

Austin Regional Manufacturer's Association (ARMA)

Deep Dive into OSHA's Lockout/Tagout (LOTO) Standard



About: Control of Hazardous Energy

Lockout/Tagout

- Important for the prevention of injuries that can occur during the repair or maintenance of equipment
 - Lockout = Control energy through use of a locking device
 - Tagout = Display warning and information using a tag
- Consistently found in OSHA's National Emphasis Program! (i.e., this is low hanging fruit)
 - LOTO violations ranked in the Top 3 in general industry, and Top 5 overall



Why Discuss LOTO?



1) To communicate the need to protect workers during maintenance procedures from the unexpected release of hazardous energy

Why Discuss LOTO?



2) Regulatory Compliance with OSHA Standards

Surprise Inspections by the Occupational Health and Safety Administration (OSHA)

Training Topics & Objectives

LOTO Training is Usually Provided to Staff Members Authorized To Apply Locks and Tags Necessary to Control Hazardous Energy on Facility Equipment

LOTO Authorized Agenda:

- ✅ Introduction
- ✅ OSHA Standard
- ✅ Hazardous Energy Sources
- ✅ LOTO and Isolation Devices and Tools
- ✅ Applying LOTO
- ✅ Removing LOTO
- ✅ Policy & Procedure

Today's Agenda:

- ✅ Prologue
 - ✅ OSHA Standard
 - ✅ Major Components of Program
- ✅ Discussion
 - ✅ Special Cases
 - ✅ A LOTO Procedure



General Industry (29CFR1910)



UNITED STATES
DEPARTMENT OF LABOR



Occupational Safety and Health Administration

[ABOUT OSHA](#) ▾ [WORKERS](#) ▾ [EMPLOYERS](#) ▾ [REGULATIONS](#) ▾ [ENFORCEMENT](#) ▾ [TOPICS](#) ▾ [NEW](#)

[OSHA Laws & Regulations](#) / [Regulations \(Standards - 29 CFR\)](#)

Regulations (Standards - 29 CFR)

By Industry

By Standard Number

Standard Number > **1910**

- [1910 - Table of Contents](#)
- [1910 Subpart A - General](#)
 - [1910.1 - Purpose and scope.](#)
 - [1910.2 - Definitions.](#)
 - [1910.3 - Petitions for the issuance, amendment, or repeal of a standard.](#)
 - [1910.4 - Amendments to this part.](#)
 - [1910.5 - Applicability of standards.](#)
 - [1910.6 - Incorporation by reference.](#)
 - [1910.7 - Definition and requirements for a nationally recognized testing laboratory.](#)
 - [1910.7 App A - OSHA Recognition Process for Nationally Recognized Testing Laboratories.](#)
 - [1910.8 - OMB control numbers under the Paperwork Reduction Act.](#)
 - [1910.9 - Compliance duties owed to each employee.](#)
- [1910 Subpart B - Adoption and Extension of Established Federal Standards](#)



— EHS Compliance For Small Business —

The Lockout/Tagout (LOTO) Standard

- 1910.146 - Permit-required confined spaces
 - 1910.146 App A - Permit-required Confined Space Decision Flow Chart
 - 1910.146 App B - Procedures for Atmospheric Testing.
 - 1910.146 App C - Examples of Permit-required Confined Space Programs
 - 1910.146 App D - Confined Space Pre-Entry Check List
 - 1910.146 App E - Sewer System Entry.
 - 1910.146 App F - Non-Mandatory Appendix F -- Rescue Team or Rescue Service
- 1910.147 - The control of hazardous energy (lockout/tagout).
 - 1910.147 App A - Typical minimal lockout procedures
- 1910 Subpart K - Medical and First Aid
 - 1910.151 - Medical services and first aid.
 - 1910.151 App A - Appendix A to 1910.151 -- First aid kits (Non-Mandatory)
 - 1910.152 - [Reserved]
- 1910 Subpart L - Fire Protection
 - 1910.155 - Scope, application and definitions applicable to this subpart.
 - 1910.156 - Fire brigades.
 - 1910.157 - Portable fire extinguishers.
 - 1910.158 - Standpipe and hose systems.
 - 1910.159 - Automatic sprinkler systems



OSHA Standard

OSHA 29 CFR 1910.147

The Control of Hazardous Energy (Lockout/Tagout) Standard

- 🔒 — LOTO procedures are designed to prevent accidents, to protect employees, the environment, and equipment from accidental release of hazardous energy.

