UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 10, 2009

Mr. Mark J. Ajluni
Manager, Nuclear Licensing
Southern Nuclear Operating Company, Inc.
40 Inverness Center Parkway
P.O. Box 1295
Birmingham, Alabama 35201

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2, REQUEST FOR ADDITIONAL INFORMATION REGARDING STEAM GENERATOR PROGRAM (TAC NOS. ME1339 AND ME1340)

Dear Mr. Ajluni:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated May 19, 2009, Southern Nuclear Operating Company, Inc., submitted a license amendment request to revise the technical specifications (TS) for Vogtle Electric Generating Plant, Units 1 and 2. The proposed changes would revise the inspection scope and repair requirements of TS Section 5.5.9, "Steam Generator (SG) Program" and the reporting requirements of TS Section 5.6.10, "Steam Generator Tube Inspection Report." The proposed changes would establish permanent alternate repair criteria for portions of the SG tubes within the tubesheet. The NRC staff is reviewing your application and finds that additional information is needed, as discussed in the enclosure. This was discussed with your staff on June 10, and July 2, 2009. Your earliest response will facilitate our continued review of the application.

Sincerely,

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

Docket Nos. 50-424 and 50-425

Enclosure:
RAI

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REQUEST FOR ADDITIONAL INFORMATION

REGARDING PERMANENT H* ALTERNATE REPAIR CRITERIA

FOR STEAM GENERATOR INSPECTIONS

VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2

DOCKET NOS. 50-424 AND 50-425

By letter dated May 19, 2009 (ADAMS Accession No. ML091470701), Southern Nuclear Operating Company, Inc., (the licensee) submitted a license amendment request to revise the technical specifications (TS) for Vogtle Electric Generating Plant (VEGP), Units 1 and 2. The request proposed changes to the inspection scope and repair requirements of TS Section 5.5.9, "Steam Generator (SG) Program" and to the reporting requirements of TS Section 5.6.10, "Steam Generator Tube Inspection Report." The proposed changes would establish permanent alternate repair criteria for portions of the SG tubes within the tubesheet. To complete its review, the Nuclear Regulatory Commission (NRC) staff needs the additional information requested below.

The Westinghouse document, WCAP-17071-P, Rev. 0, "H*: Alternate Repair Criteria for the Tubesheet Expansion Region in Steam Generators with Hydraulically Expanded Tubes (Model F)" (Reference 1) was submitted with the May 19, 2009, letter, in support of the requested license amendment. While Reference 1 is specific to Model F SGs, most of the questions below are of a generic nature and pertain to the methodology used by Westinghouse to develop the technical basis that supports the requested VEGP amendment. The NRC staff is aware that additional WCAP documents which support amendments to Model D5, 44F, and 51F SGs are forthcoming from Westinghouse. Licensees that submit amendment requests based on the forthcoming WCAP documents should reference the response to these questions if appropriate.

The NRC staff also notes that the review of Reference 1 is still ongoing and may have additional questions in the future.

1. Reference 1, page 6-21, Table 6-6. This table contains a number of undefined parameters and some apparent inconsistencies with Table 5-2 on page 5-6. Please define the input parameters in Table 6-6.

2. Reference 1, page 6-23, Section 6.2.2.2. Why was the finite element analysis not run directly with the modified temperature distribution rather than running with the linear distribution and scaling the results?

3. Reference 1, page 6-38, Section 6.2.3. Why is radial displacement the "figure of merit" for determining the bounding segment? Does circumferential displacement not enter into this? Why is the change in the tube hole diameter not the "figure of merit?"

Enclosure

4. Reference 1, page 6-69. In Section 6.2.5.3, it is concluded that the tube outside diameter and the tubesheet tube bore inside diameter always maintain contact in the predicted range of tubesheet displacements. However, for tubes with through wall cracks at the H* distance, there may be little or no net pressure acting on the tube for some distance above H*. In Tables 6-18 and 6-19, the fourth increment in the step that occurs two steps prior to the last step suggests that there may be no contact between the tube and tubesheet, over a portion of the circumference, for a distance above H*. Is the conclusion in Section 6.2.5.3 valid for the entire H* distance, given the possibility that the tubes may contain through wall cracks at that location?

5. Reference 1, page 6-87 – Are the previously calculated scale factors and delta D factors in Section 6.3 conservative for steam line break and feed line break? Are they conservative for an intact divider plate assumption? Are they conservative for all values of primary pressure minus crevice pressure that may exist along the H* distance for intact tubes and tubes with throughwall cracks at the H* distance? How is tube temperature (T_T) on page 6-87 determined? For normal operating conditions, how is the T_T assumed to vary as function of elevation?

6. Reference 1, page 6-97, Figure 6-75 – Contact pressures for nuclear plants with Model F SGs are plotted in Figure 6-75, but it is not clear what operating conditions are represented in the plotted data, please clarify.

