

 <p>Carnegie Mellon University Environmental Health & Safety FIRE LAB WORK</p>	<p>Environmental Health and Safety (EHS) Hazardous Energy Control Procedure (Lockout/Tagout/Tryout)</p>
<p>Date of Issuance: 1/1/2019</p>	<p>Revision/Review Date: 5/13/2022</p>
<p>Revision Number: 3</p>	<p>Prepared by: EHS and Facility Management and Campus Services (FMCS)</p>

1. Purpose

The purpose of this Energy Control Procedure is to protect Carnegie Mellon University faculty, and staff (herein referred to as “employee”) from the unexpected startup or release of hazardous energy during the servicing or maintenance of machines or equipment.

2. Scope

This procedure establishes the minimum requirements for control of hazardous energy sources to prevent injury to Carnegie Mellon University employee in accordance with Occupational Safety and Health (OSHA) 29 CFR 1910.147 Control of Hazardous Energy. The procedures within this document shall be used to isolate and render all machines inoperative and equipment requiring service or maintenance from unexpected startup or release of hazardous energy. This procedure also addresses proper employee training and periodic inspections.

Any hazardous energy control incident with or without injury must be reported to EHS so that a thorough investigation can be performed with the involved parties, root causes can be identified, and corrective actions taken.

3. Definitions

- a. **Affected Employee:** A CMU employee who is responsible for the equipment that will be isolated or rendered inoperative.
- b. **Authorized Employee:** A CMU employee approved to lock and tag out equipment in order to complete servicing on that equipment. An “authorized employee” and an “affected employee” may be the same person when the affected employee’s duties include equipment maintenance or repair.
- c. **Capable of being locked out:** An energy source (disconnect switch, breaker, etc.) is capable of being locked out if (1) it is designed with a hasp or other means of attachment to which a lock can be affixed; or (2) it has a locking mechanism built into it.
- d. **Energized:** Connected to an energy source or containing residual or stored energy.
- e. **Energy Control Committee:** A group comprised of Lead Operating Engineers from each trade (or designee), a Zone Manager and EHS who together develop, and maintain the energy control procedure, as well as review and approve equipment specific lockout/tagout/tryout procedures.

- f. **Energy Isolation Device:** A mechanical device that physically prevents transmission of energy. Examples of energy isolation devices would include the following: a manually operated circuit breaker; an electrical disconnect switch; a line valve; and similar devices used to block or isolate energy. (Note: Push buttons, selector switches, and other control-circuit devices are not energy isolation devices).
- g. **Hazardous Energy Source:** Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy that may cause harm.
- h. **Incident:** A work-related event in which an injury or illness (regardless of severity) or fatality occurred, or could have occurred.
- i. **Lockout:** The placement of a lockout device on an energy isolating device which ensures that the energy isolation device and the equipment being controlled cannot be operated until the lockout device is removed.
- j. **Lockout Device:** A device that utilizes a lock and key to hold an energy isolation device in the "SAFE" or "OFF" position and prevents machinery or equipment from becoming energized.
- k. **Lock Placement Verification Form:** A form that is required when more than one energy source must be isolated as part of the lockout tagout process.
- l. **Other Employee:** An employee who is not directly responsible for the operation of equipment which is being serviced under lockout/tagout/tryout conditions, but who is present in the immediate area of the servicing.
- m. **Servicing or service work:** Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining machines or equipment.
- n. **Tagout Device:** A prominent, standardized warning tag, which should be securely attached with a continuity lock to equipment for the purpose of alerting personnel not to operate the isolation device. These tags will be of a vibrant color, the words "Do Not Operate" will be prominent and should indicate questions should be directed to FMCS (Appendix A).
- o. **Tryout:** A test performed on isolated equipment to verify that it has been properly de-energized or isolated.

4. Roles and Responsibilities

- a. Carnegie Mellon University Environmental Health and Safety (EHS) is responsible for:
 - i. Providing authorized and affective energy control procedure training.
 - ii. Maintaining lockout/tagout/tryout training records to include name of employee and the date training was completed.
 - iii. Performing a thorough investigation into any hazardous energy control incidents with or without injury.
 - iv. Working with Campus Design and Facility Development (CDFD) to ensure installed equipment or machinery is designed with energy control and isolating devices to accept a lockout device.
 - v. Working with FMCS to ensure newly installed equipment or machinery is designed with energy control and isolating devices to accept a lockout device.

