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10CFR50.73



Nuclear
Operations

February 5, 1993
NRC-93-0010

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Reference: Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

Subject: Supplemental Licensee Event Report (LER) No.
88-034-02

Please find enclosed Supplemental LER No. 88-034-02, dated February 5, 1993, for a reportable event that occurred on August 31, 1988. A copy of this LER is also being sent to the Regional Administrator, USNRC Region III.

If you have any questions, please contact Barbara Siemasz, Compliance Engineer, at (313) 586-1683.

Sincerely,

Enclosure: NRC Forms 366, 366A

cc: T. G. Colburn
A. B. Davis
W. J. Kropp
M. P. Phillips
P. L. Torpey

Wayne County Emergency
Management Division

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Fermi 2 DOCKET NUMBER (2) 0500034111 OF 05

TITLE (4)

Isolation of Reactor Water Cleanup System Due to Suspected Relay Failure

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)											
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)									
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OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)																														
4	<table border="1"><tr><td>20.402(b)</td><td>20.405(c)</td><td>X</td><td>60.73(a)(2)(iv)</td><td>73.71(b)</td></tr><tr><td>20.406(a)(1)(i)</td><td>60.36(c)(1)</td><td></td><td>60.73(a)(2)(v)</td><td>73.71(c)</td></tr><tr><td>20.406(a)(1)(ii)</td><td>60.36(c)(2)</td><td></td><td>60.73(a)(2)(vi)</td><td>OTHER (Specify in Abstract below and in Text, NRC Form 306A)</td></tr><tr><td>20.406(a)(1)(iii)</td><td>60.73(a)(2)(ii)</td><td></td><td>60.73(a)(2)(vii)(A)</td><td></td></tr><tr><td>20.406(a)(1)(iv)</td><td>60.73(a)(2)(iii)</td><td></td><td>60.77(a)(2)(viii)(B)</td><td></td></tr><tr><td>20.406(a)(1)(v)</td><td>60.73(a)(2)(iii)</td><td></td><td>60.73(a)(2)(ix)</td><td></td></tr></table>	20.402(b)	20.405(c)	X	60.73(a)(2)(iv)	73.71(b)	20.406(a)(1)(i)	60.36(c)(1)		60.73(a)(2)(v)	73.71(c)	20.406(a)(1)(ii)	60.36(c)(2)		60.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 306A)	20.406(a)(1)(iii)	60.73(a)(2)(ii)		60.73(a)(2)(vii)(A)		20.406(a)(1)(iv)	60.73(a)(2)(iii)		60.77(a)(2)(viii)(B)		20.406(a)(1)(v)	60.73(a)(2)(iii)		60.73(a)(2)(ix)	
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LICENSEE CONTACT FOR THIS LER (12)

NAME Barbara Siemasz, Compliance Engineer TELEPHONE NUMBER 313 586-1683

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) X NO EXPECTED SUBMISSION DATE (15)

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

The Reactor Water Cleanup System (RWCU) outboard isolation valve, G3352F004, closed and caused the RWCU pumps to trip. Plant personnel discovered that relay A71B-K27 was de-energized but no reason for this could be determined. The isolation signal was reset, G3352F004 was opened and the RWCU system was returned to service. An investigation by engineering personnel was initiated.

The closure of G3352F004 was caused by contacts 3-4 on relay A71B-K27 closing upon de-energization of the relay. The apparent cause of the de-energization was loss of continuity to the relay due to deposits built up on the surface of the 1-2 seal in contacts.

Relay A71B-K27 and associated relay A71B-K25 were replaced. Initial analysis of these style CR120A relays had determined the presence of silver sulfide on the surface area of the relay contacts. Subsequent analysis of another style CR120A relay indicated the presence of silver sulfide and thin layers of polymerized silicone containing oil on the surface area of the relay contacts.

A method was developed and implemented to chemically remove the silicone oil deposits and then coat the contact area of new and in-stock relays with a barrier material. Primary Containment Isolation System (PCIS) Division II relays were replaced with treated relays during the third refueling outage. PCIS Division I relays, previously replaced in April 1991 with untreated relays during the second refueling outage, will be replaced with treated relays in the fourth refueling outage scheduled for spring 1994.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530) U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104) OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

Initial Plant Conditions:

Operational Condition: 4 (Cold Shutdown)
Reactor Power: 0%
Reactor Pressure: 0 psig
Reactor Temperature: 151 degrees Fahrenheit

Description of Event:

At 1831 hours on August 31, 1988, the Reactor Water Cleanup System (RWCU) (CE) outboard isolation valve, G3352F004 (ISV), closed and caused the RWCU pumps (P) to trip. Plant personnel investigated the event and determined that there was no work in progress that could have caused this isolation. They discovered that relay A71B-K27 (RLY) was de-energized, but no reason for this could be determined.

The isolation signal was reset at 1906 hours. At that time, G3352F004 was opened and the RWCU system was returned to service. An investigation by engineering personnel was initiated.

