



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

May 29, 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)
  3. Letter from TVA to NRC, "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)," dated April 16, 2014 (ADAMS Accession No. ML14108A328)
  4. 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 April 30, 2014 (ADAMS Accession No. ML14125A007)

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). By letter dated April 16, 2014 (Reference 3), TVA submitted responses to the Reference 2 RAIs. By

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U.S. Nuclear Regulatory Commission

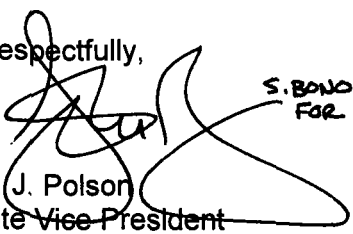
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electronic mail dated April 30, 2014, the NRC transmitted an additional RAI (Reference 4). The new RAI is a continuation of the RAI 1(b) response in Reference 3. The due date for the response is May 30, 2014. The Enclosure to this letter provides TVA's 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.

Respectfully,

  
S. BONO  
FOR K. POLSON

K. J. Polson  
Site Vice President  
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)

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 letters dated December 27, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14008A108) and April 16, 2014 (ML14108A328), 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 letters, please provide a response to the following request for additional information (RAI):

#### **NRC RAI No. 3**

*In response to NRC RAI 1(b), TVA's April 16, 2014 letter states that the BFN Unit 2 pressure-temperature (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. Describe the details of how the 35°F and 27°F shifts were calculated.*

#### **TVA Response**

The 35°F and 27°F shifts were calculated using the test results from the BFN Unit 2 120° Surveillance Capsule. The Adjusted Reference Temperature (ART) for the BFN Unit 2 limiting beltline material (Electroslag Weld (ESW)) increased from 141.1°F at 30 Effective Full Power Years (EFPY) to 167.8°F at 26 EFPY and 175.8°F at 30 EFPY.

The following calculations used to determine the ART are in Section 1.1 of NRC Reg. Guide 1.99 Revision 2 ("Radiation Embrittlement of Reactor Vessel Materials") as follows:

$$\text{ART} = \text{Initial RT}_{\text{NDT}} + \Delta\text{RT}_{\text{NDT}} + \text{Margin} \quad \text{Equation (1)}$$

$$\Delta\text{RT}_{\text{NDT}} = \text{CF (Chemistry Factor)} \times f^{(0.28 - 0.10 \log f)} \quad \text{Equation (2)}$$

where  $f$  is the neutron fluence

For calculations using pre-/post-surveillance capsule data, the Initial  $\text{RT}_{\text{NDT}}$  of the ESW remained the same at 23.1°F.

The Margin term using the post-surveillance capsule data actually decreased from 61.7°F to 38.2°F, a decrease of 23.5°F. This decrease was due primarily to a reduction of the

standard deviation for  $\Delta RT_{NDT}$  ( $\sigma_{\Delta}$ ) from 28°F to 14°F because the surveillance data was deemed “credible.”

The  $\Delta RT_{NDT}$  term increased from 56.3°F pre-surveillance capsule data at 30 EFPY to 106.5°F post-surveillance capsule data at 26 EFPY and 114.5°F post-surveillance capsule data at 30 EFPY, an increase of 50.2°F at 26 EFPY and 58.2°F at 30 EFPY. This increase was due primarily to an increase in the Chemistry Factor of the ESW from 141°F to 285.8°F.

Therefore, using Equation (1), the ART of the BFN Unit 2 limiting bellline material is calculated as follows.

ART (at 26 EFPY) = 23.1°F + 106.5°F + 38.2°F = 167.8°F (26.7°F shift from 30 EFPY pre-surveillance capsule data)

ART (at 30 EFPY) = 23.1°F + 114.5°F + 38.2°F = 175.8°F (34.7°F shift from 30 EFPY pre-surveillance capsule data)

Rounding the above calculated values, the ARTs at 26 EFPY and 30 EFPY are 27°F and 35°F, respectively.