

MWI 8715.2
REVISION C

EFFECTIVE DATE: September 19, 2004
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MARSHALL WORK INSTRUCTION

QD01

LOCKOUT/TAGOUT PROGRAM

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		12/13/99	
Revision	A	9/15/00	This document is being updated to close RCAR 157. Document numbering revised in accordance with MPG 1410.2, paragraph 3.3.1.1.b.
Revision	B	5/21/01	3.2 added "Training". 3.3 added "Selection of work practices", 3.4 added "Safeguards for personal protection", 4.3 added "Electrical Safety", 4.5 added MWI 8715.15, 5.3 added training requirements, added last sentence to 5.10 and 5.11, 6.7.4 added modified equipment, 6.7.6 added new purchased equipment, 6.9 added and this document, 8.2 added all exposed terminals, 8.2.1 added guard all exposed, 8.3 deleted PPE and special precautions, 8.4 added PPE, 8.5 added JHA, 9.2 added procedures, 9.3 added detailed survey, 9.4 added NSTC 814, 9.5 added certification program, 9.6 added JHA, 9.7 added NSTC 309, 10.1 deleted, 10.1 renumbered, 10.2 added NSTC 814, 10.3.1 deleted, 10.3 added NSTC 309, 10.4 added supervisor shall, 10.4 deleted 10.5 added supervisor ensure, 10.6 deleted, 10.7 deleted.
Revision	C	9/19/2004	Major rewrite, affected all sections, added appendices. Revised per HQ rules review.

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1. PURPOSE

This instruction establishes a program consisting of energy control procedures, employee training and periodic inspections. The program is to ensure machines, equipment, and systems are isolated from the energy source, placed in a zero energy state, and rendered inoperative by the placement of lockout and tagout devices before any employee performs any servicing or maintenance work where the unexpected energization, start-up, or the release of stored energy could occur and cause injury.

2. APPLICABILITY

The requirements in this instruction are applicable to all Marshall Space Flight Center (MSFC) organizations including on-site and off-site contractors that are performing servicing and maintenance activities at MSFC. This instruction establishes the minimum requirements for the control of such hazardous energy at MSFC.

There shall be **no** exceptions to the safe practices required by the energy control (lockout/tagout) requirements in this instruction for work performed on MSFC machines, equipment, and systems.

2.1 This instruction **shall** apply to the control of energy if **any** of the following conditions are met.

2.1.1 Servicing and/or maintenance that takes place during normal production operations is covered by this instruction **only** if:

2.1.1.1 An employee is required to remove or bypass machine guards or other safety devices; or

2.1.1.2 An employee is required to place any part of his or her body into an area on a machine or piece of equipment where work is actually performed upon material being processed (point of operation), or where an associated danger zone exists during a machine operating cycle; or

2.1.1.3 An employee is lubricating, cleaning or unjamming, servicing or 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 release of hazardous energy.

2.1.1.4 In the above situations, the following shall be performed by: de-energize the equipment, place it in a zero energy state, release all stored energy and apply locks and tags to the energy isolation devices in accordance with the requirements in this instruction.

2.2 This instruction does **NOT** apply to servicing and maintenance activities when employees are **NOT** exposed to the unexpected start-up of machines, or system energization, or the release of any stored hazardous energy.

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2.2.1 Servicing and maintenance activities conducted during normal production operations are not regulated by 29 CFR 1910.147 if the safeguarding provisions of 29 CFR 1910 Subpart O (1910.211-219) or other applicable portion of 29 CFR 1910 prevent worker exposure to hazards created by the unexpected energization of start-up of the machine or equipment.

2.2.1.1 Lockout/tagout procedures shall be required if the production safeguards are rendered ineffective while the employee is exposed to hazardous portions of the machine or equipment.

2.2.2 Servicing or maintaining activities performed on cord and plug connected electric equipment, the equipment is unplugged from the energy source, and the plug is under the exclusive control of the employee performing the servicing or maintenance.

2.2.2.1 In this instruction the plug shall be exclusively under the control of the employee if it is physically in the possession of the employee, or in arm's reach and in line of sight of the employee, or if the employee has affixed a lockout/tagout device on the plug.

2.2.3 Performing minor tool changes, adjustments, and other minor servicing activities that are routine, repetitive, and integral to the use of the production equipment occurring during normal production operations. Alternative safeguarding measures described in Subpart O and Subpart S (29 CFR 1910.301-399) shall be implemented to prevent employee exposure to hazards created by the unexpected energization or start-up of the machine or equipment.

2.2.3.1 However, lockout/tagout procedures shall be required if the production safeguards are rendered ineffective while an employee is exposed to hazardous portions of the machine or equipment.

2.2.4 Hot tap operations that involve transmission and distribution systems for substances such as gas, steam, water or petroleum products when they are performed on pressurized pipelines provided it has been demonstrated that:

2.2.4.1 Continuity of service is essential;

2.2.4.2 Shutdown of the system is impractical;

2.2.4.3 Documented procedures are followed, and;

2.2.4.4 Special equipment is used which provides proven effective protection for employees.

2.2.5 Facilities 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 Subpart S.

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2.2.6 Employees shall be protected from the hazards of contacting electrical energized parts (exposure to electric current) by the safety requirements in Subpart S.

3. APPLICABLE DOCUMENTS

- 3.1 29 CFR 1910.147, “Control of Hazardous Energy”
- 3.2 29 CFR 1910.332, “Training”
- 3.3 29 CFR 1910.333, “Selection and Use of Work Practices”
- 3.4 29 CFR 1910.335, “Safeguards for Personal Protection”
- 3.5 MWI 3410.1, “Personnel Certification Program”
- 3.6 MWI 8715.1, “Electrical Safety Program”
- 3.7 MWI 8715.15, “MSFC Safety Assessment Program”

4. REFERENCES

- 4.1 29 CFR 1926.416, “General Requirements”
- 4.2 29 CFR 1926.417, “Lockout and Tagout of Circuits”
- 4.3 MWI 8715.4, “Personal Protective Equipment (PPE)”
- 4.4 NPR 8715.3, “NASA Safety Manual”
- 4.5 OSHA 3120, “Lockout/Tagout”
- 4.6 OSHA STD 1-7.2 – 29 CFR 1.4, the Control of Hazardous (Lockout/Tagout) – Inspection Procedures and Interpretive Guidance

5. DEFINITIONS

- 5.1 Affected Employee. An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area where such service or maintenance work is being performed.
- 5.2 Authorized Employee. An employee who locks out or tags out machines or equipment in order to perform service or maintenance on that machine or equipment. An affected employee

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becomes an authorized employee when that employee's duties include performing servicing or maintenance covered in this MWI.

5.3 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 has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

5.4 CERTRAK. The Safety and Mission Assurance (S&MA) software database system used for employee certification records. CERTRAK is accessed via the Web through the MSFC Safety, Health, and Environmental Web page.

5.5 Construction work (as applied to this instruction). Activities involved in building, assembling, altering, and repairing a structure or infrastructure.

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

5.7 Energy Control Procedure. A procedure developed, documented, and utilized to control potentially hazardous energy when employees are engaged in service or maintenance activities defined in the scope of this document.

5.8 Energy Control Program. A program consisting of energy control procedures, employee training and annual inspections to ensure that before any 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 is isolated from the energy source, and rendered inoperative. This document describes how an organization implements the MSFC standard for lockout/tagout.

5.9 Energy Isolation Device. A mechanical device that physically prevents the transmission of release of energy including but not limited to, the following:

5.9.1 A manually operated electrical circuit breaker.

5.9.2 A disconnect switch.

5.9.3 A manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply connectors, and in addition, no pole can be operated independently.

5.9.4 A line valve

5.9.5 A block

5.9.6 Any similar device used to block or isolate energy.

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Note: Push buttons, selector switches, or other control circuit type devices are not considered energy isolating devices.

5.10 Energy Source. Any source of potentially hazardous stored or residual energy such as electrical, mechanical, hydraulic (fluids), pneumatic (air, gas), chemical (acids, bases), thermal (hot, cold), gravitational, stored (spring, suspended weight) or other energy that can be relieved, disconnected, restrained, and otherwise rendered safe.

