Control of Hazardous Energy Program

(Lockout/Tagout; LOTO)

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1. PURPOSE and BACKGROUND

Hazardous energy can be any form of kinetic or potential energy (electrical, thermal, hydraulic, pneumatic, chemical, and mechanical, etc.) that if not controlled properly can seriously injure or kill individuals that are working on machinery and equipment.

OSHA instituted the Control of Hazardous Energy (Lockout/Tagout) Standard 29 CFR 1910.147 to ensure the protection of all individuals working on or around machinery and equipment, from the accidental startup; or release of stored energy during servicing and maintenance of said machinery and equipment.

MIT has developed this Control of Hazardous Energy (Lockout/Tagout or LOTO) Program to protect all MIT employees, students, affiliates, and staff (herein after referred to as "staff"), as well as contractors, in accordance with the above OSHA regulation.

2. SCOPE and APPLICABILITY

This LOTO program outlines the minimum measures for controlling hazardous energies – electrical, mechanical, hydraulic, pneumatic, chemical, thermal, and other energy sources. Departments, Labs and Centers (DLCs) can develop and utilize their own program elements such as proprietary software as long as they meet the minimum requirements set forth in this document.

The minimum required program elements are:

(1) Energy control procedures (ECPs) for each machine or piece of equipment that requires one;
(2) Staff training; and
(3) Periodic Inspection Requirements

This program also requires adherence to the following applicable electrical safety-related work practices and standards when there is potential exposure to an electrical hazard:

(1) OSHA regulations (29 CFR 1910.333)
(2) NFPA 70E – Standard for Electrical Safety in the Workplace

OSHA LOTO requirements apply to MIT Staff servicing or maintaining equipment who:

(1) Remove or bypass a guard or other safety device.
(2) Place any part of their bodies in or near a machine's point of operation, or

(3) Place any part of their bodies in a danger zone associated with machine operations.

Note: Work near exposed electrical circuits with the potential of hazardous conditions (typically > 50 volts) may trigger LOTO requirements.

LOTO requirements do not apply to:

(1) Minor tool changes, adjustments and servicing activities which take place during normal operations, provided they are *routine, repetitive* and *integral* to the use of the equipment (e.g., chucking a piece in a lathe) and are performed using alternative measures that give effective protection.

Note: At MIT, it is required to apply LOTO if the task being performed is a minor servicing activity but there is no adequate alternative LOTO control determined by a risk assessment.

(2) Work on cord and plug connected electric equipment for which the only exposure to the hazards of unexpected energization or startup of the equipment are controlled by the unplugging of the equipment from the energy source. The plug must be *under the exclusive control* of the staff member performing servicing or maintenance.

Note: "Under the exclusive control" refers to instances in which the plug is physically in the possession of the staff member; in arm's reach and in the line of sight of the staff member. This exemption is voided if there are other non-electric energies, as described above, that present hazards to staff.

3. PREREQUISITES

Generally, an EHS professional with adequate experience at MIT EHS and in relevant regulatory standards, industry standards, and LOTO practices may implement and monitor the requirements set forth in this Program. The actual verification of the electrical shutdown may require electrical safety experts from within or outside of MIT.

The MIT EHS-MS includes the use of an on-line Training Needs Identification process via the MIT Learning Center. Completion of this assessment with respect to the relevant questions on electrical hazards is required of all laboratory-based research staff will trigger completion of the Authorized Person Training.

4. ROLES and RESPONSIBILITIES

Department Lab or Center (DLC) Leadership

It is each DLC's responsibility to decide how administrative and financial support should be provided for implementing and maintaining this Program and its requirements including the following:

- Resources to identify all DLC owned equipment that require LOTO
- Resources to acquire the necessary Lockout Devices and Tags needed for identified equipment.
- Ensure resources are available for the Periodic Inspection Requirements

DLC Laboratory/Shop Staff

- Develop ECPs with assistance from their EHS Coordinator, DOF and the EHS Office.
- Authorized training needed for those staff maintaining or servicing equipment. Affected training for those operating equipment needing LOTO for maintenance or servicing.
- Authorized staff maintain proficiency and understanding of ECPs and how to access them for service and maintenance operations.
- Affected and other staff understand that LOTO Devices are designed to protect the staff working on the equipment and do not try to remove devices or operate the equipment while LOTO is in place.

