ST. LAWRENCE UNIVERSITY

Environmental Health and Safety

Lockout/Tagout (LOTO) Program<-Program Name

29 CFR 19.10.147

Revised Date: 8/10/23
Author: Dean Manley

Purpose

Lockout/tagout (LO/TO) programs are designed to prevent the accidental activation or expelling of energy from equipment during servicing or maintenance tasks. The procedures listed herein must be used to ensure safe operation on and around equipment where one of the following hazards exists: electrical, mechanical, hydraulic, chemical, pneumatic, or thermal. When followed correctly, utilizing proper LO/TO techniques will ensure all affected personnel avoid the risk of unexpected start-up or energization of the equipment being serviced. Hence, avoiding the potential for serious injury or fatality.

Scope

The Occupational Safety and Health Administration (OSHA) requires employers to implement guidelines to control employee exposure to hazardous energy during the maintenance and servicing of machines and equipment in accordance with 29 CFR 1910.147. This policy covers the procedures to be followed while working on or near equipment where the unexpected release of energy could cause physical or bodily harm to workers. Examples of such equipment include but is not limited to; light fixtures, boilers, pumps, elevators, fan systems, starters, disconnects, breakers, compressors, HVAC units, steam line valves, and automobiles. This policy applies to all St. Lawrence University (SLU) employees and all professional contractors conducting business at SLU.

Definitions

Affected User/Employee: A person whose job requires them to operate or use a piece of equipment on which servicing or maintenance is being performed under LO/TO, or whose job requires them to work in an area where such servicing or maintenance is being performed.

Authorized Employee/User: A person who locks out or tags out machines or equipment to perform service or maintenance on that particular item. An affected employee/user becomes an authorized employee/user when that employee's duties include performing service or maintenance on machines or equipment covered under this policy.

Capable of Being Locked Out: An energy-isolating device is capable of being locked out if it has a hasp or other means of attachment to which a lock can be affixed, or it has a locking mechanism built into it. *Note:* Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

Energized: Connected to an energy source or containing residual or stored energy.

Energy Source: Any source of electrical, mechanical, pneumatic, hydraulic, chemical, or thermal energy that poses a hazard to employees.

Energy Isolating Device: A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: a manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and in addition, no pole can be operated independently; a line

valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

Hot Tap: A procedure used in the maintenance or repair of equipment which involves welding under pressure in order to install connections or appurtenances.

Lockout: The placement of a lockout device on energy isolating equipment in accordance with an established procedure ensuring that the energy isolating device and equipment being controlled cannot be operated until the lockout device is removed.

Lockout Device: A device that uses a lock, either key or combination type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or other equipment. Included are blank flanges and bolted slip blinds.

Normal Operations: The utilization of a machine or other equipment to perform its intended function.

Servicing/Maintenance: Workplace activities such as constructing, installation, setting up, adjusting, inspecting, modifying, maintaining, lubricating, cleaning, or making other adjustments on energized equipment.

Tag Out: The placement of a tag out device on an energy-isolating device, according to established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tag out device is removed.

Tag Out Device: A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device according to an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tag out device is removed.

General Provisions

The following situations are not subject to the procedures outlined in this document:

1. Work on plug and cord type electrical equipment, for which exposure to the hazards of unexpected energizing, startup, or the release of stored energy of the equipment is effectively controlled by the unplugging of equipment from the energy sources and by the plug being under the exclusive control of the employee/user performing the servicing or maintenance.
2. Hot tap operations involving transmission and distribution systems for substances such as gas, steam, water, or petroleum products when they are performed on pressurized pipelines, provided that it is clear that continuity of service is essential, shutdown of the system is impractical and documented procedures and special equipment are implemented which will provide proven and effective protection for employees and users.
    - *Note:* There are no SLU employees authorized to perform hot tap operations. If hot tap is required, work must be contracted out to an authorized outfit.
3. Service or maintenance that takes place during normal production operations, such as lubricating, cleaning and making minor adjustments and simple tool changes. Except, when an employee/user is required to place any part of his/her body into an area on a machine or piece of equipment.

