
	SOP-605 (Ver. 5) Control of Hazardous Energy (LOTO)
Standard Operating Procedure (SOP)	Effective: 1/25/2022 Supersedes: 11/02/2020
Approved By: James D. Herberg General Manager 	

I. Purpose

The purpose of this Standard Operating Procedure (SOP) is to protect the Orange County Sanitation District (OC San) staff and Contractors from hazardous energy during the servicing and maintenance of machines, equipment and/or facilities, or during construction-related activities that utilize or store hazardous energy. During servicing, maintenance or construction-related activities, the unexpected startup or release of stored energy could cause serious injury or death to employees.

II. Background

OC San has developed this procedure in accordance with the state of California Occupational Safety and Health Administration (CALOSHA) regulations, including the Control of Hazardous Energy for the *Cleaning, Repairing, Servicing, Setting Up, and Adjusting Operations of Prime Movers, Machinery and Equipment, Including Lockout/Tagout* (Title 8, California Code of Regulations (CCR), Section 3314).

This procedure also complies with the *Certification Requirements for Operators* under the California State Water Resources Control Board (Title 23, CCR, Section 3670.1).

III. Applicability

This procedure applies to all work performed at the OC San treatment plants, pump stations and the collection system by OC San staff and Contractors while working at OC San facility.

This procedure covers the servicing cleaning, repair, setup, adjusting, unjamming and maintenance of machines, equipment and/or facilities in which the unexpected energization or startup, or release of stored energy, could harm employees. This procedure establishes minimum requirements for the control of hazardous energy (LOTO).

Energy sources may include electrical, mechanical, hydraulic, pneumatic (gas or air), chemical, radiation, thermal, pressure and gravity (suspended parts).

The procedure applies if personnel are required to remove or bypass a guard or other safety device during servicing and maintenance of equipment, if required to place any part of their body in an area where a danger zone exists during a machine or equipment operating cycle, or if performing work in a confined space.

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This procedure does not apply to:

1. Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or startup of the equipment is controlled by the unplugging of the equipment from the energy source, and the plug being under the exclusive control of the employee performing the servicing or maintenance.
2. Workers performing servicing and maintenance on machines, equipment, and/or facilities who are NOT exposed to the unexpected energization or startup of the machines or equipment, or the release of hazardous energy.
3. Normal production operations.

IV. Definitions

Affected Employee - An employee whose job requires them to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tag out, or whose job requires them to work in an area in which such servicing or maintenance is being performed. *Note: An Affected Employee becomes an Authorized Employee when that employee's duties include performing servicing or maintenance. See definition of an Authorized employee below. Before performing service or maintenance on equipment that is locked or tagout, that employee must receive the training.*

Authorized Employee - a qualified person who locks out or tags out machines or equipment to perform the servicing or maintenance on that machine or equipment. Furthermore, any employee who implements a LOTO procedural element, including performing energy source isolation, dissipating potential energy, verifying energy isolation, implementing actions to release LOTO, or test or position machines or equipment. Only Authorized Employees may perform physical lockout of equipment. Each Authorized Employee shall receive training in the recognition of hazardous energy sources, development and implementation of hazardous energy control procedures, and hazards related to servicing and maintenance of equipment or machines. Authorized Employees must receive the training as prescribed in the training section of this program.

Capable of Being Locked Out – an energy isolating device that is designed with a hasp or other means of attachment to which, or through which, a lock can be affixed, or if it has a locking mechanism built into it. Other energy isolating devices will also be capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace energy isolating device or permanently alter its energy control capability.

Contractor – organization or individual that provides goods and services to OC San under terms specified in a contract. The term Contractor applies to Contractors, subcontractors, consultants, service representatives and visitors.

Crew Leader – the Authorized Employee who oversees or leads a group of servicing or maintenance employees (e.g., electricians, mechanics, Contractor). The Crew Leader would be designated for each workforce or crew. When more than one crew is involved, one Crew Leader would account for a single group of personnel. Each Crew Leader is responsible for maintaining accountability and for the individual exposure status of each employee in that specific group. The Crew Leader can assist the PAE with Group LOTO.

De-energized – disconnected from all energy sources and containing residual or stored energy.

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Electrical Utilization – power 480 volts or less to a single load from a single breaker.

Energy Control Procedure (ECP)– an energy control procedure outlines the scope, purpose, authorization, rules, and techniques to control hazardous energy. The procedure contains steps for shutting down, isolating, blocking, and securing machines or equipment. The procedure also contains steps for placement, removal, and transfer of lockout devices or tagout devices, and a description of who has responsibility for them.

Energy Isolating Device – a mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: a manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices. They are installed when replacement or major repair, renovation, or modification of a machine or equipment is performed, and when new machines or equipment are installed.

Facility – buildings, structures and process systems associated with the OC San treatment plants, pump stations and collection system.

Lockout – the placement of lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout Device – a device that utilizes a positive means, such as a lock, chain, block, etc. to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment.

Lockout Tagout (LOTO) – is a broad term describing the use of procedures, techniques, designs, and methods to protect personnel from injury due to inadvertent release of hazardous energy. LOTO is commonly called the control of hazardous energy.

