



Physics Division

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EDISON CIRCUITS POSE SAFETY HAZARD

On May 29, 1997, at the Idaho National Engineering and Environmental Laboratory Waste Management Facility, electricians realized that they were working on an energized circuit when they removed a wire nut connecting a light fixture to the neutral leg and an adjacent circuit from the same panel became de-energized. Electricians had isolated the circuit using an approved, lockout/tagout and performed zero-energy verification using approved procedures before starting to work on the fixture. The electricians immediately replaced the wire nut, restored the wiring to a safe configuration, and notified their foreman. No injuries resulted from this occurrence. (ORPS Report ID-LTC-WASTEMNGT-1997-0013, INEEL Lessons Learned #97283.)

Investigators determined that the two circuits shared a common neutral line, a practice commonly referred to as an "Edison circuit." According to the occurrence report, this configuration is approved by the National Electrical Code, and is widely used, especially in non-industrial service such as 120-volt lighting and receptacles. The DOE-Idaho Operation Office *Architectural Engineering Standards*, dated November 1994, no longer permit this practice for new construction at the Laboratory.

Immediate corrective actions for this occurrence were to restore the configuration of the circuit and to make the required notifications. The operating contractor's electrical safety committee recommended that electricians perform one of the following modifications when an Edison circuit is discovered:

- Install additional neutral wiring to eliminate the Edison circuit.
- Install clips on the affected circuit breakers that will open when either "hot" leg of the Edison circuit is opened.
- Post warning signs on the panels indicating that Edison circuits are installed in the associated electrical systems.

The committee also recommended that lessons learned from this event be distributed to all electrical workers at the Laboratory.

According to the occurrence report, standard lockout/tagout procedures do not require zero energy verification of the neutral line. Additional dangers to electricians are posed by circuits with common neutrals that are controlled by switches, such as thermostats, that may close unexpectedly. Therefore, it is important that pre-job planners consider the potential presence of Edison circuits. Electricians working on non-industrial circuits should consider the possibility that the circuits may be Edison circuits and take the necessary precautions.

The National Electric Code provides for the practical safeguarding of persons and property from hazards arising from the use of electricity. Compliance with the code will result in an installation that essentially is free from hazards to building occupants. OSHA requirements for worker protection are addressed in 29 CFR 1910.137, *Electrical Protective Devices*, which discusses personal protective equipment. Subpart 1910.301, "Electrical-General," discusses electrical safety requirements that are necessary for the practical safeguarding of employees in their workplaces. DOE/ID-10600, *Electrical Safety Guidelines*, provides guidance applicable to DOE and contractor personnel who are engaged in the design, construction, installation, inspection, testing, maintenance, operation, research and development,

and decommissioning of electrical systems.

Lessons Learned engineers at the Idaho National Engineering and Environmental Laboratory summarized the details of this event and submitted them to the DOE Lessons Learned list server.

DOE-STD-1010-92, *Guide to Good Practices for Incorporating Operating Experiences*, and DOE-STD-7501-95, *Development of DOE Lessons Learned Programs*, provide guidance on a systematic approach for incorporating operating experiences. The standards describe elements of a program that include the following:

- selecting and analyzing events for facility operation
- ensuring that event reports and subsequent analysis are distributed to appropriate organizations
- incorporating report information into new or existing programs and training
- tracking action plans to ensure that corrective actions are completed
- assessing effectiveness of the changes

The DOE Lessons Learned Information Services Home Page provides access to the list server and is located at URL <http://tis.eh.doe.gov:80/others/II/II.html>.

Operating experience managers at other DOE facilities should review their programs to determine if the operating experience elements described in the standard are incorporated effectively.

KEYWORDS: circuit, electrical safety, job-hazard analysis, power source

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