



## 1.0 Introduction

### 1.1 Purpose

This Lockout / Tagout Code of Practice (COP) provides a process to plan and safely manage the control of potentially hazardous energy sources. Strike has identified thirteen (13) Hazard Sources in our Hazard Assessment Awareness and Control (HIAC) program. Hazard Sources may include electrical, motion, pressure/energized, temperature, flammable/explosive, mechanical, gravity, chemical, or any other form of energy that could cause injury due to the unintended motion, energizing, start-up, or release of such stored or residual energy in machinery, equipment, piping, pipelines, or process systems.

The COP shall be used in conjunction with other applicable codes of practice and communicated through the hazard assessment process and tailgate meetings.

<b>PPE</b>	As per Hazards Identification, Assessment and Control (HIAC) methodology / Strike Standard
<b>POTENTIAL HAZARDS SOURCES</b>	Hazard Sources may include electrical, motion, pressure/energized, temperature, flammable/explosive, mechanical, gravity, chemical, or any other form of energy that could cause injury due to the unintended motion, energizing, start-up, or release of such stored or residual energy in machinery, equipment, piping, pipelines, or process systems.

### 1.2 Application

This COP applies to all personnel working for Strike.

### 1.3 Training

Training for this COP requires review of the COP, review of the PowerPoint training tool with exercises, and satisfactory completion of the quiz in worker LOTO handbook. For quick reference the Key Points of this COP, workers can be provided a self-study handbook with quiz.

## 2.0 Definitions

<b>Blocked Energy:</b>	Energy is considered isolated or blocked when its flow cannot be reactivated by an unplanned event.
<b>Bump Test:</b>	This is an industry term that the equipment has been tested, verified and documented to ensure that it is inoperable and in a zero energy state.
<b>Control Device:</b>	The energy isolating device controlling the flow of energy to the machinery or equipment and includes, but is not limited to, switches, circuit breakers, valves and clutches. In the case of electrical controls, it means the device controlling the flow of current to the branch circuit that supplies power to the machinery or equipment. Individual control buttons or switches in

<b>Dissipate Energy:</b>	To cause energy to be spread out or reduced to levels not hazardous to workers
<b>End Device:</b>	Typically, a control valve or controlling mechanical device, e.g., flow control valve (FCV).
<b>Energy:</b>	For this COP, “energy” means mechanical motion; potential energy due to pressure, gravity or springs; electrical or thermal energy resulting from high or low temperature (mechanical work, radiation, chemical reaction or electrical resistance).
<b>Fail-safe:</b>	Refers to an “end device” failing in a safe mode should control medium be interrupted (e.g., vent valve, spring-loaded open, control valve, spring-loaded closed on a process unit).
<b>Hasps:</b>	A scissor clamp device to which multiple “personal” locks are typically attached to secure a point of control or lockout box from unauthorized
<b>Hot/Odd Bolting:</b>	Hot bolting is the sequential removal, cleaning, lubrication and refitting, or replacement of one bolt at a time in a flanged joint, when the system is pressurized or if the flange acts as secondary containment. Odd bolting is the sequential removal of alternate bolts from a flanged joint when the system is shut down, isolated and at low pressure or depressurized, but not necessarily gas-free.
<b>Inspection:</b>	The act or process of looking upon, viewing closely and critically, examining, or scrutinizing and evaluating (checking or testing machinery, equipment, systems, etc.).
<b>Isolate:</b>	Using a mechanical device to restrain, direct or dissipate hazardous energy
<b>Lockout Box:</b>	Specifically identified container to store and secure keys and spare keys for process or system locks. The lockout box is secured with the worker’s personal lock.
<b>Maintenance:</b>	The tasks necessary to keep a machine, process or system in a state of repair or efficiency. This activity may include inspection, servicing, repair, troubleshooting, set-up and other related activities.
<b>Operating Authority:</b>	The person having immediate/direct control and responsibility of the operations affected by the specific work activity.
<b>Performing Authority:</b>	The person performing the work or in direct charge of the work being performed. Common titles are Crew Leader, Job Foreman, Operator,
<b>Personal Lock(s):</b>	Uniquely keyed locks assigned to the worker to provide absolute control over a piece of equipment, process, or lockout box. Strike employees and ISPs will be issued a set of two personal locks as required. Site specifics may vary, but the intent is that the workers’ supervisor shall secure the spare keys to personal locks. All Strike Employees and ISPs (where required) on sites conducting work under the intent of this COP must have
<b>Point(s) of Control:</b>	The point or points from which energy-blocking, isolating, or dissipating devices are controlled.

