

Desert Research Institute

Energy Control (Lockout/Tagout) Program

1.0 INTRODUCTION

- 1.1 The primary objective of this program is to prevent accidents/injuries due to work conducted on equipment which has energy or stored energy sources. The lockout system is the preferred system of isolating equipment or machines from energized power sources. For more complex energized machines or equipment, a more comprehensive procedure to disable or isolate the energy source should be developed. This could include a combination of lockout/tagout & blockout steps

2.0 PURPOSE AND SCOPE

- 2.1 The information outlined in the DRI Energy Control Program describes the lockout/tagout and blocking procedures and practices for the Desert Research Institute. The intent of this program is to define procedures regarding lockout/tagout & blockout to physically render research and maintenance equipment inoperative during periods of cleaning, maintenance, trouble shooting and changeover. These procedures cover servicing and/or maintenance activities of machines and equipment in which unexpected energizing or start up of the machines or equipment, or release of stored energy such as electrical, mechanical, hydraulic, pneumatic, chemical, gravity, or thermal could cause injury to employees. By establishing an energy control program that utilizes locking out and/or tagging out and/or blocking out of energy isolating devices, release of potentially hazardous energy while maintenance and servicing activities are performed will be prevented.
 - 2.1.1 This procedure includes but is not limited to machine/equipment set up, adjustment, lubrication, cleaning, tool changes and other servicing, maintenance and repair activities where the potential for injury exists due to the removal of machine guards and/or the proximity of the work to power driven machine parts or sources of stored energy.
 - 2.1.2 This procedure also applies to breaking into process and/or steam pipeline, air operated equipment, electrical, hydraulic, and springs, as these represent a potential for energy release.
 - 2.1.3 Exceptions to the Lockout/Tagout requirements of this procedure:
 - 2.1.3.1 The servicing of one-person electrically powered units, such as electrical hand tools and instruments, when disconnected from wall circuits by the person performing the service.
 - 2.1.3.2 Minor adjustments, incidental repairs, component replenishment, unjamming and other activities which are routine, repetitive and an integral part of normal production operations, provided that alternative measures are in place which provide effective protection (e.g. interlocked machine guards).
 - 2.1.3.3 Exposure to electrical hazard from work on, near or with conductors or equipment in electrical installations, which is covered under 29 CFR 1910.301-399, Electrical Safety Standards and Practices.
- 2.2 This procedure applies to equipment where, during the performance of work assignments, the unexpected energization or start-up of the equipment or the release of stored energy could cause injury to employees/temporary workers. All appropriate personnel will be properly instructed and trained in the Lockout/Tagout & Blockout Procedures. A list of personnel authorized to perform lockout and/or tagout will be maintained. Any new or transferred personnel will be notified and instructed in the purpose and use of the Lockout/Tagout Procedures. Outside contractors will be informed of the Lockout/Tagout Procedures in this guideline and will comply with them and all applicable regulations (e.g., State of Nevada and Federal OSHA 29 CFR 1910.147).

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3.0 RESPONSIBILITY

3.1 The EH&S Department is responsible for:

- 3.1.1 Evaluating the program's effectiveness at least annually.
- 3.1.2 Verifying that procedures have been reviewed annually.
- 3.1.3 Providing training tools to supervisors responsible for authorized and affected employees.

3.2 Facilities supervisors are responsible for:

- 3.2.1 Training and retraining as described in Section 11.2 and 11.3.
- 3.2.2 Maintaining locks, tags, etc., as described in Section 5.3.1.
- 3.2.3 Ensuring lockout/tagout/blockout procedures are followed as required.
- 3.2.4 Annually reviewing procedures, correcting deficiencies and/or retraining as necessary.

3.3 The Facilities departments are responsible for:

- 3.3.1 Informing outside contractors and service personnel of the expectation that they will follow all OSHA requirements, including lockout/tagout if applicable to the job being performed.
- 3.3.2 Determining if outside contractors need to utilize lockout/tagout/blockout on the job and communicating this requirement and these procedures to affected contractor employees.

3.4 Area Supervisors are responsible for:

- 3.4.1 Verifying training for their affected employees/temporary workers about the procedures and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out including the penalties for not adhering to lockout procedures.

