Chapter 31 – Lockout/Tagout (REDACTED)

31.1 Introduction

It is the policy of Ames Research Center (ARC) to prevent an undesirable release of hazardous energy during any servicing, maintenance, or modification activity. This policy is implemented through the Lockout/Tagout (LOTO) requirements described in this chapter. These requirements must be strictly followed when it is necessary to work on any equipment that may release any form of hazardous energy including, but not limited to, electrical, rotational, mechanical, chemical, hydraulic, or pneumatic energy, while the equipment is shut down.

LOTO is required whenever servicing, maintenance, or modification is being performed on equipment in which the unexpected energization or startup of the equipment, or the release of stored energy, could cause injury to people or damage to equipment. All sources of hazardous energy must be shut off and secured. LOTO must be performed by each person who works on the equipment.

31.2 Applicability

This manual is applicable to: (1) all Ames Employees; and (2) all persons and entities who agree in writing to comply with this manual.

31.3 Purpose

To establish site-specific practices and requirements for Lockout/Tagout (LOTO) of energy sources to protect employees from injury.

31.4 Exclusions

LOTO procedures do not apply under the following conditions:

1. Minor tool changes and adjustments and other minor servicing activities that take place during normal production operations if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternative measures that provide effective protection.

   Note: This exclusion does not apply under the following conditions:

   - If an employee is required to remove or bypass a guard or other safety device; or
   - If an employee is required to place any part of his/her body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation); or
   - Where an associated danger zone exists during a machine operation cycle.

2. Work on cord and plug-connected electrical equipment, if unplugging the equipment controls all the energy, and the plug remains under the continuous control of the employee performing the servicing, maintenance, or modification.

3. 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 that the employer demonstrates that:

- Continuity of service is essential, and
- Shutdown of the system is impractical, and
- Documented procedures are followed, and special equipment is used that will provide proven, effective protection for employees.

4. Electrical systems less than 50 volts to ground that do not increase exposure to electrical burns or to explosion due to electrical arcs.

31.5 Responsibilities

31.5.1 All Employees

REDACTED

31.5.2 Authorized Employees

REDACTED

31.5.3 Managers and Supervisors

REDACTED

31.5.4 Ames Occupational Safety Health and Medical Services Division

1. Administer, maintain, and revise the LOTO policy as needed.
2. Develop and present the NASA Lockout/Tagout Training course as needed.
3. Perform periodic inspections of each Directorate on an annual basis (section 31.16).

31.5.5 Division Chiefs

REDACTED

31.5.6 Code FE, Code JF, and Code AO Division Chiefs

REDACTED

31.5.7 Contracting Officers

REDACTED

31.5.8 Contracting Officer's Technical Representatives (COTRs) for Service Contracts and Construction Contracts

REDACTED

31.5.9 Onsite and Construction Contractors

Submit, as part of the contract-required Safety Plan, a LOTO program that meets the provisions of this chapter. Provide training and authorization records that meet the requirements of section 3.1.7.

31.5.10 ARC Electrical Power Systems Committee

REDACTED

31.6 Administrative Locking

A careful distinction must be made between LOTO and various other locking practices, collectively referred to as Administrative Locking. The LOTO procedure is specifically reserved for those instances in which a zero-energy state must be ensured to allow personnel to service, maintain, or modify equipment. Administrative locking is normally not used as the primary means of protection during a servicing, maintenance, or modification procedure, and is not a substitute for LOTO.

Administrative locking is distinguished from LOTO in both practice and purpose. A group rather than an individual may control an administrative lock. An administrative application must not use ARC-designated LOTO locks or LOTO tags. The "Caution, Special Conditions" tag (ARC Form 317) is an administrative locking tag that is not to be used as a LOTO tag.

Administrative locking may be performed for many reasons, including equipment security, programmatic purposes, or general safety. Examples of administrative locking are:

- Locked fences around high-voltage transformers.
- Locks on overhead-crane disconnect switches.
- A locked door to a laboratory that contains hazardous equipment.
- A water valve locked in the open position.

