Facilities & Services
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

University of Illinois at Urbana-Champaign
Control of Hazardous Energy Program
(Lockout/Tagout)

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PURPOSE

The University of Illinois at Urbana-Champaign (University), through the Facilities and Services Division of Safety and Compliance, Occupational Safety and Health Department (OSH), has established this Control of Hazardous Energy Program to protect the health of university students, faculty and staff and to assure compliance with State and Federal occupational safety and health standards.

This Program provides the minimum requirements for unit-specific control of hazardous energy programs. It is expected that campus units will utilize this Control of Hazardous Energy Program to develop unit-specific standard operating procedures (SOPs) including completion of Appendix A - Unit-Specific Standard SOPs and providing the first page to OSH.

POLICY

It is the policy of the University to protect its students, faculty and staff from hazards associated with unexpected startup or energization of equipment and machines during maintenance and repair activities. This is accomplished as far as feasible with effective administrative controls, employee training, and engineering controls.

This Control of Hazardous Energy Program impacts all students, faculty and staff who are required to repair and maintain equipment and machines having hazardous energy sources. Additional instructions for protecting employees from equipment and machine hazards may be found in other Programs (e.g., Confined Space Entry Program).

RESPONSIBILITIES

Occupational Safety and Health (OSH)

OSH is responsible for the administration of this Program. OSH maintains copies of all records for services provided by OSH pertaining to this Program. An OSH program coordinator provides guidance, regulatory interpretation and oversight for this Program and reviews this Program annually.

Deans, Department Heads, and Directors (Campus Units)

Campus Units shall provide the resources necessary to properly implement this Program and Appendix A - Unit-Specific SOPs, and designate a Responsible Person that will be charged with implementing this Program and Appendix A - Unit-Specific SOPs.

Campus Unit Responsible Person

The Responsible Person shall work with Campus Unit Supervisors to identify personnel that may be required to repair or maintain equipment and machines having sources of hazardous energy, ensure that personnel attend appropriate training before performing work that could result in an unexpected startup or energization of hazardous energy sources, and ensure that the Appendix A - Unit-Specific SOPs are reviewed annually.

Supervisors for Personnel Applying Energy Control Locks and Tags (Supervisors)
Supervisors and Principle Investigators (PIs) are responsible for enforcement of this Program and Appendix A - Unit-Specific SOPs. Supervisors and Principle Investigators (PIs) are responsible for ensuring development of equipment-specific procedures for equipment and machines for which they have responsibility. They shall assist in the development and annual review of Appendix A - Unit-Specific SOPs, ensure annual audits are performed for the personnel and equipment/machines they have responsibility for, and ensure that their employees receive appropriate training.

Personnel Applying Energy Control Locks and Tags
Faculty, staff and students who apply energy control locks and tags are responsible for adhering to the provisions of this Program, Appendix A - Unit-Specific SOPs, and manufacturer instructions. They must only apply locks and tags to equipment/machines for which they have been authorized by their supervisor and trained to service or maintain. They shall participate in annual audits as directed by their supervisor or the Campus Unit Responsible Person. They shall follow equipment-specific energy control procedures or develop them when none exist. The Appendix C - Example Equipment-Specific Energy Control Procedure Form can be used to document procedures for Campus Unit equipment.

GENERAL REQUIREMENTS
Each Campus Unit that has employees that service or maintain machines and/or equipment shall follow the requirements of this Program and implement Appendix A - Unit-Specific SOPS to prevent unexpected energization, startup, or release of stored energy through use of appropriate lockout devices or tagout devices to isolate energy sources and otherwise disable machines or equipment.

Exemptions
The following are exempt from the requirements of this Control of Hazardous Energy Policy:

- Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations if they are routine, repetitive, and integral to the use of the equipment for production, provided that:
    - machine guards and safety devices do not have to be removed or bypassed;
    - body parts are not placed in the point of operation or other dangerous area during machine cycle; and
    - work is performed using alternative measures which provide effective protection.
- Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or startup of the equipment is controlled by unplugging the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance; and
- 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 the employer demonstrates that continuity of service is essential, shutdown of the system is impractical, documented procedures are followed, and special equipment is used which will provide proven, effective protection for employees.

Energy Control Devices

Energy control devices shall be provided by the Campus Unit to employees at no charge. Energy control devices that may be required to isolate, block, or secure machines or equipment from energy sources include locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware.

Lockout devices in conjunction with tags shall be used unless an energy isolating device is not capable of being locked out. If only a tagout device is used, additional safety measures such as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle shall be utilized to reduce the likelihood of inadvertent energization. The tagout and additional safety measure must meet the equivalent safety available from the use of a lockout device.