Normal Production Operations – the utilization of a machine or equipment to perform its intended function. The physical act or process of removing or releasing the isolation, during the start-up process, as well as machine or equipment re-energization and/or start-up is considered a normal production operation.

Primary Authorized Employee (PAE) – an Authorized Employee whose primary responsibility is to implement and coordinate LOTO, and verify that the steps taken, in accordance with the specific energy control procedure, have in fact isolated the machine or equipment effectively from the hazardous energy sources. OC San PAE's exercising overall responsibility for adherence to this policy and the ECP are as follows:

1. Operations is the Primary Authorized Employee (PAE) for work related to plant process equipment for maintenance, electrical utilization, and construction activities.
2. Maintenance is the PAE for non-process critical equipment as determined by Operations. Maintenance shall consult with Operations on to determine PAE ownership.

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3. A Collections Mechanic is the Primary Authorized Employee (PAE) for work related to the collections system and pump stations for maintenance, electrical utilization, and construction activities.
4. An Electrical Technician is the Primary Authorized Employee (PAE) for work related to electrical distribution, lighting, and heating, ventilating, and air-conditioning (HVAC) systems.

Qualified Person (electrical) – a person who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved.

Servicing and Maintenance – workplace activities including, but not limited to, constructing, erecting, installing, repairing, troubleshooting, testing, dismantling, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and adjusting or tool changes where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

Tagout – the placement of a tagout device on an energy isolating device, in accordance with established procedure, to indicate that the energy isolating device and equipment being controlled cannot be operated until the tagout device is removed.

Tagout Device – a prominent warning device, such as a tag, to indicate that the energy isolating device and the equipment being controlled cannot be operated until the tagout device is removed.

Verification – prior to starting work on machines, equipment or processes that have been locked out or tagged out, Authorized Employees shall verify that the isolation and de-energization has been accomplished. *Note: Verification can be accomplished by testing circuitry, cycling, visually inspecting position, manually trying; monitoring movement or discharge, observing bleeds, gauges, indicators, etc. or other available means.*

V. Responsibilities

A. Risk Management

1. Responsible for the development of this program, which on an annual basis, shall be reviewed and updated, as necessary.
2. Provide and coordinate initial training and refresher training.
3. Provide technical assistance regarding the control of hazardous energy.
4. Audit LOTO including equipment specific energy control procedures for compliance with this procedure.

B. Supervisors

1. Verify that employees performing servicing or maintenance activities, performing energy source isolation, implementing LOTO on machines or equipment, dissipating potential energy, verifying energy isolation, releasing LOTO, or testing and positioning of machines or equipment have been trained prior to such activities.

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2. Responsible for the effective use of this procedure in the work group and to see that all required procedures are followed in every instance.
3. Verify that proper lockout equipment, including personal protective equipment (PPE), electrical testing equipment and safety equipment is available for use.
4. Ensure that energy control procedures are being used by Authorized Employees where required by this program.
5. Audit LOTO including equipment specific energy control procedures for compliance with this program.

C. All Employees

1. Shall maintain compliance with this procedure.
2. Shall maintain issued energy isolating devices, locks, and tags in good working condition.
3. Never tamper with or remove LOTO devices.
4. Immediately report incidents, near misses, or hazards resulting from activities related to the control of hazardous energy.

D. Affected Employees

1. Must understand the hazards associated with energized and de-energized equipment.
2. Shall follow instructions provided by supervisors and Authorized Employees who are conducting LOTO.
3. Must not perform servicing or maintenance on a machine or piece of equipment which is under LOTO or on a piece of equipment that should be locked out and is not. Only Authorized Employees are permitted to perform servicing and maintenance work.
4. Must be aware of LOTO procedures used to prevent unexpected startups.
5. Shall be prohibited from attempting to restart machines or equipment that are under LOTO.

E. Authorized Employees

1. Must have training and instruction in their duties and responsibilities regarding LOTO.
2. Shall recognize the hazards which may be faced during LOTO activities.
3. Shall develop a task and/or equipment specific energy control procedure when one does not already exist.
4. Shall update any existing energy control procedure when discrepancies are observed during implementation of the procedure. See Section XI for how to update the procedure.

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5. Shall identify deficiencies or other known sources of energy that need to be isolated and note them on the equipment specific energy control procedures.
6. Must follow requirements of this procedure and energy control procedures, where applicable.
7. Shall verify that sources of energy listed on the energy control procedure are accurate and that the energy control procedure is being followed.
8. Shall use appropriate and applicable PPE and testing equipment.

F. Primary Authorized Employees (PAE)

1. Shall exercise primary responsibility for implementation and coordination of Group LOTO for control of hazardous energy sources for equipment to be serviced or maintained.
2. May delegate tasks associated with LOTO to the Crew Leader, which may include aiding with equipment isolation, de-energization, bleeding, draining, applying restraint devices and lockout devices.

G. Crew Leader

1. Shall support the PAE with LOTO.
2. Shall maintain responsibility and accountability for everyone in their crew working on the specific LOTO, which includes verifying that all have applied necessary locks or tagout devices, signed the ECP, and performed self-verification of the LOTO.