31.7 Training and Authorization

Only employees who are trained and authorized can perform LOTO.

31.7.1 Training

- Civil service or onsite contractor employees who perform LOTO and civil service or onsite contractor managers who have employees directly reporting to them, and perform LOTO are required to take the NASA Lockout/Tagout Training Course. In addition to the NASA course, onsite service contractors may train their own employees in specific company policies, procedures, and equipment as needed to ensure the safety of their employees.
- Construction contractors may take the NASA Training Course, but are permitted to show written records of equivalent training. The NASA contracting officer will enforce the specification section for noncompliance if records of equivalent training cannot be produced, or if LOTO procedures are found not to be in compliance with this document.

31.7.2 Authorization

The manager provides specific authorization after the employee satisfies the training requirements. The manager must ensure that the employee is thoroughly familiar with the equipment (within the context of his/her job function) and with the energy-control procedures. The manager shall provide additional on-the-job training if the employee is not thoroughly familiar with the equipment and/or written procedure.

When satisfied that both the training and authorization requirements have been met, the manager may authorize an employee to perform LOTO. This authorization stipulates the specific equipment or types of equipment on which the authorized employee may perform LOTO. Each manager must maintain records of authorized employees, and the type of on-the-job training, if any, that was given.

31.7.3 Reauthorization and Retraining

LOTO reauthorization is required when:

- An authorized employee's job changes or if he/she is reassigned.
- New equipment is to be used.
- New energy-control procedures are to be implemented.

LOTO retraining and/or reauthorization is required when:

- A manager has reason to believe that an employee has inadequate knowledge of LOTO procedures or policy.
- A periodic inspection shows a deficiency in the authorized employee's ability to implement LOTO policy correctly.

31.7.4 Affected Employee Training

Any ARC employee may be near to or affected by equipment on which LOTO is performed. Therefore, all employees receive LOTO awareness training through the New Employee Health and Safety Orientation and Training course. All employees must know how to recognize LOTO, why LOTO is implemented, and the importance of leaving LOTO devices in place. Employees are prohibited from tampering with LOTO devices or attempting to restart equipment to which LOTO is applied.

31.8 Lockout/Tagout Equipment

The manager whose employees perform LOTO is responsible for providing LOTO equipment to those employees, and ensuring that they use it.

31.8.1 Padlocks

Padlocks shall be identified as being used for LOTO. At ARC, a padlock with a red body indicates that it is being used for LOTO. Padlock labels can also be used for padlocks without red bodies. Each padlock shall be identified with the authorized employee's name and employer. Padlock labels can be used for writing in the authorized employee's name and employer. Other means of identification (e.g., engraving) are also permissible.

A manager may elect to utilize a checkout system that permits authorized employees to borrow locks from a common local supply. In such cases, the authorized employee checking out a lock must relabel it with his/her name.

31.8.2 Padlock Labels

Each lock must be clearly labeled with the authorized employee's name and employer. Adhesive labels may be used. Satisfactory labels include Stock #SB-18591 from the Lab Safety Supply Catalog REDACTED, Stock #65507 from the Brady Catalog REDACTED, or Stock #24472 from the Seton Catalog REDACTED. The Safety Office carries a limited supply of the adhesive labels.

31.8.3 Keys

Each LOTO padlock is required to have two keys, primary and emergency. The primary key must be in the possession of the authorized employee who applied the lock. The emergency key must be kept in a secured area (e.g., a lock box) with access limited to the authorized employee's immediate manager and one level of management above the authorized employee's manager.

A group of locks with a common key may be used for equipment with multiple energy-isolation devices, if desired. If a group of locks is keyed alike for this purpose, one key only may be issued for use by the authorized employee and a second key may be kept for emergency use, as described above.

31.8.4 Tags

The ARC Hold-Off Tag ARC Form 316 is required for LOTO operations at ARC. The tag must always be used in conjunction with a lock unless the energy-isolating device is not physically capable of being locked (see section 31.12). The tag is required to be attached with a nylon locking cable tie. Protective clear plastic sleeves shall be used for outdoor applications.