5.11 Group Lockout. Servicing and/or maintenance performed by a crew, craft, department or other group, utilizing a procedure that affords each employee a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

5.12 Hot Tap. A procedure used in the repair, maintenance and service activities that involve welding on a piece of equipment (pipelines, vessels, or tanks) under pressure, in order to install connections.

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

5.14 Lockout Device. A device that uses 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. Included are blank flanges and bolted slip blinds.

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

5.16 Organization. For purposes of this instruction, the term organization refers to all MSFC directorates, offices, and on-site/off-site contractors that have the responsibility for the employees performing lockout/tagout activities, or request performance of work on their machine, equipment, or system that require lockout/tagout activities.

5.17 Other Employee. Employees who may be in the area where energy control procedures may be used.

5.18 Qualified Employee (as applied to lockout/tagout). One who has skills and knowledge related to the construction and operation of the equipment or system being lockout out and has received training on the hazards involved.

5.19 Servicing and/or Maintenance. Workplace activities such as assembling, constructing, installing, setting up, adjusting, inspecting, modifying, maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or

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equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

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

5.21 Tagout. The placement of a tagout device on an energy isolation 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.

5.22 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.

5.23 Zero-Energy State. A term that applies to equipment or system status in which all hazardous energy sources have been disconnected and secured and all internal energy sources have been relieved or restrained in a safe manner.

6. INSTRUCTIONS

This instruction shall be strictly followed when it is necessary to perform service or maintenance on any machine, equipment, or system where a possibility of an unexpected energization or start up of the machine, equipment, or system that could release any form of hazardous or stored energy and cause injury to employees. This includes energy in the form of, but is not limited to the following:

- Electrical
- Mechanical
- Hydraulic (fluid)
- Pneumatic (Air, gas)
- Chemical (acids, bases)
- Stored (spring, suspended weight)
- Thermal (hot, cold)

6.1 Energy Control Program

6.1.1 Any organization performing servicing and/or maintenance activities at MSFC on machines, equipment, and systems shall have a documented energy control (lockout/tagout) program.

6.1.2 MSFC civil service organizations shall use this instruction as their energy control program. On-site and off-site contractors are required to have a documented energy control

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program, in accordance with 29 CFR 1910.147. When working on MSFC they may elect to use this instruction as their energy control program.

6.1.2.1 If the on-site and off-site contractor has their own energy control program it shall meet or exceed all the requirements in this instruction when performing lockout/tagout activities at MSFC.

6.1.2.2 All on-site and off-site contractors shall be required to use the lockout/tagout devices specified in section 6.3 and Appendix A when performing lockout/tagout activities at MSFC.

6.1.3 The Energy Control (Lockout/Tagout) Program shall, at a minimum, include the following topics:

6.1.3.1 Documented energy control procedures;

6.1.3.2 Employee training program; and

6.1.3.3 A method for performing and documenting inspections for all energy control (lockout/tagout) procedures.

6.1.4 The energy control (lockout/tagout) program shall ensure that machines, equipment, or systems are properly and uniformly locked out and tagged throughout MSFC and that all employees are protected from exposure to any unexpected energy release.

6.2 Energy Control Procedures

6.2.1 Each organization performing service or maintenance activities on machines, equipment and systems at MSFC shall develop, document, and utilize energy control (lockout/tagout) procedures.

6.2.2 These procedures at a minimum shall include the following:

6.2.2.1 Describe the process for safely isolating the machines, equipment, and systems from their sources of energy and affixing the appropriate lockout or tagout device to energy isolating devices in order to prevent any possibility of an unexpected start-up, energization, or the release of stored energy that could result in injury to an employee.

6.2.2.2 Clearly and specifically outline the scope, purpose, authorization, rules, and techniques used to control hazardous energy, any safety precautions, and the means to enforce compliance in accordance with the minimum requirements of Appendix B.

6.2.2.3 Identify all the information that the authorized employee is required to know to control hazardous energy during service or maintenance activities.

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6.2.3 When this information is the same for similar types of machines, equipment, and systems, or if there is another logical means of grouping, then a single energy control procedure shall be sufficient.

6.2.4 When there are other conditions, such as multiple energy sources, different disconnecting means, or a particular sequence of steps that are required to be followed in order to safely shut down the machine, equipment, or system, the employer shall develop separate energy control (lockout/tagout) procedures to ensure employee protection.

6.2.5 Energy control (lockout/tagout) procedures for work at MSFC shall be written only by personnel that have received training in energy control (lockout/tagout) safe practices and are certified as an authorized employee.

6.2.5.1 Affected and other employees are allowed to assist in developing energy control (lockout/tagout) procedures if the authorized employee is not familiar with the machine, equipment, or system, or asks for their assistance.

6.2.6 Some service and maintenance activities shall **not** require a documented energy control (lockout/tagout) procedure, as defined in Appendix C.

6.2.7 Required energy control (lockout/tagout) procedures shall be written and/or reviewed to verify that they are up-to-date before any servicing, maintenance, and modifications activities are started.

6.2.8 Energy control (lockout/tagout) procedures shall be documented using MSFC Form 4287, "MSFC Lockout/Tagout Procedure" (reference Appendix D), or an equivalent OSHA-compliant procedure.

6.3 **Lockout/Tagout Devices** (Protective materials and hardware)

6.3.1 An assortment of locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, and other hardware shall be used for safely isolating, securing or blocking the machines, equipment, and systems from their energy sources.

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

6.3.3 Each organization performing service and maintenance activities shall provide all required lockout devices to their authorized employees when needed to safely isolate the machine, equipment or system from its energy sources.

6.3.4 Lockout devices used at MSFC shall be standardized by a "RED" colored case, readily identifiable as lockout devices, and compliant with the specifications in Appendix A.

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6.3.5 Tagout devices used at MSFC shall be standardized with the colors “WHITE”, “RED”, and “BLACK”, with “RED” diagonal strips containing the words “LOCKOUT/TAGOUT” on a white background. Specifications for tagout devices are listed in Appendix A.

6.3.6 Standardized lockout and tagout devices shall be used **only** for controlling energy while an authorized employee is performing service or maintenance work and **not** used for any other purpose.

6.3.6.1 Examples when the standardized lockout/tagout is not allowed are listed in section 6.3.15.1.

6.3.7 Lockout devices shall identify the organization that placed the lock and a point of contact phone number.

6.3.8 All lockout devices shall be tagged with the standardized tagout device.

6.3.9 Tagout devices shall identify the employee’s name, organization, phone number, and a brief description of the work being performed, and the beginning and ending dates the tagout is in effect.

6.3.10 Tagout devices shall be clearly visible, so every employee understands that operating or moving energy isolation devices from the “safe” or “off” position are strictly prohibited.

6.3.11 All MSFC organizations and on-site/off-site contractors shall use lockout devices with “RED” colored cases while performing work at MSFC requiring the use of lockout devices in accordance with this instruction.

6.3.12 Lockout or tagout shall be performed only by the authorized employees who are performing the servicing or maintenance.

6.3.13 If a situation arises where the employee that placed the lockout device is unable to remove it, the lockout device shall be removed as instructed in Appendix I. The responsible supervisor shall complete the “Authorized Employee Not Available to Remove Lockout/Tagout Device Checklist”, Appendix J and maintain as a record of this event.

6.3.14 Standardized lockout/tagout devices shall be placed and used to control energy for the period of time the authorized employee is to work in the danger zone.

6.3.14.1 Construction and maintenance work conducted for a specified period of time during a planned/scheduled power outage, Facility Work Request (FWR), or Test Preparation Sheet (TPS) shall use the standardized lockout/tagout device to control energy.

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6.3.15 If an unexpected event as listed in section 6.3.25.1, occur during service or maintenance work and the authorized employee is not working in the danger zone but needs to maintain the ‘out of service’ status. The standardized lockout and tagout devices shall be removed and replaced with different types of locks (not having a “RED” case) and tags (appropriate color coding and signal word to identify hazard level of “Danger”, “Warning”, or “Caution”, as instructed by MWI 8715.1; system status description; point of contact).

