Exelon Generation®

SVP-22-004 10 CFR 50.73

January 26, 2022

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

Quad Cities Nuclear Power Station, Unit 1
Renewed Facility Operating License No. DPR-29
NRC Docket No. 50-254

Subject: Licensee Event Report 254/2022-001-00 "High Pressure Coolant Injection System Inoperable due to Gland Seal System Malfunction"

Enclosed is Licensee Event Report 254/2022-001-00 "High Pressure Coolant Injection System Inoperable due to Gland Seal System Malfunction," for Quad Cities Nuclear Power Station, Unit 1.

This report is submitted in accordance with 10 CFR 50.73(a)(2)(v)(D) for an event or condition that could have prevented the fulfillment of a safety system needed to mitigate the consequences of an accident.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this report, please contact Sherrie Grant at (309) 227-2800.

Respectfully,

Brian Wake
Site Vice President
Quad Cities Nuclear Power Station

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station

NRC FORM 366 (08-2020) | U.S. NUCLEAR REGULATORY COMMISSION | APPROVED BY OMB: NO. 3150-0104 | EXPIRES: 08/31/2023

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
Quad Cities Nuclear Power Station Unit 1	05000 - 254	1 OF 4

4. Title
High Pressure Coolant Injection System Inoperable due to Gland Seal System Malfunction

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	01	2021	2022	- 001 -	00	01	26	2022	n/a	05000
									Facility Name: n/a	Docket Number: 05000

9. Operating Mode	10. Power Level
1 - Run	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)
Richard Swart	309-227-2810

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
X	BJ	LS	M040	Y		B	EJ	RLY	E062	Y

14. Supplemental Report Expected		15. Expected Submission Date	Month	Day	Year
☒	☐ Yes (If yes, complete 15. Expected Submission Date)				

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

On December 1, 2021, Unit 1 was at 100% power with a High Pressure Coolant Injection (HPCI) surveillance in progress. HPCI was declared inoperable at 1809 per the surveillance instructions. With HPCI running at rated speed, Main Control Room alarms were received for the HPCI Gland Exhauster at 1843. At 1847, Operators in the plant reported smoke and acrid odors from cubicles at a Motor Control Center (MCC) associated with Unit 1 HPCI and the Gland Exhauster. Operations aborted the surveillance and placed HPCI in Trip/Latch, and subsequently closed steam supply isolation valves to HPCI making it unavailable for automatic operation.

The causes of this event are the failure of a level switch in the HPCI Gland Seal Condenser (GSC) Hotwell and a failed thermal overload for the HPCI Gland Exhauster motor. Immediate corrective actions were to electrically isolate the faulted Gland Exhauster and to restore the system to a normal standby line up. Subsequent actions included replacement of the level switch and thermal overload.

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(v)(D) for an event or condition that could have prevented the fulfillment of a safety system needed to mitigate the consequences of an accident.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Quad Cities Nuclear Power Station Unit 1	05000- 254	2021	- 001	- 00

NARRATIVE

PLANT AND SYSTEM IDENTIFICATION

General Electric – Boiling Water Reactor, 2957 Megawatts Thermal Rated Core Power

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

EVENT IDENTIFICATION

High Pressure Coolant Injection System Inoperable due to Gland Seal System Malfunction

CONDITION PRIOR TO EVENT

Unit: 1 Event Date: December 1, 2021 Event Time: 1847 CST

Reactor Mode: 1 Mode Name: Run Power Level: 100%

No structures, systems or components were inoperable at the start of this event that contributed to the event.

A. DESCRIPTION OF EVENT

On December 1, 2021, Unit 1 was operating at 100% power. Unit 1 High Pressure Coolant Injection (HPCI)[BJ] quarterly operability testing was in progress and had progressed to the point where Unit 1 HPCI was declared INOPERABLE at 1809.

At 1843, the Main Control Room (MCR) received a HPCI MOTOR OVERLOAD alarm, indicating a motor overload condition for the Unit 1 HPCI Gland Exhauster. At 1847, Operators in the plant reported smoke and acrid odor coming from multiple cubicles at 250VDC MCC [EJ] 1A. (This Motor Control Center (MCC) is the power supply for the Unit 1 HPCI Gland Exhauster.) Concurrently, Operators in the Unit 1 HPCI Room reported acrid odor and smoke coming from the vicinity of the Unit 1 HPCI Front Standard.

