

Keith J. Polson
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10 CFR 50.73

October 20, 2016
NRC-16-0062

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 (LER) No. 2016-006

Pursuant to 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(ii)(B), and 10 CFR 50.73(a)(2)(v)(B), (C), and (D), DTE Electric Company (DTE) is submitting LER No. 2016-006, Inadequate Interpretation of Technical Specifications Related to Mechanical Draft Cooling Tower Fan Brake System Leads to Condition Prohibited by Technical Specifications, Loss of Safety Function, and Unanalyzed Condition.

No new commitments are being made in this LER.

Should you have any questions or require additional information, please contact Mr. Scott A. Maglio, Manager – Nuclear Licensing, at (734) 586-5076.

Sincerely,

Keith J. Polson
Site Vice President

Enclosure: Licensee Event Report No. 2016-006, Inadequate Interpretation of Technical Specifications Related to Mechanical Draft Cooling Tower Fan Brake System Leads to Condition Prohibited by Technical Specifications, Loss of Safety Function, and Unanalyzed Condition

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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-16-0062**

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

Licensee Event Report (LER) No. 2016-006, Inadequate Interpretation of Technical Specifications Related to Mechanical Draft Cooling Tower Fan Brake System Leads to Condition Prohibited by Technical Specifications, Loss of Safety Function, and Unanalyzed Condition



LICENSEE EVENT REPORT (LER)

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

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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 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.

1. FACILITY NAME

Fermi 2

2. DOCKET NUMBER

05000 341

3. PAGE

1 OF 11

4. TITLE

Inadequate Interpretation of Technical Specifications Related to Mechanical Draft Cooling Tower Fan Brake System Leads to Condition Prohibited by Technical Specifications, Loss of Safety Function, and Unanalyzed Condition

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	25	2016	2016	006	00	10	20	2016	N/A	05000
									FACILITY NAME	DOCKET NUMBER
									N/A	05000

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

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT Fermi 2 / Scott A. Maglio – Manager, Nuclear Licensing	TELEPHONE NUMBER (Include Area Code) (734) 586-5076
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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
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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 1629 EDT on August 25, 2016, it was determined that an inadequate interpretation of Fermi 2 Technical Specification (TS) 3.7.2 was being utilized. For an Ultimate Heat Sink (UHS) divisional reservoir to be operable, two Mechanical Draft Cooling Tower (MDCT) fans in that division are required to be operable. The MDCT fans have a brake system to prevent fan overspeed during a tornado. Fermi 2 procedures had directed personnel to declare the MDCT fans and UHS reservoir inoperable due to nonfunctionality of the brake system only if a tornado watch or warning was in effect for the area near Fermi 2. The correct interpretation of TS 3.7.2 would be to declare the MDCT fans and UHS reservoir inoperable any time the brake system was nonfunctional. Following discovery of the inadequate interpretation of TS, a review of the brake system for the past three years was performed. The review identified 15 occurrences where the brake system was nonfunctional and should have resulted in entry to TS 3.7.2. These 15 occurrences resulted in operations or conditions prohibited by TS since TS Required Actions were not completed within their Completion Times. In addition, 5 of the 15 were also instances where the plant configuration was such that it could have prevented the fulfillment of the safety function of structures or systems. Finally, 4 of the 15 were instances where the plant was in an unanalyzed condition. There were no radiological releases associated with this event. There was no credible threat of a tornado during any of the 15 occurrences. The safety significance was determined to be very low. The cause of the event was an incorrect proceduralized TS interpretation. Corrective actions were taken to revise the procedure.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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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 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.

1. FACILITY NAME Fermi 2	2. DOCKET NUMBER 05000- 341	3. LER NUMBER		
		YEAR 2016	SEQUENTIAL NUMBER 006	REV NO. 00

NARRATIVE

INITIAL PLANT CONDITIONS

Mode – 1
Reactor Power – 53 percent

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

DESCRIPTION OF THE EVENT

At 1629 EDT on August 25, 2016, while operating in Mode 1 at 53 percent power, it was determined that DTE Electric Company (DTE) had been utilizing an inadequate interpretation of Technical Specifications (TS) pertaining to the Mechanical Draft Cooling Tower (MDCT) [[CTW]] fan [[FAN]] brake [[BRK]] system. TS 3.7.2 requires the Ultimate Heat Sink (UHS) [[BS]] reservoir to be operable in Modes 1, 2 and 3. The UHS operability requirements in Modes 4 and 5 are determined by the systems the UHS supports. The UHS reservoir is divided into two one-half capacity reservoirs, corresponding to Division 1 and Division 2. Each reservoir is the cooling source for that division's service water subsystems, including the service water for the Emergency Diesel Generators (EDGs) [[DG]]. A two-cell MDCT is located above each of the one-half capacity reservoirs. Each cell is equipped with a MDCT fan. Two MDCT fans above each one-half capacity reservoir are required for it to be considered operable. The "A" and "C" MDCT fans are in Division 1 and the "B" and "D" fans are in Division 2. The MDCT fans have a brake system to prevent overspeed from a design basis tornado as described in the Updated Final Safety Analysis Report (UFSAR) Section 9.2.5.2.2. Thus the fan brakes are a design feature of the fans and their functionality impacts the operability of the MDCT fans and therefore the UHS. Contrary to this, a DTE procedure directed personnel to declare the MDCT fan and associated reservoir inoperable per TS 3.7.2 due to nonfunctionality of the brake system only if a tornado watch or tornado warning had been issued for the area surrounding Fermi 2. This inadequate interpretation of TS was discovered during an NRC Component Design Basis Inspection (CDBI). At the time of discovery on August 25, 2016, all of the MDCT fan brakes were functional and the associated fans were operable.

