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**Detroit Edison**



*A DTE Energy Company*

10CFR50.73

December 13, 2001  
NRC-01-0083

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: Licensee Event Report (LER) No. 01-003

Pursuant to 10 CFR 50.73(a)(2)(i)(B), Detroit Edison is submitting the enclosed LER No. 01-003. This LER documents a condition prohibited by Technical Specifications for an inboard Residual Heat Removal/Low Pressure Coolant Injection System pressure isolation valve which did not meet its required leakage limits.

No 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,

cc: T. J. Kim  
M. A. Ring  
M. V. Yudas, Jr.  
NRC Resident Office  
Region III  
Regional Administrator, Region III  
Wayne County Emergency Management Division

IE22

## LICENSEE EVENT REPORT (LER)

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

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

## 1. FACILITY NAME

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## 2. DOCKET NUMBER

05000341

## 3. PAGE

1 OF 5

## 4. TITLE

## Pressure Isolation Valve Leak Test Failure

## 5. EVENT DATE

MO	DAY	YEAR
11	09	2001

## 6. LER NUMBER

YEAR	SEQUENTIAL NUMBER	REV NO
2001	003	00

## 7. REPORT DATE

MO	DAY	YEAR
12	13	01

## 8. OTHER FACILITIES INVOLVED

## FACILITY NAME

## DOCKET NUMBER

05000

## FACILITY NAME

## DOCKET NUMBER

05000

9. OPERATING  
MODE

5

10. POWER  
LEVEL

0

## 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)

20.2203(a)(3)(ii)

50.73(a)(2)(ii)(B)

50.73(a)(2)(ix)(A)

20.2201(d)

20.2203(a)(4)

50.73(a)(2)(iii)

50.73(a)(2)(x)

20.2203(a)(1)

50.36(c)(1)(i)(A)

50.73(a)(2)(iv)(A)

73.71(a)(4)

20.2203(a)(2)(i)

50.36(c)(1)(ii)(A)

50.73(a)(2)(v)(A)

73.71(a)(5)

20.2203(a)(2)(ii)

50.36(c)(2)

50.73(a)(2)(v)(B)

OTHER  
Specify in Abstract below or in  
NRC Form 366A

20.2203(a)(2)(iii)

50.46(a)(3)(ii)

50.73(a)(2)(v)(C)

20.2203(a)(2)(iv)

50.73(a)(2)(i)(A)

50.73(a)(2)(v)(D)

20.2203(a)(2)(v)

X

50.73(a)(2)(i)(B)

50.73(a)(2)(vii)

20.2203(a)(2)(vi)

50.73(a)(2)(i)(C)

50.73(a)(2)(viii)(A)

20.2203(a)(3)(i)

50.73(a)(2)(ii)(A)

50.73(a)(2)(viii)(B)

## 12. LICENSEE CONTACT FOR THIS LER

## NAME

Steve Cashell – Principal Licensing Engineer

## TELEPHONE NUMBER (Include Area Code)

734-586-1549

## 13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX
A	BO	ISV	A391	Y					

## 14. SUPPLEMENTAL REPORT EXPECTED

YES (If yes, complete EXPECTED SUBMISSION DATE).

x

NO

15. EXPECTED  
SUBMISSION  
DATE

## MONTH

## DAY

## YEAR

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

On November 9, 2001, leak testing of Pressure Isolation Valve (PIV) E1100F050A, Division 1 Residual Heat Removal (RHR)/Low Pressure Coolant Injection (LPCI) System injection line inboard isolation check valve, was performed in accordance with Technical Specification (TS) Surveillance Requirement SR 3.4.5.1. The resultant leak rate was determined to be in excess of the specified leakage criteria of 10 gpm. The valve and its air-operated test actuator were disassembled and inspected. It was determined that the disk was being prevented from fully closing by the actuator. The cause of the failure of the disk to fully close was determined to be improper reassembly of the actuator during the previous refueling outage because of inadequate craft skills and insufficient craft supervision during this period. The actuator was rebuilt properly, the soft seat was replaced and the valve was successfully leak rate tested. The opposite division counterpart, E1100F050B, successfully passed its as-found leak test this outage; however, it was also disassembled, inspected, and its soft seat replaced. With both actuators properly assembled, and with new soft seats installed, historical performance indicates that both valves should pass their as-found leak rate tests at the end of the next operating cycle.

