

**R. L. Anderson**  
Vice President - Nuclear Operations

**PPL Susquehanna, LLC**  
769 Salem Boulevard  
Berwick, PA 18603  
Tel 570 542.3883 Fax 570.542-1504  
rlanderson@pplweb.com



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U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Mail Station OP1-17  
Washington, DC 20555

**SUSQUEHANNA STEAM ELECTRIC STATION  
LICENSEE EVENT REPORT 50-387/2002-007-00  
PLA-5535**

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**Docket 50-387  
License No. NPF-14**

Attached is Licensee Event Report (LER) 50-387/2002-007-00. This event is reportable per 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications in that the Unit 1 High Pressure Coolant Injection steam exhaust line check valve was determined to be inoperable for a period of time that exceeded Technical Specification specified completion times. The HPCI system's ability to inject flow to the reactor vessel was not affected. Additionally, the penetration's inboard isolation valve remained operable and capable of performing the penetration isolation function. There were no actual consequences to the health and safety of the public as a result of this event.

Richard L. Anderson  
Vice President - Nuclear Operations

Attachment

cc: Mr. H. J. Miller  
Regional Administrator  
U.S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, PA 19406

cc: Mr. S. L. Hansell  
Sr. Resident Inspector  
U.S. Nuclear Regulatory Commission  
P.O. Box 35  
Berwick, PA 18603-0035

IE22

Estimated burden per response to comply with this mandatory information collection request 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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.

# LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME Susquehanna Steam Electric Station - Unit 1	2. DOCKET NUMBER 05000387	3. PAGE 1 OF 3
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4. TITLE  
Operations Prohibited by Technical Specifications Due to Inoperable High Pressure Coolant Injection Check Valve.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
09	03	2002	2002	007	00					05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
	20 2201(b)	20 2203(a)(3)(ii)	50 73(a)(2)(ii)(B)	50 73(a)(2)(ix)(A)
10. POWER LEVEL 100	20 2201(d)	20 2203(a)(4)	50 73(a)(2)(iii)	50 73(a)(2)(x)
	20 2203(a)(1)	50 36(c)(1)(i)(A)	50 73(a)(2)(iv)(A)	73.71(a)(4)
	20.2203(a)(2)(i)	50 36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5) OTHER Specify in Abstract below or in NRC Form 366A 72.75(d)(2)
	20.2203(a)(2)(ii)	50 36(c)(2)	50.73(a)(2)(v)(B)	
	20.2203(a)(2)(iii)	50 46(a)(3)(ii)	50.73(a)(2)(v)(C)	
	20.2203(a)(2)(iv)	50 73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
	20 2203(a)(2)(v) X	50.73(a)(2)(i)(B)	50 73(a)(2)(vii)	
	20 2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
	20 2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50 73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME Eric J. Miller - Nuclear Regulatory Affairs	TELEPHONE NUMBER (Include Area Code) 570 / 542-3321
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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
E	BJ	ISV	A391	Y					

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE		
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO		MONTH	DAY	YEAR

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

On September 3, 2002 with Unit 1 in Mode 1 (Power Operation) at 100% power, the Unit 1 High Pressure Coolant Injection (HPCI) exhaust check valve (155F049) was declared inoperable following Local Leak Rate Testing (LLRT). A review of the system operating history concluded that the valve had likely been inoperable for 135 days prior to the time of discovery. This period exceeds Technical Specification required action completion times developed for Primary Containment Isolation Valves (PCIV). Disassembly revealed that vibration induced degradation of the valve's internal components compromised the valve's ability to check flow. The HPCI system's ability to inject flow to the reactor vessel, however, had not been affected. Additionally, inboard isolation gate valve (HV155F066) remained operable and capable of performing the penetration isolation function. The exhaust check valve has been reworked and satisfactorily tested. The corresponding Unit 2 HPCI exhaust check valve has also been tested and inspected. While the Unit 2 components were found to be in good condition, the valve's resilient seal was replaced as a preventative measure. Exhaust check valves in each Unit's Reactor Core Isolation Cooling system, which comprise all additional valves at the station of similar design and function, were inspected. These inspections did not reveal similar problems. Routine inspection tasks have been developed for all the aforementioned check valves to preclude recurrence of this situation. This event is reportable for Unit 1 as a condition prohibited by Technical Specification 3.6.1.3 per 10CFR50.73(a)(2)(i)(B). There were no actual adverse consequences to other plant equipment or to the health and safety of the public as a result of this event.

**LICENSEE EVENT REPORT (LER)**

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

**EVENT DESCRIPTION**

On September 3, 2002 with Unit 1 in Mode 1 (Power Operation) at 100% power, Local Leak Rate Testing (LLRT) of the Unit 1 High Pressure Coolant Injection (HPCI; EISS Code: BJ) exhaust check valve (155F049) could not be satisfactorily completed as a result of excessive leakage past the valve. The check valve (outboard Primary Containment Isolation Valve; EISS Code: ISV), in conjunction with the inboard Unit 1 HPCI exhaust isolation valve (HV155F066), provides containment isolation between the suppression pool and the Unit 1 HPCI turbine exhaust. The excessive leakage was identified when the LLRT test volume could not be filled to obtain as-found hydrostatic test results in preparation for a planned inspection/corrective maintenance effort on the check valve. Inspection of the valve had been initiated when air was found to be leaking to the suppression chamber through 155F049. Because the inspection/maintenance effort was a pre-planned activity, appropriate Limiting Conditions for Operation and associated compensatory measures were already in place when the valve was discovered to be inoperable. Subsequent disassembly of HPCI check valve 155F049 revealed that the resilient valve seal seat was missing, the retaining ring that held the seal in place was separated from the disc and found to be loose in the valve, and that 12 screws used to hold the retaining ring and resilient seal in place were either damaged or missing.