The fan brake system for each of the four trains is actuated by nitrogen which is supplied by three nitrogen stages (bottles [[GBM]]) arranged in series. The nitrogen source is the main bottle which supplies the other two bottles through pressure reducing valves [[V]]. Each of the three nitrogen bottles is rated at a different pressure and has procedurally specified lower and upper limits. The nitrogen pressures of all twelve bottles are recorded daily as part of operator rounds. If any of the nitrogen bottles is outside of its specified limits, the fan brake system is considered nonfunctional. The main nitrogen bottle for each train is replaced on an as-needed basis when it is out-of-specification or a trend indicates that it is approaching its lower limit. The replacement of a nitrogen bottle is performed per plant procedures.

With a correct understanding of the applicable TS, a past operability review was performed for the three years prior to the date of discovery. This review identified multiple occurrences where the MDCT fan brakes were nonfunctional. General descriptions applicable to one or more of the occurrences are provided below and then followed by the details of the specific occurrences.

For each occurrence, the associated MDCT fan and reservoir was considered operable at the time and no entry to TS 3.7.2 was made based on the fan brake nonfunctionality. Limiting Condition for Operation (LCO) 3.7.2 Condition B Required Action B.1 requires restoration of the reservoir within 72 hours. LCO 3.7.2 Condition D Required Actions D.1 and D.2 require the reactor to be in Mode 3 in 12 hours and Mode 4 in 36 hours if the Required Action and associated Completion Time of Condition B are not met.



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1. FACILITY NAME Fermi 2	2. DOCKET NUMBER 05000- 341	3. LER NUMBER		
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NARRATIVE

Additionally, Note 1 of LCO 3.7.2 requires entering applicable Conditions and Required Actions of LCO 3.8.1 for EDGs. In the occurrences in Modes 1, 2 or 3, both EDGs in the division associated with the affected reservoir should have been declared inoperable as a result of that division's reservoir being inoperable. LCO 3.8.1 Condition B for both EDGs in one division inoperable should have been entered. LCO 3.8.1 Condition B Required Action B.1 requires that surveillance requirement (SR) 3.8.1.1 be performed for operable offsite power circuit(s) within one hour and once per 8 hours thereafter. SR 3.8.1.1 verifies correct breaker alignment and indicated power availability for each offsite circuit. Note that although SR 3.8.1.1 was not performed at the required time, offsite power was available during every occurrence and therefore the SR would have been met. LCO 3.8.1 Condition B Required Action B.2 states that required feature(s), supported by the inoperable EDGs, must be declared inoperable within 4 hours when the redundant required feature(s) are inoperable. LCO 3.8.1 Condition B Required Action B.4 requires restoration of one EDG in the division to operable status within 72 hours, the same as the restoration time for the reservoir in LCO 3.7.2. LCO 3.8.1 Condition B also has a 24 hour Completion Time to either determine operable EDGs are not inoperable due to common cause failure (Required Action B.3.1) or perform SR 3.8.1.2 for operable EDGs (Required Action B.3.2). In these occurrences, the EDGs were inoperable due to the inoperability of the UHS rather than a common cause failure of the EDGs. This means that although neither Required Action B.3.1 nor Required Action B.3.2 was performed at the time they were applicable, Required Action B.3.1 would have been met in each case. Finally, LCO 3.8.1 Condition G requires the reactor to be in Mode 3 in 12 hours if the Required Action and associated Completion Time of Condition B are not met.

In some of the occurrences, both divisions of the UHS were impacted at the same time or work on EDGs was being performed in one division while the opposite division of the UHS was impacted by the fan brake nonfunctionality. This subset of occurrences would require entry to LCO 3.8.1 Condition C for one or both EDGs in both divisions inoperable. LCO Condition C Required Action C.1 requires that both EDGs in one division be restored to operable status within 2 hours. In addition, LCO 3.8.1 Condition G requires the reactor to be in Mode 3 in 12 hours if the Required Action and associated Completion Time of Condition C are not met.

