

## 1.0 Program Objective

The purpose of this policy is to ensure that before any employee performs any servicing or maintenance on machinery or equipment, where the unexpected energizing, start up or release of any type of energy could occur and cause injury, the machinery or equipment will be rendered safe to work on by being locked and tagged out.

## 2.0 Purpose and Scope

- 2.1 Effective hazardous energy control procedures will protect all workers potentially exposed to unexpected energization or release of stored energy which could cause injury to employees during the servicing or maintenance of machines, equipment or systems, as well as while working on or near exposed de-energized electrical conductors and parts of electrical equipment.
- 2.2 This procedure meets or exceeds the requirements specified by the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.147, Control of Hazardous Energy (LOTO); 29 CFR 1910.333, Lockout/Tagout Electrical Safe Work Practices; and 1926.417, Lockout and Tagging of Circuits, as they relate to the control of hazardous energy sources.
- 2.3 This program does not apply to the work on cord and plug connected electrical equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control (within arms reach and line of sight) of the employee performing the servicing or maintenance.
- 2.4 This procedure applies to Facility Services employees.

## 3.0 Definitions

- 3.1 **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/Tagout or whose job requires him or her to work in an area in which such servicing or maintenance is being performed. An affected worker cannot perform work under a Lockout/Tagout permit.

**Authorized Employee**- A person who either applies the locks and tags on machines, equipment and systems or works under the protection of Lockout/Tagout in order to perform servicing or maintenance on that machine or equipment. This person has completed the mandatory training to be qualified as an Authorized Employee. Only an Authorized Employee installs and removes his or her own lock(s) and tag(s) as required by this program.

- 3.2 **Authorized Locks and Tags**- These are locks and tags that are used to ensure the safety of the Authorized Employees performing servicing and maintenance of machines equipment or systems. Servicing or maintenance may not begin until these devices are applied to the Energy Isolation Device(s). These locks and tags shall not be used for any other purpose. The locks shall be singularly keyed and the Authorized employees shall retain the keys to individual locks. The type of keyed lock will be red in color. The print and format of tags shall be standardized and will warn against hazardous conditions if the machine or equipment is energized. The tag shall read "Danger – Do Not Operate" and will have black lettering with a white background. The tag will have an unlocking strength of at least 50 pounds. Locks and tags will identify the Authorized Employee applying the devices. Only an Authorized Employee may perform service or maintenance work on the system, equipment or machine.

- 3.3 **Energy Source**- Any source of hazardous energy or materials. Energy sources include, but are not limited to; electrical, mechanical, hydraulic, pneumatic, chemical, radiation, and thermal energies, as well as various forms of potential energy such as that stored in springs, compressed gases, or in suspended objects (gravitational).
- 3.4 **Double Block and Bleed**- The closure of a line, duct, or pipe by closing and locking and tagging two in-line valves and by opening and locking/tagging a drain or vent in the line between the two closed valves.
- 3.5 **Energy Isolation Device**- A device that prevents the transmission or release of hazardous energy or hazardous materials. Examples include, but are not limited to; restraint blocks, electrical circuit breakers, disconnect switches, slide gates, slip blinds, or line valves. For lockout/tagout purposes, isolating devices that provide visible indication of the device's position are desirable.
- 3.6 **Lockout Device**- A device that utilizes a positive means such as a lock, either keyed or combination type, to hold an energy isolating device in a safe position to prevent the energization of a machine, equipment or system. Other Lockout Devices include dead ends (blanks), bolted slip blinds, valve handwheel covers, and chains/lock. All locks require a Danger Tag.
- 3.7 **Lockout/Tagout (LOTO)** - Installation of lock(s) and tag(s) on the Energy Isolation Devices to ensure that work can be performed safely. The lock(s) and tag(s) ensure that the Energy Isolating Device(s) and the machine, equipment or system(s) they isolate and/or control, cannot be operated until the lock(s) and tag(s) are removed.
- 3.8 **Other Employees**- Employees whose work operations are or may be in an area where energy control procedures are utilized.
- 3.9 **Safe Condition Check (Verification of De-energization)** - The inspection or test of a system or component performed by the Authorized employee to ensure that the hazardous energy or materials are controlled to prevent injury or accident. **Note: This is an essential element of all energy control programs and procedures, which ensures the safety of all potentially exposed personnel.**
- 3.10 **Maintenance and/or Construction**- Work place activities such as maintenance inspections, construction, installing, setting up, modifying, adjusting, and maintaining and or servicing machines, equipment, or systems. 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 start-up of the equipment or release of hazardous energy. This applies to all personnel regardless of job title; (i.e., operator, maintenance, electrician, etc.)
- 3.11 **Tag**- A “Danger – Do Not Operate” Tag, which can be securely fastened to an energy isolating device with an unlocking strength of 50 pounds, to indicate that the Energy Isolating Device and the equipment being controlled can not be operated until the Tag is removed. Tags are essentially warning devices affixed to energy isolating devices and do not provide the physical restraint of a lock.
- 3.12 **Supervisor** – A member of Facility Services management with the responsibility of overseeing lockout/tagout activities.

