Lockout-Tagout Program

Brief

Title:	Lockout-Tagout Program
Publication date:	9/30/2013
Effective date:	10/1/2013

BRIEF

Policy Summary

All personnel who work on or near equipment in which the unexpected energization or start-up of the equipment, or the release of stored energy, could cause injury shall personally lock out the equipment for the duration of the work.

Who Should Read This Policy

All persons, including but not limited to Laboratory employees, affiliates, and subcontractors, who could be performing work requiring Lockout/Tagout (LOTO) at Berkeley Lab

To Read the Full Policy, Go To:

The POLICY tab on this wiki page

To Read the ES&H Program Details, Go To:

http://www.lbl.gov/ehs/pub3000/CH18/CH18.html

Contact Information

Mark Scott
Electrical Safety Program Manager
EHS Division / Occupational Safety Department/Electrical Safety Group
mascott@lbl.gov

Policy

Title:	Lockout-Tagout Program
Publication date:	9/30/2013
Effective date:	10/1/2013

POLICY

A. Purpose

This policy establishes requirements at Lawrence Berkeley National Laboratory (Berkeley Lab) for controlling hazardous-energy sources, in any form, that could cause personal injury, by locking out and tagging out those sources.

B. Persons Affected

This program is required for all Berkeley Lab employees, affiliates, students, visitors, and subcontractors who may be exposed to hazardous energy while performing any construction, service, maintenance, modification, or demolition activity.

C. Exceptions

Persons performing work on projects or sites that do not fall under DOE jurisdiction are not required to follow the requirements of this Lockout/Tagout (LOTO) Program. However, an equivalent LOTO program meeting applicable regulatory requirements will apply.

D. Policy Statement

All personnel who perform work on or near equipment in which the unexpected energization or start-up of the equipment, or the release of stored energy, could cause injury shall personally lock out the equipment for the duration of their work.

D.1 LOTO Program Quick Reference Map

A reference to the full program intended to guide the reader to the appropriate work process is provided in Work Process A.

D.2 Basic LOTO Rules

A list of basic rules including but not limited to situations when LOTO is required, authorization of workers, qualifications, and establishing safe zones is provided in Work Process B.

D.3 Cord and Plug Equipment

A detailed explanation of the cord-and-plug exemption from LOTO, including but not limited to requirements for qualifications, conditions allowing for exemption, examples, and restrictions, is provided in Work Process C.

D.4 Simple LOTO by a LOTO Authorized Person

A detailed explanation of the requirements and restrictions for an Authorized Person to perform a simple LOTO, including but not limited to requirements for authorization, qualifications, conditions allowing for simple LOTO, and a step-by-step procedure, is provided in Work Process D.

D.5 Complex LOTO by a LOTO Authorized Person

A detailed explanation of the requirements and restrictions for an Authorized Person to perform a complex LOTO, including but not limited to requirements for authorization, qualifications, written LOTO procedures, and a step-by-step procedure, is provided in Work Process E.

D.6 Complex LOTO Requiring a Responsible Individual

A detailed explanation of the requirements and restrictions to perform a complex LOTO when a Responsible Individual (RI) is required, including but not limited to requirements for authorization, qualifications of the RI, written LOTO procedures, and a step-by-step procedure, is provided in Work Process F.

D.7 Group LOTO

A detailed explanation of the requirements and restrictions to perform a group LOTO, including but not limited to responsibilities of the Responsible Individual and group LOTO participants, conditions allowing for group LOTO, and a step-by-step group LOTO procedure, is

provided in Work Process G.

D.8 Tagout Only

A detailed explanation of the requirements and restrictions to perform tagout only where the physical construction of the energy isolation does not accommodate the attachment of a lock, including but not limited to conditions and limitations of a tagout-only procedure, responsibilities of the Responsible Individual and group LOTO participants, and a step-by-step procedure, is provided in Work Process H.

D.9 Subcontractor LOTO Permit

A detailed explanation of the requirements and restrictions to allow subcontractors to perform LOTO, including but not limited to responsibilities of the Responsible Individual, prerequisites for obtaining a subcontractor LOTO permit, Environment/Health/Safety (EHS) Division responsibilities, and requirements for subcontractors to provide their own LOTO equipment, is provided in Work Process I.

D.10 Shift Change and Transfer of Control

A detailed explanation of the requirements and restrictions for shift changes and transfer of control of locked and tagged out energy sources, including responsibilities of the Responsible Individual and individuals involved in the LOTO transfer, and a step-by step procedure, is provided in Work Process J.

