University of Illinois at Urbana-Champaign
Facilities & Services
Division of Safety and Compliance

Control of Hazardous Energy Policy

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I. PURPOSE

The University of Illinois at Urbana-Champaign (U of I), through the Division of Safety and Compliance (S&C), has established this Control of Hazardous Energy Policy to protect the health of University employees and to assure compliance with State and Federal occupational safety and health standards, particularly the Occupational Safety and Health Administration (OSHA) standards 29CFR 1910.147 The Control of Hazardous Energy, 29CFR 1910.333 Electrical, 29CFR 1910.269 Electrical Power Generation, Transmission, and Distribution, and enforced at the U of I by the Illinois Department of Labor.

This Control of Hazardous Energy Policy provides the minimum elements for Unit-Specific Control of Hazardous Energy Programs including the U of I policy on administration, energy control procedures, training, and inspection. In addition, responsibilities are outlined for S&C, Deans and Directors, Unit Heads, Supervisors and Employees. It is expected that Campus Units utilizing Control of Hazardous Energy procedures will develop Unit-Specific Control of Hazardous Energy Programs and develop their own equipment-specific lockout/tagout (LOTO) procedures to complement this general policy. S&C can assist Campus Units in developing their Programs and equipment-specific procedures.

II. POLICY

It is the policy of the U of I to provide its employees with a safe and healthful working environment. This is accomplished as far as feasible with acceptable work practices and administrative controls.

III. SCOPE

The provisions of this Control of Hazardous Energy Policy apply to all Campus Units that have employees involved with the servicing and/or maintenance of machines and equipment in which the unexpected energization or startup, or release of stored energy could cause injury to employees.

IV. RESPONSIBILITIES

The Division of Safety and Compliance shall:

A. Develop a written Control of Hazardous Energy Policy and review it on an annual basis.
B. Provide Campus Units assistance with creation of Unit-Specific Control of Hazardous Energy Programs and equipment-specific LOTO procedures.
C. Assist Campus Units in the selection of appropriate equipment for LOTO.
D. Provide or assist in the arrangement of training on the requirements of this Policy and LOTO procedures for supervisors and employees.
E. Assist Campus Units in establishing proper training record retention procedures.
F. Assist Campus Units in developing a periodic inspection system for the review of each energy control procedure (LOTO procedure).

Deans, Directors of Academic and Administrative Units and Department Heads shall:
A. Ensure that the Unit-Specific Control of Hazardous Energy Program meets the requirements of this Control of Hazardous Energy Policy and applicable OSHA regulations.
B. Provide fiscal and administrative resources for the implementation of their Unit-Specific Control of Hazardous Energy Program.
C. Ensure that all personnel that service and/or maintain machines and equipment or are impacted by the servicing and/or maintenance of the machines and equipment receive the proper training.
D. Designate a Competent Person to be responsible for implementing the Unit-Specific Control of Hazardous Energy Program and ensuring compliance with applicable OSHA regulations.

Supervisors of employees who may be required to comply with the Unit-Specific Control of Hazardous Energy Program shall:
A. Attend training on the requirements of the Unit-Specific Control of Hazardous Energy Program and requirements in the Employee Training section.
B. Identify personnel who require training and ensure that they have received the proper training before allowing hazardous energy control procedures.
C. Understand and follow the protocols of this Control of Hazardous Energy Policy, Unit-Specific Control of Hazardous Energy Program, and equipment-specific LOTO procedures.
D. Ensure that the requirements of the Unit-Specific Control of Hazardous Energy Program are followed.

Authorized Employees shall:
A. Attend training on the requirements of the Unit-Specific Control of Hazardous Energy Program and requirements outlined in the Employee Training section.
B. Know and understand the associated hazards of the equipment that they will be servicing and/or maintaining.
C. Understand and follow the protocols of this Control of Hazardous Energy Policy, Unit-Specific Control of Hazardous Energy Program, and equipment-specific LOTO procedures.
D. Inform Authorized Employees and other employees whose work are or may be in the area where hazardous energy and material control procedures are to be utilized on the LOTO procedure to be used and to not attempt to restart or reenergize the affected equipment/machines.

Affected Employees shall:
A. Attend training on the purpose and use of hazardous energy control procedures.
B. Once informed by an Authorized Employee that equipment/machine has been deenergized do not attempt to restart or reenergize it.
V. DEFINITIONS

**Authorized Employee:** An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her 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 Authorized 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 unjaming 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.

