

# 2015

## Control of Hazardous Energy



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WSRMP (SAMPLE PROGRAM)

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## CONTROL OF HAZARDOUS ENERGY

### PURPOSE / SCOPE

The purpose of the *Lockout/Tagout Energy Control Safety Program* is to ensure that all employees understand the potential hazards of working on or around machines and equipment, including piping systems that could cause injury as a result of an unexpected energization or start up of the machine or equipment during service or maintenance, and the District's program for protecting them from those hazards to the greatest extent possible, and to establish the requirements for working safely on or around such an machines and equipment.

This is intended to be a universal document that describes precautions and procedures that must be followed in all cases. Field management and staff will develop Standard Operating Procedures for Energy Control at specific sites and/or for specific work tasks, which will take into account all safety issues and will define the most effective methods of accomplishing the work objectives safely and efficiently.

### POLICY STATEMENT

It is the primary policy of the WSRMP (SAMPLE PROGRAM) Water & Wastewater District to use engineering controls wherever practical to reduce or eliminate the need for employees to work on or around machines and equipment, including piping systems that could cause injury as a result of an unexpected energization or start up of the machine or equipment during service or maintenance. Where employees must work on such machines and equipment or piping systems, it is the policy of the District that the employees will comply fully with the work practice procedures and personal protective equipment specified in this *Lockout/Tagout Energy Control Safety Program*.

### DEFINITIONS

(WAC 296-803-800 unless otherwise noted)

#### AFFECTED EMPLOYEE

An employee who's required to operate, use, or be in the area where a machine or equipment could be locked or tagged out for service or maintenance.

#### AUTHORIZED EMPLOYEE

An employee who locks or tags out a machine or equipment to do service or maintenance.

#### ENERGIZED

Connected to an energy source or containing residual or stored energy.

#### ENERGY-ISOLATING DEVICE

A mechanical device that physically prevents transmitting or releasing energy. This includes, but is not limited to:

- Manually operated electrical circuit breakers
- Disconnect switches

**CONTROL OF HAZARDOUS ENERGY**

- Manually operated switches that disconnect the conductors of a circuit from all ungrounded supply conductors if no pole of the switch can be operated independently
- Line valves
- Blocks
- Similar devices used to block or isolate energy

**ENERGY SOURCE**

Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal or other energy, including gravity.

**LOCKOUT**

Placing a lockout device on an energy-isolating device using an established procedure to make sure the machine or equipment cannot operate until the lockout device is removed.

**LOCKOUT DEVICE**

A device that uses a positive means, such as a key or combination lock, to hold an energy-isolating device in the "safe" or "off" position. This includes blank flanges and bolted slip blinds

**PRIMARY AUTHORIZED EMPLOYEE**

An authorized employee who has overall responsibility for meeting the requirements of the lockout/tagout procedures for the work task

**SERVICE AND MAINTENANCE**

Activities such as constructing, installing, setting-up, adjusting, modifying, maintaining, and servicing machines or equipment. It also includes lubricating, cleaning, unjamming, and making tool changes.

**TAGOUT**

Placing a tagout device on an energy-isolating device using an established procedure to indicate that the energy-isolating device and the machine or equipment being controlled shall not be operated until the tagout device is removed.

**TAGOUT DEVICE**

A prominent warning device, such as a tag and a means of attachment that can be securely fastened to an energy-isolating device to indicate that the energy-isolating device and the machine or equipment being controlled shall not be operated until the tagout device is removed.

## EXEMPTIONS / EXCLUSIONS

The provisions of this Lockout/Tagout Energy Control Safety Program do not apply to:

- Work on electric equipment receiving power only through a cord and plug if:
  - o Unplugging the equipment eliminates the possibility of unexpected energization, unexpected start up, or the release of stored energy,  
and
  - o The plug is kept under the exclusive control of the employee doing the service or maintenance.
- Service and maintenance during normal operations, if an employee isn't required to:
  - o Remove or bypass a guard or other safety device,  
or
  - o Place any body part or portion of their clothing into the point of operation or any other hazardous area created by machine operation.
- Minor tool changes, adjustments, and other minor service during normal operations if:
  - o They are routine, repetitive, and integral to the use of the equipment for its intended purpose,  
and
  - o The work is done using measures that provide effective protection from hazards.

## HAZARD ANALYSIS

### HAZARD DESCRIPTION

People conducting maintenance/repair operations on machinery and equipment may be exposed to potential injury from the unexpected start-up of the equipment, or the release of stored energy in the equipment. The purpose of a Lockout/Tagout program is to prevent injury to individuals performing repair and maintenance tasks.

