

**CONTRA COSTA WATER DISTRICT**  
**LOCK AND TAG PROCEDURES**

**September 2009**



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## 1.0 INTRODUCTION

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### 1.1 Purpose

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To provide procedures for the isolation of energy sources (including electrical, mechanical, chemical, thermal, hydraulic, pneumatic and potential) by affixing appropriate lockout devices and tags to prevent unexpected energizing, start-up, and/or release of stored energy leading to the injury or death of personnel.

### 1.2 Scope

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This procedure covers the installation, servicing and maintenance of machines, equipment, processes, and utility systems in which the unexpected energizing, start-up, and/or release of stored energy could result in injury or death of personnel.

### 1.3 Responsibilities

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Supervisors shall ensure that authorized employees perform their work in accordance with District Lock and Tag Procedures. Supervisors shall monitor the training record database on the District server (G:\Safety) and ensure new or transferred employees are instructed in the use of District Lock and Tag Procedures. The District shall supply a sufficient number of tags and padlocks.

Employees are required to perform their work in accordance with the terms and limitations of District Lock and Tag Procedures.

Supervisors, with assistance from the Safety Officer, are responsible for auditing and verifying, through random annual inspections, that employees are complying with District Lock and Tag Procedures. Compliance with Lock and Tag Procedures is enforced through the District Administrative Procedure IV-1 "Disciplinary Procedures".

Prior to the start of work, contract administrators shall ensure that contractors performing servicing and maintenance work at District facilities have a written Lock and Tag program stating their responsibility to train their employees and provide them with lockout-tagout devices necessary to work safely.

### 1.4 References

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This procedure complies with the California Code of Regulations, Title 8, General Industry Safety Orders Section 3314 "Cleaning, Repairing, Servicing, and Adjusting of Prime Movers, Machinery, and Equipment"; Title 8, Electrical Safety Orders Section 2320.4 "De-Energizing Equipment or Systems"; and the American National Standards Institute (ANSI) Z 244.1-1982 "Safety Requirements for the Lock Out/Tag Out of Energy Sources."

## 1.5 Authorization

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Personnel may only obtain authorization to perform lock and tag from his/her supervisor after the completion of training and after demonstrating competence in identifying hazardous energy sources and techniques for isolating them.

## 1.6 Application

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This procedure applies to all District employees and contractors who will be performing installation, service and/or maintenance of machines, equipment, processes, or utility systems. Servicing and/or maintenance that takes place during normal operations are covered by this procedure if any of the following conditions pertain:

- An individual is required to remove or bypass any guard, interlock, or other safety device
- An individual is required to place any part of his/her body into an area on a machine or equipment where work is actually performed upon the material being processed (point of operation), or where an associated danger exists during a machine-operating cycle
- An individual is required to place any part of his/her body into an area on a machine, equipment, process, or utility system where energized electrical components are exposed.

This procedure does not apply to the following situations:

- Minor tool changes and adjustments or other minor servicing activities that take place during normal operations, if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternate measures that provide effective protection.
- Work on cord and plug-connected electrical equipment for which exposure to the hazards of unexpected energizing or start-up of the equipment is controlled by unplugging the equipment from the energy source, and by the plug being under the exclusive control of the individual performing the installation, servicing or maintenance.
- Energized operations involving transmission and distribution of utilities such as water, gases, or electrical power, provided that (1) the District can demonstrate that continuity of service is essential, shutdown of the system is impractical, and documented procedures are followed, (2) special equipment is used that will provide proven effective protection for employees.

## 2.0 TRAINING

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### 2.1 All Personnel

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District employees shall be specifically notified of the requirements for compliance with the lock and tag policy, and specifically made aware of the lock and tag procedures before their

initial assignment or reassignment. Contractors are notified of the lock and tag requirements by their contract administrator through the Contractor Safe Practices Handbook.

## **2.2 Affected Personnel**

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District supervisors shall ensure that all employees and contractors whose job requires them to operate or use a piece of machinery or process where installation, servicing, or maintenance is being performed under lock and tag procedures, or whose job requires them to work in and around such areas, are instructed in the purpose and use of the lock and tag procedures.

## **2.3 Authorized Personnel**

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District employees and contractors who implement lock and tag procedures on machines, equipment, process, or utility systems to perform installation, servicing, or maintenance shall receive or demonstrate that they have received training in the following areas:

- Recognition of applicable hazardous energy sources
- The methods and means of isolating and/or controlling energy sources
- The means of verification of effective energy control
- The purpose of the lock and tag procedures

## **2.4 Training and Qualification**

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The supervisor, with assistance from the Safety Officer, must ensure that all employees authorized to implement lock and tag procedures are trained and qualified. Contractors are responsible for certifying that their employees are trained and qualified.