All lockout devices and tagout devices shall:

- Be singularly identified;
- Be the only devices(s) used for controlling energy;
- Not be used for other purposes; and
- Meet the following requirements:
    - *Durable*
        - LOTO devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.
        - Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.
        - Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.
    - *Standardized*
        - Individual locks shall be LOTO locks, red in color, and always be accompanied by a tag that identifies the Authorized Employee.
        - Group locks shall be yellow in color and always be accompanied by a tag that identifies the Coordinating Authorized Employee.
        - LOTO devices shall be standardized within the facility in at least one of the following criteria: color; shape; or size; and additionally, in the case of tagout devices, print and format shall be standardized.
        - Energy isolation devices are recommended to be red in color. Alternative colors can be used to identify types of energy (e.g., red for electrical power and green for water) as long as a description of the colors are posted in an area visible to other Authorized Employees and Affected Employees.
    - *Substantial*

- Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.
- Tagout devices, including their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all environment-tolerant nylon cable tie.

- *Identifiable*
  - A tag shall be attached to each LOTO device that identifies the Authorized Employee who applied that lock.
  - Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: *Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not Operate*.

Appendix B - Example Energy Control Devices illustrates various lockout/tagout devices that are available. If you need assistance in identifying proper lockout and/or tagout devices or assistance with identifying a vendor for their purchase contact the Occupational Safety and Health Department at 217-265-9828.

PROCEDURES

Equipment-Specific Energy Control Procedures

An equipment-specific procedure is not required when **ALL** of the following exist:

- The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees;
- The machine or equipment has a single energy source which can be readily identified and isolated;
- The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment;
- The machine or equipment is isolated from that energy source and locked out during servicing or maintenance;
- A single lockout device will achieve a locked out condition;
- The lockout device is under the exclusive control of the Authorized Employee performing the servicing or maintenance;
- The servicing or maintenance does not create hazards for other employees; and
- The Campus Unit, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

Specific procedures must be developed for each piece of equipment, or for each class of related equipment. The procedures shall clearly and specifically outline the scope, purpose, authorization,

rules, and techniques to be utilized for de-energizing, and the means to enforce compliance including, but not limited to:

- Specific statement of intended use (e.g., This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on the Liebert AC unit in Room 50 of Altgeld Hall. It shall be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.);
- Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment; and
- Specific procedural steps for the placement, removal and transfer of lockout devices or tagout devices, and the responsibility for them.

The Appendix C – Example Equipment-Specific Energy Control Procedure Form can be used to document procedures for Campus Unit equipment.

A general energy control procedure by itself does not meet this requirement. Similar machines/equipment that have the same or similar types of controls, which can be rendered safe using the same sequential procedural steps can be covered by a single procedure if that procedure satisfactorily addresses the hazards and specifies the control measures.

An elaborate generic energy control procedure supplemented with checklists or appendices to address various, distinct machinery and equipment does meet the requirement of an equipment-specific procedure.

Application of Energy Control Devices

Prior to performing service and/or maintenance on machines or equipment, the application of energy control shall be performed in the following sequence:

1. Preparation for shutdown: Before an Affected or Authorized Employee turns off a machine or equipment, the Authorized Employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.
2. Notification of employees: Affected Employees shall be notified by the Authorized Employee of the application of lockout devices or tagout devices. Notification shall be given before the controls are applied to the machine or equipment.
3. Machine or equipment shutdown: The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.
4. Machine or equipment isolation: All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

5. LOTO device application: The Authorized Employee shall place locks and/or tags in the appropriate energy isolating locations.
6. Stored Energy: Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy, such as electrical, mechanical, gravitational, and thermal, shall be relieved, disconnected, restrained, and otherwise rendered safe. This can be accomplished by:
    a. Depressurizing hydraulic and pneumatic lines;
    b. Discharging electrical capacitors;
    c. Disengaging spring-loaded components; and/or
    d. Placing blocks on moving, rotating, and elevated parts.
7. Verification of Isolation: Prior to starting work on machines or equipment that have been locked out or tagged out, the Authorized Employee shall verify that isolation and de-energization of the machine or equipment have been accomplished. This can be accomplished by:
    a. Attempting to restart the machine or equipment following normal startup operations through the use of local controls; and
    b. Using appropriate testing devices.
8. Perform service and/or maintenance work: Once complete follow the procedures for releasing a machine or equipment from lockout or tagout below.

Removal of Energy Control Devices

The following steps shall be performed in the given sequence by the Authorized Employee(s) for the removal of lockout or tagout devices and the restoration of energy to the machine or equipment:

1. Work area inspection: The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.
2. Employee safety: The work area shall be checked to ensure that all employees have been safely positioned or removed.
3. Lockout or tagout devices removal: Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device. If the employee is not available to remove it see Lock Removal Procedures Below.
4. Employee Notification: After lockout or tagout devices have been removed and before a machine or equipment is started, Affected Employees shall be notified that the lockout or tagout device(s) have been removed.

