



Hazardous Energy Control Program

This Hazardous Energy Control Program is hereby approved:

Signature Donna P. Regeh Date 02 Feb 11

Signature [Handwritten Signature] Date 2/1/11

LOCKOUT/TAGOUT PROGRAM

1.0 PURPOSE

The purpose of the lockout/tagout program is to prevent injury to employees required to perform service and maintenance operations on equipment, and to comply with Cal/OSHA General Industry Safety Order, Title 8, Section 3314(f).

2.0 SCOPE

This program establishes requirements for hazardous energy control. It is to be used to ensure that machines and equipment are isolated from all potentially hazardous energy sources whenever servicing or maintenance activities are in progress. This program covers work conducted by the University, Auxiliaries, and Contract personnel.

3.0 DEFINITIONS

- 3.1 Affected employees: an employee whose job requires them to operate or use a machine or equipment on which cleaning, repairing, servicing, setting-up or adjusting operations are being performed under lockout/tagout, or whose job requires them to work in an area in which such activities are being performed.
- 3.2 Authorized employees: a qualified person or employee who has completed the required hazardous energy control (lockout/tagout) training and is authorized to lock out or tag out a specific machine or equipment to perform servicing or maintenance.
 - 3.2.1 A qualified person or employee is an employee who by either training or experienced has demonstrated knowledge of the construction and operation of the equipment or system to recognize the hazards involved.
- 3.3 Energy isolating device: a mechanical device that physically prevents the transmission or release of energy such as valves, circuit breakers, restraining devices to prevent movement of parts, etc.
- 3.4 Hydraulic energy: energy derived from the motion and pressure of liquid such as oil and water.
- 3.5 Mechanical energy: energy relating to moving parts of a machine or equipment.
- 3.6 Pneumatic energy: energy derived from the motion and pressure of gas such as compressed air.
- 3.7 Potential energy: stored energy such as suspended loads and compressed springs.

4.0 RESPONSIBILITY

4.1 Department of Environmental Health & Safety (EHS)

4.1.1 Establish, maintain, and update the Lockout/Tagout Program.

4.1.2 Review implementation of the Program and verify compliance.

4.2 Manager

4.2.1 Ensure authorized employees in the department complete lockout/tagout training.

4.2.2 Maintain a current listing of employees who have completed lockout training.

4.2.3 Maintain a current listing of all equipment/machines which apply to the lockout/tagout procedures.

4.2.4 Implement and enforce this program as it pertains to their areas.

4.2.5 Maintain an adequate supply of padlocks, lockout/tagout devices, and tags for use each time a lockout process is performed.

4.2.6 Conduct at least an annual inspection and review of this Program as per Section 7.0.

4.2.7 Ensure all procedures are understood and followed by employees in their department.

4.2.8 Verify that employees in their department are knowledgeable on the lockout/tagout procedures for equipment they are assigned to service.

4.3 Supervisor

4.3.1 Support manager in their department in carrying out the responsibilities described in Section 4.2.

4.3.2 Participate in the periodic lockout/tagout inspection.

4.4 Employee

4.4.1 Understand and follow the procedures and practices developed under this program.

4.4.2 Notify the supervisor prior to a lockout process if additional hazards might be created (i.e. shutdown fire alarm, security, or HVAC systems).

- 4.4.3 Verify that lockout/tagout devices he/she applied have not been removed before resuming work from an absence.
- 4.4.4 Contact their supervisor if they are unclear on a lockout/tagout procedure.

5.0 TRAINING

- 5.1 Each authorized employee will receive training prior to performing tasks where lockout/tagout is required under this Program. The training will include 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.
- 5.2 Annual review of the lockout/tagout procedures is accomplished through periodic inspection as per Section 7.0.
- 5.3 Each affected employee will be instructed in the purpose and use of the energy control procedure.
- 5.4 Retraining will be conducted whenever there is a change in job assignment, a change in machinery or equipment or process change that presents a new hazard, or reasons to believe the employees need to be retrained.
- 5.5 EHS is responsible for the development, implementation, and recordkeeping of training covering the general requirements of this program.
- 5.6 Each University department with responsibilities under this program is responsible for equipment specific on the job training. This includes training development, implementation, and recordkeeping.

6.0 PROCEDURES

- 6.1 Basic Rules
 - 6.1.1 Equipment must be locked out or tagged out to prevent accidental or inadvertent operation of the machinery or equipment, or the release of hazardous energy during servicing or maintenance.
 - 6.1.1.1 Energized work shall only be permitted if de-energizing introduces additional or increased hazards or is infeasible.
 - 6.1.1.2 Energized electrical work shall only be performed after a written Energized Electrical Work Permit, as per the Electrical Safety Program, has been reviewed and approved by the employee's manager.
 - 6.1.1.3 A work permit is not required for tasks such as testing, troubleshooting and voltage measuring, provided safe work practices are followed and the appropriate personal protective equipment are used.