D.11 Temporary Partial Restoration

A detailed explanation of the requirements and restrictions for temporary partial restoration of energy to part of the system, including responsibilities of the Responsible Individual and individuals involved in the restoration, applicability, and a step-by step procedure, is provided in Work Process K.

D.12 LOTO Hardware

A detailed description of the requirements and restrictions for LOTO hardware, including but not limited to locks, tags, boxes, and devices permitted at Berkeley Lab, is provided in Work Process L.

D.13 Training and Authorization

Only persons who have the appropriate level of LOTO training can be authorized to perform LOTO functions. Specific training requirements, including EHS courses, prerequisites, refresher training, and authorizations, are listed in Work Process M, Table M.1. Once LOTO training is complete, specific line-management authorization is required to perform LOTO functions. (Work Process M)

D.14 LOTO Procedures

A LOTO procedure is a formal document detailing all steps required to establish the lockout. It is specific both to the equipment or system and to the scope of work. A LOTO procedure is required for all complex LOTOs. The LOTO procedure fulfills the following purposes:

- It documents the scope of work permitted under the LOTO.
- It documents the specific isolations established by the LOTO.
- It serves as the primary communication document for all parties involved in the LOTO.

A step-by step procedure for developing and approving LOTO procedures is provided in Work Process N.

D.15 Special Condition LOTO Lock Removal

LOTO lock removal by someone other than the person who applied the lock is prohibited except under special conditions such as a lost key or unavailable personnel. A step-by-step procedure for removing locks under such special conditions is provided in Work Process O.

D.16 Periodic Quality Assurance Inspections of LOTO Procedures

All LOTO procedures at Berkeley Lab are subject to periodic quality-assurance (QA) inspection. The EHS Division will coordinate the Laboratory-wide LOTO procedure and QA inspection program, and will certify that inspections have been completed. To meet this requirement, each division must conduct QA inspections of its LOTO procedures and submit the results to the Electrical Safety Group for record-keeping. (Work Process P)

D.17 Air Gapping

Air gapping is the process whereby the sources of hazardous energy are physically removed from the work area to such an extent that LOTO is not feasible and not necessary. The air-gapping process requires that:

- All energy sources must be physically and visibly separated from the work area
- This separation must be visible without opening any cabinets, manhole covers, etc.
- The minimum separation distance is five feet, except when approved by the EHS Electrical Safety Group.

Additional requirements and restrictions are provided in Work Process Q.

D.18 Interlocked Systems

Interlocks consist of one or more devices engineered to detect an undesired condition and shut down the equipment or otherwise remove the immediate hazard. Interlocks are not a substitute for LOTO controls and shall not be used or otherwise relied upon for the purpose of protecting persons who are servicing or maintaining equipment. Additionally, an interlock cannot serve as a LOTO energy isolation point, since it does not constitute a positive energy isolation except when permitted by 10 CFR 835, *Occupational Radiation Protection*. A trapped key interlock system may be used in conjunction with the LOTO Program, but by itself does not meet the requirement for personal LOTO. (Work Process R)

D.19 Administrative Control

1. **Administrative locks.** Administrative locks are used when there is the need to provide "operational control" (control of a system, utility, or facility). Any lock used for a purpose other than LOTO is an administrative lock. Administrative locking does not provide individual personal protection for workers and is not a substitute for personal LOTO. (Work Process S.1)
2. **Tag On.** This is used for equipment that must be shut down in a controlled manner and not accidentally de-energized. When a circuit breaker, disconnect switch, or energy-securing device is readily accessible to any employee, the circuit breaker or disconnect switch may be tagged to indicate that it is not to be turned off. (Work Process S.2)

D.20 LOTO Coordination

Some large projects or events require the coordination of multiple LOTO procedures. These events include major maintenance outages, emergency outages, initial building energization, or other large projects. The increased complexity may require the assignment of an overall LOTO Coordinator to ensure that conflicts in schedule, outage planning, and required energized events do not lead to confusion. The LOTO Coordinator must ensure the various Responsible Individuals are properly informed of any changes that will affect their respective LOTO procedures. (Work Process T)

