The Universities
AT SHADY GROVE

9636 Gudelsky Drive, Rockville, MD 20850 | shadygrove.umd.edu

LOCKOUT TAGOUT PROGRAM

Control of Hazardous Energy

Universities at Shady Grove

9630, 9631, 9636, 9640 Gudelsky Drive

Rockville, Maryland 20850

February 2025

(Update to program dated May 2012)

Table of Contents

I. GENERAL INFORMATION

A. PURPOSE

This program addresses the Universities at Shady Grove (USG) requirements related to lockout/tagout and the control of hazardous energy. The purpose of this LOTO Program is to formalize the requirements for compliance with applicable regulations and standards and to protect USG personnel against injury or fatality from the uncontrolled, unexpected energizing, start-up, or release of stored hazardous energy while servicing or maintaining machines or equipment.

B. SCOPE

This program applies whenever servicing or maintenance activities are in progress or when equipment guards or other safety devices are removed requiring the need for machines, equipment, or service areas to be isolated from all potentially hazardous energy sources. These energy sources include electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other sources in machines and equipment that can be hazardous to personnel.

Hazardous energy control elements can be assigned to categories in the Hierarchy of Controls (see APPENDIX H) namely elimination, substitution, engineering, administrative, or personal protective equipment. Control of hazardous energy as described in this program involves a combination of multiple categories to achieve the most effective strategy.

This program applies whenever USG personnel are required to place any part of their body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

C. PROGRAM EXCLUSIONS

1. Normal production operations are not covered by this program if they are routine, repetitive, and integral to the use of the equipment for production purposes provided that the work is performed using alternative measures that provide effective protection. Examples of alternative measures that might offer effective protection would include light curtains, sensing devices, safety interlocks, or the use of extension tools.
2. Normal production operations are not covered by this program if one of the following conditions exists:
    a) Work on cord and plug-connected equipment is not covered if unplugging the equipment controls all energy and the plug remains under the continuous control of the Authorized Employee performing the service work.
    b) Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations that are routine, repetitive, and integral to the use of equipment

provided that work is performed using alternative measures to provide effective protection.

c) Hot tap operations involving transmission and distribution systems are not covered by this policy if the manager of the work demonstrates that (1) continuity of service is essential, (2) shutdown of the system is impractical, and (3) documented procedures offering effective protection are followed.

D. APPLICABLE INFORMATION

1. Definitions and Acronyms

a) Definitions for the LOTO Program can be found in APPENDIX A

b) Acronyms for the LOTO Program can be found in APPENDIX B

II. REGULATORY AND UNIVERSITY REQUIREMENTS

A. Federal Requirements, Occupational Safety and Health Administration (OSHA)

1. 29 CFR 1910.147, The control of hazardous energy (lockout/tagout), (See APPENDIX C)
2. 29 CFR 1910.333, Selection, and use of work practices
3. 29 CFR 1910.306, Specific purpose equipment and installations
4. 29 CFR 1926.417, Lockout and tagging of circuits

B. University Requirements

1. UMD Policy, Section VI: General Administration, VI-14.00(A) – University of Maryland, College Park Policy on Control of Hazardous Energy During Maintenance of Equipment, (See APPENDIX D)
2. USG Lockout Tagout Policy, Date/Number

III. DUTIES AND RESPONSIBILITIES

A. USG Environmental Health and Safety/Dept. of Environmental Safety, Sustainability and Risk (ESSR)

1. Ensure that the Program is established, maintained and readily available.
2. Investigate all incidents (injuries and near-misses) related to the Control of Hazardous Energy and coordinate with all involved personnel.
3. Provide consultation to assist in the identification of equipment where LOTO should be utilized.

4. Provide general training and retraining to all authorized USG personnel through the SciShield and Workday Platforms, or advise on alternate general training to meet regulatory requirements.
5. Assist with Operating Unit specific procedure training upon request.
6. Advise and provide guidance on this program.

B. USG Campus Operating Units

1. Designated Supervisors

a) Oversee the implementation of this program within their unit.

b) Direct the establishment of a recordkeeping system for maintaining the required written elements of this program.

c) Evaluate the overall effectiveness of the LOTO Plan. Ensure that unit personnel are made aware of the potential hazards associated with work near potential hazards.

d) Ensure that copies of this program and associated supporting documents are made available to unit personnel.

e) Coordinate LOTO training and information for unit personnel.

f) Determine lockout device color scheme based on the type of hazardous energy source and fill out APPENDIX F.

g) Develop and administer individual unit-specific personnel training and retain records for the duration of the employment.

h) Administer, verify, and sign the Lockout/Tagout Inspection Form (see APPENDIX G) to verify that LOTO procedures are followed.

i) Participate in incident investigations and track corrective and preventive actions to completion.

2. Authorized Employees

a) Attend LOTO Training and reviewing provided information.

b) Implement Lockout/Tagout procedures contained in this program.

c) Prepare the Lockout/Tagout Annual Certification Form (see APPENDIX G).

d) Ensure all program audits, hazard findings, and corrective actions are documented and communicated to the Designated Supervisor.

e) Participate in incident investigations and track corrective and preventive actions to completion.

f) Notify affected employees, and partner institution staff and students, before and after LOTO procedures are implemented.

3. Affected Staff/Students

a) Notify the appropriate personnel when equipment needs servicing.

b) Follow LOTO instructions given by the Authorized Employees.

IV. TRAINING AND INFORMATION

All USG personnel required to service equipment or machinery with the potential for release of hazardous energy, or affected by such release, must be provided with information and training regarding LOTO and the control of hazardous energy.

A. Training

USG personnel must be generally trained by ESSR, or other substitute equivalent method, in LOTO practices and procedures as well as the requirements of the OSHA Control of Hazardous Energy Standard. Registration and attendance for general training sessions are on ESSR's training database system.

Each Operating Unit must develop, track the implementation of, and maintain documentation for unit-specific training to keep employee activities compliant with procedures for the control of hazardous energy and the requirements of the USG LOTO Program. The Designated Supervisor shall be responsible for training of all authorized employees in the specific operations, safety equipment and emergency procedures used by their respective units.

B. Information

All Authorized Employees must be informed of:

1. The contents of the OSHA standard.
2. The location and availability of the LOTO Program.
3. The work practices covered by the LOTO Program.

a) Procedures

LOTO Devices

Procedures for Specific Hazardous Machinery

Specific Procedure Minimum Requirements

Working Without a Lock

b) Implementing Lockout/Tagout

Preparation for Shutdown of Equipment

Shutdown of Equipment

Preparation to Return Equipment to Service

Periodic Inspection

c) Special Requirements

C. Retraining

Retraining must be provided for all authorized employee whenever there is a change in their job assignments, a change in machines, equipment, or processes that present a new hazard, or when there is a change in the energy control procedures.