VI. Control of Hazardous Energy

Each Campus Unit that has employees that service or maintain machines and/or equipment shall establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, startup, or release of stored energy. Program elements must include and be in accordance with the following sections. An example Unit-Specific Control of Hazardous Energy Program is included in Appendix A.

A. Exemptions to Requirements of this Control of Hazardous Energy Policy

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.

B. Energy Control Procedures

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, the following:

• 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.

An example equipment-specific energy control procedure is included in Appendix B.

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.

Exception to Requirement for Equipment-Specific 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 deenergize 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

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 Authorized 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: Authorized 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:
   • Depressurizing hydraulic and pneumatic lines;
   • Discharging electrical capacitors;
   • Disengaging spring-loaded components; and/or
   • 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 deenergization of the machine or equipment have been accomplished. This can be accomplished by:
   • Attempting to restart the machine or equipment following normal startup operations through the use of local controls; and
   • 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, Authorized Employees shall be notified that the lockout or tagout device(s) have been removed.

Procedures for Testing or 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. Deenergization: Deenergize all systems and reapply energy control measures in accordance with the Application of Energy Control Devices procedures to continue the servicing and/or maintenance.

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 shall be provided by the employer for isolating, securing or blocking of machines or equipment from energy sources.

Lockout devices 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.**
    - 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.
  - **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**
    - LOTO devices shall indicate the identity of the employee applying the device(s).
    - 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.*

Examples of energy control devices are included in **Appendix C**. If you need assistance in identifying proper lockout and/or tagout devices or assistance with identifying a vendor for their purchase contact the Division of Safety and Compliance at 265-9828.

**Lock Removal Procedures**

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 the employer, provided that specific procedures and training for such removal have been developed, documented and incorporated into the employer's energy control program. The employer shall demonstrate that the specific procedure
provides equivalent safety to the removal of the device by the Authorized Employee who applied it. The specific procedure shall include at least the following elements:

- Verification by the employer that the Authorized Employee who applied the device is not at the facility;
- Making all reasonable efforts to contact the Authorized Employee to inform him/her that his/her lockout or tagout device has been removed; and
- Ensuring that the Authorized Employee has this knowledge before he/she resumes work at that facility.

**Coordination with Contractors**

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

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

**Group Lockout**

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 an 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 Authorized Employee to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment; and
- When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to an 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**

Specific procedures shall 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.

C. Employee Training

Each Campus Unit shall provide training to ensure that the purpose and function of this Control of Hazardous Energy Policy and their Unit-Specific Control of Hazardous Energy Program are understood by their employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. For assistance with the development of training contact the Division of Safety and Compliance at 265-6084. Training requirements for each classification of employee is presented below.

Authorized Employees

An Authorized Employee is one who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. Training for Authorized Employees shall include at a minimum:

- 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 Policy and the Unit-Specific Control of Hazardous Energy Program; and
- Equipment-specific training provided by their supervisor.

Affected Employees

An Affected Employee is one whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed. Training for Affected Employees shall include at a minimum:

- The purpose and use of the energy control procedure;
- Recognition of LOTO devices;
• Prohibition of tampering with LOTO devices and attempting to restart or reenergize affected equipment/machines; and
• Instruction by the Authorized Employee on the energy control procedure being utilized.
This training can be provided by the employee supervisor or Authorized Employee who is about to perform service and/or maintenance work by using the Authorized Employee Training and Record Form located in Appendix D.

Other Employees
All other employees whose work are 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
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 or processes that present a new hazard;
• There is a revision to this Control of Hazardous Energy Policy or the Unit-Specific Control of Hazardous Energy Program;
• 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.

D. Periodic Inspections

Each Campus Unit shall 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.

If a procedure is used less than 1 time per year, then 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

A means to record each review and identify deficiencies must be developed by each Campus Unit. An example periodic inspection form is included in Appendix E. 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.

VII. Electrical Work Practices

Energy control procedures listed previously in Section VI. Control of Hazardous Energy 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 deenergized. The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfeed even though specific parts of the circuit have been deenergized 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 electrician.
• Safe procedures for deenergizing circuits and equipment shall be determined before circuits or equipment are deenergized by a qualified electrician;
• 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 deenergizing 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. Solar panels and other power generation devices that operate for the purpose of cogeneration see Section VIII. Electrical Power Generation, Transmission, and Distribution.

