LAWRENCE BERKELEY NATIONAL LABORATORY
Facilities Division – LBNL Facilities Division Procedure – OPER-045 (rev. 2)
Title: Lock-out/Tag-out (LOTO) Operating Procedure
Effective Date: 08/15/11

1. **Purpose:**
This procedure establishes the detailed process for performing Lock-out/Tag-outs (LOTOs) not covered in PUB-3000, and is provided as a supplement to PUB-3000. Personnel authorized to carry out LOTOs are required to be trained in and familiar with the LOTO policies and procedures in PUB-3000. OPER-045 does not supersede the requirements given in PUB-3000, but serves to provide additional details.

This procedure was revised as a result of a pilot program instituted in LBNL Facilities in May 2011 to provide enhanced assurance that LOTOs will be properly applied and administered. It features the addition of an administrative lock and the provision of an exception for single 20-30A circuits.

2. **Scope:**
This procedure applies to Authorized Personnel, the Facilities LOTO Subject Matter Expert (SME), Facilities Project and Construction Managers, Utilities and Maintenance Area Supervisors, and subcontractors working at the lab who require a LOTO to perform the contracted work.

3. **Definitions**

Authorized Personnel	An individual who has completed course work such as, but not limited to EH&S -0010, EH&S -256, EH&S-0258 as judged necessary by the craft supervisor.
PUB-3000	As referenced in this procedure, the source of data pertaining to: - Training requirements - Guidance in determining whether LOTO is required in specific instances - Details on authorization - Written LOTO procedures requirements and direction - Group LOTO requirements and direction - Exclusions from LOTO - Record keeping requirements - Information and LBNL policy in the following areas: o LOTO hardware o Temporary removal of LOTO devices o Emergency removal of LOTO devices o Tag out only o Shift changes o LBNL subcontractors o Visitors o Periodic inspections o Tag on - The supervisor must ensure that Authorized Personnel are familiar with equipment that may require LOTO and with energy control procedures - LOTO exceptions of variances must be authorized by the Craft supervisor or Facilities Dept. Head as reference in OPER-045 - Each craft supervisor must keep a sufficient supply of LOTO hardware in the craft office - LOTO locks with craft color codes must be special ordered from the Lock Shop and include:
SME	The individual who is knowledgeable about LOTO activities assigned by the Facilities Division to be responsible for the technical content of a controlled procedure concerning LOTOs.

ITEM	CAT #	ITEM	CAT #
Padlock (red)	424072251	Valve lockout cover (1" - 2.5")	424072254
Padlock labels	424072253	Valve lockout cover (2.5" - 5")	424072255
Multi-hasp lockout (1" reach)	424072324	Valve lockout cover (5" - 6.5")	424072256
Multi-hasp lockout (3" reach)	424072313	Sleeve	428072563
Circuit breaker lockout (2-pole)	424072262	Plastic tie-wraps	597541706
Circuit breaker lockout (1-pole)	424072261		

4. **Roles and Responsibilities:**
All subcontractor LOTO applications shall be preceded by an administrative or LOTO lock applied by appropriate Maintenance, Repair, and Operations (MRO) personnel.

SME:

- The SME for questions regarding content in this procedure is indicated within 6. Responsibilities and Control below.

MRO:

- MRO will assist in gathering all information for the control of related applicable hazardous energy.
- MRO will apply the first lock and tag, participate in the pre-LOTO briefing, and leave their lock and tag active and in place until completion of the LOTO'd effort and all other locks and tags have been removed.
- In the pre-LOTO briefing MRO will:
    - Explain identified hazardous energy control points and where those control points are located.
    - Answer questions and address any issues that the project has about the identified hazardous energy controls and the LBNL LOTO program.
- MRO will assist in identifying all human level hazardous energies, other issues and Laboratory requirements that are associated with the work effort. Provide this information to the project and to the permit owner in EH&S.
- MRO will apply Administrative/LOTO Locks and Tags if they are not participating in the work effort and LOTO locks and tags if they are and verify zero energy or safe state for each application.
- MRO will remove MRO Administrative/LOTO Locks and Tags after determination that it is safe to do so.

