UNIVERSITY OF NOTRE DAME

FACILITIES DESIGN AND OPERATIONS

Utilities & Maintenance

LOCKOUT/TAGOUT PROGRAM

FOR

GENERAL INDUSTRY

(Covered by 29 CFR Subpart J 1910.147)

January 8, 2024 Rev. 18

I. PROGRAM

A. DEFINITIONS

Authorized Employee

A person who is approved or assigned the duty to lockout/tagout systems, equipment or distribution pathways, to allow for work activities to be performed.

Affected Employee

A person who cannot lockout/tagout systems, equipment or distribution pathways, but who is working in the vicinity and therefore affected by any work activities performed.

Energized

Connected to an energy source or containing residual or stored energy.

Established Blocking Point List

A lockout tagout blocking point list that is prewritten and routinely reviewed and is for equipment or systems that are routinely used.

Lockout

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

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 a safe position and prevent the energizing of a machine or equipment.

Medium Voltage Systems

Include systems with operating voltages greater than 600 VAC.

Normal Production Operations

The utilization of a machine or equipment to perform its intended production function.

Provisional Blocking Point Worksheet
A lockout tagout blocking point list that is developed because an Established Lockout Tagout does not exist for that particular work or that has been previously prepared, but used so infrequently that it does not merit annual review.

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.

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.

Application/Release Approval Persons

The persons performing in the following positions are those individuals allowed to authorize application requests and releases for LOTO:

Production and Distribution Areas
"A" Operator
Shift Supervisor
Power Plant Operations Supervisor
Power Plant Maintenance Supervisor
Distribution Supervisor
Power Plant Manager
Chief Electrical Engineer
Electrical Engineer(s)
Mechanical Engineer(s)
Director of Utilities
Sr. Director of Utilities and Maintenance
Assistant Vice President of Utilities and Maintenance

B. GENERAL

This program is intended to be in accordance with **29 CFR Subpart J Part 1910.147** *The control of hazardous energy lockout/tagout.* This section covers non-electrical generation, transmission and distribution at the University of Notre Dame (systems which operate at voltages greater than 600VAC).

Lockout is the primary method of isolating and securing systems, equipment or distribution pathways from potential energy sources in order to create a safe working environment. In all cases where lockout provisions exist, lockout shall be used.

Tagout is the secondary method used for isolation when an energy isolating device is not capable of being locked out. When a tagout device is used on an energy isolating device which is not capable of being locked out, the tagout device shall be attached to the operating mechanism of the energy isolating device and in plain view. The employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program. Additional means to be considered as part of the demonstration of full employee protection when tagout is used shall include the application of 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.

An energy source can be electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other type of energy in nature.

This specific program is intended for use by the Utilities Department Power Plant Operations, Power Plant Maintenance, Instrumentation & Controls and Distribution Groups for use on equipment and systems associated with the production and distribution of energy. Work performed by the Facilities Maintenance and Building Controls Groups of the Utilities Department shall be performed in accordance with the University's Lock-Tag-Try Policy, managed by the Department of Risk Management and Safety. As such all persons involved with Lockout/Tagout operations whether University personnel or outside contractors shall familiarize themselves with both this Utilities Department Policy as well as the University's Lock-Tag-Try Policy.

C. PURPOSE AND INTENT

This procedure establishes the minimum requirements for the lockout or tagout of energy isolating devices. It shall be used to ensure that the system, equipment or distribution pathway is isolated from all potential energy sources. Lockout/Tagout shall occur before any authorized person(s) perform any activities where there is the potential that the unexpected energization, start-up or release of stored energy could cause injury.

The Lockout/Tagout Program includes the following guidance as to purpose and intent:

- The control of energy during servicing and/or maintenance of machines and equipment.
- Normal production operations are not covered by the Lockout/Tagout program. Servicing and/or maintenance which takes place during normal production operations is covered only if: An authorized person is required to remove or bypass a guard or other safety device; or an authorized person is required to place any part of his or her body into an area on a machine or piece of equipment where work is actually being performed or where an associated danger zone exists during a machine or equipment operating cycle. Minor tool changes and adjustments, and other minor servicing activities, which take place during normal operations, are not covered by this Lockout/Tagout Program if they are routine, repetitive, and integral to the use of the equipment, provided that the work is performed using alternative measures which provide effective protection including, but not limited to affixing appropriate lockout devices, or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start up or release of stored energy in order to prevent injury to employees.
- The Lockout/Tagout Program does not apply to the following: Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or startup of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the authorized person performing the servicing or maintenance.

