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Subject: Yellow Alert: Electrical Shock Incident

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TITLE: **480-Volt Electrical Shock Incident**

IDENTIFIER: Y-1998-OR-LMERX10-0201
DATE: 2/6/98

LESSONS LEARNED STATEMENT: Every element of the Lockout/Tagout (LO/TO) >program is essential to the protection of workers in the field.

DISCUSSION: While performing preventive maintenance (PM) on electrical switchgear motor control center (MCC) N, an electrician was shocked when he placed his hand on an energized incoming feed.

Two electricians were performing the three-year PM in accordance with an approved maintenance work package (MWP) #505764. The MWP instructed the workers to clean, inspect, and test the 480 V MCC-N. Work had commenced on September 23, 1997. At that time, a lockout/tagout was in place which covered the MCC-N work as well as work on Switchgear No. 3. The electricians verified that the switchgear was deenergized. On September 26, the lockout/tagout was cleared to allow the switchgear to be reenergized. A new lockout/tagout was written to cover work on only MCC-N. Clearing the old lockout/tagout energized the slow speed electrical feed of PU-14, which is powered from MCC-J but is fed into MCC-N. On September 27, 1997, two electricians, one of whom had performed this work during the same week, continued the new PM under a new lockout/tagout, perceiving that the conditions from the first LO/TO had not changed.

ANALYSIS: To determine the causes associated with this incident, the investigating team used an events and causal factors chart, change analysis, barrier analysis and root cause analysis. The direct cause of the event was that two HFIR shift supervisors, a P&E craft supervisor and three electricians did not completely follow ORNL's LO/TO procedure. The root cause was that the overall management system associated with LO/TO is less than adequate.

RESOLUTION/RECOMMENDED ACTIONS: The LO/TO procedure as well as other safety procedures are intended to prevent injury and must be followed with diligence. Managers should take available opportunities to routinely and clearly establish this expectation with their employees.

The prejob safety review is an important part of the LO/TO process and a procedural requirement. It becomes an important tool used for providing adequate evaluation of job hazards, further assuring the safety of those employees performing the work. This review should be focused and conducted in an environment free from distractions. The intent of the work package

produced by the prejob review session should be to complete the necessary work safely, and to communicate measures necessary to protect workers.

Because service employees actually perform the work, at some point, they should be actively engaged in the prejob review. This involvement allows them to have a better understanding of the job's "big picture." Also, their point of view and any questions or concerns can be considered before field work begins. The prejob review is an opportunity for the entire work team to communicate, examine available diagrams, drawings, and lessons learned from similar work activity.

When a single lockout permit is used for multiple electrical jobs, complete, independent evaluation of control points should be conducted for each job. Further discussion of electrical lockout/tagout control points should be conducted in the field where possible. This allows for visualization of the system and may also reveal inadequacies in drawings.

Finally, labels noting alternate electrical feeds should be prominent and maintained in good condition.

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PRIORITY DESCRIPTOR: Yellow / Caution
DOE FUNCTIONAL CATEGORY: 440 - Worker Protection LMER FUNCTIONAL CATEGORY: OSHP- Safety & Health
KEYWORDS: 480V, electrical safety, lockout, tagout
REFERENCES: ORO--ORNL-X10HFIR-1997-0016, Investigation of Electrical Shock Incident of September 23, 1997

FOLLOW-UP ACTION: Information in this report is accurate to the best of our knowledge. As means of measuring the effectiveness of this report please notify Claretta J. Sullivan at 423/241-3134, e-mail at sv2@ornl.gov of any action taken as a result of this report or of any technical inaccuracies you find. Your feedback is important and appreciated.