



SVP-22-040

10 CFR 50.73

July 8, 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 254/2022-002-00 "Low Pressure Coolant Injection Manually Isolated Due To Valve Test Equipment Issue"

Enclosed is Licensee Event Report 254/2022-002-00 "Low Pressure Coolant Injection Manually Isolated Due To Valve Test Equipment Issue," for Quad Cities Nuclear Power Station, Unit 1.

This report is submitted in accordance with 10 CFR 50.73(a)(2)(v)(B) and 10 CFR 50.73(a)(2)(v)(D) for an event or condition that could have prevented the fulfillment of a safety function needed to remove residual heat and to mitigate the consequence of an accident.

There are no regulatory commitments contained in this letter.

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

Respectfully,

A handwritten signature in black ink, appearing to read "Brian Wake", written over a horizontal line.

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



**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> Quad Cities Nuclear Power Station Unit 1	<b>2. Docket Number</b> 05000 - 254	<b>3. Page</b> 1 OF 5
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**4. Title**  
Low Pressure Coolant Injection Manually Isolated Due To Valve Test Equipment Issue

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	10	2022	2022	- 002 -	00	07	08	2022	n/a	05000
									n/a	05000

**9. Operating Mode** 1 - Run      **10. Power Level** 100%

**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 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 checked="" 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 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 NRC 366A).

**12. Licensee Contact for this LER**

<b>Licensee Contact</b> Richard Swart	<b>Phone Number (Include area code)</b> 309-227-2810
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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
X	BO	ISV	L200	Y	n/a				

**14. Supplemental Report Expected**

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

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

On May 10, 2022, with Unit 1 operating at 100% power, motor operated valve (MOV) thrust testing was being performed on Residual Heat Removal (RHR) Low Pressure Coolant Injection (LPCI) valve 1-1001-28B, 1B LPCI Loop Upstream Stop Valve. Inadequate thrust conditions were discovered on this valve, which also serves as a Primary Containment Isolation Valve (PCIV). Technical Specification (TS) 3.6.1.3 Condition A requires that a containment penetration with a degraded valve be manually isolated within 4 hours. Manual closure of the companion PCIV valve 1-1001-29B, 1B LPCI Loop Downstream Stop Valve, including opening of the electrical breaker MCC 18/19-5 Cubicle F1 to the valve, rendered both loops of LPCI incapable of either manual or automatic injection as described in TS 3.5.1 Condition E for two LPCI Subsystems inoperable.

The cause of the low MOV thrust value was found to be insufficient installation bond between the valve stem and the thrust sensor instrument. Thrust was eventually found to be sufficient, but this was not identified prior to the 4 hour TS action requirement. A new sensor was installed, and the valve thrust results were found to be satisfactory. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(v)(B) and 10 CFR 50.73(a)(2)(v)(D) for an event or condition that could have prevented the fulfillment of a safety function needed to (B) remove residual heat and (D) mitigate the consequences of an accident.



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

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Quad Cities Nuclear Power Station Unit 1	05000- 254	2022	- 002	- 00

**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

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

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

**EVENT IDENTIFICATION**

Low Pressure Coolant Injection Manually Isolated Due To Valve Test Equipment Issue

**CONDITION PRIOR TO EVENT**

Unit: 1                      Event Date: May 10, 2022                      Event Time: 1746 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 May 10, 2022, Unit 1 was operating at 100% power. Motor Operated Valve (MOV) [V] diagnostic testing was being performed on Residual Heat Removal (RHR) Low Pressure Coolant Injection (LPCI) [BO] valve 1-1001-28B, 1B LPCI Loop Upstream Stop Valve, when a low thrust was measured at 1359 hours causing the valve to be declared inoperable. Inadequate grease volume was also identified in one chamber of the MOV actuator, which was considered an initial contributor to the insufficient thrust measurement. The grease was later eliminated as a cause or a contributor to this event. This valve is also a Primary Containment Isolation (PCIV) [BD] valve for containment penetration X-013B, resulting in TS 3.6.1.3 Condition A to be entered for a penetration flow path with one PCIV inoperable.

