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

- Case Western Reserve University (CWRU) is committed to ensuring that all machinery is evaluated and meets the criteria for lockout/tagout within our facilities. In addition, employees who will be using such machinery will receive crucial, relevant information updates, understand and practice the proper steps of identifying the power source of a machine, know how to disengage (de-energize) the power, know how to verify the lockout and undergo training programs so there is no misunderstanding regarding safety. Spot checks and audits will be performed to make sure that employees completely understand how to lock and tag out energized equipment.

  Hazardous energy sources found in the workplace include electrical (generated or static); mechanical (transitional or rotational); thermal (machines, equipment or chemical reactions) and potential (hydraulic, pneumatic or vacuum pressure, springs or gravity). By observing all safety practices, devastating injuries such as the loss of a limb, paralysis or electrocution can be avoided.

  The CWRU Environmental Health and Safety Department (EHS) or their designees are responsible for the implementation of this program and have full authority to make necessary decisions maintaining its success. Additionally, this University has expressly sanctioned the EHS directors or their designees to halt any operation of the University where there is danger of serious personal injury.

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1.0 Definitions

- *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.

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

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

- *Energized*: Connected to an energy source or containing residual or stored energy

- *Energy isolating device*: A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following:

    - A manually operated electrical circuit breaker

    - A disconnect switch

    - A manually operated switch by which the conductors of a circuit can be disconnected from all underground 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 a key or combination type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip binds.

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

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

- *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.

2.0 Written Program

- CWRU will review and evaluate this standard practice instruction on an annual basis when changes occur to 29 CFR 1910.147 prompting revision or when facility operational changes occur requiring a revision of this document. Effective implementation of this program requires support from all levels of management within the University. This written program will be communicated to all personnel that are affected. It encompasses the total workplace, regardless of the number of workers employed or the number of work shifts and is designed to establish clear, concise goals and objectives.

3.0 General Requirements

- CWRU lockout/tagout procedures are described in this document. The standard practice instruction covers the servicing and maintenance of machines and equipment in which the unexpected energization or startup of the machines or equipment, or the release of stored energy, could cause injury to employees. This instruction applies to the control of energy during servicing and/or maintenance of machines and equipment. Normal production operations are not covered. Servicing and/or maintenance, which takes place during normal production operations, is covered if:

  - An employee is required to remove or bypass a guard or other safety device.

  - An employee is required to place any part of his or her body into an area on a machine, or a piece of equipment, where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

  - Exception: Minor tool changes and adjustments and other minor servicing activities, which take place during normal production operations, are not covered if they are routine, repetitive and integral to the use of the equipment for production, provided that the work is performed using alternative measures which offer effective protection in accordance with the University operational procedures.

- This instruction does not apply to the following:

  - Work on a cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or startup of equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control

of the employee performing the servicing or maintenance

- 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 it is demonstrated that (1) continuity of service is essential (2) shutdown of the system is impractical and (3) documented company procedures are followed and special equipment is used which will provide proven effective protection for our employees

- CWRU utilizes procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start-up or release of stored energy in order to prevent injury to employees.

4.0. Program Implementation

- CWRU's program consists of energy control procedures, employee training and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy and rendered inoperative.

  - Tagout: If an energy isolating device is not capable of being locked out, the University energy control program utilizes a tagout system.

  - Lockout: If an energy isolating device is capable of being locked out, the University's energy control program utilizes lockout, unless it can be demonstrated that the utilization of a tagout system will provide full employee protection.

  - Future Requirements: Whenever replacement, major repair, renovation or modification of a machine or equipment is performed and whenever new machines or equipment are installed, energy isolating devices for such machine or equipment shall be designated to accept a lockout device.

5.0 Full Employee Protection

- Tagout Location: When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device must be attached at the same location that the lockout device would have been attached and the University must demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program.

