University of Colorado
Colorado Springs

Control of Hazardous Energy (Lockout/Tagout) Program

LOTO Program Table of Contents

A. Introduction

In every workplace there is the potential for employees to be exposed to unexpected start-up and energization of equipment during servicing, maintenance and cleaning activities. Effective hazardous energy control procedures will protect employees during machine servicing and maintenance where the unexpected energization, start up, or release of stored energy could occur and cause injury or even fatality. Hazards associated with unexpected energization include, but are not limited to, being caught in, crushed by, struck by, or thrown from as well as contacting live electrical circuits/parts.

The Code of Federal Regulations (CFR) 29 Part 1910.147 requires that an employer establish a program and utilize procedures to prevent unexpected energization, start up or release of stored energy. It is for this reason that this program has been established to

- Identify potential sources of hazardous energy
- Define responsible individuals or groups for complying with this policy
- Outline required steps and procedures to reduce the risk of unexpected energization
- Provide guidance on the use of a tagout system that provides the same level of safety if the isolation device is incapable of being locked out.
- Outline the training frequency and content to ensure employees understand the purpose, function, and gain the skills required for a safe application of the program.

B. Purpose

The purpose of this program is to establish a best management practice based on 29 CFR 1910.147 and establish a policy for safely isolating energy sources at the University of Colorado Colorado Springs (UCCS). This policy applies to all staff employees, faculty, students, visitors, and contractors on campus. This lockout tagout (LOTO) program will ensure proper isolation of energy sources before performing any maintenance and servicing activities as well as maintaining control of the isolation points throughout the duration of the work.

This program will also establish various responsibilities for implementing and controlling hazardous energy sources, identify approved equipment for isolation energy and prohibit unauthorized personnel from starting or tampering with machinery while it is being serviced.

C. Definitions

1. **Affected employee:** An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being

performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

2. **Authorized employee:** A trained person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment.
3. **Group Lockout:** A lockout that involves more than one person. It requires the use of a hasp and/or lockbox and everyone must place a lock on the hasp or lockbox to ensure their safety.
4. **Lockout:** The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
5. **Machinery:** The term machinery used in this program refers to any and all equipment, piping, or system that has the ability to use or store energy.
6. **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.
7. **Single Person Lockout**: a lockout that is completed by one person and there is only one person working on or in the machine at any given time.
8. **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. This is only to be used in the event that a lock is infeasible and the tag must provide equal employee protection as a lockout would.

D. Types of Hazardous Energy

1. **Electrical:** energy from the flow of electric charge.
2. **Mechanical:** energy that refers to the movement of machinery or equipment.
3. **Hydraulic:** energy that includes oil, water and any other substance that creates fluid pressure.
4. **Pneumatic:** energy referring to any power related to pressurized air. This can include static pressure (tanks) or moving pressure such as through hoses or pipes.
5. **Thermal:** energy that would feel hot or cold.
6. **Chemical:** energy released by a chemical reaction between substances.

7. **Potential or gravitational:** stored energy that could be released. Stored energy can come in the form of pressure, tension, and gravity. Any of the above energy types can also create or store potential energy.

E. Roles and Responsibilities

The roles and responsibilities are important to establish for lockout tagout in order to understand how various employees and departments are responsible for different aspects of the program. This reduces the chance of confusion and miscommunication between workgroups and ensures all the requirements are being met. The lockout tagout program requires the cooperation of the department heads, employees and the Environmental Health and Safety department (EHS).

Supervisors are responsible for providing all necessary equipment to perform a proper lockout or tagout within their department. All equipment must meet the requirements of the University approved equipment, as outlined in Appendix C. Department supervisors are also responsible for establishing written procedures, as described below, for the equipment in their respective areas.

Authorized employees are responsible for following all the requirements set forth by this program and the required training. They are expected to understand the basics of lockout tagout and how it applies to their work area. They are also responsible for understanding the machinery they are working on, helping to establish written procedures and identifying discrepancies between the procedures and the equipment.

Affected employees are responsible for understanding the basics of lockout tagout and how it applies to them.