- b. FMCS Zone Managers and Lead Operating Engineers are responsible for:
 - i. Maintaining a master list of trained authorized employees within their zone and ensure only authorized employees are completing lockout/tagout/tryout procedures.
 - ii. Training authorized and affected employees within their zone on equipment-specific lockout/tagout/tryout procedures.
 - iii. Ensuring that an adequate supply of locks are available to authorized employees.
 - iv. Supplying authorized employees with an adequate type and number of lockout devices appropriate for the tasks encountered in their zone.
 - v. Providing an adequate supply of lockout/tagout/tryout tags for authorized employees (Appendix A).
 - vi. Working with authorized employees to develop equipment-specific procedures lockout/tagout/tryout, and submit completed procedures to the Energy Control Committee for review, approval and posting.
 - vii. Verifying with the Energy Control Committee that similar types of equipment can be grouped together within one equipment-specific lockout/tagout/tryout procedure.
 - viii. Completing the lock removal form when necessary.
 - ix. Ensuring newly installed equipment or machinery is designed with energy and isolating devices to accept a lockout device.
 - x. Reporting any incident to EHS as soon as possible.
 - xi. Assisting EHS in any investigation into any hazardous energy control incidents with or without injury
- c. FMCS employees will be responsible for:
 - i. Reviewing this energy control procedure and following the guidelines
 - ii. Successfully completing the appropriate type of energy control, lockout/tagout/tryout training
 - iii. Stopping work and request guidance and direction from their manager at any time when a lockout/tagout/tryout situation is encountered where they do not feel safe, do not have adequate training, or similar.
 - iv. Reporting the incident as soon as possible to your supervisor or the supervisor on duty.
 - v. Assisting EHS in any investigation into any hazardous energy control incidents with or without injury.
- d. Energy Control Committee will be responsible for:
 - i. Reviewing requests to group equipment into one equipment-specific lockout/tagout/tryout procedure and provide feedback and/or approval.
 - ii. Reviewing submitted equipment-specific lockout/tagout/tryout procedures, provide feedback, post approved documents on the FMCS Box drive, and distribute communication indicating new document available for use.
 - iii. Reviewing Energy Control Procedure on an annual basis, make updates as needed and appropriately distribute updated document.

- iv. Assisting as needed in any investigation into any hazardous energy control incidents with or without injury and incorporate process improvements and/or make recommendations to leadership when necessary.
- e. Contractors will be responsible for:
 - i. Adhering to their company-specific energy control procedures.

5. Lockout vs. Tagout Concept

- a. Lockout is the most effective means of ensuring the de-energization of equipment; it is the preferred method.
- b. Tagout may be used only where the energy-isolating device cannot accept a lock. If the energy isolating device is capable of accepting a lock, a lock must be applied.
- c. Lockout locks and tags should be securely attached to each isolation point.
- d. Tags are to be treated with the same respect as locks - They may not be bypassed or ignored and may only be removed by the employee who applied them.

6. Training and Authorization

- a. Lockout/tagout/tryout training records will contain the name of the employee, the course title and the date training was provided.
- b. The level of lockout/tagout/tryout training provided to employees is based on their level of involvement with lockout/tagout/tryout procedures.
 - i. "Authorized employees" will be trained in the purpose and use of lockout/tagout/tryout procedures, the recognition of hazardous energy sources, the types and magnitude of hazardous energy sources expected to be encountered, and the methods necessary for proper energy isolation and control.
 - ii. "Affected employees" and "other employees" will be trained in the purpose of lockout/tagout/tryout procedures. They will also be shown samples of the locks and tags used during lockout/tagout/tryout procedures. They will be instructed not to remove locks or tags for any reason nor attempt to energize equipment that is being serviced.
- c. Retraining will be provided to employees whenever there is a change in:
 - i. Job assignments (which includes moving from one zone to another),
 - ii. Processes,
 - iii. Equipment that creates a new hazard,
 - iv. Whenever there is a change in lockout/tagout/tryout procedures, or
 - v. Whenever a periodic inspection reveals deviations or inadequacies in use of lockout/tagout/tryout procedures in order to reestablish employee proficiency.
- d. Training for users (faculty, staff and students)
 - i. 3D Printer Safety training must be completed by all users.
 - ii. Lab Safety and Hazardous Waste training must be completed by users in areas that are defined by the [Occupational Health and Safety Administration](#) as a laboratory.

