

<b>SAN FRANCISCO PUBLIC UTILITIES COMMISSION INFRASTRUCTURE CONSTRUCTION MANAGEMENT PROCEDURES</b>	
<b>SECTION: SFPUC INFRASTRUCTURE CONSTRUCTION MANAGEMENT</b>	<b>APPROVED:</b> 
<b>PROCEDURE NO: 019</b>	<b>DATE: 6/7/2019</b>
<b>TITLE: SHUTDOWN/SPECIFIC CONDITION COORDINATION</b>	<b>REVISION: 1</b>

**1.0 Policy**

**Shutdown/Specific Condition Coordination** procedures are vital for coordinated, efficient interactions between the construction team and the San Francisco Public Utilities Commission (SFPUC) Operations group. For this reason, SFPUC Infrastructure CM Organization project construction shutdown /specific condition events shall be coordinated with the designated operations representative (OR). Planned project shutdown/specific condition events must be scheduled, approved, and implemented in an orderly, safe fashion with minimal impact on Operations (including Maintenance activities) and other project shutdown/specific condition event. A flow chart showing the Master System Shutdown Scheduling (MSSS) process is shown in Attachment 019-6.

This shutdown/specific condition coordination procedure applies to all personnel working on the SFPUC Infrastructure CM Organization projects to the extent that their work is affected by this SFPUC Infrastructure CM Procedure and does not conflict with specific SFPUC policies or the Contract under which the work is executed.

**2.0 Description**

This procedure defines the tasks, sequence and responsibilities for execution of systems shutdown/special condition events during the construction phase of the SFPUC Infrastructure CM Organization projects. This procedure also describes how issues identified during the process will be managed and resolved. It will be necessary to adapt this procedure to the actual scope and content of each project. The facility testing and start-up process detailed description is provided in CM Procedure No. 018, System Testing and Start-Up.

### **3.0 Definitions**

#### **3.1 Specific Condition/Shutdown**

“Specific Condition” is any condition requested by the Contractor that is necessary to conduct Contractor’s Work. A “shutdown” is one specific type of specific condition. A. Shutdown is the 1) closing/opening of valves/gates and/or de-pressuring and draining of pipelines or system components and/or 2) de-energizing or isolating system components including electrical systems. Shutdown/Specific conditions are typically executed in order to allow for inspections, tie-ins or replacement/upgrade of system components. Shutdowns/Specific conditions may affect a portion of a transmission system, collection system, a facility component, a facility, a control system, or an entire system.

#### **3.2 System Outage Request (SOR) for Water Enterprise Projects**

System Outage Request (SOR) shown in Attachment 019-1a is a request made by the Contractor after award of the contract, through the RE, to a SFPUC Water Enterprise Operating Division to shut down a portion of a system in order to perform work.

3.2.1 An SOR is needed for full or partial shutdowns and hot taps. One (1) SOR is required for each facility shutdown. Once the SOR is approved, it will be re-forecast in the Master System Shutdown Schedule for the facility or Enterprise.

#### **3.3 Specific Condition Request (SCR) for Wastewater Enterprise Projects**

Specific Condition Request (SCR) shown in Attachment 019-1b is a request made by the Contractor after award of the contract, through the RE, to a SFPUC Wastewater Enterprise Operating Division to provide specific conditions affecting all or a portion of a system integral to Enterprise operations in order to perform work.

3.3.1 An SCR is needed for full or partial impacts and hot taps. One (1) SCR is required for each facility impact.

### **3.4 Hetch Hetchy Lockout Tagout Test Program Loto-T (see attachment 019-13)**

#### **3.5 Operational Change Request (OCR)**

An Operational Change Request (OCR) is a SFPUC-generated request to take a system, or portion of a system out of service. The OCR includes the Contractor’s SOR submittal and other operational details concerning maintenance of service and equipment during the shutdown. The OCR is prepared by the project Operations Representative and is approved by the Operations Division Manager.

3.5.1 The OCR requires a Work-Around Plan as for certain critical shutdowns. Please note that the three (3) SFPUC operating divisions have different versions of the OCR.

These OCR versions are;

- Water Supply & Treatment Division, Attachment 019-2.
- Hetch Hetchy Water & Power, Attachment 019-3.
- City Distribution Division, Attachment 019-4.

### **3.6 SFPUC Infrastructure CM Master System Shutdown/Specific Condition Schedule and SFPUC Infrastructure CM System Shutdown/Specific Condition Matrix**

SFPUC Infrastructure CM Shutdowns/Specific Conditions are scheduled in an iterative fashion using two documents, the SFPUC Infrastructure CM Master System Shutdowns/Specific Conditions Schedule and the SFPUC Infrastructure CM System Shutdowns/Specific Condition Matrix.

3.6.1 The Master System Shutdowns/Specific Condition Schedule (bar chart) shows all Shutdowns/Specific Conditions required for implementation of the SFPUC Infrastructure CM Organization Projects. This is the official SFPUC Infrastructure CM Specific Condition schedule. Two variations of this schedule are produced monthly, one variation is sorted by time and the second variation is sorted by geographical area.

3.6.2 The Master System Shutdowns/Specific Conditions Schedule facilitates an overview of system impacts during Shutdowns/Specific Conditions. The Master System Shutdowns/Specific Conditions Schedule, an extract of the official SFPUC Infrastructure CM schedule provided by the project teams, is electronically maintained and updated for the Shutdowns/Specific Conditions Coordinator (SDC) by SFPUC Project Controls and Scheduling Bureau (PCSB).

3.6.3 The Master System Shutdowns/Specific Conditions Matrix (chronological table), based on input from SFPUC Infrastructure CM Operational Representatives and CM teams, shows Shutdowns/Specific Conditions and hot taps, operational shutdowns, and some operational activities which potentially could impact shutdowns. The Master System Shutdowns/Specific Conditions Matrix is a detailed document maintained by the SDC.

### **3.7 Construction Kick-off Meeting**

Construction Kick-off Meeting led by the RE is a coordination meeting held with City and Contractor staff shortly after issuance of Notice-to-Proceed (NTP). CM team members Shutdown/Specific Condition responsibilities, equipment purchasing lead times, and schedule related matters are reviewed at this meeting.

### **3.8 Pre-shutdown/Specific Condition Event Meeting**

Pre-shutdown/Specific Condition Event Meeting led by the RE with participation by the Project Shutdowns/Specific Conditions Delivery Team is a coordination meeting held approximately thirty (30), fourteen (14) and seven (7) calendar days prior to a routine Shutdown/Specific Condition event to confirm the status of Contractor and City activities that will occur before, during and after the Shutdowns/Specific Conditions. Meetings to coordinate very complex, critical, and/or high-risk specific conditions events shall occur earlier and more frequently, as the Operations Division deems appropriate.

### **3.9 The Shutdown Delivery Team (SDT)**

The Shutdown Delivery Team includes the RE or PM, Construction Manager, Operations Division (OEM) Representative(s), Senior Engineer, EMB Systems Engineering Representative(s), Health and Safety Representative, Water Quality Division Representative, Communications Representatives, and the Shutdown/Special Condition Coordinator (SDC).

### **3.10 Lockout /Tagout (LOTO)**

3.10.1 Lockout/Tagout (LOTO) is a safety procedure necessary to isolate a pipeline/tank or system component from the potential release of hazardous energy while employees perform work. A work-specific LOTO plan must accompany each OCR. If no LOTO is required, state "none".

3.10.2 Hazardous energy may include electrical, mechanical, hydraulic, pneumatic, chemical, and other sources. Refer to SFPUC LOTO program (Attachment 019-7).

3.10.3 An isolated pipeline or tank may involve confined space entry. Guidelines addressing confined space entry, minimizing potential engulfment, and the necessary plan for managing incidental water are given in Attachment 019-9.

### **3.11 Hydraulic Analysis**

A system shutdown hydraulic analysis is a study of how the water pressure, or hydraulic grade line (HGL), within a water transmission and delivery system is affected by a facility shutdown and is used to analyze potential consequences to meeting system delivery goals, refer to Section 5.1 for details.

### **3.12 SOR/SCR Start Date**

The date that Operations starts to modify or remove a SFPUC facility from service to perform SOR/SCR-related work. Subsequently, Operations performs joint lockout/tagout, dewater, de-energizes, and/or prepares a facility to allow the Contractor to commence work via the RE. The SOR/SCR Start Date reflects the start of activities necessary to provide the

respective Shutdown/Specific Condition.

### **3.13 SOR/SCR End Date**

The date that Operations finishes restoring a SFPUC facility to normal operation and/or service. Beforehand, Operations is notified that the facility/Shutdown/Specific Condition are no longer needed by the Contractor via the RE, ends joint lockout/tagout, refills, disinfects, re-energizes, and/or prepares a facility for service. The SOR/SCR End Date reflects the completion of activities necessary to provide the respective Shutdown/Specific Condition and return of the facility/system to a normal operating state.

### **3.14 Acronyms**

CM	Construction Management
CMB	Construction Management Bureau
CM team	Construction Management team
EMB	Engineering Management Bureau
HGL	Hydraulic Grade Line
LOTO	Lockout/Tagout
NTP	Notice-to-Proceed
OCR	Operational Change Request
OEM	Operations Division Representative(s)
OR	Owner's Responsibility
PCSB	Project Controls and Scheduling Bureau
RE	Resident Engineer
RWQCB	Regional Water Quality Control Board
SCR	Specific Condition Request
SDC	Shutdown Coordinator
SDT	Shutdown Delivery Team
Senior OR	Senior Owner's Representative
Senior PM	Senior Project Manager
SFPUC	San Francisco Public Utilities Commission
SOR	System Outage Request
WQD	Water Quality Division

## **4.0 Responsibilities**

### **4.1 Resident Engineer (RE)**

The RE, with the assistance of the Shutdown/Specific Condition Coordinator (SDC), PM, Construction Manager, and OR shall:

- 4.1.1 Serve as the lead person to coordinate the Shutdown/Specific Condition with the assistance of the OR and is a member of the SDT.
- 4.1.2 Coordinate with the Contractor to develop and implement project-specific system shutdown/Specific Condition plans during construction and notifies the SDC of changes to the shutdown schedule, duration, or scope.
- 4.1.3 Ensure Contractor shutdown/Specific Condition responsibilities are reviewed at the Construction Kick-off meeting and are reflected in the Contractor's baseline schedule.
- 4.1.4 Ensure Contractor prepares details of contractor staff, schedule, equipment and materials to be employed during Shutdown/Specific Condition.
- 4.1.5 Assist the Senior PM in updating the Work-Around Plan, for certain critical Shutdown/Specific Condition, started by the CM team with assistance of the Shutdown/Specific Condition Delivery Team.
- 4.1.6 Notify Water/Wastewater Enterprise Operations, Shutdown /Specific Condition Coordinator and project Communications Representatives of updates to the Master
- 4.1.7 System Shutdown/Specific Condition Schedules from the Pre-Shutdown/Specific Condition Event Meetings with the Contractor.
- 4.1.8 Periodically check on the status of Contractor's acquisition of long-lead purchase items necessary for Shutdown /Specific Condition.
- 4.1.9 Monitor Contractor's work.
- 4.1.10 Certify that the Contractor's Shutdown/Specific Condition-related testing has been performed as per Section 5.9.
- 4.1.11 Review, sign and forward to the OR the Contractor's SOR/SCR.
- 4.1.12 Notify SDT of start and completion of the Contractor's portion of the Shutdown/Specific Condition work as per Section 5.10.

Further details regarding RE responsibilities are given in the procedure described in Section 5.0.

### **4.2 Owner's Representative (OR)**

- 4.2.1 The SFPUC OR reviews and signs the SOR/SCR.

4.2.2 The SFPUC OR communicates with the Operations Division Manager regarding an Operational Change Request (OCR), coordinates with SFPUC Water Quality Division (WQD), Systems Engineering Group of Engineering Management Bureau (EMB), and Operations Division Maintenance personnel to ensure support before, during and after the Shutdown/Specific Condition; grants access to affected area to RE and accepts area on behalf of Water Enterprise/Wastewater Enterprise after completion of the SOR/SCR work.

4.2.3 The OR prepares the detailed Operational Change Request (OCR). This OCR must be approved not less than twenty-one (21) calendar days prior to the shutdown. Duration may be adjusted per the request of the OR.

- The OR coordinates the facility joint LOTO to be performed prior to granting access to the section or component to the RE. Every Shutdown/Specific Condition Event involving LOTO must have a written LOTO plan which identifies all energy sources and corresponding LOTO control points and methods. SFPUC Health and Safety can waive the LOTO requirement in certain cases where LOTO does not apply. Waiver of LOTO requirement shall be in writing. Water Enterprise/Wastewater Enterprise Operations designates facility lead Operations personnel to coordinate the facility LOTO tasks including the written LOTO plan. One of the check-off items in the OCR is completion of the LOTO plan.

A LOTO plan is an attachment to the OCR and is fundamentally important to the safety of all City, CM Consultant, and Contractor personnel during a Shutdown/Specific Condition Events. The OR coordinates the LOTO with the Contractor and project CM team and the SFPUC Infrastructure CM Team Senior Safety Managers. Managers of a Shutdown/Specific Condition Event must not be started without an approved OCR and LOTO plan. Prior to commencement of Shutdown/Specific Condition work, the CM team, the Contractor and the OR should walk through the LOTO plan to assure that it is in place.

4.2.4 Every pipeline shutdown where there is incidental water passing the valve, needs a written plan (incidental water management plan) for how the water will be controlled to prevent possible engulfment situations from developing. If SFPUC is responsible for the water and/or primarily SFPUC Infrastructure CM team members will enter the pipe, the OR prepares the plan. Also, each plan needs to address how water will be removed (e.g., sandbag berm and pumps, gravity feed from blow-off, etc.) and how water levels will be

monitored such that levels cannot rise to a level that a failure could result in an inundation threat to downstream workers. If the Contractor is responsible for the water and only the Contractor's employees are the primary people entering the pipe, the Contractor prepares the written plan.

All written plans for controlling incidental water must have a documented review by appropriate Operations personnel coordinated by the OR.

### **4.3 Operations Division Manager or Process Chief**

- 4.3.1 The Operations Division Manager or Process Chief approves the completed OCR; provides personnel, equipment, materials and chemicals for City's portion of the work for the Shutdown/Specific Condition Event; and notifies wholesale customer of shutdowns or affected parties accordingly.
- 4.3.2 If applicable, the Operations Division Manager or Process Chief ensures that the San Francisco Regional Water Quality Control Board (RWQCB) and affected environmental agencies are notified.
- 4.3.3 The Operations Division Manager or Process Chief ensures that the system components are dewatered and isolated or de-energized.
- 4.3.4 The Operations Division Manager or Process Chief ensures that the safety protocols are followed when granting access to RE. The OCR must not be approved by the Operations Division Manager without the attached LOTO plan unless LOTO is inapplicable.
- 4.3.5 The Operation Division Manager or Process Chief ensures that the section or component can be returned to service; that filling, sanitary work practices, disinfection, discharge dechloramination, and discharge pH adjustments are performed; and that the section or component is returned to service. Note that discharges to a combined sewer do not require dechloramination or pH adjustment.
- 4.3.6 Approves the Contractor's work plan by signing the SOR/SCR AND attaching the SOR/SCR to the signed OCR.

### **4.4 Shutdown Coordinator (SDC)**

The SFPUC Infrastructure CM Shutdown/Specific Condition Coordinator (SDC) reports directly to the CMB Manager. The SDC's tasks, duties and activities are:

- 4.4.1 Organizes and facilitates monthly Shutdown/Specific Condition Event Coordination meetings and other necessary Shutdown/Specific Condition shutdown meetings;
- 4.4.2 Maintains the SFPUC Infrastructure CM Master System Shutdown/Specific Condition Matrix;



- 4.4.3 Checks the Master System Shutdown/Specific Condition Schedule dates for consistency with the Shutdown/Specific Condition Matrix;
- 4.4.4 Tracks all Shutdown/Specific Condition -related activities;
- 4.4.5 Reviews and takes action for compliance issues as required by the Risk Mitigation Plan for any deviation;
- 4.4.6 Coordinates and updates requirements for Shutdown/Specific Condition and the Shutdown/Specific Condition Business Plan;
- 4.4.7 Facilitates evaluation of changes to scope or schedule of Shutdown/Specific Condition;
- 4.4.8 Reviews the Shutdown/Specific Condition portions of the construction contract;
- 4.4.9 Reviews the contractor submitted SOR/SCRs for consistency and completeness and signs the SOR/SCR;
- 4.4.10 Stops a SFPUC Infrastructure CM Shutdown/Specific Condition lacking the necessary SOR/SCRs, OCRs, or LOTO plans;
- 4.4.11 Assists the RE in the planning and execution of Shutdown /Specific Condition including the preliminary review of the draft Work-Around Plan for certain critical work;
- 4.4.12 Maintains a tracking tool to track formal letters and meetings with wholesale customers and affected parties.
- 4.4.13 Reviews and develops contract specifications related to system Shutdown/Specific Condition;
- 4.4.14 Prepares the Shutdown/Specific Condition Summary Report (Attachment 019-5) which are incorporated in the Lessons Learned Report (refer to CM Procedure No.020, Project History/Lessons Learned) and the Project Closeout Report PM Procedure 3.14; and,
- 4.4.15 Prepares the semi-annual BAWSCA shutdown report (see section 6.2).

#### **4.5 Project Manager (PM)**

- 4.5.1 The PM ensures protocol reviews and approvals of all elements for Shutdown/Specific Condition planning.
- 4.5.2 The PM reviews and coordinates all changes to established schedules for SFPUC Infrastructure CM project. The Senior PM will review these potential schedule changes with the Shutdown/Specific Condition Coordinator and the CM team members.

4.5.3 The PM is responsible and leads the preparation and updates for the SFPUC Infrastructure CM project Work-Around Plan for certain critical Shutdown/Specific Condition.

#### **4.6 Construction Manager**

4.6.1 Oversees the RE activities related to Shutdown/Specific Condition Event.

4.6.2 Reviews and signs the SOR/SCR.

#### **4.7 Contractor**

4.7.1 The Contractor is responsible for setting the Shutdown/Specific Condition Event dates in the Baseline Schedule within typically 2 weeks of the start of construction.

4.7.2 The Contractor is responsible for preparing a detailed Contractor Shutdown/Specific Condition Event work plan, contingency plan, and sanitary work practices plan as part of the SOR/SCR as described in Technical Specification, Section 01 69 50, Shutdowns and Site Access of the project specifications.

4.7.3 The Contractor submits draft System Outage Request/Specific Condition Request (SOR/SCR) not less than sixty (60) calendar-days prior to the Shutdown/Specific Condition Event. The SOR/SCR work duration is from the SOR/SCR Start Date to the SOR/SCR End Date. The Contractor's work duration is a subset of the Shutdown/Specific Condition Event duration and is from the date access to the facility/system is granted to the Contractor until the date the Contractor has completed work and notifies the RE that the facility/system is ready for SFPUC to resume normal operations. The Shutdown/Specific Condition Event schedule in the SOR/SCR work plan must clearly show the SOR/SCR Start Date the SCR End Date, and the Contractor's Shutdown/Specific Condition Event work tasks. In addition, the SOR/SCR must identify all parties anticipated to be affected by the Shutdown/Specific Condition Event.

4.7.4 The Contractor notifies RE, if a need to reschedule develops; and then coordinates delivery of materials and equipment prior to the Shutdown/Specific Condition Event.

4.7.5 The Contractor, if responsible for handling incidental water, develops the plan for handling the water passing the valve and how the water will be controlled to prevent possible worker engulfment situations from developing. Also, each plan needs to address how water levels will be monitored such that levels cannot rise to a level that a failure could result in an inundation threat to downstream

workers. All written plans for controlling incidental water must have a documented review by appropriate Contractor safety personnel and then must be submitted to the SFPUC.

- 4.7.6 The Contractor is solely and totally responsible for construction safety before, during, and after the Shutdown /Specific Condition Event.
- 4.7.7 The Contractor executes Contractor's work to be performed during the Shutdown/Specific Condition Event once Operations grants access to the facility/system via the RE.
- 4.7.8 The Contractor notifies the RE and OR that the affected facility sections are ready to be returned to normal operation.
- 4.7.9 The construction contract provides guidance to the Contractor on available Shutdown/Specific Condition Event windows and system constraints affecting planned Shutdown/Specific Condition Events.
  - The Contractor must propose dates for planned project Shutdown/Specific Condition Events within the Shutdown/Specific Condition Events windows prescribed in the contract, if any. In some instances, Contractor-proposed Shutdown /Specific Condition Events for a specific period may be denied based on conflicts with Shutdown/Specific Condition Events for other SFPUC Infrastructure CM construction contracts, conflicts with operational needs, or other factors beyond the control of the Contractor. In rare instances, once a Shutdown/Specific Condition Event is underway the Contractor may be asked to terminate the Shutdown/Specific Condition Event and ready the system component for return to service.

## **5.0 Implementation**

The overall procedure for system Shutdown/Specific Condition Events is defined by the following activities:

### **5.1 Review Contractor Shutdown/Specific Condition Event Responsibilities at the Construction Kick-off Meeting**

- 5.1.1 The RE reviews Contractor Shutdown/Specific Condition Event responsibilities at the Construction Kick-off Meeting. This includes a reminder of the importance of adhering to the Shutdown/Specific Condition Event dates on the approved SOR/SCR and an outline of everything expected in the SOR/SCR package. Also, this includes a reminder of the importance of LOTO and a summary of the joint LOTO responsibilities.