- 6.1.2 Lockout/tagout is not required for cord or plug connected electrical equipment if unplugging the cord completely de-energizes the equipment and removes all other hazardous energy sources, and the plug is under the exclusive control or complete visibility of the employee performing the work.
 - 6.1.2.1 If the employee must leave the area before service or maintenance activities are completed (i.e. break, overnight), the plug must be locked out or the employee must verify that the cord is unplugged prior to resuming work.
- 6.1.3 A lockout device for all energy sources will be provided. This will include any sources such as electrical, pressure, hydraulic, and automatic starting mechanism.
- 6.1.4 If the equipment can be locked out, it must be locked out.
- 6.1.5 All maintenance employees will be provided with locks for which ONLY they have a key.
- 6.1.6 Locks are to be applied and removed only by the authorized employee who is performing the servicing or maintenance.
- 6.1.7 When the authorized employee who applied the lockout or tagout device is not available:
 - 6.1.7.1 The lockout or tagout device shall only be removed under emergency situation.
 - 6.1.7.2 The device may only be removed under the direction of a supervisor or manager and only after verifying that the authorized employee who applied the device is not at the facility AND after making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout/tagout device has been removed.
 - 6.1.7.3 The supervisor or manager authorizing the lockout/tagout device removal shall ensure that the authorized employee has this knowledge before he/she resumes work at the facility.
 - 6.1.7.4 The authorized employee shall verify that his/her lockout/tagout devices have not been removed upon returning and before resuming work at the facility.
- 6.1.8 Prior to the servicing or maintenance of equipment a padlock and DANGER warning tag will be obtained from the Supervisor.
- 6.1.9 No one should attempt to operate locked out equipment.
- 6.1.10 Unauthorized employees are prohibited from attempting to remove a lockout or tagout device from machinery or equipment locked or tagged out.
- 6.1.11 Lockout devices (padlocks) with an appropriate DANGER warning tag will be used for energy control. Each padlock will be keyed differently with no master or secondary key.

- 6.1.12 When it is necessary for work on equipment to continue into the next shift, the employee on the departing shift will remove his/her own lockout or tagout device in the presence of the oncoming employee. The oncoming employee will immediately insert his/her lockout or tagout device in the energy isolating device and will follow procedures to verify that all hazardous energies have been isolated.
- 6.1.13 Lockout/Tagout devices will be singularly identified as lockout or tagout devices and will be the only devices used for controlling energy. Lockout or tagout devices will not be used for any other purpose.
- 6.1.14 Lockout or tagout devices will:
- Be durable and capable of withstanding the environment to which they are exposed to for the maximum period of time that the exposure is expected.
 - Lockout devices will be capable of preventing tampering or removal.
 - Tagout devices will be constructed and printed so that exposure to weather conditions or wet locations will not cause the tag to deteriorate or cause the message on the tag to become illegible.
 - Be standardized within the department, using at least one of the following criteria: color, shape or size, and the print and format on tagouts will be standardized.
- 6.1.15 Lockout and tagout devices will be identifiable by indicating the identity of the employee applying the device(s).

6.2 Lockout Procedures

- 6.2.1 Notify affected employees as applicable.
- 6.2.2 Preparation
- 6.2.2.1 Determine all potential sources of hazardous energy for the equipment such as mechanical, gravity, hydraulic, pressure, chemical, electrical, and thermal.
- 6.2.2.2 Assess whether there are backup energy or other processes that must be stopped (i.e. capacitors, emergency generators, uninterrupted power sources, springs, flywheels, etc).
- 6.2.2.3 Identify lockout points.
- 6.2.3 Shutdown. Check to see that all operations have ceased before turning off the power. Shut down the equipment following the manufacturer's guidelines or using the procedures established for the equipment.
- 6.2.4 Isolate energy sources
- 6.2.4.1 Isolate all electrical energy sources and discharge capacitors.
- 6.2.4.2 Bleed/depressurize steam, water, air, gas, and hydraulic lines.

- 6.2.4.3 Place blind or similar blocking device in pipeline to block off downstream air, steam, gas, etc.
- 6.2.4.4 Lower raised loads and release any coiled springs or spring-loaded devices.
- 6.2.4.5 Block any movable part of the equipment to prevent accidental movement (place special stands under raised load, place blocks to prevent any movable part of the equipment from sliding, rolling, or falling).
- 6.2.4.6 Restrain wind/pressure driven objects.
- 6.2.4.7 Allow excess heat to dissipate.

