



Risk Management & Safety

Main Office, Wyoming Hall Room 102 Phone: (307) 766-3277 Fax: (307)766-6116

Regulated Materials Management Center Phone: (307)766-3696 Fax: (307)766-3699

Web page: http://www.uwyo.edu/ehs

OCCUPATIONAL HEALTH AND SAFETY PROGRAM

CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

TABLE OF CONTENTS

INTRODUCTION	
PURPOSE	
<u>SCOPE</u>	2
ACRONYMS/DEFINITIONS	
RESPONSIBILITIES	4
PROGRAM ELEMENTS	
PROGRAM REVIEW	
RECORDKEEPING	
REFERENCES	11
APPENDIX A – LOCKOUT/TAGOUT GENERAL PROCEDURE	
APPENDIX B – SPECIFIC PROCEDURE DEVELOPMENT TOOL	
APPENDIX C – LOCKOUT/TAGOUT PROGRAM REVIEW FORM	16



I. INTRODUCTION

The University of Wyoming (UW) is committed to protecting the health and safety of students, employees, faculty, and volunteers at the various UW facilities. Therefore, it is UW's policy to implement a control of hazardous energy program compliant with the Wyoming Occupational Safety and Health Administration's (Wyoming OSHA) Control of Hazardous Energy Standard (Wyoming Department of Workforce Services, Chapter 10, Subpart J, 1910.147) in order to ensure UW personnel are not exposed to hazardous energy sources that may cause harm.

II. PURPOSE

The purpose of UW's Control of Hazardous Energy program is to protect UW personnel during operations that involve the potential for the unexpected energization or startup of equipment, or the release of hazardous energy. This protection is achieved through a written program, training, and machine/task specific procedures.

III. SCOPE

This control of hazardous energy program applies to UW personnel (students, faculty, staff) who are or may be subjected to the unexpected energization or startup of equipment, or who are or may be exposed to the unexpected release of hazardous energy (electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy). Specifically, this program covers:

- A. Sources of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- B. Constructing, installing, setting up, adjusting, inspecting, modifying, maintaining, and servicing machines and equipment. This includes lubrication, cleaning, clearing jams, making adjustments, and making tool changes where personnel could be exposed to the unexpected startup of equipment or release of hazardous energy.
- C. Normal production operations where personnel are required to remove or bypass guards or safety devices or to place any part of his/her body into a danger zone during the equipment operating cycle.

This control of hazardous energy program does not apply to:

- A. Work on cord and plug connected electric equipment for which the plug is the only energy source and the plug is under the exclusive control of the authorized employee.
- 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 UW demonstrates that continuity of service is essential, shutdown of the system is impractical, documented procedures are followed, and special equipment is used that will provide proven, effective protection for personnel.
- C. Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations, are not covered by this program 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.



IV. ACRONYMS/DEFINITIONS

COMMON	DEFINITIONS
ACRONYMS/TERMS	
Affected Employee	Means 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	Means 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	Means connected to an energy source or containing residual or stored energy.
Energy Isolating Device	A mechanical device that physically prevents the transmission or release or 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	Means – 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 the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
LOTO	Lockout/Tagout
Servicing 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	Setting up. Any work performed to prepare a machine or equipment to perform its normal production operation.
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration

RMSO	Risk Management and Safety Office
Tagout	Means – 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.
UW	University of Wyoming
Wyoming OSHA	Wyoming Occupational Safety and Health Administration

V. RESPONSIBILITIES

A. University of Wyoming

UW is responsible for ensuring the safety of its employees and for complying with the applicable requirements of Federal, State, and Local rules/regulations. UW Administration considers safety an important priority and UW personnel are encouraged to promote a positive safety culture during their daily activities.

B. Risk Management and Safety

The UW Risk Management and Safety Office is responsible for:

- 1. Assisting with the development and implementation of this LOTO program.
- 2. Providing LOTO program training and consultation, as requested.
- Investigating and documenting adverse incidents related to LOTO processes.
- 4. Reviewing and revising this LOTO program as necessary.

