Keith J. Polson
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DTE Energy

March 4, 2016
NRC-16-0019

10 CFR 50.73

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

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

Subject: Licensee Event Report (LER) No. 2016-001

Pursuant to 10 CFR 50.73 (a)(2)(v)(A), (a)(2)(v)(D), and (a)(2)(vii), DTE Electric Company (DTE) is submitting the enclosed LER No. 2016-001, Turbine Stop Valve Closure and Turbine Control Valve Fast Closure Reactor Protection System Functions Considered Inoperable Due to Open Turbine Bypass Valves.

No commitments are being made in this LER.

Should you have any questions or require additional information, please contact Mr. Alan I. Hassoun of my staff at (734) 586-4287.

Sincerely,

Keith J. Polson
Site Vice President

Enclosure

cc: NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 5, Region III
Regional Administrator, Region III
Michigan Public Service Commission
Regulated Energy Division (kindschl@michigan.gov)

Enclosure to
NRC-16-0019

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

LER 2016-001, Turbine Stop Valve Closure and Turbine Control Valve Fast Closure Reactor Protection System Functions Considered Inoperable Due to Open Turbine Bypass Valves

NRC FORM 366 (11-2015) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2018

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 FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@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 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.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

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4. TITLE

Turbine Stop Valve Closure and Turbine Control Valve Fast Closure Reactor Protection System Functions Considered Inoperable Due to Open Turbine Bypass Valves

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
									N/A	05000 N/A
01	06	2016	2016	- 001	- 00	03	04	2016	FACILITY NAME: N/A	DOCKET NUMBER: 05000 N/A

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☑ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
100	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☑ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☑ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Alan I. Hassoun – Manager, Nuclear Licensing	(734) 586-4287

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	IT	AMP	E275	Y					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☑ NO				

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

At 1514 EST on January 6, 2016, while operating at 100 percent Reactor Thermal Power (RTP), the East and West Turbine Bypass Valves (TBV) automatically opened as expected for 3 minutes and 32 seconds in response to the number one High Pressure Turbine Stop Valve (TSV) drifting from full open to 25 percent open due to an actuator malfunction. Per Technical Specification (TS) Bases 3.3.1.1, TBVs must remain shut while RTP is at or above 29.5 percent to consider all channels of the TSV closure and Turbine Control Valve (TCV) fast closure Reactor Protection System (RPS) functions operable.

Reactor Operators lowered RTP to 91.0 percent and at 1518 EST the TBV automatically closed and the TSV closure and TCV fast closure RPS functions were no longer considered inoperable. TS 3.3.1.1 requires that the TSV closure and TCV fast closure RPS functions be operable at or above 29.5 percent RTP. In this event, during the period of time while TBVs were open, reactor power was maintained above 91 percent and the RPS functions were confirmed to be enabled.

The actuator malfunction was caused by a failed amplifier circuit card in the TSV valve control module. The failed amplifier circuit card was replaced.

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Initial Plant Conditions:

Mode 1
Reactor Power 100 percent

There were no structures, components, or systems that were inoperable at the start of the event that contributed to the event.

Description of the Event

At 1514 EST on January 6, 2016, while operating at 100 percent Reactor Thermal Power (RTP) the East and West Turbine Bypass Valves (TBV) [[V]] automatically opened as expected for 3 minutes and 32 seconds in response to the number one High Pressure Turbine Stop Valve (TSV) drifting from full open to 25 percent open due to an actuator malfunction.

Per Technical Specification (TS) Bases 3.3.1.1, TBVs must remain shut while RTP is at or above 29.5 percent to consider all channels of the TSV closure and Turbine Control Valve (TCV) fast closure Reactor Protection System (RPS) [JD] functions operable.

Troubleshooting revealed that the valve actuator malfunction and TSV position drift was caused by a failed amplifier [[AMP]] circuit card in the TSV valve control module. Reactor Operators lowered RTP to 91.0 percent and at 1518 EST, the TBVs automatically closed and the TSV closure and TCV fast closure RPS functions were no longer considered inoperable.