6.2.5 Apply lockout/tagout devices

- 6.2.5.1 Lockout all energy isolating devices or points, such as circuit breakers, disconnect switches, line valves, etc.
- 6.2.5.2 The employee that will perform the work will place his/her lock on the lockout device. If more than one employee will be performing maintenance, each employee will place his/her lock on the lockout device. Each employee is responsible for verifying that the equipment has been properly lockout/tagout as required under this program.

6.2.6 Verification

- 6.2.6.1 Challenge the lock by trying to move the switch, breaker, valve handle, etc. past the lock.
- 6.2.6.2 Test the main valves or electrical disconnect to ensure power is turned off.
- 6.2.6.3 Check electrical circuits to ensure that a defective circuit could not accidentally activate the equipment.
- 6.2.6.4 If there's potential exposure to energize/live circuits, use an adequately rated voltage detector to test disconnected electrical conductors and circuit parts to verify that they are de-energized. They will be considered energize until proven otherwise.
- 6.2.6.5 Verify that energy isolation is completed by attempting to start the affected machinery or equipment in the normal manner.

- 6.2.7 After testing, return all operation controls to the "neutral" or "off" position.

6.3 Tagout Procedures

- 6.3.1 Tag shall be used in conjunction with a lockout device, unless the required information is contained on the lockout device.
- 6.3.2 Tag use in conjunction with a lockout device shall contain a statement prohibiting unauthorized removal of the device or unauthorized operation of the disconnecting means.
- 6.3.3 Tag place on lockout device shall contain the following information:
 - Name of the person performing the service.
 - How to contact the person performing the service.

- The date and time the tag was placed.
- The reason for the placement of the tag.

- 6.3.4 Tagout is permitted only if the equipment cannot be locked out and it is demonstrated that tagout will provide an equivalent protection.
- 6.3.5 If tagout is utilized, additional means must be used whenever possible to prevent inadvertent energization or release of hazardous energy, such as removing the valve handle.
- 6.3.6 Where tagout devices are used, the tag attachment shall be fastened at the same point at which the lock would have been attached. If the tag cannot be affixed directly to the energy isolating device, it shall be attached as close/safely to the device and in a manner that it will be obvious for anyone attempting to operate the device.
- 6.3.7 Tagout devices will be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be nonreusable, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of at least 50 lb force and having the general design and basic characteristics of being at least equivalent to a nylon cable tie.
- 6.3.8 Out of order/service tags are used to indicate that a piece of equipment is out of order and an attempt to use it may present a hazard.
- 6.3.8.1 Out of order tags are not to be used in lieu of proper lockout/tagout.
- 6.3.8.2 Tag placed will contain the following information:
- Name of person placing the tag and how to contact him/her.
 - The date and time the tag was placed.
 - The reason for the placement of the tag.

6.4 Restoration to Normal

- 6.4.1 After service or maintenance is completed, check the area to ensure that no employees are exposed.
- 6.4.2 Remove all tools and repair equipment.
- 6.4.3 Ensure that all guards have been replaced and all safety interlocks reactivated (if so equipped).
- 6.4.4 Verify that the operating controls are in the neutral or off position.
- 6.4.5 Make a visual check for obstructions and a final inspection to ensure all employees are clear before starting the equipment.
- 6.4.6 Remove all lockout and tag devices and activate the energy isolation devices to restore energy.

6.4.7 Notify applicable employees that the lockout condition has been cleared.

6.5 Group Lockout or Tagout: When servicing and/or maintenance is performed by a crew or department, 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. This shall be accomplished by:

6.5.1 The application of a multi-lock accepting device by the primary authorized employee to the energy isolating device.

6.5.2 The primary authorized employee attaching his/her lock to the multi-accepting device.

6.5.3 Each authorized employee shall affix a personal lockout or tagout device to the multi-accepting device when they begin work, and shall remove their device when they stop working on the machine or equipment.

6.5.4 The primary authorized employee will be the last to remove his/her lock when all service or maintenance has been completed.

7.0 INSPECTION AND REVIEW

7.1 At least annually, the manager or his/her designee will verify the effectiveness of the Lockout/Tagout Procedures by conducting an inspection. These inspections will include a demonstration of the procedures and may be carried out through random audits and observations.

