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**DTE Energy**



10 CFR 50.73

December 20, 2010  
NRC-10-0077

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

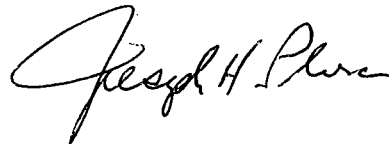
Subject: Licensee Event Report No. 2010-003, "Automatic Reactor  
Scram Due to Degraded Condenser Vacuum"

Pursuant to 10CFR50.73(a)(2)(iv)(A), Detroit Edison is hereby submitting the enclosed Licensee Event Report (LER) 2010-003. This LER documents the automatic reactor shutdown on October 24, 2010, as a result of degraded condenser vacuum.

No commitments are made in this LER.

Should you have any questions or require additional information, please contact Mr. Rodney W. Johnson, Manager Nuclear Licensing at (734) 586-5076.

Sincerely,



cc: NRC Project Manager  
NRC Resident Office  
Reactor Projects Chief, Branch 4, Region III  
Regional Administrator, Region III  
Supervisor, Electric Operators,  
Michigan Public Service Commission

JE22  
NRC

# 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: 80 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, and to the Desk Officer, Office of Information and Regulatory Affairs, NE08-10202 (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 3
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**4. TITLE** Automatic Reactor Scram Due to Degraded Condenser Vacuum

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
10	24	2010	2010	003	00	12	20	2010	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>  97	<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 checked="" 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 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	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	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
E	SH	EDR	F175	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:
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**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On October 24, 2010 shortly after 16:00 EDT with the reactor operating at approximately 97% power, condenser pressure began an upward trend. High condenser pressure alarmed at 16:38 EDT, plant operators responded to the conditions using plant procedures, and at approximately 16:42 EDT on October 24, 2010, a second condenser high pressure relay actuated resulting in a turbine trip. Turbine control valve fast closure then initiated a reactor scram. All control rods fully inserted except control rod 10-35 which initially stopped moving at position 42. Control rod 10-35 was manually inserted from position 38 to the full in position three minutes later. Extensive troubleshooting was performed on control rod 10-35 and it has been demonstrated to be capable to perform its scram function. Other safety related systems performed as expected. Reactor water level decreased to below Level 3 to a minimum of approximately 133 inches above the top of active fuel. Reactor water level was returned to normal and controlled in the normal band using the Control Rod Drive and Reactor Feedwater systems. Reactor pressure was controlled and decay heat removed through the main turbine bypass valves to the main condenser. The event was caused by a degraded condenser vacuum which was caused by the erosion of the No. 3 Steam Jet Air Ejector steam supply first stage nozzle which resulted in a loss of ejector capacity. Inspections were performed of all four Steam Jet Air Ejectors, and repairs were made to restore expected performance before resuming operation.

**LICENSEE EVENT REPORT (LER)**

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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 97 percent

**Description of the Event**

On October 24, 2010 shortly after 16:00 EDT with the reactor operating at approximately 97% power, condenser [SG] pressure began an upward trend. A high condenser pressure alarm was received at 16:38 EDT, and the operating crew entered the abnormal operating procedure for degrading condenser vacuum. Operators were bringing on an additional circulating water pump [KE] and considering a rapid power reduction to address the degrading vacuum condition when at approximately 16:42 EDT on October 24, 2010, a main turbine [TA] trip relay actuated causing a turbine control valve fast closure which initiated a reactor scram.

All control rods [JC] fully inserted except control rod 10-35 which initially stopped moving at position 42. That control rod was manually inserted three minutes later from position 38 to the full in position. The control rod inserted normally under reactor manual control. Reactor water level decreased as expected to below Level 3 to a minimum of approximately 133 inches above the top of active fuel. The post scram feedwater [SJ] logic actuated as designed to return reactor water level to the normal operating band. Plant procedures were adhered to in completing scram recovery actions. Decay heat was removed through the main turbine bypass valves to the main condenser.

All reactor parameters were maintained within analyzed limits. Turbine Bypass Valves opened to control reactor pressure. There was no significant increase in reactor pressure which remained below the Safety Relief Valve (SRV) setpoints, and the SRVs did not open. The reactor water level was controlled in the normal band using the Control Rod Drive (CRD) [AA] and reactor feedwater systems. As expected, the High Pressure Coolant Injection (HPCI) [BJ] and Reactor Core Isolation (RCIC) [BN] systems did not actuate since reactor water level was maintained above reactor water level 2. All isolations [JM] and actuations for reactor water level 3 occurred as expected. All Emergency Core Cooling Systems and Emergency Diesel Generators [EK] were operable, and no safety related equipment was out of service during the event. Plant cooldown rates were maintained within the prescribed limits at all times following the scram.

**Significant Safety Consequences and Implications**

This event posed no significant safety implications because the reactor protection and safety related systems functioned as designed following the automatic reactor trip. Important safety-related and non-safety related equipment performed as discussed in the description of the event, and plant response was as expected. All control rods fully inserted into the core except one which partially inserted. That control rod was not needed to keep the core in a shutdown condition. Operators promptly inserted that control rod in using the Reactor Manual Control System. There was no significant increase in reactor pressure, and the reactor core was adequately covered and cooled throughout the event. Therefore, the health and safety of the public were not affected by this event.

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This event is being reported under 10 CFR 50.73(a)(2)(iv)(A), as an event or condition that resulted in automatic actuation of the reactor protection system and a reactor scram. A 4-hour non-emergency notification was made to the NRC Operations Center at 18:09 EDT on October 24, 2010 (EN 46359) in accordance with 10 CFR 50.72(b)(2)(iv)(B) for an actuation of the reactor protection system.

**Cause of the Event**

The event was caused by a degraded condenser vacuum which is one of the input conditions to the turbine trip system. This signal resulted in a turbine control valve fast closure which initiated a reactor scram. The degraded condenser vacuum was caused by the erosion of the No. 3 Steam Jet Air Ejector (SJAE) [SH] steam supply first stage nozzle which resulted in a loss of ejector capacity. Inspections have determined that this condition is present in all of the SJAEs.

**Corrective Actions**

Inspections were performed of all four SJAEs, and repairs were made to restore expected performance before resuming operation.

Extensive troubleshooting has also been performed and part replacements have been made on the one control rod that did not fully insert. That problem has been attributed to a hydraulic lock due to blockage in the flowpath between the CRD mechanism and the scram discharge volume. Subsequent testing demonstrates that the blockage is no longer present and that the control rod is fully capable of scrambling as required.

This event is documented and evaluated in the Fermi 2 corrective action program. Additional actions will be tracked and implemented by the corrective action program.

**Additional Information**

- A. Failed Components:
  - Component: Steam Jet Air Ejector
  - Function: Air Ejector (Eductor)
  - Manufacturer: Foster Wheeler
  - Model Number: 261H
  - Failure Cause: Erosion
  
- B. Previous LERs on Similar Problems: There have been no previous events involving a loss of condenser vacuum due to Steam Jet Air Ejector problems.