PSE&G

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

Salem Generating Station

July 23, 1992

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 92-014-00

This Licensee Event Report is a voluntary report being submitted pursuant to the requirements of the Code of Federal Regulations 10CFR 50.73.

Sincerely yours,

C. A Vondra
General Manager -
Salem Operations

MJP:pc

Distribution

NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WTH 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)	DOCKET NUMBER (2)	PAGE (3)
Salem Generating Station - Unit 1	0 5 0 0 0 2 7 2	1 OF 0 5

TITLE (4)

Steam Generator feedwater piping linear indications.

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 6	2 6	9 2	9 2	0 1 4	0 0	0 7	2 3	9 2		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	5
POWER LEVEL (10)	0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check one or more of the following)* (11)

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	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)	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)	

X — Voluntary

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
M.J. Pollack - LER Coordinator	AREA CODE 6 0 9 3 3 9 - 2 0 2 2

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
YES *(If yes, complete EXPECTED SUBMISSION DATE)*	X NO				

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

On June 26, 1992, results of radiographic (RT) examinations on Steam Generator (S/G) 13 indicated that the weld between the feedwater nozzle and the elbow {SJ} had a number of unacceptable linear indications as per ASME Code. RT of the second weld did not indicate any evidence of unacceptable indications. Results of ultrasonic (UT) and RT inspections, on S/Gs 12 and 14, indicated that the expander fittings had linear indications on both the nozzle to expander and expander to elbow welds. RT of the third weld did not indicate any evidence of unacceptable indications. After discovery of the feedwater pipe weld nonconformances, additional detailed examinations were conducted which included visual examination, ultrasonic examination, and dye penetrant examination. Additional linear indications were identified. The cause of this event is attributed to equipment failure. Investigation into the root cause of the linear indications is continuing. Two (2) 8"x10" weld samples have been sent for laboratory analysis. Based upon results of the root cause analysis, other corrective action will be assessed. All linear indications found have been removed by excavating and blending. Observed pitting was removed. New reducing spool pieces have been installed at the inlet to the S/Gs. All 4 Unit 1 S/G expander-to-feedwater nozzle welds will be examined at the next refueling outage. Additional examinations are being assessed.

PLANT AND SYSTEM IDENTIFICATION:

Westinghouse - Pressurized Water Reactor; Series 51 Steam Generators

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

IDENTIFICATION OF OCCURRENCE:

Steam Generator feedwater piping linear indications

Event Date: 6/26/92

Report Date: 7/23/92

This report was initiated by Incident Report Nos. 92-400, 92-404, 92-405, 92-406, and 92-407.

CONDITIONS PRIOR TO OCCURRENCE:

Mode 5 (Cold Shutdown)

DESCRIPTION OF OCCURRENCE:

On June 26, 1992, results of radiographic (RT) examinations on Steam Generator (S/G) 13 indicated that the weld between the feedwater nozzle and the elbow {SJ} had a number of unacceptable linear indications as per ASME Code. RT of the second weld did not indicate any evidence of unacceptable indications. Results of ultrasonic (UT) and RT inspections, on S/Gs 12 and 14, indicated that the expander fittings had linear indications on both the nozzle to expander and expander to elbow welds. RT of the third weld (i.e., the weld between the elbow and the pipe) did not indicate any evidence of unacceptable indications. There were no unacceptable indications identified on S/G 11 nozzle fitting during the RT and UT examinations.

This examination was prompted by recent S/G feedwater nozzle leakage concerns at Sequoyah Generating Station.

Upon discovery of the S/G feedwater piping linear indications, the Nuclear Regulatory Commission (NRC) was notified per Code of Federal Regulations 10CFR 50.72(b)(2)(iii).

APPARENT CAUSE OF OCCURRENCE:

The cause of this event is attributed to equipment failure. Investigation into the root cause of the linear indications is continuing. Two (2) 8"x10" weld samples have been sent for laboratory analysis.

In 1979, similar S/G feedwater nozzle/feedwater piping connection

APPARENT CAUSE OF OCCURRENCE: (cont'd)

linear indications were identified and corrected (reference LER 272/79-46). The 1979 examination was in response to NRC Bulletin 79-13. Per a commitment, made in response to the Bulletin, additional S/G examinations were made during the following refueling outage in 1980. One linear discontinuity (approximately 1" long) was found. It was determined to be an unfused area in the root portion of the butt weld on the elbow side (reference LER 272/80-55). It is not related to the 1979 linear indication concerns. No other unacceptable linear indications were observed.

