Donald K. Cobb
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DTE Energy

10 CFR 50.73

October 12, 2006
NRC-06-0071

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. 2006-004, "Emergency Diesel Generators Out Of Service Due To Undersized Control Power Transformers"

Pursuant to 10 CFR 50.73(a)(2)(i)(B), 50.73(a)(2)(v)(D), and 50.73 (a)(2)(vii), Detroit Edison is hereby submitting the enclosed Licensee Event Report (LER) No. 2006-004. This LER documents the discovery of undersized control power transformers that were determined to affect the operability of emergency diesel generator service water pumps and hence the emergency diesel generators.

No commitments are made in this LER.

Should you have any questions or require additional information, please contact Mr. Ronald W. Gaston of my staff at (734) 586-5197.

Sincerely,

Donald K. Cobb

cc: D. H. Jaffe
C. A. Lipa
NRC Resident Office
Regional Administrator, Region III
Supervisor, Electric Operators,
Michigan Public Service Commission

IE22

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: No. 3150-0104 Expires 6/30/2007

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, 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 reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Fermi 2	05000341	1 OF 4

4. TITLE

Emergency Diesel Generators Out Of Service Due To Undersized Control Power Transformers

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
08	17	2006	2006	- 004 -	00	10	12	2006	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

1

10. POWER LEVEL

100%

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

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☒ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☒ 50.73(a)(2)(v)(D)	Specify in abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Robert J. Salmon – Principal Licensing Engineer	(734) 586-4273

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

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

At 1900 hrs EDT on August 17, 2006, all four emergency diesel generators (EDGs) were declared to be inoperable as a result of undersized control power transformers for each of the emergency diesel generator service water (DGSW) pumps. The concern was that the DGSW pump contactors would not receive adequate voltage to ensure they would pickup under degraded voltage conditions. The event was caused by a design error that occurred in 1998 when a design change was prepared for the replacement of motor control center (MCC) positions that did not account for the effect of higher inrush current of replacement contactors on the control power transformer sizing. At 0042 hrs on August 18, 2006, compensatory measures were put in place to restore operability to both Division 2 EDGs. On August 20, 2006, a modification was completed on the Division 1 DGSW pump control circuits that replaced the control power transformers with properly sized control power transformers and used an interposing relay to remove remote cable resistance from the M-coil (contactor) circuits. On August 21, 2006, a similar modification was completed on the Division 2 DGSW pump circuits. During extent of condition reviews, the Division 1 EDG engine room supply fans were identified as potentially inoperable at degraded voltage conditions, and modifications were promptly performed to correct the situation. Other affected MCC positions did not involve technical specifications related equipment.

Initial Plant Conditions:

Mode	1
Reactor Power	100 percent

Description of the Event

At 1900 hrs EDT on August 17, 2006, all four emergency diesel generators [EK,DG] (EDGs) were declared to be inoperable as a result of undersized control power transformers for each of the emergency diesel generator service water [LB] (DGSW) Pumps. The concern was that the DGSW pump contactors would not receive adequate voltage to ensure they would pickup under degraded voltage conditions. A two hour action statement for technical specification limiting condition for operability (LCO) 3.8.1 was entered to restore both EDGs in one division to an operable status. At 2100 hours on August 17, 2006, the two hour time requirement expired and a LCO action statement was entered to place the plant in Mode 3 (Hot Shutdown) within the next 12 hours.

At 0042 hrs on August 18, 2006 compensatory measures were put in place to restore operability to both Division 2 EDGs. The compensatory measures included placing the local control switch for both Division 2 DGSW pumps in run. Placing the local control switches in run eliminated a portion of the control circuit wiring and ensured sufficient voltages would be available at the Division 2 contactors to ensure they would pickup following a loss of offsite power, load shed, and restoration of power to the applicable busses. With operability restored to Division 2 EDGs, the expiration time for the LCO was revised to 72 hours based on discovery of one or both EDGs in one division inoperable concurrent with the unavailability of station blackout combustion turbine generator (CTG) 11-1. According to the plant technical specifications, operability had to be restored to either CTG 11-1 or both Division 1 EDGs, within 72 hours or the plant was required to enter Mode 3 within the following 12 hours.

A modification was performed to the Division 1 DGSW pump control circuits that replaced the control power transformers with properly sized control power transformers and used an interposing relay to remove remote cable resistance from the M-coil (contactor) circuits. These modifications were completed on August 20, 2006, before the expiration of the 72-hour LCO. A similar modification was completed on the Division 2 DGSW pump circuits on August 21, 2006.

During extent of condition reviews performed as part of the corrective action process, four (4) Division 1 EDG engine room supply fans were identified as potentially inoperable at degraded voltage conditions. The control power transformers were promptly replaced to reduce voltage drop for those MCC positions. Other potentially affected equipment did not involve technical specifications related equipment.

