

## ENERGY ISOLATION- LOCKOUT/TAGOUT (EI-LOTO) PROGRAM

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[Go to EI-LOTO Program TOC](#)

### Quick Start

The UC Santa Barbara Energy Isolation - Lockout/Tagout (EI-LOTO) Program requires campus, field station personnel and contractors to implement safe procedures when working on UCSB equipment or utility systems with one or more energy sources. Because of the potential for injury from energy sources that operate equipment / utility systems, this program guides safe installation, set-up, adjustment and maintenance work on equipment by isolating energy sources prior to commencing work. The program is required by Cal/OSHA safety regulations.



This EI-LOTO Program is applied to ALL forms of potentially hazardous energy and is applied to every individual piece of equipment that has potentially hazardous energy. The [types of energy needing to be isolated](#) include the potential energy (mechanical springs in tension or compression, compressed gas cylinders, counter weights, etc.), kinetic energy (rotating flywheel, moving parts, rolling components, parked vehicles, etc.) and utility energy (electricity, compressed air, steam, domestic water, etc.) that may be part of a particular machine or utility system. Such equipment may include building mechanical systems such as HVAC and air handlers, some larger experimental equipment that is hard wired or plumbed to building utility systems such as a Scanning Electron Microscope, an air compressor, a printing press, some shop equipment such as a programmable milling machine, CNC equipment, wood-working equipment, powered cranes and other lift equipment, etc. It may even apply to equipment that can be 'unplugged' but may have energy potentially stored in the 'unplugged' equipment.

This program is applied prior to working on all types of equipment powered by one or more energy sources, or whenever an equipment guard is removed or safety interlock is bypassed, or whenever a person must place any part of their body into potentially-operating equipment.

***This program does NOT apply to:***

- Minor tool changes, adjustments, and other small service activities that take place during normal operations if they are routine, repetitive, and integral to the use of the equipment. *(Example: Changing a drill bit on a drill press.)*
- Equipment that is isolated and made safe by simply unplugging an electrical cord, compressed air hose, or some other single-source energy supply when the person working on the equipment has exclusive control over the connection to the energy source.

“Live Work” or “Hot Work” on equipment that cannot be shut down and locked-out / tagged-out is allowed by the program provided that:

1. Department management demonstrates that continuity of service is essential, and
2. Shutdown of the system is impractical, and
3. 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 criteria must be met before “Hot Work” is permitted by law. If they cannot be met, then EI-LOTO must be practiced. If the above criterion can be demonstrated by management, prior to conducting “Hot Work” contact EH&S/General Safety Team to review safe work procedures in order to assist in developing adequate safeguards and “Hot Work” processes.

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

*{CLICK ON ANY ENTRY IN THE TABLE OF CONTENTS TO BE TAKEN TO THAT SECTION OF THE PROGRAM.}*

## TABLE OF CONTENTS

### Contents

Purpose/Introduction.....	5
Applicability/Scope.....	5
Roles/Responsibilities.....	6
Faculty, Staff and any “Affected Person” .....	6
“Qualified Person”.....	6
Capital Projects / Construction Project Manager.....	6
Departments.....	6
Department Safety Coordinator (DSC) or Other Responsible Person .....	7
Principle Investigator / Project Supervisor / “Supervisor” .....	7
Contractors and Joint Projects.....	8
EH&S .....	9
Definitions.....	9
Methods of Locking Out Energy.....	10
Electricity .....	10
Compressed Air / Gasses / Hydraulic Fluids / Steam / Pressurized Water.....	11
Mechanical Energy.....	11
Program Requirements/Procedures.....	12
Owner Department Requirements: .....	12
Surveying Equipment’s Energy Disconnecting Means .....	12
New Facilities and Equipment:.....	12
Existing Facilities and Equipment: .....	13
Identifying & Labeling the Energy Disconnecting Means.....	13
Providing Locks, Blocks, & Accident Prevention Tags.....	13
Blocks, Blinds and Bleeds.....	15
Qualifying Personnel.....	16
Periodic Inspection / Annual Audit .....	17
EI-LOTO Practitioner Procedures: .....	17
Equipment-Specific Energy Isolation Procedures.....	17
Rules for Using Energy Isolation – LOTO Procedure .....	18
Standard EI-LOTO Procedure.....	18
Testing / Adjusting Equipment during Lockout .....	19
Restoring Equipment to Service.....	20
Joint Projects .....	20
Training Requirements.....	20
Owner Department’s Training Requirements.....	20
EI-LOTO Practitioner Training .....	21

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

Record Keeping Requirements .....	21
Record Retention Requirements.....	21
Training Records .....	21
EI-LOTO Specific Equipment Procedures.....	22
EH&S Requirements .....	22
References .....	22
Issued By and Next Review Date.....	23
Attachments.....	23
Attachment 1 - Equipment Inventory and EI-LOTO Audit Tracking Form .....	24
Attachment 2 – UC Santa Barbara - EI-LOTO “Equipment Specific” Procedure .....	26
Attachment 3 - EI-LOTO – Training Record of “Qualified Person”.....	30
Attachment 4 – Completed Example – Dual Cooling Tower EI-LOTO Procedure .....	32
Attachment 5 – Completed Example – Student Shop Wood Planer EI-LOTO Procedure.....	34
Attachment 6 – Completed Example – Student Shop CNC Router EI-LOTO Procedure.....	36
Attachment 7 – Completed Example – Research MRI Equipment EI-LOTO Procedure .....	38
Attachment 8 – Completed Example – Scanning Electron Microscope EI-LOTO Procedure....	40
Attachment 9 – Completed Example – Micro-Fab Assembly Robot EI-LOTO Procedure.....	42
Attachment 10 - EI-LOTO Program FAQ Fact Sheet .....	44

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

## Purpose/Introduction

The UC Santa Barbara Energy Isolation - Lockout/Tagout (EI-LOTO) Program requires campus, field station personnel and contractors to implement safe procedures when working on UCSB equipment or utility systems with one or more energy sources. Because of the potential for injury from energy sources that operate equipment / utility systems, this program guides safe installation, set-up, adjustment and maintenance work on equipment by [isolating energy sources prior to commencing work](#). Implementation of the program is required by Cal/OSHA safety regulations.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Applicability/Scope

This EI-LOTO Program is applied to ALL forms of potentially hazardous energy and is applied to every individual piece of equipment that has potentially hazardous energy. The types of energy needing to be isolated include the potential energy (mechanical springs in tension or compression, compressed gas cylinder, counter weights, etc.), kinetic energy (rotating flywheel, moving parts, rolling components, parked vehicles, etc.) and utility energy (electricity, compressed air, steam, domestic water, hydraulics, etc.) that may be part of a particular machine or utility system. Such equipment may include building mechanical systems such as HVAC and air handlers, some larger experimental equipment that is hard wired or plumbed to building utility systems such as a Scanning Electron Microscope, an air compressor, a printing press, some shop equipment such as a programmable milling machine, metal and/or wood-working equipment, powered cranes and other lift equipment, etc.

This program is applied prior to working on all types of equipment powered by one or more energy sources, or whenever an equipment guard is removed or safety interlock is bypassed, or whenever a person must place any part of their body into potentially-operating equipment.

This program does NOT apply to:

- Minor tool changes, adjustments, and other small service activities that take place during normal operations if they are routine, repetitive, and integral to the use of the equipment. (*Example: Changing a drill bit on a drill press.*)
- Equipment that is isolated and made safe by simply unplugging an electrical cord, compressed air hose, or some other single-source energy supply when the person working on the equipment has exclusive control over the connection to the energy source.

“Live Work” or “Hot Work” on equipment that cannot be shut down is allowed by the program provided that:

1. Department management demonstrates that continuity of service is essential, and
2. Shutdown of the system is impractical, and
3. 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.*)

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

All three of the above criterion *must be met* before “Hot Work” is permitted by law. If they cannot be met, then EI-LOTO must be practiced. If the above criterion can be demonstrated by management, prior to conducting “Hot Work” contact [EH&S Safety Engineering](#) to review safe work procedures in order to assist in developing adequate safeguards and “Hot Work” processes.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Roles/Responsibilities

### Faculty, Staff and any “Affected Person”

All Faculty, Staff and any “[Affected Person](#)” are made aware through the EH&S website that “No person ever touches or tries to actuate an energy source that has been ‘locked’ and/or ‘tagged’ in the ‘off’ position by someone else. And, never disturb a mechanical block that has been placed to prevent equipment movement by someone else.”

### “Qualified Person”

Faculty and staff who work on equipment affected by this program must be “[qualified](#)” to do so by their Supervisor and follow the [energy isolation procedures](#) outlined by this program. They must be [trained](#) on, and remain current to, its requirements and application through documented training. A “[Qualified Person](#)” may develop written equipment-specific energy isolation procedures by completing ‘[Attachment 2](#)’ of this program.

### Capital Projects / Construction Project Manager

For new construction, building retrofits and equipment installed by Capital Projects, the Project Manager ensures requirements of this program are integrated into project documentation; that [energy isolation surveys](#) of all affected building systems are completed and provided to the host department; and that [signage and labels](#) are installed on energy disconnects in compliance with this program. Requirements are detailed under “[Procedures – Administrative Requirements – Equipment Survey – New Facilities and Equipment](#)”.

### Departments

[Owner Departments](#) are responsible for identifying equipment that has single or multiple sources of energy for operation that fall under the energy isolation requirements of this program. Academic Departments that own / operate research and other equipment in existing buildings not under control of a “Facilities Maintenance” department must apply the EI-LOTO Program to their equipment. Every “Owner Department” must survey and is recommended to inventory all equipment owned by the Department that requires an equipment-specific EI-LOTO Procedure be developed. [Attachment 1](#) is a template an Owner Department may use to survey and inventory equipment requiring an equipment-specific EI-LOTO Procedure, and track Cal/OSHA-required annual audits of those procedures.

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

Departments must create, and provide for employee and contractor use, written EI-LOTO procedures for individual “location specific” pieces of equipment. [Attachment 2](#) of this program is a template used to develop individual EI-LOTO procedures for specific pieces of equipment.

Owner Departments must identify individuals who are “Qualified” to conduct energy isolation through a documented “Qualification” process. This process is documented using [Attachment 3](#) of the program. All [“Qualified” persons](#) must have documented training on this EI-LOTO Program. Departments may arrange with EH&S for personnel to receive documented [training](#) or may use another vendor for “Qualifying” personnel as long as the contents of this EI-LOTO Program are included in the training curriculum.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Department Safety Coordinator (DSC) or Other Responsible Person

The DSC or Other Responsible Person has [“Training”](#) and [“Record-keeping”](#) responsibilities as outlined in those sections of this program.

## Principle Investigator / Project Supervisor / “Supervisor”

The Principle Investigator / Project Supervisor / “Supervisor” must, or may delegate in writing a “Qualified Person” to:

1. Inform all faculty, staff, students, work personnel and/or hired-in Contractors working in the area, collectively known as [“Affected Persons”](#), of the existence of this program and its impact on their work area,
2. Ensure that their subordinates have had documented [training](#) concerning EI-LOTO at a level appropriate to the anticipated level of exposure to hazardous energy sources in their research / workplace.
3. Ensure that proper [labeling is applied to all disconnect locations](#) on specific equipment controlled by the department. Labeling activities may be conducted by the PI, Supervisor or Qualified Person, another department member under the leadership of this person, or by an outside contractor.
4. Determine safe [energy isolation procedures specific to equipment](#) to be worked on.
5. Conduct an [annual audit](#) of equipment-specific energy isolation procedures to ensure they are still accurate and appropriate to needed safe work practices.
6. Determine who is a [“Qualified Person”](#) that may work on the equipment.
7. Inform all “Qualified Person(s)” and / or the Contractor of any known energy sources on the equipment, any energy isolation procedure previously developed for the equipment, and any other known hazards associated with the equipment.
8. Conduct meetings that include review of energy isolation procedures for the equipment with all “Qualified Person(s)” prior to commencing work and at the beginning of each work shift.
9. Ensure the arriving shift supervisor is oriented by the departing shift supervisor as to the job status along with the arriving shift work crew prior to the arriving shift commencement of work.
10. Ensure the departing shift’s supervisor oversees that the arriving shift workers have put locks and tags on all energy sources before the earlier shift’s locks and tags are removed when multiple shifts work on the same equipment.

## UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

11. Contact EH&S for assistance in developing energy isolation procedures and providing training to subordinates and “Qualified Personnel” as needed.

For departments hiring Contractors to conduct work at UCSB, the Project Supervisor must be familiar with the [Contractor / Joint Projects Roles / Responsibilities](#). The Project Supervisor representing the department who owns the equipment is responsible for ensuring the Contractor has an EI-LOTO program and follows it. However, the Supervisor is not responsible for evaluating the Contractor’s EI-LOTO program. The Supervisor must make any previously developed EI-LOTO Procedure for the equipment available to the Contractor prior to start of work.