General Requirements

- 🔒 — Equipment Specific Controls and Procedures
 - For any equipment that may require LOTO by employees and documented and kept in the Health and Safety Manual

Training for

- Authorized Employees
- Affected/Other Employees



Two Sides of LOTO Standard



- **29 CFR1910.147**

- Procedures necessary to disable machinery/equipment to prevent release of stored energy while maintaining equipment



- **29 CFR1910.333**

- Essentially the same but for electrical work
- Requires workers use LOTO procedures for electrical work
- Working on, near or with energized conductors or electrical systems



Maintenance on Machines/Equipment

- **29 CFR1910.147**
 - Procedures necessary to disable machinery/equipment to prevent release of stored energy while maintaining equipment



Maintenance on Electrical Components



- 29 CFR 1910.333(b)
 - Same but for electrical work
 - Requires workers use LOTO procedures for electrical work



part of their body or indirectly through some other conductor for the voltage level of the exposed electric conductors

1910.333(b)

"Working on or near exposed deenergized parts."

1910.333(b)(1)



Maintenance on Electrical Components



- **29 CFR1910.333(c)**

“...if employees are working on **energized** conductors, equipment, or other electrical systems, which have not been locked or tagged out...”

1. Qualified Personnel
2. Electrical PPE

1910.333(b)(2)(v)(D)

There shall be a visual determination that all employ

1910.333(c)

"Working on or near exposed energized parts."

1910.333(c)(1)

QUESTION FOR THE AUDIENCE

How would you define a “qualified person”???

- Occupational Safety and Health Administration (OSHA) CFR Regulation 1910 defines a “**qualified person**” as “one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of *design, analysis, evaluation, and specifications in the subject work, project, or product.*”



Major Components of a LOTO Program

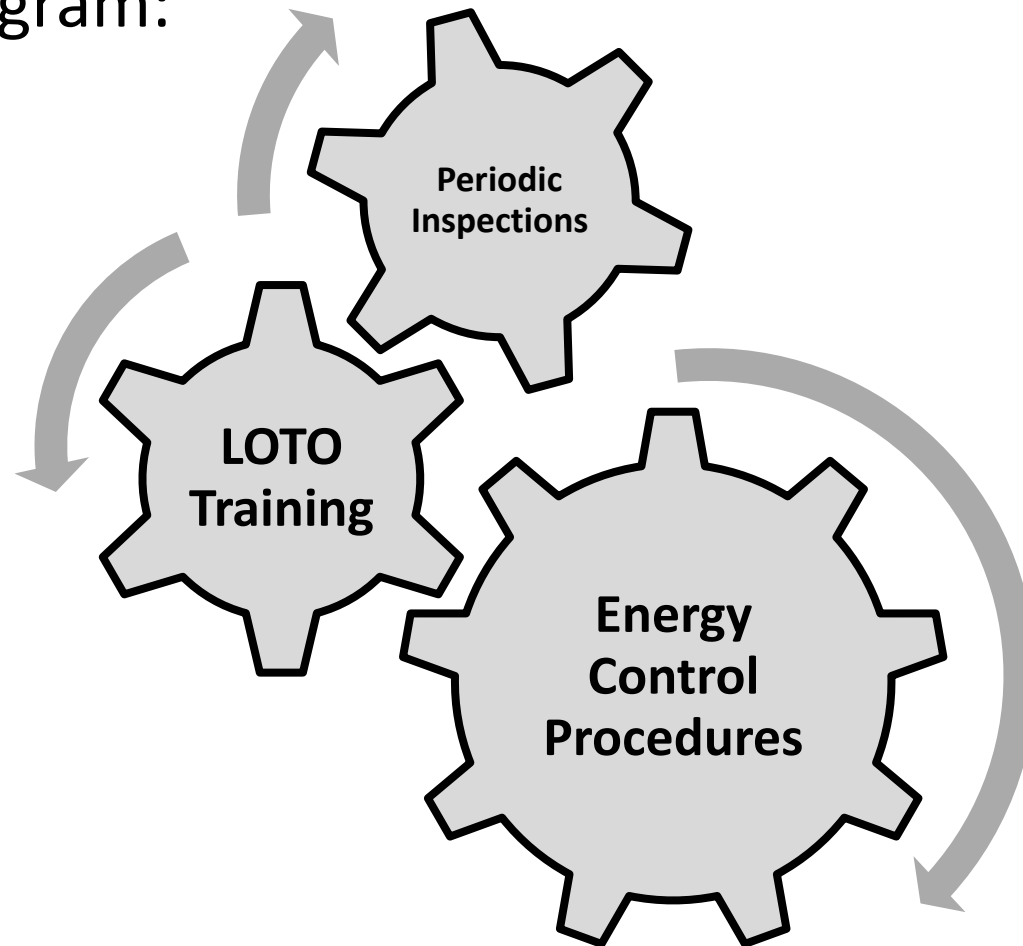
Control of Hazardous Energy Lockout/Tagout