## 4.0 Responsibilities

- 4.1 **Director of Central Services**- is responsible for approving and ensuring compliance with this procedure.
- 4.2 **Supervision**- is responsible for initiating and controlling this procedure on shift. Ensures that the proper procedures for isolating all energy sources have been controlled.
- 4.3 **Authorized Employee**- an employee who is responsible for isolating all energy sources to a system, machine or equipment and reassuring equipment is in a safe condition before work is performed. Conducts a walkdown of the equipment to ensure that all energy has been isolated and the machine is safe to work on and places his or her lock and tag on the lock box.

## 5.0 LOCKOUT/TAGOUT (LOTO) PRINCIPLES

This procedure establishes the requirements for the lockout/tagout of energy isolating devices.

- 5.1 It is mandatory that all personnel comply with the restrictions and limitations of this lockout/tagout program and related procedures.
- 5.2 No individual shall attempt to start, energize, use, or operate a piece of equipment that has been locked out and tagged out after the safe condition check has been completed.
- 5.3 No individual other than the Authorized Employee who placed the device and tag shall attempt to remove it, except as noted in section 7.
- 5.4 All locks and keys to be used will be stored in the appropriate shops with the exception of each Authorized Employees personal lock, which will be controlled by him/her.
- 5.5 The personal lockout and “Danger- Do Not Operate” tag signifies that there is an Authorized Employee working on a component and it was installed by that task’s Authorized Employee prior to starting work and will be removed by that Authorized Employee when their work is completed.
- 5.6 The Authorized Employee “Danger – Do Not Operate” tag is reserved for the exclusive use of the authorized worker identified on that tag. The identifying markings shall be made in permanent form.
- 5.7 No one shall authorize another person to ignore or violate this program and its procedures.
- 5.8 No person shall remove a Lockout Device when an unsafe condition exists until they have corrected the condition or another person has installed a Lockout Device.
- 5.9 No Authorized Employee shall install a lockout/tagout on any system without notifying the OCC Supervisor. This is to ensure that operating personnel know the status of its equipment/systems.
- 5.10 A check valve cannot be used as an Energy Isolation Device.
- 5.11 Whenever an outside firm is contracted to perform work, the University of Pennsylvania will inform the management of the outside contractor of the contents and requirements of this program. This is to ensure the safety of all employees. The contents of the outside contractors’ LOTO program will be reviewed by management to ensure that the program does not violate the requirements of the facility

LOTO program and for the purpose of ensuring that employees are not exposed to any potential hazards that may be created by the outside firm's LOTO program.

- 5.12** When electrical system grounds need to be applied they shall be the last devices applied and the first devices removed in application of LOTO. Qualified electrical personnel shall only apply grounding devices.
- 5.13** All employees shall receive the appropriate level of training based upon their LOTO duties (i.e., Authorized, Affected, or Other).
- 5.14** Any employee who observes any apparent violation of this program or related procedures shall immediately notify their supervisor.

## **6.0 Procedure**

A specific written procedure for all machines, equipment or system is developed and will be followed before beginning any servicing or maintenance work. The steps outlined in Section 6.1 will serve as a guide in accomplishing this requirement.

