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PSF INDUSTRIES, INC.

Lockout/Tagout

Controlling Hazardous Energy

Gene Patrick, CSP, ARM
Construction & Maintenance Safety Manager

Bill Wood Jr., ARM, CHST
Safety Director

Power Boiler Erection by PSF Industries

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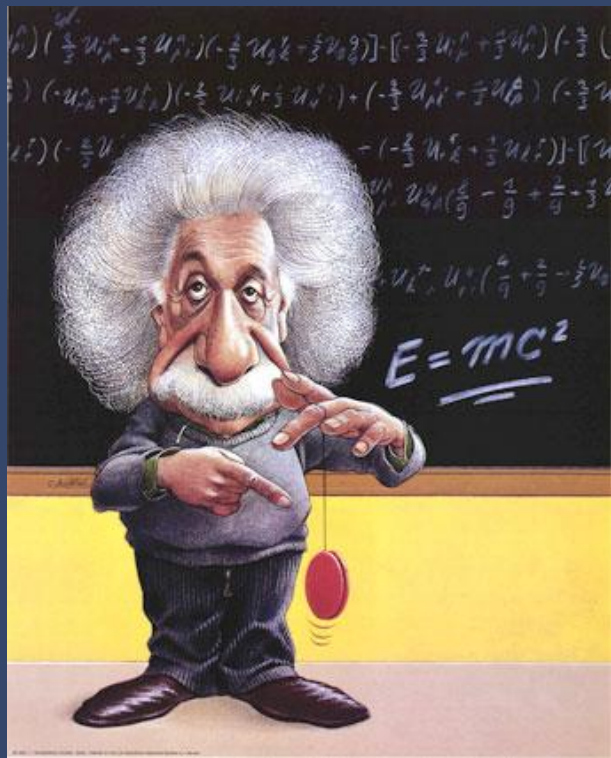
LOTO Information Covered:

1. **Hazardous Energy**
2. **Lockout-Related Accidents**
3. **Scope & Application**
4. **Type of Devices**
5. **Procedures**
6. **Responsibilities**
7. **Questions**

Examples of Hazardous Energy

- **Mechanical**
- **Hydraulic**
- **Pneumatic**
- **Chemical**
- **Electrical**
- **Thermal**



Hazardous Energy

- **Mechanical**
  - Kinetic (in motion)
    - Energy of moving machinery can cause…
      - Amputations
      - Lacerations
      - Fractures
      - Loss of life
  - Potential (stored)
    - Energy stored in…
      - Machinery
      - Weights & springs
      - Pistons under pressure
      - Hydraulic controls
    - Stored potential energy can be released during work causing injury or death

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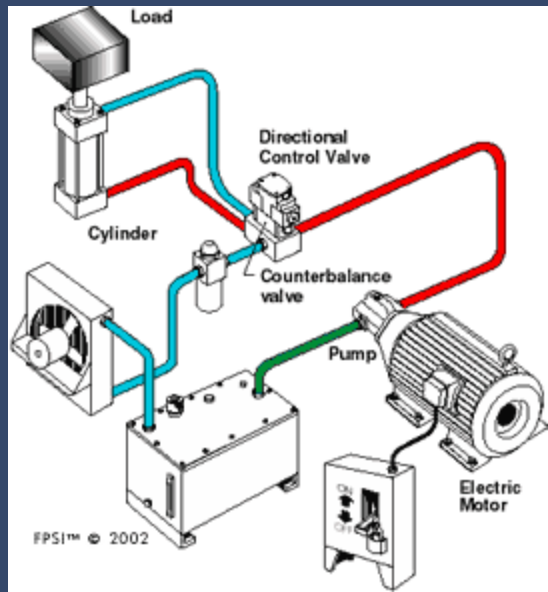
Hazardous Energy

- **Hydraulic**
  - Energy of Liquids Under Pressure
    - Pressure can cause equipment to move
    - Rapid release can cause injury
  - Relieve pressure slowly into a proper container

High pressure paint injection injury



Hazardous Energy

- **Pneumatic**
  - Energy of Compressed Gases
    - uncontrolled release can cause injury
    - rapid de-pressurization creates extreme low temperature
  - Properly vent all systems before starting work

