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SUBJECT: Provides suppl info for proposed amend 155 to plant TS re parent tube pressure boundary redefinition for W hybrid expansion joint sleeved tubes as requested during 980730 telcon & 980804 conference call.

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NRC-98-90

Wisconsin Public Service Corporation
(a subsidiary of WPS Resources Corporation)
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August 24, 1998

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Supplemental Information for Proposed Amendment 155 to the Kewaunee Nuclear Power Plant Technical Specifications: Parent Tube Pressure Boundary Redefinition for Westinghouse Hybrid Expansion Joint Sleeved Tubes

References:
1) Letter from C.R. Steinhardt (WPSC) to Document Control Desk (NRC) dated May 14, 1998
2) Letter from M.L. Marchi (WPSC) to Document Control Desk (NRC) dated July 3, 1998
3) Telephone call from J.C. Tsao (NRC) to L.M. Gunderson (WPSC) on July 30, 1998
4) Conference call NRC, Westinghouse, and WPSC on August 4, 1998.

On May 14, 1998, Wisconsin Public Service Corporation (WPSC) submitted a proposed Technical Specification (TS) amendment to redefine the parent tube pressure boundary for Westinghouse hybrid expansion joint (HEJ) sleeved steam generator (SG) tubes; reference 1. In a telephone call and conference call (references 3 and 4), the NRC staff has requested additional information (RAI) in order to complete review of the proposed TS amendment. The attachment to this letter contains our responses to the RAI.

Once again we would like to express our appreciation to the NRC staff for their timely review of this proposed TS amendment. We will continue to support this review effort by providing any needed additional information. Please contact Lynne Gunderson of my staff at (920) 388-8294 if you have any questions or require additional information.

Sincerely,

Mark L. Marchi
Site Vice President-Kewaunee Plant

A001 1/1

LMG/jmf
Attach.
cc - US NRC Senior Resident Inspector
US NRC Region III

ATTACHMENT

Letter from M. L. Marchi (WPSC)

To

Document Control Desk (NRC)

Dated

August 24, 1998

The NRC requested additional information (RAI) during a telephone call between J.C. Tsao and L.M. Gunderson on July 30, 1998 (reference 3). The responses were initially given to the NRC during a conference call which included WPSC and Westinghouse representatives on August 4, 1998 (reference 4).

NRC Question 1

Is WPSC trying to qualify a length of 0.92 inches or 0.95 inches? Is there test data to qualify this? (average length of test specimen was 0.95 inch in WCAP)

Response to Question 1

The structural length of 0.92 inch, without accounting for non-destructive examination (NDE) error, is considered to be qualified. Test specimens from which failure and leak data were taken ranged from 0.90 to 1.01 inches for the parent tube indication (PTI) location. Test results suggested that PTIs located as close as 0.90 inch from the bottom of the hardroll upper transition (HRUT) provide acceptable results relative to Regulatory Guide (RG) 1.121 (Table 3 of WCAP 15050). However, a structural length of 0.92 inches was selected. The overall conclusion from the testing was that any hybrid expansion joint (HEJ) sleeved tube with a 360 degree, throughwall PTI located greater than or equal to 0.92 inches (excluding NDE uncertainty) from the bottom of the HRUT would meet RG 1.121 requirements.

For application of the structural length, a conservative value for NDE uncertainty to be added to the 0.92 inch value. The NDE uncertainty and its application are described in detail in the original proposed amendment submittal (reference 1) and supplemented by previous responses to RAIs (reference 2).

NRC Question 2

Table 4 of WCAP 15050, (page 31), gives a summary of failure pressures. Over the phone, Bob Keating [Westinghouse] had given John Tsao [NRC] a 95/95 tolerance limit at approximately 4000 psi. This is less than the RG 1.121 allowable of 4800 psi. Explain why this is acceptable.

Response to Question 2

The 95th percentile for the burst pressure is 4800 psi at 600°F. The 90/90 tolerance value was reported in response to a specific staff request at the April 9, 1998, meeting between WPSC, Westinghouse, and the NRC staff. The 95/95 value was estimated during a phone conversation, the actual value is 4440 psi. This value was calculated for informational purposes and does not have a corresponding RG 1.121 acceptance limit. This was discussed briefly in question 3 of reference 2.

The comment that justification should be provided as to why the 95/95 tolerance limit being less than 4800 psi is acceptable is believed to be related to the guidelines of DG-1074, "Steam Generator Tube Integrity." The value of 4800 psi represents a 50 percent confidence on the 95th percentile tolerance bound. This is similar to the guideline for condition monitoring in DG-1074. There is to be no growth of the indications because the indications the L criterion is based on are considered to be at the maximum potential size (360 degrees, throughwall). Therefore, there is no future uncertainty associated with the growth of indications and the operational assessment estimate of the failure pressure is the same as the condition monitoring estimate which is 4800 psi.

