

Montgomery Power Management Inc.

CONFINED SPACE ENTRY CODE OF PRACTICE

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1. INTRODUCTION

Entering and working in confined spaces is an integral part of regular activity by Montgomery Power Management Inc. employees. This document has been developed to ensure the safety of personnel required to enter and conduct work in confined spaces. The program contained herein describes reasonable and necessary policies and procedures for any and all facilities, departments, and individuals who are associated with confined space entry operations.

2. PURPOSE

The purpose of this Confined Space Entry Code of Practice and related procedures is to prevent injury or illness to personnel by ensuring an assessment of all known hazards, good planning, precautions, communications and rescue plans are done for all confined space entries.

3. POLICY

Montgomery Power Management Inc, through its management, is fully committed to the safety and health of all employees. Therefore, it is the policy that every reasonable and practicable precaution will be taken to ensure the safety of personnel entering a confined space.

4. DISCIPLINARY MEASURES FOR NON-COMPLIANCE

As it is the policy of Montgomery Power Management Inc. to provide its employees with a safe work environment, Montgomery Power Management Inc. requires conformance with the safety standards set herein. Any breach of this Code of Practice or procedures shall be considered a "serious offence" and will result in corrective discipline up to and including termination.

5. LEGAL REQUIREMENTS

The entry of any confined space must conform to the Alberta Occupational Health and Safety Act, Regulation and Code.

6. APPLICATION OF CODE OF PRACTICE

The potential hazards of all confined spaces within the scope of a project must be evaluated to ensure that the proper precautions are taken for safety. It may be determined that a space presents no real danger for employees. However, until the space has been assessed, it is assumed confined by definition. No person shall enter a confined space until the requirements of this Code of Practice have been met.

7. DEFINITION OF A CONFINED SPACE

For the purpose of this document, a confined space means *an enclosed or partially enclosed space that is not designed or intended for continuous human occupancy with a restricted means of entry or exit and may become hazardous to a worker entering it because*

- a. *of its design, construction, location or atmosphere*
- b. *of the work activities, material or substances in it,*
- c. *the provision of first aid, evacuation, rescue or other emergency response service is compromised, or*
- d. *of other hazards relating to it*

8. HAZARD ASSESSMENTS

A hazard assessment must be conducted by a competent personnel prior to entry.

The Hazard Assessment will

- Assess the hazards the worker is likely to be exposed to while in the confined space,
- Specify the type and frequency of inspections and tests necessary to determine the likelihood of worker exposure to any of the identified hazards,
- Specify the safety and personal protective equipment required to perform the work,
- Identify the personal protective equipment and emergency equipment to be used by a worker who undertakes rescue operations in the event of an accident or other emergency, and,
- Indicate ventilation and isolation requirements

Once the Hazard Assessment has been completed, it will be used to generate the Safe Work Procedure and Confined Space Permit.

A copy of the Hazard Assessment is then to be filed. Upon a subsequent entry, the Hazard Assessment can be pulled from the files, reviewed, edited as necessary and reused. Any additions to the original Hazard Assessment should be incorporated and filed for the next entry.

9. SAFE WORK PROCEDURES

Once the Hazard Assessment has been completed and the Confined Space Classified, a Safe Work Procedure will be written for the entry based on the Hazard Assessment and Classification.

The Safe Work Procedures will

- Indicate Permit requirement and Permit Issuer.
- Indicate Atmospheric testing requirements.
- Indicate Ventilating requirements.
- Indicate isolation requirements.
- Indicate identified hazards and their corrective actions.
- Outline the requirements for Supervision, Tending Worker and Emergency Responder.
- List required equipment for communications
- List required equipment for the work
- List required equipment for rescue
- List a rescue plan
- List work steps to follow

Once the Safe Work Procedure is completed the Confined Space Permit can then be generated. The Safe Work Procedures must be available.

