

Subject: PPPL Lockout Tagout Program Implementation: Control of Hazardous Energy	Approval Date: 11/22/2019	Initiated by: Head, Environment, Safety & Health
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Management System: 09.00 ESH and Integrated Safety Management (ESH)
Management System Owner: Head, ES&H
Management Process: 09.03 Electrical Safety
Process Owner: Head, ES&H
Sub-Process: 09.03.01 Lockout/Tagout Program
Sub-Process Owner: Head, ES&H
Subject Matter Experts (SMEs): Head, ES&H; Head, Safety; ES&H Electrical Safety Specialist;
 Engineering Power Systems Group Senior Engineer

1.0 INTRODUCTION

This document describes PPPL's Hazardous Energy Control Program. This program is required by law (29CFR1910.147) and by that law is to be used for **personal injury protection and personal safety only**. This document establishes the minimum requirements for lockout/tagout (LOTO) of energy isolating devices at PPPL whenever maintenance, servicing or modifications are done on machines, systems, or equipment. It shall be used to ensure that the machine, system or equipment is stopped and isolated from all potentially hazardous energy sources and locked out before employees perform any servicing, maintenance or modification where the unexpected energization or start-up of the machine, system or equipment, unexpected movement, or release of stored energy, could cause injury.

2.0 APPLICABILITY

All employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout/tagout. Authorized employees are required to perform lockout/tagout in accordance with this procedure. All employees, upon observing a machine or piece of equipment which is locked and tagged out to perform servicing or maintenance shall not attempt to start, energize, or use that machine or equipment. When a lock and tag is attached to an energy isolating device, it is not to be removed without approval of the authorized person responsible for attaching it, and it is never to be bypassed, ignored, or otherwise defeated.

Failure to implement LOTO, or the act of completing an unauthorized removal of a lock, tag, or other energy controlling device, will subject the offender to disciplinary action or dismissal. Any workers who are found to be in non-compliance with the requirements of this procedure shall require retraining and/or disciplinary action up to and including termination, per the PPPL Training and Qualifications Manual. Unauthorized removals may include actions completed by those with expired training and qualifications. Training and qualification requirements are tracked by PPPL Human Resources.

Exception: Work on cord, plug or hose connected equipment for which exposure to the hazards of unexpected energization or startup of the equipment is controlled by the unplugging or disconnecting of the equipment from the energy source and by the plug or connector being under the exclusive control and within sight of the employee performing the servicing or maintenance.

PPPL Danger Tags and red locks as shown in this document (Attachment 1), shall not be used for any purpose other than Personal injury protection and personal safety. Employees and supervisors shall ensure that these devices are not used for configuration control, equipment status control or other administrative control.

2.1 Unresolved LOTO Situations

Whenever a lockout/tagout involves circumstances beyond those anticipated by regulations or standards, the situation shall be reviewed by the Electrical Authority Having Jurisdiction (AHJ). If the Electrical AHJ is unable to make a determination (including issues not involving electricity), the AHJ will coordinated with appropriate Subject Matter Experts and/or the Electrical Safety Committee to make a recommendation to the PPPL ES&H Executive Board. The ESH/EB will make the equivalency determination.

3.0 ATTACHMENTS

1. Red Lock Examples
2. Danger Tag Examples
3. Short Form - LOTO Procedure

4.0 REFERENCE DOCUMENTS

29CFR1910.147	Control of Hazardous Energy (Lockout/Tagout)
29CFR1910.333	Electrical Safety Related Work Practices
10CFR851	Worker Safety and Health Program
NFPA 70E	Electrical Safety in the Workplace
DOE O 422.1	Conduct of Operations
ESHD 5008	PPPL Environmental, Safety, and Health Directives (“Safety Manual”)
ESH-001	Use of Safety, Accident Prevention and Equipment Protection Tags
ESH-002	Facility Safety Signs and Barricades
ESH-004	Job Hazard Analysis
ENG-030	PPPL Technical Procedures
ENG-011	Interlock Key Control
GEN-023	Records Management
QA-025	Management Assessments

5.0 DEFINITIONS

LOCKOUT/TAGOUT	The placement of a lock on an energy isolating device, in accordance with established procedure, ensuring that the equipment cannot be operated until the lock and tag have been removed from the lockout device. Locks are always applied with Tags.
SIMPLE LOTO	Involves only an Authorized Employee de-energizing one set of conductors, or one circuit part, or one energy source for the sole

purpose of safeguarding the employee from exposure to hazards. Simple LOTO must meet the nine criteria in paragraph 7.1. Simple, Single Source, LOTO does not require an equipment specific procedure. Multiple simple LOTO may occur on a single energy isolation device.

