July 5, 2007

Mr. William R. Campbell, Jr.
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION REGARDING ULTIMATE HEAT SINK (TAC NOS. MD2621 AND MD2622)

Dear Mr. Campbell:

By letter dated July 12, 2006, as supplemented by letters dated May 8 and December 7, 2006, the Tennessee Valley Authority (TVA, the licensee) submitted a proposed license amendment request (TS-06-03) that would revise Sequoyah Unit 1 and 2 technical specifications limiting conditions for operation for the ultimate heat sink temperature and level.

In order for the staff to complete its review of the information provided by the licensee, we request that TVA provide responses to the enclosed request for additional information (RAI). Based on discussions with your staff, we understand that you plan to respond to the enclosed RAI by July 20, 2007. If you have any questions about this material, please contact me at (301) 415-3974.

Sincerely,

/RA/

Brendan T. Moroney, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-327 and 50-328

Enclosure: Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2

TECHNICAL SPECIFICATION CHANGE FOR ULTIMATE HEAT SINK

DOCKET NOS. 50-327 AND 50-328

The following questions relate to the License Amendment Request (LAR) dated July 12, 2006:

1. Page E1-6: Only addresses design-basis accidents. Please identify and discuss any impacts the proposed increase in ultimate heat sink (UHS) temperature will have on licensing-basis criteria that specify time related criteria associated with plant shutdown, cooldown, or accident mitigation, such as the time after shut down to be on residual heat removal (RHR) cooling, or time to reduce containment pressure by half.

2. Page E1-10: The table referred to in Item 7 provides information for the shell and tube sides of the component cooling system (CCS) heat exchangers. This information is suspect because the CCS heat exchanger is a plate (not a tube) heat exchanger. Please explain this apparent inconsistency. Also, the values listed in the table are said to be “assumed,” and justification as to why these values are appropriate and conservative is required.

3. Page E1-11: The last paragraph indicates that TVA continues to perform flow balance testing of the essential raw cooling water (ERCW) safety-related equipment and components served by ERCW. Explain how often ERCW flow balance testing is performed; when the most recent flow balance test was completed; how the specific flow rates were determined and corrected to account for the most limiting conditions and uncertainties (analytical and measurement), including how they were determined, validated and are assured to be correct over time; and what changes have been made to the system design or alignment during the period following completion of the most recent flow balancing determination and explain how the resultant ERCW flow rates were confirmed to be correct following implementation of these changes.

4. Page E1-12, top: The information provided indicates that the ERCW flow test method compensates for minimum pump performance. Explain how allowable pump degradation that is permitted by the in-service testing (IST) program is accounted for in this regard.

5. Page E1-17: The first paragraph indicates that ERCW will provide the auxiliary feedwater pumps with water at 87 degrees Fahrenheit (°F) if the condensate storage tank (CST) is not available. This is not consistent with the information that was subsequently provided in the RAI response (Pages E1-23 and 24, Question 8). Also, part (b) of the response indicates that the proposed ERCW temperature increase is within the existing design limits of the auxiliary feedwater (AFW) system, whereas part (c) indicates that the ERCW supply to the motor-driven AFW pumps may be as high

as 126 °F (which exceeds the AFW design temperature limit of 120 °F). Explain these apparent inconsistencies. Also, if not addressed below in Question 16, describe the specific scenario that results in the highest temperature ERCW being supplied to the AFW pumps and, for this most limiting case, identify what the maximum ERCW supply temperature is and how the uncertainties were accounted for to assure conservative results, and compare the results to the AFW system design limits that apply.

6. Page E1-17, Emergency Diesel Generator (EDG) Cooling: With respect to calculation MDQ 000 067 2003 0142, describe the most limiting scenario for the EDGs relative to temperature considerations and, for this most limiting case, explain what the most controlling temperatures are, including a discussion of how the uncertainties were accounted for to assure conservative results.

7. Page E1-17, Piping Impacts: The information that was provided indicates that the RHR system is cooled by CCS and does not receive ERCW water. Nonetheless, all other things being equal, increased ERCW temperature will result in an increase in CCS temperature, which will affect RHR. Either confirm that the resultant CCS supply temperature will continue to be bounded by existing analyses associated with the RHR system, or explain what impact the proposed increase in ERCW temperature will have on RHR, including how this determination was made.

8. Page E1-18, Measurement Equipment and Uncertainties: Identify and explain how all of the uncertainties (flow measurement, temperature measurement, modeling, and analytical) were quantified and accounted for to assure conservative results.

9. Page E1-24: Explain to what extent Station Blackout analyses and commitments will be impacted by the proposed change to the UHS temperature limit.

10. Pages E4-5: The Technical Specifications (TSs) Bases Section does not appear to be entirely appropriate and consistent with the WStandard TSs (STS). In particular, the second paragraph refers to an “average” water temperature whereas the STS refer to the water temperature of the UHS; and the fourth paragraph credits “sensitivity analyses” for demonstrating that the containment will not be compromised (even under limiting large break loss of coolant accident (LBLOCA)) for UHS temperatures up to and including 90 °F whereas this information is not included in the STS, and sensitivity analyses are typically not credited for demonstrating acceptable performance of the containment. Revise as appropriate.

