <ul style="list-style-type: none"> • work activity would cause adverse health effects (e.g., fiber glassing, abrasive blasting, welding), • contains or has the potential to contain a hazardous atmosphere (e.g., H₂S, LEL or O₂), • contains a material that has the potential for drowning or suffocating a Worker (e.g., liquid), • has an internal configuration such that a Worker could become trapped or asphyxiated, and/or contains any other safety or health hazard which is recognized as immediately dangerous to life and health (IDLH) (e.g., energy sources, visibility).
Person in Charge (PIC) /Authorized Enbridge Representative(s) or Designate	A qualified Representative authorized by Enbridge to: <ul style="list-style-type: none"> • Ensure Enbridge's Health and Safety requirements are administered and followed • Provides contractor performance management, which includes oversight, monitoring of activities, quality of work, and contractor evaluation / feedback <ul style="list-style-type: none"> ◦ Responsible for oversight of activities including but not limited to: Confined Space, Lock Out Tag Out (LOTO), Isolation, Hot Work, and Critical Lifts. • Must be competent to oversee performance of work • Have a clear understanding of their responsibilities, the scope of their duties and the understanding of authority • Confirms contractors' applicable certificates for covered tasks. (Westcoast Transmission) i.e., Trade Certificate • Confirms applicable Contractor OQ Plan Covered Task verifications • Communicates with the Supplier related to all items within the SOW (i.e., Hazards, risks, controls, qualification expectations) • Has Stop Work Authority • Awareness to the contract details, Scope of Work and Procedures.

Term	Definition
Personal Fall Arrest System (PFAS)	Commonly used PFAS include a body harness, lanyard, and anchor point. Fall Arrest relates to <u>stopping</u> a falling Worker before striking a lower level/object.
Personal Fall Restraint System (PFRS)	Commonly used PFRS include a body harness, self-retracting lifeline (SRL) or lanyard, and anchor point. Fall Restraint relates to <u>preventing</u> a fall from occurring in the first place.
Planner / Project Manager or Designate	Receives the initial information provided and develops the details required to facilitate the development of the Scope of Work (SOW) to complete a Supply Change Management (SCM) requisition. Ensures a completed Service Requisition is provided to SCM. Receives communication of award with selected Supplier.
Platform	A working space for individuals, elevated above the surrounding floor or ground, such as a balcony or platform for the operation of machinery and equipment.
Positively Identify	To visually locate (daylight) the location, depth, and size of Below Grade Facility by using either water washing (hydrovac, as an example) or hand digging. This includes elevation or alignment changes that can alter the depth/direction of the pipe (i.e., 90 and 45-degree elbows), fittings, plugs, weldolets, flanges, branch piping, known abandoned facilities, etc.
Pressure Demand Regulator	A positive pressure regulator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.
Preventive Action	A proactive process and is initiated to stop a potential problem from occurring or from becoming too severe. Preventive action focuses on identifying negative trends and addressing them before they become significant.
Process Hazard Analysis (PHA)	A detailed examination of a process, equipment or facility design that will assist in identifying hazards and required controls. PHA's are used to evaluate hazards in new designs as well as existing facilities.
Qualified	One who, by possession of a recognized degree, certificate, or professional standing, or who by knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project
Qualified Electrical Worker	A Worker who has the knowledge, training and experience to perform electrical work, including Enbridge electricians, contract journeymen electricians, and Contractor electricians working under the direct supervision of contract journeymen electricians.
Radiation	Emission of atomic particles or electromagnetic energy from the nucleus of an atom. This emission is caused by the natural decay of radioisotopes (nuclides) and/or x-rays produced by electrical means from portable or fixed static equipment.
Radiation Safety Officer (RSO)	Designated individual who has received specific radiation safety training and who oversees the operations of the radiation safety program.
Radiation Source	Apparatus or material emitting or capable of emitting ionizing radiation.
Remote Worksite (CAN)	A worksite that has road access, is located on an existing Facility / Right-Of-Way (ROW) or has a defined site footprint with ambulance response time of more than two hours.