C. Department Directors/Managers/Supervisors

Department Directors/Managers/Supervisors are responsible for:

- 1. Implementing the provisions of this LOTO program and implementing specific LOTO procedures within their departments.
- Ensuring their personnel engaged in LOTO activities are properly trained, understand
 the program requirements, and follow the processes outlined in their machine specific or
 task specific procedures.
- Ensuring the appropriate equipment and supplies are available (for example, locking and tagging devices, personal protective equipment, etc.) to personnel within their department.
- 4. Ensuring machine specific or task specific procedures are developed for the equipment within their area(s) of responsibility.



D. Authorized Employee

The authorized employee is responsible for:

- 1. Identifying equipment capable of releasing hazardous energy during servicing and maintenance work.
- 2. Following the processes and procedures identified in this program to protect themselves and others.
- 3. Ensuring the integrity and security of their locking devices.
- 4. Completing LOTO training.
- 5. Reporting unsafe conditions to their Director/Manager/Supervisor and/or the RMSO.

E. Affected Employee

The affected employee is responsible for:

- 1. Notifying the appropriate personnel when equipment needs service, maintenance, or repair.
- Completing LOTO training.
- 3. Following instructions provided by authorized employees.
- 4. Reporting unsafe conditions to the Authorized Employee, Director/Manager/Supervisor and/or the RMSO.

F. Facilities Engineering and Facilities Planning Project Manager

The facilities engineering and facilities planning project manager is responsible for:

- 1. Ensuring that contractors have a LOTO program that is equal to or exceeds the UW LOTO program.
- 2. Coordinating LOTO activities with contractors when both UW personnel and contract personnel are in a work area or working on the same equipment.

G. Contractors

Contractors are responsible for complying with the applicable Wyoming OSHA requirements when conducting work on UW equipment or UW property.

VII. PROGRAM ELEMENTS

A. Lockout/Tagout Process

During normal operation, machine guards must be in place to protect personnel from contacting moving or dangerous parts that could lead to entanglement, amputation, laceration, pinching, pinning, crushing, or other injuries. However, there are times when it may be necessary to



remove machine guards to complete maintenance or repair activities. For these situations, LOTO processes must be implemented.

Written LOTO Procedures

Specific procedures for equipment subject to LOTO are required. 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:

- a. A specific statement of the intended use of the procedure.
- b. Specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment to control hazardous energy.
- c. Specific procedural steps for the placement, removal, and transfer of lockout devices or tagout devices and the responsibility for them.
- 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.

Written specific procedures are not required if ALL the following conditions are met:

- a. The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees.
- b. The machine or equipment has a single energy source which can be readily identified and isolated.
- c. The isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment.
- d. The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
- e. A single lockout device will achieve a locked-out condition.
- f. The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance.
- g. The servicing or maintenance does not create hazards for other employees.
- h. UW, in utilizing this exception, has had NO accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

While specific procedures are not required if ALL the above conditions are met, the LOTO steps must still be completed as described.

2. LOTO Procedural Steps

a. Preparation for Shutdown

i. Identify Hazardous Energy

The Supervisor and/or Authorized Employee will identify all types and magnitude of potentially hazardous energy associated with the specific machine/equipment. Remember, there easily can be more than one energy source. Types of energy to consider include electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

ii. Communicate

Affected employees (including building automation and controls personnel) who work on or near machinery or equipment that is part of a LOTO process must be informed of the intent to perform work on that machinery or equipment and the application of LOTO. Affected employees must be advised to not attempt to restart the machinery or equipment or to implement some other action that may adversely impact safety during work on the machinery or equipment. Affected employees must be informed as to who is responsible for the LOTO process and how they will be notified once the LOTO process is complete.

b. Shutdown

Complete the machinery or equipment shutdown process using the standard shutdown procedures established for that specific machine or equipment (not emergency procedures or other shortened/simplified methods).

c. Isolate Energy

After shutdown, physically locate the energy isolation devices for the machinery or equipment (NOTE: push-buttons, selector switches, safety interlocks, and other control circuit type devices are not energy isolation devices).

- Follow the machinery or equipment specific LOTO procedure to isolate energy sources. If a specific procedure is not available, follow the general LOTO procedure.
- ii. Communicate to affected employees (including building automation and controls personnel) that LOTO is being implemented and why.
- iii. Isolate energy sources at the energy isolating device (for example, disconnect switch, control valve, etc.).



d. Apply LOTO Device

A lockout device is a device that utilizes a positive means such as a lock to hold an energy isolating device in the "safe" or "off" position to prevent the unexpected energization of machinery or equipment. Please note: lockout devices must only be used for energy isolation purposes.

