



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

Nuclear Business Unit

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

**LER 272/00-001-00
SALEM GENERATING STATION - UNIT 1
FACILITY OPERATING LICENSE NO. DPR-70
DOCKET NO. 50-272**

Gentlemen:

This Licensee Event Report entitled "Salem Unit 1 Reactor Trip Due to Loss of Normal Feedwater" is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv).

Sincerely,

A handwritten signature in black ink, appearing to read "M. B. Bezilla".

**M. B. Bezilla
Vice President -
Operations**

Attachment

BJT

**C Distribution
LER File 3.7**

The power is in your hands.

Handwritten initials "JES" in black ink.

LICENSEE EVENT REPORT (LER)

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

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

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TITLE (4)
Salem Unit 1 Reactor Trip Due to Loss of Normal Feedwater

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
01	06	00	00	-001	- 00	02	07	00	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9) 1 POWER LEVEL (10) 100										
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR II: (Check one or more) (11)										
			20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)	
			20.2203(a)(1)			20.2203(a)(3)(i)			50.73(a)(2)(ii)	
			20.2203(a)(2)(i)			20.2203(a)(3)(ii)			50.73(a)(2)(iii)	
			20.2203(a)(2)(ii)			20.2203(a)(4)			X 50.73(a)(2)(iv)	
			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)

NAME Brian J. Thomas, Licensing Engineer	TELEPHONE NUMBER (Include Area Code) (856) 339-2022
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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
B	IG	DET	Westinghouse Electric Corp	Y					
X	BA	CNV	Fischer & Porter Co.	Y					

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)

At 1611, on January 6, 2000, a manual reactor trip was initiated at Salem Unit 1 due to loss of the 12 Steam Generator Feedpump (SGFP) and degraded SGFP suction pressure as a result of the isolation of condensate flow to the SGFPs. Immediately following the reactor trip, the 11 SGFP also tripped. The safety systems performed as required except for the 12 Auxiliary Feedwater (AFW) pump, which started but failed to inject flow and the N31 Source Range Detector. The redundant source range detector operated properly throughout the shutdown.

The cause of the loss of condensate flow is attributed to radio frequency interference (RFI). Based on the troubleshooting performed, the feedwater heater level instrumentation was determined to be susceptible to RFI. Use of radios within the vicinity of the feedwater heater level instrumentation would cause the feedwater heater isolation valves (CN27s) to close. Radio use in the vicinity of the feedwater heater level instruments has been restricted. The feedwater heaters level instrumentation is currently installed in RFI vulnerable enclosures. The enclosures will either be shielded or replaced with enclosures less vulnerable to RFI.

This event is reportable in accordance with 10CFR50.73(a)(2)(iv), 'any event or condition that resulted in a manual or automatic actuation of any engineered safety feature (ESF), including the reactor protection system (RPS)...'.

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

PLANT AND SYSTEM IDENTIFICATION

Westinghouse – Pressurized Water Reactor

- Auxiliary Feedwater System {BA/-}*
- Nuclear Instrumentation System {IG/-}*
- Feedwater and Condensate System {SJ/-}*

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

CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 1 was in Mode 1 at 100% power prior to the reactor trip. Following the reactor trip, Unit 1 was stabilized in Mode 3.

DESCRIPTION OF OCCURRENCE

At 1611, on January 6, 2000, a manual reactor trip was initiated at Salem Unit 1 due to loss of the 12 Steam Generator Feedpump (SGFP) and degraded SGFP suction pressure. Immediately following the reactor trip, the 11 SGFP also tripped. The safety systems performed as required except for the 12 Auxiliary Feedwater (AFW) pump and the N31 Source Range Detector.

The 12 AFW pump started as designed however this pump delivered no flow since the steam generator inlet valves 11AF21 and 12AF21 did not open automatically. Upon identifying that the 11AF21 and 12AF21 valves did not open, operators depressed the pressure override defeat push-button and manually initiated flow to the 11 and 12 steam generators from the 12 AFW pump. The 11 AFW pump and the 13 AFW pump started and provided flow to the steam generators as designed.

Following the trip the N31 and N32 Source Range detectors energized as designed, however, the N31 detector behaved erratically. The N32 detector response was proper throughout the shutdown.