6.3.15.1 Examples of conditions and unexpected events that warrant removal of standardized lockout/tagout devices, and replacement with other types of locks and tags, shall include:

- a. Equipment condition won’t permit safe return to service by the end of the shift;
- b. Awaiting delivery of replacement parts;
- c. A design change is required;
- d. Locking is required to prevent operation by unauthorized employees;
- e. Locking is required to maintain verified compliance with specification; and/or
- f. Locking is required to support safe removal of ‘abandoned in place’ items from periodic maintenance and inspection schedules.

6.3.15.2 Reference MWI 8715.3 for descriptions of other tags approved for use at MSFC.

6.3.16 Contact the Industrial Safety Department or Facilities Engineering Department for technical assistance or to view samples of MSFC standardized lockout/tagout devices.

6.3.17 When contracted MSFC work requires use of energy control (lockout/tagout) procedures, samples of MSFC standardized lockout/tagout devices shall be displayed during contractor in-briefings by either the Industrial Safety Department, Facility Engineering Department, and/or other responsible on-site organization requesting the contracted work.

6.3.18 Standardized MSFC lockout and tagout devices are available from:

6.3.18.1 The MSFC Retail Store, for all MSFC organizations and on-site contractors approved for purchase.

6.3.18.2 Local vendors

6.3.19 If an energy isolating device is capable of being locked out, lockout devices shall be utilized, unless it can be demonstrated to the Industrial Safety Department or Facilities Engineering Department that the utilization of a tagout system provides full employee protection.

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6.3.20 Use of a tagout devices alone to control energy shall be permitted only in the following conditions:

6.3.20.1 It has been demonstrated to the organization requesting the work and/or supervisor that the energy isolation device does not accept a lockout device; or

6.3.20.2 The employer has demonstrated that utilization of the tagout system provides full employee protection, set forth in 29 CFR 1910.147(c)(3); and

6.3.20.3 The employer has demonstrated full compliance with all tagout-related provisions of this instruction, together with any additional elements needed to provide the equivalent safety available from the use of a lockout device as described in Appendix E.

6.4 Group Lockout or Tagout

6.4.1 If affected work activities involve more than one employee from a craft, crew, or department, a Group Lockout/Tagout procedure shall be developed, documented, and implemented to afford each authorized employee a level of protection equivalent to that provided by placement of personal lockout/tagout devices.

6.4.2 Group Lockout/Tagout procedures shall be communicated to all affected and participating employees prior to the start of work.

6.4.3 Each Group Lockout/Tagout procedure shall comply with the following minimum requirement:

6.4.3.1 The responsible supervisor shall designate an authorized employee to serve as the lockout/tagout coordinator for the group lockout/tagout activity.

6.4.3.2 The lockout/tagout coordinator shall make all the group members aware of the type, magnitude, and hazards related to the energy to be controlled and the methods or means to control the energy for the job, machinery, equipment, or system.

6.4.3.3 The lockout/tagout coordinator shall inform the affected employees and group members of the method to be used for the group lockout activity. The method is required to be one of the following:

- a. Use of a multi-lock hasp
- b. Use of a lock box
- c. Use of a lockout log

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6.4.3.4 The lockout/tagout coordinator shall coordinate the shut-down and lockout/tagout of the machine, equipment, or system with the affected employees and any other employees that may be affected by the lockout/tagout.

6.4.3.5 The machinery, equipment, or system shall be shut down in accordance with the requirements in listed in Appendix B.

6.4.3.6 The lockout/tagout coordinator and each group member shall verify the machinery, equipment, or system is de-energized and in a zero energy state in accordance with the requirements listed in Appendix B.

6.4.3.7 Each group member shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work.

6.4.3.8 Each group member shall remove the personal lockout or tagout device from the group lockout device, group lockout box, or comparable mechanism when he or she stops working on the machine, equipment, or system.

6.4.3.9 The lockout/tagout coordinator shall verify the lockout devices that were applied by authorized employees are removed by those employees after all the service and maintenance activities have been completed. If a situation arises where the employee that placed the lockout device is unable to remove it, the lockout device shall be removed in accordance with the requirements listed in Appendix J.

6.4.3.10 After ALL lockout devices have been removed, the lockout/tagout coordinator shall remove his/her lockout device and the multi-lock accepting device from the energy isolation device.

6.4.3.11 The machinery, equipment, or system shall then be re-energized in accordance with the requirements listed in Appendix B.

6.5 Shift or Personnel Changes

6.5.1 Each organization shall develop, document, and implement a specific procedure for shift or personnel changes to ensure the continuity of lockout or tagout protection. The procedure shall include provisions for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energizing or start-up of the machine, equipment, or system or the release of stored energy. At MSFC, the only two options listed are allowed.

6.5.2 The preferred method is a physical transfer. It offers the best protection for coordinating the transfer of lockout/tagout devices between off-going and oncoming employees. As one employee's locks and tags are replaced with those of the other employee, control of the

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lockout/tagout condition is transferred between them. Both authorized employees shall be present at the worksite at the same time.

6.5.3 When there is a gap between shifts and a physical transfer procedure cannot be used. The responsible supervisory personnel shall use the Transfer Lock Procedure. A different type of locking device, a transfer lock, is used to maintain the system's zero energy state while no authorized employee is present to supervise the system status. This procedure does not require both authorized employees to be present at the worksite at the same time.

6.6 Off-site Contractors Performing Work at MSFC

6.6.1 Performance of MSFC work by off-site contractors has the same or greater potential for exposing Center employees to hazards, as would exist if Center employees were performing the work. To help control these risks, off-site contractors shall ensure their personnel understand and comply with the procedures in this instruction.

6.6.2 Appendix F details specific responsibilities assigned to MSFC and contractor organizations when they are request off-site contractor services requiring use of lockout/tagout procedures.

6.7 Annual Inspection of Energy Control (Lockout/Tagout) Procedures

6.7.1 Each organization that performs energy control (lockout/tagout) activities shall conduct and document an annual inspection of their energy control (lockout/tagout) procedures to ensure that the procedures and the requirements of this instruction and 29 CFR 1910.147 are being followed.

6.7.2 MSFC requirements for performing and documenting the annual inspection are described in Appendix H.

6.8 Authorized Employee Unable to Remove Lockout or Tagout Device

6.8.1 The authorized employee that placed the lockout/tagout device shall personally remove the lockout/tagout device.

6.8.2 In situations where the authorized employee who applied the lockout or tagout device is not available to remove it, the device shall be removed in accordance with the instructions listed in Appendix I provided that all requirements in the Appendix have been met.

6.9 Temporary Removal of Lockout or Tagout Device for Testing or Positioning of Machine, Equipment or Components.

6.9.1 Where lockout or tagout devices are required to be temporarily removed from the energy isolating device, to permit energization for testing or positioning of the machine, equipment or

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component, to make fine adjustments or to troubleshoot to identify the source of the problem and verify the problem has been corrected. These actions shall be completed:

6.9.1.1 Clear the machine or equipment of tools and materials;

6.9.1.2 Remove the employees from the machine or equipment area;

6.9.1.3 Remove the lockout/tagout devices;

6.9.1.4 Energize and proceed with testing or positioning;

6.9.1.5 De-energize all systems and reapply lockout/tagout devices before continuing service and/or maintenance activities.

6.9.2 Troubleshooting and/or testing procedures shall be conducted after the equipment is locked out or tagged, unless the equipment is required to be energized to locate/isolate the problem.

6.9.3 In cases where it is not possible to lockout the machine, equipment or system the following measures shall be implemented to protect the employee from harm.

6.9.3.1 The employee performing the troubleshooting and/or testing procedure shall receive training in the safe work practices for the given machine, equipment, or system.

6.9.3.2 Guards shall only be removed, if it is necessary to do so, in order to perform the diagnostic procedure, and then only to the extent which is absolutely necessary. The guards shall be replaced as soon as possible.

6.9.3.3 Personal Protective Equipment (PPE) shall be worn when required by a Job Hazard Analysis (JHA).

6.9.3.4 As soon as the diagnostic procedure is completed, the machine, equipment, or system shall be locked out or tagged before any servicing or maintenance begins.

6.10 Disciplinary Action

6.10.1 Any employee violating lockout/tagout rules or procedures shall be subject to disciplinary action in accordance with the "NASA Desk Guide for Table of Disciplinary Offenses and Penalties". View this document on the SHE Web page, under NASA Disciplinary Program.

