



Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

April 16, 2014

10 CFR 50.4

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

Browns Ferry Nuclear Plant, Unit 2
Renewed Facility Operating License No. DPR-52
NRC Docket No. 50-260

Subject: **Response to NRC Request for Additional Information Regarding
10 CFR 50 Appendix H Status Update for Browns Ferry Nuclear
Plant, Unit 2 (TAC No. MF3340)**

- References:
1. Letter from TVA to NRC, "10 CFR 50 Appendix H Status Update for Browns Ferry Nuclear Plant, Unit 2," dated December 27, 2013 (ADAMS Accession No. ML14008A108)
 2. Electronic Mail from NRC to TVA, "Request for Additional Information Regarding Tennessee Valley Authority's 10 CFR 50 Appendix H Status Update for Browns Ferry Nuclear Plant, Unit 2 – Docket No. 50-260 (TAC NO. MF3340)," dated March 18, 2014 (ADAMS Accession No. ML14077A212)

By letter dated December 27, 2013 (Reference 1), the Tennessee Valley Authority (TVA) submitted a 10 CFR 50 Appendix H Status Update for Browns Ferry Nuclear Plant (BFN), Unit 2 providing an expected date for a license amendment request (LAR) to revise the non-conservative BFN, Unit 2, Pressure-Temperature (P-T) Curves.

By electronic mail dated March 18, 2014, the Nuclear Regulatory Commission (NRC) transmitted a request for additional information (RAI) (Reference 2). The due date for the response is April 16, 2014. The Enclosure to this letter provides TVA's response to the NRC RAI.

There are no new regulatory commitments contained in this submittal. Please address any questions regarding this submittal to Mr. Jamie L. Paul at (256) 729-2636.

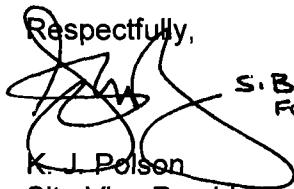
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Respectfully,



S. BONO
FOR K. POLSON

K. J. Polson
Site Vice President

Enclosure:

Response to NRC Division of Operating Reactor Licensing Office of Nuclear
Reactor Regulation Request for Additional Information

cc (Enclosures):

NRC Regional Administrator – Region II

NRC Senior Resident Inspector – Browns Ferry Nuclear Plant

NRC Project Manager - Browns Ferry Nuclear Plant

ENCLOSURE

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING TENNESSEE VALLEY AUTHORITY'S 10 CFR 50 APPENDIX H STATUS UPDATE FOR BROWNS FERRY NUCLEAR PLANT, UNIT 2 DOCKET NO. 50-260 (TAC NO. MF3340)

The Nuclear Regulatory Commission (NRC) staff has reviewed the information provided by Tennessee Valley Authority (TVA, the licensee) for Browns Ferry Nuclear Plant, Unit 2 (BFN-2) in its letter dated December 27, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14008A108), and has determined that additional information is necessary to complete the review of TVA's Status Update for BFN-2 for Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix H, "Reactor Vessel Material Surveillance Program Requirements" (10 CFR 50 App. H).

Based on the staff's review of TVA's letter, please provide responses that address the following requests:

NRC RAI No. 1

TVA's letter states that the pressure-temperature (P-T) limits curves contained in the BFN-2, Technical Specifications (TS), Figures 3.4.9-1 and 3.4.9-2 are non-conservative. Provide the following information:

- a. *Provide the details of the evaluation performed to demonstrate that the BFN-2 P-T limits curves are non-conservative.*

- b. *Provide an evaluation of the amount of non-conservatism in the BFN-2 P-T limits curves.*

TVA Response

- a. The results of the mechanical testing of the BFN Unit 2 120° Surveillance Capsule were evaluated for the effect on the following for BFN Units 1, 2, and 3:
 - Existing pressure-temperature (P-T) limit curves,
 - Supporting Adjusted Reference Temperature (ART) calculations, and
 - End of License (EOL) beltline material upper shelf energy (USE) predictions.

