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THE UNIVERSITY OF MAINE

**Lock-out Tag-out Program
OSHA 1910.147
(Zero Mechanical State)**

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1. Overview

This program is intended to preserve the safety of those individuals involved with servicing or maintenance of equipment or machinery. Departments must ensure that anyone performing servicing or maintenance activities is conducting these duties in a safe manner, using lock-out tag-out guidelines. Lockout Tagout (LOTO) should also be thought of as rendering something to a Zero Mechanical State (ZMS), as LOTO is not just concerning electricity.

1.1 Examples of Potential Energy and Zero Mechanical State

Energy Form	Energy Source	General Guidelines
Electricity	<ul style="list-style-type: none">• Power transmission• Machine power cords• Motors• Solenoids• Capacitors (stored electrical energy)• Generators• Batteries• Photovoltaic Arrays	<ul style="list-style-type: none">• Turn off power at machine or point of operation switch. Then turn off power at main disconnect switch for the machine. Lock and tag the main disconnect switch or remove fuses from box. Then lock and tag the box.• Fully discharge all capacitive systems. For example, cycle machine to drain power from capacitors.• Install grounds where necessary.• Test to ensure to current is not present, when appropriate
Fluid Pressure	Hydraulic systems including hydraulic presses, rams, cylinders or hammers	<ul style="list-style-type: none">• Shut off, lock with chains, use built-in lockout devices or lockout attachments and tag valves. Bleed off and blank lines, as necessary.
Air Pressure	<ul style="list-style-type: none">• Pneumatic systems including lines, pressure reservoirs, accumulators, air surge tanks, rams and cylinders.• Air actuated valves	<ul style="list-style-type: none">• Shut off, lock with chains, use built-in lockout devices or lockout attachments and tag valves. Bleed-off excess air. If pressure cannot be relieved, block any possible movement of the machinery.
Kinetic Energy	<ul style="list-style-type: none">• Blades• Flywheels• Material in supply lines of bins or silos	<ul style="list-style-type: none">• Stop and block machine parts and ensure that they do not cycle. Review the entire cycle of mechanical motion and ensure that all motions are stopped or blocked.• Block material from moving into an area of work and blank, as required.
Potential Energy	<ul style="list-style-type: none">• Springs• Actuators• Counterweights• Raised loads• Top or moveable part of a press or lifting device	<ul style="list-style-type: none">• If possible, lower all suspended parts and loads to the lowest or rest position. Block parts that might move due to gravity or from being release or block stored spring energy.
Pressurized liquids and gases including steam and chemicals	<ul style="list-style-type: none">• Supply lines• Storage tanks and vessels	<ul style="list-style-type: none">• Shut off with chains, built-in lockout devices or lockout attachments and tag valves. Bleed-off excess liquids or gases and blank the lines as necessary

Note: Hazardous materials may require a double-block bleed for complete isolation. These requirements and procedures must be noted in the department specific LOTO/ZMS procedures.

The Lock-out Tag-out program (LOTO) will be considered complete when your department has developed and implemented any specific procedures needed to render equipment safe for your

employees that perform maintenance and service work. Specific procedures will be needed for equipment or machinery not covered by department established generalized procedures found in appendix B, C, or D. The specific procedures are to be added to your department copy of this program, as part of Appendix A.

Individuals performing diagnostic work on energized-circuits must follow other applicable NFPA 70E safety protocols.

To prevent tampering with LOTO devices, locks or tags must include the name of the employee that placed the locking device.

2. Purpose and Responsibilities

The following departments have the following responsibilities:

Safety & Environmental Management (SEM)

Provide guidance to supervisors on how to implement LOTO/ZMS procedures. Safety & Environmental Management will offer LOTO awareness training for employees to fulfill their responsibilities under the LOTO program and perform periodic audits of the LOTO program.

Deans, Directors, & Department Heads

Deans, Directors, and Department Heads are responsible for ensuring that specific LOTO/ZMS procedures are developed and used for those pieces of equipment or machines that are serviced, cleaned, or maintained by their employees or students.

Each department is required to perform a periodic inspection at least annually of the LOTO/ZMS procedures used within their department.