<b>Process Locks:</b>	A set of locks having one common key used to isolate and secure in a safe, inoperable condition a process or system to be worked on. Process Lock keys must be secured in the lockout box and locked and tagged with all workers personal locks.
<b>Supervisory Control and Data Acquisition</b>	Allows control of pipelines or remote equipment from a single local point such as a control centre.
<b>Securing the Point(s) of Control:</b>	The points of control are secured to prevent unauthorized persons from reactivating the flow of energy. Securing is a separate and distinct action from isolating or blocking the energy sources. The use of locks, tags, restricting access or a combination of these methods shall secure the points of control to render a service inoperative
<b>Service:</b>	Defined as repair or maintenance. The definition of service is synonymous with maintenance; however, service (as used in this COP) refers to the activities needed to keep a machine, process, or system in a state of efficiency (e.g., changing crank case oil, greasing, cleaning, painting,
<b>Solenoid:</b>	Electrical end device that may isolate a control medium.
<b>Worker:</b>	Anyone conducting work on behalf of Strike; may include employees, ISP's, contractors, and subcontractors.
<b>Zero Energy:</b>	Equipment shall be considered in a zero energy state only when all sources of energy have been isolated, blocked, dissipated, locked and tagged. A zero energy check shall be performed to verify equipment is inoperable, prior to work commencement.

### **3.0 Responsibilities**

The overall objective of the Lockout Tagout COP is to prevent injury to anyone working on site. To accomplish this, the intent of the COP is to identify the energy sources, and set minimum standard for the development of specific lockout procedures at the work site. It allows for all personal working on a task or project to test energy sources to ensure they are at zero energy, and specifies the responsibilities of each employee. The intent is for each person to have control over de-energizing hazards, so they are safe from injury/illness whenever they are in the process.

#### **3.1 Operating Authority**

Operating personnel are responsible for the preparation of equipment, the release of equipment, the safety of the environment in which the work is performed and shall ensure that:

- Energy sources are identified and isolated, or blocked.
- Stored energy is dissipated prior to the beginning of maintenance work.
- Equipment is checked for zero energy to verify it is inoperable.
- This typically the owner of the facility and or job-site
- In certain situations, this may be a concurrent operation with owner and prime contractor.

#### **3.2 Performing Authority**

The performing authority shall ensure and verify prior to starting work that:

- Energy sources have been identified, isolated and/or blocked by Operating Authority.
- Stored energy is dissipated.
- Equipment is checked for zero energy to verify it is inoperable.
- Subsequent zero energy checking may be requested by workers new to the work being

performed. If done, **all other workers must be removed from equipment and/or process prior to another zero energy check.**

- All personnel are clear of hazards before re-energizing the machines or systems.
- Procedures for lockout and tagging are used and they meet the intent of this COP.
  - (Refer to Appendix B Lockout / Zero Energy Sequence / Responsibility Table and which is the Safe Work addendum which reviews the isolation and securement agreement between Operating and Performing authorities. It must accompany the Safe Work Permit.)

All the above reasonability's must be reviewed with the customer and meet their lock out policy.

### **3.3 Project Superintendent / Project Manager – Site Supervisor / Foreman**

The Project Superintendent / Project Manager – Site Supervisor shall ensure that:

- Procedures are available and the expectations of this COP are communicated to all workers.
- Site-specific procedures are developed and reviewed to meet any unique work site requirements and the intent of this COP.
- A documented process of securing and managing the "spare" keys for workers' personal locks is in use.
- All employees' under their supervision know and understand the lock out procedures.
- The necessary lock out equipment is available.
- Each employee that needs to lock out has their own personal lock(s).
- Locks are clearly identified with the company name and number and/or employee name.
- The zero energy check is carried out between the client and the project supervisor and reviewed at the tailgate with all employees.
- To ensure that lock out removal is done by the employee's and customers that have locks on the system that is locked out.
- To ensure that lock out tags are removed after a determined amount of time.