### **6.1 Detailed Lockout/Tagout Procedure**

- 6.1.1** The Authorized Employee will determine all potential sources of hazardous energy (Computer generated and any other resources to properly identify all energy sources). The Authorized Employee will develop a specific written procedure for isolating the equipment if one does not already exist (Attachment C).
- 6.1.2** The Authorized Employee will obtain a lock box from the appropriate supervisor. Some Lockout's might require the use of other lockout devices (valve covers, chains, breaker covers, etc.). Tags will have the name of the Authorized Employee performing the work.
- 6.1.3** The Authorized Employee will go to each energy isolation device in the proper order listed on lockout/tagout procedure and de-energize that device using the locks from the lockbox. After removing each key from the lock, the Authorized Employee will keep the keys and place them into the lockbox that will prevent them from being lost or misplaced. Keys to all locks will be kept inside the lockbox. The Authorized Employee will then place his/her lock and tag on the lockbox and lock it with his/her personal key. The Authorized Employee's personal key will be kept with him/her. Also, a designated Supervisor may put his/her lock on the lockbox. This would only be competed in order to secure the lockbox if an employee left the jobsite and another employee took control of the job. The new employee would then be required to put his/her lock on the lockbox and proceed to follow all of the required LOTO procedures as stated in Section 6.1.
- 6.1.4** When all energy isolation devices have been properly de-energized and locked/tagged out, the Authorized Employee will perform the necessary safe condition check(s) to ensure that all energy has been dissipated and controlled (Example: pushing local start buttons, throwing switches, etc.). The work can now begin.
- 6.1.5** When all work on the system is complete, the Authorized Employee will make sure that all machines, equipment, systems, and areas are clear from personnel and equipment before energizing.

**6.1.6** The Authorized Employees will remove their personal locks from the lockbox and then remove all locks and tags from all energy isolation devices. Upon completion, the Authorized Employees locks will be placed back into the lockbox. The system or equipment will be energized in the proper order noted on the LOTO procedure. The system will then be put back into service as necessary.

## **6.2 Exceptions To Written Lockout/Tagout Procedures**

There are occasions where specific lockout/tagout procedures are not required. They are not required when all of the following elements exist:

**6.2.1** The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees.

**6.2.2** The machine or equipment has a single energy source which can be readily identified and isolated

**6.2.3** The isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment

**6.2.4** The machine or equipment is isolated from that energy source and locked out during servicing or maintenance

**6.2.5** A single lockout device will achieve a locked-out condition

**6.2.6** The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance

**6.2.7** The servicing or maintenance does not create hazards for other employees

**6.2.8** The University of Pennsylvania, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

## **6.3 Outage Work**

**6.3.1** It may be necessary during large distribution outages to have several crafts on one LOTO permit. In this case, it is permissible to have a group LOTO and the permit in Appendix A will be used.

**6.3.2** An Authorized Employee will be chosen to put on an authorized lock on all energy isolation devices on the permit. He/she will have all of the duties as stated in Section 6.1 and will have the responsibility as the Supervisor to ensure continuity of protection for all Authorized Employees and to coordinate affected crafts. The Supervisor will ensure all lock and tags are properly installed on the energy isolating devices by visually checking all energy isolation points.

**6.3.3** The Supervisor will list all of the other Authorized Employees on the permit with which he/she is working.

- 6.3.4** Each Authorized Employee will put his/her own lock on the lockbox before beginning work.
- 6.3.5** The Supervisor cannot remove any locks or tags from the energy isolation devices unless all other Authorized Employees have first removed their locks and tags from the lockbox. If there is a need to remove a lock and tag from the lockbox because an Authorized Employee is not on site, then Section 7.0 must be followed.

## **6.4 Energy Isolation Devices Not Capable of Accepting a Lock**

- 6.4.1** If an energy isolation device is physically incapable of accepting a lock, a tagout system shall be used which will offer full employee protection similar to that of a lockout system.
- 6.4.2** The tagout system includes all of the steps of this lockout program except the actual use of a lockout device on that particular energy isolation device. Additional means to be considered as a part of the demonstration of full employee protection shall include the implementation of 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 to reduce the likelihood of inadvertent energization.

