

**SCWI-8715-0013**

**Revision D**

**July 2014**

**National Aeronautics and  
Space Administration  
John C. Stennis Space Center  
Stennis Space Center, MS 39529-6000**

**John C. Stennis Space Center**

**Control of Hazardous Energy Lockout/Tagout  
and Non-Service/Maintenance Hazardous Energy  
Isolation**

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## APPROVAL/CONCURRENCE

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Date

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## Document History Log

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Basic	7/17/09	Dave Lorance 8-1516	Transitioned all the information from the existing Safety and Health Handbook. Added Sections from each of the SSC Prime Contractor work instructions so that all aspects of Lockout, Tagout (LOTO) are addressed through this procedure. Added new forms: LOTO audit, LOTO Log Sheet, Hazardous Energy Control Procedure (HECP) and posted new LOTO related tags.
A	9/22/2010	Mike Rewis 8-2663	A grammatical change was made in section 2.0. Section 2.0 was also changed to reflect the proper referenced paragraph relating to a production LOTO environment. Changed Originator's signature block. General admin changes.
B	10/06/2012	Amy Rice 8-2972	Deleted configuration locks and tags, updated responsibilities of NASA SMA office and contractors, updated training requirements, clarified sections 5.0 – 11.0. Updated section 7.1 and deleted 7.3.
C	03/19/2014	D. Rodriguez 8-2499	Revised Section 2.0 b. to read SCWI-8715-0006. Added new requirement in Section 3.2 g. for new and overhauled equipment. Revised Section 4.0 b. and c. to include complex equipment/systems in the Hazardous Energized Control Procedures (HECP). Added new definition of Complex Equipment/Systems to Appendix B e. Administrative corrections.

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D	6/23/14	D. Rodriguez 8-2499	Changed Periodic Inspections to Job Site Audits in sections 4.2 & 4.3. Combined Annual Audits with Periodic Inspecting to better define expectations, section 8.1. Administrative reformatting.

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## PREFACE

### P.1 PURPOSE

This work instruction defines Lockout (LO) and Tagout (TO) minimum requirements for positively locking and tagging out equipment. Lockout/Tagout (LOTO) is required when performing service, maintenance or systematic operations at John C. Stennis Space Center (SSC) where the unexpected release of energy or energization could result in injury to personnel or equipment. This work instruction is intended to comply with the requirements of Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.147, Control of Hazardous Energy (LOTO) and the provisions of OSHA's Electrical Safety-Related Work Practices Standards: 29 CFR 1910.331; 1910.332; 1910.333; 1910.334; and 1910.335.

### P.2 APPLICABILITY

This work instruction is applicable to all National Aeronautics Space Administration (NASA) SSC civil servants and contractor personnel whose tasks could potentially expose personnel to hazardous energy or materials, which could be unexpectedly energized or released. It applies to all NASA contractors at SSC, including while performing work at SSC for another agency or organization.

This document does **NOT** apply to the control of energy in the following conditions:

- a. Service/maintenance activities, such as minor tool changes and adjustments, that are routine, repetitive and integral to the use of the equipment, and that are conducted during normal production operations and are not regulated by 29 CFR 1910.147, if the safeguarding provisions of 29 CFR 1910 Subpart O (1910.211–219) and Subpart S (1910.301–335) or other applicable portions of 29 CFR 1910 are implemented to prevent worker exposure to the hazards created by the unexpected energization or startup of the equipment/system.
- b. Service/maintenance activities performed on electric equipment connected to the energy source by a cord and the plug and are under the exclusive control of the employee performing the service/maintenance. Cord and plug connected equipment does not require LOTO if all of the following conditions exist:
  1. The Authorized Individual is within sight of the equipment.
  2. Unplugging the equipment isolates the equipment from all energy sources.
  3. The equipment has no stored energy.

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- c. If equipment must be left unattended or if all of the above conditions do not apply, the equipment will be locked and tagged out by attaching a tag to the on/off switch and attaching a LO device to the plug to prevent it from being plugged in.
- d. Some facilities at SSC fall under the exclusive control of electric utilities for the purpose of power generation, transmission and distribution, including related equipment for communication or metering. The exposure of employees to electrical hazards from work on, near or with conductors or equipment in electric utilization installations is regulated by 29 CFR 1910.269 and 29 CFR 1910, Subpart S (301–335).

### P.3 REFERENCES

All references are assumed to be the latest version unless otherwise indicated.

- a. NPR 8715.3, NASA General Safety Program Requirements
- b. SCWI-8715-0006, Electrical Safety Program
- c. SPR 1440.1, Records Management Program Requirements
- d. SPR 8715.1, Safety and Health Program Requirements
- e. SREF-3000-0020, NASA Desk Guide for Table of Disciplinary Offenses and Penalties
- f. SSP-8715-0001, Safety and Health Handbook
- g. 29 CFR 1910 Subpart O, Machinery and Machine Guarding
- h. 29 CFR 1910 Subpart S, *Electrical*
- i. 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout)
- j. 29 CFR 1910.269, Electric Power Generation, Transmission, and Distribution

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## P.4 RESPONSIBILITIES

### 4.1 NASA SSC Civil Service Employees

All NASA SSC civil service employees shall:

- a. Comply with all requirements of this work instruction where applicable.
- b. Follow all provisions of this document if they are required to perform the duties of an Authorized Person as defined by this work instruction.

