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10 CFR 50.73

NLS2021068  
December 27, 2021

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

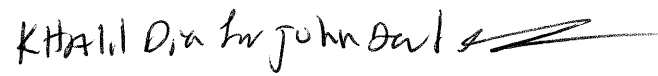
Subject: Licensee Event Report No. 2021-003-00  
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this correspondence is to forward Licensee Event Report 2021-003-00.

There are no regulatory commitments contained in this letter.

Sincerely,

  
John Dent, Jr.  
Vice President and  
Chief Nuclear Officer

/jo;mu

Attachment: Licensee Event Report 2021-003-00

cc: Regional Administrator w/attachment USNRC - Region IV	NPG Distribution w/attachment
Cooper Project Manager w/attachment USNRC - NRR Plant Licensing Branch IV	INPO Records Center w/attachment via IRIS entry
Senior Resident Inspector w/attachment USNRC - CNS	SORC Chairman w/attachment
SRAB Administrator w/attachment	CNS Records w/attachment



**LICENSEE EVENT REPORT (LER)**

(See Page 3 for required number of digits/characters for each block)

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<b>1. Facility Name</b> Cooper Nuclear Station	<b>2. Docket Number</b> 05000 298	<b>3. Page</b> 1 OF 4
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**4. Title**  
Failure of High Pressure Coolant Injection Flow Indicating Switch Results in Condition Prohibited 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
10	28	2021	2021	- 003 -	00	12	27	2021	N/A	
									Facility Name	Docket Number
									N/A	

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

<b>10 CFR Part 20</b>	<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 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)	

Other (Specify here, in Abstract, or in NRC 366A).

**12. Licensee Contact for this LER**

Licensee Contact Linda Dewhirst, Regulatory Affairs and Compliance Manager	Phone Number (Include Area Code) (402) 825-5416
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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
B	BJ	PDS	I204	Y	N/A	N/A	N/A	N/A	N/A

<b>14. Supplemental Report Expected</b>				<b>15. Expected Submission Date</b>		
<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date)			Month	Day	Year
				N/A	N/A	N/A

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

On October 28, 2021, the High Pressure Coolant Injection (HPCI) Flow Indicating Switch (FIS) (HPCI-FIS-78) failed to trip prior to exceeding the Technical Specification Limiting Condition for Operation 3.3.5.1 (Emergency Core Cooling System (ECCS) Instrumentation) Function 3.f (HPCI Pump Discharge Flow-Low (Bypass)) during the performance of the surveillance procedure.

The cause of the failure was determined to be a shift in setpoint due to the initial over-range conditions experienced on September 14, 2021, by a new FIS that had been installed on July 27, 2021. The initial shift in setpoint due to over-range operation is a previously unpublished characteristic of Barton 289A switches, not identified in any Vendor literature or Industry Operating Experience.

The As Found trip value would not have prevented the HPCI pump from performing its required functions. There was not an impact on nuclear safety, plant reliability, radiological safety, or industrial safety. Corrective actions completed were HPCI-FIS-78 was calibrated within As Left Tolerance (ALT), followed by the application of an over-range pressure equivalent to HPCI full flow for 45 minutes, and then tested once again and found to be within ALT. The remaining corrective actions are to revise the associated Vendor Manual and Maintenance procedure with respect to initial set-up for switches used in over-range applications.



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

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Cooper Nuclear Station	05000- 298	YEAR	SEQUENTIAL NUMBER	REV NO.
		2021	- 003	- 00

**NARRATIVE**

**PLANT STATUS**

Cooper Nuclear Station (CNS) was in Mode 1, Power Operation, at 100 percent power, when the event was discovered; i.e., October 28, 2021. No other equipment was inoperable or non-functional that contributed to this event.

**BACKGROUND**

Technical Specifications Bases for Limiting Condition for Operation (LCO) 3.3.5.1 (Emergency Core Cooling System (ECCS) Instrumentation), Function 3.f (High Pressure Coolant Injection (HPCI) Pump Discharge Flow-Low (Bypass)) states that the HPCI [EIS: BJ] minimum flow instrument [EIS: PDS] is provided to protect the HPCI pump [EIS: P] from overheating when the pump is operated at reduced flow. The HPCI minimum flow line valve [EIS: V] is opened when low flow is sensed and either 1) the pump is on, or 2) the system has initiated; and the valve is automatically closed when the flow rate is adequate to protect the pump.

One Flow Switch (i.e., HPCI-FIS-78) [EIS: BJ, PDS] is used to detect the HPCI Pump flow rate. HPCI-FIS-78 contains two internal switches that provide open and close permissive signals to the HPCI minimum flow (bypass) valve. On low system flow, HPCI-FIS-78 Switch #1 provides the low flow permissive signal to open the HPCI minimum flow (bypass) valve to protect the HPCI pump from overheating (Function 3.f : Allowable Value (AV)  $\geq$  490 gpm). The AV is established high enough to ensure that the HPCI pump flow rate is sufficient to protect the pump.