DLC Facility Manager*

- Ensure DLC contractor's maintenance procedures include LOTO when required while servicing and maintaining DLC owned equipment.
- Ensure contractors coordinate with the Department of Facilities when DLC equipment is being worked on by external contractors.
- Obtain training sufficient to ensure compliance with the LOTO needs present in their DLC. In most cases this will be training to the Affected level, some Facility Managers should consider Authorized Person Training.

* Or DLC designee applicable in DLCs without a Facility Manager or in situations where the Facility Manager is not taking on these responsibilities.

EHS Office

- Writing and maintaining this program to meet or exceed OSHA requirements and informing DLCs of this program's requirements.
- Provide general program awareness information across campus through outreach efforts including the MIT EHS website.
- Provide assistance for DLCs and personnel in implementation of this program.
- Make available LOTO training to all authorized and affected personnel identified by each department.

- Recommend energy isolation equipment and processes for general and / or specific use.
- Provide assistance in development of LOTO Procedures,
- Update this program periodically or as required by regulatory change.
- General oversight of MIT LOTO Program requirements as required by the OSHA standard.

EHS Coordinators and/or LOTO Coordinators*

- Assist in identifying laboratory and machine shop/makerspace equipment with LOTO needs.
- Ensure personnel in DLC areas with LOTO needs receive the appropriate training.
- Facilitate coordination with the EHS Office, DOF and Facility Managers as needed to ensure effective ECPs are developed that identify energy isolation points and ensure coordination with DOF.
- DLC EHS Coordinators will conduct or coordinate annual inspection/review of DLC ECPs either during Level II Inspections or separately.

*In certain DLCs, a LOTO Coordinator may be designated to facilitate the EHS Coordinator responsibilities and of those of the Laboratory/Shop Staff.

External Contractors

- Work with the DLC Facility Manager and/or Laboratory/Shop Staff to all parties are informed of their respective LOTO procedures.
- Follow applicable elements of the DLC equipment specific ECPs (outside contractors will likely have their own LOTO procedures) If Department of Facilities has Locked Out energy sources, verify and add contractor personal locks to the Group LOTO.
- The contractor must have a LOTO program that they adhere to and provide their own LOTO devices.

MIT Department of Facilities (DOF)

- Provide energy magnitude and isolation location to DLCs for DOF controlled building utilities associated with equipment needing LOTO.
- Isolate building energy sources using LOTO when required for DLC ECPs upon request. Work with DLC staff or contractor personnel to ensure building utilities are jointly locked out (Group LOTO).
- Communicate shutdown requests affecting DLC owned equipment to DLC personnel.
- Ensure the utilities for new equipment with ECP requirements are identified for the DLC and can be locked out by DOF as needed.
- Ensure the DOF LOTO program remains consistent with this document.

5. GUIDELINES

NOTE: MIT requires that any isolation point that can receive a LOTO Device must be locked out. If there is an isolation point that cannot receive a LOTO Device, contact EHS for assistance as there are further requirements needed for Tagout only operations**.**

NOTE: Designated Locks and Danger Tags shall ONLY be used for energy control (LOTO) during active servicing and maintenance. Do not use designated locks and tags for other reasons (e.g., access restriction).

5.1 Simple LOTO

Although the LOTO process for this equipment must still be followed, a written energy control procedure (ECP) is not required by MIT for servicing or maintenance on machinery or equipment that satisfy all of the following conditions:

- The machinery or equipment has a single energy source that can be readily identified and isolated;
- The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment;
- The machinery or equipment is isolated from that energy source and locked out during servicing or maintenance;
- A single LOTO device will achieve a zero-energy condition;
- The LOTO device is under the exclusive control of the authorized staff member performing the servicing or maintenance; and,
- The servicing or maintenance does not create any hazards for other staff.
- The machinery or equipment has no potential for stored or residual energy, or for re-accumulation of stored energy after shut down;
- There have been no prior accidents at MIT involving the unexpected activation or re-energization of that specific machinery or equipment during servicing or maintenance.

5.2 Complex LOTO

If any of the above criteria are not satisfied then a written energy control procedure (ECP) specific to each applicable machinery or equipment is required by law / regulation / OSHA (control of hazardous energy regulation). A risk assessment is required to develop, document and implement an energy control procedure. This procedure details and documents specific information that an authorized staff member must know to bring machinery or equipment to the zero-energy state, namely the scope, purpose, authorization rules and techniques to be utilized for the control of all hazardous energy.