Depending on the specific piece of equipment being serviced or maintained, there may be one or more sources of energy that must be isolated or controlled with a lockout/tagout device before beginning maintenance activities. It is generally easier to isolate the energy sources leading to single source piece of equipment when compared to a multi-source piece of equipment.

The types of energy that need to be controlled include: electric, hydraulic, pneumatic, mechanical, and pressurized liquids, vapors, and gases. Not de-energizing or locking out equipment before working on it can and has resulted in workers' injury and death. Electrocuting, crushing, amputations or other injuries are all possibilities.

The most common causes of these accidents are:

- The machine or piece of equipment was not completely shut off before a maintenance or repair operation. Both the machine and the power source that goes to the machine must be turned off.
- A machine was turned on while being worked on, either accidentally or because the person who turned it on was not alerted to the other worker's presence by a lockout/tagout device.
- Not blocking equipment that could move.
- Safety procedures were not developed, properly explained or followed.

Lockout/tagout is a way to make sure energy sources are controlled and not released while a person is working on machinery. **Turning off a power switch is not a lock-out/tag-out.** The source must be **de-energized** or **locked out** (preventing equipment from starting or moving), **stored energy released** (for instance, bleed air from a pneumatic hose), and **tested to make sure the energy has been controlled.**

## HAZARD EVALUATION

Energy control hazards requiring lockout/tagout controls are encountered throughout the District.

- The energy hazard is typically electricity associated with pumps, motors and electrical control panels. Typical energy-isolating devices are switches, plugs, and breakers.
- Hydraulic energy hazards are associated with both water and sewer piping systems. Typical hydraulic energy-isolating devices are valves.
- Fixed generators installed at District facilities create an electrical and mechanical hazard. Generator energy-isolating devices include both breakers and valves (fuel shutoff).

The preceding listed hazards are representative of those that may be encountered in the course of work assignments carried out by District employees, and it is not an exhaustive list. The employee may encounter energy control related hazards in other forms.

## METHODS OF EVALUATION

Energy, in any quantity that is not controlled, has the potential for causing injury. The evaluation will consider whether energy is used to cause mechanical or thermal work to be done by machinery and equipment. This evaluation will consider energy used in real-time while the device is activated, or energy that is accumulated and stored.

## EXPOSURE DETERMINATION

Any employee who is doing service or maintenance on machinery or equipment is potentially exposed and must evaluate the need for employing lockout or tagout systems for protection from energy release hazards.

The job roles most likely to be engaged in such tasks are associated with work in the field, such as those found in the Maintenance & Operations Department. Field staffs associated with the Engineering and the Finance/Administration Departments also need to be especially aware of energy control issues.

## RESPONSIBILITIES

### DISTRICT

- Provide for the means necessary to isolate, secure, or block machines and equipment from energy sources.
- Provide for the performance and documentation of periodic reviews to verify employees know and follow the energy control procedures.
- Provide for periodic reviews of procedures using lockout devices.
- Provide for periodic reviews of procedures using tagout devices.
- Provide for refresher training as needed.
- Assure that all new or modified machines and equipment can accept lockout devices.
- Provide any required personal protective equipment and lockout/tagout devices.

### SAFETY PROGRAM COORDINATOR

- Establish and update the written *Lockout/Tagout Energy Control Safety Program* as needed.
- Provide, or arrange for, training for all new employees in the *Lockout/Tagout Energy Control Safety Program* awareness.
- Provide, or arrange for, retraining of authorized and affected employees to introduce new or revised control measures and procedures.
- Provide, or arrange for, retraining to reestablish proficiency when
  - o Periodic inspections shows employee deviation from, or inadequate knowledge of, energy control procedures, or
  - o When there is reason to believe that retraining is necessary.
- Review and approve all Standard Operating Procedures for Energy Control with respect to safety issues.
- Collect and provide records of training to Human Resources for maintenance.



## MANAGERS

- Will develop, in consultation with operating staff, written Standard Operating Procedures for energy control through use of lock-out/tag-out devices.
- Perform and document periodic reviews to verify employees know and follow the energy control procedures.
- Periodically review procedures using lockout devices.
- Periodically review procedures using tagout devices.

## PROJECT MANAGERS

- When outside employers are servicing or maintaining District machines or equipment, the project manager will:
  - o Inform the outside employer of the District lockout/tagout procedures
  - o Make sure the outside employer informs the District of their lockout/tagout procedures
  - o Make sure the District and the outside employer confirm that all employees understand and will follow the restrictions of the other entity's Lockout/Tagout Energy Control program.