COMPLEX LOTO

A Complex LOTO is when one or more of the following conditions exist when a system is to be isolated: multiple energy sources, multiple disconnecting means, multiple crews, crafts or employers, multiple locations, particular sequences, or when transferring responsibility for a LOTO to another person such as in shift changes. A complex LOTO does not meet all nine criteria in paragraph 7.1.

TAGOUT

The placement of a tag on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tag is removed from the lockout device.

ENERGY SOURCE

Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy. Here at PPPL, this includes cryogenic and radiation energy sources.

**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, and in addition, no pole can be operated independently; 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.

LOCK BOX

A lockable box, used by a Primary Authorized Employee for Complex Lockout/Tagout situations, into which all keys, tag stubs, and/or interlock keys are placed, and onto which each Authorized Employee attaches their lock and tag. The Primary Authorized Employee is the first lock and tag to be attached and the last to be removed.

**TRAPPED (e.g. KIRK)
KEY INTERLOCK**

An installed captive key safety interlock system designed to control sequencing and/or access.

**ADMINISTRATIVE
LOCK**

Any lock, other than a red lock, used for a purpose other than LOTO. The lock may serve a safety function other than LOTO, a configuration control function or other purpose. Administrative

locks are not to be used for isolating hazardous energy sources for personnel protection. Refer to ESH-001 for more information.

**ADMINISTRATIVE
TAG**

A tag used for any other purpose than LOTO. Administrative locks and tags (Caution and Notice) are covered in ESH-001.

**ZERO ENERGY
VERIFICATION**

A process to be followed by the authorized employee, prior to starting work on machines or equipment that have been locked and tagged out, to ensure that isolation and de-energization of the machine or equipment have been accomplished. When appropriate, all zero energy verifications must include the calibration and pre-testing of the detecting device used to verify energies (e.g. voltage, pressure, vacuum, temperatures, etc.), as well as a post-test to confirm accuracy (for electrical energy, see ESHD 5008 Section 2, Chapter 3, paragraph 3.3.2).

6.0 ROLES AND RESPONSIBILITIES

AFFECTED EMPLOYEE

An employee whose job requires him/her to operate or use a machine or equipment on which servicing, maintenance or modification is being performed under lockout/tagout, or whose job requires him/her to work in an area where such activities are being performed. An Affected Employee can become an Authorized Employee when that employee's duties and training include servicing, modification or maintenance on the Locked/Tagged system or equipment.

**AUTHORIZED
EMPLOYEE (AE)**

A person designated by line management who locks and tags out machines, systems or equipment in order to perform servicing, modification or maintenance. He/she will know the system, its hazards, and the means of isolating the energy and hazards. In a Complex Lockout/Tagout situation, this individual must attach his/her own RED lock and PPPL Danger tag to the established control device, such as a lock box. Authorized employees must have the opportunity to verify energy isolation in a complex lockout/tagout before commencing work each day (or shift).

**PRIMARY AUTHORIZED
EMPLOYEE (PAE)**

An Authorized Employee designated by line management who has the responsibility for supervising a number of authorized employees working under a complex Lockout/Tagout. He/she will have overall responsibility for the locking and tagging out of a machine, system or equipment. This individual must know the system, its hazards, and the means of isolating the energy and hazards. He/she will also be responsible for establishing the LOTO for a job, performing the pre-job brief (including review of job hazards; see ESH-004 "Job Hazard Analysis") and restoration of equipment or systems when work is complete.

RESPONSIBLE MANAGER	The Line Manager or Supervisor responsible for the work (maintenance, servicing or modifications) being performed on machines, systems or equipment being locked and tagged. The Responsible Manager shall appoint appropriately trained and qualified personnel to be Authorized Employees and Primary Authorized Employees to work on systems and perform LOTO as specified in this procedure.
LOTO RECORD KEEPER	A person designated by a Line Manager or Supervisor to be responsible for keeping records of completed LOTO activities. Records may include filled-out LOTO tags, log books or procedures with recorded tag numbers as specified in Section 11.4 of this procedure.
ELECTRICAL SAFETY SPECIALIST (ESS)	The PPPL ES&H individual whose responsibility is to provide oversight towards assuring that PPPL follows required electrical codes and best practices in electrical safety, including those associated with LOTO.

7.0 REQUIREMENTS FOR LOTO PROCEDURES

All PPPL lockout/tagouts are performed in accordance with this procedure. Each Authorized Employee shall perform one of the following procedures to ensure that before any servicing, maintenance or modification is performed on a system or equipment where the unexpected energizing, startup or release of stored energy could occur and cause injury, it is isolated from the energy source and rendered inoperative.

