NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Shoreham Nuclear Power Station Unit #1	0 5 0 0 0 3 2 2	1 OF 0 6

TITLE (4)

Update on HPCI Check Valve Malfunction

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 5 0 0 0
1 1	0 4	8 5	8 5	0 5 1		0 2	1 2	0 5	8 6		0 5 0 0 0

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)					
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)		50.73(a)(2)(iv)		73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	X	50.73(a)(2)(v)		73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)		50.73(a)(2)(vii)		OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		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)(ii)		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
	AREA CODE
Robert W. Grunseich, Operational Compliance Engineer	5 1 6 — 9 2 9 - 8 3 0 0

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
B	B J	I S V	A 3 9 1	No							
B	B J	I S V	A 3 9 1	No							

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

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

On November 4, 1985, while performing maintenance on the HPCI Turbine Exhaust line, two check valves in the line were found to be inoperable due to the separation of the disc from their valve bonnets. The plant was in Operational Condition 5, with the mode switch in Shutdown. On October 30, 1985, maintenance personnel found unidentified valve internals wedged in the inlet of E41*MOV-044. On November 2, 1985, upon disassembly of the immediately upstream Check Valve, E41*18V-0022, maintenance personnel discovered valve internals missing and other valve internals wedged in the inlet of E41*18V-0022. On November 4, 1985, disassembly of another Check Valve, E41*18V-0021, further upstream, revealed the absence of certain valve internals. Plant Management was immediately notified of the situation at 1330 and at this time the situation was determined to be reportable per 10CFR50.73(a)(2)(v)(d). The NRC was notified at 1507. Efforts to resolve the problem and prevent recurrence had been implemented and proved effective. However, operational service has resulted in another form of damage to the valves and they are being replaced with valves of a different design.

12

IE22 1/1

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Shoreham Nuclear Power Station Unit #1	0 5 0 0 0 3 2 2	8 5	— 0 1 5	— 0 2	0 2 OF 0 6

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

On November 4, 1985, while performing maintenance on the HPCI Turbine Exhaust line, two check valves in the line were found to be inoperable due to partial disassembly. The disc and hinge support had come unbolted from the valve bonnets. The plant was in Operational Condition 5 with the mode switch in Shutdown.

On October 30, 1985, maintenance personnel were working on gate valve E41*MOV-044 when unidentified components were discovered in the valve. These components were tentatively identified as the swing arm, bolt, and, wedged at the gate valve inlet, the disc of E41*18V-022. Upon disassembly, Maintenance found the internals of E41*18-022 missing and another swing arm and disc, wedged at the check valve inlet. These were believed to be components of check valve E41*18V-021, further upstream. On November 4, 1985, E41*18V-021 was disassembled and the absence of the disc and mechanism was confirmed. Plant Management was notified at 1330 and the situation was determined to be reportable pesuant to 10CFR50.73(a)(2)(v)(d). The NRC was notified at 1507.

Prior to the event, HPCI had operated on September 25, 1985 without incident. Per Technical Specification requirements, E41*MOV-044 was last stroked satisfactorily on July 30, 1985. Local Leak Rate Testing (LLRT) was satisfactorily performed for penetration X-13 (which is composed of E41*MOV-044, E41*18V-0022 and E41*18V-0021) on June 14, 1984.

There was minimal safety significance to this event. Although the isolation valve, E41*MOV-044, may not have completely closed if required, any leakage through the containment would have been contained by a safety system (HPCI). Indications are that the HPCI system was most likely operational for injection purposes, despite the check valve situation.

The valve manufacturer is Anchor-Darling. Both valves are the swing check type and use cap screws to attach the hinge support piece to the valve bonnet. Vendor documentation shows the screws tack welded in place. This had not been done at Shoreham. The cap screws were found totally intact, showing no signs of distress. A survey of other nuclear plants with similar Anchor Darling valves in similar service have had no similar failures. It was reasonable to conclude therefore, the cap screws had backed out during operation.