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

**Initial Plant Conditions:**

Mode 5 (Refueling)  
Reactor Power 0 Percent  
Reactor Pressure 0 psig  
Reactor Temperature 90 Degrees Fahrenheit

**Description of the Event**

On November 9, 2001, leak rate testing of Pressure Isolation Valve (PIV)[ISV] E1100F050A, Division 1 Residual Heat Removal (RHR)/Low Pressure Coolant Injection (LPCI)[BO] System injection line inboard isolation check valve, was performed in accordance with Technical Specification (TS) Surveillance Requirement SR 3.4.5.1. The resultant leak rate was determined to be in excess of the specified leakage criteria of 10 gpm. While attempting to pressurize the inboard side of the valve, the test pressure could not be achieved and, therefore, leakage past the PIV was categorized as through seat leakage. During the testing, Division 1 systems were out of service for maintenance activities on that Division; therefore, there was no impact on the plant in the refueling configuration. The upstream RHR/LPCI System injection line outboard isolation motor-operated valve, E1150F015A, was successfully leak tested and met its specified leakage criteria.

This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by TS Limiting Condition for Operation (LCO) 3.4.5, RCS Pressure Isolation Valve Leakage. LCO 3.4.5 requires PIV leakage to be within the specified limits during plant operation in Modes 1 and 2.

**Cause of the Event**

Valve E1100F050A and its air-operated test actuator were disassembled to determine the cause of the excessive leakage. Examination revealed that the valve disk was being prevented from fully closing by the test actuator. Previous assembly of the actuator had resulted in the actuator spur gear and the actuator gear rack being misaligned by one tooth such that the actuator shaft could not complete its full rotation. This prevented the valve disk from fully closing under no/low flow and low differential pressure conditions. The leak testing method used on November 9, 2001 involved very low flow conditions. Valve E1100F050A had passed its leak test coming out of the previous refueling outage by employing another test method consisting of pressurizing the line beyond the check valve to the next isolation valve, E1150F015A, and then opening E1150F015A, simulating a break downstream. Valve E1100F050A fully seated during this previous test because of the resulting differential pressure exerted on the disk.

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The cause of the failure of the disk to fully close was determined to be improper reassembly of the actuator during the previous refueling outage because of inadequate craft skills and insufficient craft supervision during this period. The procedure used to reassemble the actuator following disassembly provided detailed instructions concerning the importance of proper fit, and required the match marks made during the removal of the actuator to be properly aligned upon its restoration. This was not properly performed during the previous refueling outage, resulting in the actuator spur gear and the actuator gear rack being misaligned by one tooth such that the actuator shaft could not complete its full rotation.

This valve had failed its leak rate test during the previous refueling outage because of degradation of the elastomer soft seat, which was believed to have been caused by hot water leakage through the soft seat. The apparent high temperature degradation of the soft seat observed during the previous refueling outage was not observed this cycle. Thermocouples were installed during the previous refueling outage and the valve was monitored during this cycle for high temperature conditions. No high temperature conditions were observed, and the soft seat was found to be in good condition.

The opposite division counterpart, E1100F050B, successfully passed its as-found leak rate test this outage; however, it was also disassembled, inspected, and its soft seat replaced. With both actuators properly assembled, and with new soft seats installed, historical performance indicates that both valves should pass their as-found leak rate tests at the end of the next operating cycle.

### Analysis of the Event

The purpose of the PIVs is to provide isolation at the interfaces between high pressure and low pressure systems. The affected check valve is one of two valves in series in the LPCI System injection line. The valve provides for isolation of the high pressure Reactor Coolant System from the low pressure LPCI System. The other valve in the injection line, a motor-operated valve, E1150F015A, was successfully tested and met its leakage criteria. Therefore, isolation of the high pressure to low pressure interface was maintained during power operation.