At a minimum the procedure must contain the following:

- A specific statement of the intended use of the procedure;
- Specific procedural steps for shutting down, isolating, blocking, and securing machinery or equipment to control hazardous energy;
- Procedure for notifying affected personnel and documenting shutdowns
- Specific procedural steps for the placement, removal, transfer of LOTO devices, and assigned responsibility; and
- Specific requirements for testing a machine or piece of equipment to determine and verify the effectiveness of LOTO devices, and other energy control measures.

Energy control procedures must be maintained in a way that is readily accessible when needed for maintenance or servicing. It is recommended that ECPs are printed out and kept with other operation and maintenance materials for the tool or equipment. **See *Appendix C* for the MIT ECP Template.** DLCs may opt to use a different ECP template or 3rd party software**.**

NOTE: An energy control procedure template may be written for identical machinery or equipment (those using the same type and magnitude of energy and substantially similar controls). Each unique isolation point must be identified in the procedure.

5.3 Steps to Control Hazardous Energy (LOTO)

The following LOTO procedure must be followed, at a minimum:

Prepare - Before an authorized staff member locks out machinery or equipment, they shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

Notify - Notify all staff in the surrounding area that will be affected by the planned LOTO. Proceed to your DLC's Centralized Lock Station (if applicable) and complete the MIT LOTO Log form (*Appendix C*) to retrieve a lock and an ID tag. *These locks and ID tags are not to be provided to contractors.*

Shutdown - If the machinery or equipment is operating, shut it down using the normal stopping procedure (stop button, toggle switch, valve, etc.).

Isolate and Lockout - All energy-isolating devices that are needed to control the machine's energy sources must be located. These devices must then be used to isolate the machine or equipment from its energy source(s). LOTO devices must be affixed to each energy-isolating device by authorized staff members. This may mean that multiple locks are required for each staff member working on the equipment. LOTO devices where used, must be

affixed in a manner that will hold the energy isolating devices in a "safe" or "off" position.

NOTE: The Department of Facilities will locate, isolate and lockout all facility owned energy sources unless prior approval is granted by DOF. This does not include single point isolation devices, such as electrical disconnects associated with specific equipment under DLC control.

Release - After the energy-isolating device has been locked out, all potentially hazardous stored or residual energy must be relieved, disconnected, restrained, and otherwise rendered safe.

Examples of possible sources of stored energy:

- Capacitors
- Coiled springs
- Elevated machine members
- Rotating fly wheels
- Air, gas, steam, chemical and water systems

Verify - Prior to starting work, verify that isolation and de-energization of the machine or equipment has been accomplished. This can be verified by an authorized staff member using normal equipment starting procedures or meters, gauges and visual inspection.

NOTE: Although any LOTO authorized staff member can apply locks and verify most energy sources, electrical energy LOTO verification must be conducted by a person qualified on safe electrical work practices related to exposure to energized electrical equipment. The Department of Facilities will verify the de-energization of all facility owned energy sources.

NOTE: For electrical verification, the qualified person shall use test equipment to test the circuit elements and electrical parts of the equipment to which staff will be exposed, verifying that the circuit elements and equipment parts are de-energized and are safe. The test equipment shall be checked for proper operation on a source of similar voltage before and after this test.

Restoring Machines and Equipment to Normal Operation – The following steps shall be followed when returning a piece of equipment or instrument to normal operating mode after maintenance or service has been completed.

- Verify - Check and remove all tools from the machinery or equipment and confirm that all guards, pulleys, and safety devices have been reinstalled and are secure.
- Remove all Locks and ID tags.
- Notify affected staff that you are about to restore energy to the equipment.

- Operate the energy-isolating devices to restore energy to the machinery or equipment.

5.4 Information for DLC on How to reach out to DOF for LOTO

De-energization of DLC operated equipment may require the assistance of DOF trades (electricians, plumbers, etc.). Examples would include access to circuit breakers or other utilities that feed lab equipment. Appendix A contains the possible scenarios where DOF and other stakeholders may have a role in LOTO.

Electrical panels located throughout campus are maintained by DOF, and should never be accessed or manipulated by non-DOF persons without the explicit written permission of the DOF electrical group. This same rule applies to other utilities including but not limited to building compressed air systems, steam, water, and building ventilation systems.

