STATES OF AMAS	Enterprise Assessments	Number: EA CRAD EA-32-11 Revision: 0 Effective Date: 09/07/2022
Control of Hazardous Energy (Lockout/Tagout) Criteria and Review Approach Document		
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# **1.0 PURPOSE**

The mission of the U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments (EA-30) is to assess the effectiveness of safety and emergency management systems and practices used by line and contractor organizations and to provide clear, concise, rigorous, and independent evaluation reports of performance in protecting workers, the public, and the environment from the hazards associated with DOE activities.

In addition to the general independent oversight requirements and responsibilities specified in DOE Order 227.1A, *Independent Oversight Program*, this criteria and review approach document (CRAD), in part, fulfills the responsibility assigned to EA in DOE Order 226.1B, *Implementation of Department Energy Oversight Policy*, to conduct independent assessments of high consequence activities. This CRAD specifically relates to assessments of control of hazardous energy under 10 CFR § 851, *Worker Safety and Health Program*.

The CRADs are available to DOE line and contractor assessment personnel to aid them in developing effective DOE oversight, contractor self-assessment, and corrective action processes. The current revision of EA's CRADs are available at <u>https://www.energy.gov/ea/criteria-and-review-approach-documents.</u>

# 2.0 APPLICABILITY

The following CRAD is approved for use by the Office of Worker Safety and Health Assessments.

#### **3.0 FEEDBACK**

Comments and suggestions for improvements on this CRAD can be directed to the Director, Office of Environment, Safety and Health Assessments.

### 4.0 CRITERIA AND REVIEW APPROACH

The review of control of hazardous energy (lockout/tagout) will assess the effectiveness of programs, procedures, and processes to establish a comprehensive lockout/tagout program. The Integrated Safety Management Policy (ISMP), DOE P 450.4A, establishes the Department's policy for work to be conducted safely and efficiently and in a manner that ensures protection of workers, the public, and the environment. To achieve this, implementing Integrated Safety Management (ISM) requirements are established through directives, and for contractor organizations through contract clauses. This includes identification of existing and potential workplace hazards and assessment of risk, development and implementation of hazard controls, assurance that work is performed within established hazard controls, and implementation of a formal mechanism and process to gather feedback and implement continual improvement by the site contractor.

The Occupational Safety and Health Administration (OSHA) Directive CPL 02-00-147, *The Control of Hazardous Energy – Enforcement Policy and Inspection Procedures,* provides additional information concerning the development of a compliant control of hazardous energy program. Although this directive is not a federal regulation or DOE order it may provide information that an assessor may find useful during any review of a contractor's lockout/tagout (LOTO) program.

The objectives and lines of inquiry are supported by the following regulations and orders:

- 10 CFR § 851, Worker Safety and Health Program
- 29 CFR § 1910.147, The Control of Hazardous Energy (Lockout/Tagout)
- DOE O 422.1, Conduct of Operations
- DOE O 426.1B, Department of Energy Federal Technical Capabilities

The following objectives are designed as stand-alone sections to be used in any combination based on the needs of the specific assessment.

#### **OBJECTIVES**

#### LOTO.1: A documented energy control program is in place to prevent unexpected energization, start up or release of stored energy, to prevent injury to employees. (10 CFR § 851.22, *Hazard Prevention and Abatement*; § 851.25, *Training and Information*; 29 CFR § 1910.147(a)(3)(i) and 29 CFR § 1910.147(c)(1))

- 1. The organization maintains a formal LOTO energy control program to ensure the machine or equipment is isolated from the energy source and rendered inoperative before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy, could occur and cause injury. A compliant program includes:
  - Requirements for written energy control procedures, where required
  - Specification of protective materials and hardware
  - Annual inspection of the application of energy control procedures

- Training of authorized and affected employees
- Use of a tagout system if an energy isolating device is not capable of being locked-out
- Requirements for full employee protection from unexpected release of energy
- Methods of coordination with outside contractors
- Requirements for group LOTO procedures, if required
- Provisions for temporary removal of LOTO
- Provisions for removal of a lockout or tagout device when the employee who applied the device is not available (29 CFR § 1910.147(a)(3) and 29 CFR § 1910.147(c)(1))
- The employer conducts periodic inspections of the energy control procedure, at least annually, to ensure that the procedure and the requirements of the LOTO standard are being followed. (29 CFR § 1910.147(c)(6)(i))
  - Is the periodic inspection performed by an authorized employee other than the ones(s) utilizing the energy control procedure being inspected? (29 CFR § 1910.147(c)(6)(i)(A))
  - Does the periodic inspection include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected? (29 CFR § 1910.147(c)(6)(i)(C and D))
  - Does the employer certify that the periodic inspections have been performed? The certification must identify the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection. (29 CFR § 1910.147(c)(6)(ii))

