Browns Ferry Nuclear Plant

Browns Ferry Nuclear Plant (BFN)

Pre-Submittal Meeting for Alternative Requests for the BFN Fifth 10-Year Inservice Testing (IST) Interval

October 13, 2022

TVA TENNESSEE VALLEY AUTHORITY

Agenda

- Introduction
- Background
- Request for Alternative BFN-IST-01
- Request for Alternative BFN-IST-02
- Request for Alternative BFN-IST-03
- Request for Alternative BFN-IST-04
- Request for Alternative BFN-IST-05
- Duration of Proposed Alternatives
- Precedents
- Schedule for Submittal

Introduction

- The purpose of the meeting is to provide information regarding the following Tennessee Valley Authority (TVA) IST alternative requests, pursuant to 10 CFR 50.55a(z)(1) and 10 CFR 50.55a(z)(2), to 10 CFR 50.55a(b)(3)(xi), “OM condition: Valve Position Indication,” for implementing American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) Subsection ISTC-3700, “Position Verification Testing,” in support of the upcoming BFN Units 1, 2, and 3 fifth 10-year IST interval.
    - BFN-IST-1 for the control rod drive (CRD) system scram discharge volume (SDV) vent and drain valve position indicating lights.
    - BFN-IST-2 for the manually operated passive residual heat removal (RHR) system valve position indicating lights.
    - BFN-IST-3 for the main steam line (MSL) drain valve position indicating lights.
    - BFN-IST-4 for the main steam relief valves (MSRV) (see additional code requirements in the proposed alternative request slides).
    - BFN-IST-5 for the emergency equipment cooling water (EECW) strainer backwash valve position indicating lights.

Background

- The code of record for BFN for the fourth 10-year IST Interval was the ASME OM Code 2004 Edition through 2006 Addenda.
- The end of the fourth 10-year IST Interval was extended from August 30, 2022, to August 30, 2023, as allowed by ISTA-3120(d). Therefore, the fifth 10-year IST interval is required to begin no later than August 31, 2023.
- In accordance with 10 CFR 50.55a(f)(4)(ii), TVA would be required to adopt the 2017 edition of the ASME OM Code for the BFN fifth 10-year IST interval.
- In accordance with 10 CFR 50.55a(f)(4)(iv), TVA plans to seek NRC approval to use the 2020 edition of ASME OM Code for the fifth 10-year IST interval (this request will be included in the submittal package along with the following alternative requests).

Alternative Request BFN-IST-1

- In accordance with 10 CFR 50.55a(z)(2), TVA is requesting NRC approval of an alternative to 10 CFR 50.55a(b)(3)(xi) for implementing Subsection ISTC-3700 for supplementing the CRD system SDV vent and drain valve position indicating lights with other indications.

BFN-IST-1 - ASME OM Code Components Affected

Site/Unit	Component ID	Component Description	Valve Type	Code Class	Valve Size	OM Category
BFN Units 1, 2, and 3	1/2/3-FCV-85-37C	WEST SCRAM DISCH VOL DRAIN CONT VLV	Globe	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-85-37E	EAST SCRAM DISCH VOL DRAIN CONT VLV	Globe	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-85-82A	WEST CRD SCRAM DISCH VOL VENT CONT VLV	Globe	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-85-83A	EAST CRD SCRAM DISCH VOL VENT CONT VLV	Globe	2	2”	B

BFN-IST-1 - Applicable Code Requirements

- 10 CFR 50.55a(b)(3)(xi) states:

  When implementing paragraph ISTC–3700, "Position Verification Testing," in the ASME OM Code, 2012 Edition through the latest edition and addenda of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section, licensees shall verify that valve operation is accurately indicated by supplementing valve position indicating lights with other indications, such as flow meters or other suitable instrumentation to provide assurance of proper obturator position for valves with remote position indication within the scope of Subsection ISTC including its mandatory appendices and their verification methods and frequencies.

- ASME OM Code, Subsection ISTC-3700 states:

  Valves with remote position indicators shall be observed locally at least once every 2 yr to verify that valve operation is accurately indicated. Where practicable, this local observation should be supplemented by other indications such as use of flow meters or other suitable instrumentation to verify obturator position. These observations need not be concurrent. Where local observation is not possible, other indications shall be used for verification of valve operation.

  Position verification for active MOVs shall be tested in accordance with Division 1, Mandatory Appendix III.