Some of the occurrences were while the plant was in Modes 4 or 5. As described above, UHS operability requirements in Modes 4 and 5 are determined by the systems the UHS supports. Although the note in LCO 3.7.2 refers to LCO 3.8.1 for EDGs made inoperable by UHS, LCO 3.8.2 is the applicable LCO for EDGs in Modes 4 and 5. LCO 3.8.2 requires two EDGs to be capable of supplying one division of alternating current (AC) power. LCO 3.8.2 Condition B for one or both required EDGs inoperable has the following Required Actions: B.1 to suspend core alterations, B.2 to suspend movement of recently irradiated fuel assemblies in secondary containment, B.3 to initiate action to suspend operations with the potential to drain the reactor vessel, and B.4 to initiate action to restore required EDGs to operable status. All four of these Required Actions have a Completion Time of "Immediately."

The occurrences are as follows:

- 1) On October 30, 2013, the main nitrogen bottle for the "B" MDCT fan brake was identified as in its required range, but nearing its lower limit. A work order was generated to replace the bottle before it exceeded its limit. At no time was the bottle found out-of-specification other than during this pre-planned maintenance. From 1447 EDT on October 31 to 0214 EDT on November 1 (i.e. approximately 11.5 hours), while operating in Mode 1 between 95% and 100% power, the "B" MDCT fan brake was nonfunctional due to the replacement of the nitrogen bottle. During this time period, the "B" MDCT fan was inoperable and therefore the Division 2 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1 and B.2 were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.



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1. FACILITY NAME Fermi 2	2. DOCKET NUMBER 05000- 341	3. LER NUMBER		
		YEAR 2016	SEQUENTIAL NUMBER 006	REV NO. 00

NARRATIVE

2) At 0901 EST on January 24, 2014, while operating in Mode 1 at 85% power, the main nitrogen bottle for the "A" MDCT fan brake was found out-of-specification low. Subsequently, one of the other nitrogen bottles for the "A" MDCT fan brake was also found out-of-specification low. A work order was generated to replace the main nitrogen bottle. From 0901 EST on January 24 until the bottle replacement was completed at 1537 EST on January 31 (i.e. approximately 7 days), the "A" MDCT fan brake was nonfunctional due to the nitrogen bottle being out-of-specification and then being replaced. During this time period, the "A" MDCT fan was inoperable and therefore the Division 1 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1, B.2, B.3.1 (or B.3.2), B.4, and G and TS LCO 3.7.2 Required Actions B.1, D.1, and D.2 were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS. In addition, the "A" MDCT fan brake nonfunctionality coincided with approximately 46 hours where various Division 2 safety-related systems, structures, or components (SSCs), including Division 2 EDGs, were inoperable. Since both EDGs in one division are required to provide AC power, LCO 3.8.1 Condition C should have been entered. The Division 2 EDGs were not always restored to operable status within the allowable Completion Time of LCO 3.8.1 Condition C Required Action C.1. Other Division 2 SSCs inoperable during this time included Residual Heat Removal (RHR) [[BO]] and Standby Gas Treatment System (SGTS) [[BH]] which, when considering the "A" MDCT fan brake nonfunctionality, resulted in exceeding the Completion Times for Required Actions in LCO 3.5.1 Condition K (for RHR) and LCO 3.6.4.3 Condition D (for SGTS). These missed Completion Times are also reportable under 10 CFR 50.73(a)(2)(i)(B). The period of overlap described above also resulted in an unanalyzed condition because the plant configuration when equipment in Division 2, such as EDGs, was inoperable while the Division 1 UHS and EDGs were inoperable would not support safe shutdown capability in the event of a tornado. This is reportable under 10 CFR 50.73(a)(2)(ii)(B) as an event or condition that results in the plant being in an unanalyzed condition that significantly degraded plant safety. It was previously reported to the NRC under 10 CFR 50.72(b)(3)(ii)(B) on August 31, 2016 (Event Notification 52214). Note that the start time of this occurrence (0901 EST) and the amount of time overlap with Division 2 SSCs inoperable (46 hours) indicated above are both slightly different than the times indicated in Event Notification 52214 (0915 EST and approximately 30 hours) due to the subsequent review of data, but there is no impact on applicable reporting criteria due to these differences. The times when both RHR divisions were inoperable or one or more EDGs in both divisions were inoperable is also reportable under 10 CFR 50.73(a)(2)(v)(B) and (D) as an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat and mitigate the consequences of an accident, respectively. The times when both SGTS subsystems were inoperable is also reportable under 10 CFR 50.73(a)(2)(v)(C) as an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to control the release of radioactive material. These losses of safety function were not reported as an 8-hour Event Notification under 10 CFR 50.72(b)(3)(v)(B), (C), or (D) since the described condition no longer existed at the time of discovery in August 2016.