- ✓ ☒ Written Program
- ✓ ☒ Equipment Specific Procedures
- ✓ ☒ Annual Procedure Assessment
- ✓ ☒ Employee Training
- ✓ ☒ LOTO Equipment

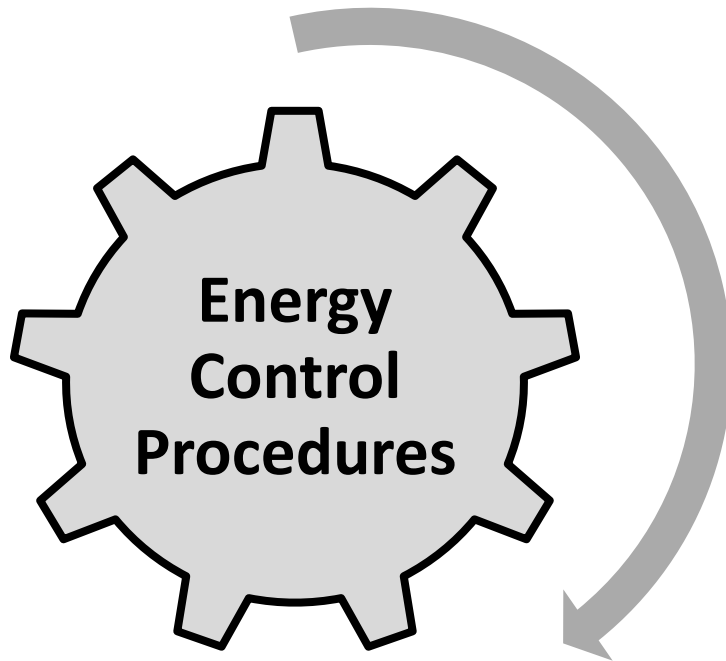


Major Components of a LOTO Program

- Written Program:



1910.147(c)(4)(i)



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.



Lockout/Tagout Procedure Components

1. Notify Employees
2. Shut Down Equipment
3. Isolate Energy
4. Release Stored Energy
5. Lock and Tag Out
6. Attempt Startup
7. Service Equipment



Image Credit: ESFI.org



Lockout/Tagout Procedures




EQUIPMENT LOCKOUT/TAGOUT PROCEDURE


Equipment	Manufacturer	Model #	Date Created
			07/21/17
Location	Created By	Serial #	Revision Date
Machine Shop	Thomas Berry	13815	10/6/2017
LOTO Points	5	Notes:	

LOCKOUT APPLICATION PROCESS

- 1) Notify affected personnel of shut down
- 2) Safely shut down equipment
- 3) Identify and isolate all energy sources
- 4) Release all stored or residual energy
- 5) Apply locks and tags
- 6) Verify the equipment is in "zero energy" state

Energy Source	Machine LOTO Location	Method and Devices Needed	Lockout Point
Electrical (208V)	Machine Shop	<p>LOCKOUT:</p> <p>Turn 3-phase disconnect switch to "off" position & attach lock and tag</p> <p>OR</p> <p>Turn breaker switch X-38,40,42 at Panel "X" to "off" position</p> <p>AND ... (next page)</p>	 <p>Behind Machine</p>  <p>Panel "X" near Sandblast Room</p>