Where Conduct of Operations applies:

- Does the procedure include provisions for periodic management inspections of lockout/tagout records? (DOE O 422.1, Attachment 2, 2.i.)
- Does the procedure include periodic audits of active lockout/tagout to ensure locks and tags are properly attached and components are in the correct positions? (DOE O 422.1, Attachment 2, 2.i.)
- 3. The program addresses energy isolating devices not capable of being locked out, energy isolating devices capable of being locked, and replacement or major repair, renovation or modification of a machine or equipment. (See 29 CFR § 1910.147(c)(2)(i), 29 CFR § 1910.147(c)(2)(ii), and 29 CFR § 1910.147(c)(2)(iii))
  - Does the program require an energy isolating device not capable of being locked out to utilize a tagout system? (29 CFR § 1910.147(c)(2)(i))
  - Does the program require an energy isolating device capable of being locked out to utilize lockout, unless the employer can demonstrate that the utilization of a tagout system will provide full employee protection? (29 CFR § 1910.147(c)(2)(ii))
  - Does the program require full employee protection when a tagout device is used on an energy isolating device which is capable of being locked out? (29 CFR § 1910.147(c)(3)(i))
  - Does the employer demonstrate that a level of safety is achieved in the tagout program which is equivalent to the level of safety obtained by using a lockout program, by demonstrating full compliance with all tagout-related provisions, and with implementation of additional safety measures such as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle to reduce the likelihood of inadvertent energization? (29 CFR § 1910.147(c)(3)(ii))
  - Does the program require energy isolating devices for new machines or equipment to be

designed to accept a lockout device, including when replacement or major repair, renovation or modification of a machine or equipment is performed? (29 CFR § 1910.147(c)(2)(iii))

- 4. The program addresses temporary removal of lockout/tagout devices for testing or positioning, outside personnel (subcontractors) use, and group lockout or tagout. (See 29 CFR § 1910.147(f)(1), 1910.147(f)(2) and 1910.147(f)(3))
  - Does the procedure allow temporary removal of LOTO for testing? (29 CFR § 1910.147(f)(1))
  - Is the machine or equipment cleared of tools and materials and employees removed from the machine or equipment area prior to removal of lockout or tagout devices? (29 CFR § 1910.147(f)(1)(i), 1910.147(f)(1)(ii))
  - Is the machine or equipment deenergized and energy control measures reapplied prior to continuing the servicing and/or maintenance? (29 CFR § 1910.147(f)(1)(v))
  - Do outside servicing personnel engaged in activities covered by LOTO and the on-site employer inform each other of their respective lockout or tagout procedures? (29 CFR § 1910.147(f)(2)(i))
  - Do procedures establish which LOTO program will be followed with clear and unambiguous lines of authority and responsibility ensuring who has overall authority for LOTO? (48 CFR § 970.5223-1(b)(2))
  - Is group LOTO allowed, and does it afford the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device? (29 CFR § 1910.147(f)(3)(i))
  - Is the primary responsibility vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device? (29 CFR § 1910.147(f)(3)(ii)(A))
  - Is an authorized employee assigned overall responsibility and designated to coordinate affected work forces and ensure continuity of protection when more than one crew, craft, department, etc. is involved? (29 CFR § 1910.147(f)(3)(ii)(C))
  - Does each authorized employee affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism prior to beginning work, and remove those devices when he or she stops working on the machine or equipment being serviced or maintained? (29 CFR § 1910.147(f)(3)(ii)(D))
  - Are specific procedures utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy? (29 CFR § 1910.147(f)(4))

# LOTO.2: Procedures have been developed, documented, and are utilized for the control of potentially hazardous energy when employees are engaged in the servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy, could occur and cause injury. (29 CFR § 1910.147(c)(4)(i))

- 1. The employer does not need to have a written procedure for a particular machine or equipment, when all the following elements exist:
  - (Note: Exception to 1910.147(c)(4)(i), may be referred to as simple LOTO)
    - The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shutdown which could endanger employees.