The Supervisor may also make this EI-LOTO program available to the Contractor for their information and use. The Project Supervisor may provide copies of [Attachment 2](#) to the Contractor to develop equipment-specific EI-LOTO procedures for that equipment as part of project activities and documentation of safe-work protocols. Any equipment-specific EI-LOTO procedures developed by the Contractor / Project Supervisor must be delivered to the Owner Department as part of the completed project documentation.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

### Contractors and Joint Projects

The Contractor follows their own EI-LOTO program when working on University property / equipment. The Contractor provides evidence of their EI-LOTO program to the University Project Supervisor / Manager upon request. The Contractor provides their own energy isolation equipment including locks, tags and hasps. The Contractor follows “Joint Project” requirements as outlined below.

If the Owner Department has previously developed equipment-specific EI-LOTO procedures for equipment the Contractor is working on, the Contractor follows the Department’s procedure. For equipment that has not previously had an EI-LOTO procedure developed, the Contractor surveys the equipment and develops a written EI-LOTO Procedure for it using [Attachment 2](#) of this program. A copy of the Contractor’s equipment-specific EI-LOTO procedure is provided to the Project Supervisor and EH&S Safety Engineering as part of completed-project documentation. As Contractor work progresses, the Contractor informs the Project Supervisor immediately of any newly discovered energy sources or potential hazards associated with the equipment.

For Joint Projects where employees of the University and Contractor(s) are working on the same equipment at the same time, the Project Supervisor, whether employed by the Contractor or University, must hold joint meetings with all personnel in attendance who will be working on the equipment to promote understanding of safe work practices, and open lines of communication between work crews.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)



# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

## EH&S

EH&S is responsible for:

- Writing and maintaining this program to meet or exceed Cal/OSHA requirements,
- Informing departments of this program's requirements,
- Providing general program awareness information across campus,
- Providing assistance for departments and personnel in implementation of this program,
- Providing training on program implementation and requirements to all affected personnel identified by each department,
- Providing an easy method for creation of equipment-specific EI-LOTO Procedures,
- Recommending energy isolation equipment and processes for general and / or specific use,
- Providing assistance in development of EI-LOTO Procedures,
- Providing safety engineering assistance to develop alternative safe-work procedures when “Hot Work” must be conducted instead of EI-LOTO, and
- Updating this program periodically or as regulatory change may dictate.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Definitions

**Affected Person** - A person who works near or on equipment upon which cleaning, repairing, servicing, setting-up or adjusting operations are performed under this EI-LOTO Program.

**Blind** – Another form of blocking is the placement of a blind. A blind is a disk of metal placed in a pipe to ensure that no air, steam, or other substance will pass through that point if the piping system is accidentally activated / pressurized.

**Blocked** – Equipment is “BLOCKED” by inserting a mechanical device to prevent inadvertent movement. Potential energy that may need to be blocked can come from suspended or rolling parts subject to movement or gravity, may be energy stored in springs, can cause movement due to air flow, etc. The “block” must be strong enough to support the entire load of the equipment components if the equipment moves. Blocks should have chain or some other means that can lock the block in place. Installing a wheel chock on a vehicle, a chain wrapped around a fan blade, or a steel bar inserted into the spokes of a fly-wheel are all examples of “blocks” used in EI-LOTO.

**De-energize / Disengage** – There is a difference between turning off a machine and actually disengaging or de-energizing a piece of equipment. When a control switch is turned off, the control circuit is off. However, there is still electrical energy at the switch, and a short in the switch or someone inadvertently turning on the machine may start the machine running again. In addition, control circuits may only control power relays on main power panels. Prior to maintaining, adjusting or repairing equipment, main power and control circuit power must be de-energized / disengaged. To de-energize / disengage equipment, the fuses / breakers must be removed or turned ‘off’ and the

## UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

electrical box containing the fuse / breaker locked shut. A knife switch disconnect locked in the ‘off’ position is also considered de-energized.

**Locked out / blocked out / blinded / bled** – means that any energy source is isolated in the “safe” position that prevents 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 atmosphere with the bleed-valves locked ‘open’, and/or valves or switches locked and piping blinded in an “off and safe” condition.

**Owner Department** – Any department that owns equipment that by its nature / design must have this EI-LOTO Program applied to the equipment for personnel to safely conduct modification, repair, adjustment, development or maintenance work on the equipment.

**Qualified Person** – A person who locks-out and/or tags-out specific machines or equipment in order to perform cleaning, repairing, servicing, setting-up, and adjusting operations on that machine or equipment. A “[Qualified Person](#)” must be approved as such by their Supervisor, trained on identifying and controlling hazardous energy as well as application of this program, provided energy isolation locks and tags, and be familiar with all equipment components prior to conducting work on equipment. A “Qualified Person” may develop written equipment-specific energy isolation procedures by completing ‘[Attachment 2](#)’ of this program. A person’s “Qualification” to conduct EI-LOTO is documented using [Attachment 3](#), and kept in a “Qualified Person’s” permanent employee file.

**Testing Equipment** – Once the equipment is locked, blocked and / or blinded, it must be TESTED to make sure the machinery is, in fact, de-energized prior to commencing work on the equipment.

**CAUTION:** Return disconnects and operating controls to the off position after each test.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Methods of Locking Out Energy

### Electricity

There are many different ways to lock out a piece of equipment. Commonly, the main electrical disconnect switch has one opening where a single lock can be placed. If more than one employee works on the equipment, a multiple-lock hasp suitable for the installation of several locks must be used, enabling all workers to lock out the machine with their individual locks. If the switches are in a metal box, the box itself must be locked out in the closed position. If a fuse was removed in order to de-energize the equipment, the fuse box must be locked. If the controls are in a metal-covered box, a common hasp can be welded or riveted to the door, along with a lock staple. Then the switch can be “opened” and the door closed and padlocked. Fuse boxes can also be locked in this way. In some equipment, an electric “control circuit” will actuate a main “power circuit”. In such situations, both circuits must be ‘locked and tagged’ out before safe-work can proceed. Capacitors must be safely discharged to ground with ground straps installed prior to working around, storing or

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

transporting them. Refer to the [UCSB Electrical Safety Program](#) appendix on the EH&S website for safe procedures to discharge and ground capacitors.



**Locks and Tags on Single and Multiple Electrical Breakers**

**Electrical Plug Lock Box**

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Compressed Air / Gasses / Hydraulic Fluids / Steam / Pressurized Water

Machines activated by compressed air or steam will have valves that control movement. These valves will need not only to be locked out, but also bled to release any residual pressure to atmosphere. Physically disconnect the equipment from the supply plumbing if possible. If not possible, use double valves or blind off supply lines with appropriate flange plates or pipe caps.



**Locked Comp. Air Line**

**Locked Globe Valve**

**Locked Gas Cylinder**

**Locked Gas Cylinder**

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Mechanical Energy

Block equipment components so they cannot move using support rods for counterweights or elevated components, a bar through spokes of a wheel, flywheel or fan blades, a wedge-shaped wheel-chalk for rolling components, wrapping and locking chains around a movable equipment component and locking it to an immovable object, etc.

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program



[Steering Wheel Locking Cover](#)



[Installing a Machine Block](#)



[Wheel Chock Prevents Rolling](#)

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Program Requirements/Procedures

### Owner Department Requirements:

#### Surveying Equipment's Energy Disconnecting Means

An initial survey of equipment specific to a department and/or work-project site is completed to identify all energy sources requiring isolation. This is done by physical inspection, possibly in combination with a study of building drawings and equipment manuals. Categorize the identification and labeling details as to the type of equipment supplied, its physical location, and energy type and magnitude.

#### **Example:**

*Air Compressor #1, Roof, HMF Building, Main Electrical - 50 Amps, 240 volts;3 phase; Control Electrical – 15 Amps 120 volts; 1½” discharge pipe - 300°F; Compressed Air 100 psi; Rotating 50 lbs. spoke flywheel on piston pump; V-belt drive.*

#### New Facilities and Equipment:

For new facilities or equipment being built or brought on line by a Project Manager, the requirements of this program are integrated into project documentation by use of project specifications. The Project Manager assures that energy isolation surveys are documented by completing Steps 1, 2, 3 and 4 of [Attachment 2](#) for each individual piece of equipment, and provides this completed documentation to EH&S and the host Department as part of project documentation. EH&S provides recommendations of PPE and Safety Equipment for Step 5 of the energy isolation procedure directly to the host Department. Completed energy isolation surveys are provided to the host Department. The Project Manager assures signage and labels are installed on energy disconnects in compliance with this program specification by the General Contractor.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

## Existing Facilities and Equipment:

For previously constructed facilities / equipment, an initial EI-LOTO equipment survey is conducted as location-need and equipment work arises. The EI-LOTO survey is completed by the owner department, owner of the equipment, by Facilities Maintenance personnel, or by a Contractor, whoever will be maintaining, repairing or adjusting the equipment needing energy isolation. This survey is documented by completing Steps 1 through 3 of [Attachment 2](#). Further completion of Steps 4 and 5 documents the complete procedure as [detailed elsewhere in this program](#).

Once each survey is complete, a list of all equipment requiring an EI-LOTO procedure and annual procedure audit is kept by the host department and made available to anyone requiring this information to conduct safe equipment-specific energy isolation work as needed for future reference / use. [Attachment 1](#) is a template that may be used for developing this Equipment List, and tracking annual audits.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Identifying & Labeling the Energy Disconnecting Means

For each piece of equipment identified, all energy sources must be determined and the corresponding disconnecting means must be appropriately marked indicating its function. Signs or stickers stating —“**LOCKOUT HERE**”— with accompanying information of the equipment being controlled at the disconnecting location must be installed to direct personnel to correct lockout devices. In complicated operations, schematics of just the disconnecting means may be developed by the Project Manager, EH&S or the Facilities Engineering department.



### Disconnect Panels with “Lockout Here” Label and Energy Isolation Information

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Providing Locks, Blocks, & Accident Prevention Tags

### **Locks**

Each worker has their own lock set and the only key to that lock set. These are provided to the worker by their Supervisor / Department. To maintain harmony with LBL facility requirements, it's suggested all locks be 'RED' in color to quickly identify locked / tagged energy sources. The locks are substantial and durable, and have the name of the employee or some other uniquely identifiable marking on them. In addition, locks may have a color-coded stripe to indicate different shifts, types

## UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

of crafts or lock owners. When more than one worker is servicing a piece of equipment that must be locked out, a lockout adaptor hasp is used which allows all the workers to place their locks on the disconnecting means. Each worker puts one of their locks on every isolation device prior to starting work on a machine. After the work is completed, each worker removes their lock(s) and the machine is then returned to service.



**Typical Locks and Hasps for use in Locking Out Equipment**



**Electrical Panels shown “Locked Out”**



**Piping shown “Locked Out”**

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Blocks, Blinds and Bleeds

Blocks are placed under raised dies, lifts, or any equipment that might inadvertently move by sliding, falling or rolling. Blocks, special brackets, or special stands such as those commonly used under raised vehicles, must be used. Before installing blinds or blocks, steam, air, or hydraulic lines are bled down to return the system to atmospheric pressure, then blinds / blocks are installed. Coiled springs, spring-loaded devices, or suspended loads are released so that their stored energy will not result in inadvertent movement. Bleed valves must be locked “open”.



**Blocking an Equipment Press**



**Pipe Blinding Flange**



**Support Stands used for Blocks**

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## ***Tags***

TAGS ARE NOT USED ALONE unless there is no method to safely isolate energy sources. Tags or signs are used in addition to locks. Tags or “tagout devices” are capable of enduring at least 50 pounds of pull. One tag is placed by the Project Manager or Lead Trades-person at each lockout location. Tags state the:

- Reason for the lockout.
- Name of the person(s) who is/are working on the equipment.
- How the person who placed the tag may be contacted.
- Date and time the tag was put in place.

## UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program



[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

### Qualifying Personnel

Only persons who are “Qualified” may conduct EI-LOTO processes. A person must be “Qualified” by their Supervisor when their duties include performing cleaning, repairing, servicing, setting-up and adjusting operations on equipment requiring Energy Isolation for safe work activities. The Supervisor determines their qualification based upon the Supervisor’s knowledge of the qualified person’s skills, and the energy sources on the equipment. All “Qualified Person(s)” must be trained as outlined in the “[Training](#)” section of this program, be provided appropriate tools to conduct Lockout/Tagout, and follow all procedures outlined in this program. Qualified Person(s) may conduct EI-LOTO to the degree of their documented qualification, develop energy isolation procedures and conduct annual audits on existing procedures as detailed below.

A “Qualified Person” is an individual formally recognized and documented as:

1. Having completed required classroom, trades or other training on EI-LOTO, and
2. Having sufficient understanding of EI-LOTO safe-work practices and equipment to be able to recognize and positively control any hazards that may be present, and
3. Possessing the work experience and formal training necessary to execute work according to recognized and accepted EI-LOTO safe-work practices, and
4. Having completed orientation to a specific equipment’s EI-LOTO procedure, or
5. Having developed and reviewed an EI-LOTO procedure for specific equipment that is subsequently reviewed and approved by another “Qualified Person” or their Supervisor.