4.0 PREPARATIONS

- 4.1 A survey should be conducted to locate and identify all isolating devices including switch(es), valve(s), or other energy isolating devices that apply to the equipment to be locked out or tagged out. Additional energy sources (electrical, mechanical, or others) may be involved. Document the identification of all isolating devices applicable to the equipment to be serviced.
- 4.2 Equipment specific lockout procedures - Each department will develop specific written lockout procedures for individual pieces of equipment (or groups of equipment) which do not meet the following criteria:
 - 4.2.1 The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shutdown which could endanger the employee.
 - 4.2.2 The machine or equipment has a single energy source which can be readily identified and isolated.
 - 4.2.3 The isolation and locking out of that energy source with a single lockout device will completely de-energize and deactivate the machine or equipment.
 - 4.2.4 A single lockout device will achieve a locked out condition.

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- 4.2.5 The lockout device is under the exclusive control of the authorized employee performing the service or maintenance.
- 4.2.6 The servicing or maintenance does not create a hazard for other employees.
- 4.2.7 No accidents have occurred involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

A sample equipment specific procedure is provided in Attachment A.

- 4.3 With equipment that meets the above criteria, where proper employee safety will be provided by compliance with the procedure outlined below, the operating department need not develop additional or separate procedures. A one page summary of this lockout/tagout procedure is provided in Attachment B for use by supervision and authorized employees when conducting lockouts which do not require an equipment specific procedure.

5.0 LOCKOUT/TAGOUT PROCEDURES

- 5.1 Assigned safety locks are issued to all authorized employees trained in the Lockout/Tagout Procedures. One key per lock is issued and the keys should not be duplicated. (A safety lock or tag can only be removed by the owner or supervisor.)
- 5.2 All affected employees are to be notified that a lockout/tagout system will be implemented. Affected employees shall be informed of the purpose for utilizing the energy control system.
- 5.3 Equipment or machine to be serviced or repaired should be deactivated. All energy sources that could pose a hazard are to be neutralized to prevent accidental operation of moving parts or electrical discharge. All energy systems are to be tested to ensure power to the system is off and neutralized.
 - 5.3.1 Where designated, the main switch for the power source of electrically operated equipment will be placed in the off position and effectively locked out by the employee responsible for the assigned work. This procedure, using an authorized lockout device, will be completed prior to starting the work assignment. The employee will secure a warning tag bearing his/her name to the lockout device. NOTE: Button type (control circuits) are not recognized as effective lockout devices.
 - 5.3.2 Main switches should be used as a positive lockout. Following lockout, the switch must be checked to verify that the equipment will not operate.
- 5.4 Lockout and/or Tagout the energy isolating devices with assigned individual lock(s) or tag(s). These must be in place prior to attempting repairs to prevent re-energizing or reactivating of equipment. If necessary, retest the system to assure all energy to the system is neutralized. Each authorized employee's lock must remain in place until their work is completed.
 - 5.4.1 An employee working on equipment previously locked out will affix her/her lock to the multiple lockout device.
 - 5.4.2 Where multiple lockout locations are designated, such as: stop/start stations, auxiliary control panels, etc., there may be the need for multiple lockout devices to be installed (i.e., labeling equipment which uses motor control circuits as well as heater control circuits). After effectively locking out the equipment, the employee will secure a warning tag to the lockout device.
 - 5.4.3 Positive steps will be taken to ensure that all energy sources are locked out and that lines are bled of any residual pressure.

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5.4.4 Positive steps will be taken to ensure that a hydraulic system cannot be inadvertently operated. The block or four-way valve will be secured in an open position by wedging or other positive means. If the pressure line to the unit on which work is being done is not disconnected or blocked out in a positive manner, the electrical power source to the hydraulic pump will be locked out. The speed control valve will be set at zero.

5.5 Signs and tags are to be used in conjunction with safety locks to clearly identify equipment that is down for repairs and is not to be operated. Signs and tags should provide a name and extension number of the contact person in case of questions or emergencies. **Signs and tags are not to be used in place of a safety lock.** If tagout devices must be used, they must be affixed in such a manner as will clearly indicate that the operation or movement of energy-isolating devices from the "safe" or "off" position is prohibited and additional means, including additional safety measures (such as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle to reduce the likelihood of inadvertent energization) should be implemented.

