



SVP-18-002

10 CFR 50.73

January 5, 2018

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

Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Licensee Event Report 254/2017-004-00, "Unit 1 HPCI Did Not Trip Due to Wear Debris in the Turbine Stop Valve Oil Resetting Solenoid"

Enclosed is Licensee Event Report (LER) 254/2017-004-00, "Unit 1 HPCI Did Not Trip Due to Wear Debris in the Turbine Stop Valve Oil Resetting Solenoid," for Quad Cities Nuclear Power Station, Unit 1.

This report is submitted in accordance with 10 CFR 50.73 (a)(2)(v)(D) which requires the reporting of any event or condition that could have prevented fulfillment of a safety function.

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 "Kenneth Ohr", written over a horizontal line.

Kenneth Ohr
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 (06-2016)		U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB: NO. 3150-0104		EXPIRES: 10/31/2018				
LICENSEE EVENT REPORT (LER) (See Page 2 for required number of digits/characters for each block)											
(See NUREG-1022, R.3 for instruction and guidance for completing this form)											
1. FACILITY NAME Quad Cities Nuclear Power Station Unit 1					2. DOCKET NUMBER 05000254		3. PAGE 1 OF 4				
4. TITLE Unit 1 HPCI Did Not Trip Due to Wear Debris in the Turbine Stop Valve Oil Resetting Solenoid											
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	
11	07	2017	2017	004	00	01	05	2018	Quad Cities Nuclear Power Station Unit 2	05000265	
									FACILITY NAME N/A	DOCKET NUMBER N/A	
9. OPERATING MODE		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)									
1		<input type="checkbox"/> 20.2201(b)			<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)	
		<input type="checkbox"/> 20.2201(d)			<input type="checkbox"/> 20.2203(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(ii)(B)		<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
		<input type="checkbox"/> 20.2203(a)(1)			<input type="checkbox"/> 20.2203(a)(4)			<input type="checkbox"/> 50.73(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(ix)(A)	
		<input type="checkbox"/> 20.2203(a)(2)(i)			<input type="checkbox"/> 50.36(c)(1)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(iv)(A)		<input type="checkbox"/> 50.73(a)(2)(x)	
100		<input type="checkbox"/> 20.2203(a)(2)(ii)			<input type="checkbox"/> 50.36(c)(1)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(v)(A)		<input type="checkbox"/> 73.71(a)(4)	
		<input type="checkbox"/> 20.2203(a)(2)(iii)			<input type="checkbox"/> 50.36(c)(2)			<input type="checkbox"/> 50.73(a)(2)(v)(B)		<input type="checkbox"/> 73.71(a)(5)	
		<input type="checkbox"/> 20.2203(a)(2)(iv)			<input type="checkbox"/> 50.46(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(v)(C)		<input type="checkbox"/> 73.77(a)(1)	
		<input type="checkbox"/> 20.2203(a)(2)(v)			<input type="checkbox"/> 50.73(a)(2)(i)(A)			<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)		<input type="checkbox"/> 73.77(a)(2)(i)	
		<input type="checkbox"/> 20.2203(a)(2)(vi)			<input type="checkbox"/> 50.73(a)(2)(i)(B)			<input type="checkbox"/> 50.73(a)(2)(vii)		<input type="checkbox"/> 73.77(a)(2)(ii)	
					<input type="checkbox"/> 50.73(a)(2)(i)(C)			<input type="checkbox"/> OTHER		Specify in Abstract below or in NRC Form 366A	
12. LICENSEE CONTACT FOR THIS LER											
LICENSEE CONTACT Rachel A. Luebbe – Regulatory Assurance								TELEPHONE NUMBER (Include Area Code) (309) 227-2813			
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT											
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX		
B	BJ	PSV	B070	Y							
14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO						15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR	
								N/A	N/A	N/A	
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) During performance of the High Pressure Coolant Injection (HPCI) Pump Operability Test, the Unit 1 HPCI turbine did not trip when the Remote HPCI Turbine Trip pushbutton was depressed. Operations shut down HPCI by isolating the steam supply valves to trip the HPCI turbine. The Unit 1 HPCI system was declared inoperable, but remained available. The cause was determined to be accumulation of wear debris within the HPCI turbine stop valve oil resetting solenoid valve causing the valve to stick in the energized position. This wear debris was a result of a manufacturing deficiency. The immediate corrective action was to replace the turbine stop valve oil resetting solenoid valve. Follow-up corrective action is to evaluate the preventative maintenance frequency for the HPCI turbine stop valve oil resetting solenoid valve. The safety impact of this condition was minimal. The HPCI system was still available to function, despite the issue with the HPCI Turbine Stop Valve oil resetting solenoid. The event is being reported because HPCI is a single train system and the loss of HPCI could potentially impact the plant's ability to mitigate the consequences of an accident.											