Supervisors

Supervisors who have employees engage in servicing, cleaning, or maintenance of machines or equipment shall ensure that employees follow LOTO/ZMS procedures, as outlined in the appendices. In addition, supervisors shall ensure employees follow specific LOTO/ZMS procedures developed by the department (and placed in appendices).

Supervisors must provide LOTO awareness training during annual departmental training for all non-authorized employees and students who are in the area during LOTO activities.

Supervisors shall be responsible for ensuring that affected employees and students receive Authorized Employee LOTO/ZMS Training where required. In addition, the supervisor shall ensure that all Authorized Employees/Students are trained on each Equipment Specific LOTO Procedure required for their Department.

Supervisors shall ensure all hired contractors adhere to the UMaine LO/TO program and insure contractors contractually obligated to follow LO/TO procedures.

Employees

Employees who perform servicing or maintenance on machines or equipment may only perform work for which they have been specifically authorized by their supervisor. Employees who perform LOTO/ZMS of equipment are required to attend training and follow General or Equipment Specific LOTO Procedures, as appropriate.

Students

Students who performed tasks that require LOTO/ZMS must be specifically authorized by their instructor and supervised by a competent person to ensure compliance with all of the requirements of the program.

Contractors

University contractors must have a LOTO/ZMS program in place *prior* to starting work that requires LOTO activities at UMaine. Contractors must share their LOTO procedures with affected UMaine staff.

3. Who Is Covered By This Program

Any UMaine employee or student engaged in cleaning, maintenance, or servicing work on machinery or equipment where unexpected start-up or energizing of the machinery or equipment, or release of stored energy, could result in serious injury, death, or property damage.

Any affected UMaine employee or student who operates or uses a machine or equipment on which servicing or maintenance is being performed under lockout/tagout, or who works in an area in which such servicing or maintenance is being performed.

Any UMaine engaged contractor whose operates or uses a machine or equipment on which servicing or maintenance is being performed under lockout/ tagout, or who works in an area in which such servicing or maintenance is being performed.

Potentially hazardous energy sources include, but are not limited to; electrical, hydraulic, kinetic, steam, pneumatic, and gravity. Daily or routine maintenance activities, research projects, renovation or construction projects, and equipment repair or failure may involve exposure to potentially hazardous energy sources. UMaine has established an objective to control and eliminate the risk involved with servicing or maintenance activities by implementing the LOTO/ZMS program.

Note – Servicing or maintenance work which takes place during normal production operations (such as oiling a gear via an oil lube port) is not covered by this program unless:

- An individual is required to remove or bypass a guard or other safety device; or,
- An employee is required to place any part of their body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle (such as moving gears, chains, etc).

3.1 Definitions

Affected employee - An employee who operates or uses a machine or equipment on which servicing or maintenance is being performed under lockout/tagout, or who works in an area in which such servicing or maintenance is being performed.

Affected student - A student who operates or uses a machine or equipment on which servicing or maintenance is being performed under lockout/tagout, or who works in an area where servicing or maintenance is being performed.

Authorized employee - An employee who locks out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

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 built in locking mechanism. 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.

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:

- Manually operated electrical circuit breaker;
- Disconnect switch;
- Manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and, 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, computer controls, 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.

Hot tap - A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. Commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

Lockout - Placement of a lockout device on an energy isolating device, in accordance with an established procedure, while 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 keyed or combination lock, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.

Normal production operations - The utilization of a machine or equipment to perform its intended production function.

Servicing and/or maintenance - Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energizing or startup of the equipment or release of hazardous energy.

Setting up - Any work performed to prepare a machine or equipment to perform its normal production operation.

Tagout device - A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to 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.

3.2 Protective materials and hardware

Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided for isolating, securing or blocking of machines or equipment from energy sources.

Lockout and tagout devices shall be singularly identified; shall be the only device(s) used for controlling energy; shall not be used for other purposes; and shall meet the following requirements:

Lockout and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

Tagout devices 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.

Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

Lockout /tagout devices shall be standardized within the department in at least one of the following criteria: Color; shape; or size; and additionally, in the case of tagout devices, print and format shall be standardized.

Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

Tagout devices, including their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal.

Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all environment-tolerant nylon cable tie.

Lockout devices or tagout devices shall indicate the identity of the employee applying the device(s).

Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following:

Do Not Start.
Do Not Open.
Do Not Close.
Do Not Energize.
Do Not Operate.

4. Lockout Tagout Procedures

The following procedures are to be followed by all employees involved in the servicing or maintenance of machinery, requiring the use of LOTO/ZMS procedures.

4.1 Preparatory Procedures

The following procedures are to be performed prior to servicing or maintaining equipment or machinery covered by this program:

- Notify all affected employees that servicing or maintenance is required, that the machine or equipment must be shut down and locked out to perform the servicing or maintenance, not to attempt to remove the lockout device, and not try to start the machine or equipment.
- Ensure that all of the tools and equipment necessary for you to perform the servicing and/or maintenance have been obtained.
- Shut down the piece of equipment or machinery using the established procedures.

4.2 General Lockout / Tagout Procedures

Simple Electrical Equipment or Machinery Exceptions (Appendix B)

If the piece of equipment or machinery meets the following criteria, an Authorized Employee may implement this general LOTO procedure without having to document it:

- (A) Has no potential for stored or residual energy or re-accumulation of stored energy after shutdown, which could endanger employees;

- (B) Has a single energy source that can be easily identified and isolated;
- (C) Isolating and locking out of that energy source will completely de-energize/deactivate the machine or equipment;
- (D) Is isolated from that energy source and locked out during servicing or maintenance;
- (E) A single lockout device will achieve a locked-out condition; and
- (F) The lockout device is under the exclusive control of the authorized employee performing the work and it may not be used, shared or removed by other employees.

Plug Connected Electrical Equipment (Appendix C)

In order for an Authorized Employee to implement this general LOTO procedure the piece of equipment or machine must meet the following criteria:

- (a) The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shutdown, which could endanger employees.
- (b) The machine or equipment has a single energy source that is powered from a cord and plug.

Motor Vehicle & Powered Industrial Equipment (Appendix D)

An Authorized Employee may implement this general LOTO procedure when servicing a motor vehicle or powered industrial equipment. These generalized procedures should be developed by each department and placed in Appendix D.

4.3 Equipment Specific Lockout / Tagout Procedures

When a piece of equipment requires servicing or maintenance, but does not meet the criteria for Appendices B, C, or D, then an Equipment Specific LOTO/ZMS procedure must be developed and filed under Appendix A of the UMaine LOTO Program.

An Equipment Specific LOTO/ZMS Procedure must contain the following details:

- A specific statement of the intended use of the procedure;
- Specific step for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy;
- Specific procedural steps for the placement and removal of LOTO devices and the authorized employee's responsibility for them; and
- Specific requirements for testing a machine or equipment to determine and verify the effectiveness of LOTO devices, and other energy control devices (ZMS).

4.4 Releasing Equipment or Machinery from LOTO / ZMS

When servicing or maintenance is completed and the equipment or machinery is ready to be released from LOTO, the following sequential steps shall be taken by the employee who performed the Lockout:

- 1) Check the machine and the immediate area around the machine to ensure that non-essential items have been removed and that the machine guards and other components are operationally intact;

- 2) Check the work area to ensure that all employees have been safely positioned or removed from the area. Notify them that the machine or equipment is going to be released from LOTO;
- 3) Verify machine controls are in neutral or off position;
- 4) Remove Lock-out devices and re-energize the machine or equipment; and,
- 5) Notify affected employees that servicing or maintenance is completed and the machine or equipment is ready for use.

4.5 Alternative Procedures

When LOTO locks cannot be used, alternative procedures must be developed. These alternative procedures must be reviewed by the Supervisor and SEM prior to implementing these procedures.

5. Lock Removal Rule

LOTO locks shall not be removed by anyone but the employee who placed the lock, unless the procedures outlined below are needed and followed. Removing a LOTO device, belonging to someone else, could result in fatality or serious injury.

