Northwestern
Control of Hazardous Energy
(Lockout/Tagout)
Risk Management
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I. Purpose
Northwestern’s Control of Hazardous Energy Program, also known as lockout/tagout (LOTO), outlines the required steps to prevent injuries resulting from the unexpected startup or release of stored energy when working on equipment, machinery, or systems that could release stored energy (e.g., mechanical, electrical, steam, hydraulic, pneumatic, chemical, thermal, gravity).

II. Scope
This program applies to contractors and Northwestern faculty, students, and staff who perform service or maintenance on machines, equipment, and/or systems in which the unexpected energization or startup of the machines, equipment, or system could harm faculty, students, staff, and contractors. This includes all academic shops that maintain or house machines or equipment.

III. Exemptions
As outlined by OSHA, certain, specific tasks are exempt from lockout/tagout and are defined as follows:

A. Work on cord- and plug-connected electric equipment:
   i. Startup of the equipment is controlled by the unplugging of the equipment.
   ii. The plug must be under the exclusive control of the employee performing the work.
   iii. No other forms of hazardous energy are part of the equipment to which the employee may be exposed.

B. Work on, near, or with premise wiring (i.e., installations of electric conductors), wiring for connection to the supply circuit, or installation of outside conductors or optical fiber cable that’s installed along with electric conductors, which is covered under 29 CFR 1910.331-355. For this information, refer to Northwestern’s Electrical Program.

C. Controlling hazardous energy in installations for the exclusive purpose of power generation, transmission, and distribution, including related equipment for communication or metering, which is covered under 29 CFR 1910.269.

IV. Responsibilities

A. Risk Management
   i. Maintain and update Northwestern’s Control of Hazardous Energy (Lockout/Tagout) Program.
   ii. Review and approve lockout/tagout procedures.
   iii. Provide or coordinate lockout/tagout training to Northwestern faculty, staff, and students.

B. Supervisors
   i. Ensure staff are adequately trained to safely perform lockout/tagout.
   ii. Provide the necessary resources to ensure staff have necessary lockout/tagout hardware.
   iii. Ensure all employees attend the appropriate lockout/tagout training.
   iv. Ensure all employees carry out lockout/tagout procedures, including conducting annual, periodic inspections.
C. **Authorized Employees**
   i. Develop energy control procedures for the machinery and equipment they perform service and maintenance on.
   ii. Conduct and document annual inspections of all energy control procedures, and update when necessary.
   iii. Attend training.
   iv. Recognize and understand energy sources that require lockout/tagout procedures.
   v. Follow lockout/tagout procedures on all equipment and machinery prior to performing any maintenance or repair activities.

D. **Affected Employees**
   i. Develop an awareness of machinery, equipment, and systems within each employee’s respective work area(s) that is subject to energy control procedures.
   ii. Do not remove or tamper with any locks or tags on machinery, equipment, or systems under the control of lockout/tagout.
   iii. Attend training.

E. **Contractors**
   i. Prior to beginning work on any machine, equipment, or system that requires lockout/tagout, ask your Northwestern contact for Northwestern’s Control of Hazardous Energy (Lockout/Tagout) Program and procedure(s) for review.
   ii. All lockout/tagout activities involving contractors must be completed in the form of group lockout/tagout. Northwestern Facilities will shut down machines, equipment, and systems prior to any work beginning, then all parties will apply their locks (see Section VII).
   iii. Contractors are responsible for supplying their own locks and tags. These devices must meet the requirements outlined in Section V.E. of this program.

V. **Lockout/Tagout**

A. All machinery, equipment, and systems must have a documented lockout/tagout procedure prior to maintenance activities, which must, at a minimum, include the following information:
   i. A statement of the intended use of the procedure;
   ii. What personal protective equipment is required;
   iii. Procedural steps for shutting down, isolating, blocking, and securing machines, equipment, or systems;
   iv. Procedural steps for the placement, removal, and transfer of lockout or tagout devices and the responsibility for them; and
   v. Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

B. Prior to the implementation of the lockout/tagout procedures, employees who will be affected by the shutdown of machinery, equipment, or systems must be notified.

C. Shutdown the machine, equipment, or system, following normal shutdown procedures for the specific machine, equipment, system.

D. Disconnect or isolate the machine, equipment, or system from the energy source(s).
E. Apply the lockout or tagout device(s) to the energy-isolating device(s) to prevent the accidental re-energization of the machine, equipment, or system to be serviced or maintained.
   i. Northwestern must provide locks, tags, and all other hardware necessary to isolate, secure, and block machines, equipment, or systems from energy sources.
   ii. Locks are considered the preferred method of isolating energy sources.
   iii. In the event an energy-isolating device is not capable of accepting a lockout device, a tagout system must be utilized.
      a. Tagout device(s) must be attached at the same location that the lockout device would have been attached.
      b. To achieve a level of safety equivalent to that of using a lockout device, additional safety measures must be implemented to reduce the likelihood of inadvertent energization (i.e., removing an isolating circuit element, blocking a controlling switch, opening an extra disconnecting device, removing a valve handle).
   iv. The hardware provided by Northwestern must be:
      a. Durable – Capable of withstanding the environment to which they are exposed for as long as the exposure is expected without deteriorating or the text becoming illegible.
      b. Standardized – Devices must be standardized in at least one of the following criteria: color, shape, or size. Additionally, tags must have a standardized print and format.
      c. Substantial – Lockout devices must be substantial enough to prevent removal without the use of excessive force or unusual techniques (i.e., bolt cutters). Tagout devices, including their means of attachment, must be substantial enough to prevent inadvertent or accidental removal.
      d. Identifiable – Lockout device(s) must indicate the identity of the employee applying the device(s). Tagout devices must warn against hazardous conditions (i.e., “Do not start”).

