

Mount Royal University: Safe Work Procedure		
Control of Hazardous Energy (Lockout / Tag Out)		
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**SAFE WORK PROCEDURE:
CONTROL OF HAZARDOUS ENERGY
(LOCKOUT / TAG OUT)**

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PREAMBLE

The unintended release of stored or kinetic energy from electrical, mechanical, hydraulic, chemical, nuclear, thermal, or gravitational sources can cause severe injuries, or even death. The use of a lockout / tag out (LOTO) procedure will help prevent:

- Contact with a hazard while performing tasks that require the removal, by-passing, or deactivation of safe guarding devices
- The unintended release of hazardous energy (stored energy)
- The unintended start-up or motion of machinery, equipment, or processes

This safe work procedure outlines the steps to take to safely isolate sources of energy so that tasks can be performed safely by employees.

SCOPE

This procedure applies to all MRU employees when performing applicable work on behalf of the University. Prime contractors working on MRU property shall have their own LOTO procedure in place that they and their subcontractors are required to follow when applicable. In cases where MRU-owned equipment must be locked out for a contractor to perform their work, the MRU procedure will be followed.

This procedure does not apply to the following:

- Work on plug-connected electrical equipment where the unexpected energization or start-up is controlled by unplugging the equipment and the plug is under the direct control of the employee performing the work
- Minor servicing, tool changes, or adjustments that do not have potential to cause injury or property damage if equipment is run while the task is being completed.

LEGISLATION

Alberta's Occupational Health and Safety (OHS) Code outlines requirements for LOTO procedures in Part 15, Managing the Control of Hazardous Energy, Sections 212 to 215.

RESPONSIBILITIES

Executive (President, Vice-Presidents):

- Provide management support and leadership necessary to provide a safe and healthy working environment for employees and students, in compliance with the Mount Royal Environmental, Health and Safety Policy.
- Ensure that adequate resources are available to implement appropriate measures.

Associate Vice-Presidents / Deans / Directors / Department Managers:

- Ensure that this safety procedure is communicated to affected employees.
- Ensure that this safety procedure is understood and followed by affected employees.

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- Identify tasks or processes that require the use of this procedure.
- Supply LOTO devices to employees as required.
- Ensure required documentation and records are maintained.
- Ensure only trained and competent employees are authorized to perform work requiring LOTO procedures.
- Ensure that contractors who perform work requiring LOTO have a suitable program or procedure in place, and that workers who perform work requiring LOTO are trained and competent.

Supervisors / Chairs:

- Ensure employees required to perform work requiring LOTO procedures are provided with appropriate training and mentorship.
- Ensure only trained and competent employees perform work requiring LOTO.
- Provide equipment / machine specific LOTO procedures when manufacturer's procedures are unavailable. A Safety Lockout Procedure Form template is provided in Appendix A.
- Ensure employees understand and follow the safety procedures as outlined.

MRU Employees (Staff, Faculty, or Volunteers):

- Complete required training.
- Follow written LOTO procedures.
- Never remove locks belonging to another employee or contractor.
- Notify the supervisor if there are questions or concerns, if locks or keys are lost, or if procedures are violated.
- Assist in the development of equipment / machine specific LOTO procedures when requested.

Contractors:

- Ensure that their workers who perform work requiring LOTO are trained and competent.
- Have a LOTO program or procedure in place for their equipment, when required.
- If a contractor requires MRU property to be locked out to complete contracted work, coordinate with the MRU Project Manager to ensure LOTO is completed as per MRU procedure.
- Provide their own locks.

Environmental, Health & Safety (EH&S):

- Provide assistance and guidance to departments regarding LOTO procedures.
- Work with supervisors to coordinate LOTO training for employees.
- Review and maintain the LOTO procedure.

TYPES OF HAZARDOUS ENERGY THAT REQUIRE CONTROL

Hazardous energy is defined as any form of energy that could cause injury to personnel due to the unintended energizing, start-up, or release of stored or residual energy in machinery or equipment. Types of energy include:

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- Electrical – energy from electricity; may be stored in live power lines, batteries, or capacitors
- Mechanical – energy from moving parts, such as springs under pressure
- Pneumatic – energy stored within pressurized air, such as spraying devices or power washers, or in pressurized lines
- Hydraulic – energy stored within pressurized liquids; may be found on hydraulic lines on equipment
- Chemical Energy – energy released when a substance undergoes a chemical reaction; usually released as heat and can cause fire or explosion
- Thermal Energy – energy related to temperature; may come from an explosion, flame, high or low temperatures, or radiation from heat sources
- Radiation – energy related to ionizing, low-frequency electromagnetic, optical, or radio-frequency electromagnetic radiation
- Gravity Potential – energy related to the mass of an object and its distance from the ground, i.e. machinery or equipment parts that might descend, slide, or fall if left unchecked, unblocked, or unsecured

PROCEDURE

Lockout / tag out (LOTO) is a systematic process that isolates hazardous energy from the worker. Only qualified and authorized employees can perform LOTO work.

