UC Merced

Energy Isolation – Lockout/Tagout Program

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1.0 Purpose/Introduction

The UC Merced Energy Isolation – Lockout/Tagout (EI-LOTO) Program requires campus, field station personnel and contractors to implement safe procedures when working on UC Merced 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.

2.0 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 woodworking 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.
- To equipment designed for power generation or transmission covered by 8 CCR 2940.13.

"Live 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.)

All three of the above criteria must be met before "Live 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 "Live Work" contact EH&S Campus Safety Officer to review safe work procedures in order to assist in developing adequate safeguards and "Live Work" processes. Also see the UC Merced Electrical Safety Program for more details, PPE requirements and other considerations under NFPA 70e.

3.0 Roles/Responsibility

3.1 UC Merced 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. All persons in the area or affected by a machine being locked out are to be notified and instructed to never disturb a mechanical block that has been placed to prevent equipment movement by someone else."

3.2 "Authorized Person"

Faculty and staff who work on equipment governed by this program must be "authorized" to do so by their Supervisor and follow the energy isolation procedures outlined by this program. They must be trained on and remain current with its requirements and application through documented training. An "Authorized Person" may assist in the development of specific energy isolation procedures for pieces of equipment they routinely work on.

3.3 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.

Departments must create, and provide for employee and contractor use, written EI-LOTO procedures for individual pieces of equipment (see Attachment 2 for an example). The form in Attachment 3 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 "Authorized" to conduct energy isolation through a documented "Qualification" process. This process is documented using Attachment 4 of the program. All "Authorized" 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.

3.4 Department Superintendent (DS) or Other Responsible Person

The DS or Other Responsible Person has "Training" and "Record-keeping" responsibilities as outlined in those sections of this program.

3.5 Principle Investigator/Project Supervisor/"Supervisor"

The Principle Investigator / Project Supervisor / "Supervisor" must, or may delegate in writing an "Authorized 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 area/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 Authorized 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 an "Authorized Person" that may work on the equipment.
7. Inform all "Authorized 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 "Authorized 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.
11. Contact EH&S for assistance in developing energy isolation procedures and providing training to subordinates and "Authorized Personnel" as needed.

For departments hiring Contractors to conduct work at UC Merced, 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 as an example 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.

3.6 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 the example in 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 Campus Safety Officering 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.

3.7 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 assistance to develop alternative safe-work procedures when "Live Work" must be conducted instead of EI-LOTO, and
- Updating this program periodically or as regulatory change may dictate.

4.0 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.

Authorized 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. An "Authorized 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. An "Authorized Person" may develop written equipment-specific energy isolation procedures by completing the software application for EI-LOTO that would produce a document similar to that in Attachment 2 of this program. However, the EH&S department may develop them as well. A person's "Authorization" to conduct EI-LOTO is documented using Attachment 4 and kept in the "Authorized Person's" permanent employee file.

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 flywheel 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 electrical box containing the fuse/breaker locked shut. A knife switch disconnects locked in the 'off' position is also considered deenergized.

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.

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.

5.0 Methods of Locking Out Energy

5.1 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 transporting them. Refer to the UC Merced Electrical Safety Program appendix on the EH&S website for safe procedures to discharge and ground capacitors. The form to use in EI-LOTO at UC Merced is included as Attachment 3 of this program manual.


Locks and Tags on Single and Multiple Electrical Breakers

Electrical Plug Lock Box

5.2 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

5.3 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-shape wheel chock for rolling components, wrapping and locking chains around a movable equipment component and locking it to an immovable object, etc.

Steering Wheel Locking Cover

Installing a Machine Block

Wheel Chock Prevents Rolling

6.0 Program Requirements/Procedures

6.1 Owner Department Requirements

6.1.1 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.

6.1.2 New Facilities and Equipment

For new facilities or equipment being built or brought online by a Project Manager, the requirements of this program are integrated into project documentation by use of project specifications. The Department or Trade Group Supervisor assures that energy isolation surveys are documented by completing Steps 1, 2, 3 and 4 of Attachment 3 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 Department or Trade Group Supervisor assures signage and labels are installed on energy disconnects in compliance with this program specification by the General Contractor.