Once completed, a copy of the Safe Work Procedure can then be filed. Upon subsequent entry, the Safe Work Procedure can be pulled from the files, reviewed, edited as necessary and reused. Any additions to the original Safe Work Procedure should be incorporated and filed for the next entry.

10 VENTILATING

The Hazard Assessment and Classification will indicate the need for atmospheric testing and ventilation requirements. Ventilating can either be natural or by mechanical means. If natural venting does not satisfy the testing requirements then extra time or mechanical ventilation is required.

If mechanical ventilation still does not satisfy the testing requirements then entrants are required to wear appropriate personnel protective equipment, for example Self Contained Breathing Apparatus. However PPE is not an acceptable method of entrant protection from flammable or explosive atmosphere

If mechanical ventilation is required, the system must incorporate a method to alert entrants if the ventilation system fails.

11 PURGING AND INERTING

Purging and Inerting are not common methods used at Montgomery Power Management Inc. . Purging means the introduction of substance such as an inert gas, or liquid to displace or flush out contaminants prior to entering the space. If either purging or inerting is used the OHS Code must be referred to and a Hazard Assessment along with Safe Work Procedures must address the atmospheric hazards as a result of such purging and inerting.

12. ISOLATION OF CONFINED SPACES

Each confined space entry must be, in some way, isolated from operating equipment, machinery, and other potentially hazardous environments. This is to prevent regular hazards from entering the system. Some of the procedures used at Montgomery Power Management Inc. involve lockouts, blanking, double block and bleed, enclosures, venting, purging, etc.

Each confined space may demand different actions. For specific procedures for individual entries, refer to the “procedures” section of this program.

13. SAFETY AND PROTECTION EQUIPMENT

All equipment to safely perform the confined space work, including personnel protective equipment and rescue equipment, must be available and inspected to ensure it is in good working order.

The inspection shall be performed by a competent person and recorded on the permit.

14. PERMIT SYSTEM AND CHECKLIST

A confined space permit is required for all confined space entries.

When a confined space must be entered, a permit shall be prepared in accordance with the hazard assessment and procedures and be accepted prior to entry of the confined space. This permit shall serve as a guideline and checklist that all safety precautions have been met prior to entry. The permit shall contain the start and expiry date, the location of the space, the requirements before and during the entry and the signature of the person who prepared the permit.

Once all conditions of the permit have been met, the person or person(s) as listed in the procedures will add their printed name and signature to the permit. For those confined space entries where no pre written procedures exists the foreman will ensure a hazard assessment and procedures are drafted prior to preparing and signing the permit.

A permit shall not be valid unless all conditions of the permit have been met. All conditions must remain in effect for the duration of the permit.

Based on a hazard assessment of a representative sample of multiple, similar or identical confined spaces, Montgomery Power Management Inc. may issue a single entry permit to be used for these and an additional number of similar or identical confined spaces.

15. UNAUTHORIZED ENTRY

Entry into a confined space is prohibited without an authorized and valid permit.

Only personnel who have printed their name and added their signature to the authorized permit will be allowed to enter the confined space.

An entrant is considered to have “entered” a confined space when the entrant’s breathing zone crosses the plane of the confined space access.

16. TRAINING

A worker that is assigned duties related to confined space entry must be trained by a competent person in,

- Recognizing hazards associated with working in confined space
- Performing the workers duties in a safe and healthy manner

This training must be recorded and filed.

17. RECORD KEEPING

All records respecting entry and work in a confined space, including entry permits and testing shall be maintained in a *Confined Space Permit and Entry* file for a period no less than 2 years.

18. RESPONSIBILITIES AND DUTIES OF PERSONNEL

Management

- Annual reviews and updates of the Montgomery Power Management Inc. Confined Space Entry Program to conform to current OH&S Standards.
- Assisting, Managers and Supervisors in providing resources.

