

Date Mon, 08 Nov 1999 174735 -0700
From Meredith Brown racer@lanl.gov
Subject: Yellow Alert- Electric Shock from Deteriorated Heat Trace

The following Lessons Learned contains a graphic of the affected heat trace that may not be transmitted through the listserver. The document is available on the Hanford Internet at URL <http://www.hanford.gov/lessons/sitell/1199/199940.htm>.

Project Hanford Lessons Learned

Title: Yellow Alert- Electric Shock from Old Deteriorated Heat Trace

Date October 22, 1999 Identifier 1999-RL-HNF-0040

Lessons Learned Statement: Electrical heat traces may degrade with age creating potential hazards to personnel working on or near them.

Discussion of Activities: Summary A sprinkler fitter received a mild electrical shock from electrical heat tracing while removing a section of fire protection main piping at the 222-SA standards laboratory.

Details: Sprinkler fitters from Fluor Daniel Northwest were re-routing existing sprinkler piping in the crawl space under 222-SA to install back-flow prevention equipment on the building fire main riser. The system had been isolated, locked and tagged out, and drained. The exposed portion of the main that is under the floor and above grade is heat traced and covered with lagging. A worker loosened a 2-piece bolt-on coupling located just below the room sub-flooring to permit removal of the section of pipe penetrating the floor into the equipment room. He noticed the heat tracing but was not concerned because it was below the coupling where he was working. The heat trace is a cord and plug, connected with an integral thermostatic control. While removing the coupling halves, the worker felt a shock to his left arm. He immediately proceeded to the nearest first aid station and later went to Hanford Environmental Health Foundation for further evaluation where he was released to return to work.

Analysis: The heat trace was old and brittle and therefore easily damaged. It was apparently damaged during work in the crawl space, exposing the 120-volt circuit conductors. While removing the coupling halves, the sprinkler fitter touched the damaged heat trace with his left hand and received a shock. The graphic below shows the damaged section of the heat trace, looking down from above the floor. The heat trace was installed around 1980 and did not meet 1978 National Electrical Code (NEC) requirements for identifying heat traced lines. It was apparently not inspected for NEC compliance as required by HNF-PRO-089. This particular heat trace remained connected to its nearby electrical supply year around since it was thermostatically controlled. However, this trace was produced prior to polarized attachment plugs with a single pole thermostat. The plug could be inserted in the receptacle in either direction. The "switched" leg was likely the neutral with the hot conductor continually energized. Although age and brittleness of the heat tracing contributed to this event, similar situations could occur with relatively new installations if tools, sharp objects, or other materials

come in contact with these devices. NEC requires that heat traces be installed so that they will not be subject to damage.

Recommended Actions: Facilities with services requiring electrical freeze protection should ensure that electrical power to these freeze protecting devices is secured prior to working on or around protected equipment. Inspection for deteriorated electric heat trace should be included on freeze protection check lists. Facilities should inspect their accessible heat traces for deterioration during building winterization and replace any that are brittle or deteriorated or that do not have polarized plugs. However, insulation should not be disturbed solely for this inspection. Heat traces should be inspected when surrounding insulation is removed for other reasons any time of the year.

Priority Descriptor YELLOW/Caution

Functional Categories (DOE) Occupational Safety and Health

Functional Categories (Hanford specific) Electrical

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References Occurrence report RL-PHMC-ANNALAB-1999-0018