VICTORIA UNIVERSITY
HEALTH AND SAFETY PROCEDURE

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LOCKOUT TAGOUT PROGRAM

PURPOSE

The purpose of this policy and program is to outline the required steps to be taken to ensure that all Victoria University employees/students/visitors and/or contractors are protected against the unexpected and release of, and exposure to hazardous forms of energy. Examples of areas/activities that may result in the release hazardous energy may include but are not limited to;

- Maintenance, repairs and servicing;
- Construction, installation and testing;
- Setting up, dismantling and disassembly;
- Unlocking, corrective maintenance and cleaning;
- Control setting, adjustment and diagnosis.

SCOPE

This procedure applies to all workers / contractors that are involved in managing, administering or completing work on energized equipment.

This procedure applies to all hazardous energy sources: kinetic, chemical, potential, thermal, electrical, pneumatic, hydraulic, radiation.

This procedure applies to all locations within Victoria University and any contractors working in these facilities.

Energy Isolating Devices

Victoria University shall ensure that energy isolating devices are:

- equipment is designed, supplied, and installed with energy-isolating devices that are capable of energy isolation and dissipation (e.g., manually operated, exhaust-type pneumatic valves). NOTE: Control devices subject to single point failure are not to be used as energy-isolating devices, e.g., emergency stop push buttons, ON/OFF switches, selector switches, etc.
- ensure that existing equipment that has been identified as having energy-isolating devices that are not capable of controlling and/or dissipating hazardous

energy shall be retrofitted to ensure compliance with this procedure

- shall ensure that a means shall be provided to ensure that the energy-isolating device is secured in an effective isolating position and prevents operation of the device, e.g., lockout devices that clamp-on or cover the energy-isolating devices in the “CLOSED” or “OFF” position that accommodate the use of a lock and tag (e.g., plug covers, ball valve covers, etc.).
- equipment with stored and residual energy is designed or supplied with the appropriate, safe means for dissipation or restraint of hazardous stored or residual energy, e.g., gravity, stored pneumatic or hydraulic energy, etc.
- that manually installed safety blocks, pins or rods, blanks, or chains must be capable of with-standing the applied forces.

Lockout Tagout Devices and Hardware

Locks used to control hazardous energy shall be purchased by Victoria University with locks and other LOTO equipment being distributed by the applicable manager of the department, and shall:

- Be made available to all authorized individuals
- Be standardized in size and type
- Not be used for any other purpose
- Be keyed differently
- Have one key (no master, duplicate or spare keys).

Tags used a means to communicate that a lockout is in effect shall be:

- Made of non-conductive material
- Secured to prevent its inadvertent removal
- Made of a material that can withstand that environment it is in
- Maintained in a legible condition.

Victoria University shall ensure that applicable hardware devices to assist in the control of hazardous energy shall be procured such as:

- Valve covers
- Hasps
- Blocks and pins used to restrain potential energy
- Lockout boxes (for group lockouts)
- Devices to control fuses

ROLES AND RESPONSIBILITY

Knowledgeable Person (Associate CAO, Infrastructure & Sustainability)

- Provides technical assistance to carry out the LOTO Policy and Procedures.
- Maintains a current master list of all equipment requiring LOTO.
- Provides technical assistance to carry out this guideline

- Maintains training records and a current list of all authorized individuals.
- Provides training for supervisors on LOTO procedures and legislative requirements, or select a knowledgeable person to deliver this training.
- Selects a knowledgeable person(s) or vendor(s) to deliver training for supervisors on LOTO procedures and legislative requirements, and to validate and approve the equipment specific LOTO Procedures.
- Ensures that all potential Energy hazards are evaluated, the necessary precautions taken, and that personnel assigned to isolate energy sources are properly trained prior to any work being done on machinery, equipment or process;
- Provides locks, tags and other hardware require for LOTO activities to employees;
- Implements written procedures where required;
- Verifies that the procedure is in use.