### **3.4 Employee**

- Reviewing with operations/construction/ Project Superintendent /Project Manager on what needs to be locked/tagged.
- Locking out and testing identified isolating devices to obtain zero energy prior to entry.
- Removing their personal lock upon completion of the work.
- Identify improvements and changes that should be made on the lock out program.

### **3.5 HSE Department**

- Assist in the selection and purchasing of the lock out equipment.
- Ensuring the employee training takes place and training records maintained.
- Evaluate the effectiveness of the program.

## **4.0 Practices and Guidelines**

### **4.1 Facilities**

Facilities (at Business Units or Fabrication Shops) shall have appropriate sets of process locks; each set having its own common key and an identifying system. Consider using CF-S-64 for documenting and to assist in tracking where appropriate.

### **4.2 Field/Maintenance Personnel**

All workers shall have their own personal locks assigned to provide absolute control as necessary

over a piece of equipment, process, or lockout box. Tags will be available to provide appropriate lockout information.

### **4.3 Duplicate Keys & Lock Removal Process**

As a rule, Strike does not issue duplicate keys. However, if and when duplicate keys are issued, they will be maintained by the Site Supervisor or alternate in a locked box/cabinet along with a logbook.

If a worker installs a personal lock but is not readily available to personally remove that lock, a Lock Removal Form (CF-S-66) must be completed to provide proper authorization to another worker for the lock removal.

A foreman or designate and the operating authority representative will inspect the area, equipment, or process to verify that it is safe to remove the lock.

If there is only one person available (e.g., at remote locations), the foreman or designate may approve the lock removal by one person. In this situation, communication with the operating authority must take place prior to lock removal.

The preference is for two workers to perform the lock removal process.

All sections of the Lock Removal Form must be completed and signed where applicable.

Records must include:

- Validation that the worker owning the personal lock has been located and/or definitively confirmed to be absent from the work site and/or in no way potentially exposed to any hazards with the removal of the lock.
- In the case of process locks, the reason for needing to access the duplicate key. Similarly, confirmation that worker safety will not be jeopardized.
- The name and signature of the worker issued the duplicate keys.
- The time and date the duplicate keys are accessed and returned.
- In cases of lock removal by a single person, a record detailing the process where communication/approval to remove was made with the operating authority must be created and retained.

### **4.4 Use of System of Locks and Tags**

A system of locks and tags shall be used to indicate condition or status of equipment.

- Before commencing services, testing, adjustments, inspections or repair work on any energy driven equipment, locks and tags shall be applied to ensure the equipment is secured in an inoperative condition.
- Equipment is considered to be inoperative only when all sources of energy are isolated, blocked, dissipated, locked, tagged, and zero energy check to verify. Energy sources include pressure from - steam, air, oil, fuel, etc.; electrical from - motor starters, breakers, rectifiers, etc.
- Appropriate tags and locks shall be attached to equipment controls, electrical switches, unblinded valves or other devices that could introduce energy, shock or other hazards into the work area.
- The tag and lock system shall warn that the control is not to be changed, that the equipment is out of service and that any change in control or attempt to operate the equipment would endanger life and property.

- Tags shall be signed and dated by the individual installing them
- Flagging is **NOT** tagging; it can be used for bringing attention (hi-visibility) to equipment but cannot be used in place of tags.

The **DANGER - DO NOT REMOVE** tag is used in conjunction with a lock and identifying system, including name and date.