- 5.1.2 The Shutdown/Specific Condition Delivery Team reviews the Contractor's Shutdown/Specific Condition Event responsibilities at the Construction Kick-off Meeting, refer to Section 3.6.1.
- 5.1.3 The RE advises the Contractor of the criticality of taking possession of equipment, especially the long-lead purchase items, in a timely manner to meet the Shutdown/Specific Condition Event dates.
- 5.1.4 The RE shall notify Water Enterprise/Wastewater Enterprise Operations, Shutdown/Specific Condition Coordinator and project Communications Representatives of any updates to the Master System Shutdown/Specific Condition Schedules, refer to Section 6.3.1.
- 5.1.5 If the RE, OR and Shutdown/Specific Condition Coordinator agree that an interim, smaller scale, Shutdown/Specific Condition only involves a portion of a facility or just electrical controls, then the standard level of approvals, review, notification, lessons learned, etc. should be scaled back proportionately. LOTO plans cannot be scaled back unless they are not applicable.

**5.2 Notify Affected Communities About Construction**

- 5.2.1 The RE provides confirmation and any new information necessary for municipality courtesy notifications and "courtesy review" to the SFPUC Infrastructure CM Communications representative related to Contractor submittals for staging areas, lay down areas, parking, traffic control, on-site chemical storage, and other appropriate matters. The basic agreements with the affected communities should already be in place.
- 5.2.2 For most projects, there should already be a memorandum of understanding or a memorialized agreement concerning the upcoming construction activities.

**5.3 Preparing Detailed Shutdown / Specific Condition Plan and System Outage Request (SOR)/Specific Condition Request (SCR)**

The Contractor submits a detailed draft SOR/SCR, refer to Attachment 019-1, to the RE for review. The RE forwards the draft SOR/SCR to the OR and SDC. The SDC will post the draft SOR/SCR on the SDT Shutdown/Specific Condition Event common drive. The RE provides courtesy copies of the draft SOR/SCR to the Regional Construction Manager (if applicable) and to the Senior Environmental Monitor. The OR provides the draft SOR/SCR to the Water Enterprise/Wastewater Enterprise Operations Manager to be included as an attachment to the OCR. One SOR/SCR is required for each Shutdown/Specific Condition Event. The SOR/SCR schedule is shown in Attachment 019-8.

**5.4 Preparing and Monitoring Detailed Operational Change Request**

5.4.1 The Operations Representative, with assistance from the SFPUC Lead Operations Person for a particular facility, prepares a detailed OCR, refer to Attachments 019-2, 3, or 4, in coordination with the Water Quality Division. This detailed OCR must be reviewed and approved by the Operations Division Manager no less than twenty-one (21) calendar days prior to the shutdown. The Shutdown/Specific Condition Event is not approved until the Division Manager signs the OCR which contains the LOTO plan and SOR/SCR as attachments. Also, the Work-Around Plan, for certain critical Shutdowns/Specific Condition Events, must be attached to the OCR.

5.4.2 The RE and SDC shall monitor and assist to ensure timely completion (21 calendar days prior to Shutdown/Specific Condition Event) and approval of the OCR.

**5.5 Monitoring Contractor's Progress Against Shutdown/Specific Condition Event Dates**

5.5.1 The RE will monitor Contractor's progress against the approved Shutdown/Specific Condition Event schedule and notify the OR and the SDC if there is a risk that the Shutdown/Specific Condition Event dates will not be met. A variance may impact other projects and planned Shutdown/Specific Condition Events.

5.5.2 Shutdown/Specific Condition Events are not independent activities, but they are tied to operational changes, other shutdowns, and seasonal constraints. Therefore, it is essential that it be known well ahead of time if the Contractor will not be able to achieve/complete the Shutdown/Specific Condition Specific Condition work at or within the planned time.

**5.6 Conducting Pre-Shutdown/Specific Condition Event Meeting**

Thirty (30) calendar days prior to the Shutdown/Specific Condition Event or as the RE deems appropriate, the RE will conduct a pre-Shutdown/Specific Condition Event meeting with the Contractor, SDC, and OR to confirm the status of all Contractor and SFPUC Infrastructure CM activities that will occur before, during and after the Shutdown/Specific Condition Event.

By weekly meeting will be required for all shutdown/specific condition events.

**5.7 Coordinating Operations Dewatering and Lockout/Tagout**

5.7.1 Water Enterprise/Wastewater Enterprise Operations has responsibility to isolate, dewater and/or de-energize, and execute LOTO prior to providing access to the RE. SFPUC Operations Divisions in some cases have tailored the SFPUC LOTO program

to fit their needs and have their own LOTO guidelines incorporating all the elements of Attachment 9.

5.7.1.1 SFPUC CM team members must always put their own locks and tags on the lockout points when the CM team members are working in the area where they are exposed to the hazardous energy (i.e., the same LOTO points as the Contractor and Operations). This Policy would also apply if a SFPUC EMB senior engineer or other City employees enters the work area refer to Attachment 019-7.

5.7.2 The RE with OR support will confirm technical and safety suitability before allowing the Contractor access to the work area and informing the Contractor to commence work.

5.7.3 The RE confirms Contractor readiness for the Shutdown/Specific Condition Event and safety before giving access to the Contractor.

5.7.4 The RE notifies the SFPUC Infrastructure CM Supervisory Control and Data Acquisition (SCADA) representative that the facility is being taken out of service. SCADA will maintain control of the facility/system as needed.

## **5.8 Monitoring Contractor's Work and Progress**

5.8.1 RE, with assistance from Inspectors, shall monitor the progress of Contractor's work and perform Quality Assurance. RE shall notify the OR and the SDC if Contractor's progress jeopardizes the scheduled completion.

5.8.2 The RE oversees Contractor's Shutdown/Specific Condition related work and responds to quality, safety, leakage, schedule, or sanitary work practices issues.

## **5.9 Conducting Testing and Accepting the Work**

The RE, with assistance from Inspectors, shall certify the Contractor's testing including welding, pressure/leak tests, other Contract required tests, Contractor's portion of sanitary work practices/disinfection work, and Contractor's portion of the drainage/discharge work; and when completed, accept the work, refer to CM Procedure No. 018, System Testing and Start-Up for details.

## **5.10 Notifying Operations of Completion of Contractor's Shutdown/Specific Condition Event Work**

The RE, upon completion and acceptance of Contractor's work, will notify the OR, facility SCADA representative, and the SDC of completion of the Contractor's Shutdown/Specific Condition Event work and confirm that the system is ready to be refilled, disinfected (if necessary) and/or re-energized. The RE coordinates with the Contractor and the SFPUC Lead

Operations Person from the facility to remove the Contractor's and CM team's locks and tags associated with LOTO.

5.10.1 Additional coordination details are provided in CM Procedure No. 018, System Testing and Start-Up.

### **5.11 Change Management During Construction**

5.11.1 Changes to scope and schedule may occur after award of the construction contract. It is necessary that the RE closely monitor the Contractor's progress towards Shutdown/Specific Condition Event dates and report any variances to the SDC and the OR as soon as they are recognized. Likewise, it is important that the SDC and the OR closely monitor Operations Division progress on the Operations portion of the work.

5.11.2 Should a change become necessary, the RE, the SDC and the OR will meet to determine the potential impact of the change, refer to CM Procedure No. 011, Construction Change Management. If this group and the Shutdown/Specific Condition Delivery Team agree that a change is necessary/possible, the SDC shall ensure that PCSB, WQD, and affected parties are formally notified.

### **5.12 Preparing Shutdown/Specific Condition Event Summary Report**

5.12.1 The RE will provide project records, digital images, and a briefing to the SDC.

5.12.2 The SDC with the assistance of the RE is responsible for preparing the Shutdown/Specific Condition Event Summary Report (Attachment 019-5), including Lessons Learned (CM Procedure No. 020, Project History /Lessons Learned and PM Procedure No. 3.14) for application to subsequent Shutdown /Specific Condition Events. The Shutdown/Specific Condition Event Summary Reports are not required for SFPUC Infrastructure CM hot taps and are optional for standalone shutdowns.

### **5.13 Preparing Work-Around Plan**

5.13.1 The purpose of this section is to provide guidance to CM teams on developing a Work-Around Plan **as a contingency** in case a system Shutdown/Specific Condition Event(s) needs to be rescheduled. The Work-Around Plans are inapplicable to hot taps which are technically not shutdowns. The CM team prepares the draft Work-Around Plan prior to SOR/SCR under the direction of the RE.

- The Senior PM is the lead for preparing a Work-Around Plan for construction contracts which have already started and the Work-Around Plan that was never written.

- The Senior PM is the lead for preparing the Work-Around Plan update with participation and support from the Shutdown/Specific Condition Delivery Team including the RE.

5.13.2 The Work-Around Plan is linked to the designation of critical and standalone Shutdown/Specific Condition Events as defined below:

**Critical Shutdown/Specific Condition Event** - a Shutdown/Specific Condition Event that has a schedule-dependent relationship to another Shutdown/Specific Condition Event (may affect, or be affected by, other Shutdown/Specific Condition Events if delayed); or is limited to certain pre-determined times of the year within which it can occur; or has limitations on when it can occur due to system operations, maintenance requirements, or other Non-SFPUC Infrastructure CM System Shutdown /Specific Condition Events.

**Stand Alone Shutdown/Specific Condition Event** - any Shutdown/Specific Condition Event which does not have limitations on when it can occur due to system operations, maintenance requirements, or other non-SFPUC Infrastructure CM system Shutdown/Specific Condition Events .

The critical and standalone Shutdown/Specific Condition Events are designated in the SFPUC Infrastructure CM Shutdown /Specific Condition Matrix and in the SFPUC Infrastructure CM Master System Shutdown/Specific Condition Schedule. Most of the Shutdown/Specific Condition Events listed in the System Shutdown/Specific Condition Matrix are critical Shutdown/Specific Condition Events. Work-Around Plans are inapplicable to SFPUC Infrastructure CM standalone Shutdown/Specific Condition Events.

5.13.3 The Work-Around Plan is linked to options for the Contractor to deal with Shutdown/Specific Condition Event delays.

- The Contract Technical Specification, Section 01 69 50, Shutdowns and Site Access covers the Contractor requirements for scheduling Shutdown/Specific Condition Events including incentives (early completion or incentive bonuses) or deterrents (liquidated damages) for timely completion of the contract work associated with a particular Shutdown/Specific Condition Event, as appropriate.
- The specifications include provisions for potential Shutdown/Specific Condition Event delay contingencies such as contractor construction activity re-sequencing, contractor demobilization/remobilization, or other appropriate delay mitigation measures.

5.13.4 For each Shutdown/Specific Condition Event the SFPUC



Infrastructure CM Shutdown/Specific Condition Delivery Team confirms or needs to identify the following basic Work-Around Plan information:

- a. Shutdown/Specific Condition Event Number and Name
- b. Date form was initiated
- c. CM team member preparing Work-Around Plan information
- d. Shutdown/Specific Condition description
- e. Project name and number
- f. Shutdown/Specific Condition Event window duration
- g. Seasonal constraints and changes
- h. System/other constraints
- i. Related Shutdown/Specific Condition Events (list as many as needed)
  - o Shutdown/Specific Condition Event Name and Number
  - o Date form was initiated
  - o CM team member who prepared Work-Around
  - o Plan information:
  - o Shutdown/Specific Condition description
  - o Project name and number
  - o Shutdown/Specific Condition Event window duration
  - o Seasonal constraints
  - o System/other constraints
  - o Related Shutdown/Specific Condition Events (list as many as needed).

5.13.5 A Work-Around Plan update is needed if a particular Specific Condition Event needs to be rescheduled due to new circumstances. Under the direction of the Senior PM, the project teams need to outline the Work-Around options and actions required for both the primary Shutdown/Specific Condition Event and the related Shutdown/Specific Condition Event. This effort must be coordinated with the Shutdown/Specific Condition Coordinator, and the Shutdown/Specific Condition Delivery Team.

5.13.6 The ORs will play a key role in developing work-around options in conjunction with the Shutdown/Specific Condition Delivery Team which meets at least monthly to review the Shutdown /Specific Condition Event schedules. The Work-Around Plan must be an

attachment to the OCR (sample OCR Attachments 022 -2, 3, or 4).

5.13.7 There are several factors to consider in developing a Work-Around Plan. Below are some of the possible considerations in developing the Work-Around Plans.

- a. Analyze Shutdown/Specific Condition period/duration for feasibility.
- b. Check on operational staffing resources.
- c. Analyze potential “what if” scenarios.
- d. Meet operational targets (demands [average, diurnal, and maximum day], replenishment, system pressures/grade lines, shutdown durations, reservoir water storage levels, water quality, etc.).
- e. Analyze risk involved with simultaneous Shutdown/Specific Condition and sequencing of Shutdown/Specific Condition.
- f. Review status of associated /wastewater system facilities.
- g. Review water/wastewater system facilities under construction.
- h. Review back-up facilities.
  - i. Determine alternate sources.
  - j. Determine effects of conservation or alternate sources for contingency planning.
- k. Examine Shutdown/Specific Condition specific considerations.
  - l. Perform hydraulic analyses.
- m. Consider hydrology and reservoir levels.
- n. Review wholesale customer and affected parties impacts. Review Contractor’s contingency plan for termination of Shutdown/Specific Condition.
- o. Examine impact on most critical Shutdown/Specific Condition Events.

The schedule for the Work-Around Plan is shown in Attachment 019-8.

## **6.0 Other Procedural Requirements**

The following activities are not specific to the subject CM procedure but are necessary to complete the Shutdown/Specific Condition Event process:

### **6.1 Hydraulic Analyses**

A hydraulic analysis is prepared in advance of most approved shutdowns

in order to evaluate the impact of the shutdown in conjunction with other scheduled shutdowns on short-term delivery capacity and ability to meet long-term hydrologic goals. This analysis is prepared by the SFPUC EMB Systems Engineering Group in coordination with the Operations Division. The analysis may need to be revised for any changes in the shutdown schedule.

6.1.2 If a change to the original shutdown schedule is proposed through a SOR/SCR, then the OR, in preparing the OCR, must consult with the Operations Division Manager and EMB Systems Engineering Group to determine whether an update to the hydraulic analysis is warranted for the proposed change. This update to the analysis may be required as part of the OCR, or may be waived by the Operations Division Manager.

6.1.3 In preparing an OCR, the OR and Operations Division Manager may request that the analysis be updated by EMB System Engineering Group to evaluate the effects of schedule changes. A satisfactory hydraulic analysis may either be a requirement of the OCR, or may be waived by the Operations Division Manager.

## **6.2 Semi-Annual Master System Shutdown/Specific Condition Schedule Update**

Semi-Annual Master System Shutdown/Specific Condition Schedule updates is prepared by Senior PM. The SDC reviews the Semi-Annual Master System Shutdown/Specific Condition Schedule update and prepares a summary report for signature by the CMB Manager.

## **6.3 Customer and Affected Parties Notification**

Water/Wastewater Enterprise Operations will formally and individually notify customers and affected parties of Shutdown/Specific Condition Events 12-18 months in advance and then 4-6 weeks prior to the actual system shutdown. It is necessary that the RE notify the SDC and the OR if there is a change to the Shutdown/Specific Condition Event (scope or schedule).

## **6.4 Hot Work**

Some SFPUC Infrastructure CM construction activities do not fall into the Shutdown/Specific Condition category; but, are quasi- Shutdown/Specific Condition or hot work. These activities also need to be tracked along with the Shutdown/Specific Condition Events in order to keep Operations personnel aware of construction work activity at their facilities, including the number of people and amount of equipment at their existing facility. The Operations Group/Supervision at the facility is to be updated on a frequent basis on the status of the hot work and Contractor's activity so that a clear understanding of potential hazards/risks to Operations and to construction can be identified and communicated swiftly and correctly

amongst the parties involved in the hot work.

The work included is a part of a contract with the SFPUC and therefore Operations needs to know who, how many, and where Contractor's personnel will be on any given day and those areas/systems the contractor will be working with or working on.

The information required will be included in the Access Request Form (Attachment 019-10); add pages with additional information for clarity as necessary. This form precedes the Contractor's hot work activity.

Operations personnel are to be updated frequently (daily if necessary) on the status of the hot work and to additionally advise CMB Manager and Contractor of relevant changes to operations which affect construction work.

## **7.0 References**

### **7.1 Technical Specifications**

Technical Specifications Division 01: General Requirements 01 69  
50: Shutdowns and Site Access.

### **7.2 SFPUC Infrastructure CM Procedures**

No. 011 Construction Change Management

No. 018 System Testing and Start-Up

No. 020 Project History/Lessons Learned

### **7.3 References and SFPUC Infrastructure CM Procedures**

Lockout/Tagout, OSHA Title 29. CFR Part 1910.147.

California Code of Regulations, Title 8 (CCR), Sections 3314  
and 2320.4-2320.6.

SFPUC Infrastructure Risk Mitigation Action Plan,  
prepared by SFPUC

PM Procedure No. 3.14, Project Closeout Report

## 8.0 **Attachments**

- 019 – 1A Shutdown/Specific Condition Request (SOR/SCR) Form (Contractor)
- 019 - 1B Shutdown/Specific Condition Request (SOR/SCR) Form (Contractor)
- 019 – 2 Water Supply & Treatment Division (WS&TD) Operational Change Request (OCR) Form
- 019 – 3 Hetch Hetchy Water and Power (HHWP) Operational Change Request (OCR) Form/Shutdown Approval Procedure
- 019 – 4 City Distribution Division (CDD) Operational Change Request (OCR) Form (Out of Service/Return to Service Record)
- 019 – 5 Shutdown/Specific Condition Event Summary Report Format
- 019 – 6 Monthly Revision of Master System Shutdown/Specific Condition Schedule (Flowchart) Flowchart
- 019 – 7 SFPUC Lockout/Tagout Program
- 019 – 8 Typical Shutdown/Specific Condition Events Schedule
- 019 – 9 Guidance on Procedures for Confined Space Entry Work in Water System Pipelines
- 019 – 10 Access Request Form
- 019 – 11 Wastewater Enterprise Lockout/Tagout Procedure/Plan
- 019 – 12 Wastewater Enterprise Lockout/Tagout Plan
- 019 - 13 HHW&P Lockout/Tagout Test Program LOTO-T
- 019 - 14 Revision Control Log

**Attachment 019 – 1A**  
*Page 1 of 2*  
**Shutdown/Specific Condition Request  
Form (SOR/SCR) (Contractor)**

**SAN FRANCISCO PUBLIC UTILITIES COMMISSION**  
*<Insert Program Title Here>*

## **SYSTEM OUTAGE REQUEST (SOR) FORM**

This form is to be prepared by the Contractor to request an outage of any portion of the SFPUC water treatment and ancillary systems and/or transmission and delivery systems to allow the Contractor to perform contracted work requiring a system Outage.

The Contractor proposing an Outage Event must prepare a “Proposed System Outage Work Plan”. This plan is to be filled in as completely as possible and submitted to the City Representative, RE. The RE will forward the SOR to the concerned Operations Division for review and approval.

Significant scope changes or changes in the overall schedule will require an amended work plan and supplementary review and approval.

**CONTRACTOR’S NAME AND CONTACT INFORMATION:**

**(Provide multiple contacts including emergency contact numbers):**

**SHUTDOWN EVENT NAME:**

**FACILITY/FACILITIES AND DATES TO BE SHUTDOWN/AFFECTED:**

**CONTRACTOR’S WORK PLAN** (Attach Work Plan meeting the requirements of Specification 01 69 50):

**CONTRACTOR’S REPRESENTATIVE** \_\_\_\_\_

Date \_\_\_\_\_

**FACILITY/FACILITIES AND DATES TO BE SHUTDOWN:**

---

**Attachment 019 – 1A**  
*Page 2 of 2*  
**Shutdown/Specific Condition Request  
Form (SOR/SCR) (Contractor)**

**SAN FRANCISCO PUBLIC UTILITIES COMMISSION**  
*<Insert Program Title Here>*

***SYSTEM OUTAGE REQUEST (SOR) FORM***

**CONCUR:**

**PROJECT CONSTRUCTION MANAGER:** \_\_\_\_\_

**REGIONAL CONSTRUCTION MANAGER:** \_\_\_\_\_

**PROJECT OPERATIONS REPRESENTATIVE:** \_\_\_\_\_

**WSIP SHUTDOWN COORDINATOR:** \_\_\_\_\_

**THIS CONTRACTOR-INITIATED *SYSTEM OUTAGE REQUEST* IS NOT CONSIDERED APPROVED UNTIL IT HAS BEEN SIGNED BY THE OPERATIONS MANAGER AND A COPY IS DELIVERED TO THE CONTRACTOR BY THE CITY REPRESENTATIVE.**

**THIS OUTAGE REQUEST IS NORMALLY ACCOMPANIED BY AN SFPUC INTERNALLY GENERATED FORM REFERRED TO AS AN *OPERATIONAL CHANGE REQUEST* PREPARED BY THE CONCERNED SFPUC OPERATING DIVISION.**

**APPROVAL OF CONTRACTOR'S SHUTDOWN EVENT WORK PLAN:**

**OPERATIONS MANAGER:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

**Attachment 019 – 1B**  
*Page 1 of 2*  
**Shutdown/Specific Condition Request  
Form (SOR/SCR) (Contractor)**

**SAN FRANCISCO PUBLIC UTILITIES COMMISSION  
SEWER SYSTEM IMPROVEMENT PROGRAM**

***SPECIFIC CONDITION REQUEST (SCR) FORM***

This form is to be prepared by the Contractor to request a special condition of any portion of the SFPUC wastewater treatment and ancillary systems and/or collection and transmission and delivery systems to allow the Contractor to perform contracted work requiring a system Specific Condition Event.