◆ Hot tap operations involving systems for substances such as gas, steam, water or petroleum products when they are performed on pressurized pipelines, provided that the employer demonstrates that continuity of service is essential; shutdown of the system is impractical; and documented procedures are followed, and special equipment is used which will provide proven effective protection for employees.

D. RESPONSIBILITY

Authorized persons shall be instructed by their respective employer in the safety significance and general practices of lockout/tagout. All persons whose work may be in any lockout/tagout areas shall be instructed in the purpose and use of the Utilities Department lockout/tagout program.

E. LOCKOUT TAGOUT PROGRAM PROCESSES

1. GENERAL

The Utilities Operations, Distribution and Administration Groups shall have the primary responsibility and oversight of the Lockout/Tagout Program. This includes the Production and Distribution of energy which includes the Utilities Complex (Power Plant and associated adjacent facilities), Electrical Substation, Diesel Generation Facility and all energy distribution systems leading to campus facilities. This procedure also includes all associated building systems, including, but not limited to equipment such as air handlers, overhead doors, and other equipment containing hazardous energy.

The Utilities Operations Group shall in all cases be responsible for approving a Lockout/Tagout Request. Information regarding the procedure and specific details of system, equipment and distribution pathway lockout/tagout blocking points shall be maintained and available for inspection by all authorized and affected persons. The Operations Group shall maintain all records of lockout/tagouts and shall be apprised of all such events in order to ensure overall safe and reliable operation of all utility systems.

2. BLOCKING POINT LISTS

If an Established blocking points list exists for a specific system, piece of equipment or distribution pathway it may be used and presumed to be up to date and accurate.

If a Provisional blocking point worksheet exists for a specific system, piece of equipment or distribution pathway it may be used only as a guide to assist in completing a thorough survey. Such a survey shall be initiated by the appropriate and knowledgeable Utilities Group to locate and identify all isolating devices. The purpose of the survey is to identify all switches, valves or other energy isolating devices that must be secured in order to provide an effective lockout/tagout of the system, equipment or distribution pathway in question. Should a Provisional blocking point list be deemed worthy of becoming an Established blocking point, it must be reviewed and approved according to section E.3 of this document.

If an Established blocking point list does not exist, a Provisional blocking point worksheet for a specific system, piece of equipment or distribution pathway shall be initiated by the appropriate and knowledgeable Utilities Group to locate and identify all isolating devices. The proper procedure for the development of a Provisional blocking point worksheet can be found in Section E.3 of this document.

3. BLOCKING POINT LIST MANAGEMENT OF CHANGE

Established blocking point lists are those that are pre-written and reviewed, for equipment, systems or pathways that are routinely locked out. Established blocking points lists will be reviewed periodically or whenever required due to new information or a modification to the equipment, system or pathway.

A Provisional blocking point list is either a previously developed seldom used blocking point list kept on file or what a new blocking point list becomes if it is not determined to be saved as an Established blocking point list due to its expected infrequent use. This avoids having a seldom used blocking point list included on an annual review cycle, but does leave it available as a tool to expedite an infrequent use in the future with the caveat that the Provisional blocking point list must be fully surveyed prior to use to ensure no changes have been made to the system, equipment or distribution pathway.

Provisional blocking point lists must be developed and checked by an A-operator, Shift Supervisor, Operations Supervisor or Plant Manager. These blocking point lists shall contain the following information:

a. System/Component to be LOTO
b. Developed by
c. Checked by
d. Blocking Points location
    i. Valve Identification number/Motor Control Center number/Lighting Panel number/Critical Panel number (if applicable)
    ii. If valves do not have Valve ID # they should be assigned and tagged and documented.
e. Position
    i. Note any special procedures for operation of valves. i.e. Reverse operating.
    ii. Notes for any special instructions for testing of isolation.

A Provisional blocking point worksheet may become an Established blocking point list through a formal review and approval procedure. Such blocking point lists must be reviewed by and checked by one of the following individuals: Shift Supervisor, Operations Supervisor, Plant Manager, Maintenance Supervisor, and I&C Supervisor. If accepted the list will be saved as an Established blocking point list as indicated previously.