EHS is responsible for updating and maintaining this policy as necessary. That includes, but is not limited to, updating with new regulatory requirements, periodic review, and modifying to meet the University's needs. EHS is also responsible for the completion of annual audits and inspections of the lockout procedures to ensure compliance with this policy. Finally, EHS is also responsible for providing and documenting all lockout tagout training.

F. LOTO Equipment

All equipment for lockout tagout should be identified for lockout tagout and can only be used for that purpose. See Appendix C for examples of University Approved Equipment.

1. Locks

i. All locks shall be durable, standardized to UCCS identified colors, substantial, and identifiable as lockout tagout locks.
ii. All locks will be single keyed with only one key available
iii. Locks shall be color coded as follows:
    1. Electricians - red locks
    2. HVAC/Plumbers - blue locks
    3. Auxiliary maintenance - yellow locks
    4. All other departments or participants - green locks

2. Tags
    i. Used to identify the authorized person and date
    ii. Must meet 50 lbs pull strength
    iii. Must prohibit unauthorized use or removal of lock/tag.
    iv. Must be attached to each lock used in a lockout.
    v. Must include the name and phone number of the employee as well as the date of lockout.

3. Lock Boxes

   The intent of a lockbox is to hold all the keys placed on the equipment for multi-source lockouts. The lockbox is then to be locked by each employee involved in the lockout by placing their locks on the outside of the box. This method secures all the keys under the control of each employee involved and all the locks cannot be undone until all employees have removed their personal lock.

4. Hasps

   Hasps are to be utilized for group lockouts to ensure each individual involved in the lockout can place their lock on the isolation point or lockbox. Hasps can also be used on individual isolation points to ease the lockout of the equipment.

5. Other Locking Devices

   Other locking devices shall be used in order to lockout individual isolation points. These devices can include, but are not limited to, electrical covers (circuit breakers, fuses, wall switch, electrical plug, etc.), gate valve locks, ball valve locks, chains, and cables. All these devices must be red, used as intended, and must fit the equipment appropriately. These devices must also effectively lockout the equipment so accidental re-energization is not feasible.

6. Contractors

All contractors and visitors must follow all energy isolation requirements set forth by this policy and 29 CFR 1910.147. They must also use their own lockout tagout equipment and devices to lockout UCCS machinery.

G. LOTO Steps

All the following steps must be followed for every lockout as it applies to the equipment. For equipment with multiple energy sources, these steps should be identified for the specific equipment in the written procedures.

1. Prepare for Shutdown

   Preparing for shutdown includes gathering the required equipment and tools and identifying the hazardous energy sources associated with the equipment. Part of this process is also identifying the hazards associated with the energy and the proper method of controlling the energy.

2. Notifying all affected employees

   Before de-energizing the equipment, the affected personnel must be notified of the lockout. This includes anyone who may operate or work on the equipment or who may be working in the area and affected by the lockout of the machinery.

3. Shutdown the equipment

   This step requires turning off the equipment. This is an important step as the machine should be turned off and/or powered down before disconnecting the energy sources.

4. Isolate the equipment

   Isolating the equipment involves disconnecting the equipment from the energy sources. This can include turning closing the valves, unplugging equipment, throwing electrical disconnects, etc.

5. Lockout the equipment

   After the energy has been isolated, apply appropriate lockout devices to all energy isolations points. This step also requires protecting against any gravitational or potential energy (apply blocks).

6. Release stored energy

   There may be energy that remains in the equipment after it is isolated in the form of tension, pressure, or gravity, that must be released prior to servicing the equipment in order to prevent injury. This can include draining pipes of liquid, bleeding off stored air pressure, grounding capacitors, etc.

7. Verify Isolation

   This step requires that the authorized employee validate the equipment is properly locked out and all stored energy is released. This can be accomplished by trying to operate the equipment, physically trying to manipulate valves, checking locks are closed, etc. Be sure to return the machinery back to off position after verifying LOTO.

8. Perform necessary servicing or maintenance work

   Once the first seven steps have been completed, the employee(s) may continue with required servicing and maintenance.

9. Check Equipment

   After the work is completed, the authorized employee(s) must clear equipment of all tools and debris, check that all personnel are out of the equipment, remove any blocks put in place, and replace all guarding that may have been removed to perform the work.