The Contractor proposing a Specific Condition Event must prepare a “Proposed System Specific Condition Work Plan”. This plan is to be filled in as completely as possible and submitted to the City Representative, RE. The RE will forward the SCR to the concerned Operations Division for review and approval.

Significant scope changes or changes in the overall schedule will require an amended work plan and supplementary review and approval.

**CONTRACTOR’S NAME AND CONTACT INFORMATION:**

**(Provide multiple contacts including emergency contact numbers):**

**SPECIFIC CONDITION EVENT NAME:**

**FACILITY/FACILITIES AND DATES TO BE AFFECTED:**

**CONTRACTOR’S WORK PLAN** (Attach Work Plan meeting the requirements of Specification 01 69 50):

**CONTRACTOR’S REPRESENTATIVE** \_\_\_\_\_

Date \_\_\_\_\_

**FACILITY/FACILITIES AND DATES TO BE SHUTDOWN:**



**ATTACHMENT 019 – 1B**  
*Page 2 of 2*  
**Shutdown/Specific Condition Request  
Form (SOR/SCR) (Contractor)**

**SAN FRANCISCO PUBLIC UTILITIES COMMISSION  
SEWER SYSTEM IMPROVEMENT PROGRAM**

***SPECIFIC CONDITION REQUEST (SCR) FORM***

**CONCUR:**

**PROJECT CONSTRUCTION MANAGER:** \_\_\_\_\_

**REGIONAL CONSTRUCTION MANAGER:** \_\_\_\_\_

**PROJECT OPERATIONS REPRESENTATIVE:** \_\_\_\_\_

**WSIP SHUTDOWN COORDINATOR:** \_\_\_\_\_

**THIS CONTRACTOR-INITIATED *SPECIFIC CONDITION REQUEST* IS NOT CONSIDERED APPROVED UNTIL IT HAS BEEN SIGNED BY THE OPERATIONS MANAGER AND A COPY IS DELIVERED TO THE CONTRACTOR BY THE CITY REPRESENTATIVE.**

**THIS *SPECIFIC CONDITION REQUEST* IS NORMALLY ACCOMPANIED BY AN SFPUC INTERNALLY GENERATED FORM REFERRED TO AS AN *OPERATIONAL CHANGE REQUEST* PREPARED BY THE CONCERNED SFPUC OPERATING DIVISION.**

**APPROVAL OF CONTRACTOR'S SPECIFIC CONDITION EVENT WORK PLAN:**

**OPERATIONS MANAGER:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

Attachment 019 - 2

Page 1 of 12

Water Supply & Treatment Division (WS&TD)
Operational Change - Form



5/17/11

REGIONAL WATER SYSTEM
OPERATIONAL CHANGE REQUEST
Water Supply and Treatment Division

INSTRUCTIONS FOR COMPLETING THIS FORM

This form is to be used for any project within the Regional Water System that requires a full shutdown, hot tap, or any other work that would directly impact normal system operations. This form, including all supplemental information indicated in under "Planning Checklist", shall be completed by the shutdown coordinator.

Once the indicated information is collected and attached, this form shall be routed to the section heads of each section for review and approval as indicated herein. If additional information and/or details become available after initial approval, this form shall be amended to include that additional information and re-routed for supplemental review and approval. Any changes to scope and/or schedule shall require supplemental review and approval.

SHUTDOWN COORDINATOR INFORMATION

Date of Initial Request: \_\_\_\_\_ Shutdown Number: \_\_\_\_\_
Name of Shutdown Coordinator: \_\_\_\_\_ Contact Number: \_\_\_\_\_

PLANNING CHECKLIST

(Shutdown coordinator shall check the appropriate box, and attach additional sheets as necessary)

- Included N/A
Shutdown Outage Request (SOR): If the work performed is in support of a contractor's outage request, include a copy of the approved SOR and all SOR supporting documents including details on the contractor's confined space work and the contractor's Incidental Water Management Plan, if applicable.
OCR Work Plan: Attach a copy of the completed work plan template that describes the work required for the initial shutdown, work performed by WSTD crews during the shutdown, and the work required for return to service. This attachment is required for all shutdowns.
Hydraulic Impacts and Limitations: Attach a summary list of impacts of the shutdown to the Regional Water System. Include a copy of the hydraulic analysis. Shutdowns that remove supply sources or restrict transmission system capacity may require consultation with the System Operations Manager.
RWQCB Notice of Temporary Discharge: Attach notification to the RWQCB that details the locations of each discharge point, the approximate flow rates and overall volume of each discharge, and the Best Management Practices utilized to minimize erosion.
Environmental Review Summary: Attach a list all environmental issues that require review and/or mitigation. Include all additional required regulatory agency notifications and copies of applicable permits and/or environmental documents. Consult the Natural Resources Division for guidance.
Disinfection Plan: Prepare and attach a plan developed by the WQD to disinfect any potable facilities that are depressurized to support the work. Include estimates of time required for disinfection as well as quantity and type of chemicals used for disinfection.
Incidental Water Management Plan (IWMP): If the work performed involves pipe entry by WSTD staff behind a single isolation butterfly valve, an IWMP shall be prepared.
Lock-Out/Tag-Out (LOTO) Plan: Include one LOTO plan for all equipment to be locked out by WSTD, including those locked out by either O&M and SYSOPS personnel.

**Attachment 019 - 2**

Page 2 of 12

**Water Supply & Treatment Division (WS&TD)  
Operational Change Request (OCR) Form**



**REGIONAL WATER SYSTEM  
OPERATIONAL CHANGE REQUEST  
Water Supply and Treatment Division**

5/17/11

**REQUIRED NOTIFICATIONS**

*(Shutdown coordinator shall complete and make the requisite notifications as necessary)*

Notice Sent	Not Applicable	Agency	Date of Notice
<input type="checkbox"/>	<input type="checkbox"/>	SFPUC City Distribution Division	_____
<input type="checkbox"/>	<input type="checkbox"/>	SFPUC Natural Resources Division	_____
<input type="checkbox"/>	<input type="checkbox"/>	SFPUC Water Quality Division	_____
<input type="checkbox"/>	<input type="checkbox"/>	SFPUC Health and Safety Division	_____
<input type="checkbox"/>	<input type="checkbox"/>	Regional Water Quality Control Board	_____
<input type="checkbox"/>	<input type="checkbox"/>	California Department of Public Health	_____
<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

**REVIEWER APPROVALS**

*(This form requires a signature from each reviewer listed, even if the work is not applicable to that section)*

Approved	Not Applicable	Comments Attached	Reviewer	Reviewer Signature	Date
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	WSTD System Operations Manager	_____	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	WSTD Operations and Maintenance Manager	_____	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	WSTD Maintenance Engineering Senior Engineer	_____	_____

**ADDITIONAL COMMENTS**

*(Shutdown coordinator to complete as necessary)*

**DIVISION MANAGER APPROVAL**

*(This signature is required for all projects)*

Request Approved By: \_\_\_\_\_  
*Water Supply and Treatment Division Manager* \_\_\_\_\_  
*Date*

Attachment 019 - 2

Page 3 of 12

Water Supply & Treatment Division (WS&TD)  
Operational Change Request (OCR) Form



REGIONAL WATER SYSTEM  
OCR WORK PLAN  
Water Supply and Treatment Division

**INSTRUCTIONS FOR COMPLETING THIS FORM**

This form is to be used to document the work associated with a system shutdown and must accompany all OCR's submitted for review and approval. All applicable fields shall be completed as indicated. Attach a diagram detailing the shutdown. **This form shall be completed by the shutdown coordinator.**

**KEY CONTACT INFORMATION**

Date of Initial Request: _____	
Shutdown Coordinator: _____	Contact Number: _____
WSTD General Foreman: _____	Contact Number: _____
WSTD Field Foreman: _____	Contact Number: _____
WSTD Field Foreman: _____	Contact Number: _____
WSTD Field Foreman: _____	Contact Number: _____
WQD Field Operations Rep: _____	Contact Number: _____
NRD Field Biologist: _____	Contact Number: _____

**PROJECT INFORMATION**

Shutdown Number: \_\_\_\_\_ WO Number: \_\_\_\_\_  
Facility/Asset Impacted: \_\_\_\_\_

Scope of Work (include initial shutdown, work by WSTD during shutdown, and return to service):



**Attachment 019 - 2**

*Page 5 of 12*

**Water Supply & Treatment Division (WS&TD)  
Operational Change Request (OCR) Form**



**REGIONAL WATER SYSTEM  
RWQCB NOTICE OF TEMPORARY DISCHARGE  
Water Supply and Treatment Division**

**INSTRUCTIONS FOR COMPLETING THIS FORM**

This form is to be used to document the treated water discharges associated with the system shutdown described in the OCR. It is required that this notification be made to the Regional Water Quality Control Board (RWQCB) at least 7 calendar days prior to the actual discharge taking place. **This form shall be completed by the shutdown coordinator.**

**KEY CONTACT INFORMATION**

Name of Shutdown Coordinator: _____	Contact Number: _____
WSTD General Foreman: _____	Contact Number: _____
WSTD On-Site Field Foreman: _____	Contact Number: _____
WSTD On-Site Field Foreman: _____	Contact Number: _____
WSTD On-Site Field Foreman: _____	Contact Number: _____

**DISCHARGE INFORMATION**

*(Shutdown coordinator shall provide the information indicated below for all discharge sites)*

Shutdown Number: \_\_\_\_\_ WO Number: \_\_\_\_\_

Pipeline: \_\_\_\_\_

Dates of Discharge: \_\_\_\_\_ to \_\_\_\_\_  
*Start Date End Date*

Time of Discharge: \_\_\_\_\_ to \_\_\_\_\_  
*Start Time End Time*

**Discharge Summary Table**

Water Type		Site Number	Site Name	GPS Coordinates		Anticipated Discharge		Affected Water Body
Raw/ Ground	Potable			North (deg)	West (deg)	Flow (gpm)	Volume (gal)	
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>							

**Attachment 019 - 2**

*Page 6 of 12*

**Water Supply & Treatment Division (WS&TD)  
Operational Change Request (OCR) Form**



**REGIONAL WATER SYSTEM  
RWQCB NOTICE OF TEMPORARY DISCHARGE  
Water Supply and Treatment Division**

**EROSION CONTROL**

*(Shutdown coordinator shall provide details on the method(s) used to mitigate erosion, including all BMPs utilized.*

[Empty box for providing details on erosion control methods and BMPs utilized.]

**SHUTDOWN COORDINATOR SIGNATURE**

Notification Prepared By: \_\_\_\_\_  
*Signature of Shutdown Coordinator*

\_\_\_\_\_ *Date*

Attachment 019 - 2

Page 7 of 12

Water Supply & Treatment Division (WS&TD)  
Operational Change Request (OCR) Form



REGIONAL WATER SYSTEM  
INCIDENTAL WATER MANAGEMENT PLAN  
Water Supply and Treatment Division

**INSTRUCTIONS FOR COMPLETING THIS FORM**

This form is to be used to document the work associated with a confined space pipe entry behind a single block butterfly valve and must accompany all OCR's submitted for review and approval. All applicable fields shall be completed as indicated. Attach a diagram detailing the shutdown. This form shall be completed by the shutdown coordinator.

**JOB INFORMATION**

Shutdown Number: \_\_\_\_\_

Job Work Order Number: \_\_\_\_\_

Shutdown Coordinator: \_\_\_\_\_

WSTD General Foreman: \_\_\_\_\_

WSTD Field Foreman: \_\_\_\_\_

WSTD Field Crew: \_\_\_\_\_

Pipeline to be Isolated: \_\_\_\_\_

Valves Closed to Isolate Pipeline: \_\_\_\_\_

**PIPE ENTRY DETAILS**

City and Cross Street(s): \_\_\_\_\_

GPS Coordinates: \_\_\_\_\_ N \_\_\_\_\_ W

**DEWATERING PLAN (describe in detail)**

Leaking Valve(s): \_\_\_\_\_ Estimated Leakage Rate (gpm): \_\_\_\_\_

**Description of Dewatering Method:**  
*(Describe how leakage water will be removed, e.g. sandbag berm and pumps, gravity feed from a blow-off, etc. Provide specific details regarding the number, sizes and types of pumps used, design of sandbag berm, size of blow-offs used for gravity discharge, etc. Attach drawing as necessary)*

**Water Level Monitoring Plan:**  
*(Describe in detail how water levels will be monitored; include high water level that triggers evacuation in the event of catastrophic valve failure or unmanageable leakage rate)*



**Attachment 019 - 2**

Page 8 of 12

**Water Supply & Treatment Division (WS&TD)  
Operational Change Request (OCR) Form**



**REGIONAL WATER SYSTEM  
INCIDENTAL WATER MANAGEMENT PLAN  
Water Supply and Treatment Division**

**DEWATERING PLAN (continued)**

Communications Plan:

(Describe in detail how communications will occur between staff in and out of the pipe, including how emergency evacuations will be communicated)

**ADDITIONAL COMMENTS**

(Shutdown coordinator to complete as necessary)

**SHUTDOWN COORDINATOR SIGNATURE**

Prepared By: \_\_\_\_\_  
Signature of Shutdown Coordinator

\_\_\_\_\_ Date



**Attachment 019 - 2**

*Page 10 of 12*

**Water Supply & Treatment Division (WS&TD)  
Operational Change Request (OCR) Form**



**REGIONAL WATER SYSTEM  
LOCK-OUT/TAG-OUT (LOTO) PLAN  
Water Supply and Treatment Division**

**LOTO PROTOCOL AND SIGN-OFF**

*(O&M and/or SYSOPS Supervisor shall complete the table below, and attach additional sheets as necessary)*

Attach a system or facility schematic showing all energy sources associated with the shutdown.

Item Number	Energy Source Type (hydraulic, electric, pneumatic, etc.)	Equipment, Device or Energy Source Name	Energy Source Isolation Type	Describe the Means of Locking Out Equipment, Device or Energy Source	Date, Time and Initials of Lock On	Date, Time and Initials of Lock Off
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			
			<input type="checkbox"/> Single Block <input type="checkbox"/> Double Block <input type="checkbox"/> N/A			



Attachment 019 - 2

Page 12 of 12

Water Supply & Treatment Division (WS&TD)  
Operational Change Request (OCR) Form



REGIONAL WATER SYSTEM  
LOCK-OUT/TAG-OUT (LOTO) PLAN  
Water Supply and Treatment Division

**SINGLE-BLOCK ANALYSIS (continued)**

For all **single-block butterfly valves** in the shutdown, provide reason(s) for not providing a double-block isolation (e.g. system configuration limitations, system demand, etc.):

[Empty text box for providing reasons for not providing double-block isolation]

Provide details on pressure surge mitigation utilized during shutdown.

[Empty text box for providing details on pressure surge mitigation]

**ADDITIONAL COMMENTS**

*(Complete as necessary)*

[Empty text box for additional comments]

**APPROVAL SIGNATURES**

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
*Signature of O&M Supervisor for LOTO*

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
*Signature of SYSOPS Supervisor for LOTO*

Reviewed: \_\_\_\_\_ Date: \_\_\_\_\_  
*Signature of Overall LOTO Coordinator*

Approved: \_\_\_\_\_ Date: \_\_\_\_\_  
*Signature of Facility/System Owner Representative*

**Attachment 019 - 3**

*Page 1 of 3*

**Hetch Hetchy Water & Power (HHWP) Operational Change Request (OCR) Shutdown Approval Procedure Form**

***SHUTDOWN APPROVAL PROCEDURE***

The purpose of this document is to prescribe the procedure that is to be followed in order to shutdown any portion of the Water and Power transmission and delivery system within the Hetch Hetchy Operation System.

The person/section proposing a shutdown needs to prepare a "Proposed Shutdown Planning Checklist." (Copy attached) It is to be filled in as completely as possible and circulated to the appropriate reviewers for their comments and concurrence.

After the checklist has been completed, the entire package is to be submitted to the Superintendent of Operations for review and approval. As more information and details become available, they are to be amended to the original checklist. Significant changes and changes in the overall schedule will require supplementary review and approval.

**FACILITY (IES) AND DATE TO BE SHUTDOWN:**

---

---

**PROPONENT:**

\_\_\_\_\_ Phone No.: \_\_\_\_\_

**APPROVAL:**

Superintendent of Operations: \_\_\_\_\_

Date: \_\_\_\_\_

**Attachment 019 - 3**

*Page 2 of 3*

**Hetch Hetchy Water & Power (HHWP)  
Operational Change Request (OCR) Shutdown Approval Procedure Form**

**SHUTDOWN PLANNING CHECKLIST**

**FACILITY (IES) TO BE SHUTDOWN:**

\_\_\_\_\_

**PROPONENT:**

\_\_\_\_\_

Phone No.: \_\_\_\_\_

**SHUTDOWN COORDINATOR:**

\_\_\_\_\_

Phone No.: \_\_\_\_\_

**OBJECTIVE(S) OF THIS SHUTDOWN:**      **WORK ORDER NUMBER:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**REVIEWERS:**

	<b>Does Not Apply</b>	<b>OK</b>	<b>See Attached Comments</b>	<b>Serious Difficulties</b>	<b>Reviewer's Signature</b>
Resource Planning	_____	_____	_____	_____	_____
Maintenance Engineer	_____	_____	_____	_____	_____
Environmental M&R Water Operations Maintenance	_____	_____	_____	_____	_____
Electrical	_____	_____	_____	_____	_____
Safety	_____	_____	_____	_____	_____
Machine Shop	_____	_____	_____	_____	_____
CMB	_____	_____	_____	_____	_____
Water Quality Water Supply & Treatment	_____	_____	_____	_____	_____

**Attachment 019 - 3**

*Page 3 of 3*

**Hetch Hetchy Water & Power (HHWP)  
Operational Change Request (OCR) Shutdown Approval Procedure Form**

**SHUTDOWN PLANNING CHECKLIST**

**COORDINATION MEETING:**

A shutdown coordination meeting(s) shall be held of all interested and affected parties to ensure that proper planning, scheduling and coordination is being achieved. Multiple meetings will be held if necessary – particularly for complex jobs involving key facilities.

**KEY CONTACTS:**

List the key contact person(s) for the various bureaus, sections and/or divisions.

Person	Section, Division, Etc.	Office Phone	Page Number	Cellular Number	Radio #

**IMPACTS AND LIMITATIONS THIS SHUTDOWN WILL HAVE UPON THE SYSTEM:**

(Attach separate sheet if necessary)

**BASIC PLAN:**

- Attach separate sheet(s) outlining in a general chronological order the various activities of work to be performed, when, how and by whom.
- Include contingency plans for maintaining service if certain key components of the system fail during this shutdown.
- Include a work-around plan that includes a plan for a given WSIP shutdown in case this shutdown needs to be rescheduled. A given shutdown may affect other WSIP critical shutdowns that cannot be rescheduled. Critical shutdowns such as the CRT, CSB Tunnel, and the BDPLs take precedence over other shutdowns. The project teams need to provide options for allowing the Contractor to continue construction activities even though the shutdown window for a given contract has been delayed.
- Include estimates of time and resources it will take to return the shutdown facility to service if need be in case of an emergency.
- Identify safety and/or environmental issues that require review and/or technical assistance.
- What activities need to be mitigated; what measures (be specific) will be undertaken to mitigate those activities.
- What agencies/groups need to be notified? What permits are required?
- List all equipment, materials, manpower and other resources need to perform the work. Are they available? If not, how will they be obtained? Will overtime be required?
- Identify those unknowns that may adversely affect the performance of the work as planned. List all assumptions that are being made.
- If appropriate, attach drawing(s) and/or map(s) showing the area where the work is to be performed, the work to be performed, configurations of the system and/or anything else that might be pertinent.

**ACTIVITY/TASK LIST:**

Attach separate sheet(s), being as specific as possible, enumerating each and every activity and task necessary to be performed. If possible, this listing should include the person responsible for supervising the activity, time/dates of when the activity is to be performed, the person(s) responsible for performing the activity and the work order number(s) covering the activity.

**SCHEDULE/TIMELINE:**

Attach a timeline schedule showing the major phases of work to be performed and the dependency of any one phase of the work upon any other phase(s) of work.



**Attachment 019 - 4**

*Page 1 of 4*

**City Distribution Division (CDD) Operational Change Request (OCR)  
(Out of Service/Return to Service Record) - Form**



**City and County of San Francisco Public  
Utilities Commission  
City Distribution Division  
CDD System Operations Change Request**



This request form is to be used for system shutdowns, testing, startups, etc. The party requesting an operational change will need to prepare a documentation package. Fill out the attached planning checklist and circulate package to the appropriate reviewers for their comments and approval. Include as much documentation/information as possible in the package.

After the checklist has been completed, the entire package is to be submitted to the Operations Manager for review and approval. As more information and details become available, the documentation packet should be amended. Significant changes to scope and/or schedule will require supplemental review and approval.