#### 4.5 Zero Energy Check – Verify Equipment is Inoperable and in Zero Energy State

- All equipment shall be tried and verified (zero energy check) that it is inoperable and in a zero-energy state before any servicing or maintenance work begins.
- "Test Switch" used should be the closest switch to the equipment being locked out.
- In the case of a SCADA system, the test switch must be locked and tagged in the 'Off' position to prevent reactivating the system.
- The Operating Authority is responsible for ensuring equipment is locked out and zero energy check to verify and document that the equipment is inoperable.
- The Performing Authority is also responsible for ensuring the equipment has been locked out, zero energy checked and verified inoperable.
- Subsequent zero energy checks may be done for any worker new to the work being performed; however, **all workers must be removed from equipment/process** prior to another zero-energy check to ensure their safety.

#### Note:

- A locked valve cannot be considered as isolation for confined space entry purposes. Refer to Confined Space Entry COP-03 and Section 4.3 (in this COP) for Blinding/Blanking rules.
- Blinds will be tagged as per blinding list.
- If a locking-type valve is not installed or a line cannot be blinded/pancaked, then, to ensure "zero energy state", a piece of downstream piping must be removed and blinded where possible (otherwise tag). The upstream piping closest to the valve still has to be blinded, blanked or plugged.
- If equipment is to be left out of service for any length of time, valves shall be chained and locked where practical; where impractical, handles shall be removed.

#### 4.6 Critical Responsibility

Unauthorized removal of tags or locks is cause for discipline up to and including termination of employment.

Where repairs must be carried out on **live** equipment by a qualified electrician, the Safe Work Agreement or Permit **must** state in writing that the equipment is live and the safety precautions required must be identified. It is the responsibility of the Operating Authority and the Performing Authority to discuss the necessary safety precautions.

**Note:** Only qualified personnel as specified by the Canadian Electrical Standards Code can perform work on any **live** electrical equipment.

### 5.0 Lockout Application Requirements

#### 5.1 Hardware

##### a) Tags:

- Must identify date and individual that locked-out equipment.



- Must be highly visible and attached to the lock or lock out box.

**b) Personal Locks:**

- Must meet the intent of securing the point of control when used alone or with chain, bar, clamp or bonnet.

**c) Scissor Clamp / Hasps:**

- Must be able to accept multiple locks.
- Must secure point of control.

**d) Lock Boxes:**

- Typically the point of control.
- Used for group lockout where it is impractical to install individual locks.
- Designated worker(s) would lock out equipment and put the Process lock keys in a lock box; the other workers involved would lock out the "lock box" with their personal locks. *Preference is that two workers would perform this task.*

**5.d.1 Multiple Trade Interfaces**

- Individual tradespersons must use their own lock(s) and key(s). This may include helpers.
- If the key to a padlock is lost, report the loss immediately to the operating or performing authority.

**e) Blinding and Blanking Rules**

The standard practice for isolation of pipes, pipelines, equipment and vessels must be used to select the appropriate isolation method.

- Hot/Odd bolting practices/procedures are not acceptable for piping/vessels that contain pressure and/or toxic atmospheres.

**6.0 Isolation Methods****6.1 Blind/Blank or Plug**

Blinding/blanking or plug is the preferred method for isolating equipment for work purposes. A blind/blank tag system must be used in all facilities. When a blind/blank is being installed, the following are critical:

- Site-specific blind/blanking procedures must be followed.
- Spec/proper pressure rated blinds/blanks and gaskets must be used. "Home-made" are not allowed.
- Gaskets must be installed on the pressure side and, where possible, on the both sides to prevent damage to flange faces.
- Confined space entry – only **Blind/Blank or Plug** or **Disconnect and Plug** is acceptable.

**6.2 Disconnect and Plug**

Disconnect and Plug is an alternative (to Blind/Blank) for isolating equipment for work purposes. A blind/blank tag system must be used in certain operations; this tag system must also be used for identifying disconnect and plug locations.

Confined space entry – only **Blind/Blank or Plug** or **Disconnect and Plug** is acceptable.

### **6.3 Double Block and Bleed**

If installing blinds/blanks creates a hazard and disconnect and plug is impractical, the recommended alternative for isolating equipment is closing double (block) valves with a bleed valve in-between.

