



Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038-0236

Nuclear Business Unit

**MAY 4 1999**

LR-N990212

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

Gentlemen:

**LER 311/99-003-00**  
**SALEM GENERATING STATION - UNIT 2**  
**FACILITY OPERATING LICENSE NO. DPR-75**  
**DOCKET NO. 50-311**

This Licensee Event Report entitled "Unplanned Loss of All Unit 2 Chillers" is being submitted pursuant to the requirements of the Code of Federal Regulations \*\*\*\*10CFR50.73 (a)(2)(i)\*\*\*\*.

Sincerely,

David F. Garchow  
General Manager  
Salem Operations

Attachment

PJD/

C Distribution  
LER File 3.7

9905120265 990504  
PDR ADDCK 05000311  
S PDR

The power is in your hands.

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IEZ

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

**LICENSEE EVENT REPORT (LER)**

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

<b>FACILITY NAME (1)</b> SALEM UNIT 2	<b>DOCKET NUMBER (2)</b> 05000311	<b>PAGE (3)</b> 1 OF 4
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**TITLE (4)**  
Unplanned Loss of all Unit 2 Chillers

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 NAME	DOCKET NUMBER
04	06	99	99	-003	- 00	05	04	99		
									FACILITY NAME	DOCKET NUMBER
									FACILITY NAME	DOCKET NUMBER

<b>OPERATING MODE (9)</b> N	<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 1: (Check one or more) (11)</b>									
<b>POWER LEVEL (10)</b> 000	20.2201(b)	20.2203(a)(2)(v)	X	50.73(a)(2)(i)	50.73(a)(2)(viii)					
	20.2203(a)(1)	20.2203(a)(3)(i)		50.73(a)(2)(ii)	50.73(a)(2)(x)					
	20.2203(a)(2)(i)	20.2203(a)(3)(ii)		50.73(a)(2)(iii)	73.71					
	20.2203(a)(2)(ii)	20.2203(a)(4)		50.73(a)(2)(iv)	OTHER					
	20.2203(a)(2)(iii)	50.36(c)(1)		50.73(a)(2)(v)						
	20.2203(a)(2)(iv)	50.36(c)(2)		50.73(a)(2)(vii)	Specify in Abstract below or in NRC Form 366A					

LICENSEE CONTACT FOR THIS LER (12)	
<b>NAME</b> Philip J. Duca Jr. , Salem Licensing Engineer	<b>TELEPHONE NUMBER (Include Area Code)</b> (609) 339-2381

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

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

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)**

On April 6, 1999, all Salem Unit 2 chillers were rendered inoperable. At the time of the event one of the three Unit 2 chillers was removed from service to support outage maintenance, and the other two were being supplied service water (SW) from #22 nuclear SW header. Operations personnel, in the process of removing 22 nuclear SW header from service, isolated #22 nuclear SW header prior to realigning the remaining two chillers to #21 nuclear SW header (the other SW header). 21 and 22 chillers were realigned to the 21 nuclear SW header and returned to operation within 35 minutes of being isolated.

This event was caused by human error, specifically a less than adequate procedure review implementation. A recent procedure revision changed the sequence of steps in the procedure used to remove #22 nuclear SW header from service. The revised sequence isolated #22 nuclear SW header prior to cross-connecting the remaining chillers to #21 nuclear SW header.

There was minimal safety significance associated with this event because the outside temperatures were cool (42 degrees F, well below the design maximum outside temperature of 95 degrees F), reactor and secondary side heat loads were minimal since the unit was in mode 5, and 2 chillers were restored within 35 minutes.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), any operation or condition prohibited by the plant's Technical Specifications.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
SALEM UNIT 2	05000311	99	0 0 3	00	2 OF 4

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

PLANT AND SYSTEM IDENTIFICATION

Westinghouse - Pressurized Water Reactor

Chilled Water System/Service Water/Chillers {KM/BI/CHU}\*

\* Energy Industry Identification System {EIIS} codes and component function identifier codes appear as (SS/CCC)

CONDITIONS PRIOR TO OCCURRENCE

At the time of identification, Salem Unit 2 was shutdown in Mode 5 (Cold Shutdown).

DESCRIPTION OF OCCURRENCE

On April 6, 1999, all Salem Unit 2 chillers were rendered inoperable. Technical Specification (T/S) 3.7.10 requires 3 chillers to be operable in Mode 5. Technical Specification Action Statement (TSAS) 3.7.10.a specifies the actions for one inoperable chiller; and TSAS 3.7.10.b specifies the actions for two inoperable chillers. T/S requires entry into 3.0.3 with three inoperable chillers.