**FACILITY / FACILITIES:**

---

---

**OBJECTIVE:**

---

---

**PROPOSED DATE** \_\_\_\_\_

**PROPONENT** \_\_\_\_\_ **PHONE** \_\_\_\_\_

**CDD COORDINATOR** \_\_\_\_\_ **PHONE** \_\_\_\_\_

**APPROVAL**

**OPERATIONS MANAGER** \_\_\_\_\_

**DIVISION MANAGER** \_\_\_\_\_

**DATE** \_\_\_\_\_

**Attachment 019 - 4**

*Page 2 of 4*

**City Distribution Division (CDD) Operational Change Request (OCR)  
(Out of Service/Return to Service Record) - Form**

**REVIEWERS:**

	<b>Not Applicable</b>	<b>OK</b>	<b>See Attached Comments</b>	<b>Serious Difficulties</b>	<b>Reviewer's Signature</b>
WS & T	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Systems Engineering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Environmental	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
CDD Operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
PUC - Health and Safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
CMB	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Water Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Natural Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

**NOTIFICATIONS**

	<b>Not Applicable</b>	<b>Notification Made</b>	<b>Notes</b>
WS & T	<input type="checkbox"/>	<input type="checkbox"/>	_____
BAWSCA (wholesale customers)	<input type="checkbox"/>	<input type="checkbox"/>	_____
Communications	<input type="checkbox"/>	<input type="checkbox"/>	_____
CDPH	<input type="checkbox"/>	<input type="checkbox"/>	_____
SFFD	<input type="checkbox"/>	<input type="checkbox"/>	_____
OTHER	<input type="checkbox"/>	<input type="checkbox"/>	_____

**Attachment 019 - 4**

Page 3 of 4

**City Distribution Division (CDD) Operational Change Request (OCR)  
(Out of Service/Return to Service Record) - Form**

**Planning Checklist:** (Include documentation for the following and mark box as "NA" to those that don't apply)

Included N/A

- Basic Plan/Schedule:** Attach separate sheet(s) outlining in a general chronological order the various activities of work to be performed, when, how, and by whom.
- Impacts and Limitations:** List the impacts of the shutdown to the Local Water System.
- Environmental Review:** Environmental issues that require review and/or technical assistance. What activities need to be mitigated; what measures will be undertaken to mitigate those activities? What agencies/groups need to be notified? What permits are required, etc.?
- Personnel/Safety:** List all equipment, materials, manpower and other resources needed to perform the work. Are they available? If not, how will they be obtained? Will overtime be required? Have safety concerns been identified and addressed? Has SFPUC's Health & Safety been involved, etc?
- Documentation:** If appropriate, attach drawing(s) and/or map(s) showing the area where the work is to be performed, configurations of the system and/or any other pertinent information. Model runs verifying the proposed system configuration should be included where appropriate.
- Contingency Plan:** Include plans for maintaining service if certain key components (a pipeline or pump station, etc.) of the system fail during this shutdown. Include estimates of time and resources it will take to return the offline facility to service if need be, in case of an emergency.
- Coordination Meeting:** A shutdown coordination meeting(s) shall be held of all interested and affected parties to ensure that proper planning, scheduling and coordination is being achieved. Multiple meetings will be held if necessary – particularly for complex jobs involving key facilities.

**ATTACHMENT 019 - 4**

Page 4 of 4

**City Distribution Division (CDD) Operational Change Request (OCR)  
(Out of Service/Return to Service Record) - Form**

**KEY CONTACTS**

List the key contact person(s) for the various bureaus, sections, and/or divisions.

<b>Name</b>	<b>Division &amp; Section</b>	<b>Office Phone</b>	<b>Pager Number</b>	<b>Cell Phone</b>	<b>Radio Number</b>
Dan McAuliffe	CDD	(415) 550-4901		(415) 748-0500	502
Bill Teahan	CDD	(415) 550-4949		(415) 601-8779	503
Don Lampe	CDD	(415) 920-4076		(415) 613-4786	601
Paul Ito	CDD	(415) 405-4503	(415) 207-3643	(415) 850-4242	606
Gateroom Office	CDD	(415) 550-4951/52			
Alan R. Wong	WQD	(415) 920-4012			
Carolyn Jones	H & S	(415) 695-7320	(415) 201-6093	(415) 819-6157	
Dee Cutino	WST	(650) 808-3810		(650) 302-0420	
CDD Radio Room		(415) 550-4956			
Lake Merced PS		(415) 333-9300			

**OTHER NOTES**

**Preparer:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Date updated/revised:** \_\_\_\_\_ **Date updated/revised:** \_\_\_\_\_

**Date updated/revised:** \_\_\_\_\_ **Date updated/revised:** \_\_\_\_\_

**Date updated/revised:** \_\_\_\_\_ **Date updated/revised:** \_\_\_\_\_

**Attachment 019 - 5  
Shutdown/Specific Condition Event Summary Report Format**

**SHUTDOWN SUMMARY REPORT**

This form is to be prepared by the Shutdown Coordinator to document the results of the shutdown and prepare a Lessons Learned Summary for possible use on future shutdowns. The results are to be shared with concerned CM and Operations Personnel.

**SHUTDOWN CONTROL NUMBER:** \_\_\_\_\_

**PROJECT AND CONTRACT NUMBER:** \_\_\_\_\_

**PROJECT CM:** \_\_\_\_\_

**OPERATIONS REPRESENTATIVE:** \_\_\_\_\_

**FAILITY SHUTDOWN:** \_\_\_\_\_

**PURPOSE:** \_\_\_\_\_

**SCHEDULED START:** \_\_\_\_\_

**ACTUAL START:** \_\_\_\_\_

**SCHEDULED COMPLETION:** \_\_\_\_\_

**ACTUAL COMPLETION:** \_\_\_\_\_

**SCHEDULED DURATION:** \_\_\_\_\_

**ACTUAL DURATION:** \_\_\_\_\_

**ESTIMATED INTRUSION:** \_\_\_\_\_

**ACTUAL INTRUSION:** \_\_\_\_\_

**TYPE DECHLORINATION:** \_\_\_\_\_

**DISCHARGE PROBLEM:** \_\_\_\_\_

**SIGNIFICANT CHANGES FROM PLAN:** \_\_\_\_\_

**WHAT SHOULD HAVE BEEN DONE DIFFERENTLY?** \_\_\_\_\_

\_\_\_\_\_

**WHAT WERE THE LESSONS LEARNED?** \_\_\_\_\_

\_\_\_\_\_

**Prepared and Submitted by:** \_\_\_\_\_

**Attachment 019 - 6**  
**Monthly Revision of Master System Shutdown/Specific**  
**Condition Schedule Flowchart**

**Attachment 019 - 7**  
*Page 1 of 18*  
**SFPUC LOCKOUT/TAGOUT Program**



525 Golden Gate Avenue, 13th Floor  
San Francisco, CA 94102  
T 415.554.3155  
F 415.554.3161  
TTY 415.554.3488

**San Francisco Public Utilities Commission  
Lockout/Tagout Policy**

**Summary:**

The Lockout/Tagout Policy establishes guidelines, practices, and procedures to protect the San Francisco Public Utilities Commission (SFPUC) employees, outside Contractors, Consultants, and all other outside servicing personnel from hazards caused by the unexpected flow of energy (in any form) or the unexpected operation/movement of equipment, machinery, components or materials.

**Authority:**

California Code of Regulations, Title 8 (CCR 8) including, but not limited to:  
General Industry Safety Orders, §3314  
Electrical Safety Orders, §2320.4-2320.6  
Code of Federal Regulations, 29CFR1910.269

**Scope:**

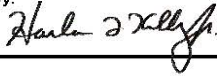
This Policy and its procedures apply to SFPUC employees. In addition the procedures apply to outside contractors or servicing personnel working on SFPUC facilities and SFPUC systems.

This Policy applies to energy sources such as, but not limited to: electrical, electromagnetic, kinetic (moving items), mechanical, hydraulic, pneumatic, chemical, radiation, thermal, physical, and potential energy from suspended or elevated parts or material (gravity), or energy stored in springs.

This Policy applies to activities such as, but not limited to: erecting, installing, constructing, repairing, adjusting, inspecting, cleaning, servicing, overhauling, operating or maintaining the equipment, process, components, machinery, or materials

Revised 5/1/2015

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**SFPUC LOCKOUT/TAGOUT Program**

<b>San Francisco Public Utilities Commission</b>			
<b>Health and Safety Policy</b>			
<b>Title:</b>			
LOCKOUT/TAGOUT (LOTO) POLICY			
<b>Effective Date</b>	<b>Revision No.</b>	<b>Revision Date</b>	<b>Approved By:</b>
11/1/2015	3	6/1/2015	 , General Manager

SAN FRANCISCO PUBLIC UTILITIES COMMISSION  
LOCKOUT/TAGOUT POLICY

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**SFPUC LOCKOUT/TAGOUT Program**

<b>San Francisco Public Utilities Commission</b>
<b>Health and Safety Policy</b>
Title: <b>LOCKOUT/TAGOUT (LOTO) POLICY</b>

1. **POLICY**  
It is the policy of the San Francisco Public Utilities Commission that before any employee performs service or maintenance on machinery or equipment where the unexpected start-up, energizing, or release of stored energy (including engulfment), could occur and cause injury, then equipment, component, or machine must be isolated and rendered inoperative; placed in a Zero Energy State.
2. **OBJECTIVE**  
The objective of the Lockout/Tagout (LOTO) Policy is to establish a control system to prevent the unexpected operation or movement of equipment, components, machinery, or material or the unexpected flow of energy in any form in a process or facility in order to:
  - 2.1. Protect personnel from possible injury caused by the inadvertent movement of equipment/processes encountered during cleaning, servicing, repairing, inspecting, and adjustment operations.
  - 2.2. Comply with applicable regulatory standards.
  - 2.3. Communicate lockout/tagout procedures to anyone who may be affected by the process
3. **SCOPE**
  - 3.1. This Policy and its procedures apply to SFPUC employees. In addition the procedures apply to outside contractors or servicing personnel working on SFPUC facilities and SFPUC systems.
  - 3.2. This Policy applies to energy sources such as, but not limited to: electrical, electromagnetic, kinetic, mechanical, hydraulic, pneumatic, chemical, radiation, thermal, physical, and potential energy from suspended or elevated parts or materials, or energy stored in springs.
  - 3.3. This Policy applies to activities such as, but not limited to: erecting, installing, constructing, repairing, adjusting, inspecting, cleaning, servicing, overhauling, operating or maintaining equipment, components, and processes.
  - 3.4. **EXCEPTIONS**  
This Policy does not apply to the following:
    - 3.4.1. Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start up is controlled by unplugging the equipment and the plug is under the exclusive control of the employee performing the servicing or maintenance.
    - 3.4.2. Tapping operations involving pressurized systems provided that the employer demonstrates 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.

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**SFPUC LOCKOUT/TAGOUT Program**

<b>San Francisco Public Utilities Commission</b>
<b>Health and Safety Policy</b>
Title: <b>LOCKOUT/TAGOUT (LOTO) POLICY</b>

**4. RESPONSIBILITIES**

**4.1. General Manager:**

Overall responsibility for safety throughout the SFPUC rests with the General Manager, who establishes the SFPUC's goals and policies. Responsibilities include the following:

- 4.1.1. Adopt and enforce the SFPUC's Lockout/Tagout Policy.
- 4.1.2. Support budget for lockout/tagout operations, training, and equipment.
- 4.1.3. Exercise oversight review on lockout/tagout issues.

**4.2. Assistant General Managers and Division Managers:**

- 4.2.1. Implement the SFPUC's Lockout/Tagout Policy within their areas of responsibility.
- 4.2.2. Ensure that personnel under their jurisdiction can identify lockout/tagout situations.
- 4.2.3. Ensure that employees have been trained on lockout/tagout procedures.
- 4.2.4. Establish a system that includes documentation for training.
- 4.2.5. Budget and provide for operations, training, and equipment necessary to comply with this Policy.
- 4.2.6. Identify Authorized and Affected Persons.

**4.3. SFPUC Health and Safety Program:**

- 4.3.1. Ensure policies and procedures satisfy current regulatory requirements.
- 4.3.2. Provide technical support for Lockout/Tagout operations and procedures.
- 4.3.3. Provide training/retraining for Authorized and Affected Employees.
- 4.3.4. Audit Lockout/Tagout policy and operations.

**4.4. Supervisors:**

- 4.4.1. Identify locations and situations that require lockout/tagout.
- 4.4.2. Provide locks and tags and other equipment necessary for safe lockout/tagout.
- 4.4.3. Ensure all safety procedures are followed.
- 4.4.4. Require proper use and maintenance of lockout/tagout equipment.
- 4.4.5. Know lockout/tagout hazards, including all forms of available and stored energy.
- 4.4.6. Understand types of energy and methods of control.
- 4.4.7. Train employees to follow lockout/tagout procedures.
- 4.4.8. Follow lockout/tagout procedures and ensure that energy sources are controlled or eliminated.

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**SFPUC LOCKOUT/TAGOUT Program**

<b>San Francisco Public Utilities Commission</b>
<b>Health and Safety Policy</b>
<small>Title:</small> <b>LOCKOUT/TAGOUT (LOTO) POLICY</b>

- 4.5. Employees:
  - 4.5.1. Know and obey lockout/tagout procedures.
  - 4.5.2. Understand types of energy sources and methods of control.
  - 4.5.3. Know lockout/tagout hazards, including all forms of available and stored energy.
  - 4.5.4. Do not perform maintenance unless energy sources have been controlled or eliminated using lockout/tagout procedures.
  - 4.5.5. Use lockout/tagout equipment properly.
  - 4.5.6. Respect the locks and tags of other employees.
  
- 5. DEFINITIONS
  - 5.1. Owner/System Operator:

The Owner/System Operator is the person in charge of operation of the equipment, components, machinery (i.e., facility superintendent, stationary engineer, plant operator, head of operations, or designated representative). This person, or their agent, is responsible for taking the equipment in and out of operation. When work is done in non-SFPUC buildings by SFPUC employees, a designated SFPUC employee will act as the owner for the project duration.
  
  - 5.2. Owner's Out of Service Lock and Tag:
    - 5.2.1. The Owner's Lock is used by the "owner" to indicate that the particular equipment, valve, de-energized switch, etc., is out of service and shall not be operated. It is a representation that the equipment is operationally secured in a safe/off condition and is **NOT for personal safety.**
    - 5.2.2. The Owner's Lock must include a tag marked "Danger, Do Not Operate/Valve Closed" or other similar wording.
    - 5.2.3. Owner's Out of Service Lock and Tag can only be removed by a supervisor or designated employee of the owner that tagged the equipment and only after all other personal danger locks have been removed. These tags must be used with a lockout device whenever possible.
  
  - 5.3. Employee's Repair in Progress Lock and Tag:

Marked "Danger, Do Not Operate, Repair in Progress" or other wording as needed. Used by employees in conjunction with the owner's Out of Service Lock and Tag to signify the presence of someone inside or working on the equipment. The "Repair in Progress" Lock and Tags can only be removed by the employee whose name is on the tag or under certain conditions as noted in Section 7.3.2. When working on equipment within the LOTO controlled area ALL employees are to place their Repair in Progress Locks and Tags on all Energy Isolating Devices or the appropriate Lock Box(es); there are no exceptions.

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**SFPUC LOCKOUT/TAGOUT Program**

<b>San Francisco Public Utilities Commission</b>
<b>Health and Safety Policy</b>
Title: <b>LOCKOUT/TAGOUT (LOTO) POLICY</b>

5.4. Energy isolating device:

A 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 slide gate;
- a slip blind;
- a line valve;
- a block;
- a chain and padlock,
- and/or any similar device used to block or isolate energy.

The term does not include a push button, selector switch, and other control circuit type devices.

5.5. Affected Employee:

An employee whose job requires him/her to operate or use equipment, components, machinery, or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed under lockout/tagout.

5.6. Authorized Employee:

A person who locks out or tags out machines, equipment, or components to perform servicing or maintenance on that machine or equipment. The Authorized Employee must have sufficient knowledge to competently determine effective and safe LOTO procedures for the specific system being locked out. An Affected Employee becomes an Authorized Employee when that employee's duties include performing, cleaning, repairing, servicing, setting-up and adjusting operations covered under this section.

6. GENERAL PROVISIONS

6.1. Compliance:

All SFPUC personnel shall comply with the provisions of the Lockout/Tagout Policy and procedures. Employees not complying with this policy and its accompanying procedures shall be subject to appropriate personnel action.

6.2. Division Specific Procedures:

Each "Operating Division" (WST, CDD, Hetch Hetchy, Wastewater and Power) shall develop their own Division-specific LOTO Program and Procedures. Operating Division-specific LOTO Program and Procedures are to be completed no later than 180 days after this Policy is signed by the General Manager. The Division's program shall be based on this SFPUC wide

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**SFPUC LOCKOUT/TAGOUT Program**

<b>San Francisco Public Utilities Commission</b>
<b>Health and Safety Policy</b>
Title: <b>LOCKOUT/TAGOUT (LOTO) POLICY</b>

LOTO Policy and relevant regulations. The Division specific Program and Procedure shall address:

- Division specific definitions
- Division specific "Written LOTO Plans" format.
- Division specific procedures for applying and removing locks and tags
- Division specific Lock Box procedures.
- Any other Division specific LOTO procedures.

**6.3. LOTO Plans**

A Written LOTO Plan is required for all LOTO work except as specified in paragraph 6.4. The written plan must include:

- A "Job Specific Title" for the plan.
- The date of the plan
- A description of the purpose for the LOTO and related relevant information.
- The dates, groups, facilities, contractors, and others affected by this LOTO.
- If a lock box(s) will be used include in the plan how it (they) will be managed, where the box(s) will reside, who will control the box(s).
- Describe all Equipment, Energy Source(s), or Device(s) to be locked out.
- The device use or method use to lock out each point
- Describe each appurtenance, air valve, or device that, if not functioning properly, could result in the unexpected release of water or energy into the work area.
- The sequencing of the shut down and placement of locks when the shutdown requires a specific sequence for safely shutting down the system.
- The name and signature of the preparer.
- The name and signature of the approver of the plan.
- A signature line for outside Contractors or other servicing personnel confirming they have received and reviewed the plan to their satisfaction and have attended a LOTO walk-through including the inspection of control devices and placement of locks.

**6.4. Exception to Written LOTO Plan Requirement:**

Written LOTO Plans are not required when ALL of the following conditions are met:

- The machine, equipment, or component has a single energy source which can be readily identified and isolated;
- The isolation/locking out of that single energy source will completely de-energize and deactivate the machine, equipment, or component;
- A single lockout device will achieve a lock-out condition;
- The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance;
- The servicing or maintenance does not create hazards for other employees;
- The Division, in utilizing this exception, has had no accidents involving the unexpected activation or re-energizing of the machine, equipment or component during servicing or maintenance during the past 12 months.

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**SFPUC LOCKOUT/TAGOUT Program**

<b>San Francisco Public Utilities Commission</b>
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Title: <b>LOCKOUT/TAGOUT (LOTO) POLICY</b>

6.5. Locks and Tags

- 6.5.1. Physical locks and tags shall be the authorized method used for the lockout/tagout of energy sources. LOTO designated locks and tags shall not be used for any purpose other than personnel protection and removal of equipment from service. Lockout/tagout instructions are specified in the facilities' Lockout/Tagout procedure.
- 6.5.2. Affected employees will be provided with locks and tags in sufficient numbers to complete their jobs. Employee locks shall be individually keyed. The employee shall be the only person to retain the key to that lock when it is in use. Owner Locks may be keyed alike if in accordance with Division specific procedures.
- 6.5.3. A multiple lockout device will be utilized as necessary where more than one lock is to be placed on the energy isolating device(s). Each employee exposed to the unexpected release of energy must still have his/her own lock and Repair in Progress Tag on the equipment, device, or lock box.
- 6.5.4. Individual locks/and tags shall be applied and removed by each employee exposed to the unexpected release of energy, except those special situations where specific facility procedures have been developed that provide protection equivalent to individual locks and tags.
- 6.5.5. As long as any lock and tag is in place, the equipment, component, or machinery shall not be restarted. Locks and tags shall only be removed by the employees that placed them. (Unless certain circumstances exist, See Paragraph 7.3.2.). Under certain conditions, as outlined in paragraph 7.3.2. a supervisor may remove another employee's lock and/or tag.
- 6.5.6. Only Authorized Employees may remove tags from the energy isolating device of equipment, and/or operate a locked out/tagged out system or piece of equipment. Unauthorized lock and/or tag removal shall result in appropriate personnel action, up to and including termination.
- 6.5.7. Upon completion of duties, the Authorized Employee shall remove locks and tags they are responsible for in a timely manner.
- 6.5.8. Any employee assigned to work on equipment may, at any time, request his/her supervisor to explain how to make the job safer or where to place locks or tags.
- 6.5.9. Where equipment, components, or machinery is lockable, the use of a lock and tag is required.
- 6.5.10. Where equipment, components, or machinery is not lockable and cannot be made lockable, tagout application and special energy isolation procedures shall be utilized. Some exposures may require additional protective techniques or mechanical safeguards, as follows:

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**SFPUC LOCKOUT/TAGOUT Program**

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Exposure	Protection
Flywheel/Press rams	Blocks, pins, etc.
Chemicals or steam lines etc.	Slip blinds, chained valves, disconnecting/line breaking, etc.
Mixers, Chemicals, etc.	Fuse, heater removal, drive shaft disconnect, etc.
Hydraulic/Pneumatic Systems.	Automatic bleeding devices, blanking, etc.

