PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION
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J. DOERING, JR.
PLANT MANAGER
LIMERICK GENERATING STATION

January 8, 1991
Docket No. 50-352
License No. NPF-39

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

SUBJECT: Licensee Event Report
Limerick Generating Station - Unit 1

This LER reports a Unit 1 plant shutdown required by Technical Specifications due to the inoperability of the 'B' loop of the Residual Heat Removal Service Water (RHRSW) system. This inoperability was caused by the unexpected failure of the 'B' Residual Heat Removal system heat exchanger outlet valve to the RHRSW system.

Reference:	Docket No. 50-352
Report Number:	1-90-034
Revision Number:	00
Event Date:	December 9, 1990
Report Date:	January 8, 1991
Facility:	Limerick Generating Station P.O. Box A, Sanatoga, PA 19464

This LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(A).

Very truly yours,

J Doering

DCS:rgs

cc: T. T. Martin, Administrator, Region I, USNRC
T. J. Kenny, USNRC Senior Resident Inspector, LGS

IE22
1/1

NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

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TITLE (4) Technical Specification required shutdown due to inoperability of the 'B' loop of the Residual Heat Removal Service Water system.

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 2	0 9	9 0	9 0	- 0 3 4	- 0 0	0 1	0 8	9 1		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (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)	0 0 0	20.405(a)(1)(i)	50.36(c)(1)	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)	X 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
Gil J. Madsen, Regulatory Engineer, Limerick Generating Station	AREA CODE 2 1 5 3 2 7 - 1 2 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	

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 December 9, 1990, at 1744 hours, the Unit 1 reactor mode switch was placed in 'Shutdown', placing the unit in hot shutdown to comply with the 72-hour Action Statements associated with the Unit 1 Technical Specifications (TS) Sections 3.6.2.3, "Suppression Pool Cooling," and 3.7.1.1, "Residual Heat Removal Service Water System - Common Systems." This shutdown was required by TS due to the inoperability of the 'B' loop of the Residual Heat Removal Service Water (RHRSW) system and the 'B' loop of the Suppression Pool Cooling mode of the Residual Heat Removal (RHR) system. Prior to the shutdown, on December 6, 1990, at 2030 hours, the 'B' RHR system heat exchanger outlet valve to the RHRSW system was declared inoperable. Following investigation, it was determined that the valve disc, disc nut, and stem had separated. The failure of this valve resulted in the inoperability of the 'B' loop of Suppression Pool Cooling mode of the RHR system. The redundant 'A' loop of RHRSW was placed in operation and remained operable throughout the event. The normal plant shutdown occurred without any complication or incident. The cause of this event was unexpected equipment failure of the 'B' RHRSW outlet valve from the 'B' RHR system heat exchanger. The valve was repaired by installing a refurbished disc, disc nut and disc retainer.

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

Unit Conditions Prior to the Event:

Unit 1 Operating Condition was 2 (Startup) at 7% power level.

The Unit was starting up following its third refueling outage.

Description of the Event:

On December 9, 1990, at 1744 hours, the Unit 1 reactor mode switch was placed in 'Shutdown', placing the unit in hot shutdown, and a normal plant shutdown and cooldown was initiated in accordance with General Plant (GP) Procedure GP-3, "Normal Plant Shutdown," to comply with the 72-hour Actions associated with the Unit 1 Technical Specifications (TS) Sections 3.7.1.1, "Residual Heat Removal Service Water System - Common Systems," and 3.6.2.3, "Suppression Pool Cooling." This shutdown was required by TS due to the inoperability of the 'B' loop of the Residual Heat Removal Service Water (RHRSW) system and the 'B' loop of the Suppression Pool Cooling mode of the Residual Heat Removal (RHR, EIIS:BP) system. The TS sections Actions required restoration of the inoperable systems within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN witnin the following 24 hours.

Prior to the shutdown, on December 6, 1990, at 2030 hours, the RHRSW system outlet valve (EIIS:VLV), HV-51-1F068B, from the 'B' RHR system heat exchanger (EIIS:HTX) was declared inoperable. While placing the 'B' RHRSW system in service, the system flow failed to change when stroking HV-51-1F068B. Following investigation, we determined that the valve disc, disc nut, and stem had separated. The failure of this valve resulted in the inoperability of the 'B' loop of the RHRSW system and the 'B' loop of the Suppression Pool Cooling mode of the RHR system. The TS required shutdown was commenced on December 9, 1990, at 1744 hours, because repairs to the valve could not be completed within the 72 hour TS Action time limit. Depressurization and cooldown were continued to achieve cold shutdown to allow repair of HV-51-1F068B. Cold shutdown was achieved on December 10, 1990, at 0147 hours.

