June 26, 2006

Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 2 AND 3 — REQUEST FOR ADDITIONAL INFORMATION FOR EXTENDED POWER UPRATE - ROUND 6 (TS-431) (TAC NOS. MC3743 AND MC3744)

Dear Mr. Singer:

By letter dated June 28, 2004, as supplemented by letters dated August 23, 2004, February 23, April 25, June 6, and December 19, 2005, February 1 and 28, March 7, 9, 23, and 31, April 13, May 5 and 11, and June 12, 2006, Tennessee Valley Authority (TVA, the licensee) submitted an amendment request for Browns Ferry Nuclear Plant, Units 2 and 3. The proposed amendments would change the Units 2 and 3, operating licenses to increase the maximum authorized power level from 3458 to 3952 megawatts thermal. This change represents an increase of approximately 15 percent above the current maximum authorized power level. The proposed amendments would also change the Units 2 and 3 licensing bases to revise the credit for overpressure from 3 pounds for short-term and 1 pound for long-term, to 3 pounds for the duration of a loss-of-coolant accident, and revise the maximum ultimate heat sink temperature.

With regards to the requests for additional information (RAIs) in the APLA section, the U.S. Nuclear Regulatory Commission (NRC) staff reviewed the response to its original RAI (SPSB-A.11 - October 3, 2005, request) involving the use of containment accident pressure in the calculation of net positive suction head available to the core spray and low pressure coolant injection pumps. The response was provided in a letter dated March 23, 2006. The NRC staff notes that the licensee requested additional time to respond, provided the response later than committed, and failed to fully answer the question. As indicated in the March 1, 2006, letter to TVA, the timeliness and quality of the responses to the NRC staff's RAIs are essential to support the timely completion of this review. Further delays of this nature will significantly challenge the NRC staff's ability to support the requested completion date.

A response to the enclosed RAI is needed before the NRC staff can complete the review. This request was discussed with your staff on June 14, 2006, and it was agreed that a response would be provided by June 30, 2006. If you have any questions, please contact me at (301) 415-2315.

Sincerely,

/RA/

Eva A. Brown, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-260 and 50-296

Enclosure:
Request for Additional Information

cc w/enclosures: See next page

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Mr. Karl W. Singer
Tennessee Valley Authority

**BROWNS FERRY NUCLEAR PLANT**

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REQUEST FOR ADDITIONAL INFORMATION

EXTENDED POWER UPRATE

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 2 AND 3

DOCKET NOS. 50-260, AND 50-296

APLA (Previously SPSB-A)

24. It is recognized that the need to have containment accident pressure for emergency core cooling system (ECCS) net positive suction head (NPSH) should be based on a realistic analysis consistent with current probabilistic risk assessment (PRA) practices, as contrasted to a deterministic, design-basis calculation that employs excessive conservatism. Discuss which typical PRA accident sequences realistically require containment accident pressure in order to ensure that the ECCS pumps remain functional. This should include sequences currently modeled in the Browns Ferry PRA models or similar sequences, not currently modeled, that could be risk-significant if containment accident pressure is necessary and not available. This should also consider realistic fire scenarios, such as those considered in the Individual Plant Evaluation of External Events for Severe Accident Vulnerabilities study.

25. For each PRA accident sequence that realistically requires containment accident pressure, describe how much pressure is required and for what period of time.

26. For each accident sequence in #25 above, estimate the risk associated with the need for that accident pressure (i.e., the risk above the level that would exist if the ECCS pumps could function satisfactorily without the need for containment accident pressure). While a realistic core damage frequency and large early release frequency are the desired metrics for this risk estimate, the licensee may utilize sensitivity studies, bounding analyses or qualitative arguments, where appropriate, provided all conclusions are substantially supported by the discussion.

ACVB

35. The term design flow rate is used to describe the core spray pump flow rate and the residual heat removal (RHR) pump flow rate assumed in the NPSH analyses. Define precisely the “design flow rate” in terms of the pump and system curves.

36. The current Updated Final Safety Analyses Report Table 14.6-4 shows a higher drywell volume for Case 3, the limiting case for drywell pressure and temperature, than for Cases 1, 2 and 4. Discuss why there is a larger drywell volume assumed for this case, and whether the same assumption made for the extended power uprate (EPU).

37. Provide the calculations used to determine the containment conditions (drywell, wetwell and suppression pool) for the loss-of-coolant accident (LOCA), Anticipated Transient Without Scram (ATWS), Station Blackout (SBO) and Appendix R Fire events.

38. Describe how the proposed crediting of containment accident pressure in determining available NPSH compares with the positions of Section 2.1.1 of Regulatory Guide 1.82, Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident, Revision 3, dated November 2003.