Lockout is the installation of a physical lock or barrier that isolates the source of hazardous energy from the equipment, machine, or process that the employee is working on, ensuring that it is safe for the employee to work on the system. The lockout mechanism can be any device that has the ability to secure the energy-isolating device in a safe position.

Tag out is a labelling process used any time lockout is required. The process of tagging out a system involves placing a standardized tag on the system that provides the following information:

- Why the lockout/tag out is required? E.g. repair, maintenance, etc.
- Date and time of application of the lock and tag
- The name of the authorized employee who attached the lock and tag to the system

Tagging out a system without locking out is only permitted when there is no risk of injury or property damage if the tagged out system is operated. Examples include seasonal equipment shutdowns that do not involve personnel working on equipment.

STEP 1: PREPARE FOR THE SHUTDOWN

The authorized employee will:

1. Identify which sources of hazardous energy need to be isolated in order to complete the task.
 - a. This step must be performed by someone with knowledge of the task or process to ensure that all of the sources of hazardous energy are controlled prior to task start.

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- b. If there is a part of the task or process that you are unfamiliar with, contact your Supervisor for assistance. They or other senior workers who know the task or process may identify hazards or hazardous energy that you have missed.
2. Identify the types and magnitude of hazardous energy to be controlled and understand the hazards of that energy.
3. Identify the methods for controlling the hazardous energy.
4. Identify all isolation points and energy isolation devices to be locked out. Ensure remote computer and/or programmable computer logic controllers are considered.
5. Perform a Field Level Hazard Assessment, and ensure all other task and location hazards are controlled, including wearing the appropriate personal protective equipment.
6. Identify and obtain locks, tags, lockout devices, and other equipment required to perform the work.
7. Inform groups at MRU that may be affected by the shutdown. The communication should include:
 - What is going to be locked / tagged out
 - Why it is going to be locked / tagged out
 - The approximate duration that the system or process is expected be out of service
 - Who is responsible for the LOTO
 - Who to contact for more information

STEP 2: EQUIPMENT SHUTDOWN

1. The authorized employee shuts down the equipment or process following the manufacturer's specifications; if these are unavailable, in-house procedures are acceptable – use the form in [Appendix A](#) to draft in-house procedures.
 - a. Equipment shutdown involves ensuring that controls are in the “off” position and that all moving parts, such as flywheels, gears, and spindles have come to a complete stop.
2. Confirm that hazardous energy is mechanically isolated wherever possible; simply tagging out (without locking out) is only permitted when there is no risk to people or property if the system is operated.
3. Remove any stored energy still in the system, as per manufacturer's instructions or in-house procedures.

STEP 3: LOCKOUT/TAG OUT

All workers will:

1. Apply **LOCKS** and **TAGS** to each energy isolation device to ensure it is held in OFF position.
 - a. If a tag alone is used, additional safety measures that can provide the same level of safety as a lock must be employed. This might include removing and isolating a circuit element, blocking access to a controlling switch or removing a valve handle to reduce the potential for any inadvertent activation.
2. Write their name, the date, time and the purpose for the LOTO on the tag.

When the system's energy sources are locked out, there are specific guidelines that must be followed to ensure that the lock cannot be removed and the system cannot be inadvertently operated. These guidelines include:

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- Each lock should only have one key. A master key for group locks must be retained by the BOps Manager.
- There must be as many locks on the system as there are people working on it. For example, if a maintenance job requires 3 workers, then 3 locks should be present - each of the individuals should place their OWN lock on the system.
- Locks can only be removed by those who installed them, and shall only be removed using a specific process - see [Emergency Lock Removal Procedure](#) below.

Where the lockout will disrupt a significant portion of a building or buildings on campus (e.g. full building electrical shut down), Supervisor approval is required before and after LOTO. Complete the LOTO permit available in the Building Operations office (copy available in [Appendix B](#)).

STEP 4: DISSIPATION OF STORED ENERGY

After application of lockout devices, confirm that all stored or residual energy is released, disconnected, blocked, bled, restrained, or otherwise made safe. Remember to consider all types of energy (e.g. electrical energy in capacitors, mechanical energy in springs, and gravitational energy in elevated equipment).

STEP 5: VERIFY ISOLATION

Verify that the system is properly locked out before beginning any work on the system.