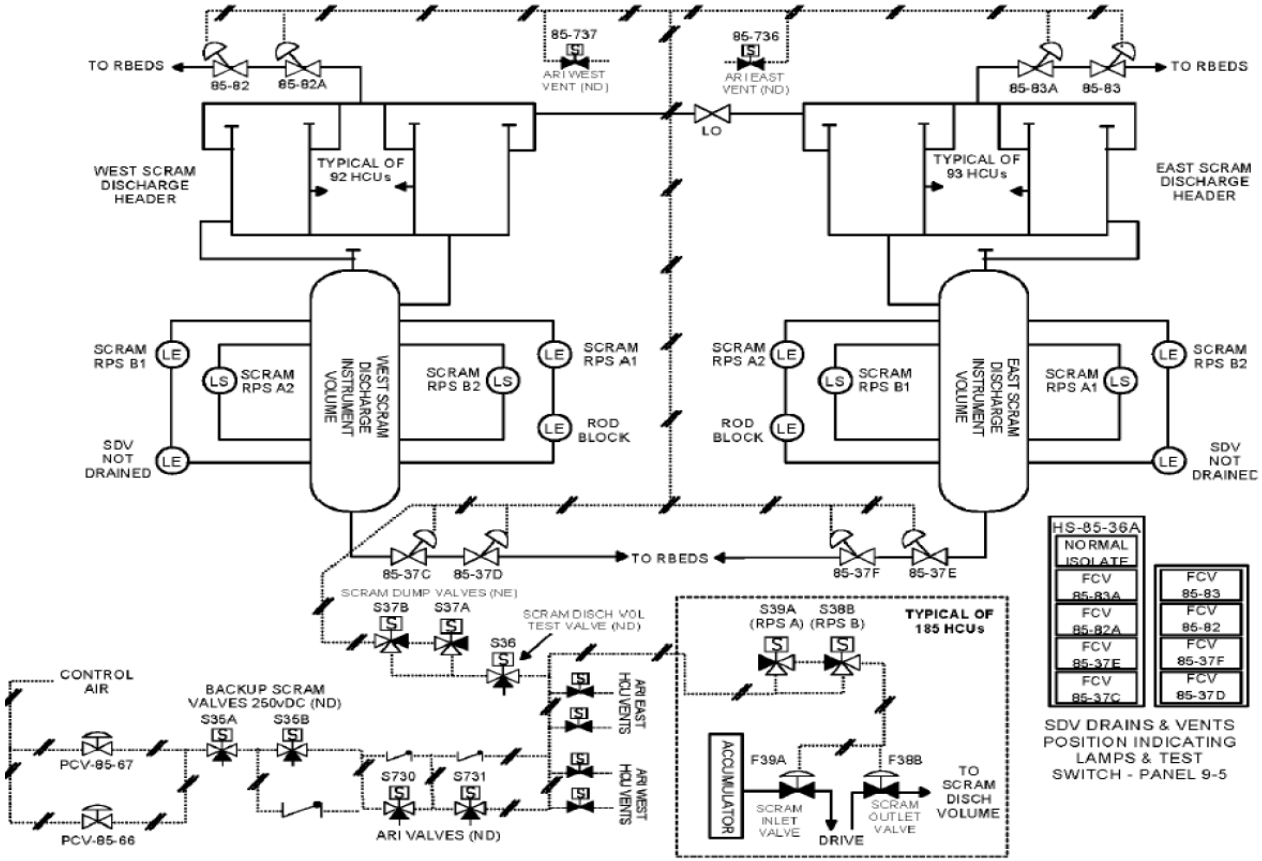
BFN-IST-1 - Reason for Request

- Due to the design of the BFN Unit 1, 2, and 3 CRD system, the SDV vent and drain valves cannot be individually operated to perform supplemental position indication verification as required by the OM Condition in 10 CFR 50.55a(b)(3)(xi).
- The two-inch air operated vent valves (AOVs) are designed as a series pair (one Code Class 2 equivalent and one non-Code Class equivalent).
- Manual actuation of the vent and drain valves for the purpose of periodic exercise testing are controlled by two keylock switches. The activation of the first keylock switch opens the first solenoid in the valve body but does not affect the air volume. Activation of both keylock switches is required to affect the air volume and actuation of the drain and vent valves occur.
- On each unit, the control circuit for the air supply of the SDV vent and drain valves is a single air header fed through a single valve body with two internal solenoids.

BFN-IST-1 - Reason for Request (cont'd)

- All valve pairs open and close simultaneously when given a signal due to this configuration for each unit. There are two additional potential exhaust pathways with a single normally closed solenoid valve. These are only actuated for alternative rod insertion (ARI) or anticipated transient without scram (ATWS) response. Figure 1 provides a layout of the SDV and related instrumentation and controls.
- The requirement imposed by 10 CFR 50.55a(b)(3)(xi) to verify that valve operation is accurately indicated by supplementing valve position indicating lights with other indications, such as flow meters or other suitable instrumentation, in order to provide assurance of proper obturator position, is impractical to perform on each valve in the scope of this alternative request due to the design of the pneumatic control system for these AOVs. Each vent and drain line has two AOVs in series, with no installed capability to verify individual valve obturator position with supplemental indications.

Figure 1 - Scram Discharge Instrument Volume Layout



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BFN-IST-1 - Reason for Request (cont'd)

- Significant plant design changes (e.g., redesigning the scram discharge instrument volume (SDIV) system) would require a major modification as part of a plant outage in order to perform supplemental position indication testing in accordance with 10 CFR 50.55a(b)(3)(xi).
- Therefore, TVA is submitting this request for alternative in accordance with 10 CFR 50.55a(z)(2) in that compliance with 10 CFR 50.55a(b)(3)(xi) for implementing ISTC-3700 for the CRD system scram discharge volume vent and drain valves, within the scope of this alternative request, constitutes a hardship without a compensating increase in quality and safety.

BFN-IST-1 - Proposed Alternative

- Supplemental position verification of the SDV vent and drain valves in the open position will be satisfied by performance of BFN Unit 1, 2, and 3 Technical Specification (TS) 3.1.8, “Scram Discharge Volume (SDV) Vent and Drain Valves,” Surveillance Requirement (SR) 3.1.8.1, and the ability to maintain the SDV drained below applicable level alarm setpoints during unit operation. Failure of any individual valve to the closed position will trigger an alarm to initiate operator action to restore valve position or a scram. SR 3.1.8.1 is performed in accordance with the Surveillance Frequency Control Program (SFCP) and verifies each SDV vent and drain valve is open.