- i. Lockout the energy source at the energy isolating device. Locks must be accompanied by a tag. The tag must list the Authorized Employee's name, reason for LOTO, and date. Locks must be affixed in a manner to that will hold the energy isolating devices in a "safe" or "off" position.
- ii. While lockout is the preferred method for energy isolation, for those situations where the energy isolating device cannot accommodate a physical lock, tags only may be used. Tags must be able to withstand the environment in which they are used and must be substantial enough to prevent inadvertent or accidental removal. The tag must clearly state "Do Not Energize", or an equivalent statement, and contain the Authorized Employee's name, reason for LOTO, and date.

e. Relieve Stored Energy

After installing the LOTO device to all energy isolating devices, potentially hazardous energy (stored or residual) must be relieved, disconnected, restrained, or otherwise rendered safe.

f. Verify LOTO

After ensuring no personnel are exposed, verify that the LOTO procedure has effectively isolated and deenergized all energy sources associated with the machinery or equipment. Verification must consider both primary and stored energy sources.

Verify by visual inspection and physical testing. Visual inspection includes visually determining switches, valves, breakers, etc. are properly locked and tagged in the "safe" or "off" position. Visual inspection also includes determining that potential energy such as flywheels, saw blades, etc. have stopped motion.

Physical testing includes activities such as attempting to start up machinery or equipment or using a test instrument such as a combustible gas indicator.

g. Service, Maintenance, or Repair

Once verification is complete, service, maintenance, or repair work can be completed.



h. Inspection

After the service, maintenance, or repair work is complete and before LOTO devices are removed, the area must be inspected to ensure that:

- i. Nonessential items have been removed.
- ii. Machinery and equipment parts/components are operationally intact.
- iii. Machine or equipment shields/guards are in place.
- iv. Controls are in the "neutral" or "off" position.
- iv. Personnel are safely positioned for startup.

i. Remove LOTO

Once the inspection process has determined a safe situation, LOTO devices may be removed by the Authorized Employee who installed the LOTO devices on the energy isolation device.

j. Communicate

Communicate with affected employees that the LOTO devices have been removed and that you are preparing to restart the machinery or equipment.

k. Reenergize

Once the above steps are completed, reenergize the machinery or equipment following normal startup procedures or according to manufacturer's instructions. If there is a sequencing process to startup, be sure and follow the appropriate steps.

B. Group LOTO

Group LOTO is required when more than one authorized employee is engaged in service, maintenance, or repair of a particular machine or equipment.

- 1. Each Authorized Employee performing service, maintenance, or repair activities must be in control of the associated hazardous energy throughout the entire exposure period.
- 2. Each Authorized Employee will affix their personal LOTO device to the group LOTO device. Each Authorized Employee will remove their personal LOTO device.
- 3. Each Authorized Employee will have his/her own LOTO device.
- 4. No employee may affix or remove another employee's LOTO device, except in an emergency.
- 5. Each Authorized Employee must be afforded the opportunity to verify energy isolation.



C. Shift or Personnel Changes

Department-specific procedures must be developed and implemented during shift or personnel changes to ensure the continuity of LOTO protection, including provision for the orderly transfer of LOTO device protection between off-going and oncoming personnel, to minimize exposure to hazards from the unexpected energization or start-up of the machinery or equipment, or the release of stored energy.

D. Contractors

Whenever Contractors are engaged to perform work for UW, UW and the Contractor must inform each other of their respective LOTO programs and procedures. Additionally, UW must ensure that its personnel understand and comply with the restrictions and prohibitions of the Contractor's energy control program.

For those situations where service, maintenance, or repair require the involvement of both UW personnel and Contractor personnel, UW and the Contractor must determine whether to use UW's LOTO procedures, the Contractor's LOTO procedures, or a combination of both. The agreed upon procedure must be documented and consistent with Wyoming OSHA's LOTO requirements.

E. Training

LOTO training is available to UW personnel through online training modules or classroom lecture style training. Authorized Employees, Affected Employees, and their Supervisors are required to attend the training.