3) On February 12, 2014, the main nitrogen bottle for the "B" MDCT fan brake was identified as in its required range, but nearing its lower limit. A work order was generated to replace the "B" bottle before it exceeded its limit. Prior to the performance of this work order, at 1152 EST on February 14, 2014, while in Mode 5 at 0% power and at a reactor pressure vessel temperature of approximately 95 degrees Fahrenheit (F), the nitrogen bottles for the "A" MDCT fan brake were found out-of-specification low. A work order was generated to replace the "A" main nitrogen bottle. From 1152 EST on February 14 until the bottle replacement was completed at 1514 EST on February 24 (i.e. approximately 10 days), the "A" MDCT fan brake was nonfunctional due to its nitrogen bottle being out-of-specification and then being replaced. From 1118 EST to 1529 EST on February 20 (i.e. approximately 4 hours), the "B" MDCT fan brake was nonfunctional due to the replacement of its nitrogen bottle. At no time was the "B" bottle found out-of-specification other than during this pre-planned maintenance. All of this occurred during a refueling outage which had begun on February 10 and continued into March (i.e. beyond the time when the "A" and "B" MDCT fan brakes were functional again). During the 10 day time period discussed above, the "A" MDCT fan was inoperable and therefore the Division 1 UHS reservoir was inoperable as well.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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		YEAR 2016	SEQUENTIAL NUMBER 006	REV NO. 00

NARRATIVE

During the 4 hour time period discussed above when both the "A" and "B" fan brakes were nonfunctional, both the "A" and "B" MDCT fans were inoperable and therefore both divisions of the UHS reservoir were inoperable. No entry to TS LCO 3.7.2 was made related to this and TS LCO 3.7.2 Required Actions B.1, D.1, and D.2 were not completed within their Completion Times. In Mode 5 (i.e. the refueling outage), TS LCO 3.8.2 only requires a single division of EDGs to be operable. During the time period when only the "A" MDCT fan was inoperable due to the nonfunctionality of its brake, the Division 2 UHS reservoir and EDGs were the ones credited to be operable at that time. This configuration was acceptable per the TS. However, during the 4 hour time period when the Division 2 UHS and EDGs were made inoperable by the "B" MDCT fan brake nonfunctionality, entry to TS LCO 3.8.2 Condition B would have been required. Required Actions B.1 through B.4 were not performed within their Completion Times. The failure to complete Required Actions within their Completion Times is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS. The coincident nonfunctionality of the "A" and "B" MDCT fan brakes, in addition to any other SSCs out-of-service during the refueling outage, resulted in an unanalyzed condition because the plant configuration when both divisions of UHS and EDGs were inoperable would not support safe shutdown capability in the event of a tornado. This is reportable under 10 CFR 50.73(a)(2)(ii)(B) as an event or condition that results in the plant being in an unanalyzed condition that significantly degraded plant safety. It was previously reported to the NRC under 10 CFR 50.72(b)(3)(ii)(B) on August 31, 2016 (Event Notification 52214). Note that the start time of this occurrence indicated above (1152 EST) is slightly earlier than the time indicated in Event Notification 52214 (1747 EST) due to the subsequent review of data, but there is no impact on applicable reporting criteria due to this difference. The times when both divisions of UHS were inoperable or one or more EDGs in both divisions were inoperable is also reportable under 10 CFR 50.73(a)(2)(v)(B) and (D) as an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat and mitigate the consequences of an accident, respectively. This was not reported as an 8-hour Event Notification under 10 CFR 50.72(b)(3)(v)(B) or (D) since the described condition no longer existed at the time of discovery in August 2016.

4) On August 6, 2014, the main nitrogen bottle for the "B" MDCT fan brake was identified as in its required range, but nearing its lower limit. A work order was generated to replace the bottle before it exceeded its limit. At no time was the bottle found out-of-specification other than during this pre-planned maintenance. From 0800 EDT to 1435 EDT on August 8 (i.e. approximately 6.5 hours), while operating in Mode 1 at 100% power, the "B" MDCT fan brake was nonfunctional due to the replacement of the nitrogen bottle. During this time period, the "B" MDCT fan was inoperable and therefore the Division 2 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1 and B.2 were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.

5) At 1432 EST on December 11, 2014, while operating in Mode 1 at 58% power, the main nitrogen bottle for the "A" MDCT fan brake was found out-of-specification low. A work order was generated to replace the bottle. From 1432 EST on December 11 until the bottle replacement was completed at 1319 EST on December 18 (i.e. approximately 7 days), the "A" MDCT fan brake was nonfunctional due to the nitrogen bottle being out-of-specification and then being replaced. During this time period, the "A" MDCT fan was inoperable and therefore the Division 1 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1, B.2, B.3.1 (or B.3.2), B.4, and G and TS LCO 3.7.2 Required Actions B.1, D.1, and D.2 were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.

