TENNESSEE VALLEY AUTHORITY

1101 Market Street, Chattanooga, Tennessee 37402

CNL-22-025

August 22, 2022

10 CFR 50.55a

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: **Browns Ferry Nuclear Plant, Units 1, 2, and 3 – American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, Request for Alternative BFN-0-ISI-32**

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, "Codes and Standards," paragraph (z)(2), Tennessee Valley Authority (TVA) requests Nuclear Regulatory Commission (NRC) approval of the enclosed inservice inspection (ISI) alternative request for the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3. The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC) 2007 Edition with 2008 Addenda is the Code of Record for BFN Units 1, 2, and 3. The duration of the proposed alternative request is through the remainder of the third, fifth, and fourth ISI intervals for BFN Units 1, 2, and 3, respectively, which are scheduled to end on January 31, 2026.

The alternative request applies to the BFN Units 1, 2, and 3 standby liquid control (SLC) nozzles listed in the enclosure to this submittal. ASME BPVC Section XI, Subsection IWB-2500, "Examination and Pressure Test Requirements," requires volumetric examination of Category B-D nozzles. Per Code Case N-648-1, VT-1 visual examination may be performed in lieu of the volumetric examination for item number B3.100.

As discussed in the enclosure to this letter, compliance with Subsection IWB-2500 for the SLC nozzles listed would cause a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, TVA is submitting this alternative request in accordance with 10 CFR 50.55a(z)(2). The enclosure to this letter describes the proposed alternative and the basis for use.

TVA requests approval of this alternative request within one year of the date of this letter.

There are no new regulatory commitments associated with this submittal. Please address any questions regarding this request to slrymer@tva.gov.

Respectfully,

Digitally signed by Rymer, Stuart Loveridge
Date: 2022.08.22 14:24:33 -04'00'

Stuart L. Rymer
Director (Acting), Nuclear Regulatory Affairs

Enclosure:

Browns Ferry Nuclear Plant, Units 1, 2, and 3, American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section XI, Table IWB-2500-1 and the Examination Requirements of the Standby Liquid Control Nozzle Inside Radius Section, Request for Alternative, BFN-0-ISI-32

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant
NRC Project Manager - Browns Ferry Nuclear Plant

Browns Ferry Nuclear Plant, Units 1, 2, and 3
American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section XI, Table IWB-2500-1 and the Examination Requirements of the Standby Liquid Control Nozzle Inside Radius Section, Request for Alternative, BFN-0-ISI-32

I. ASME Code Components Affected

Code Class:	1
Reference:	IWB-2500, Table 2500-1
Examination Category:	B-D
Item Number:	B3.100
Component ID:	Unit 1: N10-IR (00134-ISI-BFN1) Unit 2: N10-IR (00104-ISI-BFN2) Unit 3: N10-IR (00127-ISI-BFN3)
Description:	Examination of Standby Liquid Control (SLC) Nozzle Inside Radius

II. Applicable Code Edition and Addenda

The Code of Record (Code) for the third, fifth, and fourth inservice inspection (ISI) intervals for Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3, respectively, is the 2007 Edition with 2008 Addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC), Section XI, Division 1, "Rules for Inservice Inspection of Nuclear Power Plant Components."

III. Applicable Code Requirement

ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item No. B3.100, requires a volumetric examination to be performed on the inner radius section of all reactor vessel nozzles each inspection interval. Table IWB-2500-1, Examination Category B-D, Item No. B3.100 refers to the nozzle configurations shown in Figure No. IWB-2500-7. ASME Code Case N-648-1, allows for VT-1 visual examination in lieu of the volumetric examination requirements of Table IWB-2500-1.

IV. Reason for Request

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), Tennessee Valley Authority (TVA) is requesting an alternative on the basis that compliance with the Code requirements would impose hardship without a compensating increase in the level of quality and safety.

The SLC nozzle, as shown in Figure 1, is designed with an integral socket to which the boron injection piping is fillet welded. This design is different from the configurations shown in ASME Section XI, Figure No. IWB-2500-7. The SLC nozzle is located in the bottom head of the vessel, in an area that is inaccessible without extensive disassembly, hindering the ability to complete the Code required volumetric or approved Code Alternative VT-1 examinations from the inside surface of the reactor pressure vessel (RPV).

Compliance with the applicable Code requirements would require an ultrasonic volumetric examination to be performed on the outside diameter of the RPV. Based on the configuration of the nozzle, the required exam would impose a hardship to perform and will not yield information that could be used to ascertain the structural integrity of the component. As shown in Figure 1, the ultrasonic scan would need to travel through the full thickness of the vessel into a complex cladding/socket configuration which impedes the ability to obtain results that would be useful in determining the integrity and leak tightness of the SLC nozzle inside radius. Imbedded reflectors in the nozzle design do not allow a meaningful exam to be performed.

