UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 27, 2016

Mr. Joseph W. Shea
Vice President, Nuclear Licensing
Tennessee Valley Authority
1101 Market Street, LP 3R-C
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 2 AND 3 – REQUEST FOR ADDITIONAL INFORMATION RELATED TO RELIEF REQUEST FOR THE USE OF ALTERNATIVES TO CERTAIN AMERICAN SOCIETY OF MECHANICAL ENGINEERS, BOILER AND PRESSURE VESSEL CODE, SECTION XI REQUIREMENTS (CAC NOS. MF7795 AND MF7796)

Dear Mr. Shea:

By application dated June 10, 2016 (Agencywide Documents Access and Management System Accession No. ML16165A234), Tennessee Valley Authority (TVA, the licensee) submitted relief requests for the Browns Ferry Nuclear Plant, Units 2 and 3. The submittal requests the use of alternatives to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI requirements.

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing your submittal and has determined that additional information is required to complete the review. On September 27, 2016, the NRC staff forwarded, by electronic mail, a draft of the staff's request for additional information (RAI) to TVA. On October 7, 2016, the NRC staff held a conference call to provide the licensee with an opportunity to clarify any portion of the draft RAI and discuss the timeframe for which TVA may provide the requested information. The specific information requested is addressed in the enclosure to this letter. As agreed by NRC and TVA staff, TVA will respond to this RAI by December 7, 2016.

The NRC staff considers that timely responses to requests for additional information help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources.

If circumstances result in the need to revise the requested response date, please contact me at 301 415-1447 or Farideh.Saba@nrc.gov.

Sincerely,

Farideh E. Saba

Farideh E. Saba, Senior Project Manager
Plant Licensing 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/enclosure: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

RELIEF REQUEST FOR THE USE OF ALTERNATIVES TO CERTAIN ASME CODE,

SECTION XI, REQUIREMENTS

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 2 AND 3

DOCKET NOS. 50-260 AND 50-296

By letter dated June 10, 2016 (Agencywide Documents Access Management System (ADAMS) Accession No. ML16165A234), Tennessee Valley Authority (TVA, the licensee) submitted Requests for Alternative 2-ISI-30 and 3-ISI-27 for Browns Ferry Nuclear Plant, Units 2 and 3 (BFN 2 and 3), respectively. Pursuant to 10 CFR 50.55a(z)(1), the licensee has requested in its proposed alternative to permanently eliminate (for the duration of the 60-year extended license terms) the inservice examinations for the reactor pressure vessel (RPV) circumferential shell welds required by the American Society of Mechanical Engineers (ASME), Boiler Pressure and Vessel (BP&V) Code (ASME Code), Section XI, Examination Category B-A at both units by invoking the generic RPV integrity analyses of the Electric Power Research Institute (EPRI) Boiling Water Reactor (BWR) Vessel and Internals Project (BWRVIP) reports, BWRVIP-05 and BWRVIP-74-A, on the basis that the proposed alternative will provide an acceptable level of quality and safety. To support its requests, the licensee provided some plant-specific information to demonstrate that these BWRVIP analyses are bounding for the subject BFN 2 and 3 circumferential shell welds for the 60-year license terms.

The U.S. Nuclear Regulatory Commission (NRC) staff has determined that the following additional information is needed to complete its review.

Request for Additional Information (RAI)-1:

Please state whether the neutron fluence values provided in Table 2 of your submittal for Requests for Alternative 2-ISI-30 (BFN 2) and 3-ISI-27 (BFN 3) are applicable for the proposed 14.3 percent extended power uprate conditions, as proposed in your license amendment request dated September 21, 2015 (ADAMS Accession No. ML15282A152).

RAI-2:

BACKGROUND

In a letter dated July 28, 1998, to Mr. C. Terry, the BWRVIP Chairman, transmitting its safety evaluation (SE) for the BWRVIP-05 report, the NRC staff identified a concern about the failure probability of axially-oriented welds in BWR RPVs. Specifically, by RAI correspondence dated June 8, 1998, for its review of the BWRVIP-05 report, the staff requested that the BWRVIP provide analyses of RPV axial weld failure probability in BWRs (from the results of probabilistic fracture mechanics evaluations) using specific staff recommendations on input variables and a