6) At 1106 EST on January 6, 2015, while operating in Mode 1 at 100% power, the main nitrogen bottle for the "B" MDCT fan brake was found out-of-specification low. A work order was generated to replace the bottle. From 1106 EST on January 6 until the bottle replacement was completed at 1441 EST on January 9 (i.e. approximately 76 hours), the "B" MDCT fan brake was nonfunctional due to the nitrogen bottle being out-of-specification and then being replaced. During



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this time period, the "B" MDCT fan was inoperable and therefore the Division 2 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1, B.2, B.3.1 (or B.3.2), and B.4 and TS LCO 3.7.2 Required Action B.1 were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS. Since the bottle replacement was required after the bottle was already out-of-specification, this was not considered pre-planned maintenance. The Division 2 UHS reservoir is the heat sink for the Division 2 Emergency Equipment Service Water (EESW) / Emergency Equipment Cooling Water (EECW) [[CC]] subsystems. Division 2 EESW/EECW is necessary to support the operability of the High Pressure Coolant Injection (HPCI) [[BJ]] system, which is a single train system. During the approximately 76 hour time-frame discussed above, the inoperability of the UHS could have prevented the HPCI system from fulfilling its safety function to mitigate the consequences of an accident. Therefore, this occurrence is also reportable 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. This was not reported as an 8-hour Event Notification under 10 CFR 50.72(b)(3)(v)(D) since the described condition no longer existed at the time of discovery in August 2016.

7) At 0852 EST on January 23, 2015, while operating in Mode 1 at 100% power, the main nitrogen bottle for the "A" MDCT fan brake was found out-of-specification low. A work order was generated to replace the bottle. From 0852 EST until the bottle replacement was completed at 1632 EST on January 23 (i.e. approximately 7.5 hours), the "A" MDCT fan brake was nonfunctional due to the nitrogen bottle being out-of-specification and then being replaced. During this time period, the "A" MDCT fan was inoperable and therefore the Division 1 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1 and B.2 were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.

8) At 1000 EDT on March 23, 2015, while in Mode 4 at 0% power and at a reactor pressure vessel temperature of approximately 100 degrees F, the main nitrogen bottle for the "A" MDCT fan brake was found out-of-specification low. Subsequently, the other nitrogen bottles for the "A" MDCT fan brake were also found out-of-specification low. A work order was generated to replace the main nitrogen bottle. From 1000 EDT on March 23 until the bottle replacement was completed at 1447 EDT on April 9 (i.e. approximately 17 days), the "A" MDCT fan brake was nonfunctional due to the nitrogen bottle being out-of-specification and then being replaced. This occurred during a forced outage which had begun on March 21 and was completed on April 3 when Mode 4 was exited. By the time the "A" MDCT fan brake was functional again, the plant had returned to Mode 1 at 100% power. During the 17 day time period, the "A" MDCT fan was inoperable and therefore the Division 1 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 was made related to this and TS LCO 3.7.2 Required Actions B.1, D.1, and D.2 were not completed within their Completion Times. In Mode 4 (i.e. the forced outage), TS LCO 3.8.2 only requires a single division of EDGs to be operable. Until March 27, the Division 2 UHS and EDGs were the ones credited to be operable. This configuration was acceptable per the TS. However starting on March 27 at 2320 EDT, the Division 1 UHS reservoir and EDGs were the ones credited to be operable at that time. Since the Division 1 UHS and EDGs were made inoperable by the "A" MDCT fan brake nonfunctionality, entry to TS LCO 3.8.2 Condition B would have been required. Required Actions B.1 through B.3 were not applicable in Mode 4; however, Required Action B.4 was not performed within its Completion Time. Mode 4 was exited on April 3 with the Division 1 UHS and EDGs still inoperable due to the "A" MDCT fan brake nonfunctionality; this represented an unauthorized mode change per TS SR 3.0.4. After exiting Mode 4, the requirement for all EDGs to be operable per TS LCO 3.8.1 would have resumed. Although the Division 1 EDGs were still inoperable, no entry to TS LCO 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1, B.2, B.3.1 (or B.3.2), B.4, and G were not completed within their Completion Times. The failure to complete Required Actions within their Completion Times and the unauthorized mode change are reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS. In addition, the "A" MDCT fan brake nonfunctionality coincided with approximately 29 hours during the forced outage and ensuing startup where various Division 2 SSCs, including Division 2 EDGs and EESW/EECW, were inoperable. This resulted in an unanalyzed condition



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because the plant configuration when equipment in Division 2, such as EDGs or EESW/EECW, was inoperable while the Division 1 UHS and EDGs were inoperable would not support safe shutdown capability in the event of a tornado. This is reportable under 10 CFR 50.73(a)(2)(ii)(B) as an event or condition that results in the plant being in an unanalyzed condition that significantly degraded plant safety. It was previously reported to the NRC under 10 CFR 50.72(b)(3)(ii)(B) on August 31, 2016 (Event Notification 52214). The times when both EESW/EECW subsystems were inoperable or one or more EDGs in both divisions were inoperable is also reportable under 10 CFR 50.73(a)(2)(v)(B) and (D) as an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat and mitigate the consequences of an accident, respectively. This was not reported as an 8-hour Event Notification under 10 CFR 50.72(b)(3)(v)(B) or (D) since the described condition no longer existed at the time of discovery in August 2016.