## **6.5 Adding Energy Isolation Devices**

Energy Isolation Devices may be added to the existing LOTO. The Authorized Employee responsible for the LOTO will review the scope of the additional work task and determine if it can be addressed under the existing LOTO. If the work can be performed under this LOTO, the Authorized Employee responsible for the LOTO will perform the steps per Section 6.1 of this procedure. If this task cannot be addressed by the existing LOTO, a new LOTO shall be developed.

## **7.0 Removal of Authorized Employee Locks and Tags When Off-site**

There may be times when the LOTO needs to be closed out to put equipment back into service when an Authorized Employee still on the LOTO is off-site and cannot be located. Removal of an Authorized Employee lock and tag without the Authorized Employee's signature will require a review by the Authorized Employee's direct Supervisor.

- 7.1** The Authorized Employee's Supervisor will attempt to reach the Authorized Employee to determine if the LOTO may be closed. If the Authorized Employee indicates that the LOTO may be closed, the Authorized Employee must return to the site to follow the normal LOTO removal procedure.
- 7.2** If the Authorized Employee cannot be contacted or cannot return to the facility, the Authorized Employee's Supervisor may authorize removal of the Authorized Employee from the LOTO.
- 7.3** If the Supervisor authorizes the removal of the Authorized Employee's lock(s) and tag(s) all potentially affected employees shall be notified.
- 7.4** The Authorized Employee will be contacted by his/her Supervisor immediately upon their return to work, to notify them that they have been removed from the LOTO.

## **8.0 Contractors**

Outside contractors that will be performing work on site must follow, at a minimum, the University of Pennsylvania LOTO procedures and the requirements as stated in Section 8.2.

**8.1** The University of Pennsylvania and the outside Contractor firm must inform each other of their respective Lockout/Tagout procedures. The responsibility to training outside contractor employees lies with their employer. For the protection of the facility employees, the Contractor LOTO program must be reviewed in detail by the Supervisor in charge of the work to ensure that facility employees could not be injured as a result of allowing the Contractor's LOTO program and procedures to be implemented at the facility. If there are any discrepancies, it is the responsibility of the University of Pennsylvania to ensure that the facility's employees understand and comply with any restrictions and prohibitions of the outside contractor's LOTO program.

**8.2** There are several LOTO conditions that must be met by the outside contractors before they begin work at the facility.

**8.2.1** The contractor shall establish and have available for review a LOTO program that meets 29 CFR 1910.147, Control of Hazardous Energy (LOTO); 29 CFR 1910.333, Lockout/Tagout Electrical Safe Workpractices; and 1926.417, locking and tagging of circuits, as they relate to the control of hazardous energy sources.

**8.2.2** Prior to the Contractor performing work, a designated point of contact will be made within the Contractor's organization for the purpose of interfacing and coordinating the Lockout/Tagout procedures.

**8.2.3** The University of Pennsylvania designated employee's will place his/her lock on the same energy isolating point(s) as the Contractor in accordance with this procedure.(This sentence will be eliminated since it is not a requirement by OSHA)

## **9.0 Lockout/Tagout Periodic Inspections**

Annually, the University of Pennsylvania shall perform a review of its energy control program and procedures for the purpose of ensuring that the LOTO procedures and requirements of 29 CFR 1910.147 are being met. A written report shall be made documenting inspection findings, results, and as appropriate any corrective actions taken for LOTO program deficiencies.

**9.1** Periodic inspections of the Facility's LOTO program and procedure shall be conducted at least annually.

**9.2** Periodic inspections shall be scheduled and documented in writing.

**9.3** A representative trained as an Authorized Employee must perform the periodic inspection. The representative may not review any Lockout/Tagout that they currently have responsibility for. The representative must review the procedures being implemented by and under the control of other Authorized Employees. The inspection shall include a review of each Authorized Employee's responsibilities under the program and related procedures. Written documentation of findings shall be made and retained.

**9.4** An inspection of various LOTO's that have been closed out will be inspected to verify that they have been properly completed and closed out. Written documentation of findings shall be made and retained.

