CSUDH

CALIFORNIA STATE UNIVERSITY, DOMINGUEZ HILLS

THE CONTROL OF HAZARDOUS ENERGY LOCKOUT/TAGOUT PROGRAM

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Scope and Purpose

California State University, Dominguez Hills (CSUDH) is dedicated to protecting the health, safety and wellbeing of students, employees, visitors, and the surrounding community. The Control of Hazardous Energy Lockout/Tagout (LOTO) Program establishes the minimum performance standards required to protect employees from injuries or death that may result from unexpected energization or startup of machines or equipment, or the release of energy (potential or kinetic) from machines and equipment, during maintenance or servicing operations.

The Program applies to employees who use a machine or equipment for which LOTO procedures are performed, or whose job requires the employee to work in the area in which LOTO procedures are performed, or whose job requires the employee to perform the LOTO procedure. The Program outlines proper procedures in performing LOTO operations. Environmental Health & Safety (EHS) administers and oversees implementation of the Program.

The Program complies with Cal/OSHA's requirement for CSUDH to develop and implement a written LOTO program (i.e., Control of Hazardous Energy) as defined in the following regulation:

California Code of Regulations (CCR), Title 8 Section 3314	https://www.dir.ca.gov/title8/3314.html

Title 8 Section 3314, and serves to:

1. Establish a safe and positive means of shutting down machinery, equipment, and systems.
2. Prohibit unauthorized personnel or remote-control systems from starting machinery or equipment while it is being serviced.
3. Provide a secondary control system (tagout) in addition to, and/or when it is impossible to, positively lockout the machinery or equipment by traditional means
4. Ensure that only approved locks, standardized tags and fastening devices will be utilized in the LOTO procedures.
5. Develop risk assessment procedures to implement alternative methods when traditional LOTO cannot be utilized.

Definitions

Affected Employee - 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 or tagout, or whose job requires the employee to work in an area in which activities are being performed under lockout or tagout.

Alternative Methods - Methods developed to protect workers from potentially hazardous energy when servicing and/or completing maintenance of equipment when full LOTO is not possible. Methods are developed based on risk assessment of the machine, equipment, process and/or circuit. This alternative risk assessment and procedure must also include a review to determine if there are other requirements and regulations that will also need to be addressed prior to the start of work to limit and/or eliminate employee exposures. Some examples may be, but are not limited to: NFPA 70E (Arc flash boundaries, flame resistant clothing, PPE, approach boundaries, etc.); safe working distances from live parts; minimum depth of clear working space on energized equipment.

Authorized Employee or Person - A qualified person who locks out or tags out specific machines or equipment in order to perform cleaning, repairing, servicing, setting-up, or adjusting operations on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing cleaning, repairing, servicing, setting-up, or adjusting operations.

Locked Out / Blocked Out / Blinded / Bled – Refers to any energy source that is isolated in the safe position to prevent energy flow and/or movement. For example electrical sources must be disengaged and shut off, pressurized fluids / gases must be de-energized and bled to atmospheric pressure with the bleed-valves locked open, and/or valves or switches locked and piping blinded in an off and safe condition.

Normal Production Operations - The use of a machine or equipment to performs its intended production function.

Mechanical Energy - The energy of moving parts of a machine (e.g. compressed or extended springs, etc.).

Pneumatic Energy - The energy derived from the motion and pressure of a gas (e.g. air).

Potential Energy - The stored energy that can be drawn upon to do work (e.g. suspended loads and compressed springs).

Rotational Energy - Mechanical motion that can cause machine or equipment movement (e.g. flywheels, circular blades, etc.).

Prime Mover - The source of mechanical power for a machine.

Responsibilities

EHS is responsible for the following:

- Maintain hazardous energy control training and inspection records.
- Review and evaluate the Program for effectiveness and update the Program as needed.

