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July 6, 2022
NRC-22-0025

10 CFR 50.73

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

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

Subject: Licensee Event Report (LER) No. 2022-002

Pursuant to 10 CFR 50.73(a)(2)(v)(D), DTE Electric Company (DTE) is submitting LER No. 2022-002, Unexpected High Pressure Coolant Injection Turbine Trip.

No new commitments are being made in this submittal.

Should you have any questions or require additional information, please contact Mr. Eric Frank, Manager – Nuclear Licensing, at (734) 586-4772.

Sincerely,

A handwritten signature in black ink, appearing to read "Eric Olson".

Eric Olson
Site Vice President for
Peter Dietrich
Senior Vice President and Chief Nuclear Officer

Enclosure: Licensee Event Report No. 2022-002, Unexpected High Pressure Coolant Injection Turbine Trip

cc: NRC Project Manager
NRC Resident Office
Regional Administrator, Region III

**Enclosure to
NRC-22-0025**

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

**Licensee Event Report (LER) No. 2022-002
Unexpected High Pressure Coolant Injection Turbine Trip**



LICENSEE EVENT REPORT (LER)

(See Page 3 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, Library, and Information Collections Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollections.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk alt: oira_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. Facility Name
Fermi 2

2. Docket Number

05000

341

3. Page

1 OF 4

4. Title
Unexpected HPCI Turbine Trip

5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved	
Month	Day	Year	Year	Sequential Number	Revision No.	Month	Day	Year	Facility Name	Docket Number
05	11	2022	2022	- 002 -	00	07	06	2022	N/A	05000
									Facility Name	Docket Number
									N/A	05000

9. Operating Mode

1

10. Power Level

10

11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)

10 CFR Part 20	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	10 CFR Part 73
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.69(g)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(4)
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.71(a)(5)
<input type="checkbox"/> 20.2203(a)(2)(i)	10 CFR Part 21	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(1)(i)
<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 21.2(c)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(i)
<input type="checkbox"/> 20.2203(a)(2)(iii)	10 CFR Part 50	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 73.77(a)(2)(ii)
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<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)(v)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	
<input type="checkbox"/> OTHER (Specify here, in abstract, or NRC 366A).				

12. Licensee Contact for this LER

Licensee Contact

Eric Frank – Manager, Nuclear Licensing

Phone Number (Include area code)

734-586-4772

13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to IRIS	Cause	System	Component	Manufacturer	Reportable to IRIS
X	BJ	SI	W290	Yes					

14. Supplemental Report Expected

☒ No☐ Yes (If yes, complete 15. Expected Submission Date)

15. Expected Submission Date

Month

Day

Year

16. Abstract (Limit to 1560 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 11, 2022, the High Pressure Coolant Injection (HPCI) turbine unexpectedly experienced an overspeed trip during performance of surveillance 24.202.01 "HPCI Pump and Valve Operability Test At 1025 PSI". The cause was the HPCI Turbine Magnetic Pick-Up Speed Element (E41N212) was found shorted, breaking the speed feedback circuit to the HPCI Speed Controller. The HPCI Turbine Magnetic Pick-Up Speed Element (E41N212) was replaced on 05/12/2022 and HPCI 24.202.01 surveillance was completed satisfactorily on 05/16/2022.

An 8 hour Event Notification 55894 was reported to the NRC operations center per 10 CFR 50.72(b)(3)(v)(D). This report is submitted per 10 CFR 50.73(a)(2)(v)(D).

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

(See NUREG-1022, R.3 for instruction and guidance for completing this form
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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Fermi 2	05000- 341	YEAR 22	- SEQUENTIAL NUMBER 002	- REV NO. 00

NARRATIVE**INITIAL PLANT CONDITIONS**

Mode – 1
Reactor Power – 10 Percent

There were no structures, systems, or components (SSCs) that were inoperable at the start of this event that contributed to this event. Automatic Depressurization System (ADS) [RV] and Reactor Core Isolation Cooling (RCIC)[BN] were operable during the event.

DESCRIPTION OF THE EVENT

On May 11, 2022 at 1814 the plant was in Mode 1 performing start up activities. A High Pressure Coolant Injection (HPCI) [BJ] surveillance was in progress via surveillance 24.202.01 "HPCI Pump and Valve Operability Test at 1025 PSI." The HPCI turbine tripped on a mechanical overspeed due to failure of the HPCI Turbine Magnetic Pick-Up Speed Element (E41N212). Operations noted the HPCI Turbine Steam Isolation Valve (E4100F067) and the HPCI/RCIC Test Pressure Control Valve (E4100F011) were opening and closing unexpectedly. HPCI is designed to automatically restart when turbine speed drops below the mechanical over speed trip setpoint.

Troubleshooting of the system shows the system restarted twice following the initial overspeed trip before HPCI was manually tripped. Troubleshooting determined that the HPCI Turbine Magnetic Pick-Up Speed Element (E4100N212) was shorted, breaking the speed feedback circuit to the HPCI Speed Controller. Troubleshooting also identified the HPCI Pump Discharge Pressure Switch (E4100N027), which controls the HPCI Minimum Flow Valve (E4150F012) was found to be out of tolerance low, causing the HPCI minimum flow valve (E4150F012) to cycle open and closed.

