

William T. O'Connor, Jr.  
Vice President, Nuclear Generation

Fermi 2  
6400 North Dixie Hwy., Newport, Michigan 48166  
Tel: 734-586-5201 Fax: 734-586-4172

**DTE Energy**



10 CFR 50.73

August 10, 2005  
NRC-05-0055

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington D C 20555-0001

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

Subject: Licensee Event Report No. 2005-004, "Both Residual  
Heat Removal Low Pressure Coolant Injection Divisions  
Inoperable Due to Valve Failure"

Pursuant to 10 CFR 50.73(a)(2)(v)(D), Detroit Edison is hereby submitting the enclosed Licensee Event Report (LER) No. 2005-004. This LER documents a June 16, 2005 event when both divisions of the Residual Heat Removal (RHR) Low Pressure Coolant Injection (LPCI) system were declared inoperable due to a failure of E1150-F017B, the division 2 LPCI outboard injection valve. This normally open valve failed in the closed position, and would not re-open, affecting the LPCI function of RHR.

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,

*William T. O'Connor Jr.*

cc: D. P. Beaulieu  
E. R. Duncan  
NRC Resident Office  
Regional Administrator, Region III  
Supervisor, Electric Operators,  
Michigan Public Service Commission

*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 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 and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects@nrc.gov](mailto:infocollects@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NE0B-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an 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.

<b>1. FACILITY NAME</b> Fermi 2	<b>2. DOCKET NUMBER</b> 05000341	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
Both Residual Heat Removal Low Pressure Coolant Injection Divisions Inoperable Due to Valve Failure

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
06	16	2005	2005	004	00	08	10	2005	FACILITY NAME	DOCKET NUMBER
										05000
										05000

<b>9. OPERATING MODE</b>  1	<b>11. THIS REPORT SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§:</b> (Check all that apply)			
<b>10. POWER LEVEL</b>  100%	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER	
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in abstract below or in NRC Form 366A	

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME Robert J. Salmon – Principal Licensing Engineer	TELEPHONE NUMBER (Include Area Code) (734) 586-4273
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**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
X	BO	CNTR	G080	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR

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

On June 16, 2005 at 0923 EDT, with the plant in Mode 1 at 100% reactor power, both divisions of Residual Heat Removal (RHR) were declared inoperable for the Low Pressure Coolant Injection (LPCI) mode of operation due to a failure of E1150-F017B, the division 2 LPCI outboard injection valve. While performing the division 2 RHR pump and valve operability surveillance test following a planned Division 2 RHR system outage, E1150-F017B closed properly but failed to open during its required stroke time test. With this valve closed and unable to automatically open, LPCI injection into the RPV from both divisions of RHR would be prevented if the LPCI loop select logic selected the division 2 recirculation loop for injection, or if no recirculation loop break were detected. Therefore, this failure rendered both divisions of RHR inoperable for the LPCI function. Technical Specification limiting condition for operation (LCO) 3.5.1.J was entered, which requires immediate entry into LCO 3.0.3. The cause of the failure was subsequently identified as a high resistance condition on the open contactor auxiliary interlock contact associated with the closing contactor.

Valve E1150-F017B was returned to its normally open position which restored the full LPCI loop select function. At 1146 EDT, division 1 RHR was declared operable for the LPCI function, and LCO 3.5.1.J and LCO 3.0.3 were exited. The plant remained at 100% power throughout the event.

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

**Initial Plant Conditions:**

Mode 1  
Reactor Power 100 percent

**Description of the Event**

On June 16, 2005 at 0923 EDT, with the plant in Mode 1 at 100% reactor power, both divisions of Residual Heat Removal (RHR) [BO] were declared inoperable for the Low Pressure Coolant Injection (LPCI) mode of operation due to a failure of motor operated valve [ISV] E1150-F017B, the division 2 LPCI outboard injection valve. While performing the division 2 RHR pump and valve operability surveillance test following a planned division 2 RHR system outage, E1150-F017B closed properly but failed to open during its required stroke time test.

The Fermi 2 accident analysis takes credit for the proper operation of the LPCI loop select logic during a loss of coolant accident (LOCA). The loss of coolant event involves the postulation of a spectrum of piping breaks inside the primary containment varying in size, type and location. The most severe nuclear system effects and the greatest release of material to the primary containment result from a complete circumferential break of one of the two reactor recirculation loop [AD] pipe lines. This is the design basis accident (DBA). Since the LPCI system injects water into the reactor vessel through the discharge piping of one of the recirculation loops, a loop selection logic is provided to ensure that the water is injected into an unbroken loop. The loop selection logic compares pressure on the two recirculation loops. A broken loop will indicate a lower pressure than an unbroken loop. Where there is no difference in the pressures measured, the default injection is through the B recirculation loop. Where there is a difference, the loop selection directs the LPCI injection into the high pressure (unbroken) loop. The loop selection is effected through the operation of the RHR injection valves.