5.6 The lockout procedure will be followed in cases where electric motors are installed and motor leads are disconnected. Persons removing locks and tags are responsible for the satisfactory completion of their portion of the job, including reinstallation of any guards removed, provided the job is completed on that specific shift.

5.7 Each employee will remove his/her lock from the lockout device on completion of his/her portion of the work or at the end of the shift, whichever comes first, unless assigned to complete the work the next day. Employees assigned to complete work on the next shift will affix their lock. At all times, the equipment will remain locked out until the work is completed.

5.8 A supply of locks, keys, multiple locking devices and warning tags (Attachment C) will be maintained by supervision in operating departments for use in complying with this procedure. Locks and tags will be of a standard type throughout the facility. These locks will be dedicated to energy control uses only, and will have only one key, (i.e., no master key or spare key) which is kept by the authorized employee. Each authorized employee routinely involved in lockout will be assigned/provided their personal lock and key. Alternately, a single lock may be used, provided the only key to the lock is stored in a lockout box or cabinet which allows the use of multiple locks to secure it.

6.0 RESTORING MACHINES OR EQUIPMENT TO NORMAL PRODUCTION OPERATIONS

6.1 After the servicing and/or maintenance is complete and equipment is ready for normal operation, check the area around the machines or equipment to ensure that no one is exposed.

6.2 Notify all affected personnel that the machine or equipment is being restored to normal service.

6.3 After all tools have been removed from the machine or equipment and the guards have been reinstalled, remove all the lockout and tagout devices. Operate the energy isolating devices to restore energy to the machine or equipment.

6.4 Only those supervisors responsible for a job assignment may forcibly remove a lockout device and warning tag after investigating the circumstances as to why the lockout device and warning tag were not removed as indicated in the procedure.

6.5 ANY PERSON WHO REMOVES A LOCKOUT DEVICE OR WARNING TAG WITHOUT AUTHORIZATION WILL BE SUBJECT TO CORRECTIVE MEASURES UP TO AND INCLUDING TERMINATION.

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7.0 PROCEDURE INVOLVING MULTIPLE AUTHORIZED PERSONNEL

- 7.1 If more than one individual is required to lockout or tagout equipment, each individual should place their own lockout/tagout device on the energy isolating device(s). When the energy-isolating device cannot accept multiple locks or tags, a multiple lockout or tagout device (hasp) may be used.
- 7.2 When lockout is used, a single lock may be used to lock out the machine or equipment. The key may be stored in a lockout box or cabinet which allows the use of multiple locks to secure it. Each employee will then use their own lock to secure the cabinet. As each employee no longer needs to maintain lockout protection, that person will remove their lock from the box or cabinet.
- 7.3 There may be occasion where a piece of production equipment will be pulled out of service until repairs can be conducted. In these cases a multiple lockout will be used with an out of service tag and lock placed in the equipment after deenergization. Individual mechanics will apply their locks and tags when performing service on the equipment and remove their locks and tags at the end of their shift/job assignment. The out of service lock and tag will remain until the servicing is complete and the equipment is ready to be placed back into service. The mechanic completing the repairs and/or his/her supervisor will be authorized to return the equipment to service.
- 7.4 The need for supervisory lockout has been evaluated and at present there is no instance where this situation is necessary. This need will be reviewed at least annually. Should a situation occur where a large group may work on a piece of equipment or the down time may extend over several days, a supervisory team consisting of at least two supervisors, at least one of whom is in the line of supervision of the mechanics involved, and the other a supervisor normally responsible for the equipment, will lock out the equipment. A procedure will be put in place to account for all mechanics involved prior to the removal of the lockout. All mechanics involved will be advised of the supervisory lockout and the procedures to be used.

8.0 TAGOUT SYSTEM MODIFICATION

- 8.1 Whenever major replacement, repair, renovation, or modification of machines or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for the machines or equipment must be designed to accept a lockout device.
- 8.2 The Facilities Department will be contacted in cases where provision for lockout is not readily available on power switches.

