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10 CFR 50.73

June 30, 2022  
Serial: RA-22-0184

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 2022-004-00

Ladies and Gentlemen:

Duke Energy Progress, LLC, submits the enclosed Licensee Event Report 2022-004-00 in accordance with 10 CFR 50.73 for Shearon Harris Nuclear Power Plant, Unit 1 (HNP). This report describes an event in which HNP was in Mode 1 and both trains of high head safety injection (HHSI) were inoperable for a brief period of time. 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 Dennis Earp at (984) 229-2673.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. Hoffman', with a long horizontal flourish extending to the right.

David S. Hoffman

Enclosure: Licensee Event Report 2022-004-00

cc: C. Smith, NRC Resident Inspector, HNP  
M. Mahoney, NRC Project Manager, HNP  
NRC Regional Administrator, Region II



# **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

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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](mailto:Infocollections.Resource@nrc.gov), and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk all: [oir\\_submission@omb.eop.gov](mailto:oir_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 Shearon Harris Nuclear Power Plant, Unit 1	2. Docket Number 05000 400	3. Page 1 OF 4
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4. Title  
Both Trains of High Head Safety Injection Inoperable

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	02	2022	2022	- 004 -	00	06	30	2022		05000
									Facility Name	Docket Number
										05000

9. Operating Mode 1	10. Power Level 100
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## **11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)**

<input type="checkbox"/> 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 checked="" type="checkbox"/> 50.73(a)(2)(v)(A)	<b>10 CFR Part 73</b>
<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)	<b>10 CFR Part 21</b>	<input checked="" 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)	<b>10 CFR Part 50</b>	<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 Dennis Earp, Regulatory Affairs Engineer	Phone Number (Include area code) (984) 229-2673
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## **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

## **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 2, 2022, at 02:26 Eastern Daylight Time, with Shearon Harris Nuclear Power Plant, Unit 1 (HNP), in Mode 1 at 100 percent power, testing was being performed in accordance with site procedure OST-1093, "Chemical Volume Control System/ Safety Injection System Operability Train B." When Charging Safety Injection Pump (CSIP) discharge cross-connect valve 1CS-220 was stroked closed, the Main Control Room (MCR) received alarm ALB-008/2-1, Reactor Coolant Pump (RCP) seal injection low flow, and seal injection flow was lowering to zero. Valve 1CS-220 was immediately restored to the open position and seal injection flows recovered to normal within approximately 23 seconds. Further investigation identified that the 'B' CSIP discharge valve, 1CS-197, was locked shut from prior post-maintenance testing instead of being in its required open position, the result of not validating assumptions related to a 'B' CSIP clearance. With 1CS-197 locked shut when 1CS-220 was stroked closed, both 'A' Train high head safety injection (HHSI) and 'B' Train HHSI were inoperable until 1CS-220 could be restored to open. This was a violation of Technical Specification (TS) requirements to have at least one CSIP operable to meet TS 3.1.2.2, TS 3.1.2.4, and TS 3.5.2 in Modes 1, 2, and 3. If a condition occurred that initiated a safety injection signal while 1CS-220 was closed in accordance with test procedure OST-1093, an operator in the MCR would procedurally restore the valve to its open position, restoring the 'A' CSIP and its discharge path for the Emergency Core Cooling System to operable. This event did not impact plant safety and there was no actual safety consequence on the health and safety of the public as a result of this event.

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

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Shearon Harris Nuclear Power Plant, Unit 1	05000-400	2022	004	00

**NARRATIVE**

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

**A. Background**

Prior to the event, Shearon Harris Nuclear Power Plant, Unit 1 (HNP), was operating in Mode 1 at approximately 100 percent power, following recovery from a manual reactor trip on April 29, 2022, due to lowering condenser vacuum.

At the time of the event, the 'B' Charging Safety Injection Pump (CSIP)[P] discharge isolation valve 1CS-197 [ISV] was shut instead of being in its required open position. No other structures, systems, or components were inoperable at the time that contributed to the event.