Reportable Quantities Limit	The minimum amount of that substance, which if released, requires the notification of federal agencies
Restricted Area	Any area in which there is a potential for a flammable or toxic atmosphere to develop, or that may contain other hazards.
Risk	The combination of the likelihood and consequence of an unexpected positive or negative deviation from the expected outcome.
Roll Overprotective Structures (ROPS)	Engineered protection structures on heavy equipment and All-Terrain Vehicles meant to protect the operator and passenger(s) in the event the equipment rolls over.
Root Cause	Include personal factors and job factors from which substandard acts and conditions originate. These factors are the reasons why the immediate/direct causes exist, and the identification of such factors permits meaningful management control. Root Causes are often also referred to as basic causes or indirect causes.
Runway	A passageway for individuals elevated above the surrounding floor or ground level, such as a foot-walk along shafting or a walkway between buildings.

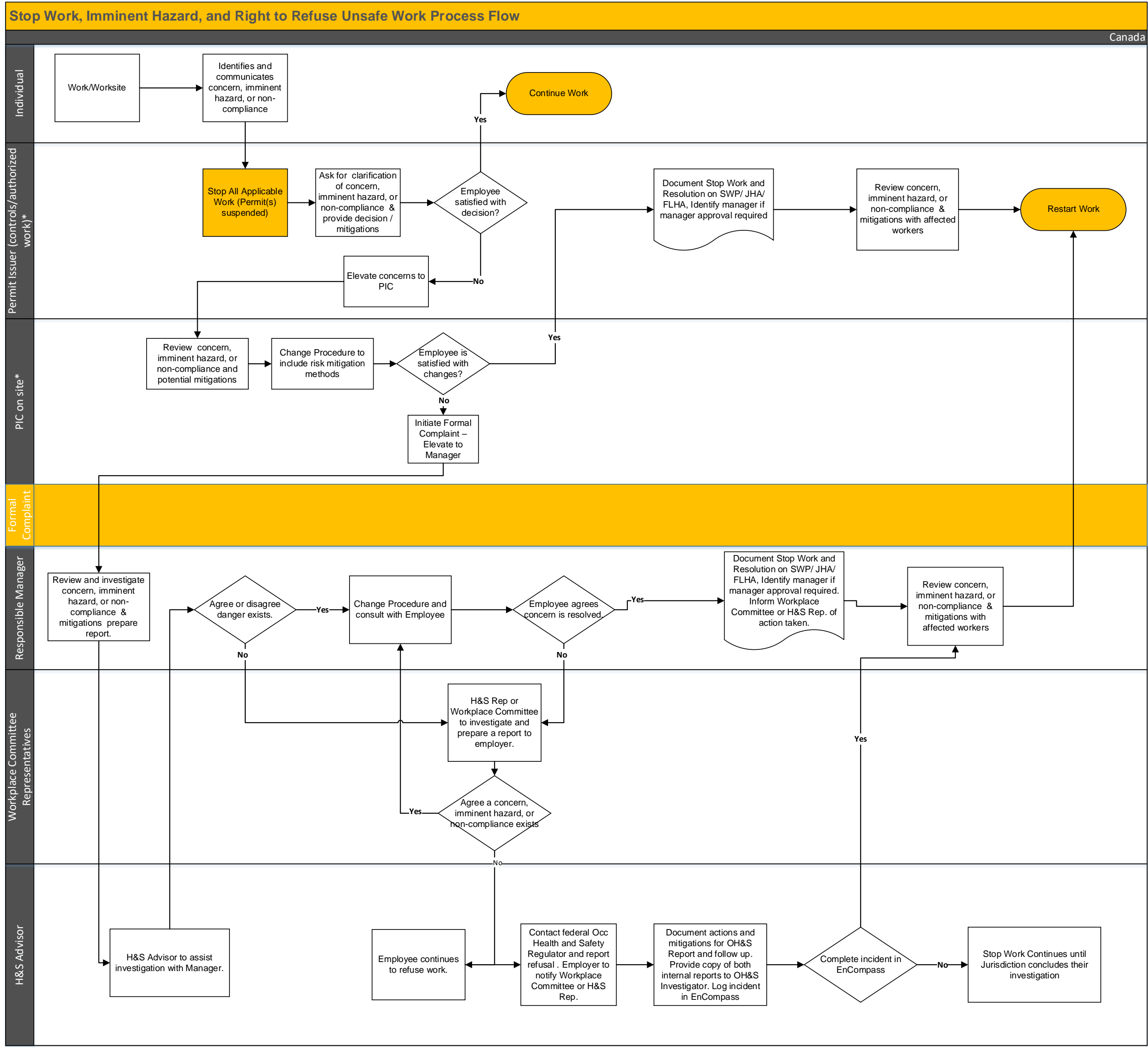
Term	Definition
Safe Work Permit (SWP)	An agreement between the Permit Issuer and Receiver that is used to authorize work for a specific time and location and to ensure a safe area of work for the working group.