- Supplemental position verification of the SDV vent and drain valves in the closed position will be satisfied by satisfactory performance of BFN Unit 1, 2, and 3 SR 3.1.8.2 and annunciation of the SDIV high level alarm during a scram. Failure of any individual valve to close would be detectable using remote position indication in the control room; however, supplemental indication could only verify one of each pair was isolated. SR 3.1.8.2 is performed in accordance with the SFCP and requires the cycling of each SDV vent and drain valve to the fully closed and open positions.

BFN-IST-1 - Proposed Alternative (cont'd)

- Because each SDV vent and drain line contains a Code and non-Code valve in series, TVA also intends to apply this supplemental verification methodology to the non-Code Class equivalent SDV vent and drain valves in the BFN augmented IST program. In accordance with 10 CFR 50.55a(f)(4), NRC approval of this proposed alternative request is not required for components in the augmented IST program.

BFN-IST-1 - Basis for Proposed Alternative

- The Required Actions of BFN Unit 1, 2, and 3 TS 3.1.8 provide the actions to be taken to address inoperable scram discharge volume vent and drain valves. Additionally, if an SDV vent or drain valve failed in the closed position, there would be ample time and warning available to drain the SDV before an automatic scram would occur due to SDV high level.
- TVA will verify the open position by verifying the absence of SDIV level alarms during periodic stroke time testing and verifying that high level alarms are received during periodic test activities which insert a full scram. These supplemental activities can only verify the pathway is isolated or unisolated, which provide indication that at least one valve in each installed pair is operating as indicated.

Alternative Request BFN-IST-2

- In accordance with 10 CFR 50.55a(z)(2), TVA is requesting NRC approval of an alternative to 10 CFR 50.55a(b)(3)(xi) for implementing Subsection ISTC-3700 for supplementing manually operated passive RHR system valve position indicating lights with other indications.

BFN-IST-2 - ASME OM Code Components Affected

Site/Unit	Component ID	Component Description	Valve Type	Code Class	Valve Size	OM Category
BFN Units 2 and 3	2/3-FCV-74-46	RHR System I-II cross-tie Valve	Gate	2	24”	B
BFN Units 1, 2, and 3	1/2/3-SHV-74-91	RHR to Fuel Pool F/D SOV	Gate	2	8”	B
BFN Unit 3	3-FCV-74-150	RHR System I & II Discharge cross-tie SOV	Gate	2	24”	B

BFN-IST-2 - Applicable Code Requirements

- 10 CFR 50.55a(b)(3)(xi) states:

  When implementing paragraph ISTC–3700, "Position Verification Testing," in the ASME OM Code, 2012 Edition through the latest edition and addenda of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section, licensees shall verify that valve operation is accurately indicated by supplementing valve position indicating lights with other indications, such as flow meters or other suitable instrumentation to provide assurance of proper obturator position for valves with remote position indication within the scope of Subsection ISTC including its mandatory appendices and their verification methods and frequencies.

- ASME OM Code, Subsection ISTC-3700 states:

  Valves with remote position indicators shall be observed locally at least once every 2 yr to verify that valve operation is accurately indicated. Where practicable, this local observation should be supplemented by other indications such as use of flow meters or other suitable instrumentation to verify obturator position. These observations need not be concurrent. Where local observation is not possible, other indications shall be used for verification of valve operation.

  Position verification for active MOVs shall be tested in accordance with Division 1, Mandatory Appendix III.

BFN-IST-2 - Reason for Request

- Due to the design of the BFN Unit 1, 2, and 3 RHR system (Figure 2 and Figure 3), limited provisions exist that could readily be used to perform supplemental position indication verification of the manually operated passive RHR valves included in this request as required by 10 CFR 50.55a(b)(3)(xi). The requirement imposed by 10 CFR 50.55a(b)(3)(xi) to verify that valve operation is accurately indicated by supplementing valve position indicating lights with other indications, such as flow meters or other suitable instrumentation to provide assurance of proper obturator position is impractical for the subject RHR valves due to the design configuration of the RHR system.
- To satisfy the requirements of the condition, numerous manual and motor operated valves not typically relied upon for isolation are required to isolate a portion of the system for supplemental verification. Because the system is water filled any leakage through the isolation valves may not provide conclusive verification results. Due to the size and location of the valves (8 and 24 inch) and that they are water filled, radiography is not a viable option. Therefore, disassembly and inspection, extensive valve maintenance, or modification of the system to facilitate testing would be required to comply with 10 CFR 50.55a(b)(3)(xi).

BFN-IST-2 - Reason for Request (cont'd)

- The listed RHR system valves are required to be locally manually operated. To satisfy the requirements of ISTC-3700, extensive effort and dose is required to fully open these valves.
- The manually operated valve exercise activities typically take 32-88 man-hours per unit each operating cycle to demonstrate that the valve can be removed from its safety position.
- Compliance with Subsection ISTC-3700 and 10 CFR 50.55a(b)(3)(xi) under the circumstances described above represents a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, this request for alternative is being submitted in accordance with 10 CFR 50.55a(z)(2).