1. Ensure all affected employees are clear of the system, machine, or equipment.
2. Verify the system is isolated and cannot be activated or restarted by one or more of the following actions:
 - a. Manually operate control buttons or switches to start or operate the equipment. Turn controls back to off or neutral before proceeding.
 - b. Use test instruments to test circuits (should be done by a certified electrician)
 - c. Visually inspect the position or movement of parts to ensure that all movement has ceased and no potential energy remains (e.g. gravitational).
 - d. Visually inspect gauges or other indicators for residual pressure or thermal energy.

STEP 6: REMOVE LOTO DEVICES

Once the work on the system is complete, the LOTO devices can be removed, following steps below.

1. Verify that controls are in a neutral or "off" position, that all non-essential tools or materials have been removed, and that the equipment is operationally intact and safe to be restarted.
2. Ensure the work area is clear of anyone who may be harmed by start-up.
3. Remove locks and tags.
 - a. The workers that installed the locks must be the ones to remove them (an exception applies in the event of an emergency – see Lock Removal Procedure, below). It's also good practice to have those workers present when the system is re-started; this ensures that those working on the system are clear of the hazards when the system is restarted.
4. Energize the equipment.

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5. Notify groups affected by the shutdown that service is complete and the system is ready to restart.
6. Re-start system.

EMERGENCY LOCK REMOVAL PROCEDURE

Removing another employee's lock is a serious matter and is prohibited except in the case of an emergency. If you must remove another employee's lock, the following procedure must be followed:

1. Inform the Supervisor that a lock needs to be removed and that the person assigned the lock cannot be located.
2. The Supervisor will make every effort to contact the lock owner and document these attempts on the Abandoned Lock Removal Form available in [Appendix C](#).
3. If the person cannot be located and the area in question has been inspected and is clear of hazards, the lock may be removed.
4. A copy of the Abandoned Lock Removal Form and the lock information shall be forwarded to EH&S for follow up. Copies shall also be supplied to the Supervisor; the MRU Joint Occupational Health and Safety Committee; and the Local Safety Advisory Group (if applicable). A copy shall also be submitted to the contractor in cases where a contractor employee's lock requires removal.

TRAINING

Training in LOTO procedures, and access to LOTO devices and tags shall be provided to all employees who are required to use this training. Supervisors / managers will maintain appropriate records of employee training and competence.

Contractors are responsible to train their workers in LOTO procedures. Copies of the MRU procedure will be made available to contractors for their information and use, as required. Contractors will be advised that they are to follow MRU procedure when working on University projects that require LOTO of MRU property; they must supply their own locks for the procedure.

If any employee requiring knowledge in lockout has demonstrated a lack of understanding of the requirements and/or a failure to follow these requirements, they shall be required to participate in additional training prior to being allowed to engage in any work activity that requires LOTO protection.

DEFINITIONS

Affected Employee: An employee who operates or uses a machine or equipment on which servicing or maintenance is being performed under LOTO or who works in an area where such work is being performed.

Authorized Employee: An employee who is qualified to control hazardous energy sources because of their knowledge, training, and experience, and has been assigned to engage in such control. May refer to an employee or contractor.

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Employee: Volunteers or individuals who are engaged to work for the University under an employment or apprenticeship contract, including Faculty, Staff, exempt Employees, Management Employees, and Undergraduate, Graduate or Postgraduate students carrying out work for the University.

Energy Isolating Device: A mechanical device that physically prevents the transmission or release of energy, to or from a machine or equipment. This device usually de-energizes the machine or equipment and allows a padlock to be placed on it. A *lockout device* is used where a padlock cannot be placed directly on the energy isolating device. Energy isolating devices include: manually operated disconnect switches, circuit breakers; line valve; block. **Note:** Push buttons, selection switches and other circuit control type devices are not considered energy isolating devices.

Energy Source: Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational or other energy.

Hazardous energy: Any form of energy (including electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, and gravitational) that could cause injury to personnel due to the unintended energizing, start-up, or release of stored or residual energy in machinery or equipment.

Isolation: Ensuring all sources of hazardous energy for a piece of equipment or machinery are moved or controlled to prevent it from unexpected activation or energization.

Lockout: Isolating the energy source or sources from equipment, dissipating any residual energy in a system, and securing the isolation by a device that is operated by a key or other process.

Lockout Device: A device that can be placed on an energy isolating device and that allows a positive means, such as a lock, to be placed on it to control the energy isolating device.

Servicing and/or Maintenance: Activities such as constructing, installing, setting up, adjusting, inspecting, modifying and/or servicing machines. This includes activities such as lubrication, cleaning or unjamming of machines or equipment and making adjustments.

Supervisor: A person who has charge over a workplace or authority over a worker. Depending on the particular reporting relationship, a Supervisor includes, but is not limited to any of the following: Manager, Associate Dean, Director, Vice President or President.