University departments are responsible for the following:

- Develop or hire a third party to develop a written LOTO procedure specific to EACH machine or type of equipment used by affected and authorized employees. The procedures shall be in accordance with this Program and Cal/OSHA standards.
- Ensure all aspects of the Program and LOTO procedures are understood and followed by affected and authorized employees.
- Conduct, certify, and document inspections of LOTO procedures, and provide inspection records to EHS.
- Provide authorized employee and affected employee LOTO training to their employees and provide training records to EHS.
- Develop and/or review alternative safe-work procedures when Live Work must be conducted instead of LOTO.
- Instruct all other employees that they are prohibited from attempting to restart or reenergize equipment that is locked out or tagged out.

Development of Equipment Shutdown/Restart Procedures

Referencing the owner's manual, determine the correct procedure for shutting down and restarting the equipment. Detail the procedure in writing, step by step, in the equipment-specific LOTO procedures. The procedures must spell out the exact actions and correct sequence for performing those actions.

Note that there may be more than one energy source (e.g., electrical, mechanical, hydraulic, pneumatic, chemical, thermal, etc.). The procedure shall identify **ALL** energy isolating devices (e.g., switches, levers, valves, etc.).

- Equipment Specific LOTO procedures sample below, **Appendix 2**

General Lockout/Tagout Procedures

General LOTO procedures are described below. In addition, equipment-specific procedures shall be developed by University departments for **EACH** piece of equipment in their respective area.

STEP 1: Equipment Identification

Authorized employees shall ensure they are performing cleaning, servicing, repair work, etc. on the correct equipment. Additionally, they shall follow the appropriate LOTO equipment-specific procedures for the equipment they will be working on.

STEP 2: Notify Affected Employees

ALL affected employees shall be notified when a LOTO operation will be performed. The notification shall include the reason the procedure is being performed, the schedule (dates/times) of the work, and how long the equipment may be unavailable.

STEP 3: Shut Down Equipment

The equipment in shall be shut down following proper shut-down procedures. The equipment shall have **ALL** energy sources de-energized or disengaged.

STEP 4: Isolate Primary Energy Sources

The energy isolating device (e.g., switch, valve, lever, etc.) shall be positioned/moved to the "closed", "off", or "neutral" position which completely isolates the equipment from the energy source.

STEP 5: Release/Restrain Secondary Energy Sources

Stored energy, such as that in springs, rotating parts, capacitors, hydraulic pressure, air/gas pressure, steam, or water pressure, must be dissipated or restrained by methods such as mechanical blocking, bleeding down, repositioning, etc. Other movable parts shall be mechanically blocked out or locked out, as necessary, to prevent accidental movement, and/or to prevent the release of stored energy during cleaning, servicing, and adjusting operations.

STEP 6: Ensure Proper Lockout/Tagout

Once the primary and secondary energy sources have been addressed, verify that all affected employees are clear of the equipment operating area. Then attempt to start/turn on the equipment by activating the controls/switches to verify isolation procedures were successful and that the machine or equipment will not operate.

IMPORTANT: Return all controls/switches back to their "off" position. Then attach the appropriate LOTO device to the equipment's control(s).

Lockout and Tagout Device Criteria

- LOTO devices (e.g., Accident Prevention Signs, Tags, padlocks, seals, multiple lock hasps, etc.) shall be provided to authorized employees by their respective department.
- LOTO devices shall have a means by which they can be readily secured to the controls.
- LOTO devices 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.

Locks

Authorized employees shall place locks on the controls of the equipment and energy isolating devices of the equipment to ensure the equipment may not be operated without the removal of the lockout device. The keys to the locks shall remain on the person who installed the lock.

One Lock, One Key, One Person: The basis of LOTO is that any individual has "total control" of the lockout of the machine, equipment, process or circuit that is being serviced and/or maintained. This concept assures that this individual has sole lockout responsibilities.

An Accident Prevention Tag shall be placed on each lock. The tag must be clearly visible, legible, and of an approved design. The tag shall include, at a minimum:

- Date the lock was placed on the control;
- Name of the person who placed the lock;
- Department in which that person works;
- Phone number of the department;
- Name of the job supervisor (if different than the person who placed the lock); and
- Expected time of job completion.