A person may be considered “Qualified” with respect to certain equipment, certain types of energy sources, and certain safe-work methods on specific equipment, but not ‘Qualified’ for other equipment/locations within the same Department. It is the responsibility of the “Qualified Person’s” Supervisor to determine limitations of “Qualification” for each and every person working under their direction, and document this on the “Qualified Person’s” record by completing [Attachment 3](#) and maintaining a copy in the “Qualified Person’s” permanent file.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)



# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

## Periodic Inspection / Annual Audit

EH&S conducts annual audits of equipment-specific energy control procedure(s) developed by Departments to evaluate their continued effectiveness and determine necessity for updating the written procedure(s) or safety equipment. These inspections must:

1. Be performed by a “Qualified Person” not routinely ‘using’ the EI-LOTO procedure(s) being audited.
2. Identify the equipment upon which the EI-LOTO procedure was being utilized, the date of the audit, the “Affected Persons” and “Qualified Persons” who are impacted by the procedure being audited, and the person performing the audit.
3. Include a random interview(s) between the auditor and “Affected Persons” and “Qualified Persons” of their responsibilities under the EI-LOTO procedure being audited.
4. Physically audit signage and EI-LOTO locks, tags and other equipment.
5. Generate recommendations to the Department for procedure improvement or training as the audit may uncover.
6. Be documented by the Department that the audits have been performed on [Attachment 1](#) or a similar document.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## EI-LOTO Practitioner Procedures:

### Equipment-Specific Energy Isolation Procedures

Use the Energy Isolation Procedure template ([Attachment #2](#)) and complete Steps 1, 2 and 3 on the template to survey energy sources and their isolation points on specific equipment. Then, complete Steps 4 and 5 to prepare a written LOTO procedure sequence for that equipment for de-energizing, lockout, testing, and start-up of any equipment requiring energy isolation under this program. Always follow the [Rules for Using EI-LOTO Procedure](#), and other procedures outlined below unless other safer work procedures are developed for a specific piece of equipment.

When surveying and/or training for an equipment-specific EI-LOTO procedure:

1. All “Affected Persons” must understand what equipment EI- LOTO means, when the equipment in their work area will be “locked / tagged out”, and to never try to start equipment when locked / tagged out.
2. The “Supervisor” and “Qualified Person(s)” must be trained in this written procedure and fully knowledgeable of the hazardous energies related to the specific equipment.
3. “Qualified Person(s)” reassigned to different equipment must be trained on that specific equipment.

## UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program



**Equipment-Specific Energy Isolation Procedure shown in file on front of Equipment Control Panel.**

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

### Rules for Using Energy Isolation – LOTO Procedure

Several basic safety rules are applied during every EI-LOTO situation. These are:

1. Only “Qualified Persons” may work on, or practice, EI-LOTO on equipment.
2. All equipment must be blocked and locked out to protect against accidental or inadvertent operation when such operation could cause injury to personnel.
3. Never attempt to operate any switch, valve, or other energy isolating device bearing a lock.
4. Never remove a blocking device until all personnel, tools and obstructions have been cleared from the area, and all equipment guards have been properly reinstalled.
5. If the equipment or system must remain energized during work, contact [EH&S Safety Engineering](#) to assist in developing adequate alternative hazard control measures, such as the use of suitable temporary barriers, special tools and personal protective equipment.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

### Standard EI-LOTO Procedure

1. All maintenance personnel are issued a suitable lock (or locks for multiple energy sources). Each lock has the individual worker’s name or other identification on it. Each worker has the only key to the lock / lock set.
2. The Qualified Person checks to be sure that no one is operating the machinery BEFORE turning off energy sources. All persons in the area, and especially the machine operator and project supervisor, are informed before the energy sources are being turned off because unexpected sudden loss of power could cause an accident.

## UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

3. Steam, air, and hydraulic piping or tanks must be bled, drained, and/or brought to atmospheric pressure and locked “open” to assure no pressure or vacuum in piping or in reservoir tanks.
4. Gas cylinders must be locked ‘closed’ and if possible disconnected from distribution piping.
5. Any mechanical component that could roll, shift or otherwise move, such as springs, counterweights, wheels, fan blades, etc. must be chained, barred or blocked.
6. Each person who will be working on the machinery must put a lock on each of the machine’s lockout device(s). Each lock must remain on the machine until the work is completed. Only the worker who placed the lock may remove their lock.
7. The Supervisor or “Qualified Person” places a tag on each lock-out location.
8. All energy sources which could activate the machine must be locked or blocked out following an equipment-specific EI-LOTO Procedure developed for that equipment. ([Attachment 2](#), Page 1)
9. All disconnects must be tested to ensure that all energy sources to the machine are off.
10. Electrical circuits must be checked by qualified persons with proper and calibrated electrical testing equipment. Stored energy in electrical capacitors must be safely discharged.
11. CAUTION: Return disconnects and operating controls to the “off” position after each test.
12. Attach accident prevention [tags](#) which give the reason for placing the lock/tag, the name of the person placing the lock/tag, how they may be contacted, and the date and time the lock/tag was placed.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

### Testing / Adjusting Equipment during Lockout

In many maintenance and repair operations, machinery must be tested and therefore energized before additional maintenance work can be performed. For such situations, this procedure must be followed:

1. Clear all personnel to safety.
2. Clear away tools and materials from equipment.
3. Remove blocks and lockout devices and re-energize systems, following the established safe procedure.
4. Proceed with tryout or test.
5. Shut off all energy sources reinstalling lockouts on energy sources, reinstall blocks, bleed all pressure systems and verify all energy sources de-energized prior to continuing work.

Equipment design and performance limitations may dictate that effective alternative worker protection be provided when the established lockout procedure is not feasible. If machinery must be capable of movement in order to perform a maintenance task, workers must use extension tools, personal protective equipment and other means to protect themselves from moving parts and potential injury.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

## Restoring Equipment to Service

After the work is completed and the equipment is ready to be returned to normal operation, this procedure must be followed:

1. Remove all non-essential items.
2. See that all equipment components are operationally intact, including reinstalling guards and safety devices.
3. Repair or replace defective guards before removing locks.
4. Remove each lockout device using the correct removal sequence.
5. Make a visual check before restoring energy to ensure that everyone is physically clear of the equipment.

Each lock is removed by the qualified person that applied it, or under his/her direct supervision. If the qualified person is absent from the work place then the lock or tag can be removed by a qualified person designated to perform this task provided that the immediate supervisor:

1. Verifies that the qualified person is not present and therefore unable to remove the lock;
2. Makes all reasonable efforts to inform the qualified person that the lockout/tagout device has been removed; and
3. Ensures that the qualified person knows their lockout/tagout device has been removed before their work resumes.

Finally, notify any “Affected Person(s)” that equipment has been restored to its operational state.

## Joint Projects

If University personnel and contractor personnel are working on the same piece of equipment, each work team installs their own hasp and locks on each energy source. The University provides the hasps that University personnel install their locks on, and the Contractor provides their hasps and locks that their personnel install / use.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Training Requirements

All persons identified in the “[Roles / Responsibilities](#)” section of this program must receive documented training on their required work practices and responsibilities in application of this program. Update training on this program is given whenever this program changes, if it’s application to specific equipment changes, or if [Owner Department](#) operations or equipment / energy hazards change such that personnel must have retraining to conduct safe work. All training is documented with, at minimum, an attendance roster signed by each trained employee, and some reference to the content / syllabus of the training provided.

## Owner Department’s Training Requirements

Departments identify “[Qualified Person\(s\)](#)” requiring training, and initiate training either through their enrollment in the UC Santa Barbara Learning Center on the EH&S website, or by phoning EH&S/General Safety Team @ (805) 893-5407) and arranging for training to occur. Initial training

## UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

is given within 3 months of program adoption for all current personnel, and within one month upon new hire via the Learning Center website and/or Department-provided training program.

Program Administrators are trained on their roles and responsibilities in the management/maintenance of the requirements outlined in the “[Roles / Responsibilities](#)” section of this program.

### EI-LOTO Practitioner Training

A “[Qualified Person](#)” must be trained on how to apply EI-LOTO properly to all equipment they are expected to work on commensurate with their general knowledge and skill level. They must be trained on the contents of this program, and how this program is applied specifically to an Owner Department’s equipment.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

### Record Keeping Requirements

An Owner Department’s DSC, or the EI-LOTO Program manager for the department, keeps training / qualification records of all department personnel trained on this program. Training records include the name of the person trained, date of training, an outline of training content, and a signature of the trained individual. Training and qualification to conduct EI-LOTO activities are documented on [Attachment 3](#) and kept in the person’s permanent file for the duration of the person’s employment / authorization at UCSB plus 3 years.

The DSC / Program Manager may keep an up-to-date Equipment Inventory and LOTO Procedure Audit Tracking List ([Attachment 1](#)) of all department-controlled equipment that falls under requirements of this program. Inventory lists are made available for review by EH&S, regulatory agencies, and use by Facilities Maintenance departments and/or other departments and/or contractors who may need access to the list for planning and training of safe work practices.

The DSC / Program Manager provides blank templates of equipment-specific EI-LOTO Procedure ([Attachment 2](#)) to “Qualified Person(s)” within the Department for documenting EI-LOTO Procedures, and may also provide this template to Contractors conducting work for the Department. Hard copies of completed equipment-specific EI-LOTO Procedures are kept on file at the equipment, and by the DSC / Program Manager, with electronic copies provided to EH&S for inclusion in a campus EI-LOTO Procedure library. The DSC / Program Manager also provides a completed EI-LOTO Procedure for a specific piece of equipment to any UCSB staff, personnel or Contractor conducting work on or around such equipment upon request.

### Record Retention Requirements

#### Training Records

Retain records for ten years after the person has retired or left University employment.

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

## EI-LOTO Specific Equipment Procedures

EI-LOTO procedures developed must be kept by the Owner Department for as long as the equipment is in service, and may be archived once the equipment has been removed from service.

## EH&S Requirements

EH&S retains indefinitely the following:

- Records of annual EI-LOTO equipment-specific procedure audits.
- Records of EI-LOTO Program training provided by EH&S and other entities.
- Historical documents and revisions EI-LOTO Program.

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## References

**EH&S/General Safety Team Phone:** (805)893-5407 or <http://ehs.ucsb.edu/>

**EI-LOTO Program Manager:** John Seaman, *Campus General Safety Supervisor*  
**Phone:** 805-893-5288  
**Email:** [john.seaman@ehs.ucsb.edu](mailto:john.seaman@ehs.ucsb.edu)

The following Title 8 Cal/OSHA codes are referenced in this program:

- 2320.4. De-energized Equipment or Systems. [http://www.dir.ca.gov/title8/2320\\_4.html](http://www.dir.ca.gov/title8/2320_4.html)
- 2320.5. Energizing (Re-energizing) Equipment or Systems. [http://www.dir.ca.gov/title8/2320\\_5.html](http://www.dir.ca.gov/title8/2320_5.html)
- 2320.6. Accident Prevention Tags. [http://www.dir.ca.gov/title8/2320\\_6.html](http://www.dir.ca.gov/title8/2320_6.html)
- 2530.43. Automatic Restarting. [http://www.dir.ca.gov/title8/2530\\_43.html](http://www.dir.ca.gov/title8/2530_43.html)
- 2530.86. Motor Not in Sight from Controller. [http://www.dir.ca.gov/title8/2530\\_86.html](http://www.dir.ca.gov/title8/2530_86.html)
- 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>
- 6004. Accident Prevention Tag <http://www.dir.ca.gov/title8/6004.html>

# UCSB – Energy Isolation Lock-out Tag-out (EI-LOTO) Program

- Requirements for working on energized electrical systems are prescribed in Sections 2320.9 and 2940 of the California General Industry Electrical Code.
  - 2320.9 [http://www.dir.ca.gov/title8/2320\\_9.html](http://www.dir.ca.gov/title8/2320_9.html)
  - 2940 <http://www.dir.ca.gov/title8/2940.html>

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Issued By and Next Review Date

**Issued by:** John Seaman, *Campus General Safety Supervisor*  
**Issue Date:** July 1, 2016.  
**Review Date:** Three years from Issue Date.

## Attachments

- [Attachment 1](#) - Template – Equipment Inventory and EI-LOTO Audit / Tracking Log
- [Attachment 2](#) - Template – Energy Isolation – EI-LOTO Equipment Specific Procedure
- [Attachment 3](#) - Template – Training Record and Authorization of Personnel
- [Attachment 4](#) – Example EI-LOTO Procedure - Dual Cooling Tower
- [Attachment 5](#) – Example EI-LOTO Procedure – Student Shop Wood Planer
- [Attachment 6](#) – Example EI-LOTO Procedure – Student Shop CNC Router
- [Attachment 7](#) – Example EI-LOTO Procedure - Research MRI under development
- [Attachment 8](#) – Example EI-LOTO Procedure - Scanning Electron Microscope
- [Attachment 9](#) – Example EI-LOTO Procedure – Micro-Fab Assembly Robot
- [Attachment 10](#) – FAQ Fact Sheet for EI-LOTO Program

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

# Attachment 1 - Equipment Inventory and EI-LOTO Audit Tracking Form

Department List

**Instructions:** This form may be used by Departments / DSCs to inventory all their equipment requiring an Energy Isolation – LOTO procedure. Prior to conducting Energy Isolation activities on equipment, Cal/OSHA requires that an initial survey of all energy sources to the equipment must be conducted. This must be done by physical inspection, possibly in combination with a study of drawings and equipment manuals. This survey may be conducted by a “Qualified Person” in a department, Facilities Maintenance, EH&S, or a Contractor who will be working on the equipment, and documented on [Attachment 2](#), Steps 1 - 3. Procedures are developed by completing Attachment 2 Steps 4 and 5, and then applying standard energy isolation process steps specific to equipment. To track equipment in the program, enter equipment inventory and energy supply data as shown. Note the date when the Attachment 2 procedure was completed and include initials of the Qualified Person who completed the procedure. Note date when the Attachment 2 procedure was audited by a Qualified Person and include initials of auditor. All procedures must be audited at least annually by law.

