

SAFETY AND HEALTH STANDARDS

LOCKOUT / TAGOUT (ISOLATION)

Effective Date: 11/18/14

Standard: 16.12

Document Number: **KUCSH0062**

Rev: 08

16.12.1 **INTRODUCTION**

16.12.1.1 This standard applies to all sources of hazardous energy and hazardous substances. The standard establishes minimum performance requirements for the control of such hazardous energy and serves as the written "Certification of Hazardous Energy Control" as required under the OSHA Lockout / Tagout of Hazardous Energy Standard (29 CFR 1910.147).

16.12.2 **DEFINITIONS**

16.12.2.1 **Energized or De-energized Piece of Equipment or Circuit:**

That which either supplies energy to, or receives energy from, the system (equipment and / or circuits) that is being worked on.

16.12.2.2 **Hazardous energy:** Energy that when released in an uncontrolled event can cause damage or injury e.g. electrical, pneumatic, hydraulic, stored (springs, batteries), potential (by virtue of position), heat (hot water, steam), radiation.

16.12.2.3 **Hazardous substances:** Substances with the potential to cause injury or illness e.g. gases, vapors, liquids, radioactive sources, and dusts (toxic, corrosive, flammable).

16.12.2.4 **Isolation Officer (Authorized person):** A person designated to carry out the facility Isolation (Lockout / Tagout) Procedure. Whenever a piece of plant or equipment is to be isolated, there must be a person designated to carry out the Isolation Procedure. That person is referred to as the Isolation Officer. No person may be designated as the Isolation Officer for a piece of equipment unless s / he has been trained, tested and certified as competent to carry out the Isolation Procedure for that piece of plant or equipment.

16.12.2.5 **Isolation Procedure (Lockout / Tagout Procedure):** Procedure that defines how the system, plant or equipment is to be made safe and kept safe. All designated systems, plant and equipment must have written procedures for isolation. The procedure should consider: decontamination; venting of stored energy; securing of rotors or fan blades; chocking of vehicles; and disconnecting, blocking or bleeding of equipment, pipes and vessels.

16.12.2.6 **Lockout:** A device that provides a positive means for rendering a switch, valve, suspended load, compressed / tensed coil spring, or any energy source inoperative. The lockout device may be a

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padlock, keyed lockout device, blanking plate, restraining bar, wheel chock, chain and padlock, or any positive device that prevents a system from being energized or releasing stored energy until the lockout device is properly removed.

- 16.12.2.7 **Lockout Matrix:** A written plan used when isolating complex electrical, mechanical or process equipment. The matrix generally includes a description of the equipment, electrical control locations (breakers, disconnects etc.), and mechanical control locations (valves, dampers, bypasses, blinds, etc.). It will show any connections to the Distribution Control Systems. It will also show the isolation points for lockout and test procedures.
- 16.12.2.8 **Master Series Locks:** The term "Master Series" is to be used for a lock or series of locks that are controlled by a master key.
- o **Isolation Officer Lock (Master Series):** Isolation Officers lock or series of locks. This enables Isolation Officers on subsequent shifts to open the master series lock. The master series lock must be the first to be put on and the last to be taken off. The master series lock is used as an additional safeguard to ensure that the isolation procedure is only carried out and controlled by Isolation Officers and facilitates transfer of a job between two individual Isolation Officers.
- 16.12.2.9 **Tag (Lockout Tag):** A tag that identifies who locked out the system or equipment and their department or company. (Exhibit 16.12.1)
- 16.12.2.10 **Verification of isolation (Trying):** A method verifying that the isolation and de-energization of the systems has been accomplished by attempting to energize the system after lockout.
- 16.12.3 **REQUIREMENTS**
- 16.12.3.1 Facility Isolation Procedures shall be developed, documented, and utilized for the control of potentially hazardous energy when personnel are engaged in activities covered by this standard. The procedures will define the isolation points for lockout, test procedures, and how the system, plant, or equipment is to be made safe and kept safe. The procedure shall demonstrate full compliance with all regulatory agency requirements.
- 16.12.3.2 Only Isolation Officers (authorized persons) who have completed the Isolation procedure training and testing shall perform application of

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Plant:

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a Facility Isolation Procedure. Before any work is begun on or in a system, plant or equipment, the Isolation Officer must first ensure that it is made safe in accordance with the Isolation Procedure. The Isolation Officer shall apply a positive lock and tag before work may be performed on, in or near equipment and / or circuits that could cause injury and / or damage to the equipment or facilities if energized. The Isolation Officer's Lock and identification Tag must be the first to be applied and the last to be removed. Persons who will perform work on the equipment or circuit shall each apply their own lock and tag in accordance with the Facility Isolation Procedure, prior to commencing any work. Personal locks must be such that they can only be unlocked by their owner. Personal locks may not be shared or borrowed.