- The machine or equipment has a single energy source which can be readily identified and isolated.
- The isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment.
- The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
- A single lockout device will achieve a locked-out condition.
- The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance.
- The servicing or maintenance does not create hazards for other employees; and
- The employer, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance. (29 CFR § 1910.147(c)(4)(i))
- Is simple LOTO used only when all eight elements listed above are true? (29 CFR § 1910.147(c)(4)(i))
- Is the LOTO device, which is under the exclusive control of the authorized person, installed prior to start of work by every authorized person performing work?
- Is absence of energy verified prior to performing work?
- 2. The employer must prepare written procedures when the exception described in Criteria 1 above does not apply, (referred to as complex LOTO) that clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance including, but not limited to, the following: (1910.147(c)(4)(ii))
  - A specific statement of the intended use of the procedure (1910.147(c)(4)(ii)(A))
  - Specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment to control hazardous energy (1910.147(c)(4)(ii)(B))
  - Specific procedural steps for the placement, removal, and transfer of lockout or tagout devices and the responsibility for them (1910.147(c)(4)(ii)(C)
  - Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures (29 CFR § 1910.147(c)(4)(ii)(D))
  - Do the authorized employee(s) 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 prior to the shutdown of the machine or equipment? (29 CFR § 1910.147(d)(1))
  - Are affected employees notified by the employer or authorized employee of the application of lockout or tagout devices before the controls are applied? (29 CFR § 1910.147(c)(9))
  - Are all energy isolating devices that are needed to control the energy to the machine or equipment physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s)? (29 CFR § 1910.147(d)(3))
  - Are lockout or tagout devices affixed to each energy isolating device by authorized employees? (29 CFR § 1910.147(d)(4)(i))
  - Are lockout devices, where used, affixed in a manner to that will hold the energy isolating devices in a "safe" or "off" position? (29 CFR § 1910.147(d)(4)(ii))
  - Are tagout devices, where used, affixed in such a manner that will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited? (29 CFR § 1910.147(d)(4)(iii))
  - Will all potentially hazardous stored or residual energy be relieved, disconnected, restrained, and otherwise rendered safe following the application of lockout or tagout devices to energy isolating

devices? (29 CFR § 1910.147(d)(5)(i))

- Does the authorized employee verify that isolation and de-energization of the machine or equipment has been accomplished prior to starting work on machines or equipment that have been locked out or tagged out? (29 CFR § 1910.147(d)(6))
- Are employees properly protected from electrical hazardous energy while verifying zero energy? (20 CFR §1910.335(a)(1)(i))
- Before lockout or tagout devices are removed and energy is restored to the machine or equipment, was the work area inspected to ensure that nonessential items have been removed and that machine or equipment components are operationally intact? (29 CFR § 1910.147(e)(1))
- Was the work area checked to ensure that all employees have been safely positioned or removed? (29 CFR § 1910.147(e)(2)(i))
- Was each lockout or tagout device removed from each energy isolating device by the employee who applied the device? (29 CFR § 1910.147(e)(3))
- Are affected employees notified by the employer or authorized employee of the removal of lockout or tagout devices before the machine or equipment is started? (29 CFR § 1910.147(e)(2)(ii))
- Are procedures established and followed to allow removal of the lockout or tagout device when the authorized employee who applied the device is not available to remove it? (29 CFR § 1910.147(e)(3))
- Does the employer verify the employee who applied the device is not at the facility, make reasonable efforts to contact the employee and notify them the LOTO device has been removed, and ensure the employee is notified before resuming work? (29 CFR § 1910.147(e)(3))

Where Conduct of Operations applies:

• Does the procedure include provisions for authorizing and documenting the repositioning of locked components for a LOTO?