4. DOCUMENT MANAGEMENT

Established and Provisional LOTO blocking point documentation shall adhere to the following protocol:

a. An editable master index/list (Excel) listing all LOTO blocking point lists shall be stored on the Power Plant Drive LOTO folder.
i. This index/list shall include the name of the blocking point list, its latest revision number and other relevant data
b. A PDF version of the master index/list will be stored on the Operations Drive under the LOTO folder
c. Editable (Word) documents of LOTO blocking point lists will be stored on the Power Plant Drive LOTO folder under any of two folders; Established, Provisional. Provisional LOTO Blocking Point Worksheets that are used from the Power Plant drive are for reference only. The worksheet must be reviewed and checked in accordance with Section 2 of this document.

d. Un-editable PDF versions of LOTO blocking point lists will be stored and accessible for use by staff on the Operations Drive LOTO folder.

5. MEDIUM VOLTAGE SYSTEMS

As part of work to be performed on major electrical equipment within the jurisdiction of Utilities, which operate in connection with medium voltage systems Lockout/Tagouts associated are included in the specific equipment's blocking point list and will be implemented under this procedure. In these cases, the survey shall be performed by the Operations Group. This may include such equipment as Generator Circuit Breakers and Large Motor Circuit Breakers or other associated disconnecting or isolation devices. If in addition to Lockout/Tagout a circuit breaker needs to be racked out the Operations Group shall inform the Administrative Group who will arrange racking both in and out..

In the case of all non-medium voltage electrical systems located within the jurisdiction of Utilities, the survey shall be performed by the Operations Group, in the case of all non-medium voltage electrical systems located external to the Power Plant the survey shall be performed by the Distribution Group. (Note if an authorized member of the Distribution Group is unavailable an Administration Group authorized person may act on their behalf.)

6. UNDERGROUND VALVES

For underground valves, including but not limited to domestic water and chilled water valves, that are not directly accessible and hence operated via a valve box, a lockable mechanism that fits in the space between the valve nut and the valve box cover shall be used.

II. PROCEDURES

A. RESPONSIBILITY FOR APPLICATION

1. The Operations and Distribution Groups have primary responsibility for the application of lockout/tagout in their areas of concern to ensure the safe and reliable operation of the utility system. No other parties may implement lockout/tagout under any circumstances. A lock or tag will not be applied in the name of the individual Operations personnel, but with the name "OPER" on the lock or "OPERATIONS" on the tag.

B. SEQUENCE OF LOCKOUT/TAGOUT

1. To initiate a Lockout/Tagout (LOTO) , obtain and submit a **LOTO Request, Application and Release Form (RARF)** and fill in the Request Section information clearly stating the purpose of the request. Energy sources that require operation to facilitate maintenance during LOTO may be identified on the RARF for the *purpose of request* area.

a. For internal Utilities Complex systems (excluding the medium voltage electrical system) submit the form to the Operations Group for approval and application.

b. For external distribution systems (excluding the medium voltage electrical system) submit the form to the Operations Group for approval, they will then in turn authorize the Distribution Group to perform application of the LOTO.

c. For medium voltage electrical systems, the Administration Group shall notify the Operations Group for their awareness of system impacts. See the Lockout/Tagout Procedure for medium voltage systems for further details.

2. **Approval to proceed** with application of a request or release of an existing LOTO must be made by one of the following positions, given that said individual has knowledge and understanding of the request and its implications to the overall utility system:

a. Shift Supervisor
b. "A" Operator
c. Power Plant Operations Supervisor
d. Power Plant Maintenance Supervisor
e. Power Plant I/C Supervisor
f. Distribution Supervisor
g. Chief Electrical Engineer
h. Mechanical Engineer(s)
i. Power Plant Manager
j. Electrical Engineer(s)
k. Director of Utilities
l. Sr. Director of Utilities and Maintenance
m. Assistant Vice President of Utilities and Maintenance.

3. Authorized personnel shall **prepare the necessary LOTO forms** and research the LOTO database for prior LOTO information. Operations personnel shall assign a LOTO reference number to all requests and maintain a file of all open and completed LOTO requests for access by all interested parties. Equipment locks will be installed by operations personnel and reviewed by an authorized person prior to the start of any work.