- The Isolation Officer's lock must be a master series lock since it will remain on the plant or equipment when handing over to subsequent shifts. Keys to the Isolation Officer's lock must only be held by other designated Isolation Officers for that plant or equipment. It is important that each Isolation Officer, when they are working on equipment, applies his / her personal lock in addition to the master series lock, as in this way his / her safety is ensured and is not reliant on the actions of another Isolation Officer.
- Where isolation involves only one person on jobs to be completed within a single shift, the person must be an Isolation Officer and must apply his / her personal lock and identification tag and isolation officer lock and identification tag.

16.12.3.3 The requirements for the implementation of the isolation procedure shall cover the following elements with actions completed in the following sequence.

- **Prepare for Shutdown** - Before the Isolation Officer de-energizes a machine or equipment; he/she 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.
- **Shutdown** - The system shall be turned off or shut down following facility procedures, including proper notification.
- **Isolation** - All energy isolation devices that are needed to control the energy to the system shall be physically located and operated in such a manner as to totally isolate the system from the energy source. All electrical disconnects shall be placed in

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the "off" position and / or all valves to the system shall be closed.

- With electrically powered equipment, locks must be attached to the main power disconnect or breaker. It is not sufficient to lockout a local "on / off" control because these circuits are normally low voltage control power and their lockout cannot assure that the main power is broken. Also, "on / off" controls may be overridden by remote control capabilities.
- o **Stored Energy** - All potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe. If there is a possibility of re-accumulation of stored energy to a hazardous level, verification of isolation shall be continued until servicing or maintenance is completed, or until the possibility of such accumulation no longer exists. In the case of piping systems, along with closing valves and draining / venting, the pipelines may require flushing and / or purging if they contained corrosive, toxic, flammable or explosive materials.
- o **Lockout and Tag** - the isolation officer shall affix lockout devices to each energy-isolating device.
- o **Verification of Isolation (Trying)**- Prior to starting work on a system that has been locked out, the Isolation Officer shall verify that the isolation and de-energization of the systems has been accomplished by attempting to energize the system. Personnel working on or near the same piece of equipment shall be notified by the Supervisor or Isolation Officer of the applications or removal of lockout devices. After locking and tagging, the Isolation Officer must Clear the area of personnel before a Trial step to ensure that the plant or equipment has been isolated. Piping systems must be verified by tracing the pipelines and ensuring that drains and vents are open locked and tagged.
 - In the case of electrical isolation (for the purpose of doing electrical work on de-energized circuits), a Test for voltage must be carried out, after the switching device, to ensure the absence of voltage.
 - Electrical equipment and conductors shall be considered energized until the absence of voltage has been verified.
 - The verification for the absence of voltage is considered energized work and requires appropriate PPE.
 - The test equipment shall be checked for proper operation on a known source immediately before and immediately after this test.

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- All conductors energized at 600 volts or more must be visibly grounded to be considered de-energized.
- o **Removal of Lock and Tag** - Before lockout and tagout devices are removed and energy is restored to the system, procedures shall be followed and actions taken to ensure the work area is inspected, nonessential items have been removed, machine, pipelines and / or equipment components are operationally intact, all personnel have been safely positioned or removed, and all affected personnel have been notified. After this inspection is complete an Isolation Officer shall remove each lockout device from each energy source.

CAUTION: Personal locks may never be removed other than by the person to whom they belong, other than in the presence of and under the supervision of the Department or Area Manager (i.e. superintendent level or above) or his / her appointed nominee in their absence, and in accordance with a written procedure. (Exhibit 16.12.2) Under no circumstances should a supervisor remove another individual's lock.

16.12.3.4 In situations in which lockout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or components thereof, the following sequence of actions shall be followed:

- o Clear the machine or equipment of tools and materials.
- o Remove employees from the machine or equipment and notify all affected employees.
- o Remove the lockout devices.
- o Energize according to equipment operating procedures and proceed with testing or positioning.
- o De-energize all systems and reapply energy control measures in accordance with the Facility Isolation Procedure.

