Ohio | Bureau of Workers' Compensation

Elements of a Lockout/Tagout Program
29 CFR 1910.147

BWC Division of Safety & Hygiene

Photo courtesy of BWC employee Roman Wilshanetsky

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How to Read OSHA Standards

29 CFR 1910.147(a)(1)(i)

- 29 Title
- CFR Code of Federal Regulations
- 1910 Part
- 147 Subpart
- (a) Subsection
- (1)(i)(a) Explanatory Subsection

References

- OSHA Compliance Directives
  - CPL 02-00-147 Control of Hazardous Energy
- OSHA Instruction
  - STD-01-16-007 Electrical Safety Related Work Practices -Inspection Procedures and Interpretation
- ANSI Standards
  - B11.19-2010 Performance Criteria for Safeguarding
  - Z244.1-2004 Lockout/Tagout and Alternative Methods

Other Part 1910 Regulations with Lockout/tagout - Related Requirements

The following listing, taken from OSHA Instruction CPL 2.82, an OSHA guidance document on inspection procedures and compliance clarification for the Control of Hazardous Energy Sources regulation, indicates a number of OSHA regulations that currently impose lockout/tagout-related requirements. The list does not necessarily include all lockout/tagout - related OSHA 29 CFR 1910 regulations.

Title of Related Regulation	Regulatory Citation of Related Regulation
Powered Industrial Trucks	Part 1910.178(g)(4)
Overhead and Gantry Cranes	Part 1910.179.(g)(5)(i)(ii)(iii), Part 1910.179 (l)(2)(i) (c)(d)
Derricks	Part 1910.181(f)(2)(i)(c), (d)
Wood-working Machinery	Part 1910.213(a)(10), Part 1910.213(b)(5)
Mechanical Power Presses	Part 1910.217(b)(8)(i), Part 1910.217(d)(9)(iv)
Forging machines	Part 1910.218(a)(3)(iii)(iv), Part 1910.218(j)(1)
Welding, Cutting and Brazing	Part 1910.252(a)(3)(i)
Pulp. Paper, & Paperboard Mills	Part 1910.262(c)(1), Part 1910.262(p)(1)
Textiles	Part1910.262(c)(1), Part 1910.262(p)(1)
Sawmills	Part 1910.265(c)(13), Part 1910.265(c)(26)(v)
Electric Power Generation, transmission and distribution	Part 1910.269(d)(1)-(8), Part 1910.269(m)(1)-(3).
Grain Handling	Part 1910.272(e)(1)(ii), Part 1910.272(l)(4)

Scope, Application & Purpose

This standard covers the **servicing** and **maintenance** of machines and equipment in which the **unexpected energization** or **start up** of the machines or equipment, or **release of stored energy** could cause injury to employees.

Establishes minimum performance requirements

Scope, Application & Purpose

- **Does Not Cover**:
  - Construction, agriculture, maritime
  - Power generation, transmission, distribution
  - Electrical hazards covered in Subpart S
  - Oil & gas well drilling and servicing

Scope, Application & Purpose

Standard does not apply to:

- Work on cord and plug connected electric equipment
  - Exclusive Control
- Hot tap operations

Photo courtesy of BWC employee Roman Wilshanetsky

Scope, Application & Purpose

- Normal production operations are not covered by this standard. See Subpart O – Machine Guarding.
- Standard applies during Servicing or Maintenance of equipment

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Scope, Application & Purpose