7.1 SIMPLE LOTO

For SIMPLE LOTO that meets all of the following nine (9) criteria, continue to **Section 8.0**.

1. The machine, system or equipment has ***no potential for stored or residual energy or re-accumulation of stored energy after shut-down*** which could endanger employees;
2. The machine, system or equipment has a ***single energy source*** which can be readily identified and isolated;
3. The machine, system or equipment ***will be completely de-energized and deactivated*** by isolating, locking and tagging of that single energy source;
4. The machine, system or equipment is isolated from that energy source and is ***locked and tagged out*** during servicing, maintenance or modification;
5. A ***single lockout device*** will achieve a locked-out condition;

6. The lockout device is under the *exclusive control of the authorized employee* performing the work (one lock and tag per person, one energy source);
7. The servicing or maintenance *does not create hazards for other people*;
8. There have been *no past accidents* involving the unexpected activation or re-energization of the machine, system or equipment during servicing, maintenance or modification; and
9. There *is no transfer* of responsibility for the LOTO from one worker to another.

7.2 COMPLEX LOTO

For COMPLEX LOTO situations (do not meet all of the nine (9) criteria above), including multiple energy sources, multiple disconnecting means, multiple crews, crafts or employers, multiple locations, or particular sequence of steps, go to **Section 9.0**

8.0 SIMPLE LOCKOUT/TAGOUT PROCEDURE

ONE LOCK and TAG per person, ONE ENERGY SOURCE – NO EQUIPMENT SPECIFIC PROCEDURE REQUIRED.

8.1 SIMPLE LOCKOUT/TAGOUT APPLICATION

Authorized
Employee

1. **Identify equipment** to be serviced, modified, or maintained and its energy sources.
2. Review **Job Hazards Analysis** for LOTO.
3. **Notify Affected Employees** of intent to shut down and LOTO equipment or system.
4. If the equipment or system is operating, **shut it down by normal shut-down process** (this may require Affected Employee support). **Verify** that all potentially hazardous stored or residual energy has been relieved, disconnected, restrained or otherwise rendered safe as part of the shutdown process.
5. Operate the energy isolating device to **isolate the equipment** or system from the energy source with all controls and hazardous equipment in safe position.
6. **Apply lock and tag** to the lockout device, with red lock and PPPL Danger tag with all fields filled out (see Attachments 1 and 2).
7. **Perform verification of isolation and de-energization** of the system or equipment (attempt to start, **zero energy verification, etc.**) When appropriate, all zero energy verifications must include the calibration and pre-testing of the detecting device used to verify energies (e.g. voltage, pressure, vacuum, temperatures, etc.) as well as a post-test to confirm accuracy (for

electrical energy, see ESHD 5008 Section 2, Chapter 3, paragraph 3.3.2). This is the test-verify-test methodology.

8. Give **Affected Employees the opportunity to apply their own lock and tag** to the overall LOTO as appropriate for their assigned work in the area. This causes the Affected Employees to become Authorized Employees.
9. For Simple LOTOs that span more than 1 shift, the AE will inspect and **verify daily that equipment conditions affecting safety have not changed** (locks and tags still attached, switches in proper position, signs and barriers remain in place, etc.). Alerting techniques and precautions required by ESHD 5008 Section 2 Chapter 4 Paragraphs 4.13 and 4.14 must be followed as applicable.

8.2 SIMPLE LOCKOUT/TAGOUT REMOVAL

Authorized
Employee

1. Upon completion of the work, **check the system** or equipment and the immediate surrounding area to ensure nonessential items have been removed and that systems or equipment components are operationally intact.
2. **Check the work area** to ensure that all employees have been safely positioned or removed from the area.
3. Verify that the **controls are in neutral**.
4. Verify that positions of locked components and associated equipment are in position as required for restart and operation.
5. **Remove lock and tag(s)** from the lockout device and reenergize the machine, equipment or system.
6. Provide completed tags, logbooks or procedures with recorded tag numbers to the LOTO Record Keeper as per paragraph 11.4 of this document, "Recordkeeping."
7. **Notify affected employees** that the servicing or maintenance is completed, and the machine or equipment is ready for use.

9.0 COMPLEX LOCKOUT/TAGOUT

MULTIPLE: ENERGY SOURCES, DISCONNECTS, CREWS, CRAFTS, LOCATIONS, EMPLOYERS

When performing a complex Lockout/Tagout (as per 7.2 above), a **Primary Authorized Employee** (PAE) shall follow a written, equipment specific procedure (see 9.1 below) to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy could occur and cause injury, the machine or equipment is isolated from the energy source and rendered inoperative. **All personnel shall utilize a procedure**

which affords the employee a level of protection equivalent to that provided by implementation of a simple lockout or tagout device.