This event is being reported under 10 CFR 50.73(a)(2)(v)(D) as an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident. It is also being reported under 10 CFR 50.73 (a)(2)(i)(B) as a condition prohibited by the technical specifications since conditions may have existed over the last three years during which the EDGs may have been

unable to perform their intended function that would have exceeded the technical specifications allowed out of service times. This event is also being reported under 10 CFR 50.73 (a)(2)(vii) as an event where a single cause or condition caused at least one independent train or channel to become inoperable in multiple systems or two independent trains or channels to become inoperable in a single system designed to (A) Shut down the reactor and maintain it in a safe shutdown condition; (B) Remove residual heat; (C) Control the release of radioactive material; or (D) Mitigate the consequences of an accident.

An 8-hour notification of this event was made to the NRC in accordance with 10 CFR 50.72(b)(3)(v) at 0100 hours ET on August 18, 2006 (EN 42783).

Cause of the Event

The event was caused by a design error that occurred in 1998 when a design change was prepared to replace safety related motor control center positions. At that time, the contactor type used in the new positions was changed, however, the original control power transformer size was maintained. The new contactors had higher inrush currents on initial energization which was not compensated for in the sizing of the control power transformers. The higher inrush current resulted in an additional voltage drop through the control power transformer which resulted in a reduction of the voltage available at the contactor terminals. When the effect of this additional voltage drop was factored into the original calculations, it was determined that the contactors may not have operated at the degraded voltage for which they were originally designed.

Analysis of the Event

The offsite electrical system at Fermi 2 is robust. The offsite circuits are considered operable at voltages above 112 kV on the 120 kV system which feeds Division 1 loads, and 328 kV on the 345 kV system which feeds the Division 2 loads. Operation below these voltage levels would require declaring the associated offsite circuit inoperable. A review of the operator logs over the last three years indicates that the offsite circuits have never been declared inoperable due to degraded voltages. Surveillance tests over the past three years have been successfully completed at the prevailing site voltage conditions without any apparent effect due to undersized control transformers. Division 1 power was lost recently during the energization of Transformer 2 (LER 2006-003), and the associated EDGs and related support equipment responded as expected and were capable of supplying required plant loads. During the loss of offsite power that occurred on August 14, 2003, all four EDGs responded as expected and supported the operation of plant shutdown loads. The plant accident analysis for the loss of cooling accident (LOCA) is performed using the assumption that there is a concurrent loss of offsite power; however, consistent with the licensing basis, equipment is evaluated for proper operation in response to a postulated LOCA signal under degraded offsite power voltage conditions.

An evaluation was performed using measured contactor pickup voltages and actual control circuit cable lengths. The offsite circuits were considered to be operating at the point where they are declared inoperable, i.e, 112 kV on the 120 kV system, and 328 kV on the 345 kV system. It was determined that had a LOCA occurred at those voltages, all EDGs and EDG support equipment would have had sufficient voltage to have operated properly, with the exception of the DGSW pump that supports EDG-11. As discussed above, that level of degraded voltage has not been present during the last three years. The voltage measured during the EDG surveillance tests performed over the last three years were also reviewed and were determined to be sufficient to have supported the

EDG support loads in the event of a loss of power condition. However, in the unlikely event of a LOCA concurrent with a degraded voltage, EDG-11 may not have been able to perform its intended function. Since two EDGs are needed per division to support post LOCA loads, and since there have been times over the last three years that EDG(s) in Division 2 have been out of service, the event is being reported as an event that could have resulted in a loss of safety function. However, the occurrence of severely degraded grid conditions that approach undervoltage operability limits and do not result in a total loss of offsite power, is considered unlikely. When coupled with a simultaneous LOCA condition, there is a very small likelihood that such a combination would exist. Nevertheless, the condition identified does not provide the intended margin for the electrical design. This event has been analyzed from a probabilistic risk analysis (PRA) perspective, and it was determined to be of very low safety significance.

Corrective Actions

The EDGs were conservatively declared to be inoperable, and compensatory actions were taken to ensure the operability of the Division 2 EDGs. A modification was performed to the Division 1 DGSW pump control circuits that replaced the control power transformers with properly sized control power transformers and used an interposing relay to remove remote cable resistance from the M-coil circuits. These modifications were completed on August 20, 2006 before the expiration of the 72-hour LCO. A similar modification was completed on the Division 2 DGSW pump circuits on August 21, 2006. An extent of condition evaluation was performed that indicated the Division 1 EDG engine supply fans may also be fed from MCC positions with undersized control power transformers. Those control power transformers have been replaced with properly sized transformers to reduce voltage drop for those MCC positions. Other control power transformer modifications have been completed, and similar modifications are being considered for additional equipment identified as having a reduced voltage margin.

This event has been documented in the Fermi 2 corrective action program, CARD 06-25253. Investigations are continuing and are expected to result in the identification of additional corrective actions to minimize future occurrences of this type. 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: None

B. Previous LERs on Similar Problems: None.