The results were that while BFN Units 1 and 3 were not affected by the BFN Unit 2 120° Surveillance Capsule data, the limiting beltline material ART for Unit 2 shifted

upward from 141°F to 176°F at 30 Effective Full Power Years (EFPY), a 35°F increase. Therefore, The BFN Unit 2 P-T limit curves will be updated to incorporate the results of the BFN Unit 2 120° Surveillance Capsule testing. TVA has committed to submit the revised P-T Limits Curves prior to the Period of Extended Operation (PEO) as part of a BFN Unit 2 License Amendment Request Technical Specifications (TS) change by June 27, 2014.

- b. The BFN Unit 2 ART Calculations were recalculated using the data contained in the BFN Unit 2 120° Surveillance Capsule. Based on the BFN Unit 2 120° Surveillance Capsule, the BFN Unit 2 P-T curves are non-conservative since the limiting beltline material shifted by 35°F higher at 30 EFPY and 27°F higher at 26 EFPY. BFN Unit 2 has currently operated for approximately 26 EFPY. The ART and USE data were evaluated against Regulatory Guide (RG) 1.99, Rev. 2.

NRC RAI No. 2

TVA's letter states that the non-conservative P-T limits curves are being treated as a degraded condition and that TVA has established compensatory measures to ensure that the BFN-2 reactor vessel is maintained within acceptable limits. Provide the following information:

- a. Provide the acceptable limits for the BFN-2 reactor vessel that are being referred to and their bases.*
- b. Provide the details and bases of the compensatory measures established to ensure that the limits provided in response to Item 2a are maintained.*
- c. Provide an assessment demonstrating the adequacy of the compensatory measures implemented by TVA for BFN-2 until such time as a TVA License Amendment Request can be submitted to and approved by the NRC.*

TVA Response

- a. The operability (both past and immediate) of BFN Unit 2 was evaluated with the following results:

Past Operability

All BFN Unit 2 beltline materials are at the upper shelf once the Reactor Pressure Vessel (RPV) metal temperature is greater than or equal to 218°F. Therefore, the P-T limit curves are applicable only for RPV metal temperatures less than 218°F.

Considering the 35°F shift upward of the limiting beltline material ART for Unit 2 due to the BFN Unit 2 120° Surveillance Capsule data, the existing 30 EFPY P-T limit curves became non-conservative at approximately 15 EFPY. Due to adequate temperature margins during startup and shutdown, no heatup/cooldown temperature limits were violated even taking into account shifting the existing P-T limits 35°F upward. However, it is possible that leak tests performed since 15 EFPY of operation may not have satisfied the existing P-T limits when the 35°F temperature shift is added. However, the results of leak tests performed since 15 EFPY confirmed that no damage was sustained by the Unit 2 RPV.

Immediate Operability

The BFN Unit 2 RPV is currently operable and can be shown to satisfy all requirements of 10 CFR 50 Appendix G through 30 EFPY of operation by using the existing P-T curves shifted upward 35°F for leak test and heatup/cooldown until revised P-T curves can be prepared and incorporated into the BFN Unit 2 Technical Specifications (TS).

- b. Operator Challenge 2-068-OWA-2013-057 has been initiated to establish conservative operating margin. In the case where the BFN Unit 2 RPV is shutdown and cooled down to temperatures less than 218°F, operators will apply a correction factor of 35°F to the existing P-T curves.
- c. BFN Unit 2 has established compensatory actions for the operators to apply a correction factor of 35°F to the existing P-T curves until GE Hitachi Nuclear Energy (GEH) issues a report with new P-T curves that incorporates the results of the BFN Unit 2 120° Surveillance Capsule testing and a new License Amendment Request has been approved. The curves will be valid for the entire PEO for BFN Unit 2. As part of the License Renewal Application, TVA has committed to submit the revised P-T Limits Curves prior to the PEO (i.e., prior to June 27, 2014) as part of a BFN Unit 2 License Amendment Request.