E. Roles and Responsibilities

Role	Responsibilities
Environment/Health/Safety (EHS) Division	• Maintain, administer, and revise the LOTO Program as needed • Ensure that LOTO equipment is available and consistent with Berkeley Lab standards • Develop and implement the Lockout/Tagout training courses • Periodically audit LOTO compliance
Qualified Persons	Wear all required PPE and follow all required safe work practices while performing the necessary operations and verifying the zero-energy state of equipment to support the LOTO process

LOTO Affected Persons	• Follow all LOTO and safety requirements • Recognize when LOTO is being used, the general reasons for LOTO, and the importance of not tampering with or removing a lock and tag
LOTO Authorized Persons	• Recognize the conditions of work that require LOTO, assess all hazardous energy sources, and use correct procedures and materials to implement LOTO • Maintain control over the keys to their personal LOTO locks • Apply his or her own personal LOTO lock and tag when performing servicing, maintenance, or modification work Must NEVER apply a LOTO lock for anyone else
LOTO Responsible Individuals (RIs)	• Accountable for the safe execution of a complex or group LOTO • Conduct the LOTO briefing • Supervise the Qualified Person(s) in the execution of the LOTO procedure • Manage all changes to the scope of work • Ensure all personnel performing work under the LOTO are LOTO Authorized Persons and are personally locked out for their tasks
LOTO Procedure Evaluators	• Observe the performance of LOTO procedures for the purpose of periodic quality assurance (QA) inspection • Verify that the LOTO procedures are adequate, are understood, and are being followed by persons participating in the LOTO • Document the completion of the LOTO procedure inspections in the EHS database
LOTO Approvers	• Review submitted LOTO procedures for completeness and accuracy • Verify that the scope of work is clearly defined, is described in the LOTO procedure, and that the LOTO Safe Zone established in the LOTO procedure fully encompasses the scope of work • Approve LOTO procedures that meet all requirements in Work Process N
LOTO Coordinators	• Maintain overall control of a set of LOTOs established during a large project • Provide overall coordination with the project schedule • Resolve scheduling conflicts between different LOTOs and other scheduled work • Ensure that the various Responsible Individuals are properly informed of any changes that will impact their respective LOTO procedures

Line management (including supervisors, managers, and work leads)	• Prohibits employees from working on equipment requiring LOTO until the worker is trained and authorized to perform LOTO
	• Generates and maintains written LOTO procedures where required, and audits these LOTO procedures at least annually
	• Assigns and documents employee LOTO authorization, including:
	  ◦ Designating specific equipment or categories of equipment to be controlled
	  ◦ Verifying that workers are qualified to perform the necessary LOTO procedures
	• Determines the appropriate levels of training required for each employee
	• Ensures consistent policy implementation and reinforcing LOTO rules
	• Removes LOTO devices in case of a person's absence (Work Process O)
	• Ensures that necessary LOTO hardware is available
	• Ensures that all outside contractors operating under the supervision of the division are informed of and adhere to the Berkeley Lab LOTO Program (Work Process I)
	• Ensures that periodic quality assurance (QA) inspections of LOTO procedures are conducted(Work Process P)

F. Definitions/Acronyms

Term	Definition
Absent Person lock removal	A procedure for the removal of a lock and tag by someone other than the person who applied the lock and tag when that person is not present or available to remove the lock

Administrative lock	Any lock used for a purpose other than LOTO. The lock may serve a safety function other than LOTO, a configuration-control function, or other purpose. Can be any color except red.
Blocked	A condition where a mechanical device is inserted into the energy path to physically prevent movement. Most commonly used with moving parts.
Capable of being locked out	An energy isolation is capable of being locked out if it has a means of attachment to which, or through which, a lock can be affixed with the device in the "off" or de-energized position, or it has a locking mechanism built into it
Complex LOTO	Any LOTO that does not meet the requirements for a simple LOTO is called a complex LOTO. Requires an assigned Person In Charge and a LOTO procedure.
Cord-and-plug-powered equipment	Portable electric equipment, such as power tools, computers, printers, appliances, etc., 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 continuous control of the employee performing the servicing or maintenance
Credited control radiation safety system	Specific definitions and requirements for radiation-generating devices, radiation safety systems and credited controls are found in the ES&H Manual *Radiation Safety* program; EH&S Procedure 730, *Radiation Generating Device Program*; and EH&S Procedure 731, *R GD Interlock Program*.
Dissipated	A condition where all stored energy has been reduced to a nonhazardous level. Pertains to energy-storing devices such as capacitors, pressure receivers, accumulators, reservoirs, or springs
EHS Division	Environment/Health/Safety Division
Energized	Connected to an energy source or containing residual or stored energy
Energy isolation	A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: • Manually operated electrical circuit breaker • Manually operated disconnect switch • Manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and no pole can be operated independently • Manually operated valve • Flange blank • Pin or block • Any similar device used to block or isolate energy • Energy isolations shall be capable of being locked out. Push buttons, selector switches, software interlocks, and control circuit type devices are not energy isolations and cannot be used to isolate hazardous energy.
Exposure	The condition of being subjected to a source of risk presented by hazardous energy sources
Group LOTO	A process to coordinate a complex LOTO so that LOTO Authorized Persons only have to apply personal LOTO locks to a lockbox instead of at each energy isolation