When planning for LOTO, identify DOF owned systems associated with the equipment Energy Control Procedures and submit a request through Atlas. To create a request, choose “repairs”. Complete the form for Lab Equipment and indicate the intention to Control Hazardous Energy / LOTO. Completed forms will be triaged through the Service Center and an appropriate DOF tradesperson will be dispatched to your location.
For emergency requests, contact the operations center at 617-253-4948 to have DOF dispatched immediately. This service is available 24/7.

5.5 Additional Information for Specific Circumstances:

Testing and Debugging - When testing or debugging requires temporarily energizing machinery or equipment, the following steps must be taken:

- Clear the machine of tools and materials;
- Clear all personnel or be sure that they are safely positioned;
- Remove LOTO devices and notify affected staff;
- Wear appropriate PPE;
- Energize and proceed with testing;
- De-energize all systems, notify affected staff, and reapply energy control devices; and
- Comply with the arc flash procedure if required.

Shift Changes – If the LOTO extends through multiple shifts, the lock by the second shift staff member shall be applied prior to the first shift staff member removing their lock. Transition locks and tags are an alternate method used

when equipment must remain under LOTO, but a worker is not actively working on the equipment.

Provisions Covering Contractors – Contractors must be aware of MIT's LOTO Program and provide their own lockout devices and ID tags. Contractors should share their LOTO procedure with MIT when requested. They shall add their LOTO devices to all Department of Facilities energy sources that have already been locked and tagged. The contractor's ID tag must show the contracting firm's name and the name of the individual to whom the lock belongs.

Group LOTO - When there is more than one authorized staff member working on a piece of equipment or staff are attaching their lock to a DOF Group LOTO, each authorized staff member must affix a personal lock and tag to the group lockout device, group lockbox, or comparable device before beginning work, and must remove it upon completion of their work. Each authorized staff member shall verify that the machinery or equipment has been properly isolated and locked out before starting work.

Removal of Another Staff Member's or a Contractor's Lock – Under normal operation, each LOTO device shall be removed from its energy-isolating device only by the authorized staff member or contractor who applied it. If for some reason it is necessary to remove another staff member or contractor lock from a piece of equipment, the following procedure must be followed:

- Every attempt should be made to contact the authorized staff member or contractor whose lock is on the machine;
- If the authorized staff member or contractor cannot be reached, then their direct supervisor will be contacted;
- If the direct supervisor cannot be reached, then Facilities will be contacted; and
- If Facilities cannot be reached, then EHS will be contacted.

If it is not possible to contact any of the above-mentioned for authorization to remove the lock, the lock must stay in place.

If any of the above-mentioned, is unable to authorize removal of the lock due to safety concerns, the lock must stay in place.

If the lock needs to be removed by another authorized staff member, the lock number must be logged as cut (this lock number cannot be reissued), and the names of the authorized staff members who added and removed the lock must be documented. The authorized staff member who attached the lock must be notified of the lock removal immediately upon return to work.

Unattended Locks – If the equipment is left unattended a check must be made before work resumes, to verify that the lock has not been removed or damaged.

Working on energized circuits
Work on de-energized systems should always be done when possible. If there are situations when de-energization is not possible, approval must be obtained from the DLC Director or Department Head or their authorized designee prior to any work on energized circuits. The PI or Supervisor must verify that de-energizing the circuits will create additional or increased hazards or it is unfeasible due to equipment design or operational limitations. Follow all requirements of NFPA 70E to ensure Staff safety during this work.

6. TRAINING and DOCUMENTATION

Staff training and retraining ensures that the purpose and function of the energy control programs are understood. Current training records must be maintained for each authorized and affected staff member.

Certification of training shall include each staff member's name and date of training.

MIT provides a general LOTO awareness training for Affected Staff. Authorized Staff receive more detailed classroom and hands-on training covering the recognition of applicable hazardous energy sources, the type and magnitude of the energy, and the methods and means necessary for energy isolation and control associated with the machinery or equipment they are authorized for. Depending on the type of hazardous energy involved, equipment specific training will be conducted by a qualified DLC staff member, DOF trades person, or external contractor. After training is provided, authorized staff will know the specifics of the equipment that they work on and can assist in the hands-on training of ECP development and use.

Upon completion and documentation of authorized staff LOTO training, Lockout Devices and tags shall be made available whenever they initiate LOTO on a piece of equipment they are authorized to work on. Although generic LOTO tags can be utilized, best practice is to provide personalized tags with a photo of the authorized staff member added.

