From: Thompson, Jon
Sent: Thursday, January 05, 2012 3:09 PM
To: Hart, Randy
Cc: Stang, John; Boyle, Patrick; Sreenivas, V
Subject: Request for Additional Information Re: License Amendment Request dated May 28, 2010

SUBJECT: CATAWBA NUCLEAR STATION, UNIT 2 (CATAWBA 2), REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING THE STEAM GENERATOR LICENSE AMENDMENT REQUEST TO REVISE TECHNICAL SPECIFICATION FOR PERMANENT ALTERNATE REPAIR CRITERIA (TAC NO. ME6671)

By letter dated June 30, 2011, (Agencywide Document Access and Management System (ADAMS) Accession No. ML11188A107), as supplemented by letter dated July 11, 2011, (ADAMS Accession No. ML11195A067),Duke Energy Carolinas, LLC (the licensee), submitted a proposed license amendment in the form of changes to the Technical Specifications for Catawba 2. The proposed change would revise the TSs to allow implementation of a permanent alternate repair criteria for steam generators at Catawba 2.

The U.S. Nuclear Regulatory Commission staff has reviewed the licensee's submittal and determined that an RAI is needed in order to complete our review. The enclosed document describes this RAI. A written response should be provided to the NRC staff for these RAI questions to support our timely review of this request. Please inform me as soon as possible if you are unable to support a timely response timeframe.

If you have any questions, please call me at 301-415-1345.

Sincerely,

Jon Thompson, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-414

Enclosure:
As stated

REQUEST FOR ADDITIONAL INFORMATION
REGARDING THE STEAM GENERATOR LICENSE AMENDMENT REQUEST TO REVISE THE
TECHNICAL SPECIFICATION FOR PERMANENT ALTERNATE REPAIR CRITERIA
CATAWBA NUCLEAR STATION, UNIT 2
DUKE ENERGY CAROLINAS, LLC
DOCKET NUMBER 50-414

By letter dated June 30, 2011, (Agencywide Document Access and Management System (ADAMS) Accession No. ML11188A107), as supplemented by letter dated July 11, 2011, (ADAMS Accession No. ML11195A067),Duke Energy Carolinas, LLC (the licensee), submitted a proposed license amendment in the form of changes to the Technical Specifications for Catawba 2. The proposed change would revise the TSs to allow implementation of a permanent alternate repair criteria for steam generators at Catawba 2.

To complete its review, the NRC staff requests the following additional information:

1. WCAP-17330-P, Revision 1 - The footnote on page 3-53 states that Figure 3-36 shows the same data as Figure 3-32 in Revision 0 of the WCAP, but without the data that correspond to negative tubesheet coefficients of thermal expansion (CTE) variation. The footnote states that while only a few percent of the data shown in Figure 3-32 of Revision 0 reflect negative values of tubesheet CTE, these cases do result in upward scatter, but must be included to properly represent the top 10% of the Monte Carlo rank order results. This being the case, why does Figure 3-32 in Revision 1 properly represent the top 10% of the Monte Carlo rank order results? Why are the minimum H* values in Figure 3-36 of Revision 1 substantially different from those in Figure 3-32 of Revision 0?

2. WCAP-17330-P, Revision 0 - Provide copy of the "response surface" (i.e., H* relationship to CTE variability for the tube and tubesheet) discussed for Model D5 steam line break (SLB) at the top of page 3-49. Confirm that this response surface applies to a radial location of 26.703 inches. Is this a full response surface or "partial" response surface of the type discussed in Revision 1 of WCAP-17330-P, page 3-58?

3. WCAP-17330-P, Revision 1 - Provide copy of the "reduced" response surfaces for bounding Model D5 SLB case discussed on page 3-58. Explain how the reduced response surfaces are used in the Monte Carlo analysis. If for a particular Monte Carlo iteration a negative variation of tubesheet CTE is randomly generated, what is done with this value (e.g., is tubesheet CTE assumed to have nominal value)? Why doesn't the use of a reduced response surface bias the rank ordering above 90% in the nonconservative direction?

4. WCAP-17330-P, Revision 1, Table 3-28 - Provide a similar table applicable to the Model D5 SLB case, from the 9526 to 9546 rank orders.

5. WCAP-17330-P, Revision 1, Table 3-29 - Provide C^2 H* values for rank orders 9888 and 9892. This will lend additional confidence to inferences drawn from this table on page 3-58. In addition, provide a similar table applicable to the Model D5 SLB case.

6. WCAP-17330-P, Revision 1, Figure 3-45 - Should the data corresponding to the two open symbols be labeled as "data used in probabilistic analysis" (consistent with Figure 3-44) instead of "reduced data?" Why does this figure show only two open symbols rather than three as are given in Figure 3-44?