- 6.5.11. All forms of energy within the system or equipment, component, or machinery being worked on shall be isolated, locked and tagged.
- 6.5.12. When locks are used in the lockout/tagout application, they shall always be accompanied by appropriate tags.
- 6.5.13. Energy isolating devices shall be clearly labeled or identified to indicate their function unless located and arranged so the purpose is evident. Such identification is necessary to reduce possible errors in applying the lockout/tagout devices.
- 6.5.14. The lockout/tagout of electrical energy sources shall occur at the circuit disconnect switch. (Note: In situations where the circuit cannot be positively interrupted, the responsible supervisor shall develop procedures providing equivalent protection. Feasibility of effective circuit isolation shall be mandated in future engineering improvements.)
- 6.5.15. The use of electrical control circuitry or SCADA to accomplish lockout/tagout is prohibited since it does not offer positive personnel protection. Examples:
  - Electrical shorts. (Water in lines and some types of dust can supply a path to close the control circuit.)
  - Vibration or component failure.
  - Remote or interlocked switches not affected by control circuitry.
- 6.5.16. Locks shall be purchased specifically for lockout applications. They shall be of such design and durability that removal by other than normal means would require excessive force or unusual techniques. In addition, they shall possess individual keying capability for employee locks.
- 6.5.17. Tags shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible. The tag attachment device shall be a non-reusable type, attached by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds (equivalent to a one-piece, all-environmental tolerant nylon cable tie).
- 6.5.18. All tags are to show the Division, workgroup/ section, phone number, first and last name of the "tagger", and the date, time, and reason for tag.

6.6. Lock Box

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- 6.6.1. When many pieces of equipment at one or more locations must be locked out, a Lock Box(es) may be used to implement the LOTO. When lock boxes are used a written description of the use, control, management, and "ownership" of the lock box(es) shall be included in the written LOTO Plan.
- 6.6.2. The Lock Box/Lock Box System shall be designed to ensure that any one affected employee, while in the LOTO protected work, can have their lock(s) placed in such a way that they are assured they are fully protected from any unexpected release of energy.
- 6.6.3. When working on equipment within the LOTO controlled area ALL employees are to place their Repair in Progress Locks and Tags on the appropriate Lock Box(es); there are no exceptions.

**7. PROCEDURES**

**7.1. Application Survey**

- 7.1.1. Each supervisor shall conduct a survey on a job by job basis to determine when and how the equipment, machinery, process can be safely isolated.
- 7.1.2. The survey should determine if energy isolating devices are available, adequate and practically located for positive protection.
- 7.1.3. A plan shall be developed to correct the surveyed deficiencies or provide interim alternative protection in order to make the lockout/tagout system effective.

**7.2. Sample Procedures for Application of Lockout/Tagout**

- 7.2.1. The equipment owner must notify Affected Employees that a lockout is required and the reason therefore.
- 7.2.2. The equipment owner removes the equipment from service and ensures that it is safe for necessary repairs by locking out, de-energizing, and disconnecting, blocking, or other means for isolating and releasing energy sources.
- 7.2.3. The equipment owner signifies this responsibility has been carried out when he/she attaches the isolating device and the signed Out of Service Tag to the de-energized equipment.
- 7.2.4. The equipment owner must place their Out of Service Tags first and remove them last, after the equipment has been released by the employee or work group assigned to repair the equipment.
- 7.2.5. The employee(s) assigned to the repair or servicing of the equipment shall first verify that all forms of energy have been identified, released, and locked out by completing one or more of the following:
  - Operate the equipment/process controls (push buttons, switches, etc.) to verify that energy isolation has been accomplished. Controls must be deactivated or returned to the off (non-operation) position.
  - Check the equipment/process by use of test instruments and/or visual inspection to verify that energy isolation has been accomplished.
  - If residual energy is detected, action must be taken to relieve or restrain the energy. Operate the switch, valve, or other energy isolating devices so that the energy



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source(s) (electrical, mechanical, hydraulic, etc.) is disconnected or isolated from the equipment. Stored energy, such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc., must also be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.

- Then the employee(s) shall place their personal locks and signed and dated tags in addition to the equipment owner's tag and lock, there are no exceptions. The employee's immediate supervisor will be responsible for monitoring compliance of the placement of tags.

7.2.6. In the event a job is incomplete by the end of the shift, each affected employee will remove his/her personal lock and tag leaving the owner's lock and tag for protection of the equipment. When the work is resumed, the employee will again hang his/her lock and tag in addition to the owner's lock and tag. The owner's locks and tags will remain on the energy isolation devices until the job is completed and they are removed by the owner.

7.2.7. When the repair is complete, the Authorized Employee will notify the equipment owner to advise them that the repair (or their part of the repair) has been completed. The equipment is now released back to the owner.

7.2.8. The equipment owner removes the Out of Service tag once he/she has verified that the equipment is safe to return to service.

**7.3. Lock and Tag Removal**

7.3.1. Each affected employee must remove his/her own personal lock and tag when their work is completed, but in no case later than the end of their work shift.

7.3.2. A supervisor may remove an affected employee's tag and cut off a personal lockout device if necessary only if he/she has made absolutely certain that the employee is not in the workplace. Prior to pulling the lock and tag, the supervisor MUST do the following:

- Check to see if the employee has left the premises;
- Call the employee's residence/cellular phone to see if he/she has arrived at home;
- Ensure that the equipment owner is notified of the status of the equipment (e.g. repair in progress, or repair completed) before removing an employee's tag and lock;
- Inspect the equipment and surrounding area to make certain that no one will be in danger if the equipment is allowed to be operated;
- After confirming all the above items in this subsection are accomplished the supervisor may delegate the actual tag and lock removal to a designated employee.
- Ensure that employee knows that his/her lock and tag was removed before he/she resumes work at the facility.

7.3.3. The equipment owner shall be notified when the work is complete and overall lockout/tagout has been cleared.

7.3.4. Before equipment/process energization a visual inspection of the work area shall be made to ensure that all personnel are in the clear and that all non-essential items have been removed and components are operationally intact.

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**8. SPECIAL APPLICATIONS**

**8.1. Lockout/Tagout Interruption (Energized Testing/Troubleshooting)**

In situations where the energy isolating device(s) is locked/tagged and there is a need for testing or positioning of the equipment/process, the following sequence shall apply:

1. Equipment owner shall be notified and he/she will approve and monitor testing;
2. Clear equipment/process of tools and materials;
3. Clear affected personnel;
4. Remove the energy isolating device(s) of locks/tags according to established procedures;
5. Proceed with test;
6. De-energize and re-lock/tag energy isolating device(s) to continue the work;
7. Operate controls, etc. to verify energy isolation;

**8.2. Special Cases**

In special cases involving low voltage lighting or circuitry (6-12 volts), small piping (instrument, air or water), the supervisor will use his/her judgment to determine whether tagging and locking is necessary, and obtain upper management's approval in writing. This decision would be based on the types and amounts of stored energy in the particular system and its ability to cause injury.

**8.3. Use of Butterfly Valves for Isolation of Permit Required Confined Spaces**

8.3.1. The use of a single butterfly valve (BV) to isolate a permit-required confined space from a water engulfment hazard, such as in a water transmission pipeline entry, is permitted provided all of the following requirements are met;

- The specific BV valve is evaluated by a qualified person(s) with sufficient knowledge of the valve capabilities and system operation parameters to render a competent professional assessment on whether the valve could catastrophically fail during the specific project in question.
- A written Lockout/Tagout Plan is developed and implemented per this Lockout/Tagout Policy.
- A written Incidental Water Management Plan is also developed and implemented for control of any nuisance water passing the BV, and to prevent a secondary engulfment hazard. This plan must address who is responsible for incidental water control, the method for control and removal, the details for the water diversion devices and equipment, details on how the incidental water will be discharged, the procedure for regular monitoring of water levels, and the procedure for notifying downstream personnel of emergency situations.
- All other safety measures as required by the SFPUC Confined Space Entry Policy are met.

8.3.2. Isolation by a single BV is not permitted in the following confined space entry situations;

- When there is insufficient operational and/or engineering data available to render a competent professional assessment on the safety of the BV.

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- For the isolation of wastewater or in wastewater systems.
- For the isolation of chemical or steam lines or hazardous atmospheres.
- For smaller BV's that is frequently operated for process control or on branch pipelines, or other significant safety concerns.

8.3.3. When use of a single BV is not permitted for isolation, an alternate protective measure is required, such as double block and bleed, blind flange, or physically disconnecting the pipe.

8.4. Pipeline Isolation, Dewatering, Air Valve Release Verification

8.4.1. Upon successful isolation of a pipeline, the stored energy or water must be released prior to entry. To accomplish this task the pipeline must be dewatered. A person knowledgeable of the system must determine which appurtenances could, if not properly functioning properly, result in the unexpected release of water into a work zone. These appurtenances must be listed individually on the written LOTO Plan and each must be confirmed to have operated properly to ensure they have released any stored water.

8.4.2. The shutdown supervisor must prepare a dewatering plan. The plan should include:

- Confined space entry locations and the limits of the entry/inspection area.
- Locations of blow off valves (BO) and dewatering locations.
- Estimated discharge volume at each discharge location.
- Recorded discharge volume at each discharge location.
- The sequence in which automatic vacuum valves (AVV) and air relief valves (ARV) are to open to atmosphere.
- Field crew confirmation that each AVV and ARV operated correctly during depressurization and is open to atmosphere.

8.4.3. Each entry location must be confirmed dewatered and hazard free prior to entry.

9. CONTRACTOR AND OUTSIDE SERVICING PERSONNEL

9.1. The equipment owner will ensure that contractor and/or outside servicing personnel are notified of SFPUC lockout/tagout requirements before work begins. Contractors and/or outside servicing personnel must follow the SFPUC Division specific LOTO procedures unless the contractor and /or servicing personnel have total control of the hazardous energy source.

9.2. Contractors, Consultants, and all other outside servicing personnel affected by or before assuming LOTO responsibilities, will provide an authorized person to attend the LOTO walk through with the Owner. They will be a signatory to the LOTO Plan document confirming their attendance during walk through including inspection of control devices and placement of locks as directed by SFPUC Operations personnel.

9.3. The Contractor or Outside Servicing personnel must receive a copy of the Written LOTO Plan and have it immediately available as needed.

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**10. HIGH VOLTAGE WORK\***

*\*See 29 CFR 1910.269 Electric Power Generation, Transmission, and Distribution, Paragraph (d) Hazardous Energy Control (lockout/tagout) Procedures.*

- 10.1. Special written procedures (i.e. Codes of Safe Practice) shall be developed to describe the lockout/tagout measures necessary when employees are required to work on high voltage circuits or equipment (greater or equal to 600 volts).
- 10.2. During application of lockout/tagout-on High Voltage electrical equipment, a Qualified Electrical Worker shall use appropriate test equipment (meter) to test the circuit elements and electrical parts, to verify the equipment is de-energized. The test shall detect any residual electrical voltage or back feed. The test equipment shall be checked for proper operation before and immediately after the test.
- 10.3. Protective equipment used during this application shall be:
  - 10.3.1. Maintained in safe, reliable condition;
  - 10.3.2. Periodically inspected and tested.
- 10.4. If energy isolating devices are installed in a central location under the exclusive control of a system operator, all the following requirements apply:
  - 10.4.1. The employer shall use a procedure that affords employees a level of protection equivalent to that by the implementation of personal lockout or tagout devices.
  - 10.4.2. The system operator shall place and remove lockout and tagout devices in place of the Authorized Employee.
  - 10.4.3. Provisions shall be made to identify the Authorized Employee who is responsible for the lockout or tagout devices, and to ensure that an Authorized Employee requesting removal or transfer of a lockout or tagout device is the one responsible for the lockout/tagout devices.

**11. EXCEPTIONS TO PROCEDURE**

- 11.1. In special instances where the Lockout/Tagout procedure cannot be practically applied, a "special lockout/tagout procedure" shall be developed that provides an equivalent level of protection. Those procedures shall be in writing and must have prior approval of the equipment owner, and the SFPUC Health and Safety Program.
- 11.2. Copies of these procedures will be issued as follows:
  - Copies to all affected employees concerned with this special procedure.
  - A copy incorporated into the job specific Code of Safe Practices
  - Copies to the SFPUC Health and Safety Program.
  - Install a sign to indicate a special lockout/tagout procedure that is required on the equipment or process.

**12. TRAINING**

**12.1. Initial Training**

The SFPUC shall provide training to ensure that the purpose and function of the energy control program are understood by employees and owners and that the knowledge and skills

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required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following:

- 12.1.1. Authorized Employees shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.
- 12.1.2. Affected Employees shall be instructed in the purpose and use of the energy control procedure and the recognition of hazards
- 12.1.3. All other employees, whose work operations are or may be in an area where lockout/tagout procedures may be utilized, shall be instructed about the procedure.

**12.2. Tagout Training**

Employees shall also be trained in the following limitations and characteristics of tags:

- Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.
- When a tag is attached to an energy isolating means, it is not to be removed without authorization of the person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.
- Tags must be legible and understandable.
- Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.
- Tags may evoke a false sense of security.
- Tags must be securely attached to lockout devices.
- Tagout device attachment shall be non-reusable.

**12.3. Employee Retraining**

- 12.3.1. Each Division will establish its own policy regarding the frequency of refresher training. Minimally:
- 12.3.2. Retraining shall be provided for employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.
- 12.3.3. Additional retraining shall also be conducted whenever a periodic inspection indicates it is needed.

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12.4. Documentation

The Learning Management System (LMS) will be utilized to document training required under this policy.

13. ANNUAL REVIEW

The SFPUC will conduct an annual audit review of this policy to ensure that the procedures and requirements are being followed, and to identify and correct any problem areas. The annual audit review will be documented.

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APPENDIX A  
SAMPLE LOCKOUT/TAGOUT PROCEDURE SUMMARY

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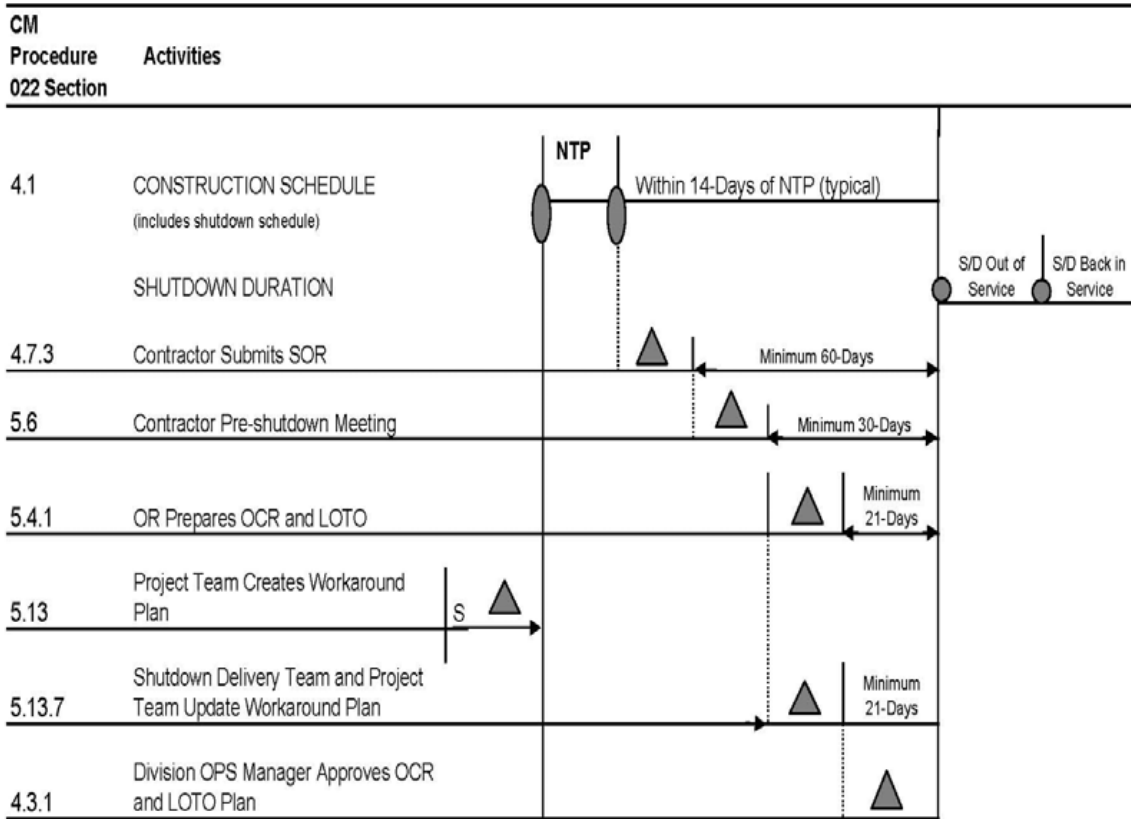
APPENDIX A

SAMPLE LOCKOUT/TAGOUT PROCEDURE SUMMARY

1. **IDENTIFY** service or maintenance that requires lockout/tagout
2. **NOTIFY** equipment owner of job
3. **OWNER**
  - a. **Determines** how to isolate equipment; prepares a written LOTO Plan, and develops special procedures if needed.
  - b. **Isolates** equipment (locks/blocks, etc.) and documents action(s) on written LOTO Plan.
  - c. **Tests** equipment to verify energy isolation (and release) has been accomplished.
  - d. **Attaches Owner's Out of Service** lock(s) and tag(s).
  - e. **Notifies** Authorized Employee (service or maintenance employee who will work on equipment).
4. **AUTHORIZED EMPLOYEE:**
  - a. **Reviews the written LOTO Plan** and verifies if the equipment has been properly isolated.
  - b. **Tests** equipment to verify energy isolation has been accomplished.
  - c. **Adds** Employee's Repair in Progress lock(s) and tag(s). (When many employees are involved, one lock and Repair in Progress Tag are hung on the equipment and the key is placed in a lock box. Subsequent employee locks and Repair in Progress Tags are hung on the lock box).
  - d. **Performs** service or maintenance work.
  - e. **Removes** his/her lock and tag at the end of the job (if finished in one day) or at the end of the shift each day (if the job is not complete). (The owner's tag remains on the equipment until the job is finished.)
  - f. **Notifies** Owner when job is complete.
5. **OWNER:**
  - a. **Verifies** equipment is safe to return to service.
  - b. **Removes** Owner's tag(s) and lock(s), returns equipment to service, and documents actions on the Written LOTO Plan.



## Attachment 019 - 8 Typical Shutdown/Specific Condition Events Schedule



**\*NOTE:** All durations are calendar days

- LOTO - Lockout/Tagout
- NTP - Notice to Proceed
- OCR - Operational Change Request
- SOR - System Outage Request

Revised: 1/7/11

## Attachment 019 - 9

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# Guidance on Procedures for Confined Space Entry Work in Water System Pipelines

Guidance on Procedures for Confined Space Entry Work In Water System Pipelines

### Inter-Office Memo SFPUC Health and Safety Program

To: WST, HHWP, CDD, PMB, CMB, EMB, AECOM  
FROM: Carolyn Jones  
Health and Safety Program Manager  
SUBJECT: Guidance on Procedures for Confined Space Entry Work In Water System Pipelines  
DATE: 3/14/2011

**Introduction:** The purpose of this letter is to address various questions on confined space entry processes and procedures that have arisen following the receipt of a December 22, 2010 letter from Cal/OSHA, *Water System Improvement Project BDPL-5 East Bay* (see attached). The official name of that project is Bay Division Pipeline Reliability Upgrade Project – Bay Division Pipeline No. 5 (CUW 368-02) and there are two construction contracts, one in the East Bay and one on the Peninsula. The letter was in response to the East Bay contractor's concerns about permit-required confined space (PRCS) entry requirements for pipeline isolation procedures and it summarized the related meeting between Cal/OSHA and SFPUC representatives on November 4, 2010. The Cal/OSHA letter documented their acceptance of the use of a single butterfly valve (BV) for PRCS isolation for one shutdown for the BDPL 5 project, including their rationale. The letter also identified several areas of Cal/OSHA concern, including engulfment in the event of a major earthquake, and secondary engulfment hazards from incidental water passing the valve.

Several SFPUC managers and staff have asked for clarification about PRCS procedures for other projects, both WSIP (contractor) projects and SFPUC Operations projects and inspections. The information below addresses those questions and it summarizes the procedural changes that have been developed from several meetings and discussions with H&S, WST, HHWP, PMB, CMB, and AECOM/WSIP Safety staff. Aspects of this procedure may also be applicable to PRCS for WWE facilities.

#### Areas of Concern:

1. *What are the pipeline entry hazards that Cal/OSHA is concerned about?*

All water system pipeline entries have two water engulfment hazards – the primary hazard from an inability of the valve(s), specifically BVs, to provide complete and continuous isolation (with no failure potential) from system water, and the secondary hazard from failure to control incidental water passing the valve(s).

2. *Do the findings of the Cal/OSHA letter on the single BV isolation apply to other shutdowns?*

The Cal/OSHA letter specifically states that their letter applies only to that one shutdown and that other shutdowns must be individually evaluated for engulfment hazards.

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# Guidance on Procedures for Confined Space Entry Work in Water System Pipelines

Guidance on Procedures for Confined Space Entry Work in Water System Pipelines

3. *What safety-related procedures are required to isolate a section of transmission pipeline from the primary engulfment hazard, to allow personnel to enter the pipe?*

a. The work must follow the requirements of Title 8, California Code of Regulations (CCR) Sections 5156 – 5158, Confined Spaces, and Sections General Industry Safety Orders 3314 and Electrical Safety Orders 2320.4-5 for control of hazardous energy.

b. All PRCS entries require initial evaluation to identify the potential hazards; of which only primary and secondary engulfment is addressed in this letter (other hazards such as hazardous atmosphere must also be evaluated). Appropriate controls must be identified and implemented to control those hazards. The evaluation process must be done by a qualified person(s), meaning that the evaluator has sufficient knowledge of the job-specific valve(s) design and condition to determine the likelihood (if any) for valve failure. There is no requirement for the evaluation to be done by a professional engineer or a safety professional; rather, it is the responsibility of the owner (i.e., the respective SFPUC Division or Program level management) to identify the appropriate qualified persons.