- The bleed valve size between the block valves must be sufficient (i.e., same size) to handle potential upstream block valve leakage without applying pressure to the downstream block valve.
- Block valves must be locked and tagged in a closed position and the bleed valve must be locked and tagged in the open position.
- Bleed valve outlets must be vented to atmosphere and consideration must be given to the vent location to ensure it is safe.
- Double block and bleed cannot be used to isolate critical hot work in British Columbia. Refer to provincial regulations outside of Alberta.

### **6.4 Single Block Valves with Authorization**

Strike requires the use of a double block and bleed wherever possible. Where a double block and bleed has been deemed not possible by the Operating Authority, work can be completed on a single block only when approved by the Strike Operations Vice President. This approval must be based on a documented risk assessment complete with written, site-specific procedures which meet all jurisdictional code requirements (e.g., Alberta OHS Code requires the process be certified as appropriate and safe by a professional engineer).

- Close the inlet valve and the outlet valve and then de-pressure the equipment.
- You must verify that the valves hold before work commences. Valves must be locked closed and tagged.

### **6.5 Alternative Methods for Isolation and Tasks Certified by Professional Engineer**

Isolation and tasks that are unique requires the expertise of and be certified by a Professional Engineer to ensure that the equipment isolation meets safety requirements and OHS Regulations. The method must be documented and signed-off by a Professional Engineer and retained in site office and/or business unit.

### **6.6 Isolation of Additional Energy Sources**

Consideration must be given to additional sources of energy such as motion (oscillation, rotation, etc.) (Refer to Appendix C for Additional Energy Isolation Methods.)

### **6.7 Remote Application**

SCADA systems and automatic operated equipment that is activated with gas, air, hydraulics or electrical power are not considered “locked-out” unless:

- They are rendered inoperable by physically disabling or disconnecting the control medium.
- They are locked-out and tagged at the control point.
- Solenoid systems: “Warning”, solenoids and electrical assist devices are not



- considered locked-out or fail- safe unless:
- Electrical power supply is disconnected.
  - Hydraulic, air, gas or other control medium is completely disconnected, or energy dissipated (mandatory).

This will ensure that leakage through a solenoid device will not activate the end device.

### **6.8 Sequencing**

When a correct sequence of lockout and isolation is required, sequences must be identified on a site- specific shut down procedure and the correct order established.

### **6.9 Related Practices/Procedures**

Site specific procedures apply in all lockout/tagout activities. Also, the following COPs and procedures may be required and utilized during lockout/tagout activities:

- Confined Space Entry COP (Refer to Strike Codes, SWP, SJPs).
- Site-Specific Procedures (equipment, welding, etc.).
- Regulations applicable to the work being carried out.

### **6.10 Returning to Operations**

A person must not remove a personal lock or other securing device unless:

- The person is the worker who installed it.
- The person is the designated worker.
- The person is acting in accordance with the Provincial OHS regulations.

### **6.11 Implementation**

To effectively implement your site lockout/tagout zero energy procedures, you must ensure the following:

- a) Each person directly involved in the activity has been supplied with lock(s).
- b) Locks must be keyed differently (and will be identified according to functional group).
- c) The Site Supervisor has control of all master keys and duplicates.
- d) Locks are signed out and returned to the applicable lock station upon completion of job.
- e) An adequate supply of lockout tags is available.
- f) A complete review of this COP and related practices has taken place with all applicable workers.