All Authorized Employees are required to attach a lock and tag to the lockbox or control mechanism when actively working on the system.

9.1 COMPLEX LOCKOUT/TAGOUT - PROCEDURE REQUIREMENTS

All Complex Lockout/Tagout shall be performed in accordance with an equipment specific procedure. This procedure must include all of the information specified below and must be approved by the Responsible Manager or Responsible Engineer. An equipment specific procedure may be in the form of: Facilities & Site Services Work Orders, Technical Infrastructure Group Work Orders, Power Systems Group Switching Orders, other formal procedure (prepared in accordance with ENG-030) or use of the Short Form template in Attachment 3.

A. Application of LOTO Requirements

1. **Identification of the equipment** to be serviced, modified, or maintained and its energy sources.
2. A specific **statement of the intended use** of the procedure;
3. **Specific procedural steps** for shutting down, isolating, blocking and securing machines, systems or equipment to control hazardous energy;
4. **Specific procedural steps for the placement, removal and transfer of locks and tags on lockout devices and the responsibility for them** (see 9.3 for testing considerations).
5. Specific requirements for testing a machine, system or equipment to **verify the effectiveness of lockout devices and other energy control measures**.
6. **Notification requirements for Affected Employees** regarding the intent to shut down and LOTO equipment or system including a review of the LOTO Job Hazard Analysis (JHA) if appropriate.
7. If the equipment or system is operating, steps to **shut it down by normal stopping procedure** (this may require Affected Employee support).
8. Steps to **operate the energy isolating devices** to isolate the equipment or system from the energy sources.
9. Steps to **Lock and Tag** the energy isolating devices with red locks and PPPL Danger tags (see exhibits) with all fields filled out.
10. Steps to **record Tag Numbers with location of application** in the procedure or logbook.

11. Steps to **relieve, disconnect, restrain** or otherwise render safe, all potentially hazardous stored or residual energy.
12. Steps to perform **Zero Energy Verification** and de-energization of the system or equipment (attempt to start, **zero voltage check**, check gauges, etc). When appropriate, zero energy verifications must include the calibration and pre-testing of the detecting device used to verify energies (e.g. voltage, pressure, vacuum, temperatures, etc.) as well as a post-test to confirm accuracy (for electrical energy, see ESHD 5008 Section 2, Chapter 3, paragraph 3.3.2). (Test – Verify – Test)
13. Steps to establish a lockbox with all keys and stubs, and attach lock and tag using a gang hasp or one of the holes on a multi-holed lockbox. When appropriate, other control mechanisms, such as a gang hasp, may be used without the lockbox. **The Primary Authorized Employee must indicate PAE on his/her tag.**
14. Steps to perform **pre-job brief with crew, craft or group** working on system or equipment.
15. Steps to give **Affected Employees the opportunity to apply their own locks and tags to the lockbox** as appropriate for their assigned work in the area. If Affected Employees will perform any work on the equipment or system being locked and tagged, they must become Authorized Employees, comply with all requirements associated with that role, and must apply their own locks and tags to the lockbox or control mechanism.
16. Steps to require all **Authorized Employees to attach a lock and tag** to the lockbox or control mechanism, be given the opportunity to review the initial application of the locks and tags, and be given the opportunity to perform or observe a zero energy verification.
17. Steps to, upon **completion of their work, have all Authorized Employees remove their locks and tags** from the lockbox or control mechanism and, if the tag numbers are not recorded in the procedure or on a log, provide completed tags to the LOTO Record Keeper.
18. For Complex LOTOs that span more than 1 shift, steps for the Primary Authorized Employee and all Authorized Employees to **verify daily that equipment conditions affecting safety have not changed** (locks and tags still attached, switches in proper position, signs and barriers remain in place, etc.) prior to start of work for that day.

B. Complex Lockout/Tagout Removal Requirements

1. Steps to **check the system** or equipment and the immediate surrounding area to ensure that nonessential items have been removed and that the systems or equipment components are operationally intact.
2. Steps to **check the work** area to ensure that all employees have been safely positioned or removed from the area.
3. Steps to verify that the **controls are in neutral**.

4. Steps to **oversee removal of locks and tags** from the lockout devices and re-energize the machine or equipment.
5. If tag numbers are not recorded in the procedure or on a log, steps to provide **completed tags to the LOTO Record Keeper**, per Section 11.4.
6. Steps to **notify affected employees** that the servicing or maintenance is completed, and the machine or equipment is ready for use.