TS 3.3.1.1 requires that the TSV closure and TCV fast closure RPS functions be operable at or above 29.5 percent RTP.

An event notification and follow up notification (No. 51755) were made to the NRC based on meeting the reporting criteria of 10 CFR 50.72(b)(3)(v)(A) and (D).

This event is reportable under 10 CFR 50.73(a)(2)(v), as an event or condition that could have prevented the fulfillment of the safety function of systems that are needed to: (A) shut down the reactor and maintain it in a safe shutdown condition and (D) mitigate the consequences of an accident.

In addition, since this event affected all channels of the TSV closure and TCV fast closure RPS functions, this event is reportable under 10 CFR 50.73(a)(2)(vii), as an event where a single cause or condition caused two independent channels to become inoperable in a single system designed to: (A) shut down the reactor and maintain it in a safe shutdown condition and (D) mitigate the consequences of an accident.

There were no radiological releases associated with this event.

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Significant Safety Consequences and Implications

There were no significant safety consequences associated with this event. At no time during this event was there a potential for endangering the public health and safety.

Per Chapter 15 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR), the TCV fast closure function is the primary scram signal for the generator load rejection event. For this event, the reactor scram reduces the amount of energy required to be absorbed and ensures that the Minimum Critical Power Ratio (MCPR) Safety Limit (SL) is not exceeded. TCV fast closure signals are initiated by the de-energization of the solenoid dump valve at each control valve. This function must be enabled at RTP greater than or equal to 29.5 percent.

Per Chapter 15 of the Fermi 2 UFSAR, the TSV closure function is the primary scram signal for the turbine trip event. For this event, the reactor scram reduces the amount of energy required to be absorbed and ensures that the MCPR SL is not exceeded. TSV closure signals are initiated from position switches located on each of the four TSVs. This function must be enabled at RTP greater than or equal to 29.5 percent.

Four Turbine First Stage Pressure (TFSP) transmitters [[PT]] are provided to initiate the automatic bypass of the TCV fast closure and TSV closure scrams, when the first stage pressure is below a preset fraction of rated pressure corresponding to approximately 29.5 percent of rated power.

The TBVs, if open at power levels above 29.5 percent RTP, may cause the TSV closure and TCV fast closure RPS functions to be inadvertently bypassed due to the diversion of steam flow away from the TFSP transmitters. In this event, during the period of time while TBVs were open, reactor power was maintained above 91 percent and the RPS functions were confirmed to be enabled. Therefore, there was no actual impact on safety.

Cause of the Event

The valve actuator malfunction and TSV position drift was caused by a failed power amplifier circuit card in the TSV valve control module. The power amplifier circuit card was providing an incorrect output signal while being supplied with the correct input signals. This caused the number one TSV to drift from full open to 25 percent open and as expected the TBVs automatically opened.

The failed circuit card was inspected and showed signs of overheating degradation (discoloration). A failure analysis is being performed on the circuit card to determine the cause of the failure.

Corrective Actions

The failed circuit card was replaced.

Additional corrective actions include: designating the failed circuit card as within the scope of the Circuit Card Program, identifying additional turbine control circuit cards to be included in the Circuit Card Program, checking the temperature of the equivalent circuit cards for all turbine valves, adding temperature monitoring of the circuit card to the Main Turbine Control system performance monitoring plan, and performing a failure analysis on the failed circuit card.

This event was documented and is being evaluated in the Fermi 2 Corrective Action Program.

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Additional Information

A. Failed Component: Power Amplifier Circuit Card
Function: Amplifier for Position Demand Signal to the High Pressure Turbine Stop Valve
Manufacturer: English Electric
Model Number: 650-30X-3157
Primary Failure Cause: Pending Failure Analysis Results

B. Previous Licensee Event Reports (LERs) or Similar Events:

There are no previous LERs for similar events. However, in February 2015 a malfunctioning input signal comparator circuit card in the number two TSV valve control module caused the TSV to close. The West TBV automatically opened and the TSV closure and TCV fast closure RPS functions were declared inoperable. A review of internal Operating Experience, including the 2015 event, did not reveal a component or failure mode that could have prevented the current event.