Safety Team

- Provide the training as set forth in the program
- Completion of hazard assessments based on the confined space entry tasks;
- Preparing of Work Procedures for the Confined space entry
- Preparing Isolation and Safety Requirements for the Confined space entry
- Providing Personnel Protective Equipment for Confined space entry
- Ensuring Inspections and Calibrations of Confined Space Entry equipment occur at scheduled frequencies
- Ensure Rescue Plans, and off site Rescue Personnel/Emergency Services are aware of rescue needs, and are periodically reviewed.
- Prepare and Issue Permits

Foreman

- Prepares or ensures that a Hazard Assessment, Safe Work Procedures and Confined Space Permit is prepared.
- Ensuring all equipment necessary to complete the confined-space entry task and is available.
- Ensuring that all communication devices required for the Confined Space entry are available.
- Ensuring all equipment necessary is available to workers undertaking rescue operations.
- Ensuring that, where required, tests and inspections are performed by competent personnel at the confined space and results recorded on the permit prior to entry authorization.
- Ensures Isolation and Lockouts have been installed.
- Ensures the assignment of a *Tending Worker and Emergency Response Person*
- Reviews Hazard Assessments, Safe Work Procedures and Permits with the workers, updates these documents as required. Ensures the workers
 - ◆ Understand,
 - ◆ Are equipped as per the permit requirements, and
 - ◆ Print their name and sign the permit.
- Reviews all other applicable procedures with the workers, For example
 - ◆ WHMIS and applicable MSDS's.
 - ◆ Working in Heat Guidelines
 - ◆ Respirator Code of Practice
 - ◆ Barrier Tape Guidelines
 - ◆ Fall Protection Plan
- Documenting that all requirements for a specific confined space entry have been met by filling in the relevant check boxes and lists of the confined space permit.
- If required by the Safe Work Procedures,
 - ◆ Authorize entry by signing the Acceptance space on the Permit after all conditions for a safe entry have been met.
 - ◆ Remains in contact with the *Tending Worker and Emergency Response Person*
 - ◆ Remains on the plant site where the confined space entry is being performed.
- Ensure compliance with standards set forth in the Code of Practice by periodic inspections of entry sites.
 - ◆ Identifies and corrects new hazards within the confined space.
 - ◆ Updates Hazard Assessment and Procedures as result of new hazards.
- Terminating the entry and canceling the permit when:
 - ◆ Entry operations covered by the entry permit have been completed.
 - ◆ A condition that is not allowed under the entry permit arises in or near the permit space.

Tending Worker

- Strict adherence to Montgomery Power Management Inc's Safety Policy and this Code of Practice.
- Is trained and knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.
- Proper use of equipment, which includes:
 - ◆ Ventilating equipment needed to obtain acceptable entry conditions.
 - ◆ Personal protective equipment as needed.

- ◆ Lighting equipment as needed.
- ◆ Barriers and shields as needed.
- ◆ Equipment, such as ladders and fall arrest devices needed for safe access and egress.
- ◆ Any other equipment for safe entry into and rescue from permit spaces.
- ◆ Communication equipment necessary to maintain contact with the *Emergency Responder*.
- ◆ Rescue and emergency equipment as needed.
- Keeps track at all times of the number of workers inside the confined space.
- Is in constant communication with the workers inside the confined space.
- Has been given a suitable system for summoning assistance.
- Restricting entry to the Confined Space to those authorized only.
- During entry operations and dependant on the Safe Work Procedure,
 - ◆ remains
 - at or near an entrance to the confined space, or,
 - remains on the site and in communication with the confined space(s) until relieved by another qualified and authorized tending worker
- Communicating with the entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space should conditions warrant.
- When directed by the procedures to remain at the confined space, monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and ordering the entrants to evacuate the confined space immediately under any of the following conditions:
 - ◆ If the *Tending Worker* detects an unsafe condition.
 - ◆ If the *Tending Worker* detects the behavioral effects of hazard exposure in an entrant.
 - ◆ If the *Tending Worker* detects a situation outside the space that could endanger the authorized entrants.
 - ◆ If the *Tending Worker* cannot effectively and safely perform all the duties required by this program.
- Remains in contact with the *Emergency Response Person*.
- Initiates rescue and summoning rescue and other emergency services by contacting the *Emergency Response Person*.
- Performs no other duties that might interfere with the *Tending Worker* primary duty to monitor and protect the entrants.
- Does not enter the Confined Space under any circumstances, including rescue, while fulfilling the role of Tending Worker.