Additional retraining must also be conducted whenever a periodic inspection reveals, or whenever a Designated Supervisor has reason to believe, that there are deviations from or inadequacies in the USG personnel's knowledge or use of the energy control procedures.

Retraining re-establishes proficiency and is used to introduce new or revised control methods and procedures, as necessary. The Designated Supervisor must certify that training has been accomplished and is being kept up to date.

D. Recordkeeping

Documentation of general LOTO training conducted by ESSR shall be maintained within the ESSR training database system. Documentation of alternative general training shall be maintained at the Operating Unit level. Each Operating Unit must maintain documentation of the LOTO Program, the OSHA Standard and procedures for specific hazardous machinery provided within the unit.

V. PROCEDURES

Locking or tagging devices shall be used when employees are performing maintenance or service to any machine or equipment where unexpected or unintentional start-up or energization motion could cause harm. Locking devices shall also be used when guards or other safety devices must be removed during service or when moving or energized parts put any part of the employee's body at risk of injury.

Examples of hazardous energies where locking and tagging should be used may include, but are not limited to:

- Electrical
- Mechanical
- Hydraulic
- Pneumatic
- Gravity
- Stored Energy
- Kinetic
- Spring Loaded

- Chemical
- Thermal
- Compressed Gases
- Water Utilities
- Fuels
- Steam

If the equipment being serviced must be temporarily re-activated (for example, to test the equipment as part of the installation) all start-up and lockout/tagout procedures must be followed.

A. LOTO Devices

Devices must meet criteria to ensure adequate control and continual presence (see APPENDICIES E and F).

1. **Durable** – capable of withstanding the environment to which they are exposed for the maximum time of the anticipated exposure. For tagout devices, this includes a requirement that the tag be able to withstand exposure to weather conditions that could cause the tag to deteriorate or become illegible.
2. **Standardized** – the LOTO devices used throughout a unit must be standardized within that unit by color, shape, or size. For tagout devices, the print and format must be standardized.
3. **Substantial** – lockout devices must be substantial enough to prevent the removal without the use of excessive force or unusual techniques; tagout devices must have a means of attachment substantial enough to prevent inadvertent or accidental removal; the tagout device attachment must be of a non-reusable type, attachable by hand, self-locking and have a minimum unlocking strength of no less than 50 pounds.
4. **Identifiable** – LOTO devices must indicate the identity of the Authorized Employee who applied the device; tagout devices must include a warning on the hazardous conditions that could occur if the machine or equipment is energized. The tag must include a legend such as “do not start,” “do not open,” “do not energize,” or “do not operate.”

Lockout device color scheme based on the type of hazardous energy source shall be selected by the Operating Unit and APPENDIX F filled out.

B. Procedures for Specific Hazardous Machinery

Specific Procedures shall be developed and documented for the locking, tagging, or alternative control of hazardous energy measures for machinery or equipment under any of the following conditions:

1. When the machine being serviced has the potential for stored or residual energy, or the re-accumulation of stored energy after shut down and isolation;
2. When the machine has multiple energy sources;
3. When the isolation and locking of the machine will not completely deactivate it;
4. When the machine cannot be locked out;

5. When a single lockout device will not achieve a lockout condition;
6. When the lockout device will not be under the exclusive control of the authorized employee performing the service;
7. The servicing or maintenance creates hazards for other employees;
8. Authorized Employees, in utilizing this program, have had accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.

The Designated Supervisor shall maintain a written copy of the specific procedures as outlined by OSHA and shall make it available for inspection by employees, inspectors, or regulatory agencies.

C. Specific Procedure Minimum Requirements

The procedure shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance including, but not limited to, the following:

1. A specific statement of the intended use of the procedure.
2. Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy.
3. Specific procedural steps for the placement, removal and transfer of lockout devices, tagout devices, and other equivalent energy control measures and the responsibility for them.
4. Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

D. Working Without a Lock

If a lock cannot be applied to the equipment and the Designated Supervisor can demonstrate that a tagging procedure alone will provide a level of safety **equivalent** to that obtained by the use of a lock, a tag may be used instead. A tag used without a lock shall be supplemented by at least one additional safety measure that provides a level of safety **equivalent** to that obtained by the use of a lock.

Additional safety methods may include the removal of an isolating circuit element, blocking of a control switch, opening of an extra disconnecting device or the removal of a valve handle to reduce the likelihood of inadvertent activation. The tagout device shall be attached to the same location that the lockout device would have been attached.

Further demonstration of full employee protection must be performed by following procedure development and documentation as described in part V. B & C of this section. These are reviewed annually during the periodic inspection and documented on the Lockout/Tagout Inspection Form.

VI. IMPLEMENTING LOCKOUT/TAGOUT

Employees shall implement an orderly shutdown of machinery to avoid any additional or increased hazards resulting from equipment stoppage. The following is a list of steps to be used during shutdown.

PREPARATION FOR SHUTDOWN

1. Identify the types of energy and sources
2. Notify affected staff and students of intent to service equipment

SHUTTING DOWN THE EQUIPMENT

3. Turn off equipment
4. Deactivate energy
5. Release all stored or residual energy
6. Attach locking and tagging devices
7. Verify that equipment is secure and deactivated

PREPARATION TO RETURN EQUIPMENT TO SERVICE

8. Remove all tools from the equipment
9. Inspect the controls to verify they are in the "off'' position
10. Remove all locking and tagging devices
11. Re-energize the equipment
12. Notify affected staff and students when machine is back in service

PERIODIC INSPECTION

13. Audit procedure annually at a minimum

B. PREPARATION FOR SHUTDOWN OF EQUIPMENT

1. Identification of the Energy Type or Source

Determine where and how equipment is being energized. Since some equipment is powered by several sources (e.g., electrical, mechanical, pneumatic, chemical, thermal and hydraulic), all energizing sources shall be identified. For complex equipment, refer to the manufacturer's control diagram detailing the locations of all isolating points. These points may include breaker panels, switches and valves. Furthermore, possible residual energy and methods used to dissipate or restrain that energy shall be identified. In addition to identifying energy sources, the employee must determine the magnitude of the energy, the hazards of the energy to be controlled, and the methods or means to control the energy. Safe procedures for deenergizing circuits and equipment shall be determined before circuits or equipment is deenergized. **If authorized employees are unable to determine each form of energy, they must consult their Designated Supervisor before work is started.**

2. Notification of employees

Affected Staff and Students must be notified by authorized personnel of the intent to service equipment. Written notification via email or memorandum shall be given before LOTO controls are applied and should contain the name and job titles of authorized employees, location of equipment being serviced, and duration/date of service.

C. SHUTDOWN OF EQUIPMENT

3. Shut Off Equipment

If the machine or equipment is operating, the authorized employee shall shut it down by the normal stopping procedures (depress the stop button, open the switch, close valve, etc.).