6.10.2 On-site and off-site contractor employees shall be subject to MSFC disciplinary action as determined by the Contracting Officer (CO) and/or Contracting Officer Technical Representative (COTR), or requesting organization.

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6.11 Responsibilities assigned to supervisor of the authorized employees are described in Appendix G.

6.12 Appendix K lists OSHA standards for equipment and operations that have specific requirements for lockout/tagout.

6.13 Appendix Z provides a cross-reference matrix of the requirements in 29 CFR 1910.147 and MWI 8715.2.

7. NOTES

None

8. SAFETY PRECAUTIONS AND WARNING NOTES

8.1 Another person's lockout or tagout device shall not be used for your protection. The lockout or tagout device could be removed by the other person while you are still working in the danger zone.

8.2 All employees working at MSFC shall be prohibited from disturbing the controls, energy isolating devices, and/or energy sources for any system or component that has been locked out and/or tagged out by someone else. Failure to follow this rule could result in the death or serious injury of a coworker.

8.3 Only the authorized employee that placed the lockout or tagout devices shall be allowed to remove it. The life and safety of each authorized employee depends on this critical element.

8.3.1 The only exception to this shall be during emergency situations, using the process is described in Appendix I.

8.4 The use of tagout devices alone without energy control lockout devices shall be **PROHIBITED**, unless it has been demonstrated to the responsible organization and/or responsible supervisor that the use of the lockout device is impossible.

8.4.1 Tagout devices shall be used in accordance with section 6.3 and Appendix E. The use of tags alone puts you at much greater risk of injury or death, and additional safety precautions shall be taken.

8.4.2 Standardized energy control tagout devices shall NEVER BE USED FOR ANY PURPOSE OTHER THAN TO CONTROL ENERGY while an employee is to perform work in the danger zone on a machine or equipment. Section 6.3.15.1 provides a list of examples when use of the standardized tagout is not allowed.

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8.5 All exposed electrical terminals, connections, and cables shall be treated as energized or “live” parts by all employees.

8.6 All exposed electrical terminals shall be guarded in accordance with MWI 8715.1, “Electrical Safety”, when the authorized employee leaves the immediate work area.

8.6.1 All exposed electrical terminals shall be guarded by: replacing panel covers when feasible; or placing signs or tags on the equipment to notify affected and other employees of the potential hazard, or placing barricades to restrict access to the equipment.

8.7 The responsible organization/supervisor shall conduct a Job Hazard Analysis (JHA) in accordance with MWI 8715.15, “MSFC Safety Assessment Program,” for each service and maintenance task for each unique type machine or equipment to identify the following:

8.7.1 Required Personal Protective Equipment (PPE) in accordance with 29 CFR 1910.335, “Safeguards for Personnel Protection.”

8.7.2 Special precautions to be taken for the control of energy, as required by 29 CFR 1910.333, “Selection and Use of Work Practices.”

9. RECORDS

9.1 Annual inspection of the energy control (lockout/tagout) procedures (MSFC Form 4287 or equivalent) shall be documented and maintained by the organization that performed the lockout/tagout procedure in accordance with NRRS 1/72 (E)[1410] for a period of 3 years then destroy when no longer needed or maintained for reference purposes.

9.2 Written energy control (lockout/tagout) procedures shall be maintained by the organization that performed the lockout/tagout in accordance with NRRS 1/72 (E)[1410] for the length of time the energy control (lockout/tagout) procedure is applicable, then destroy when no longer needed or maintained for historical purposes. Maintaining some evidence of appropriate procedure updates is recommended.

9.3 Completion of required lockout/tagout training for authorized employees NASA Safety Training Course (NSTC) 814, “Lockout/Tagout,” or approved equivalent) shall be documented and maintained by the organization performing lockout/tagout. Civil service records shall be forwarded to the Employee and Organizational Development Department (EODD). These records shall be maintained in accordance with NRRS 3/33 (G.2) [3400] for the length of employment, then destroy when no longer needed.

9.4 Organizations performing lockout/tagout shall forward copies of documented o authorized employee training to S&MA for inclusion in CERTRAK, per MWI 3410.1, “Personnel Certification Program.” Personnel certification records shall be maintained in accordance with NRRS 3/33 (G.2) [3400] for the length of employment then destroy when no longer needed.

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9.4.1 On-site contractors shall be required to record authorized employee certification in CERTRAK beginning in Jan. 2005 or next contract renewal or award.

9.5 Completion of recommended lockout/tagout training for authorized employees (per section 10.12) shall be documented and maintained by the organization performing lockout/tagout. Civil service records shall be forwarded to the Employee and Organizational Development Department (EODD). These records shall be maintained in accordance with NRRS 3/33 (G.2) [3400] for the length of employment, then destroy when no longer needed.

9.6 Records of “Removal of Lockout/Tagout Device When Authorized Employee Is Not Available” shall be maintained by the organization that removed the lockout/tagout device. The records shall be maintained in accordance with NRRS 1/72 (E) [1410] for 3 year, then destroyed when no longer needed.

9.7 The Job Hazard Assessment (JHA) for the lockout/tagout activity, if applicable, shall be maintained by the organization performing the lockout/tagout activity in accordance with NRRS 1/119.X (A) [1710] for the length of time activity is being performed then destroy when no longer needed for reference.

9.8 Off-site contractors Memorandum for Record that provides documented evidence from the contractor that the authorized employee is trained and qualified to perform lockout/tagout. This record shall be maintained by the organization that requested the lockout/tagout to be performed in accordance with NRRS 1/6 (C)[1050] for 3 years then destroy when no longer needed or superseded, beginning Jan 2005, or next contract renewal or award.

9.8.1 Off-site (large and small construction) contractors Memorandum for Record that provides documented evidence from the contractor that the authorized employee is trained and qualified to perform lockout/tagout. This record shall be maintained by the Facilities Engineering Department in accordance with NRRS 1/6 (C) [1050] for 3 years then destroy when no longer needed or superseded, beginning Jan. 2005, or at the next contract renewal or award.

9.9 Off-site contractors MSFC Lockout/Tagout Orientation Training record shall be maintained by the organization that requested the lockout/tagout to be performed in accordance with NRRS 3/33 (G.2) [3400] for 3 years then destroy when no longer needed, beginning Jan. 2005, or at the next contract renewal or award.

9.9.1 Off-site (large and small construction) contractors MSFC Lockout/Tagout Orientation Training record shall be maintained by the Facilities Engineering Department in accordance with NRRS 3/33 (G.2) [3400] for the length of time contractor is performing construction for a given project then destroy when no longer needed, beginning Jan. 2005, or at the next contract renewal or award.

10. PERSONNEL TRAINING AND CERTIFICATION

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10.1 Lockout/tagout training shall be provided to MSFC organizations to ensure that all employees understand the purpose and function of the MSFC energy control (lockout/tagout) program.

10.2 Affected and Other Employee Training

10.2.1 All MSFC employees (affected and others) shall be instructed in the purpose and use of energy control (lockout/tagout) procedures, and the prohibition against attempts to restart or re-energize machines, equipment or systems that have been locked or tagged out.

10.2.2 All MSFC employees (authorized, affected, and others) shall be trained in the limitations of tags, as defined in Appendix E. Personnel shall understand that use of a tagout system alone does not provide the same type of protection as the use of lockout devices.

10.2.3 Annual refresher training for affected and other employees shall be provided on the Supervisor Safety Web Page (SSWP) and/or Site for On-line Learning Resources (SOLAR) by the Industrial Safety Department (ISD). Estimated completion date for this training to be placed on the SSWP and/or SOLAR is 8/05.

10.2.3.1 On-site contractors shall elect to provide and document their own annual refresher training for affected and other employees or use the training provided by ISD.

10.3 Authorized Employee Training and Certification

10.3.1 Lockout/tagout training for Authorized Employees shall teach the knowledge and skills required for safe application, usage, and removal of energy control devices, and shall include the following topics:

10.3.1.1 Recognition of applicable hazardous energy sources.

10.3.1.2 Types and magnitude of energy found in the workplace.

10.3.1.3 Methods and means necessary for energy isolation and control.

10.3.2 MSFC Civil Service and On-site contractor personnel certification for Lockout/Tagout Authorized Employee is based on completion of NSTC 814, "Lockout/Tagout," or an approved alternate course that provides the employees knowledge of the standards, procedures, and requirements necessary for controlling hazardous energy through the use of lockout and tagout devices and meets the requirements of 29 CFR 1910.147(c) (7).