- 1. General awareness training is required for Authorized Employees, Affected Employees, and Supervisors. This training can be completed through the online training module or classroom lecture style training.
- 2. Training shall include:
 - a. Recognition of hazardous energy sources.
 - b. The LOTO process.
 - c. Purpose and use of the LOTO process.
 - d. Prohibition of restarting machinery or equipment.
 - e. Use and limitations of tags.
 - f. Location and availability of the LOTO program.
- 3. Authorized Employees must complete specific procedural training for the machinery or equipment they perform work on. This training must be completed by a competent person who is experienced with the machinery or equipment.
- 4. UW personnel must complete LOTO training before being assigned to complete tasks that requires LOTO processes.



- 5. Retraining must occur when there is:
 - a. A change in job assignments.
 - b. A change in machinery or equipment.
 - c. A change in energy control procedures or devices.
 - d. A change in process that presents a new hazard.
 - e. Evidence that an employee has not retained the skill or knowledge to properly implement the LOTO procedures.

VIII. PROGRAM REVIEW

Department Directors, Managers, or Supervisors, or designee, must at least annually review the written procedures and observe personnel performing LOTO activities. These reviews must be documented. The reviews must: identify the machine or equipment on which the energy control procedure was being utilized; inspection date; personnel included in the inspection, and the person performing the inspection. Additionally, the reviews must observe for LOTO procedures being properly implemented; Affected and Authorized Employees are familiar with their responsibilities; personnel maintain their proficiency with the energy control procedures; and compliance with the Wyoming OSHA Control of Hazardous Energy standard (Wyoming Department of Workforce Services, Chapter 10, Subpart J, 1910.147).

IX. RECORDKEEPING

Training records will be maintained through the UW Human Resource Management System (HRMS). Program reviews will be maintained in the specific departments. Specific written procedures will be maintained within the departments.

X. REFERENCES

Wyoming OSHA Control of Hazardous Energy (Wyoming Department of Workforce Services, Chapter 10, Subpart J, 1910.147)

OSHA Directive Number: CPL 02-00-147. Control of Hazardous Energy: Inspection Procedures and Interpretive Guidance

29 CFR Subpart S, 1910.301-1910.335, Electrical



APPENDIX A LOTO General Procedure

Name:	Date:
Equipment (Name, Make, Model):	Location (Bldg, Room #):
Department:	
Authorized Employee(s):	
Affected Employee(s):	

This general procedure may be used for those situations where specific procedures are not in place.

Step	Description	Done		
Prepare for Shutdown	Identify all types and magnitude of potentially hazardous energy associated with the specific machine/equipment. Remember, there easily can be more than one energy source. Types of energy to consider include electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.			
	Communicate with affected employees (including building automation and controls personnel) who work on or near machinery or equipment that is part of a LOTO process of the intent to perform work on that machinery or equipment and the application of LOTO. Affected employees must be advised to not attempt to restart the machinery or equipment or to implement some other action that may adversely impact safety during work on the machinery or equipment. Affected employees must be informed as to who is responsible for the LOTO process and how they will be notified once the LOTO process is complete.			
Shutdown	Complete the machinery or equipment shutdown process using the standard shutdown procedures established for that specific machine or equipment (not emergency procedures or other shortened/simplified methods).			
Isolate Energy	Physically locate the energy isolation devices for the machinery or equipment (NOTE: push-buttons, selector switches, safety interlocks, and other control circuit type devices are not energy isolation devices). Follow the machinery or equipment specific LOTO procedure to isolate energy sources. Communicate to affected employees (including building automation and controls personnel) that LOTO is being implemented and why. Isolate energy sources at the energy isolating device (for example, disconnect switch, control valve, etc.).			
Apply LOTO Device	Lockout the energy source at the energy isolating device. Locks must be accompanied by a tag. The tag must list the Authorized Employee's name, reason for LOTO, and date. Locks must be affixed in a manner to that will hold the energy isolating devices in a "safe" or "off" position. For those situations where the energy isolating device cannot accommodate a physical lock, tags only may be used. Tags must be able to withstand the environment in which they are used and must be substantial enough to prevent inadvertent or accidental removal. The tag must clearly state "Do Not Energize", or an equivalent statement, and contain the Authorized Employee's name, reason for LOTO, and date.			
Relieve Stored Energy	After installing the LOTO device to all energy isolating devices, potentially hazardous energy (stored or residual) must be relieved, disconnected, restrained, or otherwise rendered safe.			