Dry ice bomb injury

Hazardous Energy

- **Chemical**
  - Chemicals have energy that can
    - start fires
    - cause skin burns
    - generate harmful gases or fumes
    - cause explosions
  - Before working –release, drain or vent chemicals safely

Hazardous Energy

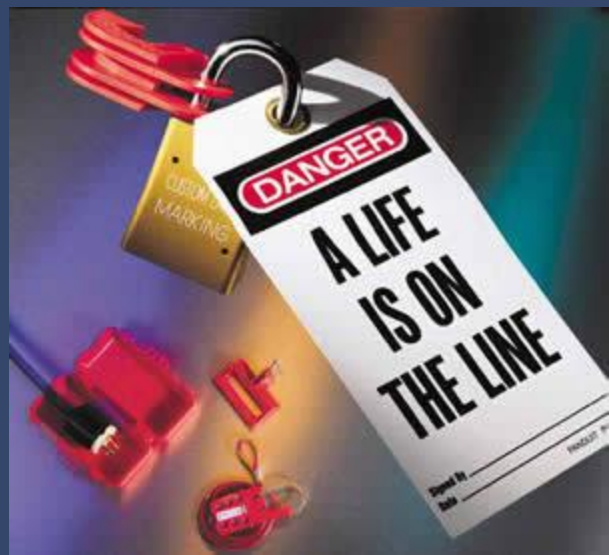
- **Electrical**
  - Potential exposure from energized distribution systems, circuits and equipment.
  - Injuries from electric shock, thermal burns, arc flash explosions.
  - Examples include open bus bars, electrical motors, generators.
  - Capacitors can deliver potential (stored) electrical energy.

Hazardous Energy

- **Thermal**
  - Energy of Heat (and cold)
    - Hot equipment & fluids
    - Cryogenic liquids
    - Quick release of compressed gases
    - Allow equipment to reach a safe temperature before starting work

Hazardous Energy Gone Bad

- What kind of injuries can result?
- **The Fatal Five** – Main Causes of Lockout/Tagout Incidents
  - Failure to stop equipment.
  - Failure to disconnect from power source.
  - Failure to dissipate residual energy.
  - Accidental restarting of equipment.
  - Failure to clear work areas before starting.



Hazardous Energy Gone Bad

NIOSH's review of 152 fatal LOTO incidents suggests that three related factors contributed to these fatalities:

- Failure to completely de-energize, isolate, block, and/or dissipate the energy source (82% of the incidents, or 124 of 152)

- Failure to lockout and tagout energy control devices and isolation points after de-energization (11% of the incidents, or 17 of 152)

- Failure to verify that the energy source was de-energized before beginning work (7% of the incidents, or 11 of 152)

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Hazardous Energy Gone Bad

On the 2008 "10 Most Cited OSHA Violations" list, #5 is Lockout/Tagout

Lockout/Tagout is listed as #4 under "Highest Penalties"

<u>Breakdown of 2006 Total LOTO Violations: 3,659</u>

- 1910.147 (c)(4)(i) — Failure to develop equipment-specific lockout procedures: 658
- 1910.147 (c)(1) — Lack of a written program: 624
- 1910.147 (c)(6) — Failure to conduct periodic (annual) inspections of energy control program: 500
- 1910.147 (c)(7)(i) — Failure to train employees: 480
- 1910.147 (c)(4)(ii) — Inadequate equipment-specific procedures: 233

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Scope & Application

- The **OSHA Standard for the Control of Hazardous Energy (Lockout/Tagout) 29 CFR 1910.147** covers the servicing and maintenance of machines and equipment in which the unexpected start-up or the release of stored energy could cause injury to employees.

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Scope & Application

- **Covered Activities**
  - Constructing, installing, setting up, adjusting, inspecting, modifying, maintaining and/or servicing machines or equipment where employees could be exposed to the unexpected energizing or release of hazardous energy

Scope & Application

- **Exceptions to LOTO provisions:**
  - Work on cord and plug connected equipment if the equipment is unplugged from the energy source and the authorized employee has exclusive control of the plug
  - Hot tap operations (with adequate protective measures)
  - Energized electrical work (with adequate protective measures)

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Scope & Application

- **Lockout/Tagout Rules**
  - The equipment must be de-energized and locks or tags must be applied to the energy-isolation devices) to servicing and maintenance activities when:
    - The employee must either remove or bypass machine guards or other safety devices, resulting in exposure to hazards at the point of operation.
    - The employee is required to place any part of his or her body in contact with the point of operation of the operational machine or piece of equipment.
    - The employee is required to place any part of his or her body into a danger zone associated with a machine operating cycle.

