From:	Saba, Farideh
To:	Williams, Gordon Robert; Wells, Russell Douglas
Cc:	Schrull, Edward Dustin; Venkataraman, Booma; Jordan, Natreon; Clayton, Beverly
Subject:	Browns Ferry Units 1, 2, and 3: RAIs Related to Code Case N-702 (L-2018-LLR-0074)
Date:	Thursday, September 06, 2018 8:54:00 AM
Attachments:	RAI for Request for Alternative to use CC N-702 for BF units 1 2 and 3.docx

Gordon and Russel,

By letter dated May 11, 2018 (ADAMS Accession No. ML18135A357), Tennessee Valley Authority (TVA) submitted Request for Alternative ISI-46 for relief from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI regarding the inspection program for the third, fifth, and fourth 10-year inservice inspection (ISI) interval for Browns Ferry Nuclear Plant, Units 1, 2, and 3, respectively. This request is pursuant to Section 55a(z)(1) of Title 10 of *Code of Federal Regulations*, and pertains to inspect reactor pressure vessel (RPV) nozzles based on ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds," which allows inspection of 25 percent of RPV nozzles each ISI interval instead of the ASME Code, Section XI required 100 percent.

The NRC staff reviewed the licensee's submittal and determined that additional information, as described in the attached request for additional information (RAI), is required for the staff to complete its review of the subject relief request. The NRC staff forwarded by electronic mails draft RAIs to TVA. On August 30, 2018, the NRC staff held a conference call to provide the TVA with an opportunity to clarify any portion of the draft RAIs and discuss the time frame for which TVA would provide the requested information. The final RAIs as discussed with TVA is attached to this email. During this call TVA proposed to submit it responses by October 15, 2018, and the NRC staff agreed with the proposed date.

Thanks,

Farideh
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REQUEST FOR ADDITIONAL INFORMATION BY

THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ALTERNATIVE ISI-46

FOR OPERATING LICENSE NOS. DPR-33, DPR-52, AND DPR-68

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3

THIRD, FIFTH, AND FOURTH INSERVICE INSPECTION INTERVAL PROGRAM

TENNESSEE VALLEY AUTHORITY

DOCKET NOS. 50-259, 50-260, AND 50-296

EPID L-2018-LLR-0074

By letter dated May 11, 2018 (ADAMS Accession No. ML18135A357), Tennessee Valley Authority (TVA, the licensee) submitted Request for Alternative ISI-46 for relief from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI regarding the inspection program for the third, fifth, and fourth 10-year inspection interval, respectively, for Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(1), the licensee proposed an alternative to inspect reactor pressure vessel (RPV) nozzles based on ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds." This alternative allows inspection of 25 percent of RPV nozzles (nozzle-to-vessel shell welds and nozzle inner radii) each inservice inspection (ISI) interval instead of the ASME Code, Section XI required 100 percent.

The NRC Staff determined that additional information was required to make a regulatory decision on this request.

RAI 1

Requested Approval Date

The requested approval date for the proposed alternative is within one year from the date of the letter (i.e., May 11, 2019). In comparison, the start date of the subject intervals for the alternative is February 1, 2016. Typically, the first inspection period of an ISI interval is the first 3 calendar years within the interval (ASME Code, Section XI, Table IWB-2411-1). This means that the end date of the first inspection periods of BFN Units 1, 2 and 3 is January 31, 2019, and the requested approval date is after the first inspection periods.

In comparison, Note (2) in ASME Code, Section XI, Table IWB-2500-1 for Items B3.90 and B3.100 states that at least 25 percent but not more than 50 percent of the nozzles shall be examined by the end of the first inspection period and the remainder by the end of the inspection interval. To implement the provision in Note (2), the approval/disapproval date for

the proposed alternative may need to be earlier than January 31, 2019 (considering a hypothetical situation of request disapproval).

Therefore, please clarify the schedules for the first inspection periods of BFN Units 1, 2 and 3 and the requested approval date in consideration of the provision in Note (2) of Table IWB-2500-1.

RAI 2

Updated Probability of Failure (PoF) Values

The licensee's request letter (May 11, 2018) indicates that technical documents BWRVIP-108 and BWRVIP-241 provide the basis for the use of Code Case N-702, but only consider 40-year plant operation. The licensee also indicated that, to extend the applicability of the code case for the period of extended operation, a probabilistic fracture mechanics evaluation, consistent with the methods of BWRVIP-108 and BWRVIP-241, was performed to ensure that the PoF remains acceptable. The licensee further indicated that the limiting PoF due to a low-temperature over-pressurization (LTOP) event is 1.53E-6 per year for the nozzle blend radius region, and 8.33E-12 per year for the nozzle-to-shell weld. The NRC staff noted that each of these PoF values is lower than the corresponding PoF value for the 40-year operation described in Table 5-8 of BWRVIP-241 for the BFN Unit 2 recirculation outlet nozzle.

Therefore, please discuss why the updated limiting PoF values for the extended period of operation are less than the 40-year PoF values in BWRVIP-241, Table 5-8. In addition, provide the updated limiting PoF values in the format of BWRVIP-241, Table 5-8, including the normal operating condition, for the subject nozzles addressed in the licensee's request.

RAI 3

Neutron Fluence Effects

The increased neutron fluence on the subject nozzles for the period of extended operation may have effects on the fracture toughness values of the nozzle materials and crack growth rates in the nozzle materials. Please discuss how the updated fracture mechanics evaluation accounts for these potential fluence effects in the PoF calculations.