Authorized Individual (Worker, contractor)

- a person who is qualified to engage in hazardous energy control because of the knowledge, training and experience and has been assigned to engage in such control.
- Follows and adheres to the LOTO program, and performs the designated lockouts as trained, keeping control of the keys to their personal locks while conducting LOTO activities
- Brings forward any issues regarding the LOTO Policy and Procedures to the attention of their Supervisor, Knowledgeable Person, Health and Safety Management and/or Health and Safety Officer – as applicable.
- Supports LOTO Hazardous Energy Assessments (along with Knowledgeable Person and Supervisor) and provide feedback for modified lockout procedures at any new or modified equipment.
- Report any deficiencies or omissions in lockout program or machine specific instructions.

Affected Individual (worker)

- are not directly involved in the work requiring the hazardous energy control, but who are (or may be) located in the work area
- Affected employees are not authorized to perform control of hazardous energy procedures or activities (i.e. lockout/ tagout).
- Affected employees are not to remove or otherwise tamper with any lockout or tag out energy isolation devices, or hardware.
- Do not attempt to start or re-energize equipment that is de-energized and/or locked-out. Affected individuals must always ask their supervisor if there are any questions regarding equipment that is de-energized and locked/tagged-out.
- Report any safety hazards to the supervisor.

PROCEDURES

ISOLATION PROCEDURE FOR ALL ENERGY SOURCES

Isolation of energy sources takes place before starting work on any machinery, equipment or process. Isolation of energy sources is a 7 step process (CSA Z460).

1) Prepare for Shutdown
    a. Identify all hazards (including stored energy)
    b. Identify type/magnitude of energy to be controlled
    c. Establish a means of controlling the energy
    d. Notify all affected persons in the area that the equipment is to be shut down and locked out
2) Shut Down Equipment
    a. Shut down equipment as per established shutdown procedures
        i. shutting down equipment by pressing the machine STOP button,
        ii. closing valves, etc. and
        iii. waiting for all moving parts to come to a complete stop
3) Isolate Equipment
    a. The machine, equipment or process must be isolated by following isolation procedures
        i. Devices that are required for isolation should be identified
        ii. Isolate the system from every source that feeds it
        iii. Close all valves
        iv. De-energize and disconnect circuit breaks and main disconnect switches
            - With any high or low voltage switching operations, follow the “left hand rule”. Never operate a disconnect switch with your body directly in front of the switch. If the operating handle is to the right of the switch, stand to the right, turn your face away, hold your breath, and use your left hand to operate the switch into the "OFF" position. NOTE: Only qualified persons may perform high voltage switching operations.
4) Control Stored Energy
    a. Authorized person must ensure all potentially hazardous stored or residual energy must be dissipated, relieved, blocked, bled, restrained or rendered safe
        i. Blank pipe glanges
        ii. Discharge electrical capacitors
        iii. Block/support elevated equipment
        iv. Check that all moving parts have stopped moving
    b. Each worker involved must ensure this is done
5) Apply Lockout/Tagout Devices

a. Each employee working on the machine, equipment or process is responsible for attaching their personal locks
b. Locks must be applied to each energy-isolating device used
c. Each authorized person applying their locks to the energy isolating devices must retain the keys for the locks on themselves.
    i. No employee or contractor shall apply or remove another person lock or tag (exception outlined in lock removal section of this program).
d. Locking out and tagging all energy isolating devices prevents restoring energy flow

6) Verify Isolation of Equipment
    a. Prior to working on equipment/ machines or processes that have been locked out, each authorized individual shall verify that it has been effectively isolated and de-energized. Methods can include:
        i. Testing circuitry
        ii. Trying to start the machines controls/actuating devices
        iii. Checking gauges and indicators etc.
    b. If at any point in the de-energization process there is any indication of the presence of hazardous energy, residual or otherwise, or the system cannot be locked out or fails verification, stop and contact your supervisor or manager.
7) Release from Lockout
    a. Upon completion of work, and prior to the removal of a lockout device all authorized individuals shall inspect the work area to ensure the equipment and surrounding area is clear of anyone who could be harmed by the start-up.
    b. Authorized individuals shall verify that the equipment has been cleared of all non-essential items, guards have been re-installed and functional, equipment is operationally intact, etc.
    c. Once authorized individuals are satisfied the machine is a ready state, each authorized individual shall
        i. remove their lock from energy isolating devices in reverse order as they were put on
        ii. notify affected employees that power will be restored
        iii. restore power to equipment, machinery or processes

Group Lockout

- Each person working on the machinery, equipment or process is responsible for locking out each energy-isolating device and verifying isolation of energy sources (including the release of any residual energy). Multiple locks can be applied with hasps.
- When each worker has finished maintenance, the worker removes only his or her own personal lock.