The circuits and equipment to be worked on shall be isolated from all energy sources. Control circuit devises, such as push buttons, selector switches, and interlocks, **may not** be used as the sole means for deenergizing circuits or equipment.

4. Deactivate the Energy

Disconnect the device from all energy sources and release all residual energies that may present a hazard. Inspect/test the equipment to ensure all energy sources are disconnected.

5. Release of Stored or Residual Energy

Release stored or residual energy, such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems and pressurized systems (air, gas, steam, or water). Capacitors shall be discharged and high capacitance elements shall be short-circuited and grounded, if the stored electric energy might endanger personnel.

If energy is incapable of being released, the authorized employee shall reposition, block or utilize some other protective measure to prevent the release of residual energy while service is in progress. For stored non-electrical energy in devices that could reenergize electric circuit parts shall be blocked or relieved to the extent that the circuit parts could not be accidentally energized by the device.

6. Attach a Lock and Tag

Attach a lock and tag or identifier, with a descriptive warning, to serve as an energy isolating device on machinery or equipment to which work is to be performed. The lock shall be attached to prevent persons from operating the equipment. Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

Additionally, tags shall be attached to all points where equipment or circuits can be energized. If multiple employees are servicing the same equipment, each shall attach their own lock to a multiple lock plate or hasp.

For electrical, each tag shall contain a statement prohibiting unauthorized operation of the circuit or breaker.

Note: No attempt shall be made to remove another employee's lock unless the requirements listed in Section D – PREPARING TO RETURN EQUIPMENT TO SERVICE of this document are satisfied.

7. Special Provision for Electrical Lockout/Tagout

If a lock cannot be applied, or if the employer can demonstrate that tagging procedures will provide a level of safety **equivalent** to that obtained by the use of a lock, a tag may be used without a lock.

A tag used without a lock, as permitted by OSHA, refer to APPENDIX C, shall be supplemented by at least one additional safety measure that provides a level of safety **equivalent** to that obtained by use of a lock. Examples of additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device.

8. Verify that equipment is secure and deactivated

Confirm the energy is isolated within the equipment to ensure that equipment cannot be energized and potential energy sources secured. This should be done by:

a) Checking that no personnel are exposed;
b) Verifying the isolation of equipment by operating the push button or other normal operating controls. Secure all switches to prevent movement to the "on" or "start" position;
c) Verification that a system or component is drained, depressurized, and safe for work.
d) Checking pressure gauges to ensure de-pressurization of lines; and
e) Test/inspecting electrical circuits to confirm zero voltage with a volt meter.

For electrical, a qualified person shall use test equipment to test the circuit elements and electrical parts equipment to which employees will be exposed and shall verify that the circuit elements and equipment parts are deenergized.

The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage back feed even though specific parts of the circuit have been deenergized and presumed to be safe. If the circuit to be tested is over 600 volts, nominal, the test equipment shall be checked for proper operation immediately after testing.

Note: All employees should consider equipment to be operable at all times except when they have personally locked out and verified to be deactivated.

D. PREPARATION TO RETURN EQUIPMENT TO SERVICE

After service has been completed and the machine is ready to be tested or returned to service the following steps must be followed.

9. Inspect the machine and work area

Inspect the machine(s) to insure that non-essential materials have been removed and the machine is in operating order. Visual inspections shall be conducted to ensure:

a) Tools and equipment are removed and secured safe guards are in place;
b) Blocks, pins, and chain (used during the lockout) are removed; and
c) Electrical jumpers, shorts, grounds, and other such devices have been removed, so that the circuits and equipment can be safely energized.

Additionally, the Authorized Employees shall verify all equipment components are fully assembled and operational. Finally, Authorized Employees shall inspect the work area to ensure that all individuals have been safely positioned or removed from the area.

10. Inspect the controls

Verify the controls are in neutral or the "off' position.

11. Remove the energy isolating devices

Each lock shall be removed by the Authorized Employee that applied it or under his/her direct supervision. If the Authorized Employee is absent from the workplace, then the lock or tag may be removed by a qualified person designated to perform this task provided that the immediate Designated Supervisor:

a) Verifies that the original Authorized Employee is not present and unable to remove the lock;
b) Ensures that the replacement Authorized Employee has verified that lock or tag removal presents no hazard to any Affected Staff/Students.
c) Make all reasonable efforts to inform the original Authorized Employee that the lockout/tagout device has been removed; and
d) Ensures that the Affected Staff/Students know the lockout/tagout device has been removed before work resumes.

12. Re-energize the machine

After completing the above steps, restore the energy to the machine.

For electrical, employees exposed to the hazards associated with reenergizing the circuit or equipment shall be warned to stay clear of circuits and equipment. There shall be a visual determination that all employees, staff, and students are clear of the circuits and equipment.

13. Notify Affected Staff and Students

Notify Affected Staff/Students that the servicing or maintenance is completed, and the machine or equipment is ready for use.

E. PERIODIC INSPECTION

Periodic inspection of the energy control procedure, at least annually, are to ensure that the procedure and the requirements of this program are being followed.

1) The periodic inspection shall be performed by an Authorized Employee other than the ones(s) utilizing the energy control procedure being inspected.
2) The periodic inspection shall be conducted to correct any deviations or inadequacies identified.
3) 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.
4) Where tagout 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, and the elements set forth by OSHA, refer to APPENDIX C, paragraph (c)(7)(ii).
5) The Designated Supervisor shall certify that the periodic inspections have been performed. The certification shall identify 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.
6) APPENDIX G – Lockout/Tagout Inspection Form to be used.

VII. SPECIAL REQUIREMENTS

A. GROUP LOCKOUT/TAGOUT

When service or maintenance on a machine or equipment will be conducted by more than one person, then group lockout/tagout devices will be used to provide protection to all authorized employees. Each authorized employee must have their own individual device as part of the group lockout/tagout device. Locks will be applied to prevent the machine/ equipment from being reenergized until all the individual lockout/tagout devices of each Authorized Employee have been removed.

One of the Authorized Employees will be assigned primary responsibility for the entire lockout/tagout procedure.

The Authorized Employee with primary responsibility must be able to ascertain the exposure status of each individual employee within the group, with regard to the locked out/tagged out equipment/machine. When more than one group of Authorized Employees are working on a

machine or equipment, the authorized employee with primary responsibility must be able to coordinate between groups and ensure the continuity of protection for all Authorized Employees in each group.

Each Authorized Employee must affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and must remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

B. SHIFT OR PERSONNEL CHANGES

When work on a locked out/tagged out machine or equipment continues through a change in authorized employees servicing and/or maintaining the machine or equipment, the authorized employees continuing to service or maintain the machine or equipment will apply their lockout/tagout devices prior to the removal of the lockout/tagout devices of the authorized employees ending their work. At no time will all lockout/tagout devices be removed from a machine or equipment without first implementing the removal procedures listed above.