Enclosure

risk assessment of the impact of inservice inspection, operating procedures, and training on the results of these failure probability evaluations and the guidance in NRC Regulatory Guide (RG) 1.174. In response to this concern, by letters dated December 15, 1998, and November 12, 1999, the BWRVIP supplied the generic evaluations of axial weld failure probability, which were necessary to support the analysis justifying the elimination of circumferential weld inservice examinations required by the ASME Code, Section XI, Examination B-A for the 40-year license term. The NRC staff's supplemental BWRVIP-05 SE for these generic analyses is enclosed in a letter dated March 7, 2000 (ADAMS Accession No. ML003690281), from Mr. J. Strosnider (NRC) to Mr. C. Terry, wherein the staff concludes that, based on its review of these results, the limiting RPV axial weld failure frequency for the BWR fleet at the end of the 40-year license term is below 5 X 10^{-6} per reactor operating year, consistent with RG 1.154, given the assumptions as described in its SE dated March 7, 2000. Subsequently, by letter dated October 18, 2001, the staff issued its Final License Renewal Safety Evaluation Report (LR-FSER) for the BWRVIP-74-A report (EPRI proprietary information) wherein the staff concludes that BWRVIP-74-A is acceptable for licensees participating in the BWRVIP to reference in a license renewal (LR) application to the extent specified and under limitations delineated in the LR-FSER. The LR-FSER for BWRVIP-74-A also states that since the supplemental BWRVIP-05 axial weld results supplied in the BWRVIP's December 15, 1998, and November 12, 1999, correspondence apply only for the initial 40-year license term for BWR plants, LR applicants shall provide plant-specific information on RPV axial weld failure probability applicable to 60 years of operation. As documented in the LR-FSER for BWRVIP-74-A, an acceptable plant-specific evaluation of axial weld failure probability may consist of a plant-specific determination of the mean reference nil ductility temperature (RT_{NDT}) of the most limiting RPV axial beltline weld based on projected embrittlement at the end of the 60-year license term and demonstrating that it is less than the values specified in Table 1 of the LR-FSER for BWRVIP-74-A. Accordingly, this was identified as a time-limited aging analysis (TLAA) to be performed by BWR LR applicants that were operating with NRC staff-approved ASME Code alternatives authorizing the elimination of RPV circumferential weld exams for the 40-year term.

ISSUE

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) must meet the inservice inspection requirements set forth in the ASME Code, Section XI to the extent practical. The regulations require that inservice examination of components comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(a)(1)(ii), 12 months prior to the start of the 120-month interval, subject to the conditions listed in 10 CFR 50.55a(b)(2). Therefore, BFN 2 and 3 are required to examine "essentially 100 percent" (i.e., greater than 90 percent, per ASME Code Case N-460) of the length of the RPV circumferential shell welds, as required by Examination Category B-A of the ASME Code, Section XI, 2007 Edition through 2008 Addenda. The NRC staff must review the licensee's proposed alternative for permanent relief from the RPV circumferential shell weld examinations required by the ASME Code, Section XI, Examination Category B-A at BFN 2 and 3 to determine whether it will provide an acceptable level of quality and safety, per the requirements of 10 CFR 50.55a(z)(1). The acceptance criteria by which the staff must review this proposed alternative for the 60-year license term are established in the BWRVIP-74-A report and include analyses for both the limiting RPV circumferential weld and the limiting RPV axial weld at BFN 2 and 3.

The NRC staff determined that up-to-date analysis of the RPV axial weld failure probability is needed to support its review of the requested circumferential weld examination relief for the period of extended operation (PEO) at BFN 2 and 3 because the failure probability of the axial welds was identified as a concern by the staff in its review of the technical bases to support circumferential weld examination relief, as documented in the correspondence cited above. Specifically, the staff must verify that the limiting axial weld embrittlement is below the thresholds identified in the LR-FSER for BWRVIP-74-A. The staff also noted that the axial weld failure probability was evaluated as a TLAA for the PEO for all three BFN units, as documented in its safety evaluation report for the LR of BFN in NUREG-1843. However, the staff noted that the TLAAs for the BFN 2 and 3 limiting axial welds are now over 10 years old. Furthermore, the staff noted that a critical material property input for the limiting axial weld TLAA for BFN 2 is now no longer valid. Specifically, for BFN 2, the staff's independent calculation determined that the projected mean RT_{NDT} value (corresponding to projected embrittlement at end of the 60-years) for the limiting axial beltline weld has increased significantly since the performance of the LR TLAA cited above, based on more recent credible BWRVIP integrated surveillance program data, which invalidates the results of the LR TLAA for the RPV axial weld failure probability at BFN 2.

REQUEST

Based on the concern identified above, supplement your request to include the updated analysis of the failure probability for the limiting RPV axial weld at BFN 2 so that the NRC staff can verify that it remains bounded by the BWRVIP-74-A acceptance criteria.

If circumstances result in the need to revise the requested response date, please contact me at 301 415-1447 or Farideh.Saba@nrc.gov.

Sincerely,

/RA/

Farideh E. Saba, Senior Project Manager
Plant Licensing II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-260 and 50-296

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Request for Additional Information

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ADAMS Accession No.: ML16288A018 *by memorandum

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