Figure 2 – RHR System

OPL171.044, Residual Heat Removal (RHR) System, Revision 22

Appendix B - Additional Transparencies

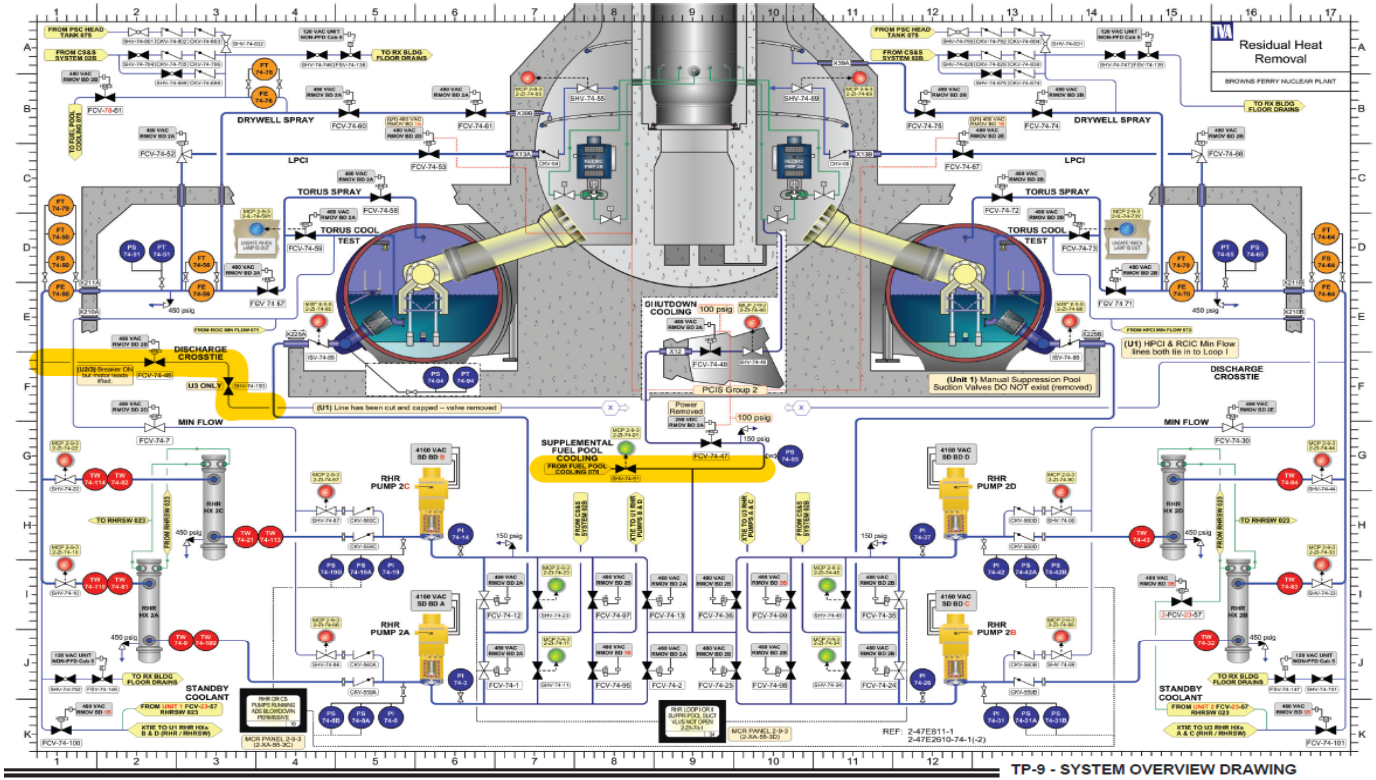

Figure 3 – RHR System

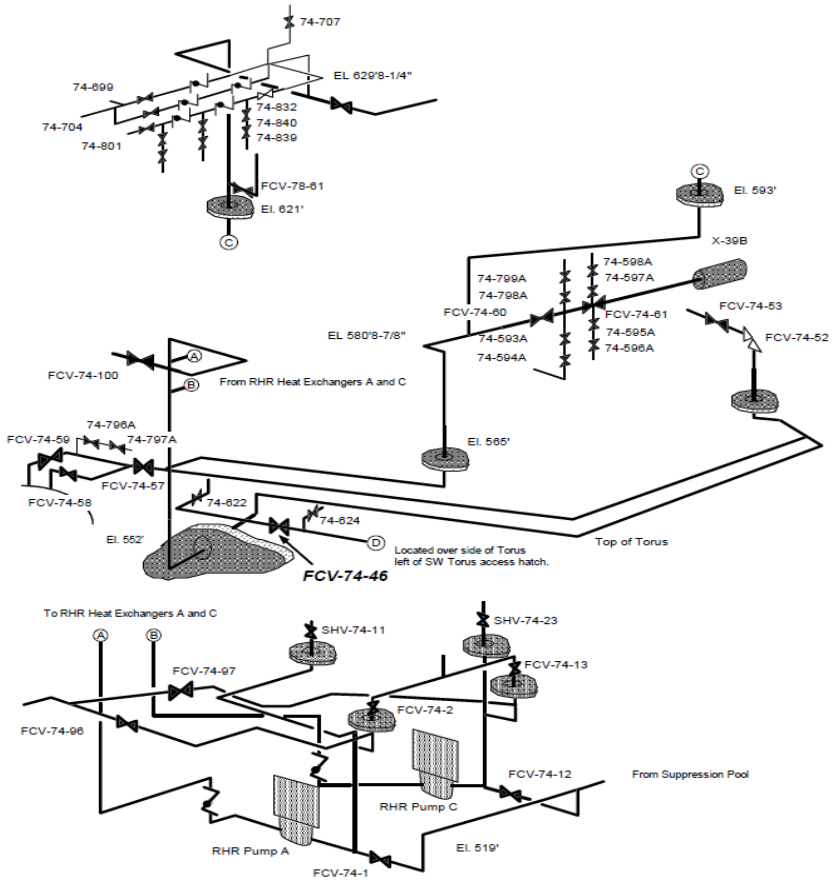

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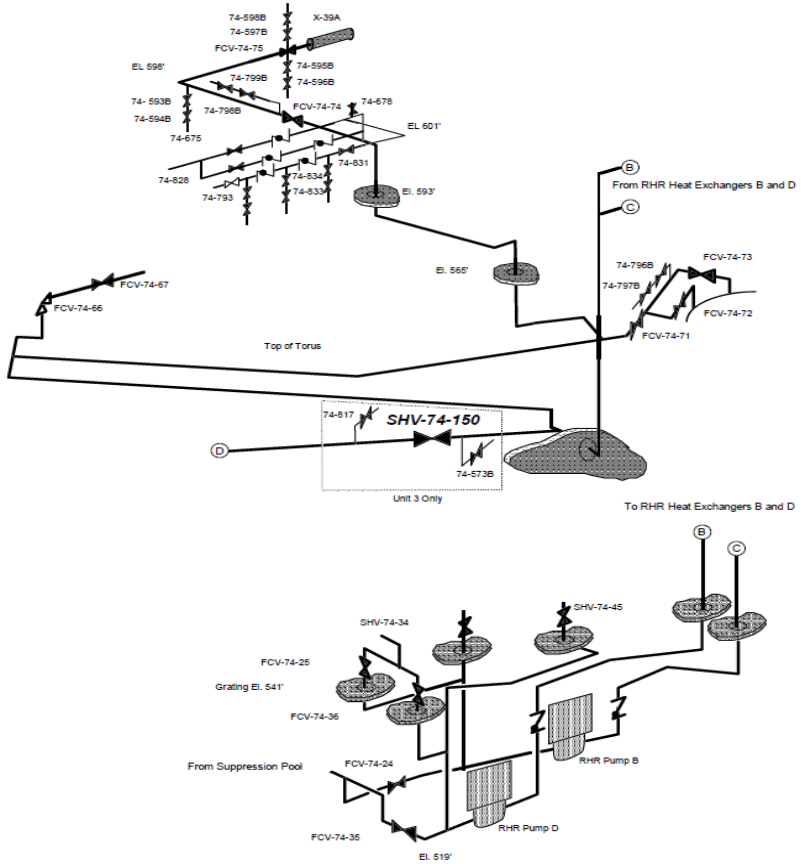
Figure 3 – RHR System (cont'd)



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BFN-IST-2 - Proposed Alternative

- In lieu of ISTC-3700, TVA will verify the closed indicating lights and verify dual-indication when the valve is partially opened. TVA will not be verifying that open position lights were provided.
- In lieu of the requirements of 10 CFR 50.55a(b)(3)(xi), TVA will supplement valve closure indication, but will not supplement indication that the valve may be opened or partially opened.

BFN-IST-2 - Basis for Proposed Alternative

- The manually operated passive RHR valves within the scope of this request do not have a safety function in the open position. TVA proposes to continue to perform the above modified remote position indication testing and supplemental position indication in accordance with the requirements of the ASME OM Code. TVA will verify that the valve closed position indication accurately reflects the safety position of the valve with supplemental methods described above. This alternative simplifies implementation requirements by reducing scope of manual field work and dose impacts to operator crews while providing an acceptable level of quality and safety to demonstrate each valve can perform its credited design safety function. This testing will be performed at the required periodicity for remote position indication.
- On BFN Unit 2, a single cross-tie valve is provided in the loop cross-tie line (2-FCV-74-46) and is normally closed with power removed. Valve 2-FCV-74-46 remains in the closed position with motor operator power removed and has no credited open safety function. Testing will be performed to demonstrate the closed safety position indication with a supplemental observation.

BFN-IST-2 - Basis for Proposed Alternative (cont'd)

- Changing the position of the RHR loop cross-tie valves results in inoperability of both RHR loops.
- RHR shutdown cooling supply to fuel pool cooling system shutoff valves 1/2/3-SHV-74-91, do not have a safety function in the open position.
  Valves 1/2/3-SHV-74-91 have a safety function in the closed position to provide a system and inservice inspection Code Class boundary between RHR and FPC systems.
- Each of these manually operated passive valves has a safety function in the closed position and does not have a safety function in the open position. Remote position indication testing will be performed by verifying that the valve indicates closed and that, when partially opened, the closed indicating light extinguishes (for valves with a single closed indicating light) or indicates mid-position (for valves with both open and closed indicating lights).