If the person who applied a LOTO device is not available to remove the device in a timely manner, the device may be removed by the authorized employee's supervisor after the following procedures have been followed:

- Supervisor verifies that the authorized employee who applied the device is not available;
- Supervisor ensures that servicing or maintenance has been completed prior to releasing the machine or equipment from LOTO, and procedures for releasing a piece of equipment or machinery from LOTO are followed;
- Supervisor ensures the authorized employee (who placed the lock) knows that the device has been removed before other employees engage in their work duties;
- Supervisor verifies that the authorized employee who applied the device is not at the facility ;
- Supervisor ensures all reasonable efforts to contact the authorized employee to inform them that their LOTO device has been removed have been undertaken and documented;
- Supervisor ensures that the authorized employee has this knowledge before they resume work in that area or department; and,
- Supervisor documents the reason for the lock removal and maintains documentation for one year.

6. Responsibility at the End of a Work-Shift

Individuals not completing the servicing or maintenance of equipment or machines that they have Locked-Out by the end of their workday shall:

- Leave their attached locks until they complete their maintenance or servicing; and,
- If another shift will be continuing the maintenance or service work, the authorized individuals from the on-coming and off-going shifts will transfer responsibilities from the off-going shift to the on-coming shift. The off-going shift will remove their lock and the on-coming shift will install their own lock and tags in accordance with the lockout procedures.

7. Group LOTO

When equipment, machine maintenance or servicing is provided by individuals of more than one job class (i.e. plumbers and electricians), a procedure shall be used that protects all individuals performing maintenance or servicing. This is accomplished by providing all job classes with a lock which they control. All locks are secured to a multiple hold lockout hasp. The hasp is attached to the equipment or machine cutoff switch, valve or combination of both. Those employees assigned (by their co-workers) to control a lock have the same responsibility as if they were performing the LOTO by themselves. Lock placement and removal shall be coordinated between the differing job classes.

7.1 Group LOTO Guidance

This guidance provides a sample policy template for group lock-out tag-out procedures. Whenever a group of people perform LOTO work, the adopted Group LOTO should provide the same level of protection as if only one person is performing the work.

A lockout hasp should be used to allow each person to affix a lockout device to the energy isolating device. If two groups or more are involved, a coordinator shall be appointed to coordinate the work. A group lock box may be used. Once all energy sources have been isolated, residual energy released and locked out, all of the keys to the locks are placed in the group lockbox and the coordinator or supervisor would then apply their lock on the group lock box.

All group-lockout must be performed under the direction of an assigned or authorized employee as designated by the manager or supervisor. The primary responsibility is to oversee the group lockout.

Each authorized employee involved in the group lockout shall affix a personal lockout device to the group lockout device at the beginning of their work shift. The lockout devices are removed when work on the machine or equipment is completed.

During a shift change the authorized employee with the primary responsibilities of the group lockout will coordinate the orderly transfer of lockout devices so that continuity of protection between off-going and oncoming employees is maintained.

When more than one crew or group is involved, an authorized employee shall be designated to coordinate the work forces and ensure continuous protection.

Where there are several lockout points to be secured and several authorized employees involved in the project, group LOTO department specific written procedures must be in place and the following suggestions are made:

- The primary trade or department obtains a lock box and secures it to the machine or piece of equipment.
- Lockbox locks and tags are applied to all lockout points by the authorized employee from the primary trade or department.
- The keys are collected, verified and placed inside the lockbox.
- The lockbox is then closed and a multi-lock hasp is affixed to it. This will allow for additional locks to be added.

- The last available hole should never be used for a lock. It should remain open to add another multiple lockout device, if needed, to create more space. (As many locks as needed for the task can be added to the equipment.)
- Each worker then applies their personal lock to the multi-lock hasp such that the box cannot be opened until each personal lock is removed. Each of the workers personal lock remains in place as long as they are actively working on the locked out equipment or machinery.
- In all cases, the last lock to be removed should be that of the person supervising the lockout. This responsibility should not be delegated to another person.

Before implementing a group lockout, a knowledgeable person, such as the primary trade or supervisor must plan the procedure ahead of time and develop a written group lockout procedure. The written procedure must be conspicuously posted at the place where the system is in use. The plan can be in the form of a checklist or a simple bullet-item listing of the course of action for the group procedure.

8. Training

Employees and students who are to perform LOTO procedures are to receive training prior to engaging in their work. This training is to be performed by authorized individuals in their departments. SEM will authorize department trainers for LOTO training, and provide LOTO awareness training (as described in 29 CFR1910.147 (7) (i) [B]). The training is to ensure that the purpose and function of the LOTO program is understood. The supervisor will also ensure that the employees have acquired the knowledge and skill required for safe application, use and removal of lockout devices, prior to having authorized employees perform Lockout procedures.