9) On July 4, 2015, the main nitrogen bottle for the "B" MDCT fan brake was identified as in its required range, but nearing its lower limit. A work order was generated to replace the bottle before it exceeded its limit. At no time was the bottle found out-of-specification other than during this pre-planned maintenance. From 0810 EDT to 1522 EDT on July 9 (i.e. approximately 7 hours), while operating in Mode 1 at 100% power, the "B" MDCT fan brake was nonfunctional due to the replacement of the nitrogen bottle. During this time period, the "B" MDCT fan was inoperable and therefore the Division 2 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1 and B.2 were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.

10) On December 5, 2015, the main nitrogen bottle for the "B" MDCT fan brake was identified as in its required range, but nearing its lower limit. A work order was generated to replace the bottle before it exceeded its limit. At no time was the bottle found out-of-specification other than during this pre-planned maintenance. From 1126 EST to 1717 EST on December 7 (i.e. approximately 6 hours), while operating in Mode 1 at 100% power, the "B" MDCT fan brake was nonfunctional due to the replacement of the nitrogen bottle. During this time period, the "B" MDCT fan was inoperable and therefore the Division 2 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1 and B.2 were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.

11) On January 22, 2016, the main nitrogen bottle for the "A" MDCT fan brake was identified as in its required range, but nearing its lower limit. A work order was generated to replace the bottle before it exceeded its limit. At no time was the bottle found out-of-specification other than during this pre-planned maintenance. From 0845 EST to 1109 EST on January 23 (i.e. approximately 2.5 hours), while operating in Mode 1 at 100% power, the "A" MDCT fan brake was nonfunctional due to the replacement of the nitrogen bottle. During this time period, the "A" MDCT fan was inoperable and therefore the Division 1 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Action B.1 was not completed within its Completion Time and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.

12) On February 19, 2016, the main nitrogen bottle for the "A" MDCT fan brake was identified as in its required range, but nearing its lower limit. A work order was generated to replace the bottle before it exceeded its limit. At no time was the bottle found out-of-specification other than during this pre-planned maintenance. From 0801 EST to 1407 EST on February 29 (i.e. approximately 6 hours), while operating in Mode 1 at approximately 60% power, the "A" MDCT fan brake was nonfunctional due to the replacement of the nitrogen bottle. During this time period, the "A" MDCT fan was inoperable and therefore the Division 1 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1 and B.2 were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.



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13) On March 17, 2016, the main nitrogen bottles for the "A" and "C" MDCT fan brakes were both identified as in their required ranges, but nearing their lower limits. Work orders were generated to replace the bottles before they exceeded their limits. At no time were the bottles found out-of-specification other than during this pre-planned maintenance. From 0855 EDT to 1738 EDT on April 6 (approximately 8.5 hours), while operating in Mode 1 at 100% power, the "A" MDCT fan brake was nonfunctional due to the replacement of the nitrogen bottle. From 0856 EDT on April 6 to 1641 EDT on April 7 (i.e. approximately 32 hours), while operating in Mode 1 at 100% power, the "C" MDCT fan brake was nonfunctional due to the replacement of the nitrogen bottle. During this cumulative time period of approximately 32 hours, one or both of the "A" and "C" MDCT fans were inoperable and therefore the Division 1 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1, B.2, and B.3.1 (or B.3.2) were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS. In addition, the "A" and "C" MDCT fan brakes nonfunctionality coincided with a test of a Division 2 EDG. The Division 2 EDG test resulted in EDG 14 being inoperable at 1347 EDT on April 6 for a period of 22 seconds. Both EDGs in one division are required to provide AC power. During the 22 second time-frame on April 6, one or more EDGs in both divisions were inoperable. EDG 14 was restored to operable status within the allowable Completion Time of LCO 3.8.1 Condition C Required Action C.1. However, this resulted in an unanalyzed condition because the plant configuration when Division 2 EDG 14 was inoperable while the Division 1 UHS and EDGs were inoperable would not support safe shutdown capability in the event of a tornado. This is reportable under 10 CFR 50.73(a)(2)(ii)(B) as an event or condition that results in the plant being in an unanalyzed condition that significantly degrades plant safety. It was previously reported to the NRC under 10 CFR 50.72(b)(3)(ii)(B) on August 25, 2016 (Event Notification 52202). The occurrence of one or more EDGs in both divisions being inoperable is also reportable under 10 CFR 50.73(a)(2)(v)(B) and (D) as an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat and mitigate the consequences of an accident, respectively. This was not reported as an 8-hour Event Notification under 10 CFR 50.72(b)(3)(v)(B) or (D) since the described condition no longer existed at the time of discovery in August 2016.

