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LR-N06-0338  
LCR S05-07



United States Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

RESPONSE TO RAIs #2 ON LCR S05-07: REQUEST TO CHANGE TO  
TECHNICAL SPECIFICATIONS TO REVISE STEAM GENERATOR TUBE  
SURVEILLANCE REQUIREMENTS IN ACCORDANCE WITH WCAP-14797,  
REVISION 2 (W\* METHODOLOGY)  
SALEM GENERATING STATION - UNIT 2  
DOCKET NO. 50-311  
FACILITY OPERATING LICENSE NO. DPR-75

- References:
- (1) Letter from PSEG to NRC: "Request for Change to Technical Specifications, to Revise Steam Generator Tube Surveillance Requirements in Accordance with WCAP-14797, Revision 2 (W\* Methodology), Salem Nuclear Generating Station, Unit 2, Facility Operating License DPR-75, Docket No. 50-311", dated September 15, 2005
  - (2) Letter from PSEG to NRC: "Response to RAIs on LCR S05-07: Request for Change to Technical Specifications, to Revise Steam Generator Tube Surveillance Requirements in Accordance with WCAP-14797, Revision 2 (W\* Methodology), Salem Nuclear Generating Station, Unit 2, Facility Operating License DPR-75, Docket No. 50-311", dated June 28, 2006

On September 15, 2005, PSEG Nuclear LLC (PSEG) submitted a License Change Request (LCR S05-07) to Facility Operating License DPR-75, for Salem Generating Station Unit 2 (Reference 1). On June 28, 2006, PSEG submitted additional supporting information (Reference 2) in response to an NRC Request for Additional Information (RAI).

Following further review by the NRC Staff, PSEG received a second RAI on LCR S05-07. The second RAI requested additional information on the Technical Specifications (TS) Bases related to the proposed license change. The response to the second RAI is provided in Attachment 1. The required changes to the TS Bases are provided in Attachment 2.

ADD1

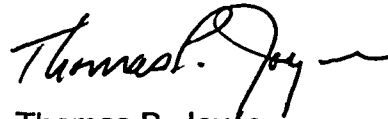
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Should you have any questions regarding this additional information related to LCR S05-07, please contact Mr. Jamie Mallon at (610) 765-5507.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 8/4/06  
(Date)

Sincerely,



Thomas P. Joyce  
Site Vice President  
Salem Generating Station

Attachments (2)

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**SALEM GENERATING STATION – UNIT 2  
FACILITY OPERATING LICENSES NOS. DPR-75  
DOCKET NO. 50-311**

**RESPONSE TO NRC RAIs #2 ON LCR S05-07: CHANGE TO TECHNICAL  
SPECIFICATIONS TO REVISE STEAM GENERATOR TUBE SURVEILLANCE  
REQUIREMENTS IN ACCORDANCE WITH WCAP-14797, REVISION 2 (W\*  
METHODOLOGY)**

In order to complete its review the staff needs the additional information requested below.

Proposed TS Bases Insert 2 describes how you plan to apply the W\* criteria, including how the postulated steam line break leakage will be determined. The staff notes that, in general, this discussion does not adequately describe the W\* criteria the staff believes you are proposing. Two examples are discussed below.

- a. The W\* criteria apply only to the hot-leg portion of the tubesheet, but this is not specified in the proposed TS Bases.

**Response:**

PSEG has revised the TS Bases (Attachment 2 of this submittal) to clarify that License Change Request (LCR) S05-07 is only applicable within the hot leg WEXTEx expanded region of the tubesheet for the Salem Unit 2 Westinghouse Series 51 Steam Generators.

- b. The proposed TS Bases reference WCAP-14797 and Westinghouse LTR-CDME-05-30 as the methodology sources for determining the number of indications in the tubesheet region and the amount of postulated leakage from these indications. These documents are not consistent with the approach you discussed in your June 28, 2006, letter. For example, the basis for the leak rate of 0.0033 gallons per minute from flaws between 8 and 12 inches below the top of the tubesheet, which Salem 2 intends to use and which was approved for Diablo Canyon, is not provided in WCAP-14797 and LTR-CDME-05-30. The basis for that leak rate was provided in a letter from Pacific Gas and Electric, dated August 25, 2005 (ML052440396). In addition, since the constrained crack leakage model referenced in your TS Bases is different than what was approved for Diablo Canyon, the proposed TS Bases do not reference an NRC-approved leakage model for W\*. If your intent is to calculate postulated leakage consistent with the methodology approved for Diablo Canyon, as indicated in response #1b in your June 28, 2006, letter, the proposed TS Bases will need to be modified.