H. Contractors

1. Must have a written program for the control of hazardous energy. The program shall be developed, maintained, and implemented according to applicable governmental regulations and this procedure.
2. Must submit written energy control procedures to the OC San project contact for lockout of Contractor rented or owned equipment that may affect OC San employees or facilities. The OC San project contact will provide records of the energy control procedures to Operations and Maintenance.
3. Contractor employees performing or directly supervising construction-related activities that utilize or store hazardous energy must have Authorized Employee training. The Contractor is responsible for this training.
4. Shall coordinate all hazardous energy control activities with the designated OC San construction management inspector, who in turn will coordinate with the OC San PAE. Lockout will be performed under the direction of an OC San PAE utilizing Group LOTO.
5. The PAE will verify isolation of energy hazards with the Contractor Crew Leader. The Contractor Crew Leader is responsible for communicating the LOTO to its employees, including verification.

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6. Shall supply unique and personally identifiable keyed locks for lockout to each Authorized Employee. Locks issued to an Authorized Employee can only contain one key, which remains in possession of the Authorized Employee in which the locks were issued. Note: OC San will not provide locks for Contractor use.
7. Must not manipulate energy isolation devices or lockout devices on machinery, equipment, or facilities.
8. Each Contractor Authorized Employee shall verify that all hazardous energy has been isolated and released prior to the start of work.
9. Authorized Contractor employees shall remove all personal locks once they have completed the job, except where Section XII, Employees Unavailable to Unlock would apply.
10. Operate energy isolating devices or apply lockout device(s) only under the direction of an OC San PAE.

VI. LOTO Equipment

A. General Requirements

LOTO equipment shall not be altered or modified. Equipment shall not be used if damaged or where determined that it no longer meets the manufacturer's intent for hazardous energy control. Equipment shall only be used as it was designed.

Personal and group locks shall only be used for energy isolation of machinery, equipment, and/or facilities and not to be used for other purposes. For example, these locks shall not be used to prevent against theft (securing toolbox, cabinets, locker, etc.) or to render equipment out of service. Locks differing from the ones listed in Subsection B and C of this section shall not be used by OC San Authorized Employees for LOTO. The implementation of locks used for purposes other than LOTO may be governed by other OC San safety programs and will not be used for LOTO.

B. Personal (Red) Locks

Personal locks will be issued to Authorized Employees only. Personal locks are American Lock, Series A1100 (red) and issued at no cost to the Authorized Employee. No other locks are permitted to be used by OC San Authorized Employees for the control of hazardous energy. These personal locks are uniquely identifiable and will only have one common key.

Contractors are responsible for providing locks to their Authorized Employees. Contractor locks do not need to be manufactured by American Lock but must be uniquely keyed (no combination locks allowed).

The Authorized Employee shall maintain possession of their assigned personal locks and key. The key for the personal locks shall not be given to a supervisor or coworker for use or storage. Personal locks shall only be applied or removed by the Authorized Employee in which they were assigned. Employees who are no longer authorized to participate in LOTO program shall return all locks and keys to Risk Management.

C. Equipment (Black) Locks

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Equipment locks may be distributed to Authorized Employees designated as a Primary Authorized Employee. Equipment locks can be shared among other Primary Authorized Employees within the same Division. Equipment locks are American Lock, Series A1100 (black) and issued at no cost to the Primary Authorized Employee.

Equipment locks are the only locks permitted to be used by OC San employees for group LOTO under lock box applications. Refer to Section VIII(C) for guidance on lock box installations. These equipment locks are uniquely identifiable and will only have one common key.

D. Tags

Tags shall be of sufficient material that is capable of enduring adverse conditions (weather, wet locations, corrosive materials, etc.) that will not cause the tag to deteriorate or message on tag to become illegible. Tags can be ordered from the Warehouse.

Tags shall contain at a minimum the following legible information:

1. First and Last Name of Authorized Employee (Personal Locks Only)
2. Division Number or Contractor Name
3. Phone number of people placing tag (Contractor Only)
4. Date of Installation
5. Reason (Work Order or Project Number)

Tags must be standard “Danger – Do Not Operate” (black, red, and white).

Tags installed as a tagout device shall be installed to prevent inadvertent or accidental removal. The securing means shall be of sufficient strength to prevent removal without destroying the securing means (such as a zip or cable tie) or require the use of a tool to remove it. Tagout device attachment means shall be of a non- reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds.

If lockout is not feasible, tagout tags shall be secured directly on the energy isolating device on or as close as possible to the isolation point.

Tags differing from the ones listed above may be used at OC San for purposes other than LOTO. The implementation of tags used for purposes other than LOTO will be governed by other safety programs and/or OC San policies.

E. Energy Isolation Devices

Isolating devices shall be adequately labeled or marked to indicate their function unless they are located and arranged so that their purpose is evident. The devices shall be capable of either being locked or otherwise secured in an effective isolating position.

When replacement or major repair, renovation, or modification of a machine or equipment is performed, and when new machines or equipment are installed, such devices shall be designed to accept a lockout device.

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F. Restraint Devices

Physical restraint devices (e.g., pins, blanks, blocks, props, or chains) that restrict hazardous motion shall comply with applicable standards when one exists for the device and be designed, constructed, and installed to hold the full working force of the system when hazardous energy is actuated. Restraint devices can be ordered from the Warehouse.