# LOTO.3: LOTO protective materials and hardware are durable, standardized, substantial, identifiable, and provided by the employer. (29 CFR § 1910.147(c)(5))

- Lockout and tagout devices shall be singularly identified; shall be the only devices(s) used for controlling energy; shall not be used for other purposes; and shall meet the following requirements: durable, standardized, substantial, and identifiable. (See 29 CFR § 1910.147(c)(5)(ii), 29 CFR § 1910.147(c)(5)(ii)(A), 29 CFR § 1910.147(c)(5)(ii)(B), 29 CFR § 1910.147(c)(5)(ii)(C), and 29 CFR § 1910.147(c)(5)(ii)(D))
  - Are lockout and tagout devices capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected? (29 CFR § 1910.147(c)(5)(ii)(A)(1))
  - Are lockout and tagout devices standardized within the facility in at least one of the following criteria: color, shape, or size; and additionally, in the case of tagout devices, print and format? (29 CFR § 1910.147(c)(5)(ii)(B))
  - Are lockout devices substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools? (29 CFR § 1910.147(c)(5)(ii)(C)(1))
  - Are tagout devices, including their means of attachment, substantial enough to prevent inadvertent or accidental removal 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? (29 CFR § 1910.147(c)(5)(ii)(C)(2))

- Does lockout and/or tagout device(s) indicate the identity of the employee applying the device(s)? (29 CFR § 1910.147(c)(5)(ii)(D))
- Do tagout devices warn against hazardous conditions if the machine or equipment is energized and include a legend such as the following? Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not Operate. (29 CFR § 1910.147(c)(5)(iii))

# LOTO.4: The employer provides training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. (29 CFR § 1910.147(c)(7)(i))

# Criteria:

- 1. Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control. (29 CFR § 1910.147(c)(7)(i)(A))
  - Are authorized employees trained in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, the machine specific procedure, and the methods and means necessary for energy isolation and control? (29 CFR § 1910.147(c)(7)(i)(A))
  - Is lockout or tagout performed only by authorized employees who are performing the servicing or maintenance? (29 CFR § 1910.147(c)(8))
  - Are authorized employees properly trained on the exception to paragraph (a)(2)(ii) of 29 CFR § 1910.147 and equally protective methods under 29 CFR § 1910.212 when invoking the exception?
- 2. Each affected employee shall be instructed in the purpose and use of the energy control procedure. (29 CFR § 1910.147(c)(7)(i)(B))
  - Are affected employee trained in the purpose and use of the energy control procedure? (29 CFR § 1910.147(c)(7)(i)(B))

All other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure and the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out. (29 CFR § 1910.147(c)(7)(i)(C))

- Are employees trained on the following limitations of tags? (1910.147(c)(7)(ii))
  - 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. (29 CFR §1910.147(c)(7)(ii)(A))
  - When a tag is attached to an energy isolating means, it is not to be removed without the authorization of the authorized person responsible for it; and it is never to be bypassed, ignored, or otherwise defeated. (29 CFR §1910.147(c)(7)(ii)(B)
  - Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, to be effective. (29 CFR § 1910.147(c)(7)(ii)(C))
  - Tags and their means of attachment must be made of materials which will withstand the

environmental conditions encountered in the workplace. (29 CFR \$1910.147(c)(7)(ii)(D))

- Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program. (29 CFR \$1910.147(c)(7)(ii)(E))
- Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use. (29 CFR §1910.147(c)(7)(ii)(F))
- Is retraining provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures? (29 CFR §1910.147(c)(7)(iii)(A))
- Is additional retraining conducted whenever a periodic inspection under 29 CFR § 1910.147 (c)(6) reveals, or whenever the employer has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures? (29 CFR §1910.147(c)(7)(iii)(B))
- Does the employer certify that employee training has been accomplished and is being kept up to date? Does the certification contain each employee's name and dates of training? (29 CFR § 1910.147(c)(7)(iv))
- Are all other employees in an area where energy control procedures may be utilized instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out? (29 CFR § 1910.147(c)(7)(i)(C))

Where Conduct of Operations applies:

- Does training include material on how lockouts can hinder facility operations, particularly when local component operations are necessary while remote controls are locked out? (DOE O 422.1 Chg4 (LtdChg) Attachment 2, 2.i.(1)(e))
- Does training include material on how the mass of locks or chains may impair seismic design features of components? (DOE O 422.1 Chg4 (LtdChg) Attachment 2, 2.i.(1)(e))

# LOTO.5: Feedback and improvement processes are effective in addressing and preventing the recurrence of the uncontrolled release of hazardous energy.

