AUG 2 2 1994

Ms. Cheryl Dahle, Quality Assurance Manager
ABB Power T&D Company Inc.
4300 Coral Ridge Drive
Coral Springs, Florida 33065

Dear Ms. Dahle:

SUBJECT: INFORMATION NOTICE REGARDING ABB/WESTINGHOUSE RELAYS

The U. S. Nuclear Regulatory Commission (NRC) is planning to issue an information notice (IN) that discusses failure of ABB/Westinghouse relays due to insulation degradation. Mr. Bill Rogers of the NRC has discussed this issue with you. Please review the enclosed draft IN to ensure that the technical information is correct and return any comments you may have as soon as possible.

Your cooperation is appreciated. If no comments are received by September 28, 1994, we will assume the technical information in the notice is correct. If you have any questions regarding this issue, please call T. J. Kim of my staff at (301) 504-2841.

Orignal signed by
Elizabeth L. Doolittle, Acting Chief
Generic Communications Branch
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Enclosure: As stated

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

September XX, 1994

NRC INFORMATION NOTICE 94-XX: ELECTRICAL WIRE POLYVINYL CHLORIDE INSULATION DEGRADATION CAUSED FAILURE OF ELECTRICAL COMPONENTS

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees of a possible situation where polyvinyl chloride (PVC) insulation, used on electrical wire, may degrade and cause the failure of electrical components. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

On April 14, 1993, at St. Lucie Nuclear Plant Unit 1, a non-safety related ABB/Westinghouse model CO9 overcurrent protective relay failed to operate during calibration testing. The relay's failure was determined to be caused by a green substance, coming from the relay's internal wiring, which had coated the instantaneous trip unit. Electrical tests indicated that the substance was insulating the relay's instantaneous contacts and prevented relay operation even at twice the normal trip current. The licensee identified the wiring insulation type to be polyvinyl chloride (PVC).

The licensee inspected all ABB/Westinghouse relays in Unit 1 (primarily 1970 date codes) and Unit 2 (primarily 1975 date codes) and found relays in both units which contained PVC insulated wire (black with white lettering which identified it as 105°C, 18 AWG, manufactured by the Philadelphia Insulated Wire Co). The licensee had ABB/Westinghouse models CO-7, CO-9, KC-4, COM-5, CV-2, and CVE installed.

The licensee found that numerous Unit 1 relays (but no Unit 2 relays) contained the green substance and subsequently replaced all PVC insulated wire with a cross linked polyethylene insulated wire. The licensee also replaced the relay coils because the coil lead wiring was not identifiable and the insulation type could not be determined. The relays, used in both safety-related and non-safety-related applications, had been provided as original plant equipment.

Discussion

The licensee performed a laboratory analysis and identified the green substance as a copper chelate of the polyester plasticizer from the PVC insulation on the relay's internal wire. In addition, the laboratory evaluation also indicated that overheating of the wiring could have caused the release of the plasticizer. ABB's analysis drew the similar conclusion that the green substance was due to the temperature related breakdown of the PVC insulation which released a plasticizer which oxidized and interacted with the copper.

ABB indicated that the ABB relay line was manufactured by Westinghouse until 1989, as a joint venture by ABB and Westinghouse for a brief period in 1989, and by ABB since 1989, and that the relays manufactured during those time periods would be labeled accordingly. Prior to 1975 ABB/Westinghouse supplied only commercial grade relays and all relays manufactured during that period used PVC insulated wire for the internal wiring. From 1975 through 1992, ABB/Westinghouse supplied commercial grade relays which used PVC insulated wire and safety related relays which did not use PVC insulated wire. In November of 1992, ABB/Westinghouse began using non-PVC insulated wire for the commercial grade relays as well as the safety-related relays.

Therefore, this information is of particular interest to licensees which have ABB/Westinghouse relays, installed in safety-related applications, which were procured from ABB/Westinghouse prior to 1975 or which were procured from ABB/Westinghouse as commercial grade between 1975 and 1992 (and subsequently dedicated by the licensee or other party). Relays supplied by ABB/Westinghouse as safety-related (available since 1975) were not manufactured with PVC wire. The date of manufacture may be established by a four digit date code which specifies the month and year of manufacture (for example, November 92 is indicated as 1192) and is typically stamped inside the relay's latch handle.

Related Generic Communication

PVC insulated wire has been used in a variety electrical components made by various manufacturers. A similar condition was first addressed in Information Notice 91-20, "Electric Wire Insulation Degradation Caused Failure In a Safety-Related Motor Control Center," which discussed the decomposition of PVC insulation in motor control centers and containment fan coolers at H. B. Robinson and a motor control center at San Onofre Nuclear Generating Station, Unit 1.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Brian K. Grimes, Director
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Technical contacts: George T. MacDonald, Region II
(404) 331-5576

Milton B. Shymlock, Region II
(404) 331-5596

Bill H. Rogers, NRR
(301) 504-2945

Attachments:
1. List of Recently Issued NRC Information Notices