10. Notify affected personnel of start-up

    Before re-energizing the equipment, it is important to notify the affected personnel that the equipment will be returned to normal operation.

11. Remove lockout equipment

    Each authorized employee is responsible for removing their personal lock. If there is still a personal lock on the equipment and the employee has left for the day, follow lock removal procedures. Once all the individual locks are removed, any authorized employee can remove the rest of the isolation locks.

12. Return the machine to normal operation

    Once all the locks and lockout devices have been removed, all the energy can be returned to operating mode. Be sure to note if there is a specific sequence for properly returning the equipment to service.

H. Tagout Policy

If an isolation point or equipment is physically incapable of being locked out, a tagout must be performed. This process requires all the same steps as a lockout, but instead of the use of locks, the employee will place tags on all the isolation points. The tags shall be consistent with the requirements above and must say “Danger: Tagged Out. Do not Remove.” or some similar language that prevents the unauthorized removal of the tag. The tagout process and placement must also be described in the written procedures.

I. Lock Removal Policy

This policy is in place in case an employee's lock is still on the equipment or lockbox, the equipment needs to be restarted, and the employee is not available to remove the lock. In this event, it is critical that certain steps are followed to ensure the employee's safety and prevent premature start-up of equipment. See Appendix B for the Lock Removal Form that includes all of the critical steps and information. This form must be approved by the supervisor of the department or the lab. For Facilities, the Executive Director of Facilities Services or their delegate must approve the lock removal form before starting up the equipment. If the equipment is not property of UCCS, this policy does not apply and the contractor must be brought back onsite to remove the lock. If it is a contractor lock on UCCS equipment, this policy can be utilized. This policy also does not apply if a key is lost and the employee is the one removing their lock.

J. Written Procedures

Each piece of equipment that requires multiple energy source lockout, or multi-point lockout, must have a written lockout procedure associated with it. The intent behind this procedure is to ensure the authorized employee(s) understand the purpose, scope, authorization, rules and techniques required for each piece of equipment. This procedure should address all hazards associated with the lockout and how to properly isolate each energy source. See Appendix A for an example of a written procedure. These written procedures must be utilized every time when locking out the machinery. For the facilities department, these procedures will be kept in the work order system and associated with each equipment as appropriate.

These written procedures are to be audited annually by authorized personnel. This inspection should consist of verifying the procedures are still accurate, the lockout steps adequately de-energize the machine, and the employee is correctly following all UCCS requirements. See Appendix D for the inspection form. Any discrepancies found during the audit should be addressed as soon as possible and the procedures updated accordingly. If the inspections finds the employee in violation of the LOTO procedures, that employee must be retrained. This retraining can consist of informal training on the non-compliant findings or contact EHS for full lockout tagout retraining.

K. Training Requirements

1. All training will be documented and kept in the EHS files.
2. New employees will be required to complete online LOTO training provided by EHS within 30 days of hire. In addition to online training, this policy will be provided to new employees within 30 days of the beginning of their

employment. It is the expectation that they read, understand, and follow this policy. Any specific questions or concerns can be addressed during on the job training.

3. Refresher training will occur annually. It will also be provided to employees if there are changes to the program requirements or procedures.
4. Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, an annual inspection indicates it is necessary, or there is a change in the equipment specific procedures.

L. Exceptions

1. Cord and plug

   The LOTO procedural requirements do NOT apply if the machinery is completely de-energized simply by unplugging it and the cord or plug remains under the direct control of the person conducting the maintenance. Pneumatic tools may also fall into this category provided that they can be completely isolated from their energy source and bled of stored energy.

2. Minor servicing

   Minor tool changes, adjustments and other minor servicing activities which take place during normal production operations are not subject to lockout tagout standards provided ALL of the following criteria are met:

   1. The activity is routine. It is performed as part of a regular and prescribed course of action/procedure and is performed in accordance with established practices/industry standards.
   2. The activity is repetitive. It is repeated regularly as part of the production process or cycle.
   3. The activity is integral to the use of the equipment for production (the activity must be essential to the production process).
   4. The activity is conducted with effective production-mode safeguards in place.
   5. The activity does not require extensive disassembly of the machinery/equipment.
   6. The activity is performed using alternative measures (tools or guarding) which provide effective employee protection

Appendix A – Sample Lockout Tagout Procedure

This procedure is intended as an example procedure for all written procedures to follow. This is not an actual lockout tagout for any piece of equipment at UCCS.