Entrant

- Strict adherence to Montgomery Power Management Inc. 's Safety Policy and this Code of Practice.
- Reviews and understands the Hazard Assessment, Procedures and Permit.
- ***If in doubt asks for clarification!***
- Prints their name and signs the permit before entry.
- Is trained in Confined Space entry hazards and becomes aware of the hazards that may be faced during entry.
- Proper use of equipment, which includes:
 - ◆ Ventilating equipment needed to obtain acceptable entry conditions.

- ◆ Personal protective equipment as needed.
- ◆ Lighting equipment as needed.
- ◆ Barriers and shields as needed.
- ◆ Equipment, such as ladders, needed for safe access and egress.
- ◆ Communication equipment necessary to maintain contact with the *Tending Worker*.
- ◆ Rescue and emergency equipment as needed.
- ◆ Any other equipment for safe entry into and rescue from permit spaces.
- Avoids carrying in personal material and substances not required for the work inside the confined space. For example;
 - ◆ Lighters, matches and smoking material
 - ◆ Coins
- Communication with the *Tending Worker* as necessary to enable the *Tending Worker* to monitor entrant status and to enable the *Tending Worker* to alert entrants of the need to evacuate the space if required.
- Alerts the *Tending Worker* whenever;
 - ◆ The entrant recognizes any potentially unsafe condition, or
 - ◆ The entrant detects a condition outside the scope of the Hazard Assessment or Permit.

- Exiting the confined space as quickly as possible whenever:
 - ◆ An order to evacuate has been given by the *Tending Worker* or *Supervisor*;
 - ◆ The entrant recognizes any warning sign or symptom of exposure to a dangerous situation;
 - ◆ The entrant detects an unsafe condition; or
 - ◆ An evacuation alarm is activated.

- Disclosing any limitation, personal or otherwise, to his supervisor which could negatively impact the safety of the worker or co-worker(s) involved in the confined space entry. For example
 - ◆ Medications
 - ◆ Acrophobia – (Fear of heights)
 - ◆ Claustrophobic – (Fear of Confined Spaces)
 - ◆ Illness
 - ◆ Panic Attacks

- **IF IN DOUBT, STOPS AND GETS CLARIFICATION.**

Emergency Response Person

- Assigned to respond to a request from the *Tending Worker*, or *Entrant(s)* and initiate assistance as requested.
- Remains in contact with *Tending Worker*, or *Entrant(s)*
- Follows the Emergency Response Plan
- Calls for on site First Aid personnel.

- Calls for an ambulance, fire department, or other emergency services as determined necessary.
- Directs first aid response to location, either personally or through the use of designated personnel, as per the Emergency Response Plan

Emergency Services – Fire, Ambulance and/or 911

- Assigned to respond to a request from the *Emergency Response Person* to perform rescue and first aid services as required.

19 CONTRACTOR, CONSULTANT and/or VISITOR NOTIFICATION

- Contractors, Consultants and/or visitors must comply with this Confined Space Entry Code of Practice and Procedures.