- *Note:* Each department is responsible for understanding appropriate LO/TO procedures relevant to their specialized equipment.

Roles and Responsibilities

Supervisors:

1. Responsible for the implementation of these procedures to ensure the safety of employees. These procedures apply to the control of energy sources during service, installation, removal, or maintenance of machines or equipment.
2. Ensure all employees are properly trained on this program prior to working on hazardous sources of energy.
3. Ensure employees are properly trained prior to assigning their task.
4. Ensure employees have all necessary PPE and LO/TO equipment prior to performing hazardous energy isolation tasks.
5. Organize re-training on LO/TO procedures after an accident or by employee request.
6. Maintain records of departments LO/TO use via sign out sheet.

Employees:

1. Attend required LO/TO training prior to performing LO/TO tasks.
2. Follow appropriate LO/TO procedures described herein.
3. Maintain and utilize all university-issued PPE and LO/TO equipment properly.
4. Alert supervisor and EHS of safety concerns in your work area.
5. Do not remove another employee's lock/tag.
6. Work in a safe and responsible manner in full compliance with this program.

Outside Contractors:

1. Submit company LO/TO procedures to SLU EHS for review and approval prior to beginning work.
2. Follow more restrictive LO/TO procedures if conflict exists between contractor policy and SLU policy.
3. Inform appropriate SLU personnel any time a piece of machinery or equipment is locked or tagged out on SLU property.

Environmental Health and Safety:

1. Provide general procedural training.
2. Assist with implementing PPE to affected employees.
3. Provide assistance in evaluating machines/equipment.
4. Perform periodic audits of LO/TO procedures as necessary.
5. Update this program regularly.

Sequence of LO/TO Procedures

St. Lawrence University will provide the necessary equipment to effectively lockout or tagout energy isolating devices. Lockout/tagout equipment will be the only devices used for controlling energy and shall not be used for other purposes. Any devices used for LO/TO will be capable of withstanding the environment to which they are exposed for the maximum period they are expected to be exposed. The devices will be substantial enough to prevent removal without excessive force. LO/TO devices will indicate the identity of the employee who applied the device, and the tagout device will warn against the hazard if the equipment is energized.

Note: If deenergizing is chosen, a thorough inspection should be performed to identify all potential sources of hazardous energy, including adjacent equipment. Energy is considered adequately isolated, blocked, or dissipated when an unplanned event would not reactivate the flow of energy.

The person(s) performing LO/TO work shall:

1. Determine the need to control hazardous energy by method of lockout/tagout.
2. Notify all affected employees that a lockout or tag out system is going to be utilized. Explain why and how LO/TO is being utilized to all affected users.
3. Ensure the machine or equipment is clear of all tools, materials, and personnel.
4. Know and understand all potential hazards, magnitude of energy, and the means of controlling energy prior to shutting down equipment.
5. Shut down machine or equipment via normal stopping procedure.
6. Operate the switch, valve, or other energy isolating device to ensure the equipment is disconnected from the energy source(s). Ensure all stored energy (such as that in springs, elevated machine members, rotating fly wheels, hydraulic systems, air, gas, steam or water pressure) has been alleviated or is restrained by proper blocking or bleeding down practices.
7. Attach the lockout device(s) to ensure the energy isolating mechanism is in the “safe or “off” position.
8. Review normal operating controls and owner’s manual to verify all potential sources of energy have been disconnected.
9. *Note:* When possible, you must place the tags at the same point at which a lockout would have been attached. If this is not feasible, locate the tag as closely as safety allows to the device in a position that will be immediately obvious to anyone who attempts to operate the device.
10. Report all locked-out equipment to the shift supervisor at time of lock out, and again once work has been completed and power is restored.
11. Inform all rotating shift workers of LO/TO equipment and scope of work, if applicable.