6.1.3 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 3. 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, as well as tracking annual audits.

6.1.4 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.

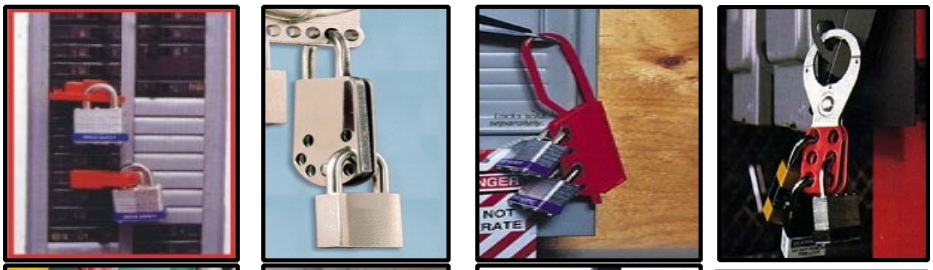
Disconnect Panels with "Lockout Here" Label and Energy Isolation Information

6.1.5 Providing Locks, Blocks, & Accident Prevention Tags

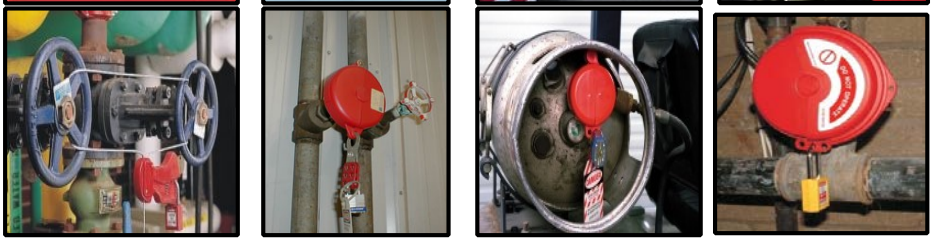
6.1.5.1. Locks

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 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"

6.1.5.2. 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 stores 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

6.1.5.3. 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

6.1.6 Authorizing Personnel

Only persons who are "Authorized" may conduct EI-LOTO processes. A person must be "Authorized" 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 authorized person's skills, and the energy sources on the equipment. All "Authorized 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. Authorized 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.

An "Authorized 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 "Authorized Person" or their Supervisor. A person may be considered "Authorized" with respect to certain equipment, certain types of energy sources, and certain safe-work methods on specific equipment, but not 'Authorized' for other equipment/locations within the same Department. It is the responsibility of the "Authorized Person's" Supervisor to determine limitations of "Authorization" for each and every person working under their direction, and document this on the "Authorized Person's" record by completing Attachment 4 and maintaining a copy in the "Authorized Person's" permanent file.

6.1.7 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 an "Authorized 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 "Authorized 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 "Authorized 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.

7.0 EI-LOTO Practitioner Procedures

7.1 Equipment-Specific Energy Isolation Procedures

Use the Energy Isolation Procedure template (Attachment 3) 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 "Authorized Person(s)" must be trained in this written procedure and fully knowledgeable of the hazardous energies related to the specific equipment.
3. "Authorized Person(s)" reassigned to different equipment must be trained on that specific equipment.

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

7.2 Rules for Using Energy Isolation – LOTO Procedure

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

1. Only "Authorized 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 Campus Safety Officer to assist in developing adequate alternative hazard control measures, such as the use of suitable temporary barriers, special tools, and personal protective equipment.

7.3 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 Authorized 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.

7. Only the worker who placed the lock may remove their lock.
8. The Supervisor or "Authorized Person" places a tag on each lock-out location.
9. All energy sources which could activate the machine must be locked, blocked or otherwise deenergized out following an equipment-specific EI-LOTO Procedure developed for that equipment. (Attachment 3)
10. All disconnects must be tested to ensure that all energy sources to the machine are off.
11. Electrical circuits must be checked by authorized persons with proper and calibrated electrical testing equipment. Stored energy in electrical capacitors must be safely discharged.
12. CAUTION: Return disconnects and operating controls to the "off" position after each test.
13. 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.

