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*See Proposed Change
to T/S*

SUBJECT: Submits response to RAI re TS change request for SG Tube 2
 Volt repair criteria.

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December 20, 1996

AEP:NRC:1166AF
10 CFR 50.90

Docket No: 50-315

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

Gentlemen:

Donald C. Cook Nuclear Plant Unit 1
TECHNICAL SPECIFICATION CHANGE REQUEST
STEAM GENERATOR TUBE 2 VOLT REPAIR CRITERIA
REQUEST FOR ADDITIONAL INFORMATION

The purpose of this letter is to update our Steam Generator Tube 2 Volt repair criteria as requested by your staff in an October 28, 1996, letter requesting additional information. Pursuant to NRC staff guidance, the latest approved databases will be used in support of the voltage repair criteria. The burst and leakage analysis methodology will be those given in WCAP-14277, revision 1.

Attachment 1 contains the NRC staff questions/statements and our responses. Attachment 2 contains the Westinghouse analysis WCAP-14277, revision 1, which supports the responses.

We do not believe these responses constitute significant change to our original submittal; therefore, a significant hazards analysis is not provided.

We believe the proposed changes will not result in (1) a significant increase in the amounts, and no significant change in the types, of any effluent that may be released offsite, or (2) a significant increase in individual or cumulative occupational radiation exposure.

In compliance with the requirements of 10 CFR 50.91(b)(1), copies of this letter and its attachments have been transmitted to the Michigan Public Service Commission and to the Michigan Department of Public Health.

Sincerely,

A handwritten signature in cursive script, appearing to read 'E. E. Fitzpatrick'.

E. E. Fitzpatrick
Vice President

jmb

Attachments

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 20th DAY OF December 1996

A handwritten signature in cursive script, appearing to read 'Jan Watson'.

Notary Public

My Commission Expires: _____

9612300068 961220
PDR ADOCK 05000315
P PDR

JAN WATSON
NOTARY PUBLIC, BERRIEN COUNTY, MI
MY COMMISSION EXPIRES FEB. 10, 1999

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U. S. Nuclear Regulatory Commission
Page 2

AEP:NRC:1166AF
10 CFR 50.90

cc: A. A. Blind
A. B. Beach
MDEQ - DW & RPD
NRC Resident Inspector
J. R. Padgett

1-1-74

ATTACHMENT 1 TO AEP:NRC:1166AF

STAFF COMMENTS AND REQUEST FOR ADDITIONAL INFORMATION
ON CALCULATIONS IN SUPPORT OF THE VOLTAGE-BASED
TUBE REPAIR CRITERIA

961230 0068

The following are NRC staff questions/comments and our responses.

"WCAP-14277, 'SLB Leak Rate and Tube Burst Probability Analysis Methods for ODS-CC at TSP Intersections', was issued prior to Generic Letter (GL) 95-05, 'Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking'. It has been reviewed against the guidance in GL 95-05 since this is the NRC staff position regarding voltage-based limits. Based on a comparison of WCAP-14277 to GL 95-05, we have the following observations."

Note: page references are from WCAP-14277

- 1) "NRC approval is required for the databases used in conjunction with the voltage-based tube repair criteria consistent with the guidance in GL 95-05. See below for additional comments on NRC approval of the databases. [page 1-2 and 4-1]"

Response

The text in both sections of the report has been modified to remind the reader that the database must be approved for use by the NRC.

- 2) "Implementation of tube repair criteria based on limited TSP displacement would require NRC approval of the limits and the methodologies to be used. [page 1-2]"

Response

The text has been modified to note that implementation may only follow NRC approval to do so.

- 3) "When two cycles of previous operating data are available, the highest growth rate should be used consistent with GL 95-05. Use of the most recent data because it is lower for a specific cause is inconsistent with GL 95-05. [page 2-1, 3-3, and 3-7]"

Response

The text has been modified to note that specific NRC approval would be required to use the lower growth rates even if they could be demonstrated to be lower for cause.

- 4) "The methodology for predicting the end of cycle voltage distribution is acceptable except that the beginning of cycle voltage distribution should include all bobbin indications regardless of whether these indications were confirmed as flaw indications during inspections with a rotating pancake coil (RPC), or equivalent. Essentially, F_{rc} in equation 3.2 should be considered to have a value of one [page 3-2]. As specified in GL 95-05, a fraction of bobbin indications which are not confirmed as flaws during RPC inspections may be excluded pending NRC approval; however, the methodology specified in WCAP-14277 for addressing this particular issue is not approved for use at this time."