## 3.0 IMPLEMENTATION OF LOCK AND TAG PROCEDURES

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### 3.1 General

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#### 3.1.1 Lock Out Devices

All authorized personnel shall be issued, by their supervisor, uniquely identifiable locks (lock out devices), which are to be solely used for the purpose of lock and tag. Each employee has the only key to the assigned lock(s).

Whenever replacement/repair or renovation/modification of a machine/equipment is performed or when new machines/equipment are installed, these machines/equipment must be designed and capable of accepting the District used lockout device.

Locks and tags used for Lock and Tag Procedures shall not be used for any purpose other than controlling hazardous energies. Any tags used for other applications shall not duplicate lockout-tagout tags in color or verbiage.

#### 3.1.2 Tag Out Devices

Tags shall be affixed to each lock device stating (1) the name of the authorized person, (2) the date of installation, (3) the purpose for installation, (4) the tag number, and (5) contact information in case affected personnel need to contact the authorized person.

### 3.2 Preparation for Lock and Tag

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#### 3.2.1 Notification of Personnel

All affected personnel including Operations staff potentially impacted by the outage shall be notified by the authorized person of the installation, service, or maintenance on machines, equipment, process, or utility system being performed in their work areas. When lock and tag involves a District contractor, the District and contractor shall use their respective lock and tag programs and procedures, and jointly agree with the restrictions and procedures for energy control.

#### 3.2.2 Initial Survey and Lockout/Tagout Isolation Sequence Forms

An initial survey shall be made by the authorized person to identify all energy sources and related exposures, and energy isolation devices so that the machines, equipment, process, or utility system can be completely isolated. Even though all energy sources are locked and tagged out, energy may be stored up inside the equipment. Care should be taken to ensure that all stored energy is released. The O&M Line Breaking Involving Dangerous Materials SOP is followed for maintenance work on hazardous chemical systems. The O&M Water Delivery System Shutdown Procedure is followed for major shutdowns of water systems.

If more than one energy isolation device is identified (e.g., an electrical throw switch and a valve), then a description of those isolation devices as well as other related devices in the system (e.g., control circuit-type devices, energy bleeding/draining devices, energy indicator

devices, etc.) are documented on the Lockout/Tagout Isolation Sequencing form. The “position” of each device (e.g., “off”, “shut”, “stop”, “open”, “removed”, etc.) is also documented on the form. Consult updated design drawings and records of Lockout/Tagout Isolation Sequencing forms used for past maintenance of the equipment to ensure all isolation points are properly identified.

### 3.2.2.1 Lockout/Tagout Isolation Sequence Form Usage

**Non-Treatment Plant Areas:** The Area Maintenance Supervisor is ultimately responsible to ensure that the forms are properly filled out and kept. Prior to work commencing, the employee responsible for the job shall fill out the form. (Responsible person: the crew leader, instrument technician or electrical technician). After work is complete, locks/tags removed, and the form closed out, the person responsible for the work shall turn the form into their supervisor for record keeping. For call outs, the forms shall be filled out by the person responsible for performing the work, after the work is complete, locks/tags removed, and the form closed out, the form is routed to the appropriate supervisor.

**Treatment Plant Areas:** The treatment plant supervisor is ultimately responsible to ensure that the forms are filled out and records kept. For regularly scheduled work during normal working hours, the treatment plant supervisor or his designee shall fill out the lockout tagout isolation forms. For after hours or emergency work, the person responsible for running the job or performing the work shall fill out the form.

During line breaking involving dangerous materials, SOP 2007-04 Line Breaking Involving Dangerous Materials must be followed during regular working hours as well as after hours and during emergency work. The lockout/tagout isolation form must be reviewed and initialed by the Treatment Plant (Operations) Supervisor and the Maintenance Supervisor during a hazard analysis meeting.

After work is complete, tags removed and the form closed out, the person responsible for the work shall turn the form into the treatment plant supervisor for record keeping.

**Construction:** The contract administrator shall be ultimately responsible to ensure that the forms are filled out and ensure that the records are kept with their project files.