VIII. Electrical Power Generation, Transmission, and Distribution

This section applies to installations under the exclusive control of electric utilities for the purpose of power generation, transmission, and distribution, including related equipment for communication or metering. Installations in electric power generation facilities that are not an integral part of, or inextricably commingled with, power generation processes or equipment are covered by Section VI. Control of Hazardous Energy and Section VII. Electrical Work Practices.

A. 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 deenergized, a test shall be performed to ensure that these parts are deenergized; 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:
  o 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.
  o 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.
  o 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.

B. Electrical Power Transmission and Distribution

The following procedures are for the deenergization of electrical energy sources used exclusively for purposes of electric 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 Deenergizing 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 Deenergizing 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 deenergization 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 Deenergizing Lines and Equipment* section below can be omitted. Additionally, tags required by the remaining steps below need not be used.

*Procedures for Deenergizing 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 deenergized. 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 deenergized 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 deenergized.
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 deenergized.

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 his or her 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 A: UNIT-SPECIFIC CONTROL OF HAZARDOUS ENERGY PROGRAM
University of Illinois at Urbana-Champaign
Facilities & Services
Division of Safety and Compliance

F&S Control of Hazardous Energy Program

February 2013
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Appendix F&S Abandoned Lock Removal Form
I. PURPOSE

Facilities & Services (F&S) at the University of Illinois at Urbana-Champaign (U of I), through the Division of Safety and Compliance (S&C), has established this Control of Hazardous Energy Program to protect the health and safety of F&S employees and to assure compliance with State and Federal occupational safety and health standards, particularly the Occupational Safety and Health Administration (OSHA) standards 29CFR 1910.147 The Control of Hazardous Energy, 29CFR 1910.333 Electrical, 29CFR 1910.269 Electrical Power Generation, Transmission, and Distribution, and enforced at the U of I by the Illinois Department of Labor.

This Control of Hazardous Energy Control Program is intended to be used in conjunction with the U of I Control of Hazardous Energy Policy. See U of I Control of Hazardous Energy Policy for definitions of terms and general requirements required on the U of I campus.

II. POLICY

It is the policy of F&S to provide its employees with a safe and healthful working environment. This is accomplished as far as feasible with acceptable work practices and administrative controls.

III. SCOPE

The provisions of this Control of Hazardous Energy Program apply to all F&S employees involved with the servicing and/or maintenance of machines and equipment in which the unexpected energization or startup, or release of stored energy could cause injury to employees.

F&S personnel working in Abbott Power Plant (APP) must be familiar with and follow the APP Out of Service, Lockout/Tagout Program.

IV. RESPONSIBILITIES

The Division of Safety and Compliance shall:
A. Develop a written Control of Hazardous Energy Program and review it on an annual basis.
B. Provide F&S shops and personnel assistance with creation of equipment-specific lockout/tagout (LOTO) procedures.
C. Assist F&S shops and personnel in the selection of appropriate equipment for LOTO.
D. Provide or assist in the arrangement of training on the requirements of the U of I Control of Hazardous Energy Policy, this Program, and LOTO procedures for supervisors and employees.
E. Retain training records and/or assist F&S divisions with establishing training record retention procedures.
F. Assist F&S shops and personnel in developing a periodic inspection system for the review of each energy control procedure (LOTO procedure).

F&S shop foreman, subforeman, and zone managers of employees who may be required to comply with this Control of Hazardous Energy Program shall:
A. Attend training on the requirements of this Control of Hazardous Energy Program and requirements of the U of I Control of Hazardous Energy Policy.
B. Identify personnel who require training and ensure that they have received the proper training before allowing hazardous energy control procedures.
C. Understand and follow the protocols of the U of I Control of Hazardous Energy Policy, this Control of Hazardous Energy Program, and equipment-specific LOTO procedures.
D. Ensure that the requirements of this Control of Hazardous Energy Program are followed.

Authorized employees shall:
A. Attend training on the requirements of this Control of Hazardous Energy Program and requirements of the U of I Control of Hazardous Energy Policy.
B. Know and understand the associated hazards of the equipment that they will be servicing and/or maintaining.
C. Understand and follow the protocols of the U of I Control of Hazardous Energy Policy, this Control of Hazardous Energy Program, and equipment-specific LOTO procedures.
D. Inform Affected employees and other employees whose work are or may be in the area where hazardous energy and material control procedures are to be utilized on the LOTO procedure to be used and to not attempt to restart or reenergize the affected equipment/machines.