Safe Work Permit Issuer (may be designated as Person in Charge)	<ul style="list-style-type: none"> Responsible for verification, of contractor safety qualifications/certifications i.e., fall protection, confined space entry. Responsible for review of SOW, Hazards & Risks, and associated hazard control documentation (JHA, JSA, etc.). Controls must be agreed to by both Contractor and Safe Work Permit Issuer. Responsible to stop work and have the authority to initiate the stop work process. Issue Safe Work Permits. May be designated as Person in Charge.
Safe Working Load	Commonly understood to be the load which a given lifting device or lifting arrangement can safely lift, suspend, or lower
Safety Data Sheet (SDS)	A Safety Data Sheet (SDS), previously called a Safety Data Sheet (SDS), is a document that provides information on the properties of hazardous chemicals and how they affect H&S in the workplace.
Safety Watch	A qualified Worker responsible for monitoring work activities to ensure safe work practices are followed, to identify hazards, to alert Workers of hazardous conditions and to initiate emergency response procedures.
Self-Contained Breathing Apparatus (SCBA)	A respirator that has a portable supply of breathing air and is independent of the ambient atmosphere. The breathing air source is designed to be carried by the user.
Severity Rating	The rating as determined using the Enbridge Actual & Potential Event Severity Guidance Document from ESOR and the current Severity Matrix.
Shall	Indicates mandatory; no deviation is permitted without authorization from the appropriate vice-president
Shipper	In cases where the Company uses third-party companies (e.g., FedEx or UPS) to transport hazardous materials, it is defined as the “shipper”.
Shipper/Carrier	In those cases where Company vehicles are used to transport hazardous materials, the Company is defined as both the “shipper” and “carrier”.
Shipping Papers	Documents used for day-to-day activities involved in the transport of hazardous materials. Shipping papers include Bills of Lading, Cargo Manifests, and Waybills.
Shoring	Shoring is a temporary installation, which “shores” up or supports trench or excavation walls to prevent movement of soil, underground utilities, roadways, and foundations.
Short Term Exposure Limit (STEL)	A 15-minute Time Weighted Average (TWA) exposure limit that should not be exceeded at any time during a workday even if the overall 8-hour TWA is within limits, and it should not occur more than 4 times per day. There should be at least 1 hour between successive exposures.
Should	Used where an action is recommended.
Signaler/Spotter	A competent Worker that looks for, locates, guides, signals, and reports hazards – as well as one who will stop unsafe activities – in relation to movement of vehicles and heavy equipment. This person shall have the ability to clearly communicate to the Workers under their care and site supervision as required.
Single Block and Bleed	An isolation system utilizing one block valve to separate one pressure source with a bleed downstream of the sealing surface.
Site	See Worksite.
Site Supervisor	See Enbridge Operations Representative.
Sloping	A method of preventing cave-ins of excavation and trench walls by cutting them back on an incline away from the excavation or trench. The angle of incline shall vary with differences in such factors as the soil type, environmental conditions of exposure, and application of soil overloads.
Softener	Material used to prevent loads from slipping and to protect cable or rope from damage.
Spoil Pile	A pile of material that was removed from an excavation, trench, or borehole.
Standard	Approved Enbridge practice.

Term	Definition
Standard first aid certificate or Level 1 (CAN)	Means the certificate issued by either a qualified person or the organization that developed the training, as the case may be, for successful completion of a two-day first aid course.