Please discuss your plans for modifying Insert 2 to the TS Bases to make it consistent with the W\* criteria you are proposing. In addition, please clarify whether you will be assigning 0.0033 gpm to all indications (detected and non-detected) between 8 and 12 inches below the top of the tubesheet (as discussed in your June 28, 2006, letter), or whether you plan on using the constrained crack model for detected indications between 8 and 12 inches (as discussed in your proposed Bases).

**Response:**

PSEG has revised the TS Bases (Attachment 2 of this submittal) to be consistent with the June 28, 2006 submittal (LR-N06-0277). The revised TS Bases indicate that LCR S05-07, which includes the RAI responses (LR-N06-0277, and this submittal, LR-N06-0338), is the primary reference supporting the W\* inspection methodology proposed for Salem Unit 2. This revision provides consistency between the proposed methodology and the TS Bases.

PSEG has also revised the TS Bases (Attachment 2 of this submittal) to clarify that the assignment of 0.0033 gpm is applicable to all indications (detected and non-detected) between 8 and 12 inches below the top of the tubesheet (TTS). Specifically, PSEG will inspect in accordance with LCR S05-07 and therefore hot leg tubesheet inspections below the W\* distance is not required. The methodology established in LCR S05-07 for conservatively projecting the potential population of indications between 8 and 12 inches below the TTS would envelop detected and non-detected indications. For example, since the technology utilized for inspections in the tubesheet region typically exceeds the minimum inspection requirements, it is not unrealistic that inspections may occasionally detect a number of indications below 8 inches from the TTS. Since the methodology established in LCR S05-07 already conservatively projects the total postulated indications within 8 and 12 inches below the TTS, detected indications would already be bounded.

**PROPOSED CHANGES TO TS BASES PAGES**

The following Technical Specifications Bases for Salem Unit 2, Facility Operating License No. DPR-75, are affected by this change request:

Salem Unit 2

Technical Specification

Page

Bases 3/4.4.6

B 3/4 4-3 through B 3/4 4-4

## REACTOR COOLANT SYSTEM

### BASES

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#### 3/4.4.6 STEAM GENERATORS (continued)

Wastage-type defects are unlikely with proper chemistry treatment of the secondary coolant. However, even if a defect should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging will be required for all tubes with imperfections exceeding the plugging limit of 40% of the tube nominal wall thickness. Steam generator tube inspections of operating plants have demonstrated the capability to reliably detect degradation that has penetrated 20% of the original tube wall thickness.

INSERT 2 →

## INSERT 2

The License Change Request (LCR) S05-07 (LR-N05-0397, LR-N06-0277, LR-N06-0338) provides requirements for limited tubesheet inspection that is only applicable within the hot leg WEXTEx expanded region of the tubesheet for the Salem Unit 2 Westinghouse Series 51 Steam Generators. LCR S05-07 is supported by, but not limited to, the W\* criteria incorporate the guidance provided in WCAP-14797, Revision 2, "Generic W\* Tube Plugging Criteria for 51 Series Steam Generator Tubesheet Region WEXTEx Expansions" and supporting information provided from Westinghouse Letter Report LTR-CDME-05-30, "W\* Integrity Evaluation for Salem Unit 2 Limited SG Tube RPC Examination (Based on WCAP-14797, Revision 2)". In accordance with LCR S05-07, the W\* length is the undegraded length of tubing into the tubesheet below the bottom of the WEXTEx transition (BWT) that precludes tube pullout in the event of a complete circumferential separation of the tube below the W\* length. The W\* distance is the larger of the following two distances as measured from the top-of-the-tubesheet (TTS): (a) 8-inches below the TTS or (b) the non-degraded distance from the TTS to the bottom of the W\* length, including the distance from the TTS to the bottom of the WEXTEx transition (BWT) and Non-Destructive Examination (NDE) measurement uncertainties (i.e., W\* distance = W\* length + distance to BWT + NDE uncertainties). Non-Destructive Examination determines the distance to the BWT for each tube. The nondestructive examination (NDE) measurement uncertainty is provided from LCR S05-07, as supported by WCAP-14797 Revision 2. Tubes with indications detected within the W\* distance will be removed from service by tube plugging.