C. OUTSIDE PERSONNEL (CONTRACTORS)

Whenever outside contractors engage in activities covered by the scope of this program, the USG Project Manager and the outside contractor will inform each other of their lockout/tagout programs and procedures which comply with 1910.147 for the job. They will both ensure their personnel understand and comply with any restrictions and prohibitions of the energy control procedures to be used.

General Contractor/Construction Managers, when performing lockout/tagout activities, are to ensure all persons potentially affected by de-energizing or re-energizing of building systems are properly protected and notified. All work shall be performed in accordance with all applicable laws and regulations. In addition, the General Contractor/Construction Manager is responsible for adhering to the following guidelines and communicating the information to their employees and all Subcontractors/Trade Contractors.

The General Contractor/Construction Manager is responsible for:

1) Developing and implementing an Energy Control Program in compliance with 29 CFR 1910.147; 29 CFR 1926.417; and any other applicable regulations
2) Ensuring that all employees and Subcontractors/Trade Contractors submit their own LOTO program to the General Contractor/Construction Manager for review and approval. If the Subcontractor/Trade Contractor does not have a program, they are not authorized to implement work that requires the implementation of energy control procedures.
3) Informing employees and Subcontractors/Trade Contractors of all work requiring the use of lockout/tag out procedures.

4) Having trained employees and Subcontractors/Trade Contractors on all work requiring the use of LOTO. All training must be documented and made available for review upon USG's request.
5) Ensuring that all persons maintaining or working on the system understand and comply with the LOTO procedure.
6) Ensuring all hazardous energy is isolated or "locked and tagged out" before servicing and/or maintenance activities are performed.
7) Following special procedures for jobs requiring multiple lockout devices and those involving shift or personnel changes.

APPENDIX A – Definitions

Affected Staff/Student – A university staff/employee/student whose activities requires them to operate or use a machine or equipment on which servicing, or maintenance is being performed under lockout or tagout, or whose job requires them to work in an area in which such servicing or maintenance is being performed.

American National Standards Institute (ANSI) – A non-profit, voluntary membership organization that coordinates the U.S. Voluntary Consumers Standards System. Their standards have been adopted throughout government and industry for various types of PPE.

Authorized Employee – An employee, authorized by their Designated Supervisor, who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment.

Capable of being locked out – An energy-isolating device (see definition) is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or has a locking mechanism built into it. Other energy-isolating devices are capable of being locked out if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.

Danger Zone – An area associated with a piece of equipment that is impacted by a movement arc of rotating equipment, the movement path of actuating equipment, or a pinch or nip point.

Designated Supervisor – The USG designated employee who oversees or leads a group of serving/maintenance personnel (e.g., plumbers, electricians, mechanics).

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

Energy isolating device – A mechanical device that physically prevents the transmission or release of energy, including but not limited to, the following:

- A manually operated electrical circuit breaker.
- A disconnect switch.
- A manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently.
- A line valve, a block, and any similar device are used to block or isolate energy.

*NOTE***:** Push buttons, selector switches, and other control circuit-type devices are not energy-isolating devices

Energy source – Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Guard – A barrier that prevents entry of the operator's hands, fingers, or any other body part into the point of operation.

Guarded – Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach to a point of danger or contact by persons or objects.

Hazardous energy – Energy including electrical, rotational, mechanical, chemical, hydraulic, and pneumatic that could be released during servicing, maintenance, or modification of a machine.

Hot tap – A procedure used in the repair, maintenance, and services activities that involves welding on a piece of equipment (pipelines, vessels, or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipelines without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

Isolate – To physically separate a machine or equipment from its energy source by the use of an energy-isolating device.

Isolation Test – The method used to ensure all stored energy sources cannot create the potential for an incident while servicing or maintenance is being performed on the equipment. The test method is documented in the LOTO Procedure.

Job – An action that personnel perform routinely that is made up of a task or a series of tasks. Each job must have an associated JHA.

Job Hazard Analysis – A systematic, written evaluation of the potential hazards associated with each step of a given job and recommendations for engineering controls, administrative controls and procedures, and PPE to control the hazards. This procedure helps integrate accepted safety and health principles and practices into a particular operation. In a JHA, each basic step of the job is examined to identify potential hazards and determine the safest way to do the job.

Lockout – The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring 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. Included are blank flanges and bolted slip blinds.

Major Repair – Non-routine repairs that include factors such as scale, complexity, time, materials, and the physical size of parts used or required for the repair.

Normal Production operations – The utilization of a machine or equipment to perform its intended production function.

Personal Protective Equipment (PPE) – Devices worn by personnel to protect against hazards in the workplace and the environment. Includes personal protective equipment for eyes, face, head, and

extremities, protective clothing, respiratory devices, and protective shields and barriers. PPE must be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary.

Servicing and/or maintenance – Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment, and making adjustments or tool changes, where personnel may be exposed to the unexpected energizing or startup of the equipment or release of hazardous energy.

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

Tagout – The placement of a tagout device on an energy-isolating device in accordance with an established procedure to indicate the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed. This procedure is only implemented when it has been determined that lockout is impossible for the machine.

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 the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Operating Unit - A defined employee group within USG that, for purposes of control of hazardous energy, is comprised of personnel responsible for compliant work with items such as equipment and machines with hazardous energy sources that must be controlled for worker safety.

APPENDIX B – Acronyms

CFR	Code of Federal Regulations
CHE	Control of Hazardous Energy
CHEP	Control of Hazardous Energy Program
DES	Department of Environmental Safety
ESSR	Environmental Safety, Sustainability & Risk
LOTO	Lockout/Tagout
OSHA	Occupational Safety and Health Administration
PPE	Personal protective equipment
SOP	Standard Operating Procedure
USG	Universities at Shady Grove
UMD	University of Maryland, College Park

APPENDIX C - OSHA Control of Hazardous Energy Standard_(29 CFR 1910.147)

1910.147(a)

Scope, application, and purpose –

1910.147(a)(1)

***Scope*.**

1910.147(a)(1)(i)

This standard covers the servicing and maintenance of machines and equipment in which the *unexpected* energization or start up of the machines or equipment, or release of stored energy could cause injury to employees. This standard establishes minimum performance requirements for the control of such hazardous energy.

1910.147(a)(1)(ii)

This standard does not cover the following:

1910.147(a)(1)(ii)(A)

Construction and agriculture employment;

1910.147(a)(1)(ii)(B)

Employment covered by parts 1915, 1917, and 1918 of this title;

1910.147(a)(1)(ii)(C)

Installations under the exclusive control of electric utilities for the purpose of power generation, transmission and distribution, including related equipment for communication or metering;

1910.147(a)(1)(ii)(D)

Exposure to electrical hazards from work on, near, or with conductors or equipment in electric-utilization installations, which is covered by subpart S of this part; and

1910.147(a)(1)(ii)(E)

Oil and gas well drilling and servicing.