Once system flow is adequate to protect the pump, HPCI-FIS-78 Switch #2 provides a permissive signal to close the HPCI minimum flow (bypass) valve. The HPCI minimum flow (bypass) valve is required to close to achieve the Technical Specification required ECCS injection flow for HPCI ( $\geq$  4250 gpm), but is not required to close to achieve the ECCS flow assumed [EIS: BJ] in the analyzed transients that require HPCI injection ( $\geq$  3825 gpm). Therefore, this instrument does not have a Technical Specifications AV associated with the HPCI minimum flow (bypass) valve closure.

**EVENT DESCRIPTION**

HPCI-FIS-78 was replaced on July 27, 2021, with a new Barton 289A Flow Indicating Switch (FIS) and was satisfactorily calibrated using station procedures. Then, on September 14, 2021, a surveillance procedure was performed to test the HPCI pump to ensure that it can produce its Technical Specifications required flow of  $\geq$  4250 gpm. However, the surveillance procedure did not functionally test HPCI-FIS-78.

On October 28, 2021, at 12:08 Central Time, with the plant operating at 100% Power in Mode 1, the HPCI-FIS-78 Switch #1 failed to trip prior to exceeding the Technical Specifications LCO 3.3.5.1 Function 3.f, AV of  $\geq$  490 gpm during the performance of the calibration procedure for HPCI-FIS-78. HPCI-FIS-78 Switch #1 tripped at 473.5 gpm decreasing.



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On October 29, 2021, the vendor for the Barton 289A FIS (Cameron) was contacted to discuss the excessive shift in setpoint. The Cameron Engineering Manager determined that since this FIS is installed in an application where it would be over-ranged in one direction during normal operation, the FIS would experience a shift in the setpoint the first time the FIS was over-ranged due to the bellows in the Differential Pressure Unit (DPU) taking an inelastic set. The vendor went on to state that once the DPU bellows were set, the setpoint performance would be expected to be stable.

On October 29, 2021, HPCI-FIS-78 was calibrated satisfactorily, and then on October 31, 2021, HPCI-FIS-78 additional testing was performed to verify setpoint stability. This testing verified that Switch #1 of HPCI-FIS-78 was initially within As Found Tolerance (AFT), and then the FIS was subjected to an over-range pressure equivalent to rated HPCI pump flow (4250 gpm) for a minimum of 45 minutes to simulate normal operating conditions. After the simulation of normal over-range conditions, the calibration of the FIS was then tested again. HPCI-FIS-78 Switches #1 and #2 were both found to be within As Left Tolerance (ALT) limits, and HPCI-FIS-78 was declared Operable.

**BASIS FOR REPORT**

CNS is reporting this event as an operation or condition prohibited by plant TS per 10 CFR 50.73(a)(2)(i)(B), and also as a condition that could have prevented fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident as defined under 10 CFR 50.73(a)(2)(v)(D).

An engineering review was performed for Loss of Safety Function and it documented that the HPCI-FIS-78 Switch #1 As Found trip value of 473.5 gpm would not have prevented fulfillment of the safety function of the HPCI system. The evaluation determined that this As Found trip value would not be expected to cause any change in HPCI system performance or cause damage to the HPCI pump.

Based on the engineering review, this event will not be counted as a Safety System Functional Failure for the Nuclear Regulatory Commission performance indicator since no actual loss of safety function occurred.

**SAFETY SIGNIFICANCE**

The condition was non-consequential. The As Found trip value of 473.5 gpm would not have prevented the HPCI pump from performing its required functions. There was not an impact on nuclear safety, plant reliability, radiological safety, or industrial safety.

**CAUSE**

The cause of the failure was determined to be a shift in setpoint due to the initial over-range experienced by the newly installed FIS during HPCI pump testing on September 14, 2021. HPCI-FIS-78 is a Barton 289A FIS with a calibrated range of 0 - 1000 gpm and a maximum allowable working pressure of 3000 psi. The HPCI system is designed to have a flow of  $\geq 4250$  gpm, which results in the FIS being over-ranged every time the HPCI pump is operated, but maintaining the pressure well below the maximum allowable working pressure of 3000 psi.



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The initial shift in setpoint due to over-range operation is a previously unpublished characteristic of Barton switches that has not been identified in any Vendor literature or Industry Operating Experience.

**CORRECTIVE ACTIONS**

HPCI-FIS-78 was calibrated within ALT, followed by the application of an over-range pressure equivalent to HPCI full flow for 45 minutes, and then tested once again and was found to be within ALT. This testing confirmed that both switches tripped within ALT limits and the switches had not been affected by the over-range conditions, confirming that the subsequent over-range did not affect setpoint performance.

The remaining corrective actions have been entered into CNS's corrective action program:

1. Revise Instrument and Control procedure for calibrating Barton Differential Pressure Indicating Switches to add steps to over-range new instruments during setup if the instrument is normally over-ranged during service.
2. Update Barton 289A vendor manual (VM 1733) with information received from Cameron describing the initial over-range effect on the setpoint.

**PREVIOUS EVENTS**

None.