		<p>coolant plug: Unplug cord and attach plug lock and tag</p>  <p>(coolant pump LOTO Point)</p>
Pneumatic (520psi)	LOCKOUT:	<p>Close and attach ball valve lock and tag</p> <p>OR</p> <p>Disconnect air hose if used connect is used and attach lockout device. Attach airline lock and tag</p> 
Bathwater	LOCKOUT:	<p>Close valve and attach gate valve lock and tag</p> <p>Residual Energy:</p> <p>After closing valve, detach hose and drain hose line</p> 

Nitrogen (800psi)	LOCKOUT:	
Chemical (CIMTECH GL2015 Pink)	Chemical Hazard:	<p>Pump residual chemical through system until empty</p> <p>THEN</p> <p>Ensure electrical disconnect is locked and tagged out</p>

LOCKOUT REMOVAL PROCESS

- 1) Ensure all tools & items have been removed
- 2) Ensure all personnel are safely located
- 3) Verify all controls are in the neutral or off position
- 4) Remove lockout devices & re-energize equipment
- 5) Notify affected personnel that maintenance or servicing is complete

Lockout-Tagout Procedure

Purpose: Ensure employees performing activities are protected from hazardous potential energy

Scope: This "Long Form" of the LOTO process is intended for any servicing or maintenance task other than routine maintenance that requires you to place your body in harm's way of the equipment.

Authorization: Only authorized employees are allowed to perform this procedure

Enforcement: Failure to properly follow lockout-tagout procedures may result in corrective action

Shutdown, Lock, Tag & Verification Procedure		
#	Step	Description
1.	Notify Employees	Notify all affected personnel that the equipment must be shutdown for maintenance or servicing.
2.	Review Lockout Procedure	Refer to the company procedure to identify the types and magnitude of energy sources the equipment uses, understand the hazards of the energy, and shall know the methods to control the energy.
3.	Perform Shutdown	If equipment is operating, shutdown using the general shutdown procedure.
4.	Isolate Energy	Follow procedure to de-energize equipment using the isolation devices present for the equipment.
5.	Lockout Energy	Lockout/tagout as required, the energy isolation device(s) with assigned individual lock(s) and tag(s).
6.	Dissipate Energy	Release or isolate any stored or residual energy (e.g., capacitors, springs, rotating, moved or raised parts, as well as gas, pneumatic, chemical, steam, or water pressure) by blocking, dissipating, bleeding, repositioning or grounding.
7.	Verify Isolation	Ensure no personnel are in harms way and attempt to start the equipment or activate any of the energy sources. NOTE: Return all controls or commands to the off or neutral position following verification.
Restoring Service Procedure		
#	Step	Description
1.	Check Equipment	Ensure that all tools and other items have been removed from the area.
2.	Check Area	Ensure all employees are in a safe position.
3.	Verification	Verify the controls are in the off or neutral position.
4.	Lockout/Tagout Removal	Remove locks/tags and other devices used in the reverse order as the application process.
5.	Notify Employees	Notify all affected personnel that the servicing and maintenance has been completed and the equipment is ready to use.

Lockout/Tagout Procedures

Lockout-Tagout Procedure

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7.	<i>Verify Isolation</i>	Ensure no personnel are in harms way and attempt to start the equipment or activate any of the energy sources. NOTE: Return all controls or commands to the off or neutral position following verification.

Restoring Service Procedure

#	Step	Description
1.	Check Equipment	Ensure that all tools and other items have been removed from the area.
2.	Check Area	Ensure all employees are in a safe position.
3.	Verification	Verify the controls are in the off or neutral position.
4.	Lockout/Tagout Removal	Remove locks/tags and other devices used in the reverse order as the application process.
5.	Notify Employees	Notify all affected personnel that the servicing and maintenance has been completed and the equipment is ready to use.

De-energize Steps

Re-energize Steps



1910.147(c)(7)(iv)

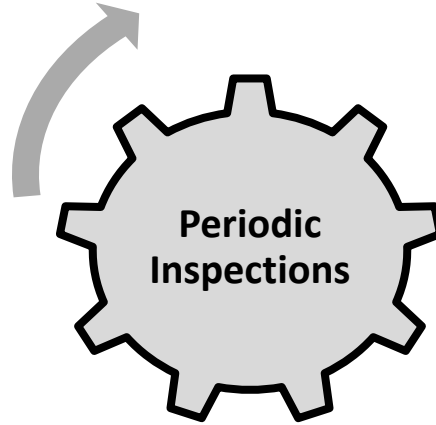


1910.147(c)(7)(iv)

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)(6)(ii)



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.