Lockout/Tagout Isolation Sequence forms are maintained in a chronological order by “finished date and time”. Lockout/Tagout Isolation Sequencing forms are to be kept for at least three years. These forms, along with updated design drawings, are used to develop preventative maintenance, modification, or other relevant procedures.

### 3.2.3 Hazardous Material Systems

During all servicing and maintenance operations on hazardous material systems (alum, acids, caustic solution, ozone, aqueous ammonia, chlorine, sodium hypochlorite, etc.) redundant two valve isolation from the source side is required between hazardous material systems and personnel or occupied areas. For the purposes of hazardous energy lockout, both valves are to be locked and tagged. If double block and bleed is used to isolate a system, locks and tags must be placed on both isolation valves and the drain/bleed valve. When two-valve isolation is not feasible, alternative work plans must developed during the line breaking hazard analysis meeting to ensure safety of all employees.

## 3.3 Application of Lock and Tag

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### 3.3.1 Equipment Shutdown

Using appropriate equipment shutdown procedures, all operating controls shall be turned off or returned to the neutral position by authorized individuals only.

### 3.3.2 Equipment Isolation

A uniquely identifiable locking device (lock) shall be required to isolate each energy source and shall be installed by an authorized person. Locking devices shall be attached in such a manner as to prevent the operation of the energy source controls. Tag devices (tags) shall be attached to the locking device in such a position as to be immediately obvious and to warn anyone attempting to operate the energy source controls.

Each employee involved in the maintenance of the machinery/equipment shall place their own unique lock and tag at each energy isolation point, or on a lock box containing the keys of locks used to lockout each energy isolation point. The Plant Supervisor, Maintenance Supervisor, or lead maintenance employee initials each isolation point description listed on the Lockout/Tagout Isolation Sequencing form after lockout of each isolation point. If a lock box is used, then the Plant Supervisor or Maintenance Supervisor is responsible for control and accessibility of the lock box.

If using a lock box, the area supervisor or lead employee supervising the lock and tag operation shall apply “operational” locks and tags to each hazardous energy isolation point, place the key(s) to the locks in the lock box, and affix their own lock and tag to the lock box. An operational lock can only be unlocked by the key placed in the lock box. Duplicate keys for the operational lock outside the lock box are prohibited.

No individual shall interfere with another person’s lock and tag devices or try to start any equipment/tools under someone else’s lock and tag isolation efforts.

The lock and tag operation must be a true isolation method, without possible override. Unacceptable means for isolating hazardous energies include the use of interlocks, push (control) buttons, selector switches, software controls, and control circuit devices.

Use both locks and tags unless the system will not physically accept a lock. If a particular piece of equipment cannot be physically locked out, then only a tag will be used on the energy isolating device. Additional means to ensure equivalent safety as physical lockout are required as necessary (e.g., removing a valve handle or disconnecting wires).

### 3.3.3 Verification of Isolation

The following testing actions must be accomplished to determine whether the operation of the energy source controls has, in fact, produced the required isolation of the machine, equipment, process, or utility system:

1. Operate the equipment-operating controls (push buttons, switches, etc.) to determine that the energy source isolation is effective. CAUTION: Return operating controls to neutral or off after test.

2. Test the equipment by use of appropriate test equipment and/or visual inspection to determine that the energy source isolation has been effective.

#### 3.3.4 Stored Energy

The equipment shall be carefully examined to detect and release, disconnect, or restrain any residual energy. If there is the possibility of re-accumulation of stored energy to a hazardous level, verification of isolation shall be continued until installation, servicing, or maintenance is completed, or until the possibility of such re-accumulation no longer exists.

### 3.4 Release from Lock and Tag

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#### 3.4.1 Equipment/Process

Before energy sources are restored, a visual inspection of the work area shall be performed by the authorized person to ensure that all components/covers/guards are in place and tools/debris are removed from the machine, equipment, and/or utility system.

#### 3.4.2 Personnel

Before energy sources are restored, a visual inspection of the work area shall be performed by the authorized person to ensure that all personnel are clear of the machine, equipment, process and/or utility system.

#### 3.4.3 Lock and Tag Device(s) Removal

All lock and tag devices must only be removed by the authorized person who installed the devices. The Plant Supervisor, Maintenance Supervisor, or lead maintenance employee initials again each isolation point description listed on the Lockout/Tagout Isolation Sequencing form after removal of locks. If a lock box is used, the Plant Supervisor or Maintenance Supervisor is responsible for control of the lock box and its accessibility.