1910.147(a)(2)

***Application*.**

1910.147(a)(2)(i)

This standard applies to the control of energy during servicing and/or maintenance of machines and equipment.

1910.147(a)(2)(ii)

Normal production operations are not covered by this standard (See subpart O of this part). Servicing and/or maintenance which takes place during normal production operations is covered by this standard only if;:

1910.147(a)(2)(ii)(A)
An employee is required to remove or bypass a guard or other safety device; or

1910.147(a)(2)(ii)(B)
An employee 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 performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

Note: *Exception to paragraph (a)(2)(ii)*: Minor tool changes and adjustments, and other 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 (See subpart O of this part).

1910.147(a)(2)(iii)
This standard does not apply to the following.

1910.147(a)(2)(iii)(A)
Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start up 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 employee performing the servicing or maintenance.

1910.147(a)(2)(iii)(B)
Hot tap operations involving transmission and distribution systems for substances such as gas, steam, water or petroleum products when they are performed on pressurized pipelines, provided that the employer demonstrates that

1910.147(a)(2)(iii)(B)(1)
continuity of service is essential;

1910.147(a)(2)(iii)(B)(2)
shutdown of the system is impractical; and

1910.147(a)(2)(iii)(B)(3)
documented procedures are followed, and special equipment is used which will provide proven effective protection for employees.

1910.147(a)(3)

***Purpose*.**

1910.147(a)(3)(i)
This section requires employers to establish a program and utilize procedures for 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.

1910.147(a)(3)(ii)
When other standards in this part require the use of lockout or tagout, they shall be used and supplemented by the procedural and training requirements of this section.

1910.147(b)
***Definitions applicable to this section*.**

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.

Authorized employee. A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

Capable of being locked out. An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

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

Energy isolating device. A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, 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.

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

Hot tap. A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

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

Lockout device. 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. Included are blank flanges and bolted slip blinds.

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

Servicing and/or maintenance. Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the *unexpected* energization or startup of the equipment or release of hazardous energy.

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

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.

1910.147(c)
General –

1910.147(c)(1)
Energy control program. The employer shall establish a program consisting of energy control procedures, employee training and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start up or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source, and rendered inoperative.

1910.147(c)(2)
Lockout/tagout.

1910.147(c)(2)(i)
If an energy isolating device is not capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize a tagout system.

1910.147(c)(2)(ii)
If an energy isolating device is capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize lockout, unless the employer can demonstrate that the utilization of a tagout system will provide full employee protection as set forth in paragraph (c)(3) of this section.

1910.147(c)(2)(iii)
After January 2, 1990, whenever replacement or major repair, renovation or modification of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machine or equipment shall be designed to accept a lockout device.

1910.147(c)(3)
Full employee protection.

1910.147(c)(3)(i)
When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program.

1910.147(c)(3)(ii)
In demonstrating that a level of safety is achieved in the tagout program which is equivalent to the level of safety obtained by using a lockout program, the employer shall demonstrate full compliance with all tagout-related provisions of this standard together with such additional elements as are necessary to provide the equivalent safety available from the use of a lockout

device. Additional means to be considered as part of the demonstration of full employee protection shall include the implementation 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.

1910.147(c)(4)
***Energy control procedure*.**

1910.147(c)(4)(i)
Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section.

Note: *Exception:* The employer need not document the required procedure for a particular machine or equipment, when all of the following elements exist: (1) The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees; (2) the machine or equipment has a single energy source which can be readily identified and isolated; (3) the isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment; (4) the machine or equipment is isolated from that energy source and locked out during servicing or maintenance; (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 servicing or maintenance; (7) the servicing or maintenance does not create hazards for other employees; and (8) the employer, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

1910.147(c)(4)(ii)
The procedures shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance including, but not limited to, the following:

1910.147(c)(4)(ii)(A)
A specific statement of the intended use of the procedure;

1910.147(c)(4)(ii)(B)
Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy;

1910.147(c)(4)(ii)(C)
Specific procedural steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them; and

1910.147(c)(4)(ii)(D)
Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

1910.147(c)(5)
***Protective materials and hardware*.**

1910.147(c)(5)(i)
Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by the employer for isolating, securing or blocking of machines or equipment from energy sources.

1910.147(c)(5)(ii)
Lockout devices and tagout devices shall be singularly identified; shall be the only devices(s) used for controlling energy; shall not be used for other purposes; and shall meet the following requirements:

1910.147(c)(5)(ii)(A)
***Durable*.**

1910.147(c)(5)(ii)(A)(1)
Lockout and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

1910.147(c)(5)(ii)(A)(2)
Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.

1910.147(c)(5)(ii)(A)(3)
Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

1910.147(c)(5)(ii)(B)
Standardized. Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria: Color; shape; or size; and additionally, in the case of tagout devices, print and format shall be standardized.

1910.147(c)(5)(ii)(C)
Substantial –

1910.147(c)(5)(ii)(C)(1)

Lockout devices. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

1910.147(c)(5)(ii)(C)(2)
Tagout devices. Tagout devices, including and their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all-environment-tolerant nylon cable tie.

1910.147(c)(5)(ii)(D)
Identifiable. Lockout devices and tagout devices shall indicate the identity of the employee applying the device(s).

1910.147(c)(5)(iii)
Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: *Do Not Start, Do Not Open, Do Not Close, Do Not Energize, Do Not Operate*.

1910.147(c)(6)
***Periodic inspection*.**

1910.147(c)(6)(i)
The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed.

1910.147(c)(6)(i)(A)
The periodic inspection shall be perfomed by an authorized employee other than the ones(s) utilizing the energy control procedure being inspected.

1910.147(c)(6)(i)(B)
The periodic inspection shall be conducted to correct any deviations or inadequacies identified.

1910.147(c)(6)(i)(C)
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.

1910.147(c)(6)(i)(D)

Where tagout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized and affected employee, of that employee's responsibilities under the energy control procedure being inspected, and the elements set forth in paragraph (c)(7)(ii) of this section.

1910.147(c)(6)(ii)
The employer shall certify that the periodic inspections have been performed. The certification shall identify 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.

1910.147(c)(7)
***Training and communication*.**

1910.147(c)(7)(i)
The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following:

1910.147(c)(7)(i)(A)
Each authorized employee shall receive training 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.

1910.147(c)(7)(i)(B)
Each affected employee shall be instructed in the purpose and use of the energy control procedure.

1910.147(c)(7)(i)(C)
All other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

1910.147(c)(7)(ii)
When tagout systems are used, employees shall also be trained in the following limitations of tags:

1910.147(c)(7)(ii)(A)
Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.

