

## Lifting Wires instead of Locking/Tagging Disconnects

### Summary

The LESC has determined that disconnecting wires at the disconnecting device only, in lieu of not applying LOTO to perform servicing, maintenance or construction activities on the load side equipment is not in conformance with NFPA 70E Article 120 – Establishing an Electrically Safe Work Condition and OSHA 29 CFR 1910.333. Lifting and taping wires is similar to opening a disconnect switch in that it breaks the circuit but both can be reversed easily by a knowledgeable person. LOTO is an administrative procedure that puts control of the deenergized equipment under the control of the Authorized Employee, who attaches a lock and/or tag, and therefore the equipment can not be reenergized until the Authorized Employee removes his LOTO (the Subject Area has an exception when the Authorized Employee is not available).

### Relevant Codes Sections (Highlights in Red Added)

#### **NFPA 70E Article 100 Definitions**

**Deenergized.** Free from any electrical connection to a source of potential difference and from electrical charge; not having a potential different from that of the earth.

**Disconnecting Means.** A device, or group of devices, or **other means by which the conductors of a circuit can be disconnected from their source of supply.**

#### **NFPA 70E Article 110.8 Working On or Near Electrical Conductors or Circuit Parts**

**(A) General.** Safety-related work practices shall be used to safeguard employees from injury while they are working on or near exposed electric conductors or circuit parts that are or can become energized. The specific safety-related work practice shall be consistent with the nature and extent of the associated electric hazards.

**(1) Live Parts—Safe Work Condition.** **Live parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works on or near them,** unless work on energized components can be justified according to 130.1.

#### **NFPA 70E Article 120 Establishing an Electrically Safe Work Condition**

##### **120.1 Process of Achieving an Electrically Safe Work Condition.**

An electrically safe work condition shall be achieved when performed in accordance with the procedures of 120.2 and verified by the following process:

- (1) Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.
- (2) After properly interrupting the load current, open the disconnecting device(s) for each source.
- (3) Wherever possible, visually verify that all blades of the disconnecting devices are fully open or that drawout-type circuit breakers are withdrawn to the fully disconnected position.
- (4) **Apply lockout/tagout devices in accordance with a documented and established policy.**

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- (5) Use an adequately rated voltage detector to test each phase conductor or circuit part to verify they are deenergized. Test each phase conductor or circuit part both phase-to-phase and phase-to-ground. Before and after each test, determine that the voltage detector is operating satisfactorily.

### **120.2 Working On or Near Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied.**

**(A) General.** All electrical circuit **conductors** and circuit parts shall be considered energized until the source(s) of energy is (are) removed, at which time they shall be considered deenergized. **All electrical circuit conductors and circuit parts shall not be considered to be in an electrically safe condition until all sources of energy are removed, the disconnecting means is under lockout/tagout,** the absence of voltage is verified by an approved voltage testing device, and, where exposure to energized facilities exists, are temporarily grounded. *(See 120.1 for the six-step procedure to establish an electrically safe work condition.)* **Electrical conductors and circuit parts that have been disconnected, but not under lockout/tagout, tested, and grounded (where appropriate) shall not be considered to be in an electrically safe work condition,** and safe work practices appropriate for the circuit voltage and energy level shall be used. Lockout/tagout requirements shall apply to fixed, permanently installed equipment, to temporarily installed equipment, and to portable equipment.

#### **(D) Hazardous Electrical Energy Control Procedures.**

**(1) Individual Qualified Employee Control Procedure.** The individual qualified employee control procedure shall be permitted when equipment with exposed conductors and circuit parts is deenergized for minor maintenance, servicing, adjusting, cleaning, inspection, operating conditions, and the like. The work shall be permitted to be performed without the placement of lockout/tagout devices on the disconnecting means, provided the disconnecting means is adjacent to the conductor, circuit parts, and equipment on which the work is performed, the disconnecting means is clearly visible to the individual qualified employee involved in the work, and the work does not extend beyond one shift. **(Author's note: BNL SBMS does not allow this practice)**

#### **(F) Procedures.**

**(2) Elements of Control.** The procedure shall identify elements of control.

(k) Lockout/Tagout Application. The procedure shall clearly identify when and where lockout applies, in addition to when and where tagout applies, and shall address the following:

(4) **The use of tagout procedures without a lock shall be permitted only in cases where equipment design precludes the installation of a lock on an energy isolation device(s). When tagout is employed, at least one additional safety measure shall be employed. In such cases, the procedure shall clearly establish responsibilities and accountability for each person who might be exposed to electrical hazards.**

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### OSHA 29 CFR 1910 .333 (B)

#### 1910.333(b)(2)

"Lockout and Tagging." While any employee is exposed to contact with parts of fixed electric equipment or circuits which have been deenergized, the circuits energizing the parts shall be locked out or tagged or both in accordance with the requirements of this paragraph. The requirements shall be followed in the order in which they are presented (i.e., paragraph (b)(2)(i) first, then paragraph (b)(2)(ii), etc.).

#### 1910.333(b)(2)(iii)(A)

A lock and a tag shall be placed on each disconnecting means used to deenergize circuits and equipment on which work is to be performed, except as provided in paragraphs (b)(2)(iii)(C) and (b)(2)(iii)(E) of this section. The lock shall be attached so as to prevent persons from operating the disconnecting means unless they resort to undue force or the use of tools.

#### 1910.333(b)(2)(iii)(C)

If a lock cannot be applied, or if the employer can demonstrate that tagging procedures will provide a level of safety equivalent to that obtained by the use of a lock, a tag may be used without a lock.