20. **CONFINED SPACE HAZARD ASSESSMENT ENTRY INFORMATION**

General Confined Space Characteristics

- Large enough or so configured that an employee can bodily enter and perform assigned work.
- Have limited or restricted means for entry or exit. Confined-space openings are limited primarily by size and location. Openings may be small in size and may be difficult to move through easily. Entrance and exit may be required from top, bottom, or side.
- Size or location may make rescue efforts difficult.
- Are not designed for continuous employee occupancy. Most confined spaces are not designed for employees to enter and work on a routine basis. They may be designed to store a product, enclose materials and process, or transport products or substances. Therefore, occasional employee entry for inspection, maintenance, repair, cleanup, or similar tasks, is often difficult and potentially dangerous. The danger associated with entry may come from chemical hazards or physical hazards, which are in or may enter the space.

Identification of Confined Space Hazards

Once a space has been identified as confined, the hazards that are, or may be present within the confined space must be identified. Confined Space hazards include the following categories:

- Oxygen-deficient atmospheres;
- Asphyxiant gas atmospheres
- Flammable atmospheres;
- Toxic atmospheres,
- Engulfment with product or fluid
- Mechanical and physical hazards.
- Illumination Hazards
- Temperature hazards – either hot or cold
- Falling hazards
- Falling Object Hazards
- Traffic hazards
- Corrosive Materials or Chemicals

Every confined space must be evaluated for these types of hazards. The four types of atmospheric hazards are often the most difficult to identify since they are normally invisible.

Oxygen-Deficient Atmospheres

The normal atmosphere is composed of approximately 21% oxygen and 79% nitrogen. An atmosphere containing less than 19.5% oxygen shall be considered oxygen-deficient. The oxygen level inside a confined space may be decreased as the result of either consumption or displacement.

There are a number of processes which consume oxygen in a confined space. Oxygen is consumed during combustion of flammable materials, as in welding, cutting, or brazing. Oxygen can also be consumed during chemical reactions such as in the formation of rust on the exposed surfaces of a confined space. The number of people working in a confined space and the amount of physical activity can also influence oxygen consumption. Oxygen levels can also be reduced as the result of oxygen displacement by other gasses.

Asphyxiant Gas Atmospheres

Gases can dilute or displace atmospheric oxygen below the level required for normal human functioning. Common examples of asphyxiant gases are carbon dioxide, ethane, helium, hydrogen, methane, nitrogen and nitrogen dioxide. During a process known as purging an inert gas such as nitrogen is deliberately pumped into a confined space to purge or force out flammable or explosive atmospheres. The inert gas is usually replaced with fresh air before the space is safe to enter. The results of a combustion process (i.e. calcining) are carbon dioxide, carbon monoxide, water vapor and other gases, which displace oxygen. It is required that atmospheric tests be conducted at all levels of the confined space if a purging technique has been used or combustible gases have passed through the confined space.

Flammable Atmospheres

Flammable atmospheres are generally the result of flammable gases, vapors, or dust mixed in certain concentrations with air, or oxygen-enriched atmosphere.

Oxygen-enriched atmospheres are those atmospheres that contain an oxygen concentration greater than 22%. An oxygen-enriched atmosphere will cause flammable materials such as clothing and hair to burn violently when ignited.

Combustible gases or vapors can accumulate within confined space when there is inadequate ventilation. Gases that are heavier than air will accumulate in the lower levels of a confined space. Therefore, it is especially important that atmospheric tests be conducted at **all** levels of the confined space.

The work being conducted in a confined space can generate a flammable atmosphere. Work such as spray-painting, coating, or the use of flammable solvents for cleaning can result in the formation of an explosive atmosphere. Welding or cutting with oxyacetylene equipment can also be the cause of an explosion in a confined space. Oxygen and acetylene hoses may have small leaks, which could generate an explosive atmosphere and, therefore, should be removed when not in use. The atmosphere shall be tested as indicated on the Safe Work Procedures, while any hot work, painting or coating is being conducted within the confined space.