The inner radius socket attaches to piping that injects boron at locations far removed from the nozzle. Therefore, the SLC nozzle inner radius is not subjected to turbulent mixing conditions that are a concern at other nozzles.

In addition, the performance of this exam results in significant radiation dose to plant workers. Without the compensating guarantee of obtaining meaningful results, the performance of this exam would be contrary to industry and Nuclear Regulatory Commission (NRC) practices related to maintaining radioactive dose as low as reasonably achievable (ALARA).

The SLC nozzle is approximately 2 inches in diameter and, therefore, was exempt (i.e., 3-inch and smaller) from examination based on Section IWB-1220(b)(1) of the Code of Record in effect for the first 10-year ISI interval (ASME Section XI, 1974 Edition, Summer 75 Addenda) for all three units. With the exception of the BFN Unit 2 second 10-year ISI interval for which relief was requested (Reference 1), ultrasonic examination results have been obtained as required for each successive interval. However, as explained previously, the results do not meaningfully determine integrity or leak tightness due to the nozzle configuration. The SLC nozzle has, additionally, received a VT-2 visual examination in conjunction with the Class 1 system leakage test conducted during each refueling outage. No leakage from this nozzle inner radius has ever been observed on any unit at BFN.

Based on this, the Code requirements impose hardship without a compensating increase in the level of quality and safety in accordance with 10 CFR 50.55a(z)(2).

V. Proposed Alternative and Basis for Use

As an alternative examination, BFN Units 1, 2, and 3 will perform a VT-2 visual examination of the subject SLC nozzles each refueling outage in conjunction with the Class 1 system leakage test.

A system leakage test of the Class 1 pressure boundary is conducted at the end of each refueling outage at operating pressure. The RPV bottom head penetrations, including the SLC penetration, are visually inspected during the leakage test, with the acceptance criteria being zero leakage.

The proposed alternative verifies integrity and leak tightness by ensuring no leakage at nominal operating pressure during the ASME Section XI system leakage test. This test is performed prior to startup every refueling outage to provide confidence that there is no leakage during unit operation. Passing this test with no identified through-wall leakage at the nozzle provides reasonable assurance of structural integrity and leak tightness of the SLC nozzle.

During normal plant operation, the SLC nozzle is inaccessible for direct visual observation based on its location in the drywell. This does not preclude the nozzle from being indirectly monitored. Leakage from the nozzle would be collected in the drywell sumps, prompting action from the station.

VI. Duration of Proposed Alternative

The proposed alternative method of examination is requested for BFN Units 1, 2, and 3 for the remainder of the third, fifth, and fourth ISI intervals, respectively, which began on February 1, 2016, and are scheduled to conclude on January 31, 2026.

VII. Precedent

The following precedents are similar to the proposed alternative in that they also apply to SLC nozzles.

- NRC Letter to Exelon Generation, "Peach Bottom Atomic Power Station, Units 2 and 3 – Correction to Relief Request I5R-10 Dated December 2, 2019, Re: Errors Introduced in the Issuance of Relief from the ASME Code (EPID L-2019-LLR-0076)," dated December 19, 2019 (ML19350A015)
- NRC Letter to Exelon Generation, "Dresden Nuclear Power Station, Units 2 and 3 – Safety Evaluation in Support of Request for Relief Associated with the Fifth 10-Year Inservice Inspection Interval Program (TAC Nos. ME9682, ME9683, ME9684, ME9685, ME9686, ME9687, ME9688, ME9689, ME9690, ME9691, ME9692, ME9693, ME9694, ME9695, ME9696, and ME9697)," dated September 30, 2013 (ML13260A585)
- NRC Letter to Exelon Generation, "Quad Cities Nuclear Power Station, Units 1 and 2 – Safety Evaluation in Support of Request for Relief Associated with the Fifth 10 Year Interval Inservice Inspection Program (TAC Nos. ME9668, ME9669, ME9670, ME9671, ME9672, ME9673, ME9674, ME9675, ME9676, ME9677, ME9678, ME9679, ME9680, ME9681)," dated September 30, 2013 (ML13267A097)
- NRC Letter to TVA, "Browns Ferry Nuclear Plant, Unit 2 – Relief Requests Nos. 2-ISI-6, Revision 2; 2-ISI-13; 2-ISI-14; and 2-ISI-15; Related to the Second 10-Year Interval Inservice Inspection Program (TAC Nos. MB5309, MB8130, MB8132, and MB8133)," dated April 3, 2003 (ML030970815)

VIII. References

1. TVA Letter to NRC, "Browns Ferry Nuclear Plant (BFN) – Unit 2 – American Society of Mechanical Engineers (ASME) Section XI, Inservice Inspection (ISI) Program – Second Ten-Year Inspection Interval, Requests for Relief 2-ISI-6, Revision 2, 2-ISI-13, 2-ISI-14, and 2-ISI-15," dated May 24, 2002 (ML021610382)

Figure 1 – Standby Liquid Control Nozzle