QUESTION FOR THE AUDIENCE

Which of the following employee tasks DO NOT fall under “maintenance/servicing” under the LOTO Standard (1910.147)???

- Setting up/Installation
- Inspecting
- Lubricating
- Repairs
- Changing tools
- Unjamming
- Cleaning
- Adjusting



Scenario#1 – Standard Application

RULE: Servicing/Maintenance taking place during normal production operations is covered by this standard only if:

- Employee is required to remove or bypass guard or other safety device OR
- Employee must place any part of his/her body into point of operation or where associated danger zone exists

True or False: There is no exception to this rule.



Minor Tool Change Exception:

- Routine
- Repetitive
- Integral

...to the use of the equipment..

Scenario#2 – “Out of Service” VS Maintenance

Question

Long Version: When equipment is placed in an "out of service" status for business or production purposes (e.g., poor efficiency, recycled, sold, etc.) and not related to servicing or maintenance, is the use of lockout/tagout devices for this purpose a violation of 29 CFR 1910.147(c)(5)(ii)??

Short Version: Can I use a LOTO lock on a machine that is “Out of Service”?



..would not "...preserve the integrity of the Lockout/Tagout program."

Scenario#3 – Standard Application

True or False. Employee training is conducted on an annual basis.



Additionally: ...whenever there is a change in their job assignments, change in machines/equipment/processes presenting new hazard, change in energy control procedures

Scenario#4 – Exclusive Control Exemption

Scenario 1: Maintenance is to be performed on a single piece of shop machinery, such as a lath or drill press. The machine has a single energy source which is a disconnect switch, located in clear view, within five unobstructed feet of the machine on an adjacent wall. An electrician placed the disconnect switch in the "off position, removed the fuses from the disconnect switch and the machine's control panel, and verified that the machine would not start. In order for another employee to reach the disconnect switch, they would need to walk past the employee performing maintenance on the machine.

Question: Is the disconnect switch "under the exclusive control" of the employee performing the maintenance, or is a lockout or tagout device still required to be placed on the disconnect switch?



.. only to equipment that is de-energized through a cord and plug connection”

Scenario#5 – Annual Inspection of Procedures

Scenario 1: ...Section 1910.147(c)(6)(i) goes on to require periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed.

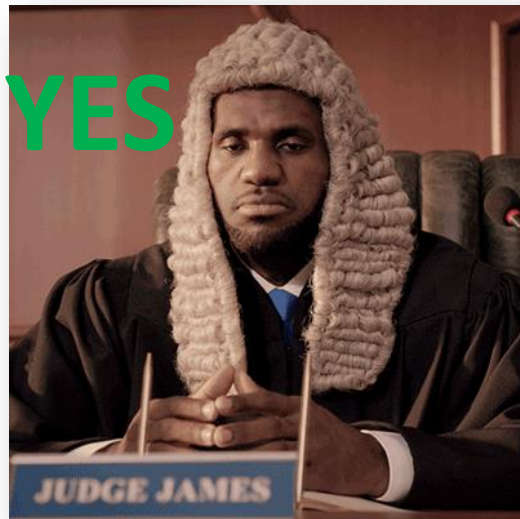
Question: In order to meet the requirement in Section 1910.147(c)(6)(i)(A), can one "authorized employee," who is not performing the lockout procedures, observe/inspect a second "authorized employee" who is performing the lockout procedures?



IMPORTANT NOTE: One authorized member performs procedure while another inspects for accuracy, efficiency, etc.

Scenario#6 – Annual Inspections of Procedures

Question: Is every lockout procedure required to have a periodic inspection, or can lockout procedures be grouped for machines that are of similar construction and operation?



“...employer may elect to group procedures as described above, and then inspect a representative number of such employees implementing one procedure within each group.”

QUESTION FOR THE AUDIENCE

What information, at minimum, must be included on a tag that has been placed at an energy isolation point with lockout device?