BFN-IST-2 - Basis for Proposed Alternative (cont'd)

- Supplemental position indication will be performed for the closed position only. This testing demonstrates the valve will perform its closed safety function as indicated. Demonstrating that the valve indicates not closed or mid-position will provide reasonable assurance that operators have indication if the valve is removed from its safety position.
- Therefore, due to the dose and man-hours required to exercise the valves, compliance with Subsection ISTC-3700 and 10 CFR 50.55a(b)(3)(xi) under the circumstances described above represents a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Alternative Request BFN-IST-3

- In accordance with 10 CFR 50.55a(z)(2), TVA is requesting NRC approval of an alternative to 10 CFR 50.55a(b)(3)(xi) for implementing Subsection ISTC-3700 for supplementing MSL drain valve position indicating lights with other indications.

BFN-IST-3 - ASME OM Code Components Affected

Site/Unit	Component ID	Component Description	Valve Type	Code Class	Valve Size	OM Category
BFN Units 1, 2, and 3	1/2/3-FCV-1-168	MAIN STEAM LINE A DRAIN VALVE	Ball	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-1-169	MAIN STEAM LINE B DRAIN VALVE	Ball	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-1-170	MAIN STEAM LINE C DRAIN VALVE	Ball	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-1-171	MAIN STEAM LINE D DRAIN VALVE	Ball	2	2”	B

BFN-IST-3 - Applicable Code Requirements

- 10 CFR 50.55a(b)(3)(xi) states:

  When implementing paragraph ISTC–3700, "Position Verification Testing," in the ASME OM Code, 2012 Edition through the latest edition and addenda of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section, licensees shall verify that valve operation is accurately indicated by supplementing valve position indicating lights with other indications, such as flow meters or other suitable instrumentation to provide assurance of proper obturator position for valves with remote position indication within the scope of Subsection ISTC including its mandatory appendices and their verification methods and frequencies.

- ASME OM Code, Subsection ISTC-3700 states:

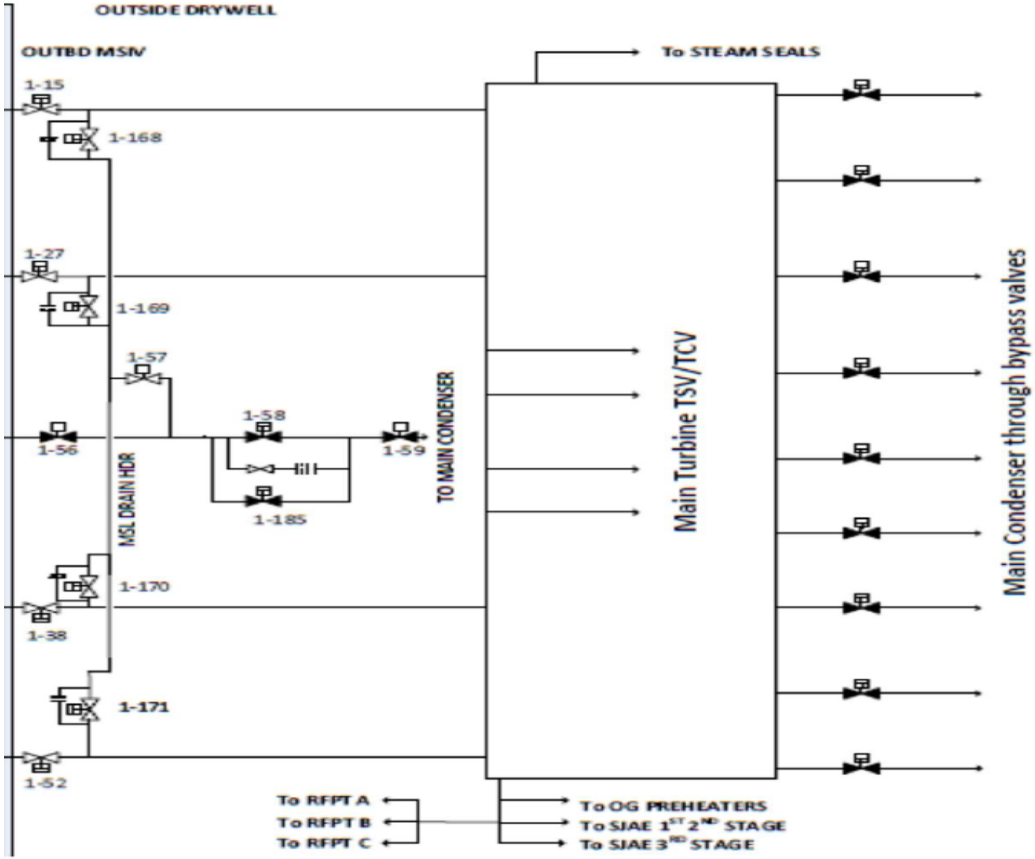
  Valves with remote position indicators shall be observed locally at least once every 2 yr to verify that valve operation is accurately indicated. Where practicable, this local observation should be supplemented by other indications such as use of flow meters or other suitable instrumentation to verify obturator position. These observations need not be concurrent. Where local observation is not possible, other indications shall be used for verification of valve operation.

  Position verification for active MOVs shall be tested in accordance with Division 1, Mandatory Appendix III.

