INDIANA MICHIGAN POWER
A unit of American Electric Power

Indiana Michigan Power
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106
IndianaMichiganPower.com

July 21, 2022

AEP-NRC-2022-41
10 CFR 50.73

Docket No.: 50-315

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Donald C. Cook Nuclear Plant Unit 1
LICENSEE EVENT REPORT 315/2022-001-00
Manual Reactor Trip Following Manual Turbine Trip due to High Vibrations on Main Turbine

In accordance with 10 CFR 50.73, Licensee Event Report (LER) System, Indiana Michigan Power Company, the licensee for Donald C. Cook Nuclear Plant Unit 1, is submitting as an enclosure to this letter the following report:

LER 315/2022-001-00: Manual Reactor Trip Following Manual Turbine Trip due to High Vibrations on Main Turbine

There are no commitments contained in this submittal.

Should you have any questions, please contact Mr. Michael K. Scarpello, Regulatory Affairs Director, at (269) 466-2649.

Sincerely,

Scott Wailey for
Kelly J Ferneau
Site Vice President

MPH/kmh

Enclosure: Licensee Event Report 315/2022-001-00: Manual Reactor Trip Following Manual Turbine Trip due to High Vibrations on Main Turbine

c: R. J. Ancona – MPSC
EGLE – RMD/RPS
J. B. Giessner – NRC Region III
NRC Resident Inspector
R. M. Sistevaris – AEP Ft. Wayne
J. Walcutt – AEP Ft. Wayne
S. P. Wall – NRC, Washington D.C.
A. J. Williamson – AEP Ft. Wayne

Enclosure to AEP-NRC-2022-41

Licensee Event Report 315/2022-001-00: Manual Reactor Trip Following Manual Turbine Trip due to High Vibrations on Main Turbine

NRC FORM 366 (08-2020) U.S. NUCLEAR REGULATORY COMMISSION

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/)

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/20

1. Facility Name	2. Docket Number	3. Page
Donald C. Cook Nuclear Plant Unit 1	05000315	1 OF 4

4. Title

Manual Reactor Trip Following Manual Turbine Trip due to High Vibrations on Main Turbine

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 Numb
05	24	2022	2022	001	00	07	21	2022		05000
									Facility Name	Docket Numb
										05000

9. Operating Mode	10. Power Level
1	12

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

10 CFR Part 20	☐ 20.2203(a)(2)(vi)	☐ 50.36(c)(2)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(A)	**10 CFR Part 73**
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.69(g)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(4)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(i)	**10 CFR Part 21**	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(1)(i)
☐ 20.2203(a)(2)(ii)	☐ 21.2(c)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(i)
☐ 20.2203(a)(2)(iii)	**10 CFR Part 50**	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)	☐ 73.77(a)(2)(ii)
☐ 20.2203(a)(2)(iv)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)	
☐ 20.2203(a)(2)(v)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)	

☐ **OTHER** (Specify here, in abstract, or NRC 366A).

12. Licensee Contact for this LER

Licensee Contact	Phone Number (Include area code)
Michael K. Scarpello, Regulatory Affairs Director	(269) 466-2649

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 IRI
X	TA	TRB	GE	Y						

14. Supplemental Report Expected		15. Expected Submission Date	Month	Day	Year
☒ No	☐ Yes (If yes, complete 15. Expected Submission Date)				

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

On May 24, 2022, at 0414 EDT, Donald C. Cook Unit 1 was operating at approximately 12 percent power, while emerging from the Unit 1 Cycle 31 refueling outage (U1C31) which included significant maintenance on the Unit 1 High Pressure Turbine. While rolling the Unit 1 Main Turbine, it experienced high vibrations due to an apparent rub, and was manually tripped. Following the Main Turbine trip, the high vibrations persisted, and the Unit 1 Reactor was manually tripped, the Main Steam Stop Valves were closed, and main condenser vacuum was broken.

Following the reactor trip, Unit 1 continued to be supplied by offsite power. All control rods fully inserted. The Auxiliary Feedwater Pumps started as required and operated properly, no Safety Injection actuation was initiated or required, and Decay Heat Removal was through the Unit 1 Steam Generator Power-Operated Relief Valves (SG PORVs). All required equipment operated as expected, and the trip was not complicated.

The initiating event for the Unit 1 Manual Reactor Trip was to allow the control room operators to break Main Condenser vacuum and prevent further potential damage to the Main Turbine due to the high vibrations.

The event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A), System Actuation, due to the valid actuation of the Reactor Protection System (RPS) and the Auxiliary Feedwater System, as a result of the manual reactor trip.