7.4 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.

7.5 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 authorized person that applied it, or under his/her direct supervision. If the authorized person is absent from the workplace then the lock or tag can be removed by an authorized person designated to perform this task provided that the immediate supervisor:

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

7.6 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.

7.7 Contractors

Contractors performing work at UC Merced that are not part of a joint project. Contractors are required to review UC Merced's Lockout/Tagout procedures and to comply with the requirements thereof, as well as, all applicable State, Federal and Local regulations regarding hazardous energy control.

7.8 Interrupted Work

When equipment or systems need to remain de-energized longer than one shift and the work has ceased for the day, all employees, as well as, contractors and researchers, shall communicate the operational status to the person in charge of that equipment or area. Any lockout/tagout installed on an appliance, machinery, equipment, or system shall remain on such equipment until the work is done or another Authorized Person takes control of the lockout procedure for that equipment or system. If the worker cannot remain at the equipment location the locks shall remain on the equipment and the person in charge of the equipment or area is fully apprised of the situation. It is important that an orderly transfer of lockout devices and information between the person initiating the lockout and any subsequent authorized person taking control of that equipment or system. New locks shall be installed, and new lockout permit will be initiated by the subsequently authorized person. Each authorized person will complete his/her permit form and apply his/her own locks and tags.

7.9 Emergency Lock Removal

In case of an emergency, a special lock/tag removal procedure shall be used prior to removing locks and tags. An emergency exists if equipment or systems require re-energizing to prevent injury to personnel, or to enable secured equipment to obtain minimum operating conditions.

Every effort shall be made to use normal procedures prior to emergency removal and every effort must be made to contact the Authorized Person involved, in other words the person installing the lock. The subsequent authorized person requiring removal of the lock must personally inspect the work site to ensure that work is no longer in progress and the equipment is safe to operate. The concerned parties shall complete the Special Lock and Tag Removal Form (see Attachment 5). The Department or Trade Group Supervisor approval is required before removing the lock. This can be done via telephone, provided that such information is documented on the worksheet. The removal form shall be retained in the Department's Lockout/Tagout manual and a copy provided to EH&S for reference. Further, all relevant information shall be recorded at the Lockout/Tagout log for that department (see Attachment 6).

8.0 Training Requirements

All persons identified in the "Roles and 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.

8.1 Owner Department's Training Requirements

Departments may identify "Authorized Person(s)" to perform maintenance on a particular piece of, or type of, equipment assuming that such person has the required training either through their enrollment in the UC Merced Learning Center on the EH&S website, or by phoning EH&S (2283347) and arranging for training to occur. Initial training 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 and Responsibilities" Section of this program.

8.2 EI-LOTO Practitioner Training

An "Authorized 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.

9.0 Record Keeping Requirements

Department supervisors are required to keep 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 UC Merced plus 3 years.

This can also be done through the LMS system.

The Depart Supervisors will 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 EH&S Safety Specialist has developed, or is developing, equipment-specific EI-LOTO procedures (see Attachment 2). Such EI-LOTO Procedures may also provide a template to Contractors conducting work for the Department. Hard copies of completed equipment-specific EI-LOTO Procedures are kept on a departmental or Trade group file for the equipment they lockout, and by EH&S. This may be done in electronic form.

9.1 Record Retention Requirements

9.1.1 Training Records

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

9.1.2 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.

9.1.3 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.

9.1.3 POPD Requirements

POPD retains the following:

- Records of EI-LOTO equipment lockout for 6 months in POPD Archives.

