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IN 86-52

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

June 26, 1986

IE INFORMATION NOTICE NO. 86-52: CONDUCTOR INSULATION DEGRADATION ON FOXBORO MODEL E CONTROLLERS

Addressees:

All nuclear power reactors holding an operating license or a construction permit.

Purpose:

This notice is to alert recipients to a potentially generic problem with conductor insulation degradation on 15 conductor/24 gage interconnection coil-cord cable sets (cable sets) supplied by the Foxboro Company (TFC) for use with Foxboro model E electronic controllers. Degradation of the insulation could result in a common mode failure in that wiring of the same age in various controllers may fail in certain circumstances, such as a seismic event. Recipients are expected to review the information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem from occurring at their facilities. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

While performing routine surveillance on the reactor protection system (RPS) instrumentation at the Haddam Neck Nuclear Plant in October 1984, Connecticut Yankee Atomic Power Company (CY) found that the conductor insulation on a cable set for a Foxboro model E electronic controller in the control room RPS logic cabinet was in a degraded condition after more than 10 years of service. The degradation consisted of embrittlement of the insulation on the conductors within the cable set. CY determined that handling could cause the wire insulation to disintegrate with the potential for unanalyzed short circuits occurring. Further inspections determined that 21 similar Foxboro cable sets in the RPS exhibited the same degradation. Normal CY maintenance activities did not require access to the terminal block portion of the cable set, so it is not clear how long this condition may have existed. CY issued a licensee event report (LER 50-213/84-017 dated 11/01/84) in which it stated that the cause of the degradation was aging and that the insulation had poor stability.

TFC has been aware of this problem since the fall of 1978, and concluded in a 1979 internal report that the failures seemed to be occurring after about 15 years in the field and were due to oxidation aging. Additionally, the report stated that sometime after 10 years the insulation of the individual wires will deteriorate and wires may contact each other and that all model E controllers 10 years or older should be examined for insulation deterioration at least annually. Due to inadequacies in TFC's Part 21 evaluation and reporting procedure, TFC failed to make notification to either their customers or the NRC (reference violation 85-01-01 in VPB inspection report 99900225/85-01).

Discussion:

An NRC inspection at the Foxboro Company (reference VPB inspection report 99900225/85-01) and discussions with the cable manufacturers have determined that:

1. The Foxboro Company recommends that all cable sets for Foxboro model E controllers should be examined for insulation degradation at least annually, regardless of when they were purchased since these cable sets may have been in stock at The Foxboro Company warehouse for several years.

2. Foxboro has disposed of all of the remaining coil-cord cable sets in stock to prevent recurrence of the insulation degradation condition.

3. The cable manufacturers typically had a 1-year warranty for the coil-cord cable sets. The life expectancy of the cable sets under mild service conditions and environment is under 10 years.

In addition, the Institute of Materials Science (IMS) of the University of Connecticut performed an analysis of two of the defective cable sets for CY. The IMS analysis concluded that the insulation degradation of some production batches was due to poor stability of the insulation material.

Foxboro model E electronic controller numbers 61, 62, and 67 have been identified as utilizing the coil-cord type of cable sets. A subsequent Foxboro electronic controller model line has similar numbers 61 H, 62 H, and 67 H but they are not affected. Foxboro cannot determine which nuclear facilities have installed model E electronic controllers in safety-related systems. Foxboro issued a letter on October 18, 1985 which discussed "end of life" components. However, this letter may not have been effective at notifying end users of the problem. Therefore, Foxboro issued a second letter to all nuclear power plants on June 4, 1986. Foxboro stopped manufacturing the model E electronic controllers in 1970 and withdrew model E product line support in 1984. Coil-cord cable sets were available for replacement from Foxboro until 1984. However, the cable sets that Foxboro had in stock were several years old. In the June 4, 1986 letter, TFC committed to supporting nuclear power plant control system needs.

No specific action or written response to this information notice is required. If you have any questions regarding this matter, please contact this office or the appropriate Regional Administrator.

Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contact: J. J. Petrosino
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Attachment:
List of Recently Issued IE Information Notices

Attachment 1
IN 86-52
June 26, 1986

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-51	Excessive Pneumatic Leakage In The Automatic Depressurization System	6/18/86	All BWR facilities holding an OL or CP
86-50	Inadequate Testing To Detect Failures Of Safety-Related Pneumatic Components Or Systems	6/18/86	All power reactor facilities holding an OL or CP
86-49	Age/Environment Induced Electrical Cable Failues	6/16/86	All power reactor facilities holding an OL or CP
86-48	Inadequate Testing Of Boron Solution Concentration In The Standby Liquid Control System	6/13/86	All BWR facilities holding an OL or CP
86-47	Feedwater Transient With Partial Failure Of The Reactor Scram System	6/9/86	All BWRs and PWRs facilities holding an OL or CP
86-46	Improper Cleaning And Decontamination Of Respiratory Protection Equipment	6/12/86	All power reactor facilities holding an OL or CP and fuel fabrication facilities
86-45	Potential Falsification Of Test Reports On Flanges Manufactured By Golden Gate Forge And Flange, Inc.	6/10/86	All power reactor facilities holding an OL or CP and research and test facilities
86-44	Failure To Follow Procedures When Working In High Radiation Areas	6/10/86	All power reactor facilities holding an OL or CP and research and test reactors

OL = Operating License
CP = Construction Permit