Scope & Application

- **Lockout/Tagout or Tagout Only**
  - If an energy-isolating device is capable of being locked out, it must be locked out.
  - Tagout may be used if an energy isolating device is not capable of being locked out.
  - Tagout must be used where a lockout device would have been attached, and it must provide full employee protection through additional measures.

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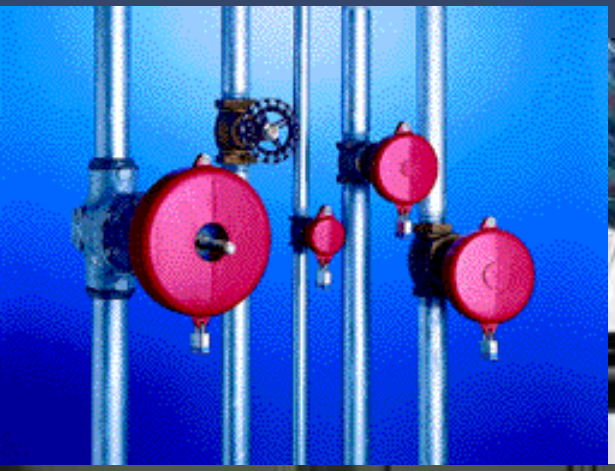
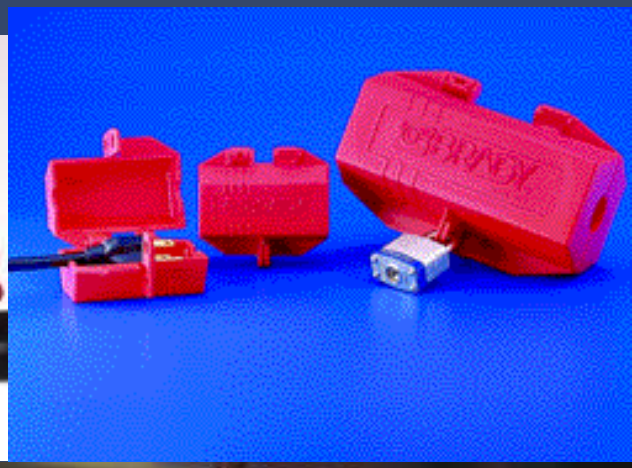
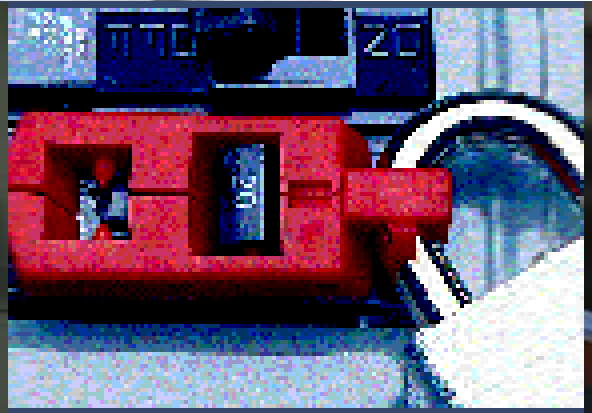
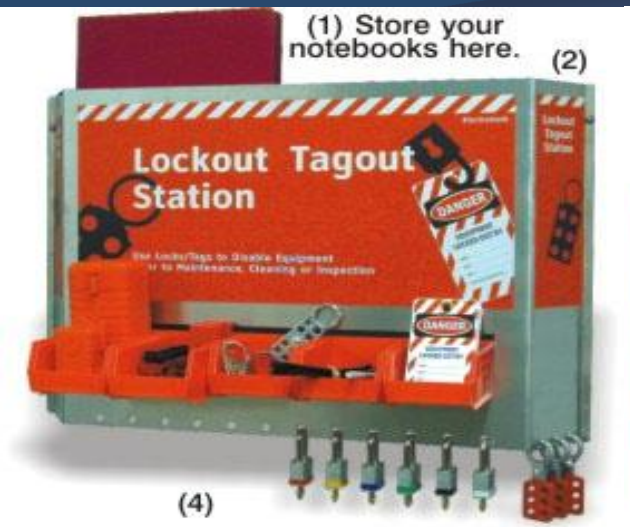
Types of Devices