<u>Equipment Name</u>	<u>Location</u>	<u>Energy Sources</u>	<u>Magnitude</u>	<u>Procedure Date</u> <u>Initials</u>	<u>Audit Date</u> <u>Initials</u>
<i>Example: Piston Air Compressor #3</i>	<i>Level 1, Machine Room Hildebrandt Hall</i>	<i>Electricity Compressed air Heat Rotating Equipment</i>	<i>3 Phase, 50 Amps, 480 volts 120 psi tank / piping Manifold 220 degrees F 50 lbs. flywheel and belts</i>	<i>4/15/10 JNG</i>	<i>4/05/11 GWB</i>
<i>Example: Vacuum Vane Pump #1</i>	<i>Level B2, Machine Room Stanley Hall</i>	<i>Electricity – Main Electricity – Control Vacuum Domestic Water Rotating Equipment Heat</i>	<i>3 Phase, 30 Amps, 480 volts 1 Phase, 15 Amps, 120 volts 24 Hg” tank / piping 80 psi. Pump-motor coupler Exhaust Pipe 190 degrees F</i>	<i>3/6/09 RBW</i>	<i>2/28/10 GWB</i>

(over)

YEAR: \_\_\_\_\_ DSC NAME: \_\_\_\_\_ PAGE \_\_\_\_ OF \_\_\_\_





## Attachment 2 – UC Santa Barbara - EI-LOTO “Equipment Specific” Procedure

Equip. Name: \_\_\_\_\_ Building: \_\_\_\_\_ Location / Room Number: \_\_\_\_\_

<b>Describe scope of work here:</b>	<b>Instructions:</b> <i>Follow the steps to create a written sequence for de-energizing, lockout, testing, and start-up of equipment requiring energy isolation. Use completed procedure for safety meetings / training for the equipment-specific lockout process. Discuss with workers how equipment energy isolation – LOTO is applied to this specific equipment during these planned job / tasks. Also, discuss communication methods on the job site.</i>
-------------------------------------	---

<b>Step 1 - Survey and Check off [X] all Energ Sources</b>	<b>Step 2 – Note Magnitude and type of each energ source</b>	<b>Step 3 – Note Device and Location of each energy disconnecting / isolation source / method.</b>
--	--	--

	1: ENERGY SOURCE	2: MAGNITUDE / TYPE	3: ISOLATION DEVICE / LOCATION / METHOD
<input type="checkbox"/>	ELECTRICITY– Main power	Amps:    Volts:    # Phase:	
<input type="checkbox"/>	ELECTRICITY– Control circuit(s)	Amps:    Volts:    # Phase:	
<input type="checkbox"/>	BATTERY / SOLAR / ALT POWER AC/DC/PH:	Amps:    Volts:	
<input type="checkbox"/>	COMPRESSED AIR / GASES	PSI:        Gas Type:	
<input type="checkbox"/>	STEAM / CONDENSATE	PSI:        Source:	
<input type="checkbox"/>	FLUID UNDER PRESSURE	PSI:        Source:	
<input type="checkbox"/>	HEAT / COLD +/- C° <u>or</u> +/- F°	Temp:      Source:	
<input type="checkbox"/>	VACUUM CHAMBER / PIPING	Hg”:        Source:	
<input type="checkbox"/>	FUEL(S) - SOLID / LIQUID / GAS	Volume:      Fuel:	
<input type="checkbox"/>	ROTATING WHEEL / FAN / DRIVE	Details:	
<input type="checkbox"/>	SUSPENDED WEIGHT	Details:	
<input type="checkbox"/>	MECHANICAL OTHER:	Details:	

<b>Step 4 – List sequence of Energy Isolation Number 1 un to 12</b>	<b>Instructions continued:</b> <i>Isolate energy sources in sequence. Assure each worker installs their own lock on each disconnect location. Supervisor/Authorized Person installs warning tags. Verify Energy Isolation prior to starting work. When testing / jogging equipment, follow program procedures on the back of this form. When restoring equipment to operation, reverse isolation sequence unless otherwise discussed / approved by the Project Supervisor. Use Personal Protective Equipment and safety equipment as noted below during work activities. Contact EH&amp;S for technical support and special concerns at 510-642-3073.</i>
---	---

**Step 5 – Check off [X] and circle all PPE and safety equipment to be used for Energy Isolation.**

- |  |   |
|--|---|
| <p><b><u>PPE to be worn during work</u></b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> GOGGLES / FACE SHIELD / WELD GEAR</li> <li><input type="checkbox"/> BOOTS – STEEL TOE / RUBBER / OTHER</li> <li><input type="checkbox"/> GLOVES – LEATHER / RUBBER / INSULATED</li> <li><input type="checkbox"/> SAFETY HARNESS / LANYARD &amp; LINE</li> <li><input type="checkbox"/> RESPIRATOR – DUST / CHEMICAL</li> <li><input type="checkbox"/> THERMAL – HEAT / COLD PROTECTION</li> <li><input type="checkbox"/> APRON / WET GEAR / OTHER</li> </ul> | <p><b><u>Safety Equipment to be used during work</u></b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> FIRE EXTINGUISHER / FIRE WATCHER</li> <li><input type="checkbox"/> LINES BLINDED &amp; TAGGED</li> <li><input type="checkbox"/> VALVES / SWITCHES - LOCKED &amp; TAGGED</li> <li><input type="checkbox"/> REMOVE FLAMMABLES / COMBUSTIBLES</li> <li><input type="checkbox"/> BLEEDERS LOCKED OPEN &amp; TAGGED</li> <li><input type="checkbox"/> SHIELDS – ARC CURTAIN / HEAT BLANKET</li> <li><input type="checkbox"/> BLOCKS / BARS / BARRICADES / CHAINS</li> </ul> |
|--|---|

OTHER: \_\_\_\_\_  TOOLS - LONG HANDLE / INSULATED

PROCEDURE PREPARED BY: 

(PRINT NAME)

\_\_\_\_\_  
SIGNATURE / DATE

---

ANNUAL REVIEW COMPLETED BY:

(PRINT NAME)

\_\_\_\_\_  
SIGNATURE / DATE

---

**Instructions continued:** Isolate energy sources in sequence. Assure each worker installs their own lock on each disconnect location. Supervisor/Authorized Person installs warning tags. Verify Energy Isolation prior to starting work. When testing / jogging equipment, follow program procedures on the back of this form. When restoring equipment to operation, reverse isolation sequence unless otherwise discussed / approved by the Project Supervisor. Use Personal Protective Equipment and safety equipment as noted below during work activities.

# UCSB EI-LOTO program- EI-LOTO “Equipment Specific” Procedure

## Standard EI-LOTO Procedure

1. All maintenance personnel are issued a suitable lock (or locks for multiple energy sources). Each lock has the individual worker's name or other identification on it. Each worker has the only key to the lock / lock set.
2. The Qualified Person checks to be sure that no one is operating the machinery BEFORE turning off energy sources. All persons in the area, and especially the machine operator and project supervisor, are informed before the energy sources are being turned off because unexpected sudden loss of power could cause an accident.
3. Steam, air, and hydraulic piping or tanks must be bled, drained, and/or brought to atmospheric pressure and locked “open” to assure no pressure or vacuum in piping or in reservoir tanks.
4. Gas cylinders must be locked ‘closed’ and if possible disconnected from distribution piping.
5. Any mechanical component that could roll, shift or otherwise move, such as springs, counterweights, wheels, fan blades, etc. must be chained, barred or blocked.
6. Each person who will be working on the machinery must put a lock on each of the machine's lockout device(s). Each lock must remain on the machine until the work is completed. Only the worker who placed the lock may remove their lock.
7. The Supervisor or “Qualified Person” places a tag on each lock-out location.
8. All energy sources which could activate the machine must be locked or blocked out following an equipment-specific EI-LOTO Procedure developed for that equipment. (Other side)
9. All disconnects must be tested to ensure that all energy sources to the machine are off.
10. Electrical circuits must be checked by qualified persons with proper and calibrated electrical testing equipment. Stored energy in electrical capacitors must be safely discharged.
11. CAUTION: Return disconnects and operating controls to the “off” position after each test.
12. Attach accident prevention tags which give the reason for placing the lock/tag, the name of the person placing the lock/tag, how they may be contacted, and the date and time the lock/tag was placed.

## Testing / Adjusting Equipment during Lockout

In many maintenance and repair operations, machinery must be tested and therefore energized before additional maintenance work can be performed. For such situations, this procedure must be followed:

1. Clear all personnel to safety.
2. Clear away tools and materials from equipment.
3. Remove blocks and lockout devices and re-energize systems, following the established safe procedure.
4. Proceed with tryout or test.
5. Shut off all energy sources reinstalling lockouts on energy sources, reinstall blocks, bleed all pressure systems and verify all energy sources de-energized prior to continuing work.

Equipment design and performance limitations may dictate that effective alternative worker protection be provided when the established lockout procedure is not feasible. If machinery must be capable of movement in order to perform a maintenance task, workers must use extension tools, personal protective equipment and other means to protect themselves from moving parts and potential injury.

## Restoring Equipment to Service

After the work is completed and the equipment is ready to be returned to normal operation, this procedure must be followed:

1. Remove all non-essential items.
2. See that all equipment components are operationally intact, including reinstalling guards and safety devices.
3. Repair or replace defective guards before removing locks.
4. Remove each lockout device using the correct removal sequence.
5. Make a visual check before restoring energy to ensure that everyone is physically clear of the equipment.

Each lock is removed by the qualified person that applied it, or under his/her direct supervision. If the qualified person is absent from the work place then the lock or tag can be removed by a qualified person designated to perform this task provided that the immediate supervisor:

1. Verifies that the qualified person is not present and therefore unable to remove the lock;
2. Makes all reasonable efforts to inform the qualified person that the lockout/tagout device has been removed; and
3. Ensures that the qualified person knows their lockout/tagout device has been removed before their work resumes.

Finally, notify any “Affected Person(s)” that equipment has been restored to its operational state.

## Joint Projects

If University personnel and contractor personnel are working on the same piece of equipment, each work team installs their own hasp and locks on each energy source. The University provides the hasps that University personnel install their locks on, and the Contractor provides their hasps and locks that their personnel install / use.

## UCSB EI-LOTO program- EI-LOTO “Equipment Specific” Procedure

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

### Attachment 3 - EI-LOTO – Training Record of “Qualified Person”

To: Personnel File for \_\_\_\_\_  
(Employee name – please print)

From: \_\_\_\_\_ Date: \_\_\_\_\_  
(PI / Supervisor name – please print)

TO BE COMPLETED BY THE PI / SUPERVISOR OF THE “QUALIFIED PERSON” conducting Energy Isolation – Lockout/Tagout work:

Re: This document confirms required Qualification of the above named person to perform:  
(Check all that apply) (Attach additional pages if more space is needed)

- Energy Isolation operations and work on the following equipment / locations:
  - All locations and equipment under my supervision
  - All locations and equipment in our Department’s jurisdiction
  - All locations and equipment as this person’s job duties may dictate
  - Specific equipment / locations as listed: \_\_\_\_\_

- Energy Isolation work with the following energy sources (check all that apply):
  - All Energy Sources below
  - Compressed Air  Other Compressed Gases \_\_\_\_\_
  - Cryogenic Fluids / Gases
  - Electricity (<50 volts)  Electricity (50 – 600 Volts)  Electricity (>600 volts)
  - Flammable materials  Flammable gases  Flammable fluids  Flammable solids
  - Fluids under pressure  Hydraulic systems (<150 psi)  Hydraulic systems (>150psi)
  - Hot Fluids / Gases  Steam
  - Mechanical Equipment – Springs / Counterweights / Fly Wheels / Fan Blades / Blocks
  - Other (describe): \_\_\_\_\_

This designation of “Qualified Person” is based on evidence of safe performance of all duties related to Energy Isolation through: (Check all that apply)

- Training on UCB EI-LOTO program conducted (including any skill checks or tests).
- Experience – This person has been safely performing, and has demonstrated skill in safe Energy Isolation procedures, for \_\_\_\_\_ years (minimum of five years).
- Instruction – This person has received instruction from me or another person who is authorized in Energy Isolation, and who has observed this person’s work while performing Energy Isolation operations, and confirms that the above named person has the knowledge and skills to perform Energy Isolation work safely.

If, for any reason, as their supervisor, I think that this person is not performing work safely, this qualification will be revoked. Below are signature(s) of person(s) verifying training and/or experience:

PI / Supervisor Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Qualified Person’s Signature \_\_\_\_\_ Date: \_\_\_\_\_

CC: PI / Supervisor file;  
Qualified Person’s Permanent File;  
DSC / EI-LOTO Program Manager file

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Attachment 4 – Completed Example – Dual Cooling Tower EI-LOTO Procedure

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

Equip. Name: COOLING TOWER Building: BANCROFT LIBRARY Location / Room Number: ROOF

**Describe scope of work here:**

Maintenance for cooling towers 1 and 2 including drive-belt replacement, cleaning, lubrication, testing and tightening of all electrical / mechanical / plumbing system components.