### 4.2 Contractors (Onsite Prime Contractors and Construction Contractors)

NASA SSC onsite prime contractors and construction contractors shall:

- a. Classify all LOTO Procedures as SAFETY CRITICAL and require a written Hazardous Energy Control Procedure (HECP) be reviewed and approved by a designated safety representative prior to initiation.
- b. Follow the requirements of this work instruction.
- c. Annually review HECPs and associated work instructions.
- d. Ensure compliance with standards set forth in the program by performing unscheduled Job Site Audits of LOTO operations and by documenting findings on an audit form (SSC Form 849 or equivalent).
- e. Ensure that only Authorized Employees apply and remove locks and tags. Ensure that employees who are found not to be proficient in LOTO do not perform those activities prior to retraining.
- f. Ensure that all equipment used for LOTO is stocked and available in a safe state of readiness.
- g. Ensure that new or overhauled equipment is capable of being locked out.
- h. Ensure that employees whose locks are removed are formally notified prior to their return to work.
- i. Construction contractors and subcontractors shall ensure that personnel performing LOTO activities are designated in writing and have received acceptable training/certification, and those personnel comply with all applicable LOTO requirements of this document.

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- j. Outside contractors must provide a copy of their LOTO program and evidence that their company has trained them about LOTO before they are allowed to work at this facility. If outside contractors perform servicing or maintenance that requires LO, the responsible Cognizant Safety Office shall take the following steps:
1. Inform the outside contractor of SSC's LO procedures and supply them with a copy.
  2. Obtain and review a copy of the outside contractor's LO procedures.
  3. Ensure that employees understand and comply with the responsibilities and a prohibition of the outside contractor's LO procedure.

#### **4.3 NASA SSC Safety and Mission Assurance Directorate**

NASA SSC Safety and Mission Assurance Directorate (SMA) shall:

- a. Annually review HECPs and associated work instructions.
- b. Ensure compliance with standards set forth in the program by performing unscheduled Job Site Audits of LOTO operations and by documenting findings on an audit form (SSC Form 849 or equivalent).
- c. Provide stringent controls and oversight of established LOTO operations to ensure compliance with all minimum requirements specified within this document.
- d. Direct the Facility Operating Services Contractor (FOSC) training department to establish, maintain and schedule up-to-date training in LOTO for all Authorized and Affected Employees.

#### **4.4 Line Managers and Supervisors**

Line Managers and Supervisors shall:

- a. Attend LOTO training for Authorized Employees and maintain certification.
- b. Ensure that employees performing LOTO procedures are properly trained and certified in accordance with the requirements contained within this document.
- c. Provide appropriate site-specific LOTO equipment, as required, to certified employees.

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- d. Ensure certified employees use locks, tags and associated equipment according to the requirements prescribed in this document.
- e. Ensure that this LOTO work instruction is available to all employees.
- f. Perform an annual inventory of the LOTO locks and keys and ensure that the integrity of proper lock and tag management practices are maintained.
- g. Hold employees accountable for each padlock and key that is provided to the employee.
- h. Assure written coordination and concurrence of process/procedure when LOTO activity requires participation with another organization.

#### **4.5 Authorized Employees**

Authorized Employees shall:

- a. Complete required LOTO certification training for Authorized Employees.
- b. Perform LOTO activities in conformance to this procedure and compliant with OSHA requirements.
- c. Provide notification to Affected Employees, contractors and supervisors of LOTO activities in their respective areas.
- d. Remain knowledgeable of LOTO procedures.
- e. Maintain all equipment associated with LOTO activities in good condition.

#### **4.6 Affected Employees**

Affected Employees shall:

- a. Be aware and knowledgeable of the intent and requirements of the LOTO program.
- b. Complete required LOTO training for Affected Employees.
- c. Follow all LOTO guidelines and procedures presented in the training provided.

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## CHAPTER 1. LOCKOUT/TAGOUT WRITTEN PROGRAM

This work instruction shall serve as the primary document for all LOTO tasks performed at NASA SSC. Secondary to this work instruction is the requirement for each contractor and construction contractor to develop and maintain Work Authorizing Documents (WAD). Where applicable, the WAD shall contain the equipment or system specific HECPs that will be used to ensure the control of hazardous energy.

**WARNING:** Documented HECPs shall be developed and utilized to protect persons from any condition where potentially hazardous energy may exist and contribute to personnel injury if unexpectedly released.