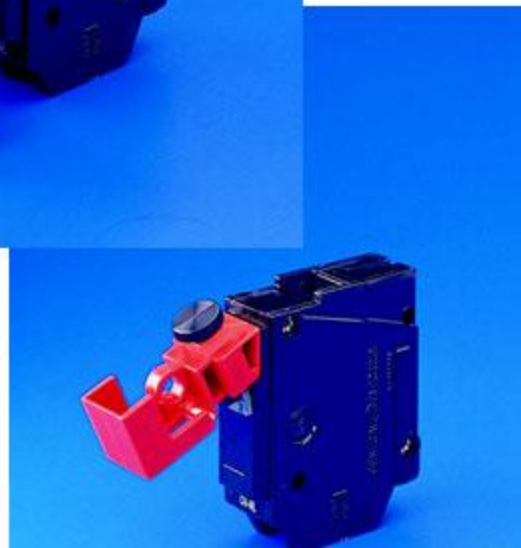






Types of Devices





Types of Devices

- **Durable**
  - Lockout and tagout devices must withstand the environment to which they are exposed for the maximum duration of the expected exposure. Tagout devices must be constructed and printed so that they do not deteriorate or become illegible, especially when used in corrosive or wet environments.

- **Standardized**
  - Both lockout and tagout devices must be standardized according to either color, shape, or size. Tagout devices must also be standardized according to print and format.

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Types of Devices

- **Substantial**
  - Lockout and tagout devices must be substantial enough to minimize early or accidental removal. Tag means of attachment must be non-reusable, attachable by hand, self-locking and non-releasable, with a minimum unlocking strength of no less than 50 pounds (one-piece nylon cable tie).

- **Identifiable**
  - Locks and tags must clearly identify the employee who applies them. Tags must also warn against hazardous conditions if the machine or equipment is energized and must include a legend such as: DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, DO NOT OPERATE.

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Procedures

- **Basic Steps:**
  - Shut down equipment
  - Isolate all energy sources
  - Apply lockout devices
  - Release all energy
  - Verify zero energy state
  - Perform work
  - Remove lockout devices

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Procedures

- **Preparation for Shutdown**
  - Know the types and amounts of energy that power it.
  - Know the hazards of that energy.
  - Know how the energy can be controlled.
  - Notify all affected employees of shutdown & lockout procedure.

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Procedures

- **Shutting Down the Equipment**
  - Shut the system down by using operating controls.
  - Follow whatever procedure is right for the equipment to avoid endangering anyone during shutdown.

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Procedures

- **Equipment Isolation**
  - Operate all energy-isolating devices so that the equipment is isolated from its energy sources.
  - Be sure to isolate all energy sources (secondary power supplies as well as the primary supplies).

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Procedures

- **Application of Devices**
  - All energy-isolating devices are to be locked, tagged or both.
  - Only standardized devices can be used and they are not to be used for anything else.
  - Use a lockout device if your lock cannot be placed directly on the energy control.
  - When more then one lockout is used, every employee must attach his/her personal lock.

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Group Lockout

- **When servicing and/or maintenance is performed by a crew, craft, department or other group, they shall utilize a procedure which affords 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 for a set of employees working under the protection of a group lockout or tag out device.
  - Provision for the authorized employee to ascertain the exposure status on individual group members with regard to the lockout.
  - When more than one crew, craft, etc. is involved an authorized employee is designated to coordinate.
  - Each employee shall affix a personal lockout or tag out device to the group lock out device.

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Procedures

- **Release Stored Energy**
  - Inspect the system to make sure all parts have stopped moving.
  - Relieve trapped pressure.
  - Block or brace parts that could fall due to gravity.
  - Bleed lines and vent valves open.
  - If stored energy can reaccumulate, monitor it to make sure it stays below hazardous levels.

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Procedures

- **Verify Zero Energy State**
  - Make sure all danger areas are clear of personnel.
  - Verify that the main disconnect switch or circuit breaker can’t be moved to the on position.
  - Press all start buttons and other activating controls on the equipment itself and return controls to the off position when the testing is complete.