Tags: The “Do Not Operate” tags or other similar label used to indicate that the device is not to be operated. The use of “Do Not Operate” tags in place of locks is only permitted when there is no risk of injury or property damage if the tagged out system is operated.

REFERENCES

Canadian Centre for Occupational Health and Safety, Lockout / Tag out

<https://www.ccohs.ca/oshanswers/hsprograms/lockout.html>

Canadian Centre for Occupational Health and Safety, Hazardous Energy Control Programs

https://www.ccohs.ca/oshanswers/hsprograms/hazardous_energy.html

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Canadian Standards Association (CSA) Standard Z460 Control of Hazardous Energy - Lockout and Other Methods.

University of Regina, Lockout / Tag Out Procedures, March 2013.

REVISION HISTORY

Date	Revision	Notes
September 2019	01	Creation of Safe Work Program

APPENDICES

[Appendix A: Equipment Lockout Procedure Form](#)

[Appendix B: Lockout / Tag Out Permit](#)

[Appendix C: Abandoned Lock Removal Form](#)

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APPENDIX A: EQUIPMENT LOCKOUT PROCEDURE FORM - TEMPLATE

Supervisors must ensure that LOTO procedures are prepared for machines and equipment. When manufacturer's procedures are available, they may be used. Otherwise use the Safety Lockout Procedure template to create an internal procedure. A sample copy of the template is below; the current version can be found on the [EH&S website > Safety Resources > Forms](#).

Post a copy with the equipment and keep a copy in the Department Office.

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Equipment Lockout Procedure			
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<i>To be completed when internal lockout / tag out procedures are required. Post with the machine / equipment and keep a copy in the Department Office.</i>			
Building / Room Number:		Date:	
Machine / Equipment:			
Department:			
<i>See reverse for review of LOTO procedure steps</i>			
Energy Source <i>What needs to be controlled?</i>	Lockout Location <i>Where is it locked out?</i>	Steps for Locking Out and/ or Releasing Energy <i>What steps must followed to complete the LOTO and dissipation of energy?</i>	Verification Procedure <i>How do we verify the system is isolated?</i>

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APPENDIX B: LOCKOUT / TAG OUT PERMIT

Below is a sample of the LOTO permit. The current version can be found on the [EH&S website > Safety Resources > Forms](#).

	Lockout Tag Out Permit		
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LOCKOUT / TAG OUT PERMIT

*Required when extensive shutdown operations are required
(e.g. entire buildings or wings on campus, tasks involving multiple workers).
Post at worksite for duration of task and file in the Department Office when work is complete.*

Work Location:	Date:
Scope of Work:	
Campus Areas Affected:	
Estimated Duration of Work: <i>Limit to one shift per permit</i>	
Employee(s) Performing Work:	
Equipment Lockout Procedures Available? <i>Manufacturer's procedures or internal</i> <input type="checkbox"/> Yes <input type="checkbox"/> No	
All Energy Sources Locked / Tagged Out, Stored Energy Released, and Isolation Verified? <input type="checkbox"/> Yes	
Permit Authorizer: <i>Supervisor Name / Signature</i>	
Work Complete, Workers Clear, Equipment Operational and Safe to Start, Locks Off? <input type="checkbox"/> Yes	
Work Complete: <i>Supervisor Name / Signature</i>	

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APPENDIX C: ABANDONED LOCK REMOVAL FORM

Below is a sample of the Abandoned Lock Removal Form. The current version can be found on the [EH&S website > Safety Resources > Forms](#).

 <p>MOUNT ROYAL UNIVERSITY 1910</p>	Abandoned Lock Removal Form		
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It is the responsibility of authorized employees to remove their own lock at the end of the workday and/or completion of the task. If an authorized employee forgets to remove their lock before leaving MRU, the Supervisor must:

1. Contact the authorized employee (or in the case of a contractor, the contractor's supervisor) to verify that the employee has left MRU and inform the authorized employee that their lock is being removed.
 - a. The Supervisor must make all reasonable attempts to reach the employee prior to removing their lock. If the authorized employee cannot be contacted but the Supervisor has confirmed that the employee is no longer on site, the Supervisor shall continue to the next step.
2. The equipment will be inspected and if it is deemed to be in safe working order, the Supervisor may remove the lock and restore energy to the equipment.

Department: _____

Lock Location: _____

Authorized Employee: _____

Date Lock Removed: _____

Authorized Employee Notification Verification:

Notified by (check one): Phone Text In Person

Date: _____ Time: _____ am / pm

Supervisor Signature: _____

Authorized Employee Signature: _____ (when available)

Original to be retained by the Supervisor.

Copy to be provided to the authorized employee (or contractor supervisor) for their records.