**Paul Fessler, P.E.**
Assistant Vice President, Nuclear Operations

Fermi 2
6400 North Dixie Hwy., Newport, MI 48166
Tel: 734.586.5325

**Detroit Edison**

10CFR50.73

March 29, 2000
NRC-00-0018

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

Reference: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Fermi 2 Letter to NRC,
Licensee Event Report (LER) No. 00-001,
NRC-00-0015, dated February 7, 2000.

Subject: Licensee Event Report (LER) No. 00-002

Pursuant to 10 CFR 50.73(a)(2)(i)(B), Detroit Edison is submitting the enclosed LER No. 00-002. The LER documents an event in which the E2150-F015A, Division 1 Core Spray Test Line Isolation Valve, was in a condition prohibited by Technical Specifications.

No new commitments are being made in this LER.

Should you have any questions or require additional information, please contact Mr. Norman K. Peterson of my staff at (734) 586-4258.

Sincerely,

P. Fessler

cc: J. Dyer
A. J. Kugler
M. A. Ring
M. V. Yudasz, Jr.
NRC Resident Office
Region III
Wayne County Emergency Management Division



JE22

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(6-1998)

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001



| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Fermi 2 | 05000341 | 1 of 5 |

TITLE (4)

Damaged Terminal Blocks for Division 1 Core Spray Test Line Isolation Valve

| 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 NAME | DOCKET NUMBER |
| | | | | | | | | | | 05000 |
| 02 | 29 | 00 | 00 | --0 0 2-- | 00 | 03 | 29 | 00 | FACILITY NAME | DOCKET NUMBER 05000 |

| OPERATING MODE (9) | 1 | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11) | | | | | |
|---|---|---|---|---|---|---|---|
| POWER LEVEL (10) | 97 | 20.2201(b) | 20.2203(a)(2)(v) | X | 50.73(a)(2)(i) | | 50.73(a)(2)(viii) |
| | | 20.2203(a)(1) | 20.2203(a)(3)(i) | | 50.73(a)(2)(ii) | | 50.73(a)(2)(x) |
| | | 20.2203(a)(2)(i) | 20.2203(a)(3)(ii) | | 50.73(a)(2)(iii) | | 73.71 |
| | | 20.2203(a)(2)(ii) | 20.2203(a)(4) | | 50.73(a)(2)(iv) | | OTHER |
| | | 20.2203(a)(2)(iii) | 50.36(c)(1) | | 50.73(a)(2)(v) | | Specify in Abstract below or in NRC Form 366A |
| | | 20.2203(a)(2)(iv) | 50.36(c)(2) | | 50.73(a)(2)(vii) | | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| Jerome Flint – Licensing | (734) 586-5212 |

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

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| A | ED | CON | X999 | Y | | | | | |
| | | | | | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|---|
| | YES (If yes, complete EXPECTED SUBMISSION DATE). | X NO | | | | |

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On February 29, 2000, during performance of a work request for thrust testing of E2150-F015A, Division 1 Core Spray Test Line Isolation Valve, five damaged terminals of a terminal block assembly were discovered. The plastic barriers between terminal blocks 17 through 21 of Motor Control Center (MCC) 72B-3A position 3B were broken creating a potential for a short circuit between terminals. An evaluation of the damaged terminals determined it was possible that adjacent leads in the E2150-F015A valve MCC position could come in contact causing a short circuit under seismic conditions and, with a design basis accident signal present, render Division 1 Core Spray incapable of performing its Emergency Core Cooling System function and the E2150-F015A valve incapable of performing its primary containment isolation function.

Because this condition was conservatively determined to exist since July 6, 1999, a period exceeding that permitted by Technical Specifications, this event is considered to be a condition prohibited by Technical Specifications in accordance with 10 CFR 50.73(a)(2)(i)(B).

The cause of the event was determined to be excessive stress on the terminal block divider plates due to the weight of the cable run connected to these terminals. The damaged terminal blocks were replaced and cables lengthened.