Response

The text has been modified to note that the use of the currently approved value of 1.0, unless specific NRC staff approval is obtained for an alternate value.

- 5) "Adjustment of the voltage growth distribution to correct for differences in cycle length by assuming growth is linear in time is acceptable and is consistent with GL 95-05 (per attachment 3 to the staff's May 30, 1995, memorandum from Frank J. Miraglia to Edward L. Jordan, entitled "Request for CRGR Review of Generic Letter 95-XX, 'Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking'."). [page 3-3]"

Response

No changes to the document are required to address this comment.

- 6) "All indications should be included in determining the average voltage growth rate per the guidance in GL 95-05, not just the ones with "appreciable BOC amplitude readings, i.e., greater than or equal to 0.75 volt." The staff notes that various average growth rates may be calculated for comparison purposes, but the growth rate used in calculations of repair limits and in projecting the end-of-cycle (EOC) voltage distributions should be consistent with the guidance in GL 95-05. [page 3-3]"

Response

The text has been modified slightly to note that the other distributions discussed in that paragraph may be presented for information purposes or comparison, but GL 95-05 guidance will be used for consistency.

- 7) "For the voltage growth distribution, in addition to including indications identified at two successive inspections, indications which change from non-detectable to a relatively high voltage (e.g., 2.0 volts) should also be included consistent with GL 95-05. [page 3-3]"

Response

The text has been changed to include the wording of GL 95-05.

- 8) When probe wear exceeds 15% during the Monte Carlo simulation, no mention is made on whether the value for probe wear is redetermined or whether a value of 15% is applied. 15% is referenced as the limit on probe wear. [page 3-5]"

Response

The text has been revised to reflect the fact that the value for probe wear is redetermined, i.e., resampled, until it is $\leq 15\%$ in absolute value.

- 9) "Equation 3-6 may be used in the Monte Carlo analysis provided the term deleted (as specified on page 3-6) has a negligible effect on the EOC voltage projections. The staff notes that using equation 3-5 is acceptable and avoids the

need to assess the effect of using equation 3-6. [page 3-5 and 3-6]"

Response

The text has been revised to note that equation 3-5 is used in the Monte Carlo analysis. The original specification of equation 3-6 was a typographical error.

- 10) "The method for accounting for variations in material properties in calculating the probability of burst is acceptable and consistent with GL 95-05 (per attachment 3 to the staff's May 30, 1995, memorandum from Frank J. Miraglia to Edward L. Jordan, entitled "Request for CRGR Review of Generic Letter 95-XX, 'Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking'.") [page 4-2 and 4-3]"

Response

No changes to the document are required to address this comment.

- 11) "As noted on page 4-9 of WCAP-14277, segregation of the data is not currently approved for use if the p value is greater than 5%. Alternatives to the leak rate model specified in GL 95-05 would require NRC review and approval. [page 4-9]"

Response

The text has been modified to indicate that the use of a segregated database would require prior NRC review and approval.

- 12) "GL 95-05 does not require calculation of total steam generator tube leakage and tube burst probabilities under postulated accident conditions for both the actual as measured EOC voltage distribution and for the projected next EOC voltage distribution. Rather, it permits licensees to calculate the tube leakage and burst probabilities from the measured EOC voltage distribution if it is not practical to complete these calculations using the projected EOC voltage distribution prior to returning the steam generators to service. [page 5-1]"

Response

The text has been revised to reflect the requirements of the GL as described in the second sentence of the NRC document.

- 13) "With respect to the Monte Carlo methodology specified in the EPRI ODSCC report TR-10047, revision 1 referenced on page 5-5 (actually EPRI report TR-100407, revision 2a), the staff finds this approach unacceptable. The staff has the following comments on this methodology.

For the conditional leak rate regression, the residual plot presented in Figure 11-2 does not seem to match up with the regression plot presented in Figure 11-1.

There is no proof that the conditional voltage relationship is valid at a 5% level.

In section D.4.2.1, a method for calculating the joint distribution of the regression parameters is presented. It appears to be incorrect. The derived distribution should represent the posterior distribution of the true parameters about their estimates. A derivation of the correct result is given in section 2.7 of "Bayesian Inference in Statistical Analysis", Box GEP, Tiao GC, Addison Wesley, 1973.

It does not appear that equation D-19 for generating leak rates correctly accounts for systematic errors caused by parametric uncertainty in the leak rate. The variations at each tube support plate are treated as if they were independent of each other, and they are not.