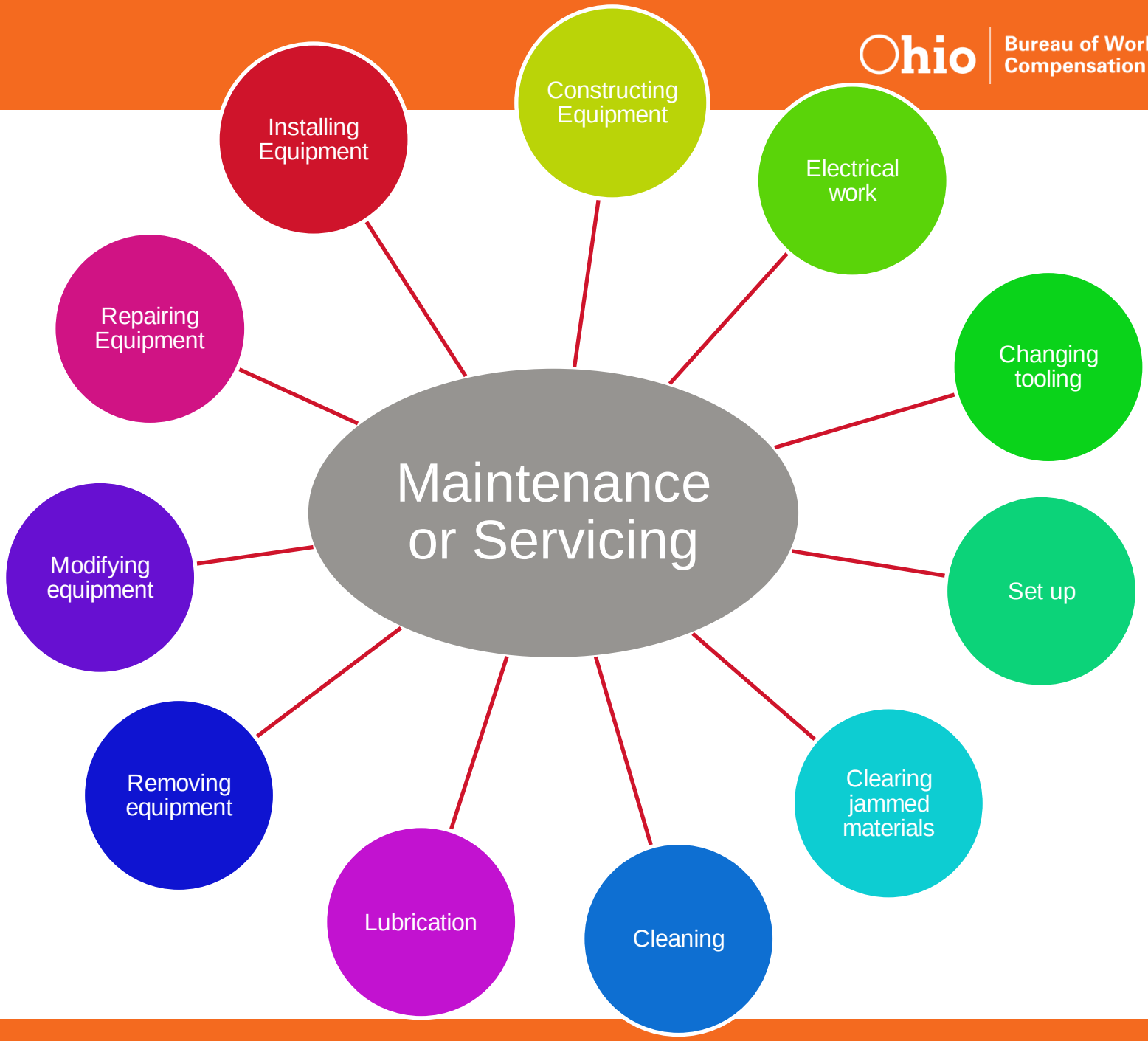
Exception

- Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations, are not covered by this standard if they are:
  - **Routine**
  - **Repetitive**
  - **and Integral**

to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection.

Minor Servicing Definitions

- Routine
  - Part of a regular and prescribed course of procedure and be performed in accordance with established practices (i.e. SOP)
- Repetitive:
  - Repeated regularly as part of the production process or cycle (See ISO 13849 for definition of “frequent”)
- Integral
  - Inherent to the production process


Maintenance or Servicing
Installing Equipment
Constructing Equipment
Electrical work
Repairing Equipment
Changing tooling
Modifying equipment
Set up
Removing equipment
Clearing jammed materials
Lubrication
Cleaning

Scope, Application & Purpose

- Servicing and/or maintenance during normal production operations are covered if:
  - Remove or bypass a guard or other safety device
  - Required to place any part of his or her body into the point of operation or an associated danger zone exists during a machine operating cycle.

Define: LOCKOUT

The process of blocking the flow of energy from a source to a piece of equipment and keeping it blocked.