~~Tubes to which WCAP-14797 is applied can experience through wall degradation up to the limits defined in Revision 2 without increasing the probability of a tube rupture or large leakage event. Tube degradation of any type or extent below the W\* distance, including a complete circumferential separation of the tube, is acceptable and therefore may remain in service. As applied at Salem Unit 2, the W\* methodology (WCAP-14797) LCR S05-07 is used to define the required tube inspection depth into the tubesheet, and is not used to permit degradation in the W\* distance to remain in service. Furthermore, potential primary to secondary leakage in the W\* distance, and below the W\* distance, can be conservatively evaluated in accordance with LCR S05-07 using WCAP-14797 Revision 2 and LTR-CDME-05-30. The leak rate potential for axial, circumferential, and volumetric indications detected within 12 inches from the top of the tubesheet can be conservatively calculated using the constrained crack model as delineated in LCR S05-07 (supported by Westinghouse LTR-CDME-05-30).~~

The postulated leakage during a steam line break shall be equal to the following equation, as supported by LCR S05-07 (~~WCAP-14797 Rev 2 and LTR-CDME-05-30~~):

Postulated SLB Leakage =                      Assumed Leakage  $0"-8" <_{TTS}$  + Assumed Leakage  $8"-12" <_{TTS}$  + Assumed Leakage  $>12" <_{TTS}$

Where:                      Assumed Leakage  $0"-8" <_{TTS}$  is the postulated leakage for indications that are deemed via flaw depth estimation techniques to be 100% throughwall, and therefore present a potential leak path. This term is applicable to detected indications during an in-service



inspection and potentially undetected indications in the steam generator tubes left in service between 0 inches and 8 inches below the top of the tubesheet (TTS). Since tubes with indications detected between 0 and 8 inches below the TTS are plugged upon detection, the calculation of this term for the assessment of SLB leakage for the subsequent operation cycle following an in-service inspection only requires consideration of potentially undetected indications. The calculation of this term for the assessment of SLB leakage for the previous operation cycle, following an in-service inspection, requires consideration of both detected and potentially undetected indications.

Assumed Leakage " $8-12"$   $<TTS$  is the conservatively estimated ~~projected~~ leakage ~~from the total of identified and postulated unidentified indications~~ in steam generator tubes between 8 and 12 inches below the top of the tubesheet. Implementation of LCR S05-07 does not require tube inspection below the W\* Distance, therefore the methodology for conservatively calculating the population of unidentified indications between 8 and 12 inches below the TTS is provided by fitting a regression line to the cumulative inspection data (detected indications) from all SGs and projecting the number of indications (to minus 12 inches below TTS) using a 95-percent probability prediction bound (as similarly discussed in Westinghouse LTR-CDME-05-30). The cumulative indications from all steam generators are conservatively assumed to ~~be in occur~~ in one SG (similar to figure 16 of Westinghouse LTR-CDME-05-30). The conservative leakage rate for the unidentified indications between 8 and 12 inches is 0.0033 gpm multiplied by the number of projected indications (as discussed in LCR S05-07 submittals LR-N06-0277 and LR-N06-0338). The leak rate of indications detected between 8 and 12 inches are bounded by the projected total discussed above, assuming that the inspection results for detected indications do not contradict the calculated population as described previously. ~~Identified indications between 8 and 12 inches below TTS will be assessed for leak rate using the constrained crack model as delineated in Westinghouse LTR-CDME-05-30.~~

Assumed Leakage  $>12"$   $<TTS$  is the calculated leakage from the steam generator tubes left in service below 12 inches from the top of the tubesheet. This is 0.00009 gpm times number of tubes left in service in the steam generator.

Each SG is assessed for Main Steam Line Break (MSLB) leakage individually in accordance with the discussion above, and the SG with the most calculated leakage is conservatively assigned as the affected SG.

The calculated MSLB leakage provided above, including MSLB leakage from all other sources, shall be reported to the NRC in accordance with applicable Technical Specifications. The Calculated MSLB Leakage must be less than the maximum allowable MSLB leak rate limit in any one steam generator in order to maintain doses within 10 CFR 50.67 guideline values and within GDC-19 values during a postulated main steam line break event.