1910.147(c)(5)(ii)(D)

ID of Authorized Personnel

DANGER

DO NOT OPERATE

MY LIFE IS ON THE LINE

Place Picture Here

THIS LOCK/TAG MAY ONLY BE REMOVED BY:

NAME: _____

DEPT.: _____

EXPECTED COMPLETION: _____

1910.147(c)(5)(iii)

- Do Not Start.
- Do Not Open.
- Do Not Close.
- Do Not Energize.
- Do Not Operate.



Individual LOTO Procedure Review

Lockout-Tagout Procedure

Purpose: Ensure employees performing activities are protected from hazardous potential energy

Scope: This "Long Form" of the LOTO process is intended for any servicing or maintenance task other than routine maintenance that requires you to place your body in harm's way of the equipment.

Authorization: Only authorized employees are allowed to perform this procedure




Enforcement: Failure to properly follow lockout-tagout procedures may result in corrective action

Shutdown, Lock, Tag & Verification Procedure

#	Step	Description
		Ensure that the equipment must be shutdown using the general shutdown procedure to identify the types and magnitude of the energy sources, understand the hazards of the equipment uses, and the methods to control the energy.
3.	Perform Shutdown	Shutdown the equipment using the general shutdown procedure.
4.	Isolate Energy	De-energize equipment using the isolation devices (e.g., disconnects, valves, etc.). Lock, tag, and block the energy isolation device(s) with a lock and tag(s).
5.	Lockout Energy	Verify that all energy sources are isolated and that there is no stored or residual energy (e.g., capacitors, springs, etc.) or raised parts, as well as gas, pneumatic, or hydraulic pressure by blocking, dissipating, bleeding, or other means.
6.	Dissipate Energy	Attempt to start the equipment in harm's way and attempt to start the equipment to verify the energy sources. NOTE: Return all equipment to the off or neutral position following the procedure.

#	Step	Description
1.	Check Equipment	Ensure that all tools and other items have been removed from the area.
2.	Check Area	Ensure all employees are in a safe position.
3.	Verification	Verify the controls are in the off or neutral position.
4.	Lockout/Tagout Removal	Remove locks/tags and other devices used in the reverse order as the application process.
5.	Notify Employees	Notify all affected personnel that the servicing and maintenance has been completed and the equipment is ready to use.

Individual LOTO Procedure Review

		<p><u>Coolant Plug:</u> Unplug cord and attach plug lock and tag</p>  <p>(Coolant pump LOTO Point)</p>	
Pneumatic (120psi)	<p><u>LOCKOUT:</u> Close and attach ball valve lock and tag</p> <p>OR</p> <p>Disconnect air hose if quick connect is used and attach lockout device. Attach airline lock and tag</p> 		
Bathwater	<p><u>LOCKOUT:</u> Close valve and attach gate valve lock and tag</p> <p><u>Residual Energy:</u> After closing valve, detach hose and drain hose line</p> 		


r	Model #	Date Created
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Chemical (CIMTECH GL2015 Pink)		<p><u>Chemical Hazard:</u> Pump residual chemical through system until empty</p> <p>THEN</p> <p>Ensure electrical disconnect is locked and tagged out</p>	

LOCKOUT REMOVAL PROCESS

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LOTO Points	5	Notes:		

LOCKOUT APPLICATION PROCESS			
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Individual LOTO Procedure Review

EQUIPMENT LOCKOUT/TAGOUT PROCEDURE			
Equipment		Manufacturer	Model #
Location		Created By	Serial #
CNC Area/East Aisle			Revision Date
LOTO Points	3	Notes: Depending on what item of the machine or its process is being serviced or maintained, maintenance personnel may not lock out every form of energy on machine because some are not directly affiliated with machine item of concern	
Wide shot photo of machine/equipment			





References

- https://www.google.com/search?q=machine+injuries+during+maintenance&num=20&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjOwbqlz6XgAhVQKawKHepRCroQ_AUIDigB&biw=1536&bih=768#imgrc=fvO3WxbXwCUeWM:
- <https://www.esfi.org/resource/lockout-tagout-your-life-depends-on-it-544>
- <https://www.osha.gov/laws-regs/regulations/standardnumber/1910>