Requirement for LO/TO Devices

All devices must meet industry standards for the intended use of the device. Each lockout and tag out device must indicate the identity of the authorized employee using the device and must warn against re-energizing of the equipment. Questions regarding standardization and procurement of LOTO equipment can be directed to the relevant department supervisor or EHS. EHS must review and approve all LO/TO equipment prior to purchase.

The energy isolating devices must be locked out/tagged out with assigned locks and tags. The LO/TO device must be readily identifiable and must not be used for any purpose other than energy control. While conducting LO/TO operations, the following conditions must also be met:

1. Locks must be individually keyed.
2. One key must remain in the possession of the authorized employee/user, and the other must be placed in a secure location in the appropriate supervisor's office.
3. Supervisors shall maintain an accurate and current list of key assignments with proper sign in/sign out documentation.
4. The name of the authorized employee and the date shall be legible on each tag at time of use.
    - *Note:* Tags may evoke a false sense of security. Tags are essentially warning devices affixed to energy isolating devices and do not provide the physical restraint that a lock would provide.

Restoring Machines or Equipment to Normal Operations

These procedures shall be followed when restoring machines or equipment back to normal operation:

1. After servicing/maintenance is complete, re-install all relevant parts and subassemblies. Re-install all guards and protective devices.
2. Remove all blocks or other restraints from the operating area of the equipment.
3. Remove all tools and maintenance materials from the operating area.
4. Ensure all personnel are safely positioned clear of the operating area and verify equipment is ready for operation.
5. Remove energy isolation device (authorized employee only) and re-connect all relevant breakers, valves, and pipe fittings.
6. Re-energize equipment.
    - *Note:* The removal of some forms of blocking may require reenergization of the machine/equipment before safe removal.

Emergency Removal of a LO/TO Device

Only the employee who installs a lockout or tagout device shall remove it. However, in the extreme circumstance where such employee is not available, the device may be removed with the permission and direct supervision of the relevant department manager provided that the following is verified:

- The authorized employee who installed the device is not at the facility.
- All reasonable efforts are made to contract the employee regarding the need to remove the LO/TO device.
- The employee is informed of such removal before they return to work at the facility.

Group Lockout/Tagout

Group LO/TO services shall be used whenever maintenance or servicing of energy isolated equipment is performed by a crew, department, shop, or group of greater than one person. Depending on the circumstances of how the group, crew, shop, or department is arranged, the authorized, appointed person shall exercise one of the following two procedures.

1. If more than one authorized individual must perform maintenance on a machine or piece of energized equipment, then each employee performing work shall place a lock/tag on the energy isolating device.

2. If one designated individual leader of a work crew (foreman, supervisor, shop manager, etc.) deems it as best practice, then that person may lock or tag out the equipment for the entire group. *Note:* If this method is chosen, it shall be the responsibility of the individual who initiated the LO/TO procedure to carry out all necessary steps of this protocol while most importantly communicating with his/her team members throughout the LO/TO process.

Work on Live/Energized Circuits or Equipment

Any work conducted on live or energized parts shall only be issued to properly trained and authorized employees. In the event that work must be performed on live/energized circuits or equipment greater than 50 volts for reasons such as troubleshooting, or working on circuits that form an integral part of a continual industrial process, the following criteria must be met:

1. Ensure all proper PPE is available and worn prior to operating.
2. Ensure there are at least two employees involved on the worksite of live equipment.
3. Ensure completion/review of Energized Electrical Work Permit (*appendix D*).

Note: Live parts that operate on 50 volts (to ground) or less do not need to be de-energized if there are no increased exposures to electric burns or arcs.

Vehicle LO/TO

Authorized employees who are subject to potential exposure to accidental start-up of automotive vehicles or equipment are required to lock and tag the equipment throughout the duration of vehicle service. Affected employees who utilize the equipment being serviced for their scope of work shall not remove a lock or tag under any circumstance. Unauthorized removal of a lock/tag or utilization of equipment with a lock/tag in place may result in disciplinary action.