NOTE: Trained staff members are only allowed to perform maintenance or servicing on specific equipment with which they are familiar. **Only use LOTO on equipment you are authorized to work on.**

Retraining (and documentation of retraining) is needed when:

- There is a change in job assignments;

- There is a change in machines, equipment, or processes that present a new hazard;
- There is a change in the energy control procedures;
- Periodic inspections reveal that there are deviations in the energy control procedure; and
- It is apparent that there are deviations from, or inadequacies in, the staff member's knowledge or use of the energy control procedures.

MIT reserves the right to revoke authorized staff member status from any individual who no longer needs this status or is continually non-compliant with this program.

7. MONITORING REQUIREMENTS

Training

The MIT EHS-MS provides for routine and regular evaluation of training requirements and status, and gaps in completion. The EHS-MS uses a database-driven training needs that requires new staff to register and complete training requirements, as determined through the assessment. EHS will periodically monitor overall compliance with the requirements for Training and report those to EHS Coordinators.

EHS Coordinators are expected to regularly monitor their DLC training databases to identify new or changed status conditions regarding authorized and affected staff. Wherever a DLC identifies significant issues related to incomplete training, they should make reasonable efforts to solicit completion of training.

The EHS-MS provides for consequences in circumstances of extended non-compliance with training requirements.

Inspections and Documentation

DLCs conduct periodic (at least annual) inspections of LOTO procedures; authorized staff member competency; availability of LOTO equipment and any locked-out equipment (if present), to ensure compliance with this program. The LOTO reviews are conducted or coordinated by the EHS Coordinator and/or at least one authorized staff member familiar with the equipment.

The authorized staff member included in the review must understand the ECP but must not be the staff member utilizing the ECP at the time of the review. Each ECP must be verified for its accuracy, completeness and effectiveness in energy control.

Each DLC maintains documentations and certifications that the periodic inspections have been performed. The certification shall:

- Identify the machine on which the procedure was utilized;
- The date of inspection;
- The staff member included in the inspection; and
- The staff who performed the inspection.

The EHS Office has an oversight role in reviewing annual DLC inspections. Each DLC with LOTO needs, on a rolling basis starting six months after the implementation of this program, will be contacted to confirm that the requirement for annual inspections is being met.

8. RECORD MANAGEMENT

This section incorporates record management practices defined by the EHS office or DLCs. These would include this SOP, the MIT Learning Center, training completion records and sign-in sheets, Level II EHS-MS Inspection sheets, Inspection verification audits, and any official correspondence to authorized, affected, potentially affected and/or their supervisors.

9. REFERENCES

Standards

- 29 CFR 1910.147: Control of Hazardous Energy (Lock-out, Tag-out)
- 29 CFR 1910, Subpart S, "Electrical" Sections 301 through 335
- NFPA 70E, *Electrical Safety Requirements for Employee Workplaces* (latest edition)

10. DEFINITIONS

- **Authorized Staff:** A staff member who locks and tags machines or equipment in order to perform servicing or maintenance.
  Required training:
  - How to find and recognize hazardous energy sources
  - Be able to identify the types and magnitudes of energy sources in the workplace
  - How to isolate energy sources
- **Affected Staff:** A staff member who is required to use machines or equipment on which servicing is performed under the LOTO standard or who performs other job responsibilities in an area where such servicing is performed.
  Required training:
  - The purpose of energy control procedures

- How energy control procedures are applied
- Notified of LOTO and stay clear of locked out equipment

- **Other Staff:** All staff who are or may be in an area where energy control procedures may be utilized.

  Required training:

  - Awareness level training about Energy Control Program.
  - Understand to stay clear of locked out equipment.

- **Capable of being locked out:** An energy-isolating device is considered capable of being locked out if it: 1) Is designed with a hasp or other means of attachment to which a lock can be affixed; 2) Has a locking mechanism built into it; and 3) Can be locked without dismantling, rebuilding, or replacing the energy-isolating device or permanently altering its energy control capability.

- **Energized:** Machines and equipment are energized when they are connected to an energy source or they contain residual or stored energy.

- **Energy-isolating device:** A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors; a line valve; a block; and any similar device used to block or isolate energy; Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

- **Energy source:** Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

- **Group LOTO device:** A specially designed hasp, cabinet or lock box whereby each authorized staff member working on the machine or equipment can affix their own lock.

- **Lockout:** The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy-isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

- **Lockout device:** Any device that uses positive means, such as a lock, blank flanges and bolted slip blinds, to hold an energy-isolating device in a safe position, thereby preventing the energizing of machinery or equipment.