Standard Precaution	Administrative controls based on the premise that all blood and bodily fluids are considered infectious and are treated as such (also known as universal precautions).
Standard Railing	A vertical barrier erected along exposed edges of a floor opening, wall opening, ramp, platform, or runway to prevent falls of individuals.
Standard Strength and Construction Railing	Any construction of railings, covers, or other guards that meets the requirements of 29 <i>CFR</i> 1910.23.
Static Electricity	An accumulation of electric charge on an insulated body.
Station Site	Fenced-in pump stations, valve stations, terminals, etc.
Stop Work Authority	<p>The special authority or power vested in a designated person on a worksite to stop and subsequently restart some or all work activities on that worksite. In the context of a GTM worksite, this authority automatically rests with the Safe Work Permit Issuer (who has a formalized process for initiating, suspending, restarting, or cancelling work activities) and the Person in Charge.</p> <p>This authority may be exercise when a hazard arises that requires further controls before work continues or when a work activity is not being conducted in accordance with the Safe Work Permit, the GTM Health and Safety Manual or GTM Construction Safety Manual.</p> <p>The Stop Work Authority is not to be confused with the general right to stop work by any person on a worksite in response to a hazard arising. Any worker may stop their work as per the Stop Work, Imminent Hazard, and Right to Refuse Unsafe Work process.</p>
Subcontractor	Any person, firm or corporation contracting with the Supplier to perform part of the work and shall include partners and associates in a joint venture
Subcontractor Workers	Any person performing work on behalf of the Supplier.
Subject Matter Expert (SME)	A person with experience or expertise in a specific aspect or topic (i.e., a Process Safety Engineer)
Supplied-Air Respirator (SAR) or Supplied Air Breathing Apparatus (SABA)	An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.
Supplier	<p>Hires and trains its own worker(s) (contractors), assigns worker(s) to job duties, and provides day-to-day work direction to those worker(s).</p> <p>Responsible to deliver a competent worker (contractor) to complete the Scope of Work on behalf of the Supplier.</p> <p>To be aware of what controls/permits are being proposed for the SOW.</p> <p>To be aware of what equipment/materials are required of the Supplier and associated equipment certifications.</p> <p>Communicate to their workers the controls, equipment, and materials required for the SOW.</p> <p>Communicate to their workers the identification of equipment certification requirements for the SOW.</p> <p>Can provide Sub-Contractor Worker(s) to complete the Scope of Work assigned.</p> <p>Sub-Contractor Workers are required to adhere to the contractual obligations of the Supplier.</p> <p>Communicate what equipment/materials that will be used and how the equipment is certified, and materials meet SOW requirements</p>
Supplier / Contractor Safety Variance / Exclusion	Form used to document a Supplier's safety prequalification deficiencies, required mitigation plan and Management approval to use a deficient Supplier with either a Yellow or Red grade in ISN.
Tagout	Placement of a perforated tag on an energy-isolating device to indicate that the device and machine/equipment being controlled shall not be operated until the tag is removed.
Threshold Limit Value (TLV)	Occupational exposure limit set by the American Conference of Governmental Industrial Hygienists (ACGIH) under which it is believed that nearly all Workers may be

Term	Definition
	repeatedly exposed, day after day, over a working lifetime, without adverse health effects.
Tight Fitting Respirator	A respirator that is designed to form a complete seal with the face or neck.
Time Weighted Average (TWA) Exposure Limit	The average exposure a contaminant for an individual over a given working period determined by sampling at given times during the period. Unless otherwise mentioned, TWA is the concentration of contaminants measured over an 8-hour period.
Toe board	A vertical barrier at floor level erected along exposed edges of a floor opening, wall opening, platform, runway, or ramp to prevent falls of materials.
Trench	An elongated excavated area of ground whose depth exceeds its width at the bottom.
Trench Box	A self-contained steel structure placed in an excavation that is designed to withstand soil pressures and protect the Workers against cave-ins.
Trench Foot	A condition caused by long, continuous exposure to above freezing cold temperatures, while in contact with dampness or water. The affliction is characterized by swelling, tingling, itching, and severe pain, followed by tissue death, and ulceration.