- A formal process is established and implemented to gather feedback and implement continuous improvement of the control of hazardous energy program elements, implementation, and the adequacy of hazard identification, prevention, abatement, and controls. (DOE O 210.1A, Attachment 1, CRD, Section 1.a; DOE O 226.1B Attachment 1,2.b.(5); 48 CFR 970.5223-1(c)(5); and 10 CFR 851.26(b))
  - Does the contractor's programs and procedures include written plans and schedules for planned assessments, focus areas for operational oversight, and reviews of the contractor's self-assessment of processes and systems? (DOE O 226.1B Paragraph 4.b.(2))
  - Does the contractor assurance system include credible self-assessments, and feedback and improvement activities? (DOE O 226.1B Attachment 1, Paragraph 2.b.(2))
  - How does management communicate the results of these assessments to all affected management and workers?
  - What are the procedures for the development of corrective actions?
  - How does management ensure the corrective actions are implemented and effective?
  - How does management incorporate lessons learned into future work planning, activities, and training for continuous improvement?

- Does the contractor develop lessons-learned that focus on preventing adverse events, trends, and reliability related events, and on performance improvement? (DOE O 210.1A, Attachment 1, CRD, Section 1.a.(1))
- Does the contractor screen, distribute, and review DOE Corporate Operating Experience Program documents and external operating experience documents for site specific relevance, risks and vulnerabilities, and take appropriate actions? (DOE O 210.1A, Attachment 1, CRD, Section 1.a.(2))
- Does the contractor incorporate operating experience into their activities and processes? (DOE O 210.1A, Attachment 1, CRD, Section 1.d.)

# LOTO.6: Federal oversight programs are established and effective in ensuring the contractor has established an effective control of hazardous energy (LOTO) program.

# Criteria:

- 1. The DOE field office has established and implemented a formal mechanism and process to assess the adequacy and implementation of the contractor's LOTO program and procedures used to ensure they effectively prevent unexpected energization, start up or release of stored energy to prevent injury to employees. (DOE Order 226.1)
  - Does DOE line management conduct oversight and operational awareness activities of the contractor's LOTO program? (DOE Order 226.1, Section 4.b.)
  - Are oversight activities conducted by technically competent and experienced personnel? (DOE Order 226.1B, Section 4.a.(2).), and DOE O 426.1B, Criterion 4(c))
  - Does the DOE line management oversight program include written plans and schedules for planned assessments, focus areas for operational oversight, and reviews of the contractor's self-assessment of processes and systems? (DOE O 226.1B, Criterion 4(b)(2))
  - Does DOE line management have in place effective processes for communicating oversight results up the line management chain and to the contractor, as appropriate? Are the issues entered into the contractor's issues management system, so they can be tracked to ensure satisfactory resolution? (DOE O 226.1B, Criterion 4(d))

# **REVIEW APPROACH**

# Pre-onsite records review:

Prior to the field portion of the assessment, the organization(s) being assessed should provide the following information:

- Organizational chart(s) for all safety and health related elements assessed
- DOE contract (e.g., clauses or DOE directives regarding LOTO requirements)
- Recent LOTO program self-assessment reports and resulting corrective actions
- LOTO program(s), forms and supporting documents
- Work planning and control programs directing LOTO use
- Work packages where LOTO is used to perform work including completed forms
- LOTO training records for authorized and affected employees
- LOTO training lesson plans
- DOE line management organizational chart for LOTO use
- DOE line management assessment reports for contractor's LOTO program and resulting corrective actions where hazards are identified
- LOTO occurrence (ORPS) reports

- LOTO annual inspection reports for the last 3 years
- Documentation of subcontractor's LOTO program, approval for use, coordination records, and/or and training records if contractor's LOTO program is used by the sub-tier subcontractor.

### Onsite records review:

The following information should be readily available for the assessor(s) during the onsite review:

- Any pre-onsite records not available prior to onsite review.
- Work packages requiring use of LOTO
- Training for individuals observed performing LOTO
- Machine specific procedures
- Annual periodic procedure inspections
- LOTO hazard assessments or analysis
- Control reliability documentation for alternative lockout procedures where the lockout exception is invoked
- Procedures for lockout work involving subcontractors

#### Interviews:

- Manager(s) for the organization responsible for the LOTO program (e.g., Director of the Safety and Health Division)
- LOTO subject matter expert
- LOTO procedure writers for machines and equipment
- LOTO training personnel
- Authorized and affected employees
- Work planners, facility operational and support personnel
- DOE field office safety and health managers and support staff
- Subcontractors who perform lockout

#### **Observations:**

- Field application of LOTO
- Inspections conducted for LOTO
- LOTO training