Affected employees shall:
A. Attend training on the purpose and use of hazardous energy control procedures.
B. Once informed by an Authorized employee that equipment/machine has been deenergized do not attempt to restart or reenergize it.

V. Control of Hazardous Energy

A. Exemptions to Requirements of this Control of Hazardous Energy Program

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

- 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.

B. Energy Control Procedures

F&S authorized employees will develop equipment-specific energy control procedures using the example form located in Appendix B of the U of I Control of Hazardous Energy Policy when work is to be completed for each piece of equipment, or for each class of related equipment that is to be serviced or maintained if an equipment-specific energy control procedure does not already exist.

An equipment-specific energy control procedure does not need to be developed 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 deenergize 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
- F&S, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance

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 authorized or affected 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:
   • Depressurizing hydraulic and pneumatic lines;
   • Discharging electrical capacitors;
   • Disengaging spring-loaded components; and/or
   • 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
deenergization of the machine or equipment have been accomplished. This can be
accomplished by:
   • Attempting to restart the machine or equipment following normal startup operations
     through the use of local controls; and
   • 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 or 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. Deenergization: Deenergize all systems and reapply energy control measures in accordance with the *Application of Energy Control Devices* procedures to continue the servicing and/or maintenance.

**Protective Hardware and Materials**

**Individual Locks**
Each LOTO Authorized Employee will be assigned a personal lock(s) through the Locksmith Shop. Personal locks will be red in color, uniquely keyed to the extent feasible, and shall not be used for any other purposes. The Locksmith Shop will permanently assign a maximum of 3 locks to an individual. If additional locks are required, they can be checked out through the Locksmith Shop.

**Group Locks and Lockout Devices**
Group locks and their associated group lockout box can be checked out from the Tool Room. Group locks will be yellow in color, uniquely keyed to the extent feasible, and shall not be used for any other purposes.

**Lockout Devices**
Lockout devices can be checked out from the Tool Room and shall meet the following:
- Hold the energy isolating device in a safe or “OFF” position;
- Be red in color;
- Be substantial enough to prevent removal without the use of excessive force such as bolt cutters or other metal cutting tools; and
- Be accompanied by a tagout device that identifies the employee applying the device.

Lockout devices of colors other than red can be used for non-safety related deenergization (e.g., shut down for energy conservation). The non-safety related lockouts must not use lockout locks of any color and must be accompanied by a tag indicating the reason for the equipment being off (e.g., “This valve has been turned off to gather accurate water meter readings.”) and contact information for the person or shop responsible for the deenergization.

**Tagout Devices**
Tagout devices can be checked out from the Tool Room and shall meet the following:
- When only tagout devices are used, all affected employees will be trained on the following topics: the limitations of tags; that when a tag is not to be removed without consent of the person that attached it; and that a tagout device is never to be by-passed, ignored, or otherwise defeated;
• Tags must be legible and understandable and attached in a manner that will clearly indicate the safe or “off” position;
• Tags, and means of attachment, must be made of materials which will withstand the environmental conditions of the workplace;
• Tagout devices (devices used to connect tags) shall be non-reusable, attached 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; and
• Be substantial enough to prevent inadvertent or accidental removal.

**Removal of Lockout/Tagout Devices**
Lockout/tagout devices shall only be removed by the individual that applied the device unless it has been verified that the employee who applied the device is not on campus. Only the employees Foreman, Subforeman, or Foreman/Subforeman designee shall remove the lockout/tagout device by cutting it off. The *Abandoned Lock Removal Form* located in the Appendix must be completely filled out before removing the lockout/tagout device. All reasonable efforts shall be made to inform the employee that their lockout/tagout device has been removed and the employee must be informed prior to beginning work upon their return to campus.