9.2 SYSTEMS OR EQUIPMENT UTILIZING TRAPPED (e.g., KIRK) KEYS

Systems or equipment utilizing trapped keys, locks and tags for shutdown, or 'safeing' procedures, may be used for lockout/tagout provided the primary authorized employee implementing the shutdown or safeing procedure provides a control method (e.g. a lockbox or a multi-lock hasp) for any authorized employee working on the system or equipment to have positive control of the energy isolating devices (as in complex LOTO). The safeing procedure must meet all of the requirements of the Equipment Specific Procedure in 9.1 above.

9.3 TESTING – TEMPORARY LOTO REMOVAL

For situations in which locks and tags must be temporarily removed from a lockout device to test or position a machine, system, equipment or component, follow the steps for LOTO removal and reestablishment in the equipment specific procedure as defined in 9.1 above.

9.4 SHORT FORM – LOTO PROCEDURE

9.4.1 The Short Form LOTO Procedure (Attachment 3) can be used in place of an equipment specific procedure providing the following conditions are met:

1. Approved by a Responsible Manager or Responsible Engineer (RE)
2. Must have a Primary Authorized Employee
3. No more than 4 Authorized Employees
4. Maximum of 4 energy isolation devices
5. Maximum 600 Volts AC/DC
6. Allowed by ENG-030 (An ENG-030 Technical Procedure is required for all electrical access, installation or repairs unless the work is covered by a work order that is reviewed by the Electrical Safety Specialist. Minor electrical maintenance and repair are exempt from ENG-030)
7. Approved by the Electrical Safety Specialist

9.4.2 Instructions for Completion of the Short Form by the Primary Authorized Employee

1. State equipment to be locked out and for what purpose
2. Initial each item when complete
3. List devices and safeing operation
4. List Authorized Employees and Tag numbers
5. Primary Authorized Employee, Name and Tag number
6. PAE conduct daily equipment conditions

10.0 SPECIAL CONSIDERATIONS

10.1 USE OF LOCKS AND TAGS

A lock and tag shall be affixed to each lockout device by an authorized employee and shall be affixed in a manner that will hold the energy isolating devices in a "safe" or "off" position.

Tags shall be properly filled out and affixed in such a manner to clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.

Safety interlocks [e.g., trapped key] may be used in lieu of standard locks in the lockout/tagout process provided the trapping device is an energy isolating device and the removal of the trapped key prevents operation. When a trapped key is employed in the lockout/tagout process, a PPPL Danger Tag must be affixed to the trapping device or the operating handle of the device and the use of the trapped key device is documented in the appropriate procedure (if applicable).

10.2 CUSTODY OF KEYS

Locks unique to LOTO as shown in Attachment 1, "Locks," shall be used for LOTO except for trapped key secured equipment. The AE(s) and PAE(s) shall maintain possession of the key for their personal LOTO lock attached to the device or lockbox for the duration of the LOTO.

10.3 TAG WITHOUT A LOCK

A tag without a lock on an energy isolating device is Restricted at PPPL. If a lock cannot be easily attached, there are three options:

1. Modify the energy isolating device to be capable of being locked open/closed (any changes which affect a Nationally Recognized Testing Laboratory (NRTL) certification shall be reviewed by the Electrical AHJ prior to implementation), or
2. Use a temporary locking device to lock the isolating device in the open/closed position, or
3. Tags may be applied without locks on grounding cables and grounding sticks as part of a Complex LOTO procedure.

If none of the above apply, documented approval for the Tagout-only usage is required from the ES&H Electrical Safety Specialist.

10.4 LOCK AND TAG REMOVAL

Locks and tags shall be removed from each energy-isolating device by the employee who applied them using the associated key(s).

Exception: When the authorized employee who applied the lock and tag on the lockout device is not available to remove it, or the lock needs to be removed by means other than the key, the lock and tag may be removed under the direction of the Responsible Manager (see below).

Prior to device removal it must be verified by the Responsible Manager that the authorized employee who applied the lock and tag is not at the facility and all reasonable efforts have been made to contact the authorized employee to inform him/her that his/her lock and tag is to be removed or that all reasonable efforts have been made to find the key.

If the lock and tag must be cleared and the authorized employee is not available or the key is not available, the Responsible Manager will designate another authorized employee along with the ES&H Electrical Safety Specialist (or his designee) to walk down the system or equipment (with the existing complex lockout/tagout procedure if available) to determine that the lock and tag can be safely cleared. The newly authorized employee shall remove the existing lock and tag and, if appropriate, attach his/her own lock and tag. The removal or transfer shall be documented and

signed by the Responsible Manager (or designee) and the ES&H Electrical Safety Specialist (or designee). This document shall be retained by the ES&H Electrical Safety Specialist.

The original authorized employee must be notified of the lock and tag removal by the Responsible Manager before he/she resumes work at PPPL (if appropriate).