Photo courtesy of BWC employee Roman Wilshanetsky

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Define: TAGOUT

- A warning not to restore energy. It is not a physical restraint but has the same effect as a lock.
- Tags should be standardized throughout the facility.
- A tag by itself should have a pull strength of 50 lbs.
- Resist deterioration from weather or chemical exposure

Photo courtesy of BWC employee Debra Higginson

Define: AUTHORIZED

A person who locks and tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment.

Photo courtesy of BWC employee Roman Wilshanetsky

Responsibilities of Authorized

- Have sufficient number of locks with lock identification, tags and keys to fully isolate all energy sources during maintenance or service of a machine or equipment.
- Properly apply these energy isolating devices, lock(s) and tag(s).
- Assure that all key(s) related to LOTO are properly controlled so that the locks cannot be removed without your knowledge.
- Understand and follow the procedures of the LOTO program.
- Be responsible for following LOTO procedures that have been developed for specific equipment or machinery maintenance operations in your workspace.

Define: AFFECTED

- A person who normally operates machines or equipment which will be locked and tagged out during service or maintenance.
- Affected employees are not responsible to perform the Lockout/tagout.

Define: OTHER

Any other person who must be able to recognize when machines or equipment have been locked or tagged out for service or maintenance.

Responsibilities of Affected and Other

- Understand the purpose and importance of the LOTO program.
- Recognize when the LOTO procedure is being implemented in your facility.
- Make certain not to attempt startup and use of equipment that has been locked or tagged out.
- SIMPLY: Whenever there is a LOTO device in place on an energy isolating device, leave it alone and do not attempt to operate the equipment.

Other Definitions

- Energy Isolating Device--Mechanical device that physically prevents the transmission or release of energy (disconnect switch, line valve, manually operated circuit breaker)
  - Control circuitry type devices are not energy isolating devices (push buttons, selector switches, interlocks)

- Lockout Device--Device that utilizes a positive means to hold an energy isolating device in a safe position and prevent energization

Two Types of Energy

- Kinetic
  - Energy in motion even after power supply is off (fly wheel)
- Potential
  - Stored force in an object even when the object is not in motion (compressed gas, stretched spring)

Identify Sources of Energy

- Electrical
- Hydraulic
- Pneumatic
- Thermal
- Water
- Reactive
- Steam
- Mechanical
- Cord & Plug equipment
- Flammable
- Gravity
- Chemical
  - Acid
  - Corrosive

Energy Control Program (c)(1)

- Establish a program consisting of:
  - Energy control procedures
  - Employee Training
  - Periodic Inspections
- Ensure that before equipment maintenance is performed, the equipment's energy sources are isolated and rendered inoperative.

Lockout/Tagout (c)(2)

- Employers shall utilize lockout, unless the employer can demonstrate the utilization of a tag-out system will provide full employee protection.
- Whenever equipment is modified, replaced or renovated, they shall be made capable to accept a lockout device.

Photo courtesy of BWC employee Roman Wilshanetsky

Full Employee Protection (c)(3)

- Use of a tag-out device on a lockable energy isolating device:
  - Tag-out device attached at the same location as the lockout device
  - Employer shall demonstrate that the tag-out program will provide a level of safety equivalent to that obtained by using a lockout program.

Procedures for Each Piece of Equipment (c)(4)

- Procedures shall be developed, documented and utilized for the control of potentially hazardous energy for each piece of equipment.
- If machinery or pieces of equipment are similar, just one procedure will cover all like pieces.

Energy Control Procedure "Exception" (c)(4)(i)

- The employer need not document the required procedure for a particular machine or equipment, when all eight elements exist.
- Not a recommended practice. To determine if a piece of equipment meets all eight may be more difficult (and take more time) than to write a procedure.

