A STANDARD OPERATING PROCEDURE
for

Controlling Hazardous Energy Sources

July 2001

U.S. General Services Administration
Safety and Environmental Management Team
1500 E. Bannister Road
Kansas City, MO 64131

INTRODUCTION

This Standard Operating Procedure (SOP) has been developed for the purpose of outlining the control of hazardous energy sources in GSA workplaces.

Safety requirements for the control of hazardous energy sources are contained in Title 29, Code of Federal Regulations, Part 1910. The criteria contained therein is mandatory for all GSA employee tasks involving hazardous energy sources. This SOP should be used as a model for the development of a regional SOP (in conjunction with the OSHA standard) for hazardous energy sources if one does not currently exist. The regional SOP must be at least as stringent as the requirements contained herein.

The procedures contained herein apply to GSA employees only. It should be noted that non-GSA persons engaged in work on hazardous energy sources in GSA-controlled space must follow the criteria specified in the applicable OSHA standards or alternate standards approved by OSHA and GSA.

All GSA activities that have power sources (electrical, pneumatic, mechanical, hydraulic, etc.) must have a copy of the OSHA standards that govern the tasks (29 CFR 1910). In addition, the American National Standards Institute (ANSI) Standard Z244.1 (Lockout/Tagout of Energy Sources) is an excellent reference that should be on file locally for reference purposes.

It is incumbent upon the Facility Manager to ensure the criteria stated in the appropriate standards are enforced. It is the individual supervisor's responsibility to ensure employees are properly trained to comply with the criteria. This SOP will assist those responsible in meeting their obligations.

OSHA standards may be obtained from the local OSHA Area Office or purchased from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. ANSI standards may be purchased from American National Standards Institute, 1430 Broadway, New York, NY 10018.

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APPENDICES

General Services Administration
Heartland Region

CONTROLLING HAZARDOUS ENERGY SOURCES (Lockout/Tagout or LOTO)

1. **PURPOSE**. The purpose of this SOP is to establish performance objectives and procedures for the protection of GSA employees due to the unintentional energizing (start-up) of power sources or unexpected release of stored energy. The purpose is achieved by deenergizing equipment and affixing appropriate lockout/tagout (LOTO) devices to the energy isolating controls of the equipment or process according to prescribed procedures.

2. **SCOPE**. This SOP establishes minimum requirements for the lockout/tagout of all energy sources which could cause injury to GSA employees or occupants of GSA-controlled space. This SOP applies to all GSA operations where repair or maintenance is performed on energy-activated equipment or processes by GSA employees.

3. **OTHER CRITERIA**. The lockout/tagout process is not intended to replace existing safety precautions. It is an added measure necessary to ensure that GSA employees are afforded the safest possible environment when working with machines or processes powered by an energy source. It is incumbent upon supervisors to ensure employees are familiar with all precautions contained herein, as well as other safety criteria applicable to the tasks (e.g., OSHA standards, NFPA codes, ANSI standards, etc.)

4. **REFERENCES**.

a. OSHA 29 CFR 1910.147, The control of hazardous energy (lockout/tagout).

5. **DEFINITIONS**.

a. Affected Employee. An employee whose job requires him or 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 or her to work in an area in which such servicing or maintenance is being performed.

b. Authorized Employee. A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment.

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

d. Energy Isolating Device. A mechanical device that physically prevents the transmission or release of energy, including but not limited to 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; or any similar device used to block or isolate energy.

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

f. 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.

g. Lockout/Tagout (LOTO) Process. The placement of a lock and tag on the energy isolating device in accordance with an established procedure after the device has been deenergized. The presence of the lock and tag indicates that the energy isolating device shall not be activated until removal of the lock and tag takes place by the individual who was responsible for the initial placement.

h. Normal Production Operations. The utilization of a machine or equipment to perform its intended production function.

i. Servicing and/or Maintenance. Involves any 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 energization or start-up of the equipment or the release of hazardous energy.

j. 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 to indicate that energy isolating procedures have been implemented on that machine or equipment.