This procedure is meant to isolate all energy sources for [this equipment]. If there have been any recent changes to the equipment, validate these procedures are still accurate or submit changes to have the procedure updated. If there are any questions or concerns regarding your safety while following these procedures, stop the work and contact your supervisor or EHS immediately.

Tools:

4 red locks	1 ball valve
1 lock box	2 light switch covers
4 tags	1 6’ ladder

Energy Sources:

2 electrical sources – light switch on West wall and by the South door

1 Air supply – located 8’ high by South wall

Notification:

Notify janitorial staff and building manager of work.

Shutdown, Isolation, and Lockout:

Flip light switches to down or “off” position. Place covers over each switch and lock with a red lock and tag.

Utilizing the ladder, turn air supply valve counterclockwise until perpendicular with pipe. Place ball valve cover over the valve and lock in place with a red lock and tag.

Place all 3 lock keys into the lockbox and place your personal lock on the box. Ensure all tags are filled out with your name, number, and the today’s date.

Insert pictures as helpful

Release energy:

Release stored air through bleed valve located to the left of the ball valve.

Verify Isolation:

Try to start equipment by physically trying to flip light switches on and press run on the equipment. Be sure to turn equipment back to the “Off” position after testing.

Perform Maintenance

Perform necessary maintenance as described in the work order.

Clear equipment:

Remove tools, cleaning equipment, and spare parts from the machine. Ensure all coworkers and contractors are out of the equipment. Replace all machine guarding.

Notify and remove:

Remove lockout tagout devices from energy sources, return sources to “on” or running positions and notify janitorial and building manager the work is complete.

Appendix B – Lock Removal Verification Form

This form is to be used in the event that equipment needs to be put back in service and an employee is not available to remove their lock. This form does not need to be used in the event of a lost key. If this is not UCCS equipment, the lock cannot be removed. The contractor must be contacted and back onsite to place equipment back in service. If it is a contractor's lock on UCCS equipment, these procedures can apply.

General Information	
Today's Date	
Name of Employee Completing the Form	
Name of Person who is having their lock removed	
Building the lock is in	
Specific equipment the lock is on	
Color of the lock	
Reason for the lock removal	

Steps to Remove Lock

Verify all work is complete and all employees are out of the equipment.

Complete ☐ Incomplete ☐ (Check one)

Verify the employee is not available to remove their lock.

1. Call employee to verify they are not on campus and inform them their lock is being removed.

   Number Called:_____

   Time Called:_____

   Talked to Employee (Circle one): YES NO LEFT A VOICEMAIL

2. If the employee cannot be reach, notify their supervisor of the situation and verify the number is correct.

Name of Supervisor:_____ Talked to Supervisor (circle one): YES NO

Complete the proper lockout removal procedures. ☐ Complete

Follow up with the employee when they return to retrain and give employee a new lock.

Date Employee Returned:_____ Date of Retraining:_____

Employee Completing Form Signature: _____ Date: _____

Supervisor's Signature: _____ Date: _____

Absent Employee (when they return):_____ Date: _____

Appendix C – University Approved Equipment

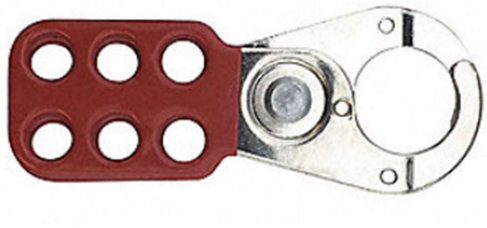
This appendix is to show types of the currently approved lockout tagout equipment for UCCS. His list is not extensive for all types of lockout tagout equipment. ny other colored equipment may not be used for lockout tagout. Contact EHS for questions or concerns.

Below are the approved and designated lock colors for each workgroup.