10.5 SHIFT OR PERSONNEL CHANGES

For Complex LOTO situations where responsibility for a LOTO will be transferred from one Authorized Employee (or Primary Authorized Employee) to another, the transfer shall be described in the equipment specific procedure or in accordance with a separate transfer procedure produced in accordance with ENG-030 by the Responsible Manager.

10.6 WHEN A LOTO IS ENCOMPASSED BY ANOTHER LOTO

A LOTO shall NOT be installed when encompassed by another LOTO as there is no sure method of performing a Zero Energy Verification. (Example: If an entire building is isolated by a complex LOTO, locking a single disconnect within that building is not permitted, because with all the power down, there is no way to effectively show that the disconnect is the proper one by zero energy verification. If the power were restored to the building and the disconnect was incorrect, shock may occur.) In such cases the PAE/AE shall join the encompassing LOTO and follow the requirements of that complex LOTO.

11.0 ADMINISTRATION

11.1 AUDIT AND INSPECTION REQUIREMENTS

11.1.1 ELECTRICAL SAFETY SPECIALIST AUDIT

The Safety Division Electrical Safety Specialist will be responsible for conducting documented periodic audits of the energy control procedures at least annually as a Management Assessment in accordance with QA-025 to ensure that the requirements of this procedure, the OSHA standard and NFPA 70E are being met. The audit will consist of periodic inspections that include reviews of the employees' responsibilities under the LOTO's being inspected and shall identify deficiencies and recommend corrective actions and/or retraining for any deviations or inadequacies. The audit shall meet all of the following requirements:

- a. It shall cover at least one lockout/tagout in progress and the procedure details.
- b. The periodic inspection shall be performed by an authorized employee other than the ones(s) utilizing the energy control procedure being inspected (typically the Electrical Safety Specialist).
- c. The periodic inspection shall be conducted to identify any deviations or inadequacies in the procedure or in employee understanding and enact corrective measures.
- d. Where lockout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.
- e. PPPL shall certify that the periodic inspections have been performed by documenting: the identification of the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.
- f. Documentation shall be completed and maintained as per PPPL Procedure QA-025.

11.1.2 RESPONSIBLE MANAGER INSPECTIONS

Responsible Managers are required to perform periodic inspections of active LOTOs and the associated documentation to review for proper compliance. The inspection will include a review of each employee's responsibilities under the LOTO being inspected and shall recommend corrective actions and/or retraining for any deviations or inadequacies. Responsible Managers shall document these reviews and the results in LOTO or system logs, by using procedure completion signature lines, or by using the Management Assessment Report form in procedure QA-025. The Responsible Manager Inspections shall be conducted at least annually, or more frequently at the discretion of the Responsible Managers.

11.2 REQUIRED TRAINING

1. **Classroom LOTO training along with a practical demonstration:** All Authorized Employees and PAEs, with a refresher every three years.
2. **Classroom LOTO training** (no practical demonstration): Employees whose responsibilities include only joining an already established Complex LOTO, with a refresher every three years.
3. **General LOTO, online training:** Awareness for those needing access to LOTO protected areas, with a refresher every three years.
4. In addition to the required refresher training every three years, an employee shall receive additional training (or retraining) if any of the following conditions exists:
 - (a) There are indications that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures, including ESH-016.
 - (b) There is a change in the employee's job assignment that requires additional LOTO training or retraining (e.g., new assignment as PAE).
 - (c) There is a change in machines, equipment or processes relevant to an employee that present a new hazard.
 - (d) There is a change in ESH-016 or other energy control procedures that affect the previously received LOTO training.

11.3 SUBCONTRACTORS

Subcontractors who are applying LOTO may either take the appropriate training as above or may provide their own LOTO program and training documentation for review and approval by the ES&H Electrical Safety Specialist before performing LOTO work at PPPL under their program.

11.4 RECORDKEEPING

Records of all LOTO applications must be kept for at least one year. The LOTO record shall contain identification of the AE or PAE applying the tag(s), the LOTO tag number, the reason for application of the LOTO, the equipment or system requiring the LOTO, and the date(s) the LOTO began.

Records may be in the form of a log system; use of Switching Orders, Facilities or Technical Work Orders; ENG-030 Procedures that contain the relevant information as above; or the completed and removed LOTO tags. The line management designated LOTO Record Keeper shall maintain the records.

11.5 Alerting of Hazards

Work activities requiring LOTO shall also provide for the use of protection techniques that alert personnel to the presence of hazardous activities, as appropriate. These techniques shall follow the applicable requirements of ESHD 5008 Section 2 Chapter 4 for temporary hazardous operations (i.e., Section 2 Chapter 4, Sub-chapters 4.13 and 4.14), including but not limited to signage, barriers and safety watches. The requirements of procedures ESH-001 and ESH-002 for tags, signage and barricades shall also be followed.