Initial Plant Conditions:

| | |
|---|---|
| Mode | 1 (Power Operation) |
| Reactor Power | 97 Percent |
| Reactor Pressure | 1023 psig |
| Reactor Temperature | 537 Degrees Fahrenheit |

Description of the Event:

At 1050 hours on February 29, 2000, during performance of Work Request (WR) 000Z000423 for thrust testing of E2150-F015A, Division 1 Core Spray Test Line Isolation Valve [TV], five damaged terminals of a terminal block assembly [CON] were discovered. The plastic barriers between terminal blocks 17 through 21 of Motor Control Center (MCC) [MCC] 72B-3A position 3B were broken creating a potential for a short circuit between terminals. The electrical connections to the broken terminal blocks were still physically intact. The primary containment isolation function of the E2150-F015A valve and the Division 1 Core Spray (CS) [BM] system had been declared inoperable for thrust testing of the E2150-F015A valve prior to discovery.

It was determined that the MCC position internals for the E2150-F015A valve had been replaced on July 6, 1999 as part of MCC position replacement efforts. At that time terminals 17 through 21 of MCC 72B-3A position 3B had been disconnected and re-connected as part of the replacement. Little slack was left in these cables after termination of the new MCC position. Additionally, cable run movement during subsequent MCC replacement work adjacent to this MCC position may have caused additional stress on the vertical cable run, contributing to the failure of barriers between terminal blocks.

Work Request 000Z000423 was modified and the damaged terminals of the terminal block assembly were replaced at 2142 hours on February 29, 2000. The Division 1 CS system was declared operable at 0114 hours on March 1, 2000, after post maintenance testing verified proper stroking of the valve. A walkdown of MCC positions that had been replaced was performed to determine if similar problems existed. No additional damaged or potentially overstressed terminations were discovered.

An assessment was performed to determine if the E2150-F015A valve could be relied on to operate under normal and design basis (seismic) conditions. It was determined the valve would operate properly for normal conditions. Under seismic conditions, because the electrical circuit connections were still intact, an open circuit condition was not likely; however, with the terminals loose it was possible for adjacent leads to contact. This could cause the E2150-F015A valve to momentarily open upon receipt of a Loss of Coolant Accident (LOCA) initiation signal. When the valve reached full open the close circuit would override, re-closing the valve. If the shorted terminals remained in contact, the valve could continue to cycle open and closed, resulting in diversion of Division 1 CS flow, reducing the effectiveness of the CS system and loss of the primary containment isolation function for the E2150-F015A valve.

The exact time of occurrence could not be determined. Upon MCC position replacement the terminations were verified correctly installed. At some time after this the weight of the cables overstressed the terminal block dividers. Conservatively, the E2150-F015A was not seismically qualified from the date the MCC position was replaced, July 6, 1999. Consequently, the valve was inoperable for longer than the action statements allowed by Technical Specification 3.5.1, Emergency Core Cooling System (ECCS) and Reactor Core Isolation Cooling (RCIC) [BN] System (7 days), and 3.6.1.3, Primary Containment Isolation Valves, (72 hours). Therefore, a condition prohibited by Technical Specifications 3.5.1 and 3.6.1.3 existed, which is reportable under 10 CFR 50.73(a)(2)(i)(B).

Cause of the Event:

The probable cause of the failure was excessive force being applied to the terminal block barriers. Little slack was left in these cables after termination of the new MCC position. Additionally, cable run movement during subsequent MCC replacement work adjacent to this MCC position caused additional stress on the vertical cable run, contributing to the failure of barriers between terminal blocks.

Improved MCC position internals are being installed at Fermi 2 under Technical Services Request 29429. As a part of the installation, logic circuits connected to the MCC positions are disconnected from the old MCC position terminal blocks and re-connected to the new MCC position terminal blocks. Procedure 35.306.016, Motor Control Center Cubicle Replacement, provides direction and a form to document and independently verify these terminations for configuration control. This was performed. The work request provides instruction to extend leads, if necessary. During replacement sufficient lead length was determined to be available. While the cable [CBL] terminations may have been satisfactory at the time of installation, there was most likely very little slack left in the leads.