In section D.4.2.5, the systematic errors caused by parametric uncertainty are not correctly expressed in equation D-22. The probability of leakage variations at each tube support plate are treated as if they are independent of each other, and they are not.

The formula for calculating the scatter about the predicted leak rate appears to be wrong (see page D-44 Item 3). According to this, the equation for generating the scatter is equation D-9. The term under the square root in this equation is unnecessary. This term accounts for parametric uncertainty, but parametric uncertainty has been accounted for by sampling random slopes and intercepts.

To assess how the probability of burst calculation would be performed, a more complete description is necessary."

Response

Only the simulation methodology described in WCAP-14277 has been used by Westinghouse for alternate repair criterion evaluations. The methodology of TR-100407 is not being used by Westinghouse and the discussion referring to the EPRI report has been deleted.

- 14) "The probabilistic methodologies in sections 5.4, 5.5, and 5.6 of WCAP-14277 for calculating the total leak rate under postulated accident conditions and the probability of burst are consistent with the guidance in GL 95-05 and are acceptable for use. This conclusion has been iterated in several plant specific safety evaluations (e.g., South Texas Unit 1; Beaver Valley Unit 1)."

Response

No changes to the document are required to address this comment.

- 15) "Database comments:

A. All pulled tube data should be included in the databases consistent with GL 95-05. If the new data does not fit with the old data, the correlations should be declared invalid. [page 4-7]"



Response

It appears that this comment is intended to apply to section 4-7 on page 4-9 of the original report. If the new data do not fit with the old data, it does not mean the correlations should be declared invalid. It may be that the new data are invalid for one reason or another. The WCAP states that the impact of new data must be analyzed. It was not intended that all possibilities be listed with analysis guidelines. The wording was changed to indicate that all new data should be included, based on evaluating the data against NRC approved outlier criteria, instead of indicating that it may be included.

- B. "GL 95-05 states that NRC approved databases be used in support of the voltage-based criteria. Pending completion of the development of an industry process for updating the applicable databases, licensees implementing the voltage-based tube repair criteria should submit for NRC review and approval prior to every outage a current database which includes all applicable data. Applicable data are all data that do not meet NRC approved data exclusion criteria (see attachment 5, item V-1 to the staff's May 30, 1995, memorandum from Frank J. Miraglia to Edward L. Jordan, entitled "Request for CRGR Review of Generic Letter 95-XX, 'Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking'"). Data excluded per these approved data exclusion criteria should be provided along with the basis for their exclusion."

Response

We will either submit the database or submit a reference to an appropriate database previously submitted to the NRC. The current NRC approved database (a recommended updated database is also included) is described in EPRI Report, NP 7480-L, Addendum 1, 1996 Database Update, August 1996, which is currently being reviewed by the NRC staff.

- C. The deterministic estimates of the probability of burst and the total steam generator tube leakage under postulated accident conditions are reasonable for sensitivity analyses; however, they should not be used for the GL 95-05 calculations of the probability of burst and total steam generator tube leakage under postulated accident conditions.

Response

The text at the end of the deterministic estimate of the probability of burst section has been revised to note that the deterministic estimates are for sensitivity studies only. It is noted that the deterministic burst estimate discussion is a subsection to a section entitled "Deterministic Methods for Sensitivity Analyses."



16. "In summary, WCAP-14277 provides a very understandable description of Westinghouse's methodology for calculating the probability of burst and the total steam generator tube leakage under postulated accident conditions. Based on the staff's review, the staff finds the methodologies documented in WCAP-14277 acceptable provided it is modified to become consistent with the guidance in GL 95-05 per the above comments/observations. Note that in some instances, additional NRC review and approval would be required prior to implementation (e.g., using only a fraction of indications which are not confirmed during RPC examinations in the BOC distribution, approval of databases, use of the EPRI leak rate methodology, etc.)."

Response

It is noted that none of the NRC comments has an effect on prior Westinghouse Monte Carlo evaluations which were performed for various plants invoking alternate repair criteria for ODSCC at TSP elevations. This is because the comments were mainly concerned with analysis options which were presented in WCAP-14277, but not used for any particular evaluation. WCAP-14277, revision 1, has been modified to become consistent with the guidance in GL 95-05 and contains specific language requiring NRC review and approval for certain instances.



ATTACHMENT 2 TO AEP:NRC:1166AF

WCAP-14277, REVISION 1

"SLB LEAK RATE AND TUBE BURST PROBABILITY ANALYSIS

METHODS FOR ODSCC AT TSP INTERSECTIONS

