



**PSEG**

Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038

**Salem Generating Station**

May 4, 1993

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

Dear Sir:

SALEM GENERATING STATION  
LICENSE NO. DPR-70  
DOCKET NO. 50-272  
UNIT NO. 1

LICENSEE EVENT REPORT 93-010-00

This Licensee Event Report is being submitted pursuant to the requirements of the Code of Federal Regulations 10CFR 50.73(a)(2)(ii)(B) and 50.73(a)(2)(v)(D). This report is required to be issued within thirty (30) days of event discovery.

Sincerely yours,

C. A Vondra  
General Manager -  
Salem Operations

MJPJ:pc

Distribution

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9305110314 930504  
PDR ADOCK 05000272  
S PDR

The power is in your hands.

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Salem Generating Station - Unit 1						DOCKET NUMBER (2) 0   5   0   0   0   2   7   2			PAGE (3) 1   OF   0   5		
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TITLE (4)  
Less than Design Service Water Flow through the Diesel Generators' Jacket Water Cooler.

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	4	0	7	9	3	9	3	0	1	0	0	0	5	0	0	0	3	1	1			
0	4	0	7	9	3	9	3	0	0	0	5	0	4	9	3	0	5	0	0	0		

OPERATING MODE (8) 1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)									
POWER LEVEL (10) 0   7   1	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)	X	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 M. J. Pastva, Jr. - LER Coordinator						TELEPHONE NUMBER 6   0   9   3   3   9   -   2   1   5   7			

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
<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 4/7/93, it was determined that Service Water (SW) flow through the Diesel Generators' (DGs') jacket water and lube oil coolers (installed in series) was less than the design requirement of 700 gallons per minute (GPM). Engineering determined that operability of the coolers is unaffected at SW inlet temperatures less than 60°F. This condition was due to an incorrect setpoint, which existed from the original 1978 System Description. This setpoint is for the differential pressure (D/P) controllers that modulate the cooling water outlet control valves of the three (3) DG's on each Salem Unit. A D/P drop of approximately 12 pounds per square inch gauge (PSIG) across the flowpath of the coolers (installed in series) is needed to achieve the required flow rate. However, the setpoint was 6 PSIG, which matched the D/P drop required to achieve this flow across a single cooler. This event was identified through investigation of unexpected flow and D/P readings across DG "C" jacket water and lube oil coolers during flow testing for upgrading the SW piping of the Unit 2 DGs. The proper setpoint for the control valves was determined, verified by field testing, added to the plant database via design changes, and subsequently implemented for both Units during the week of 4/19/93.

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PLANT AND SYSTEM IDENTIFICATION:

Westinghouse - Pressurized Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as {xx}

IDENTIFICATION OF OCCURRENCE:

Less than design Service Water flow through the Diesel Generators' jacket water and lube oil coolers.

Discovery Date: 4/7/93

Report Date: 5/4/93

This report was initiated by Incident Report Nos. 93-218 and 219.

CONDITIONS PRIOR TO OCCURRENCE:

Unit 1 - Mode 1 Reactor Power 71% - Unit Load 790MWe.

Unit 2 - Defueled in its seventh refueling outage.

DESCRIPTION OF OCCURRENCE:

On April 7, 1993, it was determined that SW flow through the DGs' jacket water and lube oil coolers was less than the design requirement of 700 gallons per minute (GPM). The potential consequence of this condition was insufficient cooler heat removal capability during periods of elevated Delaware River water temperature. An Engineering evaluation has determined that operability of the coolers is unaffected at SW temperatures less than 60°F. At the time of event discovery, river water temperature was in the 40°F range.

This condition was due to an incorrect setpoint, which existed since startup for both units. This setpoint is for the differential pressure (D/P) controllers that modulate the SW42 cooling water outlet control valves of the three (3) DG's on each Salem Unit. A D/P drop of approximately 12 pounds per square inch gauge (PSIG) across the flowpath of the two coolers (installed in series) is needed to achieve the required flow rate. However, the setpoint was 6 PSIG, which matched the D/P drop required to achieve this flow across a single cooler.

This concern was identified while investigating unexpected flow/differential pressure readings across "C" DG jacket water and lube oil coolers during post-installation flow testing of a SW piping upgrade. The upgrade replaced the existing lined carbon steel

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DESCRIPTION OF OCCURRENCE: (cont'd)

Service Water (SW) piping of the Unit 2 Diesel Generators (DGs), with 6% molybdenum stainless steel.

The NRC was notified of this event in accordance with 10CFR50.72 (b)(1)(ii)(B) since the low setpoint condition existed during periods when river water temperature was greater than 60°F.

APPARENT CAUSE OF OCCURRENCE:

This event is attributed to Design, Manufacturing, Construction/Installation, as defined by NUREG-1022, "Licensee Event Report System".