7.2 The manager or his/her designee must observe the employees using the procedures and review any deficiencies observed, the Lockout/Tagout Procedures, and the employee's responsibilities under the Lockout/Tagout Program with each authorized employee. This review will be documented using the Lockout/Tagout Periodic Inspection form (Appendix A).

7.3 The inspections are to ensure that the Lockout/Tagout Procedures are being properly used, and provide a check on the continued adherence to the procedures. Any deficiencies must be corrected immediately, either by modification of the procedure, retraining of employees, or a combination of both. Deficiencies and inadequacies should be documented and reported to management for corrective action(s).

8.0 OUTSIDE CONTRACTORS

8.1 The University and outside personnel or contractor will inform each other of their respective Lockout/Tagout Program.

8.2 When the work involved affects University employees or both parties are working on the machine/equipment:

- 8.2.1 Group lockout will be used. An authorized University employee will apply his/her lock on the lockout devices in addition to the contractor.
- 8.2.2 The contractor will adhere and follow the University Lockout/Tagout Program.
- 8.2.3 The (University) Project Manager will oversee this process and ensure that both parties comply with the University Lockout/Tagout Program.

- 8.3 When the work involved is within the University, but the facility is run by a third party and the work involved does not affect University employees or students, the contractors will follow their Lockout/Tagout Program. The Project Manager and party directing the project will ensure the contractors adhere to Cal/OSHA Hazardous Energy Control standards and applicable regulations.

- 8.4 Contractors failing to adhere to the provisions of Cal/OSHA Hazardous Energy Control standard will be asked to terminate their work until their program is brought into compliance.

- 8.5 The contractor's work area will be isolated, and access by University employees will be restricted. If this is impractical or cannot be accomplished, the employees' supervisor will ensure that the employees understand and comply with the restrictions and prohibitions of the contractor's Lockout/Tagout Program and assure the contractor's compliance with proper work procedures, energy isolation procedures, and contractor employee compliance.

9.0 RECORDKEEPING

- 9.1 Training documentation will be maintained by the authorized employee's department. Copies of the training content and sign-in sheets will be sent to EHS. Training records will be maintained for 3 years.

- 9.2 Energized work permits will be maintained by the department performing or authorizing the work. These records will be maintained for one year.

- 9.3 Copies of the annual inspection records will be forwarded to EHS. These records will be maintained for one year.

**Appendix A
PERIODIC INSPECTION FORM
Lockout/Tagout**

Date _____ Inspector's Name _____

Employee's Name _____ Job Title _____

Location _____

Machine or Process Involved _____

Lockout/Tagout Procedures & Processes

<i>Steps (observe or have employee demonstrate each step below):</i>	
1. Notify affected employees (if applicable)	<input type="checkbox"/>
2. Prepare equipment/machine for shutdown (determine all potential energy sources, assess for backup energy or other process that must be stopped, identify lockout points)	<input type="checkbox"/>
3. Shutdown equipment/machine	<input type="checkbox"/>
4. Isolate all energy sources (isolate electrical energy sources, lower raised loads, release spring-loaded devices, block movable parts, restrain wind/pressure driven objects, allow heat to dissipate, bleed/depressurize steam, air, water, gas and hydraulic lines, blind/block pipeline)	<input type="checkbox"/>
5. Apply lockout/tagout devices (lockout all energy isolating devices/points, tag placed on lockout device contains required information, group lockout is used-if more than one employee is involved)	<input type="checkbox"/>
6. Verify that machine/equipment is completely de-energized (challenge locks, try to start machine/equipment, test exposed circuits for de-energization using voltage detector)	<input type="checkbox"/>
7. Returns all operation controls to the "neutral or "off" position	<input type="checkbox"/>
8. Properly restore machine/equipment to normal operation after servicing	<input type="checkbox"/>

The following has been reviewed with the employee (check box after reviewing):

- 1.) The Lockout/Tagout Procedures
- 2.) Any deficiencies observed
- 3.) The employee's responsibilities under the Lockout/Tagout Program

Inspector's comments:

Inspector's Signature _____

Date _____

Employee's Signature _____

Date _____

Program Revision/Review Log

Revised/ Reviewed Date	Revised/Reviewed by	Comments	Approved by
8/09	Lyanh Luu	Program reviewed; no changes to content	
5/14/10	Lyanh Luu	Added Section 3.3.3 and 5.1.6	
10/12/10	Lyanh Luu	Added Section 3.0, 6.1.1, 6.1.2, 6.1.4, 6.2, 6.3, 9.0 and Appendix A. Revised 4.2.1, 5.3, 6.1.5, 6.4.5, 7.2 and 8.0	Donna Placzek; Bob Andrews