April 16, 2004

Mr. J. A. Scalice
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 1, 2, AND 3 — REQUEST FOR ADDITIONAL INFORMATION REGARDING THE ALTERNATIVE SOURCE TERM IMPLEMENTATION (TAC NOS. MB5733, MB5734, AND MB5735)

Dear Mr. Scalice:

By letter dated July 31, 2002, as supplemented by letters dated December 9, 2002, and February 12, March 26, July 11 and 17, 2003, the Tennessee Valley Authority submitted an application to revise the Technical Specifications and the licensing basis for the Browns Ferry Nuclear Plant, Units 1, 2, and 3. The proposed revision is related to the planned implementation of the alternative source term as prescribed in Title 10, *Code of Federal Regulations*, Section 50.67.

The U.S. Nuclear Regulatory Commission staff has reviewed your submittals and finds that a response to the enclosed request for additional information is needed before we can complete the review. This request was discussed with Mr. T. Abney of your staff on April 15, 2004, and it was agreed that a response would be provided within 30 days of receipt of this letter. If you have any questions, please contact me at (301) 415-2315.

Sincerely,

/RA/

Eva A. Brown, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-259, 50-260, and 50-296

Enclosure: Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

ALTERNATIVE SOURCE TERM IMPLEMENTATION

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY UNITS 1, 2, AND 3

DOCKET NO. 50-259, 50-260, AND 50-296

Background regarding the use of the standby liquid control (SLC) system for pH-control of the suppression pool

The Tennessee Valley Authority (TVA) has proposed to credit control of the potential of hydrogen (pH) in the suppression pool following a loss-of-coolant accident (LOCA) by means of injecting sodium pentaborate into the reactor core via the SLC system for Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3. The SLC system design was not previously reviewed for this safety function (pH control post-LOCA). Licensees proposing such credit need to demonstrate that the SLC system is capable of performing the pH control safety function assumed in the alternate source term (AST) LOCA dose analysis. In responding to the following questions regarding the SLC system, the focus should be on the proposed pH-control safety function. The reactivity-control safety function is not in question. For example, the SLC system may be redundant with regard to the reactivity-control safety function, but lacks redundancy for the proposed pH-control safety function. If the information was previously submitted to support the license amendment request to implement AST, you may refer to it.

Questions

1. Please identify whether the SLC system is classified as a safety-related system as defined in Title 10, *Code of Federal Regulations* (10 CFR), Section 50.2, and whether the SLC system satisfies the regulatory requirements for a safety-related system. If the SLC system is not classified as safety-related, please provide the information requested in Items 1.1 to 1.5 below, to show that the SLC system is comparable to a system classified as safety-related. If any item is answered in the negative, please provide the justification regarding the acceptability of the SLC system for pH-control safety function.

   1.1 Is the SLC system provided with standby AC power supplemented by the emergency diesel generators?

   1.2 Is the SLC system seismically qualified in accordance with Regulatory Guide (RG) 1.29 and Appendix A to Title 10, 10 CFR Part 100 (or equivalent used for original licensing)?

   1.3 Is the SLC system incorporated into the plant's Inservice Inspection or Testing program (e.g., 10 CFR 50.55a) based upon the American Society of Mechanical Engineers Boiler and Pressure Vessel Code?

   1.4 Is the SLC system incorporated into the plant's Maintenance Rule program consistent with 10 CFR 50.65?

1.5 Does the SLC system meet 10 CFR 50.49 and Appendix A to 10 CFR Part 50 General Design Criterion No. 4, or equivalent used for original licensing)?

2. Please describe the proposed changes to plant procedures that implement SLC sodium pentaborate injection as a pH control additive. In addition, address Items 2.1 to 2.5 below in your response. If any item is answered in the negative, explain why the SLC system should be found acceptable for pH control additive injection.

   2.1 Are the SLC injection steps part of a safety-related plant procedure?

   2.2 Are the entry conditions for the SLC injection procedure steps symptoms of imminent or actual core damage?

   2.3 Does the instrumentation cited in the procedure entry conditions meet the quality requirements for a Type E variable as defined in RG 1.97 Tables 1 and 2?

   2.4 Have plant personnel received initial and periodic refresher training in the SLC injection procedure?

   2.5 Have other plant procedures (e.g., Emergency Response Guidelines/Severe Accident Guidelines) that call for termination of SLC as a reactivity-control measure been appropriately revised to prevent blocking of SLC injection as pH control measure?