Locks left on equipment may only be removed without a key by following the flowchart at the bottom of this procedure.

Accident Prevention Tags and Signs

If it is not physically possible to use locks, Accident Prevention Tags or Signs shall be used. Authorized employees shall place Accident Prevention Tags and/or Signs on the controls of the equipment and energy isolating devices of the equipment to ensure the equipment may not be operated without the removal of the tagout device.

Accident Prevention Tags and Signs shall include, at a minimum:

- Date the tag/sign was placed on the control;
- Name of the person who placed the tag/sign;
- Department in which that person works;
- Phone number of the department
- Name of the job supervisor (if different than the person to who placed the tag/sign); and
- Expected time of job completion.

IMPORTANT: See the Group Lockout/Tagout section for information on group procedures. See Hand-off for Shift or Personnel Changes section for information on transferring LOTO operations.

Lockout/Tagout Device Exception

Lockout or tagout devices are not required for work on cord and plug-connected electric 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 of the employee performing the work.

STEP 7: Restore Equipment to Normal Operations

AFTER all required servicing and/or maintenance is completed, authorized employees shall clear the operating area of all affected employees. The equipment and area shall be carefully inspected to

ensure that all tools and other materials are clear of the equipment, and that the equipment is ready and is safe to return to normal production operations.

AFTER all tools and other materials have been removed from the machine, accounted for, and the guards have been reinstalled and properly adjusted (if applicable), the authorized employee(s) may remove all LOTO devices.

Reconnect or re-establish contact with the energy source for the equipment. Position/move the energy isolating devices to "On" or "Open" position to restore energy to the equipment. Verify the equipment is operating properly.

Group Lockout/Tagout

If maintenance and servicing operations require more than one person, each group member shall follow the preceding steps listed above. Each person who is involved in the operation shall attach a lockout and/or tagout device to the controls of the equipment and energy isolating devices of the equipment. No group member shall have the capability to remove any other group member's lock. If the equipment's controls or energy isolating devices cannot accept multiple locks, then an approved hasp will be used to facilitate multiple locks.

If it is not physically possible for **ALL** of the authorized employees in the operation to attach an individual lock, then only one lock shall be used. The key to this lock will be placed in a designated LOTO cabinet, and each group member will apply their lock to a multiple-lock hasp, ensuring all group member keys are secure.

As each group member completes their part of the task, they will then remove their lock. Upon removal of their lock, the group member will inform their job supervisor.

Hand-off for Shift or Personnel Changes

If a LOTO operation will carry over to the following work shift the Supervisor of the current LOTO operation shall notify the Supervisor of the following shift, who shall be responsible for notifying **ALL** affected and authorized employees of the LOTO operation.

When it becomes necessary to change personnel, whether for shift change or other reason, there shall be an orderly transfer and/or sign over of all lockout and/or tagout devices. Appropriate actions shall be taken to ensure the transfer is not interrupted.

Live Work

Live Work on equipment that cannot be shut down is allowed by the program, provided that the following is met:

- Department management demonstrates that continuity of service is essential.
- Shutdown of the system is impractical.
- Special equipment is provided along with specific standard operating procedures that are documented and followed that will provide effective protection for personnel. (Example: Work on certain life-sustaining equipment or utility lines.)

All three of the above criterions must be met before Live Work is permitted by law. If they cannot be met, then LOTO must be practiced. Prior to conducting the initial Live Work, management must contact EHS to review the documented alternative methods to determine if the procedures provide effective protection.

Contractors

All contractors and contract activities must follow their own LOTO policy. Additionally, contractors shall review the CSUDH LOTO program to ensure there is compliance, especially when both the contractor and CSUDH representative are working on the same equipment. As a best practice, the CSUDH authorized representative will perform the initial LOTO step-by-step process. The outside contractor will then attach and secure individual LOTO locks and Cal-OSHA approved lockout/tagout tags to the same energy-isolating devices that the CSUDH representative has locked out.

Periodic Inspections

Departments shall conduct periodic inspections of each energy control procedure annually to evaluate their continued effectiveness and determine necessity for updating the written procedures (Appendix 1).