G. Group Lock Box

A lock box is a container that secures the keys from locks placed on energy isolating devices as part of group LOTO, which allows Authorized Employees in the group to apply their personal lock directly to the lock box instead of the individual isolation points. Lock boxes can be ordered from the warehouse.

VII. Hazardous Energy Control procedures

The following eight step process shall be completed for the Control of Hazardous Energy. Refer to Section VIII for Group LOTO.

A. Step One – Preparation for Shutdown

1. Identify hazardous energy source(s) to be controlled and method or means for controlling the energy. Authorized Employees must be familiar with the specific machinery, equipment, or facilities in which LOTO will be conducted.
2. Notify the Affected Employee(s) that the equipment will be isolated for servicing and maintenance. Contractors, Operators, and Maintenance personnel working upstream, downstream, or adjacent to may also be considered Affected Employees and must be notified.
3. Obtain the Energy Control Procedures (ECP) and prepare for equipment shutdown. If an ECP does not already exist, one must be developed by Authorized Employees prior to initiation of LOTO.

B. Step Two – Equipment Shutdown

1. Turn off or shut down equipment by following established ECP. The ECP will be initiated by OC San Authorized Employees only.
2. An orderly shutdown must be utilized to avoid any additional or increase of hazards to employees because of the equipment stoppage.

C. Step Three – Equipment Isolation

1. Physically locate and operate the required energy isolating devices (e.g., manually operated switch, valve) to control the hazardous energy to the equipment.
2. Equipment controls shall be secured in a "safe" or "off" position.
3. Emergency stop buttons (e-stops) shall not be used during LOTO. Verify that all emergency stop buttons on the system are not engaged.

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4. Circuit control devices (include but are not limited to push buttons, selector switches, wall switches, emergency stop buttons or equipment activating devices) are not energy isolating devices.
5. Electrical systems shall only be operated by authorized, trained and/or qualified persons. Refer to the Electrical Safety Program (SOP-205) for more guidance.

D. Step Four – Application of Lockout or Tagout Devices

1. Place a restraint device (e.g., adjustable cable lockout, breaker clamp, valve cover) at each energy isolating device. The restraint device shall be of suitable construction that prevents inadvertent re-energization of machinery or equipment.
2. Each Authorized Employee implementing LOTO or isolating equipment, dissipating potential energy, verifying energy isolation, testing, and positioning equipment, or performing the servicing and maintenance work shall attach one personal lock and tag to each restraint device or lock box.
3. If an energy isolating device is not accepting of a lockout device, a tagout device must be used. Each Authorized Employee shall also apply a tagout device to each energy isolating device that is not capable of accepting of a lockout device, except where managed as Group LOTO. The tagout device shall be attached at the same location that the lockout device would have been attached.
4. No employee shall perform work under another Authorized Employee's lock or tag.

E. Step Five – Stored Energy

1. Stored or residual energy must be released or dissipated from each system in such a manner as to isolate the equipment or process from the accumulation or release of hazardous energy. Stored and/or residual energy shall be released, relieved, blocked, bled, restrained, or rendered safe (i.e., grounding).
2. If there is a possibility of re-accumulation of stored energy, verification of isolation must be continued until the work is completed, or until the possibility of such accumulation no longer exists.
3. In the case of stored or residual energy, warnings or instructions shall be provided when it is not practical to dissipate the energy.

F. Step Six – Verification of Isolation

1. Prior to servicing or maintenance activities, the Authorized Employee(s) shall verify for proper and effective isolation and de-energization of hazardous energy. Multiple verifications steps may be required. Verification can include, but is not limited to the following:
 - a. Activating startup devices and/or attempting to operate controls.
 - b. Verify zero voltage using voltage testing equipment/indicators.
 - c. Verify zero pressure on gauges.
 - d. Perform or observe bleeding procedures.

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- e. Return all operating controls(s) to the neutral or off position after verifying the isolation of the equipment.
- f. Walk the line to verify all sources are accounted for and controlled.

G. Step Seven – Servicing and Maintenance Work

1. Once hazardous energy has been isolated and verified, the work can be performed.
2. Steps 2 through 6 shall be performed if hazardous energy reaccumulates.

H. Step Eight – Release from LOTO Control

1. Before lockout or tagout devices are removed and energy is restored to the equipment, procedures shall be followed, and actions taken by the Authorized Employee(s) to ensure the following:
 - a. Nonessential items have been removed and to ensure that machine or equipment components are operationally intact, including guards and covers.
 - b. All employees have been safely positioned away or removed from the work area.
 - c. Verification that all operating controls are in safe or off position.
 - d. After lockout devices have been removed and before the equipment is started, the Affected Employee(s) shall be notified that the devices have been removed and the equipment is ready for normal production operations.

I. Lockout Interruption (Energized Testing)

When lockout devices must be temporarily removed for troubleshooting, positioning of the machine, etc., the sequence of the above subsections shall be followed and LOTO reapplied in accordance with the required lockout sequence. In situations where there is a need for testing or positioning of the equipment or process, the following shall apply:

1. Clear the equipment or process area of all tools and materials.
2. Clear all personnel from the equipment or process.
3. Remove necessary locks or tags from energy-isolating devices. Record which isolation devices were removed on the ECP.
4. Proceed with testing or positioning.
5. De-energize and relock or retag the energy-isolating device(s).
6. Verify that hazardous energy has been removed, including any residual energy that may have been stored during the test or equipment positioning.