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Procedures

- **Perform Work**
  - Look ahead and avoid doing anything that could reactivate system and/or equipment.
  - Don’t bypass the lockout when installing new piping or wiring.

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Procedures

- **Remove Lockout/Tagout**
  - Make sure the equipment is safe to operate by removing all tools from the work area and making sure the system is fully assembled.
  - Safeguard all employees by conducting a head count to make sure everyone is clear of the equipment. Also notify everyone in the work area that lockout/tagout is being removed.
  - Remove the lockout/tagout devices. Each device must be removed by the person who put it on.

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Lock Removal

- Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device. When the employee who applied the lock is not available to remove it, that device may be removed by the employer if documented in their energy control program and must include the following.
  - 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 to inform him/her lockout or tagout device has been removed; and
  - Ensuring that the authorized employee has the knowledge before he/she resumes work at that facility.

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Procedures

- **Contractors**
  - Contractors and the Facilities staff must exchange lockout/tagout information.
  - Employees on site must understand rules used by the contractor and vice versa (policy requires pre-meeting).
  - Contractors must apply their own locks and tags

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Procedures

- **Work with Shift Changes**
  - If servicing lasts more than one shift, lockout/tagout protection must not be interrupted.
  - When the employee who applied device is not there to remove it, it can be removed only under the direction of a responsible supervisor (policy must cover required steps)

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Procedures

- **Written procedures are not required if <u>all</u> of the following conditions are met:**
  1. There is no potential for stored energy;
  2. There is only a single energy source and it is easily identified and isolated by a single lockout device;
  3. Isolation results in complete deenergization;
  4. The machine or equipment is isolated from that energy source and locked out during servicing or maintenance;
  5. A single lockout device will achieve a locked-out condition;
  6. Lockout is under the compete control of the authorized employee;
  7. The servicing or maintenance does not create hazards for other employees; and
  8. There is no history of accidents with the specific machine or equipment being serviced or maintained.

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Procedures

- **If written procedures are required, they must cover:**
  - Scope of the procedure;
  - Specific steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy;
  - Specific procedural steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them; and
  - Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures; and
  - Communication between, and roles of, all affected and authorized employees

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Responsibilities

- **Authorized employee**
  - An employee who performs servicing or maintenance on machines and equipment. Lockout or tagout is used by these employees for their own protection.
  - Follow established procedures.
  - Reporting any problems to your supervisor.
  - Notifying affected employees of shutdowns/lockout situations and before energy is restored to systems or equipment.
  - Attend training sessions (required every two years)

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Responsibilities

- **Affected employee**
  - An employee who performs the duties of his or her job in an area in which the energy control procedure is implemented and servicing or maintenance operations are performed.
  - Understand basic requirements of LOTO procedures
  - Not attempt to operate any system or equipment during lockout
  - Not attempt to remove any lockout devices

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Responsibilities

- **Supervisors**
  - Ensure energy control procedures are established and followed
  - Employees are trained
  - Employees have proper equipment
  - Designate primary responsibility for group lockout situations
  - Maintain exclusive control over master or duplicate keys
  - Conduct periodic inspections

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Responsibilities

- **Management**
  - Develop, maintain, and support the LOTO policy
  - Maintain policy by reviewing and revising as necessary
  - Facilitate training

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Periodic Inspections

- Inspections must be performed at least annually to assure that the energy control procedures continue to be implemented properly and that the employees are familiar with their responsibilities.

- Supervisors are responsible for conducting this annual inspection and they must certify that the inspections have been performed. The certification must identify the machine or equipment, the date of the inspection, the employees included, and the name of the person performing the inspection. Must identify any deficiencies or deviations and correct them.

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Questions?

Resources & Assistance

Gene Patrick, OHSU Construction and Maintenance Safety Manager: patrickg@ohsu.edu
Bill Wood Jr., PSF Industries, Inc.
Safety Director: bill@psfindustries.com

Oregon OSHA Consultative Services or Technical Services

OAR 437, Division 2, Subdivision J, "THE CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)"

Fed OSHA (http://www.osha.gov) CPL 02-00-147 LOTO Enforcement Policy and Inspection Procedures

GEW, LLC. Safety Consultants GEWLLC@aol.com

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