PSEG

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Nuclear Business Unit

AUG 31 1995

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

Attn.: Document Control Desk

SALEM GENERATING STATION
LICENSE NO: DPR-70
DOCKET NO: 50-272
UNIT NO: 1

SUPPLEMENTAL LICENSEE EVENT REPORT NO. 94-017-01

This Licensee Event Report supplement is being submitted pursuant to requirements of the Code of Federal Regulations 10CFR50.73. It addresses the applicability of the original issue to Unit 2 and also provides additional information related to root cause and corrective actions.

Sincerely,

Clay C. Warren
General Manager -
Salem Operations

MJPJ:vs

SORC 95-098

C Distribution
LER File 3.7.1

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND 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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
SALEM GENERATING STATION UNIT1	05000272	1 OF 7

TITLE (4)

INADEQUATE MARGIN FOR PRESSURIZER OVERPRESSURE PROTECTION DURING LOW TEMPERATURE CONDITIONS

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
									SALEM UNIT 2	05000311
1 1	17	94	9 4	017	0 1	08	2 5	95	FACILITY NAME	DOCKET NUMBER
										05000

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

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
CRAIG LAMBERT	609/339-1848

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 15 single-spaced typewritten lines) (16)

On 11/17/94, a 10CFR50.72(b)(1)(ii) notification was made when it was determined that based on realistic assumptions for various system availability and alignments, Salem Generating Station Unit 1 was outside the design/licensing basis for Pressurizer Overpressure Protection System (POPS) should an inadvertent safety injection (SI) signal occur in Mode 5 below 200° F. Under these conditions, an SI signal could result in a peak RCS pressure of 474 psig which exceeded the then current design basis pressure limit of 450 psig. This concern was not considered applicable to Unit 2 at that time. Subsequent review of an engineering evaluation has determined that both Units 1 and 2 were outside their design/licensing basis for the POPS analysis and should have been reported on December 30, 1993. This conclusion is based on the differential pressure from the operating RCPs that was not considered in the original POPS analysis for the mass addition transient. The transient analysis code and inappropriate use of ASME Code Case N-514 led to the misreporting. Code Case N-514 has since been approved by the NRC for use at Salem.

Plant and System Identification:

Westinghouse - Pressurized Water Reactor

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

Identification of Occurrence:

Inadequate Margin For Pressurizer Overpressure Protection During Low Temperature Conditions (Applicable To Units 1 and 2)

Event Date: November 17, 1994 and December 30, 1993

Initial Report Date: December 14, 1994

Report Date: August 25, 1995

This report was initiated by Incident Reports 94-419 and 95-343.

Initial Conditions:

Mode 1 Reactor Power 100% Unit Load 1150 MWe

Description of Occurrence:

The bases for Salem Units 1 and 2 Technical Specifications (TSs) state that one Pressurizer Overpressure Protection System (POPS) relief valve, at a lift setting of </= 375 psig, provides adequate relieving capacity in the event of an overpressure transient that includes inadvertent start of a safety injection (SI) pump (mass addition transient) into a water solid Reactor Coolant System (RCS). Subsequently, it was determined that the following realistic mass addition transient assumptions could place Unit 1 outside the design and licensing basis POPS analysis should an SI signal occur:

- RCS temperature </= 200° F
- One reactor coolant pump (RCP) in operation
- Positive displacement Charging Pump (PDP) in service
- Power available to a maximum of one Centrifugal Charging Pump (CCP)

At 1746 hours on November 17, 1994, the Nuclear Regulatory Commission was notified of this event relative to Unit 1, pursuant to the requirements of 10CFR50.72(b)(1)(ii).

Description of Occurrence: (cont'd)

Under the above conditions, an SI signal could result in a combined flow from the PDP and CCP with a peak RCS pressure of 474 psig. This exceeded the current design basis pressure limit of 450 psig for Salem Unit 1.

Subsequently, review of an engineering evaluation completed on December 30, 1993, determined that pressure differences due to operation of one or more RCPs would have resulted in the pressure/temperature (P/T) limits for both Units 1 and 2 (450 psig and 475 psig respectively) being exceeded in Mode 5. This determination is based on the differential pressure from the RCPs not being considered in the original POPS analysis for the mass addition transient.