Control power and logic cable terminations for individual MCC positions is by means of a vertical cable run alongside the MCC positions. Two additional MCC position internals were replaced on July 7, 1999, the day following installation of the MCC position for the E2150-F015A valve. These positions were immediately below the affected MCC position, utilizing the same vertical cable run for control and logic cabling. Installation work on these MCC positions may have caused additional stress on the E2150-F015A valve cable terminations.

When the barriers between the terminal blocks failed, they did so by cracking at the base of the terminal block next to the metal termination plates. This caused terminals 17 through 21 to be loose, creating a potential for a short circuit. A plastic terminal block identification strip runs the entire length of the terminal strip, across the top of the terminal blocks. This identification strip, along with the support of the cables kept the damaged terminal blocks in position, preventing the broken dividers from moving. In fact, it was not realized that the terminal block barriers were damaged until terminal 19 was being disconnected to support Motor Power Monitor testing of the E2150-F015A valve.

Analysis of the Event:

The function of the Core Spray System is to spray water from the Suppression Pool onto the top of the reactor core following a large break Loss of Coolant Accident (LOCA). The normally closed E2150-F015A, Division 1 Core Spray Test Line Isolation Valve, receives a signal to close upon receipt of a LOCA signal. This valve also provides a primary containment isolation function. Under seismic conditions the E2150-F015A valve may not have remained closed coincident with a LOCA initiation signal.

Division 2 Core Spray and both divisions of Low Pressure Coolant Injection (LPCI) [BO] were available from July 6, 1999 to February 29, 2000, the duration the E2150-F015A valve was not capable of performing its intended ECCS or primary containment isolation function, with the following exception: LPCI loop select was inoperable for a period of eight minutes on January 7, 2000, causing both divisions of LPCI to be inoperable. This was previously evaluated and reported in LER 00-001, Residual Heat Removal (RHR) Low Pressure Coolant Injection (LPCI) System Declared Inoperable due to Loss of Power to the Division I LPCI Inboard Isolation Valve. The likelihood of a LOCA and a seismic event occurring during this eight minute period is insignificant.

The E2150-F015A valve connects to the Primary Containment via penetration [PEN] X-227B with piping inside primary containment continuing to below the Suppression Pool water line. The penetration is described in UFSAR Table 6.2-2, Summary of Primary Containment Penetrations and Associated Isolation Valves, as General Design Criterion 56 with Notes 12 and 39 applying. Note 12 states a single isolation valve and closed system outside the primary containment is required and Note 39 states the piping terminates below the low water level in the suppression pool and thus it is not credible that the isolation valve will be exposed to containment atmosphere at any time during an accident. If the E2150-F015A were to have opened, the closed system would have remained intact, acting as a second barrier to release. Penetration X-227B would have remained capable of performing its intended function.

This was not a Safety System Functional Failure. For the Maintenance Rule, Core Spray is not considered a risk significant system at Fermi 2. Moreover, the Fermi 2 Seismic Margin Assessment demonstrated the ability to attain safe shutdown via two paths independent of the Core Spray system. Thus, there was no significant increase in overall plant risk as a result of this condition. The health and safety of the public were not adversely affected by this condition.

Corrective Actions:

This event was documented in the Fermi 2 Corrective Action Program. Immediate corrective action was taken to replace the damaged terminals of the terminal block assembly (Work Request 000Z000423). Cables leading to terminals 17 through 21 were extended to provide additional slack. Following replacement, Motor Power Monitor and stroke testing ensured the valve was operable.

A walkdown of Motor Control Centers was performed. All recently replaced MCC positions (approximately 186 positions) were inspected with no other damaged terminals or potentially overstressed terminations discovered. This was a 100 percent inspection of replaced MCC positions.

Further corrective actions relating to this event, such as including additional guidance to prevent placing excessive stress on cable terminations during MCC position replacement, are being considered for implementation commensurate with established priorities and processes of the Fermi 2 Corrective Action Program.

Additional Information:

A. Failed Component Data

| | |
|---|---|
| Component: | Terminal Block |
| Description: | Phenolic Heavy Duty Dovetail Base |
| Manufacturer: | Buchanan |
| Part Number: | 0211 |

B. Previous Similar Events

No similar LERs were identified within the past five years.