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Indiana Michigan Power
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Bridgman, MI 49106
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February 19, 2018

AEP-NRC-2018-11
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 315/2017-001-00
Unit 1 Turbine Driven Auxiliary Feedwater Pump Inoperable Longer Than Allowed by Technical Specifications

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 315/2017-001-00: Unit 1 Turbine Driven Auxiliary Feedwater Pump Inoperable Longer Than Allowed by Technical Specifications

There are no commitments contained in this submittal.

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

Sincerely,

Q. Shane Lies
Site Vice President

SJM/ml

Enclosure: Licensee Event Report 315/2017-001-00: Unit 1 Turbine Driven Auxiliary Feedwater Pump Inoperable Longer Than Allowed by Technical Specifications


IEZZ
NRR

c: R. J. Ancona – MPSC
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Enclosure to AEP-NRC-2018-11

Licensee Event Report 315/2017-001-00

Unit 1 Turbine Driven Auxiliary Feedwater Pump Inoperable Longer Than Allowed by Technical Specifications

NRC FORM 366 (04-2017)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB: NO. 3150-0104	EXPIRES: 03/31/2020
		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 Information Services Branch (T-2 F43), 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 Donald C. Cook Nuclear Plant Unit 1	2. DOCKET NUMBER 05000315	3. PAGE 1 OF 4
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4. TITLE
Unit 1 Turbine Driven Auxiliary Feedwater Pump Inoperable Longer than Allowed by Technical Specifications

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
12	21	2017	2017	- 001 -	00	02	19	2018	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 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)
100	<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 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 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 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 Michael K. Scarpello, Regulatory Affairs Manager	TELEPHONE NUMBER (Include Area Code) 269-466-2649
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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
D	BA	SCV							

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO				

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

On December 21, 2017, with Unit 1 operating in Mode 1 at 100 percent power, the Unit 1 Turbine Driven Auxiliary Feedwater Pump (TDAFP) failed a surveillance test by not achieving the required operating speed and was declared inoperable. An investigation followed that discovered an incorrect governor valve linkage setup. Following corrective maintenance, surveillance testing requirements were met and the TDAFP was restored to operable status on December 23, 2017. An evaluation was completed and determined that the incorrect governor valve linkage setup condition that affected pump operating speed was introduced during a previous maintenance activity. As a result, the TDAFP was considered inoperable longer than allowed by Technical Specifications (TS) during a period from November 25, 2017, until December 23, 2017.

The cause of the incorrect governor valve linkage setup that prevented the TDAFP from reaching the required operating speed was due to insufficient guidance within applicable maintenance procedures. Corrective actions include revising the applicable maintenance procedures to ensure that future governor linkage maintenance activities result in the pump meeting all required acceptance criteria.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), as an Operation or Condition Prohibited by Technical Specifications.



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

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Donald C. Cook Nuclear Plant Unit 1	05000-315	2017	- 001	- 00

NARRATIVE

EVENT DESCRIPTION

During the Unit 1 Cycle 28 (U1C28) refueling outage, preventative maintenance (PM) was performed on the Unit 1 Turbine Driven Auxiliary Feedwater Pump Governor Valve [BA][SCV], to inspect the valve internals and linkage. The governor valve was reassembled on October 13, 2017.

On November 25, 2017, during preparations to complete the U1C28 refueling outage, Unit 1 was operating in Mode 3 Hot Standby conditions. The Unit 1 Turbine Drive Auxiliary Feedwater Pump (TDAFP) [BA][P] had passed surveillance testing and met the requirements of Unit 1 Technical Specification (TS) Limiting Condition For Operation (LCO) 3.7.5 Auxiliary Feedwater (AFW) System and was considered operable. The U1C28 refueling outage was completed on November 28, 2017.

On December 21, 2017, Unit 1 was operating in Mode 1 at 100 percent power. Scheduled surveillance testing of the Unit 1 TDAFP was performed. When the Unit 1 TDAFP was started, the operating speed was observed to rise slowly to approximately 3500 RPM, which is less than the required operating band of 4330 RPM to 4370 RPM. At approximately 1 hour and 5 minutes of operation, the pump speed was observed to be operating at approximately 4000 RPM and the U1 TDAFP speed was unable to be increased further to be within the required operating band. The Unit 1 TDAFP was declared inoperable in accordance with TS LCO 3.7.5 Auxiliary Feedwater (AFW) System Condition B, "One AFW train inoperable in MODE 1, 2, or 3 for reasons other than Condition A" on December 21, 2017, at 2201. A Failure Investigation Process was convened.

On December 23, 2017, Maintenance staff determined that the valve linkage was incorrectly set which prevented the governor valve from having full travel capability. Maintenance staff performed adjustments to the valve linkage assembly to allow full travel of the governor valve. The Unit 1 TDAFP was restarted and the pump operating speed was adjusted within the required operating band. Operations staff completed surveillance testing of the U1 TDAFP and all acceptance criteria were met.