- Lockout Equivalency Demonstration: In demonstrating that a level of safety is achieved in the tagout program, which is equivalent to the level of safety obtained by using a lockout program, the University shall demonstrate full compliance with all tagout related provisions together with such additional elements as necessary to provide the equivalent safety available from the use of a lockout device. Additional means to be considered as part of the demonstration of full employee protection shall include, where possible, the implementation of additional safety measures such as the:

  - Removal of isolating circuit elements
  - Blocking of controlling switches
  - Opening of extra disconnecting devices
  - Removal of a valve handles to reduce the likelihood of inadvertent energization

6.0 Energy Control Procedure Exceptions

- Once a facility evaluation has been accomplished, documented procedures will not be developed when the following conditions exist:

  - The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after a shut down that could endanger employees.
  - The machine or equipment has a single energy source that can be readily identified and isolated.
  - The isolation and locking out of that energy source will completely de-engerize and deactivate the machine or equipment.

- The machine or equipment is isolated from that energy source and locked out during service 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.

- CWRU, in utilizing this exception, has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance. In the event of such occurrences, energy control procedures will be developed.

7.0 Energy Control Procedures

- Once a facility evaluation has been accomplished, procedures shall be developed, documented and utilized for the control of potentially hazardous energy.

- The following format will be followed for each machine requiring procedures: The plant services administrator will be responsible for the execution of these procedures. The procedures shall clearly and specifically outline the scope, purpose, authorization, rules and techniques to be utilized for the control of hazardous energy and the means to enforce compliance including, but not limited to, the following:

  - A specific statement of the intended use of the procedure

  - Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control followed whenever possible.)

  - Specific procedural steps for the placement, removal and transfer of lockout or tagout devices and the duties of person(s) responsible for them

  - Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout and tagout devices and other energy control measures

8.0 Facility/Department Evaluation

- CWRU's Plant Services Department shall evaluate our facility(s) annually by department to determine which machines or pieces of equipment require steps for shutting down, isolating or blocking and securing machines or equipment to control hazardous energy.

9.0 Protective Materials and Hardware

- Appropriate lockout devices such as locks, tags, chains, wedges, key blocks, adapter pins, self- locking fasteners or other hardware shall be provided by the responsible University department for isolating, securing or blocking of machines or equipment from energy sources based on the individual machine/equipment evaluation conducted by the following personnel authorized to evaluate lockout/tagout requirements:

    - Selection criteria: Lockout/tagout devices shall be singularly identified and must be the only device(s) used for controlling energy. They must not be used for other purposes and shall meet the following requirements:

    - Selected lockout and tagout devices must be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

    - Selected tagout devices must 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 must not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

    - Lockout and tagout devices must be within the facility in at least one of the following criteria: color, shape or size. Additionally, in the case of tagout devices, print and format should be standardized.

- Removal requirements:

    - Lockout Devices: Lockout devices must 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: Tagout devices, including zip ties, paper tags and their means of attachment shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means must be 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 the basic characteristics of being at least equivalent to a one-piece, all environment-tolerant nylon cable tie.

- Identification Requirements

  - Lockout/tagout devices must identify the employee who applied for 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, etc.

10.0 Periodic Inspections and Certifications

- Inspections: CWRU shall conduct a periodic inspection of the energy control procedure for each machine or piece of equipment to ensure that the procedure and the requirements of this instruction are being followed.

  - The date of the inspection

  - The employees included in the inspection

  - The person performing the inspection

11.0 Initial Training

- CWRU provides training to ensure that the purpose and function of the energy control program is understood by employees and that the knowledge and skills required for the safe application, usage and removal of the energy controls are acquired by employees. The training includes the following:

  - Each authorized plant employee receives training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace and the methods and means necessary for energy isolation and control.

  - Each affected employee is instructed in the purpose and

use of the energy control procedure.

- All other employees whose work operations are or may be in an area where energy control procedures may be utilized, are instructed about the procedure and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

- When tagout systems are used, employees are also trained in the following limitations of tags:

  - Tags are essentially warning devices affixed to energy isolating devices and do not provide the physical restraint on those devices that is provided by a lock.

