

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Salem Generating Station - Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 2 7 2										PAGE (3) 1 OF 5				
TITLE (4) Reactor Coolant System - RTD Bypass Line Valve Failures																								
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)								
									Salem - Unit 2							0 5 0 0 0 3 1 1								
0	4	0	1	8	4	8	4	0	1	0	0	0	5	0	1	8	4	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)																						
6		20.402(b)					20.406(e)					50.73(a)(2)(iv)					73.71(b)							
POWER LEVEL (10)		20.406(a)(1)(i)					50.36(e)(1)					50.73(a)(2)(v)					73.71(e)							
0 0 0		20.406(a)(1)(ii)					50.36(e)(2)					50.73(a)(2)(vi)					<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)							
		20.406(a)(1)(iii)					50.73(a)(2)(i)					50.73(a)(2)(vii)(A)												
		20.406(a)(1)(iv)					50.73(a)(2)(ii)					50.73(a)(2)(vii)(B)												
		20.406(a)(1)(v)					50.73(a)(2)(iii)					50.73(a)(2)(x)												
LICENSEE CONTACT FOR THIS LER (12)																								
NAME										TELEPHONE NUMBER														
J. L. Rupp										AREA CODE		6 0 9 3 3 9 - 4 3 0 9												
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																								
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC														
B	A	B	I	S	V	R	3	4	4	Y														
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)

LER 83-007/03L documented an isolated event (occurring on January 29, 1983) involving, what was assumed to be, corrosion products restricting flow in No. 14 Reactor Coolant Loop RTD Bypass Line. As a result of that LER, the NRC issued IE Information Notice 83-65 to all utilities, describing that event and making recommendations concerning the RTD Bypass Line flow sensors and associated alarm. On October 19, 1983, PSE&G received a notice from another utility, describing a similar event that they had experienced; although, their problem was caused by a stem-to-disk separation of a bypass line isolation valve. They explained that the valve disk had fallen, resulting in restriction of the flow; and, the valve disk could lift reestablishing flow. Since this type of failure could easily be mistaken for an obstruction caused by crud, it was decided to radiograph all RTD Bypass Line valves. In January, 1984, radiography results of Unit 2 valves revealed stem-to-disk separations associated with two valves. Unit 2 LER 84-001-00 documented these findings, and alerted the Commission to possible generic problems. On April 1, 1984, radiography results of Unit 1 valves revealed similar failures associated with eleven valves. All Unit 1 RTD Bypass Line valves have been replaced with ones of a different design. Present plans are to replace Unit 2 valves during the next refueling outage.

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### PLANT AND SYSTEM IDENTIFICATION:

Westinghouse - Pressurized Water Reactor

Energy Industry Identification System (EIIS) codes are indentified in the text as [XX].

### IDENTIFICATION OF OCCURRENCE:

Resistance Temperature Detector (RTD) Bypass Line - Valve Failures

Event Date: 04/01/84

Report Date: 05/01/84

This report was initiated by Incident Report 84-046

### CONDITIONS PRIOR TO OCCURRENCE:

Mode 6 - Rx Power 000 % - Unit Load 0000 MWe - Defueled

### DESCRIPTION OF OCCURRENCE:

On January 29, 1983, during routine shutdown operation, a low flow alarm was received in the Unit 1 control room from the No. 14 Reactor Coolant Loop RTD Bypass Line. Investigation of the problem, by alternately isolating the hot-leg and cold-leg sides of the flowpath, indicated that the hot-leg flowpath was obstructed. The No. 14 Reactor Coolant Average Temperature Channel was therefore declared inoperable and a limiting condition for operation was entered, retroactive to the time of discovery. All bistables associated with the channel were immediately placed in the tripped condition. The redundant loop Tave channels remained operable throughout the occurrence. In an attempt to dislodge the obstruction from the hot-leg bypass loop, its isolation valve was cycled, and bypass flow was restored to normal. No other problems with the channels were evident, and the occurrence was assumed to involve an isolated instance of corrosion products restricting flow in the bypass line.

Unit 1 Licensee Event Report (LER) 83-007/03L documented the above listed occurrence. As a result of that LER, the NRC issued IE Information Notice No. 83-65 (dated October 7, 1983) to all Westinghouse nuclear power reactor facilities holding an operating license (OL) or a construction permit (CP). This information notice recommended calibration of the flow sensors on a refueling outage basis and verification of the alarm setpoint on a monthly basis, to assure the operability of this monitoring function, since no previous surveillance requirements existed.

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**DESCRIPTION OF OCCURRENCE: (cont'd)**

As a result of that information notice, Salem received a notice (dated October 19, 1983) from another utility, via the Site Westinghouse Representative, informing us of a similar problem which they had experienced with reduced flow through the RTD bypass loops. The message explained that their problem was caused by a stem-to-disk separation of a bypass line isolation valve. The valve disk had fallen, resulting in restriction of the flow. Given the right conditions, the valve disk could lift and flow would be reestablished; this type of failure could easily be mistaken for an obstruction caused by crud.