4. Each authorized person shall **affix a personal lockout or tagout device** to the group lockout device, group lockbox, or comparable mechanism when they begin work, and shall remove those devices when they stop working on the machine, equipment or distribution pathway being serviced or maintained. A contractor may elect to apply a single lock to the group lockbox so long as the contractor ensures all appropriate measures in accordance with applicable regulations are taken to protect their individual employee(s).

5. If an Established **Blocking Point List exists** on file it shall be attached to the RARF and serve as the basis for this LOTO. An Established Blocking Point List may not be altered without a thorough investigation and administrative approval.

6. If equipment is modified or the Established **Blocking Point List is found deficient**, a Blocking Point Revision Request Form must be submitted to generate changes. A Request for revision may be initiated by any personnel listed in section III of this procedure. Operations personnel listed in section II, item 5 must perform the operations review prior to administrative approval. Revisions will be tracked on the Equipment Blocking Point List Revision Tracking Sheet.

7. If an Established **Blocking Point List does not exist** on file then a Provisional LOTO Blocking Points Worksheet (BPW) will be generated listing all blocking points. A BPW will typically be used in cases where it would be counterproductive to try and develop a fixed list of blocking points to cover every scenario, or where the system, equipment or distribution pathway has never been isolated before. An example of such a situation could be the isolation of sections of a distribution main.

8. In the event there is not sufficient space on the RARF form for all authorized personnel to sign the form, an Additional Authorized Employee Form (AAEF) will be attached and will include all other signatures. This allows for a single set of locks/tags, to be applied to the blocking points. The key to such a single set of locks will be secured in a group lockbox onto which each person involved applies a single lock. A contractor may elect to apply a single lock to the group lockbox so long as the contractor ensures all appropriate measures in accordance with applicable regulations are taken to protect their individual employee(s).

9. If, as a result of work in progress, it is determined that additional work or a larger scope is required, the existing LOTO may not be modified or amended. The existing LOTO shall be cancelled and released. In these cases, a new and independent LOTO RARF is required.

10. If isolation devices identified in the original blocking point list are found to not provide an adequate isolation, and additional blocking points are required, then the LOTO shall be cancelled and immediately released. A new LOTO RARF will be issued with the corrected blocking point list.

11. Throughout different phases of an outage, certain blocking points may require **temporary release to allow for functional testing** (such as a boiler hydrostatic pressure test). A temporary release is intended to provide the ability to test the system or subsystems while maintaining the necessary safety precautions, and fulfilling the intentions of the OSHA standard. In such cases, a LOTO temporary release will be provided by having all authorized personnel remove their lock from the group lockbox allowing operations personnel access to the LOTO lockset key. Operations personnel may hence remove any blocking device(s) required in order to perform testing. Special caution and care should be taken in performing a temporary release. Once the need for the temporary release is over all removed LOTO devices must be reapplied and all authorized personnel shall reapply their lock to the lockbox.

12. In accordance with the OSHA exception to 1910.147(a)(2)(ii), "minor tool changes and adjustments and minor servicing activities, which take place during normal production operations, are not covered by this standard if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection" and OSHA 1910.147(c)(4)(i) "in those cases where the machine has a single energy source that can be easily identified and isolated", the person(s) performing the work shall be a qualified person aware of the hazards involved and shall obtain permission from the "A" Operator on duty. They may then lockout the applicable blocking point. On completion of their work, all locks will be removed and the "A" Operator will be advised of the equipment's return to service. Examples include, but are not limited to, the following systems or equipment:

- Chiller Air Ejector Cleaning
- Turbine Generator Air Ejector Cleaning
- On-Line Instrumentation Calibration
- Troubleshooting and Testing

A determination of applicability of any additional such activities shall be made by a person listed in II.B.2

13. When the need for a LOTO is over and all authorized persons have signed for release, the LOTO devices may be removed and the system, equipment or distribution pathway returned to operational status.

14. Periodically, an audit of selective active and inactive LOTOs will be performed to ensure that the procedure and the requirements of the program are being followed. Findings will be used for program enhancement and training purposes. Audits shall be documented using the Audit Form (AF).

15. On an annual basis, all employees who perform LOTOs shall be evaluated by means of a supervised LOTO process to evaluate their proper understanding and use of the LOTO procedure. Employees who are unable to demonstrate proficiency shall be retrained and reevaluated prior to their being permitted to implement a LOTO.