- a. The following requirements and instructions shall apply to HECPs:
- b. Only employees who are knowledgeable about the process and fully understand the requirements of LOTO shall write HECPs.
- c. HECPs shall contain the identity of the equipment or system; the identity or location of the energy isolation points; a method to de-energize and secure equipment; and a method to verify successful de-energization.
- d. The detail required in an HECP will depend upon the complexity of the equipment involved; the type of service or maintenance to be performed; and the control means used.
- e. SSC Form 848 can be used to document an HECP. Use of this form is optional provided a similar form is used to document the HECP.
- f. Similar machines or equipment can be covered with a single generic HECP if it adequately addresses the hazards to be encountered and steps to be taken during service and maintenance of all the machines and/or equipment covered by the procedure. Generic HECPs can be applied where the hazards, shutdown procedures, energy controls, etc. are identical for each piece of equipment. Where this is not the case, an individual HECP will be required.
- g. An HECP is not required for a piece of equipment when **all** of the following elements exist:
  1. The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shutdown that could endanger employees.
  2. The machine or equipment has a single energy source that can be readily identified and isolated.

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3. The isolation and locking out of that energy source completely de-energizes and deactivates 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 LOTO device will achieve a locked-out condition.
  6. The LOTO device is under the exclusive control of the Authorized Employee performing the servicing or maintenance.
  7. The servicing or maintenance does not create hazards for other employees.
  8. NASA SSC and its contractors, in utilizing this exception, have had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.
- h. HECPs shall designate a means for notification of Affected Employees, as necessary.
- i. HECPs shall be posted at the jobsite or readily available to Authorized and Affected Employees.

## **CHAPTER 2. ENFORCEMENT/REINFORCEMENT**

Employees discovered disturbing the controls, energy isolating devices and/or energy sources for any equipment/system or component that has been locked or tagged out by someone else (SSC standardized LOTO devices or tags) shall be subject to disciplinary action as described below.

- a. Civil service employees shall be subject to disciplinary action in accordance with SREF-3000-0020.
- b. Onsite and offsite contractor employees shall be subject to SSC disciplinary action as determined by the Contracting Officer and/or the Contracting Officer's Representative, or possibly the organization requesting service.

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## CHAPTER 3. LOCK AND TAG SPECIFICATIONS

### 3.1 Locks

**NOTE:** Locks physically prevent the use of equipment or machinery.

Locks and keys shall be managed and controlled through supervisors or their designees.

- a. For each LO device assigned, the crew number and/or identification nomenclature and the employee who received/returned the LO device shall be documented on SSC Form 847 or equivalent.
- b. All LOTO program locks shall be singularly identified and RED in color for personal and Group LO tasks. These locks are to be used exclusively for the purpose of locking out equipment in conjunction with this program.
- c. Locks shall have no more than one (1) key for the Authorized Employee. If the key is lost, the individual must report it to his/her supervisor immediately.
- d. Locks used in conjunction with the LOTO program can be purchased from a manufacturer with a RED case or have a RED heat shrink sleeve installed over the lock case.
- e. Locks shall be durable and substantial enough to prevent removal.
- f. Locks and tags used for LOTO with their means of attachment shall be returned to the respective supervisor/shop leader when the employee transfers to another crew; transfers to a job that does not require locking devices; or terminates employment.

### 3.2 Tags

- a. LOTO tags shall be singularly identified.
- b. A pictorial of an approved SSC tag must be exhibited as an example in the program plan.

**NOTE:** SSC LOTO tags can be ordered through the SSC warehouse via a Material Request using the SSC Service Request System (accessible via the NASA/SSC Intranet Portal). The LOTO tag stock number is 769000N013923.

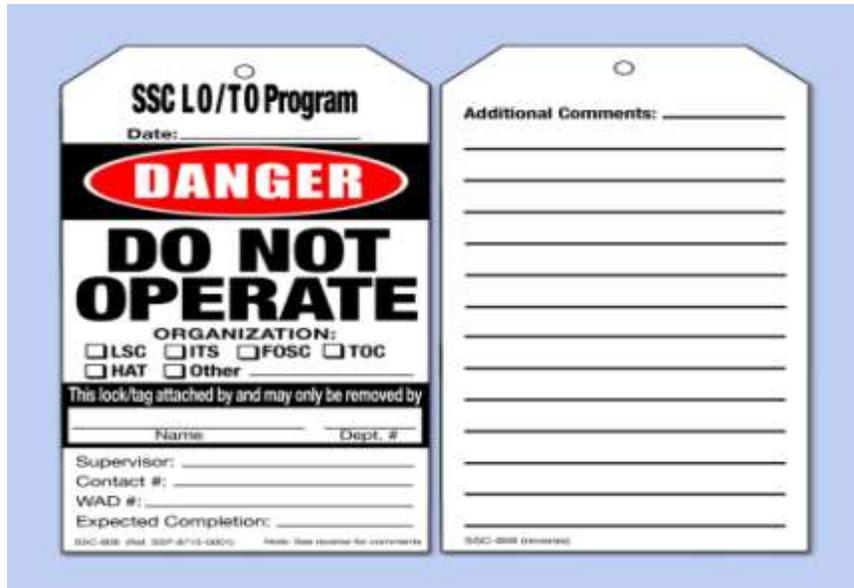
**NOTE:** Tags are warning devices, and do not provide physical restraint.