Group LOTO lock	A LOTO lock used for the purpose of group LOTO. It is identified by a group LOTO lock tag. The keys to group LOTO locks are controlled in a LOTO lockbox.
Hazard zone	The space near a source of hazardous energy where a person could be harmed if the hazardous energy was suddenly or unexpectedly released, such as the unexpected release of stored pressure, the unexpected movement of a machine, the unexpected energization of an electrical conductor, or the spray from a hazardous chemical that was unexpectedly released
Hazardous energy	Energy that is of such a magnitude that it is capable of causing harm to a person
Hazardous energy control	The process of systematically implementing mechanical means to prevent hazardous energy from flowing to a person
Isolated	A condition where a source of hazardous energy has been controlled by physically stopping the energy path so that the energy cannot flow to workers or equipment. The term "isolated" is commonly used with electrical circuits and fluid lines.
Lockout/Tagout (LOTO)	The method of applying a mechanical lockout device and a tag on an energy isolation by a LOTO Authorized Person in accordance with established procedures to control hazardous energies and prevent the equipment from being operated until the lockout device is removed
Look-alike equipment	Equipment that is similar in shape, size, and function that could lead a person to lock out Item A but start working on Item B instead. Common examples are: • "North/middle/south" pumps installed side by side • High-voltage switching stations with rows of switchgear • Sets of laboratory furnaces installed in a row
LOTO Affected Person	A person whose job requires him/her to be near or around the hazard zone (but not within the hazard zone) when equipment or an apparatus is being maintained or serviced under a locked-out or tagged-out condition
LOTO Approver	The LOTO Approver is a person designated by the division to approve LOTO procedures. LOTO Approvers must be authorized as a LOTO Responsible Individual and have technical competence and familiarity with the equipment or systems for which the LOTO procedure is written. They must obtain additional technical assistance as required from qualified persons who are more familiar with the systems involved.
LOTO Authorized Person	A person who has completed the required LOTO training (general and procedure-specific) and is authorized by the supervisor or work lead to perform LOTO on energy isolation points to perform service or maintenance. Only LOTO Authorized Persons shall apply locks and tags to control hazardous energy.
LOTO Coordinator	The LOTO Coordinator is a LOTO Approver who has been assigned by line management to oversee and coordinate multiple LOTOs for a large project, such as a maintenance outage or building energization

G. Recordkeeping Requirements

- Completed LOTO procedures must be kept by the divisions for 12 months.
- Completed LOTO Audit Forms must be kept by EHS Electrical Safety Group.

H. Implementing Documents

Document Number	Document Title	Document Type
07.07.020.001	Lockout/Tagout Program	Program
07.07.020.002	Work Process A, *LOTO Program Quick Reference Map*	Process
07.07.020.003	Work Process B, *Basic LOTO Rules*	Process
07.07.020.004	Work Process C, *Cord-and-Plug Equipment*	Process
07.07.020.005	Work Process D, *Simple LOTO by a LOTO Authorized Person*	Process
07.07.020.006	Work Process E, *Complex LOTO by a LOTO Authorized Person*	Process
07.07.020.007	Work Process F, *Complex LOTO Requiring a Responsible Individual*	Process
07.07.020.008	Work Process G, *Group LOTO*	Process
07.07.020.009	Work Process H, *Tagout Only*	Process
07.07.020.010	Work Process I, *Subcontractor LOTO Permit*	Process
07.07.020.011	Work Process J, *Shift Changes and Transfer of Control*	Process
07.07.020.012	Work Process K, *Temporary Partial Restoration*	Process
07.07.020.013	Work Process L, *LOTO Hardware*	Process
07.07.020.014	Work Process M, *Training and Authorization*	Process
07.07.020.015	Work Process N, *LOTO Procedures*	Process
07.07.020.016	Work Process O, *Special Condition LOTO Lock Removal*	Process
07.07.020.017	Work Process P, *Periodic Quality Assurance Inspections of LOTO Procedures*	Process
07.07.020.018	Work Process Q, *Air Gapping*	Process
07.07.020.019	Work Process R, *Interlock Systems*	Process
07.07.020.020	Work Process S, *Administrative Control*	Process
07.07.020.021	Work Process T, *LOTO Coordination*	Process
07.02.003.001	Safe Work Authorizations	Program
07.07.011.001	Electrical Safety Program	Program
07.07.018.001	Laser Safety	Program
07.08.001.001	Radiation Protection Program	Program
07.07.021.001	Machine Safeguarding – Shop and Laboratory Machine Safety	Program