Procedures for Testing and Positioning

In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or component thereof, the following sequence of actions shall be followed:

1. Work area inspection: The work area shall be inspected to ensure that nonessential items, including tools and materials, have been removed and to ensure that machine or equipment components are operationally intact.

2. Employee safety: The work area shall be checked to ensure that all employees have been safely positioned or removed.
3. Lockout or tagout devices removal: Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device.
4. Startup: Energize and proceed with testing or positioning;
5. De-energization: De-energize all systems and reapply energy control measures in accordance with the ***Application of Energy Control Devices*** procedures to continue the servicing and/or maintenance.

Group LOTO
When servicing and/or maintenance is performed by more than one individual, they shall utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

Group lockout or tagout devices shall be used in accordance with the procedures required by the **Energy Control Procedures** described above, but not necessarily limited to, the following specific requirements:

- Primary responsibility is vested in the Coordinating Authorized Employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock);
- Provision for the Coordinating Authorized Employee to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment;
- When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to a Coordinating Authorized Employee designated to coordinate affected work forces and ensure continuity of protection; and
- Each Authorized Employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

Shift or Personnel Changes
Each Campus Unit shall develop, as necessary, specific procedures to be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy.

Motorized Equipment with Key Ignition
Specific procedures shall be utilized during service and maintenance work on motorized equipment with key ignitions (e.g., automobiles, tractors, forklifts, etc.). Removal and sole possession of the ignition key by the Authorized Employee may not prevent unexpected startup of the machine if duplicate keys are available, a short in the ignition system could cause startup, or a manual transmission vehicle is capable

of being started by "roll-starting". In addition to removal and sole possession of the ignition key by the Authorized Employee, additional steps that must be taken include:

- Setting the parking brake;
- Placing a tagout on the steering wheel or locking the doors; and
- Disconnecting the negative battery cable if startup is possible without the key.

Other sources of hazardous energy, such as hydraulic pressure and springs, must also be isolated or dissipated prior to commencing service or maintenance work.

Abandoned Lock Removal

When the Authorized Employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of that employee's Supervisor. The Supervisor shall verify that the safety of all Campus personnel are protected from injury as a result of the removal of the device. Prior to removing the device the Supervisor shall:

- Verify that all Campus personnel are protected from injury as a result of the removal of the device;
- Verify that the Authorized Employee who applied the device is not at the facility;
- Make all reasonable efforts to contact the Authorized Employee to inform them that their lockout or tagout device has been removed; and
- Ensure that the Authorized Employee has this knowledge before they resume work at that facility.

Removal of an Authorized Employee's lockout or tagout device shall be recorded using the Appendix D – Abandoned Lock/Tag Removal Form and retained by the Responsible Person or Supervisor.

Communication and Coordination

Whenever outside servicing personnel are to be engaged in energy control activities, the Campus project contact and the contractor shall inform each other of their respective lockout or tagout procedures.

The Campus project contact shall ensure that affected Campus employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

Training

The Campus Unit Responsible Person must attend an in-person initial training session provided by OSH. Initial training for all other Authorized Employees may be provided by OSH either in-person or online via Moodle as a self-enrollment course, or via an alternative provider.
Upon completion of the online course, Authorized Employees must complete an in-person practical training. Practical training can be provided by OSH or alternative provider including the Campus Unit Responsible Person or employee's Supervisor.

If an alternative provider is used, the Campus Unit Responsible Person or Supervisor shall ensure that Authorized Employees are trained on:

- Recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace;
- The methods and means necessary for energy isolation and control;
- Limitations of tagout only usage;
- Requirements of this Control of Hazardous Energy Program and the Unit-Specific Control of Hazardous Energy SOP; and
- Equipment-specific training provided by their supervisor.

All Affected Employees must review and sign the Appendix E - Affected Employee Training and Record Form. The Responsible Person or Supervisor shall retain a copy of each record form for the duration of employment.

All other employees who work or may be in the area where energy control procedures may be utilized shall be instructed by the Authorized Employee on the procedure and to not attempt to restart or reenergize affected equipment/machines.

Retraining is required for Affected and Authorized Employees when job duties regarding LOTO change, there are new or revised energy control procedures, there is a change in machines/equipment/processes that present a new hazard, there is a revision to this Control of Hazardous Energy Program or the Unit-Specific SOPs, or periodic inspection reveals or a supervisor has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

Training records shall be kept by either the Responsible Person or Supervisor. Training records shall be provided to OSH upon request.

Periodic Inspection

Each Campus Unit shall develop procedures to conduct an annual review of each energy control procedure to evaluate its effectiveness in protecting employees from hazardous energy and materials. The review should be performed by an Authorized Employee other than the one(s) utilizing the energy control procedure. Each review shall be recorded and kept on file using the Appendix F - Periodic Inspection Form included.