On December 23, 2017, at 1949, Operations staff declared the Unit 1 TDAFP operable and exited TS LCO 3.7.5 Auxiliary Feedwater (AFW) System, Condition B.

EVENT ANALYSIS

The apparent cause of the Unit 1 TDAFP failure to reach rated speed was due to the governor valve linkage being incorrectly setup during a previous maintenance activity which prevented the governor valve from having full travel capability and to fully open. A higher steam supply pressure was available to the pump turbine in Mode 3 conditions during the U1C28 refueling outage which allowed the Unit 1 TDAFP to reach the required operating speed and pass surveillance testing requirements. On December 21, 2017, in Mode 1 operating conditions, a lower steam supply pressure to the pump turbine and the inability of the governor valve to fully open resulted in not achieving the required operating speed and pass surveillance test requirements.

ASSESSMENT OF SAFETY CONSEQUENCES

NUCLEAR SAFETY

The failure of the Unit 1 TDAFP to achieve rated speed could impact the ability of the pump to provide adequate feedwater flow to cool the Unit down to Mode 4 conditions, as required by Technical Specifications. The Unit 1 TDAFP was declared inoperable and corrective maintenance was completed within the requirements of Unit 1 Technical Specifications LCO 3.7.5 Auxiliary Feedwater (AFW) Condition B. No actual events occurred during the period of inoperability that relied on the safety function to be fulfilled.



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The AFW System is a system that automatically supplies feedwater to the steam generators to remove decay heat from the Reactor Coolant System (RCS) when the main feedwater supply is not available. The AFW System is capable of supplying feedwater to the steam generators during normal unit startup, shutdown, and hot standby conditions.

The AFW system consists of two motor driven AFW pumps and one steam turbine driven pump configured into three trains. Each motor driven AFW pump is powered from an independent Class 1E power supply and feeds two steam generators. The steam turbine driven AFW pump receives steam from two main steam lines upstream of the steam generator stop valves (SGSVs). Each of the steam feed lines will supply 100% of the requirements of the turbine driven AFW pump.

The other two trains of Unit 1 AFW pumps were available during the period of time after the Unit 1 TDAFP was considered inoperable on November 25, 2017.

The extent of condition was limited to the Unit 2 TDAFP. A review of past surveillance testing and operation was completed for the Unit 2 TDAFP and did not reveal similar operating speed or pump performance issues.

INDUSTRIAL SAFETY

There was no actual impact or potential industrial safety hazard resulting from this event.

RADIOLOGICAL SAFETY

There was no actual or potential radiological safety hazard resulting from this event.

PROBABLISTIC RISK ASSESSEMENT (PRA)

The Unit 1 TDAFP would have met some, but not all, of the PRA success criteria for AFW. Primary accident assumptions in PRA do not always require the plant to cooldown to Residual Heat Removal (RHR) entry conditions. In many cases, a stable condition is achieved in Mode 3, or, high pressure injection Emergency Core Cooling System (ECCS) is available to provide core cooling in high pressure recirculation mode. In some cases, AFW is required to cooldown the Unit to below the RHR pump shutoff head, if high pressure ECCS is not available. For this limited set of conditions, the U1 TDAFP was considered unavailable.

Additional analysis was completed to provide risk information involving the U1 TDAFP in an under speed condition during the time period of inoperability. The risk information is used to help determine the significance of the event. The risk analysis was performed assuming that the Unit 1 TDAFP could provide adequate core cooling in Mode 3 (Hot Standby), but would not be able to provide sufficient feedwater flow to cool the plant to Mode 4 (Hot Shutdown), in the event depressurization and cooldown were needed to meet PRA success criteria. These assumptions are consistent with the past operability assessment of the Unit 1 TDAFP's capability for this condition. The results of the risk calculation were characterized as "Very Low Safety Significance" for the duration of the condition.

CORRECTIVE ACTIONS

IMMEDIATE CORRECTIVE ACTIONS:

Corrective maintenance was performed that replaced the U1 TDAFP governor and adjusted the governor valve linkage to obtain the required pump operating speed.



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CORRECTIVE ACTIONS TO REDUCE THE PROBABILITY OF SIMILAR EVENTS OCCURRING IN THE FUTURE:

Revise procedure 12-MHP-5021-056-008, Turbine Driven Auxiliary Feed Pump Governor Valve Maintenance, based on guidance from the EPRI Terry Turbine Maintenance Guide, Auxiliary Feedwater (AFW) Application (3002010629) to ensure full governor valve travel is obtained.

Revise procedure 12-MHP-5021-056-011, Auxiliary Feed Pump Governor Valve Maintenance, based on guidance from the EPRI Terry Turbine Maintenance Guide, Auxiliary Feedwater (AFW) Application (3002010629) to ensure full governor valve travel is obtained.

PREVIOUS SIMILAR EVENTS:

On February 2, 2017, the Unit 2 TDAFP did not reach the required pump operating speed during scheduled surveillance testing. However, the apparent cause of the Unit 2 TDAFP failing to immediately reach rated speed was due to a different cause, an internal governor component malfunction.