At 0120 on April 6, 1999, 23 chiller was removed from service in preparation for a "2C" 4kV vital bus outage. At 0514, a control room licensed operator identified that 22 chiller was tripped, and at 0519, the operator observed 21 chiller had also tripped. At 0523, a field operator identified that there was no service water (SW) available to the 21 and 22 chillers. 21 and 22 chillers were re-aligned to the 21 nuclear SW header and, at 0554, were returned to service.

Normally SW is supplied to 23 chiller from 21 nuclear SW Header and SW is supplied to 21 and 22 chillers from 22 nuclear SW Header. This was the configuration at the time of the event. At the time of the event #4 SW Bay was out of service so that both 21 and 22 nuclear SW headers were being supplied by #2 SW Bay and 22 nuclear SW header by way of a flow path through 21SW23 and 22SW23 cross-tie valves.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
SALEM UNIT 2	05000311	99	0 0 3	00	3 OF 4

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

DESCRIPTION OF OCCURRENCE (continued)

SW to the 21 and 22 chillers was lost because the 22 nuclear SW header was isolated prior to cross-connecting the chillers to the 21 nuclear SW header. 22 nuclear SW header was being removed from service for planned maintenance in accordance with procedure S2.OP-SO.SW-0003(Q), "22 Nuclear Service Water Header Outage." Procedure S2.OP-SO.SW-0003, Attachment 1 contains a list of actions required to "harden" 21 nuclear SW header prior to isolating 22 SW header. (This "hardening" removes power to certain valves to prevent a single failure from causing a loss of cooling to RHR.) Procedure Attachment 1 closes nuclear header cross-tie valve 21SW23. With the #4 SW Bay out of service, closing 21SW23 isolated the 22 nuclear SW header, which was supplying 21 and 22 chillers.

An April 1, 1999 revision to procedure S2.OP-SO.SW-0003(Q), changed the step sequence for the procedure section addressing "Preparation for Removal of 22 Nuclear Header". The revised sequence isolated the 22 nuclear SW header prior to cross-connecting the chillers to the 21 nuclear SW header. Prior to this revision, the cross-connect was performed before isolation of 22 nuclear SW header. Similar procedure changes were in progress for the 21 nuclear SW header and for both Unit 1 headers; however, these changes were not approved.

CAUSE OF OCCURRENCE

This event was caused by human error, specifically a less than adequate procedure review implementation. Neither the procedure author, nor the station qualified reviewer (SQR) adequately considered the impact of the step sequence change with a SW Bay out of service. In addition, the SQR recommended the sequence change; contrary to the requirements of Administrative Procedure NC.NA-AP.ZZ-0001(Q) "Nuclear Procedure System", Attachment 3, which prohibits an SQR from providing technical guidance including "ordering of procedure steps." The step sequence change was not identified on the revision summary.

A contributing cause for this event was a less than adequate questioning attitude by Operations personnel removing 22 nuclear SW header from service. Since the purpose of Attachment 1 was to "harden" 21 nuclear SW header, personnel did not adequately consider the effects on loads supplied by 22 nuclear SW header with #4 SW bay out of service.

LICENSEE EVENT REPORT (LER)  
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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
SALEM UNIT 2	05000311	99	0 0 3	00	4 OF 4

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PRIOR SIMILAR OCCURRENCES

LERs and Special Reports for Salem and Hope Creek for 1997, 1998 and 1999 to date were reviewed for occurrences which involved procedure review and human error. While several LERs were noted which involved procedure review and human error the corrective actions taken for the specific root causes involved could not have precluded the causes of this event.

SAFETY CONSEQUENCES AND IMPLICATIONS

The chilled water system provides heat removal capability for the control rooms, relay rooms, equipment rooms, and #2 Emergency Control Air Compressor. There was minimal safety significance associated with this event because the outside temperatures were cool (42 degrees F, well below the design maximum outside temperature of 95 degrees F), reactor and secondary side heat loads were minimal since the unit was in mode 5, and 2 chillers were restored within 35 minutes.

CORRECTIVE ACTIONS

1. 21 and 22 chillers were cross-connected to the 21 nuclear SW header and, at 0554, the 21 and 22 chillers were returned to service.
2. In progress procedure changes for all other nuclear SW headers (both units) were cancelled.
3. Procedure S2.OP-SO.SW-0003(Q), "22 Nuclear Service Water Header Outage," was revised.
4. Procedure review requirements, including the SQR responsibilities, were reviewed with the Operations procedure group.
5. Personnel were held accountable for their actions in accordance with PSE&G policies.
6. Lessons Learned from this event were communicated to all Operators by including them in the night orders.