**Work With Contractors**
When work is conducted between F&S and a contractor(s) F&S will assign a coordinating authorized employee will be the lead authorized employee on the project and responsible for all work being conducted. The F&S coordinating authorized employee will apply a hasp to each lockout point on the equipment or machine. Each entity must:
• Have and follow their own control of hazardous energy and materials program;
• Inform F&S of their energy control procedures and F&S must inform contractor of energy control procedures;
• Comply with restrictions and prohibitions of this Control of Hazardous Energy Control Program and F&S must comply the restrictions and prohibitions of the contractor’s energy control program;
• Provide appropriately qualified and trained authorized employees;
• Provide the appropriate group and individual lockout equipment;
• Assign a coordinating authorized employee who will:
  o Be directly responsible for the authorized employees that work for their entity;
  o Work with the other coordinating authorized employees to make sure that the requirements of their own program are met; agree on the proper procedures for shutdown, isolation and deenergization, and reenergization; verify that hazardous energy has been isolated and de-energized; and ensure that all authorized and affected employees are aware of reenergization;
  o Apply a group lock on the hasp at each lockout location and place the group lock keys in their own group box; and
  o Verify that each authorized employee working for their entity places an individual lock on their own group box.
Reenergization of the equipment or machine cannot occur until each individual lock on each group lock box has been removed and each group lock has been taken off of the hasp at each lockout location. The F&S group lock applied by the F&S coordinating authorized employee shall be the last group lock removed.

**Contractor Work**
Contractors shall have and follow their own control of hazardous energy program and procedures. Contractors must provide their own authorized employees and equipment to safely isolate and de-energize hazardous energy and materials, and verify that isolation and deenergization was successful. Contractors are responsible for informing all affected F&S and other University employees of the equipment or machine work. F&S will provide the Contractor with the known energy sources, lockout locations, and equipment-specific procedures including procedures for lockout, shutdown, and startup.

**Group Lockout/Tagout**
Group lockout/tagout is required when service or maintenance on a machine or equipment will be conducted by more than one person. Two procedures for conducting group lockout/tagout are described below.

**Procedure 1**
A hasp designed to accept multiple locks is affixed to each lockout point on the affected machine or equipment. Each person conducting work must place individual locks and tags on the hasp at each lockout point. Each person must also verify that hazardous energy has been isolated and de-energized.

**Procedure 2**
Group lockout/tagout can also be accomplished using group locks and lockout boxes available through the F&S Toolroom. Group locks and lockout boxes shall be used in accordance with the following:

- When one crew or trade is involved, a single responsible authorized employee from the group shall:
  - be assigned primary responsibility for the employees working under the protection of the group lockout/tagout;
  - ascertain the exposure status of each individual group member with regard to the locked out/tagged out machine/equipment;
  - affix the designated group locks at each lockout point on the affected machine or equipment, place the group lock keys in the lockout box, and affix an individual lock and tag to the lockout box;
  - verify that hazardous energy has been isolated and de-energized; and
  - verify that each individual group member has placed their individual lock and tag on the lockout box prior to beginning work, verified that hazardous energy has been isolated and de-energized, and removed their individual lock and tag when their work has been completed;

- When more than one crew or trade is involved a coordinating authorized employee:
  - shall be assigned with overall job-associated lockout/tagout control responsibility;
shall coordinate with the responsible authorized employee from each crew or trade to ensure continuity of protection; and
will place an individual lock on the lockout box and coordinate reenergization and start-up with each of the responsible authorized employees.

- Use LOTO release any time the lockout box needs to be opened during the servicing work, such as testing motor rotation. Clear all workers from the equipment and worker locks off the lock box. When release is complete, restore isolation of energy sources;

- Once maintenance or service work is complete:
  - all workers will remove their individual locks and tags from the lock box; and
  - the responsible authorized employee(s) and coordinating authorized employee, if required, shall inspect the work site and machine/equipment, and then remove their locks from the lock box and the group locks from the machine/equipment lockout points, and re-energize the machine/equipment according to the manufacturer recommended startup guidelines.

- Specific written procedures must be developed and implemented for complex isolation systems or repair operations involving many workers over more than one work shift.

**Shift/Personnel Changes**

If a shift or personnel change occurs for work on equipment or a machine is locked out/tagged out the following steps shall be followed:

- Authorized employees taking over the service or maintenance work will apply their locks or tags prior to the removal of locks or tags by the authorized employees ending their work;
- Authorized employees ending their work will provide a detailed summary of all work that has been completed and sources that may have been re-energized for testing to the authorized employees taking over the work prior to leaving the work area; and
- Authorized employees taking over the service or maintenance work must re-verify that all sources of hazardous energy have been isolated and de-energized.