10.3.2.1 Organizations performing lockout/tagout activities shall ensure this training is provided and documented in the MSFC CERTRAK system every 2 years.

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10.3.2.1 On-site contractors shall be required to record authorized employee certification in CERTRAK beginning in Jan. 2005, or at the next contract renewal or award.

10.3.2.2 Off-site contractors shall be required to provide evidence of documented training for authorized employees. This shall be accomplished with a Memorandum for Record stating the employee is qualified to perform lockout/tagout based on education, job experience, on-the-job training (OJT), etc. to perform lockout/tagout activities on the machine, equipment, or system the work is to be performed, beginning Jan. 2005, or at the next contract renewal or award.

10.3.3 Off-site contractors performing lockout/tagout activities on MSFC shall be required to attend MSFC Lockout/Tagout Orientation Training given by the Facilities Engineering Department and/or S&MA prior to performing any lockout/tagout, beginning Jan. 2005, or at the next contract renewal or award.

10.3.4 Authorized employees shall attend NSTC or equivalent courses relevant to their assigned jobs as directed by their supervisor, to gain knowledge of applicable safety-related work practices. Such courses, as described below, shall satisfy the requirements of 29 CFR 1910.332, "Training." Employees exposed to:

10.3.4.1 Electrical equipment shall attend NSTC 309, "Electric Safety Standards," or an approved equivalent course covering hazards and OSHA electrical standards associated with electrical installations and equipment.

10.3.4.2 Machinery or machine shops shall attend NSTC 204, "Machinery and Machine Guarding," or an approved equivalent course covering the hazards and safety standards related to those machines.

10.3.4.3 Cryogenics shall attend NSTC 313, "Cryogenics Safety," or an approved equivalent course covering the hazards and safety requirements for processes and phenomena at temperatures below 1 150 °C (-238 °F).

10.3.4.4 Pressure systems shall attend NSTC 317, "Safety in High Pressure Operations," or an approved equivalent course covering hazards and safe work practices for pressure systems.

10.3.4.5 Oxygen systems shall attend NSTC 053, "Oxygen Systems: Operation and Maintenance," or an approved equivalent course covering hazards and safety standards for oxygen systems.

10.3.4.6 Liquid nitrogen systems shall attend NSTC 314, "Liquid Nitrogen Handlers' Course," or an approved equivalent course covering hazards and control techniques for handling cryogenic liquid nitrogen.

10.4 Retraining

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10.4.1 MSFC organizations performing lockout/tagout activities shall provide documented retraining whenever a periodic inspection reveals, or there is reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of energy control (lockout/tagout) procedures.

10.4.2 MSFC organizations performing lockout/tagout activities shall provide and document additional retraining whenever a periodic inspection reveals, or there is other reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of energy control (lockout/tagout) procedures.

10.4.3 Retraining shall be designed to reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

10.4.4 Documented retraining shall be performed during the annual inspection of lockout/tagout procedures.

11. FLOW DIAGRAM

None

12. CANCELLATION

MWI 8715.2B dated May 21, 2001

Original signed by
Robin N. Henderson for

David A. King
Director

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APPENDIX A

MSFC Standardized Lockout and Tagout Devices

Standardized lockout or tagout devices shall be installed on and removed from energy isolation devices by authorized employees only.

A.1 **Energy Control Lockout Device**

The MSFC standardized device for controlling energy shall have a red-colored lock case,. The entire lock case shall be red. Use of locks having only a red band or strip around the case shall not be permitted for energy control lockout devices. The lock case shall have the installer’s organization and phone number written on the lock case. Options for accomplishing this are described below.

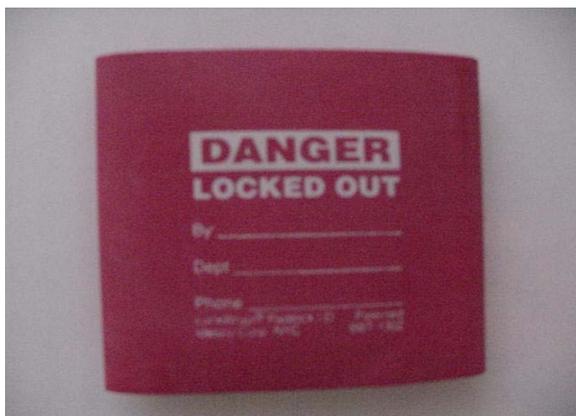
A.1.1 **Option 1:** The preferred method is use of a red label sleeve to identify a lock as an MSFC standardized lockout device for controlling energy. Recommended products include: the LockWrap Color-Coded Sleeve, “RED” LMBBT101AAD, by IDESCO Corp., for #3 and smaller locks, the LockWrap Color-Code Sleeve, “RED” LMBBT106AAD, by IDESCO Corp.; and/or and equivalent red padlock sleeve.

Heavy-duty level sleeves are slid over the lock case, as shown below, then heated with a heat gun to shrink the label to a snug fit on the lock case. The red label sleeve readily identifies the lock as being used for energy control lockout. Red-sleeved locks shall be used for energy control lockout/tagout activities ONLY.

A.1.2 **Option 2:** Use of a lock manufactured with a red lock case. The red lock case readily identifies the lock as being used for energy control lockout. Locks with read cases shall be used for energy control lockout/tagout activities ONLY.

A.1.3 **Option 3:** In emergency situations, when Options 1 and 2 are not feasible, a lock having its lock case painted red may be substituted. Locks with red-painted cases shall be used for energy control lockout/tagout activities ONLY.

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Lockout Device, Option 1:
Example of a **red label sleeve** used to identify an MSFC lock as a standardized lockout device for energy control.



Lockout Device, Option 2: Example of a **red lock case** that identifies an MSFC standardized lockout device for energy control.

A.1.4 For optional color-coding to distinguish the craft or function that installed a lockout device, an organization may choose one of the following methods. An organization may define its own system for coding the colors.

A.1.4.1 **Method 1:** Install a colored piece of heat-shrink tubing (such as the Panduit Corp. product) on the lock shackle, then heat the tubing until it shrinks snugly on the bar.

A.1.4.2 **Method 2:** Wrap colored tape around the shackle section.

A.1.4.3 **Method 3:** Place a hole-punched colored card on the shackle.



Color-Coding Method 1: Example of **heat shrink tubing** placed on a lock shackle before heating. The **red label sleeve** is slid partly over the lock case, and not yet heated.

A.2 Energy Control Tagout Devices

The MSFC standardized tagout device for controlling energy shall be a label Master No. H-LKT3 tag, as shown below, or an equivalent tag meeting the listed criteria.

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Slight variations in manufacture tag designs shall be considered acceptable, but shall be pre-approved by the Industrial Safety Department.

A.2.1 Only uses the colors of white, red, and black.

A.2.2 The white background with red diagonal strips.

A.2.3 “Lockout/Tagout” is printed on the strips in white.

A.2.4 “Danger” is printed inside a white-bordered red oval in white, within a black rectangle near the top of the tag.

A.2.5 The black major message words “DO NOT OPERATE”.

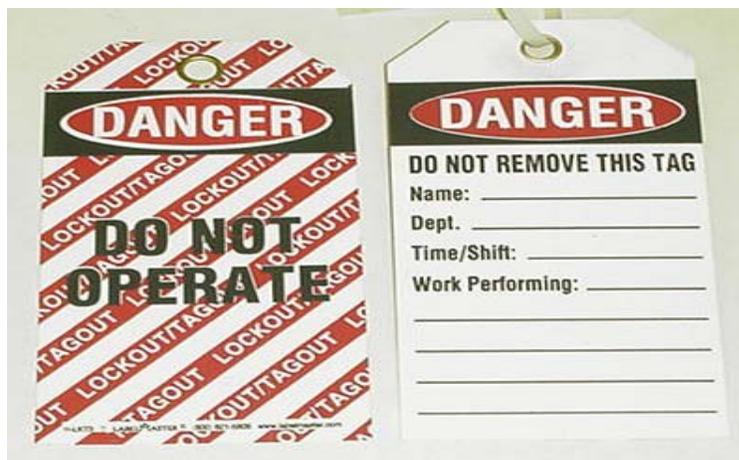
A.2.6 Is about 3 inches wide and 5-5/8 inches.