10.0 References

EH&S Phone: 209-228-4234 or http://ehs.ucmerced.edu/

EI-LOTO Program Manager: Mal Donohue, Director EHS Campus Safety Officer
Phone: 209-228-4234
Email: mdonohue@ucmerced.edu

11.0 Issued by and Next Review Date

Issued by: Chou Her, Campus Safety Officer
Approved by: Mal Donohue, EH&S Director
Issue Date: July 1, 2021
Next Review Date: Three years from Issue Date

12.0 Attachments

Attachment 1.	Equipment Log
Attachment 2.	Energy Isolation – EI-LOTO Equipment Specific Procedure (Example)
Attachment 3.	Energy Isolation – EI-LOTO Form
Attachment 4.	Training Record and Authorization of Personnel
Attachment 5.	Special Lock Removal Worksheet
Attachment 6.	Energy Isolation – EI-LOTO Department Log

Energy Isolation – Lockout/Tagout Program –
Equipment Inventory & 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 3, 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. **Procedure Audit**

Equipment Name	**Location**	**Energy Sources**	**Magnitude**	**Date Initials**	**Date Initials**
Example: *Piston Air Compressor #3*	*Level 1, Machine Room* *Hildebrandt Hall*	*Electricity* *Compressed air* *Heat* *Rotating Equipment*	*3 Phase, 50 Amps, 480 volts* *120 psi tank / piping* *Manifold 220 degrees F* *50 lbs. flywheel and belts*	*4/15/10* *JNG*	*4/05/11* *GWB*
Example: *Vacuum Vane Pump #1*	*Level B2, Machine Room* *Stanley Hall*	*Electricity – Main* *Electricity – Control* *Vacuum* *Domestic Water* *Rotating Equipment* *Heat*	*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*	*3/6/09* *RBW*	*2/28/10* *GWB*

YEAR: _____ DSC NAME: _____ PAGE _____ OF _____

Energy Isolation – Lockout/Tagout Program – Equipment Inventory & EI-LOTO Audit Tracking Form

Equipment Name	Location	Energy Sources	Magnitude	Procedure Date Initials	Audit Date Initials

YEAR: _____ DSC NAME: _____ PAGE _____ OF _____

Lockout-Tagout Procedure: CHILL WATER

Equipment Name: CHILL WATER

Location: Student Services

Date: April 13, 2015 at 1:14:57 PM PDT

Contact Name: ROBERT MASASSO

EQUIPMENT PHOTO

GENERAL SCOPE OF WORK

Access/Operational Control

JOB PLANNING

Safety Process

- **VERIFY, THEN VERIFY AGAIN, ALL ELECTRICAL CIRCUITS ARE DEAD**

Safety Equipment

- **RADIO**
- **CELL PHONE**
- **TEST METER 1000 VOLTS AND UNDER - USE STANDARD PROBES**

Minimum Number of Locks and Tags is 2

Please Note: Use of a lock box is suggested for three or more people doing LOTO on three-or more energy sources to minimize number of locks needed.

- INSTALL BLANKET & USE CABLE LOCK TO SECURE
- 1-POLE BREAKER SWITCH LOTO DEVICE

Personal Protective Equipment

- **SAFETY GLASSES LONG PANTS AND LONG-SLEEVES**
- **STEEL / COMPOSITE TOE BOOTS**

LOTO PROCEDURE

1. Be familiar with and trained on safety processes noted above.
2. Assemble safety equipment, LOTO equipment and PPE noted above.
3. Travel to LOTO location with all equipment.
4. BEFORE STARTING LOTO: Put on your PPE. Then, verify that the LOTO energy sources and what equipment you are working on agree and make sense to this procedure.
5. Modify this LOTO procedure as needed to ensure your safety, and alert others of ANY procedure modifications before doing LOTO.
6. Apply LOTO equipment to each energy source in sequence shown below.
7. Remove LOTO equipment in reverse sequence unless otherwise noted in "Special Instructions for Removing LOTO" as noted below.
8. Make procedure corrections if needed and save for future reference

ENERGY SOURCE(S)

SEQUENCE	SOURCE	MAGNITUDE/TYPE
1	ELECTRICAL (CONTROL POWER)	**Amps:** 15 **Volts:** 480 **#Phase:** 3

LOTO EQUIPMENT

- 1-POLE BREAKER SWITCH LOTO DEVICE

SEQUENCE SOURCE

MAGNITUDE/TYPE

PSI: 60

2 FLUID UNDER PRESSURE

Source: Chiller - Central plant

LOTO EQUIPMENT

- BALL / GATE / GLOBE VALVE LOTO DEVICE AND LOCK

PROCEDURE PREPARED BY

Prepared By: Bill Collier

Standard EI-LOTO Procedure

1. All LOTO personnel are issued a suitable lock (or locks for multiple energy sources). Each lock has the individual person's name or other identification on it. Each LOTO person has the only key to the lock / lock set.