Initial training shall include at least the following:

- preparatory LOTO/ZMS procedures;
- recognition of hazardous energy sources, the magnitude of the available energy and the methods and means necessary for isolation and control of the available energy;
- releasing equipment or machinery from LOTO/ZMS procedures; and,
- reviewing the Equipment Specific LOTO Procedures (provided by the Department Authorized LOTO Trainer/supervisor).

Re-training shall be provided:

- whenever there is a change in job assignments, change in machines, equipment or process, or whenever there is a change in the LOTO procedures;
- whenever employees are unfamiliar with LOTO procedures, or appear to have inadequate knowledge concerning what is required by this program, then the employee shall be re-trained prior to servicing or maintaining the machine or equipment; and,
- whenever the department supervisor believes that an employee is in need of the training.

Training shall be documented by each department. The documentation should include:

- subject of training;
- date of training;
- employees' name;
- name of supervisor providing the training; and,
- Periodic Program Review Evaluation Information (See Section 10.0).

9. Record Keeping

Each department shall maintain records of the following:

- a copy of this program;
- specific LOTO / ZMS procedures for equipment and machinery (found in their department);
- training records;
- periodic inspection forms and,
- disciplinary actions/corrective actions taken when deficiencies to the LOTO/ZMS program are found.

This program shall be reviewed annually by department and updated as new equipment or procedures are added.

10. Periodic Inspections

Each department shall perform periodic inspection of the Equipment Specific, Simple Electrical, and Motor Vehicle and Powered Industrial Equipment LOTO procedures used by their department and note the auditor name, Employee audited and last audit date on the written procedure.

Periodic Inspections are intended to improve the LOTO procedures and to correct or improve any inadequacies. Inspections must be performed by an authorized employee other than the ones(s) utilizing the energy control procedure being inspected. The Inspection will include a visual evaluation of those workers performing the lockout procedures. Periodic Inspections are to be documented using the LOTO Periodic Inspection Form located in Appendix E of the UMaine LOTO Program. Completed periodic inspection forms shall be kept on file for a minimum of two years and a copy should be sent to the Safety and Environmental Management Department for compliance verification.

SEM shall annually conduct an audit of the Lockout/Tagout program to ensure that the program and the requirements of this standard are being followed.

Revision Page

DATE	TYPE	PAGE NUMBERS
November 3, 2008	Clarified LOTO is Zero Mechanical State and included a chart outlining examples of potential energy.	Throughout document.
November 3, 2008	Developed guidance for group LOTO	7-8
October 1, 2012	Clarified definitions, clarified student interaction, clarified SEM audit process, Department Inspection process and form, Training documentation, corrected typographical errors and minor wording modifications. Appendices better clarified.	4-5, Appendices A, B, C, D, and throughout document
November 19, 2014 By Jill Rand	Consolidate Appendix A into one example document with key elements highlighted. And a line added to document annual auditor and date which makes Appendix E a guidance document, not part of this program.	1, 15, 15, 17 and 23

APPENDIX A
Example
Equipment Specific Lockout / Tagout Procedure

Reason for this procedure: LOTO / Grounding Procedure for RF Generator

Location: No name Hall, Room 127

Affected Personnel: John Q. Public, Jane Q. Researcher, Bill C. Faculty

Affected Process: Servicing or Maintaining RF Generator on TJA Model 975 ICP

Power Source: Electrical

Specific Hazard: Stored Electrical Energy (Transformers/Capacitors)

<i>Annual Auditor and Date</i>	Jane Doe on November 19, 2014
<i>Employees Audited:</i>	_____

LOTO Procedure Steps:

1. Notify all affected employees that the RF Generator requires servicing
2. Ensure all tools and equipment required for servicing has been obtained.
3. If ICP is in operation: push the blue "Power off" button on the front of the RF and turn off the coolant water.
4. Move the 2 circuit breakers on the front of the RF generator to the "off" position.
5. Disconnect the power supply by pulling the handle on the disconnect box located on the wall to the "off" position.
6. Lock the disconnect box in the off position with an approved lock and tag. Label the tag with you name, date, and time. Maintain possession of the key for the remainder of the procedure.
7. Pull on the lock to verify complete locking. Attempt to move disconnect handle to verify lockout.
8. TRY/VERIFY STEP: Move both circuit breakers on the RF generator to the "on" position, to verify power disconnect. Return both breakers to the "off" position.