The authorized employee who performs LOTO must complete all applicable sections of the tag.

31.8.5 Other Hardware

The manager shall provide other hardware as required such as multiple lock hasps and circuit breaker and valve lockout devices.

31.9 General Procedure

31.9.1 Preparation and Notification

1. Use written procedure, if applicable.

   The authorized employee must determine if an Equipment-Specific Written Procedure is applicable to the task (see section 31.13). If so, the authorized employee must obtain and follow the equipment-specific written procedure. If a new written procedure must be generated, the authorized employee must contact his/her manager/supervisor.

2. Assess energy type and magnitude.

   The authorized employee must assess the type, magnitude, and hazards of the energy to be controlled.

3. Determine methods of control.

   The authorized employee must determine the appropriate methods of controlling the hazardous energy; e.g., disconnect switch or valve. Note: Push buttons, selector switches, interlock circuits, and other control type devices are not energy-isolating devices.

4. Notify all affected personnel.

   The authorized employee must notify all affected employees of the impending shutdown and the reasons for it.

31.9.2 Shutdown

1. Verify that it is safe to shut down equipment.

   The authorized employee must verify that it is safe to shut down the equipment.

2. Perform normal equipment shutdown.

   The authorized employee must turn off or shut down the equipment using established methods for that equipment.

3. Isolate and lock out energy sources.

   The authorized employee must operate the energy-isolating device and affix his/her LOTO lock to this device. The lock must be affixed so as to hold the energy-isolating device in an off or safe position that physically prohibits normal operation of the energy-isolating device. Where more than one authorized employee is involved in the job and a Group LOTO procedure is not used (see section 31.14), each authorized employee must affix his/her own personal lock using a multiple lock hasp.

4. Enter required information on tag and apply with nylon cable tie.

   The authorized employee must complete all appropriate information on the tag. If the placement of the tag would compromise safety by obscuring indicator lights or controls, the tag may be located as close as is safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device. Where more than one authorized employee is involved in the job, and a Group LOTO procedure is not used (see section 31.14), each authorized employee must affix his/her own personal tag on a multiple lock hasp.

5. Release stored energy.

   The authorized employee must completely release or otherwise control any stored energy. In the case of stored mechanical energy, vent valves, spring releases, blocking devices, or equipment repositioning (as appropriate) must be utilized. In the case of stored electrical energy, approved grounding wands or discharge devices must be used.

If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation must be continued until the servicing, maintenance, or modification is completed or until the possibility of such accumulations no longer exists. The equipment must be in a Zero-Energy State (see section 31.19 for a definition of this term).

31.9.3 Verification of LOTO Application Procedure

1. Attempt to restart the equipment.

   The authorized employee must physically attempt to operate the energy-isolating device and attempt to restart the equipment using the normal equipment controls (e.g., start buttons or computer software controls).

2. If the equipment is electrical, test for zero-energy state.

   The authorized employee must additionally test potential electrical energy sources using appropriate instruments or testers. The authorized employee shall use test equipment to verify that the circuit elements and equipment parts are de-energized. The authorized employee shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfeed even though specific parts of the circuit have been de-energized and presumed to be safe. If the authorized employee is not qualified to test the energy being isolated, he/she must ensure that a qualified person tests the energy. The qualified tester, if other than the authorized employee, must be identified in the Remarks section on the tag. If the circuit to be tested is over 600 volts, nominal, the test equipment must be checked for proper operation before and immediately after this test.

31.9.4 Release from LOTO

Before LOTO devices are removed and energy is restored to the equipment, the authorized employee must follow the procedures below:

1. Verify that it is safe to reenergize.

   The authorized employee must verify that the work for which the LOTO was applied has been completed and that it is safe to reenergize equipment.

2. Clear all tools and personnel.

   The authorized employee must check the work area to ensure that all tools and personnel are at a safe distance from the equipment.

3. Remove all isolating and grounding devices.

   The authorized employee must remove any devices applied under section 31.9.2, Step 5.