RECORDS REQUIREMENTS

Records Custodians must assure records are maintained as follows:

Record	Record Custodian	Location	Retention Time
LOTO Records and/or Completed Tags as per 11.4	Record Keeper assigned by Department or Project	Various	Destroy 1 yr after completion of work <i>Reference: Admin 17 (15)</i>
Access/Safeing Procedures	Record Keeper assigned by Department or Project	Various	Destroy when superseded Hold indefinitely - DOE <i>Reference: Admin 17 (22.a.1)</i>
Electrical Safety Specialist Audit Reports	Electrical Safety Specialist and QA as per QA-025	Various	Official Copy Cut off upon completion of audit or investigation. Destroy when 10 years old. <i>(Reference: Admin 22, Audit/Investigative Records (2.b1))</i> All other copies. Destroy when no longer needed. <i>(Reference: Admin 22, Audit/Investigative Records (2.b.2))</i>
Responsible Manager Inspection Reports	Line Manager and QA as per QA-025	Various	Official Copy Cut off upon completion of audit or investigation. Destroy when 10 years old. <i>(Reference: Admin 22, Audit/Investigative Records (2.b1))</i> All other copies. Destroy when no longer needed. <i>(Reference: Admin 22, Audit/Investigative Records (2.b.2))</i>
Training Records	Human Resources	Various	As identified in the HR Learning Management System

ATTACHMENTS:

1. Lock examples
2. Danger Tag examples
3. Short Form – Complex LOTO procedure – Installing/Uninstalling

Locks

The standard lock for personal lockout is uniquely identified by the red band around the bottom or a red lock body. These locks shall not be used for purposes other than personal lockout/tagout. They shall only be used for locking out equipment or attached to a lock box.



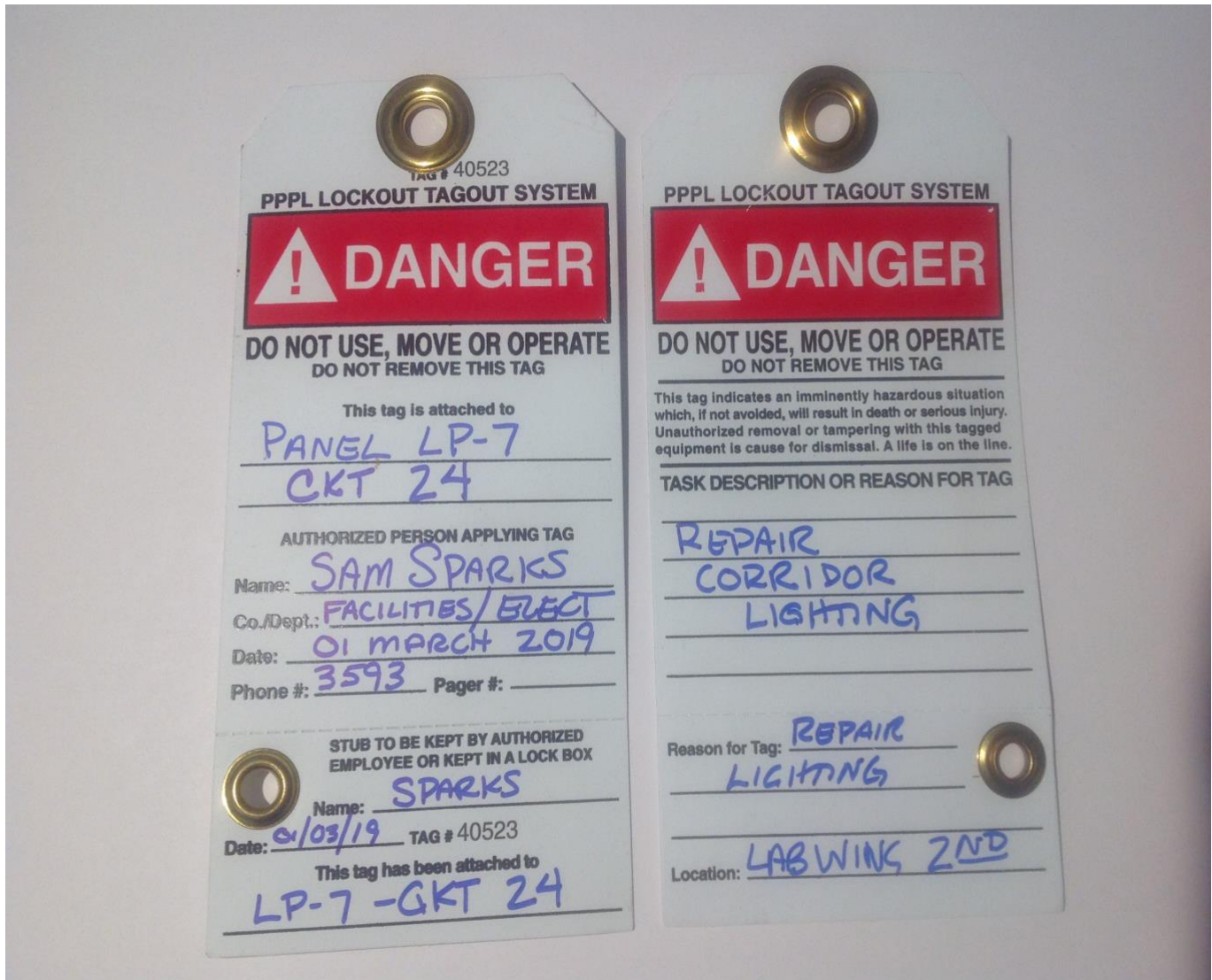
Lockout Devices (fig 1)