If a procedure is used less than once per year, an inspection must be done during each use. Grouping of distinct procedures associated with similar machines or equipment is acceptable. Consider the group of distinct procedures to be a single procedure for purposes of conducting a periodic inspection, if the machines or equipment in the group have the same or similar types of control measures.

If grouping is done, inspect a representative number of such employees implementing one procedure within each group. The inspector shall also discuss the energy control procedure with a representative number of such employees to obtain a reasonable reflection of the servicing/maintenance work being evaluated. This approach is acceptable as long as the inspection sampling reasonably reflects plant servicing and/or maintenance operations and hazardous energy control practices for the procedures being inspected.

Typical items covered in a periodic inspection should include at a minimum:

- An evaluation of energy control methods;
- Correct energy source identification;
- Proper LOTO device selection and use;
- Methods used to release stored energy;
- Confirmation that each participating employee fully complied with their responsibilities;
- Deficiencies in employees use of the energy control procedure; and
- Availability of necessary recordkeeping.

If the review shows deficiencies in any energy control procedure, appropriate changes should be noted on the review form. If changes are required to correct deficiencies, retraining will be required. Results of each review must be communicated to each Authorized Employee reasonably expected to implement the procedure during the year.

Electrical Work Practices

Energy control procedures listed previously in **Application of Energy Control Devices** cover non-electric service work on electrically driven equipment (e.g., replacing a pulley on a fan) but do not cover exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations (e.g., replacing the electrical disconnect for a fan). In order to properly protect workers from electrical hazards an additional requirement must be met:

- A qualified person shall use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and shall verify that the circuit elements and equipment parts are de-energized. The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage back-feed even though specific parts of the circuit have been de-energized and presumed to be safe. If the circuit to be tested is over 600 volts, nominal, the test equipment shall be checked for proper operation immediately after this test.

Additional steps that shall be implemented include:

- Work on, near, or with electrical conductors or equipment in electric utilization installations shall only be completed by a qualified person;
- Safe procedures for de-energizing circuits and equipment shall be determined before circuits or equipment are de-energized by a qualified person;

- The circuits and equipment to be worked on shall be disconnected from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks, may not be used as the sole means for de-energizing circuits or equipment. Interlocks for electric equipment may not be used as a substitute for lockout and tagging procedures;
- Stored electric energy which might endanger personnel shall be released. Capacitors shall be discharged and high capacitance elements shall be short-circuited and grounded, if the stored electric energy might endanger personnel. If the capacitors or associated equipment are handled in meeting this requirement, they shall be treated as energized; and
- Stored non-electrical energy in devices that could reenergize electric circuit parts shall be blocked or relieved to the extent that the circuit parts could not be accidentally energized by the device.

This section also applies to solar panels and other electrical power generation devices that are only emergency or standby in nature. See **Electrical Power Generation, Transmission, and Distribution located** immediately below for solar panels and other power generation devices that operate for the purpose of cogeneration.

Electrical Power Generation, Transmission, and Distribution
Information on control of hazardous energy of installations under the exclusive control of electric utilities for the purpose of power generation, transmission, and distribution, including related equipment for communication or metering is included in Appendix G – Procedures for Electrical Power Generation, Transmission, and Distribution.

PROGRAM EVALUATION
This Program will be reviewed annually by OSH. The written Appendix A - Unit-Specific SOPs and associated records shall be reviewed and updated by the respective Campus Unit at least annually and more frequently as hazards, tasks, procedures and/or equipment change. Annual Campus Unit reviews shall be recorded and kept on file using Appendix I - Program Audit Checklist.

APPENDIX A – UNIT-SPECIFIC STANDARD OPERATING PROCEDURES

University of Illinois at Urbana-Champaign
Control of Hazardous Energy Program (Lockout/Tagout)

Campus Unit: _____

It is the policy of the above-mentioned unit to comply with the University of Illinois Control of Hazardous Energy Program (Lockout/Tagout). The purpose of this document is to complement the University Program with Unit-Specific SOPs.

PROGRAM ADMINISTRATION

The University of Illinois recognizes that supervisors are not necessarily experts in the area of control of hazardous energy. However, as outlined in Policy Number FO – 18 of the Campus Administrative Manual, supervisors are "responsible for maintaining a healthy and safe environment within their areas under their supervision and are responsible for the safety of activities, procedures and operations under their control or direction." OSH and other qualified personnel will assist supervisors and individuals in fulfilling these obligations upon request.

The following individual has responsibility for the administration of Control of Hazardous Energy SOPs in the above-mentioned unit. It is the responsibility of this person to supervise the requirements of the Control of Hazardous Energy Program (Lockout/Tagout) and to ensure that Authorized Employees are implementing energy control procedures in a manner in which they have been trained.

_____ _____
(Name) (Title)

ENERGY CONTROL DEVICE AVAILABILITY

Energy control devices are located at _____.
Contact _____ at _____ to access the devices.

