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PSEG
Nuclear LLC

Technical Specification 6.9.1.5
Technical Specification 4.4.6.5.a

AUG 0 3 2007
LR-N07-0183

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Salem Nuclear Generating Station Unit 2
Facility Operating License No. DPR-75
NRC Docket No. 50-311

Subject: Response to Request for Additional Information Regarding Steam Generator Tube Inspections Conducted During the Fall 2006 Refueling Outage Salem Nuclear Generating Station, Unit No. 2 Docket No. 50-311

References: (1) PSEG Letter LR-N06-0434, "Steam Generator Tube Plugging Report," dated November 6, 2006.
(2) PSEG Letter LR-N07-0045, "2006 Steam Generator Tube ISI Summary Report," dated March 1, 2007.
(3) NRC letter to Mr. William Levis "Request for Additional Information Regarding Steam Generator Tube Inspections Conducted During the Fall 2006 Refueling Outage Salem Nuclear Generating Station, Unit No. 2," dated July 10, 2007.

PSEG Nuclear LLC (PSEG) hereby transmits its response to the Nuclear Regulatory commission (NRC) request for additional information as documented in Reference 3.

Attachment 1 to this letter contains the NRC's questions in bolded text followed by PSEG response. The response provided is consistent with the discussion held between PSEG and NRC personnel in a teleconference held on July 3, 2007.

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If there are any questions regarding this letter, please contact E. H. Villar at (856) 339 - 5456.

Sincerely,

Robert C. Braun
Site Vice President - Salem

Attachments (1)

cc: Mr. Samuel Collins, Administrator - Region I
U. S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

U. S. Nuclear Regulatory Commission
Attn: Mr. R. Ennis, Licensing Project Manager – Salem
Mail Stop 08B1
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USNRC Senior Resident Inspector - Salem (X24)

Mr. P. Mulligan, Manager IV
Bureau of Nuclear Engineering
P.O. Box 415
Trenton, NJ 08625

1. Please discuss whether the growth rates for the indications due to anti-vibration bar wear and cold leg thinning (CLT) are consistent with historical experience. In addition, discuss whether these indications (particularly the CLT indications) satisfy the structural integrity performance criteria.

Anti Vibration Bars (AVB) wear and CLT growth (wear) rates observed during outage 2R15 were relatively consistent as compared to previous Salem Unit 2 experience and considering the compounding effects of Non Destructive Examination (NDE) sizing uncertainty. For example, the 95th percentile AVB wear growth rate for 2R14 was estimated at approximately 4.6% Through Wall/Effective Full Power Year (TW/EFPY), as compared to approximately 2.9% TW/EFPY for 2R15. A similar discussion for CLT provided an estimated growth rate for 2R14 at approximately 7% TW/EFPY (average structural depth), as compared to approximately 13% TW/EFPY (average structural depth) for 2R15. The growth rate estimates for AVB and CLT are an overestimate of actual physical growth rate, since NDE sizing uncertainty is included. No attempt was made to remove the effects of NDE sizing uncertainty since the conservative growth rate provided an acceptable structural margin. Assessment of these indications was performed consistent with the guidance and requirements provided from NEI 97-06 "Steam Generator Program Guidelines," EPRI Tube Integrity Assessment Guidelines, EPRI Steam Generator Degradation Specific Management Flaw Handbook, and the EPRI Steam Generator In Situ Pressure Test Guidelines. All of the AVB wear and CLT indications burst pressures were calculated well above the structural integrity performance criteria burst pressure limit, and as such satisfied the structural integrity performance criteria.

2. Page 8 of Attachment 1 to your submittal dated March 1, 2007, states that the "total postulated accident leakage is estimated to be much less than the total allowable for all SGs (1 gpm [gallon per minute]), and any single SG (0.6 gpm)." In your Salem Unit 2 amendment request dated April 6, 2006, related to Technical Specification Task Force (TSTF) traveler TSTF-449, it appears that the only limit cited for accident-induced leakage was 1 gpm for all SGs. Please clarify your accident-induced leakage criteria for all design-basis accidents that are assumed to have primary-to-secondary leakage.

Copies of design-basis accident analyses supporting Salem's full implementation of alternative source term (AST) were submitted to the NRC and approved via License Amendments 271 and 252 (Ref. TAC Nos. MC3094 and MC3095). Further clarification was also provided in response to Request for Additional Information (RAI) number 9 in LR-N06-0277. Consistent with and subsequent to response number 9 in LR-NO6-0277, PSEG revised the accident analysis calculations with limiting assumptions of 0.6 gpm primary-to-secondary (PTS) leakage in the affected Steam Generator (SG) and 1.0 gpm total PTS leakage for all SGs. Apportioned PTS leakage is used in the Main Steam Line Break and Locked Rotor Accidents. PTS leakage of 1.0 gpm in a single SG is used in the Steam Generator Tube Rupture and Control Rod Ejection (CRE) Accidents. Therefore, the limiting accident-induced leakage criteria for all design basis accidents (DBAs) are the PTS leakage of 1.0 gpm for all SGs and 0.6 gpm in any single SG.