14) On April 23, 2016, the main nitrogen bottles for the "B" and "D" MDCT fan brakes were both identified as in their required ranges, but nearing their lower limits. Work orders were generated to replace the bottles before they exceeded their limits. At no time were the bottles found out-of-specification other than during this pre-planned maintenance. From approximately 0500 EDT on April 28 to 1240 EDT on April 29 (i.e. approximately 32 hours), while operating in Mode 1 at 100% power, both the "B" and "D" MDCT fan brakes were nonfunctional due to the replacement of the nitrogen bottles. During this time period, both the "B" and "D" MDCT fans were inoperable and therefore the Division 2 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Actions B.1, B.2, and B.3.1 (or B.3.2) were not completed within their Completion Times and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.

15) On April 26, 2016, the main nitrogen bottle for the "A" MDCT fan brake was identified as in its required range, but nearing its lower limit. A work order was generated to replace the bottle before it exceeded its limit. At no time was the bottle found out-of-specification other than during this pre-planned maintenance. From 1241 EDT to 1552 EDT on April 29 (i.e. approximately 3 hours), while operating in Mode 1 at 100% power, the "A" MDCT fan brake was nonfunctional due to the replacement of the nitrogen bottle. During this time period, the "A" MDCT fan was inoperable and therefore the Division 1 UHS reservoir was inoperable as well. No entry to TS LCO 3.7.2 or 3.8.1 was made related to this. Thus, TS LCO 3.8.1 Required Action B.1 was not completed within its Completion Time and this is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.



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SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

As described previously, the MDCT fan brakes are only required for a design basis tornado; they are not required for other design basis events. No tornado watches or warnings occurred during the time-frames above when MDCT fan brakes were nonfunctional. Since there was no credible threat of a tornado during any of the periods when the MDCT fan brakes were nonfunctional, the MDCT fans and associated UHS would have been able to perform their intended functions. Also note that 8 out of 15 of the occurrences discussed in this LER occurred during the months of December, January, and February. Historical weather data from more than 50 years shows that tornadoes are extremely rare in Michigan during those particular months.

A bounding risk evaluation was performed to assess the on-line Probabilistic Safety Assessment (PSA) risk impact of the MDCT fan brakes being unable to perform their function in the event of a tornado strike to the Fermi 2 RHR complex (i.e. where the MDCTs are located). Using the limiting configuration of both Division 2 MDCT cells (i.e. the "B" and "D" fans) unavailable for an entire year yields increases in core damage frequency (CDF) and large early release frequencies (LERF) of 2.38E-07 per year and 7.20E-08 per year, respectively. Changes in CDF below 1.0E-06 per year and changes in LERF below 1.0E-07 per year are considered to be of very low safety significance.

Although the TS Bases indicate that both MDCT fans are required for that UHS division to be operable, it should also be noted that the PSA success criteria require that only one MDCT cell be available in a division for that division to remove decay heat; this limits the risk impact of a single MDCT fan brake in a division being unavailable. Of the 15 occurrences described above, 13 involve impact to only one MDCT cell (i.e. only a single MDCT fan brake is nonfunctional) in a division at a time. While these occurrences do represent conditions prohibited by TS, they still met the PSA success criteria.

During shutdown conditions (Modes 4 and 5), the site shutdown risk procedure would have, on two occasions, evaluated the outage risk color as red (one time for both divisions of UHS inoperable (i.e. number 3) and one time for one division of UHS inoperable with inoperable EDGs in the other division (i.e. number 8)). In neither case, however, were both MDCT fan brakes within a division nonfunctional, meaning the UHS was available for decay heat removal in the event of a tornado strike to the RHR complex; the risk of this configuration is qualitatively deemed to be low.

As discussed above for the occurrence from January 6 to 9, 2015 (i.e. number 6), the nonfunctionality of the "B" MDCT fan brake could have prevented the HPCI system from fulfilling its safety function. However, the Reactor Core Isolation Cooling (RCIC) system remained available for high pressure injection in the event of an emergency. The Standby Feedwater system was also available for high pressure injection, except for a 1.5 hour period on January 9 during a surveillance test. Additionally, the Automatic Depressurization System was available to reduce reactor pressure to within the capabilities of the low pressure Emergency Core Cooling Systems. The longest instance where HPCI could have been prevented from fulfilling its safety function as a result of the MDCT fan brake nonfunctionality was approximately 76 hours. TS 3.5.1 allows HPCI to be taken out of service for planned outages for up to 14 days. The risk increase associated with the impact to HPCI is bounded by the PSA evaluation for Division 2 discussed above. It is also important to note that, although HPCI was considered inoperable due to the propagation of TS requirements for UHS and was therefore considered a loss of safety function in this LER, HPCI is not a system required for safe shutdown in the event of a tornado per UFSAR Table 3.3-2. HPCI is required for design basis accidents such as a loss of coolant accident (LOCA).