VIII. Group LOTO

A. General

1. Group LOTO is conducted when servicing and/or maintenance is performed by a crew, craft, department, or other group, they shall utilize a procedure which affords the

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employees a level of protection equivalent to that provided by the utilization of a personal lockout or tagout device.

2. Group LOTO is how each Authorized Employee exercises his or her control over the associated hazardous energy by attaching their personal locks or tagout devices onto a Group LOTO mechanism. Group LOTO mechanisms consist of multi-lock hasps and lock boxes. Procedures for performing LOTO with multi-lock hasps and lock boxes are provided in Section B and C below.
3. Group LOTO will be implemented when there is two or more Authorized Employees.
4. Group LOTO shall be managed by a PAE with assistance from a Crew Leader. The PAE has primary responsibility for administering the LOTO sequence outlined in Section VII. The PAE will be designated per work order by Supervision (or designee).
5. For OC San work, the Crew Leader will be assigned by Supervision.
6. For Contractor work, the Crew Leader will be an onsite Foreman, Superintendent, or designee. The Contractor's Crew Leader will not assist with isolations and will only be responsible for verifying that the hazardous energy has been controlled, maintaining accountability for individual exposures of each employee, maintaining compliance with OC San policy, and coordinating shutdowns activities with OC San.

B. Multi-lock Hasps

1. A multi-lock hasp shall be placed at each restraint device of each energy isolating device if more than one Authorized Employee is involved in the LOTO.
2. A multi-lock hasp allows up to 6 individual locks to be applied on each energy isolation device. The practice of daisy-chaining multi-lock hasps should not be undertaken, as the hasp is vulnerable to failure.
3. Group LOTO using multi-lock hasps will be performed in accordance with the following:
 - a. The PAE shall provide necessary restraint devices and multi-lock hasps.
 - b. The PAE shall de-energize, isolate, and dissipate hazardous energy sources according to the ECP. Refer to Section XI for requirements on ECPs. The Crew Leader may assist with the isolation at the direction of the PAE.
 - c. The PAE shall affix multi-lock hasps at each restraint device of an energy-isolating device. If the energy-isolating device is not accepting of a multi-lock hasp, a tagout device shall be used. The PAE shall secure the multi-lock hasp with a personal lock and tag. The PAE must be the first to lock on and the last to lock off the hasp.
 - d. The Authorized Employee(s) shall attach one personal lock and tag to each multi-lock hasp. If tagout devices are used, each Authorized Employee shall also apply a tagout device on the energy-isolating device that does not accept a lockout device.
 - e. The Authorized Employee(s) shall demonstrate their acceptance of the ECP by reviewing it and performing a physical and visual verification check of isolation points. A copy of the approved ECP shall be made available at the equipment being serviced. If the hazardous energy has not been controlled, the Authorized Employee(s) shall notify the PAE.

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- f. The Authorized Employee(s) shall sign the ECP once they have verified that the hazardous energy has been controlled and dissipated from the equipment or system. Only after the Authorized Employee(s) sign the ECP work may begin.
- g. The Authorized Employee(s) shall remove their personal locks and tags from the multi-lock hasp or tagout devices once they have completed the work or job task, are reassigned to a different work order, transfer to a different work group or plant.
- h. The Authorized Employee(s) who arrive later to the work site shall not work on the isolated equipment until they have reviewed the ECP with the Crew Leader, conducted a visual and physical verification of all isolation points, and attached their lockout and/or tagout devices.
- i. Once the work is completed by the Authorized Employee(s), the Crew Leader shall notify the PAE. The PAE and Crew Leader will verify that the work has been completed, all guards are put back in place and that all nonessential items have been removed from the work area.
- j. The PAE shall remove the group LOTO mechanisms and restraint devices.
- k. The PAE will notify all Affected Employees that the equipment is ready for normal production operations. The PAE shall follow normal startup procedures.

C. Lock Box

1. At the sole discretion of the PAE, a lock box can be implemented under any of the following situations:
 - a. More than six (6) Authorized Employees are involved in the servicing or maintenance of machinery, equipment, or systems.
 - b. Five (5) or more energy-isolating devices are required to isolate the machinery, equipment, or systems for service or maintenance work.
 - c. Contractor personnel involved in the construction, maintenance, and/or retrofitting of OC San machinery, equipment and/or facilities.
 - d. Based on physical size and extent of equipment and interdependence or interrelationship of components in the system or between different systems.
2. Group LOTO using a lock box shall be completed in accordance with the following:
 - a. The PAE shall provide necessary restraint devices and group LOTO mechanisms, including equipment locks and tags, and tagout devices (if needed).
 - b. The PAE shall de-energize, isolate, dissipate hazardous energy sources according to the ECP. Refer to Section XI for requirements on ECPs. The PAE shall affix one equipment lock and tag each restraint device of an energy-isolating device. If the energy-isolating device is not accepting of a lock, a tagout device shall be used. The Crew Leader shall assist with the isolation at the direction of the PAE, which can include applying restraint devices and equipment locks and tags.
 - c. The PAE shall place the key to the equipment locks inside the group lock box and secure the lock box by attaching a personal lock and tag to the lock box. The PAE must be the first to lock on and the last to lock off the group lock box.
 - d. The Authorized Employee(s) shall attach their personal lock and tag on the lock box.