A.2.7 Can withstand exposure to expected environmental conditions, for the maximum expected time of exposure.

A.2.8 Can withstand exposure to weather conditions and wet or damp locations, without tag deterioration or loss of message legibility.

A.2.9 Can withstand exposure to corrosive environments, such as acid or alkali use and storage areas, without tag deterioration.

A.2.10 Provides space to identify employee’s name, organization, and phone number, with a brief description of the work being performed, and the beginning and ending dates the tagout is in effect.



Standardized Tagout Device

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APPENDIX B

Lockout/Tagout Procedure Requirements

B.1 Each MSFC energy control (lockout/tagout) procedure shall include the following:

B.1.1 A specific statement of the intended use and purpose of the procedure.

B.1.2 Notification of employees – Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

B.1.3 Specific procedural steps for preparation for shutdown, isolating, blocking and securing the machines or equipment from the energy source – Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

B.1.4 Shutting down the machine or equipment – The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown shall be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.

B.1.5 Isolating the machine or equipment from the energy source(s) – All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

B.1.6 Specific procedural steps for applying the lockout or tagout device(s) to the energy isolating device(s) – Lockout or tagout devices shall be affixed to each energy isolation device by the authorized employee.

B.1.6.1 The lockout devices, where used, shall be affixed a manner so that the energy isolating device in a “safe” or “off” position.

B.1.6.2 The tagout devices, where used, shall be affixed in such a manner that clearly indicates that the operation or movement of the energy isolating devices from the “safe” or “off” position is prohibited.

B.1.6.3 Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock out have been attached.

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B.1.6.4 Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that is immediately obvious to anyone attempting to operate the device.

B.1.7 Safety releasing all potentially hazardous stored or residual energy – Following the application of lockout or tagout device to the energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.

B.1.7.1 If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

B.1.8 Specific procedural steps for verifying the isolation of the machine or equipment prior to the start of service or maintenance work – Prior to starting work on the machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and de-energizing of the machine or equipment have been accomplished and are in the zero-energy state. This can be done by trying to restart the machine or equipment or by the use of test equipment.

B.1.9 Specific procedural steps for removing the lockout/tagout devices and restoring energy to the machine or equipment – Procedures shall be followed and actions taken by the authorized employee(s) to ensure the following:

B.1.9.1 The machine or equipment – The work area shall be inspected to ensure that nonessential items have been removed and to ensure that the machine or equipment components are operationally intact.

B.1.9.2 Employees – The work area shall be checked to ensure that all employees have been safely positioned or removed.

B.1.9.3 After lockout or tagout devices have been removed and before the machine or equipment is started, affected employees shall be notified that the lockout or tagout devices(s) have been removed.

B.1.9.4 Lockout or Tagout device removal – Each lockout or tagout device shall be removed from the energy-isolating device by the employee that applied the device.

10. Specific procedural steps to address situations when the lockout/tagout device is transferred to another employee and when the employee that placed the lockout/tagout device is unable to remove it.

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APPENDIX C

C.1 A written Energy Control (Lockout/Tagout) Procedure shall not be required when ALL the following conditions exist:

C.1.1 The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shutdown that could endanger employees;

C.1.2 The machine or equipment has a single energy source that can be readily identified and isolated;

C.1.3 The isolation and locking out of that energy source completely de-energizes and deactivates the machine or equipment;

C.1.4 The machine or equipment is isolated from that energy source and locked out during servicing or maintenance;

C.1.5 A single lockout device achieves a locked out condition;

C.1.6 The lockout device is under the exclusive control of the authorized employee performing the servicing and maintenance;

C.1.7 The servicing and maintenance does not create hazards for other employees;

C.1.8 The MSFC organization or off-site contractor has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.

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APPENDIX D

MSFC Energy Control (Lockout/tagout) Procedure (MSFC Form 4287)

MSFC LOCKOUT / TAGOUT PROCEDURE	
PURPOSE AND SCOPE	
This procedure establishes the minimum requirements necessary for the lockout/tagout of hazardous energy or material contained in the equipment/system listed below when servicing or maintenance is performed. It will be used to ensure the equipment/system is placed in a stop position, de-energized, isolated from all potential hazardous sources, and lockout/ tagout devices placed before any service or maintenance is performed, where the unexpected startup of the equipment/system could cause injury of an employee.	
REQUIREMENTS AND RULES	
The restrictions imposed by this procedure during lockout/tagout of the equipment/system apply to all employees. Employees shall comply with these requirements and not attempt to restart or use equipment/system where a lockout/tagout device is placed. Failure by any employee to comply with these requirements can result in reprimand, suspension, or termination. Authorized employees shall perform the lockout/tagout in accordance with the requirements and rules in MWI 8715.2.	
Equipment/System:	Location (Building/Room):
Authorized Employees/Organization: (List additional authorized employees in block 9)	
PROCEDURE AND TECHNIQUES	
1. Statement of the intended use and purpose of this procedure.	
2. Notify all affected (equipment/system) operators of the work to be performed using this lockout/tagout to be procedure.	
a. Employees Notified (Name/Organization):	b. Method of Notification (Direct/Telephone/PA/E-Mail):
3. Hazard recognition and identification:	
a. Method of Verification (Manuals, Operators, etc.):	
b. Identify Hazard Type and Magnitude (Pneumatic, Hydraulic, Toxic, Flammable, Electrical, Voltage, Material, PSI, etc.):	
4. Shut down machine, equipment or system using the following control devices. List sequence of safe de-energization.	
a. Device (Disconnect, Valve, etc.)	b. Location

MSFC Form 4287 (Rev July 2004)

Informa

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5. Isolate equipment system from the energy sources. List sequence if different from step 4.				
a. Device (Disconnect, Valve, etc.)	b. Location			
6. Release all potentially hazardous stored or residual energy. List method of release. (Open Valve, Open Disconnect, etc.)				
7. Steps for applying lockout/tagout devices. List sequence if different from step 4.				
8. Verify machine, equipment, or system is isolated from energy source. List method used (test equipment, attempt restart, etc.)				
9. Proceed with servicing or maintenance.				
10. Servicing or maintenance is complete and equipment/system is ready to return to normal operation:			Yes	No
11. Nonessential items are removed from the immediate area and the equipment/system is operationally intact.				
12. All personnel are removed from the area or positioned safely prior to restart.				
13. All controls are in neutral or correct positions.				
14. Steps for removing lockout/tagout devices. List sequence if not opposite sequence of step 4.				
15. Notify all affected (equipment/system) operators the work is complete and the equipment/system is ready to restart.				
16. Procedure Prepared By:		Date:	17. Service/Maintenance Performed By:	
18. Additional Authorized Employees and Organization:				
a. Name	b. Organization	c. Signature/Date (following removal of lockout/tagout device)		
19. Annual inspection of lockout/tagout procedure:				
a. Date:		b. Authorized employee performing inspection:		
c. Authorized employees that performed this lockout/tagout:				

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APPENDIX E

TAGOUT DEVICE SYSTEM to PROVIDE “FULL EMPLOYEE PROTECTION”

E.1 MSFC standardized tagout devices shall not be used without a standardized lockout device unless:

E.1.1 The energy isolation device is not capable of accepting a standardized lockout device, or any combination of protective hardware or equipment with locking capability.

E.1.2 This inability to lock the energy isolation device into a safe position has been demonstrated to the responsible supervisor or organization.

E.1.3 Full employee protection is provided.

E.2 When MSFC standardized tagout devices are installed without energy control lockout devices, the following additional safety measures shall be implemented to provide full employee protection:

E.2.1 The tagout device shall be attached at the same location that the lockout device would have been attached.

E.2.2 The tagout device shall contain a description of the work being performed and shall be affixed in a manner to clearly indicate that operation or movement of energy-isolation devices from the “safe” or “off” position is prohibited.

E.2.3 Where a tagout device cannot be affixed directly to the energy-isolating device, it shall be located as close as possible to the energy isolation device, and in a position that is obvious to anyone attempting to operate that device.