Analysis of Occurrence:

POPS protects the RCS from exceeding the TS P/T limits for plant heatup (reference TS Figure 3.4-2) and cooldown (reference TS Figure 3.4-3) by opening the Power Operated Relief Valves (PORV) during low temperature overpressure (LTOP) transients (RCS cold leg temperature below 312° F). Per existing design bases, either of the two PORVs has adequate relieving capacity to protect the RCS from overpressurization when the transient is limited to either (1) the start of an idle RCP with the secondary water temperature less than or equal to 50° F above the RCS cold leg temperature (heat addition), or (2) the start of an SI pump and resultant injection into a water solid RCS (mass addition). The pressure limit at the low temperature end of the P/T curves was 450 psig for Unit 1 and 475 psig for Unit 2, as read from the heatup and cooldown curves in effect on December 30, 1993.

The original Salem POPS analysis, based on the LOFTRAN computer code, calculated a maximum peak pressure for the most limiting mass addition transient of 446 psig with the PORV set at a pressure of 375 psig. In this analysis, the RCS pressure due to injection of 780 gpm SI flow into the initially cold water solid RCS was considered.

The Nuclear Steam Supply System (NSSS) vendor identified in a letter, dated March 15, 1993, a non-conservatism in the calculation for peak pressure for the heat input and mass addition transients that affects both Salem Units 1 and 2. The concern was that the difference between the wide range pressure transmitters (PT403 and PT405) elevations, which sense hot leg pressure, and the reactor vessel midplane (where the TS heatup and cooldown P/T limits are defined) with the RCPs operating was not considered in the original Salem POPS analysis.

Analysis of Occurrence: (cont'd)

To quantify the effects, specific pressure differences associated with RCP operation were determined for one, two, and four RCPs operating. The results of these calculations provided values of 29, 37, and 71 psig with one, two, and four RCPs operating, respectively. A correction pressure of 2.0 psig was then added to account for transmitter elevation differences not previously accounted for in the original calculations. When considering the pressure differential from one RCP in operation (31 psig) and adding this pressure to the peak pressure for the mass addition transient (446 psig), the P/T limits for both Salem Units 1 and 2 were exceeded. Therefore, both units were outside of their design basis for reporting purposes.

It was also determined that the PDP, if already in operation, would continue to operate upon initiation of a SI signal if offsite power remained available. During this postulated event, letdown would automatically isolate as part of the SI actuation. The additional flow from the PDP is a concern for the limited period of time when the RCS is </= 200° F (Mode 5), the PDP is in operation, and one (1) CCP has its associated power supply available. The combined flow of 665 gpm from the PDP (105 gpm) and the CCP (560 gpm) is now considered the most limiting mass addition transient.

PSE&G has re-analyzed this mass addition event using the GOTHIC computer code assuming a bounding maximum pump flow rate of 675 gpm. The resulting peak pressure is 474 psig, which exceeded the limit of 450 psig for Salem Unit 1, but was within the limit of 475 psig for Unit 2.

Additional margin on the TS P/T curves can be obtained when operating with POPS (RCS cold legs </= 312° F) by applying ASME Code Case N-514. The code case allows exceeding the P/T limits calculated in accordance with 10CFR50, Appendix G, by 10%. PSE&G requested permission to utilize Code Case N-514 and the NRC approved the request on 2/13/95.

On December 22, 1994, a 10CFR50.59 Safety Evaluation was completed for Salem Unit 2 that changed the POPS TS Bases. The mass addition flow rate assumed for the present POPS analysis is limited to the combined flow from the CCP in conjunction with an operating PDP or SI pump while in Mode 5.

On February 8, 1995, a 10CFR50.59 Safety Evaluation was completed for Salem Unit 1 that changed the POPS Technical Specification Bases. The mass addition flow assumed for the POPS analysis was limited to the flow from a single CCP while in Mode 5. Following approval of the ASME Code Case N-514 by the NRC, an additional 50.59 Safety Evaluation was completed that again changed the Technical Specification Bases. The new mass addition flow

Analysis of Occurrence (cont'd):

rate assumed for the POPS analysis is limited to the combined flow from the CCP in conjunction with an operating PDP or SI pump while in Mode 5. This is identical to Unit 2 Bases.

Apparent Cause of Occurrence:

This event is attributed to Design, as classified in Appendix B of NUREG-1022. This occurred because the NSSS vendor had not considered either the pressure differential associated with the operation of the RCPs or PDP operation as part of the design basis analysis for the mass addition transient.