If you require devices that are not available in the above location, contact _____ _____at_____immediately.

All devices must be inspected daily prior to use. Damaged devices shall not be used and shall be reported to _____ at _____ immediately.

EQUIPMENT-SPECIFIC ENERGY CONTROL PROCEDURES

The following equipment/machines have equipment-specific energy control procedures that have been reviewed by the appropriate supervisor or Responsible Person. Copies of equipment-specific energy control procedures can be found at _____ _____and/or_____. If a procedure does not exist for the equipment/machine you have been assigned to maintain/repair, complete the form located in **Appendix C** and provide to your supervisor and/or Responsible Person upon completion.

Equipment/Machine ID	Equipment/Machine Description	Specific Location	Procedure ID

TRAINING

Authorized Employee training will be provided by _____.

Records of training for individuals in this unit can be found in _____.

The individuals listed below have completed proper training suitable for an **Authorized Person**.

Last Name	First Name	UIN	Signature

The individuals listed below have completed proper training suitable for an **Affected Employee**.

Last Name	First Name	UIN	Signature

ABANDONED LOCKS/TAGS

Abandoned locks/tags removal forms can be found in _____.

PERIODIC INSPECTIONS

Periodic inspection forms can be found in _____.

RECORDKEEPING

The Unit Responsible Person shall ensure records are retained in accordance with the following:

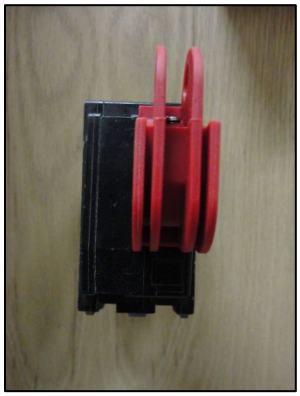
1. Equipment-specific energy control procedures shall be retained for the life of the equipment or until replaced by a new equipment-specific energy control procedure.
2. Training records to be retained for the length of employment.
3. Abandoned locks/tags removal forms shall be retained a minimum of year and shall be used for annual evaluation of the Unit-Specific SOPs.
4. Periodic inspection forms shall be retained a minimum of year and shall be used for annual evaluation of the Unit-Specific SOPs.

APPENDIX B – EXAMPLE ENERGY CONTROL DEVICES

Locks and Tags

Devices for Light Switches

Devices for Breakers


Devices for Fuses

Devices for Plugs


Devices for Valves

Group Devices

APPENDIX C – EXAMPLE EQUIPMENT-SPECIFIC ENERGY CONTROL PROCEDURE FORM

University of Illinois at Urbana-Champaign
Control of Hazardous Energy Program
(Lockout/Tagout)

Energy Control Procedure ID:

Section I

Equipment Description:	**Date Created:**
Building/Room:	**Date Modified:**
Specific Location:	**Revision:**

Originator: **Phone #:** **Campus Unit:**

Purpose: This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance/ servicing is completed on the above listed equipment. It shall be used to ensure that the equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing/maintenance where the unexpected energization or start-up of the machine/equipment or release of stored energy could cause injury.

Section II

Hazardous Energy Sources	Control Type	Control Location	LOTO Device	Verification Method

Section III

Stored Hazardous Energy Sources	Means of Dissipation/Elimination	Verification Method

Section IV

Steps for Normal Shutdown:

Section V

Steps for Normal Startup:

Instructions for Equipment-Specific Energy Control Procedures

Step 1: Identify all hazardous energy sources – List the sources of hazardous energy in the first column of Section II. Identify and list the control type (e.g., valve, breaker, etc.) and control location(s) of each source of hazardous energy and the LOTO device necessary to control it. Identify and list the verification method used to confirm the control of each hazardous energy source (e.g., attempted to turn on at local control switch, pressure gauge reading, tested with voltmeter, etc.).

Identify all sources of hazardous stored energy and the means to dissipate/eliminate it (e.g., hydraulic: opened bleeder valve, electrical capacitor: certified electrician dissipated). Identify the verification method used to confirm the dissipation/elimination of hazardous stored energy (e.g., removed spring, tested with voltmeter, etc.). Input this information in Section III.

Note: Sources of hazardous and/or stored hazardous energy include, but are not limited to, electrical, mechanical, pneumatic, hydraulic, thermal, chemical, gravity, capacitors, springs, flywheels, radiation, and steam.

Step 2: Notify all affected and other employees of the intent to shut down and LOTO equipment.

Step 3: Shut down equipment according to the sequence of steps listed in Section IV.

Step 4: Isolate equipment – Using the information listed in Section II, isolate/control all hazardous energy sources at their listed control locations.

Step 5: LOTO equipment – Using the information listed in Section II, place the energy control devices in the control locations, securing them with a lock and tag.

Step 6: Release stored energy – Using the information listed in Section III, dissipate/eliminate all sources of hazardous stored energy.