E.2.3.1 Push buttons, selector switches, or other control circuit type devices are not considered energy isolating devices.

E.2.4 Suitable additional safety measures shall be identified and implemented to effectively reduce the risk of inadvertent energization (for example, removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle).

E.2.5 Specific additional safety measures to be used shall be recorded on the Energy Control (Lockout/Tagout) Procedure.

E.3 All employees (authorized, affected, and other) shall be trained in the following limitations of tags:

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E.3.1 Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.

E.3.2 When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized employee responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.

E.3.3 Tags shall be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.

E.3.4 Tags and their means of attachment shall be made of materials that can withstand the environmental conditions encountered in the workplace, and be substantial enough to prevent inadvertent or accidental removal during use.

E.3.5 Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control (lockout/tagout) program.

E.3.6 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.

E.3.7 The tagout devices shall identify the employee's name, the organization, phone number, a brief description of the work being performed, , and the beginning and ending dates the tagout is in effect.

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APPENDIX F

Requirement For Off-Site Contractor Lockout/Tagout

F.1 When requested MSFC work is performed by off-site contractors and the work requires use of energy control (lockout/tagout) procedures for worker protection, special responsibilities shall be assumed by both the requesting organization and the off-site contractor(s) in accordance with the following requirements:

F.1.1 The requesting MSFC organization shall provide the off-site contractor with a current copy of MWI 8715.2, "Lockout/Tagout Program".

F.1.2 The requesting MSFC organization shall assure that the off-site contractor is notified of and complies with the **pre-work requirement** to provide copies of their Safety and Health Plan, Energy Control Program, and examples of their lockout/tagout devices for review and approval or disapproval by the requesting MSFC organization and/or Industrial Safety Department.

F.1.3 The requesting MSFC organization shall assure that the off-site contractor is notified and complies with the **pre-work requirement** to provide a Memorandum for Record stating the employee is qualified to perform lockout/tagout based on education, job experience, on-the-job (OJT) training, etc. to perform lockout/tagout activities on the machine, equipment, system the work is being performed. The authorized employee shall also be required to attend MSFC Lockout/Tagout Orientation Training given by the Facilities Engineering Department and/or S&MA, in accordance with section 10.3.3 and 29 CFR 1910.147, prior to beginning any work requiring the use of energy control (lockout/tagout) devices. This requirement becomes effective beginning Jan. 2005, or at the next contract renewal or award.

F.1.4 The off-site contractor and the requesting MSFC organization shall fully understand that **NO** work can begin until the off-site contractor's Safety and Health Plan, Energy Control Program, and other lockout/tagout submittals are approved.

F.1.5 The off-site contractor shall fully understand that special or additional lockout/tagout procedures may be required when working at MSFC, above and beyond those described in their own Energy Control Program.

F.1.6 The requesting MSFC organization and off-site contractor shall fully understand and comply with all the MSFC lockout/tagout program requirements. Contact the Industrial Safety Department if additional information is needed.

F.1.7 The off-site contractor shall fully understand that a supervisor/foreman who is familiar with the MSFC energy control program shall be on-site at all times while any lockout/tagout activities are being performed.

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F.1.8 The off-site contractor shall fully understand that the use of tagout devices alone is prohibited at MSFC, except under conditions described in MWI 8715.2, section 6.3.19, and Appendix E.

F.1.9 The requesting MSFC organization shall coordinate any corrective action needed to resolve differences between their energy control program and the MSFC lockout/tagout program.

F.1.10 The requesting MSFC organization shall ensure that all the affected and other employees working in the area where the off-site contractor is performing lockout/tagout activities fully understand and comply with the restrictions and prohibitions of the contractor's energy control program.

F.1.11 The requesting MSFC organization and off-site contractor shall ensure that any lockout/tagout activities performed by more than one crew or contractor are coordinated, and all contractors are aware of the other contractors' lockout/tagout procedures.

F.1.12 If the requesting MSFC organization does not have an authorized employee to lockout the machine, equipment, and complex systems during service by the off-site contractor, the organization shall coordinate this support service through the Facilities Engineering Department, is needed.

F.1.13 The requesting MSFC organization shall monitor the off-site contractor to ensure they are compliant with all the MSFC lockout/tagout program requirements, and identify and report any potential problems to the Industrial Safety Department.

F.1.14 The requesting MSFC organization shall ensure that removal of all off-site contractor lockout/tagout devices occurs at job completion, and before the contractor leaves the center.

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APPENDIX G

Responsibilities Assigned To Supervisors Of Authorized Employees'

G.1 Personnel who supervise authorized employees (workers who implement lockout/tagout procedures to control work-related exposure to hazardous energy at MSFC) shall fulfill the following responsibilities:

G.1.1 Ensure that all employees comply with the MSFC Energy Control Program.

G.1.2 Identify all work tasks, machines, equipment, and systems that may involve employee exposure to hazardous energy; and coordinate the writing and maintenance of applicable equipment-specific energy control (lockout/tagout) procedures. This responsibility applies to non-routine and modified work tasks, as well as to routine and recurring operations.

G.1.3 When major replacement, repair, renovation, or modification of existing equipment and facilities is performed, ensure that all modified and newly purchased equipment is designed with energy-isolating devices capable of accepting lockout devices, and that up-to-date written energy control (lockout/tagout) procedures are available to authorized employees, where required.

G.1.4 Provide required lockout/tagout equipment to their "authorized employees," and ensure they use it.

G.1.5 Ensure that lockout/tagout devices are placed on energy isolation devices by authorized employees only; and that the devices are installed before work begins and removed when work is complete.

G.1.6 In the event of an emergency when the authorized employee who installed the lockout/tagout device is absent, remove those devices as directed in Appendices I and B.

G.1.7 Conduct the annual periodic inspection of each of the crew's energy control (lockout/tagout) procedures, in accordance with Section 6.8 and Appendix H of this instruction and 29 CFR 1910.147 (c)(6). Inspection records shall be maintained as directed in Section 9, Records.

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APPENDIX H

Annual Inspection of Energy Control (Lockout/Tagout) Procedures

H.1 Each MSFC organization performing lockout/tagout activities shall conduct an annual inspection of their energy control (lockout/tagout) procedures to ensure that the procedures and the requirements of this Instruction and 29 CFR 1910.147 are being followed.

H.2 The annual inspection shall be performed by an authorized employee other than the one(s) utilizing the energy control (lockout/tagout) procedure being inspected.

H.3 The annual inspection shall be conducted to correct any deviations or inadequacies identified.

H.4 Where **lockout** is used for energy control, the annual inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control (lockout/tagout) procedure being inspected.

H.5 Where **tagout** is used for energy control, the annual inspection shall include a review, between the inspector and each authorized and affected employee, of that employee's responsibilities under the energy control (lockout/tagout) procedure being inspected, and the elements.

H.6 The MSFC organization shall document that the annual inspections have been performed. The documentation shall identify the machine and equipment on which the energy control (lockout/tagout) procedure was being utilized, the date of the inspection, the employees included in the inspection and the person performing the inspection.

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APPENDIX I

Emergency Removal of Lockout/Tagout Devices When The Install Employee Is Absent

I.1 Employee's Supervisor Removes Lock – the device shall be allowed to be removed by the authorized employee's supervisor provided **ALL** the following conditions are met:

I.1.1 Specific procedures and training for such removal have been developed, documented, and incorporated into the employer's energy control program and the safety and health plan.

I.1.2 The supervisor verifies that the authorized employee who applied the lock or tag is not at MSFC.

I.1.3 The supervisor and qualified employee thoroughly inspect the worksite to ensure: that planned work has been accomplished, and safe re-energization is possible; and/or that hazards to personnel, equipment and systems created by device removal and system re-energization can and is effectively controlled.

I.1.4 The supervisor uses the specific energy control procedure to remove the lock.

Note: The supervisor shall maintain a copy of all energy control procedures during the servicing and maintenance activity.

I.1.5 The supervisor verifies that the authorized employee and affected employees are notified that the lockout/tagout has been removed prior to the authorized employee and affected employees resuming work on the machine or equipment.

I.1.6 The supervisor shall complete the checklist in Appendix J and maintain in accordance with section 9.