LBNL Construction (CM/PM):

- Fully define the scope of the project and LOTO effort including all affected equipment in the Work Order.
- Request MRO support to help define what will be affected.
- Request LOTO Permit and/or EEWP.
- Conduct all pre job and pre-LOTO briefs.
- Insure compliant subcontractor Locks and Tags so that:
    - Each affected worker shall witness the absence of voltage verification and/or attempt to reenergize or restart equipment.
    - All affected workers shall be protected by a compliant lock and tag properly filled out.
    - All affected workers shall be protected by LOTO 100% of the time following:

Rule Reminder: One lock + one tag protect one worker.

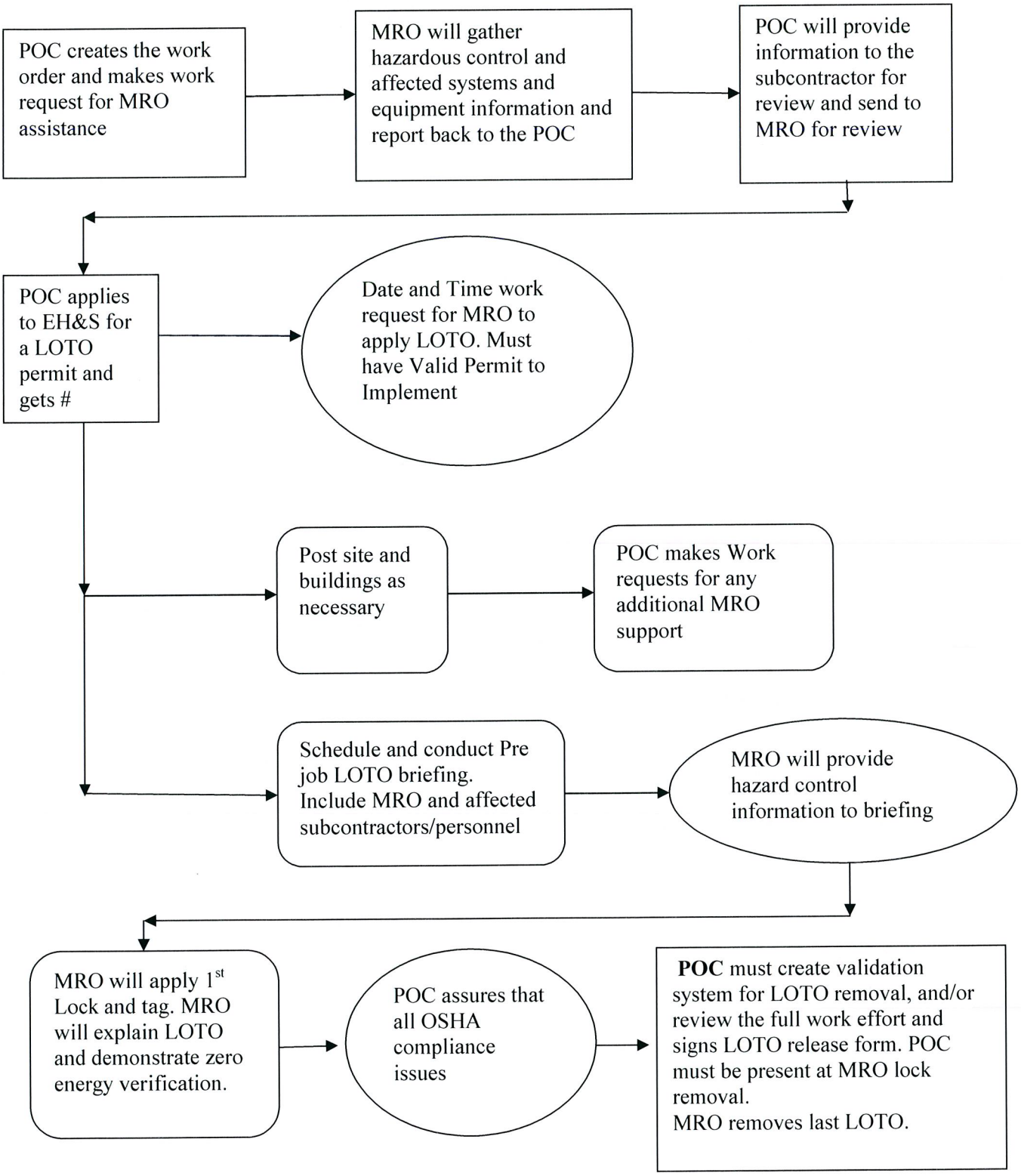
    - Locks and tags shall not be removed without LBNL point of contact approval.
        - Procedure for Emergency lock removal is defined in Chapter 18 pub 3000 Section 18.9 and Appendix 7.
- Be responsible for subcontractor Lock and Tag removal so that:
    - Each affected worker must remove their own lock and tag.
    - Only after completion of the work effort and the determination that it is safe to remove locks and tags.
- All post LOTO testing and validation of completeness of work (leak detection, Electrical voltage testing, phase rotation, water and/or gas flow, equipment start up etc.