Step 7: Verify Isolation – Using the information listed in Sections II and III, verify that all sources of hazardous energy, including stored sources of hazardous energy, are at a zero energy state.

Step 8: Perform service/maintenance work.

Step 9: Release from LOTO – Perform the following steps:

- All locks, tags, and lockout devices shall by removed by the person that applied them;
- Remove all tools and supplies from the equipment area;
- Replace all machine guards;
- Verbally notify all affected and other employees that the LOTO is complete;
- Ensure the area is clean of equipment, supplies, tools, and personnel; and
- Restart the equipment in accordance with the steps listed in Section V.

Enforcement: Failure to comply with these procedures can result in amputation, electrical shock, or death.

APPENDIX D – ABANDONED LOCK/TAG REMOVAL FORM

LOTO Lock Removal Form

Only a Supervisor or their designee can authorize the removal of locks/tags. All lock/tag removal forms must be retained by the Unit Responsible Person.

Building _____ Building No. _____
Equipment Description _____ Location _____
Requested By _____ Date _____

Name of Person whose lock/tag must be removed: _____

Has an attempt been made to contact them? □ YES □ NO

Describe Steps taken to contact them.

_____

_____

Why is it critical to remove this lock/tag now?

_____

_____

Are you sure it is safe to remove this lock/tag? □ YES □ NO

Authorized By: _____UIN/Badge:_____

Signature: _____ Date: _____

The lock owner must be informed of removal of their lock upon their return to work. Have the lock owner complete the section below verifying that they have been notified and return completed form to S&C.

Lock/Tag Owner: _____UIN/Badge:_____

Signature: _____ Date: _____

APPENDIX E – AFFECTED EMPLOYEE TRAINING AND RECORD FORM

University of Illinois at Urbana-Champaign
Control of Hazardous Energy Program
(Lockout/Tagout)

What is Lockout/Tagout (LOTO)?
Specific practices and procedures to safeguard employees from the unexpected energization or startup of machinery and equipment, or the release of hazardous energy during service or maintenance activities.

What is a LOTO Authorized Employee?
A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An Affected Employee becomes an Authorized Employee when that employee's duties include performing servicing or maintenance covered under this section.

What is a LOTO Affected Employee?
An employee whose job requires them to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires them to work in an area in which such servicing or maintenance is being performed.

What are the responsibilities of an Authorized Employee?
- Properly shut down equipment/machines. Assistance from the Affected Employee may be necessary to ensure proper shutdown and identification of isolation locations.
- Apply locks/tags.
- Verbally notify all Affected and Other Employees about the shutdown, and explain the purpose and use of the specific energy control procedure to be applied.
- Once work is complete, notify all Affected and Other Employees about the removal of locks/tags and impending restart.

What are the responsibilities of an Affected Employee?
- Provide assistance to the Authorized Employee, as requested, to ensure proper shutdown and identification of isolation locations.
- Do not attempt to start equipment/machines that are locked out or tagged out.
- Do not attempt to remove or tamper with locks or tags for any reason.

Why is LOTO important?
Unexpected startup of equipment/machines during service/maintenance work can result in serious injury or even death. Studies have shown that 10% of injuries occurring during service work are the result of someone else starting up the equipment. Don't be responsible for injuring a fellow employee.

What do you do if the machine/equipment that you need to use is locked out/tagged out?
- Do not attempt to remove of tamper with the locks or tags.
- Attempt to contact the Authorized Employee. Their name and number should be on the tag.
- If the Authorized Employee cannot be contacted, call the Authorized Employee's supervisor, foreman or subforeman and ask that they track down the Authorized Employee.
- If the Authorized Employee is not on campus, contact Safety and Compliance to initiate the abandoned lock/tag removal process.

What do LOTO locks and tags look like?

To verify training completion, please fill in the requested information below. Provide one (1) copy to your supervisor and one (1) copy to your Unit Responsible Person.