  - When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it. It is never to be bypassed, ignored or otherwise defeated.

  - Tags must be legible and understandable by all authorized employees, affected employees and all other employees whose work operations are or may be in the area in order to be effective. Non-legible or missing tags must be reported immediately.

  - Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.

  - Tags may evoke a false sense of security. Therefore, their meaning needs to be understood as part of the overall energy control program.

  - Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

12.0 Refresher Training

- Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in their machines, equipment, processes that present a new hazard or when there is a change in the energy control procedures.

- Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever the University has reason to believe, there are

deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

- The retraining shall re-establish employee proficiency and introduce new or revised control methods and procedures as necessary.

- CWRU shall certify that employee training has been accomplished and is being kept up to date.

13.0 Energy Isolation

- Lockout or tagout shall be carried out only by the authorized employees who are performing the servicing, maintenance or repair.

14.0 Notification of Employees

- Affected employees shall be notified of the application and removal of lockout or tagout devices. Notification shall be given before the controls are applied and after they are removed from the machine or equipment.

15.0 Application of Control

- The lockout or tagout procedures shall cover the following elements and actions and shall be done in the following sequence:

    - 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.

    - 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.

    - 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).

- Lockout device application
    - Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.
    - Lockout devices, where used, shall be affixed in a manner that will hold the energy isolating devices in a "safe" or "off" position.
    - Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.
- Tagout device application
    - Where tagout devices are used with energy isolating devices that are designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached.
    - Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as closely and as safely as possible to the device in a position that will be immediately obvious to anyone attempting to operate the device.
- Stored energy
    - Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained and otherwise rendered safe.
    - If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed or until the possibility of such accumulation no longer exists.
- Verification of Isolation
    - Prior to starting work on machines or equipment that have been Locked out or tagged out, the authorized employee must verify that isolation and de-energization of the machine or equipment has been accomplished.

16.0 Release From Lockout or Tagout

- Before lockout or tagout devices are removed and energy is restored to the machine or equipment, the following procedures must be followed and actions taken by the authorized employee(s) to ensure:

  - The machine or equipment: The work area must be inspected to make sure nonessential items have been removed and to confirm that machine or equipment components are operationally intact.

  - Employees: The work area must be checked to ensure that all employees have been safely positioned or removed.

  - After lockout or tagout devices are removed and before a machine or equipment is started, affected employees must be notified that the lockout or tagout device(s) have been removed.

  - Lockout or tagout devices removal: Each lockout or tagout device must be removed from each energy isolating device by the employee who applied the device. 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 a facilities services administrator provided that specific procedures and training for such removal have been developed, documented and incorporated into the University's energy control program. In such cases, an authorized individual from the University must 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 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

    - Ensuring that the authorized employee has this knowledge before he/she resumes work at that facility

17.0 Testing of Machines, Equipment or Components

- 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:
  - Clear the machine or equipment of tools and materials.
  - Remove employees from the machine or equipment area.
  - Remove the lockout or tagout devices as specified as part of the individual machine procedures.
  - Energize and proceed with testing or positioning.
  - De-energize all systems and reapply energy control measures in accordance with machine procedures and continue the service and or maintenance.

18.0 Non-University Personnel (contractors, subcontractors, etc.)

- Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this instruction, the University and the outside employer shall inform each other of their respective lockout or tagout procedures.
- CWRU must ensure that its employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

19.0 Group Lockout or Tagout

- When servicing and/or maintenance is performed by a crew, craft department or other group, 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 must be used in accordance with the procedures required by this instruction governing individual procedures which shall include, but are not necessarily limited to, the following specific requirements:
  - Primary responsibility will be 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 will be made.

- When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility will be vested to an authorized employee designated to coordinate affected work forces and ensure continuity of protection.

- 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 the equipment being serviced or maintained.

20.0 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.