Verify LOTO	Verify that the LOTO procedure has effectively isolated and deenergized all energy sources. Verification must consider both primary and stored energy sources. Verify by visual inspection and physical testing. Visual inspection includes visually determining switches, valves, breakers, etc. are properly locked and tagged in the "safe" or "off" position. Visual inspection also includes determining that potential energy such as flywheels, saw blades, etc. have stopped motion. Physical testing includes activities such as attempting to start up machinery or	
Service, Maintenance, and Repair	equipment or using a test instrument such as a combustible gas indicator. Once verification is complete, service, maintenance, or repair work can be completed.	
Inspection	After the service, maintenance, or repair work is complete and before LOTO devices are removed, the area must be inspected to ensure that: Nonessential items have been removed. Machinery and equipment parts/components are operationally intact. Machine or equipment shields/guards are in place. Controls are in the "neutral" or "off" position. Personnel are safely positioned for startup.	
Remove LOTO	Once the inspection process has determined a safe situation, LOTO devices may be removed by the Authorized Employee who installed the LOTO devices on the energy isolation device.	
Communicate	Communicate with affected employees that the LOTO devices have been removed and that you are preparing to restart the machinery or equipment.	
Reenergize	Reenergize the machinery or equipment following normal startup procedures or according to manufacturer's instructions. If there is a sequencing process to startup, be sure and follow the appropriate steps.	



APPENDIX B Specific Procedure Development Tool

Part A: General Information		No.	
Machine/Task Name:	Location:	Department/Shop:	
Created by:	Title:	Date:	
List Authorized Employee(s) Here:			
List Affected Employee(s) Here:			

Part B: Hazard Assessment

- 1. Circle energy type and potential hazards that apply.
- Write in source(s) of hazardous energy.
 Write in points where energy is controlled and locked out.
- 4. Write in which LOTO device is required.
- 5. Write in sources of stored energy that require release or restraint, if applicable.

Energy type and potential hazards	Source(s)	LOTO point(s)	LOTO device(s)	Stored energy
Electrical				
Shock, burn, fire				
Mechanical				
Moving parts, crushing,				
entanglement				
Chemical (liquid or gas)				
Flammable, corrosive, toxic, reactive				
Physical (heat and pressure)				
Burns, explosions				
Other (ultraviolet,				
electromagnetic, pneumatic,				
hydraulic)				



Part C: LOTO Procedure	
Prepare for Shutdown A. Identify Hazardous Energy B. Communicate	
 Shutdown Isolate Energy Apply LOTO Device Relieve Stored Energy Verify LOTO Complete Service/Maintenance/Repairs Inspect Remove LOTO Communicate Reenergize 	iir
Attach a diagram or photo identifying I	ock and tag locations (optional):
Part D: Approval	

. a.t z. Approva.		
Authorized Employee or Supervisor	Name:	Title:
Authorized Employee or Supervisor	Signature:	Date:





APPENDIX C Lockout/Tagout Program Review Form

Part A:	General Information						
Review	er Name:		Title:				
Review Date:		Department:					
Machin	e/Task Name:	Location:		Department/Shop			
Part B:	Program Review						
No.					Yes	No	NA
1	Equipment specific and gener	ral LOTO procedures	are followed?				
2	Equipment specific procedure	s are adequate?					
3	Adequate LOTO equipment a	vailable (at least 1 lo	ck per Authorized E	Employee)?			
4	LOTO equipment in good wor	king condition?					
5	No new equipment introduced	that requires a spec	ific procedure?				
6	No changes required for any existing procedures?						
7	No new authorized employee	s that need training?					
8	No other LOTO-related training needs?						
List the Authorized Employee(s) who participated with this review:							
NOTE:	All questions marked "NO" mu	st have corrective act	ion developed.				
ITEMS I	REQUIRING CORRECTIVE AC	CTION:					
Part C:	Approval						
Superv	visor Name:		Title:				
Superv	risor Signature:		Date:				