Name: _____ Badge/UIN:_____

Signature: _____ Date: _____

APPENDIX F – PERIODIC INSPECTION FORM

LOTO Periodic Inspection Form			
SECTION I: GENERAL INFORMATION			
Campus Unit:	**Building:**		
Equipment/Machine Description:			
Equipment/Machine Location:			
SECTION II: PROCEDURE EVALUATION			
Inspection Criteria		**Yes**	**No**
Equipment-specific procedure completed, legible, workable?			
Affected and other employees notified prior to commencement of work?			
Sources of hazardous energy correctly identified?			
Equipment/machine properly shut down?			
Isolation/control locations correctly identified?			
Appropriate lockout device and lock/tag used at each isolation/control location?			
Sources of stored energy correctly identified?			
Sources of stored energy appropriately dissipated?			
Were appropriate methods used to verify control/isolation of hazardous energy?			
If group lockout/tagout was used, were appropriate group lockout methods employed (e.g., multi-lock hasp or group box) by each participating authorized employee?			
Were all locks, tags, and devices properly removed after completion of service/ maintenance work?			
Was the area inspected to make sure it was clear of tools, supplies, etc. prior to restart?			
Did the authorized employee(s) verify that all machine guards had been re-installed prior to restart?			
Were affected and other employees notified that the machine/equipment had been released from LOTO?			
Was the equipment/machine properly restarted?			
Were the responsibilities of the authorized and affected employee(s) reviewed in regards to lockout and/or tagout?			
Is this equipment-specific procedure adequate to control hazardous energy sources? If no, make recommendation in Section IV below.			
Did the authorized employee(s) satisfactorily complete this procedure and understand their responsibilities? If no, make recommendation in Section IV below.			
SECTION III: PARTICIPANTS			
Authorized Employee(s) Being Observed	**Badge/UIN:**		
SECTION IV: COMMENTS AND RECOMMENDATIONS			
SECTION V: CERTIFICATION			
I certify that I have evaluated the implementation of the above listed energy control procedure for adherence to the procedure, University policy, and departmental program requirements. Observer:			
(Signature)	(Print Name)	(Badge)	(Date)

APPENDIX G – PROCEDURES FOR ELECTRICAL POWER GENERATION, TRANSMISSION, AND DISTRIBUTION

Electrical Power Generation

In general, energy control procedures listed previously in **Section VI. Control of Hazardous Energy** cover energy sources in installations for the purpose of electric power generation, including related equipment for communication or metering. Additional requirements follow:

- If normally energized parts will be exposed to contact by an employee while the machine or equipment is de-energized, a test shall be performed to ensure that these parts are de-energized; and
- If energy isolating devices are installed in a central location and are under the exclusive control of a system operator, the following requirements apply:
    - The employer shall use a procedure that affords employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.
    - The system operator shall place and remove LOTO devices in place of the Authorized Employee under paragraphs (d)(4), (d)(6)(iv), and (d)(7)(iv) of this section.
    - Provisions shall be made to identify the Authorized Employee who is responsible for (that is, being protected by) the lockout or tagout device, to transfer responsibility for lockout and tagout devices, and to ensure that an Authorized Employee requesting removal or transfer of a lockout or tagout device is the one responsible for it before the device is removed or transferred.

Electrical Power Transmission and Distribution

The following procedures are for the de-energization of electrical energy sources used exclusively for purposes of electrical power transmission or distribution.

If a system operator is in charge of the lines or equipment and their means of disconnection, all of the requirements in the ***Procedures for De-energizing Lines and Equipment*** section below shall be observed, in the order given.

If no system operator is in charge of the lines or equipment and their means of disconnection and more than one crew will be working on the lines, one employee in each crew shall be designated as being in charge of the clearance. All of the requirements in the ***Procedures for De-energizing Lines and Equipment*** section below shall be observed. The employee in charge of the clearance shall take the place of the system operator, as necessary. The designated employees shall coordinate their operations and de-energization to ensure the safety of all workers.

If no system operator is in charge of the lines or equipment and their means of disconnection, only one crew will be working on the lines or equipment, and the means of disconnection is accessible and visible to and under the sole control of the employee in charge of the clearance, Steps 2, 4, 5, 9, and 13 in the ***Procedures for De-energizing Lines and Equipment*** section below can be omitted. Additionally, tags required by the remaining steps below need not be used.

Procedures for De-energizing Lines and Equipment

1. Any disconnecting means that are accessible to persons outside the employer's control (for example, the general public) shall be rendered inoperable while they are open for the purpose of protecting employees.

2. A designated employee shall make a request of the system operator to have the particular section of line or equipment de-energized. The designated employee becomes the employee in charge and is responsible for the clearance.
3. All switches, disconnectors, jumpers, taps, and other means through which known sources of electric energy may be supplied to the particular lines and equipment to be de-energized shall be opened. Such means shall be rendered inoperable, unless its design does not so permit, and tagged to indicate that employees are at work.
4. Automatically and remotely controlled switches that could cause the opened disconnecting means to close shall also be tagged at the point of control. The automatic or remote control feature shall be rendered inoperable, unless its design does not so permit.
5. Tags shall prohibit operation of the disconnecting means and shall indicate that employees are at work.
6. After the applicable requirements in Steps 1-5 have been followed and the employee in charge of the work has been given a clearance by the system operator, the lines and equipment to be worked shall be tested to ensure that they are de-energized.
7. Protective grounds shall be installed as follows:
    - Temporary protective grounds shall be placed at such locations and arranged in such a manner as to prevent each employee from being exposed to hazardous differences in electrical potential.
    - Protective grounding equipment shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the fault. This equipment shall have an ampacity greater than or equal to that of No. 2 AWG copper. (Note: Guidelines for protective grounding equipment are contained in American Society for Testing and Materials Standard Specifications for Temporary Grounding Systems to be Used on De-Energized Electric Power Lines and Equipment, ASTM F855-1990.)
    - Protective grounds shall have an impedance low enough to cause immediate operation of protective devices in case of accidental energizing of the lines or equipment.
    - Before any ground is installed, lines and equipment shall be tested and found absent of nominal voltage, unless a previously installed ground is present.
    - When a ground is to be attached to a line or to equipment, the ground-end connection shall be attached first, and then the other end shall be attached by means of a live-line tool.
    - When a ground is to be removed, the grounding device shall be removed from the line or equipment using a live-line tool before the ground-end connection is removed.
    - When work is performed on a cable at a location remote from the cable terminal, the cable may not be grounded at the cable terminal if there is a possibility of hazardous transfer of potential should a fault occur.
    - Grounds may be removed temporarily during tests. During the test procedure, the employer shall ensure that each employee uses insulating equipment and is isolated from any hazards involved, and the employer shall institute any additional measures as may be necessary to protect each exposed employee in case the previously grounded lines and equipment become energized.