6. **RESPONSIBILITIES**.

a. Facility Managers. Each manager of a GSA activity having a valid need for accomplishing repair or maintenance on any powered equipment or process, is responsible for implementation of the lockout/tagout program within his or her facility. Additionally, facility managers shall ensure that Equipment-

Specific Written LOTO Procedures are developed and utilized when GSA employees are engaged in activities involving energized equipment.

CAUTION: Work associated with building power feeds or line connections is normally a function of the local utility company. Consequently, only local utility employees are authorized to work on these systems.

b. Regional OSH Program Offices. Regional OSH Program Offices shall assist responsible facility managers and supervisors in identifying energy sources, developing appropriate lockout/tagout procedures, and selecting applicable lockout/tagout devices.

c. Supervisors. Anyone exercising supervisory authority over a GSA employee tasked to perform work on equipment or processes containing an energy source shall:

(1) Ensure that each affected employee is trained on the safety precautions associated with the work and that documented evidence is available reflecting that initial and annual refresher training has been conducted.

(2) Personally explain the lockout/tagout program to any employee having a need to work in or around energized equipment or processes.

(3) Ensure each authorized employee has available sufficient locks and tags to be used for the task.

7. **COVERED OPERATIONS**. Before any GSA employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start-up, or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative. E**xceptions** which are applicable to GSA operations to the foregoing policy are:

a. Hot tap operations, provided employer **demonstrates**:

(1) Continuity of service is essential, ***and***

(2) Shutdown of the system is impractical, ***and***

(3) Documented procedures are followed, and special equipment is used which will provide proven **effective** protection for employees.

b. Work on cord-and-plug connected electrical equipment where unplugging the equipment from the energy source will control **all** hazardous energy sources. The equipment must be unplugged and the plug must remain under the exclusive control of the employee performing the servicing or maintenance.

c. Exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations, which is covered by 29 CFR 1910, Subpart S.

d. Servicing and/or maintenance which takes place during normal production operations **UNLESS**:

(1) An employee is required to remove or bypass a guard or other safety device, ***OR***

(2) An employee is required to place any part of his or her body into an area of 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.

> *(**NOTE:** Minor tool changes and adjustments, other minor servicing activities, which take place during normal production operations, are not required to comply with lockout/tagout requirements **IF** they are routine, repetitive, and integral to the use of the equipment for production, **PROVIDED** that the work is performed using alternative measures which provide effective protection of the employee.)*

8. **LOCKOUT/TAGOUT PROCEDURES**.

CAUTION: At the outset, it should be remembered that removing the power source from any type of equipment does not remove any energy that may be stored in the equipment, such as electrical energy stored in a capacitor, kinetic energy stored in flywheels, mechanical energy due to pressure differences, heat energy and hot surfaces, potential energy stored in pendulums, and heavy objects not at their lowest position. In some cases, this could prove to be disastrous. Therefore, it is imperative that employees responsible for removing power sources are thoroughly knowledgeable in their duties. Any stored energy should be released. If this is not possible, it should be controlled by blocking or other means and all persons that could be injured from such unexpected energy releases must be free and clear of the danger zones.

a. Equipment-Specific Written LOTO Procedures. Procedures shall be developed, documented, and utilized for the control of potentially hazardous energy when employees are engaged in activities involving energized equipment. A sample procedure is presented in Appendix A. The procedures shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance including, but not limited to, the following:

(1) A specific statement of the intended use of the procedure;

(2) Specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment to control hazardous energy;

(3) Specific procedural steps for the placement, removal, and transfer of lockout/tagout devices and the responsibility for them; and

(4) Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout/tagout devices and other energy control measures.

b. Equipment and Supplies. The requirements for locks, tags, chains, adapters, pins, and the like shall be ascertained and an adequate supply shall be maintained, distributed, or assigned, as needs dictate.

(1) Lockout Devices.