- iii. Hazard Communication training must be completed by users in those areas not defined by the Occupational Health and Safety Administration as a laboratory.
- iv. Biological Safety training must be completed by users to print biological materials requiring BSL-2 containment.
- v. Fire extinguisher training should be completed by users that use powdered metals.
- vi. For additional information on training, please visit the [EHS training website](#).

7. Lockout/Tagout/Tryout Supplies

- a. Locks
 - i. A Master Lock and a vertical shackle clearance of 1.5 or 3 inches is the recommended type of lock to be used for lockout/tagout/tryout purposes.
 - ii. Lock may not be used for any other purpose (such as securing toolboxes or lockers).
 - iii. Locks and keys are for the exclusive use of the holder and may not be loaned to other employees for any reason. One-Person-One-LockOne-Key.
 - iv. It is important to use personal safety locks to prevent identity confusions and issues with employees who are not trained on the use of lockout locks.
 - v. Locks shall be individually numbered and keyed.
 - vi. Locks must be able to withstand the environment to which they are exposed.
 - vii. Durable enough to prevent removal without excessive force e.g. bolt cutters.
- b. Personal safety and equipment locks will be identified through the following color scheme:
 - i. Personal safety locks:
 - Black in color and identified with employee's name and Andrew ID engraved on outside.
 - ii. Equipment Safety Lock Colors
 - 1. Electrical - **RED**
 - 2. HVAC - **YELLOW**
 - 3. Plumbers - **GREEN**
 - 4. Steam Fitters - **BLUE**
- c. Continuity locks will follow the same color scheme identified for equipment safety locks but will have a contrasting band of electrical safety tape to distinguish its purpose.
 - i. Electrical - **RED** Safety Locks with a **YELLOW** Band
 - ii. HVAC - **YELLOW** Safety locks with a **RED** band
 - iii. Plumbers - **GREEN** locks with a **WHITE** band
 - iv. Steam Fitters - **BLUE** locks with an **ORANGE** band.
- d. Lockout device types
 - i. Multiple lockout hasps,
 - ii. Valve enclosures,
 - iii. Circuit breaker lockouts,
 - iv. Chains,

- v. Plug enclosures, and
- vi. Other devices of this nature.
- e. Lockout devices must always be secured with a lock.
- f. Lock placement verification form as required.
- g. Tags
 - i. Tags are to be used in conjunction with continuity locks (Appendix A).
 - ii. Authorized employees can obtain lockout/tagout/tryout tags from the FMCS stores.
 - iii. Tags must be securely attached onto the lock and durable enough to prevent accidental removal.
 - iv. Tags must be capable of withstanding the environmental conditions to which they are exposed, including wet or corrosive environments.

8. General Lockout/Tagout/Tryout Procedure

The following general steps will be taken by CMU employees when locking and tagging out equipment. Contractors are not permitted to de-energize or isolate any CMU-owned equipment. Only authorized employees who are performing the servicing or maintenance can perform the lockout/tagout/tryout.

- a. **Identify Energy Sources:** Electrical, hydraulic, pneumatic, and other energy sources such as electrical, mechanical, hydraulic, gravity, etc. feeding the equipment must be identified and understood by the authorized employee.
 - i. More than one energy source may be involved (electrical, mechanical, hydraulic, gravity, etc.). Any questionable identification of energy sources should be clarified with a Manager prior to beginning any service work.
 - ii. The **Lock Placement Verification Form** (Appendix B) must be completed any time a lock box is used for a lock out activity, a lock placement verification form must be used and be accessible at the lock box (see also 8.4 for details).
- b. **Notify Others:** The authorized employee preparing to perform lockout/tagout/tryout must notify all “affected” and “other” employees of the impending equipment shutdown. This may include notifying Primary Investigators (PI) of the pending shut down since it may affect research or equipment within their space.
- c. **Shutdown Equipment:** If the equipment is running, it must be shutdown using established stopping procedures. (Example: Depress “stop” button, open toggle switch, etc.).
 - i. In emergencies, established shut down procedures may need to be bypassed, depending on the needs of the emergency.
- d. **Isolate Equipment from Energy Sources:** Once the equipment has been shut down, isolate the machinery from energy sources, verifying that secondary energy sources are de-energized or isolated as well. (Example: Turn electrical disconnects to “Off” or “Safe” position; open electrical circuit breakers; close hydraulic valves; close pneumatic valves, etc.).