7. WCAP-17330-P, Revision 1, Tables 3-35 to 3-48 - The numerical methods used to generate the accumulated pullout loads in these tables appear to contain two sources of non-conservatism. One, the distance below the top of the tubesheet (TTS) where the contact pressure transitions from zero to a positive non-zero value is assumed to be the

lowermost elevation for which a C^2 calculation was performed and yielding a zero value contact pressure. The NRC staff believes a more realistic and more conservative estimate of
the contact pressure zero intercept value can be obtained by extrapolating the C2 results at lower elevations to the zero intercept location. Two, the method used to interpolate the H* distance between specific locations where C^2 analyses were performed assumes that the distribution of contact pressure between these locations is a constant value equal to average value between these locations. For Table 3-35, the NRC staff estimates that elimination of the non-conservatisms increases the calculated H* by 0.34 inches. For
Tables 3-46 and 3-48, H* increases by 0.15 inches. These are not trivial differences. The NRC staff estimates that the pullout loads corresponding to the H* distances in Figures 3-35, 3-46, and 3-48 are overestimated by 17%, 6%, and 8%, respectively. Provide revisions to Tables 3-35 to 3-48, if and as needed, to address the NRC staff's concern.

8. WCAP-17330-P, Revision 1, Figures 3-48 and 3-49 - These figures were generated with the thick shell model. Were "spot checks" performed with the C^2 model to determine whether adjustments to the curves in these figures are needed to approximate what the curves would look like if entirely generated with the C^2 model? If not, why are the curves in their present form conservative?

9. In addition to the potential non-conservatisms in the H* estimate discussed in Question 7 above, there is uncertainty associated with the computed probabilistic H* values calculated with the C^2 model as illustrated in Table 3-29. Depending on the response to question 8 above, there also may be some uncertainty associated with the H* adjustments for the crevice pressure distribution. What change to the proposed H* value of 14.01 inches is needed to ensure that it is a conservative value?

10. Westinghouse letter LTR-SGMP-10-95 P - Attachment, Revision 1 - The NRC staff is able to reasonably reproduce the numbers in Table 5 for Exp-2 and Power-2. It is the NRC staff's understanding that Table 4 contains intermediate results leading to the results in Table 5. However, the NRC staff cannot reproduce the numbers in Table 4 based on the information provided. Is Table 4 correctly titled? Provide a precise definition of the parameters that are listed in Table 4. Provide one example of how the parameter values were calculated, say for one segment at a tubesheet radius of 18.139 inches for SLB.

11. Westinghouse letter LTR-SGMP-10-95 P - Attachment, Revision 1 – This report spells out the definition of Exp-2 and Power-2 in Table 5. Provide definitions of the other functions considered in the table.

12. BET measurements for Catawba 2, documented in Westinghouse letter LTR-SGMP-09-111 P-Attachment, Revision 1, range to a maximum of 0.65 inches and appear not to be a factor affecting the H* and leak rate ratio calculations. Apart from tubes with this reported range of BETs, are there any non-expanded or partially expanded tubes at Catawba 2? If so, provide revisions to the proposed technical specifications which exclude such tubes from the proposed H* provisions.

13. Proposed TS 5.6.8.h through j – The proposed changes contain more words than seem necessary, reducing the clarity of the proposed reporting requirements. For example,

the proposed wording refers to “an inspection performed after each refueling outage” which doesn’t seem to make sense. The NRC staff believes the proposed requirements can be stated more clearly and concisely as follows:

h. For Unit 2, ~~following completion of an inspection performed during End of Cycle 17 Refueling Outage (and any inspections performed during subsequent Cycle 18 operation),~~ the primary to secondary LEAKAGE rate observed in each steam generator (if it is not practical to assign the leakage to an individual SG, the entire primary to secondary leakage should be conservatively assumed to be from one SG) during the cycle preceding the inspection which is the subject of the report,

i. For Unit 2, ~~following completion of an inspection performed during the End of Cycle 17 Refueling Outage (and any inspections performed during subsequent Cycle 18 operation),~~ the calculated accident induced leakage rate from the portion of the tubes below ~~20~~ **14.01** inches from the top of the tubesheet for the most limiting accident in the most limiting SG. In addition, if the calculated accident leakage rate from the most limiting accident is less than 3.27 times the maximum primary to secondary LEAKAGE rate, the report shall describe how it was determined, and

j. For Unit 2, ~~following completion of an inspection performed during the End of Cycle 17 Refueling Outage (and any inspections performed during subsequent Cycle 18 operation),~~ the results of monitoring for tube axial displacement (slippage). If slippage is discovered, the implications of the discovery and corrective action shall be provided.

Provide revisions to the proposed reporting requirements as necessary to clarify their intent.