- Inspections shall be conducted by an authorized employee or person other than the one(s) utilizing the hazardous energy control procedures being inspected.
- Where LOTO procedures are used, the inspection shall include a review between the Supervisor and affected/authorized employees of their responsibilities under the hazardous energy control program.
- The periodic inspection shall be documented and certified (signed) by the employee conducting the inspection.
- The inspection shall include the identification of the equipment on which the hazardous energy control procedure was being utilized, the date of the inspection, the names of all employees included in the inspection, and the name of the person conducting the inspection.

Certified inspection records shall be provided to EHS.

Training

Training on energy control procedures (i.e., LOTO) shall be provided by University departments to ALL employees whose work operations may be in an area where energy control procedures may be utilized. Requirements include:

- Authorized employees shall be trained on hazardous energy control procedures and on the hazards related to performing activities required for cleaning, repairing, servicing, setting-up and adjusting prime movers, machinery and equipment.
- Affected employees shall be instructed in the purpose and use of the energy control procedure.
- All other employees shall be instructed that they are prohibited from attempting to restart or reenergize equipment that are locked out or tagged out.

Authorized employee and affected employee training records shall be provided to EHS.

Recordkeeping

Records related to the implementation and maintenance of this Program shall be retained per the CSU Executive Order 1031 record retention policy and schedule:
http://www.calstate.edu/recordsretention/documents/EHS.pdf

The following documents and records shall be maintained by EHS:

- This Hazardous Energy Control Program
- Authorized and affected employee training records
- Certified inspection records

References

Cal/OSHA

- 3203. Injury and Illness Prevention Program
  - http://www.dir.ca.gov/title8/3203.html
- 3314. The Control of Hazardous Energy for the Cleaning, Repairing, Servicing, Setting-Up, and Adjusting Operations of Prime Movers, Machinery and Equipment, Including Lockout/Tagout
  - http://www.dir.ca.gov/title8/3314.html
- 2320. Low-Voltage Electrical Safety Orders
  - http://www.dir.ca.gov/title8/sb5g1a3.html
- 2940-2945. High-Voltage Electrical Safety Orders
  - https://www.dir.ca.gov/Title8/sb5g2a36.html
- CA Department of Industrial Relations Resources
  - http://www.dir.ca.gov/dosh/etools/08-003/definitions.htm

APPENDIX 1

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Periodic Inspection Checklist

Date:		**Area/Dept.:**	
Equip/Process:		**Inspector(s):**	
Task:			
Type of Lockout/Tagout Procedures Utilized (Check all that apply):			
	Electrical- Flexible Cord- Exclusive Control		Hydraulic- Stored Energy- Lock
	Electrical- Flexible Cord- Plug Lockout		Hydraulic- Ball Valve- Locking Cap
	Electrical-Disconnect-Lock		Process- Gate Valve- Locking Cap
	Electrical- Breaker Switch- Switch Device		Process- Line- Break in Line
	Electrical Fuse Block- Block Device		Process- Line- Cable or Chain
	Electrical- PLC- Lock		Mechanical- Block- Pin
	Pneumatic- Quick Disconnect- Locking Cap		Mechanical- Mobile Equipment- Block
	Pneumatic- Ball Valve- Locking Cap		Mobile Equipment- Ignition- Key Control
	Other (please explain):		

Authorized Workers:	**Craft/Title:**
1.	
2.	
3.	
4.	
5.	