- e. **Lockout/Tagout/Tryout the Equipment:** Locks and lockout devices must be attached by an authorized employee to each energy isolation device in order to prevent the transmission of energy. When more than one device is isolated, individuals shall use the appropriate colored equipment locks. Keys associated with the equipment locks shall be placed in a gang box and the box shall be secured with a personal safety lock.
- f. **Release or Block Stored Energy:** After the equipment has been isolated and locked out, all stored energy must be safely controlled. The appropriate bleeding or blocking methods must be used to dissipate stored energy sources (such as hydraulic pressure, pneumatic, water, air, gas, steam pressure, suspended parts, spring-driven parts, gravity, etc.). Repeated bleeding or blocking should be completed until no possibility of further accumulation of energy exists.
- g. **Verify Isolation of Equipment (tryout):** Prior to beginning any service work, the authorized employee must attempt to restart the equipment (i.e. tryout) using the normal starting procedure or otherwise ensure the effectiveness of the lockout. Operational controls must be returned to the "Off" position after a restart attempt has been completed.
- h. **Release from Lockout/Tagout/Tryout:** Locks, lockout devices, and tags must be removed by the same person who applied each item.
 - i. Prior to restarting equipment, tools must be removed from the work area and equipment components must be in place.
 - ii. "Affected" and "other" employees must be verbally informed of the restart and cleared from the equipment area prior to energization. This may include notifying Primary Investigators (PI) of the pending re-energization.

9. Equipment-Specific Lockout/Tagout/Tryout Procedures

- a. Equipment-specific procedures shall identify the information that an authorized employee must know in order to effectively control hazardous energy sources.
- b. If this information is the same for various machines or equipment or if another means of logical grouping exists, then a single energy control procedure may be sufficient.
- c. Any authorized employee can develop a draft equipment-specific lockout/tagout/tryout procedure with the use of the designated Lockout/Tagout/Tryout Equipment Procedure template (Appendix C). The draft document must be submitted to the Energy Control Committee for review and approval. Once approved, the document will be posted to the FMCS Box for authorized employee use (<https://cmu.app.box.com/folder/59829011631>) and a communication will be distributed to FMCS employees.

10. Equipment-Specific Lockout/Tagout/Tryout Procedures

The following sequence of actions must be taken when equipment being serviced under lockout/tagout/tryout conditions must be energized for testing or positioning:

- a. Clear the equipment of tools and materials.
- b. Clear personnel from the equipment area.

- c. Notify “affected” and “other” people in the area that equipment will be reactivated for testing purposes.
- d. Remove any repositioning or blocking devices.
- e. Remove locks and lockout devices from energy isolation devices.
- f. Energize equipment and proceed with testing or positioning.
- g. The equipment must be de-energized and locked/tagged/tryout out in accordance with Section 9 of this document or the applicable lockout/tagout/tryout if servicing is to continue after testing or positioning has been completed.

11. Group Lockout/Tagout/Tryout Procedures

The following sequence of actions must be taken when two or more employees are involved in equipment being serviced under lockout/tagout/tryout conditions:

- a. A single authorized employee must assume the overall responsibility for the control of hazardous energy for members of the group while the servicing or maintenance work is in progress.
- b. Contractors working in the area must adhere to their company-specific energy control procedures when participating in group lockout/tagout/tryout procedures.
- c. The authorized employee with the overall responsibility must:
 - i. Implement the energy control procedures,
 - ii. Communicate the purpose of the operation to the service and maintenance employees,
 - iii. Coordinate the operation, and
 - iv. Ensure procedural steps have been properly completed.
- d. Locks and lockout devices must be attached to each energy isolation device in order to prevent the transmission of energy. Keys from the locks should then be placed in a group lockout device, group lockbox or comparable mechanism.
- e. Each employee must then affix their personal lockout/tagout/tryout device to the group lockout device, group lockbox, or comparable mechanism, before engaging in the servicing and maintenance operation.
- f. The employees performing service activities will continue to be protected by his/her lockout or tagout device until it is removed. The authorized employee in charge of the group lockout or tagout must not remove the group lockout or tagout device until each employee in the group has removed his/her personal device, indicating that he/she is no longer exposed to the hazards from the servicing operation.

12. Shift Change Coordination

- a. When lockout activities will continue beyond one work shift, and cannot be interrupted, a continuity lock must also be applied to the group lockout device, group lockbox, or comparable mechanism before servicing and maintenance operations begin.

- i. The continuity lock key must be maintained in a secure manner to insure the lockout integrity. The supervising manager must coordinate with the following shift supervising manger to identify a way to past the continuity key and maintain lockout integrity (left in a secure place until it can be retrieved).
- ii. Continuity locks must be used in conjunction with the “Do not remove tag” identified in Appendix A.
 - 1. The purpose of this tag is to communicate to the University community the importance of not removing the tag/lock and contact information for FMCS, if they would have questions.

13. Lock Removal Procedure When Owner Not Available

- a. If it becomes necessary to remove a lock when the owner is not available, the Forcible Lock Removal Form must be completed (Appendix D)
- b. The lock owner’s supervisor must be notified.
- c. FMCS Locksmiths are the only individuals authorized to remove a personal safety lock ONLY after each of the steps included in the forcible lock removal form have been completed. These steps include:
 - i. It has been verified that the lock owner is not at the work site, which may include verifying the employee has clocked out for the day.
 - ii. Attempts have been made to contact the lock owner.
 - iii. A determination has been made as to why the lock was applied.
 - iv. Supervisor or their direct designee has inspected the equipment and determined that the removal of the lock does not create a safety hazard.
 - v. Provisions have been made to notify the lock owner of the lock removal BEFORE they have returned to resume work on the equipment.
- d. The completed lock removal form needs to be provided to EHS as soon as possible.

14. Periodic Inspections

- a. Supervisors of authorized employees are responsible for completing periodic inspections on at least an annual basis in order to ensure authorized employees are adhering to the lockout/tagout/tryout equipment specific procedure.
- b. Inspections will be conducted using the checklist found in (Appendix E)
- c. Inspections will focus on correcting any deviations from equipment specific lockout/tagout/tryout procedures and updating procedures as needed.
 - i. Updated procedures shall be provided to the Energy Control Committee for review and posting to the FMCS Box.
- d. Completed inspection checklists are to be reviewed and maintained by EHS.

15. Revisions

Date	Documented Changes	Initials
May 18, 2020	Document format change	MAS
Aug. 10, 2020	New Tag	AR
March 16, 2021	Updated Format and Accessibility Update	MAS
May 13, 2022	Reviewed and no changes needed	CB

Appendix A – Standard Lockout/Tagout/Tryout Tag

Front



This lock/tag may only be removed by:

NAME _____

DEPT. _____

DATE _____

Back



This energy source has been LOCKED OUT!

Unauthorized removal of this tag is prohibited.

Remarks: _____

Appendix B – Lock Placement Verification Form

Job Description:

Lockout/Tagout/Tryout Equipment Procedures Used:

Isolation Device & Location	Lock #	Lock Placed By Name:		Energy Isolation (i.e. Try Out, Visual Confirmation of Pin/Blocks or Voltage Testing) Verified By:		Lock Removed By Name:	
		Date	Time	Date	Time	Date	Time

Appendix C – Lockout/Tagout/Tryout Equipment Procedure

Machine: XXXXXX

Location: XXXXXX

Page: 1 of 2

ENERGY SOURCES:

Energy Type(s)	Energy Isolation Device(s)	Magnitude(s)	Location & Description of Energy Isolation Device(s)	Lockout Device(s)

- Pictures of equipment lockout points -

AUTHORIZED EMPLOYEES

Refer to the attached document that displays pictures of each isolation point as well as the machine itself.