4. Replace safety guards.

   The authorized employee must check the equipment to ensure that any removed guards are reinstalled.

5. Remove lock and tag, reset the energy-isolating device, and return the machinery to service.

6. Notify all affected personnel.

   The authorized employee must notify all affected employees that the equipment is back in service.

Note: If following the above-prescribed sequence of the General Procedure compromises safety, the authorized employee may modify the sequence. However, all steps must be performed.

31.10 Temporary Removal of LOTO Devices

When LOTO devices must be temporarily removed from the energy-isolating device so that the equipment or component can be energized for testing or positioning, the following sequence of actions must be taken:

1. Notify the affected employees and area manager.
2. Clear the equipment of tools and materials.
3. Remove employees from the machine or equipment area and ensure that required tools are safely and properly positioned.
4. Remove all repositioning and blocking devices and return all vents and valves to their normal operating positions.
5. Remove all grounding/shorting conductors.
6. Energize and proceed with testing or positioning.
7. De-energize all systems and reapply lockout/tagout measures to continue the servicing, maintenance, or modification of the equipment. The original tag may be reused.

31.11 Emergency Removal of LOTO Devices

When the authorized employee who applied a LOTO device is not available to remove it, the manager may remove the device. This is considered to be an emergency procedure, to be undertaken only in extreme circumstances.

Extreme care must be taken and the following steps must be performed:

1. The manager must verify that the authorized employee is not at the facility. If the employee's location cannot be determined, no further action shall be taken.
2. The manager must make every reasonable effort to contact the authorized employee. This may include a telephone call to the employee's home or other location.
3. If the employee is contacted, the manager must inform the employee that his/her LOTO devices are being removed.
4. The manager must verify that it is safe to remove the LOTO devices.
5. The manager may then use the emergency key to remove the LOTO devices, or the lock may be cut off if the key is not available (see section 31.8.3).
6. The manager must ensure that the authorized employee is presented with the removed lock immediately upon returning to work, and is informed of the reasons for the emergency removal.
7. The emergency procedure must be duly recorded in the department's lockout/tagout records and signed by both the manager and the authorized employee.

31.12 Tagout Only

If a device is incapable of being locked out, a "tagout only" procedure may be employed. Any energy-isolating device capable of being locked out must be locked out without exception.

To conduct a tagout only procedure, the authorized employee must follow all the steps outlined in the General Procedure (see section 31.9). The placement of the lock in section 31.9.2, Step 3, in the General Procedure is omitted. Instead, the authorized employee must utilize a second means of isolating the hazardous energy. Removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnect device, or removal of a valve handle are all examples of secondary measures. The second means of isolation must be identified on the tag, and tags must

be affixed to both the energy-isolating device, and at the point of the second means of isolation, as described in section 31.9.2, Step 4.

If it is determined that a device is incapable of being locked out, and a second means of isolation is not possible, then an equipment-specific written procedure (see section 31.13) is required to be approved by the ARC Electrical Power Systems Committee prior to implementing the procedure.

It is ARC policy to required that energy-isolating devices accept a lockout device when new machines or equipment are installed, or whenever machines or equipment undergo major repair, renovation, or modification.

31.13 Equipment-Specific Written Procedures

An equipment-specific written procedure is required if the equipment undergoing servicing, modification, or maintenance meets one or more of the following conditions:

- Has more than one energy source.
- Requires the operation of more than one device to isolate the hazardous energy.
- Has potential for stored, residual, or accumulated hazardous energy.
- Is incapable of being locked out, and a second means of isolation is not possible.

31.13.1 Preparing an Equipment-Specific Written Procedure

A written energy-control procedure must be generated by the department, group, or authorized employee most familiar with the equipment. This procedure must be used by any authorized employee who will perform LOTO on the equipment.

Managers must ensure that equipment that requires a written procedure is so identified, and that the procedure is readily available to the employees authorized to perform LOTO on the equipment.