There is no evidence the condition of the shorted HPCI Turbine Magnetic Pick-Up Speed Element (E4100N212) or the HPCI Pump Discharge Pressure Switch (E4100N027) low out of tolerance conditions existed prior to the overspeed trip event on 05/11/2022. This is based on the fact the HPCI system performed as expected during surveillance testing 24.202.02 HPCI Flow Rate Test At 165 PSI Reactor Steam Pressure on 05/09/2022 and HPCI did not exhibit abnormal behavior prior to the start of 24.202.01 "HPCI Pump and Valve Operability Test at 1025 PSI" on 05/11/2022.

The HPCI Turbine Magnetic Pick-Up Speed Element (E4100N212) was replaced and the HPCI Pump Discharge Pressure Switch (E4100N027) was successfully calibrated into tolerance and HPCI was restored to operable status following satisfactory performance of 24.202.01 HPCI Pump and Valve Operability at 1025 Rx PSIG" on 05/16/2022.

Prior to the event, during the refueling outage, the HPCI turbine internal inspection was performed; which, included removing HPCI Turbine Magnetic Pick-Up Speed Element (E4100N212). The Post Maintenance Test for this work included performing both 24.202.02 "HPCI Flow Rate Test At 165 PSI Reactor Steam Pressure" and 24.202.01 "HPCI Pump and Valve Operability at 1025 Rx PSIG". Procedure 24.202.02 was satisfactorily completed on 05/09/2022. On 05/11/2022, the HPCI turbine unexpectedly experienced an overspeed trip during performance of surveillance 24.202.01. Troubleshooting determined the HPCI Turbine Magnetic Pick-Up Speed Element (E41N212) had failed. The failed speed element was replaced and HPCI 24.202.01 surveillance was completed satisfactorily on 05/16/2022.

An 8 hour Event Notification 55894 was reported to the NRC operations center per 10 CFR 50.72(b)(3)(v)(D). This report is submitted per 10 CFR 50.73(a)(2)(v)(D).

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Fermi 2		05000-	341	YEAR 2022	SEQUENTIAL NUMBER 002	REV NO. 00

NARRATIVE**SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS**

During the time HPCI was inoperable, the RCIC system remained OPERABLE for high pressure injection in the event of an emergency. The Standby Feedwater (SBFW) [SJ] system was also available for high pressure injection. Additionally, the Automatic Depressurization System (ADS) was available to reduce reactor pressure to within the capabilities of the low pressure Emergency Core Cooling Systems (ECCS) [BO][BM]. TS 3.5.1 allows HPCI to be taken out of service for up to 14 days provided that RCIC is available. The duration of the HPCI inoperability, although unplanned, was within the allowable out of service time. HPCI is required for design basis accidents such as a loss of coolant accident (LOCA). No accidents or transients requiring HPCI occurred or were in progress during the HPCI inoperability.

Based on this, the safety significance of this event is low. There were no radiological releases associated with this event.

CAUSE OF THE EVENT

The direct cause was the failed HPCI Turbine Magnetic Pick-Up Speed Element (E4100N212). The magnetic pick-up switch was found shorted, breaking the speed feedback circuit to the HPCI Speed Governor. This resulted in a loss of speed indication to the HPCI governor (E4100K200) controller "HPCI Turbine Governor (EG-M) speed controller" and HPCI overspeed turbine trip. The speed sensor was replaced and HPCI 24.202.01 surveillance was completed satisfactorily, confirming the speed sensor was the failed component.

CORRECTIVE ACTIONS

The failed HPCI Turbine Magnetic Pick-Up Speed Element (E4100N212) was replaced and the HPCI Pump Discharge Pressure Switch (E4100N027) was recalibrated to within tolerance.

PREVIOUS OCCURRENCES

There have been previous occurrences of unplanned HPCI inoperability in the past several years, for example LERs 2018-005 dated September 2018 and 2019-004 dated September 2019. However, those occurrences were due to a support system, the Mechanical Draft Cooling Towers (MDCT), not being able to support operability of the Division 2 Emergency Equipment Cooling Water (EECW) system which is required for the operability of the HPCI room cooler. Therefore, the corrective actions taken to resolve those previous occurrences would not have prevented the issue described in this LER.

LER 21-002 Rev.1, dated March 2022, the unplanned inoperability of the HPCI system due to an inverter circuit failure had an unknown cause but was most likely due to a voltage transient. Components in the system were found shorted. The failure mechanism of the inverter and the sequencer failures were caused by a voltage transient on the DC bus. This transient was created from an unknown source either electrically or magnetically coupled to the supply cables of the devices. Therefore, the corrective actions taken to resolve this previous occurrence would not have prevented the issue described in this LER.

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3. LER NUMBER**YEAR**

2022

**SEQUENTIAL
NUMBER**

002

**REV
NO.**

00

NARRATIVE

In addition, August 2021 HPCI was declared inoperable (EN 55403) for a HPCI failure due to poor connections associated with the flow controller. EN55403 was recently retracted as HPCI was determined to be operable. The cause and corrective actions associated with EN55403 event were reviewed from the perspective of this event being reported in this LER and it was determined that the two events were independent. Therefore, the corrective actions taken to resolve these issues would not have prevented the issue described in this LER.