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

(b) At larger GSA activities, it may be beneficial to have different types of locks for the various crafts (e.g., electrician, pipefitter, air conditioning mechanic, etc.). This shall be at the discretion of the GSA official in charge of the activity.

(c) Lockout devices shall not be used for any purpose other than for controlling hazardous energy. For example, locks used for lockout shall not be used to lock tool boxes, wall lockers, etc.

(d) Duplicate keys for locks will not be maintained, except by the Facility Manager in a locked area of his/her office.

(2) Tagout Devices.

(a) The tags used for this program shall be uniform throughout the facility (i.e., size, shape, color, and format). Also, they shall be durable enough for the maximum period of time that exposure is expected

(b) Tags shall be substantial enough to prevent inadvertent or accidental removal. 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-tolerable nylon cable tie.

(c) The employee responsible for completing tag information shall include:

/1/ Date and hour of tagout,

/2/ Printed name, facility, and telephone number of the employee,

/3/ Reason for tagout, and

/4/ Anticipated duration of the tagout.

(d) Tags must warn against hazardous conditions if the equipment/process is re-energized and shall include the legends: "DO NOT START," "DO NOT OPEN," "DO NOT CLOSE," or similar language.

c. Pre-Planning.

(1) An initial survey shall be made to identify all energy sources and related exposures to determine if machines, equipment, and processes can be isolated.

(2) All energy isolating devices shall be adequately labeled or marked to indicate their function. The identification shall include the equipment or process supplied, energy type, and magnitude.

(7) Only knowledgeable employees shall prescribe the appropriate duties and responsibilities relating to the actual details affecting the lockout/tagout.

(8) Energy isolating devices shall be operated only by authorized employees.

d. Implementation.

(1) All personnel affected by the lockout/tagout shall be informed before the lockout/tagout takes place. It may be necessary to tag associated equipment which will be rendered inoperable due to the deenergization process to avoid unnecessary service calls by employees not aware of the lockout/tagout.

(2) No one will be allowed to energize equipment/process which has been locked or tagged. To assure compliance, only those employees actually engaged in the repair, maintenance, or replacement of the equipment or process shall have the key to the locking device. Only the person applying the lockout/tagout is authorized to remove the lock and/or tag, except in extreme circumstances (see "Release of Lockout/Tagout," below).

(3) If a task is so complex as to create confusion on the part of the employee or anyone affected by the lockout/tagout, the responsible supervisor shall develop a plan of action to serve as a control measure for the duration of the job. This plan is in addition to, and shall incorporate, the Equipment-Specific Written LOTO Procedures required for the energized equipment involved. This plan shall include:

(a) Job objectives and equipment/process involved,

(b) Estimated job duration,

(c) Location, personnel, and crafts involved,

(d) Special precautions required,

(e) Type, number, and location of all energy isolating devices requiring lockout/tagout devices,

(f) Responsible personnel approvals in writing, and

(g) Start-up provisions.

(4) Using appropriate equipment/process shutdown procedures, all operating controls shall be turned off or returned to the neutral mode.

(5) All involved energy isolating devices shall be located and operated in such a manner as to isolate the equipment or process from the energy source. The lockout/tagout plan, if developed, and Equipment-Specific Written LOTO Procedures shall be followed.

(6) Appropriate lockout/tagout devices shall be applied to each energy isolating control.

(a) The preferred method shall be by lockout **and** tagout. Tagout without lockout shall be considered **only** as a last resort.

(b) Lockout devices shall be attached in such a manner as to prevent the operation of energy isolating devices.

(c) Tagout devices shall be attached to the energy isolating device except, that, where the installation does not permit this attachment, they shall be so located in such a manner as to be immediately obvious to anyone attempting to operate the energy isolating device.

(7) The following actions shall be accomplished after lockout/tagout application to determine if the operation of the energy isolating devices has, in fact, produced the required isolation of the equipment or process:

(a) Test the equipment or process by use of appropriate test equipment and/or visual inspection to determine that the energy isolation has been effective, **and**

(b) Operate the equipment or process operating controls (push buttons, switches, etc.) to determine that the energy isolation has been effective.

