Entergy

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November 16, 2004
JAFP-04-0182

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

Subject: **James A. FitzPatrick Nuclear Power Plant**
Docket No. 50-333

10 CFR Part 21 Notification
Potential GE HMA Type Auxiliary Relay Failures in Multiple Systems

Dear Sir:

This report is being submitted in accordance with 10CFR21.21(d) to address a reportable defect. The defect deals with General Electric (GE) HMA Type auxiliary relays. The failure of two GE HMA Type auxiliary relays in a short period of time was identified at James A. FitzPatrick (JAF) via the corrective action system on October 8, 2004 as a potential common mode failure. The two relay failures involved the 'A' and 'C' Emergency Diesel Generators (EDGs), which started during the performance of a Surveillance Test (ST) due to the failure of a blocking relay designed to prevent their start when the test switch was installed and operated, and the 'B' loop Residual Heat Removal (RHR) injection valve, which failed to open during the performance of a ST due to the failure of another relay. Initial troubleshooting revealed that both relay coils were open circuited. There was no evidence of any obvious cause for the coils to open circuit (e.g., discoloration, smell, physical damage). Both relays are normally de-energized relays located in a mild environment in the relay room (controlled humidity, no vibration at the panels, no local heat source that could cause accelerated aging). Both relays were installed in 1988 along with 21 other relays. A total of 33 relays were purchased from GE with the same lot/date code.

An extent of condition review was conducted. By checking the continuity of related relay coils, two other relay coil failures were detected. An Apparent Cause Evaluation was performed as was a failure analysis of the relays. All installed safety-related relays from this lot/date code were replaced.

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JAF's evaluation concluded that a substantial safety hazard existed since there was a potential for a major deficiency/major degradation of essential safety-related equipment, specifically for the RHR system (Low Pressure Coolant Injection (LPCI) mode of operation) and High Pressure Coolant Injection (HPCI) system. No actual loss of safety function occurred as a result of the deficiency. See the attachment for additional details.

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. Timothy Page at (315) 349-6209.

Very truly yours,

T. A. SULLIVAN

TAS:TP:dmr

Attachment

cc: USNRC, Region 1
USNRC, Project Directorate
USNRC, Resident Inspector
INPO Records Center
General Electric Nuclear Energy

I. Name and Address

Mr. T. A. Sullivan – Site Vice President
Entergy Nuclear Operations, Inc.
James A. FitzPatrick Nuclear Power Plant
P.O. Box 110
Lycoming, NY 13093

II. Facility, Activity or Component

James A. FitzPatrick Nuclear Power Plant (JAF)

The components in question are General Electric (GE) HMA Type auxiliary relays that are used in safety-related systems.

Component and Supplier:
GE HMA Type auxiliary relays
GE Part No. 12HMA124A2 (Date Code 14VC)
GE Dwg No. DA137C6164P001 (Date Code 8836); safety-related dedication
Serial #s: D88542-0001D R02 through D88542-0033D R02
All were purchased as safety-related from GE under JAF Purchase Order # 88-5628

III. Constructor or Supplier

General Electric Nuclear Energy
M/C 397
175 Curtner Ave.
San Jose, CA 95125

IV. Defect and Safety Hazard

The failure of two GE HMA Type auxiliary relays in a short period of time were identified at JAF via the corrective action system on October 8, 2004 as a potential common mode failure. At that point in time, the two relay failures involved the following equipment:

- 'A' and 'C' EDGs – The 'A' Division EDGs started unexpectedly during the performance of a Surveillance Test (ST) due to the failure of a blocking relay designed to prevent their start when the corresponding test switch was installed and operated;
- 10MOV-25B – The 'B' RHR loop injection valve (in the LPCI mode of operation) failed to open during the performance of a ST due to the failure of another auxiliary relay.