S/G examinations continued through 1984 with no additional observed linear indications.

Investigation of the 1979 linear indications identified the cause as corrosion assisted thermal fatigue. Specifically, a fatigue loading mechanism was induced by thermal stratification and striping during cold low flow, feedwater injections. Other significant contributing factors included high oxygen exposure, counterbore geometry, and the number of times that large temperature differences (stratification) exist during heatup, hot standby and low power operations.

ANALYSIS OF OCCURRENCE:

After discovery and removal of the 12, 13, and 14 S/G feedwater pipe weld nonconformances, additional detailed examinations were conducted. They included: 1) visual examination of the four (4) S/G nozzles' internal diameter; 2) ultrasonic examination of the thermal sleeve; and 3) dye penetrant (PT) examination from the counterbore region up to and including the thermal sleeve. Results were:

- 11 S/G - no unacceptable indications in the counterbore areas however, visual and PT examination identified linear indications on the nozzle ID surfaces close to the thermal sleeve
- 12 S/G - linear indications observed (by PT) in the counterbore area, minor linear indications close to the thermal sleeve, some rounded indications close to the thermal sleeve, and visual observation of erosion of the thermal sleeve resulting in larger than design gaps between the thermal sleeve and the S/G feedwater nozzle
- 13 S/G linear indications observed (by PT) near the thermal sleeve and visual observation of minor pitting and erosion in the area before the thermal sleeve
- 14 S/G linear indications observed (by PT) at the weld root, in the counterbore area, and near the thermal sleeve; also, visual observation of erosion of the thermal

ANALYSIS OF OCCURRENCE: (cont'd)

sleeve resulting in larger than design gaps between the thermal sleeve and the S/G feedwater nozzle

Per Westinghouse, failure experience with operating plant feedwater nozzles indicate that prior to catastrophic failure at the point of linear indication(s), the pipe/nozzle area will leak (i.e., leak-before-break failure). The Sequoyah Plant concern, which initiated the examinations resulting in discovery of this event, was discovered by leakage. Per Technical Specifications, several leakage detection systems including Containment pocket sump level monitoring system and Containment Fan Cooler condensate flow rate monitoring system, are maintained in service during plant operations. Therefore, since leakage would not go undetected, the health and safety of the public was not affected by this event.

The Code of Federal Regulations 10CFR 50.72 and 10CFR 50.73 reporting requirements do not encompass this event per the interpretations of NUREG 1022, "Licensee Event Report System". However, due to its significance, this voluntary LER has been issued. Also, the original 10CFR 50.72 notification was corrected.

Salem Unit 2 S/G expander-to-nozzle welds were examined prior to the Unit 1 examinations. No unacceptable indications were found; however, one localized shadow area was observed, via RT, on 24 S/G. This shadow on RT film could not be confirmed by UT. This shadow area will be reexamined at the next refueling outage.

Areas unaccessible without removal of the thermal sleeve, although not examined, were evaluated by Westinghouse to determine the impact of potential linear indications. This evaluation included comparison of Salem to a similar plant on which a detailed fracture mechanics analyses was completed. Westinghouse concluded that potential linear indications in the unaccessible areas present no safety significant issues up through the end of the next operating cycle (1R11).

CORRECTIVE ACTION:

All linear indications found on the S/G feedwater nozzle ID's have been removed by excavating and blending with the surrounding area. The deepest excavation was in nozzle 13 (0.083"). The VT and PT observed pitting was removed. New reducing spool pieces have been installed at the inlet to the Unit 1 S/Gs.

All four (4) Unit 1 S/G expander-to-feedwater nozzle welds will be examined at the next refueling outage. Additional examinations are being assessed.

The Unit 2 apparent 24 S/G indication (shadow on RT film) discussed above, will be reexamined at the next refueling outage. The need to conduct additional examinations is being evaluated.

CORRECTIVE ACTION: (cont'd)

The root cause investigation of the linear indications is continuing. Two (2) 8"x10" weld samples have been sent for laboratory analysis.

Based upon results of the root cause analysis, additional corrective action will be assessed.

General Manager -
Salem Operations

MJP:pc

SORC Mtg. 92-086