NRC Question 3

Pull out testing: What is the pull out capability of the tubes under the L criteria? What is the justification for pullout capability?

Response to Question 3

The pull out capability was not independently determined because the specimens were pressure tested to failure. An axial load corresponding to the failure pressure may easily be estimated because the cross section area of the tube is about 0.5 square inch. Hence, for a 4800 psi failure pressure the axial load is about 2400 lbf. Prior pull out tests did not simulate the effect of the thermal gradient between the sleeve and the tube, nor did they simulate the effect of the internal pressure on the joint. Every attempt was made to properly simulate the appropriate SG conditions during the pressure testing.

It is to be noted that the WCAP reports on the results of four pull tests performed in 1996 on removed tube sections (see page 3) which did not meet the diameter difference criteria. The failure loads ranged from 4200 to 5400 lbf. These results are well in excess of the regulatory guideline performance criteria loads.

NRC Question 4

For TS 4.2.b.4.c.3, is the criteria for axial indications the same as for the circumferential indications?

Response to Question 4

Yes. Parent tube indications that are axial in nature are dispositioned using the definition of the parent tube pressure boundary in Figure TS 4.2-1. The definition for the point at which both the sleeve and parent tube become the pressure boundary is determined by the L criterion measurement. However, WPSC has in the past committed to plugging or repairing any axial indications in the hardroll lower transition in either the parent tube or sleeve upon detection. It is WPSC intent to continue this practice for all HEJ sleeved tubes upon application of the L criteria.

NRC Question 5

Provide the technical basis for assuming 1 gpm for the tube leakage under a steam line break event.

Response to Question 5

The third paragraph on page 20 of the WCAP refers to an expected leak rate of one gpm during SLB given a leak rate of 150 gpd (0.104 gpm) during normal operation. In the same paragraph it is noted that the ratio of the SLB leak rate to the normal operation leak rate is 9.3 at a 99 percent confidence level. Hence, the expected leak rate during a SLB event was estimated as 9.3 times 0.104 gpm or one gpm. It is noted that the ratio is a bound on the individual ratios. The 99 percent confidence bound on the average leak rate per indication is 3.7, hence, a more realistic estimate of the total leak rate during a SLB event would be 0.38 gpm rather than one gpm given a normal operation leak rate of 0.104 gpm.

The above evaluation of the leak rates uses techniques which are different, although no less valid, than elucidated in Generic Letter (GL) 95-05 for outer diameter stress corrosion cracking (ODSCC) at tube support plate (TSP) intersections. Compliance with the GL leads to simulating (Monte Carlo) the leak rate from each individual indication and summing over all of the indications in the SG to obtain a predicted total leak rate. The simulations are performed many times and a 95th percentile of the total is estimated at a 95 percent confidence level. It is apparent from the data that simulating the leak rates in this case would lead to excessively high leak rates. This is due to the normal operating condition leak rates from the test program being unrealistically high. For example, at normal operating, the average leak rate was found to be 0.013 gpm. If applied to 1000 sleeved tubes, the normal operating leak rate for L criterion HEJ sleeved tubes would be 13 gpm. Not only is this well in excess of what Kewaunee sees for a normal operating leak rate during operation, it is well in excess of Kewaunee's primary to secondary leakage limit of 0.104 gpm (150 gpd). Therefore, assigning the average would be unrealistic especially since monitoring for the normal operating limit protects from excessive leakage during a steam line break.

However, it was possible to use the test data to develop information about the potential SLB leak rate as a function of the normal operation leak rate. In fact, both had nearly the same average and variance. In keeping with the techniques, or spirit, of the generic letter, the distribution of the ratio of the individual leak rates was examined and it was found that a hypothesis of a lognormal distribution would not be contradicted. (The index of determination of the calculated residuals on the expected residuals was 96 percent.) This means that the distribution could be simulated and a 95 percent upper confidence value for the 95th percentile of the total leak rate could be calculated. No simulation was performed, but, using the fitted distribution parameters, a 99 percent confidence bound for the average leak rate ratio was calculated to be 2.7 which is significantly less than the bounding ratio of 9.3 that was used to estimate the total leak rate during SLB (and is also less than the estimate of 3.7 given above). In addition, the 95%/95% tolerance bound for the average leak rate ratio using the fitted distribution parameters was calculated to be 2.2, which is also less than the ratio value used to estimate the total leak rate. Therefore, the bounding estimate used is judged to be conservative relative to any Monte Carlo estimates that would be made of the 95th percentile at a 95 percent confidence level.