SHUTDOWN PROCEDURES & SEQUENCE OF LOCKOUT:

The steps listed below must be followed to properly shut down and de-energize this equipment.

1. Notify all affected employees verbally that servicing or maintenance is required on this machine and that the machine must be shut down and locked out to perform the servicing or maintenance.
 - a. Affected employees include the machine operator and any employees in the area.
2. **If the machine is operating, please follow the normal stopping procedure to shut it down.**
 - a. xxxxx
 - b. xxxxx
 - c. xxxxx
 - d. xxxxx
3. Authorized personnel will have equipment assigned to them and will be kept with them at all times. If an extended lockout is needed, there is a lockout station at the shop. This will be the location to acquire the equipment and make sure it is signed out properly.
4. Each authorized person that will be servicing the equipment needs to apply their individual locks and tags to the lockout device(s).
5. All stored or residual energy must be dissipated or restrained
 - a. xxxxx
 - b. xxxxx
 - c. xxxxx

6. Verify that all energy has been dissipated by first checking that no personnel are exposed, then attempt to restart the machine. Return the operating controls to the “neutral” or “off” position after verifying the isolation of the machine.
7. The machine or equipment has now been locked out.

RESTORING EQUIPMENT TO SERVICE:

The steps listed below must be followed to properly release this equipment from a locked or tagged out condition and restart it.

1. Inspect the machine and the immediate area around the machine to ensure that nonessential items have been removed and that the machine components and guards are operationally intact.
2. Check the work area to ensure that all employees have been safely positioned or removed from the area.
3. Verify that the controls are in neutral.
4. Remove the lockout devices and reenergize the machine.
5. Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

Lockout/Tagout/Tryout Equipment Procedure - EXAMPLE

Machine: Air Handler #1
 Location: FMS/Physical Plant Building – Floor 2
 Page: 1 of 2

ENERGY SOURCES:

Energy Type(s)	Energy Isolation Device(s)	Magnitude(s)	Location & Description of Energy Isolation Device(s)	Lockout Device(s)
Electrical	Electrical Disconnect	480 V	<u>Supply VFD/Disconnect</u> : Located behind the unit <u>Return Fan VFD/Disconnect</u> : Located in front/above unit Main Electrical Disconnect: Located backside of the unit	Lock/Tag
Chilled Water	Two (2) Chilled Water Valves	60-100 PSI	<u>Chilled Water Supply/Return Valves</u> : Located in front of the unit, next to return fan	Lock/Tag
Hot Water	Two (2) Hot Water Valves	55-95 PSI	<u>Hot Water Supply/Return Valves</u> : Located directly in front of unit	Lock/Tag

Air Handler #1



Supply Fan VFD



Supply Fan Disconnect



Return Fan



Chilled Water



Hot Water Valves



AUTHORIZED EMPLOYEES

Refer to the attached document that displays pictures of each isolation point as well as the machine itself.

SHUTDOWN PROCEDURES & SEQUENCE OF LOCKOUT:

The steps listed below must be followed to properly shut down and de-energize this equipment.

1. Notify all affected employees verbally that servicing or maintenance is required on this machine and that the machine must be shut down and locked out to perform the servicing or maintenance.
 - a. Affected employees include the machine operator and any employees in the area
2. If the machine is operating, please follow the normal stopping procedure to shut it down.
 - a. Shut down the air handler unit at both the return and supply fan drives/disconnects. Press the OFF/Stop button at the Supply Fan Drive.
 - b. At the Supply Fan Disconnect, place the controls into the OFF position.
 - c. Place the electrical disconnect switch into the OFF position and apply a lock/tag onto the switch.
 - d. Go to the Return Fan Disconnect and place all control switches into the OFF position.
 - e. Place the electrical disconnect switch into the OFF position. Apply a lock/tag onto the switch.
 - f. Shut off both of the Hot Water Valves and apply locks/tags.
 - g. Shut the Chilled Water Valves and place a lock/tag onto the valves.
 - h. Prior to performing work on the unit, ensure it is properly locked out. Test the lockout by placing the controls on both disconnects back into the On/Auto positions. Press the On/Start button at the VFD for the Supply Fan. The unit should not start if properly locked out. Place the controls back into the OFF position prior to performing any work.
3. Authorized personnel will have equipment assigned to them and will be kept with them at all times. If an extended lockout is needed, there is a lockout station at the shop. This will be the location to acquire the equipment and make sure it is signed out properly.
4. Each authorized person that will be servicing the equipment needs to apply their individual locks and tags to the lockout device(s).
5. All stored or residual energy must be dissipated or restrained
 - a. Ensure all water lines are bled if needed to work directly on a line.
 - b. Put a lock/block onto the fan blades as necessary.
6. Verify that all energy has been dissipated by first checking that no personnel are exposed, then attempt to restart the machine. Return the operating controls to the "neutral" or "off" position after verifying the isolation of the machine.
7. The machine or equipment has now been locked out.

