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**DTE Energy**



10 CFR 50.73

October 10, 2003  
NRC-03-0079

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

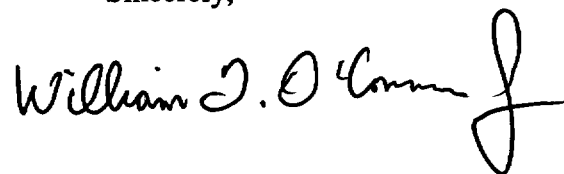
Subject: Licensee Event Report No. 2003-002, "Automatic Reactor Shutdown  
Due to Electric Grid Disturbance and Loss of Offsite Power"

Pursuant to 10 CFR 50.73(a)(2)(iv)(A), Detroit Edison is hereby submitting the enclosed Licensee Event Report (LER) No. 2003-002. This LER documents the automatic reactor shutdown on August 14, 2003 as a result of the regional electric grid disturbance and loss of offsite power.

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: H. K. Chernoff  
M. A. Ring  
M. V. Yudas, Jr.  
NRC Resident Office  
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 [bis1@nrc.gov](mailto:bis1@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.

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## 4. TITLE

Automatic Reactor Shutdown Due to Electric Grid Disturbance and Loss of Offsite Power

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	14	2003	2003	- 002 -	00	10	10	2003	FACILITY NAME	DOCKET NUMBER
										05000
9. OPERATING MODE		1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)							
10. POWER LEVEL		100	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)		X	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
			20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)	Specify in Abstract below or in
			20.2203(a)(2)(iv)			50.73(a)(2)(i)(A)			50.73(a)(2)(v)(D)	NRC Form 366A
			20.2203(a)(2)(v)			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 Sam Hassoun - Principal Licensing Engineer	TELEPHONE NUMBER (Include Area Code) (734) 586-4287
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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
X	EK	INVT	L015	Y					

## 14. SUPPLEMENTAL REPORT EXPECTED

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
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## 16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On August 14, 2003, at approximately 1610 hours, the Reactor Protection System initiated an automatic reactor scram from 100% power as a result of a Turbine Control Valve (TCV) fast closure. The TCV closure was caused by a turbine trip signal initiated by the main turbine-generator protective control system upon sensing electrical grid voltage fluctuations. A Loss of Offsite Power occurred as a result of the regional electric grid disturbance that affected several eastern and central states and portions of Canada and that led to blackout conditions in a large portion of the United States.

All safety related systems operated as expected in response to this event. All control rods fully inserted into the reactor core. Reactor Pressure Vessel (RPV) water level decreased and the Reactor Core Isolation Cooling system was manually started to restore RPV level; however, the High Pressure Coolant Injection system automatically started when RPV water level reached the setpoint for Level 2. Primary containment penetration isolations associated with RPV Level 3 and 2 setpoints occurred as expected. All Main Steam Isolation Valves closed and all four Emergency Diesel Generators started and energized their pertinent emergency loads. Nine Safety Relief Valves lifted and reseated.

Offsite power was restored on August 15, 2003, and the plant was restarted on August 18, 2003.

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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 the afternoon of August 14, 2003, a regional electric grid disturbance occurred in several eastern and central states and portions of Canada that led to blackout conditions in a large portion of the United States. Fermi 2 was operating at 100% power. At approximately 1605 hours, plant operators noted voltage fluctuations on the grid. At 1610 hours, continuing grid instability resulted in a turbine trip initiated by the main turbine-generator [TB] protective control system. A Turbine Control Valve (TCV) fast closure occurred and the Reactor Protection System (RPS) initiated a reactor scram as a result of the turbine trip. All control rods fully inserted into the reactor core.

At approximately 1611 hours, offsite power was lost and all Main Steam Isolation Valves [ISV] (MSIVs) closed due to the loss of RPS power caused by the Loss of Offsite Power (LOSP). All four Emergency Diesel Generators [DG] (EDGs) received an automatic start signal. Three EDGs (11, 12 and 14) automatically started from standby and loaded as expected. EDG 13 was out of service undergoing a monthly surveillance run; however, the EDG recovered from the test mode and lined up to its emergency mode of operation. An Unusual Event was declared at 1622 hours.