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- c. The means of attachment for a LOTO Tag shall be:
1. Non-reusable.
  2. Attached by hand.
  3. Self-Locking.
  4. Non-releasable.
  5. Equipped with a minimum unlocking strength greater or equal to fifty (50) pounds.
- d. Each lock must be accompanied by a “DO NOT OPERATE” tag identifying:
1. Company/organization name.
  2. Name and department of Authorized Employee who installed lock.
  3. Supervisor’s name and contact information.
  4. Realistic estimated removal date.
  5. Tags must be legibly completed using fine or extra fine permanent marker. See Figure 1.

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**Figure 1. Approved SSC Lockout/Tagout Tag (SSC Form 808)**



(SSC Standardized LOTO Tags SSC Form 808, Warehouse Stock #769000N013923)

e. Notes regarding sole use of TO devices:

1. TO devices used without a lock in conjunction with this program are prohibited unless it is physically impossible to lock and tag the energy source(s), and supporting evidence proves that tagging alone can eliminate potential danger that may be associated with the unexpected energization.
2. The responsible Safety Office shall inspect all instances where tagging without a lock will serve as the designated means for isolation and provide a signature of concurrence on such TO.
3. Additional safety measures, such as removing fuses or lifting wires, shall be exercised to provide added employee protection when tags are used without locks in this program.

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## CHAPTER 4. GENERAL SAFETY REQUIREMENTS FOR CONTROL OF HAZARDOUS ENERGY

### 4.1 Job Preparation

- a. The supervisor shall ensure all employees assigned to the work task are current with LOTO Certification training.
- b. The Authorized Employees must identify all energy sources for the task by reviewing the HECP for the activity to be performed. In the absence of an HECP, one (1) must be developed and approved as a "Safety Critical" procedure that requires a signoff by a Safety Representative.
- c. The Authorized Employee shall notify Affected Employees of the LOTO activity.
- d. The Authorized Employee will shutoff equipment by the normal stopping means.

### 4.2 LOTO Application (Authorized Employees Only)

- a. Apply the lock and tag device so that the energy isolation device is locked in the off/de-energized position.
- b. Dissipate, drain or safely release any stored or residual energy in the system according to the instructions on the HECP.
- c. Block any mechanical parts or lines and remove mechanical linkage as necessary to ensure safe completion of work.
- d. If the LOTO is being applied to electrical equipment to prevent electric shock, an Electrically Qualified Person using appropriate test equipment must verify the LOTO. A Qualified Person shall use test equipment to test circuit elements and electrical parts of equipment to which employees will be exposed and shall verify that the circuit elements and equipment parts are de-energized. The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage back-feed even though specific parts of the circuit have been de-energized and presumed to be safe. If the circuit tested is over 600 volts, nominal, the test equipment shall be checked for proper operation immediately before and after this test.
- e. Attempt to restart the equipment or systems in the normal or intended manner. If the equipment restarts, do not proceed until the cause of failure to de-energize is identified and corrected.

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- f. If attempts to restart fail, replace all selector switches and control devices back in the de-energized position.
- g. The equipment should now be in a zero (0) energy state, and work can safely proceed.

#### **4.3 Preparation for Removal of LOTO**

- a. Verify once again that operating controls are in a neutral position or “off” position.
- b. Inspect the work area to ensure that nonessential items, tools, etc. are removed from the work area or danger zone.
- c. Check that all guarding is properly reinstalled and ready for service.
- d. Notify Affected Employees just prior to reenergizing equipment and ensure that all personnel are in a safe location.

#### **4.4 LOTO Removal**

- a. Remove the lock and tag devices.
- b. Reenergize the equipment.
- c. Start equipment using normal startup procedures.
- d. Notify all Affected Employees that the equipment has been reenergized.

**NOTE:** LOTO equipment can remain in place if the Authorized Employee(s) will exclusively perform service and maintenance activities.

#### **4.5 Temporary Removal of LOTO for Test and Alignment Purposes**

In situations where a lock and tag must be temporarily removed from the energy source and the equipment must be energized to test, align, position or calibrate, the following actions apply:

- a. Clear equipment of tools and materials.
- b. Remove Affected Employees from the equipment area.
- c. Remove lock and tag device(s).

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- d. Energize and proceed with testing, aligning, positioning or calibrating of equipment.
- e. Reinitiate LOTO procedures to isolate energy sources if further service or maintenance is required.

**NOTE:** Employees utilizing this exception must remain clear of equipment pinch points/danger zones or must maintain absolute control over the hazardous energies during the testing, aligning, positioning or calibrating.

## CHAPTER 5. GROUP LOCKOUT/TAGOUT

Operations that require a large number of employees to apply RED locks and tags to equipment may utilize a Group LOTO system. A Group LOTO system utilizes either a Lockbox or a Multi-Lock Hasp. In addition to all of the other requirements, the following requirements for a Group LOTO are defined below:

- a. If an HECP for the operation does not exist, an HECP shall be developed by the craft, crew or department assigned as the primary responsibility for the service/maintenance activity.
- b. The HECP shall have all the appropriate signatures for approval since it is deemed "Safety Critical," which requires signoff by a Safety Representative.
- c. The Authorized Employee or Supervisor responsible for developing the HECP is responsible for communicating it to all Affected and Authorized Employees.