INTRODUCTION

On May 24, 2022, at 0414 EDT, Donald C. Cook Unit 1 was operating at approximately 12 percent power, while emerging from the Unit 1 Cycle 31 refueling outage (U1C31) which included significant maintenance on the Unit 1 High Pressure Turbine [TA][TRB]. While rolling the Unit 1 Main Turbine, it experienced high vibrations due to an apparent rub, and was manually tripped. Following the Main Turbine trip, the high vibrations persisted, and the Unit 1 Reactor [RCT] was manually tripped, the Main Steam Stop Valves [SB][ISV] were closed, and main condenser vacuum was broken. Due to the significant amount of maintenance done on the Main Turbine, the potential for a turbine trip and/or a reactor trip was anticipated as part of the startup preparations.

All required equipment operated as expected, and the trip was not complicated. Following the reactor trip, Unit 1 continued to be supplied by offsite power. All control rods fully inserted. The Auxiliary Feedwater Pumps [BA][P] started as required and operated properly, and no Safety Injection actuation was initiated or required. During the event, Reactor Coolant System (RCS) temperature initially lowered, as expected and was stabilized at approximately 550 degrees F by the Steam Generator Power-Operated Relief Valves (SG PORVs) [SB][RV], after the Main Steam Stop Valves were closed.

EVENT DESCRIPTION

The Main Turbine had been tripped twice the previous day. The first trip occurred on May 23, 2022 at 0620, with the turbine at 500 rpm, due to excessive eccentricity and rising vibration, and the second trip occurred on May 23, 2022 at 1420, with the turbine at 1800 rpm, due to elevated thrust bearing temperature. The generator was not connected to the grid prior to these turbine trips, and in both cases, the reactor remained critical since the turbine trip occurred below P-8. The Power Range Neutron Flux (P-8) interlock is actuated at approximately 29% power as determined by two-out-of-four Nuclear Instrumentation System (NIS) Power Range Detectors. The P-8 interlock automatically enables the reactor trip on Turbine Trip (Low Fluid Oil Pressure and Turbine Stop Valve Closure) on increasing power.

At 0332 on May 24, 2022, control room operators rolled the Main Turbine a third time. At 0403, the turbine was tripped at 1221 rpm due to high vibration on the #1 and #2 bearings. Vibrations continued to rise, following the turbine trip, and at 0414, the reactor was manually tripped from approximately 12% power to permit breaking vacuum in the Main Condenser[COND] and prevent further potential damage to the Main Turbine due to the high vibrations.

Event Notification 55910 was submitted in accordance with 10 CFR 50.72(b)(2)(iv)(B), Reactor Protection System (RPS) [JG] actuation as a four (4) hour non-emergency report, and under 10 CFR 50.72(b)(3)(iv)(A), specified system actuation of the Auxiliary Feedwater System [BA], as an eight (8) hour non-emergency report.

The event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A), System Actuation, due to the valid actuation of the Reactor Protection System (RPS) and the Auxiliary Feedwater System, as a result of the manual reactor trip.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Donald C. Cook Nuclear Plant Unit 1	05000315	2022	- 001	- 00

NARRATIVE

COMPONENT

1-OME-76, Unit 1 High Pressure Turbine

CAUSE OF THE EVENT

A preliminary analysis has determined the cause of the turbine vibrations to be a rub on the high pressure turbine shaft seals. An Apparent Cause Evaluation (ACE) is in progress at the time of the writing of this Licensee Event Report (LER). If any information regarding the cause or corrective actions differs significantly from what is documented in this LER, a supplement will be submitted after the conclusion of the ACE.

CORRECTIVE ACTIONS

The #1 and #2 Main Turbine bearings were inspected for damage. Inspections on the #1 bearing revealed normal wear marks and some additional areas that needed to be cleaned up. Inspections on the #2 bearing revealed damage to the oil seal ring. The damage was repaired, and the final, as-left, bearing inspections and measurements were found to be satisfactory. The Main Turbine and Main Generator were restored to operation on May 30, 2022 at 0539.

ASSESSMENT OF SAFETY CONSEQUENCES

NUCLEAR SAFETY

All equipment operated as designed, and there was no actual or potential nuclear safety hazard resulting from the Main Turbine high vibrations and subsequent turbine and reactor trips.

INDUSTRIAL SAFETY

There was no actual personnel safety hazard resulting from the Main Turbine high vibrations and subsequent turbine and reactor trips.

RADIOLOGICAL SAFETY

There was no actual or potential radiological safety hazard, or radiological release, resulting from the Main Turbine high vibrations and subsequent turbine and reactor trips.

PROBABILISTIC RISK ASSESSMENT (PRA)

A PRA risk assessment was performed by calculating the Conditional Core Damage Probability (CCDP) and the Conditional Large Early Release Probability (CLERP) of the transient initiating event. A comparison of the results of these calculations, to the thresholds provided in NRC Inspection Manual Chapter (IMC) 0609, determined this event to be of "very low" safety significance.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Donald C. Cook Nuclear Plant Unit 1	05000315	2022	- 001	- 00

NARRATIVE

PREVIOUS SIMILAR EVENTS

A review of Licensee Event Reports for the past five years found no events due to similar causes.