16.12.3.5 If work is to be continued on another shift or assigned personnel are changing as a job progresses, lockout / tagout protection must not be interrupted. Where there is a need for work to extend over multiple shifts or where there are large numbers of people involved in the work (such as large maintenance projects) a lockout matrix procedure shall be implemented. This procedure must, however, have the requirements that personal locks must be used for each person working on the job, an Isolation Officer's lock and tag is in place and this control lock cannot be unlocked without all personal locks being removed.

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- 16.12.3.6 Should it be necessary to leave equipment out of service, a responsible supervisor (or designee) shall place an Out of Service lock / tag (Exhibit 16.12.1) on the equipment controls or lockout box (board). The Out of Service lock / tag will remain in place until the equipment is placed back into service or work is to start again. If work is to start again, a responsible supervisor (or designee) shall remove the Out of Service lock and tag and normal isolation procedures will be followed.

Caution: An Out of Service lock and tag does not relieve any person from isolation procedures requirements and the use of a personal lock / tag and isolation officer lock / tag.

- 16.12.3.7 In instances where the equipment or system to be locked and tagged out has multiple energy sources and / or occupies a large geographical area, an equipment / system-specific isolation procedure will be used. This procedure will be developed jointly by plant operations, maintenance, and safety personnel in accordance with this Standard.

- 16.12.3.8 In the event a group key lock box, lockout board or comparable mechanism is used, each assigned person shall place their personal lock on the mechanism ensuring lockout of all energy sources. The lock box, lockout board or comparable mechanism used to secure the key(s) for all individual machine and equipment energy isolating locks shall include the following:

- A visible checklist that verifies all the energy sources included in the complex lockout.
- One lock for each energy-isolating device.
- The means to visibly verify that the key(s) for each energy isolating lock are secured.
- The means for each assigned person to affix a personal lock and tag to secure the lockout.

Upon completion of work, each employee shall remove their personal lock and tag, allowing the Isolation Officer to remove individual energy isolating locks on equipment and machines. Key lock boxes, lockout boards or comparable mechanisms must be kept in prominent, easily accessible sites.

- 16.12.3.9 Where it is necessary to work on live equipment for the purposes of commissioning, testing, sampling and adjustments, such work shall be carried out in accordance with a written procedure. The written procedure shall require:

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- a) An isolation officer to confirm effectiveness of controls associated with the live work area; and
- b) The work area is controlled to prevent unauthorized access.

- 16.12.3.10 Whenever contractor employees are to be engaged in activities covered by the scope and application of this standard, the contractor shall be informed of the Facility Isolation Procedure, and KUC personnel shall ensure that the procedure is understood and complied with. An assigned Isolation Officer shall affix all lockout / tagout devices. Contractors are responsible for their own and all sub-contract employees while performing work at KUC.
- 16.12.3.11 Specific procedure for lockout, tagout, and grounding of high voltage electrical systems such as transmission lines, substations, etc. are described in the Kennecott Electrical Switching Procedures and the Kennecott Substations and Switchyards Manual. Qualified KUC personnel will perform all high voltage switching. Contractors must comply with the switching procedures for high voltage as provided.
- 16.12.3.12 Locks, tags, wedges, key blocks, blanking plates, or other appropriate hardware shall be provided for isolating, securing, or blocking of machines, piping systems and / or equipment from energy sources.
- 16.12.3.13 Lockout devices and tagout devices shall be singularly identified, shall be used only for controlling energy, and shall not be used for other purposes. Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria: Color, shape or size and additionally, in the case of Tags, print and photo identification format are preferred. (Exhibit 16.12.1).
- 16.12.3.14 Lockout devices shall be 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.
- 16.12.3.15 Lockout Tags shall indicate the identity of the person applying the device. They should be durable and securely fastened to the locking mechanism and shall be constructed and printed so that exposure to weather conditions or wet, damp, or corrosive locations will not cause the tag to deteriorate or the message on the tag to become illegible. The means of attachment shall be substantial enough to prevent inadvertent or accidental removal.