Although it is probable that the retaining ring screws backed out over an extended period, a successfully performed LLRT in March 2002 suggests that the resilient seal was still in place at that time. Conservative interpretation of HPCI system operational history indicates that the earliest and most likely time the last of the retaining ring screws failed, thus allowing the resilient seal to be swept downstream, was during HPCI overspeed testing or startup testing that was performed during the spring 2002 outage. Accordingly, it has been concluded that the valve was inoperable since the beginning of the 13<sup>th</sup> Fuel Cycle (April 21, 2002) until the time the valve was repaired, reassembled and tested on September 4, 2002, a period of 135 days.

**CAUSE OF EVENT**

The HPCI exhaust line check valve (155F049) chatters at low steam flow. This chattering and associated vibration occurs after each turbine run and during overspeed testing but is not a factor during normal HPCI operating conditions. The stainless steel retaining ring had signs that indicated the screws used to hold it in place were tack welded. Failure of these tack welds, combined with valve vibration during those periods of low steam flow operation, permitted 10 of 12 screws to loosen and back out. The remaining 2 screw shanks were found in place with their screw heads broken off. The apparent cause of the retaining ring displacement and subsequent loss of the resilient seal is attributed to tack weld failure most probably caused by vibration that occurs when the valve disc impacts the seat during low steam flow conditions. Others factors that may have contributed to the tack weld failures include initial weld quality, age, operational thermal expansion cycles and number of vibration/impact cycles. Dissimilar metal of the disc and the retaining ring screws could also have contributed to tack weld stress. The tack weld failures likely occurred over a several year period but remained undetected as successful routine operation of the system and strong LLRT performance had been considered sufficient condition monitoring to forego periodic internal inspections.

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Susquehanna Steam Electric Station - Unit 1	05000387	2002	- 007	- 00	3 OF 3

17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

**ANALYSIS/SAFETY SIGNIFICANCE**

This event is reportable as a condition prohibited by Technical Specifications per 10CFR50.73(a)(2)(i)(B) for Unit 1 in that the Primary Containment Isolation Valve 155F049 was apparently inoperable for a period of 135 days. This period exceeds the action completion times allowed in Technical Specification 3.6.1.3. However, the HPCI Exhaust Line Primary Containment penetration was still able to maintain the Primary Containment Isolation safety function because the inboard isolation gate valve HV155F066 remained operable to complete the isolation as necessary. The as-left LLRT performed on September 4, 2002 fully verified the integrity of this valve. In addition, boroscopic inspection of piping downstream of the check valve did not reveal the presence of any check valve parts that could potentially affect inboard containment isolation valve operation. It has been concluded that missing check valve parts were swept through the inboard isolation valve to the suppression pool during one of several HPCI turbine surveillance runs this year. The small amount of debris that is now in the suppression pool did not, and will not, interfere with HPCI exhaust line isolation or exhaust line sparger function. The debris, by virtue of its limited size and content, will not impact suppression pool functions or ECCS suction strainer capacity, or create adverse consequences to any plant equipment. At no time was the HPCI injection function adversely affected by the condition of the exhaust check valve. There were no actual adverse consequences to the health and safety of the public as a result of this event.

In accordance with guidance in NUREG-1022, Revision 2, the due date for this report is November 4, 2002.

**CORRECTIVE ACTIONS**

Corrective actions that have been completed:

- The Unit 1 HPCI exhaust check valve 155F049 was reworked and satisfactorily tested.
- The Unit 2 HPCI exhaust check valve 255F049 was tested and inspected. Although no problems were identified, the retaining ring, resilient seat and screws (tack welded) were replaced as a precautionary measure. The valve was successfully tested following this maintenance work effort.
- Equipment Reliability Preventive Maintenance tasks (ERPM) have been initiated to perform periodic internal inspections for both the Unit 1 and the Unit 2 HPCI exhaust check valves (155F049 and 255F049).
- Equipment Reliability Preventive Maintenance tasks (ERPM) have been initiated to perform periodic internal inspections for both the Unit 1 and Unit 2 Reactor Core Isolation Cooling (RCIC) exhaust check valves (149F040 and 249F040) which maintain a similar design to the failed HPCI check valve.
- As part of the determination of the extent of condition, both the Unit 1 and Unit 2 RCIC exhaust check valves were tested per the LLRT program and inspected for problems with the resilient seat, set screws and tack welds. No problems were found with those subcomponents. The Unit 2 valve failed the LLRT due to an unrelated problem that will be described in a separate LER.

**ADDITIONAL INFORMATION**

Past Similar Events: None  
 Failed Component: HPCI Exhaust Check Valve 155F049  
 Manufacturer: Anchor Darling Valve Co.  
 Model Number: W8121409 rev. D