7. Reference 1, page 6-113, Reference 6-5 – This reference seems to be incomplete; please provide a complete reference.

8. Reference 1, page 6-113, Reference 6-15 – Table 6-3 in Reference 6-15 (SM-94-58, Rev 1) appears inconsistent with Table 6-2 in the same reference. Explain how the analysis progresses from Table 6-2 to Table 6-3.

9. Reference 1, page 8-9, Figure 8-1 – There is an apparent discontinuity in the plotted data of the adjustment to H* for distributed crevice pressure, please provide any insight you may have as to why this apparent discontinuity exists.

10. Reference 1, page 8-6, Section 8.1.4 – Clarify whether the "biased" H* distributions for each of the four input variables are sampled from both sides of the mean H* value during the Monte Carlo process, or only on the side of the mean H* value yielding an increased value of H*.

11. Reference 1, page 8-14, Figure 8-6 – The legend for one of the interactions shown between α_{TS} and E_{TS} appears to have a typo in it, please review and verify that all values shown in the legend are correct.

12. Reference 1, page 8-20, Case S-4 - Why does the assumption of a 2-sigma value for the coefficient of thermal expansion of the tube (αT) and the tubesheet (αTS) to determine a "very conservative biased mean value of H*" conservatively bound the interaction effects between αT and αTS? Describe the specifics of how the "very conservative biased mean value of H*," as shown in Table 8-4, was determined.

13. Reference 1, page 8-22, Case M-5 - The description for this case seems to correspond to a single tube H* estimate rather than a whole bundle H* estimate. How is the analysis performed for a whole bundle H* estimate?

14. Reference 1, page 8-22, Case M-5 states, "Interaction effects are included because the 4.285 sigma variations were used that already include the effective interactions among the variables." Case M-5 also states that the 4.285 sigma variations come from Table 8-2. However, Table 8-2 does not appear to include interactions among the variables. Explain how the 4.285 sigma variations include the effect of interactions among the variables.

15. Reference 1, page 8-22, Case M-6, first bullet – Should the words "divided by 4.285" appear at the end of the sentence?

16. Reference 1, page 8-23, Case M-7 – Was the "2 sigma variation of all variables" divided by a factor of 2?

17. Reference 1, page 8-23, Case M-7 – Explain how this case includes the interaction effects between the two principle variables, αT and αTS.

18. Reference 1, page 8-25, Table 8-4 – Explain why the mean H* calculated in the fifth case does not require the same adjustments, as noted by the footnotes, that all other cases in the table require.

19. Reference 1, page 8-25, Table 8-4 – Verify the mean H* shown in the last case in the table.

20. Section 8 of Reference 1 – The variability of H* with all relevant parameters is shown in Figure 8-3. The interaction between α_T and α_{TS} are shown in Figure 8-5. Please explain why the direct relationships shown in these two figures were not sampled directly in the Monte Carlo analysis, instead of the sampling method that was chosen. Also, please explain why the sampling method chosen led to a more conservative analysis than directly sampling the relationships in Figures 8-3 and 8-5.

21. The limiting leakage factor for VEGP is greater than 2.0 per Reference 1. The reporting requirement proposed by VEGP only requires them to report if they use a leakage factor of less than 2.0. The NRC staff understands that the licensee does not want to give a false impression that it can measure very small leak rates; however, the NRC staff feels it is appropriate for the licensee to use a number that bounds the plant-specific limiting leakage factor in Reference 1. Please discuss your plans to incorporate a limiting leakage factor that bounds the value in Reference 1.

22. In the May 19, 2009, letter, VEGP commits to monitor for tube slippage as part of the SG tube inspection program. The "due date/event" is prior to the start of Refueling Outage 1R15. It is not clear whether the planned monitoring will be performed once and whether it only applies to Unit 1. The commitment should be modified to indicate that the tube slippage will be monitored at both units during every SG tube inspection outage.

23. In the May 19, 2009, letter, VEGP commits to determine the position of the bottom of the expansion transition in relation to the top of the tubesheet and to enter "any significant deviation" into their corrective action program. This is a one-time verification prior to implementation of H*. The commitment should be modified to also include a commitment to notify the NRC staff if significant deviations in the location of the bottom of the expansion transition relative to the top of the tubesheet are detected.

24. Reference 1, Page 9-6, Section 9.2.3.1 – The feedwater line break heat-up transient is part of the plant design and licensing basis. Thus, it is the NRC staff's position that H* and the "leakage factors," as discussed in Section 9.4, should include consideration of this transient. Explain why the proposed H* and leakage factor values are conservative, even with consideration of the feedwater line break heat-up transient.

References:

1. WCAP-17071-P, Rev. 0, "H*: Alternate Repair Criteria for the Tubesheet Expansion Region in Steam Generators with Hydraulically Expanded Tubes (Model F)," dated April 2009.

July 10, 2009

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Docket Nos. 50-424 and 50-425

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Enclosure:
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ADAMS Accession No.: ML091880384 *by memo dated

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