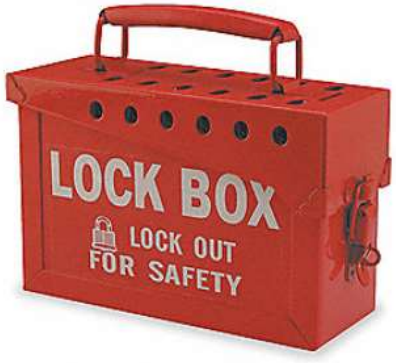
Electricians – red	HVAC/Plumbers – blue	Auxiliary Maintenance - yellow	Other Departments - green
			

All equipment (besides designated locks) must be red. This includes all of the following:

HASPS

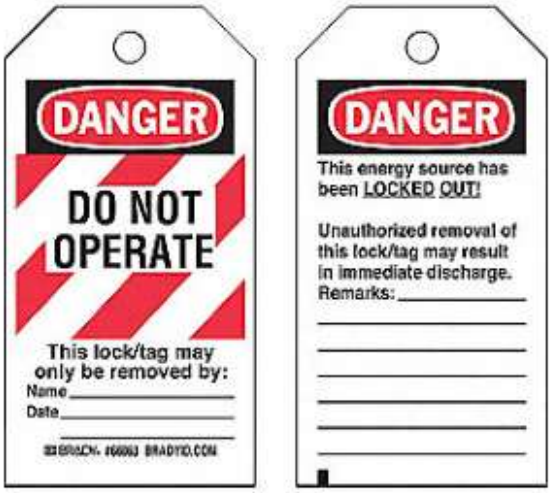


GROUP LOCKOUT BOX



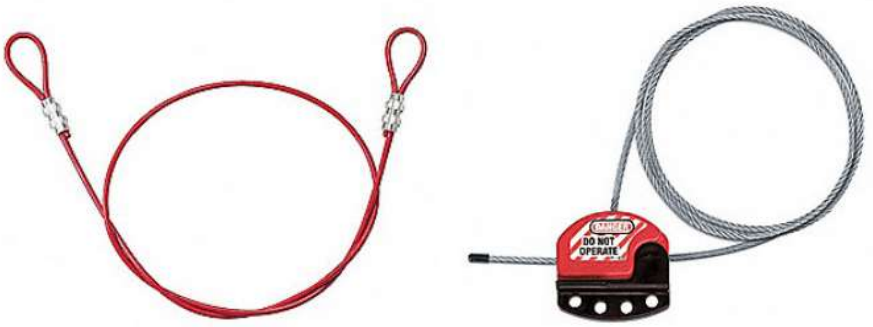
TAGS

Any variety of tag is acceptable as long as it has “DANGER: DO NOT OPERATE” with a space for the name, date, and phone number.