2. All energy sources which could activate the machine must be locked or blocked out following an equipment specific LOTO Procedure developed for that equipment. (Use specific info in other part of this procedure to complete safe LOTO on the equipment.) 3. LOTO-qualified personnel check 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.
4. 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 remains or can build-up in piping or in reservoir tanks.
5. Gas cylinders must be locked 'closed' and if possible disconnected from distribution piping.
6. Any mechanical component that could roll, shift, or otherwise move, such as springs, counterweights, wheels, fan blades, etc. must be chained, barred, or blocked to prevent movement.
7. Each person who will be working on the machinery must put a lock on each of the machine's lockout device(s). Each person's lock must remain on the machine until their work is completed. Only the person who placed the lock may remove their lock.
8. All disconnects must be tested to ensure that all energy sources to the machine are off.
9. Electrical circuits must be checked by qualified persons with proper and calibrated electrical testing equipment and verified dead. Stored energy in electrical capacitors must be safely discharged to ground with ground-straps left attached during LOTO.
10. CAUTION: Return disconnects and operating controls to the "off" position after each test.
11. The Supervisor or LOTO-Qualified Person places a tag on each LOTO location.
12. Accident prevention tags must state 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

During LOTO, machinery may need to be tested and therefore energized before additional equipment 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 to re-energize the equipment.
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 LOTO procedure is not feasible. If machinery must be capable of movement in order to perform maintenance / repair / adjustments, personnel 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. Ensure 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 following the correct removal sequence specific to the equipment.
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 workplace 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 their LOTO device has been removed; and
3. Ensures that the qualified person knows their LOTO 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.

Energy Isolation - LOTO FORM

Hazardous Energies Control Procedure

Equipment Name: _____ **Building:** _____ **Location / Room Number:** _____

Describe scope of work:	**Instructions:** *Follow the steps to create a written sequence for de-energizing, lockout, testing, and start-up of equipment requiring energy isolation (EI). 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. (see continued instructions below)*

STEP 1: Survey and mark 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	**STEP 4:** List sequence of EI (1-12)
[X]	**ENERGY SOURCE**	**MAGNITUDE / TYPE**	**ISOLATION / DEVICE / LOCATION / METHOD**	**[#]**
	ELECTRICITY– Main power	Amps: Volts: # Phase:		
	ELECTRICITY– Control circuit(s)	Amps: Volts: # Phase:		
	BATTERY / SOLAR / ALT POWER AC / DC / PH:	Amps: Volts:		
	COMPRESSED AIR / GASES	PSI: Gas Type:		
	STEAM / CONDENSATE	PSI: Source:		
	FLUID UNDER PRESSURE	PSI: Source:		
	HEAT / COLD ±°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:		

Instructions (contd.): *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 or concerns at (209) 228-3347.*

STEP 5: Mark and check off all PPE and safety equipment to be used for Energy Isolation.				**PROCEDURE PREPARED BY:**
[x]	**PPE TO BE WORN DURING WORK**	**[x]**	**SAFETY EQUIPMENT TO BE USED DURING WORK**	

Energy Isolation - LOTO FORM

Hazardous Energies Control Procedure

	Goggles		Face Shield		Weld Gear					Fire Extinguisher		Fire Watcher						(PRINT NAME)	
	Boots		Steel Toe		Rubber		Other			Lines Blinded & Tagged								SIGNATURE / DATE:	
	Gloves		Leather		Rubber		Insulated			Valves / Switches – Locked & Tagged									
	Respirator		Dust		Chemical					Remove Flammables / Combustibles								**ANNUAL REVIEW COMPLETED BY:**	
	Thermal		Heat		Cold Protection					Bleeders Locked Open & Tagged									
	Apron		Wet Gear		Other					Shields		Arc Curtain		Heat Blanket				(PRINT NAME)	
	Safety harness				Lanyard & Line					Blocks		Barricades		Bars		Chains		SIGNATURE / DATE:	
	Other: _____									Tools		Insulated		Long Handle					

NOTE: This procedure must be strictly followed to ensure protection of all persons involved. Return completed form to UC Merced Facilities B- 5200 North Lake Road, Merced, CA 95338

NOTE on SHIFT CHANGES: If this procedure lasts more than one work shift, the oncoming persons will apply their locks and tags before the departing shift removes their locks and tags.