When the degraded valve was discovered on December 6, 1990, the 'A' loop of RHRSW was placed in service and the 'B' loop was removed from service by blocking closed the 'B' RHR heat exchanger inlet valve, HV-51-1F014B. Unit 1 was shutdown on December 9, 1990 to comply with the TS Action and allow repair of HV-51-1F068B. The valve was repaired by installing a refurbished disc, disc nut and disc retainer.

A one hour notification was made to the NRC at 1716 hours on December 9, 1990, in accordance with 10CFR 50.72(b)(1)(i)(A), since this event resulted in the initiation of a shutdown required by TS. This report is being submitted in accordance with the requirements of 10CFR 50.73(a)(2)(i)(A).

Analysis of the Event:

The 'B' loop of the RHRSW system flow was approximately 6500 gpm with HV-51-1F068B partially open. Normal operating system flow is greater than 6000 gpm with a design flow of 9000 gpm in the event of a Design Basis Loss of Coolant Accident. Because the maximum design system flow could not be achieved, the RHRSW system loop B was declared inoperable. The redundant 'A' loop of the RHRSW system was placed in operation and remained operable throughout the event.

The Unit 1 shutdown commenced with the unit at approximately 7% of rated thermal power following its third refueling outage. Therefore, the decay heat level was low and the 'A' loop of the RHRSW system was capable of removing the decay heat. Had this event occurred following or during operation at full power, the decay heat removal capabilities of one operable loop of RHRSW would be sufficient. Additionally, the 'B' loop of RHRSW, although inoperable, was capable of being operated in shutdown cooling and was therefore available as an alternate method of decay heat removal.

The normal plant shutdown occurred without any complication or incident. Main Control Room (MCR) operators are trained and performed the shutdown in accordance with the appropriate procedures. All redundant systems performed as designed and there was no release of radioactive material as a result of this event. Therefore, the actual and potential consequences of this event were minimal.

Cause of the Event:

The cause of this event was an unexpected equipment failure of the 'B' RHRSW system outlet valve from the 'B' RHR system heat exchanger; a 20 inch Anchor Darling Globe Stop Valve with bolted bonnet (See Diagram 1). Upon investigation, we determined that process water entering the threaded area between the valve disc and disc nut eroded the threads causing them to weaken. The threads eroded away and, when the valve was opened, the tack weld broke, separating the disc and disc nut, causing the stem to dislodge from the disc nut and the disc retainer to fall out. This resulted in an inability to open or close the valve, therefore the RHR system loop 'B' was declared inoperable.

A similar failure of the Unit 1 'A' RHR system heat exchanger outlet valve to the 'A' RHRSW system, HV-51-1F068A, had occurred earlier in 1990. This failure was also caused by water erosion in the threaded area between the disc and disc nut. This valve was repaired and HV-51-1F068B was inspected for similar difficulties. Maintenance personnel performed a current trace while stroking the valve and compared the results with those obtained following initial installation of the valve. This current trace identified the valve motor's current draw during valve operation thereby enabling identification of areas of

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resistance to valve motion. No discrepancies were revealed, therefore the degrading condition of HV-51-1F068B remained unconfirmed until failure.

Corrective Actions:

Following repair of HV-51-1F068B, the threaded area between the disc and disc nut was seal welded to prevent water from entering. The routine preventive maintenance program for this valve would not have discovered this problem internal to the valve. We, in cooperation with the vendor/supplier (Anchor Darling), are currently investigating options to increase the reliability, and thereby ensure operability, of these valves. The effectiveness of the repair (seal weld) performed on HV-51-1F068B will be evaluated and, if appropriate, similar actions will be taken for HV-51-1F068A and the two corresponding Unit 2 valves. There are no other similar valves on either unit.

Previous Similar Occurrences:

There have been no previous TS required shutdowns of either Unit 1 or 2 at Limerick Generating Station. The earlier degradation of HV-51-1F068A, while similar in cause, did not result in inoperability of the A loop of the RHRSW system; the valve could still be opened to allow design system flow for normal operation and during a transient. As described in the text, the actions taken following repair of HV-51-1F068A could not have prevented this event.

Tracking Codes: B15 Failure due to normal wear

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DIAGRAM 1