TS 3.6.1.3 Condition A requires that the affected flow path be isolated within 4 hours by use of one closed and de-activated valve. Engineering review of thrust data and grease quantities did not reach a conclusion during the 4 hour window to provide confidence in valve performance. Operations de-activated the affected penetration at 1746 hours by closing the 1-1001-29B, 1B LPCI Loop Downstream Stop Valve, and electrically isolating it by opening breaker [BKR] MCC 18/19-5 Cubicle F1. LPCI Loop Select Logic will determine if LPCI flow is injected into the A or B loop of the Reactor Recirculation (RR) [AD] System depending upon the appropriate accident's line break location. The isolated penetration is part of the injection flow path into the B loop of the RR system with either the A or B loop of LPCI providing injection. Because the LPCI injection path cannot be predicted ahead of an event, this penetration isolation renders both the A and B LPCI loops inoperable, causing entry into TS 3.5.1 Condition E for two LPCI subsystems inoperable.



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**NARRATIVE**

The valve thrust failure investigation concluded that there was no actual MOV thrust deficiency on the 1-1001-28B effecting valve functionality. The measurement and test equipment (M&TE) sensor was not bonded correctly to the valve stem. This cause was not identified until after TS 3.6.1.3 Condition A required isolation of the containment penetration. Following additional troubleshooting and repair activities, post maintenance testing indicated proper performance of both the M&TE sensor and all related MOV performance characteristics. At 1500 on May 11, 2022, the containment penetration was unisolated, and LPCI function was recovered.

The penetration de-activation took place on May 10, 2022 at 17:46 and was recovered on May 11, 2022 at 1500, for a total of twenty-one hours and fourteen minutes that LPCI was unavailable. Isolation of the containment penetration prevented both automatic and manual LPCI functions during this period. Therefore, reportability is required under 10 CFR 50.73(a)(2)(v)(B) and 10 CFR 50.73(a)(2)(v)(D) – “Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: (B) remove residual heat,” and “(D) mitigate the consequences of an accident.”

**B. CAUSE OF EVENT**

The cause of the as-found low thrust was bad data obtained from an insufficient installation bond between the M&TE sensor and the valve stem and not a deficiency with the valve, thus this condition never actually prohibited proper valve performance.

The cause of the containment penetration and LPCI isolation was operator actions in accordance with Technical Specification (TS) requirements during the period that the 1-1001-28B valve performance was not clearly supported.

**C. SAFETY ANALYSIS**

System Design

Valves 1-1001-28B and 1-1001-29B provide both a PCIV function for penetration X-013B, as well as an injection path into the B RR loop for RHR pump low pressure Emergency Core Cooling System (ECCS) subsystem of LPCI to provide core cooling and residual heat removal during accident conditions. These valves receive automatic signals for both the PCIV function as well as the LPCI function and can also be manually controlled from the main control room.

Safety Impact

Actual safety consequences of the event were minimal for both normal operation and design basis event operation based on the availability during this time of all High Pressure ECCS, as well as both loops of Low Pressure ECCS subsystem of Core Spray. The remaining functions of RHR including containment spray and suppression pool cooling remained available despite the loss of the LPCI



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**NARRATIVE**

subsystem ability to inject into RR Loop B. Based on the availability of these additional sources of coolant to the core, the consequences of this event were minimal. There was no impact on the health and safety of the public or plant personal.

This issue was evaluated for a Safety System Functional Failure (SSFF) in accordance with NEI 99-02 and 10 CFR 50.73. Although the failure analysis determined that there was no MOV failure related to the function of the 1-1001-28B valve, the 1-1001-29B valve was still closed and electrically de-activated which resulted in the loss of the manual and automatic function of LPCI. Therefore, reportability under 50.73(a)(2)(v)(B) and 50.73(a)(2)(v)(D) - "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: (B) remove residual heat" and "(D) mitigate the consequences of an accident" is required and this event is a Safety System Functional Failure (SSFF).

**D. CORRECTIVE ACTIONS**

Immediate:

- Operations de-activated the affected penetration by closing the 1-1001-29B and electrically isolating it by opening breaker MCC 18/19-5 Cubicle F1.

Follow up:

- Replaced the M&TE sensor and re-perform the MOV 1-1001-28B As-left diagnostic test satisfactorily. (Complete)
- Procedure and training enhancements to be reviewed for detecting issues with sensor installation or performance issues.

**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 M&TE equipment installation issues that resulted in test data that prompted operations to isolate the LPCI system. No previous occurrences were identified.



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**NARRATIVE**

**F. COMPONENT FAILURE DATA**

Valve 1-1001-29B failed to perform its design function when de-activated by operations.

Failed Equipment: Motor Operated Valve Actuator

Component Manufacturer: Limitorque

Component Model Number: SMB-4

Component Part Number: N/A

This event will be reported to IRIS.

The M&TE sensor was improperly installed but not failed.