Lockout Interruption (Testing)

In situations where energy-isolating devices are locked out and it is necessary to test, troubleshoot, or position the equipment, the following steps shall be followed:

- All employees associated with the lockout, and who may be in the vicinity of the equipment, shall be notified of the intent to re-energize and activate the equipment
- The equipment shall be in a safe state that would not endanger an employee upon being energized
- Locks shall be removed by the authorized individuals who applied them
- Testing or troubleshooting is performed
- The lockout shall be re-established
- **NOTE:** The authorized individual shall be positioned outside of the point of operation (not inside the cell, equipment, or safeguarded space) during the testing process.

Shift or Personnel Changes

When each authorized individual has completed their shift but the work is not completed, or when the authorized individual has to leave the workplace or is reassigned from an incomplete job, the authorized individual shall ensure the continuity of lockout via one of the following methods as outlined below (method to be used to be determined on a case by case basis by the manager or supervisor involved):

- Where there is a direct change of shift and the lockout is expected to extend into the next shift, incoming authorized individual(s) and outgoing authorized individual(s) in contact with each other shall exchange information regarding the status of the repair. The incoming authorized individual(s) installs their lockout lock(s) and tag(s) and the outgoing authorized individual(s) removes their lockout lock(s) and tag(s) from the energy-isolating device(s). Incoming authorized individual shall ensure zero energy state and that there is no stored or residual energy.
- Where there is an indirect change of shift and the lockout is expected to extend into the next shift or when the authorized individual has been reassigned from an incomplete job, the following steps shall be followed:
    - The authorized individual shall notify the supervisor (or designate, e.g., manager)
    - The supervisor will sign-out an appropriate quantity of "supervisor" locks and tags and document the status of the repair on the *Lockout Lock(s) Sign-out Sheet;*
    - The supervisor will affix a "supervisor" lock and tag on each energy-isolating device or on the group lockbox (where applicable) to ensure the continuity of lockout;
    - The keys to the “supervisor" locks shall be secured from unauthorized access in a designated lockable “cashbox” located in the supervisor's office. The key to the “cashbox” shall be under the exclusive control of the supervisors and their respective manager;

- The outgoing authorized individual removes their personal lock(s) and tag(s) from the energy-isolating device(s);
- The incoming authorized individual shall contact the incoming supervisor (or manager) to remove the “supervisors" lock(s) and tag(s) and installs their personal lock(s) and tag(s) on each energy-isolating device. The authorized individual shall perform a verification of lockout prior to commencing work; and
- The supervisor (or manager) shall return the “supervisor" locks and tags to the “cashbox” and document the return date on the *Lockout Lock(s) Sign-out Sheet* upon completion of the service or repair.

Authorized Removal (Cutting) of a Lockout Lock and Tag

- Each authorized individual shall remove his/her personal lock and tag when work is completed or prior to leaving the workplace.
- When an authorized individual has left the workplace prior to removing their lock and tag, or in the event that the key has been misplaced, the supervisor (or manager) shall be notified of the situation.
- The supervisor (or manager) shall verify that the authorized individual has left the workplace.
- If the authorized individual has left the workplace, the supervisor (or manager) will attempt to contact them at home to communicate the situation and ask them to return to work to remove the lock.
- When the authorized individual is unable to return to the workplace the Operations Manager or designate shall be contacted to verify the status of the work and the condition of the equipment.
- The Operations Manager or designate will give their approval to remove the lock and tag ensuring that :
    - A witness is selected and present throughout the entire lock removal process
    - The steps outlined on the *Lock Removal Form* is signed and dated by the Operations Manager or designate, and the witness.
        - If the above conditions and requirements are met, the lock may be removed (cut-off) by the Maintenance Supervisor or assigned designate (e.g., maintenance employee), under the direction of the authorized individual's supervisor and with the witness present. Once a lock has been removed, it shall be destroyed.
        - Once the machine and equipment is ready to be re-energized, the supervisor (or manager) shall ensure that the return to service process outlined below.
        - The supervisor (or manager) shall inform the authorized individual of the lock removal before he/she resumes work at the facility
        - Any employee who removes a personal lock used for lockout purposes, who has not been authorized to do so, shall be subject to discipline, up to and including termination.