Grounding Procedure:

1. DO NOT TOUCH ANY INTERNAL COMPONENTS BEFORE GROUNDING. Grounding must be done through the back access panel before other panels are removed.
2. After power supply has been locked out, leave power cord attached to the outlet to facilitate RF component grounding.
3. Remove screws to the access panel at the back of the RF generator. Remove panel and set aside, so that the diagram on the inside of the panel is visible.
4. Remove "shepherds crook" grounding tool from the storage bracket and verify grounding wire is attached.

5. *Ground all high-voltage transformers and capacitors by touching all junction terminals with the shepherds crook. Critical components to be grounded are clearly labeled on the color photograph inside the pack panel.*
6. *After complete grounding, hook the shepherds crook under one terminal and over the second terminal on the large (4uf) capacitor (lower right corner), in order to maintain continuous contact between the terminals, thus preventing accidental recharging. An alternative is to clip a jumper wire between the 2 terminals.*
7. *Proceed with service or maintenance.*

Exit/Release Procedure:

1. *After maintenance or repair is complete, check the immediate area to ensure that any grounding jumpers, tools, or any other non-essential items have been removed from the RF.*
2. *Replace shepherds crook in storage bracket.*
3. *Replace all access panels and reinstall all screws.*
4. *Notify all affected employees that the RF generator will be removed from the lockout condition.*
5. *Remove lock from the power disconnect and reactivate RF generator for operation evaluation.*
6. *Following successful evaluation, notify all affected employees that the RF/ICP is back in service.*

Appendix B

Lockout / Tagout of Simple Electrical Equipment or Machinery

Individual, undocumented lockout may be performed following the procedures outlined below, for electrical equipment or machinery meeting the following criteria:

- a) The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shutdown, which could endanger.
- b) The machine or equipment has a single energy source that can easily be identified and isolated.
- c) The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment.
- d) The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
- e) A single lockout device will achieve a locked-out condition.
- f) The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance and may not be used, shared, or removed by other employees.

Lockout of Simple Equipment or Machinery

General lockout procedures for simple machines or equipment are as follows:

- Notify all affected employees that servicing or maintenance is required, that the machine or equipment must be shut-down and locked out to perform, and not to attempt to remove the lock, or start the machine or equipment.
- Ensure that all of the tools and equipment necessary for you to perform the servicing and/or maintenance have been obtained.
- If the machine or equipment is in operation, shut it down by following operating procedure (e.g.; depress stop button, open switch, etc).
- Isolate the energy source by securing a lock on the disconnect device (cut-off switch or breaker switch) used to isolate equipment on which work is to be performed. Lockout energy isolating device(s), in the open position, with assigned individual locks (note: each authorized individual conducting maintenance or servicing shall ensure that the lock has their name and work phone number attached).
- Ensure that the equipment or machinery is disconnected from the energy source(s) by first checking that no personnel are exposed, and then verify the isolation of the equipment by actuating the start button or switch. **Caution:** Ensure that the actuation device returns to neutral or “off” position after verifying the machine or equipment is isolated.
- Perform maintenance and servicing of equipment or machinery.

Procedures for “Releasing Equipment or Machinery from Lockout”:

- Check the machine and the immediate area around the machine to ensure that non-essential items have been removed and that the machine guards and other components are operationally intact.

- Check the work area to ensure that all employees have been safely positioned or removed from the area. And, notify them that the machine or equipment is going to be released from lockout.
- Verify machine controls are in neutral or off position.
- Remove lockout devices and re-energize the machine or equipment.
- Notify affected employees that servicing or maintenance is completed and the machine or equipment is ready for use.