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- e. The Authorized Employee(s) shall demonstrate their acceptance of the ECP by reviewing it and performing a physical and visual verification check of isolation points. A copy of the approved ECP shall be attached to the group lock box in a weatherproof container. If the hazardous energy has not been controlled, the Authorized Employee(s) shall notify the PAE.
- f. The Authorized Employee(s) shall sign the ECP once they have verified that the hazardous energy has been controlled or eliminated and dissipated from the system. Work may begin only after the Authorized Employee(s) sign the ECP.
- g. The Authorized Employee(s) shall remove their personal lock and tag from the lock box once they have completed the work or job task, are reassigned to a different work order, transfer to a different work group or plant.
- h. The Authorized Employee(s) who arrive later to the work site shall not work on the isolated equipment until they have reviewed the ECP with the Crew Leader, conducted a visual and physical verification of all isolation points, and attached their personal lock and tag on the group lock box.
- i. Once the work is completed by the Authorized Employee(s), the Crew Leader shall notify the PAE. The PAE and Crew Leader will verify that the work has been completed, all guards are put back in place and that all nonessential items have been removed from the work area.
- j. The PAE shall remove lockout devices and equipment locks and tags. The Crew Leader can assist with removal of these devices.
- k. The PAE will notify all Affected Employees that the equipment is ready for normal production operations. The PAE shall follow normal startup procedures.

IX. Shift/Personnel Change

- A. Transfer of control will occur between the Authorized Employee(s) only. During transfer of LOTO authority between arriving and outgoing Authorized Employees, the following must be performed:
 - 1. Ensure that all Authorized Employees who are leaving the work site have removed their personal locks.
 - 2. All oncoming Authorized Employees shall review the ECP and verify that all the isolated machinery, equipment, or systems are in the proper positions and secured by equipment locks and tags. Each time an Authorized Employee attaches their personal lock, they must physically and visually verify that the equipment is still isolated, per the ECP.
 - 3. Once the verification is completed, all oncoming Authorized Employees shall attach their personal lock and tag to the group lock box before starting work.
 - 4. The ECP shall remain attached to the group lock box to allow the oncoming Authorized Employees an opportunity to review and verify the LOTO conducted.
- B. Lockout or tagout devices shall be removed by the Authorized Employee who applied them. However, if the Authorized Employee is not available when the machinery or equipment is ready to be put back into service, Section XII must be followed.

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- C. All Authorized Employees assigned to work on a multi-shift LOTO must remove their personal lock and tags from the group lock box during shift and personnel changes.

X. LOTO Affecting Electrical Power

- A. All electrical work, including LOTO on electrical systems, shall be performed in accordance with the OC San Electrical Safety Program (SOP-205).
- B. If LOTO requires electrical outage or has the potential to affect plant or pump station operation, the following must be completed (where applicable):
 - 1. Notify Administrative, Laboratory, and Information Technology Supervisors if the electrical power outage will affect their ability to perform their work.
 - 2. Notify Operations and Maintenance Supervisors staff if the electrical power outage will affect their ability to perform their work or the work of contracted employees.
 - 3. If the electrical power outage will or has the potential to affect ongoing construction work, notify Construction Management Supervisory staff.
- C. Electrically live parts not suitably guarded, isolated, or insulated to which an employee is exposed shall be de-energized before the employee works on or near them. Refer to SOP-205.
- D. All electrical isolations performed in the power generating facilities, including auxiliary equipment, must be coordinated through the on-duty Power Plant Operator and conform to SOP-205.

XI. Energy Control Procedures

A. General

- 1. Energy Control Procedures (ECP) shall be developed for each unique machine, equipment or facility requiring service, maintenance, or construction-related activities prior to implementation of LOTO, unless if all the following conditions are met:
 - a. The machine or equipment has a single energy source which can be readily identified and isolated.
 - b. The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment.
 - c. The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
 - d. A single LOTO device will achieve a locked-out condition.
 - e. The LOTO device is under the exclusive control of the Authorized Employee performing the servicing or maintenance.
 - f. The servicing or maintenance does not create hazards for other employees.
 - g. In utilizing this exception, there have been no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.

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2. The ECPs shall contain the following information:
 - a. Identification of the machine, equipment, or facility.
 - b. Listing of all required energy isolating devices, the magnitude of each hazardous energy source and its location.
 - c. Specific procedural steps for shutting down, isolating, blocking, securing, and relieving stored or residual hazardous energy.
 - d. Specific procedural steps for placement of lockout devices.
 - e. Specific requirements that isolation, de-energization and verification have been accomplished.
 - f. Specific steps for removal of lockout devices.
 - g. A development, validation, and revision date.
 - h. Employee signature section acknowledging energy sources identified and isolated.
3. Equipment specific ECP's shall be printed from Maximo and brought into the field for review prior to use.
4. During LOTO, the ECP shall be posted and available at the jobsite for the duration of the repair, servicing, maintenance, or construction activities.
5. The Authorized Employee(s) shall sign and acknowledge the ECP. The ECP will be field verified for accuracy and completeness during the first use and periodically thereafter.