Anchor Darling had advised LILCO that the prefered method of securing the capscrews was to lockwire the screws to one another in lieu of tack welding. It was expected that the lock wire modification was a suitable means of resolving the situation and preventing recurrence. Upon completion of the modifications, the check valves passed Local Leak Rate Tests. The plant then proceeded with the scheduled low power testing during which HPCI was run. Maintenance reperformed the LLRT's when low power testing was complete. The valves could not pass their LLRT's and were once again inspected. The modification

2

was, in fact, effective in keeping the cap screws in place. The hinge arms, however, were bent due to system operation As a result of the 5% testing, the swing check valves are currently being replaced by lift check valves. This modification was originally scheduled for the first refueling outage, but given the damage incurred to the swing checks during low power testing, this modification is being implemented immediately as a conservative measure. LLRT's will be performed upon completion of the modification. The previously planned series of inspections will not be performed due to the installation of these different design valve. 2

An examination of other Anchor Darling Check Valves in the plant was conducted, due to the potential for this failure mechanism to be a generic condition. MWRs were written to inspect the valves for generic deficiences.

Valves under consideration included the following:

E11*16V0020A	RHR PUMP "A" DISCHARGE CHECK VALVE
E11*16V0020B	RHR PUMP "B" DISCHARGE CHECK VALVE
E11*16V0020C	RHR PUMP "C" DISCHARGE CHECK VALVE
E11*16V0020D	RHR PUMP "D" DISCHARGE CHECK VALVE
E41*31016V-0001	HPCI PUMP SUCTION CHECK VALVE
E41*31016V-0002	HPCI PUMP SUCTION CHECK VALVE
G41*31006V-0003A	FUEL POOL COOL. PUMP "A" DISCH. CK VLV
G41*31006V-0003B	FUEL POOL COOL. PUMP "B" DISCH. CK VLV
B21*31018V-1103A	FEEDWATER INLET "A" CHECK VALVE
B21*31018V-1103B	FEEDWATER INLET "B" CHECK VALVE

The 10 valves listed above were inspected to verify that their Hinge Support Cap Screws, Set Screws and Disc Pins were secured by either being tack welded, lockwired or staked. 1E41*16V0001 and 1E41*16V0002 are the HPCI pump suction check valves from the condensate storage tank and the suppression pool. These two valves have not experienced any failures to date. The hinge support cap screws are intact for both valves and show no signs of loosening. The disc, disc nut, and hinge show no signs of abnormal wear. 1E11*16V00020B is the "B" RHR pump discharge check valve. This valve experienced the loss of only one of the two hinge support cap screws. However, the hinge support mechanism was still in place showing no signs of movement, relative to the bonnet. The valve in all respects was still functional. The disc, disc nut, and hinge were inspected and found to be in acceptable condition. 1E11*16V0020A, 1E11*16V0020C and 1E11*16V0020D are the discharge check valves for the "A", "C" and "D" RHR pumps, respectively. These valves had their cap screws intact and showed no abnormalities.

1G41*06V003A and 1G41*06V003B are the Fuel Pool Cooling Pump Discharge Check Valves. These valves have not experienced any failures to date. 1G41*06V003A was the only valve found to have its hinge support cap screws tack welded. The disc, disc nut and hinge show no sign of abnormal wear. 1B21*31018V-1103A and 1B21*31018V-1103B are the Feedwater Inlet Check Valves. Inspections of these valves proved satisfactory. The hinge support cap screws are intact and show no sign of loosening. The disc, disc nut and hinge show no sign of abnormal wear.