(8) The equipment or process shall be carefully examined to detect and relieve, disconnect, or restrain any residual energy.

(9) Where hydraulic, steam, water, pneumatic, gas, etc. isolation valves are involved, they shall be tightly closed, chained, locked, and appropriately tagged.

e. Release of Lockout/Tagout.

CAUTION: Energy stored in a locked- or tagged-out system must be considered prior to restoring the power to the system, regardless of the source. It is essential that the employee responsible for

removing locks and/or tags is well versed in the possibility of unexpected movement or power when the locking mode is removed.

(1) Before energy is restored to the equipment/process, a visual inspection of the work area shall be made to ensure that all nonessential items have been removed and that all components are operationally intact.

(2) Check the work area to ensure that all employees have been safely positioned or removed from the area.

(3) Verify that the equipment's or machine's controls are in the "neutral" or "off" position.

(4) Each individual who has attached a lock/tag will remove his/her lockout/tagout device. When all locks/tags have been removed, remove the lockout/tagout device and re-energize the machine or equipment. In the absence of the employee who applied the lockout/tagout device, **ONLY** that employee's immediate supervisor may remove an energy isolating device – and then **ONLY** after personally ensuring the equipment/process is ready for reenergization **AND** that the authorized employee is notified of the reenergization.

CAUTION: The removal of some forms of blocking may require re-energization of the machine before safe removal. If so, proceed with extreme caution!

(5) Notify affected employees that the servicing or maintenance is completed and the equipment or machine is ready for use.

9. **TRAINING AND CERTIFICATION**. Employees authorized to perform energy isolation tasks shall receive initial training, and refresher training annually thereafter.

a. Training shall consist of recognition of applicable hazardous energy sources and the use of adequate methods and means for energy isolation and control.

b. The GSA official in charge of the activity must certify that training has been conducted and will maintain records which reflect the subject, employee names, and the date training was performed. GSA employee training records shall be in accordance with current GSA training criteria.

10. **INSPECTIONS**. The GSA official in charge of the activity must ensure inspection of work falling under the provisions of this SOP are conducted at least annually. Inspection records

shall be maintained which specifies the equipment or process being inspected, date of inspection, and the name of the inspector. The inspector will be an authorized employee but **not** be the employee performing the work being inspected.

11. **UNAUTHORIZED PERSONNEL**. Under no circumstances shall the individual performing the lockout/tagout allow anyone access to the equipment/process, unless it is absolutely certain that all energy hazard potentials have been secured and the possibility of anyone coming in contact with the energy source has been eliminated.

APPENDIX A

SAMPLE EQUIPMENT-SPECIFIC WRITTEN LOTO PROCEDURE

SAMPLE

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LOCK-OUT PROCEDURE

Lock-out Procedure for: General Services Administration
Kansas City South Property Management Center
1500 E. Bannister Road
Kansas City, MO 64131

Identification of Equipment: Air Handler Unit (AHU) #008, PM Guide A11

Location of Equipment: Room B-151, Building 1, 1500 E. Bannister Road, KCMO

Date of this Procedure: 12 Sep 1994

Statement of Purpose: This procedure established the minimum requirements for the lock-out of energy isolating devices whenever maintenance or servicing is performed on the above identified machines or equipment. It shall be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources, and locked out before employees perform any servicing or maintenance when the unexpected energization or start-up of the machine or equipment or the release of stored energy could cause injury.

Compliance Requirement: All General Services Administration (GSA) employees are required to comply with the restrictions and limitations identified herein imposed upon them during the use of lock-out. Contractors and other non-GSA employees must adhere to all requirements contained within OSHA 29 CFR 1910.147. GSA Authorized Employees are required to perform the lock-out in accordance with this procedure. All employees, upon observing a machine or piece of equipment which is locked out to perform servicing or maintenance shall **not** attempt to start, energize, or use that machine or equipment. **Failure to follow these lockout requirements may result in administrative and/or disciplinary action.**

Additional Assistance: Contact the Region 6 Safety and Environmental Management Office (6PMF) at telephone 816-823-2219 for additional assistance in identifying or clarifying these hazardous energy control procedures.