Eight Elements

The machine:

- Has no potential for stored energy
- Has a single energy source
- The energy source will completely de-energize and deactivate
- Isolated from that energy source and locked out during servicing or maintenance

Eight Elements (continued)

- A single lock-out device will achieve a locked-out condition
- Lockout device is under the exclusive control of the authorized employee
- Servicing or maintenance does not create hazards
- The employer, in utilizing this exception, has had no accidents involving an unexpected activation or re-energization

Energy Control Procedure (c)(4)

- Procedures shall clearly and specifically outline:
  - Scope
  - Purpose
  - Authorization
  - Rules
  - Techniques for the control of hazardous energy
  - Enforcement

Energy Control Procedure (c)(4)

- The means to enforce compliance include:
  - Specific statement of intended use
  - Specific steps for shutting down, isolating, blocking and securing equipment
  - Steps for the placement, removal and transfer of devices and the responsibility for them
  - Requirements for testing equipment to determine and verify the effectiveness of lockout/tagout devices

Lockout/ tagout

Energy Source Identification

Machine: *Compressor* **Date:** *12/10/2010*

Location: *Auto Shop* **Department:** *Maintenance*

Person Identifying Sources: *John Doe, Maintenance supervisor*

Type of Energy	YES	NO	Method, Device or System Selected to De-energize. Quantity of Energy Source (i.e. Voltage, Velocity, PSI, etc.
Electrical	X		Close disconnect on wall behind unit & lockout. Check with tester. 480 Volts.
Hydraulic	X		Close valve on left end. Open pressure release valve below it. Allow pressure to escape (15 minutes). 150 PSI Lockout
Pneumatic	X		Shut valve on right end and open bleeder valve, lockout, wait 15 minutes for pressure to bleed down. 300 PSI
Chemical		X	
Thermal		X	
Mechanical		X	
Cord & Plug Connected		X	
Engulfment Hazard		X	
Other		X	

Protective Materials & Hardware (c)(5)

- The employer shall provide locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware
- Lockout/tagout devices shall be:

a) Identifiable
b) Durable
c) The only device used for controlling energy
d) Not be used for other purposes
e) Standardized
f) Substantial

Photo courtesy of BWC employee Roman Wilshanetsky

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Protective Materials & Hardware (c)(5)

Durable

- Capable of withstanding the environment for the maximum period of time
- Tagout devices constructed and printed to withstand wet/damp locations
- Tags shall not deteriorate when used in corrosive environments (acid and alkali chemicals)

Standardized

- Lockout/tagout devices shall be standardized by:
  a) Color
  b) Shape
  c) Size
  d) Print and format (Tagout devices)

Protective Materials & Hardware (c)(5)

Substantial

- Lockout devices - prevent removal without use of excessive force (bolt cutters)
- tagout devices - prevent inadvertent or accidental removal.

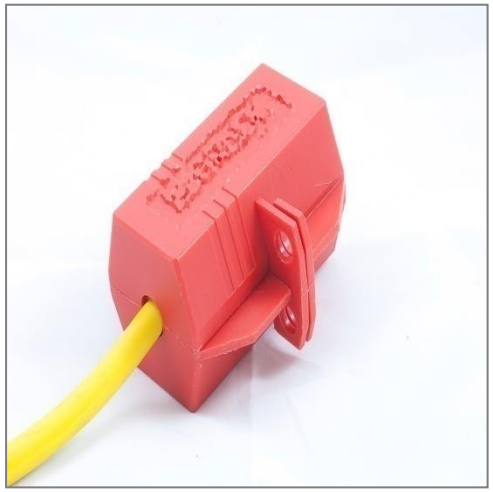
Identifiable

- Lockout/tagout devices indicate the identify of the employee applying the device(s).

Photo courtesy of BWC employee Roman Wilshanetsky

Protective Materials & Hardware

(c)(5)



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Periodic Inspection of your Procedures (c)(6)

Certification to include:

- Date of inspection.
- Machine or process to review identified.
- Names of persons involved in LO/TO.
- Name of person doing inspection.
- Copy of inspection kept on record.

Periodic Inspection (c)(6)

- Employer shall conduct a periodic inspection of the energy control procedure **at least annually**
- The inspection is performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected
- The inspection shall be conducted to correct any deviations or inadequacies identified

Periodic Inspection (c)(6)

- Inspection shall include a review of the procedure for each authorized employee's responsibilities
  - Tagout inspections shall include both authorized and affected employees
- Employers shall certify that the periodic inspections have been performed.