1910.147(c)(7)(ii)(B)
When a 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.

1910.147(c)(7)(ii)(C)
Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.

1910.147(c)(7)(ii)(D)
Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.

1910.147(c)(7)(ii)(E)
Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.

1910.147(c)(7)(ii)(F)
Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

1910.147(c)(7)(iii)
Employee retraining.

1910.147(c)(7)(iii)(A)
Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.

1910.147(c)(7)(iii)(B)
Additional retraining shall also be conducted whenever a periodic inspection under paragraph (c)(6) of this section reveals, or whenever the employer has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

1910.147(c)(7)(iii)(C)
The retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

1910.147(c)(7)(iv)
The employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

1910.147(c)(8)

Energy isolation. Lockout or tagout shall be performed only by the authorized employees who are performing the servicing or maintenance.

1910.147(c)(9)

Notification of employees. Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout devices or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

1910.147(d)

Application of control. The established procedures for the application of energy control (the lockout or tagout procedures) shall cover the following elements and actions and shall be done in the following sequence:

1910.147(d)(1)

Preparation for shutdown. Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

1910.147(d)(2)

Machine or equipment shutdown. The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.

1910.147(d)(3)

Machine or equipment isolation. All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

1910.147(d)(4)

Lockout or tagout device application.

1910.147(d)(4)(i)

Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.

1910.147(d)(4)(ii)

Lockout devices, where used, shall be affixed in a manner to that will hold the energy isolating devices in a "safe" or "off" position.

1910.147(d)(4)(iii)
Tagout devices, where used, shall 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.

1910.147(d)(4)(iii)(A)
Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached.

1910.147(d)(4)(iii)(B)
Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

1910.147(d)(5)
Stored energy.

1910.147(d)(5)(i)
Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.

1910.147(d)(5)(ii)
If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

1910.147(d)(6)
Verification of isolation. Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and deenergization of the machine or equipment have been accomplished.

1910.147(e)
Release from lockout or tagout. Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employee(s) to ensure the following:

1910.147(e)(1)
The machine or equipment. The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.

1910.147(e)(2)
***Employees*.**

1910.147(e)(2)(i)
The work area shall be checked to ensure that all employees have been safely positioned or removed.

1910.147(e)(2)(ii)
After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout device(s) have been removed.

1910.147(e)(3)
***Lockout or tagout devices removal*.** Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device. *Exception to paragraph (e)(3):* When the authorized employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented and incorporated into the employer's energy control program. The employer shall demonstrate that the specific procedure provides equivalent safety to the removal of the device by the authorized employee who applied it. The specific procedure shall include at least the following elements:

1910.147(e)(3)(i)
Verfication by the employer that the authorized employee who applied the device is not at the facility;

1910.147(e)(3)(ii)
Making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed; and

1910.147(e)(3)(iii)
Ensuring that the authorized employee has this knowledge before he/she resumes work at that facility.

1910.147(f)
***Additional requirements* –**

1910.147(f)(1)
***Testing or positioning of machines, equipment or components thereof*.** In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or component thereof, the following sequence of actions shall be followed:

1910.147(f)(1)(i)
Clear the machine or equipment of tools and materials in accordance with paragraph (e)(1) of this section;

1910.147(f)(1)(ii)
Remove employees from the machine or equipment area in accordance with paragraph (e)(2) of this section;

1910.147(f)(1)(iii)
Remove the lockout or tagout devices as specified in paragraph (e)(3) of this section;

1910.147(f)(1)(iv)
Energize and proceed with testing or positioning;

1910.147(f)(1)(v)
Deenergize all systems and reapply energy control measures in accordance with paragraph (d) of this section to continue the servicing and/or maintenance.

1910.147(f)(2)
Outside personnel (contractors, etc.).

1910.147(f)(2)(i)
Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this standard, the on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedures.

1910.147(f)(2)(ii)
The on-site employer shall ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

1910.147(f)(3)
***Group lockout or tagout*.**

1910.147(f)(3)(i)
When servicing and/or maintenance is performed by a crew, craft, department or other group, they shall utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

1910.147(f)(3)(ii)
Group lockout or tagout devices shall be used in accordance with the procedures required by paragraph (c)(4) of this section including, but not necessarily limited to, the following specific requirements:

1910.147(f)(3)(ii)(A)

Primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock);

1910.147(f)(3)(ii)(B)
Provision for the authorized employee to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment and

1910.147(f)(3)(ii)(C)
When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to an authorized employee designated to coordinate affected work forces and ensure continuity of protection; and

1910.147(f)(3)(ii)(D)
Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

1910.147(f)(4)
Shift or personnel changes. Specific procedures shall be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy.

APPENDIX D – UMD Policy Number: VI-14.00(A)

University of Maryland, College Park Policy on Control of Hazardous Energy During Maintenance of Equipment

Consolidated USM and UMD Policies and Procedures
(Approved by the President March 13, 1996)

I. Purpose

This is a statement of official University policy to establish the process for compliance with the Occupational Safety and Health Administration (OSHA) regulation, "Control of Hazardous Energy," 29 CFR 1910.147. It is intended to protect University employees from hazards caused by the inadvertent activation of equipment during maintenance. This policy establishes the minimum requirements to protect employees from such hazards.

II. Scope

Servicing and/or maintenance which takes place during normal production operations is covered by this plan if: 1) An employee is required to remove or bypass a guard or safety device; or 2) An employee is required to place any part of his or her body into an area of the machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger exists during a machine cycle.

Minor tool changes and adjustments (e.g., clearing jammed paper from a copier, printer or typewriter) and other minor servicing activities, which are routine, repetitive, and take place during normal production operations, are not covered by this plan. This type of maintenance must be completed using alternative safety measures (e.g., proper use of manufacturer-required and recommended machine guards).

This plan also does not apply to work on cord and plug connected electrical equipment for which exposure to the hazards of unexpected start-up is controlled by unplugging it from the energy source if the plug is under the exclusive control of the employee performing the service.

III. Policy

The University is dedicated to providing safe work facilities for students and employees and complying with federal and state occupational health and safety standards. Administrators, principals, faculty, employee, and students all share a responsibility to reduce hazards due

to the unintentional release of hazardous energy.

The Lockout/Tagout Plan (LOTO) will be implemented for all facilities at the College Park Campus where there is a need to perform maintenance or provide routine service to machinery or equipment. Servicing of all electrically, chemically, pneumatically, thermally and/or hydraulically powered machinery is included in this plan. Contractors who perform work on University equipment will also comply with the procedures outlined in this plan.