The evaluation process should incorporate available information such as, engineering design data and drawings, valve model, manufacturer's data, valve history information, valve age and condition, valve type (e.g., butterfly or gate), operational data, site data, and/or any other information necessary to render a competent professional assessment on whether the valves in question can catastrophically fail (e.g., could they open or break unexpectedly, leading to flooding and engulfment while workers are inside the pipeline). The evaluation process must also include valves associated with pipe cross-ties, branch lines, service connections, and any chemical injection points, if their failure could cause engulfment of the work area.

Since there are many varieties of BVs, the failure analysis done for the specific BDPL 5 shutdown, approved by Cal/OSHA, may or may not be applicable to other BVs for other shutdowns. For valves for which there is no operational or engineering data available to make this assessment, additional protective measures, such as but not limited to double block and bleed, are required for isolation.

c. Because PRCS isolation is achieved through both equipment controls (adequate valve performance) and process/operations controls (Lockout/Tagout, LOTO), the evaluation process must also include review of the job-specific LOTO Plan. A written LOTO Plan is now required for all pipeline shutdowns as part of WSIP Construction Management Procedure 022, System Shutdowns. LOTO is not required for hot taps.

The LOTO Plan must be prepared by knowledgeable/qualified persons. It must be submitted as part of the Operational Change Request (OCR) document, and responsibility for reviewing and approving the OCR includes review and approval of the LOTO Plan. LOTO Plan review criteria include identification of all sources of energy, identification of each corresponding control point (valve, switch, etc.), method of LOTO for each control point, sequence for implementation, and responsible person to perform LOTO. The LOTO Plan must also include any information necessary for coordination of LOTO actions, including a lockbox, with/between the equipment

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# Guidance on Procedures for Confined Space Entry Work in Water System Pipelines

Guidance on Procedures for Confined Space Entry Work in Water System Pipelines

owner (SFPUC), contractors, and other affected parties such as Construction Management staff. The LOTO Plan review process must include Operations, Health and Safety, and the WSIP Shutdown Coordinator for WSIP shutdowns.

The designated SFPUC LOTO supervisor will meet with the contractor and provide LOTO coordination information concerning the shutdown prior to the outage. The information will include; valves to be isolated, past valve leak rate data, date and time of LOTO, names of LOTO personnel (SFPUC and Contractor), and other hazards identified in the professional assessment. All issues raised in this meeting must be addressed or additional information must be gathered and provided to the contractor.

d. When pipeline confined space entry projects are being planned, effort should be made to minimize the duration of entry and the number of people in the pipeline. In addition, alternate non-entry methods should be evaluated (for example, the use remote operated vehicles for inspection).

#### 4. When is "double block and bleed" required for pipeline isolation?

Cal/OSHA initially stated to one of the Bay Division Pipeline contractors that a single BV could not be used for providing water system isolation for PRCS entry work in the pipeline, and that "double block and bleed" was always required. The SFPUC met with Cal/OSHA over several months to discuss their regulatory requirement, and we presented operational information on the water system, technical information on potential for valve failure on the BV in question, our procedures for LOTO, the limited amount of time that personnel would be in the pipe, and our history of safe work in the pipelines. Based on this information, Cal/OSHA agreed that risk of engulfment from water in this particular section of pipeline was adequately controlled by use of this single BV.

It is important to recognize that while the determination for this specific situation recognized that the BV provided adequate protection, each future pipeline shutdown must be evaluated on its merits. Cal/OSHA revised its initial position that a single BV would never be sufficient for isolation. The evaluation process as discussed in #3 above is necessary to determine the acceptability of future isolation procedures. There are circumstances where a single BV is not appropriate for isolation, and double block and bleed, or a blind flange is required (such as for chemical lines, steam lines, smaller valves that are frequently operated for process control or on branch pipelines, or other significant safety concerns). Note that inflatable bladders or other temporary barriers cannot substitute for required double block and bleed or blind flanges.

#### 5. What safety-related procedures are required for protection from the secondary incidental water engulfment hazard?

a. In response to incidental water concerns raised by Cal/OSHA on the BDPL-5 project, the following requirements have been identified by H&S, WSIP, and SFPUC Operations staff. Each pipeline entry shutdown requires that a detailed written plan be developed for incidental water management to prevent a situation where workers are endangered by the build-up and sudden release of this water. If Operations staff will be responsible for incidental water management,

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# Guidance on Procedures for Confined Space Entry Work in Water System Pipelines

Guidance on Procedures for Confined Space Entry Work in Water System Pipelines

the incidental water management plan will be developed by the SFPUC, and submitted as part of the OCR. When the project specifications identify the contractor as responsible for incidental water management, the contractor will develop the plan and submit it as part of the System Outage Request (SOR) for review by CM staff and/or the Operations Representative.

b. The incidental water management plan must address contractor and SFPUC roles and responsibilities as appropriate, the method for water control, the procedure for regular monitoring of water levels, and the procedure for notifying downstream personnel in a timely manner of any emergency situations. This plan must include dewatering and discharge away from the worksite.

6. Does Cal/OSHA have to review and/or approve the isolation procedures, LOTO Plan, or incidental water management plan each time?

There is no requirement by Cal/OSHA for review and/or approval on a shutdown-specific basis. The Cal/OSHA letter specifically states "In analyzing future projects to determine whether or not the work will trigger permit-required confined space requirements, you [the SFPUC] must include engulfment by water as one of the factors in your determination". However, sufficient project documentation should be kept to address any future questions on how our review and evaluation were done.

7. What are the requirements for work inside or adjacent to tunnels?

Tunnel construction activities (construction, alteration, repairing, and/or renovating) must comply with the Cal/OSHA Tunnel Safety Orders. Tunnel inspection or maintenance activities (routine activities in a completed tunnel that do not significantly alter the tunnel structure) must at least comply with the Cal/OSHA Confined Space regulations, although the employer can choose to follow the Tunnel Safety Orders. Either way, the isolation requirements for work inside tunnels are consistent with the requirements and procedures described above addressing potential engulfment hazards.

Additionally, when work is done in pipelines that are connected to tunnels, remember that the Tunnel Safety Orders must be followed, unless the pipeline is physically isolated from any tunnel gas hazards. Physical isolation means a water block, mechanical block, or disconnected section of pipe. A single closed BV would not be sufficient isolation unless there was water behind the valve. This Tunnel Safety Orders applicability to pipeline work adjacent to tunnels is irrespective of the tunnel classification.

Please let me know if you need further information. I can be reached at 415-550-3577, or [cjones@sfpuc.org](mailto:cjones@sfpuc.org).

w/attachment

E:\Kin's work\SFPUC\Files to combine\Pipeline Confined Space Entry Procedures.doc

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## Attachment 019 - 9

Page 5 of 6

# Guidance on Procedures for Confined Space Entry Work in Water System Pipelines

STATE OF CALIFORNIA

ARNOLD SCHWARZENEGGER, GOVERNOR

DEPARTMENT OF INDUSTRIAL RELATIONS  
DIVISION OF OCCUPATIONAL SAFETY & HEALTH  
RESEARCH & STANDARDS DEVELOPMENT SAFETY UNIT  
2000 E. McFADDEN AVE., SUITE 203  
SANTA ANA, CA 92705  
PHONE (714) 597-7142  
FAX (714) 567-7246



December 22, 2010

David Briggs, Division Manager  
Water Supply and Treatment  
San Francisco Public Utilities Division  
P. O. Box 730  
Millbrae, CA 94030

RE: Water System Improvement Project BDPL-5 East Bay

Dear Mr. Briggs:

This is to summarize the points discussed at the November 4, 2010 meeting in Division headquarters, regarding the designation of a permit-required confined space for work underway on the BDPL-5 project in the East Bay. As part of that work, contractor's employees are replacing pipeline sections in several locations on a 66-inch diameter water pipeline, and must enter the pipeline for the final welding of the sections. While arrangements have been made to extract welding gases and fumes and provide fresh air, concerns have been expressed about the hazard of engulfment by water. Permanent butterfly valves on the pipelines upstream from the work will be closed off during this work, but no other cofferdams or other forms of blanking or blinding the pipeline will be installed to completely isolate the work areas from water during the project.

At the meeting, Division staff made clear that when there is a foreseeable hazard of engulfment, repair work of this kind on water pipelines triggers all the requirements of a permit-required confined space, found in Section 5157 of the General Industry Safety Orders. However, your staff explained in some detail why engulfment was not a hazard on this project:

1. The water in the pipeline is not under pressure, other than the pressure of gravity, and that pressure was less than half the design strength of the butterfly valves. A butterfly valve has a large disc closure member, which pivots on its stem. The valve opens and closes when the stem is rotated one-quarter turn. The side of the disc that is pointed upstream has a larger surface area than the side facing downstream, because of the flange on the outside edge which closes against the valve seat when the valve is shut. In the event of a failure, this difference in surface area forces the valve shut, rather than open. In the event of any failure, water pressure would force the valve shut, rather than force it open.
2. Even in the event of an earthquake, engulfment would not occur downstream of the valves. Each valve body is one large cast iron object. The valve stem is several inches in diameter, and embedded inches into the valve body on top and bottom. In the event of a major earthquake, the pipeline around the valve would fail before the valve did. Water on the upstream side of the valve might escape elsewhere, but would not suddenly burst through the valve.

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*Page 6 of 6*

**Guidance on Procedures for Confined  
Space Entry Work in Water System Pipelines**

David Brigge, Division Manager

- 2 -

December 22, 2010

3. While the valve is expected to leak, this is not the same as an engulfment hazard, and is generally controlled through conventional dewatering methods such as weirs and pumps. In the event that the amount of water leaking from the valve cannot be adequately controlled, the workers welding the seams on the inside of the pipe can easily be evacuated through manholes in the immediate area of the work.

Based on this information, Division staff agreed that the work in pipeline sections below these particular valves, on Water System Improvement Project RDPL-5, did not have to be treated as permit-required confined spaces because of the risk of engulfment by water. The Division's agreement about this particular set of circumstances does not apply beyond this particular project. In analyzing future projects to determine whether or not the work will trigger permit-required confined space requirements, you must include engulfment by water as one of the factors in your determination. If you need assistance in advance of those projects, you may always contact the Cal/OSHA Consultation Service or our unit.

Thank you for your interest in worker safety.

Sincerely,



Joel Foss, Acting Principal Safety Engineer,  
DOSH Research & Standards Safety Unit

cc: Len Welsh, Chief, Division of Occupational Safety and Health  
Vicky Heza, Program Manager, Cal/OSHA Consultation Service

# Attachment 019 - 10 Access Request Form

<b>SAN FRANCISCO PUBLIC UTILITIES COMMISSION</b>		
<Insert Program Logo HERE>	<Insert Program Title – HERE>	<Insert Program LOGO here>

AREA REQUESTED: _____	ACCESS REQUEST #: _____
DATE/TIME REQUESTED: _____	DATE: _____
DURATION OF WORK: _____	PLAN REF. _____
APPROVED SUBMITTALS: _____	SPEC. REF. _____
SUBCONTRACTOR: _____	ISSUED BY: _____

DESCRIPTION OF WORK: \_\_\_\_\_

EQUIPMENT LIST: \_\_\_\_\_

PLANT STAFF SUPPORT REQUIRED: \_\_\_\_\_

HOT WORK PERMIT REQUIRED?  YES  NO      SKETCH ATTACHED?  YES  NO

SIGNATURES:

1. Contractor Rep. \_\_\_\_\_ DATE: \_\_\_\_\_

2. PLANT REVIEW: \_\_\_\_\_ DATE: \_\_\_\_\_

3. CMB REVIEW: \_\_\_\_\_ DATE: \_\_\_\_\_

COMMENTS:

DATE WORK COMPLETED: \_\_\_\_\_ QA INSPECTOR SIGNATURE: \_\_\_\_\_



**Attachment 019 - 11**  
*Page 1 of 2*  
**WASTEWATER ENTERPRISE**  
**LOCKOUT/TAGOUT Procedure/Plan**

Wastewater Enterprise  
Lockout Tagout  
Procedure/Plan

Date

Job Title/Purpose:	Job Date/Duration
Operations Contact:	LOTO Tag #:
Owner: Operations <input type="checkbox"/> Maintenance <input type="checkbox"/>	Overall LOTO Coordinator:

Describe the groups, facilities, contractors and others affected by this LOTO:

Is there a lock box? Yes  No

If Yes, describe the lock box plan i.e. Where the box(s) will reside, who will control the boxes, how it will be managed?

**Attachment 019 - 11**

*Page 2 of 2*

**WASTEWATER ENTERPRISE  
LOCKOUT/TAGOUT Procedure/Plan**

	LOTO Steps	Name of preparer & Name of Approver	Name of group responsible to perform the LOTO	Name, Date, Time Locks Applied	Name, Date, Time Locks Removed
1.					
2.					
3					
4.					

Reviewed and Approved by: \_\_\_\_\_ Date: \_\_\_\_\_

Contractor: \_\_\_\_\_ Date: \_\_\_\_\_

**Attachment 019 - 12**  
*Page 1 of 3*  
**WASTEWATER ENTERPRISE**  
**LOCKOUT/TAGOUT Plan**

**Wastewater Enterprise**  
**Lockout Tagout**  
**Plan**  
**May 2, 2014**

**Inspect and Repair**  
**SEP 011**  
**#1 Main Lift Pump**  
 Equipment Number: SEO191-1

Overall LOTO Coordinator: Jim Manage It	Job Date/Duration: 8/20/14 – 8/24/2014
Operations Contact: Jerry Doe	LOTO Tag Number: 2132

Describe purpose, groups, facilities, contractors and others affected by this LOTO:

- The purpose of this LOTO is to Inspect and repair as needed.
- WWE crews to perform operational LOTO (See steps below) WWE personal LOTO as needed
- TP Plumbing Contractors on site to perform Repair work TP Plumbing employees to

Is there a lock box? Yes  No   
 If Yes, describe the lock box plan i.e. Where the box(s) will reside, who will control the boxes, how it will be managed?

Lock Box to be on site at the Lift Pump. LOTO coordinator in charge of Lock Box – the coordinator to have their own lock on it with a white process tag on it.

LOTO Steps	Name of preparer & Name of Approver	Name of group responsible to perform the LOTO	Name, Date, Time Locks Applied	Name, Date, Time Locks Removed
1 <b>Main Power</b> <ul style="list-style-type: none"> <li>MCC 011 – A1-LP1 position gate SE01FG4-1 to Close or Open position</li> <li>Switch to Off and remove control key</li> </ul>	Mike Maravillia	Electric Shop		
2 <b>VFD</b> 01P1 – 1 – VFD - 1	Mike Maravillia	Electric Shop		

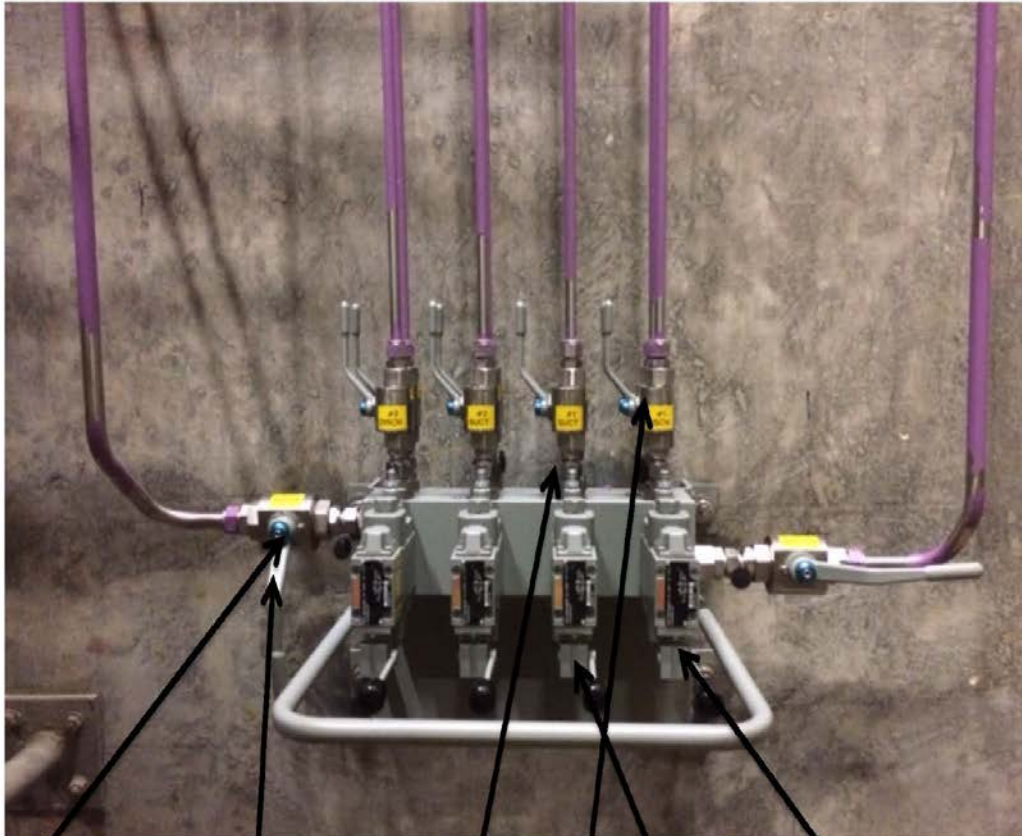
**Attachment 019 - 12**  
*Page 2 of 3*  
**WASTEWATER ENTERPRISE**  
**LOCKOUT/TAGOUT Plan**

LOTO Steps		Name of preparer & Name of Approver	Name of group responsible to perform the LOTO	Name, Date, Time Locks Applied	Name, Date, Time Locks Removed
3	<p><b>Suction/Discharge Isolation Valve knife gate</b></p> <ul style="list-style-type: none"> <li>• <b>Step 1</b> - Open supply valve to directional control valve manifold..</li> <li>• <b>Step 2</b> – Close #1 suction knife gate using correct directional control valve.</li> <li>• <b>Step 3</b> - Close #1 discharge knife gate using correct directional control valve.</li> <li>• <b>Step 4</b> - Close hydraulic cylinder supply valves on top of directional control valve manifold. <b>Apply Locks and Tags</b></li> <li>• <b>Step 5</b> - Once LOTOed, attempt to open gate using correct directional control valve to ensure correct and safe LOTO – Testing out the LOTO.</li> <li>• <b>Step 6</b> - Reclose supply valve to directional control valve manifold.</li> </ul>	Nathan Ciappara	Hydraulic Shop		
4	<p><b>Seal Water Solenoid Valve</b></p> <ul style="list-style-type: none"> <li>• Close main inlet shutoff valve for seal water solenoid and install appropriate lockout device.</li> <li>• Open drain valve to remove residual pressure and return to close position.</li> </ul>	Andy Clark	Operations		
5	<p><b>Flushing Water Valves</b></p> <ul style="list-style-type: none"> <li>• Close main inlet shutoff valve for flushing water valve and install appropriate lockout device.</li> <li>• Open bypass valve to remove residual pressure and return valve to close position.</li> </ul>	Andy Clark	Operations		

\_\_\_\_\_ **Date:** \_\_\_\_\_  
**WWE LOTO Coordinator – Print, Sign, and Date**

\_\_\_\_\_ **Date:** \_\_\_\_\_  
**Contractor – Print, Sign, and Date**

**Attachment 019 - 12**  
*Page 3 of 3*  
**WASTEWATER ENTERPRISE**  
**LOCKOUT/TAGOUT Plan**



**Step 1** Open supply valve to directional control valve manifold.

**Step 5** - Once LOTOed, attempt to open gate using correct directional control valve to ensure correct and safe LOTO – Testing out the LOTO.  
Reclose supply valve to directional control valve manifold.

**Step 4** - Close hydraulic cylinder supply valves on top of directional control valve manifold. **Apply Locks and Tags**

**Step 2** – Close #1 suction knife gate using correct directional control valve.

**Step 3** - Close #1 discharge knife gate using correct directional control valve.



# **HETCH HETCHY WATER & POWER LOCKOUT TAGOUT TEST PROGRAM LOTO-T**



**August 2018**  
**Version 3.0**

# Attachment 019 - 13

Page 2 of 32

## SFPUC Hetch Hetchy Water & Power LOTO-T Program

### Approvals

Approved by:  Date: 9/26/18  
Brent Hörger, Operations and Maintenance Manager  
Hetch Hetchy Water & Power  
San Francisco Public Utilities Commission  
City and County of San Francisco

Approved by:  Date: 9-12-18  
Carolyn Jones, Manager  
Health & Safety Program  
San Francisco Public Utilities Commission  
City and County of San Francisco

Date Implemented: 10/1/2018

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## SFPUC Hetch Hetchy Water & Power LOTO-T Program

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## SFPUC Hetch Hetchy Water & Power LOTO-T Program

### 1 Foreword

The HHWP Lockout Tagout Test (LOTO-T) Program is derived from, and compliant with, state and federal OSHA regulations for the control of hazardous energy. These regulations clearly state “what” must be performed but leave the “how” to the Organization complying with the regulation. This document defines “how” HHWP applies the standards to our working environment through the use of two processes: Personal LOTO-T, and Safe Clearances (which can be designated a sub safe clearance as needed).

