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

April 3, 1992

NRC INFORMATION NOTICE 92-27: THERMALLY INDUCED ACCELERATED AGING AND FAILURE OF ITE/GOULD A.C. RELAYS USED IN SAFETY-RELATED APPLICATIONS

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 to problems resulting from the accelerated aging and failure of 120V ac relays manufactured by the ITE/Gould Manufacturing Company (currently Telemecanique). The relay failures rendered portions of the associated safety-related systems inoperable. 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 November 23, 1991, while performing an eighteen month engineered safety features operability test, the licensee for the Millstone Nuclear Power Station, Unit 3, noted that control power was interrupted to three safety-related motor operated valves (MOVs). The valves were located in the charging, component cooling water, and steam generator atmospheric dump systems. The licensee inspected the valves' control power circuitry and determined that three normally energized auxiliary relays had failed. These relays provided control power alarms and thermal overload protection for the MOVs. The relay failures rendered each valve inoperable.

The relays, which had been in service for about seven years, were class J10 relays with J20M magnet block assemblies and standard G10JA126, 120V, 60 cycle coil assemblies manufactured by the ITE/Gould Manufacturing Company. Inspection of the relays revealed that the movable plastic armature carrier, which surrounds the core and coil, and the retainer for the magnet yoke assembly were discolored, brittle and severely cracked. Insulation degradation was severe, allowing electrical shorts to develop within the coils. The licensee concluded that the failures resulted from the thermal aging of the coil assemblies and plastic parts near the coil assemblies.

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The failed relays were mounted shoulder to shoulder in a horizontal "ganged" arrangement on a universal mounting strip supplied by the manufacturer. The three relays that failed were each mounted in the middle of a ganged relay cluster. The relays were originally qualified, individually, for the life of the plant. However, the qualification process did not account for the use of the relays in the ganged arrangement. The licensee stated that the potential heat induced degradation of "weak-link" materials such as the plastic armature carrier was not considered in the qualification test report.

The licensee inspected relays in other safety and nonsafety systems and found similar discoloration and embrittlement caused by overheating, but found no additional failures. The Millstone licensee has replaced approximately 260 relays with identical components from spare motor control centers. Long term corrective actions include periodic monitoring and replacement and/or physical separation of ganged relays.

During the period April 1987 through August 1987, the licensee for the Seabrook Generating Station experienced similar failures of ITE/Gould J-10 relays. Following those failures, Telemecanique submitted a report to the NRC under Title 10 of the Code of Federal Regulations (10 CFR), Part 21 (Part 21 report) describing the failures at Seabrook. The report attributed the overheating failures to the special low voltage coils in the J10 relays that were supplied to the Seabrook Nuclear Station. Telemecanique stated that the relays supplied to Seabrook were equipped with a non-standard magnet coil (identified as 816 with 50 ohms resistance) and, therefore, the failure mode would not be experienced at any other facility. The licensee for the Seabrook Station submitted a Licensee Event Report (LER) to the NRC under 10 CFR Part 50.73 describing the relay failures and their root cause analysis. The licensee stated in the LER that, "...It was originally believed that excessive temperature resulted from the close proximity of six normally energized relays...Subsequent investigation led to the identification of relays not in close proximity with other energized components that showed slight discoloration." However, the Seabrook licensee accepted the Telemecanique Part 21 report conclusions that the failures were due to the heat generated by the energized, non-standard coil.

The recent failures at Millstone suggest that the Seabrook licensee's original conclusion may have been accurate. The gang mounting ("close proximity") of these relays was likely a major contributor to the accelerated aging with the condition being exacerbated by the additional heat generated by the continuously energized coil.

The J10 relay is one of a family of J-class relays currently manufactured by Telemecanique as commercial grade items. Although the NRC staff is not aware of the failure of any of the other J-class relays, these relays could be susceptible to similar heat induced degradation when gang mounted.

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.

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical contacts: N. Fields, NRR
(301) 504-1173

K. Naidu, NRR
(301) 504-2980

R. Spence, AEOD
(301) 492-8609

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
92-26	Pressure Locking of Motor-Operated Flexible Wedge Gate Valves	04/02/92	All holders of OLs or CPs for nuclear power reactors.
92-25	Potential Weakness in Licensee Procedures for A Loss of the Refueling Cavity Water	03/31/92	All holders of OLs or CPs for nuclear power reactors.
92-24	Distributor Modification to Certain Commercial-Grade Agastat Electrical Relays	03/30/92	All holders of OLs or CPs for nuclear power reactors.
92-23	Results of Validation Testing of Motor-Operated Valve Diagnostic Equipment	03/27/92	All holders of OLs or CPs for nuclear power reactors and all vendors of motor-operated valve (MOV) diagnostic equipment.
92-22	Criminal Prosecution and Conviction of Wrongdoing Committed by A Commercial-Grade Valve Supplier	03/24/92	All holders of OLs or CPs for nuclear power reactors.
92-21	Spent Fuel Pool Reactivity Calculations	03/24/92	All holders of OLs or CPs for nuclear power reactors.
92-20	Inadequate Local Leak Rate Testing	03/03/92	All holders of OLs or CPs for nuclear power reactors.
92-19	Misapplication of Potter & Brumfield MDR Rotary Relays	03/02/92	All holders of OLs or CPs for nuclear power reactors.
92-18	Potential for Loss of Remote Shutdown Capability during A Control Room Fire	02/28/92	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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