#### 1910.333(b)(2)(iii)(D)

A tag used without a lock, as permitted by paragraph (b)(2)(iii)(C) of this section, shall be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by use of a lock. Examples of additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device.

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### **Discussion / Analysis**

The act of disconnecting the wires of an energized disconnecting device to perform servicing, maintenance or construction activities on the load side equipment, and not locking out/tagging out the disconnect or wires, is not acceptable. OSHA in Article 1910.333(b)(2) specifically states “While any employee is exposed to contact with parts of fixed electric equipment which have been deenergized, the circuits energizing the parts shall be locked out or tagged or both...”. Since the wires and the disconnect are part of the circuit which energizes the parts to the load side equipment there must be a lock or tag (lock on the disconnecting device or tag on the ends of the disconnected conductors at the line side) because the act of lifting the wires is not the same as removing the wires. If the wires are physically removed from the circuit by being cut so they can not be reconnected or removed or physically disconnected at the load-side device in a manner in which they can easily be inspected for verification they are disconnected, , then no LOTO is required.

NFPA 70 E states “All electrical circuit conductors and circuit parts shall not be considered to be in an electrically safe condition until all sources of energy are removed, the disconnecting means is under lockout/tagout... Even though the act of disconnecting the wires breaks the electrical circuit and removes the source of energy, while the employee is working on the load side the disconnecting means must be LOTO.

The rationale for this conclusion is that both OSHA and NFPA want the employees working on the deenergized equipment to have complete control that the equipment can not be reenergized without a violation of procedures. Typically accidents happen because of a failure of one or more of the barriers to the hazard, without the employee having control over the disconnect by his lock, or the wires by his tag, the potential for an accident exists.

### **Scenarios where LOTO is not required**

1. Construction project where the new supply will be from a spare CB or MCC cubicle. LOTO on the supply will not be required until the wires are pulled into the energized cabinet. Once the wires are able to be connected the supply has to be LOTO if employees are exposed to conductors, circuit parts, or potential start of equipment, even if the wires are not connected.
2. Demolition or removal of equipment. The supply has to be LOTO until; a) the conductors are cut so that they can not be reconnected to the disconnecting device (see attached DOE Interpretation) or, b) after the equipment has been removed, the conductors are made safe by insulating the exposed bare conductors.
3. A plumber or HVAC tech. has to remove a motor that the electrician has disconnected at the load terminal box to the motor, the motor wires are disconnected, are easily inspected, and therefore can not be reconnected without the plumber or HVAC tech observing, this does not require LOTO because there is no potential electrical hazardous energy at the motor.

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### Attachment DOE Interpretation

**RECORD ID** D98-10-009 Precedented

**STANDARD NUMBER**

**INFORMATION DATE** 11-05-1998

**SUBJECT** Lockout/tagout Requirements For Electrical Conductors In A D&d Operation

### **QUESTION**

I am in the process of putting together the elements of an electrical safety program for a D&D operation. I would like to know the requirements for lockout/tagout under the following scenario: We have electrical conductors located within raceways. We want to cut the de-energized conductors at the raceway ends and leave the conductors in the raceway. Whenever possible, both ends of the conductor would be cut at the same time, but this may not always be feasible and one end of the conductor may not be cut for awhile, or may be cut by a different person. In some cases there will be live conductors alongside the de-energized severed conductors in the same raceway. Are we required to tag both ends of a cut conductor, or can we use a fluorescent green stripe to designate the conductor as being de-energized? After all the conductors have been cut at both ends of the raceway, our plan is to remove the raceways in sections, with the conductors in situ. Are we required to have a "qualified" employee perform the removal of the raceway sections, or can we use an "unqualified" employee? Further clarification of the inquiry was obtained from the submitter: For example, one contractor comes in and verifies that the cables are de-energized, then cuts the cables in such a way that they cannot be re-energized. When the next phase of the project is performed, the new contractor would have to again verify the absence of voltage. This cycle would continue for each contractor at each phase of the contract. What we want to do is mark the cables in such a way to reduce the time for verification, thus cutting the cost of the job.

### **REGULATORY REVIEW**

In the scenario you describe, the initial identification of electrical cables and their isolation would fall under lockout/tagout as described in 29 CFR 1926.417(b). "...circuits that are deenergized shall be rendered inoperative and shall have tags attached at all points where such equipment of circuits can be energized." Please note that when lockout or tagging is used, it must be done to ensure that the de-energized state is maintained. Once the electrical cables are cut in such away as to render them inoperative to the point that they cannot be re-energized (example - cutting the electrical cable so that it is too short to reconnect), then lockout/tagout as described in 29 CFR 1926.417 would not apply because the hazard has been eliminated. You may wish to establish a method for marking the ends of the cables that have been cut so they are easily identified. This will help save time when verifying that the voltage has been disconnected. Ideally, on a project of this size, one person would be in charge of the field activities and would establish a method of identifying severed cables to help eliminate the effort to verify de-energization each time a new contractor comes on board. Once a qualified electrical worker has

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determined that the cable is de-energized, then an unqualified worker can remove the cable. One must remember that the unqualified worker may require training depending upon the electrical hazard involved. One must also remember that some of the older systems in DOE have shared neutrals that must be evaluated by a qualified electrical worker before allowing an unqualified person to work on these cables.

<http://www.hss.energy.gov/healthsafety/wshp/il/pres/docs/D9810009.HTM>