Standard Energy Isolation – Lockout / Tagout (LOTO) Procedure

1. 2.
3. 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.
4. 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
5. project supervisor, are informed before the energy sources are being turned off because unexpected sudden loss of power could cause an accident.
6. 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.
7. Gas cylinders must be locked 'closed' and if possible disconnected from distribution piping.
8. Any mechanical component that could roll, shift, or otherwise move, such as springs, counterweights, wheels, fan blades, etc. must be chained, barred, or blocked.
9. 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.
10. Only the worker who placed the lock may remove their lock.
11. The Supervisor or "Qualified Person" places a tag on each lock-out location.
12. 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)

All disconnects must be tested to ensure that all energy sources to the machine are off.

Electrical circuits must be checked by qualified persons with proper and calibrated electrical testing equipment. Stored energy in electrical capacitors must be safely discharged.

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

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 LOTO	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 workplace 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.

NOTE: This procedure must be strictly followed to ensure protection of all persons involved. Return completed form to UC Merced Facilities B- 5200 North Lake Road, Merced, CA 95338

NOTE on SHIFT CHANGES: If this procedure lasts more than one work shift, the oncoming persons will apply their locks and tags before the departing shift removes their locks and tags.

Energy Isolation – Lockout/Tagout Program – Training Record of "Authorized Person"

To: Personnel File for _____

From: _____ Date**:** _____

TO BE COMPLETED BY THE PI / SUPERVISOR OF THE "AUTHORIZED PERSON" conducting Energy Isolation – Lockout/Tagout work:

Re: This document confirms required authorization of the above-named person to perform: *(Check all that apply)* □

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 (<150psi) □ Hydraulic systems (>150psi)

□ Hot Fluids/Gases □ Steam

□ Mechanical Equipment – springs / Counterweights / Fly Wheels / Fan Blades / Blocks □

Other (describe):

This designation of "Authorized Person" is based on evidence of safe performance of all duties related to Energy Isolation through: *(Check all that apply)*

☐ Training on UC Merced 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 authorization will be revoked. Below are signature(s) of person(s) verifying training and/or experience:

PI / Supervisor Signature: _____ Date**:** _____

Authorized Person's Signature: _____ Date**:** _____

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

Energy Isolation – Lockout/Tagout Program – Special Lock Removal Worksheet

This worksheet is for ***emergency use only***.
All attempts to utilize normal procedures shall be exhausted before utilizing this worksheet.

Requester's Name: _____ Date: _____

Signature: _____

I want to remove the lock and/or tag presently securing the following equipment:
The lock and/or tag cannot be removed using standard procedure because:
I have considered the following safety issues:

Required Approvals

UC Merced Supervisor		
Name:	Date:	Time:
Signature:		
UC Merced Employee Initiating New LOTO Form		
Name:	Date:	Time:
Signature:		

Energy Isolation – Lockout Tagout Record Sheet

Date Locked or Tagged	**Equipment Location:** Building, Floor, Room Number	**Equipment Description or Energy Source Secured:** Air – Gas – Steam – Gravity – Spring – Fluid – Electricity	**Lock Number**	**Person Setting Locks / Tags**	**Date Cleared**	**Person Removing Locks / Tags**	**Equipment Operational? Indicate (Yes / No)**
				Print Name:		Print Name:	
				Print Name:		Print Name:	
				Print Name:		Print Name:	
				Print Name:		Print Name:	
				Print Name:		Print Name:	
				Print Name:		Print Name:	
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