LBNL CM/PM and MRO Joint Responsibilities:

- Each affected worker (contractor/LBNL) must review and understand the LOTO effort and agree that it is safe and sufficient prior to implementation.
- Application of locks and tags should be done at the same time.
- POC and MRO will participate in the assurance that it is safe to remove locks and tags.

5. **LOTO Procedures and Guidance**

Procedure for MRO LOTO First Lock Program for Construction Subcontractors:



Facilities Internal LOTO Procedure:

- All affected employees must apply Locks and Tags
- Rule Reminder: (1) Lock + (1) Tag protect (1) Person
- To apply locks and tags requires that the worker must be trained and authorized (full LOTO training), or escorted by a qualified worker with EH&S SME approval, or EH&S SME exemption.
- LOTO locks and tags cannot be removed until the work is complete (100% safe).
- Use only LBNL red approved locks with a single key in the lock user's possession.
- Use only LBNL approved tags.
- Locks and tags shall remain in place until the lock owner's work is safe and complete. If it is required for the worker to leave the work site, the LOTO will remain in place.
- At least one approved lock and tag shall remain in place until the work effort is complete and the system or equipment is safe with all covers, barriers, and shielding in place including all necessary parts, components and fasteners.

Facilities Internal LOTO Exception:

- An exemption for a single 20-30A single circuit may be requested. Approval is required in writing in advance (e-mail or hard copy) by the Dept. Head for MRO or the MRO Manager.
- Once approval is obtained:
    - LOTO the circuit
    - Remove the device
    - Make safe
    - Remove LOTO

Additional Information:

This revised procedure is a result of a pilot program instituted in LBNL Facilities in May 2011 to provide enhanced assurance that LOTOs will be properly applied and administered. It featured the addition of an administrative lock and the provision of an exception for since 20-30A circuit (see below).

Additional Work Steps and Guidance:

- Use LOTO prior to and during equipment servicing, maintenance or modification IF unexpected release of energy could injure personnel.
- Craft supervisors are responsible for qualified personnel to carry out LOTO.
- Authorized personnel have the right to impose LOTO whenever they judge it necessary.
- Use an equipment-specific WRITTEN LOTO procedure (OPER-002) when the equipment in question has:
    - More than one energy source, and/or
    - Requires operation of more than one device to isolate the energy, and/or
    - Has potential for stored, residual, or accumulated hazardous energy.
- Use a GROUP LOTO procedure when:
    - Service, maintenance, or modification is performed by a crew, and
    - The level of protection provided is equivalent to an individual LOTO.
- PUB-3000 contains the approved LBNL LOTO policy and procedures. Personnel authorized to carry out LOTO must be familiar with and act in accordance with PUB-3000.

6. Responsibilities and Controls

Rev. No.		SME		Reviewed By		Approved By		Approved By		Effective Date
2										08/15/2011
		Tom Caronna LOTO SME		Mike Dong Facilities Utility Manager		Glen Langstaff SPG&E/MRO – Dept. Head		Ken Fletcher Deputy Director		