Training and Communication (c)(7)

- Provide training to ensure that the purpose and functions of the energy control program are understood by employees.
- Levels of training:
  - Authorized
  - Affected
  - Others

Training of Authorized Employees (c)(7)(i)(A)

- Authorized Employees
  - Recognition
  - Type
  - Magnitude
  - Methods/means for energy isolation and control

Training of Affected/Other Employees

- Affected Employees
  - Purpose and use of the energy control procedure.
- Other Employees
  - The procedure and the prohibition of restarting or re-engineering locked out equipment
- Training should be completed upon hire

Employee Retraining (c)(7)(iii)

- Employee retraining shall be provided for all authorized and affected employees when:
  - A change in their job assignments
  - A change in machines, equipment or processes that present a new hazard
  - A change in the energy control procedures.

Retraining and Certification

- Additional retraining shall also be conducted when a periodic inspection reveals that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

- Employer shall certify that training has been accomplished and is being kept up to date. Certification shall include the employee's name and dates of training.

Energy Isolation (c)(8)

- Lockout/ tagout shall be performed only by the **authorized employees** who are performing the servicing or maintenance.

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Notification of Employees (c)(9)

- Affected employees shall be notified by the employer or authorized employee when lockout occurs

- Notification shall be given before the controls are applied, and after they are removed from the machine or equipment

Application of Controls (d)

- Lockout/ tagout procedures shall cover the following elements which will be done in the following sequence:
  - Preparation for shutdown-authorized employee has knowledge of type and magnitude of the energy, hazards and method to control the energy
  - Equipment shutdown-orderly shutdown

Application of Controls (d)

- Equipment isolation
  Energy isolating devices to be physically located and operated
- Lockout/ tagout device application
  Attached by authorized employees & will hold the energy isolating devices in a "safe" or "off" position.
- Stored energy
  Potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.

Application of Controls (d)

- Verification of Isolation

  Prior to starting work on equipment that has been locked/tagged out, the authorized employee shall verify that isolation and de-energization of the machine or equipment have been accomplished.

Lock...Tag...Try...and Test!

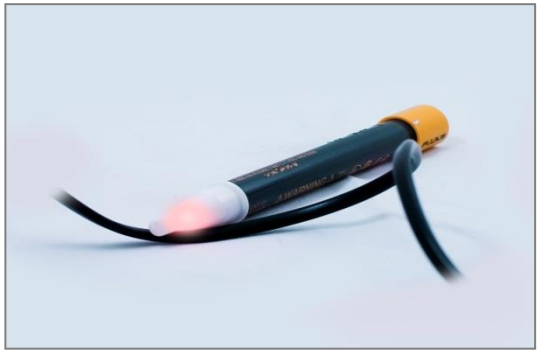


Photo courtesy of BWC employee Roman Wilshanetsky

Release from Lockout or Tagout (e)(1) & (2)

- Before lockout/ tagout devices are removed, the following actions must be taken:
  - Work area inspected for tools, parts, equipment components
  - Work area checked to ensure employees are in a safe location
  - Notify affected employees of removal of LO/TO

Lockout Device Removal (e)(3)

- Each device shall be removed by the employee who applied the device
- **Exception:** If authorized employee is not available to remove device then device may be removed under the direction of the employer
- Employer must provide specific documented procedures and training for device removal (include in written program)

Lockout Device Removal (e)(3)

- Procedure shall include the following elements:
  - Verification by the employer that the authorized employee who applied the device is not at the facility
  - Making all reasonable efforts to contact the authorized employee
  - Ensuring that the authorized employee knows that the device was removed before resuming work at that facility

Testing/Positioning of Equipment (f)(1)

- Testing or positioning of equipment when devices must be removed-the following sequence of actions shall be followed:
  - Clear the equipment of tools and materials
  - Remove employees from the equipment
  - Remove the lockout/tagout devices
  - Energize and proceed with testing/positioning
  - De-energize and reapply energy control measures

Procedures on How You Will Communicate with Contractors on LO/TO.