- **Normal production operations:** Utilization of a machine or equipment to perform its intended production function.

- **Servicing and/or maintenance:** Workplace activities, including installing, setting up, inspecting, adjusting, repairing, replacing, constructing, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment, and making adjustments or tool changes, during which the staff member may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

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

- **Stored Energy:** Any source of potential energy, which would include the following:
  - Hydraulic or pneumatic pressure
  - Pressure below atmospheric (e.g. vacuum system)
  - Compressed or extended springs
  - Potential energy due to gravity
  - Stored mechanical energy (e.g., moving flywheels)
  - Static electricity
  - Stored electrical energy (e.g., charged capacitors or batteries)
  - Thermal energy
  - Residual chemicals in pipes which may cause thermal or pressure buildups.

APPENDIX A: ACTIONS FOR DLC RESEARCHER OWNED EQUIPMENT WITH HAZARDOUS ENERGY SOURCES

DLC Researcher Owned equipment	Examples	DLC Researcher or Lab Group Action Required	Facility Manager Action required	Department of Facilities Action required
Plug in tools and equipment	Benchtop machine tools and lab equipment	LOTO Awareness training, disconnect plug and control	None	None
Hard Wired (single isolation point under DLC control) e.g., local disconnect	Researcher built systems, machine tools	LOTO Authorized training, no ECP required if single source. Switch off and lockout isolation point.	Facilitate work by contractors	None
Hard Wired (multiple isolation points under DLC and DOF control) e.g., local disconnect and steam line	Autoclave (vendor maintained)	LOTO Authorized training, DLC owned ECP, LOTO of DLC owned equipment	Coordinate with DOF	DOF will identify energy sources (electrical/steam/ other) for the ECP. LOTO of DOF equipment only
Single isolation point at DOF electrical panel	Researcher equipment, hard wired with no local disconnect	LOTO Authorized training, Add lock to DOF LOTO device	Role is DLC dependent, may be responsible for oversight, and/or coordination with DOF	LOTO of electrical panel
Hard Wired (multiple isolation points under DLC control)	Gas bunker maintenance	LOTO Authorized training, ECP required	Role is DLC dependent, may be responsible for oversight, and/or coordination with DOF	Verify and apply lock to DLC LOTO device
Hard Wired (multiple isolation points)	NW12 Reactor shutdown	LOTO Authorized training, ECPs required, proper equipment	DLC dependent, may be responsible for oversight, and/or coordination with DOF	Review DLC ECP Verify appropriate shutdown procedures
Facilities equipment	HVAC, exhaust fans, compressors	Receive notification secured equipment/chemicals if needed	Coordination between DOF and DLC, potential approval of shutdown	DOF ECP, training

APPENDIX B: LOTO EQUIPMENT

Locks – Each DLC should Designated Locks shall ONLY be used for energy control (LOTO) during active servicing and maintenance. Each lock has a unique key such that only the authorized staff member who uses the lock has access to it. MIT requires that each time a lock is applied to an energy isolation device an ID tag shall also be required.

ID Tags – Authorized staff members may be issued personalized ID tag(s) or have tags available with fillable fields. The tags will identify the individual staff member. An ID tag must always be firmly attached to the lock on the energy-isolating device.

Best Practice

Energy-Isolating Equipment and Group LOTO – Multi-lock hasps for group LOTO and any other energy isolating hardware may be used when necessary.

Other – MIT allows for locks other than those designated for LOTO to be used as restricting devices for the safe use of equipment only by trained staff. The addition of a 'Restricted' or a 'Caution' tag should be applied as well. These locks and other tags are intended for equipment that do not necessarily require LOTO locks (i.e., restricted use, out of service, decommissioning).

APPENDIX C: MIT ECP Template

(To use the MIT ECP Template, download and save the template.)

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MIT ENERGY CONTROL PROCEDURE (ECP)

DESCRIPTION:			
DLC:	DLC using the ECP	Building-Room:	e.g., N52-496
Equipment/Tool Description:	Equipment or Tool Description	Asset or ID #:	Enter Asset or ID here
PI or Lab Group:	Enter PI or Lab Group	ECP review date:	Date ECP was last reviewed

PURPOSE:
This ECP establishes the minimum requirements necessary to protect MIT Staff from injury caused by the unexpected energization, start up, or release of stored energy during service or maintenance. Use this procedure to make sure the machine or equipment is stopped, isolated from all potentially hazardous energy sources, and locked out before any MIT Staff begin work.