## EMPLOYEES

- Be aware of uncontrolled energy hazards associated with machinery and moving equipment and comply with all work practices described in this *Lockout/Tagout Energy Control Safety Program*.
- Consider the safety of all people in the area when working with or around moving equipment and machinery.
- Do not work on machines or equipment, including piping systems unless all appropriate lockout devices have been installed in accordance with the established Standard Operating Procedure for that device.

## GUIDELINES/RULES

### REQUIRED PPE

See applicable specific SOPs for Energy Control.

### APPLICABLE SOPs FOR ENERGY CONTROL

SOP's to be developed for each machine, equipment and/or process by employee

## STANDARD OPERATING PROCEDURES FOR ENERGY CONTROL – REQUIREMENTS

Managers will develop, in consultation with operating staff, written Standard Operating Procedures (SOP) for Energy Control. A single written SOP may be prepared for similar machines and equipment if all of the following apply:

- They use the same type and magnitude of energy
- They have the same or similar types of controls
- The specific machines and equipment covered by the procedure are identified by at least type and location.

Standard Operating Procedures for Energy Control will, at minimum, contain the following elements:

- The scope, purpose, authorization, rules, and techniques to control hazardous energy.
- How use of the procedures will be enforced.
- When the procedure must be used.
- What the specific procedural steps are for:
  - o Shutting down, isolating, blocking, and securing the machine or equipment.
  - o Testing the machine or equipment to verify the effectiveness of lockout devices, tagout devices, and other energy control measures.
  - o Placing, removing, and transferring lockout or tagout devices and identifying the responsible party

## WHEN WRITTEN STANDARD OPERATING PROCEDURES FOR ENERGY CONTROL ARE NOT

### REQUIRED:

A **written** energy control procedure for a particular machine or equipment **is not required** if **ALL of the following apply**:

- The machine or equipment has a single energy source that's easily identified and can be isolated
- The machine or equipment is completely deenergized and deactivated by isolating and locking out the energy source
- There's no stored or residual energy that could be a hazard to employees, and the machine or equipment can't reaccumulate such energy after it's been shut down
- The energy source can be locked out with a single lockout device.
- The machine or equipment is isolated from the energy source and locked out during service or maintenance
- The authorized employee doing the service or maintenance has exclusive control of the lockout device
- The service or maintenance doesn't create a hazard for other employees
- The machine or equipment has never been unexpectedly energized or activated during service or maintenance.

## MACHINE AND EQUIPMENT DESIGN AND CONSTRUCTION

All newly installed machines or equipment that use an energy source, as defined in this document, must be designed to accept a lockout device.

All District machines or equipment that use an energy source, as defined in this document, that undergo a major repair, renovation, or modification will be provided with means to accept a lockout device.

## ENERGY CONTROL DEVICES

Energy control devices are applied to energy-isolating devices to isolate, secure, or block machines and equipment from energy sources while service or maintenance is being performed on a machine or piece of equipment.

Energy control devices include, but are not limited to:

Locks	Wedges	Self-locking fasteners
Tags	Key blocks	Blind flanges
Chains	Adapter pins	Cribbing

## LOCKOUT/TAGOUT DEVICE REQUIREMENTS – GENERAL

Lockout/tagout devices will meet all of the following requirements:

- Create **no** additional hazards
- Have a distinctive design or appearance
- Are the only devices used for controlling energy
- Are **not** used for any other purpose
- Are durable enough to withstand the environment they are used in for the maximum time they are expected to be used
- Are standardized within the facility by color, shape, or size
- Identify the person applying the device
  - o Locks assigned to authorized persons have a unique number on the lock and the key. This number is associated with the authorized person to whom it is assigned on a list maintained by the Operations and Maintenance Department.

## LOCKOUT DEVICE SPECIFIC REQUIREMENTS

Lockout devices will be strong enough so that removing them by other than the normal unlocking method requires:

- Excessive force
- **or**
- Unusual techniques, such as the use of bolt cutters or other metal-cutting tools.