9.0 LIMITATION OF TAGS

- 9.1 When using tagout systems, employees should be instructed on the following limitations of tags:
 - 9.1.1 Tags are warning devices attached to the machine or equipment in repair and do not provide the physical restraint or barrier that is provided by a lock.
 - 9.1.2 Tags that are attached to energy isolating devices should only be removed by the authorized person responsible for it. The tags are never to be bypassed, ignored or detached. Tags must be securely attached to prevent accidental dislodging.
 - 9.1.3 All tags must be legible and understandable to all authorized employees, affected employees, and all other employees that may come into contact with the tagged out equipment.
 - 9.1.4 Tags and their means of attachment should be made of durable materials capable of withstanding the workplace environment i.e. waterproof, chemical resistant.

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- 9.1.5 Tags may convey a false sense of security. It is strongly recommended that energy isolating devices be modified to accept locks thereby assuring absolute hazardous energy isolation control.

10.0 PROGRAM EVALUATION

- 10.1 The lockout/tagout program and procedures are to be reviewed at least annually by the EH&S Department.
- 10.2 This evaluation is to include at a minimum:
 - 10.2.1 A mechanism to correct any deviations or inadequacies observed.
 - 10.2.2 Where lockouts are used for energy control, a review with each authorized employee of that employee's responsibilities under the particular energy control procedure being inspected.
 - 10.2.3 Where tagout is used for energy control, a review with each authorized employee of that employee's responsibilities under the particular energy control procedure being inspected and limitation of tags described in 29 CFR 1910.147(7)(c)(ii).

11.0 TRAINING

- 11.1 Training should be provided to employees to ensure that employees understand the purpose and function of the energy control program and have the knowledge and skills required for the safe application, use, and removal of energy controls. This program recognizes three types of employees (1) authorized, (2) affected, and (3) other.
 - 11.1.1 Authorized employees - This includes, but is not limited to, maintenance personnel and electricians. They will be instructed in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.
 - 11.1.2 Affected employees – This usually includes equipment/machine operators; they will be trained in the purpose and use of the energy control procedure.
 - 11.1.3 Other employees - If their work operations are affected by the energy control procedure, awareness training should be conducted. The training will include an explanation of the procedure used and inform them that during repair or maintenance, attempts to restart or re-energize locked out or tagged out machines and equipment is prohibited.
- 11.2 Supervision will arrange for and document the training of all personnel who perform lockout/tagout or who may be affected by the lockout/tagout procedure. The training should include:
 - 11.2.1 Recognition of hazardous energy sources (type and magnitude of energy).
 - 11.2.2 Methods and means necessary for energy isolation.
 - 11.2.3 Purpose and use of the lockout/tagout procedure (differences).
 - 11.2.4 Prohibitions relating to locked out or tagged out equipment.
 - 11.2.5 Penalty for unauthorized removal of a lock or tag.
 - 11.2.6 Retraining (See 11.3 below).

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11.2.7 Reviewing and assessing compliance with this procedure on a routine basis.

11.3 Retraining will be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machine, equipment or process that presents a new hazard or if there is a change in the energy control procedure. Retraining will also be conducted whenever inspection of the program indicates the need for refresher training.

11.4 The EH&S Department will provide basic training tools to Facilities supervisors who will be responsible for the training of authorized, affected and other employees/temporary workers.

11.5 All training will be documented on a DRI Employee Training Documentation Form.

11.6 Contractors will be required to train their employees whenever their work falls within Section 2.0 of this procedure and to provide copies of training documentation if requested to do so by DRI personnel.

12.0 RECORD KEEPING

12.1 The following records are maintained by the EH&S Department.

12.1.1 Annual program evaluations.

12.1.2 Certification records which include:

12.1.2.1 The identity of the machine or equipment on which the energy control procedure was being utilized.

12.1.2.2 The date of inspection.

12.1.2.3 The employees included in the inspection.

12.1.2.4 The person performing the inspection.

12.2 Training records are maintained on a DRI Employee Training Documentation Form with copies going to:

12.2.1 The EH&S Department (original)

12.2.2 Employee's supervisor

13.0 DEFINITIONS

13.1 Affected employee. An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

13.2 Authorized employee. A person who locks out or tags out machines or equipment to perform the servicing or maintenance on that machine or equipment. An authorized employee and an affected employee may be the same person when the affected employee's duties also include performing maintenance or service on a machine or equipment which must be locked or a tagout system implemented.