F. Reposition, block, bleed, etc. the machine, equipment, or system to relieve, disconnect, and restrain stored or residual energy (e.g., springs, capacitors, rotating flywheels, hydraulic systems, air, gas, steam, water pressure). If a possibility exists for re-accumulation of hazardous energy, regularly verify during the service and maintenance that such energy has not re-accumulated to hazardous levels.

G. Verify the isolation and de-energization of the machine, equipment, or system.
   i. Prior to verification of the lockout/tagout procedures, check the area to ensure all personnel are in a safe location.
   ii. Attempt to restart the machine, equipment, or system to ensure all energy sources have been properly isolated.
   iii. Upon completion of the verification process, all controls must be returned to their original position.
VI. **Periodic Inspections**

A. Periodic inspections are required at least annually to evaluate and validate the effectiveness of the employee knowledge and procedures.

B. Procedures are tracked in Facilities Connect, which automatically invalidates procedures after one year and requires them to be reviewed and revised by an authorized employee prior to being validated again.

C. During the audit process, authorized employees must update any procedural steps that need to be edited, added, or removed. After updating the procedure, the authorized employee must document in Facilities Connect what changes, if any, were made.

D. After being approved by the authorized employee, Risk Management must review the procedure and activate it to revalidate it.

VII. **Group Lockout/Tagout**

If maintenance or servicing of a machine, piece of equipment, or system is performed by multiple individuals (e.g., contractors and employees), each authorized employee must follow the individual lockout/tagout instructions, including:

A. The Northwestern employee who is responsible for the maintenance or servicing of a machine, equipment, or system must:
   i. Authorize the locking/tagging out of that machine, equipment, or system;
   ii. Be the primary initiator of the lockout/tagout;
   iii. Be responsible for the employees working under the protection of the group lockout/tagout device; and
   iv. Be responsible for notifying affected employees before and after lockout/tagout procedures are performed.

B. Each person who is going to perform maintenance must affix a personal lockout or tagout device to the group box or hasp before work begins.

C. When servicing or maintenance is complete, each authorized employee will be responsible for removing their individual lockout or tagout device. The primary initiator must authorize the energizing of the machine, equipment, or system after the maintenance or servicing is complete.

VIII. **Shift or Personnel Changes**

To maintain continuity in the protection provided for those involved in the lockout/tagout procedures, and for the orderly transfer of the lockout/tagout devices, the steps below are necessary during personnel or shift changes:

A. **Personnel Changes**
   The arriving authorized employee’s lock and tag must be applied before the departing authorized employee’s lock and tag are removed. The departing personnel will inform the arriving personnel of the status of the equipment and work in progress.

B. **Group Lockout/Tagout Shift Changes**
   The lock and tag of at least one authorized employee on the arriving shift must be applied before the last group member of the departing group removes their lock. The departing group will inform the arriving group of the status of equipment and work in progress.
IX. Removing Locks and Tags
   A. Inspect the work area to ensure all tools and materials have been removed from the work area.
   B. Remove all personnel from the work area to a safe location.
   C. Remove the lockout/tagout devices.
   D. Reenergize the machine, equipment, or system.
   E. Notify employees affected by the shutdown that the machine, equipment, or system has been put back into service.

X. Forcible Removal of Locks or Tags
   Only the person who installed their lockout/tagout devices should remove them. If a personal lock is left on a piece of equipment and the owner of that lock is not present, only a member of management/supervision may remove the lock by following these steps:
   A. Verify that the lock’s owner is not on campus.
   B. Make a reasonable attempt to contact the employee.
   C. Thoroughly inspect the equipment to determine it is safe to re-energize.
   D. Notify the lock’s owner of the removal upon his or her return to work.

XI. Training
   Department leadership is required to ensure their direct reports receive training to certify the understanding of the purpose and function of the Control of Hazardous Energy (Lockout/Tagout) Program, knowledge and skills required for safe application of lockout/tagout, and usage/removal of controls. Training records must be maintained and include employee names and corresponding training date(s). OSHA defines three different levels of training: authorized, affected, and other:

   A. Authorized Employees
      Authorized employees perform service or maintenance on machinery, equipment, or systems around campus. Training for authorized employees is required to cover the following:
      i. Recognition of applicable hazardous energy sources.
      ii. Type and magnitude of the energy available.
      iii. Methods and means necessary for energy isolation and control.
      v. Instruction on how to verify energy isolation.

   B. Affected and Other Employees
      Affected and other employees work in or occupy an area in which lockout/tagout procedures may be used. This group of employees must be instructed about lockout/tagout procedures in their area and taught that it is prohibited to attempt to restart/energize machines, equipment, or systems that are de-energized.

Retraining must be provided to all authorized or affected employees whenever there is a change in job assignment; machines, equipment, or systems; processes; or it is identified that the employee’s knowledge or use of the energy control procedures is lacking. The re-training must reestablish the appropriate level of knowledge needed to work safely, and the trainer is required to certify and document the employee’s name and training date.
XII. Recordkeeping
Lockout/Tagout procedures are maintained on Facilities Connect, and training records for authorized and affected employees are maintained on myHR Learn.

XIII. Regulatory Authority
Northwestern and contractors will comply with the Occupational Safety and Health Administration’s (OSHA) standards and any other applicable codes and standards, including:

OSHA 29 CFR 1910.147 – Control of Hazardous Energy (Lockout/Tagout)

XIV. Contact
For questions, contact Gwen Butler, Director, Environmental Health and Safety, at gwen.butler@northwestern.edu or (847) 491-4936.