The PIV leak test performed this outage consisted of pressurizing the test volume between the check valve and a downstream closed manual isolation valve, E1100F060A/B, with three positive displacement pumps of approximately 10 gpm capacity each. Leakage by the disk exceeded the test pumps capacity and prevented the test volume from being pressurized sufficiently to seat the disk, thereby preventing demonstration that the valve could meet the leak rate acceptance criteria. Valve E1100F050A passed its leak test at the end of the previous refueling outage by employing a different test method, consisting of pressurizing the line beyond the check valve to the next isolation valve, E1150F015A, and then opening E1150F015A, simulating a line break downstream. The disk on valve E1100F050A fully seated during this previous test because of the resulting differential pressure exerted on the disk using this method. Thus, we believe that E1100F050A would have fully closed if a demand resulting from an actual intersystem loss of coolant accident (LOCA) would have occurred during the cycle. Additionally, it is believed that E1100F050A would have passed its leak

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rate test this outage had this more realistic leak test methodology been used. The soft seat which had been a problem during previous tests does not appear to have been a problem this cycle.

Regardless of the condition of E1100F050A, this event had no adverse impact on the health and safety of the public because the other PIV in the injection line, E1150F015A remained closed during Cycle 8 plant operation, and successfully passed its leak rate test this outage.

### Corrective Actions

Following the seventh refueling outage (RFO-7), Detroit Edison recognized that the skill of the craft in the specialty work activity of valve repair was limited. Therefore, preparations for the most recent, eighth refueling outage (RFO-8) included a detailed screening process for valve workers consisting of pre-hire written and practical tests. A 100% fidelity mockup of the E1100F050 valve was purchased from the vendor, Anchor Darling and was used for pre-outage training. Valve workers practiced on the mockup for 3 weeks prior to the outage under the scrutiny of Detroit Edison and contractor supervision, as well as the vendor representative, to validate the procedure and to hone their skills. Additionally, Detroit Edison and contractor supervision was increased this outage to ensure that valve repairs would be correctly performed. As a result of this pre-outage training and increased supervision, the problem associated with the previous reassembly of E1100F050A was recognized and corrected well within the window scheduled for this work.

The air-operated test actuator on valve E1100F050A was properly reassembled in the presence of the vendor, and a new soft seat was installed. The removed soft seat appeared to be in good condition. The post maintenance leak rate was within Technical Specification acceptance criteria.

Check valve E1100F050B, the Division 2 counterpart to E1100F050A, successfully passed its as-found leak rate test. However, due to past concerns, the soft seat on E1100F050B was also replaced following the as-found testing. The removed soft seat appeared to be in good condition. Fit-up gap measurements between the disk and the valve body were taken to determine whether the valve actuator and hinge mechanism were properly aligned. These measurements showed that the fit-up was good, and no further work was performed on the actuator.

With both valve actuators properly assembled, and with new soft seats installed, historical performance indicates that both valves should pass their as-found leak rate tests at the end of the next operating cycle.

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Temperature monitoring instrumentation installed on check valves E1100F050A and E1100F050B to monitor operating conditions for these valves during the previous cycle has been removed. Temperatures recorded during the previous cycle remained below 300 degrees Fahrenheit, well within the soft seat specifications.

Further corrective actions relating to this event to obviate the need for periodic soft seat replacement are being considered, and will be developed and implemented commensurate with established priorities and processes of the Fermi 2 corrective action program. This event is documented in the Fermi 2 corrective action program (CARD 01-20111).

## Additional Information

### A. Failed Components

Component: Division 1 Residual Heat Removal (RHR)/Low Pressure Coolant Injection (LPCI) System Inboard Isolation Testable Check Valve (E1100F050A)  
Description: 24 inch-Full Exercisable Air Operated Swing Check Valve  
Manufacturer: Anchor Darling  
Type: Model 2229-3

### B. Previous LERs On Similar Problems

LER 00-005, Pressure Isolation Valve Leak Test Failure

This LER documents the previous failure of the as-found leak rate test for E1100F050A which occurred during the seventh refueling outage. This failure was caused by the degradation of the soft seat.

LER 98-008, LER 98-008-01 Pressure Isolation Valve Leak Test Failure

This LER and its supplement document previous failures of the as-found leak rate tests for E1100F050A/B which occurred during the fifth and sixth refueling outages. In 1998, E1100F050B failed its as-found LLRT in the sixth refueling outage due to degradation of the soft seat and was reported in LER 98-008. During the investigation for this LER, it was discovered that E1100F050A had failed its as-found leak rate test during the fifth refueling outage in 1996, but had not been reported. LER 98-008-01 was submitted to document this failure. This failure was caused by the degradation of the soft seat which was exacerbated by a minor misalignment of the valve disc.