IV. Duties and Responsibilities

1. Department of Environmental Safety (DES) will:

    a. Provide consultation to assist in the identification of equipment where LOTO should be utilized;

    b. Prepare the LOTO Plan with periodic review and revisions as needed;

    c. Distribute the LOTO plan to each affected department for distribution to all individuals who are authorized by the department to perform maintenance on energized equipment;

    d. Approve locks to be used by individual departments;

    e. Investigate and document all reported accidents and/or near-miss accidents that are directly or indirectly related to the locking and tagging of equipment; and

    f. Provide training and retraining to all authorized students/employees.

2. Department Heads will:

    a. Designate Department Principals to implement specific LOTO procedures; and

    b. Select appropriate locking and tagging devices for their respective department.

3. Designated Department Principals will:

    a. Implement all provisions of the LOTO for work areas under their control;

    b. Inventory and identify all potentially dangerous equipment capable of releasing hazardous energy during maintenance in work areas or facilities under their

control;

c. Prepare specific LOTO and emergency procedures for hazardous machinery (refer to APPENDIX A of the LOTO Plan);

d. Identify persons authorized to implement LOTO procedures and assure that each person attends training provided by the Department of Environmental Safety;

e. Report all workplace injuries, unsafe conditions, and near-misses to the Department of Environmental Safety;

f. Instruct authorized LOTO personnel regarding the applicability of this plan to their respective shop;

g. Provide proper locking and tagging equipment including locks, tags, multiple lock holders, etc.;

h. Direct periodic safety audits of LOTO procedures to determine regulatory compliance, and recommend action to correct conditions of noncompliance; and

i. Comply with necessary documentation requirements.

4. Authorized employees shall:

   a. Adhere to the requirements of the Lockout Tagout Plan.

   b. Follow guidelines referenced in this plan to protect themselves and others from the release of hazardous energy.

   c. Ensure the security of their own locking devices.

   d. Complete all safety training requirements and comply with documentation procedures; and

   e. Report all workplace injuries, unsafe conditions, and near-misses to their Department Principals and/or the ESSR.

5. Affected employees shall:

   a. Notify the appropriate persons when equipment needs servicing; and

b. Follow LOTO instructions given by the authorized students/employees.

V. Information

Assistance will be provided by the Department of Environmental Safety to any Department or individual requesting guidance or training to satisfy implementation of this policy. (Departmental telephone number is (301) 405-3960; electronic mail (E-Mail) address is Safety@UMDACC.UMD.EDU; WWW Home Page address is http://www.wam.umd.edu/~safety). A complete copy of the LOCKOUT TAGOUT PLAN may be obtained from the Department of Environmental Safety.

APPENDIX E – Lockout/Tagout Devices

Lockout Hasps

- Universal applications
- Equipped for multiple locks during group lockout situations.
- Strong, durable, and resistant to corrosion

Wall Switch Lockout

- Prevents the operation of standard wall switches.
- llows for oth “on” an “off” lo kin functions.
- Plastic construction is non-conductive

Electrical Panel Lockout

- Pertinent mounting rails.
- Adjustable to fit various sizes of switches.
- Plastic construction is non-conductive

Cable Lockout

- Feed the cable through the device intending to lockout, cinch tight, and remove slack.
- Fully adjustable
- Secure fit
- Steel cable

LOTO Locks

- Either assigned to individual personnel, or part of a Group Lockout Tagout
- Durable
- Standardized/identifiable

Pneumatic Lock Device

- Eliminates the need for an inline valve.
- Affixes to the male end
- Prevents it from engaging with a female fitting.
- Strong, durable, and resistant to corrosion

Valve Lockout

- Covers the valve with two flattened half-moons which encloses the valve handle.
- ANSI designated color-coded: Red: Fire protection; Blue: Low hazard gas; Green: Low-hazard liquid; Yellow: Life or property hazards

Group Lockout Box

- Allows four multiple lockouts for a device that is only designed for one lock.
- The key to the lockout device is stored in the box

Lockout Kits

- Multiple functions for standard industrial work environment

LOTO Tags

- May be used by single personnel or part of a group LOTO process.
- Durable
- Standardized/identifiable

APPENDIX F – Lockout Device Colors

Hazardous Energy Source	Input Standardized Device Color
Electrical	
Hydraulic	
Mechanical, Pneumatic, Stored Energy, Kinetic, Gravity, Spring Loaded	
Steam	
Water	
Compressed Gas, LP, Oxidizer	
Temperature	
Chemical	

APPENDIX G - Lockout/Tagout Inspection Form

Dept./Unit/Shop Inspected: _____ Date: _____

Is this an equipment/machine specific LOTO procedure or general LOTO procedure? ☐ Specific ☐ General

Specific Equipment/Machine Name (Serial #): _____

Location (Building & Room #): _____

ANNUAL INSPECTION ITEMS	Yes	No	NA
1. Is the written LOTO program readily available for employee review upon request?			
2. Has a LOTO Designated Supervisor been assigned?	☐	☐	☐
3. Has the Dept./Unit/Shop implemented any Specific Procedures? (Attach all to this form)	☐	☐	☐
4. Have previous inspections of energy control procedures been performed?	☐	☐	☐
5. Are copies of previous inspections and findings available?	☐	☐	☐
6. Has initial LOTO training been documented for the authorized employees in this Dept./Unit/Shop? (Attach training records.)	☐	☐	☐
7. Has initial LOTO training on the equipment or machine specific LOTO Procedure been documented by the Dept./Unit/Shop? (Must show records with names & dates of attendance.)	☐	☐	☐
8. Has there been a change in job assignments, machines, equipment, or processes that present a new hazard, or has there been a change in the LOTO procedure?	☐	☐	☐
a. If YES to #8, has there been re-training of personnel to make them aware of the change?	☐	☐	☐
9. When **Lockout** is used to control energy, is the authorized employee aware of and understands the responsibilities?	☐	☐	☐
a. To report to their Designated Supervisor any unsafe conditions concerning the control of hazardous energy sources.	☐	☐	☐
b. To follow safe work procedures while performing work on or near equipment with hazardous energy sources.	☐	☐	☐
c. To ask their Designated Supervisor for assistance or clarification of work procedures, as necessary.	☐	☐	☐
d. To accurately label and prominently attach lock-out/tag-out devices when required.	☐	☐	☐
e. To utilize their own padlock and key when applying and removing lock-out devices.	☐	☐	☐
f. To remove ONLY their OWN lock-out/tag-out devices at the completion of the task.	☐	☐	☐