BFN-IST-3 - Reason for Request

- Due to the design of the BFN Unit 1, 2, and 3 main steam system, the MSL drain valves do not have isolations or test connections to perform supplemental position indication verification as required by 10 CFR 50.55a(b)(3)(xi). The two-inch AO drain valves are located in inaccessible areas during plant operation. Each two-inch AO drain valve has a parallel orifice which cannot be isolated. The MSL drains function as part of the alternate leakage pathway and must open to allow for main steam isolation valve (MSIV) leakage to be routed to the holding volume of the main condenser.
- These valves were not provided with nearby isolations or test connections to allow for testing with air or water during unit shutdowns. During unit shutdowns, this piping is voided through the secondary orifice pathway, which limits access to some nonintrusive inspection methods. Figure 4 provides a layout of the MSL drain valves and associated nearby piping components.

Figure 4 - Main Steam Line Drain Valve Flow Path



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BFN-IST-3 - Reason for Request (cont'd)

- The requirement imposed by 10 CFR 50.55a(b)(3)(xi) to verify that valve operation is accurately indicated by supplementing valve position indicating lights with other indications, such as flow meters or other suitable instrumentation to provide assurance of proper obturator position is impractical to perform on each valve due to the design of the system piping for these AOVs. Each drain line has no installed capability to verify valve obturator position with supplemental indications during unit operation or unit shutdown.
- Compliance with Subsection ISTC-3700 and 10 CFR 50.55a(b)(3)(xi) under the circumstances described above represents a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, this request for alternative is being submitted in accordance with 10 CFR 50.55a(z)(2).

BFN-IST-3 - Proposed Alternative

- Supplemental position verification of the MSL drain valves in the open position will be satisfied by periodic performance of non-intrusive testing (e.g., radiography) in the safety position only.
- Stroke timing and remote position verification will be performed in accordance with the OM code and the BFN IST program requirements.

BFN-IST-3 - Basis for Proposed Alternative

- Additional testing of the non-safety direction (closed) of these valves would require additional plant resources and radiation exposure with no compensating increase in the level of quality and safety. Developing, planning, and implementing additional supplemental testing constitutes a hardship for the licensee.
- TVA considers supplemental position indication of only the safety direction an acceptable alternative for valves where testing in the non-safety direction provides unnecessary burden.
- TVA will continue to perform required fail-safe, stroke time, and remote position indication testing in accordance with the OM Code and the BFN IST program requirements.

Alternative Request BFN-IST-4

- In accordance with 10 CFR 50.55a(z)(2), TVA is requesting NRC approval of an alternative to 10 CFR 50.55a(b)(3)(xi), Subsection ISTC, and Mandatory Appendix I for MSRVs.

BFN-IST-4 - ASME OM Code Components Affected

Site/Unit	Component ID	Component Description	Valve Type	Code Class	Valve Size	OM Category
BFN Units 1, 2, and 3	1/2/3-PCV-1-4	MS LN A RLF	RV	1	6”	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-5	MS LN A RLF	RV	1	6”	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-18	MS LN B RLF	RV	1	6”	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-19	MS LN B RLF	RV	1	6”	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-22	MS LN B RLF	RV	1	6”	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-23	MS LN B RLF	RV	1	6”	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-30	MS LN C RLF	RV	1	6”	B/C

BFN-IST-4 - ASME OM Code Components Affected (cont'd)

Site/Unit	Component ID	Component Description	Valve Type	Code Class	Valve Size	OM Category
BFN Units 1, 2, and 3	1/2/3-PCV-1-31	MS LN C RLF	RV	1	6"	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-34	MS LN C RLF	RV	1	6"	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-41	MS LN D RLF	RV	1	6"	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-42	MS LN D RLF	RV	1	6"	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-179	MS LN A RLF	RV	1	6"	B/C
BFN Units 1, 2, and 3	1/2/3-PCV-1-180	MS LN D RLF	RV	1	6"	B/C

BFN-IST-4 - Applicable Code Requirements

- OM Code Subsection ISTC, “Inservice Testing of Valves in Water-Cooled Reactor Nuclear Plants,” for the affected Category B/C valves.
- Mandatory Appendix I for Class 1 main steam pressure relief valves with auxiliary actuating devices.

BFN-IST-4 - Reason for Request

- Changes to ISTC-1200, “Exclusions,” in the 2020 OM Code have resulted in ambiguous requirements for Category B/C Class 1 main steam pressure relief valves with auxiliary actuating devices. TVA submitted an inquiry to the OM inquiry committee seeking clarification of requirements for these valves. The OM inquiry committee determined that changes to the OM Code language are necessary and did not provide the clarification that TVA requested.
- TVA recognizes that the requirements of the OM Code were not ambiguous in earlier editions (e.g., 2004 Edition through 2006 Addenda). In the 2004 Edition through 2006 Addenda, ISTC-1200 stated, “Category A and Category B safety and relief valves are excluded from the requirements of ISTC-3700, Valve Position Verification and ISTC-3500, Valve Testing Requirements.”