Training

The Department of Environmental Health and Safety must provide training to all authorized employees/users to ensure that the purpose and function of the energy control procedures are understood. It is the employer's responsibility to provide employees with the knowledge and skills necessary for the safe application, usage and removal of the energy controls that are required. Training sessions must be scheduled on a periodic basis for any new personnel who may require hazardous energy control training, or when the job assignment or workspace/equipment of a given task is altered. Additional training responsibilities include:

1. Each supervisor must forward a list of authorized employees that are to receive hazardous energy control training to the EHS department.
2. Both EHS and department supervisors are to ensure that periodic refresher training is completed by affected employees.
3. Employees shall be re-trained whenever there is a change in energy control procedures.
4. The employer shall maintain current and accurate LO/TO training records with names and dates of employees trained.
5. Training shall be in accordance with OSHA Lockout/Tagout standard 29 CFR 1910.147(c)(7).

There will be three specific types of training offered to SLU employees:

1. General Awareness: All employees who may be affected by a LO/TO shall be trained to an awareness level of this procedure. This training will teach affected employees to recognize LO/TO devices if encountered in their work area. Employees who complete this training will know their basic role in LO/TO procedures. This training will be provided by EHS or Human Resources upon employee orientation.
    -
2. Authorized Employee Training: Any employee who is authorized to perform LO/TO as part of their work scope is required to take this training. This training will ensure the employee possesses the skills and knowledge to fully implement this general procedure. This training will be provided by the applicable department head or supervisor.
    -
3. Machine/Equipment Specific Training: Supervisors and shop managers are required to train affected employees on each piece of equipment or machinery that may require the need for LO/TO under their scope. This training shall include any site-specific procedures relevant to the equipment at hand. This training should be recorded and maintained by the shop supervisor.

Enforcement

The department of Environmental Health and Safety along with facilities and shop managers should conduct periodic inspections to ensure that the energy control procedures and requirements are being followed. The facilities or shop manager must correct any inadequacies and/or deviations from the procedure noted during period inspection. Any unauthorized removal of lockout/tagout equipment, or unauthorized use of equipment that is locked out or tagged out may result in disciplinary actions.

Policy Contacts

Environmental Health and Safety

Nick Ormasen, Executive Director of Business Services & EHS
(315) 229-5303, Nick@stlawu.edu

Dean Manley, EHS Coordinator
(315) 229-5339 dmanley@stlawu.edu

Suna Stone, Chemical Hygiene and Environmental Compliance Officer
(315) 229-5105 smcmasters@stlawu.edu

Safety and Security

Dispatch
(315) 229-5555 security@stlawu.edu

Policy Review

Name	Date	Changes
Nick Ormasen, Dean Manley, Suna Stone	8/10/23	Final review of updated policy prior to posting

Appendices

Appendix A

Machine Specific Lockout/Tagout Procedure Form

General Information:	
Machine/Equipment Name:	**Model/Equipment Number:**
Department:	**Location:**
Energy Sources: **Type** **Magnitude** _____Electrical _____ Volts _____Hydraulic _____ _____Chemical _____ _____Thermal _____ _____Mechanical _____ _____ Other _____	**Equipment Required for LO/TO:** Specify as required: ____ Locks ____ Ball Valve Cover ____ Lockout Hasp(s) ____ Breakers ____ Gate Valve Cover ____ Other ____ Tag(s) If other, explain: _____ ____ Tie(s) _____ _____
Describe Pre-Lockout Procedures: _____ _____ _____ **Describe Lockout Procedures:** _____ _____ _____	

Describe Reenergization Procedures:

_____

_____

_____

Other Comments/Notes:

_____

_____

LO/TO Personnel Signature: _____

Supervisor Signature: _____

Appendix B

Pre-Job Briefing Checklist

NFPA 70E Annex I

Identify

1. The hazards.
2. Voltage levels involved.
3. Skills required.
4. Secondary voltage source.
5. Any unusual work conditions.
6. Shock protection boundaries.
7. Available incident energy.
8. Potential for Arc Flash.
9. Flash protection boundary.