3. The leakage for the WEXTEX region, the top of tubesheet transition region, and from tube plugs was assessed in the letter dated March 1, 2007. Please discuss whether any other indications detected during the outage would have leaked under postulated accident conditions. In addition, discuss the amount of leakage expected from these indications and provide the total accident-induced leakage from all sources.

No other indications detected during the outage would have leaked under postulated accident conditions. Therefore, the accident-induced leakage assessment provided in the letter dated March 1, 2007 for the WEXTEX region, the top of tubesheet transition region, and from tube plugs is the total accident-induced leakage from all sources. The total leak rate is estimated to be less than 0.36 gpm for the worst-case steam generator and total for all steam generators.

4. Please provide an assessment of the severity of the single axial indications and the single circumferential indications detected at the tube support plate elevations. Did these indications satisfy the structural integrity performance criteria?

The table below supplements the information supplied in the March 1, 2007 letter. As shown below, all the tube support plate indications are relatively short in axial/circumferential length and with maximum depth (%TW) measured much less than through-wall. Assessment of these indications was performed consistent with the guidance and requirements provided from NEI 97-06 "Steam Generator Program Guidelines," EPRI Tube Integrity Assessment Guidelines, EPRI Steam Generator Degradation Specific Management Flaw Handbook, and the EPRI Steam Generator In Situ Pressure Test Guidelines. The calculated burst pressures for the indications are well above the structural integrity performance criteria burst pressure limit and more than half of the indications demonstrated a Plus Point voltage less than 0.5 volts (EPRI Steam Generator In Situ Pressure Test Guidelines), and as such satisfied the structural integrity performance criteria.

TSP Indications				Plus Point Data					
SG	Row	Col	Location	Axial Length Inches	ARC Deg	ID/OD	Volts	Max %TW	Ind
SG21	5	38	01H	0.33		ID	0.88	44	SAI
SG21	5	41	01H	0.08		ID	0.74	27	SAI
SG21	6	41	01H	0.41		ID	0.65	26	SAI
SG21	6	65	02H	0.19		ID	0.37	28	SAI
SG21	10	12	01H	0.38		ID	0.49	21	SAI
SG21	12	13	02H	0.13		ID	0.37	29	SAI
SG21	19	28	01H		39	OD	0.22	38	SCI
SG21	20	27	01H	0.27		OD	0.15	27	SAI
SG21	21	37	03H	0.41		ID	0.81	36	SAI
SG22	9	56	01H	0.38		ID	0.37	49	SAI
SG24	12	4	01H	0.31		ID	0.4	29	SAI
SG24	20	64	01H	0.26		ID	0.71	38	SAI
SG24	20	64	01H	0.31		ID	0.72	44	SAI
SG24	23	82	02H	0.18		OD	0.12	30	SAI

5. Please discuss whether the inspection data acquired for the permeability variation indications was adequate to determine whether the area may have had a significant flaw. If not, please discuss how tube integrity was assessed at these locations (i.e., in-situ testing).

Permeability Variation (PVN) is a condition where the test coil impedance changes due to a change in the tubing material's inherent willingness to conduct magnetic flux lines. PVN signals are not considered to be flaws or degradation. Rather, the signals are considered data quality issues that require additional testing using a magnetically biased rotating coil probe to disposition. During 2R15, conservative changes were made relative to the identification of PVN signals based on bobbin coil response. A quantitative bobbin voltage value of equal to or greater than 5 volts was used to identify locations for supplemental magnetically biased Plus Point testing. This resulted in the identification of four areas of tubing (table below) that required follow-up testing. The results of this testing did not reveal any flaw-like response indicative of degradation in the area of interest; however, low level permeability variations were noted. PSEG made the conservative decision to preventively plug these tubes. It is expected that any flaws or degradation in the area where PVN was reported would result in a change in signal response when compared to previous inspection data. Based on review of 2R12 bobbin coil data (2002 timeframe), there were no observed changes in the signals.

The last location (Row 7 Column 41 in 22 SG) is routinely inspected as part of the base scope Top of the Tube Sheet (TTS) Plus Point inspection program. The bobbin coil data for this location did not reveal any data quality concerns. There was no flaw-like response observed in the magnetically biased Plus Point data; however, low level PVN was observed. Therefore, PSEG made the conservative decision to preventatively plug this tube. Based on review to 2R12, there were no changes in the Plus Point signal response at this location. In addition, the locations identified with permeability variation are in locations not typically conducive to degradation (e.g., freespan). The locations identified with permeability variation are as follows and were preventatively plugged:

SG	Tube ID	Bobbin Coil at Location	Location
21	R12C24	PVN	03C + 14.40
21	R23C40	PVN	02C + 25.63
22	R14C9	PVN	02H + 16.88
22	R15C18	PVN	02H + 41.27
22	R7C41	NDD	TSH + 1.73

With the absence of degradation at the locations listed above, tube integrity is demonstrated.