B. Procedure Management

1. Equipment specific ECPs, if available, will be attached to Maximo work orders that require LOTO.
2. The Crew Leader (or designee) will print the available ECP for verification in the field with the PAE. The Crew Leader and PAE will verify the available ECP is accurate. The ECP shall be hand marked in the field if conditions do not match or if the scope of work requires a modified isolation. The PAE and Crew Leader may determine that creating an entirely new ECP is warranted.
3. If an ECP is not attached to the Maximo work order, one shall be developed by the PAE and Crew Leader using a blank ECP template. The ECP can also be developed in Maximo from the Safety Plan tab. Draft ECPs must always be reviewed by another Authorized Employee familiar with the scope of work and equipment.
4. Once the work is complete, the Crew Leader (or designee) will scan and attach the field verified ECP with signatures to the Maximo work order. In cases where a Crew Leader is not established (e.g., Contractor work), the PAE will be responsible for completing this step.
5. The Crew Leader (or designee) shall complete a Maximo LOTO Log to revise an existing ECP for future use or for the adoption of a new ECP. In cases where a Crew Leader is not established (e.g., Contractor work), the PAE will be responsible for completing this

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step. Adequate detail shall be provided in the LOTO Log regarding the requested changes.

6. The approval or denial for ECP revision or adoption will be provided by the responsible Supervisor. If approved, the ECP request will workflow to the responsible Maintenance Specialist for incorporation.

XII. Authorized Employee or Contractor Unavailable to Unlock

- A. When the Authorized Employee who applied the lock and tag is not available to remove it, the following must be performed:
 1. The Authorized Employee's supervisor shall be contacted to discuss the need for lock removal.
 2. The Authorized Employee's supervisor or designee will make all reasonable efforts to contact the employee and determine whether the employee is onsite.
 - a. If the employee is onsite, the employee must return to the work area to remove their locks. The employee shall communicate with the PAE potential impacts from lock removal if any are posed. For example, a segment of pipe was removed for repair and has not been replaced.
 - b. If the employee is off site and communication is established, the employee shall be verbally notified that the locks will be removed. The employee shall communicate potential impacts from lock removal if any are posed. The employee's supervisor or designee will communicate these impacts directly to the requesting OC San PAE.
 - c. If the employee is off site and communication is not established, the employee's supervisor or designee can give authorization for lock removal only after it has been verified that the equipment is safe for re-energization.
 3. The employee whose LOTO devices were removed must be notified immediately upon their return to work or before the Authorized Employee resumes field work.
 4. Prior to device removal, a physical inspection of the machine, equipment or facility shall be performed in accordance with Step 7 of the LOTO sequence.
 5. The Hazardous Energy Control Device Removal Notification form must be completed prior to the removal of the LOTO devices. The form must be submitted to Risk Management and the employee whose locks/tags were removed.
 6. The Authorized Employee's supervisor shall return to the Authorized Employee their lock(s) regardless of condition.
- B. When the Contractor employee who applied the lock and tag is not available to remove it, the following must be performed:
 1. The OC San PAE will contact the OC San project team (e.g., Inspector, Project Manager, Engineer), who in turn will notify the Contractor Superintendent or Foreman regarding the need for lock removal.
 2. The Contractor Superintendent or Foreman will make all reasonable efforts to contact the Contractor employee and determine whether the employee is onsite.

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- a. If the Contractor employee is onsite, the Contractor employee must return to the work area to remove their locks. The Contractor employee shall communicate with the OC San PAE potential impacts from lock removal, if any are posed.
 - b. If the Contractor employee is off site and communication is established, the Contractor employee shall be verbally notified that the locks will be removed. The Contractor employee shall communicate potential impacts from lock removal if any are posed. The Contractor Superintendent or Foreman will communicate these impacts directly to the requesting OC San PAE.
 - c. If the employee is off site and communication is not established, the Contractor Superintendent or Foreman can give authorization for lock removal only after it has been verified that the equipment is safe for re-energization.
3. The Contractor shall provide written (e.g., lock removal form equivalent or email) approval to OC San prior to removal of the Contractor employee lock.
 4. Prior to device removal, a physical inspection of the machine, equipment or facility shall be performed in accordance with Step 7 of the LOTO sequence.
 5. The Contractor employee whose LOTO devices were removed must be notified before the Contractor employee resumes field work.

XIII. Periodic Inspections/Audits

- A. Authorized Employees shall perform periodic inspections or audits at least annually to verify the ECPs are adequate and being properly applied. The periodic inspections do not have to be by the employees from the same Division or crew, or by Authorized Employees involved in the work. Inspection records shall be maintained for a period of two years.
- B. The Control of Hazardous Energy Periodic Inspection form will be used to document this activity. The purpose of the audits is to insure the following:
 1. Ensure that Authorized Employees are implementing ECPs properly and are familiar with their responsibilities under those procedures.
 2. Ensure that Authorized Employees have access to and are equipped with the necessary lockout equipment, personal protective equipment, and verify correct and safe energy isolation.
 3. Ensure that any deviations observed in the application of the lockout device(s) and/or energy control procedures are immediately corrected.
 4. The audits are designed to correct any deviations or inadequacies observed, as well as determine if retraining is required.

