

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Hope Creek Generating Station										DOCKET NUMBER (2) 0 5 0 0 0 0 5 4 1					PAGE (3) OF 0 5										
TITLE (4) Unanticipated Failure of MSIV To Close On Signal - Blocked Port Of Solenoid Valve Operator (Supplemental Report)																									
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)															
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES					DOCKET NUMBER(S)											
0	2	2	4	8	7	8	7	0	1	8	0	1	0	8	3	1	8	7	0	5	0	0	0	0	0
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)																							
3		20.402(b)				20.405(c)				50.73(a)(2)(iv)				73.71(b)											
POWER LEVEL (10)		20.405(a)(1)(i)				50.36(c)(1)				50.73(a)(2)(v)				73.71(c)											
01 01 0		20.405(a)(1)(iii)				50.36(c)(2)				50.73(a)(2)(vii)				OTHER (Specify in Abstract below and in Text, NRC Form 306A)											
		20.405(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(viii)(A)															
		20.405(a)(1)(iv)				50.73(a)(2)(B)				50.73(a)(2)(viii)(B)															
		20.405(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(x)															
LICENSEE CONTACT FOR THIS LER (12)																									
NAME										TELEPHONE NUMBER															
A. M. Ervin, Lead Engineer - Technical										6 0 1 9 3 3 9 - 1 5 1 2 1 5 9															
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC															
SUPPLEMENTAL REPORT EXPECTED (14)												EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR									
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)												<input checked="" type="checkbox"/> NO													

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

On February 24, 1987 at 2230 hours the plant was in OPERATIONAL CONDITION 3 (Hot Shutdown). Work was in progress to isolate and repair several small steam leaks in the steam tunnel. As part of this activity, operators attempted to close the "A" Inboard Main Steam Isolation Valve (MSIV). However the valve failed to close from either the manual control switch signal or when the fused power supply was de-energized. The MSIV was declared inoperable in accordance with Technical Specification 3.4.7.A.1.(B) and the Action Statement was entered. The "A" Outboard MSIV, and the "A" Steam Line Main Steam Stop Valve were closed, isolating the "A" Steam Line as required. The failure of the "A" MSIV to operate is attributed to foreign material in the solenoid cavity between the plunger and the upper orifice. The solenoids in the MSIV Pneumatic Valve Operator have been replaced and MSIV operability has been verified.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/86

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Hope Creek Generating Station	0 5 0 0 0 3 5 4 8 7	—	0 1 8	—	0 1	0 2	OF 0 5

TEXT (If more space is required, use additional NRC Form 365A's) (17)

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)  
Main Steam System (EISS Designation: SB)

IDENTIFICATION OF OCCURRENCE

Unanticipated Failure of MSIV to close on Signal - Blocked Port Of Solenoid Valve Operator (Supplemental Report)

Event Date: 02/24/87

Event Time: 2230

This LER was initiated by Incident Report No. 87-037 and 87-038.

CONDITIONS PRIOR TO OCCURRENCE

The plant was in OPERATIONAL CONDITION 3 (Hot Shutdown). Preparations were being made for the repair of small steam leaks in the Main Steam Tunnel.

DESCRIPTION OF OCCURRENCE

On February 24, 1987 at 2230 hours work was in progress to isolate and repair several small steam Leaks in the steam tunnel. As part of this activity, operators attempted to close the "A" Inboard Main Steam Isolation Valve (MSIV), however the valve failed to close from either the manual control switch signal or when the fused power supply was de-energized. The MSIV was declared inoperable in accordance with Technical Specification 3.4.7.A.1.(B) and the Action Statement was entered. The "A" Outboard MSIV, and the "A" Steam Line Main Steam Stop Valve were closed, isolating the "A" Steam Line as required.

APPARENT CAUSE OF OCCURRENCE

The failure of the "A" MSIV to operate is attributed to the accidental intrusion of a foreign material, most likely a loose seal, in the solenoid valve cavity between the plunger and the upper orifice.

ANALYSIS OF OCCURRENCE

For approximately ten (10) days prior to this occurrence, Operations was aware that the No. 1 Solenoid Valve of the "A" Inboard MSIV was drawing a high mA current. The high current was observed during the performance of a routine I&C surveillance procedure. I&C then investigated this high current further by installing a recorder with a current probe to monitor the Pilot Solenoid Valve Output (Work Order 0099113732). The current was determined to be non-fluctuating.



## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Hope Creek Generating Station	0500035487	—	018	—	01	03	OF 05

TEXT (If more space is required, use additional NRC Form 366A's) (17)

ANALYSIS OF OCCURRENCE CONT'D

Based on these observations, further testing was initiated to determine if an operational problem existed. Power was reduced to a level that would accept a closure of the "A" Inboard MSIV if the suspect coil was not holding. The No. 2 Solenoid was de-energized to test the holding power of the No. 1 Solenoid and the MSIV remained open. At this time it was determined that there was no apparent problem with the "A" Inboard MSIV. The System Engineer confirmed by telecon with the valve manufacturer that the high mA current reading was no apparent problem.