RESTORING EQUIPMENT TO SERVICE:

The steps listed below must be followed to properly release this equipment from a locked or tagged out condition and restart it.

1. Inspect the machine and the immediate area around the machine to ensure that nonessential items have been removed and that the machine components and guards are operationally intact.
2. Check the work area to ensure that all employees have been safely positioned or removed from the area.
3. Verify that the controls are in neutral.
4. Remove the lockout devices and reenergize the machine.
5. Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

Appendix D – Forcible Lock Removal Form

Reason for lock removal: (Check only one)

Can't find Lock Owner
 Can't identify Lock

Lost Key to Lock
 Other _____

Complete the following questions:

Today's Date: _____ Time: _____ Zone: _____ Building: _____

Equipment/Job Description: _____

Name and Andrew ID of employee whose personal safety lock is being removed or the department safety lock name/identification number to be removed (**print if known**): Name: _____ Andrew ID: _____

Supervisor who is having the lock removed: Name: _____ Andrew ID: _____

Were reasonable attempts made to have the lock owner located & returned to remove the lock? _____

*Department safety locks do not require an employee call.

Date	Time	Who Was Called & Phone Number Used	Response/Results
Date	Time	Time Employee Clocked Out	

*If the lock owner is on campus they shall be required to report to the lock location to remove their own lock.

Supervisor responsible for the equipment/job: Print Name: _____ Sign: _____

Supervisor responsible for lock owner/dept lock: Print Name: _____ Sign: _____

EHS Notified: Name: _____ Date: _____ Time: _____

Once all attempts have been made to notify lock owner, the supervisor preparing to remove the lock must:

1. Communicate warnings to "Stay in the Clear" to all affected & authorized personnel in the area;
2. Inspect equipment affected by lock to verify that no one is in a position to be injured prior to start up;
3. Use bolt cutters to cut the personal safety lock from the equipment.

Lock removed by: Name: _____ Sign: _____

When lock was removed: Date: _____ Time: _____

Person witnessing lock removal: Name: _____ Sign: _____

The person whose lock was removed shall be contacted regarding the lock removal prior to he/she starting work the following shift. Date Contacted: _____ by: _____

Note: This completed form must be provided to the EHS Department no less than the following business day.

Appendix E - Lockout/Tagout/Tryout Inspection Form

Inspection Date:		
Inspector Name:		
Inspector Name:		
Employee Inspected:		
Machine/Equipment involved in lockout/tagout/tryout activities:		
Inspection Questions	Yes	No*
1. Have all affected personnel been notified of the lockout/tagout/tryout activities and the equipment that will be involved?		
2. Do employees have adequate lockout/tagout/tryout devices for the work occurring? (hasp, cable lock, circuit breaker lockout, equipment locks, etc)		
3. If more than one energy source was isolated, was the lock placement verification form filled out correctly?		
4. Does each employee have their personal safety lock secured to the group lockout device (hasp, group lockout box)?		
5. Was a lockout/tagout/tryout procedure used to lockout the equipment? If yes, what procedure was used?		
	Procedure:	
6. If work will continue beyond one shift, has the continuity lock and appropriate tag been applied?		

Inspection Date:	
<p>*If any answer is No, identify what follow-up actions are needed to correct the observation (retraining, update to procedure, additional lockout/tagout/tryout supplies, etc.)</p>	
Comments/Observations	