**Instructions:** Follow the steps to create a written sequence for de-energizing, lockout, testing, and start-up of equipment requiring energy isolation. Use completed procedure for safety meetings / training for the equipment-specific lockout process. Discuss with workers how equipment energy isolation – LOTO is applied to this specific equipment during these planned job / tasks. Also, discuss communication methods on the job site.

**Step 1 - Survey and Check off [X] all Energ Sources**

**Step 2 – Note Magnitude and type of each energ source**

**Step 3 – Note Device and Location of each energy disconnecting / isolation source / method.**

		1: ENERGY SOURCE	2: MAGNITUDE / TYPE	3: ISOLATION DEVICE / LOCATION / METHOD
X	1	ELECTRICITY– Main power	Amps: 20 Volts: 480 # Phase:3	CT-Fan Motor 1 and CT Fan Motor 2 – Knife Switches - West Wall
X	2	ELECTRICITY– Control circuit(s)	Amps: 20 Volts: 120 # Phase: 1	Panel # RLA, Breaker # 6.
X	3	BATTERY/SOLAR or ALT. SYSTEMS [Make-up Water Pumps]	Amps: 15 Volts: 480 # Phase: 3	CWP1 and CWP2 – Knife Switches – SE Wall
		COMPRESSED AIR / GASES	PSI:      Gas Type:	
		STEAM / CONDENSATE	PSI:      Source:	
X	4	FLUID UNDER PRESSURE	PSI: 60      Source: Dom. H2O	1" copper ball-valve each CT – Shut off valve and open drain plug.
		HEAT / COLD +/- C° <u>or</u> +/- F°	Temp:      Source:	Chem Feed Pumps - (2) ¾" globe valves in & out. Normal op's at 150PSI.
		VACUUM CHAMBER / PIPING	Hg":      Source:	Note: Bleed Chemical Feed pumps to atmosphere before work.
		FUEL(S) - SOLID / LIQUID / GAS	Volume:      Fuel:	
X	6	ROTATING WHEEL / FAN / DRIVE	Details: Fan Blades	Use 6' chain and wrap / attach to frame member to prevent movement.
		SUSPENDED WEIGHT	Details:	
X	5	MECH. OTHER: H2O Qual. Controller	Details: 120 VAC, 20 Amps	Panel # RLA. Breaker # TBD.

**Instructions continued:** Isolate energy sources in sequence. Assure each worker installs their own lock on each disconnect location. Supervisor/Authorized Person installs warning tags. Verify Energy Isolation prior to starting work. When testing / jogging equipment, follow program procedures on the back of this form. When restoring equipment to operation, reverse isolation sequence unless otherwise discussed / approved by the Project Supervisor. Use Personal Protective Equipment and safety equipment as noted below during work activities. Contact EH&S for technical support and special concerns at 510-642-3073.

**Step 5 – Check off [X] and circle all PPE and safety equipment to be used for Energy Isolation.**

**PPE to be worn during work**

- GOGGLES / FACE SHIELD / WELD GEAR
- BOOTS – STEEL TOE / RUBBER / OTHER
- GLOVES – LEATHER / RUBBER / INSULATED
- SAFETY HARNESS / LANYARD & LINE
- RESPIRATOR – DUST / CHEMICAL

**Safety Equipment to be used during work**

- FIRE EXTINGUISHER / FIRE WATCHER
- LINES BLINDED & TAGGED
- VALVES / SWITCHES / LOCKED & TAGGED
- REMOVE FLAMMABLES / COMBUSTIBLES
- BLEEDERS LOCKED OPEN & TAGGED



THERMAL – HEAT / COLD PROTECTION  
 APRON, WET GEAR / OTHER  
 OTHER: \_\_\_\_\_

SHIELDS – ARC CURTAIN / HEAT BLANKET  
 BLOCKS, BARS / BARRICADES / CHAINS  
 TOOLS - LONG HANDLE / INSULATED

PROCEDURE PREPARED BY:

\_\_\_\_\_  
Jim Jackson / Jim Gilson 10/21/11  
(PRINT NAME)

SIGNATURE / DATE

ANNUAL REVIEW COMPLETED BY:

\_\_\_\_\_  
(PRINT NAME)  
SIGNATURE / DATE

**Instructions continued:** Isolate energy sources in sequence. Assure each worker installs their own lock on each disconnect location. Supervisor/Authorized Person installs warning tags. Verify Energy Isolation prior to starting work. When testing / jogging equipment, follow program procedures on the back of this form. When restoring equipment to operation, reverse isolation sequence unless otherwise discussed / approved by the Project Supervisor. Use Personal Protective Equipment and safety equipment as noted below during work activities.

**Attachment 5 – Completed Example – Student Shop Wood Planer EI-LOTO Procedure**

## Attachment 2 – UC Berkeley - EI-LOTO “Equipment Specific” Procedure

Equip. Name: WOOD PLANER Building: STUDENT SHOP Location / Room Number: WURSTER 290

Describe scope of work here:

CLEARING JAMS & GENERAL MAINTENANCE

**Instructions:** Follow the steps to create a written sequence for de-energizing, lockout, testing, and start-up of equipment requiring energy isolation. Use completed procedures for safety meetings / training for the equipment-specific lockout process. Discuss with workers how equipment energy isolation – LOTO is applied to this specific equipment during these planned job / tasks. Also, discuss communication methods on the job site.

**Step 1 - Survey and Check off [X] all Energy Sources**

**Step 2 – Note Magnitude and type of each energy source**

**Step 3 – Note Device and Location of each energy disconnecting / isolation source / method.**

	1: ENERGY SOURCE	2: MAGNITUDE / TYPE	3: ISOLATION DEVICE / LOCATION / METHOD
<input checked="" type="checkbox"/>	ELECTRICITY– Main power	Amps: <u>40</u> Volts: <u>240</u> # Phase: <u>3</u>	<u>PANEL #2 - SOUTH WALL; BREAKERS 6, 8, 10</u>
<input checked="" type="checkbox"/>	ELECTRICITY– Control circuit(s)	Amps: <u>20</u> Volts: <u>240</u> # Phase: <u>3</u>	<u>FLOOR PLUG - TWIST LOCK RIGHT SIDE</u>
	BATTERY / SOLAR / ALT POWER AC/DC/PH:	Amps:    Volts:	
	COMPRESSED AIR / GASES	PSI:        Gas Type:	[EXAMPLE ONLY]
	STEAM / CONDENSATE	PSI:        Source:	
	FLUID UNDER PRESSURE	PSI:        Source:	
	HEAT / COLD +1- C° or +1- F°	Temp:      Source:	
	VACUUM CHAMBER / PIPING	Hg":        Source:	
	FUEL(S) - SOLID / LIQUID / GAS	Volume:    Fuel:	<u>ENGAGE HAND BRAKE ON LEFT SIDE OF MACHINE</u>
<input checked="" type="checkbox"/>	ROTATING WHEEL / FAN / DRIVE	Details: <u>PLANNER MOTOR</u>	<u>ROTATING - PLANNER HEAD -- 3600 RPH MOTOR DRIVE</u>
	SUSPENDED WEIGHT	Details: <u>FEED MOTOR</u>	<u>GEAR BOX &amp; DRIVE SHAFTS/ROLLERS - 1800 RPH MOTOR</u>
<input checked="" type="checkbox"/>	MECHANICAL OTHER:	Details: <u>PINCH POINTS</u>	<u>USE SACRIFICIAL / PUSH STICK TO CLEAR JAMS</u>

**Step 4 – List sequence of Energy Isolation Number 1 up to 12**

**Instructions continued:** Isolate energy sources in sequence. Assure each worker installs their own lock on each disconnect location. Supervisor/Authorized Person installs warning tags. Verify Energy Isolation prior to starting work. When testing / jogging equipment, follow program procedures on the back of this form. When restoring equipment to operation, reverse isolation sequence unless otherwise discussed / approved by the Project Supervisor. Use Personal Protective Equipment and safety equipment as noted below during work activities. Contact EH&S for technical support and special concerns at 510-642-3073.

**Step 5 – Check off [X] and circle all PPE and safety equipment to be used for Energy Isolation.**

- PPE to be worn during work**
- GOGGLES / FACE SHIELD / WELD GEAR
  - BOOTS – STEEL TOE / RUBBER / OTHER
  - GLOVES – (LEATHER) RUBBER / INSULATED
  - SAFETY HARNESS / LANYARD & LINE
  - RESPIRATOR – DUST / CHEMICAL
  - THERMAL – HEAT / COLD PROTECTION
  - APRON / WET GEAR / OTHER
  - OTHER: SACRIFICIAL WOOD STICKS

- Safety Equipment to be used during work**
- FIRE EXTINGUISHER / FIRE WATCHER
  - LINES BLINDED & TAGGED
  - VALVES / SWITCHES - LOCKED & TAGGED
  - REMOVE FLAMMABLES / COMBUSTIBLES
  - BLEEDERS LOCKED OPEN & TAGGED
  - SHIELDS – ARC CURTAIN / HEAT BLANKET
  - BLOCKS / BARS / BARRICADES / CHAINS
  - TOOLS (LONG HANDLE) INSULATED

PROCEDURE PREPARED BY: ITM GILSON  
(PRINT NAME)  
 SIGNATURE / DATE: [Signature] 1-12-12  
 ANNUAL REVIEW COMPLETED BY: \_\_\_\_\_  
(PRINT NAME)  
 SIGNATURE / DATE: \_\_\_\_\_

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Attachment 6 – Completed Example – Student Shop CNC Router EI-LOTO Procedure

**Attachment 2 – UC Berkeley - EI-LOTO "Equipment Specific" Procedure**

Equip. Name: CNC TABLE ROUTER Building: C.E.D. CAD/CAM SHOP Location / Room Number: 225 WURSTER HALL

**Describe scope of work here:**  
1. JOB SETTING UP  
2. EQUIPMENT REPAIRS & MAINTENANCE

**Instructions:** Follow the steps to create a written sequence for de-energizing, lockout, testing, and start-up of equipment requiring energy isolation. Use completed procedure for safety meetings / training for the equipment-specific lockout process. Discuss with workers how equipment energy isolation – LOTO is applied to this specific equipment during these planned job / tasks. Also, discuss communication methods on the job site.

Step 1 - Survey and Check off [X] all Energy Sources	Step 2 – Note Magnitude and type of each energy source	Step 3 – Note Device and Location of each energy disconnecting / isolation source / method.
1: ENERGY SOURCE	2: MAGNITUDE / TYPE	3: ISOLATION DEVICE / LOCATION / METHOD
<input checked="" type="checkbox"/> <u>3</u> ELECTRICITY- Main power	Amps: <u>30</u> Volts: <u>220</u> # Phase: <u>3</u>	<u>KNIFE SWITCH - PANEL 4 - EAST WALL BEHIND CNC.</u>
<input checked="" type="checkbox"/> <u>4</u> ELECTRICITY- Control circuit(s)	Amps: <u>15</u> Volts: <u>120</u> # Phase: <u>1</u>	<u>BREAKER PANEL 2; CIRCUIT BREAKER #12</u>
<input checked="" type="checkbox"/> <u>5</u> BATTERY / SOLAR / ALT POWER AC/DC/PH:	Amps: <u>0.5</u> Volts: <u>50 D.C.</u>	<u>COMPUTER / SENSOR WIRELESS HARNESS - M/F DISCONNECT AT BACK OF COMPUTER</u>
<input checked="" type="checkbox"/> <u>Z</u> COMPRESSED AIR / GASES	PSI: <u>60</u> Gas Type: <u>AIR</u>	<u>1/2" BALL VALVE - EAST WALL ADJACENT TO BREAKER PANEL 2</u>
STEAM / CONDENSATE	PSI: Source:	<u>⊗ AIR SURGE TANK UNDER CNC - LOCK OPEN BLEED VALVE</u>
FLUID UNDER PRESSURE	PSI: Source:	
HEAT / COLD +I- C° or +I- F°	Temp: Source:	[EXAMPLE ONLY]
VACUUM CHAMBER / PIPING	Hg": Source:	
FUEL(S) - SOLID / LIQUID / GAS	Volume: Fuel:	
ROTATING WHEEL / FAN / DRIVE	Details:	
SUSPENDED WEIGHT	Details:	
<input checked="" type="checkbox"/> <u>1</u> MECHANICAL OTHER: <u>MOVEMENT</u>	Details:	<u>← PRIOR TO SHUTTING OFF ENERGY SUPPLIES, RETURN CNC X-Y CARTRIDGE TO "HOME" POSITION IN S.E. CORNER OF TABLE. INSTALL RUNGEE STRAP ON ROUTER MOTOR TO PREVENT X-Y AXIS MOVEMENT.</u>

**Step 4 – List sequence of Energy Isolation Number 1 in to 12**

**Instructions continued:** Isolate energy sources in sequence. Assure each worker installs their own lock on each disconnect location. Supervisor/Authorized Person installs warning tags. Verify Energy Isolation prior to starting work. When testing / jogging equipment, follow program procedures on the back of this form. When restoring equipment to operation, reverse isolation sequence unless otherwise discussed / approved by the Project Supervisor. Use Personal Protective Equipment and safety equipment as noted below during work activities. Contact EH&S for technical support and special concerns at 510-642-3073.