The physical condition of the terminations, wiring, voltage drop measurements for the total isolation loop logic and relay contacts of relays A71B-K27 and A71B-K25, which is the other active component that could have caused this event, were examined. No discrepancies in the terminations or discontinuities within the logic or wiring were found. Deposits were found on both relay's contacts. Both relays were removed and replaced.

It was suspected that the deposits had caused a momentary loss of continuity in the seal in circuit. In order to determine if that assumption was correct, relay A71B-K27 was sent to the manufacturer, General Electric (GE), for analysis and relay A71B-K25 was sent to an independent laboratory. The results of the two analyses differed so that an additional analysis was obtained. Based upon the results, it was concluded that the deposits were caused by a build-up over time of silver sulfide.

Contacts of a third relay (A71B-K18), removed from the Primary Containment Isolation System (PCIS) Division II logic due to a similar problem, were sent to Perkin Elmer Physical Electronics laboratory for analysis. On March 19, 1990 test results identified a significant

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 600 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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concentration of silver sulfide, silicone oil or light grease and chlorides on the surface of the relay contacts. Additional testing determined the depth profile of the polymerized silicone oil to be from 200 to several thousand Angstroms thick layered on the surface of the removed A71B-K18 relay. This relay was located in the same panel as relay A71B-K27, which had been previously replaced.

On July 17, 1991, additional laboratory analysis was performed on the new relays and those removed from PCIS Division I during the second refueling outage. The analysis confirmed the presence of silicone oil on the relay contacts of both new and used relays.

On April 28, 1992, two new relays, taken from a lot purchased in October 1990, were analyzed. The results of this analysis determined that silicone oil was deposited on the relay contacts and on the exterior surface of the relay case (which up to this time had never been analyzed).

Cause of the Event:

The closure of G3352F004 was caused by contacts 3-4 on relay A71B-K27 closing upon de-energization of the relay. The apparent cause of the de-energization was a loss of continuity of the logic power to relay A71B-K27. This was caused by the build-up of silver sulfide deposits on the surface of the seal in 1-2 contacts of A71B-K27. Further analysis of relay contact surfaces has determined that a silver sulfide buildup was aggravated by a buildup of polymerized layers of silicone oil. Silicone containing oil was also found on the exterior surfaces of the relay case. This oil deposit on the contact surfaces tended to polymerize in layers and harden the silver sulfide over time. Since polymerized oil is a very poor conductor of electricity, this deposit caused a momentary loss of electrical continuity through fixed and moveable contacts of contact set 1-2.

Safety Analysis:

The RWCU system functions to control reactor vessel water level and remove impurities from the reactor coolant. The system is not required for the safe shutdown of the plant. Isolation valve G3352F004 closed in accordance with its containment isolation design

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 800 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-633), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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basis when relay A71B-K27 de-energized. At no time was the health and safety of the public or plant personnel affected.

Corrective Actions:

Surveillance procedures were performed and satisfactory results obtained prior to any work performed on the logic string components. Each contact set and wire termination in the isolation circuit was tested for excessive voltage drop across it. The contacts were in their energized closed (non-isolation) condition. No significant voltage drop was identified.

Relay A71B-K27 and the associated relay A17B-K25 were replaced. The relays in PCIS Division I were replaced with new untreated relays during the second refueling outage. Subsequent to this and as a result of the lack of sufficient vendor information to explain the presence of the silicone oil, a method was developed and evaluated by Detroit Edison for removal of silicone containing oil from relay contacts and adjacent parts of the relay case. This was done by procedure using a specialized cleaning solution and equipment at the COBEHN Inc. cleaning facility in Winchester, Virginia. The evaluation included a post-treatment test of relays to ensure that the cleaning and coating of relay contacts would not result in degradation of electrical function. The evaluation also included surface elemental analysis to verify that the silicone containing oil present prior to chemical cleaning had been removed as a result of the cleaning. The cleaning process included an application of a fluorinated methacrylic polymer barrier material (NYEBAR-K). The application of this polymer, following removal of the silicone containing oil, is expected to inhibit future migration of silicone containing oil, such as, from the case onto the cleaned contact surface.

All QA1 relays in stock in the warehouse have been cleaned, treated and electrically tested. The relays in PCIS Division II were replaced during the third refueling outage with relays from stock.

PCIS Division I relays, previously replaced in April 1991 with untreated relays during the second refueling outage, will be replaced with treated relays during the fourth refueling outage scheduled for spring 1994. Degradation of these relay contacts is not expected to occur prior to change-out.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 600 HRS. FORWARD COMMENT REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-520), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3160-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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The Spare Parts Reference System stock codes for CR120A relays which may be used in QA1 applications in the plant have been updated to include cleaning of the relays prior to installation.

Previous Similar Events:

The events that led to confirmatory action letter CAL-R111-88-009, dated May 4, 1988, describe the failure of another GE Model CR120A relay (A71B-K18) installed in the Residual Heat Removal System by an apparently similar mechanism. A third failure of a CR120A relay by coil burn up initiated the events described in LER 90-003.

Failed Component Data:

GE Relay Model CR120A06002AA (Relay A71B-K27)