When the special industry regulations for electrical generation, transmission, and distribution (29 CFR 1910.269, and corresponding state regulations) differ from general regulations for control of hazardous energy (29 CFR 1910.147 and corresponding state regulations), HHWP follows the more conservative 1910.147 (except in limited exceptions described under *Policy*, below). Specifically, although OSHA special industry regulations allow for the use of tags only in a powerhouse as part of an effective tagout program, HHWP always uses locks on hazardous energy boundary points except in rare situations where a method of locking out an antiquated piece of equipment cannot be devised (in which case HHWP requires a manager-approved written safety plan such as an SFPUC Code of Safe Practices form).

This approach ensures all LOTO-T communications, tools and procedures are universal regardless of whether the scope of work falls within HHWP’s electrical generation and transmission operations. This approach is designed to minimize any confusion for crews who regularly work under one set of regulations but are assigned to work under another.

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### SFPUC Hetch Hetchy Water & Power LOTO-T Program

## 2 Policy

It is the policy of the San Francisco Public Utilities Commission that before any employee performs service or maintenance on machinery or equipment where the unexpected start-up, energizing, or release of stored energy (including engulfment), could occur and cause injury, then equipment, component, or machine must be isolated and rendered inoperative, and placed in a Zero Energy State.

It is the policy of HHWP to comply with 29 CFR 1910.147 (and the corresponding California regulations) except as otherwise noted. Furthermore, it is the policy of HHWP to use locks on all equipment that is capable of being locked out; if equipment is not capable of being locked out a manager-approved written safety plan (Code of Safe Practice or similar) shall be used. Exception to use of 1910.147: It is our policy to comply with 29 CFR 1910.269 (and the corresponding California regulations) when working with outside utilities that use 1910.269 for the transmission system, or when HHWP's line crews perform work on distribution systems without the involvement of other HHWP crafts.

Refer to the Responsibility Matrix ("RACI") in the Appendix for a summary of roles and responsibilities under this program.

***Authorized employees working under this program have a right and a shared responsibility for understanding, implementation, and verification of LOTO-T. This program exists to protect lives. All HHWP personnel must comply with these policies. Violation of these policies is a severe offense at HHWP, subject to disciplinary action up to and including termination.***

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## SFPUC Hetch Hetchy Water & Power LOTO-T Program

### 3 General Provisions for LOTO-T

#### 3.1 Lockout and Tagout Devices

##### 3.1.1 Locks

As noted under *Policy* (except as provided for 29 CFR 1910.269), locks shall be used on all isolation points that are capable of being locked out. In rare cases where no locking method can be devised, a manager-approved written safety plan (Code of Safe Practices) shall be used.

##### Personal Locks (Blue)

- Are issued to all authorized employees after training.
- Shall only be placed AFTER the authorized employee understands and verifies the boundary(ies) of the clearance.
- Are placed directly on the single point of isolation (with hasp) when used in a Personal LOTO-T application.
- Are placed on a group lockbox when entering the boundaries of a safe clearance under the direction of the clearance holder.
- Shall be labeled with the owner's name and department.
- Shall be accompanied by a properly filled out personal lockout tag.
- Under no circumstances shall any worker perform work under the protection of only another worker's personal lock and tag.



##### Safe Clearance Boundary Locks (Red)

- Are used on equipment isolation points to establish the boundaries of a safe clearance.
- Are placed by authorized employees, who follow an approved switching order.
- Shall be labeled with a unique identifier for easy reference.
- Shall be accompanied by a properly filled out danger tag.



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SFPUC Hetch Hetchy Water & Power LOTO-T Program

Escorted Visitor Locks (Purple)

- Are used to escort consultant or contractors, who do not have their own personal lock and tag under another LOTO-T program, within the boundaries of a clearance, under the direction of the clearance holder.
- Only issued if the recipient understands the boundaries of the clearance, is NOT performing any work other than inspections, and is escorted by an SFPUC representative (who shall also be locked on).
- Must be accompanied by a properly filled out personal lockout tag.



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## SFPUC Hetch Hetchy Water & Power LOTO-T Program

### 3.1.2 Tags

Tags are used as part of the HHWP LOTO-T Program to provide information about lockout devices and boundaries. Tags, as specified below, shall always be used with locks and other lockout devices.

As noted under *Policy* (except as provided for 29 CFR 1910.269), HHWP always uses locks on hazardous energy boundary points except in rare situations where a method of locking out an antiquated piece of equipment cannot be devised, in which case a manager-approved written safety plan (Code of Safe Practices) shall be used.

#### Danger Tag

- Shall be attached at all points of energy isolation on equipment.
- Shall be used with a safe clearance boundary lock when equipment is lockable.
- Shall never be used with a personal lock or as a personal tag.
- Shall include the following information:
  - Equipment being worked on
  - Device being locked or tagged out and its position
  - Name of Employee placing tag
  - Date and time of placement
  - Clearance number
- Shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.
- Shall only be removed after the Safe Clearance has been released and at the direction of designated system operator.



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## SFPUC Hetch Hetchy Water & Power LOTO-T Program

### Personal Lockout Tag

- Shall be used with a personal lock.
- Under no circumstances shall any worker perform work under the protection of another worker's personal lock and tag.



### Safe Clearance Tag

- Shall be affixed to a clearance lockbox.
- Includes the following information:
  - Equipment being worked on
  - Scope of work
  - Clearance holder
  - Date and time of placement
  - Clearance number



(Additional non-LOTO-T tags are described in the appendices.)

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## SFPUC Hetch Hetchy Water & Power LOTO-T Program

### 3.1.3 Clearance Lockboxes

- Used to secure the key(s) to one or more series of safe clearance boundary locks after they have been applied to isolation points described on a switching order.
- The clearance holder shall be the first to lock on to the lockbox using their personal lock and tag.
- The clearance holder's personal lock and tag shall remain on the lockbox at all times until they sign off of the safe clearance.
- Authorized employees shall lock on with their personal locks and tags (or escorted visitor locks and personal lockout tags, as applicable) under the direction of the clearance holder.



### 3.1.4 Multi-Lock Hasps

- Shall be used whenever any lock would take the last open locking point on a device or lockbox.



### 3.2 Verification of Isolation and Deenergization

- Shall be performed prior to conducting work under personal LOTO-T.
- When establishing safe clearances, shall be documented with the switching orders, and shall be verified by the clearance holder prior to the issuance of the clearance.

### 3.3 Removal of Personal Locks by Supervisor

When the authorized employee who applied the personal lock and tag is not available to remove it, that personal lock may be removed by the supervisor with the approval of a manager.

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### SFPUC Hetch Hetchy Water & Power LOTO-T Program

Prior to removing the personal tag and lock, the Supervisor shall perform the following:

- Verify that the authorized employee who applied the personal tag and lock is not within the boundaries of the safe clearance nor at the facility.
- Make all reasonable efforts to contact the authorized employee to inform them that their personal lock and tag have been removed.
- Notify the Control Center the employee's personal and lock and tag are being removed from the safe clearance in accordance with this policy, so that it can be logged in the Control Center Log.
- Ensure that the authorized employee is notified that their personal lock(s) and tag(s) were removed before they resume work. Note: The authorized employee may NOT enter the boundaries of the clearance again without gaining permission from the clearance holder and locking back onto the clearance.

#### 3.4 Coordination with Outside Parties (Contractors and Visitors)

Whenever outside personnel are to perform work on HHWP systems, HHWP shall establish a safe clearance, and then the clearance holder (or designee) and the outside employer shall inform each other of their respective lockout/tagout procedures. When applicable, the clearance holder shall ensure that HHWP workers understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

#### 3.5 HHWP LOTO-T Program Availability

The most recent version of this document shall be readily available to all HHWP employees via the Moccasin Intranet "Connections". Hard copies are also available from the Moccasin Records Department.

#### 3.6 Training

HHWP shall provide initial training to ensure that the purpose and function of the LOTO-T Program are understood and that employees acquire the knowledge and skills for the safe application, usage, and removal of the energy controls prior to performing LOTO-T. Training will include the awareness of energy sources and means necessary for control and isolation.

Retraining shall be provided for all authorized and affected employees whenever requested by themselves or a supervisor, if there is a change in their job assignments, if there is a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.

Employee LOTO-T training shall be documented in accordance SFPUC's standard procedures.



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### SFPUC Hetch Hetchy Water & Power LOTO-T Program

#### **3.7 Periodic Inspections**

HHWP shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed. The periodic inspection shall be performed by an authorized employee other than the ones(s) utilizing the energy control procedure being inspected. Annual inspections shall be documented and retained for a minimum of three years. Feedback shall be provided, and corrective actions shall be taken as needed.

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## SFPUC Hetch Hetchy Water & Power LOTO-T Program

### 4 Provisions for Personal LOTO-T

#### 4.1 Conditions for Personal LOTO-T

1. The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shutdown which could endanger employees.
2. The machine or equipment has a single energy source which can be readily identified and isolated.
3. The isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment.
4. The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
5. A single lockout device will achieve a locked-out condition.
6. The lockout device is under the exclusive control of the authorized employee(s) performing the servicing or maintenance. Note: Multiple authorized employees may use personal LOTO-T on the same boundary point.
7. The servicing or maintenance does not create hazards for other employees.
8. HHWP has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

#### 4.2 Typical Workflow



Supervisors shall ensure that the following actions are performed:

1. Work order is created and approved detailing work scope and LOTO-T boundary.
  - a. Conditions for personal LOTO-T (as stated in the section titled *Conditions for Personal LOTO-T*) shall be verified prior to assigning work.
2. If water/power operations are affected, or non-routine alarms are generated, ATS application is submitted and approved. (See Terms and Definitions for "ATS.")
  - a. Supervisors (or designee) are responsible for validating proposed boundary for defined work scope for ATS application.

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### SFPUC Hetch Hetchy Water & Power LOTO-T Program

3. Actions to accomplish personal LOTO-T:
  - a. If multiple authorized employees are involved, safety tailgate is conducted by supervisor or designee.
  - b. Control Center and onsite personnel are notified.
  - c. Personal lock(s) and personal lockout tag(s) is/are applied with hasp. (Multiple workers may attach their personal locks and tags as applicable.)
  - d. Test is executed to verify isolation and deenergization.
4. Actions when work is concluded:
  - a. Personal lock(s) and tag(s) are removed.
  - b. Control Center is notified.
  - c. Equipment is returned to service (normal or modified, as applicable).

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## SFPUC Hetch Hetchy Water & Power LOTO-T Program

### 5 Provisions for Safe Clearance LOTO-T

#### 5.1 Conditions for Safe Clearance LOTO-T

1. Two or more boundaries are required for a de-energized work area for specifically-scoped work.
2. Safe clearance boundary locks and danger tags are applied in accordance with a switching order reviewed and approved by three qualified employees.
3. A clearance holder assumes management and monitoring of the LOTO-T clearance until another clearance holder signs on or the work is ended. (Refer to the Responsibility Matrix ("RACI") in the Appendix for a summary of roles and responsibilities under this program.)

#### 5.2 Typical Workflow



Supervisors shall ensure that the following actions are performed:

1. Work order is created and approved detailing work scope.
2. ATS application for safe clearance (and sub safe clearance(s), as applicable) detailing multiple points of isolation is submitted and approved, and if applicable, a safety plan is prepared (Code of Safe Practices form (CSP), or similar):
  - a. Supervisors (or designee) are responsible for validating proposed boundaries for defined work scope for ATS application.
  - b. Written safety plan is recommended if there are multiple sub clearances and/or overlapping scopes of work with multiple crafts.
3. Switching orders (written LOTO-T plan) are prepared and approved by three qualified reviewers.
  - a. Code of Safe Practices form shall be prepared if an element will be tagged without a lock.

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### SFPUC Hetch Hetchy Water & Power LOTO-T Program

4. Switching to clear is directed by designated system operator (DSO) using three-part communication.
  - a. Under direction of the DSO, authorized employee (switch person) executes assigned steps of the switching order; applies specified locks, protective devices, and tags, and verifies isolation and deenergization.
  - b. DSO logs all pertinent information in the Control Center log.
  
5. Safe clearance is issued to clearance holder, and managed and monitored by clearance holder for the duration of work.
  - a. Clearance holder shall verify the boundaries to isolate and deenergize machinery and equipment for the scope of work (with assistance from switch person, if desired).
  - b. DSO signs clearance holder onto the clearance; clearance holder then locks on with their personal lock and tag on the lockbox, assuming ownership of all equipment within the boundaries. The clearance holder's personal lock and tag shall remain on the lockbox at all times until they sign off the safe clearance. (For transfer of clearance, see below.)
  - c. Tracking of personal grounds and protective devices is performed by clearance holder (as applicable).
    - i. The installer of any personal grounds shall inform clearance holder for tracking purposes.
  - d. A copy of the switching order, ATS, Code(s) of Safe Practice (as applicable), and/or other written safety plan (as applicable) shall be retained at the job site for the duration of work.
  - e. Prior to locking on, each authorized employee shall be shown the clearance boundaries and then shall lock on to the clearance lockbox using their personal lock and tag under the direction of the clearance holder.
  - f. If an authorized employee removes their lock and tag at end of the shift, the clearance holder shall provide visual and/or verbal confirmation of clearance boundaries prior to the authorized employee locking on again.
  - g. Daily safety tailgate with authorized employees shall be conducted by clearance holder (or designee).
  - h. Code of Safe Practices form shall be used if energized testing/troubleshooting will occur under the safe clearance, or in rare cases when boundaries must be modified after a safe clearance is issued.
  - i. Transfer of clearance, when requested, is directed by the DSO.
    - i. Incoming clearance holder shall verify the boundaries established and the removal of all energy for the scope of work, then sign on.
    - ii. The incoming clearance holder shall lock on **PRIOR TO** the outgoing clearance holder removing their personal lock and tag and signing off.
  - j. Coordination with outside parties (contractors and visitors), is performed by clearance holder, as applicable. See section titled *Outside Parties*.

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6. Release of safe clearance and switching to restore is directed by DSO using three-part communication.
  - a. Clearance holder verifies that work by all authorized employees has been concluded.
  - b. Clearance holder and DSO notify all authorized employees of intent to release clearance.
  - c. Clearance holder verifies that all personnel, equipment, protective grounds and protective devices are clear and equipment is ready for restoration.
  - d. Clearance holder reports to DSO that they release the safe clearance with ATS number, date, and time; and states that all personnel and equipment are in the clear and equipment is ready for service (normal or modified, as applicable).
  - e. DSO signs the clearance holder off the clearance, giving current time; DSO records time on ATS (electronic copy and hard copy) and in electronic log.
  - f. Under direction of the DSO, authorized employee executes assigned steps of the switching order to remove all locks, tags, and protective equipment.
  - g. Equipment is returned to service (normal or modified, as applicable).

#### **5.3 Working with Sub Safe Clearances**

- Sub Safe Clearances are used in conjunction with another safe clearance when a separate clearance is needed to capture additional boundaries (for example, when testing and applying boundary grounds).
- Sub safe clearance holder(s) shall coordinate with any/all other clearance holders.
- Scopes of work remain with their individual clearances, and the holder of each clearance remains fully responsible for the clearance(s) onto which they are signed.
- The original safe clearance cannot be lifted without the sub safe clearance being lifted first. Therefore, the sub safe clearance holder controls the return to service of the affected equipment, and the safe clearance holder cannot sign off until the sub safe clearance is released.
- A written safety plan is recommended if there are multiple sub clearances and/or overlapping scopes of work with multiple crafts.

#### **5.4 Requirements for Switching Orders**

Switching Orders (a written LOTO-T plan) shall include or have attached the following information.

- A "Job Specific Title" for the plan.
- A description of the purpose for the LOTO-T and related relevant information.
- A description of all equipment, energy source(s), or device(s) to be locked out.
- The method used to lock out each point (lock and tag, or tag only).

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- The sequence for shutdown and placement of locks, tags, and safety devices.
- The method to verify effectiveness of isolation and deenergization.
- The name and initials of the preparer.
- Initials of three qualified approvers of the plan.

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### **6 Acknowledgements**

This revision was prepared by Brent Hörger, HHWP Operations and Maintenance Manager; Robert Edwards, HHWP Power Generation & Transmission Manager; Justin Hanson, Power System Operations Manager (Acting); and Carrie King, HHWP Utility Analyst.

The writing team thanks everyone who contributed time and input for this revision. The team also thanks the managers of HHWP, under the leadership of Margaret Hannaford, Division Manager, for their continued active support of this Lockout Tagout Test Program.



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**7 Revision History**

Version	Date	Change
Original	March 2005	Established HHWP procedure for Lockout/Tagout Program, Applications for Work, Safe Clearances, and Switching Orders.
2.0	January 2015	Added three basic levels of LOTO-T and associated work flows: Personal LOTO-T, Safe Clearance LOTO-T, and Complex Safe Clearance LOTO-T.
3.0	Pending	Clarified HHPW policy to adhere to 29 CFR 1910.147 except for limited exceptions for transmission and distribution lines in accordance with 29 CFR 1910.269; removed Complex Safe Clearance type; added Escorted Visitor Lock (purple) type; clarified HHWP procedure for "tagout only"; reorganized to clarify procedures and roles/responsibilities for LOTO-T, including procedures to verify isolation and deenergization ("Test"); removed outdated ATS requirements.

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**8 Appendices**

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## SFPUC Hetch Hetchy Water & Power LOTO-T Program

### 8.1 HHWP LOTO-T Responsibility Matrix

<b>HHWP LOTO-T RESPONSIBILITY MATRIX</b>													
	Role												
Task	HHWP Division Manager (Margaret)	Operations & Maintenance Manager (Brent)	Dispatch Managers (B2X, C83X, or Comparable)	Supervisors of Affected Crafts	Clearance Holder(s)	Designated System Operator	Authorized Employees (Performs LOTO-T, Maintenance, Service)	Affected Employee (Works Nearby)	Authorized Representative of Outside Employer	Outside Personnel	H&S Manager	Safety Officer	Verified During Inspection
HHWP LOTO-T	Management			Involved Employees				Outside Parties		H&S	Audit		
<b>Overall Program</b>													
Complying with Program	R	A	A	A	A	A	A	A	I	I	I	C	
Procuring LOTO Supplies		R	C	A	I	I	I	I				C	
Supervisor Removing LOTO-T Devices			R	A	C	I	I						
Coordinating with Outside Parties (Contractors and Visitors)				R	A*	C		I	A	I			
Ensuring Program Availability		R	C	A	I	I	I	I	I	I	I	C	
Training		R	C	A	I	I	I	I	I	I	I	C	
Conducting Inspections (Annually Or More Often)		R	C, I	A*								C, I	
Reviewing and Revising Program As Needed		R	C	C	C	C	C	C			I	C	
<b>Personal LOTO-T</b>													
Verifying Work Scope and LOTO-T on Work Order			R	A*	N/A		I						
Submitting ATS Notification For Water/Power Impacts or Non-Routine Alarms			R	A*	N/A								
Conducting Safety Tailgate (If Multiple Workers)			R	A*	N/A		I						
Notifying Control Center and People Nearby When Starting Job				R	N/A	I	A	I					
Applying Personal Lock(s) and Tag(s)				R	N/A		A						
Testing to Verify Isolation and Deenergization				R	N/A		A	I					
Removing Lock(s) and Tag(s)				R	N/A	I	A	A					
Notifying Control Center and People Nearby When Job Is Complete				R	N/A	I	A	I					
<b>Safe Clearances</b>													
Validating Proposed Boundaries for Defined Work Scope			R	A*	C	C							
Submitting ATS Safe Clearance Application			R	A*	C	I							
Preparing Codes of Safe Practices (If Needed)			C	R	A*	C	I						
Preparing Switching Orders				R	I	A	A						
Switching to Clear and Isolate				R	I	A	A	I					
Verifying Isolation and Deenergization				R	A	I	C						
Signing On to Clearance				R	A	A	I	I					
Placing and Tracking Personal Grounds				R	A		A						
<i>Management and Monitoring of Clearance</i>													
Walking Boundaries Before Locking On				R	A		A						
Applying Personal Locks and Tags				R	C		A						
Conducting Daily Safety Tailgates				R	A*		I						
Managing All Work Within Safe Clearance Boundaries				R	A*		C						

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Task	Role											
	HHWP Division Manager (Margaret)	Operations & Maintenance Manager (Brent)	Department Managers (O&M, O&S, or Compliance)	Supervisors of Affected Crafts	Clearance Holder(s)	Designated System Operator	Authorized Employee (Performs LOTO-T, Maintenance, Servical, Affected Employee (Works Nearby))	Authorized Representative of Outside Employer	Outside Personnel	H&S Manager	Safety Officer	Verified During Inspection
HHWP LOTO-T	Management	Involved Employees				Outside Parties	H&S		Audit			
Coordinating with Outside Parties (Contractors and Visitors)				R	A*	C			A	I		
Transferring the Safe Clearance				R	A	C		I				
Coordinating Energized Testing/Troubleshooting within Boundaries, with Approved Code of Safe Practices				R	A	C, I	C, I					
Modifying Boundaries, with Approved Code of Safe Practices				R	A	C, I	C, I					
Releasing the Clearance				R	A	C		C				
Switching to Restore and return to Service				R		A	A					

RACI Definitions:  
 Responsibility = person or role responsible for ensuring that the item is completed ("Where the buck stops")  
 Accountable = person or role responsible for actually doing or completing the item ("A=Action")  
 Consulted = person or role whose subject matter expertise is required in order to complete the item  
 Informed = person or role that needs to be kept informed of the status of item completion

\* Or Designee

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### SFPUC Hetch Hetchy Water & Power LOTO-T Program

#### 8.2 Terms and Definitions

**Affected Employee** – An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

**Application for Work** – Used by the proposed clearance holder, their supervisor, or a designated person on their behalf to request permission from HHWP management to work on equipment which will impact water or power delivery systems, sewage systems, or any machine/equipment which will cause a non-routine alarm at the Control Center. Applications for work are submitted through the HHWP Application Tracking System (ATS).