Valve E1150-F017B is a normally open RHR injection valve in series with the E1150-F015B valve. These valves control the RHR LPCI flow into reactor recirculation loop B. Had the E1150-F017B valve failed in the open position, the LPCI function would have been unaffected because the E1150-F015B valve was available to perform the loop selection task. However, because the valve failed in the closed position, flow would be inhibited into the B recirculation loop for scenarios where a break is detected in loop A or where no recirculation loop break is detected. Therefore, both divisions of RHR were declared inoperable for the LPCI function at 0923 EDT on June 16, 2005. Technical Specification 3.5.1, Action J, was invoked and limiting condition for operation (LCO) 3.0.3 was immediately entered. For scenarios where a break was detected in the B reactor recirculation loop, the LPCI function would be unaffected.

Trouble shooting was performed, and determined that the open contactor auxiliary interlock contact associated with the closing contactor had a high resistance that prevented the proper operation of the open contactor. The closing contactor was manually actuated and the auxiliary contact resistance returned to a normal value. Valve E1150-F017B was then stroked open electrically which returned it to its normally open position. With the valve in its normally open position, the RHR LPCI function is fully functional. At 1146 EDT, division 1 RHR was declared operable for the LPCI function, and LCO 3.5.1.J and LCO 3.0.3 were exited.

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The plant remained at 100% power throughout the event.

Required immediate notifications were made to the NRC in accordance with 10 CFR 50.72 on June 16, 2005 (EN 41780).

This report is being made pursuant to 10 CFR 50.73(a)(2)(v)(D) as a condition that could have prevented the fulfillment of a safety function of a system needed to mitigate the consequences of an accident.

**Cause of the Event**

The event was caused by a failure of valve E1150-F017B to re-open during a surveillance test due to a high resistance condition (8.2 Meg-ohm) on the open contactor auxiliary interlock contact associated with the closing contactor. This high resistance condition resulted in the inability of the circuit to energize the contactor open coil. When the closing contactor was manually actuated, the contact resistance returned to normal, and the valve was able to be opened normally from the main control room. Therefore, the most probable cause of the problem was debris in, or a mechanical binding of, the open contactor auxiliary interlock contact that cleared when the contactor was manually actuated.

The auxiliary contacts were replaced and the original contacts were sent to Detroit Edison's engineering service organization for inspection and evaluation, however, no abnormalities were identified.

**Analysis of the Event**

The safety function of the LPCI mode of the RHR system is to inject water from the suppression pool into the reactor vessel via injection lines connected to the reactor recirculation piping following a large break LOCA. Since a large break LOCA could occur in either of the two reactor recirculation loops, the LPCI loop select logic function is designed to select an undamaged reactor recirculation loop for LPCI injection. Reactor recirculation loop B is set up to be the default loop for injection. Therefore, LPCI would always inject via the B loop unless the LPCI loop select logic determines that the break is in recirculation loop B, then recirculation loop A is selected for LPCI injection. Under the conditions of this event, with the Loop B outboard injection valve closed and unable to open, had a LOCA occurred in recirculation loop A or elsewhere in the reactor connected piping systems in containment, the Loop B injection valve would not have opened, thus preventing automatic LPCI injection to the reactor vessel.

Inoperability of the E1150-F017B valve, for the approximately 2-1/2 hour period on June 16, 2005, rendered both divisions of LPCI inoperable for large break LOCA scenarios except those occurring in recirculation loop B. However during that period of time the core spray and standby feedwater systems were available to address large break LOCA events. The high pressure coolant injection, reactor core isolation cooling, and standby feedwater systems were also available to address any small break LOCA scenarios that could have occurred at that time. In the probabilistic safety assessment (PSA) analysis, the loss of the LPCI function is of very low safety significance. When coupled with its short duration, this event is considered to be of even lower safety significance. In summary, the effect of this event on plant risk has been evaluated, and it has been determined to

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be of very low safety significance. Therefore, the health and safety of the general public was not adversely affected by this event.

**Corrective Actions**

Valve E1100-F017B was returned to its normally open position which restored the full LPCI loop select function.

All of the auxiliary contacts associated with the close contactor were replaced on June 17, 2005.

The original auxiliary contacts were sent to Detroit Edison's engineering service organization for inspection and evaluation, however, no abnormalities were identified.

This event has been documented in the Fermi 2 corrective action program, CARD 05-23618. Additional evaluations are being performed that may result in additional corrective actions. Any further corrective actions identified as a result of these evaluations will be tracked and implemented commensurate with the established processes and priorities of the corrective action program.

**Additional Information**

**A. Failed Components:**

Component: Contactor / auxiliary contact block  
 Function: Valve motor control  
 Manufacturer: General Electric  
 Model Number: CR305  
 Failure Cause: high contact resistance

**B. Previous LERs on Similar Problems:**

There have been no LERs for similar events in the last three years.