**Step 5 – Check off [X] and circle all PPE and safety equipment to be used for Energy Isolation.**

<p><b>PPE to be worn during work</b></p> <p><input checked="" type="checkbox"/> GOGGLES / FACE SHIELD / WELD GEAR</p> <p><input checked="" type="checkbox"/> BOOTS – STEEL TOE / RUBBER / OTHER</p> <p><input checked="" type="checkbox"/> GLOVES (LEATHER / RUBBER / INSULATED)</p> <p><input checked="" type="checkbox"/> SAFETY HARNESS / LANYARD &amp; LINE</p> <p><input checked="" type="checkbox"/> RESPIRATOR (DUST / CHEMICAL)</p> <p><input type="checkbox"/> THERMAL – HEAT / COLD PROTECTION</p> <p><input type="checkbox"/> APRON / WET GEAR / OTHER</p> <p><input type="checkbox"/> OTHER: <u>TANK UNDER CNC</u> →</p>	<p><b>Safety Equipment to be used during work</b></p> <p><input type="checkbox"/> FIRE EXTINGUISHER / FIRE WATCHER</p> <p><input type="checkbox"/> LINES BLINDED &amp; TAGGED</p> <p><input checked="" type="checkbox"/> VALVES / SWITCHES - LOCKED &amp; TAGGED</p> <p><input type="checkbox"/> REMOVE FLAMMABLES / COMBUSTIBLES</p> <p><input checked="" type="checkbox"/> BLEEDERS LOCKED OPEN &amp; TAGGED</p> <p><input type="checkbox"/> SHIELDS – ARC CURTAIN / HEAT BLANKET</p> <p><input checked="" type="checkbox"/> BLOCKS / BARS / BARRICADES / CHAINS</p> <p><input type="checkbox"/> TOOLS - LONG HANDLE / INSULATED</p>	<p>PROCEDURE PREPARED BY: <u>AGO PARKER</u></p> <p>SIGNATURE / DATE: <u>[Signature] 2/1/12</u></p> <p>ANNUAL REVIEW COMPLETED BY: _____</p> <p>SIGNATURE / DATE: _____</p>
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[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Attachment 7 – Completed Example – Research MRI Equipment EI-LOTO Procedure

**Attachment 2 – UC Berkeley - EI-LOTO "Equipment Specific" Procedure**

**Equip. Name:** LKS MRI #1     **Building:** BASEMENT 272 - LKS.     **Location / Room Number:** 272 LKS

**Describe scope of work here:**  
MAGNET ALIGNMENT, ROUTINE P.M.;  
TROUBLE SHOOTING ACTIVITIES

**Instructions:** Follow the steps to create a written sequence for de-energizing, lockout, testing, and start-up of equipment requiring energy isolation. Use completed procedure for safety meetings / training for the equipment-specific lockout process. Discuss with workers how equipment energy isolation – LOTO is applied to this specific equipment during these planned job / tasks. Also, discuss communication methods on the job site.

**Step 1 - Survey and Check off [X] all Energ Sources**

**Step 2 – Note Magnitude and type of each energ source**

**Step 3 – Note Device and Location of each energy disconnecting / isolation source / method.**

	1: ENERGY SOURCE	2: MAGNITUDE / TYPE	3: ISOLATION DEVICE / LOCATION / METHOD
<input checked="" type="checkbox"/>	4 ELECTRICITY– Main power	Amps: <u>600</u> Volts: <u>480</u> # Phase: <u>3</u>	<u>M.C.C. FOR MRI #1 - PANEL LKS 40 - S.E. WALL</u>
<input checked="" type="checkbox"/>	5 ELECTRICITY– Control circuit(s)	Amps: <u>50</u> Volts: <u>120</u> # Phase: <u>1</u>	<u>BREAKER PANEL # LKS 238 BREAKER #2 - S.E. WALL</u>
<input checked="" type="checkbox"/>	6 BATTERY / SOLAR / ALT POWER AC/DC/PH:	Amps: <u>20</u> Volts: <u>12 D.C.</u> <u>CAPACITOR BANK</u>	<u>COMPUTER TELEMETRICS CABLES - H/F DATA CONNECTS - BACK OF MRI #1 CONTROL PANEL</u>
<input checked="" type="checkbox"/>	7 COMPRESSED AIR / GASES STEAM / CONDENSATE	PSI: <u>80</u> Gas Type: <u>AIR</u> PSI:                      Source:	<u>1/2" BALL VALVE - N.W. WALL</u> <u>GROUND CAPACITOR BANK TO FRAME USING GROUND STRAP.</u>
<input checked="" type="checkbox"/>	8 FLUID UNDER PRESSURE	PSI: <u>300</u> Source: <u>HYDRAULIC PUMP/RESERVOIR</u>	<u>TURN RESERVOIR TANK BLEED TO OPEN</u>
<input checked="" type="checkbox"/>	3 HEAT / COLD +1 - C° or +1 - F°	Temp: <u>-80°</u> Source: <u>LN2</u>	<u>LOCATED BEHIND MRI CONTROL PANEL</u> <u>ENSURE LN2 JACKET BLEED VALVE LOCKED OPEN TO ATMOSPHERE</u>
	VACUUM CHAMBER / PIPING	Hg":                      Source:	
	FUEL(S) - SOLID / LIQUID / GAS	Volume:                      Fuel:	
	ROTATING WHEEL / FAN / DRIVE	Details:	
<input checked="" type="checkbox"/>	1 SUSPENDED WEIGHT	Details: <u>PATIENT TABLE COUNTERWEIGHT</u>	<u>- PLACE JACK-STAND UNDER COUNTERWEIGHT</u>
<input checked="" type="checkbox"/>	2 MECHANICAL OTHER:	Details: <u>MOTOR COUPLERS/FANS</u>	<u>- DON'T REMOVE GUARDS UNLESS NECESSARY.</u>

**Instructions continued:** Isolate energy sources in sequence. Assure each worker installs their own lock on each disconnect location. Supervisor/Authorized Person installs warning tags. Verify Energy Isolation prior to starting work. When testing / jogging equipment, follow program procedures on the back of this form. When restoring equipment to operation, reverse isolation sequence unless otherwise discussed / approved by the Project Supervisor. Use Personal Protective Equipment and safety equipment as noted below during work activities. Contact EH&S for technical support and special concerns at 510-642-3073.

**Step 4 – List sequence of Energy Isolation Number 1 on to 12**

**Step 5 – Check off [X] and circle all PPE and safety equipment to be used for Energy Isolation.**

**PPE to be worn during work**

GOGGLES / FACE SHIELD / WELD GEAR

BOOTS – STEEL TOE / RUBBER / OTHER

GLOVES – LEATHER / RUBBER / INSULATED

SAFETY HARNESS / LANYARD & LINE

RESPIRATOR – DUST / CHEMICAL

THERMAL – HEAT / COLD PROTECTION

APRON / WET GEAR / OTHER

OTHER: GROUND CAPACITOR BANK TO MRI FRAME w/ GROUND STRAP UNDER MACHINE

**Safety Equipment to be used during work**

FIRE EXTINGUISHER / FIRE WATCHER

LINES BLINDED & TAGGED

VALVES / SWITCHES - LOCKED & TAGGED

REMOVE FLAMMABLES / COMBUSTIBLES

BLEEDERS LOCKED OPEN & TAGGED

SHIELDS – ARC CURTAIN / HEAT BLANKET

BLOCKS / BARS / BARRICADES / CHAINS

TOOLS - LONG HANDLE / INSULATED

PROCEDURE PREPARED BY: CAROL RAYNE

SIGNATURE / DATE: C.R. RAYNE 2/12/12

ANNUAL REVIEW COMPLETED BY: \_\_\_\_\_

(PRINT NAME)

SIGNATURE / DATE: \_\_\_\_\_

[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Attachment 8 – Completed Example – Scanning Electron Microscope EI-LOTO Procedure

LAB# 241  
 " 281  
 " 320  
 # 372

**Attachment 2 – UC Berkeley - EI-LOTO "Equipment Specific" Procedure**

Equip. Name: OXFORD INST. ELECT. MICRO Building: VLSB/LSA - M.C.B. DEPT Location / Room Number: VARIOUS

**Describe scope of work here:**  
SETUP & TROUBLESHOOTING OF OXFORD INSTRUMENTS  
SCANNING ELECTRON MICROSCOPES IN M.C.B. DEPT

**Instructions:** Follow the steps to create a written sequence for de-energizing, lockout, testing, and start-up of equipment requiring energy isolation. Use completed procedure for safety meetings / training for the equipment-specific lockout process. Discuss with workers how equipment energy isolation – LOTO is applied to this specific equipment during these planned job / tasks. Also, discuss communication methods on the job site.

Step 1 - Survey and Check off [X] all Energy Sources	Step 2 – Note Magnitude and type of each energy source	Step 3 – Note Device and Location of each energy disconnecting / Isolation source / method.
1: ENERGY SOURCE	2: MAGNITUDE / TYPE	3: ISOLATION DEVICE / LOCATION / METHOD
<input checked="" type="checkbox"/> 1 ELECTRICITY – Main power	Amps: <u>40</u> Volts: <u>240</u> # Phase: <u>3</u>	<u>TWITT- LOCK POWER PLUG – UNPLUG &amp; LOCK w/ PLUG LOCK.</u>
<input checked="" type="checkbox"/> ELECTRICITY – Control circuit(s)	Amps: <u>15</u> Volts: <u>120</u> # Phase: <u>1</u>	<u>INTERNAL TRANSFORMER – CONTROL POWER DEAD LUNG UNPLUGGED</u>
<input checked="" type="checkbox"/> 2 BATTERY / SOLAR / ALT POWER AC/DC/PH:	Amps: Volts: <u>CAPACITOR BANK</u>	<u>GROUND CAPACITOR BANK TO FRAME w/ GROUND STRAP</u>
<input checked="" type="checkbox"/> 3 COMPRESSED AIR / GASES	PSI: <u>60</u> Gas Type: <u>AIR</u>	<u>1/2 BALL VALVE – SHUT OFF &amp; LOCK/TAG – WEST WALL?</u>
STEAM / CONDENSATE	PSI: Source:	<u>(FOLLOW HOSE ON EACH MACHINE TO SHUT-OFF VALVE.)</u>
<input checked="" type="checkbox"/> 4 FLUID UNDER PRESSURE	PSI: <u>50</u> Source: <u>DOM. H<sub>2</sub>O</u>	<u>1/2 BALL VALVE – SHUT OFF &amp; LOCK/TAG – UTILITY LOCK</u>
HEAT / COLD +1- C° or +/- F°	Temp: Source:	
VACUUM CHAMBER / PIPING	Hg": Source:	
FUEL(S) - SOLID / LIQUID / GAS	Volume: Fuel:	
ROTATING WHEEL / FAN / DRIVE	Details:	
SUSPENDED WEIGHT	Details:	
MECHANICAL OTHER:	Details:	

**[EXAMPLE]**

**Step 4 – List sequence of Energy Isolation Number 1 up to 12**

**Instructions continued:** Isolate energy sources in sequence. Assure each worker installs their own lock on each disconnect location. Supervisor/Authorized Person installs warning tags. Verify Energy Isolation prior to starting work. When testing / jogging equipment, follow program procedures on the back of this form. When restoring equipment to operation, reverse isolation sequence unless otherwise discussed / approved by the Project Supervisor. Use Personal Protective Equipment and safety equipment as noted below during work activities. Contact EH&S for technical support and special concerns at 510-642-3073.

**Step 5 – Check off [X] and circle all PPE and safety equipment to be used for Energy Isolation.**

<b>PPE to be worn during work</b> <input checked="" type="checkbox"/> GOGGLES / FACE SHIELD / WELD GEAR <input checked="" type="checkbox"/> BOOTS – STEEL TOE / RUBBER / OTHER <input checked="" type="checkbox"/> GLOVES – LEATHER / RUBBER <u>INSULATED</u> <input type="checkbox"/> SAFETY HARNESS / LANYARD & LINE <input type="checkbox"/> RESPIRATOR – DUST / CHEMICAL <input type="checkbox"/> THERMAL – HEAT / COLD PROTECTION <input type="checkbox"/> APRON / WET GEAR / OTHER <input checked="" type="checkbox"/> OTHER: <u>GROUND CAPACITORS w/ GROUNDING STRAP TO FRAME</u>	<b>Safety Equipment to be used during work</b> <input type="checkbox"/> FIRE EXTINGUISHER / FIRE WATCHER <input type="checkbox"/> LINES BLINDED & TAGGED <input checked="" type="checkbox"/> VALVES / SWITCHES - LOCKED & TAGGED <input type="checkbox"/> REMOVE FLAMMABLES / COMBUSTIBLES <input type="checkbox"/> BLEEDERS LOCKED OPEN & TAGGED <input type="checkbox"/> SHIELDS – ARC CURTAIN / HEAT BLANKET <input type="checkbox"/> BLOCKS / BARS / BARRICADES / CHAINS <input type="checkbox"/> TOOLS - LONG HANDLE / INSULATED	PROCEDURE PREPARED BY: <u>Jason Casey</u> (PRINT NAME) SIGNATURE / DATE: <u>Jason Casey 1/15/2012</u> ANNUAL REVIEW COMPLETED BY: _____ (PRINT NAME) SIGNATURE / DATE: _____
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[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

## Attachment 9 – Completed Example – Micro-Fab Assembly Robot EI-LOTO Procedure

**Attachment 2 – UC Berkeley - EI-LOTO "Equipment Specific" Procedure**

Equip. Name: QUANTUM 3 ASSEMBY Building: SUTAJADAI HALL Location / Room Number: MICRO FAB 2-A

**Describe scope of work here:**  
MICROASSEMBLY ROBOT PREPARATIONS / SET-UP FOR RESEARCH PRODUCTION RUN.

**Instructions:** Follow the steps to create a written sequence for de-energizing, lockout, testing, and start-up of equipment requiring energy isolation. Use completed procedure for safety meetings / training for the equipment-specific lockout process. Discuss with workers how equipment energy isolation – LOTO is applied to this specific equipment during these planned job / tasks. Also, discuss communication methods on the job site.