13.3 Blockout. The practice of securing a piece of equipment to minimize the hazards caused by breakage or release of mechanical energy by loosening and falling.

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- 13.4 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.
- 13.5 Lockout device. A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment.
- 13.6 Tagout. The placement of a tagout device 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 tagout device is removed.
- 13.7 Tagout device. A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to 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 tagout device is removed.
- 13.8 Zero Energy State. The neutralization and/or isolation of all sources of injurious substances or hazards which affords maximum protection against unexpected movement or discharge of hazardous substances. The zero state concept includes not only locking out of electrical energy, but also requires that all kinetic and potential energy and harmful substances be isolated, blocked, supported, returned, or controlled to the extent that such energy or substances will not be released unexpectedly.

14.0 REFERENCES

- 14.1 Title 29 Code of Federal Regulations 1910.147 and 1910.333.
- 14.2 1910.147, State of Nevada Occupational Safety and Health Standards for General Industry
- 14.3 Articles 110 and 500, National Electric Code.

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ATTACHMENT A

LOCKOUT/TAGOUT PROCEDURE OUTLINE FOR SPECIFIC EQUIPMENT

1. Name of Department
2. Type(s) and magnitude(s) of energy and hazards
3. Job title(s) of employees authorized to lockout/tagout
4. Job title(s) of potentially affected employees who must be notified of lockout
 - a. Affected Employees (i.e., those who operate the equipment undergoing the LOTO and/or work in the area where the LOTO is taking place):
 - b. Other Employees (i.e., those who need to be notified of the equipment undergoing maintenance or repair) and how the notification will take place (general email to all employees, email to specific employees, area posting, etc.):
5. Types(s) and location of energy isolating means
6. Type(s) of stored energy and methods to dissipate or restrain
7. Method(s) selected, i.e., lock, tags, specific lockout device to use, additional safety measures, etc.
8. After equipment shut down and all locks and tags are applied and stored energy has been released, verify the equipment is isolated and de-energized. Then conduct work.
9. If temporary power up is required during work, follow this sequence:
 - Clear the machine or equipment of tools and materials
 - Remove employees from the machine or equipment in accordance with normal start-up procedures.
 - Remove lockout/tagout devices
 - Energize and test or position.
 - De-energize all systems and reapply energy control measures in order to continue the servicing and/or maintenance.
10. Release of Lockout/Tagout. Before removing lockout/tagout devices and restoring energy, authorized employees must follow these steps:
 - Inspect the work area to ensure that nonessential items have been removed and that the equipment components are intact (for example guards have been replaced).
 - Check the work area to make sure all employees are safely away from the equipment.
 - Notify the affected employees (within the work area) before removing lockout/tagout devices and before energizing the machine or equipment.
 - Notify other affected employees when the work is completed.

ATTACHMENT B

LOCKOUT/TAGOUT SUMMARY

I. Preparation for Logout/Tagout

Locate and identify all isolating devices to be certain which switch, valve or other energy isolating devices applies to the equipment to be locked out. If more than one power source is involved, the equipment should have a specific procedure which must be followed.

II. Sequence of Lockout/Tagout

- A. Notify all affected employees that a lockout/tagout system is going to be utilized and explain why.
- B. If the machine or equipment is operating, shut it down.
- C. Operate the switch, valve, or other energy isolating device so that the equipment is isolated from the power source. Stored energy must be dissipated or restrained.
- D. Lock out the energy isolating device using the assigned lock(s) and tag(s).
- E. Operate the push button or other normal controls to make certain the equipment will not operate. Return operating controls to off or neutral.
- F. The equipment is now locked and tagged out.

III. Restoring the Equipment to normal Operation

- A. After work on the equipment is complete, check the area around the equipment to verify that all employees are clear.
- B. Notify all affected employees that the locked out equipment is being restored to normal operation condition.
- C. When all tools have been removed from the equipment and guards have been reinstalled, remove all lockout/tagout devices. Restore energy to the equipment.

IV. More than One Person

If more than one person is required to lockout or tagout equipment, each will place his/her own personal lockout/tagout device on the energy isolating device.

ATTACHMENT C
Example Tags



FRONT



BACK