Unattended	A powered industrial truck is unattended when the operator is 25 ft. or more away from the vehicle which remains in view, or whenever the operator leaves the vehicle, and it is not in view.
Upstream	The side of the valve that maintains pressure.
Utility Terrain Vehicle (UTV)	Also known as a side by side. For purposes of this Manual is defined as a small 2-person or up to 6-person four-wheel drive, off-road vehicle, factory-equipped with roll-over protective structures (ROPS) and seatbelts. This includes: Recreational Off-Highway Vehicles (ROHVs) and Multipurpose Off-Highway Utility Vehicle (MOHUV), as defined by ANSI Off-Highway Utility Vehicle (MOHUV), as defined by ANSI.
Vapor	Gaseous form of substances that are normally in liquid or solid state; it can be changed to solid or liquid by increasing pressure, decreasing temperature, or both. Evaporation may create vapors.
Vendor	Any person, firm, or corporation with whom Enbridge may enter into an agreement for the provision of engineered and/or fabricated equipment.
Verification	Confirmation that the machine/equipment is in a zero-energy state.
Visitor	Any Enbridge or non-Enbridge individual that is not performing any assigned work activity on an Enbridge worksite (i.e., facility, right-of-way, or construction site). An example of a visitor is any individual or group on a tour of an Enbridge worksite.
Wall Hole	An opening less than 76 cm (30 in) but more than 2.5 cm (1 in) high, of unrestricted width, in any wall or partition, such as a ventilation hole or drainage scupper.
Wall opening	An opening at least 76 cm (30 in) high and 46 cm (18 in) wide, in any wall or partition, through which individuals may fall, such as a yard-arm doorway or chute opening.
Waste Management Plan	A written document designed to assist Enbridge Personnel and Contractors with the identification project man of appropriate waste management practices for each waste type generated by Enbridge operations.
Waybills	Document accompanying a shipment, containing instructions for handling the shipment, description of the shipment, shipper and consignee information, and other details, and similar documents
Wilderness Worksite (CAN)	A worksite that does not have road access, is not located on an existing Facility/ Right-Of-Way (ROW) or does not have a defined site footprint. (e.g., Survey, Environmental Studies, Geotechnical/Geophysical).
Work Authorization	The Work Authorization process provides a formal process to acknowledge an extended work plan for Contractors on an Enbridge site and documents who (and how) Safe Work Permitting duties will be managed during that work.
Work Authorization Issuer	An Enbridge Operations Representative who shall be familiar with the operational and/or site-specific hazards covered by the Work Authorization being issued.
Workload	Level of heat produced by the body based on type of work being done. Workload may be divided into three categories based on type of operation or by estimating the metabolic rate of the Workers in kilocalories per hour (kcal/hr) burned by the body. The three categories are:

Term	Definition
	Light work (up to 200 kcal/hr), for example: sitting or standing to control machines, performing light hand or arm work. Moderate work (200-350 kcal/hr), for example: walking about with moderate lifting and pushing. Heavy work (350-500 kcal/hr), for example: pick and shovel work.
Work Restraint	Protection devices used at elevations that will not permit a Worker to travel beyond a certain point.
Workers	Term used to refer to Employees and Contractors cumulatively.
Workplace	See Worksite.
Worksite	Entire work area required for the work, including station property, right-of-way, temporary working space, and all right-of-way storage areas as required by Enbridge.

Appendix C – Stop Work, Imminent Hazard, Right to Refuse Unsafe Work Process Flow (CAN)



*The Safe Work Permit Issuer and Enbridge Person in Charge carry full Stop Work Authority and must stop work in affected areas when and unsafe work condition, imminent hazard, or non-compliance with the Safe Work Permit, the GTM HS Manual or GTM Construction Safety Manual is identified by any means. Work may only restart when they authorize the restart. The Enbridge Person in Charge is the most senior person on site actively involved in site management (e.g., a more senior person visiting the site not regularly engaged in onsite management would not automatically fulfill this role)

Appendix D – Stop Work, Imminent Hazard, Right to Refuse Unsafe Work Process Flow (U.S.)