## TAGOUT DEVICE SPECIFIC REQUIREMENTS

Tagout devices will meet all of the following requirements:

- Use the same print and format throughout the District
- Are constructed and printed so they do not deteriorate and the message on the tag remains legible when:
  - o Exposed to weather
  - o Used in wet or damp locations
  - o Used in corrosive environments such as areas where acid or alkali chemicals are handled or stored.
- Have a warning about **not** energizing the machine or equipment.
  - o The warning on the tag should include wording such as:
    - Do Not Start
    - Do Not Open
    - Do Not Close
    - Do Not Energize
    - Do Not Operate.
- Are strong enough to prevent unintentional or accidental removal.
- The means used to attach the tag to the energy-isolating device meets all of the following:
  - o Is not reusable
  - o Is self-locking
  - o Can be attached by hand
  - o Can not be released with a force of less than 50 pounds
  - o Is similar in design and basic characteristics to a one-piece, all-environment-tolerant, nylon cable tie.
- Have a place to identify the authorized person who placed the tagout device.

## USE OF ENERGY CONTROL PROCEDURES – GENERAL

Standard Operating Procedures for Energy Control will be used to protect District employees servicing or maintaining machines and equipment from potentially hazardous energy. The following sections describe the general concepts of the District's energy control procedures that are more specifically described in the District's Standard Operating Procedures for Energy Control.

A lockout system will be used in all cases where an energy-isolating device can be locked out. Where an energy-isolating device cannot be locked out, the District will use a tagout system.

## EXCEPTION

The District may use a tagout system instead of a lockout system when it meets **all** of the following:

- The tagout device is attached where the lockout device would have been located
- The tagout system provides the same level of employee protection as a lockout system
- It can be demonstrated that the tagout system:
  - o Meets all tagout requirements of this chapter
  - o Includes additional safety measures to provide the same level of safety as a lockout system.
    - Additional safety measures used with the tagout system to provide protection equal to a lockout system could include actions such as:
      - Removing part of the isolating circuit
      - Blocking a controlling switch
      - Opening an extra disconnecting device
      - Removing a valve handle.

## APPLYING LOCKOUT/TAGOUT DEVICES – GENERAL

- Before a machine or equipment is turned off, the authorized employee must know all of the following:
  - o Type and magnitude of the energy
  - o Hazards of the energy to be controlled
  - o Method or means to control the energy
- Turn off or shut down the machine or equipment using established procedures.
- Completely isolate the machine or equipment from its energy sources using the appropriate energy-isolating devices after the machine or equipment has been turned off.
- The authorized employee, or their designee, must notify affected employees that the machine or equipment is being locked or tagged out before the devices are applied.
- Make sure a lockout or tagout device is applied:
  - o For each energy-isolating device
  - o Only by the authorized employee doing the service or maintenance.

### APPLYING LOCKOUT DEVICES – SPECIFIC

Lockout devices must hold the energy-isolating device in a “safe” or “off” position.

- Make sure a tagout device is put on an energy-isolating device so it clearly shows that moving the energy-isolating device from the “safe” or “off” position is prohibited.
- Make sure a tagout device, when used with an energy-isolating device that can be locked out, is fastened to the device at the same point a lock would have been attached.
- Make sure a tagout device that cannot be attached directly to an energy-isolating device is located:
  - o As close as safely possible to the energy-isolating device;
  - and**
  - o In a position that is immediately obvious to anyone attempting to operate the energy-isolating device.
- Make sure the authorized person applying the tagout device is clearly identified on the tagout device.

### PROTECTION FROM THE HAZARDS OF STORED AND RESIDUAL ENERGY

- Make sure all potentially hazardous stored and residual energy is relieved, disconnected, restrained, or otherwise rendered safe after the lockout or tagout devices have been put on the energy-isolating devices
- Continue to verify the isolation of machines and equipment that could reaccumulate stored energy to a hazardous level until:
  - o Service or maintenance is completed
  - or**
  - o The possibility of reaccumulating hazardous energy does not exist.

#### ***Before Starting Work***

The authorized employee must verify that the machine or equipment that has been locked out or tagged out has been isolated from all energy sources and deenergized before starting work.

### REMOVING LOCKOUT OR TAGOUT DEVICES AND REENERGIZING THE MACHINE OR EQUIPMENT

The authorized employee must do the following before removing any lockout or tagout device:

- Inspect the work area to make sure that items not essential to the operation of the device have been removed
- Verify the machine or equipment is in operating condition and ready to energize.

**and**

- Check that employees in the area are in positions that make it safe to energize the machine or equipment.

Only the authorized employee who applied a lockout or tagout device may remove it under normal circumstances. Before energizing or starting the machine or equipment, notify affected employees that the lockout or tagout devices have been removed.