The authorized person's supervisor may remove the devices if the authorized person has lost the key to the lock device, or if the authorized person is not available to remove his/her locks and the supervisor has made an attempt to make contact with the authorized person. If contact with the authorized person cannot be made, then the supervisor shall arrange to have the authorized person's facility access restricted until contact is made. The supervisor must also have an appropriate craftsperson (e.g., electrical technician, instrument technician, mechanic) verify that work is completed and the lock and tag can be safely removed.

If unauthorized removal of locks and/or tags occurs:

1. Maintenance work must immediately cease.
2. The employee whose locks and tags were removed is notified of the unauthorized removal.
3. Maintenance work may only resume after the employee properly re-applies his/her locks and tags on the necessary isolation points.

4. An incident investigation is led by the Department/Division Manager to determine the cause and to ensure effective corrective action. Compliance with Lock and Tag Procedures is enforced through the District Administrative Procedure IV-1 “Disciplinary Procedures”.

#### 3.4.4 Lock and Tag Records

Maintenance maintains the completed Lockout/Tagout Isolation Sequencing form. Records of the isolation sequencing forms are retained for three years.

### 3.5 Special Lock and Tag Considerations

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#### 3.5.1 Lock and Tag Interruption

In situations where the energy sources are locked and tagged and there is a need for testing or positioning of the equipment, the following sequence shall apply:

1. Clear equipment of tools and debris
2. Clear personnel
3. Clear the control of locks and tags according to established procedure
4. Proceed with test, positioning, etc.
5. De-energize all systems and relock and retag each energy source according to established procedures.

#### 3.5.2 Multiple Personnel Protection

When multiple crews, contractors, or other groups need to work on the same machine, process, or utility system, a multiple lock device (e.g., lock box, hasp, etc.) must be used. The multiple lock device shall afford all personnel the same level of protection provided by their uniquely identifiable lock and tag devices. Each authorized person shall affix their uniquely identifiable lock and tag device to the multiple lock device and shall remove their devices when he or she stops working on the equipment being installed, serviced or maintained. In addition, multiple crews, crafts, departments, or other groups are required to coordinate all lock/tag procedures to ensure that personnel safety is not compromised.

#### 3.5.3 Transfer of Lock and Tag

When multiple shifts are working on the same machine, equipment, process, or utility system, it is the responsibility of the current shift’s lead/designee to ensure that the arriving shift’s lead/designee has attached their lock and tag device on the energy source(s) before removing his/her lock and tag device. For long-term lock outs where a lock box is used, the Plant Supervisor or Maintenance Supervisor will be responsible for maintaining control of the lock box during the entire period of the lock out.



## 4.0 INSPECTIONS

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Supervisors, with assistance from the Safety Officer, are responsible for auditing and verifying, through random annual inspections, that personnel are complying with District Lock and Tag Procedures. The random annual inspection shall fulfill the following requirements:

1. The inspection shall be performed by an employee other than the individuals using the lock and tag procedure.
2. The inspection shall be designed to correct any deviations or inadequacies observed.
3. Where lock and tag is used for hazardous energy control, the inspection shall include a review between the inspector and each authorized and affected employee of that employee's responsibilities under the lock and tag procedure being inspected.
4. The authorized inspector shall certify that the inspections have been performed. The certification shall identify the machine, equipment, or utility system on which the lock and tag procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.
5. A copy of the lockout inspection form is provided to the Safety Officer for filing. The Safety Officer will maintain the inspection forms for three years.

## 5.0 ELECTRICAL SAFETY ISSUES

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All District electrical and instrument technicians and contractors working on District equipment shall comply with this section.

- All open enclosures that contain exposed energized electrical equipment not under the direct supervision and control of an authorized employee are equipped with suitable and effective temporary barriers to prevent access. No conductive tape measures, ropes or similar measuring devices will be used in these situations.
- Prior to climbing poles or other elevated structures supporting overhead electrical lines or equipment, an inspection shall be made to assure that such poles or structures are in safe condition for the work to be performed. Where poles or structures are determined to be unsafe for climbing, they shall not be climbed until made safe by guying, bracing or other adequate means.

### 5.1 Treatment Plant Excavations

If markings or other indicators indicate the presence of subsurface utility installations within the area of the proposed excavation and it may be reasonably expected that those installations may be inside or just below the pavement (e.g., electrical conduit encases in red-colored concrete), then:

1. Use chisels to expose and locate the utility line instead of using a jackhammer, or
2. Use the Lock and Tag procedure to eliminate the hazardous energy.