



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-15-102

July 10, 2015

10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Browns Ferry Nuclear Plant, Units 1, 2, and 3
Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68
NRC Docket Nos. 50-259, 50-260, and 50-296

Subject: **Response to NRC Request for Additional Information Related to License Amendment Request for the Adoption of Technical Specifications Task Force (TSTF) Traveler TSTF-535, Revision 0, "Revise Shutdown Margin Definition to Address Advanced Fuel Designs" (TS-502) (TAC Nos. MF5823, MF5824, and MF5825)**

- References:
1. Letter from TVA to NRC, "License Amendment Request for the Adoption of Technical Specifications Task Force (TSTF) Traveler TSTF-535, Revision 0, 'Revise Shutdown Margin Definition to Address Advanced Fuel Designs (TS-502),' " dated March 9, 2015 (ADAMS Accession No. ML15068A407)
 2. Letter from NRC to TVA, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Request for Additional Information Related to License Amendment Request for Adoption of Technical Specifications Task Force (TSTF) Traveler TSTF-535, Revision 0, 'Revise Shutdown Margin Definition to Address Advanced Fuel Designs' (TS-502) (TAC Nos. MF5823, MF5824, and MF5825), dated June 17, 2015 (ADAMS Accession No. ML15161A392)

By letter dated March 9, 2015 (Reference 1), Tennessee Valley Authority (TVA) submitted a license amendment request (LAR) for Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3, to modify the Technical Specification (TS) definition of "Shutdown Margin" (SDM). The modified definition would require calculation of the SDM at a reactor moderator temperature of 68°F or a higher temperature corresponding to the most reactive state throughout the operating cycle.

By letter dated June 17, 2015 (Reference 2), the Nuclear Regulatory Commission (NRC) transmitted a request for additional information (RAI). The due date for the response is July 10, 2015. The Enclosure to this letter provides TVA's response to the NRC RAI.

Consistent with the standards set forth in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50.92(c), TVA has determined that the additional information, as provided in this letter, does not affect the no significant hazards consideration determination associated with the request provided in Reference 1.

There are no new regulatory commitments contained in this submittal. Please address any questions regarding this submittal to Mr. Edward D. Schrull at (423) 751-3850.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 10th day of July 2015.

Respectfully,



J. W. Shea
Vice President, Nuclear Licensing

Enclosure:

Response to NRC Request for Additional Information Related to License Amendment Request for the Adoption of Technical Specifications Task Force (TSTF) Traveler TSTF-535, Revision 0, "Revise Shutdown Margin Definition to Address Advanced Fuel Designs" (TS-502) (TAC Nos. MF5823, MF5824, and MF5825)

cc (with Enclosure):

NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Browns Ferry Nuclear Plant
NRC Project Manager - Browns Ferry Nuclear Plant
NRC Branch Chief - Region II
State Health Officer, Alabama State Department of Health

ENCLOSURE

Response to NRC Request for Additional Information Related to License Amendment Request for the Adoption of Technical Specifications Task Force (TSTF) Traveler TSTF-535, Revision 0, "Revise Shutdown Margin Definition to Address Advanced Fuel Designs" (TS-502) (TAC Nos. MF5823, MF5824, and MF5825)

NRC RAI

Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Appendix A, General Design Criteria (GDC) 26, "Reactivity control system redundancy and capability," and GDC 27, "Combined reactivity control systems capability," respectively require that reactivity within the core be controllable to ensure subcriticality is achievable and maintainable under cold conditions, with appropriate margin for stuck rods; and that reactivity within the core be controllable to assure that under postulated accident conditions and with appropriate margin for stuck rods the capability to cool the core is maintained.

Plants licensed before the promulgation of the GDC should address their plant-specific licensing basis in the license amendment request to adopt TSTF-535 as described in the letter from the Technical Specification Task Force dated July 4, 2012 (ADAMS Accession No. ML12187A184).

- a) *Provide the Browns Ferry specific information, identified by brackets [], in the following paragraph (Item 2 in the July 4, 2012, letter), which should have been be [sic] included in the TVA LAR.*

The Traveler and model Safety Evaluation discuss the applicable regulatory requirements and guidance, including the 10 CFR 50, Appendix A, General Design Criteria (GDC). Browns Ferry Nuclear Plant Units 1, 2 and 3 were not licensed to the 10 CFR 50, Appendix A, GDC. Browns Ferry Nuclear Plant Units 1, 2 and 3 equivalent of the referenced GDC are [REFERENCE INCLUDING UFSAR [updated final safety analysis report] LOCATION, IF APPLICABLE]. [DISCUSS THE EQUIVALENCE OF THE REFERENCED PLANT-SPECIFIC REQUIREMENTS TO THE APPENDIX A GDC AS RELATED TO THE PROPOSED CHANGE.] This difference does not alter the conclusion that the proposed change is applicable to Browns Ferry Nuclear Plant Units 1, 2 and 3.

