John R. Dills
Plant Manager
Shearon Harris Nuclear Power Plant
5413 Shearon Harris Road
New Hill, NC 27562-9300

10 CFR 50.73

March 15, 2021
Serial: RA-21-0072

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 2021-002-01

Ladies and Gentlemen:

Duke Energy Progress, LLC, submits the enclosed Licensee Event Report 2021-002-01 in accordance with 10 CFR 50.73 for Shearon Harris Nuclear Power Plant, Unit 1 (HNP). This report is a planned supplement to LER 2021-002-00 submitted on February 15, 2021. This report describes an event in which HNP was in Mode 3 and the Reactor Coolant System was pressurized greater than 1000 pounds per square inch gauge for approximately 15 minutes with all three cold leg injection accumulator discharge valves closed. 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 Sarah McDaniel at (984) 229-2002.

Sincerely,

John R. Dills

Enclosure: Licensee Event Report 2021-002-01

cc: J. Zeiler, NRC Senior Resident Inspector, HNP
M. Mahoney, 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/)

1. Facility Name	2. Docket Number	3. Page
Shearon Harris Nuclear Power Plant, Unit 1	05000 400	1 OF 3

4. Title

All ECCS Accumulator Isolation Valves Closed in Mode 3 With RCS Pressure Greater Than 1000 psig

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
12	17	2020	2021	- 002 -	01	3	15	2021		05000
									Facility Name	Docket Number
										05000

9. Operating Mode	10. Power Level
3	0

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)
Sarah McDaniel, Regulatory Affairs Engineer	(984) 229-2002

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	BP	ACC	W351	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 December 17, 2020, with Harris Nuclear Power Plant, Unit 1 (HNP), in Mode 3, Reactor Coolant System (RCS) pressure was being controlled between 900-1000 pounds per square inch gauge (psig) with all three cold leg accumulator (CLA) discharge valves closed. Only one reactor coolant pump (RCP) was available and operating while RCS pressure was being controlled in manual using a pressurizer spray valve (PSV). With only one RCP in operation, when pressurizer level lowered, pressurizer spray flow became ineffective and RCS pressure began rising at 15:35. Operators took immediate actions to arrest the pressure increase by fully opening the PSV, reducing charging flow, and turning off pressurizer heaters. The RCS pressure rise did not stop prior to exceeding 1000 psig. HNP Technical Specifications (TS) require each CLA to be operable in Modes 1, 2, and 3 when RCS pressure is greater than 1000 psig. Since all three CLA discharge valves were closed, this TS requirement was not met for approximately 15 minutes, until pressure was reduced to less than 1000 psig.

Actions that may be needed for precise RCS pressure control when running the 'A' RCP only were not understood or proceduralized, as this condition had not occurred at HNP prior to this event. Procedures will be revised to limit operation of only one RCP and to support adequate pressurizer spray flow during operation of only one RCP when needed. Operators will also receive training on the lessons learned from this event.

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/)

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Shearon Harris Nuclear Power Plant, Unit 1	05000- 400	2021	- 002	- 01

NARRATIVE

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

A. Background

On December 17, 2020, Shearon Harris Nuclear Power Plant, Unit 1 (HNP), was in Mode 3 due to a reactor [RCT] trip that occurred on December 16, 2020 at 8:51 eastern standard time (EST). There were no structures, systems, or components that were inoperable prior to the event that contributed to the event. HNP remained in Mode 3 after the event.

HNP Technical Specifications (TS), Section 3.5.1, requires all three Emergency Core Cooling System (ECCS) [BP] cold leg accumulators (CLAs) [ACC] to be operable in Modes 1, 2, and 3 with Reactor Coolant System (RCS) [AB] pressure greater than 1000 pounds per square inch gauge (psig). In order for an ECCS CLA to be considered operable, its motor-operated isolation valve [ISV] must be open. The CLAs are pressure vessels partially filled with borated water and pressurized with nitrogen gas. They are designed to passively inject into the RCS cold legs during a loss of coolant accident (LOCA) when RCS pressure decreases below the nitrogen cover gas pressure. One accumulator is attached to each of the three cold legs of the RCS. During normal operation, each CLA is isolated from the RCS by two check valves [V] in series. In a LOCA, each CLA injects borated water through an open motor-operated isolation valve and two check valves into the RCS. The CLAs are sized so that two of the three CLAs can adequately reflood the core, assuming that one CLA discharges through the LOCA break and into containment [NH].

This event is reportable per 10 CFR 50.73(a)(2)(v)(D), as "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: (D) Mitigate the consequences of an accident."

