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1.0 INTRODUCTION

1.1 Policy

It is the policy of the University of California, San Diego (UCSD) to ensure a safe and healthful work environment for faculty, staff, students and visitors. Implicit in this policy is a requirement to provide individuals with pertinent information about Lockout/Tagout procedures.

1.2 Purpose

The purpose of the Lockout/Tagout (LOTO) Program is to ensure specific practices and procedures to safeguard employees from the unexpected startup of machinery and equipment or the release of hazardous energy during service or maintenance activities as specified in Cal/OSHA Title 8 Sections 3203, 3314 and 6004. Requirements for working on energized electrical systems are prescribed in Sections 2320.4, 2320.5, 2320.6, 2530.43 and 2530.86 of the electrical safety orders.

This program requires that an authorized employee(s) turns off and disconnects the machinery or equipment from its energy source(s) before performing service or maintenance. The authorized employee(s) also either locks out, blocks out and/or tags out the energy-isolating device(s) to prevent the release of hazardous energy and take steps to verify that the energy has been isolated effectively.

1.3 Scope

This program provides guidelines in the servicing and maintenance of machines and equipment in which the **unexpected** energization or start-up of the machines or equipment, or release of stored energy could cause injury to employees. This program establishes minimum performance requirements for the control of such hazardous energy. LOTO applies to all facility and laboratory equipment. LOTO procedures apply to the following forms of energy:

- _ Electrical _ Gravity
- _ Pneumatic _ Springs
- _ Hydraulic _ Steam
- _ Heat _ Thermal
- _ Positional or stored _ Chemical
- _ Natural Gas _ Other

LOTO does not apply to:

Work on cord and plug connected electrical equipment where the equipment is unplugged, and the plug is under the exclusive control of the employee who is performing the servicing and maintenance on the equipment. For example hand power tools and plug/cord connected equipment. However, if at any time the employee no longer has direct control of the plug/cord connected equipment, then LOTO procedures would apply.

During Hot Tap operations that involve transmission and distribution systems for gas, steam or water when performed on pressurized pipelines. **NOTE:** This function is only to be performed by a qualified/authorized steam fitter defined by industry standards.

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When Lockout/Tagout procedures introduce additional hazards into the work being performed, justification for performing such actions must be established and a site safety plan must be developed and adhered to.

2.0 RESPONSIBILITY

Each department that provides servicing and maintenance of machines and equipment or units is responsible for developing written **machine specific** Lockout/Tagout procedures. Where written procedures have not been fully developed, blue prints or as-built drawings must be available to identify sources of energy and sufficient Lockout/Tagout control points.

2.1 Supervisor

Supervisors are responsible for:

- Identifying all machinery or equipment that would be subject to this program.
- Development, documentation and implementation of written energy control procedures for each potentially hazardous energy source.
- Identifying “authorized” and “affected” employees within their department.
- Ensuring that “authorized” and “affected” employees receive appropriate training.
- Ensuring that all new or refurbished equipment is capable of accommodating lockout devices.
- Evaluating and Correcting deficiencies identified in the Lockout/Tagout program.
- Providing ongoing support of the Lockout/Tagout program.
- Managing and tracking equipment that is in a Lockout/Tagout state.
- Disclosing identified hazardous conditions to Contractors working at UCSD.

2.2 Employee

Employees are responsible for:

- Following the written procedures.
- Assisting with identification of hazardous energy sources.
- Reporting known or suspected deficiencies to their supervisor.
- Providing Supervisors with the operational status of equipment under Lockout/Tagout.
- Participating in training for Lockout/Tagout.

2.3 Department of Environment, Health and Safety (EH&S)

EH&S is responsible for:

- Developing and maintaining a written program which complies with the requirements of CCR Title 8 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.
- Providing training to Supervisors/Department Heads on the requirements of the program.
- Assisting in identification of hazardous energy sources and the selection of proper energy control devices.
- Performing periodic assessments to identify deficiencies in the LOTO program.

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3.0 IDENTIFICATION OF ENERGY SOURCES

UCSD Maintenance and research departments, which have hazardous energy sources, must identify all machinery and equipment that is subject to LOTO. Panel schedules will be maintained and updated by the department or contractor performing any modifications or work in the area.

4.0 ENERGY CONTROL PROCEDURES

Each written procedure for the control of hazardous energy will contain the following steps.

4.1 Lockout/Tagout of Equipment Procedures

When servicing or maintenance of machinery or equipment is required, the following steps shall be taken.

- Notify affected employees.
- The authorized employee shall identify the type(s) and magnitude(s) of energy that the machine or equipment uses. The authorized employee shall understand the hazards of the energy, and shall know the methods to control the energy.
- If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).
- De-activate the energy isolating devices(s) so that the machine or equipment is isolated from the energy source(s).
- Lock out the energy isolating device(s) with assigned individual lock(s) and tags.
- Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, air, gas, steam, water pressure, etc.) must be discharged, dissipated or restrained by methods such as grounding, repositioning, blocking, blanking or bleeding down to remove or isolate stored energy potentials.
- Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the start on/off button or other normal operating control(s) or by testing to make certain the equipment will not energize or operate.
- **Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.**
- The machine or equipment is now locked out.
- Remove machinery guards or access panels necessary to perform work.

4.2 Restoring Equipment To Service

When servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken.

- Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact, machinery guarding in place, etc.
- Check the work area to ensure that all employees have been safely positioned or removed from the area.
- Verify that the controls are in neutral.