Ask

1. Can equipment be de-energized?
2. Are back feeds on circuits possible?
3. Is a "standby person" required?

Check

1. Job plans.
2. Status board.
3. Information on plant and vendor resources up to date.
4. Individuals are familiar with the facility.
5. Safety procedures.
6. Vendor information.

Know

1. What the job is.
2. Who else must be notified.
3. Who is in charge.

Think

1. Consider unexpected events.
2. Lock-Tag-Test-Try.
3. Test for voltage first.
4. Use right tools, equipment, and PPE.
5. Install/remove temporary protective grounding equipment.
6. Install barriers and barricades.

Prepare for an Emergency

1. Is the required emergency equipment available?
2. Know location of nearest fire alarm pull station.
3. Is there confined space work involved? *If yes, call EHS*
4. How is equipment shut off in an emergency?
5. Know location of nearest fire extinguisher.
6. Are radio communications available?

Appendix C

Job safety Planning Checklist

NFPA 70E Annex I

Job Safety Planning Checklist				
Equipment:				
Task:				
Location:				
Qualified submitter:		**Date:**		
Section A, General				
Mark "Y" or "N" as appropriate				
No.	**Item**	**Yes**	**No**	**Instructions**
1.	Is there justification for the energized work? a. Equipment operating at less than 50 volts b. Additional hazard or increased risk c. Infeasible to de-energize d. Normal operating condition			*If **No**, the equipment must be placed in an electrically safe working condition.* *If **Yes**, complete 1a, 1b, and 1c, and shock and arc flash risk assessments are required to determine the appropriate hazard controls.* *Proceed to Line 2.*
2.	Will the worker be exposed to energized parts?			*If **No**, a shock risk assessment is discretionary and completing Sections B and C is optional.* *Proceed to Line 3.*
3.	Is there an arc flash hazard?			*If **No**, arc flash risk assessment is discretionary and completing Sections D or E and F is optional.* *Proceed to Line 4.*
4.	Were any of the answers to Questions 3 or 4 yes?			*If **No**, further risk assessment is discretionary.* *If **Yes**, proceed to Line 5.*
5.	Did the arc flash risk assessment determine that additional protective measures are required?			*If **No**, completing Parts D or E and F is discretionary.* *If **Yes**, Part D or E is required to be completed.* *Proceed to Line 6.*
6.	Is the required working distance available?			*If **Yes**, proceed to Line 7.* *If **No**, additional risk assessment is required before completing Section D or E or performing any work.* *Proceed to Line 7.*
Section B, Shock Hazard Information *Use Table 130.4(D)(a) for ac system boundaries or Table 130.4(D)(b) for dc system boundaries*				
7.	Voltage between phases: Limited approach boundary: Restricted approach boundary:			*Establish the shock boundaries.* *Proceed to Line 8.*
Section C, Shock Control Information				
Mark "Y" or "N" as appropriate				
8.	Will the task require the worker to cross the restricted approach boundary?			*If **No**, shock protection controls are discretionary.* *Proceed to Section D or E as appropriate.* *If **Yes**, shock protection controls are required.* *Proceed to Line 9.*
9.	Will rubber insulating gloves and leather protectors be used for the task?			*If **Yes**, proceed to Line 10.* *If **No**, proceed to Line 11.*
10.	Minimum glove class required for insulating gloves			*Establish minimum glove class.* *Proceed to Line 11.*
11.	Will insulating blankets be used for the task?			*If **Yes**, proceed to Line 12.* *If **No**, proceed to Line 13.*
12.	Minimum voltage rating for insulating blankets			*Establish minimum voltage rating.* *Proceed to Line 13.*