39. The units have drywell coolers that operate during normal plant operation. Address whether the drywell coolers are conservatively assumed to continue operation following accident initiation for the LOCA, ATWS, SBO and Appendix R Fire events.

40. Section 4.2.5 of the General Electric (GE) Analysis Report, PUSAR, states that the NPSH margins were calculated based on conservatively assuming RHR maximum flow rates and containment spray design flow rates in the short-term analyses and RHR and containment spray design flow rates in the long-term analyses. Describe the design provisions or operator actions that limit the pump flows to these values.

41. Describe how the make-up of nitrogen to the drywelll and wetwell atmospheres could serve as a verification of containment integrity during normal operation.

42. Describe the measures taken to ensure that all containment penetrations are properly isolated prior to and during operation.

43. Describe any other actions/programs which contribute to assurance that the containment is isolated.

44. Address whether the RHR and core spray pumps can be throttled to increase available NPSH and decrease required NPSH. Discuss what, if any, guidance is provided in the emergency operating instructions (EOIs) or abnormal operating instructions regarding throttling these pumps to preserve NPSH margin during accident conditions.

45. Discuss whether any of the units have features to automatically terminate drywell or wetwell spray. Describe the conditions under which the operator would terminate drywell and/or wetwell spray under accident conditions in accordance with the EOIs. Address those measures put in place to prevent an operator from reducing wetwell pressure below that needed for adequate available NPSH.

46. In a letter dated September 4, 1998, Tennessee Valley Authority (TVA) requested the previous use of containment overpressure for Units 2 and 3. The letter stated that the short term NPSH analysis assumes a double-ended recirculation pump discharge line break while the long term analysis assumes a double-ended suction line break. Address whether this is the case for the EPU analyses. Any difference in assumptions should be explained.

47. Address the criteria in the EOIs for initiating drywell and wetwell sprays. Discuss how the timing of the actions resulting from these criteria compares with the 10-minute assumption in the accident analyses for initiating suppression pool cooling. Discuss

how the times for initiating drywell and wetwell sprays using the EOI criteria compare with times obtained in simulator training.

48. Using Figure ACVB 7-1 of the March 7, 2006, letter, explain the physical occurrences which result in (1) the reduction in the steep slope at approximately 2 seconds; (2) the small sudden increase at approximately 8 seconds; and (3) the following steep decrease. Discuss at what time the torus-to-drywell vacuum breakers to actuate.

49. Page E1-3 of the letter dated September 4, 1998, indicated that containment pressure is only needed in the short term for the RHR pump at the maximum flow conditions and that “other pathways are available and functional without containment overpressure being relied upon.” Discuss whether this is still true with the EPU NPSH analyses. If still true, elaborate on this statement.

50. In the safety evaluation dated September 3, 1999, on the credit for containment accident pressure in determining available NPSH, TVA discussed a 10-year frequency for suppression pool cleaning. Discuss whether suppression pool cleaning still done on a 10-year frequency.

51. For Figures ACVB 7-3 and ACVB 7-4 from the March 7, 2006, letter, explain the physical occurrences that produce the significant changes in the shape of the curves as a function of time.

52. Table ACVB 22-1, in response to ACVB 22 from the March 7, 2006, letter, states that the licensing basis calculation of NPSH assumes no heat sinks while the realistic calculation does. Address whether the reverse should be true to ensure conservatism. Also, see TVA reply to ACVB 27 and Table SPSB-A.11-2, which states that not crediting heat sinks is conservative.

53. Table ACVB 22-1, in response to ACVB 22 from the March 7, 2006, letter, gives values of wetwell airspace and suppression pool volume that sum to different values for the realistic and the licensing basis values. Discuss whether the sums should be the same and equal to the total volume of the wetwell.

54. The response to RAI ACVB 18 provided curves of pressures and temperatures for the events crediting containment accident pressure for available NPSH. The curves for ATWS and Appendix R Fire should be extended to provide the total time that containment accident pressure is needed for available NPSH.

55. The response to RAI SPSB-A.11 provided Table SPSB-A.11-2, which contains calculations of suppression pool temperature with various assumptions. The cases are identified as either GE or TVA. Describe the analytical methods used for the TVA calculations and the steps taken to ensure a meaningful comparison with SHEX.

56. In Table 6 of Calculation MD-Q0999-970046 Rev. 8, provided in the March 23, 2006, response, the NPSHR of the RHR pumps varies even when the pumps have the same flow rate. The core spray pumps, all with the same flow rate, also have the same value of NPSHR. Explain why the NPSH required varies even when the pumps have the same flow rate.