XIV. Training

- A. Affected Employee Training
 1. All non-authorized or Affected Employees must complete online training. The training topics will include the purpose, function, and restrictions of OC San's Control of Hazardous Energy Program.

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2. Affected Employees will be trained on their responsibilities under the program. The employees will be able to recognize energy isolation device(s), lockout device(s), and tagout device(s), and the importance of not attempting to start up or use equipment involved in an active hazardous energy control application.

B. Authorized Employee Training

1. Initial and annual refresher training is mandatory for those employees whose job duties require them to perform as an Authorized Employee. The training is scheduled and provided by Risk Management.
2. Retraining shall be provided for all Authorized Employees when there is a change in machines, equipment and/or facilities that present new hazards, when there is a change in regulations or when an audit reveals inadequate or inconsistent control of hazardous energy by an Authorized Employee(s).
3. Training shall include review of the following:
 - a. The requirements of this procedure.
 - b. Recognition of hazardous energy sources.
 - c. Each authorized employee shall be instructed in the purpose and use of the energy control procedure.
 - d. The type and magnitude of energy at the OC San.
 - e. Methods for isolation and control of the energy.
 - f. Hazards related to performing activities required for cleaning, repairing, servicing, setting-up and adjusting prime movers, machinery, and equipment.
 - g. Energy control procedures.
 - h. Energy isolating devices, lockout and tagout devices.
 - i. Limitations of tags as energy control device(s).
 - j. Include audit findings, action items from incidents reported, or changes made to the program.
 - k. Applicable manufacturer's documentation, industry best practices, regulatory requirements.
4. Annual training requires a passing score of 80% to retain authorized status. Employees who fail the test will be classified as non-authorized and will be required to attend a subsequent Control of Hazardous Energy training course to be reinstated as authorized. Training shall be documented.

XV. Exceptions

A lockout or tagout device is not required for work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energizing or startup of the equipment is controlled by unplugging of the equipment from the energy source, and by the plug being under the exclusive control of the employee performing the servicing or maintenance.

In situations where testing and/or repositioning of machinery or equipment is required to accomplish the service or maintenance objectives, Authorized and Affected Employees shall

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follow all procedures set forth in this document as well as the hazardous energy control procedures for removal and application of all hazardous energy control device(s) and/or lockout device(s) as well as Safety-SOP-120 Machine Guarding.

LOTO is not required for hot tap operations involving transmission and distribution systems for substances such as gas, steam, water, or petroleum products when they are performed on pressurized pipelines, if it is demonstrated that:

1. Continuity of service is essential.
2. Shutdown of the system is impractical.
3. Documented procedures are followed, and special equipment is used which will provide proven effective protection for employees.

XVI. References

ANSI/ASSE Z244.1-2016, The Control of Hazardous Energy Lock Out, Tag Out and Alternative Methods.

Federal Register, Vol. 54, No. 169, September 1, 1989, page 36644-36683

Injury and Illness Prevention Program

SOP-120, Machine Guarding

SOP-205, Electrical Safety

SOP-608, Contractor Safety

Title 23, California Code of Regulations, Section 3670.1, Certification Requirements for Operating Wastewater Treatment Plants

Title 29, Code of Federal Regulations, Standard 1910.147, The Control of Hazardous Energy (lockout/tagout)

Title 29, CFR, Subpart S, Standard 1910.333, Selection and Use of Work Practices

Title 29, CFR, Subpart K, Standard 1926.417, Lockout and Tagging of Circuits

Title 29, CFR, Subpart Q, Standard 1926.702, Requirements for Equipment and Tools

XVII. Recordkeeping

All records created or generated during this procedure shall be legible and stored in a way that they are readily retrievable in facilities or electronic document/content management systems that provide a suitable environment to prevent damage, deterioration, or loss. Records may be in the form of any type of media, such as hard copy or electronic media. The OC San Records Retention Schedule is the official procedure governing the retention, retirement, and destruction of OC San records. Document owners should use these schedules to determine the item and series that best fit their records. Document owners are responsible for ensuring that documents are properly marked, indexed, and filed for their projects or area of responsibility.

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XVIII. Revision History

Version	Date	By	Reason
1.0	-	-	New
2.0	01/6/2015	Collins, Rod	Clarify lock-on duration; require Operations approval of shutdowns; include language for control of hazardous stored energy.
3.0	1/31/2019	Frattali, John	Removed gold out-of-service locks from program; changed lock-on duration to end of job.
4.0	1/13/2020	Frattali, John	Established and defined roles for Primary Authorized Employee (PAE) and Crew Leader; provided procedure on Group LOTO mechanisms and application; provided procedure on updating energy control procedures electronically; revised audit frequency to annual.
4.0	10/19/2020	Frattali, John	Periodic Update and Review – Refer to Program Change Log
5.0	12/13/2021	Lam, Brian	Annual Program Review – Refer to Program Change Log