Following the inspection of the HPCI Exhaust and RHR "B" Discharge Check Valves, an investigation was initiated to determine the location of missing parts. At the time of the valve inspections, there were three socket head cap screws and two spring pins missing from the HPCI turbine exhaust. Unaccounted for from the "B" RHR Pump discharge check valve was a single socket head cap screw. Inspections were performed on the HPCI steam exhaust sparger and the suppression pool, in an effort to locate the parts. Three cap screws and one spring pin from the HPCI Check Valves were recovered from the suppression pool. The cap screw from the RHR "B" Discharge check valve was found in the suppression pool. Nothing was found in the HPCI sparger. There is still one spring pin missing from the HPCI valves. This missing pin is presumed to be in the suppression pool but poses no threat to the ECCS pumps due to the design and location of the pump suction strainers.

The check valves found without adequate securing of their cap screws, set screws and disc pin were modified as summarized in the following table:

VALVE	CAP SCREW TACKED	CAP SCREW LOCKWIRED*	SET SCREW TACKED	SET SCREW STAKED	DISC PIN STAKED
E11*16V0020A	-	YES	-	YES	YES
0020B	-	YES	-	YES	YES
0020C	-	YES	-	YES	YES
0020D	-	YES	-	YES	YES
E41*18V0021	-	YES	-	YES	YES
0022	-	YES	-	YES	YES
E41*16V0001	-	YES	-	YES	LOCKWIRED*
0002	-	YES	-	YES	LOCKWIRED*
G41*06V0003A	YES	-	-	YES	YES
0003B	NR	NR	NR	NR	YES
B21*18V1103A	NR	NR	NR	NR	YES
1103B	NR	NR	NR	NR	YES

NR - Not Required
* Lockwire used is a .065 inch diameter 316 stainless wire. The cap screw heads have been drilled to .070 inch diameter at a 60 degree interval to accomodate the wire.

Since none of the other swing check valves will be subjected to the severe conditions experienced by the HPCI exhaust valves, the modifications listed should be a suitable means of preventing the recurrence of the malfunction.

There will be an inspection of the "B" RHR Discharge Check Valve which exhibited a cap screw failures similar to the HPCI exhaust check valves one year, plus or minus one month, from the date the valve was returned to service. If this inspection reveals no loosening of the cap screws, no further inspections will be performed.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Shoreham Nuclear Power Station Unit #1	0 5 0 0 0 3 2 2	8 5	— 0 5 7	— 0 2	0 6 OF 0 6

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

Previously, what was considered a possible secondary contributing factor to the check valve failure was a transient condition caused by the HPCI turbine control system allowing steam to be admitted to the turbine with the control valve almost completely open. Since the control valve did not start to close until the turbine was rotating, a transient was imposed on the system. Quick-start testing of the HPCI turbine from a cold condition has resulted in HPCI pump low suction pressure and HPCI turbine overspeed trips as a result of this transient. To prevent this condition, the HPCI turbine control system has been modified to dampen the turbine acceleration transient on start-up by adjusting the ramp generator/signal convertor module and by adding a hydraulic bypass line with a check valve around the EG-R hydraulic control actuator. This modification provides a more controlled opening of the HPCI turbine control valve during startup, thus lessening the large surge of steam and the associated overspeed and suction line low pressure transients. However, the tests just conducted showed no impact in check valve operation. 2

LILCO
LONG ISLAND LIGHTING

LONG ISLAND LIGHTING COMPANY

SHOREHAM NUCLEAR POWER STATION • P.O. BOX 628 • WADING RIVER, NEW YORK 11792

TEL. (516) 929-8300

December 5, 1986 PM-86-319

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

Dear Sir:

In accordance with 10CFR50.73, enclosed is a copy of Shoreham Nuclear Power Station Unit 1's Licensee Event Report 86-051, Revision 2. This revision is being submitted to provide an update on the corrective actions taken as a result of the "HPCI Check Valve malfunction".

Sincerely yours,

William E. Steiger, Jr.
Plant Manager

WES/pz

Enclosure

cc: Dr. Thomas E. Murley, Regional Administrator
John Berry, Senior Resident Inspector
Institute of Nuclear Power Operations, Records Center
American Nuclear Insurers

SR.A21.0200

IE22
1/1