In December 1993, PSE&G inappropriately utilized the 10% margin allowed by Code Case N-514 without prior NRC approval. Utilizing the additional margin allowed by the Code Case resulted in failure to recognize that the P/T limits could be exceeded for both Units. PSE&G also failed to initiate timely or effective corrective action in accordance with Nuclear Administrative Procedure NC.NA-AA.ZZ-0006(Q) to address the POPS non-conservatism after being notified by the NSSS vendor in March 1993. Also, PSE&G credited analysis results for the mass addition transient utilizing the GOTHIC computer code rather than LOFTRAN (used for the original mass addition transient) without the completion of a 10CFR50.59 safety evaluation. All of these factors resulted in PSE&G's failure to recognize that both Salem Units were outside their design bases in December 1993, when considering the pressure differential associated with one or more RCPs in operation.

Prior Similar Occurrence:

No other prior similar occurrences have been identified related to this design deficiency.

Safety Significance:

This event is reportable in accordance with the requirements of 10CFR50.73(a)(2)(ii)(B), due to the POPS not being able to meet its current design basis. This event had minimal safety significance, based upon the additional relieving capacity available through the use of RH3 and/or with the 10% allowance, permitted by use of Code Case N-514.

WCAP - 13366, "Analysis of Capsule X From PSE&G Salem Unit 2 Reactor Vessel Radiation Surveillance Program", dated June 1992, analyzed the effects of radiation on the Unit 2 reactor vessel to determine the impact on the operating P/T limits. The results of that analysis determined that at an

Safety Significance: cont'd

RCS temperature of 85° F the pressure is 495 psig. In January 1993, PSE&G submitted a TS change request to modify the P/T limits based on the WCAP. The change request was approved by the NRC in February 1994 and made effective in April 1994.

The change in the pressure limit at the low temperature end of the P/T curve, while not approved by the NRC in December 1993, shows that in actuality the P/T limits for Unit 2 were never exceeded and the original concerns identified on Unit 1 were not applicable to Unit 2. Additionally, the revised P/T limits for Unit 2 and the new limits provided by the additional 10% margin allowed by Code Case N-514 ensures that the current P/T limits for Salem Units 1 and 2 will not be exceeded for an LTOP event.

Corrective Action:

The following administrative controls are in place on Salem Units 1 and 2 to ensure compliance with the POPS analysis:

1. Procedures limit operation in Mode 5 to two (2) RCPs.
2. Power must be removed from the SI pumps upon entry into Mode 4 (350° F > Tave > 200° F).

A submittal was made to the NRC requesting permission to utilize ASME Code Case N-514 to allow an additional margin of 10% in the P/T limits for the POPS during LTOP conditions. The NRC approved PSE&G use of Code Case N-514 on February 13, 1995.

The Corrective Action Program has been significantly improved by combining the previous processes for reporting conditions adverse to quality, lowering the program threshold, formalizing the Operability Determination Process, increasing management involvement and oversight, and clearly communicating management expectations regarding timeliness of evaluations and corrective actions.

Management has re-emphasized supervisions primary role to assess emerging issues objectively, as opposed to helping develop a solution.

Procedure and program commitment and compliance has been re-emphasized, especially in the are of Corrective Actions.

Management has re-emphasized that 10CFR50.59 is applicable if revisions to calculations/evaluations alter either the design basis, basis of analysis or conclusions in the UFSAR.

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

Personnel involved have received reinforcement on procedure compliance responsibility for compliance with licensing commitments and problem reporting.

Guidance has been provided to appropriate Engineering personnel regarding ASME Code application.

A 10CFR50.59 safety evaluation will be completed to allow PSE&G to utilize the GOTHIC computer code rather than LOFTRAN for the most recently completed mass addition transient.

Process improvements to the Operating Experience Feedback (OEF) Program will be implemented to ensure OEF documents (e.g. Westinghouse NASLs, etc.) receive initial screening for operability and the need to enter the issue into the Corrective Action Program. Issues that involve potential operability concerns will be prioritized through the Corrective Action Program.

The Technical Specification Bases for Units 1 and 2 have been revised to reflect the changes in the assumptions for the mass addition transient. Procedure changes have also been implemented to assure that appropriate controls are maintained.

REF: SORC Mtg. 95-098