I.2 Another organization removes the lock in an emergency situation when pre-approved procedures do not exist - In cases where pre-approved plans for lockout/tagout removal by anyone other than the authorized employee who installed the device do not exist, or where those plans are not immediately available, **the following steps shall be followed:**

I.2.1 Every effort is made to get verbal clearance from the authorized employee who placed the lock or tag, and/or their supervisor or employer before proceeding.

I.2.2 Affected employees and/or the supervisor or employer of affected employees are notified of the planned removal.

I.2.3 The organization removing the lock uses the lockout/tagout procedure (MSFC Form 4287 or equivalent) to remove the lock or tag after a thorough check has been made to ensure the equipment is in safe operating condition and all employees are clear of the equipment.

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I.2.4 The authorized employee who placed the lock or tag is notified that the lockout/tagout device was removed before he/she resumes work on the machine or equipment.

I.2.5. The organization shall comply with the checklist in Appendix J and maintain in it accordance with section 9.

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APPENDIX J

Checklist for Lockout/Tagout Device Removal When Authorized Employee Is Not Available to Remove Lockout/Tagout Device

Organization: _____ Supervisor: _____ Date: _____

Location: _____ Equipment Item/Number: _____ Lock Number: _____

Authorized Employee Who *Applied* Lockout/Tagout Device: _____

Authorized Employee To *Remove* Lockout/Tagout Device: _____

MSFC Directive Requirement: MWI 8715.2, "Lockout/Tagout Program"	Initials	Comments
1. Supervisory employee used all reasonable means available to verify that authorized employee who applied device(s) is not physically present at MSFC.		
2. All reasonable efforts to contact the authorized employee and notify of lockout/tagout device(s) removal were unsuccessful.		
3. Lockout/Tagout identified by location, equipment ID number, and name(s) of employee(s) who applied lockout/tagout device(s).		
4. Immediate supervisor of employee(s) who applied the lockout/tagout device(s) notified authorized employee who will remove lockout/tagout devices.		
5. Energy Control Procedure located for identified equipment; if procedure not available , developed and documented an energy control procedure using MSFC Form 4287, with aid from affected employees familiar with safe operation of the system, machine, or equipment.		
6. Authorized employee who will remove the installed lock(s) and tag(s) reviewed and thoroughly understood Energy Control Procedure.		
7. Supervisory employee who requested device removal collected the damaged/destroyed device(s).		
8. Authorized employee(s) who installed original device(s) were notified of device removal by immediate supervisor(s), before they resumed work at MSFC.		

Supervisor's Signature

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APPENDIX K

Examples of OSHA Standards For Equipment and Operations With Specific Requirements For Lockout/Tagout

Equipment and Operations	29 CFR Reference
Bakery Equipment	1910.263(l)(3)(iii)(b); 1910.263(l)(8)(iii)
Derricks	1910.181(f)(2)(i)(c), and (d)
Electrical	1910.305(j)(4)(ii)(A); 1910.305(j)(4)(ii)(c)(1)
Forging Machines	1910.218(a)(3)(iii), and (iv); 1910.218(d)(2); 1910.218(e)(1)(ii), and (iii); 1910.218(f)(1)(i), (ii), and (iii); 1910.218(f)(2)(i), and (ii); 1910.218(h)(2) and(5); 1910.218(i)(1) and (2); 1910.218(j)(1)
Mechanical Power Presses	1910.217(b)(8)(i); 1910.217(d)(9)(iv)
Overhead and Gantry Cranes	1910.179(g)(5)(i), (ii), and (iii); 1910.179(l)(2)(i)(c), and (d)
Powered Industrial Trucks (Forklifts)	1910.178(q)(4)
Sawmills	1910.265(c)(12)(v); 1910.265(c)(13); 1910.265(c)(26)(v)
Textiles	1910.262(c)(1); 1910.262(n)(2); 1910.262(p)(1); 1910.262(q)(2)
Welding, Cutting, and Brazing Equipment	1910.252(c)(1)(i)
Woodworking Machinery	1910.213(a)(10); 1910.213(b)(5)

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APPENDIX Z

Cross-Reference Matrix: 29 CFR 1910.147 Versus MWI 8715.2

OSHA 29 CFR 1910.147		MSFC MWI 8715.2	
Sections	Title	sections	Title
147(a)	Scope, Application, and Purpose	-	-
147(a)(1)	Scope	1&2	Purpose, Applicability
147(a)(2)	Application	2	Applicability
147(a)(3)	Purpose	1,3,4,& 6.1	Purpose, Applicable Documents, References, Energy Control Program
147(b)	Definitions	5	Definitions
147(c)	General	6	Instructions
147(c)(1)	Energy Control Program	5.7, 6.1	Energy Control Program
147(c)(2)	Lockout/tagout	6.3.20, 8.4	Use of Tagout Device Without Lockout Devices, Supervisor Responsibilities
147(c)(3)	Full Employee Protection	6.3.20 & Appendix E	Tagout system, Full Employee Protection
147(c)(4)	Energy Control Procedure	5.6, 6.2, 9.2, Appendices B,C, & D	Energy Control Procedures
147(c)(5)	Protective Materials & Hardware	6.3 & Appendix A	Lockout/tagout devices
147(c)(6)	Periodic Inspection	6.7, 9.1, & Appendix H	Periodic Inspection of Energy Control Procedures
147(c)(7)	Training & Communication	8, 9.3, 9.4, 10 & Appendix E	Personnel Training and Certification
147(c)(8)	Energy Isolation	6.3.12, 8.3, Appendices A & B	Only Authorized Employees Perform Lockout/Tagout
147(c)(9)	Notification	Appendix B	Affected Employee Notification
147(d)	Application of Control	6.2, Appendices B & D	Lockout/tagout Procedure Guidelines, MSFC Form
147(d)(1)	Preparation for Shutdown	Appendix B	Preparation Procedures
147(d)(2)	Machine or Equipment Shutdown	Appendix B	Shutdown Procedures
147(d)(3)	Machine or Equipment Isolation	Appendix B	Isolation Procedures

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147(d)(4) Lockout or Tagout Device Application	Appendix B	Application Procedures
147(d)(5) Stored Energy	Appendix B	Energy Release Procedures
147(d)(6) Verification of Isolation	Appendix B	Verification Procedures
147(e) Release from Lockout or Tagout	Appendix B	Release Procedures
147(e)(1) The Machine or Equipment	Appendix B	Machine/Equipment Inspection
147(e)(2) Employees	Appendix B	Employee Check/Notification
147(e)(3) Lockout or Tagout Device Removal	6.3.12- 6.3.15, 6.8, 8.3, 9.6, Appendices B, G, J & I	Removal Procedures, Authorized Employee Not Available to Remove Devices, Records,
147(f) Additional Requirements	-	-
147(f)(1) Testing or Positioning of Machines, Equipment or Components	2.5.1, 2.5.2, & 6.9	Temporary Removal For Test and Adjustment
147(f)(2) Outside Personnel (Contractors, etc)	2, 5.15, 6, 6.12, 6.3.3, 6.3.11, 6.3.18, 6.3.19, 6.4.2, 6.5.1, 6.6, 9.4, 10, Appendices A, C, E, F, G, H, I, & J	Applicability, Definitions, Energy Control Program, Lockout /Tagout Devices, Group Lockout or Tagout, Shift or Personnel Changes, Off-site Contractors, Records, Personnel Certification Training
147(f)(3) Group Lockout or Tagout	5.10, 6.4	Definitions, Group Lockout or Tagout
147(f)(4) Shift or Personnel Changes	6.5 & Appendix B	Shift or Personnel Changes
Appendix A Typical Minimal Lockout Procedure	6.2.10 & Appendix D	MSFC Form 4287
1 General	Appendix D	MSFC 4287
2 Purpose	Appendix D	MSFC 4287
3 Compliance with this Program	Appendix D	MSFC 4287
4 Sequence of Lockout	Appendix D	MSFC 4287
5 Restoring Equipment to Service	Appendix D	MSFC 4287
	Appendix K	Operations With Specific OSHA Lockout Requirements MSFC Standardized Lockout and Tagout Devices

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Appendix L Cross-Reference Matrix :
1910.147 Versus
8715.2LOTO procedure
guidelines