- 9.5 Active LOTOs will be visually verified that all locks and tags are in place. The required LOTO documents will be verified to have been prepared in accordance with the Facility's LOTO program. Written documentation of findings shall be made and retained.
- 9.6 The periodic inspection shall include a review, between the inspector and the Authorized Employee, of that employee's responsibilities under the energy control procedure being inspected. Written documentation of this review/training shall be kept.
- 9.7 If during the inspection a discrepancy or procedural inadequacy is found, steps shall be taken immediately to determine the reason for, and the corrective action necessary to remedy the discrepancy. Written documentation of findings shall be made and retained.
- 9.8 All discrepancies or noncompliance with the Facility's program and procedures will be corrected as soon as possible but no later than 60 days from the date of identification (the 60 day reference will be taken out since it is not an OSHA mandate). If a discrepancy or inadequacy is identified the appropriate individuals shall be retrained.
- 9.9 The Supervisor shall certify in writing that the periodic inspection has been performed. This certification shall identify and document the machine, equipment or system, on which the LOTO procedure was utilized, date of inspection, the employees (by name) covered by the inspection, and the individual performing the inspection.

## 10.0 Personnel LOTO Training

Employees shall be trained so that they understand the purpose and function of the LOTO program and procedures. Employees shall also be trained so that they understand the purpose, contents and requirements of 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout).

- 10.1 Authorized Employees shall receive training in the recognition of sources of hazardous energy, the types and magnitude of hazardous energy and the means and methods of isolation and control.
- 10.2 Affected Employees shall be instructed in the purpose and use of the Facility's LOTO program.
- 10.3 Other Employees shall be instructed about the Facility's LOTO program and about the prohibition against attempting to restart equipment, machines or systems that have been locked and tagged out of service.
- 10.4 Employees retraining will be conducted when there are changes in job assignment; machines, equipment or processes; or in the Facility's LOTO program and procedures. Retraining will also be conducted when a periodic inspection of the effectiveness of this procedure reveals inadequacies in employee knowledge or performance.
- 10.5 A record of all training and retraining shall be maintained. The training record shall include the name of the employee, level of training, name of the instructor and the date of the training. (See Attachment B: Training Attendance Roster) The Supervisor will keep all training records on file. (Training records will be retained indefinitely or until the employee is no longer employed or at the site)

**11.0 References**

- 11.1** 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout).
- 11.2** 29 CFR 1910.333, Lockout/Tagout Electrical Safe Workpractices.
- 11.3** 29 CFR 1926.417, Lockout and Tagging Circuits.

**TITLE:**

**Lockout/Tagout Procedure  
Facility Services**

**Revision 1  
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**11/14/02**

Approved By:

\_\_\_\_\_  
Director of Central Services

\_\_\_\_\_  
Effective Date

\_\_\_\_\_  
Utilities Operations Manager

**TITLE:**

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**ATTACHMENT A**

PERMIT NUMBER	COMPONENT DESCRIPTION

COMMENTS

REFERENCES

**AUTHORIZATION**

\_\_\_\_\_

OCC Supervisor

\_\_\_\_\_

Date

NUMBER	ENERGY ISOLATION POINT	DESCRIPTION	POSITION	DATE & INITIAL	
				APPLIED	REMOVED
1					
2					
3					
4					
5					
6					
7					
8					

**JOB COMPLETED**

\_\_\_\_\_

Authorized Employee

\_\_\_\_\_

Date

**PERMIT CLOSED**

\_\_\_\_\_

OCC Supervisor

\_\_\_\_\_

Date

**ATTACHMENT B**

## University of Pennsylvania

**ATTENDANCE ROSTER**

Program Title: LOCKOUT/TAGOUT TRAINING (1910.147) Instructor(s) \_\_\_\_\_

Date From \_\_\_\_\_ To \_\_\_\_\_

Training \_\_\_\_\_

Location: \_\_\_\_\_

	NAME	SOCIAL NUMBER	SECURITY	DEPARTMENT	TOTAL COURSE/WORKSHOP HOURS	<i>Type of Training</i> Authorized Employee Affected Employee Other Employee
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						