Following the failure of the "A" Inboard MSIV to fast close (slow-close was functional), the investigation intensified and a number of concerns regarding both the "A" Inboard MSIV and the remaining MSIV's were identified. These concerns were:

- o The No. 1 Solenoid Plunger for the "A" Inboard MSIV appeared to be of an undocumented design. In addition, a black deposit of undetermined composition was observed in all three solenoid ports of the "A" Inboard MSIV.
- o The MSIV Electrical Junction Boxes attached to the Solenoid Manifold Assembly appeared not to be mounted in accordance with vendor instructions.
- o The mounting screws for some MSIV's junction boxes were loose.

In response to these findings, plant management pursued a number of parallel investigations. These included verifying the proper installation requirements for the MSIV Electrical Junction Boxes, investigating the root cause for the MSIV failure, and assessing the safety impact of the event.

The review of the Junction Box Installation entailed determining the vendor requirements and possible approved deviations implemented during the construction/installation process. Engineering established that the as found condition of the MSIV junction boxes on February 24, 1986 was indeed fully consistent with the documentation and that design configuration had not been compromised.

The loose screws were secured and returned to seismic design condition. Further evaluation of the impact of the as found condition of the screws has been performed. This evaluation determined that under SSE conditions, the as found junction box mounting deficiency would not have caused a failure of the MSIV.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Hope Creek Generating Station	0500035487	—	018	—01	04	OF 05

TEXT (If more space is required, use additional NRC Form 366A's) (17)

ANALYSIS OF OCCURRENCE CONT'D

Troubleshooting of the "A" Inboard MSIV revealed a plunger which appeared to be of an undocumented design in the No. 1 solenoid assembly. As a result of this finding, the solenoid manifold assembly for the "A" Inboard MSIV and the core and plunger assemblies for the other seven (7) MSIV's were replaced. In addition the solenoid manifold block for the "A" Inboard MSIV and the core and plunger assemblies from all eight (8) MSIV's were sent to GE for analysis on March 6, 1987. GE was tasked with investigating the cause of the failure of "A" Inboard MSIV and determining the source of the undocumented plunger.

On May 7, 1987 GE issued a report of their findings regarding the malfunction of the "A" inboard MSIV. This report contains supporting information from their laboratory and the solenoid valve vendor (Automatic Valve Corp.). The report provides a detailed explanation of the malfunction and contains a review of the damaged solenoid valve plunger. Per this report, GE determined that the plunger was of the original design and that the cause of failure appeared to have been the accidental intrusion of a foreign material in the orifice.

PSE&G engineering had reviewed the GE report and is technically satisfied with GE's explanation of this event. Based on the information contained in this report, PSE&G is satisfied that the MSIV solenoid valves used at Hope Creek do not have a generic problem and that the malfunction was a unique occurrence. This is supported by the fact that the vendor records since 1972 show only one other occurrence of a similar nature in the early 1970's. A further review of internal and nuclear industry experience revealed occurrences at other plants where MSIV's have failed to close. However, investigations into these events found the components involved to be from a different manufacturer.

In assessing the safety significance of the event, the above indicate that the MSIV junction boxes as found design condition was consistent with approved plant documentation. Further, with the failure of the "A" Inboard MSIV having been determined to be the result of an isolated component failure, the occurrence does not present a common mode failure concern. As such, with only one MSIV affected, no loss in safety function (as defined in 10CFR50.73 (a) (2) (v)) occurred. Based on this, the event did not pose a threat to the health and safety of the public. However, in light of the component involved, PSE&G management considered the occurrence appropriate for reporting.



## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

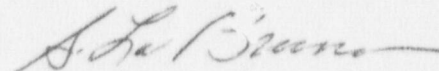
FACILITY NAME (1)  Hope Creek Generating Station	DOCKET NUMBER (2)  0 5 0 0 0 3 5 4 8 7	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		8 7	0 1 8	0 1	0 5	OF 0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

CORRECTIVE ACTIONS

1. As described previously, the damaged solenoid manifold assembly for the "A" inboard MSIV was replaced as well as the core and plunger assemblies for the other seven (7) MSIV's.
2. The loose mounting screws on the MSIV junction boxes were secured and returned to design condition.

Sincerely,



S. LaBruna  
General Manager -  
Hope Creek Operations

AME:tlb  
SORC Mtg. 87-118

USNRC-DS  
1987 SEP -4 A 9 49



Public Service Electric and Gas Company P.O. Box L Hancocks Bridge, New Jersey 08038  
Hope Creek Operations

August 31, 1987

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

Dear Sir:

HOPE CREEK GENERATING STATION  
DOCKET NO. 50-354  
UNIT NO. 1  
LICENSEE EVENT REPORT 87-018-01

This Licensee Event Report Supplement is being submitted as a follow-up to the original report.

Sincerely,

A handwritten signature in cursive script, appearing to read "S. LaBruna", written over a horizontal line.

S. LaBruna  
General Manager -  
Hope Creek Operations

AME:tlb

Attachment  
SORC Mtg. 87-118

C Distribution