ISOLATION OF ELECTRICAL ENERGY SOURCES

- Electricity is the most common energy source that needs to be locked out.
- For plugged in type of equipment, equipment must be isolated from the energy source (outlet) with the plug being put in a lockable clamshell device or similar hardware that prevents it from being plugged back in.
- For hard-wired equipment, the equipment or machine will need to be isolated and locked out using the main electrical disconnect (i.e electrical panel level, rotary disconnect etc.) making sure that all moving parts have come to a complete stop.
- Isolation of lighting circuits in electrical panels can be achieved by closing the circuit breaker and applying the lockout device with lock and tag.
- Pay particular attention to equipment/machine with multiple power sources (all power sources needs to be isolated, locked and tagged).
- When operating a power disconnect switch, employees must look away from the box, stand to one side of the switch box, on the side of the handle, and using their left hand, open or close the switch.
- Notes:
    - A licensed electrician will be used to remove circuit breakers, fuses and or perform work in the electrical panel.
    - Emergency stops cannot be used from lockout
    - Isolation by means of other control switches or PLCs is not acceptable

ISOLATION FOR LINE BREAKING

Line-breaking hazards include shock along the pipeline, which can result in a rupture; damage to flange faces; exposure to pressures, corrosive materials, hot steam or condensate; and danger from failing pipe sections once the pipeline integrity has been disturbed.

EVALUATION OF POTENTIAL HAZARDS

- Maintenance and operating personnel shall inspect the job site prior to starting work. This inspection is for the purpose of developing a plan for the safe performance of the job.
- Evaluate all potential hazards associated with the job and plan the necessary precautions to prevent injury.

PREPARE THE JOB SITE

- Regardless of the procedures to render the pipeline and connected equipment non-hazardous, all lines shall be treated as though they are under pressure.
- Scaffold shall be erected, where needed, with consideration given to an escape route.
- Barrier shall be set up, as required, to keep unauthorized people away.

- Pipelines to be opened shall have additional supports provided so that the pipeline section does not fall when flange, coupling, connector or joint is opened.

ISOLATION

- The point where the equipment will be cut or parted shall be isolated by the nearest valve (closed and chain locked and tagged) on each side of the point of entry.
- Where pumps are involved, lockout procedures must be followed.
- Bleed all pressure (if any) from the isolated section of the pipeline.
- If the line being opened is connected to a common header, it may be necessary to lockout valves and blank off the downstream side as well. Never depend on check valves to prevent flow of contents in any pipeline.

DRAIN CONTENTS – BLEED PRESSURE

- Pipelines and equipment shall be drained into suitable containers, rather than allowing the contents to run over the ground.

PERSONAL PROTECTION

- Know the location of the nearest safety shower, eye wash bottle or constant flow station. See your Victoria University contact if temporary means will be required.
- The type of Personal Protective Equipment that shall be worn for breaking the first flange on a line or system will be dictated by the chemical contact hazard that may be present. Personal Protective Equipment shall not be used to replace proper job preparation or safe work methods, but it shall be utilized to provide personnel with an added level of protection.
- Regardless of the material, the individuals breaking any line must wear splash proof goggles. Where acids, caustic, other corrosives and hot fluids are involved, protective clothing such as PVC coat, pants, rubber boots, gloves, goggles and face shield must be worn.

PIPELINE/PIPE FLANGE ENTRY

- The point of entry into a line, or equipment containing hazardous material, shall be adequately sheathed, where practical, to prevent spraying or splashing of material.
- The studs on opposite sides of the flange shall be loosened first.
- Remove a series of studs and attach the first flange jack or wedge.
- Open the flange far enough to determine if any material remains in the pipelines.
- Always keep the body out of direct line of material that could be discharged from the open line.
- Remove the stud directly opposite the studs previously removed, once the pressure is relieved, attach the second flange jack or wedge.
- Proceed to remove other studs, as necessary, following the same diagonal sequence.

