DUKE ENERGY

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10 CFR 50.73

March 10, 2022
Serial: RA-22-0067

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

Shearon Harris Nuclear Power Plant, Unit 1
Docket No. 50-400/Renewed License No. NPF-63

Subject: Licensee Event Report 2022-001-00

Ladies and Gentlemen:

Duke Energy Progress, LLC, submits the enclosed Licensee Event Report 2022-001-00 in accordance with 10 CFR 50.73 for Shearon Harris Nuclear Power Plant, Unit 1 (HNP). This report describes a condition impacting the 'A' Train of the Essential Services Chilled Water (ESCW) System. Analysis of the condition concluded that the 'A' Train of the ESCW System was inoperable for a period longer than permitted by Technical Specifications prior to discovery of the condition. Additionally, there were periods in which the 'B' Train of the ESCW System was inoperable for planned maintenance while the condition was present. This event had no significance with respect to the health and safety of the public.

There are no regulatory commitments contained within this report.

Please refer any questions regarding this submittal to Chuck Yarley at (984) 229-2477.

Sincerely,

David S. Hoffman

Enclosure: Licensee Event Report 2022-001-00

cc: J. Zeiler, NRC Senior Resident Inspector, HNP
A. Hon, NRC Project Manager, HNP
NRC Regional Administrator, Region II

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: 08/31/2023

1. Facility Name	2. Docket Number	3. Page
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4. Title
Essential Services Chilled Water Chiller Inoperable Due to Pre-Rotation Vane Actuator Control Arm Position

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
1	10	2022	2022	- 001 -	00	3	10	2022		05000
									Facility Name	Docket Number
										05000

9. Operating Mode	10. Power Level
Mode 1	100%

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)
Chuck Yarley	(984) 229-2477

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
D	KM	CMP	B350	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 January 10, 2022, a Reactor Auxiliary Building operator for the Shearon Harris Nuclear Power Plant, Unit 1, noted that the 'A' Train Essential Services Chilled Water System chiller's compressor pre-rotation vane (PRV) was mispositioned. This resulted in the chiller being declared inoperable at 07:57 on January 10th. Maintenance personnel identified that the PRV control arm had slipped at its tapered connection to the associated control shaft due to reduced torque on the cap screw holding it in place. The chiller was declared operable on January 11th at 21:09, following successful completion of corrective maintenance.

The cause of the slippage was inadequate guidance within maintenance procedure CM-M0259, "Essential Chiller Compressor Maintenance," which presented a latent error trap for installation of the cap screw over an adjacent cam plate. This resulted in torque loss on the fastener while the chiller was in operation. The cap screw was previously installed during a maintenance activity involving a replacement of the compressor and the PRV actuator in August 2021. To address this condition, the cap screw was retorqued to proper specification and the adjacent cam plate was validated to no longer interfere with the cap screw. CM-M0259 was revised to provide guidance for proper cap screw installation.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

(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/)

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		YEAR	SEQUENTIAL NUMBER	REV NO.
Shearon Harris Nuclear Power Plant, Unit 1	05000-400	2022	- 001	- 00

NARRATIVE

Note: Energy Industry Identification System (EIIS) codes are identified in the text within brackets [].

A. Background

On January 10, 2022, with Shearon Harris Nuclear Power Plant, Unit 1 (HNP) in Mode 1 and at 100% power, a Reactor Auxiliary Building (RAB) [NF] operator noted that the 'A' Train Essential Services Chilled Water (ESCW) [KM] chiller's [CHU] compressor pre-rotation vane (PRV) [CMP] control arm [DRIV] was mispositioned while the unit was shutdown. No other systems, structures, or components were inoperable at the time that contributed to the event.

The ESCW System circulates chilled water to the safety related cooling coils [CCL] of the air handling units [AHU] serving their respective heating, ventilation, and air conditioning (HVAC) systems for transfer of the thermal loads generated in the various areas of the plant to the Service Water System [BI]. Areas include the control room [VI], RAB electrical equipment protection rooms [VF], RAB switchgear rooms [VF], and other engineering safety feature (ESF) [JE] equipment areas [VF].

There is firm evidence that the 'A' Train of the ESCW System became inoperable while operating between December 27, 2021 at about 02:00 Eastern Standard Time (EST) through January 11, 2022, at 21:09 EST, for a total duration of approximately 15 days and 19 hours, which includes time that the 'A' Train ESCW System chiller was shutdown for planned operational activities. HNP Technical Specifications for the ESCW System list an allowed out-of-service time of 7 days for conditions impacting a single train. This event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as "any operation or condition which was prohibited by the plant's Technical Specifications."

