NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Salem Generating Station - Unit 2	0 5 0 0 0 3 1 1	1 OF 0 4

TITLE (4)
Controlled Shutdown Due To Charging Line Leak

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 7	0 5	8 4	8 4	0 1 6	0 0	0 8	0 3	8 4		0 5 0 0 0
										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)			
1	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
1 0 0	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
	AREA CODE
J. L. Rupp	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 NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
B	C B	P S P	X 9 9 9	Y							

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 July 5, 1984, during routine power operation, a leak was discovered on the common suction line to the Charging Pumps. A Unit shutdown was initiated, due to the questionable operability of all Charging Pumps and both Emergency Core Cooling System Subsystems. The Nuclear Regulatory Commission was notified of the commencement of the Unit shutdown. Investigation revealed a crack in the schedule 10 suction header piping, of approximately three inches in length, and originating in the toe of the weld where vent Valve 2CV372 piping is attached to the main suction header. Independent laboratory tests showed that this was an outside diameter to inside diameter fatigue failure, attributed to normal system vibration of the vent valve piping. The affected piping was replaced, and the weld areas of thirty-three vent and drain connections were inspected, prior to authorizing a Unit startup. Design Change Requests have been issued, which will reduce the length of certain Charging System vent and drain valve piping, reducing the moment arm and the stress on the weld area caused by vibration. This occurrence involved no undue risk to the health or safety of the public. Due to the completion of a shutdown which is required by the Technical Specifications, this event is reportable in accordance with 10CFR 50.73 (a)(2)(i)(A).

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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:

Controlled Shutdown Due to Charging Line Leak

Event Date: 07/05/84

Report Date: 08/03/84

This report was initiated by Incident Report No. 84-102

CONDITIONS PRIOR TO OCCURRENCE:

Mode 1 - Rx Power 100 % - Unit Load 1150 MWe

DESCRIPTION OF OCCURRENCE:

On July 5, 1984, during routine power operation, a leak was discovered on the common suction line to the Charging Pumps [CB], in the vicinity of vent valve 2CV372. At 0822 hours, Technical Specification Limiting Condition For Operation 3.0.3 was entered and a controlled shutdown was initiated, due to the questionable operability of all Charging Pumps and both Emergency Core Cooling System (ECCS) Subsystems (Safety Injection [BQ] and Residual Heat Removal [BP]). In accordance with the Code of Federal Regulations, 10CFR 50.72(b)(i)(A), the Nuclear Regulatory Commission was notified of the commencement of the Unit shutdown. The Unit was placed in cold shutdown and Technical Specification Action Statement 3.0.3 was terminated at 0338 hours, July 6, 1984.

APPARENT CAUSE OF OCCURRENCE:

The section of piping containing the defect was removed and sent to an independent laboratory for evaluation and determination of the failure mechanism. A crack was physically located in the schedule 10, eight (8) inch charging pump suction line, and originated in the toe of the weld where the vent valve piping is attached to the main suction header. Fractographic analysis attributed the failure to fatigue, which was most probably caused by normal system vibration of the vent valve piping. Relative dimensions of the crack (e.g., 3 1/8 inches on the O.D. and 2 5/8 inches on the I.D. of the pipe), and the presence of a ductile shear lip on the I.D. edge of the crack, confirmed that the failure had initiated from the O.D. of the pipe. Although fatigue failures (a total of nine in both Units) have previously been experienced in various Charging System vent and drain valve piping, this was the first defect located in the main header piping.

ANALYSIS OF OCCURRENCE:

The leak rate, which was present when the leak was discovered, was not sufficient to degrade the capability of the charging pumps to deliver Reactor Coolant System [AB] makeup or ECCS flow, had the need arisen. However, since the crack in the pipe was axial, it could have continued to propogate with a relative increase in the leakage rate; therefore, the Charging Pumps and the ECCS Subsystems were declared inoperable, and a Unit shutdown was conservatively initiated.

Although the discovery of the leak was by visual observation, the leak would have eventually shown up as primary system leakage, during the routine water inventory balance calculation. In addition, the operator would have become aware of the existence of a problem by the increased makeup frequency to the Volume Control Tank [CB]. Had the leak rate progressed to the point where the makeup system was not capable of maintaining Volume Control Tank level (greater than 75 GPM), the level would have decreased to the point where the charging pump suction would have automatically transferred to the Refueling Water Storage Tank [CB]. Alarms on the control room console, in addition to the makeup system being in operation, would have alerted the operator to the fact that there was a significant problem within the Charging System.

The operator would have been alerted to a potential loss of primary system inventory, by the increased makeup to the Volume Control Tank. Investigations required by leakage procedure EI-I-4.17 would have first led the operator to evaluate the Reactor Coolant System leakage. Since no leakage would have been indicated, the efforts to locate the problem would then have been shifted to systems outside the containment. This would have eventually led to the leak being discovered by visual observation. When the location of the leak was discovered, it could have been isolated and the plant placed in a safe shutdown condition.

Cooldown to cold shutdown would have been hampered by the lack of charging pumps and makeup capability to the Reactor Coolant System. However, when the Reactor Coolant System pressure decreased to less than 1500 psi, the Safety Injection Pumps could have been started to supply makeup to the Reactor Coolant System from the Refueling Water Storage Tank. As an alternative, pressure could have been decreased to 1500 psi prior to cooling down the Reactor Coolant System, while still maintaining approximately fifty degrees ($50^{\circ}F$) subcooling (Tsat for 1485 psig is equal to $596^{\circ}F$). This would have allowed the Safety Injection Pumps to maintain pressurizer level during the cooldown to Residual Heat Removal. Also, makeup from the Refueling Water Storage Tank would have provided the borated water necessary to maintain an adequate shutdown margin.

ANALYSIS OF OCCURRENCE: (cont'd)

In light of these facts, this occurrence involved no undue risk to the health or safety of the public. Due to the completion of a shutdown which is required by the Technical Specifications, this event is reportable in accordance with the Code of Federal Regulations, 10CFR 50.73(a)(2)(i)(A).

CORRECTIVE ACTION:

The affected Charging System piping was replaced utilizing schedule 40 piping, in place of the original schedule 10 piping. Dye-penetrant (PT) inspections of the weld areas of thirty-three (33) Charging System vent and drain connections (15 located on the suction header and 18 on the discharge header) were performed, to ensure no undetected defects, prior to authorizing a Unit startup.

In addition, Design Change Requests have been issued, which will reduce the length of certain Charging System vent and drain line piping. This will reduce the moment arm, and consequently reduce the stress on the weld area caused by normal system vibrations. Further evaluation is continuing, and PT inspections of selected vent and drain connections will continue, on a six (6) week basis, until such time as failures of this sort are resolved.

J. M. Zupko, Jr.

General Manager-
Salem Operations

JLR:tms

SORC Mtg 84-092

PSE&G

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

Salem Generating Station

August 3, 1984

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

Dear Sir:

SALEM GENERATING STATION
LICENSE NO. DPR-75
DOCKET NO. 50-311
UNIT NO. 2
LICENSEE EVENT REPORT 84-016-00

This Licensee Event Report is being submitted pursuant to the requirements of 10CFR 50.73(a)(2)(i)(A). This report is required within thirty (30) days of discovery.

Sincerely yours,

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

JR:kll

CC: Distribution

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