- If nuts and bolts must be cut off, mechanically or with a torch, and there is a possibility of the line or equipment being under pressure, each nut and bolt that is cut off shall be replaced with a new nut and bolt. Tighten before cutting off the next bolt.

CLOSE THE ENTRY

- Broken lines remaining in place shall have all openings blanked or capped off to prevent drips or spills.
- Removed sections of lines and equipment shall be handled cautiously until inspected and decontaminated.
- Mark each section of removed line and indicate previous content on the line/pipe. The line/pipe is now presumed to be empty

COMPLETE THE JOB

- If contaminated lines or equipment are transferred to the maintenance shop for repairs, they shall be tagged, with a warning sign identifying the contamination or condition, until they can be properly decontaminated. They shall not be stored outdoors.
- The job is not complete until all safety tags, lockout, scaffolding and barriers are removed.

ISOLATION OF HYDRAULIC OR PNEUMATIC SYSTEMS

- Identify the machinery or equipment that needs to be locked out.
- Stop the machine as per normal operation. Ensure that all moving parts have come to a complete stop.
- Find all energy sources,
    - Isolate and secure the energy source, apply a lockout device to all energy sources (locks, tags, valve covers, etc.)
    - bleed off/release/block any residual or stored energy.
    - Disconnect the electrical power to the pump/compressor or close the valve feeding the cylinder.
    - To make sure that all parts have been secured against inadvertent movement, you may have to pin or block a “weight” that is being supported by the stored pressure in the cylinder.
- Test the lockout to make sure de-energization is effective (zero energy). Test to make sure the pump or compressor will not start and that the flow does not bypass the valve. Make sure there is no residual pressure in the lines, reservoirs, or accumulator feeding the cylinder.

COMMUNICATION

- Lockout tagout procedure will be communicated to applicable employees by department managers. Victoria University lockout procedure will be communicated to contractors and third parties as required.
- Changes to this procedure will be communicated to employees by applicable managers.

TRAINING

Training Requirements

- Employees required to perform lockout/tagout will be trained on lockout/tagout steps, hazardous energy, energy isolation devices, lockout specific procedures, etc.

Frequency of Training

- The initial training will be provided before an employee is required to isolate an energy source.
- Follow-up training is provided every 2 years.

Training is provided for all new machinery, equipment or processes.

Type of Training

- The training will include classroom theory (legislative requirements, internal procedure, and specific procedures) with quiz and practice (actual isolation of machinery or equipment).
- The training can also be equipment, machinery or process specific.

FORMS

Lock Removal Form.

EVALUATION

The Operations Manager shall ensure that each element of the lockout/tagout program is evaluated for effectiveness on an annual basis, including this procedure; machine specific lockout procedures; lockout hardware; energy-isolating devices; and the lockout training program.

RELATED PROCEDURES

Health and Safety Responsibilities

REFERENCE MATERIALS

Occupational Health and Safety Act
O.Reg851 Industrial Establishments

DEFINITIONS

Assigned Lock:	This is a lock for which the worker personally controls the key.
Clear:	The process of ensuring that no one is near the system before it is checked to ensure that all power is out.
Chemical Energy:	Chemical energy refers to the energy that can be released by a chemical reaction. Hazardous chemical energy can be released with flammable, combustible, and corrosive substances.
Dissipate (stored energy):	Allowing any remaining energy to run down or be expended after isolating the primary energy source (e.g., electrical, kinetic, thermal, hydraulic, pneumatic, etc.).
Energy-isolating device:	A mechanical device (lockable) that physically prevents the transmission or release of energy, including but not limited to the following: a manually operated electrical circuit breaker; a manually operated switch by which the conductors of a circuit can be disconnected from all undergrounded supply connectors and, in addition, no pole can be operated independently; a manually operated valve (e.g., ball valve, gate valve); a physical block; etc. NOTE: Stop buttons, selector switches (including keyed switches), programmable logic controllers (PLC) that operate on control circuits, manual motor controllers (unless marked "suitable as a motor disconnect"), and other control type devices are not considered energy-isolating devices.
Energy Source:	Includes but is not limited to electrical, mechanical, radiation, process liquids, steam, air, water, oil, hydraulic, and vapour sources.
Electrical Energy:	Conductors, motors, and generators are sources of electrical energy. Both low voltage and high-voltage equipment and conductors can injure or kill workers. Maintenance work on lighting systems or electrical panels, for example, requires lockout.
Hasp:	A device that is capable of accepting multiple locks. Hasps allow multiple authorized individuals to secure an energy-