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- 16.12.3.16 Audits of the Facility Lockout / Tagout Procedure shall be conducted at least annually to ensure that the procedures and requirements of this standard are being followed. An authorized person other than the personnel utilizing the procedure shall perform the periodic audit.
- 16.12.3.17 Supervisors shall ensure that initial training is provided to their employees to ensure full understanding of the Facility Isolation Procedure. The training shall include recognition of hazardous energy sources, the type and magnitude of the energy available, and the means necessary for energy isolation and control. The instruction will be documented on an appropriate training form.
- Retraining shall be provided for all affected personnel whenever there is a change in their job assignment such as relocation to another plant or area, change in machines, equipment, or processes that present a new hazard, or when there is a change in the isolation procedure. Additional retraining shall be conducted whenever the periodic audit reveals, or whenever there is reason to believe, that there are deviations from or inadequacies in the person's knowledge or use of the isolation procedure. The retraining shall re-establish employee proficiency and introduce new or revised control methods and procedures. All retraining will be adequately documented on an appropriate training form.
 - Each facility should develop a system to provide testing of supervisors / trainers to ensure competence in isolation training and isolation procedures.

16.12.4 **RESPONSIBILITIES**

- 16.12.4.1 An Isolation Officer is responsible for applying a positive lockout / tagout before work may be performed on, in or near equipment, and / or systems that could cause injury and/or damage to equipment and facilities.
- 16.12.4.2 Everyone, including the Isolation Officer, who has to perform work on the plant, equipment or system, must apply a personal lock and identification tag in accordance with the Isolation Procedure and remove their lock and tag upon completion of the job or at the end of the shift.
- 16.12.4.3 The Area Manager is responsible for ensuring that an audit of the facility Isolation Procedure is conducted at least annually to ensure that the procedures and requirements of the procedure are being

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followed and that there is a system to provide testing of supervisors / trainers to ensure competence in isolation training and isolation procedures.

REFERENCES:

- OSHA 29 CFR Part 1910.147 (www.osha.gov)
- MSHA 30 CFR 56 Subpart K (www.msha.gov)
- KUC Electrical Switching Procedure
- KUC Substation and Switchyard Manual
- KUC HSEQ MS Element 11 Management of Change (MOC)
- Rio Tinto Safety Standard C1. Isolation
- NFPA 70E

REVISION HISTORY:

MOC#	Description of Change	Prepared By	Date
18072	Scheduled Review and update. Added Rio Tinto C1 Standard requirements regarding working on live equipment; Expanding the definition of a Lockout Matrix; add paragraph 2.7 a & b from the Rio Tinto Isolation Standard under Isolation officer's responsibilities; and further clarify the verifying of electrical isolation requirements. Also, updated format and Document number added.	KUC Safety and Health Standards Committee	12/11
26756	Added Back to Out of Service Tag	KUC Safety and Health Standards Committee	July 2014

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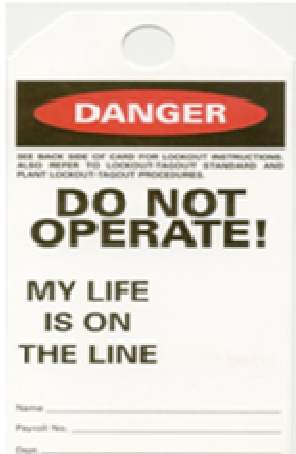
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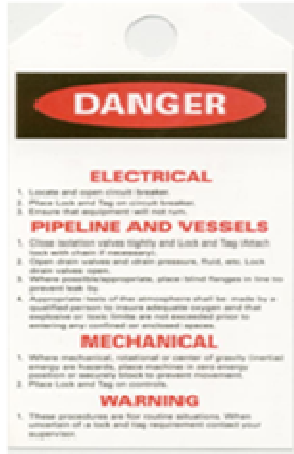
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Exhibit 16.12.1

Personal Identification Tag



Front

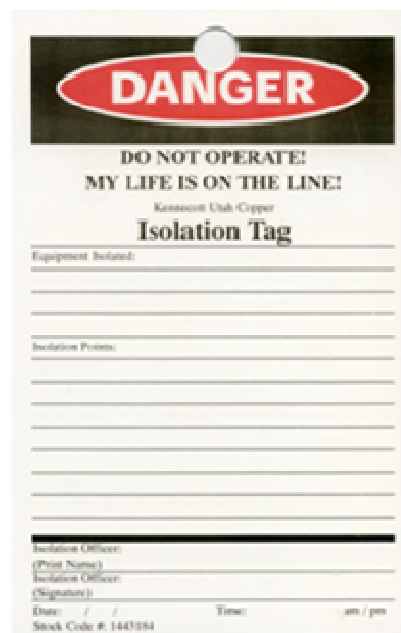


Back

Isolation Officers Tag



Front



Back

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Front of Tag

**Out of Service
Isolation Tag**

DANGER

DO NOT OPERATE

Date _____

THE LOCK ATTACHED IS PART OF AN EQUIPMENT OUT OF SERVICE ISOLATION LOCKOUT AND IS IN COMPLIANCE WITH KUC ISOLATION PROCEDURE.