The DG SW flow deficiency has existed since original development of the setpoint for subject D/P instruments 1(2) DP9628, 9630 and 9632 for the original Service Water System Description of 1978. A contributing factor was that no direct means of flow measurement was provided in this flow path by the original plant design.

When the DG jacket water and lube oil coolers were upgraded in the mid 1980s, an opportunity was missed to identify and resolve the subject setpoint error. While performance testing the upgraded coolers, it was determined, based upon measured temperatures, that flow rates through the new coolers were the same as the original coolers and were therefore adequate.

D/P data, as well as jacket water and lube oil temperature, are included in the parameters collected and trended during surveillance testing. Until the flow testing of the piping upgrade there had been no reason to question the setpoint. The testing consisted of installing a portable clamp-on ultrasonic flow measurement instrument (on a section of new unlined piping) and taking D/P data for comparison with hydraulic flow calculations.

ANALYSIS OF OCCURRENCE:

This event did not affect the health and safety of the public. It is reportable in accordance with 10CFR50.73 (a)(2)(ii)(B) and 10CFR 50.73(a)(2)(v)(D). No evidence was found of abnormal operation or high temperature trips of the Diesel Generators (including times of high river water temperature) that could be attributed to the subject cooling water flow deficiency.

The SW supply to the Diesel jacket water and lube oil coolers is initiated by the opening of normally closed air operated valve SW39 on a Diesel start signal and the flow is controlled by modulating D/P control valve SW42. The coolers are mounted directly in series. Vendor heat exchanger data sheets identify a pressure drop of 4.2 PSIG (the original design was 6.0 PSIG) across each cooler at 700 GPM. The current design basis for the SW System is 90°F and there have been

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ANALYSIS OF OCCURRENCE: (cont'd)

at least two warm summers (1983 and 1988) that have approached this temperature for SW for short periods of time. The jacket water system is a closed loop cooling system that removes heat from the engine and its accessory components to maintain the temperature of the equipment within the normal operating range. The lubricating oil system circulates, cools, and filters lubricating oil for the engine and it's accessories. Both systems are provided with HIGH and HIGH-HIGH temperature alarms. During normal exercising tests the DG engine will automatically shutdown if either of the subject HIGH-HIGH alarms is received. These interlocks are bypassed in an accident situation.

With the original coolers and the setpoint error, there was an estimated nominal flow rate through the coolers of 71% of design flow (497 GPM). In the mid 1980's the design of the coolers was upgraded, and although the setpoint error was maintained, the new design provided a lower pressure drop at design flow resulting in an estimated nominal flow rate of 84% of design (588 GPM).

An evaluation was made of the increased temperatures assuming the most significant flow shortfall noted above and the currently established design SW temperature of 90°F. This evaluation predicted an increase of 5°F in maximum jacket water temperature to 179°F and an increase of 7.9°F in lube oil temperature to 192°F. The jacket water design control range is 150 to 180°F with the high and double up alarms at 175 and 195°F (also a trip during normal operation), respectively. The lube oil design control range is 160 to 190°F with the HIGH and HIGH-HIGH temperature alarms at 185 and 205°F, respectively.

Had the DGs been called upon to provide their safety function at the design basis 90°F SW temperature, the jacket water temperature would have been at the high end of the normal control range. The lube oil temperature, while slightly above the normal control band, would have been well below oil degradation limits. Additionally, it should be noted that in the event of a high temperature alarm, the Salem DG Alarm response procedures require the operator take action to adjust the Service Water control valve to increase cooling flow.

Based on this evaluation, the resultant temperatures are well below the normal operation automatic trip points and therefore would not be expected to result in any significant reduction in performance, loss of function or permanent degradation of the DGs.

CORRECTIVE ACTION:

Following event discovery, Engineering determined the Diesels were unaffected by this condition until the Service Water inlet temperature reached 60°F. This determination allowed sufficient time to develop and implement the correct setpoint to achieve design flow.

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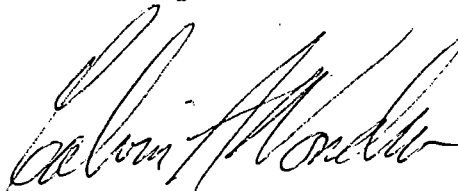
CORRECTIVE ACTION: (cont'd)

The proper setpoint was developed by Engineering, verified by field testing, added to the plant data base via Design Changes, and subsequently implemented for both Units the week of April 19, 1993.

Flow measurement capability for the subject DG SW cooling water path is being added by the piping upgrade design change in progress on Salem Unit 2 and planned for the Fall 1993 refueling outage on Salem Unit 1.

The assessment, which determined that use of the incorrect setpoint for the D/P controllers did not result in any significant reduction in performance, loss of function, or permanent degradation of the DGs, will be confirmed with the original equipment manufacturer (GE/ALCO).

General Manager -  
Salem Operations



MJPJ:pc

SORC Mtg. 93-040