	isolating device in the "OFF" or "CLOSED" position, e.g., in a group lockout.
Hazardous Energy:	any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, gravitational, or other energy that can harm personnel
Hydraulic Energy:	Energy in the form of fluid under pressure (be aware of stored energy)
Isolating Energy Sources:	This means stopping and securing the machinery, equipment, process or system to protect workers from danger. Such stopping and securing must eliminate or control the danger to the safety and health of workers from unexpected start up of the machinery, equipment, process or system, or the release of hazardous energy or substances.
Energy Isolating Device (Control Device)	This is a device that physically prevents the transmission or release of an energy source to machinery or equipment (the main power source). Typical energy isolating devices include switches, circuit breakers, and valves. Stop buttons on control circuits and programmable logic controllers (PLCs) cannot be used as energy-isolating devices.
Kinetic Energy:	The energy of moving equipment or moving materials.
Lock:	Lock is the use of locks to positively secure the control device(s) used to control the hazardous energy or other hazard.
Lockout:	Means to physically neutralize all energies in a piece of equipment before beginning any maintenance or repair work. Lockouts generally involve: • stopping all energy flows (for example, by turning off switches, or valves on supply lines); • locking switches and valves; • securing the machine, device, or power transmission line in a de-energized state (for example, by applying blocks or blanks, or bleeding hydraulic or pneumatic pressure from lines).
Person in Charge	Individual responsible to ensure that the work is done safely and

of the Work:	according to the procedure. This individual can also be the person carrying out the actual work. This individual is not necessarily a manager.
Pneumatic Energy:	Energy in the form of gas, such as air, under pressure (be aware of stored energy)
Potential Energy:	Potential energy is the energy in suspended, elevated, or coiled materials. An example would be the forks of a forklift truck.
Release:	The process of releasing the equipment for the work to be done on it. This means that all is safe to release the system to work on.
Stored Energy:	energy that an object has the potential to release. Stored energy may be due to an object or material's position or configuration.
Tag:	Tag is the use of a Danger tag to warn people that the equipment or process was locked-out of service. It indicates the reason and the name of the person in charge.
Thermal Energy:	Thermal energy is the energy in heat, which is found in steam, hot water, fire, gases, and liquified gases.
Verify:	The process of trying out the equipment by pushing its' start button to ensure that all sources have been locked-out. This is the process of verifying that all areas of the process or equipment are secured before work is done on it.
Radiation: radiation.	Radiation energy includes non-ionizing and ionizing
Zero Energy:	All energy sources have been eliminated or controlled, and all residual energy has been dissipated or blocked. The machine, equipment, or process is at an energy level that is not harmful to any person.

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LOCK REMOVAL

Lock Owner: _____ Date: _____ Time: _____

Persons witnessing lock removal:_____
_____

Area Supervisor's name: _____

Location and equipment/job affected:_____

Reasons for lock removal:_____

Attempts to contact the owner of the lock(s)
Time: _____ Place: _____

Time: _____ Place: _____

Time: _____ Place: _____

Time: _____ Place: _____

Area or equipment checked for:

Obstructions: _____ Tools: _____ Personnel: _____

Signs of Work: _____ Safe to Operate: _____

Lock removed by: _____

Lock out restored: _____ or equipment started
and checked for correct operation: _____

Signatures:

Witness Area	Supervisor	Manager	H&S Officer
_____	_____	_____	_____

Information reviewed by Manager, Health and Safety and owner of lock.

Date: _____ Time: _____

Action Taken:
_____
_____
_____
_____
_____