Step 1 - Survey and Check off [X] all Energy Sources	Step 2 - Note Magnitude and type of each energy source	Step 3 - Note Device and Location of each energy disconnecting / isolation source / method.
<b>1: ENERGY SOURCE</b>	<b>2: MAGNITUDE / TYPE</b>	<b>3: ISOLATION DEVICE / LOCATION / METHOD</b>
<input checked="" type="checkbox"/> 2 ELECTRICITY- Main power	Amps: <u>80</u> Volts: <u>240</u> # Phase: <u>3</u>	<u>KNIFE SWITCH ADJACENT TO EACH ROBOT @ POWER SUPPLY</u>
<input checked="" type="checkbox"/> ELECTRICITY- Control circuit(s)	Amps: <u>15</u> Volts: <u>120</u> # Phase: <u>1</u>	<u>ON-BOARD TRANSFORMER - POWER KILLED BY MAIN POWER KNIFE SWITCH</u>
<input checked="" type="checkbox"/> 4 BATTERY / SOLAR / ALT POWER AC/DC/PH:	Amps: <u>0.5</u> Volts: <u>20 DC</u> - COMPUTER TELEVIEWERS - DISCONNECT AT ROBOT TERMINALS 1, 2, #B CAPACITOR BANK - LOWER ROBOT - GROUND WITH "ON-BOARD" GEOMETRIC STRAP.	
<input checked="" type="checkbox"/> 3 COMPRESSED AIR / GASES	PSI: <u>60</u> Gas Type: <u>AIR</u>	<u>1/2" BALL VALVE - UTILITY DROP BY INSTALLATION</u>
STEAM / CONDENSATE	PSI: Source:	
FLUID UNDER PRESSURE	PSI: Source:	
HEAT / COLD +1- C° or +1- F°	Temp: Source:	
VACUUM CHAMBER / PIPING	Hg": Source:	
FUEL(S) - SOLID / LIQUID / GAS	Volume: Fuel:	
ROTATING WHEEL / FAN / DRIVE	Details:	
SUSPENDED WEIGHT	Details:	
<input checked="" type="checkbox"/> MECHANICAL OTHER:	Details: <u>STEPPER MOTORS</u>	<u>PULL TO SHUT DOWN, PROGRAM ROBOT TO RETURN TO "SLEEP" LOCATION WITH CONTROL FUNCTION - 1"</u> <u>INSTALL BUNGEE CORD ON ROBOT HEAD TO FRAME.</u>

**Instructions continued:** Isolate energy sources in sequence. Assure each worker installs their own lock on each disconnect location. Supervisor/Authorized Person installs warning tags. Verify Energy Isolation prior to starting work. When testing / jogging equipment, follow program procedures on the back of this form. When restoring equipment to operation, reverse isolation sequence unless otherwise discussed / approved by the Project Supervisor. Use Personal Protective Equipment and safety equipment as noted below during work activities. Contact EH&S for technical support and special concerns at 510-642-3073.

**Step 4 - List sequence of Energy Isolation:**  
 Number 1 (in to 12)

**Step 5 - Check off [X] and circle all PPE and safety equipment to be used for Energy Isolation.**

<p><b>PPE to be worn during work</b></p> <p><input checked="" type="checkbox"/> <u>GOGGLES</u> FACE SHIELD / WELD GEAR</p> <p><input checked="" type="checkbox"/> BOOTS - STEEL TOE / RUBBER / OTHER</p> <p><input checked="" type="checkbox"/> GLOVES - LEATHER / RUBBER / <u>INSULATED</u></p> <p><input type="checkbox"/> SAFETY HARNESS / LANYARD &amp; LINE <u>ESD</u></p> <p><input type="checkbox"/> RESPIRATOR - DUST / CHEMICAL</p> <p><input type="checkbox"/> THERMAL - HEAT / COLD PROTECTION</p> <p><input type="checkbox"/> APRON / WET GEAR / OTHER</p> <p><input checked="" type="checkbox"/> OTHER: <u>USE BUNGEE CORD ON ROBOT HEAD TO PREVENT MOVEMENT</u></p>	<p><b>Safety Equipment to be used during work</b></p> <p><input type="checkbox"/> FIRE EXTINGUISHER / FIRE WATCHER</p> <p><input type="checkbox"/> LINES BLINDED &amp; TAGGED</p> <p><input checked="" type="checkbox"/> VALVES / SWITCHES - LOCKED &amp; TAGGED</p> <p><input type="checkbox"/> REMOVE FLAMMABLES / COMBUSTIBLES</p> <p><input type="checkbox"/> BLEEDERS LOCKED OPEN &amp; TAGGED</p> <p><input type="checkbox"/> SHIELDS - ARC CURTAIN / HEAT BLANKET</p> <p><input checked="" type="checkbox"/> BLOCKS / BARS / BARRICADES / CHAINS</p> <p><input type="checkbox"/> TOOLS - LONG HANDLE / INSULATED</p>	<p>PROCEDURE PREPARED BY: <u>SANDRA BOULVAUD</u></p> <p>SIGNATURE / DATE: <u>S. Boulvaud</u> <u>1/15/12</u></p> <p>ANNUAL REVIEW COMPLETED BY: _____</p> <p>SIGNATURE / DATE: _____</p>
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[Go to Quick Start](#)

[Go to Table of Contents](#)

[Go to FAQ Fact Sheet](#)

# UCSB EH&S/General Safety Team

## FACT SHEET - EI-LOTO Program

This fact sheet provides awareness level information of energy isolation hazards and their controls as addressed in the UCB Energy Isolation – Lockout/Tagout Program.

Go to the [Table of Contents of the EI-LOTO Program](#).

Go to the [beginning of the UCB EI-LOTO Program](#).

*{CLICK ON ANY ENTRY IN THE TABLE OF CONTENTS TO BE TAKEN TO THAT SECTION OF THE FAQ FACT SHEET}*

### Table of Contents – FAQ Fact Sheet

What is Energy Isolation – Lockout/Tagout (EI-LOTO)?.....	45
What types of energy may need to be isolated?.....	45
How are energy sources isolated? .....	45
Does this EI-LOTO Program apply to my department? .....	46
What types of equipment does this EI-LOTO Program apply to? .....	46
Does EI-LOTO apply to research equipment that is ‘one of a kind’, or does it only apply to building / utility systems? .....	46
Are there situations where EI-LOTO is not, or should not, be practiced? .....	46
Does EI-LOTO apply to equipment that can be ‘unplugged’ from a utility source? .....	47
What are the EI-LOTO Program requirements? .....	47
What are the EI-LOTO Compliance Specifics? .....	48
Are there times when locks must be applied but tags are not needed? .....	48
What EI-LOTO Program training is required? .....	48
Who is responsible for implementing the EI-LOTO Program in my department?.....	48
I’m designated “EI-LOTO Program Manager”, what do I have to do?.....	49
Who’s responsible for providing EI-LOTO equipment (locks, tags, hasps, and other EI-LOTO equipment) and who should get it?.....	50
Can a ‘generic’ procedure be used to guide an EI-LOTO Practitioner on how to conduct EI-LOTO on a specific piece of equipment? .....	50
How are “Equipment Specific EI-LOTO Procedures” created?.....	50
Who must create “Equipment Specific EI-LOTO Procedures”? .....	50

Are there “Rules” and/or “Safe Work Practices” for EI-LOTO Practitioners to follow? .....	51
How is EI-LOTO applied to Contractor’s work on UCB equipment? .....	51
Who should be trained on EI-LOTO and how do we get training? .....	51
Who keeps the records required by the EI-LOTO Program? .....	51

**What is Energy Isolation – Lockout/Tagout (EI-LOTO)?**

Every piece of powered equipment or utility system uses or transports one or more types of energy. The design of the equipment safely controls the energy flowing to, through, or stored in the equipment when properly maintained and operating normally. However, when equipment is being installed, when maintenance work is being performed on it, or when it is being modified to perform specific functions, the energy sources must be isolated from the equipment to assure a safe working environment for the people working on the equipment. This is a specific and documented process called “Energy Isolation – Lockout/Tagout”, or shortened to “EI-LOTO”. It is required by Cal/OSHA and Federal OSHA law to be followed whenever equipment that has potentially hazardous energy associated with it is being worked on.

**What types of energy may need to be isolated?**

There are many different kinds of energy used to power equipment and different kinds of utility systems used to deliver specific types of energy. Types of energy that immediately come to mind include electricity, compressed air, steam, and water or hydraulic fluids under pressure. However, other types of energy can be stored or used to power equipment. Liquid or gas fuels, counter weights, mechanical springs, elevated components that can fall, extreme heat, cryogenic (cold) liquids, compressed gases, charged capacitors, kinetic energy such as fly-wheels or potential vehicle movement, even convective air or wind, may be hazardous types of energy that could cause equipment or utility systems to become hazardous to people if the energy is not safely isolated or eliminated prior to working on the equipment.

Return to [FAQ FACT SHEET Table of Contents](#)

**How are energy sources isolated?**

Most people know this EI-LOTO Program as the “Lockout/Tagout” program which traditionally refers to electrical isolation by installing a lock on a disconnect switch, and hanging a tag on the lock explaining who “locked out” the switch and why. This has been around since the 1980’s and is routinely applied to utility systems supplying energy to fixed pieces of equipment in industrial and commercial buildings and processes.

But additional types of energy isolation governed in the law and addressed by this program include the need to blind off pressurized piping, close and lock valve handles on water systems, lower down counterweights or support them with a block so they cannot drop, install a bar into a rotating machine component so it cannot turn, bleed off pressure in a storage tank, install grounding straps on capacitors, install a temporary insulation blanket around a nearby hot or cold surface, putting a wheel chock on parked vehicle to prevent it from rolling, or even putting a jack-stand under an elevated vehicle when working on it. These are all methods of controlling potentially hazardous energy prior to working on a piece of equipment.

### **Does this EI-LOTO Program apply to my department?**

If your department purchases, designs, builds, creates, maintains, modifies, teaches with, researches on or with, or in any way uses equipment that operates on and/or stores any type of potentially hazardous energy, then the EI-LOTO Program applies to the equipment owned / operated by your department.

Return to [FAQ FACT SHEET Table of Contents](#)

### **What types of equipment does this EI-LOTO Program apply to?**

This EI-LOTO Program is applied to ALL forms of potentially hazardous energy, and the equipment that operates on and/or stores that energy. The types of energy needing to be isolated are as varied as the “potential energy” (mechanical springs in tension or compression, compressed gas cylinders, capacitors storing electrical charge, etc.), “kinetic energy” (rotating flywheel, moving parts, rolling vehicles, etc.) and “flowing energy” (electricity, compressed air, steam, domestic water under pressure, etc.) that may be part of any particular machine or process.

### **Does EI-LOTO apply to research equipment that is ‘one of a kind’, or does it only apply to building / utility systems?**

It applies to all types of equipment that utilize one or more potentially hazardous sources of energy to operate, regardless of whether the equipment is ‘one-of-a-kind’ research equipment, purchased “commercially available” equipment, or ‘one-of-a-kind’ building / utility systems unique to a particular location or operation.

### **Are there situations where EI-LOTO is not, or should not, be practiced?**

Yes, but very few. EI-LOTO does not need to be practiced for minor tool changes, adjustments, and other small service activities that take place during normal operations if they are routine, repetitive, and integral to the use of the equipment. (*Example: Changing a drill bit on a drill press.*)

EI-LOTO may not be practiced if it can be demonstrated by management (1) that continuity of service is essential, (2) shutdown of the system is impractical, and (3) special equipment is provided or special protective procedures are documented and followed that will provide effective protection for personnel (all three criterion must be met, by law). EI-LOTO may not be practiced if management can demonstrate that by doing so would increase the work-hazards to people while doing the work. EI-LOTO may not be practiced when to do so would be life-threatening to persons relying on equipment to operate continuously.

These very specific criterion in the law as outlined above must be met through a documented planning process to allow work to commence “live” or “hot” without EI-LOTO being practiced. Unless management can demonstrate that the intended work meets the requirements of that criterion, EI-LOTO must be implemented prior to commencing work on equipment.