3. Please provide a description of the analysis assumptions, inputs, methods, and results that show that a sufficient quantity of sodium pentaborate can be injected to raise and maintain the suppression pool greater than pH 7 within 24 hours of the start of the event. (See also Position 2 of Appendix A to RG 1.183.) In your response, please discuss the adequacy of recirculation of suppression-pool liquid via the emergency core cooling system through the reactor vessel and the break location and back to the suppression pool in meeting the transport and mixing assumptions in the chemical analyses. Assume a large-break LOCA.

4. Please show that the SLC system has suitable redundancy in components and features to assure that for onsite <u>or</u> offsite electric power operation, its safety function of injecting sodium pentaborate for the purpose of suppression pool pH control can be accomplished assuming a single failure. For this purpose, the check value is considered an active device since the check valve must open to inject sodium pentaborate. If the SLC system cannot be considered redundant with respect to its active components, the licensee should implement one of the three options described below, providing the information specified for that option for staff review.

   4.1 <u>Option 1</u> Show acceptable quality and reliability of the nonredundant active components and/or compensatory actions in the event of failure of the nonredundant active components. If you choose this option, provide the following information to justify the lack of redundancy of active components in the SLC system:

4.1.1 Identify the nonredundant active components in the SLC system and provide their make, manufacturer, and model number.

4.1.2 Provide the design-basis conditions for the component and the environmental and seismic conditions under which the component may be required to operate during a design-basis accident. Environmental conditions include design-basis pressure, temperature, relative humidity and radiation fields.

4.1.3 Indicate whether the component was purchased in accordance with Appendix B to 10 CFR Part 50. If the component was not purchased in accordance with Appendix B, provide information on the quality standards under which it was purchased.

4.1.4 Provide the performance history of the component, both at the licensee's facility and in industry databases such as Equipment Performance and Information and Exchange System and Nuclear Plant Reliability Data System.

4.1.5 Provide a description of the component's inspection and testing program, including standards, frequency, and acceptance criteria.

4.1.6 Indicate potential compensating actions that could be taken within an acceptable time period to address the failure of the component. An example of a compensating action might be the ability to jumper a switch in the control room to overcome its failure. In your response consider the availability of compensating actions and the likelihood of successful injection of the sodium pentaborate when nonredundant active components fail to perform their intended functions.

4.2 Option 2 Provide for an alternative success path for injecting chemicals into the suppression pool. If you choose this option, provide the following information.

4.2.1 Provide a description of the alternative injection path, its capabilities for performing the pH control function, and its quality characteristics.

42.2 Do the components which make up the alternative path meet the same quality characteristics required of the SLC system as described in Items 1.1 to 1.5, 2 and 3 above?

4.2.3 Does the alternate injection path require actions to be taken in areas outside the control room? How accessible will these areas be? What additional personnel would be required?

4.3 Option 3 Show that 10 CFR 50.67 dose criteria are met even if pH is not controlled. If you choose this option, demonstrate through analyses that the projected accident doses will continue to meet the criteria of 10 CFR 50.67 assuming that the suppression pool pH is not controlled. The dissolution of cesium iodide and its re-evolution from the suppression pool as elemental iodine must be evaluated by a suitably conservative methodology. The analysis of iodine speciation should be provided for staff review. The analysis documentation should include a detailed description and justification of the analysis assumptions, inputs, methods, and results. The resulting iodine speciation should be incorporated into the dose analyses The calculation may take credit for the mitigating capabilities of other equipment, for example the standby gas treatment system, if such equipment would be available. A description of the dose analysis assumptions, inputs, methods, and results should be provided. Licensees proposing this approach should recognize that this option will incur longer staff review times and will likely involve fee-billable support from national laboratories.

5. The Updated Final safety analysis report for BFN, Section 1.5.1.6 “Nuclear Design Criteria,” has requirements on the secondary containment in Items 13, 14, 15 and automatic responses in Item 3, and control room shielding in Item 23. These requirements may be impacted by the proposed technical specification (TS) changes, which relax requirements on secondary containment operability and isolation functions. Provide information on BFN’s compliance with these nuclear design criteria and any proposed changes to these criteria which will be made.

6. As described in the TVA’s submittals on BFN AST, there appears to be no intent to restore isolation to the secondary containment or to stop venting the secondary containment building in the event of a fuel-handling accident. Other licensees have committed to TS changes or administrative controls that would require restoration of containment and termination of venting after a fuel-handing accident. Please provide information on actions, plans, or commitments that TVA intends to make or implement at BFN in the event of a fuel-handling accident or other radiological release in an open secondary containment.