### **References/ Additional Information**

- Canadian Standards Association Z294-05

### **Alberta Occupational Health and Safety Code**

- PART 15 Managing the Control of Hazardous Energy

### **BC Occupational Health and Safety Regulations**

- PART 10 De-energization and Lockout



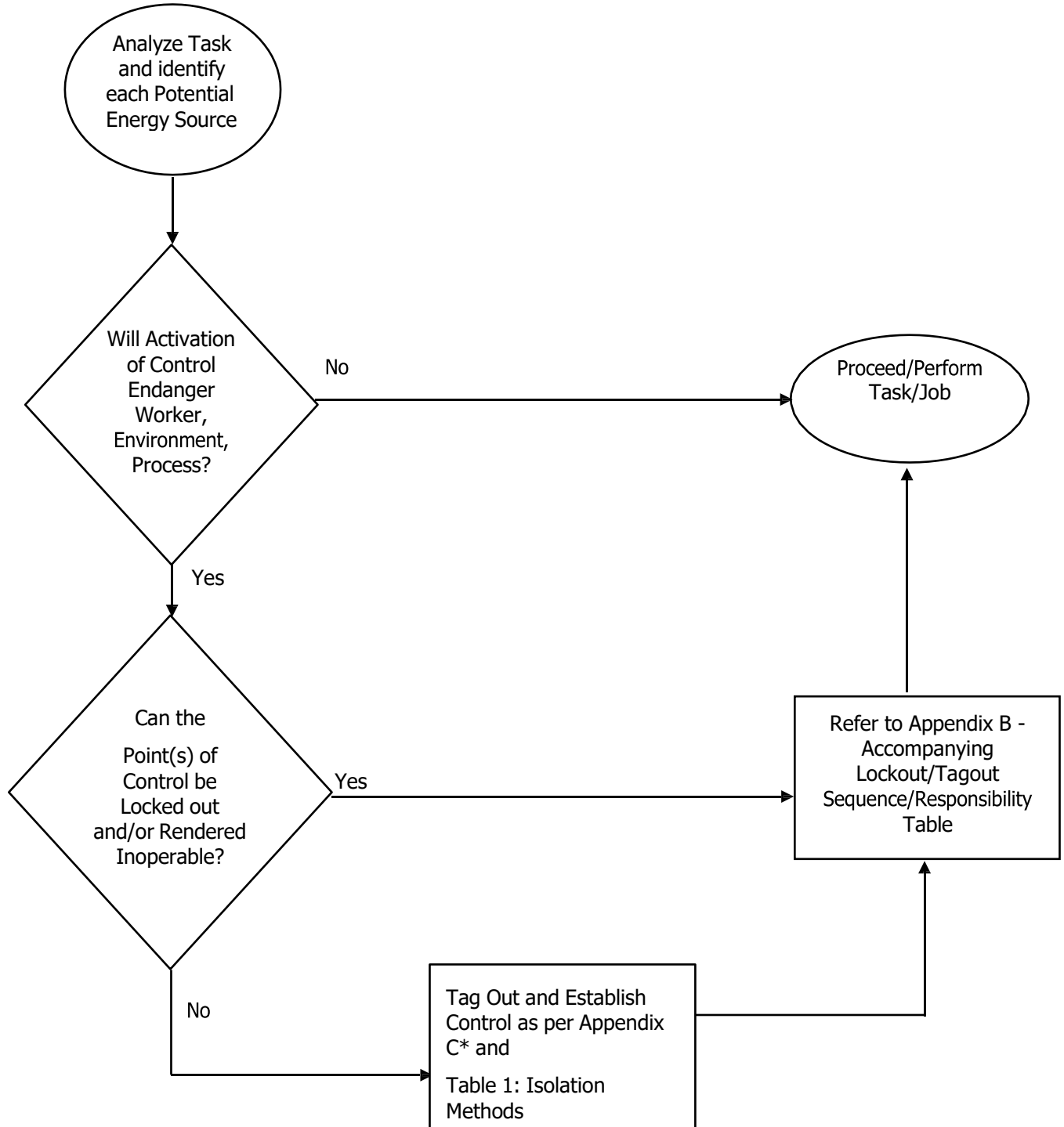
**Manitoba Safety and Health Regulations**