07.07.006.001	Confined Spaces	Program

I. Contact Information

Mark Scott
Electrical Safety Program Manager
EHS Division / Occupational Safety Department/Electrical Safety Group
mascott@lbl.gov

J. Revision History

Date	Revision	By whom	Revision Description	Section(s) affected	Change Type
1/2/2012	0	M. Scott	Reformat for wiki (brief)	All	Minor
10/1/2013	1	M. Scott	Complete rewrite of the program	All	Major

Document Information

DOCUMENT INFORMATION

Title:	Lockout-Tagout Program
Document number	07.07.020.000
Revision number	1
Publication date:	9/30/2013
Effective date:	10/1/2013
Next review date:	10/1/2017
Policy Area:	Industrial Hygiene and Safety
RPM Section (home)	Environment, Safety and Health
RPM Section (cross-reference)	none
Functional Division	EHSS
Prior reference information (optional)	PUB- 3000, Chapter 18

Source Requirements Documents

- 10 CFR 851.21, *Hazard Identification and Assessment*
- 29 CFR Part 1910.147, *The Control of Hazardous Energy (Lockout/Tagout)*
- 29 CFR Part 1910.269, *Electric Power Generation, Transmission, and Distribution*
- 29 CFR Part 1910.333, Subpart S , *Electrical: Selection and use of work practices*
- 29 CFR Part 1926, *Safety and Health Regulations for Construction*
- NFPA 70E, *Standard for Electrical Safety in the Workplace*

Implementing Documents

Document Number	Document Title	Document Type
07.07.020.001	Lockout/Tagout Program	Program
07.07.020.002	Work Process A, *LOTO Program Quick Reference Map*	Process
07.07.020.003	Work Process B, *Basic LOTO Rules*	Process
07.07.020.004	Work Process C, *Cord-and-Plug Equipment*	Process
07.07.020.005	Work Process D, *Simple LOTO by a LOTO Authorized Person*	Process
07.07.020.006	Work Process E, *Complex LOTO by a LOTO Authorized Person*	Process
07.07.020.007	Work Process F, *Complex LOTO Requiring a Responsible Individual*	Process
07.07.020.008	Work Process G, *Group LOTO*	Process
07.07.020.009	Work Process H, *Tagout Only*	Process
07.07.020.010	Work Process I, *Subcontractor LOTO Permit*	Process
07.07.020.011	Work Process J, *Shift Changes and Transfer of Control*	Process
07.07.020.012	Work Process K, *Temporary Partial Restoration*	Process
07.07.020.013	Work Process L, *LOTO Hardware*	Process
07.07.020.014	Work Process M, *Training and Authorization*	Process
07.07.020.015	Work Process N, *LOTO Procedures*	Process
07.07.020.016	Work Process O, *Special Condition LOTO Lock Removal*	Process
07.07.020.017	Work Process P, *Periodic Quality Assurance Inspections of LOTO Procedures*	Process
07.07.020.018	Work Process Q, *Air Gapping*	Process
07.07.020.019	Work Process R, *Interlock Systems*	Process
07.07.020.020	Work Process S, *Administrative Control*	Process
07.07.020.021	Work Process T, *LOTO Coordination*	Process
07.02.003.001	Safe Work Authorizations	Program
07.07.011.001	Electrical Safety Program	Program
07.07.018.001	Laser Safety	Program
07.08.001.001	Radiation Protection Program	Program
07.07.021.001	Machine Safeguarding – Shop and Laboratory Machine Safety	Program
07.07.006.001	Confined Spaces	Program