Appendix C continued

	Mark "Y" or "N" as appropriate			
13.	Are insulated or insulating hand tools required for the task?			*If **Yes**, proceed to Line 14.* *If **No**, proceed to Section D or E as applicable.*
14.				*Identify the hand tools, including the minimum voltage rating required.* *Proceed to Section D or E as applicable.*
	Section D, Arc Flash Control Information — Incident Energy Analysis Method *Use information from incident energy study*			
15.	Incident energy: Working distance: Level of PPE: Minimum arc rating of clothing: Arc flash boundary:			***Include:** the arc flash boundary **and** at least one of the following: the incident energy and the working distance **or** the level of PPE **or** the minimum arc rating of clothing.* *Proceed to Section F.*
	Section E, Arc Flash Hazard Control Information — Arc Flash PPE Category Method *Use Table 130.5(C)(15)(a) for ac systems or Table 130.7(C)(15)(b) for dc systems*			
16.	Determine the estimated available fault current and clearing times for the task.			
	Available *fault* current:		Overcurrent device clearing time:	
	Mark "Y" or "N" as appropriate			
17.	Do the estimated available fault current and clearing times for the task exceed the maximum allowed by Table 130.7(C)(15)(a) or Table 130.7(C)(15)(b)?			*If **Yes**, an incident energy analysis is required.* *If **No**, proceed to Line 18.*
18.	Arc flash boundary:			*Proceed to Line 19.*
19.	Arc flash PPE category: Working distance:			*Proceed to Line 20 and 21, Section F.*
	Section F, Arc-Rated Clothing and Other Arc Flash Protection Equipment Information			
20.	Minimum arc rating in cal/cm^2 for protective clothing and other PPE			*Establish the required arc-rated clothing and other PPE.*
21.				*List the required arc-rated clothing and other arc flash PPE.* ***PPE Category Method:** Use 130.7(C)(15)(c) and Table 130.7(C)(15)(c).* ***Incident Energy Analysis Method:** Use 130.5(G) and Table 130.5(G).*
	Section G, Energy Source Controls			
22.				*List all sources of electrical supply to the specific equipment.* *Include location and method to lock or tag.* *Include method to verify and test for absence of voltage.* *List temporary protective grounding equipment.*
	Section H, Work Procedures and Special Precautions			
23.				*List specific work procedures required to complete the task.* *List any special precautions needed to safely complete the task (i.e., discharge time for capacitors).*

Appendix D

Energized Electrical Work Permit

NFPA 70E Annex J

PART 1 TO BE COMPLETED BY THE REQUESTER

Job/Work Order Number _____

1. Description of circuit/equipment/job location: _____
2. Description of work to be done: _____
3. Justification of what the circuit/equipment cannot be de-energized or the work deferred until the next scheduled outage: _____

PART II: TO BE COMPLETED BY THE ELECTRICALLY QUALIFIED PERSONS DONG THE WORK

Check when Complete

1. Detailed job description procedure to be used in performing the above detailed work: ❒

   _____

2. Description of the safe work practices to be employed: ❒

   _____ ❒

3. Results of the shock hazard analysis: _____ ❒
4. Determination of shock protection boundaries: _____ ❒
5. Results of the flash hazard analysis: _____ ❒
6. Determination of the flash protection boundary: _____
7. Necessary personal protective equipment to safely perform the assigned task: : ❒

   _____

8. Means employed to restrict the access of unqualified persons from the work area: ❒

   _____

9. Evidence of completion of job briefing including discussion of any job-related hazards: ❒

_____

10. Do you agree the above described work can be done safely? ❒Yes ❒No (if no, return to requester)

Electrically Qualified Person(s) Date

PART III: APPROVAL(S) TO PERFORM THE WORK WHILE ELECTRICALLY ENERGIZED

Individual conducting electrical work: _____

General Manager _____ Date _____

Note: Once the work is complete, forward this form to the site Safety Department for review and retention.

Source: National Fire Protection Association, © 2004