#	Questions:	Yes	No	N/A
1.	Were the affected personnel notified of the work to be performed?			
2.	Is a written procedure available for the task?			
3.	If Yes to #2, was it followed?			
4.	If Yes to #2, is the procedure adequate?			
5.	If No to #2, is a procedure needed?			
6.	Did each authorized employee know what energy sources to isolate?			
7.	Are the proper energy control devices being used?			
8.	Did authorized employee(s) verify equipment is safe after lockout?			
9.	Was the on/off switch returned to "off" position following verification?			
10.	Did each authorized employee on the job have his or her personal lock and tag attached to all isolation points on the equipment or device?			
11.	Is the tag properly filled out (User clearly identified)?			
12.	Does the authorized employee have sole control of his/her key?			
13.	Have authorized employees responsibilities been reviewed with them?			
14.	Did authorized employees understand their responsibilities under the energy control procedure being inspected?			
15.	Was the procedure found to be correct/without deficiency? If not, what was corrected?:			

APPENDIX 2

LOCKOUT PROCEDURE

ID#: LP1001
EQ#:

CSUDH ENVIRONMENTAL HEALTH & SAFETY

Chiller 1

LOCATION: Central Plant: Inside

SCOPE/USE: This Lockout procedure is required whenever machine guards or other safety devices are removed or bypassed or any hazardous exposure to a point of operation or an associated danger zone takes place.

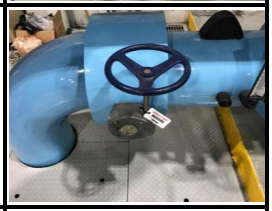
PURPOSE: This Lockout procedure will bring this equipment (or section) to a fully de energized condition.

EQUIPMENT OVERVIEW PHOTOS		SPECIAL PRECAUTIONS
		• USE SOP TO DEPRESSURIZE/DRAIN PRIOR TO SERVICING.
LOCKOUT DEVICES USED:	**Padlock = 6, Universal Cable Device = 4**	

LOCKOUT APPLICATION PROCESS (Apply in Order, Top to Bottom)

1. Notify all affected personnel before starting to apply this LOCK OUT procedure.
2. Turn off machinery using normal operating controls and standard shutdown procedures.
3. Isolate energy sources at control points in the order shown below and apply lockout devices and locks.
4. Locks applied to isolation points must be personally identified and in the "secured" position.
5. Authorized personnel must maintain possession of the key(s) for each personal lock applied.
6. Do not work under the protection of a lock you have not personally applied.

ENERGY TYPE	ENERGY ISOLATION POINT OR STEP	APPLICATION METHOD	VISUAL REFERENCE
CONTROL PANEL	HMI: located on unit.	Use SOP to shutdown equipment at HMI.	
ELECTRICAL 160VDC	Electrical Disconnect: E1372 located on unit.	Move disconnect to the OFF position and apply a lockout padlock through the built-in securement hole.	
ELECTRICAL 480V	Electrical Disconnect: E1373 located on unit.	Move disconnect to the OFF position and apply a lockout padlock through the built-in securement hole.	

WATER	Butterfly Valve: W08600 located near unit.	Turn valve to CLOSED position and secure with a lockout device.	
WATER	Butterfly Valve: W08599 located near unit.	Turn valve to CLOSED position and secure with a lockout device.	
WATER	Butterfly Valve: W08601 located near unit.	Turn valve to CLOSED position and secure with a lockout device.	
WATER	Butterfly Valve: W08602 located near unit.	Turn valve to CLOSED position and secure with a lockout device.	

TESTING / VERIFICATION REQUIREMENTS

(If contact with exposed electrical conductors could occur, a qualified person must perform voltage testing to verify zero energy condition)

1. **Test for full de energization by turning normal operational controls to the on (or neutral) position and verifying that no machine function or movement occurs.**
2. **Return all controls to the off position and complete all necessary adjustments or repair work.**
3. **During testing and adjustment, Lockout must be re-applied when contact with hazardous area(s) is required.**

LOCKOUT REMOVAL PROCESS

(Use this Procedure to be sure each locking device has been removed and that each energy source has been restored according to the normal startup procedure)

1. **Ensure all tools and items have been removed.**
2. **Confirm that all employees are safely located.**
3. **Ensure all safety guarding has been replaced.**
4. **Verify that controls are in off position.**
5. **Remove lockout devices and reenergize machine.**
6. **Notify affected employees that servicing is completed.**

DOCUMENT CONTROL	**Written or Updated:**	**03/22/2022**	**By:**	**Version:**	**1.0**

Flowchart for removal of a lock