(06-2016)

**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/>)

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, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Quad Cities Nuclear Power Station Unit 1	05000254	2017	- 004	- 00

NARRATIVE**PLANT AND SYSTEM IDENTIFICATION**

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

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

EVENT IDENTIFICATION

Unit 1 HPCI Did Not Trip Due to Wear Debris in the Turbine Stop Valve Oil Resetting Solenoid

A. CONDITION PRIOR TO EVENT

Unit: 1
Reactor Mode: 1

Event Date: November 7, 2017
Mode Name: Power Operation

Event Time: 18:10 hours
Power Level: 100%

B. DESCRIPTION OF EVENT

On November 7, 2017 at 1810 hours, during performance of the quarterly High Pressure Coolant Injection (HPCI) [BJ] Pump Operability test, the Unit 1 HPCI turbine [TRB] failed to trip when the remote HPCI Turbine Trip pushbutton [HS] was depressed. Operations directed the shutdown of the Unit 1 HPCI system by isolating the HPCI steam supply valves [ISV], causing HPCI flow to reduce to 0 GPM. After the isolation was completed, Unit 1 HPCI was declared inoperable but available. There were no other structures, systems or components (SSC) inoperable during this event time period that could have contributed to this event.

After troubleshooting, the internal HPCI stop valve oil resetting solenoid [PSV] was replaced. Following the replacement of the solenoid valve, the HPCI system was declared operable on November 8, 2017 at 2335 hours.

C. CAUSE OF EVENT

The cause of the HPCI turbine failure to trip was determined to be accumulation of wear debris within the HPCI stop valve oil resetting solenoid valve causing the solenoid valve to stick in the energized position. The wear debris was caused by a manufacturing deficiency.

D. SAFETY ANALYSIS**System Design**

According to the Quad Cities Nuclear Power Station (QCNP), Units 1 and 2 Updated Final Safety Analysis Report (UFSAR) Section 6.3.2.3, the HPCI subsystem is designed to pump water into the reactor vessel under Loss of Coolant Accident (LOCA) conditions which do not result in rapid depressurization of the pressure vessel. The loss of coolant might be due to a loss of reactor feedwater or to a small line break which does not cause immediate depressurization of the reactor vessel. The sizing of the HPCI subsystem is based upon providing adequate core cooling during the time that the pressure in the reactor vessel decreases to a value that the Core Spray [BM] subsystem and/or the Low Pressure Coolant Injection (LPCI) [BO] subsystem become effective. The HPCI subsystem is designed to pump 5600 gallons per minute into the reactor vessel within a reactor pressure range of

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Quad Cities Nuclear Power Station Unit 1

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YEAR	SEQUENTIAL NUMBER	REV NO.
2017	- 004	- 00

NARRATIVE

about 1120 pounds per square inch gage (psig) to 150 psig. Initiation of the HPCI subsystem occurs automatically on signals indicating reactor low-low water level or high drywell pressure. HPCI injection into the reactor vessel may be accomplished manually by the operator or without operator action by the HPCI automatic initiation circuitry. HPCI can also operate in a pressure control mode of consuming steam from the reactor vessel without providing full injection into the vessel (down to and including zero injection).

Safety Impact

The safety significance of this event is minimal. The HPCI Turbine Stop Valve would not trip, however this did not impact the injection function of HPCI, until the system was isolated via the steam supply valves. The HPCI steam supply valves would have to be manually opened to allow HPCI to function as an injection system. The HPCI system was declared inoperable but available once the steam supply valves were closed.

Since HPCI is a single train safety system, this notification is being made in accordance with 10 CFR 50.73 (a)(2)(v)(D), Event or Condition that Could Have Prevented Fulfillment of a Safety Function.

Risk Insights

Automatic HPCI trip failure is represented in the Quad Cities Full Power Internal Events (FPIE) PRA model, which includes the HPCI turbine steam stop valve and others to manually control HPCI and prevent level overfill. The accident sequences involved are Automatic Transit without a Scram (ATWS) sequences, for which a HPCI trip failure leads to Boron dilution. ATWS sequences contribute about 3.7% to Core Damage Frequency (CDF). This assessment looks at the oil resetting solenoid valve trip failure. The PRA assessment found that there is minimal risk impact since the changes in CDF and LERF due to the HPCI (mechanical) trip failure are very small.

E. CORRECTIVE ACTIONS

Immediate:

1. Replaced solenoid valve internal to HPCI Turbine Stop Valve and verified proper operation.

Follow-up:

1. Evaluate PM frequency change for Turbine Stop Valve internal solenoid valve replacements. Also evaluate current design for improvement by changing solenoid valve model or manufacturer.

F. PREVIOUS OCCURRENCES

The Station events database, LERs, and INPO Consolidated Event System (ICES) were reviewed for similar events at Quad Cities Nuclear Power Station. This event was attributed to wear debris in the HPCI Turbine Stop Valve oil resetting solenoid valve.

No previous occurrences applicable to the circumstances of this event were identified in this search.

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2017	- 004	- 00

NARRATIVE**G. COMPONENT FAILURE DATA**

Failed Equipment: Solenoid Valve
Component Manufacturer: Barksdale
Component Model Number: Q165A322BBG-1
Component Part Number: N/A

This event has been reported to ICES as Report No. 426159