As discussed above for the occurrence from January 24 to 31, 2014 (i.e. number 2), the nonfunctionality of the "A" MDCT fan brake combined with work on the Division 2 SGTS could have prevented the SGTS from fulfilling its safety function.



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However, the Reactor Building Heating Ventilation and Air Conditioning (RBHVAC) [[VA]] system remained available during that time to maintain the Secondary Containment (SC) [[NH]] pressure boundary. It is also important to note that, although SGTS was considered inoperable due to the propagation of TS requirements for UHS and was therefore considered a loss of safety function in this LER, SGTS is not a system required for safe shutdown in the event of a tornado per UFSAR Table 3.3-2. SGTS is required for design basis accidents such as a LOCA.

Offsite power was available during all fifteen of the occurrences. Combustion Turbine Generator (CTG) [[GEN]] 11-1 serves as an alternate AC power source for Fermi 2 during station blackout conditions. CTG 11-1 was operable during all of these occurrences with the exception of a three day period from March 25 to 28, 2015 that overlapped with the occurrence from March 23 to April 9, 2015 (i.e. number 8). The continued availability of offsite power plus the availability of CTG 11-1, with the one exception noted, reduces the consequence of the potential loss of safety function of the EDGs.

There were no radiological releases associated with any of the occurrences discussed in this event.

CAUSE OF THE EVENT

The cause of the event was an incorrect proceduralized TS interpretation. Fermi 2 utilizes an Operations Department Expectation (ODE) to provide guidance for implementing LCOs. ODE-12, Revision 36, "LCOs," contained specific guidance on how to treat nonfunctionality of the MDCT fan brakes. This guidance incorrectly directed Operations personnel to declare the MDCT fan inoperable only if a tornado watch or warning was issued for the area surrounding Fermi 2. This guidance was based on a letter dated December 28, 1989 in which DTE notified the NRC of the intent to determine MDCT fan operability in this manner. DTE had assumed that this position was acceptable to the NRC and therefore had implemented this position in the ODE. However, based on a discussion and review during the August 2016 CDBI, it was determined that the NRC had never approved this position and that the position was incorrect.

The individual occurrences of MDCT fan brake nonfunctionality discussed above were all related to the brake system nitrogen bottles. There are several causes for the nitrogen bottle pressures to be nearing their limits or out-of-specification. The nitrogen bottles may slowly lose pressure over time due to imperfect leak-tightness of the system or may decrease more rapidly if there is a more significant leak. In addition, the pressure in the bottles may be impacted by the ambient temperature due to weather changes (i.e. winter to summer and vice-versa) or operating equipment nearby, such as surveillance testing of the MDCT fans.

CORRECTIVE ACTIONS

As described above, the inadequate interpretation of TS was embedded in the procedure ODE-12. Corrective action has been taken to revise ODE-12 (Revision 37 dated August 27, 2016) such that it now states that "If the MDCT fan brake(s) are not meeting their ability to function for any reason including nitrogen pressures, the associated MDCT fan will be declared INOPERABLE and actions taken in accordance per TS 3.7.2." The revised ODE has already been used since that time to prompt the appropriate entry into the Technical Specifications following detection of a nitrogen bottle out-of-specification for the MDCT "C" fan brake on August 29, 2016.

The corrective actions associated with the individual occurrences were discussed as part of the description of the occurrence. In all cases, the main nitrogen bottle was replaced to restore the pressure to within the required limits.

In addition, DTE will evaluate potential modifications to the nitrogen bottle configuration to reduce the frequency of nitrogen bottle replacement and/or reduce the time required to replace a nitrogen bottle.



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PREVIOUS OCCURRENCES

The previous occurrences of the inadequate interpretation of TS related to the operability of the MDCT fan brake system within the past three years were discussed in this LER. Two other LERs regarding the operability of the MDCT fan brake system were identified. LER 99-008-00 documented a condition prohibited by TS for a MDCT fan brake being inoperable due to valve misalignment. The corrective actions associated with LER 99-008-00 addressed the valve alignment problems and did not address the question of how the operability of the MDCT fans is treated when the fan brake nitrogen pressures are outside of specification. LER 89-016-01 documented a deficiency in the design of the power supply of the MDCT fan brake system that could have led to the system being inoperable. The corrective actions associated with LER 89-016-01 included upgrades to the MDCT fan brake system and an engineering review which confirmed the necessity of the fan brakes during a design basis tornado. However, a review of LER 89-016-01 also resulted in the formulation of the DTE position that the fan brakes only needed to be operable when tornado conditions are present (i.e. watch or warning) which was communicated to the NRC by letter dated December 28, 1989. That DTE position taken in 1989 was the basis for the incorrect procedural guidance that caused the inadequate interpretation of TS as discussed in this LER. Therefore, these previous occurrences would not have prevented the condition described in this LER.