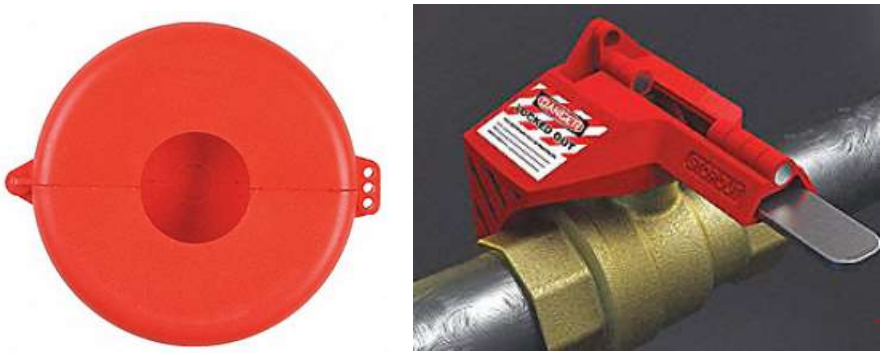


EXAMPLES OF OTHER LOCKOUT DEVICES

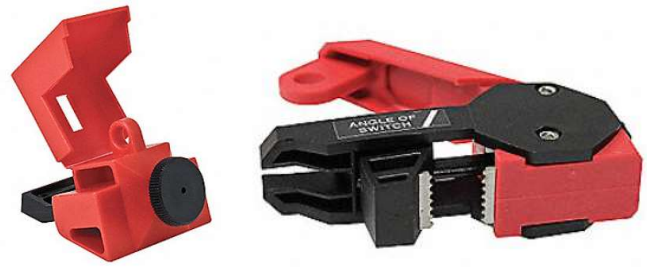
CABLE LOCKOUTS



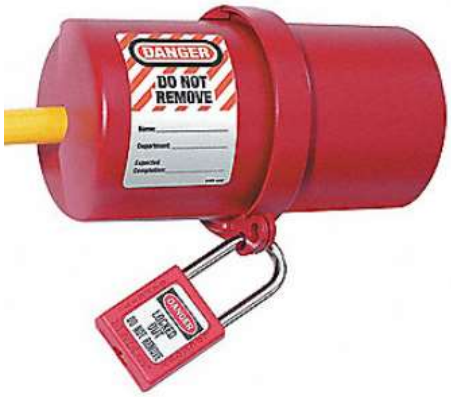
VALVE LOCKOUT DEVICES



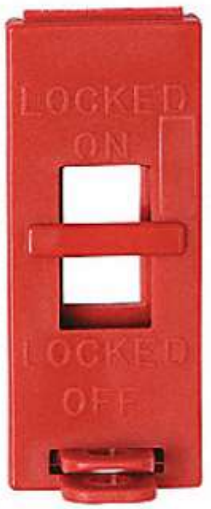
CIRCUIT BREAKER LOCKOUTS

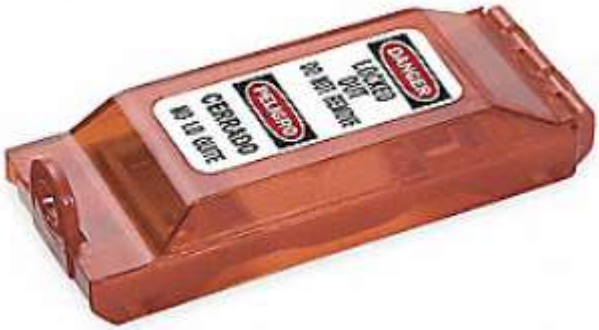


PLUG LOCKOUT

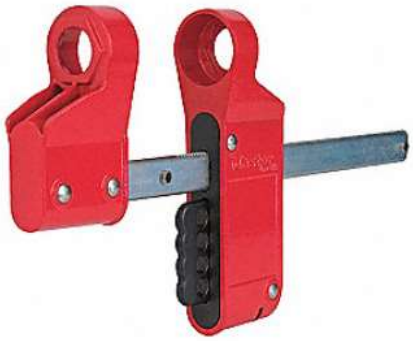


SWTICH LOCKOUT

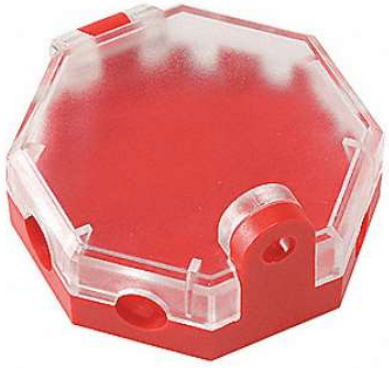




FLANGE LOCKOUT



PNEUMATIC LOCKOUT



Appendix D – UCCS Lockout Tagout Inspection Form

Date of Inspection: _____

Name of Employee Performing Inspection: _____

Name of Employee(s) Inspected: _____

Equipment Inspection Performed on:

Bldg Name: _____ Floor: _____ Equipment name:_____

Yes	No	Subject	**Comments** (Required for all "No" responses)
		1. Is there a written procedure?	
		2. Does the procedure include all required steps?	
		3. Does the procedure accurately lock out the equipment and release all energy?	
		4. Does the employee understand the purpose of lockout tagout?	
		5. Does the employee correctly follow all the steps in the procedure?	
		6. Does the employee use the proper LOTO equipment?	

If "No" answered for any of questions 4-6, employee must be retrained.

Date of Retraining: _____

Corrective Actions (if applicable):

_____

_____

_____

_____

Signature of Inspector: _____ Date: _____

Employee(s) Signature: _____ Date: _____

Employee(s) Signature: _____ Date: _____

Employee(s) Signature: _____ Date: _____

All actions are complete ☐

Turn into EHS when all actions are complete. For any questions, contact EHS at x7241 or x3212.