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- Remove the lockout devices and re-energize the machine or equipment. **NOTE:** The removal of some forms of blocking may require the machine to be re-energized before safe removal. Precautions must be taken to ensure employees are not exposed to rotating or moving parts when this process is performed.
- Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.
- Inspect work area and assure that all tools and people are clear from equipment or machinery.
- Replace all guards.
- Notify affected employees in the immediate area.
- Remove all energy isolating devices.

If more than one individual is required to lockout the equipment, each person will place a personal lock and tag on a group lockout device prior to beginning work. Each individual applying a lock is responsible for its removal upon completion of their task. During shift changes, the supervisor shall ensure the continuity of the lockout protection. Workers will be responsible for removing their own lock and tag at the completion of the shift. If work is to cease until the following day, the employee may leave his lock on the equipment or the supervisor may replace it with his personal lock and tag so that the employees may remove their lock. When work resumes, the employees are to place their lockout on the equipment prior to the removal of the supervisor's lockout.

5.0 LOCKOUT/TAGOUT DEVICES

Lockout devices are the preferred method for energy isolation. In the event that machinery or equipment is not capable of being locked out a Tagout process may be used. Due to the fact that tags may be easily removed, bypassed or ignored, further steps must be taken to ensure control of hazardous energy.

All Lockout/Tagout devices must meet the following requirements:

- Employees must be provided with sufficient numbers of devices for control of hazardous energy.
- Employee will apply assigned locks/tags on all energy control devices capable of accepting lockout devices at all times.
- Devices must indicate the identity of the employee applying the device, the date it was applied, contact number and shall warn against hazardous conditions if the machine is energized.
- These devices must only be used for controlling energy.
- There will be only one key in use for each lockout lock.
- Lockout/Tagout devices must be capable of withstanding the environment for the period of time they will be applied.
- Devices must be standardized within the University by color, shape or size.
- Lockout devices must be sturdy enough to prevent removal without excessive use of force. Tagout devices must be self-locking and capable of withstanding at least 50lbs of force.

6.0 ASSESSMENT

To ensure that the program is being implemented and providing adequate protection for employees, an assessment/evaluation will be conducted annually. The assessment will be conducted by the supervisor, department head or manager, and when requested a member of the EH&S staff who is knowledgeable about LOTO procedures.

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The assessment will be designed to identify and correct deficiencies. During the assessment, procedures will be reviewed by authorized employees who will assist in the identification of deficiencies and the development of solutions. Documentation of the assessment will include the machine or equipment evaluated the date of the assessment, the people involved and any corrective action taken. These records will be kept for at least five (5) years in the department office.

7.0 TRAINING

The department, supported by EH&S, will be responsible for training to ensure the purpose and function of the LOTO program is understood by all authorized and affected employees.

Authorized employees will receive 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. The training will be documented on Form #2 in Appendix III.

Affected employees will be instructed in the purpose and use of the energy control procedure. The training/instruction will be documented on Form #3 in Appendix III.

Other employees whose work operations are or may be in an area where energy control procedures may be utilized, will be instructed about the procedure and about the prohibition relating to attempts to restart or re-energize machines or equipment which are locked out. The instruction will be documented on Form #4 in Appendix III.

Retraining will be conducted when employees no longer demonstrate an understanding or proficiency with the LOTO program, when job assignments change, when equipment or processes are modified or when new equipment is installed.

In the event that Tagout devices must be utilized the training will include the following:

- Tags are warning devices – they do not provide any type of physical restraint.
- Tags cannot be removed other than by the authorized person who applied the tag and must follow the same steps when removing a lockout device.
- Tags must be legible and understandable.
- Tags must be made out of material that is capable of withstanding the environment in which they are used.
- Tags must be securely attached.

8.0 CONTRACTORS

Contractors must have a written LOTO Program in place that is as stringent as the UCSD program. They will follow their LOTO Program and coordinate all LOTO activities with Facilities Management or Department Management personnel.

Upon completion of installations and modifications of machinery or equipment, the contractor will submit blue prints, schematics, LOTO procedures or other data as specified by the hiring department. This shall be done within the timeframe established by the hiring department or upon project completion.

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9.0 MANAGEMENT REMOVAL OF LOCKOUT/TAGOUT DEVICES

In the event a Lockout/Tagout device must be removed to continue work, the person applying the device must be the one to do so. Should a situation arise that the person applying the device is not available the lock may only be removed after the following conditions are met.

- Every attempt has been made to locate the person.
- Verification that the employee is not on the premises and is not able to return.
- Should the individual be located he/she must return to the site to remove the device.
- The supervisor and a member of upper management agree that the device must be removed.
- The device is removed in accordance with the Lockout/Tagout program section 4.2 Restoring Equipment To Service.
- Documentation (Appendix I) of this process will be kept on file in the department for five (5) years and evaluated during the annual assessment.

10.0 GLOSSARY OF TERMS

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 said 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 them. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

Blind - A device such as metal plates inserted in flanged joints, blind flanges, and caps or plugs installed on the ends of pipe lines, used to prevent liquids, gases, or vapors from passing through a pipe line or nozzle. Valves are not blinds.

Block Out - A device or process which provides physical support or a barrier to prevent incidental rotation, shifting, moving or displacement of an isolated piece of equipment due to gravity, wind, seismic activity or other unplanned events that could cause movement of the equipment.

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. Types of energy include but are not limited to:

- _ Pressurized fluid (air, oil, water, etc.)
- _ Electrical
- _ Freely moving machine members
- _ Potential/stored Energy (spring, gravity, etc.)

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

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

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, maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or un-jamming 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.

Setting up - Any work performed to prepare a machine or equipment to perform its normal production operation.

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.