Further, there were several instances were either the 'B' Train chiller or other associated 'B' Train equipment were briefly inoperable for periods between December 27, 2021 through January 11, 2022 due to planned maintenance or testing. During those periods, operations staff were present with approved procedures capable of restoring the system to service prior to negatively impacting ESF equipment. These events are reportable in accordance with 10 CFR 50.73(a)(2)(v)(D) for "Any 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."

B. Event Description

On January 10, 2022, a RAB operator noted that the 'A' Train chiller's compressor PRV control arm was mispositioned while the 'A' Train chiller was shutdown. Maintenance personnel identified that the PRV control arm had slipped at its tapered connection to the associated control shaft [DRIV] due to reduced torque on the cap screw [DRIV] holding it in place. Investigation into the event identified that the PRV control arm had slipped when the 'A' Train chiller was started on December 27, 2021. The chiller continued to run normally, however the slippage resulted in reduced available chiller cooling capacity to respond to a design basis event. Further, the chiller would have been unable to restart if it tripped, which is an expected occurrence when responding to certain design basis events. The chiller was declared inoperable at 07:57 on January 10th when the deficient condition was identified. The chiller was declared operable on January 11th at 21:09 following successful completion of corrective maintenance and testing.

C. Causal Factors

Maintenance personnel identified that the PRV control arm had slipped at its tapered connection to the associated control shaft due to reduced torque on the cap screw holding it in place. The cause of the slippage was inadequate guidance within maintenance procedure CM-M0259, "Essential Chiller Compressor Maintenance," which presented a latent error

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trap for installation of the cap screw over an adjacent cam plate, versus through the designed bore hole. This resulted in torque loss on the fastener over time while the chiller was in operation. The cap screw was previously installed during a maintenance activity involving a replacement of the compressor and the PRV actuator in August 2021.

D. Corrective Actions

The cap screw was retorqued to proper specification and the adjacent cam plate was validated to no longer interfere with the cap screw. Visual inspection of the 'B' Train chiller validated proper fastener assembly without cam plate interference. CM-M0259 was revised to provide guidance for the PRV control arm installation at the adjacent cam plate interface. A 'caution' statement was added to ensure the cam plate is not under the shoulder of the joining cap screw.

E. Safety Analysis

The 'A' Train ESCW chiller was in operation during the period in question with normal chilled water outlet temperature. Thus, the supported 'A' Train locations would have been supplied with chilled water at the onset of the event. Although cooling to the 'A' Charging/Safety Injection Pump (CSIP) [P] [BQ] room would eventually be challenged, evaluation has shown that a loss of room cooling will have no adverse impact to CSIP function in the first 120 minutes. Proceduralized actions are contained within AOP-026, "Loss of Essential Services Chilled Water System," for operators to move a portable fan [AHU] into the associated CSIP room door to ensure adequate cooling is maintained. These actions are determined to occur within 50 minutes (40 minutes for recognition, 10 minutes for implementation) from the time of an ESF start signal being generated for a CSIP, and prior to room heat-up becoming a challenge. These actions are evaluated and approved by HNP License Amendment 153 and are bounding for both normal and emergent response scenarios for loss of the ESCW System. During the period in question, there were several instances where the 'B' Train chiller or other associated 'B' Train equipment were inoperable to support testing or maintenance. For these cases, proceduralized steps for system restoration existed and operators were present to perform them. EOP-E-0, "Reactor Trip or Safety Injection," includes a verification per Attachment 3, "Safeguards Actuation Verification," that the ESCW System is in operation with both chillers and directs entry into AOP-026 for loss of any chiller. AOP-026 directs operations to manually start the chillers per OP-148, "Essential Service Chilled Water System." Start of the 'B' Train chiller and chilled water pump would have been successful, with recovery time being well under 120 minutes. Based on this information, the safety function of the ESCW system was maintained even while the system was inoperable.

NEI 99-02, Revision 7, "Regulatory Assessment Performance Indicator Guidelines," states the following for inclusion of events on the NRC Mitigating Systems Performance Indicator for Safety System Function Failures (SSFF), "The level of judgment for reporting an event or condition under paragraph (a)(2)(v) as an SSFF is a reasonable expectation of preventing the fulfillment of a safety function." Based on this guidance and the above analysis showing the safety function can be reasonably expected to be met within the required period, this event will not be counted as a SSFF.

Subsequent to the condition discovered on January 10, 2022, the ESCW System compressor, PRVs, actuator, and linkages were re-categorized as RISC-3 in accordance with 10 CFR 50.69. All ESCW System functions associated with the compressor, refrigerant, and chilled water supply are considered to be low safety significant. Therefore, a similar condition discovered in the future would not need to be reported under the requirements of 10 CFR 50.73 in accordance with the requirements of 10 CFR 50.69(g).

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F. Additional Information

No LERs have been issued by HNP in the past three years for a similar issue.