ANALYSIS OF OCCURRENCE

On January 6, the 13A, 14A and 15A feedwater heaters automatically isolated when the 11CN27 (feedwater heater inlet valve) closed. Operations personnel went with a radio to investigate the 11CN27 valve closure. The operators validated that thermal power was within proper limits and that there was no apparent feedwater heater tube break. The operators then decided to re-establish flow to the 13A, 14A, and 15A feedwater heaters by opening the 11CN27 valve. After initiating an open signal to valve 11CN27, the 12CN27 valve (inlet to 13B, 14B and 15 B feedwater heaters) and the

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ANALYSIS OF OCCURRENCE (cont'd)

13CN27 valve (inlet to 13C, 14C and 15C feedwater heaters) automatically closed. Upon closure of the 12CN27 and 13CN27 valves, condensate flow to the suction of the steam generator feed pumps (SGFPs) was isolated. The 12 SGFP tripped on low suction and the operators manually initiated a reactor trip. Subsequent to the manual reactor trip, the 11 SGFP tripped on high discharge pressure after the feedwater regulating valves closed in response to the trip.

CAUSE OF OCCURRENCE

The cause of the CN27 valves to automatically close is attributed to radio frequency interference (RFI). Based on the troubleshooting performed, the feedwater heater level instrumentation was determined to be susceptible to RFI. Use of radios within the vicinity of the feedwater heater level instrumentation would repeatedly cause the CN27 valves to close.

The most probable cause for the 11AF21 and 12AF21 valves failing to open is attributed to a controls failure of the transmitter or electric/pneumatic (E/P) converter associated with the 12 AFW pump outlet pressure sensing circuit. Although the equipment operated properly during troubleshooting, the most probable cause was mechanical binding of the transmitter or E/P converter due to lack of operation. This circuit is only exercised on 92-day frequency during inservice testing of the pump.

The cause of the erratic indication of the N31 source range detector is attributed to a ground path from the detector to the well. The detector was picking up noise through the ground.

PRIOR SIMILAR OCCURRENCES

A review of 1998 and 1999 LERs for Salem Units 1 and 2 did not identify any incidents attributed to inadvertent equipment operation due to radio frequency interference nor any incidents involving the erratic indication of the neutron detectors. LER 311/98-012-00 was submitted concerning the 22 AFW pump runout protection circuit being inoperable. This event was attributed to human error and not associated with any equipment deficiencies. Maintenance technicians left the isolation valve for the pressure transmitter closed following calibration of the runout protection circuit. During development of the operability determination for the AFW pump runout protection, a review of past plant history for similar failures of the AFW pump runout protection was performed. This review identified that in the past two years, two previous failures occurred for the 11AFW pump runout circuit. These two failures were determined to be equipment related failures associated with the pressure transmitter. In both events, the transmitters were repaired and the 11AFW pump runout circuitry was returned to service. The failure exhibited during this event was not similar to the previous failures of the 11AFW pump runout circuitry.

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SAFETY CONSEQUENCES AND IMPLICATIONS

The safety systems performed as required following the reactor trip except for the 12 Auxiliary Feedwater (AFW) pump and the N31 Source Range Detector.

The 12 AFW pump started as designed however this pump delivered no flow since the steam generator inlet valves 11AF21 and 12AF21 did not open automatically. Upon identifying that the 11AF21 and 12AF21 valves did not open, operators depressed the pressure override defeat push-button and manually initiated flow to the 11 and 12 steam generators from the 12 AFW pump. The 11 AFW pump and the 13 AFW pump started and provided flow to the steam generators as designed. Only one motor-driven AFW pump supplying flow to two steam generators is assumed in the accident analysis for a loss of normal feedwater event. Therefore, more than sufficient AFW flow was available.

Following the trip the N31 and N32 Source Range detectors energized as designed, however, the N31 detector behaved erratically. The N32 detector response was proper throughout the shutdown.

A review of this event determined that a Safety System Functional Failure (SSFF) as defined in NEI 99-02 did not occur. All systems performed as designed to safely shutdown the reactor and maintain the reactor in a safe shutdown condition.

CORRECTIVE ACTIONS

1. Radio use in the vicinity of the feedwater heater level instruments has been restricted.
2. The feedwater heaters level instrumentation are currently installed in RFI vulnerable enclosures. The enclosures will either be shielded or replaced with enclosures less vulnerable to RFI. The changes to the enclosures are being tracked under PSE&G's corrective action program.
3. An operability determination for the auxiliary feedwater pump outlet pressure sensing circuit was written and approved prior to Unit 1 entering Mode 3. The operability determination states that the pressure override circuit was being exercised on a quarterly frequency during inservice testing of the pumps, to ensure proper operation of the pressure override circuit the frequency of operation of this circuit is being increased to monthly until the operability determination is terminated. The operability determination will be terminated upon completion of a modification to redesign the auxiliary feedwater pump run out protection circuitry. Implementation of the modification is being tracked under PSE&G's corrective action program. The operability determination encompasses both Units 1 and 2.
4. The N31 source range detector was replaced.
5. Further actions to review and address RFI equipment susceptibility for both Salem Units 1 and 2 are being addressed in accordance with the corrective action program.