LOSP caused the loss of Feedwater flow and a decrease in Reactor Pressure Vessel (RPV) water level. The Reactor Core Isolation Cooling [BN] (RCIC) system was manually started to restore RPV level; however, the High Pressure Coolant Injection [BJ] (HPCI) system automatically started when RPV water level reached the setpoint for Level 2. HPCI and RCIC were used to supply water to the RPV until they both tripped on Level 8. RCIC was then manually restarted and used for level control. The operators noted a minimum RPV level of 112 inches above the Top of Active Fuel. Primary containment penetration isolations associated with RPV Level 3 and 2 setpoints occurred as expected.

Following MSIV closure, nine Safety Relief Valves [RV] (SRVs) lifted and reseated. Peak RPV pressure was about 1140 psig. Reactor pressure was then automatically controlled using the Low-Low Set mode of SRV A throughout the remainder of the event and recovery until the MSIVs were reopened and the main condenser was restored as a heat sink.

At about 1620 hours, the operators attempted to start Combustion Turbine Generator [TG] (CTG) 11, Unit 1, to power the balance of plant (BOP) buses; however, the CTG failed to start due to the trip of a battery-powered inverter which provides power to the igniters used to start the CTG. The CTG was locally started later that afternoon, around 1919 hours, using an alternate source of starting power provided by a portable generator. Restoration of electrical power continued in accordance with procedures. By 1332 hours on August 15, 2003, offsite power was fully restored and all four EDGs were shutdown. At 1348 hours, the Unusual Event was terminated.

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

This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in a valid actuation of RPS and other plant Engineered Safety Features.

### Cause of the Event

The cause of turbine trip and the loss of offsite power is the regional electric grid disturbance on August 14, 2003. The reactor scram occurred as a result of the turbine trip before offsite power was lost.

### Analysis of the Event

Section 15.2.2 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR) describes a Generator Load Rejection transient and Section 15.2.6 describes a LOSP transient. A comparison of this event's scenario to the transients described in the UFSAR indicates that, with minor differences discussed below, plant systems operated as designed in response to the turbine trip and LOSP.

The Generator Load Rejection transient analysis in the UFSAR assumes a failure of the turbine bypass valves to open upon closure of the TCVs. In this event, the bypass valves opened to provide a steam path to the main condenser; however, when offsite power was lost shortly after the turbine trip, the MSIVs closed and isolated steam flow to the condenser. Therefore, MSIV closure had similar effects on steam flow as the failure of the turbine bypass valves to open.

In the UFSAR LOSP scenario, the turbine trip occurs as a result of the LOSP. In this event, the turbine trip was caused by grid instability. LOSP occurred about a minute after the turbine trip; however, once loss of offsite power occurred, plant systems responded as expected to the transient.

The UFSAR LOSP scenario predicts all four EDGs to start in 3 seconds and their breakers to close in 13 seconds. In this event, EDG 13 was in a Limiting Condition of Operation (LCO) that was entered at 1215 hours on August 14 to perform a surveillance run. The EDG was operating parallel to the grid when the transient occurred; however, it recovered from the test mode and loaded as expected after about one minute. The other three EDGs started and loaded within the expected time. The minor delay in EDG 13 loading had no significant effect on other plant systems response to the transient.

CTG 11, Unit 1, is not a safety related system but is utilized as the alternate power source for a Station Blackout (SBO) event (loss of both offsite and on-site emergency power) and to support response from the Dedicated Shutdown Panel to an Appendix R fire (which assumes an SBO condition). The unit failed to start when operators attempted to manually start it from the main control room to supply BOP loads; however, it was locally started about three hours later. The delay in starting this unit had no significant effect on the plant response to the actual transient because the CTG was not required for the mitigation of this event.

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

**Corrective Actions**

The reactor was restarted on August 18, 2003, the turbine generator was synchronized to the grid on August 20, 2003 and the plant returned to full power on August 21, 2003.

This event is characterized as a transient that has been evaluated as part of the plant's design basis analysis. All plant safety related systems operated as expected in response to the event. The event and the minor differences between it and the analyzed transients in the UFSAR have been documented in the Fermi 2 corrective action program. Any further actions relating to this event will be developed and implemented commensurate with the established processes of the Fermi 2 corrective action program.

**Additional Information**

**A. Failed Components:**

Component: Combustion Turbine Generator 11, Unit 1, Inverter  
Function: Converts battery DC power to AC power for starting the CTG  
Manufacturer: La Marche Manufacturing Company  
Model Number: A31-2K-120V-A6  
Failure Cause: Pending investigation

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

There has been no previous total loss of offsite power events at Fermi 2.