TO REMOVE THE LOCK IT IS NECESSARY TO OBTAIN THE KEY FROM THE DESIGNATED AREA SUPERVISOR. YOU WILL BE REQUIRED TO SIGN OUT THE KEY RECORD IN A LOG BOOK AND ASSUME RESPONSIBILITY FOR THE LOCKOUT AND/OR LOCK REMOVAL.

Kennecott Utah Copper

MH 40411354 Rev 7 - ??/??

Back of Tag

KEY NO: _____

OUT OF SERVICE

FUNCTIONAL LOCATION: _____

FUNCTIONAL NAME: _____

STATUS: _____

DATE: _____

PLACED BY: _____ DATE: _____

DO NOT OPERATE

Exhibit 16.12.2

Rio Tinto Kennecott
ABNORMAL LOCKOUT LOCK REMOVAL PROCEDURE

It is everyone's responsibility that has to perform work on the plant, equipment or system to first apply his or her personal lock and identification tag. Personal locks must be such that they can only be unlocked by their owner.

However, there have been instances when locks have been left by their owners on plant or equipment at the end of their shift. When this happens, it is important to remember that the locks **CANNOT** simply be cut in order to get the plant or equipment running again.

KUC procedures are clear in that personal locks may never be removed other than by the person to whom they belong, other than in the presence of and under the supervision of the Area Manager (i.e. superintendent level or above) or his / her appointed nominee in their absence, and in accordance with a written procedure. Under no circumstances should anyone remove another individuals lock without following the Abnormal Lockout Removal Procedure.

When this abnormal situation occurs (when a lock is left) and the owner cannot

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be located, the following shall occur:

- Every effort must be made to verify that the employee who applied the lock is not at the facility.
- Once this has been done, contact the employee at their residence to inform them that their lock and tag needs to be removed. If the employee is contacted, they must return to the facility to remove their lock and tag.
- If the employee cannot be contacted at their residence, the Area Manager or his / her appointed nominee in their absence, must perform an inspection of the work area to ensure safe conditions exist to unlock the equipment. If necessary, a guard must be posted.
- Removal of the lock can then proceed under the direction of the Area Manager or his / her appointed nominee in their absence. The removed lock and tag are to be taken to the safety department. The attached form is to be completed to document the process undertaken. The form is to be signed by the Area Manager.
- On the next shift, prior to commencing work, the Area Manager or his / her appointed nominee in their absence, will inform the employee that their lock was removed. Appropriate corrective action will be given to ensure the incident is not repeated.

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Rio Tinto Kennecott

ABNORMAL LOCKOUT LOCK REMOVAL PROCEDURE FORM

Date		Time	AM PM
Employee		Payroll No.	
Department or Contractor			
Occupation		Supervisor	
Lock Number		Equipment Locked	
Comments:			

PROCEDURE:

1. Prior to lock removal, the Area Manager or designee in their absence, must make a reasonable effort to contact the employee who is assigned to the lock and tag by:
 - a. Verifying that the employee who applied the lock is not at the facility or on site.
 - b. Contacting the employee at their residence to inform them their lock and tag needs to be removed.

Employee's phone number(s)

Note: Under most circumstances, if the employee is contacted, they must be required to return to the facility / site to remove the lock and tag. However, the Area Manager or designee in their absence has the option instead, once the employee has been contacted, to have the lock and tag removed.

2. If the employee could not be contacted, the Area Manager or designee in their absence shall give approval to have the lock and tag removed.
3. The Area Manager or his / her appointed nominee in their absence is to perform an inspection of the work area to ensure safe conditions exist to unlock the equipment. If necessary, a guard must be posted.
4. Remove the lock and tag and return both the lock and tag with this form to the safety department. Locks may be cut under the direction of the Area Manager.
5. A copy of the completed form must be delivered to safety department, supervisor and Area Manager before the end of the shift.
6. Determine the day and shift the employee is to return to work. Ensure the employee is contacted before beginning their next working shift and inform them their lock and tag was removed. Appropriate corrective action must be given to the employee to ensure the incident is not repeated.

Area Manager or their designee (*signature*):