## REMOVAL OF LOCKOUT OR TAGOUT DEVICE BY SOMEONE OTHER THAN AUTHORIZED EMPLOYEE THAT APPLIED IT

The supervisor of an authorized employee may remove a lockout or tagout device in the absence of the authorized employee if the following procedure is followed:

- The supervisor and the District Safety Coordinator concur that it is necessary to place the machine or equipment back in service in the absence of the authorized employee who applied the device.
- The supervisor will verify that the authorized employee who applied the device is not at the facility.
- The supervisor will make all reasonable efforts to contact and inform the authorized employee that the lockout or tagout device is being removed.
- The supervisor or designee will follow the established procedure for removing the lockout or tagout device and returning it to service.
- The supervisor will make sure the authorized employee is informed, before the authorized employee resumes work at the facility, that the lockout or tagout device has been removed.

## TEMPORARILY ENERGIZING A MACHINE, EQUIPMENT, OR COMPONENT

Normal energy control procedures will be followed to:

- Remove the lockout or tagout devices.
- Energize the machine, equipment, or component.
- Reapply the lockout or tagout devices when testing or positioning is completed.

## ENERGY CONTROL WITH MULTIPLE USERS

The District's energy control procedures will provide each member of a crew or other group with the same level of protection as that provided by an individual lockout or tagout device. To achieve this level of protection:

A primary authorized employee will be assigned who:

- Has overall responsibility for the service or maintenance
  - Attaches their lockout or tagout device to the energy-isolating device when the equipment is de-energized and before any work begins
- and**
- Is the last person to remove their lockout or tagout device when the job is completed.

Each authorized employee working on the machine or equipment:

- Will put a personal lockout or tagout device on the group lockout device, lockbox, or comparable mechanism before beginning work
- and

- Will **not** remove their personal lockout or tagout device until they have finished work on the machine or equipment.

**Reminder:** The *primary authorized employee* is the authorized employee who has overall responsibility for meeting the requirements of the lockout/tagout procedures.

## COORDINATION WITH OUTSIDE EMPLOYERS

See Project Managers sub-section of the Responsibilities section above.

## EMERGENCY PROCEDURES

### First Aid Awareness and Actions

Because an energy control device is managing hazardous energy, failure of the device may expose the employee to serious or catastrophic injury. Employees working where such devices are required should not work alone. If it is necessary to work alone in this situation, the employee should ascertain that there is ready access to the 9-1-1 system.

Follow standard first aid procedures for any minor injuries incurred while engaged in such work.

## FORMS USED

LOTO Procedure

## TRAINING

Employees will be trained to make sure that they understand the purpose and function of the District's Lockout/Tagout Energy Control Safety Program. The training will make available the knowledge and skills necessary to carry out their program responsibilities. The training will be documented, including the employee's name and the training date

### AUTHORIZED EMPLOYEE TRAINING

Each authorized employee will be trained in:

Energy aspects including:

- The type and magnitude of energy available in the workplace
- Recognizing hazardous energy sources that apply
- Methods and means to isolate and control energy, including lockout devices.



Tagout devices including:

- Tags are warning devices and do not provide the same level of physical restraint as a lock.
- When attached to energy-isolating devices, tags are not to be:
  - o Removed by anyone other than the authorized person responsible for that tag

**or**

  - o Bypassed, ignored, or otherwise defeated.
- Tags need to be legible and understandable to be effective
- Tags may evoke a false sense of security
- The meaning of tags needs to be understood as part of the overall energy control program
- Tags and their means of attachment must be:
  - o Securely attached to energy-isolating devices so they can't be inadvertently or accidentally detached

**and**

  - o Made of materials that will withstand the environmental conditions they will be exposed to.

### AFFECTED EMPLOYEE TRAINING

All employees who work or may work where energy control procedures might be used will be trained about the:

- Procedures being used
- and**
- Prohibition against attempting to restart or reenergize a machine or equipment that has been locked out or tagged out.

### RETRAINING – AUTHORIZED AND AFFECTED EMPLOYEES

Authorized and affected employees will be retrained to introduce new or revised control methods and procedures when there is a change in **any** of the following:

- Job assignments
- Machines, equipment, or processes that present a new hazard
- Energy control procedures.

Retraining of employees to reestablish proficiency will also be done when a periodic inspection shows the employee deviates from, or has inadequate knowledge of, the energy control procedures, or when the District has reason to believe retraining is necessary.

## REFERENCES/RESOURCES

*Chapter 296-803 WAC, Lockout/Tagout (Control of Hazardous Energy)*