**NOTE:** Group LOTO procedures may need to be tailored to the specific industrial operation.

- d. The LOTO Coordinator assumes responsibility for the project and applies a lock and tag to each hazardous energy source identified in the HECP. The person who assumes responsibility for the project and applies the locks is typically referred to as the LOTO Coordinator.
- e. The LOTO Coordinator will place all of the keys to the locks used in a lockbox and will affix his/her own lock and tag to the box. Thus the keys to the locks that actually isolate the various energy sources become secured inside of the lockbox.
- f. The LOTO Coordinator and each group member verifies that the equipment/system is properly shutdown, de-energized and placed in a zero (0) energy state; that any stored or hazardous energy is released; and that the equipment/system is in safe working condition.

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- g. Each Authorized Employee preparing to work on the project shall verify that the system is properly locked out by reviewing the HECF and by physically viewing each secured energy source.
- h. Authorized Employees preparing to work on the locked out system shall affix their own locks and tags to the lockbox.
- i. After all energy sources have been isolated, locked and tagged out, and it has been ensured that personnel are not exposed to any type of hazardous energy, an attempt to start the equipment, machine or system shall be made to verify it has been de-energized.

**CAUTION: Return operating control(s) to NEUTRAL or OFF position after this verification.**

- j. Personnel shall not remove their locks and tags from the lockbox until they have completed their work.
- k. After all work has been completed, the LOTO Coordinator shall verify that the LOTO devices applied by other Authorized Employees in the group activity are removed by those employees. If the Authorized Employee who placed the LOTO devices is unable to remove them, the LOTO devices are to be removed in accordance with “emergency removal” guidelines contained in Section 6, Emergency Lock Removal.
  - 1. Once all Authorized Employees have removed their applied devices, the LOTO Coordinator shall remove his/her own lock and tag and then remove each of the locks from the equipment energy isolation points.

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## CHAPTER 6. EMERGENCY LOCK REMOVAL

- a. Removal of LOTO devices shall be limited to the employee who applied the devices. When the Authorized Employee who applied the LOTO devices is not available to remove the devices, they may be removed under the direction of the supervisor or designee. The level of safety must not be jeopardized in any way by this process.
- b. The supervisor shall verify that the Authorized Employee who applied the devices is not at work. Verification must occur in the following manner:
  1. Make a reasonable effort to contact the Authorized Employee to inform him/her that the LOTO devices are to be removed and verify that he/she is not able to return to work to remove them.
  2. If contact is not made, the supervisor must ensure that the Authorized Employee has been informed of any actions taken prior to the employee's returning to and resuming work.
- c. The Supervisor shall prepare and process a Discrepancy & Correction Report (D&CR) or Problem Report (PR).
- d. The engineer, team lead or supervisor shall perform a walk-down of the affected system and authorize removal of the lock/tag in the disposition section of the D&CR/PR or in the form of a letter and shall process the D&CR/PR letter through SMA.
- e. The supervisor or designee shall check the machine or equipment and the adjacent area to ensure that all potentially hazardous items, if left in place, are removed, and equipment is ready for reactivation.
- f. The supervisor or designee shall confirm that equipment controls are in the neutral position.
- g. All employees shall be safely positioned or removed from the impact area before system reactivation.
- h. The Authorized Person who performed the LOTO shall be notified that the devices have been removed prior to their return to work.
- i. After reactivation, notify Affected Employees and Facility Managers that the lock and tag process is complete, and equipment/system is again functional.

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## CHAPTER 7. SHIFT OR PERSONNEL CHANGES

During shift or personnel changes, the Authorized Employee who initially applied the LOTO devices shall ensure the continuity of LOTO protection between off-going and on-coming employees to minimize exposure to hazards from the unexpected energizing; start-up of the machine/equipment/system; or release of stored energy. At SSC, only the following two (2) options are allowed to transfer LOTO devices between off-going and on-coming employees:

- a. A physical transfer between off-going and on-coming Authorized Employees. Both Authorized Employees shall be present at the worksite at the same time to replace the off-going employee's lock and tag with the on-coming employee's lock and tag.
- b. If there is a gap between shifts and a physical transfer is not possible, the responsible supervisory personnel and other Authorized Employees who have placed their locks on the equipment or system shall make the transfer in the following manner:
  1. The supervisor shall install a lock and then remove his/her LO device(s) to maintain a zero (0) energy state.
  2. The off-going employees shall remove their personal LOTO devices.
  3. The supervisor shall verify all employees have removed their locks.
  4. The supervisor shall be present when the new crew arrives to LO the system.