Unit 1 operators aborted the surveillance, and the Unit Supervisor directed Unit 1 HPCI taken to 'Trip/Latch' at 1847 hours. By placing Unit 1 HPCI in 'Trip/Latch', the system was in a condition that could have prevented the fulfillment of a safety function needed to mitigate the consequences of an accident; therefore, this condition is reportable per 10 CFR 50.72(b)(3)(v)(D). An Event Notification Sheet (ENS) #55619 was transmitted to the NRC at 2358.

Steam supply to HPCI was also isolated at 1853. The Gland Exhauster was electrically isolated, supply steam was reestablished and the HPCI stand-by lineup was completed by 2110. HPCI was declared operable at 2110. HPCI was unavailable for automatic initiation for 1 hour 27 minutes.

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The Unit 1 Reactor Core Isolation Cooling (RCIC) system and the Unit 1 Automatic Depressurization System (ADS) remained Operable throughout the event. There was no impact on the health and safety of the public or plant personal.

B. CAUSE OF EVENT

The cause of the event was attributed to two equipment malfunctions: a failed level switch in the Unit 1 HPCI Gland Seal Condenser Hotwell, and a failed thermal overload for the Unit 1 HPCI Gland Exhauster motor.

The high-level limit switch in the Gland Seal Condenser (GSC) Hotwell suffered age-related degradation which resulted in a failure of the Unit 1 HPCI GSC Condensate pump to actuate on high level. As water level increased in the Unit 1 HPCI GSC, water eventually impinged on the Unit 1 HPCI Gland Exhauster and overloaded the associated motor. Under these high current conditions, the Unit 1 Gland Exhauster's motor (located in the Unit 1 HPCI Room) and the associated motor overloads (located in a cubicle at 250VDC MCC 1A) underwent thermal events that generated a significant quantity of smoke and acrid odor.

Continued operation of the Unit 1 HPCI Turbine under these conditions could have presented an industrial safety hazard to plant personnel in the vicinity of the Turbine or the MCC 1A. This hazard was eliminated by tripping Unit 1 HPCI Turbine and preventing a subsequent initiation while personnel were in the immediate vicinity.

C. SAFETY ANALYSIS

System Design

The HPCI system is designed to ensure that adequate core cooling takes place for all break sizes less than those for which Low Pressure Coolant Injection (LPCI) or Core Spray systems can adequately protect the core without assistance from other engineered safety features. Based on previous analysis the HPCI system's safety-related mission time is 10-minutes.

The purpose of the HPCI GSC sub-system is to draw away non-condensable gases and condensate from the HPCI turbine rotor and valve seals during initial start-up and to keep steam from being leaked into the HPCI room from the turbine shaft seals. Per previous system assessment, the HPCI turbine can run without a GSC. However, if the GSC were not in operation while the turbine is running, a small amount of steam could leak from the turbine shaft seals into the HPCI room and increase the HPCI room temperature.

Safety Impact

The safety significance of this event is minimal. At the time of the event, Unit 1 was at full power in a normal electric plant lineup with all other means of Reactor Coolant Injection available. Prior to the faults seen with the Unit 1 HPCI GSC sub-system, the Unit 1 HPCI Turbine had already demonstrated

NARRATIVE

the ability to meet pressure and flow requirements to perform its required safety-related function within the required time. In the event of a line break less than those requiring LPCI or Core Spray, Unit 1 HPCI would have been able to generate adequate pressure and flow with manual operator action in the Main Control Room. Automatic initiation of HPCI would not have been possible during this event (i.e., during the time Unit 1 HPCI was in "Trip/Latch"). The only impact present was to workers in the immediate vicinity of leaking steam or smoke.

This event is considered a Safety System Functional Failure per NEI 99-02, Revision 7.

D. CORRECTIVE ACTIONS

Immediate:

1. Operations electrically isolated the faulted HPCI Gland Exhauster.
2. Operations restored Unit 1 HPCI to OPERABLE by placing the system in a normal standby lineup at 2110 on 12/1/2021.

Follow up:

1. Replace the faulted level switch for the Unit 1 HPCI Gland Seal Condenser Condensate Pump. (Complete)
2. Replace the faulted motor overloads for the Unit 1 HPCI Gland Exhauster. (Complete)

E. PREVIOUS OCCURENCES

The station events database, LERs and INPO Industry Reporting Information System (IRIS) were reviewed for similar events at Quad Cities Nuclear Power Station. This event was caused by equipment failures causing operations to isolate the HPCI system. No previous occurrences were identified.

F. COMPONENT FAILURE DATA

Level Switch
Manufacturer: Magnetrol
Nomenclature: Tuffy Level Switch
Model/Part Number: 039-5000-400

Thermal Overload Relay
Manufacturer: Eaton / QualTech NP
Nomenclature: Coil, Overload
Model/Part Number: H1029