The following questions relate to the December 7, 2006, response to Request for Additional Information (RAI):

11. Pages E1-1 through E1-3, Question 1 (also, Page E1-18, Question 5): Discuss measures that exist or will be established to ensure that TVA river operations practices are controlled in a manner that preserves the capability of the UHS to perform its functions in accordance with the analyses that have been completed.

12. Page E1-3, Question 1: The response states that the design basis temperature limits of safety-related equipment are not exceeded when operating at the increased UHS temperature limit. Confirm that equipment design limitations that have been established by component vendors will not be exceeded (e.g., the heating, ventilation and air conditioning compressors at Watts Bar were affected and required modification).

13. Page E1-16, bottom: With the exception of the 1 °F temperature increase referred to for the boric acid tank (BAT) and AFW coolers, confirm that no other cooler or heat exchanger ERCW outlet temperatures will increase as a result of the increased UHS temperature limit with respect to any plant operating or postulated accident conditions.

14. Page E1-16, bottom: Discuss whether or not the "other" assumption and methodology changes that were integrated into the July 2006 submittal require NRC review and approval, and provide the necessary justification as appropriate.

15. Page E1-19, Question 6: Explain how the most limiting heat transfer capability of the CCS heat exchanger is determined when evaluating the spent fuel pool cooling thermal analysis to assure conservative results. Also, the 183 °F exceeds the value of 182 °F referred to in the UFSAR Table 9.1.3-1, Sheet 2, which is not consistent with the plant licensing basis. Please explain.

16. Page E1-20, Question 7: To the extent these items are not addressed above in response to Question 5: (a) For the LBLOCA case, explain in more detail how the TS shutdown/cooldown requirements will be satisfied for the non-accident unit, including worst-case considerations, most limiting CST inventory, how the AFW supply temperature compares to the maximum allowed value over time, controls that are credited to ensure that AFW design limits will not be exceeded, and how and when the TS shutdown/cooldown requirements will be satisfied and maintained without exceeding any design limitations while continuing to mitigate the LBLOCA condition; (b) for the shutdown of both units case, explain in more detail how the TS shutdown/cooldown requirements will be satisfied for both units, including a description of the worst-case scenario (e.g. seismic event with loss of downstream dam, loss of offsite power, single active failure, and no CST available), how the AFW supply temperature compares to the maximum allowed value over time, controls that are credited to ensure that AFW design limits will not be exceeded, and how and when the TS shutdown/cooldown requirements will be satisfied and maintained without exceeding any design limitations.

17. Page E1-24, Question 9: Part (a) indicates that certain manual valves have been fully opened to increase overall ERCW flows, and that the flow gains were confirmed by ERCW multiflow modeling. To the extent that this is not addressed in response to Question 3, describe how the increased ERCW flows that are being credited were actually confirmed to be correct after the changes were made and explain how the impact on other ERCW flow paths was determined and is assured to be conservative, including how the uncertainties in the ERCW flow rates were determined and accounted for in this regard.

18. Page E1-26, Question 10: Explain what the basis/justification is for increasing the air flow for the BAT and AFW coolers, including a comparison with the design flow rates that were established by the equipment vendor.

19. Page E1-27, Question 11:

(a) The response indicates that various different fouling factors are used based on actual experienced values seen at the various components. Provide a listing of the limiting fouling factors that are used for all shell and tube heat exchangers that provides a comparison of the assumed values to those specified by the Tubular Exchanger Manufacturers Association (TEMA). Justify any inconsistencies that exist between the assumed values and the TEMA values, including supporting information that demonstrates that the assumed fouling factors are in fact conservative for the most limiting licensing basis conditions that are postulated (including, for example, those that would exist at the lower ERCW flow rates).

(b) Provide a listing of those shell and tube heat exchangers where the assumed heat transfer capability is different from the design capability that was specified by the vendor data sheet and explain/justify the different values that were used.

(c) Provide a copy of the vendor data sheets for the major heat exchangers referred to in (a), those referred to in (b), and copies of data sheets that are representative of the other shell and tube heat exchangers that are used.

(d) The response indicates that the CCS plate heat exchangers operate in continuous, high velocity, turbulent service. This is not consistent with the acceptance criterion that was established in the supporting calculations (for example, see assumptions 2.4 and 3 of Calculations 70D53EPMMCG02129 and 70D530HCGKBO102287, respectively). Explain this apparent inconsistency and how the higher flow rates are assured consistent with performance assumptions. Also, explain in detail how the performance of the plate heat exchangers was determined and is assured to be conservative for the lower ERCW flow rates that are postulated.

(e) Explain what provisions and design features exist to prevent clogging of the CCS plate heat exchangers, especially during postulated upstream dam failures.

(f) Explain why the actual measured EDG jacket water heat exchanger fouling factor is less than the design value.

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SEQUOYAH NUCLEAR PLANT

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