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## CHAPTER 8. ANNUAL PERIODIC INSPECTIONS AND JOBSITE AUDITS

### 8.1 Annual Periodic Inspections

- a. Contractors and NASA shall conduct a periodic inspection at least annually of each Hazardous Energy Control Procedure (HECP), their written program and LOTO training to ensure that procedures are adequate and are being followed. (This individual should not be directly involved with the day-to-day supervision of the LOTO program).
- b. The periodic inspection must ensure that each procedure is adequate in providing effective protection to personnel during servicing and/or maintenance of machines, equipment and/or systems operations. If Authorized Employees are deviating from the procedures, the employees involved must be retrained, and the training must be documented.
- c. Inspectors shall observe a representative sample of Authorized Employees performing tasks using LOTO procedures. They will also perform a review with each Authorized Employee of that employee's responsibilities under the energy control procedure being audited. For TO procedures, the review of responsibilities also includes the Affected Employees. The audit should include verification that training has been completed for all Authorized and Affected Employees involved in the LOTO procedure.
- d. Periodic inspection shall be performed by an Authorized Employee who is not utilizing the energy control procedure being inspected. (An individual not directly involved with the day-to-day supervision of the LOTO program shall perform the periodic inspection.)
- e. Where lockout is used for energy control, the periodic inspection shall include a review between the inspector and each Authorized Employee of that employee's responsibilities under the energy control procedure being inspected.
- f. After the inspection, the results shall be reviewed with each Authorized and Affected Employee.
- g. Documentation certifying that the periodic inspections have been completed shall be maintained on file and include the following information:
  1. The date of the inspection.
  2. Identify the machine, equipment or system on which the energy control procedure was being utilized.
  3. The employees included in the inspection.

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4. Any deviations or inadequacies noted.
5. A Corrective Action Plan (CAP) for the identified deficiencies.
6. The name and signature of the person performing the inspection.
- h. Where WAD are reviewed, modified and/or updated for each and every situation and where an HECP is applicable, this inspection is acceptably accomplished.
- i. Where an HECP is created in the field and is signed off by a Safety Representative to achieve a "Safety Critical" review, this inspection is also considered acceptably accomplished.
- j. In cases where an HECP is posted on a piece of equipment and inspections are not performed, an annual inspection of the HECP is required as stated in steps a through d, above.

## 8.2 Jobsite Audits

- a. A minimum of four (4) random jobsite audits are required by each Safety and Health Office. NASA SSC Form 849, or equivalent form, shall be used to document jobsite audits.
- b. Findings that result from a jobsite audit shall be corrected immediately.
- c. Completed audit forms shall be maintained, so they are available for review and/or utilized for evaluation purposes during the Annual LOTO Program Evaluation.

## 8.3 Annual LOTO Program Evaluations

- a. An Annual LOTO Program Evaluation shall also be summarized and reported in the Annual Voluntary Protection Program (VPP) Self Evaluation under the element Hazard Prevention and Control, as required by SPR 8715.1, *Safety and Health Program Requirements*.
- b. A qualified representative of the affected Safety and Health Organization shall perform the audit.
- c. Objective evidence of LOTO program inspection results and CAPs shall be maintained on file by the inspected organization for a minimum period of three (3) years from the actual last finding closure date reflected in the LOTO inspection CAP.

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- d. CAPs must be developed by the audited organization and properly managed to reflect closure rationales, all closure dates and actual implemented corrective actions and dates (if different from the original).
- e. LOTO inspection CAPs shall be tracked until completed through the safety recommendation section of the Annual VPP Self Evaluation.

## CHAPTER 9. ELECTRICAL SAFETY

**NOTE:** See SCWI-8715-0006, *Electrical Safety Program*.

### 9.1 Training

#### 9.1.1 LOTO Certification Requirements

- a. All onsite LOTO certification programs shall be officially administered via FOSC.
- b. The training must demonstrate that each employee understands the purpose and function of the SSC LOTO Program, and that those employees possess the knowledge and skills to work safely on or in the vicinity of systems/equipment that could be impacted by the LOTO program.
- c. “Control of Hazardous Energy” (LOTO course #QG-609-FOS) and NSTC 814 are approved as designated courses for obtaining certification in the SSC LOTO program. Each organization’s Safety Office shall coordinate LOTO training for its respective employees.
- d. Authorized and Affected Employees shall receive refresher training by the supervisor or shop leader whenever a change in job assignments occurs; a change in machines, equipment, or processes present a new hazard; a change in machines, equipment, or processes present a new hazard; a change is made to the energy control procedures; or there is a recognized violation of the work instruction.”

#### 9.1.2 LOTO Training Records Management

- a. Onsite SSC Authorized Employees’ certification records shall be maintained current in the NASA SSC Training Certification Records System.
- b. The SSC LOTO Certification Program requires a three (3) year periodicity cycle.

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- c. Supervisors shall identify Affected Employees and ensure that those employees receive the necessary training relating to recognition of this program and its limitations.
- d. Personnel certification records shall be maintained for at least five (5) years after separation of employee and then destroyed when no longer needed.

#### 9.1.3 New Employees

- a. New employees will receive LOTO instructions during their “New Employee Safety and Health Orientation.”
- b. Testing or other means of verification will demonstrate that each employee understands the purpose and function of the SSC LOTO program.