If management can demonstrate the need to “work hot” or “work live”, then detailed work plans, special equipment, and safe work-processes must be created for the work prior to starting the work. The work-processes must create the safest work environment possible under the circumstances, equivalent in safety to practicing EI-LOTO as closely as possible. All workers must have documented training on the planned “hot work” processes specific to the equipment prior to starting the work.

EH&S's Electrical Safety Program, Fall Protection Program, Crane Safety Program, and other energy-hazard-control programs detail the requirements for planning and executing "hot work" or "live work" as may be required by specific energy sources. [EH&S Safety Engineering](#) is available to help you develop safe-work plans for "hot work" or "live work". Please call EH&S at 642-3073 for support as needed.

Return to [FAQ FACT SHEET Table of Contents](#)

### **Does EI-LOTO apply to equipment that can be 'unplugged' from a utility source?**

Sometimes, yes, sometimes, no. By unplugging a single-energy-source piece of equipment (for example a hand-held circular saw when changing a saw blade, or a house vacuum cleaner when changing a vacuum bag) you are practicing energy isolation and in compliance with the EI-LOTO program. The law is very specific about the requirements of a work-situation where a piece of equipment does not need to have LOTO practiced on it as follows:

- When equipment is isolated and made safe by simply unplugging an electrical cord, compressed air hose, or some other single-source energy supply, and
- When the person working on the equipment has exclusive control over the connection to the energy source, and
- When the single-source energy equipment has no possibility of unsafe movement of equipment components when the energy source is unplugged.

If you have a piece of equipment that operates on a single utility source, but may store multiple sources of energy, then simply unplugging the utility energy is NOT acceptable to Cal/OSHA, and EI-LOTO must be applied. For example, a wood planer that plugs into an electrical outlet, but has a flywheel on the planer blade, must have EI-LOTO practiced on it prior to working the equipment even if it is unplugged from the electrical source. This is because while the utility energy may be isolated simply by unplugging the electrical cord, there may be stored energy in the rotating flywheel that's driving the planer-blades. In such a situation, a written EI-LOTO procedure must be created for that equipment that includes isolating energy sources by unplugging all utilities, engaging a brake on the planer blade, and then inserting a wooden block into the rotating flywheel or planer blade to assure all system energy is blocked / isolated prior to commencing work on the machine. An example of such an EI-LOTO procedure is detailed on [Attachment 5](#).

### **What are the EI-LOTO Program requirements?**

Cal/OSHA requires that every piece of fixed equipment that uses energy to operate must have a written energy isolation procedure as part of the safe work practices on that equipment. This procedure becomes the basis of training for applying the EI-LOTO program to that piece of equipment. Therefore, equipment owners, supervisors, maintenance personnel, contractors, etc. must be familiar with ALL the energy sources used by the equipment, and how the equipment functions. And, they must take measures to isolate or eliminate all energy sources prior to working on the equipment. An energy isolation procedure is a step by step instruction that details the location of all energy sources on the equipment and what steps must be taken to isolate / block those energy sources.

Return to [FAQ FACT SHEET Table of Contents](#)

### What are the EI-LOTO Compliance Specifics?

Cal/OSHA compliance mandates the EI-LOTO Program require each department to create a written energy isolation procedure for each piece of single / multi-energy source equipment hard wired / plumbed or that has the potential of stored or kinetic energy at a state of rest. This procedure must be shared with all persons who will work on the equipment as part of tailboard training prior to start of work. Every person working on a piece of equipment must have their own set of keyed padlocks and lock-out attachments for specific energy sources. Each person must place their keyed padlock on a hasp that accepts multiple padlocks at that energy-isolation location. The hasps are installed on energy isolation devices such as electrical disconnect switches, piping valves, bleed valves (open position), blocking bars or rolling stops (kinetic energy), etc. so that once installed, energy cannot flow to the equipment, and moving parts cannot move. Every person must have their own locks installed on each energy source. Every energy source must be isolated from the equipment prior to work commencing. In addition to locking out energy sources, a written tag must be installed on the 'shut off' device that details the reason for energy isolation, what work is being completed, who is doing the work, and who is responsible for removing the tag once work is complete.

### Are there times when locks must be applied but tags are not needed?

UC Santa Barbara allows the use of only locks on each energy-source isolation point, but without the need to install a written tag at that location, when all of the following criterion are met:

1. When the work to be done is completed within a single 8-hour shift, and
2. When the work to be done is done by only one person, and
3. When all energy isolation points are within eye-site of that person, and
4. When that person is present for the entire time the work is being done.

If any of the above criterion cannot be met during the work (for example, the person must leave to eat lunch or use the rest-room), then written tags must be installed at each energy isolation point prior to continuing the work.

The only exception to bullet #4 above is when the person can 'lock up' the equipment and all its energy-isolation points in a room to which no one else has access, not even a janitor or a research associate. In such a situation, tags are not needed to be installed on lock-out points for the equipment.

### What EI-LOTO Program training is required?

Anyone who is responsible for working with and conducting maintenance on powered equipment must be trained on the EI-LOTO Program, and provided with the locks, hasps and tags by their department and/or PI to implement the program and its procedures during their work activities.

Return to [FAQ FACT SHEET Table of Contents](#)

### Who is responsible for implementing the EI-LOTO Program in my department?

EI-LOTO Program implementation responsibility may vary from department to department. **For academic departments** such as Physics, Chemistry, all Engineering practices, College of Environmental Design, Astronomy, etc..., department management is responsible to assure that all aspects of the EI-LOTO Program are integrated into PI research, Lab operations, Teaching / Lecture activities, and professional "Shops". PIs may delegate the implementation of EI-LOTO processes to



associate researchers under their supervision who have all the same implementation responsibilities as “Front-line Supervisors” noted in the paragraph below.

**For service departments** such as Facilities Management, H&RS Maintenance, Athletics, UCEN, etc... department management is responsible to assure that all aspects of the EI-LOTO Program are integrated into department operations and activities.

**Front-line Supervisors** are responsible for the following activities:

- Assure that their direct-report personnel are trained on EI-LOTO processes, and
- Provide all personnel with the proper EI-LOTO equipment, and
- Identify all equipment under their supervision that requires EI-LOTO procedures, and
- Develop and provide procedures to conduct EI-LOTO safely and effectively on equipment under their areas of responsibility, and
- Develop written EI-LOTO procedures specific to that equipment, and
- “Qualify” personnel in a documented process to conduct EI-LOTO activities, and
- Assure that personnel are properly trained to conduct EI-LOTO prior to letting them work on that equipment.

### **I’m designated “EI-LOTO Program Manager”, what do I have to do?**

If you have been assigned the duty to implement the EI-LOTO Program in your department, follow this suggested plan of action:

1. Read the EI-LOTO Program to fully understand what the requirements of the program are.
2. Contact the [EH&S EI-LOTO Program Manager](#) to discuss your concerns about how the EI-LOTO Program may impact your department operations and start developing an implementation strategy with EH&S’s help.
3. Discuss the program requirements with your department’s upper management to brainstorm implementation strategies, and find allies and early adopters to pilot implementation.
4. Pilot program adoption with volunteer supervisors / PIs who are willing to work with you and EH&S.
5. Work out bugs in the implementation strategy during the pilot phase.
6. Assure that key personnel receive EI-LOTO training and “Qualification” from their Supervisors and EH&S.
7. Conduct an equipment assessment / inventory to identify department equipment, operations and research activities that require EI-LOTO processes.
8. Create a timeline for development of equipment-specific procedures that’s reasonable for department need and work-force time-availability.
9. Delegate responsibility of implementation and creation of EI-LOTO equipment-specific procedures to “[Qualified Personnel](#)”, and give them a time-line to adhere to.
10. Monitor implementation as it goes along and keep department management apprised of work progress.
11. Work with the [EH&S EI-LOTO Program Manager](#) to remove road-blocks and support your efforts.

- Celebrate your successes with all department personnel, and learn and share lessons with them as road-blocks arise and are overcome.

Return to [FAQ FACT SHEET Table of Contents](#)

### **Who's responsible for providing EI-LOTO equipment (locks, tags, hasps, and other EI-LOTO equipment) and who should get it?**

Every "Front-line Supervisor" is responsible for identifying all energy isolation locations and the specific types of equipment needed to safely isolate and install a hasp and lock on the isolation location. They are also responsible to provide keyed padlocks, tags and hasps to all "Qualified Personnel" who will be conducting EI-LOTO activities. Every person doing EI-LOTO on a piece of equipment must have a uniquely-keyed padlock. Padlocks may not be 'shared' by more than one person. Each person must have their own padlock installed on each LOTO point.

### **Can a 'generic' procedure be used to guide an EI-LOTO Practitioner on how to conduct EI-LOTO on a specific piece of equipment?**

No. Every piece of equipment that has source(s) of energy that make the equipment operate must have an equipment-specific written procedure developed for that equipment. There are a few exceptions to this rule as noted in other questions. The equipment-specific EI-LOTO procedure must be shared with anyone who may work on or with that equipment. Equipment operators and maintenance personnel must have documented training on the EI-LOTO Program, its application within and to a department's equipment, and to how to understand and utilize the information provided on the equipment-specific procedure. Such procedures may be documented on the template shown in [Attachment 2](#), or in another written format that contains all the information needed to convey a procedure to safely conduct EI-LOTO for that specific equipment.

### **How are "Equipment Specific EI-LOTO Procedures" created?**

The EI-LOTO Program is designed to help the equipment owner or project supervisor develop their own Energy Isolation Procedure for each piece of equipment requiring one. Through the EH&S website, equipment owners / project supervisors can download a template, print-out, and complete a simple checklist ([Attachment 2](#)) that will become the written energy isolation procedure for that equipment. The original documents are kept by responsible persons in each department, with photo-copies displayed near the equipment, and provided to all personnel working on the equipment as part of tailboard trainings prior to work commencing. Copies may be sent to EH&S for inclusion in an Energy Isolation Procedure Library that is posted on the EH&S website. In addition, these documents are available for use by any department with similar equipment as a basis for developing their own equipment procedures. EH&S maintains the program and is available for consultation and technical assistance as well as providing training for the EI-LOTO Program. Please contact EH&S/General safety Team at (805)893--5407 for further assistance.

Return to [FAQ FACT SHEET Table of Contents](#)

### **Who must create "Equipment Specific EI-LOTO Procedures"?**

Supervisors must assure that all equipment under their responsibility have written EI-LOTO procedures developed for them. The supervisor may create the procedure using [Attachment 2](#) template, or may delegate this task to "Authorized Personnel" who will do this task.

### **Are there “Rules” and/or “Safe Work Practices” for EI-LOTO Practitioners to follow?**

Yes. These are detailed in the “[Procedures](#)” section of the EI-LOTO Program, and are included on the ‘back-side’ of every [Attachment 2](#) template document. The “[Rules](#)” include policy on how to apply the EI-LOTO Program to department operations. The “[Procedures](#)” include instructions on “[Standard EI-LOTO Procedures](#)”, “[Testing and Adjusting Equipment Procedures](#)”, “[Restoring Equipment to Use Procedures](#)” and “[Joint Projects Procedures](#)”. Joint Projects procedures refer to situations where UCB personnel from different departments work on the same equipment at the same time, or when UCB personnel may work on the same equipment as contractors at the same time.

Return to [FAQ FACT SHEET Table of Contents](#)

### **How is EI-LOTO applied to Contractor’s work on UCSB equipment?**

If contractors are working on University equipment, then the Project Supervisor representing the department who owns the equipment is responsible for assuring the Contractor has an EI-LOTO program equivalent to the University’s program and follows it. The Project Supervisor is not responsible to evaluate the Contractor’s program, only to verify that the Contractor has one and intends on following it. The contractor must provide their own locks and hasps. The project supervisor must inform the contractor of any known energy sources on the equipment, any energy isolation procedure previously developed for the equipment, and any other known hazards associated with the equipment. As work progresses, the contractor must inform the project supervisor of any newly discovered energy sources or hazards associated with the equipment.

If University personnel and contractor personnel are working on the same piece of equipment, then the University must provide the hasps that the University personnel install their locks on, and contractor must provide the hasps that their personnel installs their locks on. Each work team installs their own hasp on each energy source. The project supervisor must hold joint tailboard meetings with all personnel who will be working on the equipment to promote understanding of safe work practices, energy isolation procedures specific to the equipment, and any hazard controls needed to complete work in a safe manner.

### **Who should be trained on EI-LOTO and how do we get training?**

Cal/OSHA requires that the employer train all employees on the energy-hazards associated with the maintenance and use of powered equipment. [Training requirements](#) are detailed in the EI-LOTO program. Training can be provided at no cost to the Owner Department by EH&S, or for cost by outside vendor as long as the contents of this program are addressed by the vendor-trainer.

### **Who keeps the records required by the EI-LOTO Program?**

Records that must be kept are outlined in that section of the program. [Owner Departments must keep records](#) concerning the EI-LOTO Program’s application to their work activities. It’s likely they will delegate this task to the “[EI-LOTO Program Manager](#)” for the Department. Discuss with your department management who the Program Manager is in your department. All records must be kept for certain periods of time as [outlined in the program](#) by the Department and must be made available to EH&S and regulatory agencies such as Cal/OSHA, if they request.

Return to [FAQ FACT SHEET Table of Contents](#)