AUTHORIZATION:
List MIT Staff authorized to lock and tag out the machine or equipment using this procedure:

SCOPE: Provide a description below of the scope of work for this service:	**Work Order:** (if applicable)	

NORMAL SHUTDOWN:
Shutdown the machine or equipment by normal stopping procedures (Such as depressing a stop button, opening switches, or closing valves). List the types and locations of machine or equipment operating controls:

Shutdown Method:	Location:

NOTIFY:
Notify all affected employees that the machine or tool is to be shut down for service or maintenance

Name/Job Title:	Notification Method:

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ISOLATE and LOCKOUT: Isolate energy sources using appropriate isolating devices. Lock and tag out the energy isolating devices with assigned individual locks and tags.

WARNING: The following are the known lockout steps. They should be completed sequentially. If additional steps are discovered, inform your supervisor, perform additional LOTO as needed, and modify this procedure accordingly.

1

Click here to insert picture

Energy Source and Magnitude

Type of Energy Source: Select a Type of Energy Source

Magnitude: enter volts, amps, psi, temp, lbs., etc.

Energy Isolating Device (EID) Location:

EID location (building/room), EID identification #.

Isolation device/Procedure:

Describe the device the lock/tag is applied to (e.g. circuit breaker, line valve, block, etc.) and the method of the de-energization of equipment.

Control Method: Lock/Tag Info *(Initial and Date)*

Provide lock description or specific lock #, if applicable, if tagout only provide description of additional safeguard. Initial/Date of person applying lock/tag.

Method to Relieve Residual/Stored Energy:

If applicable, describe the process for relieving any additional energy sources (i.e. bleeding a valve).

Verification Method:

Explain how zero energy is confirmed

Restored By: *(initial and Date)* Person removing EID

2

Click here to insert picture

Energy Source and Magnitude

Type of Energy Source: Select a Type of Energy Source

Magnitude: enter volts, amps, psi, temp, lbs., etc.

Energy Isolating Device Location:

EID location (building/room), EID identification #.

Isolation device/Procedure:

Describe the device the lock/tag is applied to (e.g. circuit breaker, line valve, block, etc.) and the method of the de-energization of equipment.

Control Method: Lock/Tag Info *(Initial and Date)*

Method to Relieve Residual/Stored Energy:

If applicable, describe the process for relieving any additional energy sources (i.e. bleeding a valve).

Verification Method:

Explain how zero energy is confirmed

Restored By: *(initial and Date)* Person removing lock

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GROUP LOTO: Determine which method to use if more than one person will be involved in the LOTO procedure		
Will more than one person be involved in this procedure? If you select NO, group LOTO will not be used, skip to the next section If you select yes, a group LOTO will be used, describe you group LOTO method below.	☐ YES	☐ NO

Choose a group LOTO method:

A hasp will be used for this procedure

A lock box will be used for this procedure — Lock Box Identification#:

Primary Authorized Person(PAP) — Name:

Name:

During shift or personnel changes, make sure there is continuous LOTO protection and record the new PAP and date each time there is a

THE MACHINE OR EQUIPMENT IS NOW LOCKED OUT AND SERVICE OR MAINTENANCE CAN BE DONE

RESTORE: The following steps shall be followed when returning a piece of equipment or instrument to normal operating mode after maintenance or service has been completed	
Step 1	Verify - Check and remove all tools from the machinery or equipment and confirm that all guards, pulleys, and safety devices have been reinstalled and are secure.
Step 2	Remove all Locks and ID tags.
Step 3	Notify affected staff that the service or maintenance is complete and you are about to restore energy to the equipment
Step 4	Operate the energy-isolating devices to restore energy to the machinery or equipment.

If a specific restoration process is needed, enter it below:

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Questions? Contact: environment@mit.edu

APPENDIX D: Example of LOTO Log

LOCKOUT / TAGOUT LOG SHEET

Page Number_____

Date Applied	Lock Number	Equipment being locked out (type, location)	Other Lockout equipment borrowed	Name and Phone Number	Released	
					Date	Initials

Notes on Log (above):

(1) Authorized staff should complete log prior to any equipment being locked out and after removal of lock and restoration of energy.
(2) When required by the ECP, a qualified DOF electrician or qualified electrical contractor must conduct electrical energy verification prior to any servicing or maintenance work.