- PART 16 MACHINES, TOOLS AND ROBOTS

**Saskatchewan Occupational Health and Safety Regulations**

- PART 10 Machine Safety

**Appendix A: Lockout / Tagout Decision Chart**



\*Appendix C - Alternate Energy Sources Isolation

**Appendix B: Lockout / Zero Energy Sequence / Responsibility Table**

Steps	Controls	Operating	Performing
1. Analyze task/job and identify all applicable energy	As per decision chart. Appendix A	R	R
2. Shut in appropriate equipment		R	I
3. Identify and tag isolation (points of control), initial	Tags must be dated and signed with reason for installation. Name of person who installed.	R	I
4. Dissipate energy sources.	By venting, blocking, etc.	R	I
5. Isolate, depressure, purge, dissipate or block all energy sources.	Blinding, purging procedures, open vents, etc. (Refer to Appendix C: Isolation Methods)	R	I
6. Install locks.	Documentation.	R	R
7. Secondary verification of appropriate	Walk-through, blind list, checking vent (atmosphere	I	R
8. <b>Zero Energy Check</b> (power on, open vent, etc.).	Absolute assurance by both authorities that equipment is inoperable. If any worker desires a subsequent zero energy check, further	R	R
9. Conduct work.	As per Safe Work Permit or Agreement.	I	R
10. Inspection prior to lock/tag removal.	Ensure no other workers in potentially hazardous	R	R
11. Removal of lock/tag and/or control system.	Performing Authority first and <b>Operating Authority last.</b>	R	R
Legend: <b>R</b> – Responsible to do <b>I</b> – Must be informed			

**Note:** If sequence of isolation is critical in isolating a specific system, develop a written site-specific procedure. Vessel Cleaning and/or Entry – require lockout procedures including **blinding/blanking** and **purging**.

**Appendix C: Additional Energy Sources Isolation**

Hazard Source /Energy Type	Method of Isolating/Blocking Energy	Method of Securing the Point of Control	Remarks
<b>Motion, Rotation, Translation, Linear, Oscillation</b>	a) Remove segments of operating mechanical linkage such as dismantling push rods and removing belts and flywheels.	Tag the linkage and place them in locked cabinets away from machine.  <b>OR</b>  Attach danger tags where the linkages were removed and restrict access to necessary personnel.	
	b) Use blocking devices such as wood or metal blocks.	<b>OR</b>  Post a person to protect against unauthorized reinstallation of the linkages.  Chain or lock in point of control or use metal pins driven or welded in place.  <b>OR</b>  Post a person to protect against unauthorized removal of the blocking devices.	
	c) Remove power or energy from the driving mechanism such as: i. Disconnect main electrical source.	A. Padlock in the "off" position.	Check for alternate sources of power.
	ii. Close hydraulic or pneumatic valves, bleed.	B. Disconnect pneumatic and hydraulic lines and tag.  <b>OR</b>  Post a person to protect against unauthorized reconnection of the energy sources.	Check for residual pneumatic and hydraulic energy.



Hazard Source /Energy Type	Method of Isolating/Blocking Energy	Method of Securing the Point of Control	Remarks
<b>Electrical</b>	a) Place the main electrical disconnect switch in the "off" position.  b) Remove segments of electrical circuit, such as printed circuit modules.	Secure by a padlock, a clip and padlock, or a bar and padlock.  Tag the module and place in a locked cabinet away from the control center and tag the control center door.  Have a person remain at the control center to protect from unauthorized installation of a spare or replacement module.	Check for alternative sources of power.
<b>Temperature</b> Thermal (steam)	Close valves and maintain an open bleed vent.	Chain and padlock valve or use blind flanges or slip blinds.	Allow time for residual heat to dissipate.
<b>Potential Pressure</b>	Close valves and maintain open vent to relieve.	Secure, block, blind flange, slip blind or valve with locking device.	
<b>Potential Gravity</b>	Block in place by using metal or wood blocks under the mechanism or pin the linkages in a position where gravity will not cause the mechanism to inadvertently fall.	Secure, block, or pin with a locking device.  <b>OR</b> Station a person at the mechanism to prevent unauthorized removal of blocks and pins and reinstallation of linkages.	Lowering to a point where gravity could no longer cause inadvertent falling to dissipate energy.
<b>Potential Springs</b>	Block in a safe position by pinning or clamping the device eliminating the potential of unrestricted and undesired travel.	Secure pin or clamp in place with a locking device.  <b>OR</b> Station a person at the control point to protect against pin or clamp removal and unauthorized activation of the spring mechanism.	Spring energy may be dissipated by release or dismantling of the mechanism.