16. Should LOTO permits be discovered, either through the audit process or employee evaluation process, be found to be incomplete or inaccurately completed, the identified persons associated shall be re-trained. Should there be repeated occurrences, employees shall be subjected to the university disciplinary process and contractors shall be subject to loss of work privileges.

17. For record keeping purposes all forms associated with a specific LOTO event shall be affixed together and filed under the specific LOTO reference number, forms are to be filled out in ink and readily accessible. Separate files for open, pending and closed LOTO's are to be maintained along with a log sheet of all LOTO's. Audit Forms as well as copies of the program and other associated blank forms shall be retained in the central file system.

C. RESTORE SYSTEMS, EQUIPMENT OR DISTRIBUTION PATHWAY TO NORMAL OPERATION

NOTE THAT WHENEVER A SYSTEM, EQUIPMENT OR DISTRIBUTION PATHWAY IS CAPABLE OF BEING OPERATIONAL AND AN INDIVIDUAL HAS COMPLETED THEIR WORK, THEIR LOCKOUT/TAGOUT DEVICE SHALL BE REMOVED AND THE ASSOCIATED PAPERWORK CLEARED IMMEDIATELY IN ORDER TO ALLOW FOR MAXIMUM OPERATIONAL EFFECTIVENESS.

1. After the servicing and/or maintenance tasks have been completed, all tools shall be removed from the area, all guards or other safety devices shall be reinstalled and all employees shall stand clear.
2. Both those performing the work as well as those operations personnel responsible for clearing the LOTO must verify that there are no apparent hazards remaining.
3. Once all authorized employee lockout/tagout devices are removed from the lockbox, the Operations or Distribution Group shall remove their lockout/tagout devices and proceed to operate the energy isolating devices to restore energy to the system, equipment or distribution pathway.
4. Should a lockout device remain for an authorized employee after confirmation he/she is: a) not at the facility, b) reasonable efforts have been were made to contact the individual and c) ensuring he/she has knowledge of this before resuming work, the device may be removed with authorization from those persons listed in II.B.2. Such instances shall be documented on the Absent (Authorized Employee) Release Log.

III. DEPARTMENTAL SPECIFIC INFORMATION

A. Name of Company: University of Notre Dame, Utilities Department
B. Type(s) and Magnitude(s) of known energy and hazards:

Steam 400 psig-725 degree F
Steam 10 psig-300 degree F
Feedwater 650 psig-325 degree F
Domestic Cold Water 80 psig-50 degree F
Heating Hot Water 85 psig 130 degree F
Once Thru Non-Contact Cooling Water 45 psig 50-120 degree F
Closed Loop Cooling Tower Condenser Water 50 psig 50-120 degree F
Steam 70 psig-500 degree F
Salt
Domestic Hot Water 65 psig-140 degree F
Compressed Air 100 psig
Geothermal Field Water 85 psig 35-85 degree F

(Cooling Towers 6-9)

Caustic Soda 50%	Natural gas 300, 150, 35 psig
12.47 kVAC-3 phase	
4.16 kVAC-3 phase	480 VAC-3 phase
277 VAC-1 phase	240 VAC-1 or 3 phase
208 VAC-1 or 3 phase	120 VAC-1 phase
125 VDC	#2 Fuel Oil
Nitrogen	Drip/Pumped Condensate, 150 degree F
Various Water Treatment Chemicals	Chilled Water 85 psig-40 degree F
Refrigerants: R-22, R-123 & R-134a	Glycol

C. Job Title(s) of authorized employees

Distribution Supervisor
Distribution Technicians
Power Plant Manager
Operations Supervisor
Shift Supervisor
Operator
Maintenance Supervisor
Mechanic
I/C Supervisor
I/C Technician
Electrical Engineers(s)
Mechanical Engineer(s)

D. Job Title(s) of affected persons; Support Staff

Assistant Vice President of Utilities and Maintenance
Sr. Director of Utilities and Maintenance
Director of Utilities
Mechanical Engineers
Senior Environmental and Safety Specialist

IV. Additional References

http://www.osha.gov/SLTC/controlhazardousenergy/index.html

http://riskmgt.nd.edu/manuals/index.shtml