8. After the applicable requirements of Steps 1-7 have been followed, the lines and equipment involved may be worked as de-energized.
9. If two or more independent crews will be working on the same lines or equipment, each crew shall independently comply with each of the steps in this section.
10. To transfer the clearance, the employee in charge (or, if the employee in charge is forced to leave the worksite due to illness or other emergency, the employee's supervisor) shall inform the system operator; employees in the crew shall be informed of the transfer; and the new employee in charge shall be responsible for the clearance.
11. To release a clearance, the employee in charge shall:
    - Notify employees under their direction that the clearance is to be released;
    - Determine that all employees in the crew are clear of the lines and equipment;
    - Determine that all protective grounds installed by the crew have been removed; and
    - Report this information to the system operator and release the clearance.
12. The person releasing a clearance shall be the same person that requested the clearance, unless responsibility has been transferred in accordance with Step 10.
13. Tags may not be removed unless the associated clearance has been released in accordance with Step 11.
14. Only after all protective grounds have been removed, after all crews working on the lines or equipment have released their clearances, after all employees are clear of the lines and equipment, and after all protective tags have been removed from a given point of disconnection, may action be initiated to reenergize the lines or equipment at that point of disconnection.

APPENDIX H – DEFINITIONS

Affected Employee: An employee whose job requires them to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires them to work in an area in which such servicing or maintenance is being performed.

Authorized Employee: A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An Affected Employee becomes an Authorized Employee when that employee's duties include performing servicing or maintenance covered under this section.

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, or through which, a lock can be affixed, or it has a locking mechanism built into it. 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 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.

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

Hot tap: A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

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

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

Lockout/Tagout (LOTO): Specific practices and procedures to safeguard employees from the unexpected energization or startup of machinery and equipment, or the release of hazardous energy during service or maintenance activities.

Normal production operations: The utilization of a machine or equipment to perform its intended production function.

Servicing and/or maintenance: Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the **unexpected** energization or startup of the equipment or release of hazardous energy.

Setting up: Any work performed to prepare a machine or equipment to perform its normal production operation.

Tagout: The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout device: A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

APPENDIX I – PROGRAM AUDIT CHECKLIST

University of Illinois at Urbana-Champaign
Control of Hazardous Energy Program
(Lockout/Tagout)

	Yes	No
1. Has a written control of hazardous energy program (lockout/tagout) that includes work-site specific procedures been established?	☐	☐
2. Has a program administrator, with appropriate training and experience, been designated and identified in the written program?	☐	☐
3. Only trained Authorized Employees perform lockout/tagout?	☐	☐
4. Appropriate energy control devices for each type of energy control point are available?	☐	☐
5. All equipment/machines requiring equipment-specific energy control procedures have been identified and procedures developed?	☐	☐
a. Authorized Employees know where to locate equipment-specific energy control procedures?	☐	☐
b. Authorized Employees understand how to utilize equipment-specific energy control procedures?	☐	☐
c. Each equipment-specific procedure undergoes a periodic inspection at least annually?	☐	☐
6. Locks and tags are standardized, durable, identifiable, and used for no other purpose?	☐	☐
a. Tags are only used for equipment that is not capable of being locked out?	☐	☐
7. Authorized employees are trained and know:		
a. Source, type and magnitude of energy available in their workplace?	☐	☐
b. Methods and means necessary for energy isolation and control?	☐	☐
8. Affected Employees understand the importance of energy control procedures and know not to attempt to restart equipment/machines or remove locks/tags?	☐	☐

DOCUMENT REVISIONS

Revision Dates	
November 8, 2018	New revisions throughout
September 10, 2019	Minor formatting
March 29, 2020	Minor formatting
April 16, 2021	Review, update format, and minor grammatical edits
February 12, 2024	Review, update Appendix A