Any equipment with an equipment-specific written LOTO procedure must be clearly labeled as such. The manager or employee responsible for the equipment may determine the appropriate format and content of the label, for example:

*CAUTION--An equipment-specific written procedure exists for the locking and tagging of this equipment. This equipment-specific written procedure may be obtained from _____.**

*Entry to be determined by the manager.

31.13.2 Elements of an Equipment-Specific Written Procedure

The equipment-specific written procedure must incorporate each step as outlined in the General Procedure section (31.9) of this chapter.

It is essential that the specific application of each LOTO step be clearly explained in the context of the specific equipment.

31.14 Group LOTO Procedure

When a crew performs servicing, maintenance, or modification, the manager may determine that the use of a group LOTO procedure is appropriate. This determination must be made only if the size of the crew and the nature of the work preclude the feasibility of individual LOTO, and if the level of protection provided by the group LOTO procedure is equivalent to that of individual LOTO.

A group LOTO procedure is a special procedure wherein the responsibility for applying and removing the lockout devices of a group of authorized employees is vested in a single designated authorized employee.

31.14.1 Procedure/Application of Group LOTO

1. The manager must determine that group LOTO is appropriate.
2. The manager must convene a meeting of all members of the group to be covered under the procedure.
   - The manager must describe the tasks to be performed.
   - The manager must delegate primary responsibility to a designated authorized employee for a specified group of employees working under the protection of the group's LOTO.
   - The structure of the group, the names of all group members and the designated authorized employee, and reasons for the group LOTO must be documented in an appropriate LOTO logbook.
   - Each member of the specified group must be trained and authorized, as described in section 31.7.
3. The designated authorized employee is responsible for ensuring that each step of the general or equipment-specific written procedure is completed.
4. The designated authorized employee must apply his/her personal LOTO lock(s) and tag(s) to the energy-control device(s) and indicate on the tag that a "group lockout" is in effect.
5. The designated authorized employee must communicate to each person in the crew that LOTO is in place and work may commence. If the makeup of the crew changes while work is in progress, the designated authorized employee must inform any new group member that a group lockout is in place and communicate to him/her all the information relating to the group lockout. The names of the new group members must be added to the log.

Anyone leaving the group before the servicing, maintenance, or modification is completed must notify the designated authorized employee. The group member leaving must communicate the status of his/her activities to the designated authorized employee. The designated authorized employee must make a logbook entry indicating the date and time of each group membership change.

31.14.2 Release from Group LOTO

1. When the work is completed, the designated authorized employee must communicate to each group member that the group LOTO is being considered for removal and:
   - Must verify with each member that all tasks performed in conjunction with the specific job are complete.
   - Must verify that the equipment has been returned to a safe restart condition.
2. After positive verification is received from all crew members, the designated authorized employee may remove the group LOTO devices and perform equipment restart.

   If any group member is not present to provide the verification that is required under Steps 1 and 2, the designated authorized employee must follow all the procedures as outlined in section 31.11.
3. The designated authorized employee is responsible for making all appropriate logbook entries.

31.15 Shift Changes

To ensure the continuity of LOTO protection during shift or personnel changes, if work is to be continued by an oncoming shift, an orderly transfer of LOTO devices between authorized employees from the offgoing and oncoming shifts must be performed. The authorized employees from both shifts must both be present at the lockout device. The offgoing authorized employee

must remove his/her lock and tag, and the oncoming authorized employee must immediately place his/her lock and tag on the group LOTO device. The authorized offgoing employee must inform the authorized oncoming employee of any potential hazards.

31.15.1 Gaps between Shifts

If the orderly transfer of LOTO devices is not possible because of a gap in shifts, a procedure must be implemented to provide continuity of LOTO protection.