**Motorized Equipment with Key Ignition**

F&S personnel who perform service and/or maintenance work on motorized equipment with key ignitions (e.g., automobiles, tractors, forklifts, etc.) shall:

be trained as authorized employees, remove and maintain sole possession of the ignition key by the authorized employee additional steps that must be taken include:

- Be trained as authorized employees;
- Remove and maintain sole possession of the ignition key;
- Set the parking brake;
- Place a tagout on the steering wheel or lock the doors; and
- Disconnect 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.
C. Employee Training

**Authorized Employees**
S&C shall provide training for Authorized Employees that covers general application of LOTO including:

- Recognition of hazardous energy sources;
- The type and magnitude of the energy available in the workplace;
- The methods and means available for energy isolation and control;
- Limitations of tagout only usage; and
- Requirements of the U of I Control of Hazardous Energy Policy and this Control of Hazardous Energy Program.

Shop foreman, subforeman, zone managers, or their designee shall provide additional training specific to the equipment that the employee will be servicing and/or maintaining including:

- Recognition of hazardous energy sources;
- The type and magnitude of the energy available in the workplace;
- The methods and means available for energy isolation and control; and
- Equipment-specific LOTO procedures that may be utilized.

**Affected Employees**
Prior to beginning service and/or maintenance work F&S personnel shall identify affected employees and provide/verify the following information:

- Verify the affected employee has documentation of having received affected employee training; or
- Provide a copy of the Affected Employee Training and Record Form located in Appendix D of the U of I Control of Hazardous Energy Policy and verify affected employees acknowledgement of the information; and
- Provide instruction on the energy control procedure to be utilized.

**Other Employees**
All other employees whose work are 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**
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 or processes that present a new hazard;
- There is a revision to the U of I Control of Hazardous Energy Policy or this Control of Hazardous Energy Program;
• 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.

D. Periodic Inspections

F&S will conduct annual periodic inspections using the Periodic Inspection Form located in Appendix E of the U of I Control of Hazardous Energy Policy. Management of the periodic inspections will be done by the F&S Maintenance Division for the facilities that contain equipment/machines serviced by the F&S Maintenance Division and by the F&S Construction Management Division for facilities that are contain equipment serviced by the F&S Construction Management Division.

Maintenance Zone Managers and Shop Foreman will assign personnel to the Authorized Employee and Observer roles. The Observer shall observe the implementation of the energy control procedure performed by a representative number of Authorized Employees authorized to perform service/maintenance work using the energy control procedure and talk with a representative number of Authorized Employees authorized to perform service/maintenance work using the energy control procedure to review the procedure and their responsibilities under it.

Upon completion of a periodic inspection, the completed Periodic Inspection Form shall be provided to S&C along with recommendations for retraining or edits to the energy control procedure. Results of the periodic inspection shall be communicated to each Authorized Employee reasonably expected to implement the procedure during the year by the Maintenance Zone Managers and Shop Foreman.

VI. Electrical Work Practices

Isolation, discharge, and verification of electrical hazards from work on, near, or with conductors or equipment in electric utilization installations (e.g., replacing the electrical disconnect for a fan) shall only be performed by a qualified electrician according to the procedures included in Section VII. Electrical Work Practices of the U of I Control of Hazardous Energy Policy.

VII. Electrical Power Generation, Transmission, and Distribution

Work on installations under the exclusive control of electric utilities for the purpose of power generation, transmission, and distribution, including related equipment for communication or metering shall be conducted by qualified employees assigned to perform F&S Utilities work. Work shall be conducted in accordance with Section VIII. Electrical Power Generation, Transmission, and Distribution of the U of I Control of Hazardous Energy Policy.
APPENDIX: F&S ABANDONED LOCK REMOVAL FORM
Only Foreman, Subforeman, or their designee can authorize the removal of locks. All lock removals must be approved by Safety and Compliance.

Building: ___________________________ Building No. ______________
Equipment Description: ___________________________ Location: ______________
Requested By: ___________________________ Date: ______________

Name of Person whose lock must be removed: ___________________________

Has an attempt been made to contact him or her? □ YES □ NO

Describe Steps taken to contact him/her.
________________________________________________________________________
________________________________________________________________________

Why is it critical to remove this lock now?
________________________________________________________________________
________________________________________________________________________

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

Authorized By: ___________________________ UIN/Badge: ______________
Signature: ___________________________
Date: ___________________________

S&C Representative: ___________________________ 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 Owner: ___________________________ UIN/Badge: ______________
Signature: ___________________________
Date: ___________________________
**Appendix B**