10. When **Tagout** is used to control energy, is the Authorized/Affected individuals are aware of and understands the responsibilities and the limitations of tags?	☐	☐	☐
a. The tagout program must provide equivalent protection to that obtained by using a lock-out program.	☐	☐	☐
b. Tags are warning devices affixed to energy isolation devices and do NOT provide the physical restraint on those devices provided by a lock.	☐	☐	☐
c. Tags must NOT be removed except by the Authorized Employee responsible for it and never bypassed, ignored, or otherwise defeated. This includes contractor's danger tags.	☐	☐	☐
d. Tags must be legible and understandable by all personnel in order to be effective.	☐	☐	☐
e. Tags must be made of durable materials.	☐	☐	☐
f. Tags must be securely attached to energy-isolating devices at the same location a lock-out device would have been attached.	☐	☐	☐
g. That tags may provide a false sense of security, and their meaning needs to be understood as part of the LOTO program.	☐	☐	☐
1. Does the Authorized employee have their own lock? (Each personnel must have their own lock-out device in a group lock-out.)	☐	☐	☐
2. Is the lock individually keyed?	☐	☐	☐
Assessment of Performance of Lockout Procedure			
1. **Based on direct observation**, are the LOTO devices being used only for controlling energy, durable, standardized, substantial, identifiable, legible, securely attached, and understandable, to all Affected & Authorized individuals? (Are non-English speaking personnel present in the workplace?)	☐	☐	☐
2. **Based on direct observation**, are lock-out/tag-out procedures performed correctly?	☐	☐	☐
a. **Prepare: Identify** the energy type or sources - where and how equipment is being energized.	☐	☐	☐
b. **Inform/Notify** any Affected Staff/Students of the intent to service equipment and the shutdown.	☐	☐	☐
c. **Shut Down** machine or equipment that will be serviced or maintained.	☐	☐	☐
d. **Deactivate/Disconnect** the machine or equipment from any source of energy.	☐	☐	☐
e. **Release Stored or Residual Energy** (e.g., capacitors, springs, rotating wheels, hydraulics, pressurized systems).	☐	☐	☐
f. **Attach LOTO** energy isolating devices on machinery or equipment.	☐	☐	☐

* **Special Electrical Provision** If a lock cannot be applied or if personnel can demonstrate that tagging procedures will provide a level of safety equivalent to that obtained by the use of a lock, a tag may be used without a lock.	☐	☐	☐
g. **Verify** that equipment is secure and deactivated through an **Isolation Test.**	☐	☐	☐
3. **Based on direct observation**, are lock-out/tag-out removal procedures performed correctly? (Following and written program or Equipment/Machine Specific procedure.)	☐	☐	☐
a. **Inspect** the machine and work area to ensure the machine is in operating order.	☐	☐	☐
b. **Inspect/Verify** that the controls are in the neutral or "off" position	☐	☐	☐
c. **Remove** the energy-isolating devices	☐	☐	☐
d. **Re-energize** the machine or equipment	☐	☐	☐
e. **Notify** the Affected Staff/Students that the servicing or maintenance is completed.	☐	☐	☐
4. Has documentation of audit findings and recommendations been generated and provided to management for corrective action?	☐	☐	☐
5. Are shift changes appropriately documented?	☐	☐	☐
6. Have adequate resources been provided to implement the LOTO program?	☐	☐	☐
7. Is a lockout device inventory being maintained within the Dept./Unit/Shop?	☐	☐	☐

Authorized Employees Observed

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.

Deviations or Inadequacies Observed

Corrective Action(s) and Due Date(s)

Certified by: _____ **Date:** _____

APPENDIX H – LOTO Hierarchy of Controls

The implementation of LOTO practices and procedures are generally considered engineering controls used in conjunction with personal protective equipment (PPE) controls. This written program, specific procedures along with policies and provision of LOTO training and information are applicable administrative controls with respect to the control of hazardous energy.

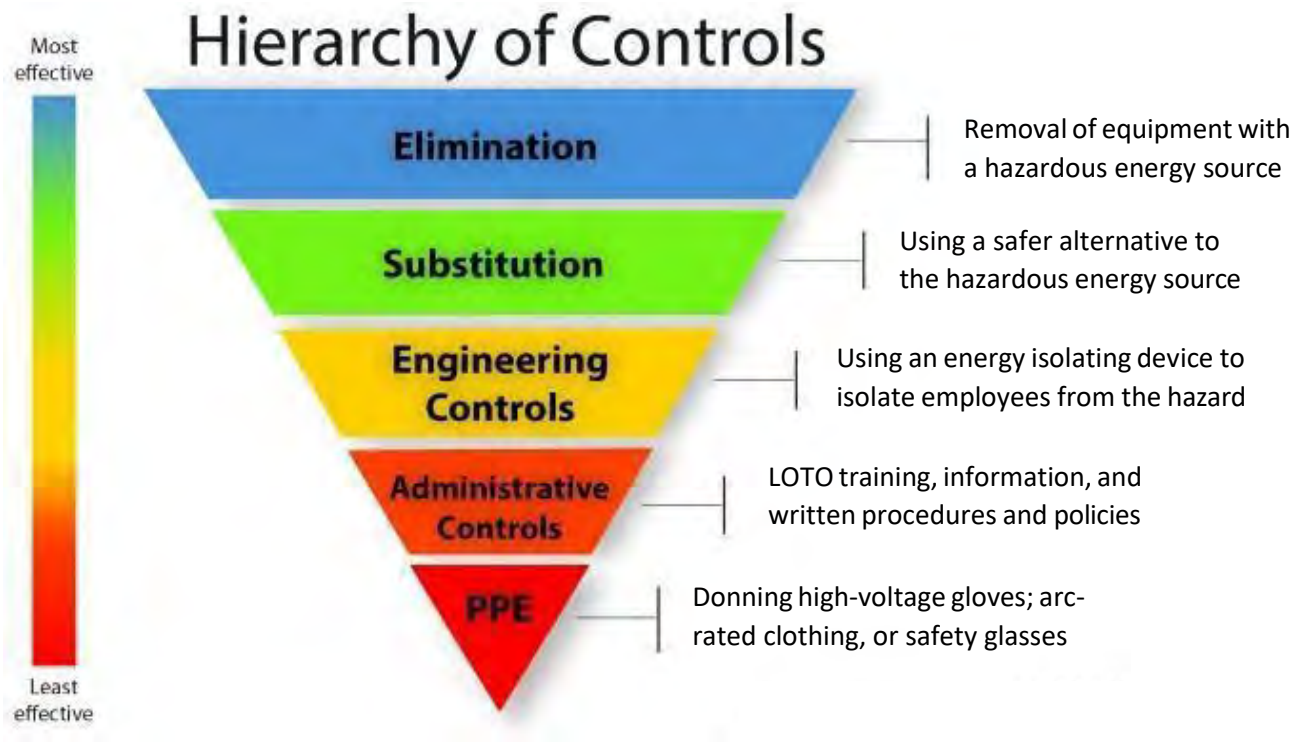

Figure 1 - Hierarchy of Controls with example that may apply to USG.

Adapted from National Institute of Occupational Safety and Health: https://www.cdc.gov/niosh/topics/hierarchy/default.html.