Although the occurrence in January 1983 was the only one of its kind ever experienced at either of the Salem units, it was decided to radiograph all RTD bypass line valves in all reactor coolant loops of both units during their next refueling outages. In January, 1984, when a maintenance shutdown of Unit 2 was extended, the valves associated with that unit were radiographed. Five valves in each of the four bypass lines (for a total of twenty valves) were radiographed. The results revealed that the disk was separated from the stem on 22RC17 and on 23RC24 (located in No. 22 and No. 23 Reactor Coolant Loop RTD Bypass Lines). On February 9, 1984, Unit 2 LER 84-001-00 was submitted documenting these findings, and notifying the Commission and other facilities to the possibility of similar undetected failures.

On April 1, 1984, during a refueling outage, radiography results of Unit 1 valves revealed that the disks were separated from the stems on eleven out of the twenty valves. The valves involved were 11RC16, 11RC17, 11RC24 and 11RC28 in No. 11 Reactor Coolant Loop RTD Bypass Line; 12RC16 in No. 12 RTD Bypass Line; 13RC16, 13RC17 and 13RC25 in No. 13 RTD Bypass Line; and, 14RC16, 14RC17 and 14RC25 in No. 14 RTD Bypass Line.

**ANALYSIS OF OCCURRENCE:**

The reactor coolant loop temperature instruments are utilized in the Reactor Protection System [JC]. Operability of the temperature instruments is required to provide the overall reliability, redundancy, and diversity available in the facility design for the mitigation of accidents. The Reactor Coolant System [AB] hot-leg and cold-leg RTDs are located in reactor coolant bypass loops. A bypass loop from upstream of the steam generator to the reactor coolant pump inlet is used for the hot-leg RTD, and a bypass loop from downstream of the reactor coolant pump to the pump inlet is used for the cold-leg RTD.

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**ANALYSIS OF OCCURRENCE: (cont'd)**

The bypass loop flowrate affects the overall time response of the temperature signals provided for reactor protection. These response times are considered in performing FSAR accident analyses and are included in the plant Technical Specification surveillance requirements. The Westinghouse Functional Specification (CE-CPA-978) requires a bypass flowrate of fifty to three-hundred gallons per minute (50-300 GPM). Flowrate within this band will ensure the required time response for thermal overpower and overtemperature protection. The Salem Generating Station design enables a normal flowrate of three-hundred (300) GPM. The RTD bypass loops have low flow alarms whose setpoint is ninety percent (90%) of the normal flow. This setpoint corresponds to a flowrate of two-hundred and seventy (270) GPM, and is well above the minimum required flowrate of fifty (50) GPM.

In January, 1984, when the Unit 2 valve failures were discovered, flow measurements verified flow to be greater than two-hundred and ninety (290) GPM in the bypass lines containing the defective valves. This indicated that the disks were, in fact, lifting off of their seat. The low flow alarm setpoints were checked; they were satisfactory, and the alarms functioned properly. Since Unit 2 had never received this alarm, this verified that flow has always been greater than two-hundred and seventy (270) GPM. In addition, flow measurements confirmed that flow in all of Unit 1 Reactor Coolant Loop RTD Bypass Lines was greater than two-hundred and seventy (270) GPM. Unit 1 low flow alarms were also verified to be operating properly. A safety evaluation was also performed. The physical dimensions of these detached disks precluded the possibility of them being dislodged from the inlet or outlet ports of the valves. Because of the valve design, the stems could not be physically backed out of the valves by overtravel. They also could not be forced out by the system pressure; this was confirmed by the vendor. Based on the above findings (in January, 1984), it was concluded that there were no problems associated with a startup of Unit 2, or with the continued operation of Unit 1.

**APPARENT CAUSE OF OCCURRENCE:**

The separation of the disk from the stem is apparently caused by the force exerted on the joint when the valve is backseated, with additional forces being applied to the joint due to the thermal effects of heatup and cooldown.

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CORRECTIVE ACTION:

As stated in Unit 2 LER 84-001-00, PSE&G began working on plans to replace the valves with ones of a different design. When the Unit 1 valves were discovered (in April, 1984), plans for replacement were in place. As a result, all five valves in each of the four Reactor Coolant Loop RTD Bypass Lines (for a total of twenty Unit 1 valves) have been replaced. Present plans are to replace Unit 2 valves during the next refueling outage.

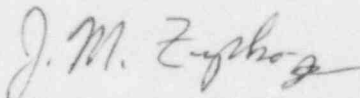
FAILURE DATA:

OLD VALVE

Rockwell-International  
Globe Valve 1500 S  
2 Inch, Stainless Steel  
Type 3624 F316  
Mark No. FA-17

REPLACEMENT VALVE

Yarway Corporation  
Globe Valve  
2 Inch, Stainless Steel  
Type 5515B F316  
Mark No. FA-131

  
General Manager-  
Salem Operations

JLR:tns

Sorc Mtg. 84-049



**PSEG**

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

Salem Generating Station

May 1, 1984

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 84-010-00

This Licensee Event Report is being submitted to notify the Commission and other facilities of a possible undetected generic problem associated with Reactor Coolant Loop RTD Bypass Line Valves. This reports is required within thirty (30) days of discovery.

Sincerely yours,

J. M. Zupko, Jr.  
General Manager -  
Salem Operations

JR:k11 *JH*

CC: Distribution