**Authorized Employee** – A person who locks out or tags out machines, equipment, or components to perform servicing or maintenance on that machine or equipment. The Authorized Employee must have sufficient knowledge, training and experience to understand LOTO-T procedures for the specific system being locked out. (An Affected Employee becomes an Authorized Employee when that employee's duties include activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment.)

**Boundary** – The point or points used to isolate the requested work area from all sources of energy. Such boundaries include, but are not limited to, switches, disconnects, open jumpers, separable connectors and valves.

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

**Clearance Holder** – The person to whom the clearance is issued. Responsible for monitoring the boundaries and managing all work within safe clearance boundaries.

**Control Center** – HHWP System Operations Control Center. May be the primary control center located in Moccasin, or a backup control center at another designated location.

**Control Center Log** – The electronic log used by the Designated System Operator (DSO) at the Control Center. It is a chronological, legal record of all events and significant information relating to HHWP system wide operations.

**Designated System Operator (DSO)** – The Power and/or Water System Operator who has been authorized and identified by their shift supervisor to perform specified LOTO-T related tasks from the HHWP Control Center.

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### SFPUC Hetch Hetchy Water & Power LOTO-T Program

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

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.

Energy source – Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Lockout – The placement of a 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, either key or combination type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment.

Master Safe Clearance - A main clearance with established boundaries that hosts one or more interdependent sub safe clearances with separate additional boundaries.

Non-routine – A procedure that is performed less frequently than monthly.

Protective Device – Any device temporarily installed on or adjacent to line(s) or equipment to provide an additional safeguard. Such devices include but are not limited to: personal grounds, wooden blocks, chains, insulated covers, and barriers.

Responsibility Matrix (“RACI”) – RACI is an acronym that stands for responsible, accountable, consulted and informed. A RACI matrix shows activities or decision-making actions versus the people or roles who will carry out those activities or actions.

Routine – A procedure that is performed at least monthly.

Safe Clearance – A process in which safe clearance boundary locks and danger tags are applied in accordance with a switching order reviewed and approved by three qualified employees to establish boundaries for a de-energized work area for specifically-scoped work.

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**Safety Plan** – A Code of Safe Practices form or other written document that identifies the procedures to be used to prevent injury from the unexpected energizing, startup or release of stored energy when energized testing/troubleshooting or other non-routine work is performed within the boundaries of a safe clearance. Also recommended when there are multiple sub-clearances or overlapping scopes of work with multiple crafts. Hydroelectric Powerhouse Annual Maintenance is an example of a work scope that may warrant a written safety plan in addition to safe clearances.

**Sub Safe Clearances** – used in conjunction with another clearance when a separate but interdependent clearance is needed, typically to capture additional boundaries. A Sub Safe Clearance is used to perform a unique scope of work.

**Supervisor** – The responsible person under whose direction employees perform duties.

**Switching Orders** – Written procedure or “LOTO-T plan” to establish a specific boundary for a de-energized work area consisting of two or more energy isolation points.

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

**Three-Part Communication** – A communication protocol in which the sender states the message, the receiver acknowledges the sender and repeats the message back (not necessarily verbatim), and the sender acknowledges the receiver’s reply.

**Work Order** – An official document approved by management which details the scope of work to be performed under lockout/tagout, as applicable.

**Zero Energy State** – Condition in which all sources of energy have been removed or neutralized.

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## SFPUC Hetch Hetchy Water & Power LOTO-T Program

### 8.3 Additional HHWP Tag Types

#### HOT LINE WORK TAG

- Used to indicate a non-test condition established on a transmission or distribution line.
- In the event of relay action with a non-test in place, the affected breaker(s) will not be re-closed until permission is obtained from the clearance holder.



#### CAUTION TAG

- Used to identify and assign control of a device such as switch, valve, gate or machine which shall not be operated or changed except upon specific instructions from the clearance holder.
- Shall never be used to isolate hazardous energy.
- Shall never be used for personnel protection.





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INFORMATION TAG

- Used to convey information regarding equipment or machines.
- Shall never be used for personnel protection.



**INFORMATION TAG**

CITY & COUNTY OF SAN FRANCISCO  
HETCH HETCHY WATER & POWER

1. TAG No. 3769

2. DEVICE AND POSITION \_\_\_\_\_

3. EMPLOYEE'S NAME \_\_\_\_\_

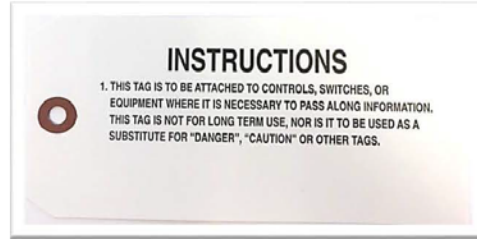
4. DATE INSTALLED: \_\_\_\_\_

5. ADDITIONAL INFO: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**INSTRUCTIONS**

1. THIS TAG IS TO BE ATTACHED TO CONTROLS, SWITCHES, OR EQUIPMENT WHERE IT IS NECESSARY TO PASS ALONG INFORMATION. THIS TAG IS NOT FOR LONG TERM USE, NOR IS IT TO BE USED AS A SUBSTITUTE FOR "DANGER", "CAUTION" OR OTHER TAGS.

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**8.4 Example Code of Safe Practices for Tagout Only**

<b>San Francisco Public Utilities Commission Code of Safe Practices</b>																	
Division: HHWP	Department: Power Operations																
Prepared by: EXAMPLE	Date: EXAMPLE																
Title: Tag Only LOTO-T Procedure for PT Drawers																	
Location and Crew HPH, KPH and MPH PSOs and Affected																	
Task: Tagout PTs for generation unit block																	
Approved By and Date EXAMPLE																	
<b>Hazards:</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;"><input type="checkbox"/> Chemicals</td> <td style="width: 50%; padding: 2px;"><input type="checkbox"/> Hot Work</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> Confined Space</td> <td style="padding: 2px;"><input type="checkbox"/> Infectious Materials</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> Cumulative Trauma</td> <td style="padding: 2px;"><input type="checkbox"/> Lifting</td> </tr> <tr> <td style="padding: 2px;"><input checked="" type="checkbox"/> Electrical</td> <td style="padding: 2px;"><input type="checkbox"/> Materials Handling</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> Fire</td> <td style="padding: 2px;"><input type="checkbox"/> Moving Machinery</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> Heat Stress</td> <td style="padding: 2px;"><input type="checkbox"/> Noise</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> High Pressure</td> <td style="padding: 2px;"><input type="checkbox"/> Slips</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> High Work/Falls</td> <td style="padding: 2px;"><input type="checkbox"/> Other</td> </tr> </table>	<input type="checkbox"/> Chemicals	<input type="checkbox"/> Hot Work	<input type="checkbox"/> Confined Space	<input type="checkbox"/> Infectious Materials	<input type="checkbox"/> Cumulative Trauma	<input type="checkbox"/> Lifting	<input checked="" type="checkbox"/> Electrical	<input type="checkbox"/> Materials Handling	<input type="checkbox"/> Fire	<input type="checkbox"/> Moving Machinery	<input type="checkbox"/> Heat Stress	<input type="checkbox"/> Noise	<input type="checkbox"/> High Pressure	<input type="checkbox"/> Slips	<input type="checkbox"/> High Work/Falls	<input type="checkbox"/> Other	<b>Describe:</b>  <div style="border: 1px solid black; padding: 5px; min-height: 50px;">                     13.8kV. Tagout only as no lockable device currently exists.                 </div>
<input type="checkbox"/> Chemicals	<input type="checkbox"/> Hot Work																
<input type="checkbox"/> Confined Space	<input type="checkbox"/> Infectious Materials																
<input type="checkbox"/> Cumulative Trauma	<input type="checkbox"/> Lifting																
<input checked="" type="checkbox"/> Electrical	<input type="checkbox"/> Materials Handling																
<input type="checkbox"/> Fire	<input type="checkbox"/> Moving Machinery																
<input type="checkbox"/> Heat Stress	<input type="checkbox"/> Noise																
<input type="checkbox"/> High Pressure	<input type="checkbox"/> Slips																
<input type="checkbox"/> High Work/Falls	<input type="checkbox"/> Other																
<b>Personal Protective and Other Safety Equipment:</b>																	
<b>Eyes</b> <input type="checkbox"/> Chemical Goggles <input checked="" type="checkbox"/> Safety Glasses <input type="checkbox"/> Face Shield & Goggles <input checked="" type="checkbox"/> Other - Describe: FR/AR RATED Clothes	<b>Body</b> <input checked="" type="checkbox"/> Gloves <input checked="" type="checkbox"/> Work Shoes/Rubber Boots <input type="checkbox"/> Coveralls <input type="checkbox"/> Hard Hat	<b>Respiratory Protection</b> <input type="checkbox"/> Half-Face Air Purifying Respirator with Appropriate Cartridge <input type="checkbox"/> Self Contained Breathing Apparatus <input type="checkbox"/> Emergency Escape Respirator <input type="checkbox"/> Dust/Mist Mask															
<b>Hearing</b> <input type="checkbox"/> Ear Plugs <input type="checkbox"/> Ear Muffs <input type="checkbox"/> Other - Describe:	<b>Ventilation</b> <input type="checkbox"/> Exhaust Fan <input type="checkbox"/> Blower Fan <input type="checkbox"/> Other - Describe:	<b>Fall Protection</b> <input type="checkbox"/> Safety Harness and Lanyard <input type="checkbox"/> Self-Retracting Lifeline (SRL) <input type="checkbox"/> Portable Anchor Type:															
<b>Air Monitoring Equipment</b> <input type="checkbox"/> Four Gas Meter How Many?: _____ <input type="checkbox"/> Five Gas Meter How Many?: _____ <input type="checkbox"/> Other - Describe:		<b>Confined Space Retrieval</b> <input type="checkbox"/> Tripod or UCL <input type="checkbox"/> SRL/Winch Combination Unit <input type="checkbox"/> Safety Harness <input type="checkbox"/> Ladder															
<b>Specific Procedures:</b>																	
<div style="border: 1px solid black; padding: 10px; min-height: 80px;">                     Under OSHA 1910.147(c)(2)(i) no lockable device exists so these points will be tag only (pending modification).                 </div>																	

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**8.5 Example Code of Safe Practices for Energized Testing/Troubleshooting**

<b>San Francisco Public Utilities Commission Code of Safe Practices</b>	
Division: HHWP	Department: Power Operations
Prepared by: EXAMPLE	Date: EXAMPLE
Title: Pressure Testing Repair(s)/Replacement of Surface Air coolers @ HPH	
Location and Crew: Holm Powerhouse - Power System Operations and Machine Shop	
Task: Hydraulically pressure test the repair(s) or replacement(s) of surface air cooler	
Approved By and Date: EXAMPLE	
<b>Hazards:</b> <input type="checkbox"/> Chemicals <input type="checkbox"/> Confined Space <input type="checkbox"/> Cumulative Trauma <input type="checkbox"/> Electrical <input type="checkbox"/> Fire <input type="checkbox"/> Heat Stress <input checked="" type="checkbox"/> High Pressure <input type="checkbox"/> High Work/Falls <input type="checkbox"/> Hot Work <input type="checkbox"/> Infectious Materials <input type="checkbox"/> Lifting <input type="checkbox"/> Materials Handling <input type="checkbox"/> Moving Machinery <input type="checkbox"/> Noise <input type="checkbox"/> Slips <input type="checkbox"/> Other	<b>Describe:</b>  <div style="border: 1px solid black; padding: 5px; min-height: 50px;">           Pressurized piping         </div>
<b>Personal Protective and Other Safety Equipment:</b>	
<b>Eyes</b> <input type="checkbox"/> Chemical Goggles <input checked="" type="checkbox"/> Safety Glasses <input type="checkbox"/> Face Shield & Goggles <input type="checkbox"/> Other - Describe:	<b>Body</b> <input checked="" type="checkbox"/> Gloves <input checked="" type="checkbox"/> Work Shoes/Rubber Boots <input type="checkbox"/> Coveralls <input type="checkbox"/> Hard Hat
<b>Respiratory Protection</b> <input type="checkbox"/> Half-Face Air Purifying Respirator with Appropriate Cartridge <input type="checkbox"/> Self Contained Breathing Apparatus <input type="checkbox"/> Emergency Escape Respirator <input type="checkbox"/> Dust/Mist Mask	
<b>Hearing</b> <input type="checkbox"/> Ear Plugs <input type="checkbox"/> Ear Muffs <input type="checkbox"/> Other - Describe:	<b>Ventilation</b> <input type="checkbox"/> Exhaust Fan <input type="checkbox"/> Blower Fan <input type="checkbox"/> Other - Describe:
<b>Fall Protection</b> <input type="checkbox"/> Safety Harness and Lanyard <input type="checkbox"/> Self-Retracting Lifeline (SRL) <input type="checkbox"/> Portable Anchor <input type="checkbox"/> Type:	
<b>Air Monitoring Equipment</b> <input type="checkbox"/> Four Gas Meter    How Many?: _____ <input type="checkbox"/> Five Gas Meter    How Many?: _____ <input type="checkbox"/> Other - Describe:	<b>Confined Space Retrieval</b> <input type="checkbox"/> Tripod or UCL <input type="checkbox"/> SRL/Winch Combination Unit <input type="checkbox"/> Safety Harness <input type="checkbox"/> Ladder
<b>Specific Procedures:</b>	
<ul style="list-style-type: none"> <li>- Personnel aware and unnecessary equipment reported clear of the safe clearance boundaries and SAC</li> <li>- Clearance holder signs off applicable clearance for testing equipment within the boundaries</li> <li>- Switch to remove red lock and chain from CW Limitorque manual handwheel</li> <li>- Switch to remove tag from open Limitorque DC supply breaker (if applicable)</li> <li>- At the direction of mechanic slowly, manually open the limitorque valve               <ul style="list-style-type: none"> <li>a) If no leaks are identified, pressurize at given psi for duration supplied by mechanic(s)</li> <li>b) If leak is identified close manual handwheel or DC supply breaker (dependent on severity of leak)</li> </ul> </li> <li>- Switch to replace tag on open Limitorque DC supply breaker (if applicable)</li> <li>- Switch to replace red lock and chain on CW Limitorque manual handwheel</li> <li>- Clearance holder walks the boundaries to ensure adequacy               <ul style="list-style-type: none"> <li>a) Clearance holder releases clearance, all personnel equipment and grounds in the clear, ready to be returned to normal service</li> <li>b) Clearance holder signs back on to applicable clearance to continue work/repair(s)</li> </ul> </li> </ul>	

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**8.6 Example Code of Safe Practices for Modification of Boundaries**

San Francisco Public Utilities Commission Code of Safe Practices		
Division: HHWP	Department: Water Operations	
Prepared by: Chris Graham	Date: 12/27/2017	
Title: Reseating slide gates at Cherry Intake Tower		
Location and Crew: Cherry Valvehouse and Cherry Intake Tower; Watershed Keepers		
Task: Reseating slide gates at Cherry Intake Tower		
Approved By and Date:  12/27/17		
<b>Hazards:</b>		
<input type="checkbox"/> Chemicals <input checked="" type="checkbox"/> Confined Space <input type="checkbox"/> Cumulative Trauma <input type="checkbox"/> Electrical <input type="checkbox"/> Fire <input type="checkbox"/> Heat Stress <input type="checkbox"/> High Pressure <input checked="" type="checkbox"/> High Work/Falls	<input type="checkbox"/> Hot Work <input type="checkbox"/> Infectious Materials <input type="checkbox"/> Lifting  <input type="checkbox"/> Materials Handling <input type="checkbox"/> Moving Machinery <input type="checkbox"/> Noise <input type="checkbox"/> Slips <input type="checkbox"/> Other	
<b>Describe:</b>		
<b>Personal Protective and Other Safety Equipment:</b>		
<b>Eyes</b> <input type="checkbox"/> Chemical Goggles <input type="checkbox"/> Safety Glasses <input type="checkbox"/> Face Shield & Goggles <input type="checkbox"/> Other - Describe:	<b>Body</b> <input type="checkbox"/> Gloves <input type="checkbox"/> Work Shoes/Rubber Boots <input type="checkbox"/> Coveralls <input type="checkbox"/> Hard Hat	<b>Respiratory Protection</b> <input type="checkbox"/> Half-Face Air Purifying Respirator with Appropriate Cartridge <input type="checkbox"/> Self Contained Breathing Apparatus <input type="checkbox"/> Emergency Escape Respirator <input type="checkbox"/> Dust/Mist Mask
<b>Hearing</b> <input type="checkbox"/> Ear Plugs <input type="checkbox"/> Ear Muffs <input type="checkbox"/> Other - Describe:	<b>Ventilation</b> <input type="checkbox"/> Exhaust Fan <input type="checkbox"/> Blower Fan <input type="checkbox"/> Other - Describe:	<b>Fall Protection</b> <input checked="" type="checkbox"/> Safety Harness and Lanyard <input type="checkbox"/> Self-Retracting Lifeline (SRL) <input type="checkbox"/> Portable Anchor Type:
<b>Air Monitoring Equipment</b> <input type="checkbox"/> Four Gas Meter    How Many?: _____ <input type="checkbox"/> Five Gas Meter    How Many?: _____ <input type="checkbox"/> Other - Describe:	<b>Confined Space Retrieval</b> <input type="checkbox"/> Tripod or UCL <input type="checkbox"/> SRL/Winch Combination Unit <input type="checkbox"/> Safety Harness <input type="checkbox"/> Ladder	
<b>Specific Procedures:</b>		
<ol style="list-style-type: none"> <li>1) Have all workers exit work area and remove locks from 6366-6367 LOTO box.</li> <li>2) Release clearance 6366-6367 for an un-planned operation of equipment within an existing clearance per approved Code of Safe Practice.</li> <li>3) Remove 6367 lock from 6366 box.</li> <li>4) Release clearance 6366 for an un-planned operation of equipment within an existing clearance per approved Code of Safe Practice.</li> <li>5) WSK remove lock from control pump Cherry Intake Tower and locks on slide gate operator for slide gate(s) needing adjustment.</li> <li>6) Machine Shop attempt to reseat gate with a close command. For this evolution: if required, the gate can be raised no more than 6" from its original LOTO-T state.</li> <li>7) Once gate has been adjusted, relock control pump and slide gate operator.</li> <li>8) Return appropriate key(s) to their associated lock box.</li> <li>9) Clearance holder verifies boundaries, signs back on and places personal lock on Clearance 6366.</li> <li>10) Reinstall 6367 lock on 6366 lock box.</li> <li>11) Clearance holder verifies boundaries, signs back on and places personal lock on Clearance 6366-6367.</li> <li>12) Inform all affected employees of the event and have them lock back on and resume work.</li> </ol>		

## Attachment 019 - 13

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### SFPUC Hetch Hetchy Water & Power LOTO-T Program

#### 8.7 References

##### 8.7.1 SFPUC

Code of Safe Practices (Fillable PDF)

<https://infrastructure.sfwater.org/fds/fds.aspx?lib=HHWP&doc=249069&data=77460459>

Lockout/Tagout (LOTO) Policy

<https://infrastructure.sfwater.org/fds/fds.aspx?lib=SFPUC&doc=355063&data=136699255>

Training Record Form

<https://infrastructure.sfwater.org/fds/fds.aspx?lib=SFPUC&doc=286465&data=110289025>

##### 8.7.2 U.S. OSHA 29 CFR 1910

1910.147 The control of hazardous energy (lockout/tagout)

[https://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9804](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9804)

1910.269 - Electric Power Generation, Transmission, and Distribution

[https://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9868](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9868)

1910 Subpart S Electrical – 1910.333 Selection and use of work practices

[https://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9912](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9912)

##### 8.7.3 Cal OSHA

CCR Subchapter 5 Electrical Safety Orders – Group 1 Low-Voltage Electrical Safety Orders

Article 3. Work Procedures (Sections 2320.1-2320.10)

<https://www.dir.ca.gov/Title8/sb5g1a3.html>

CCR Subchapter 5 Electrical Safety Orders – Group 2. High-Voltage Electrical Safety Orders

Article 36. Work Procedures and Operating Procedures (Sections 2940 - 2945)

<https://www.dir.ca.gov/Title8/sb5g2a36.html>

**Attachment 019 - 14  
Revision Control Log**

<b>Revision No.</b>	<b>Revision Date</b>	<b>What changed?</b>
Rev 1	6/7/19	<ul style="list-style-type: none"> <li>• Section 3.0; 3.4 added new; 3.5; 3.6; 3.7; 3.8; 3.9; 3.10; 3.11; 3.12; 3.13; 3.14;</li> <li>• Section 4.0; 4.5 Senior removed from Project Manager;</li> <li>• Attachments revised and added new attachment 13;</li> <li>• Revision Control Log updated.</li> </ul>
Rev 0	11/14/16	Signed