Toxic Atmosphere

Toxic atmospheres may be present within a confined space as the result of one or more of the following:

- **Substance Stored in the Confined Space**

When a substance is stored in a confined space, the substance can be absorbed by the walls, and release toxic vapors when removed or when cleaning the residual material. The substance can also produce toxic vapors, which will remain in the atmosphere due to poor ventilation

- **The Work Being Conducted in the Confined Space**

Toxic atmospheres can be generated as the result of work being conducted inside the confined space. Examples of such work include welding or brazing with metals capable of producing toxic vapors, painting, scraping, etc. Many of the solvents used for cleaning and/or degreasing produce highly toxic vapors. MSDS's should be referred to for materials used inside confined spaces.

- **Areas Adjacent to the Confined Space**

Toxic fumes produced by processes, including combustion engines or sources near a confined space may enter and accumulate in the confined space. Vehicles, portable engine driven welders and generators, and direct fired heaters should not be operated near the openings into a confined space. Toxic generating processes should be shutdown or the appropriate atmospheric testing equipment located in the confined space.

Engulfment with Product or Fluids

Entrants can be trapped or buried by dry bulk materials such as grain, sand, flour and sawdust. Steam, water or other gas or liquid could also enter the space. At Montgomery Power Management Inc. introduction of the raw Magnesite Ore and or final MgO products into the confined space must be isolated. Locking out, blinding or blanking, double block and bleed are common methods of isolating these hazards before entry.

Mechanical and Physical Hazards

Problems such as rotating or moving mechanical parts or energy sources can create hazards within a confined space. All rotating or moving equipment such as pumps, process lines, electrical sources, pneumatic and hydraulic sources etc., entering into or within a confined space must be identified and isolated accordingly. Locking out, blinding or blanking, double block and bleed, and grounding or common methods of isolating these hazards before entry.

Internal mechanical equipment, such as an open screw conveyor at the bottom of a dust collector is a hazard if the worker can fall on it, or can slip and get lodged into it, even if it is locked out. Fall protection, and/or additional safeguarding methods needs to be addressed.

Physical factors such as, dust levels, noise, vibration, fatigue, slipping hazards from slopes, uneven surfaces, liquids and frost and can contribute to accidents. These factors must be evaluated and minimized as necessary for all confined spaces.

Illumination Hazards

Most confined spaces are dark. Poor lighting makes it difficult to enter, exit and work in. Ground fault protected or low voltage lighting may be necessary to complete the work. The need for secondary lighting such as flashlights should be addressed at the Hazard Assessment level.

Temperature Hazards

Air temperature inside the confined space must be assessed as a hazard. Environments with an elevated temperature may lead to heat exhaustion or heat stroke. Environments that are sub zero in temperature may lead to frost bite, as well as additional slipping hazards due to frost or ice build-up.

Fall Hazards

Silos, Baghouses, Railcars and the Electrostatic Precipitator all have falling hazards associated with their confined space entry. All other confined space entries must be carefully analyzed during the hazard assessment to determine if this hazard exists. Fall protection requirements and the necessary equipment including rescue devices should be addressed in conjunction with the Fall Protection Plan to minimize or eliminate these hazards.

Lifelines can present a danger if they get tangled around equipment or wrapped around a protrusion in the confined space. Lifelines, in the event that they are required, may only be used in a manner that does not endanger a worker by creating another hazard.

Falling Object Hazards

Objects can fall into the space if topside openings are unguarded or improperly guarded and housekeeping is neglected. Objects falling out of the bottom side openings also need to be considered.

Traffic Hazards

Entrants within a confined space must be protected from traffic hazards such as idling vehicles situated outside the space that could contaminate the space with exhaust, lift trucks or skid steers that could damage rescue equipment, or moving vehicles around manhole areas that could interfere with the entrants safety.

Corrosive Materials or Chemicals

The nature of stored or materials or products introduced for the task inside the confined space must be addressed at the Hazard Assessment Level. Corrosive chemicals can cause eye or skin irritation if exposed entrants are not wearing protective clothing or the space has not been adequately cleaned out.