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U.S. Nuclear Regulatory Commission  
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SUSQUEHANNA STEAM ELECTRIC STATION  
LICENSEE EVENT REPORT 50-388/01-001-00  
PLA - 5297 FILE R41-2

Docket No. 50-388  
License No. NPF-22

Attached is Licensee Event Report 50-388/01-001-00. This report is being made pursuant to 10CFR50.73(a)(2)(ii). The total Main Steam Line leakage pathway exceeded the Technical Specification maximum pathway limit when the Reactor Core Isolation Cooling system inboard steam supply Primary Containment Isolation Valve failed to close.

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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  
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IE22

## LICENSEE EVENT REPORT (LER)

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

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FACILITY NAME (1) Susquehanna Steam Electric Station - Unit 2						DOCKET NUMBER (2) 05000388			PAGE (3) 1 OF 4		
TITLE (4) Main Steam Line Containment Penetration Maximum Path Leakage Total Exceeded Technical Specification Limit											
EVENT DATE (6)			LER NUMBER (8)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER	
01	31	2001	01	001	00	03	31	2001	FACILITY NAME	DOCKET NUMBER	
OPERATING MODE (9) 1			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)								
POWER LEVEL (10) 100			20.2201(b)			20.2203(a)(3)(ii)			50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
			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)
			20.2203(a)(2)(ii)			50.36(c)(2)			50.73(a)(2)(v)(B)		OTHER
			20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.73(a)(2)(i)(A)			50.73(a)(2)(v)(D)		
			20.2203(a)(2)(v)			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)			X	50.73(a)(2)(ii)(A)			50.73(a)(2)(viii)(B)	
LICENSEE CONTACT FOR THIS LER (12)											
NAME Joseph J. Meter - Nuclear Licensing								TELEPHONE NUMBER (Include Area Code) 570 / 542-1873			
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANU-FACTORER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTORER	REPORTABLE TO EPIX		
X	SB	ISV	L200	Y							
SUPPLEMENTAL REPORT EXPECTED (14)								EXPECTED SUBMISSION DATE (15)		MONTH	DAY
YES (If yes, complete EXPECTED SUBMISSION DATE).								X	NO		
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)											
<p>On January 31, 2001, at 23:30, with Unit 2 in Mode 1 (Power Operation) at 100% power, the Reactor Core Isolation Cooling (RCIC) inboard steam supply Primary Containment Isolation Valve (PCIV) HV249F007 was closed to support planned maintenance work on the Unit 2 RCIC system. The valve failed to close fully and it was determined that the total Main Steam Line (MSL) containment penetration leakage would have exceeded the 300 Standard Cubic Feet per Hour (SCFH) maximum pathway leakage Technical Specification limit. The RCIC outboard steam supply PCIV, HV249F008, was closed and deactivated as required by Technical Specifications. It was determined that high resistance across the HV249F007 valve motor torque switch contacts was preventing the valve from closing fully. A 250 VDC voltage was applied across the motor torque switch contacts via a low current megger and HV249F007 was stroked multiple times to improve the electrical continuity of the motor torque switch contacts. After HV249F007 was confirmed to close fully, a qualitative leak test was performed to ensure that the valve was properly seated. HV249F007 was restored to operable status on 02/08/01. The cause of the high resistance condition was due to grease/oil intrusion from the actuator gear compartments. Electrical resistance across the motor torque switch contacts was periodically measured from 02/08/01 to the start of the current Unit 2 10<sup>th</sup> refueling outage to ensure that the high resistance condition had not recurred. The valve actuator will be overhauled to replace the torque switch and reoriented to reduce grease/oil intrusion. Maintenance practices/requirements will be reviewed for any necessary changes. There was no compromise to the health and safety of the public due to this event since the automatic isolation function of the primary containment penetration was maintained by HV249F008, and the minimum pathway leakage for MSL containment penetrations remained below the Technical Specification limit.</p>											

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

## EVENT DESCRIPTION

On January 31, 2001, at 23:30, with Unit 2 in Mode 1 (Power Operation) at 100% power, a Control Room Operator (licensed) closed the Reactor Core Isolation Cooling (RCIC; EIS Code: BN) inboard steam supply Primary Containment Isolation Valve (PCIV; EIS Code: JM). The inboard PCIV, HV249F007, was closed to depressurize the RCIC steam supply line to support planned maintenance work on the Unit 2 RCIC system. It was expected that the RCIC steam line would depressurize through a steam trap, however, the RCIC steam line remained pressurized. After investigation of the condition, at 02:35 on 02/01/01, a Control Room Operator closed the RCIC outboard steam supply PCIV (HV249F008). The RCIC steam line then depressurized as expected. After Operations shift turnover and discussion of the event, HV249F008 was then deactivated in the closed position at 09:43 on 02/01/01 to comply with Technical Specification 3.6.1.3 Condition A.