#### 9.1.4 Authorized Employee

An Authorized Employee is an employee who is qualified, certified and trained under the provision of this procedure and designated by the employer to perform work on a machine, equipment or system. An Authorized Employee and an Affected Employee may be the same person when the Affected Employee's duties also include performing maintenance or service on any machine, equipment or system that must be locked and/or tagged out. These employees will receive “Control of Hazardous Energy” training (LOTO Course #QG-609-FOS). In addition to the general LOTO requirements, training for an Authorized Employee shall ensure that these employees are able to:

- a. Distinguish various types of hazardous energy sources.
- b. Identify the hazardous energy sources present in the workplace.
- c. Understand dangers presented by workplace energy sources.
- d. Understand and follow workplace LOTO procedures.
- e. Testing or other means of verification will demonstrate that each employee understands the purpose and function of the SSC LOTO program.

Authorized Employees of the onsite prime contractors and NASA SSC shall be recertified at least every three (3) years by FOSC.

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#### 9.1.5 Affected Employee

- a. An employee whose job requires operation or use of a machine, equipment or system on which servicing or maintenance is being performed under LO and/or TO or whose job requires work in an area in which such servicing or maintenance is being performed.
- b. In addition to the general LOTO training requirements, training for Affected Employees shall ensure that these employees are able to:
  1. Recognize when LOTO procedures are being implemented.
  2. Understand and follow workplace LOTO procedures and the importance of not attempting to startup or use equipment/machinery that has been locked and/or tagged out.
- c. Employees who may have a reason to enter or work in the area where LOTO may be implemented shall be instructed regarding the purpose of LOTO procedures and be informed of the prohibition against restarting or reenergizing equipment that is locked and/or tagged out.
- d. Testing or other means of verification will demonstrate that each employee understands the purpose and function of the SSC LOTO program.

#### 9.1.6 Refresher Training

- a. Supervisors shall identify employees whose work operations may be in an area where energy control procedures may be utilized and shall ensure that those employees are properly trained.
- b. Each contractor group's Safety Department or designated department shall maintain these records to ensure that all Authorized Employees maintain current certification.
- c. If necessary, the Affected and Authorized Employee shall receive refresher training by the supervisor or shop leader whenever a change in job assignments occurs; a change in machines, equipment or processes that present a new hazard; or a change in the energy control procedures are a recognized violation of this work instruction.

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#### 9.1.7 Construction, Offsite Contractors, Resident Agencies and Tenants

- a. Construction contractors, offsite contractors, resident agencies and tenants shall ensure that their Authorized and Affected Employees are trained in accordance with 29 CFR 1910.147 and the requirements of this work instruction.
- b. Authorized and Affected Employees shall receive initial training upon hire and annual refresher training thereafter.
- c. The training must demonstrate that each employee understands the purpose and function of the SSC LOTO Program, and that those employees possess the knowledge and skills to work safely on or in the vicinity of systems/equipment that could be impacted by the LOTO Program.
- d. Construction contractors, offsite contractors, resident agencies and tenants shall independently maintain accurate and up-to-date training/certification records for its respective employees.

## CHAPTER 10. RECORDS AND FORMS

The following records shall be retained in accordance with this procedure. All records and forms are assumed to be the latest version unless otherwise indicated. Quality records are identified in the SSC Master Records Index. Records generated by this work instruction shall be maintained in accordance with applicable requirements of SPR 1440.1, *Records Management Program Requirements*.

- a. SSC-339, Discrepancy & Correction Report
- b. SSC-808, SSC Lockout/Tagout Tag
- c. SSC-847, Lockout/Tagout Equipment Log Sheet
- d. SSC-848, Hazardous Energy Control Procedure (or applicable Contractor Form)
- e. SSC-849, LOTO Jobsite Audit Form
- f. Training Records: Lockout/Tagout, Authorized and Affected Employee Refresher Training, New Employee and Personnel Certification Records

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## APPENDIX A. ACRONYMS

CAP	Corrective Action Plan
D&CR	Discrepancy & Correction Report
FOSC	Facility Operating Services Contractor
HECP	Hazardous Energy Control Procedure
LO	Lockout
LOTO	Lockout/Tagout
NASA	National Aeronautics Space Agency
OSHA	Occupational Safety and Health Administration
PR	Problem Report
SCWI	Stennis Common Work Instruction
SMA	Safety Mission Assurance Directorate
SPR	Stennis Procedural Requirements
SSC	Stennis Space Center
TO	Tagout
VPP	Voluntary Protection Program
WAD	Work Authorizing Documents