Appendix C

General Lockout/Tagout Procedure for Plug Connected Electrical Equipment

For servicing or maintenance on cord and plug connected electric equipment for which exposure to the hazards of unexpected energizing or start-up of the equipment is controlled by the unplugging of the equipment from the energy source:

1. Unplug equipment
 - a. Maintain exclusive control over plug. Exclusive control means either
 - i. the plug is within reach and within sight and in the complete custody, care and control of person doing servicing or maintenance, or
 - ii. a plug lock is installed. Examples



Plug lock and tag. Source: CalOSHA



Plug lockout device. Source: CalOSHA

2. Test equipment by operating on/off switch or normal operating controls to verify equipment has dissipated stored electrical energy.
3. Ensure on/off switch or normal operating controls are placed back in off position.
4. Begin servicing or maintenance activities
5. When complete, verify the area around equipment is clear, all guards or open panels are in position, the equipment is in the off position, and plug in the equipment for use.

Appendix D

General Lockout/Tagout Procedure for Motor Vehicle and Powered Industrial Equipment

Insert Department Procedures for each class/type of vehicle

Example

Machine or Equipment Type: All Fleet Dump Body Trucks

Location: Public Works Garage, Main St. Vehicle ID # 0085, 0086, 0087

Date Procedure Created: 12/05/08 Verified By: Guy Foreman Date: 12/09/08

1. *Notify all affected employees in the area.*
2. *Hang "Out of Service" Tag on the driver's side door or on the steering wheel.*
3. *Put your name, date, time and reason for lockout on the tag.*
4. *Place dump in position needed for repair if need.*
5. *Shutdown Procedure:*
 - a. *Put in "Park Gear" for automatic or "in gear" for Standard transmissions.*
 - b. *Set "Park Brake"*
 - c. *Turn engine "Off" remove ignition key.*
 - d. *Release air pressure if equipped.*
 - e. *See owner's manual for special shutdown procedures for performing various tasks.*
6. *Isolation of Power Sources:*

<i>Energy Type</i>	<i>Isolating Device</i>	<i>Location</i>	<i>Procedure</i>
<i>Mechanical Start up</i>	<i>Ignition Key</i>	<i>Inside Vehicle Cab</i>	<i>Turn key to "Off" position.</i>
<i>Electrical</i>	<i>"Red" Battery Cable</i>	<i>Battery Compartment</i>	<i>Remove from battery terminal(s) and secure from accidental contact with battery.</i>

7. *Blocking of Potential Mechanical Energy*

<i>Hazard</i>	<i>Equipment Needed</i>	<i>Placement Safety Devices</i>
<i>Falling Body or Dump</i>	<i>Properly rated jacks, jack stands, blocking and dump Body pins.</i>	<i>For raising body use jacks and back up blocking. For dump body use 2 properly rated jack stands and dump body pins. Check owner's manual for recommended jack ratings.</i>
<i>Roll Away</i>	<i>Wheel Chocks</i>	<i>Set emergency brake and place chocks behind and in front of both left and right wheels.</i>

8. Bleeding of Potential Energy

<i>Energy</i>	<i>Bleed Down Points</i>	<i>Procedure</i>
<i>Hydraulics</i>	<i>Bleed Valves</i>	<i>Wait until oil cools then bleed off line. Place oil in container and dispose of properly.</i>
<i>Pneumatics</i>	<i>Bleed Valves</i>	<i>Open valve until pressure is relieved.</i>

9. Verification Test

<i>Lockout to Verify</i>	<i>Controls to try:</i>	<i>Process to verify Lockout</i>
<i>Mechanical Start up</i>	<i>Ignition Key</i>	<i>Turn ignition key to the "Off" position remove from Ignition and place inside lockbox and each employee involved in the vehicle maintenance must put a personal lock on the lockout box.</i>
<i>Electrical</i>	<i>Lights/Elect powered equipment</i>	<i>Check to see if the lights come on when switch is turned to the "On" position, the lights should not come on.</i>
<i>Falling Body or Dump</i>	<i>None</i>	<i>Check back up blocking for stress. If none, Primary jacks or pins are working to hold body in place.</i>
<i>Roll Away</i>	<i>None</i>	<i>Try to push vehicle, it should not move.</i>
<i>Hydraulics</i>	<i>Any hydraulic controls</i>	<i>Controls that were activated, the parts should not activate.</i>
<i>Pneumatics</i>	<i>Any pneumatics controls</i>	<i>Controls that were activated, the parts should not activate.</i>