- b) *List all the applicable plant-specific design criteria equivalent to GDC 26 and GDC 27 and reference the sections of the UFSAR in which they are discussed.*
- c) *Describe the equivalence of the referenced plant-specific requirements to GDC 26 and GDC 27 as related to the proposed change.*

TVA Response

- a) The Traveler and model Safety Evaluation discuss the applicable regulatory requirements and guidance, including the 10 CFR 50, Appendix A, General Design Criteria (GDC). Browns Ferry Nuclear Plant (BFN), Units 1, 2 and 3 were not licensed to the 10 CFR 50, Appendix A, GDC. The BFN Units 1, 2 and 3 equivalent of the referenced GDC are the Atomic Energy Commission (AEC) Proposed General Design Criteria of November 1965 (Units 1 and 2) and July 1967 (Unit 3), as discussed in Appendix A of the BFN Updated Final Safety Analysis Report (UFSAR). Although not explicitly licensed to the AEC draft criteria, Appendix A to the UFSAR contains an evaluation, performed at the time of initial FSAR preparation, of the design bases of each BFN unit against the draft of the 70 criteria current at the time of operating license application. The evaluation demonstrates the plant design conformance with TVA's interpretation of the intent of the criteria. AEC draft criteria 27, 28, and 29 address information similar to current 10 CFR 50 Appendix A GDCs 26 and 27. This difference does not alter the conclusion that the proposed change is applicable to BFN Units 1, 2 and 3.
- b) As discussed above, AEC Draft Criteria 27, 28, and 29 address information similar to current 10 CFR 50 Appendix A GDCs 26 and 27. BFN UFSAR Appendix A contains an evaluation discussing the plant design bases conformance to the intent of the AEC Draft Criteria. UFSAR Table A.0-5 contains references to other sections of the FSAR which demonstrates conformance to the intent of the criteria. These FSAR references are contained in the parentheses after the discussion of each AEC Draft Criterion.

Criterion 27 – Redundancy of Reactivity Control

At least two independent reactivity control systems, preferably of different principles, shall be provided. (FSAR 1.5, 3.4, 3.8, 7.7)

Criterion 28 – Reactivity Hot Shutdown Capability

At least two of the reactivity control systems provided shall independently be capable of making and holding the core subcritical from any hot standby or hot operating condition, including those resulting from power changes, sufficiently fast to prevent exceeding acceptable fuel damage limits. (FSAR 1.5, 3.4, 3.6, 3.8, 7.7, 14.0)

Criterion 29 – Reactivity Shutdown Capability

At least one of the reactivity control systems provided shall be capable of making the core subcritical under any conditions (including anticipated operational transients) sufficiently fast to prevent exceeding acceptable fuel damage limits. Shutdown margins greater than the maximum worth of the most effective control rod when fully withdrawn shall be provided. (FSAR 1.5, 3.4, 3.6, 7.2, 14.0)

- c) As related to the proposed change, GDC-26, "Reactivity control system redundancy and capability," requires that two independent reactivity control systems of different design principles be provided, and that one of the reactivity control systems shall be capable of holding the reactor core subcritical under cold conditions with appropriate margin for stuck rods. AEC Draft Criteria 27, 28, and 29 provide the equivalent requirements.

TVA Response (cont.)

AEC Draft Criterion 27, "Redundancy of Reactivity Control," states, "At least two independent reactivity control systems, preferably of different principles, shall be provided." AEC Draft Criterion 28, "Reactivity Hot Shutdown Capability," states, "At least two of the reactivity control systems provided shall independently be capable of making and holding the core subcritical from any hot standby or hot operating condition, including those resulting from power changes, sufficiently fast to prevent exceeding acceptable fuel damage limits." AEC Draft Criterion 29, "Reactivity Shutdown Capability," states, "At least one of the reactivity control systems provided shall be capable of making the core subcritical under any conditions (including anticipated operational transients) sufficiently fast to prevent exceeding acceptable fuel damage limits. Shutdown margins greater than the maximum worth of the most effective control rod when fully withdrawn shall be provided."

As related to the proposed change, GDC-27, "Combined reactivity control systems capability," requires that the reactivity control systems have a combined capability, in conjunction with poison addition by the ECCS, to reliably control reactivity changes under postulated accident conditions, with appropriate conditions for stuck rods and that reactivity within the core be controllable to assure that under postulated accident conditions and with appropriate margin for stuck rods the capability to cool the core is maintained. As quoted above, AEC Draft Criteria 28 and 29 provide the equivalent requirements.

Therefore, the plant specific requirements of AEC Draft Criteria 27, 28, and 29 are equivalent to the 10 CFR 50, Appendix A, GDCs 26 and 27 related to the TVA LAR, because the requirements assure the protection of fuel design limits and the capability of maintaining the core subcritical under any conditions.

Based on the above, the justification for the proposed TS change and the model safety evaluation provided in the TSTF-535 traveler are applicable to BFN Units 1, 2, and 3.