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## APPENDIX B. DEFINITIONS

- a. **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 LOTO, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.
- b. **Authorized Employee:** An employee who locks out or tags out machines or equipment to perform servicing or maintenance on that machine or equipment.
- c. **Capable of Being Locked Out:** Having a built-in locking mechanism or having a hasp or other means of attachment that will accept a lock.
- d. **Cognizant Safety Office:** Safety Office of the onsite prime or construction contractor.
- e. **Complex Equipment/System:** Equipment/Systems that have multiple (more than one (1)) energy sources that are required to be de-energized to place the equipment in a safe-working condition and have a specific sequence of steps required to safely shutdown and startup.
- f. **Designated Safety Person:** Person(s) who are certified by the Cognizant Safety Office as competent in 29 CFR 1910.147, this procedure and all LOTO requirements.
- g. **Energized:** Connected to an energy source or containing residual or stored energy.
- h. **Energy Isolating Device:** A mechanical device that physically prevents the transmission or release of energy. Examples: Disconnect switch, circuit breaker, pneumatic valve, line valve, block and any other similar device used to block or isolate energy.
- i. **Exclusive Control:** The lock and key are controlled by the person who placed the lock.
- j. **Hazardous Energy Control Procedure:** A machine-specific or system-specific procedure identifying all known energy sources present on a particular piece of equipment or system. The procedure indicates the location of energy isolation points and the sequence of steps to be taken to properly lock out the equipment.
- k. **Lockbox:** An approved box or container into which a key or set of keys can be placed. Lockboxes shall be substantial enough to prevent entry without the use of excessive force or unusual techniques. Lockboxes must be capable of being locked with a hasp or other means of attachment to which a lock can be affixed.

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- l. **Locked Out Conditions:** The placement of a lock on an energy isolation device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the device is removed.
- m. **LOTO Coordinator:** An Authorized Employee is responsible for **ALL** employees working under the protection of the **Group Lockout/Tagout**; to coordinate affected workforces; and to ensure continuity of protection.
- n. **LOTO Device:** A device that holds an energy-isolating device in the de-energized position and prevents the ability to be energized.
- o. **Qualified Person:** A person who has training in avoiding the electrical hazards of working on or near exposed energized parts, and who is familiar with the construction and operation of the equipment and hazards involved.
- p. **Servicing and/or Maintenance:** Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying and maintaining machinery or equipment. These activities include lubrication, cleaning, making adjustments, changing tools or unjamming machinery or equipment.
- q. **Tagout Device:** A durable, distinctive warning tag that can be attached to all locked out energy-isolation devices. The tag must indicate the identity of the user.
- r. **Work Authorizing Document:** A control document that authorizes and clearly outlines the scope, purposes, authorization, rules, requirements, techniques and specific steps to accomplish a work task. Examples include, but are not limited to, Process Plans, Test Preparation Sheet, Discrepancy and Correction Report, Troubleshooting and Inspection Report, Safe Plan of Action and Engineering Change Request. Where applicable, WAD shall contain the machine-specific HECF that will be used to ensure the control of hazardous energy.
- s. **Zero Energy State:** The release of all stored energy from a power source, so that it is at rest or in a neutral position without any stored or potential energy.

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**APPENDIX C. Hazardous Energy Control Procedure (HECP) Form SSC-848**

 National Aeronautics and Space Administration John C. Stennis Space Center Stennis Space Center, MS 38529-6000		<b>HAZARDOUS ENERGY CONTROL PROCEDURE (HECP)</b>				
HECP Preparer: _____			Date: _____			
Area/Building		Equipment Location		Equipment Name		Operated & Controlled From
Controls	Pneumatic	Electrical	Chemical	Stored Energy	Hydraulic	
Location of Energy Sources				Type of LO/TO Device		
Shutdown of Energy Sources						
Test (Shutdown Verification)						
Start Up Procedures						
Exceptions or Alternative Control Methods						
Authorization						
Authorized Person Print Name Below:				Safety Representative Sign Name Below:		
Date:				Date:		

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**APPENDIX D. LOTO Job Site Audit Form – SSC-849**

 National Aeronautics and Space Administration John C. Stennis Space Center Stennis Space Center, MS 39528-6000	<b>LOTO JOB SITE AUDIT FORM</b>		
	Location of Equipment Being Locked Out: _____ Name of Equipment Being Locked Out: _____ Date: _____ Time: _____ <input type="checkbox"/> AM <input type="checkbox"/> PM Purpose of LO/TO Activity: _____ _____ _____		
<b>Authorized Persons Working</b> _____ _____ _____	<b>Immediate Supervisor</b> _____ _____ _____		
	YES	NO	N/A
1. The job being performed requires LOTO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. A document hazardous energy control procedure (HECP) exists for the equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. The (HECP) is in a known location readily available to the worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. The (HECP) is being followed without exception	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. The (HECP) is accurate in identifying all energy sources required to be locked out considering the task at hand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Each energy source is secured with a Red padlock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Each energy source is labeled with a "Do Not Operate" tag indicating the identity of the individual who applied the tag	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Each person performing work is protected by their own Lock(s) and Tag(s) on each energy source	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Only persons who have received LOTO Authorized Person Training are participating in the service/maintenance activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Affected persons were notified prior to LOTO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. All discrepancies were reviewed with the Authorized Persons	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Other Comments:</b> _____ _____ _____			
Completed By: _____ Signature: _____			
<b>Forward form to appropriate safety department upon completion</b>			

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