Date: Thu, 15 Jan 1998 09:51:31 -0700
From: Meredith Brown <racer@lanl.gov>
Subject: Blue Alert: Edison Circuits

Title: BLUE: **"Edison Circuits" Difficult to Identify; May Pose Safety Hazard**

The following Idaho National Engineering and Environmental Laboratory (INEEL) Lockheed Martin Idaho Technologies Blue Alert Lessons Learned is being issued to inform you that "Edison Circuits" may not be identified during standard lockout/tagout procedures.

Identifier: INEEL Lessons Learned #97283
Dated: September 8, 1997

Lessons Learned Statement: Edison circuits (separate circuits that share a common neutral line) were used in non-industrial service (such as lighting and receptacles) across the INEEL before 1994. (Edison circuits are also widely used in residential service, especially in older homes.) Before assuming a circuit is dead even after standard lockout/tagout procedures are followed, including a zero energy check-the neutral line must be checked for current.

Executive Summary: Edison circuits are separate circuits that share a common neutral line. Common neutrals are especially used in non-industrial service (such as lighting and receptacles). Common neutrals were widely used at the INEEL before 1994, when the DOE-ID Architectural Engineering (AE) Standards were changed to no longer permit their installation.

Standard tagout procedures do not require checking for current in a neutral line. The ability to detect circuits with common neutrals is impaired by open switches (such as thermostats) that may close unexpectedly. Before assuming a circuit is dead-even after standard lockout/tagout procedures are followed, including a zero energy check-the neutral line must be checked for current.

Discussion: Construction personnel were temporarily removing a wiring fixture in CPP-605. The fixture is fed electrically from circuit 6 of the 3-phase 120/208 lighting panel. The circuit for the fixture was isolated and tagged out with an approved Lockout/Tagout. Zero energy verification of the circuit confirmed that the fixture was de-energized. When workers removed the wire nut connecting the neutral leg of the circuit, an adjacent circuit from the same lighting panel was also de-energized. The electricians immediately replaced the wire nut, restored the wiring to a safe configuration, and notified their foreman.

This event originally was categorized as non-reportable. However, the critique revealed serious concerns worth reporting. Despite following safe work practices, the margin of safety was reduced.

Analysis: The task was performed in a safe manner: the circuit was identified, de-energized, and locked out and a zero energy check was performed. Even with all these precautions, the neutral was energized.

Although it was known before this incident that Edison circuits can be encountered in older site facilities, the work package being used to relocate the light fixture did not adequately address the existing facility configuration. The past practice of using Edison circuits is not accurately reflected in circuit directories or wiring diagrams. Detection of circuits with common neutrals is impaired by open switches (such as thermostats) that may close unexpectedly.

Common neutrals are widely used in non-industrial service (and especially residential service). DOE-ID AE standards adopted in 1994 do not allow new installations to use common neutrals (Section 1641-2.1). Non-industrial wiring installed before 1994 should be assumed to contain Edison circuits.

Recommended Actions: Expect to encounter Edison circuits in non-industrial installations. Because standard lockout/tagout procedures cannot always confirm the existence of an Edison circuit, the current in the neutral line must be checked.

When an Edison circuit is discovered, the LMITCO Electrical Safety Committee recommends the following actions:

1. Install additional neutral wiring to eliminate the Edison circuit, or

2. Install clips on the affected breakers that will open when either "hot" leg of the Edison circuit is opened, or

3. Install warning signs on the panels indicating that Edison circuits are installed in the associated electrical systems.

Originating Organization: Idaho Chemical Processing Plant
Contact: Larry L. Davis, (208) 526-3906
Priority Descriptor: BLUE
Functional Categories: Electrical, Maintenance
Keywords: electrical, maintenance, neutral, edison circuit
References: ORPS No. ID-LITC-WASTEMNGT-1997-0013

Follow-up Action: Information in this report is accurate to the best of our knowledge. As a means of measuring the effectiveness of this report, please notify Terry Pierce at (208) 526-4288 (or by electronic mail at txp@inel.gov) or the INEEL Lessons Learned Program Office at (208) 526-1530 (e-mail at mae@inel.gov or lmitll@inel.gov) of any action taken as a result of this report or of any technical inaccuracies you find. Your feedback is important and appreciated.