Lockout Devices (fig 2)

Danger Tags

These tags are only to be used for the personal protection of employee(s) while working on equipment under the LOTO program. They shall not be used for any other purpose.



Front

Back

(fig 3)

Warning: When a lock and/or tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated. Unauthorized removal will subject the offender to disciplinary action or dismissal.

SHORT FORM - LOTO PROCEDURE (INSTALLING)

(PAE initial next to each completed requirement)

This Procedure is intended to Lockout and Tagout: _____
(Equipment Description)

For the following purpose(s): _____

Primary Authorized Employee (PAE): _____

1. _____ Notified Affected Employees of intent to Lockout – Tagout
2. _____ Complete and review Job Hazard Analysis (JHA) including analysis of hazards (attach to this form) and complete pre-job brief
3. _____ Shut down equipment (listed above)
4. _____ De-activated or opened energy isolation device(s)
List device(s) and steps (Maximum 4 attach additional pages if necessary)

Device	Steps for isolation
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____

1. _____
2. _____
3. _____
4. _____

5. _____ Lock and Tag energy isolating device(s)
List Tag #'s and Authorized Employee's name on each isolating device above

1. Tag # _____ AE Name: _____	2. Tag # _____ AE Name: _____
3. Tag # _____ AE Name: _____	4. Tag # _____ AE Name: _____

6. _____ Relieve, disconnect, restrain or otherwise render safe all potentially hazardous stored or residual energies.

7. _____ Verify isolation and de-energization with zero energy check and attempt to start. Indicate steps: (attach additional pages if necessary)

8. _____ PAE Established lockbox or Control mechanism

(PAE SIGNATURE)

(PAE PHONE)

9. _____ All Authorized Employees have attached their locks and tags to the lockbox or control mechanism

10. Procedure approved by Electrical Safety Specialist: _____
(Print) (Sign) (Date)

11. Procedure approved by Responsible Manager or (RE): _____
(Print) (Sign) (Date)

12. _____ Primary Authorized Employee verify daily equipment conditions. Date/ Initial (attach additional pages if necessary)

Date/Initial

Date/Initial

Date/Initial

Date/Initial

Date/Initial

Date/Initial

SHORT FORM - LOTO PROCEDURE (UNINSTALLING)

--CONTINUED--

(Initial next to each completed requirement)

Lockout – Tagout-Removal Procedure.

1. _____ Final Installation/LOTO Inspections complete? PAE (required)____ QA____ ES&H____ RM____
2. _____ All Authorized Employees locks and tags removed, and all persons safely positioned?
3. _____ Verified controls in neutral?
4. _____ PAE removed all locks and tags
5. _____ Notified all affected employees – equipment ready for use.
6. _____ Tags and procedure(s) provided to designated LOTO Record Keeper

Specific Considerations

Transfer of LOTO (attach additional pages if necessary)

A. _____ Off-going PAE walk down with On-going PAE

Off-going PAE Name _____ On-going PAE Name _____

B. _____ Verify zero energies, Indicate steps: _____

C. _____ On-going PAE attach LOTO – Off-going PAE remove LOTO. Indicate steps. _____

D. Transfer complete:

Off-going concur _____ On-going concur _____
(PAE Signature) (PAE Signature)

Equipment Testing considerations- Temporary LOTO Removal (If Required)

- I. _____ Clear equipment
- II. _____ Notify all affected employees
- III. _____ Remove LOTO (as per steps above)
- IV. _____ Energize and Test
- V. _____ De-energize and re-apply LOTO (as per steps above)
- VI. _____ Verify Zero energy and attempt to start.
- VII. _____ Notify all affected employees