- Who
- What
- When
- Where
- How

Outside Personnel (f)(2)

- Contractors, outside service personnel, etc.
- The on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedures.
- The on-site employer shall ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

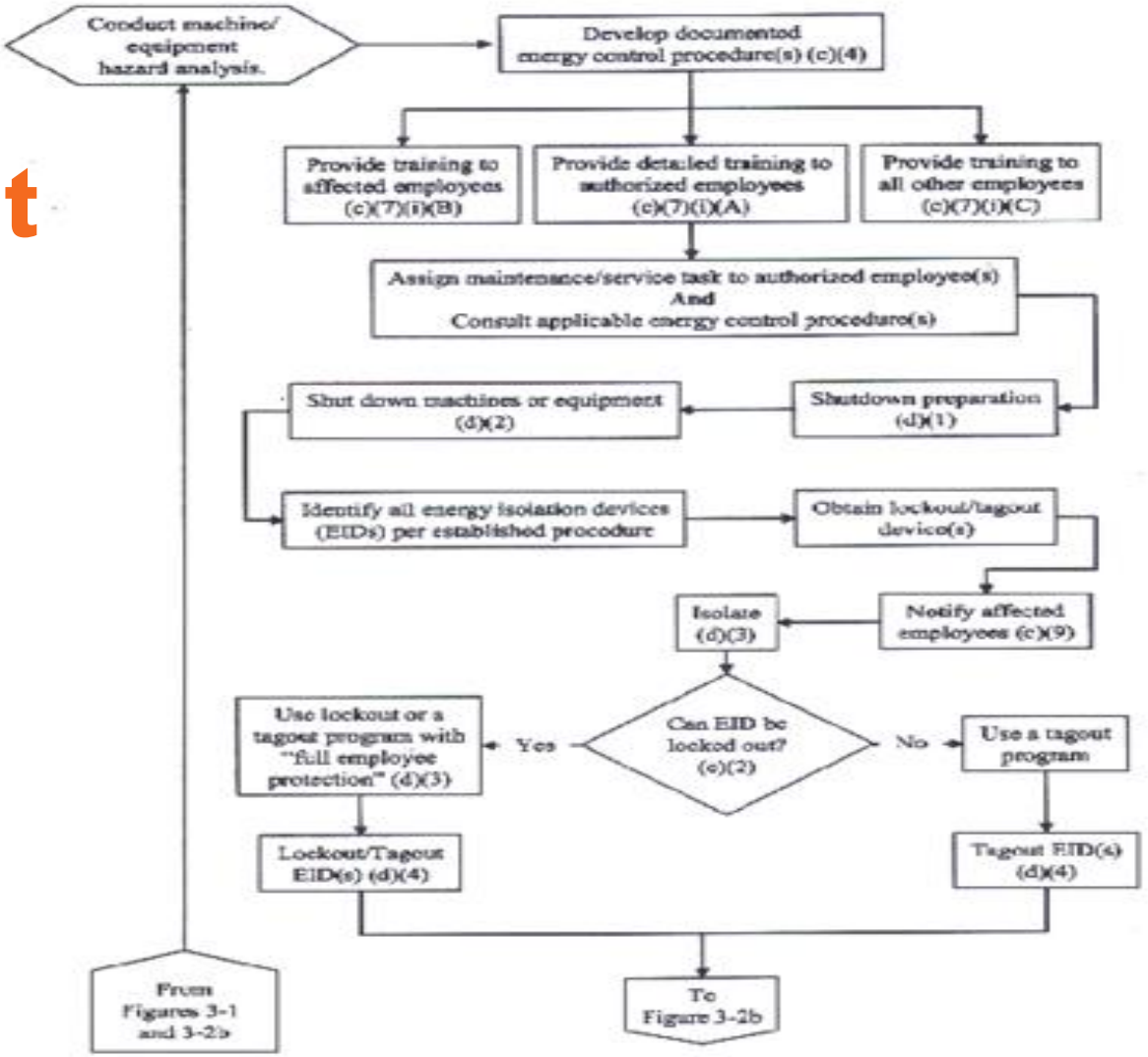
Group Lockout/Tagout (f)(3)

- Service or maintenance performed by a crew, craft, department or other group, shall utilize a procedure which affords all the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.
- Primary Responsibility is vested in an authorized employee
- When more than one crew, or department is involved, an authorized employee is designated to coordinate affected work forces and ensure protection.

Photo courtesy of BWC employee Mark Walsh

Lockout/ Tagout Flowchart

Figure 3-2a: Implementation of Lockout/Tagout (Part 1)



Lockout/ Tagout Flowchart Part Two