Accident Reporting: Immediately report **all** accidents or incidents involving the control of hazardous energy to the Region 6 Safety and Environmental Management Office (6PMF) at telephone 816-823-2227.

Sequence of Lock-Out:

(1) Notify **all** affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance. The following identifies the affected employees (name or job title) of the above identified machine or equipment and how to notify them:

⇨

John E. Doe; Maintenance Supervisor; 926-2222
Mary H. Yang; A/C Supervisor; 926-2225
Ben E. Brush; A/C Mechanic #2; 926-2225

(2) The authorized employee shall refer to the machine or equipment manufacturer's procedures to identify the type and magnitude of the energy that the machine or equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy. The following lists the type(s) and magnitude(s) of energy of the above listed machine or equipment, its hazards, and the methods to be used to control the energy:

⇨

Electrical (277 Volts) isolated at disconnects.

(3) Ensure the above identified machine or equipment is shut down by the normal stopping procedure, i.e., place its control(s) in the "**neutral**" or "**off**" position. The following identifies the type(s) and location(s) of the above identified machine's or equipment's operating control(s):

⇨

Main disconnect at mechanical panel #A-01 , located in Electrical Room, B-152.
Secondary disconnect at AHU located in Electrical Room, B-152, west wall.
Control disconnect at panel AHU, room #B-005, electrical closet.

(4) De-activate the energy isolating device(s) so that the machine or equipment is isolated from the energy sources. The following identifies the type(s) and location(s) of energy isolating devices for the above identified machine or equipment:

⇨

Padlock on main disconnect, secondary, and control disconnects.

(5) Lock out the energy isolating device(s) with assigned individual lock(s). Attach a tag to **each** lock-out device identifying the following information:

(a) Name of the person (printed or typed) applying the lock-out device.

(b) Department to which assigned and telephone number.

(c) Date and time the lock-out device was attached.

(6) Stored or residual energy (such as that in capacitors; springs; elevated machine members; rotating flywheels; hydraulic systems; and air, gas, steam, or water pressure; etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, blinding, bleeding down, etc. The following lists the type(s) of stored or residual energy contained within the above identified machine or equipment and the methods to be used to dissipate or restrain that energy:

⇨

Hot Water: 160 to 190 degrees Fahrenheit, lockout both supply and return valves. Drape insulating cloth over hot pipes to protect against skin contact. Do NOT open lines unless water temperature has first been allowed to cool for at least 4 hours.

(7) Ensure and verify that the equipment is disconnected from the energy source(s) as follows:

(a) First, check that no personnel are exposed,

(b) Then, verify the isolation of the equipment by operating the push button or other normal operating controls or by testing to make certain the equipment will not operate.

The following identifies the method(s) of verifying the isolation of energy for the above identified machine or equipment:

⇨

Electric: Turn operating switch to "on" position; use multimeter tester.
Water: Check temperature gauges, touch and feel.

CAUTION: Return operating control(s) to "**neutral**" or "**off**" position after verifying the isolation of the equipment.

(8) The machine or equipment is now locked out. Proceed with maintenance or servicing.

Restoring Equipment to Service:

(1) Check the machine or equipment **AND** the immediate area around the machine or equipment to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.

(2) Check the work area to ensure that all employees have been safely positioned or removed from the area.

(3) Verify that the equipment's or machine's controls are in the "**neutral**" or "**off**" position.

(4) Each individual who has attached a lock will remove his/her lock-out device(s). When all locks have been removed, remove the lock-out device and re-energize the machine or equipment.

NOTE: The removal of some forms of blocking may require re-energization of the machine before safe removal. If so, proceed with extreme caution!

(5) Notify affected employees that the servicing or maintenance is completed and the equipment or machine is ready for use.