This event is reportable per 10 CFR 50.73(a)(2)(i)(B) as "any operation or condition which was prohibited by the plant's Technical Specifications," and 10 CFR 50.73(a)(2)(v) as "any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: (A) shut down the reactor and maintain it in a safe shutdown condition;" and "(D) mitigate the consequences of an accident," due to both the 'A' CSIP and 'B' CSIP being inoperable concurrently, which subsequently rendered both trains of high head safety injection (HHSI)[BQ] in the Emergency Core Cooling System (ECCS) inoperable.

The ECCS consists of multiple water reservoirs and redundant flow paths to provide emergency borated cooling water directly to the Reactor Coolant System (RCS) [AB] subsequent to a loss of coolant accident (LOCA), main steam line break, or other event affecting RCS inventory. The primary function of the ECCS is to remove the stored and fission product decay heat from the reactor core during accident conditions. This system functions in conjunction with the Residual Heat Removal (RHR) System [BP] as low head safety injection [BP] and the Chemical Volume and Control System (CVCS)[CB] as HHSI. The high head pumps deliver flow through the boron injection tank [TK] to the RCS.

HNP Technical Specification (TS) 3.1.2.4 requires at least two CSIPs to be operable in Modes 1, 2, and 3. With only one CSIP operable, the site must restore at least two CSIPs to operable status within 72 hours or in accordance with the Risk-Informed Completion Time Program or be in at least hot standby and borated to a shutdown margin as specified in the Core Operating Limits Report (COLR) at 200°F within the next 6 hours. Furthermore, at least two CSIPs must be restored to operable status within the next 7 days or be in hot shutdown within the next 6 hours.

HNP TS 3.1.2.2 requires at least two of the following three boron injection flow paths to be operable in Modes 1, 2, and 3: a) the flow path from the boric acid tank via a boric acid transfer pump and a CSIP to the RCS; and b) two flow paths from the refueling water storage tank via CSIPs to the RCS. With only one of the above required boron injection flow paths to the RCS operable, the site must restore at least two boron injection flow paths to the RCS to operable status within 72 hours or in accordance with the Risk-Informed Completion Time Program or be in at least hot standby and borated to a shutdown margin as specified in the COLR at 200°F within the next 6 hours. Furthermore, at least two flow paths must be restored to operable status within the next 7 days or be in hot shutdown within the next 6 hours.

HNP TS 3.5.2 requires two independent ECCS subsystems to be operable in Modes 1, 2, and 3, with each subsystem comprised of: a) one operable CSIP; b) one operable RHR heat exchanger; c) one operable RHR pump; and d) an operable flow path capable of taking suction from the refueling water storage tank on a Safety Injection signal and, upon being manually aligned, transferring suction to the containment sump during the recirculation phase of operation. With one ECCS subsystem inoperable, the site must restore the inoperable subsystem to operable status within 72 hours or in accordance with the Risk-Informed Completion Time Program or be in at least hot standby within the next 6 hours and

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**NARRATIVE**

in hot shutdown within the following 6 hours.

**B. Event Description**

On May 2, 2022, at 02:26 Eastern Daylight Time (EDT), during partial performance of OST-1093, "Chemical Volume Control System/Safety Injection System Operability Train B," CSIP discharge cross-connect valve 1CS-220 [V] was stroked closed. When 1CS-220 stroked closed, the Main Control Room (MCR) received alarm ALB-008/2-1 [ALM], Reactor Coolant Pump (RCP) seal injection low flow, and seal injection flow was lowering to zero. Valve 1CS-220 was immediately restored to open and seal injection flows recovered to normal within approximately 23 seconds. Further investigation identified that the 'B' CSIP discharge valve, 1CS-197, was locked shut from prior post-maintenance testing instead of being in its required open position.

With 1CS-197 locked shut when 1CS-220 was stroked closed, both 'A' Train HHSI and 'B' Train HHSI were inoperable until 1CS-220 could be restored to open. This was a violation of TS requirements to have at least one CSIP operable to meet TS 3.1.2.2, TS 3.1.2.4, and TS 3.5.2 in Modes 1, 2, and 3.