B. Event Description

Prior to the event, RCS pressure was being controlled in manual using the pressurizer [PZR] spray valve (PSV) for Loop 1 of the RCS, with only the 'A' Reactor Coolant Pump (RCP) [P] in service. The 'A' RCP was the only RCP in service due to the 'B' and 'C' 6.9 kilovolt (kV) auxiliary buses [EA][BU] being de-energized in response to faults on the 6.9 kV non-segregated bus [NSBU] from the 'B' Unit Auxiliary Transformer [XFMR] to the 'B' Auxiliary Bus. These faults resulted in a main generator [GEN] lock-out, which caused an automatic reactor trip on December 16, 2020 at 8:51 EST.

Following the reactor trip, a plant cooldown to Mode 4 was planned and a control band was established from 900 to 1000 psig to isolate the CLAs in accordance with procedure guidance for normal plant cooldown from Mode 3 to Mode 5. Subsequently, a decision was made to stay in Mode 3 at 900 to 1000 psig. Due to only having the 'A' RCP available and operating, when pressurizer level lowered, pressurizer spray flow became ineffective. RCS pressure began rising at 15:35. Operators took immediate action to arrest the pressure increase by fully opening the PSV. Operators also reduced charging system flow and turned off pressurizer heaters [EHTR] immediately to arrest the pressure increase. Due to the reduced pressurizer spray effectiveness and the time it takes for heat input from the pressurizer heaters to decay, the RCS pressure rise did not stop prior to exceeding 1000 psig for approximately 15 minutes. RCS pressure reached a maximum of 1010 psig during this time period, which is below the RCS design pressure of 2485 psig. Since all three CLA discharge valves were closed, TS 3.5.1 was not met, resulting in TS 3.0.3 entry for approximately 15 minutes, until pressure was reduced to less than 1000 psig.

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/)

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Shearon Harris Nuclear Power Plant, Unit 1	05000- 400	2021	- 002	- 01

NARRATIVE

C. Causal Factors

Actions that may be needed for RCS pressure control when running the 'A' RCP only were not understood or proceduralized prior to this event. With only 'A' RCP running, a loss of pressurizer spray flow occurred after approximately 15 hours. This condition had not occurred at HNP prior to this event. The RCPs were prioritized to be operated in the order of (1) 'B' RCP, (2) 'A' RCP, and (3) 'C' RCP, to maximize pressurizer spray flow effectiveness, based upon existing procedures and training.

D. Corrective Actions

RCS pressure was lowered below 1000 psig to restore compliance with HNP TS 3.5.1. The operators established margin to the RCS pressure limit by setting a conservative control band and eliminated future concerns by reopening the CLA isolation valves. Procedures will be revised to change the priority of running RCPs to maximize pressurizer spray effectiveness. Procedures will also be revised to clarify that operation of the 'A' RCP only may result in the need to use auxiliary spray for RCS pressure control instead of normal spray. Operators will receive training on the lessons learned from this event.

E. Safety Analysis

The safety analysis for a LOCA initiating from Mode 1 plant conditions credits three ECCS CLAs being available to function to inject borated water into the RCS. For the limiting large-break LOCA case, the safety analysis assumes that the contents of one CLA are spilled through the break, and that injection from the remaining two ECCS CLAs provides replenishment of RCS inventory to provide cooling to the reactor core. However, in consideration of the actual plant conditions at the time of the event, adequate core decay heat removal and RCS inventory replenishment would have been available to successfully mitigate a postulated LOCA with the CLAs isolated. At the time of the event, the plant was in Mode 3 after being in hot standby (Mode 3) for approximately 30 hours following a reactor trip on December 16, 2020, from normal RCS operating temperature and pressure. Given these initial conditions, the decay heat load during the event was lower than the limiting Mode 3 LOCA analysis performed by the Pressurized Water Reactor Owners Group (PWROG) which assumes the CLAs are not available. Furthermore, the PWROG analysis for LOCAs in Mode 3 credits one ECCS subsystem train, consisting of one ECCS centrifugal charging pump, one RHR pump, and one RHR heat exchanger. During the event, both ECCS subsystem trains were operable and available to function to provide injection to the RCS, as required by HNP TS. The availability of RCS injection from a second ECCS subsystem train would provide a risk benefit for the potential consequences of the inability to inject to the RCS from the ECCS CLAs, but is not credited in the deterministic PWROG Mode 3 analysis. In a probabilistic risk assessment (PRA) of the event, it was assumed that all three CLAs were unavailable to inject into the RCS for a 15-minute duration at full power conditions, which bounds the risk impact of this event in Mode 3. The PRA results indicate that this event was of very low risk significance. This condition had no impact on the health and safety of the public.

F. Additional Information

There have been no events similar to the event documented in this LER in the past three years.