IV. Defect and Safety Hazard (continued)

Initial troubleshooting in accordance with procedure MP-100.04, Troubleshooting Control and Maintenance Activities, revealed that both relay coils were open circuited. There was no evidence of any obvious cause for the coils to open circuit (e.g., discoloration, smell, physical damage). Both relays are normally de-energized relays located in a mild environment in the relay room (controlled humidity, no vibration at the panels, no local heat source that could cause accelerated aging). Both relays were installed per a modification in 1988 along with 21 other relays that were part of an order of 33 relays total. Common attributes of these relays include:
- All are GE HMA Type auxiliary relays
- All were purchased as safety-related from GE
- All are from the same lot/date code

An extent of condition review was conducted. By checking the continuity of related relay coils, two other relay coil failures were detected. These relays performed the following functions:

- SRV 'D' (ADS Function) – Failure of this relay, with an additional failure, would have prevented the 'D' SRV from actuating as designed on a valid Automatic Depressurization System (ADS) actuation signal.
- 13AOV35 – The RCIC Steam Supply Line Drain Downstream Isolation valve would not have closed as designed when the RCIC Turbine Steam Inlet Isolation Valve opened. This failure would not have rendered RCIC inoperable.

An Apparent Cause Evaluation was performed as was a failure analysis of the relays.

The failure (or potential failure) is an open in the relay coil due to corrosion of the coil wire. This open in the coil will prevent the relay from changing state as the relay is energized. An independent laboratory concluded that the coil insulation and the underlying wire were damaged during coil manufacture. The damage allowed the copper wire to corrode over the years to the point of failure. The evaluation performed by JAF assumed a failure of all suspect relays and another single failure, consistent with the guidance in NUREG-0302, Rev.1, Remarks Presented (Questions/Answers Discussed) At Public Regional Meetings To Discuss Regulations (10 CFR Part 21) For Reporting Of Defects and NonCompliance.

These HMA relays were installed in multiple Emergency Core Cooling Systems (ECCS) and other systems. Each component was evaluated to determine the specific impact on the respective system. The systems affected included: Residual Heat Removal (RHR) (the Low Pressure Coolant Injection (LPCI) mode of operation), Emergency Diesel Generators (EDGs), Automatic Depressurization System (ADS), Reactor Core Isolation Cooling (RCIC), Core Spray (CS), and High Pressure Coolant Injection (HPCI).

IV. Defect and Safety Hazard (continued)

JAF's evaluation concluded that a substantial safety hazard existed since there was a potential for a major deficiency/major degradation of essential safety-related equipment, specifically for the RHR system (LPCI mode of operation) and HPCI system. The degradation to the RHR system was based on the impact to the 'A' and 'B' RHR loop injection valve logic, both for the actual failure of the logic relay for 10MOV-25B and for the potential failure of other logic relays affecting the injection valves. The degradation to the HPCI system was based on impact to the transfer circuit when automatically transitioning out of the test mode upon receipt of a valid Loss of Coolant Accident (LOCA) signal. The HPCI system may not have operated at the required flow rate without operator intervention.

In some cases, Technical Specifications (TS) required systems would have been rendered inoperable using the assumptions of the relays failing, but a substantial safety hazard would not have been created due to the TS being more conservative than the plant's safety analysis. In these cases, since the additional postulated failures did not actually occur, they are not reportable as a condition prohibited by the TS or as any event or condition that could have prevented the fulfillment of the safety function of systems needed to ... , and thus are not reportable under 10CFR50.72 or 10CFR50.73. In the case of the four actual relay failures, there was no loss of safety function. As this lot of installed safety-related relays were replaced, the potentially defective relays were tested to check for open coils. There were no cases where the redundant train was compromised by a failed relay.

No other safety functions would have been lost for the other identified systems.

V. Date

This defect was discovered on October 8, 2004.

VI. Location and Number of Defective Components

JAF purchased 33 relays from GE under the Purchase Order referenced above in Section II. All of the relays have been accounted for with the exception of three relays. Based on a thorough search of plant records since the initial purchase, it is most likely that the three relays were discarded at some point. These relays do not remain in the JAF stock system and thus cannot be installed in the plant.

VII. Corrective Action

All installed safety-related relays from this lot/date code were replaced during the recent refueling outage. Remaining spares held onsite were placed in a "hold" status to prevent issuance in the plant.

VIII. Advice
None.