**C. Causal Factors**

A review of previous work activities, as well as the restoration sequence, was performed as a result of this event. On April 24, 2022, a clearance was authorized to be hung for planned CSIP maintenance, with the checklist to be performed in conjunction with plant procedure OP-107.03, "CVCS Fill, Vent, and Maintenance Activities," Section 8.10, "Placing 'B' CSIP Under Clearance for Maintenance with Known Isolation Boundary Leakage." OP-107.03 Section 8.10 was maintained as an open procedure during the 'B' CSIP maintenance window. The final clearance lift checklist was started on dayshift April 28, 2022. This restoration sequence was interrupted early on April 29, 2022, when the reactor was manually tripped, due to lowering condenser vacuum. The procedure was suspended while the plant was stabilized, and post-trip actions were performed. In preparation for the clearance lift, the clearance and OP-107.03 Section 8.10.2 were reviewed by the dayshift crew on April 29, 2022, and an incorrect determination was made that the remaining steps in OP-107.03 Section 8.10.2 to remove gauges and perform the valve lineup closeout section (OP-107.03 Section 8.10.3), could be performed in parallel with the remaining items on the clearance lift. However, the clearance was written specifically to perform the remaining steps in OP-107.03 Section 8.10.2 (to complete the remaining 'B' CSIP fill and vent steps including Section 8.10.3), which would have opened 1CS-197. The clearance lift checklist was written to be performed in order, ensuring each step was performed and then signed off.

The open procedure OP-107.03 Section 8.10.2 was reviewed, but Section 8.10.3 was not, which was required to be completed and signed for. This is contrary to Duke Energy fleet procedure AD-HU-ALL-0004, "Procedure and Work Instruction Use and Adherence," which states the performer initials for the step after the step has been performed. The proper action would have been to complete OP-107.03 Section 8.10.2 before signing the clearance comment tag. Distractions from the post-trip recovery actions contributed to staff looking for an opportunity to perform clearance steps in parallel with OP-107.03 and assumptions were not validated prior to moving forward with the 'B' CSIP clearance.

Additionally, it was found that performance of the pump pre-start checks were not performed in accordance with the standard pre-start checks detailed in Duke Energy fleet procedure AD-OP-ALL-1000, "Conduct of Operations." Instead, pump specific pre-start checklists were solely utilized, which typically contain many of the generic requirements, rather than referencing the general equipment manipulation section of the fleet procedure. The CSIP pre-start checklist did not include actions to check suction and discharge valve lineup, which is contrary to the standard listed in the fleet procedure.

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**NARRATIVE****D. Corrective Actions**

Valve 1CS-220 was immediately restored to open and seal injection flows recovered to normal. This was followed by the restoration of the 'B' CSIP valve lineup in accordance with procedure. Human performance accountability actions have been implemented, emphasizing the importance of signing for steps only when complete. Furthermore, a standing instruction was issued to require reviewing all completed procedure sections, prior to signing off "Ready to Work" or "Tags Removed" status on a clearance. All pre-start checklists that lack a requirement to check manual suction and discharge valves will be revised to align with the standard contained in fleet procedure AD-OP-ALL-1000.

**E. Safety Analysis**

If a condition occurred that initiated a safety injection signal while 1CS-220 was closed in accordance with test procedure OST-1093, an operator in the MCR would procedurally restore the valve to its open position, restoring the 'A' CSIP and its discharge path for ECCS to operable. The action to open the valve is contained within a procedure and it is a single uncomplicated action. Emergency operating procedure EOP-E.0, "Reactor Trip or Safety Injection," contains further administrative barriers to ensure the ECCS would have performed its safety function in the event the system was required to mitigate the occurrence of a design basis event during the test. In this particular instance on May 2, 2022, the operator restored the valve to its open position within approximately 23 seconds, which is within the ECCS response times (time from safety injection to time ECCS flow reaches cold legs) for both small break and large break LOCAs, and a steam line break at hot zero power (29 seconds, 29 seconds, and 27 seconds, respectively). Therefore, this event did not significantly impact plant safety and there was no actual safety consequence on the health and safety of the public as a result of this event.

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.

**F. Additional Information**

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