

10CFR50.73

August 22, 2011

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

Limerick Generating Station, Unit 1  
Facility Operating License No. NPF-39  
NRC Docket No. 50-352

Subject: LER 2011-003-00, Condition That Could Have Prevented the  
Fulfillment of the High Pressure Coolant Injection System  
Safety Function

This Licensee Event Report (LER) addresses a condition that could have prevented the fulfillment of the high pressure coolant injection (HPCI) system safety function. The HPCI turbine control valve failed to fully close when the system was secured following surveillance testing. An inspection identified that the No.1 control valve sub-assembly was degraded to the degree that the HPCI safety function could not be assured.

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(v)(D).

There are no regulatory commitments contained in this letter.

If you have any questions, please contact John Hunter III at (610) 718-3400.

Respectfully,

Original signed by

William F. Maguire  
Vice President - Limerick Generating Station  
Exelon Generation Company, LLC

cc: Administrator Region I, USNRC  
USNRC Senior Resident Inspector, LGS

**LICENSEE EVENT REPORT (LER)**(See reverse for required number of  
digits/characters for each block)

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 Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects.resource@nrc.gov](mailto: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**

Limerick Generating Station, Unit 1

**2. DOCKET NUMBER**

05000352

**3. PAGE**

1 OF 4

**4. TITLE**

High Pressure Coolant Injection System Turbine Control Valve Failed To Fully Close During Testing

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
06	22	2011	2011	- 003 -	00	08	22	2011	FACILITY NAME	DOCKET NUMBER 05000
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)(i)(C)		<input type="checkbox"/> 50.73(a)(2)(vii)		
			<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
10. POWER LEVEL			<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)		<input type="checkbox"/> 50.73(a)(2)(ii)(B)		<input type="checkbox"/> 50.73(a)(2)(vii)(B)		
			<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(ix)(A)		
			<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(iv)(A)		<input type="checkbox"/> 50.73(a)(2)(x)		
			<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)		<input type="checkbox"/> 50.73(a)(2)(v)(A)		<input type="checkbox"/> 73.71(a)(4)		
			<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(v)(B)		<input type="checkbox"/> 73.71(a)(5)		
			<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(v)(C)		<input type="checkbox"/> OTHER		
			<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)		<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)		Specify in Abstract below or in NRC Form 366A		

**12. LICENSEE CONTACT FOR THIS LER**

NAME John G. Hunter III, Manager – Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) 610-718-3400
--	--

**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
D	BJ	V	T129	Y					

**14. SUPPLEMENTAL REPORT EXPECTED**☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

The high pressure coolant injection system turbine control valve failed to fully close as expected when the system was secured following surveillance testing. A subsequent inspection identified that the No.1 control valve sub-assembly was degraded to the degree that the system safety function could not be assured. The cause of the turbine control valve failure to fully close was binding between the pilot venturi valve and the venturi valve guide. The failure of the lifting beam to venturi valve stem anti-rotation pin initiated accelerated wear of the valve assembly parts, which led to intermittent binding of the parts during turbine operation and ultimately fatigue failure of the pilot venturi valve stem. The Unit 1 turbine control valve No. 1 valve sub-assembly was reworked to replace all damaged parts. The procedure that directs periodic inspection of the turbine control valve assembly will be revised to require non-intrusive inspection of No.1 control valve assembly each refueling outage and to require disassembly of the turbine control valve assembly for detailed inspection of all valve sub-assemblies and replacement of any worn or suspect parts at each turbine major inspection.

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Limerick Generating Station, Unit 1	05000352	YEAR	SEQUENTIAL NUMBER	REV NO.	2      OF      4
		2011	-   003   -	00	

**NARRATIVE**

Unit Conditions Prior to the Event

Unit 1 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. There were no structures, systems or components out of service that contributed to this event. The Unit 1 high pressure coolant injection (HPCI) system (EIIS:BJ) was available and post maintenance testing (PMT) was in progress to restore the system to operable status following planned maintenance activities.

Description of the Event

On Wednesday, June 22, 2011, Limerick Unit 1 was operating at 100% power. The PMT for a planned system outage was in progress and required performance of the two-year HPCI Pump Comprehensive Test (ST-6-055-231-1). At the completion of this test the HPCI control valve (FV-056-111) (EIIS:V) failed to close as expected when the auxiliary oil pump was secured. A subsequent inspection of the control valve assembly identified damage to the No.1 control valve sub-assembly that was preventing full travel of the control valve lifting beam.