Electrical test data for HV249F007 showed that the valve motor current was interrupted when the valve was approximately 93 percent closed. An engineering evaluation of the as found condition concluded that the total Main Steam Line (MSL; EIS Code: SB) containment penetration leakage would have exceeded the 300 Standard Cubic Feet per Hour (SCFH) maximum pathway leakage Technical Specification limit. It was determined that high resistance (greater than 20 mega-Ohms) across the valve motor torque switch contacts was preventing the valve from closing fully. The motor torque switch contacts are in parallel with the bypass limit switch contacts with both sets of contacts closed to provide current to the valve motor while the valve is closing. During normal valve closure, the bypass limit switch contacts open at approximately 93 percent valve closed while the motor torque switch contacts remain closed until the valve is properly seated. With high motor torque contact resistance, current to the valve motor was interrupted when the valve's bypass limit switch contacts opened at approximately 93 percent valve closed. Engineering, Operations and Maintenance personnel then developed a technique to "clean" the motor torque switch contacts by applying an electrical potential with a megger. A voltage of 250 VDC was applied to the torque switch contacts via a megger while the valve motor was bypassed from the circuit. The motor torque switch contact resistance dropped to 3000 Ohms which provided sufficient electrical continuity for HV249F007 to close fully. These results suggested that the torque switch contacts were dirty or oxidized and the applied voltage had cleaned them and improved the electrical conductivity. Measures were taken to ensure that use of the megger did not have a detrimental affect on the torque switch circuit. Subsequent circuit testing allowed the normal operating current to pass through the motor torque switch contacts while the valve motor was bypassed from the circuit. HV249F007 was then stroked several times while monitoring equipment was installed. The torque switch contact resistance had decreased to less than 2 Ohms and remained at that value for multiple valve strokes. No conditions were identified that indicated any problems existed with the internals of HV249F007. Valve motor current and valve stroke times were repeatedly measured to be within normal ranges. Lastly, a qualitative leak test was performed on HV249F007 with satisfactory results. HV249F007 was returned to operable status on 02/08/01.

## CAUSE OF EVENT

The cause for exceeding the MSL maximum pathway leakage limit was the Unit 2 RCIC steam supply line inboard PCIV (HV249F007) failed to fully close on 01/31/01. The cause for HV249F007 to fail to fully close has been attributed to high resistance across the motor torque switch contacts which interrupted

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the current to the valve motor while the valve was closing. The cause for the high resistance condition across the motor torque switch contacts was investigated during the on-going Unit 2 10<sup>th</sup> Refueling and Inspection Outage and was found to be due to grease/oil deposits on the torque switch contacts. Degradation of the seals and gaskets within the valve actuator allowed grease and oil from the gear compartments to enter the torque switch compartment. Orientation of the torque switch compartment with respect to the gear compartments allowed the grease and oil to drip down into the torque switch compartment and onto the torque switch.

## **REPORTABILITY/SAFETY SIGNIFICANCE**

This event was determined to be reportable per 10CFR50.73(a)(2)(ii)(A) as a condition resulting in a degraded principal safety barrier. The Unit 2 RCIC steam supply line is connected to the 'C' main steam line upstream of that line's main steam isolation valves. Therefore, the leakage experienced by the RCIC steam supply line PCIVs is included in the MSL containment leakage totals. An engineering evaluation of the as found condition concluded that the total MSL containment penetration leakage would have exceeded the 300 SCFH maximum pathway leakage Technical Specification limit. However, based on the leakage rate tests of record, the minimum pathway leakage (i.e. leakage that would have actually reached the main condenser) would have been 72 SCFH. This value is below the 300 SCFH analyzed for the main condenser and in the dose calculations.

It is worth noting that the Unit 1 and Unit 2 Technical Specification limits for MSL containment penetration leakage were changed from 300 SCFH maximum pathway leakage to 300 SCFH minimum pathway leakage via amendment on March 9, 2001. Therefore, this event would not be reportable under the new limits.

HV249F007 and HV249F008 are normally open valves that have an automatic closure safety function to isolate the RCIC steam supply line during a steam leak or steam line break event. The automatic isolation function of the primary containment penetration was maintained by HV249F008. The function of both valves to open and allow steam to the RCIC turbine was not affected. Therefore, the RCIC system was capable of performing its function prior to removing it from service for planned maintenance. As such, there were no safety consequences or compromises to the public health and safety as a result of this event.

In accordance with the guidance provided in NUREG-1022, Revision 2, Section 5.1.1, the required submission date for this report is April 2, 2001.

## **CORRECTIVE ACTIONS**

Corrective actions that have been completed are:

- A 250 VDC voltage was applied across the motor torque switch contacts via a low current megger, and HV249F007 was stroked multiple times to improve the electrical continuity of the motor torque switch contacts.

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- Ensured no damage occurred to the valve internals and the electrical circuitry via measurements and testing.
- After HV249F007 was confirmed to close fully, a qualitative leak test was performed to ensure that the valve was properly seated.
- Internal and industry events were reviewed to assess if a generic problem existed with this type of PCIV. No evidence of similar failures was found, which indicates that a generic problem does not exist.
- Electrical resistance across the motor torque switch contacts was periodically measured from 02/08/01 to the start of the Unit 2 10<sup>th</sup> Refueling and Inspection Outage to ensure that the high resistance condition had not recurred.

Corrective actions to be completed are:

- The actuator for HV249F007 will be overhauled during the ongoing Unit 2 10<sup>th</sup> refueling outage which will replace the seals, gaskets, grease and torque switch.
- The orientation of the valve actuator will be changed to reduce the chance of grease/oil intrusion into the torque switch compartment.
- The preventive maintenance practices/requirements for HV249F007 will be evaluated to determine if any changes are needed for HV249F007 specifically, and any other like-in-kind valves in general.

## ADDITIONAL INFORMATION

The events listed below are for the total MSL maximum pathway leak rates exceeding the Technical Specification as-found criteria.

Past Similar Events: LER 97-004-00, Docket No. 388/License No. NPF-22  
LER 99-001-00, Docket No. 388/License No. NPF-22  
LER 99-003-00, Docket No. 387/License No. NPF-14  
LER 00-002-00, Docket No. 387/License No. NPF-14

Failed Component: PCIV, HV249F007

Manufacturer: Limitorque

Model: SMB-00-10