1. If the authorized employees from both shifts cannot be present simultaneously at the lockout device because there is a gap between their shifts, the authorized employee of the offgoing shift may acknowledge, by written logbook entry, prior consent to remove his or her LOTO devices during the oncoming shift. The supervisor of the authorized employee must make a corresponding logbook entry. The logbook entries must include the authorized employee's and supervisor's printed names and signatures, the equipment identification, maintenance procedure being performed, and all other pertinent safety information regarding the equipment and/or procedure.
2. The manager of the oncoming shift must read and understand the logbook entries, and is authorized to remove the LOTO device of the authorized employee from the offgoing shift.
3. The authorized employee of the oncoming shift must apply his/her LOTO devices.
4. Both the oncoming authorized employee and his/her manager must make logbook entries acknowledging the performance of this special procedure.
5. All subsequent LOTO actions must conform to the standard LOTO policy and procedures.
6. Before resuming work, the authorized employee who gave prior consent for removal of his/her LOTO devices must be personally informed by the manager that the authorized employee's devices have been removed. This authorized employee and manager must make confirming logbook entries, and the manager must then return the LOTO devices to the employee.

31.16 Periodic Inspections

At least annually the manager/supervisor of an organization implementing LOTO shall perform an inspection of the energy-control procedures. The inspection shall be conducted to identify and correct any deviations or deficiencies. The inspection shall also document the following:

- Identification of the machine(s) or equipment on which the energy-control procedure was utilized,
- Date of the inspection,
- Names of employees included in the inspection, and
- Name of the person who performed the inspection.

31.17 Tag-On

Sump pumps, emergency lights, refrigerators, or equipment that must be shut down in a controlled manner fall into a class of equipment that should not be accidentally de-energized. When a circuit breaker, disconnect switch, or energy-securing device is readily accessible to any employee, the circuit breaker or disconnect switch may be tagged to indicate that it is not to be turned off. The energy-securing device must not be locked by any means that would prevent the device from being used as an emergency disconnect.

31.18 Recordkeeping Requirements

Each LOTO event must be fully documented in the department log, project log, or a dedicated LOTO logbook.

The following information must be documented:

1. Name of authorized employee who performed LOTO.
2. Date and time LOTO was applied.
3. Equipment and circuit identification.
4. Reason for LOTO.
5. Schematic drawing or print numbers, when available.
6. Date and time of LOTO removal.
7. Name of authorized employee who removed LOTO if different from authorized employee who initiated LOTO (see section 31.11).

At the discretion of the manager, recordkeeping requirements may be satisfied by an orderly system of archiving completed tags.

Records shall be maintained for two years.

31.19 Definitions

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 in which such servicing or maintenance is being performed.
2. **Authorized employee -** A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.
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 it has a locking mechanism built into it. Other energy-isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.
4. **Energized -** Connected to an energy source or containing residual or stored energy.
5. **Energy isolating device -** A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.
6. **Energy source -** Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
7. **Hot tap -** A procedure used in the repair, maintenance and services activities that involves welding on a piece of equipment (pipelines, vessels, or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.
8. **Lockout -** The placement of lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy-isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

9. **Lockout device -** A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy-isolating device in a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
10. **LOTO -** An acronym for lockout/tagout.
11. **Normal production operations -** The utilization of a machine or equipment to perform its intended production function.
12. **Servicing and/or maintenance -** Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment, and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.
13. **Setting up -** Any work performed to prepare a machine or equipment to perform its normal production operation.
14. **Tagout -** The placement of a tagout device on an energy-isolating device, in accordance with an established procedure, to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.
15. **Tagout device -** A prominent warning device, such as a tag and a means of attachment, that 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.
16. **Zero-energy state -** A condition that is reached when all energy sources to or within equipment are isolated, blocked, or otherwise relieved, with no possibility of re-accumulation. Equipment is not safe to work on until it is in a zero-energy state.

31.20 References

- 29 CFR Part 1910.147, The Control of Hazardous Energy (Lockout/Tagout), Department of Labor, Occupational Health and Safety Administration
- 29 CFR Part 1910, Subpart S, Electrical, Department of Labor, Occupational Health and Safety Administration
- APG 1700.1, Ames Health and Safety Manual, Chapter 11, Electrical Safety
- 29 CFR Part 1910.333, Selection and Use of Work Practices (Electrical)

END OF DOCUMENT