Unit 1 HPCI was previously declared inoperable and unavailable on Sunday, June 19, 2011, at 2300 hours, for a planned system outage window. The HPCI system was restored to available status on Tuesday, June 21, 2011, at 1614 hours. The HPCI system was secured following the PMT on Wednesday, June 22, 2011, at 0345 hours. Shortly following turbine (EIIS:TRB) shutdown, failure of the control valve to fully close was observed when the auxiliary oil pump was secured. The HPCI system was considered inoperable, but available until a clearance was applied to support troubleshooting and inspection of the control valve assembly and hydraulic system. The HPCI turbine control valve was repaired and the HPCI system was restored to available status on Monday, June 27, 2011 at 0449 hours. The HPCI System was restored to operable status on Monday, June 27, 2011 at 2124 hours following completion of the PMT.

An 8-hour NRC ENS notification was required by 10CFR50.72(b)(3)(v)(D) for a condition that could have prevented fulfillment of the HPCI safety function. The ENS notification (#46979) was completed on Friday, June 23, 2011, at 17:39 ET. This event involved a condition that could have prevented fulfillment of the HPCI safety function. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(v)(D).

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Limerick Generating Station, Unit 1	05000352	YEAR	SEQUENTIAL NUMBER	REV NO.	3      OF      4
		2011	-    003    -	00	

**NARRATIVE**

Analysis of the Event

There was no actual safety consequence associated with this event. The potential safety consequences of this event were minimal. There was no event that required HPCI operation during the affected period. In addition, the RCIC System remained operable during the period when HPCI was unavailable for control valve repair.

Disassembly and inspection of the control valve assembly identified the following damage to the No. 1 control valve:

- 1) Pilot venturi valve stem cap was cracked, but intact.
- 2) Anti-rotation pin provided to prevent rotation of the pilot venturi valve stem relative to the lifting beam was broken or worn to the degree that engagement to the pilot venturi valve stem slot was lost.
- 3) Anti-rotation pin provided to prevent rotation of the pilot venturi valve relative to the venturi valve guide was in place and functional, but excessive clearances were evident allowing rotation between the parts over a limited arc.
- 4) Restricted movement (binding) of the pilot venturi valve relative to the venturi valve guide was evident at certain angular orientations.

An extent of condition inspection on Unit 2 HPCI system was performed to inspect the No. 1 control valve assembly. This inspection identified the following damage to the valve:

- 1) Anti-rotation pin that is installed in the lifting beam to prevent valve stem rotation for the purpose of minimizing wear between the parts was found to be broken or worn to the degree that engagement with the valve stem slot was lost.
- 2) The remaining parts were found to exhibit minor evidence of wear, but were fully functional.

Cause of the Event

Failure of the HPCI turbine control valve to fully close was caused by binding between the pilot venturi valve and the venturi valve guide that did not permit the valve assembly to float freely and self align at certain angular orientations. Failure of the lifting beam to venturi valve stem anti-rotation pin initiated accelerated wear of the valve assembly parts, which led to intermittent binding of the parts during turbine operation and ultimately fatigue failure of the pilot venturi valve stem.

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Limerick Generating Station, Unit 1	05000352	YEAR	SEQUENTIAL NUMBER	REV NO.	4      OF      4
		2011	- 003	- 00	

**NARRATIVE**

Corrective Action Completed

The Unit 1 HPCI turbine control valve No. 1 valve sub-assembly was reworked to replace all damaged parts.

The Unit 2 HPCI control valve was inspected and identified as degraded. The Unit 2 HPCI control valve was repaired and the Unit 2 HPCI system was restored to operable status.

Corrective Action Planned

The procedure for HPCI turbine inspection (M-C-756-001) will be revised to direct inspection of the No. 1 valve sub-assembly during each HPCI turbine minor inspection.

The procedure for HPCI turbine inspection (M-C-756-001) will be revised to require disassembly of the HPCI turbine control valve assembly for detailed inspection of all valve sub-assemblies including non-destructive examination (NDE) of the valve stem to cap transition areas every major turbine inspection.

The results of the completed failure analysis will be reviewed and any additional corrective actions identified.

Previous Similar Occurrences

There were no previous similar occurrences regarding HPCI control valve failure in the prior three years.

Component data:

System: High Pressure Coolant Injection  
 Component: FV-056-111 HPCI Turbine Control Valve  
 Manufacturer: T129 Terry Turbine  
 Model: Turbine Type CCS