**Equipment-Specific Energy Control Procedure**

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### Section I

<table>
<thead>
<tr>
<th>Equipment Description:</th>
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</tr>
</thead>
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<tr>
<td>Building/Room:</td>
<td>Date Modified:</td>
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<td>Specific Location:</td>
<td>Revision:</td>
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<tr>
<td>Originator:</td>
<td>Phone #:</td>
</tr>
<tr>
<td>Campus Unit:</td>
<td></td>
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</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Hazardous Energy Sources</th>
<th>Control Type</th>
<th>Control Location</th>
<th>LOTO Device</th>
<th>Verification Method</th>
</tr>
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</table>

### Section III

<table>
<thead>
<tr>
<th>Stored Hazardous Energy Sources</th>
<th>Means of Dissipation/Elimination</th>
<th>Verification Method</th>
</tr>
</thead>
</table>

### Section IV

**Steps for Normal Shutdown:**

### Section V

**Steps for Normal Startup:**
Instructions for Equipment-Specific Energy Control Procedures

The 9 steps that must be followed for the control of hazardous energy:

**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 be 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 disciplinary action. If this form is completed by F&S personnel, it shall be provided to the Division of Safety and Compliance upon completion of work.
Appendix C
Example Energy Control Devices

Locks and Tags

Devices for Light Switches
Appendix C
Example Energy Control Devices

Devices for Breakers

Devices for Fuses

Devices for Plugs
Appendix C
Example Energy Control Devices

Devices for Valves

Group Devices
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 him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her 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 explains the purpose and use of the specific energy control procedure to be applied.
- Once work is complete, notifies 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.
Appendix D
Affected Employee Training and Record Form

What do you do if the machine/equipment that you need to use is locked out/tagged out?

- Do not attempt to remove or 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?

![Image of LOTO locks and tags]

To verify training completion, please fill in the requested information below and return 1 copy to the Division of Safety and Compliance via campus mail or email at safetyandcompliance@illinois.edu.

Name: ________________________________  Badge/UIN: ____________________

Signature: _____________________________  Date: ________________________
## Appendix E
### Periodic Inspection Form

<table>
<thead>
<tr>
<th>SECTION I: GENERAL INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Unit:</td>
</tr>
<tr>
<td>Building:</td>
</tr>
<tr>
<td>Equipment/Machine Description:</td>
</tr>
<tr>
<td>Equipment/Machine Location:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION II: PROCEDURE EVALUATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection Criteria</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Equipment-specific procedure completed, legible, workable?</td>
</tr>
<tr>
<td>Affected and other employees notified prior to commencement of work?</td>
</tr>
<tr>
<td>Sources of hazardous energy correctly identified?</td>
</tr>
<tr>
<td>Equipment/machine properly shut down?</td>
</tr>
<tr>
<td>Isolation/control locations correctly identified?</td>
</tr>
<tr>
<td>Appropriate lockout device and lock/tag used at each isolation/control location?</td>
</tr>
<tr>
<td>Sources of stored energy correctly identified?</td>
</tr>
<tr>
<td>Sources of stored energy appropriately dissipated?</td>
</tr>
<tr>
<td>Were appropriate methods used to verify control/isolation of hazardous energy?</td>
</tr>
<tr>
<td>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?</td>
</tr>
<tr>
<td>Were all locks, tags, and devices properly removed after completion of service/maintenance work?</td>
</tr>
<tr>
<td>Was the area inspected to make sure it was clear of tools, supplies, etc. prior to restart?</td>
</tr>
<tr>
<td>Did the authorized employee(s) verify that all machine guards had been re-installed prior to restart?</td>
</tr>
<tr>
<td>Were affected and other employees notified that the machine/equipment had been released from LOTO?</td>
</tr>
<tr>
<td>Was the equipment/machine properly restarted?</td>
</tr>
<tr>
<td>Were the responsibilities of the authorized and affected employee(s) reviewed in regards to lockout and/or tagout?</td>
</tr>
<tr>
<td>Is this equipment-specific procedure adequate to control hazardous energy sources? If no, make recommendation in Section IV below.</td>
</tr>
<tr>
<td>Did the authorized employee(s) satisfactorily complete this procedure and understand their responsibilities? If no, make recommendation in Section IV below.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION III: PARTICIPANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorized Employee(s) Being Observed</td>
</tr>
<tr>
<td>Badge/UIN:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION IV: COMMENTS AND RECOMMENDATIONS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SECTION V: CERTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>Observer:</td>
</tr>
<tr>
<td>(Signature) (Print Name) (Badge) (Date)</td>
</tr>
</tbody>
</table>