BFN-IST-4 - Reason for Request (cont'd)

- The MSRV design configuration is not suited for implementation of OM Code Subsection ISTC requirements for remote position verification and Mandatory Appendix IV AOV testing.
- Application of ISTC-3500 and ISTC-3700 to MSRVs results in additional to MSRVs results in additional undesirable operational impacts, such as the potential inadvertent blowdown of the primary system during MSRV exercise, and the potential to increase operational leakage from the primary system.
- Therefore, compliance with Subsection ISTC-3700 and 10 CFR 50.55a(b)(3)(xi) under the circumstances described above represents a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

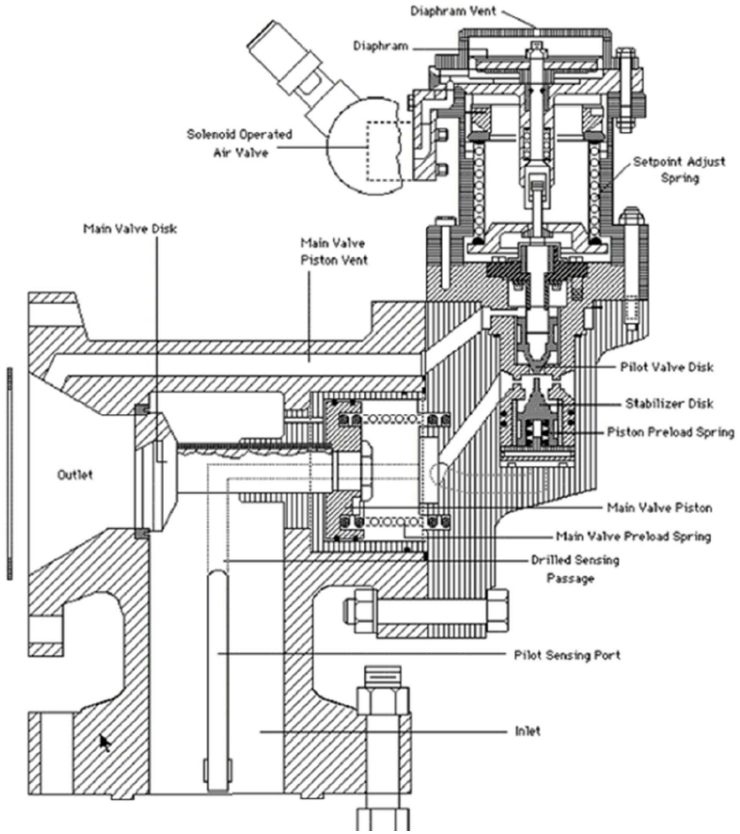
BFN-IST-4 - Proposed Alternative

- TVA proposes to test the MSRVs in accordance with the Mandatory Appendix I requirements for Class 1 main steam pressure relief valves with auxiliary actuating devices.

BFN-IST-4 - Basis for Proposed Alternative

- The BFN Units 1, 2, and 3 MSRVs are Target Rock Model 7567F pilot operated safety/relief valves with an auxiliary actuating device (Figure 5). These valves have been categorized in accordance with ISTC-1300, Valve Categories," as Category B/C because they are capable of remote manual operation when inlet pressure is below valve setpoint and are self actuated when inlet pressure reaches valve setpoint.
- BFN has 13 MSRVs and only six are credited for remote-manual operation in the safety analysis for reactor pressure control at reactor coolant system pressures below the valve automatic set pressure.
- The BFN IST program categorizes the MSRVs equally as OM Category B/C valves in order to simplify implementation of OM Code, Appendix I, sample testing of pressure relief devices.
- The position indication in the control room related to remote manual operation of the MSRVs indicates whether the air solenoid valve is energized or de-energized rather than indicating valve stem or valve obturator travel.

Figure 5 – MSRV Design



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BFN-IST-4 - Basis for Proposed Alternative (cont'd)

- Thermal and acoustic monitors are installed on the piping downstream of the MSRV to provide main control room indication that the valves are open/closed or experiencing seat leakage.
- Category C check valves and safety/relief devices are excluded from Mandatory Appendix IV per IV-1300(c).
- The MSRV auxiliary actuating device is not a traditional AOV design and therefore does not have the provisions for compliance with Mandatory Appendix IV.
- Mandatory Appendix I provides sufficient test requirements to ensure the MSRVs are capable of remote manual operation and automatic operation at set pressure.
- Therefore, compliance with Subsection ISTC-3500, Subsection ISTC-3700, 10 CFR 50.55a(b)(3)(xi), and Mandatory Appendix IV under the circumstances described above represents a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Alternative Request BFN-IST-5

- In accordance with 10 CFR 50.55a(z)(1), TVA is requesting NRC approval of an alternative to 10 CFR 50.55a(b)(3)(xi) for implementing Subsection ISTC-3700 for supplementing EECW strainer backwash valve position indicating lights with other indications.

BFN-IST-5 - ASME OM Code Components Affected

Site/Unit	Component ID	Component Description	Valve Type	Code Class	Valve Size	OM Category
BFN Unit 0	0-FCV-67-1	EECW STRAINER A BACKWASH DISCHARGE VLV	Ball	3	3”	B
BFN Unit 0	0-FCV-67-5	EECW STRAINER B BACKWASH DISCHARGE VLV	Ball	3	3”	B
BFN Unit 0	0-FCV-67-8	EECW STRAINER C BACKWASH DISCHARGE VLV	Ball	3	3”	B
BFN Unit 0	0-FCV-67-11	EECW STRAINER D BACKWASH DISCHARGE VLV	Ball	3	3”	B

BFN-IST-5 - Applicable Code Requirements

- 10 CFR 50.55a(b)(3)(xi) states:

  When implementing paragraph ISTC–3700, "Position Verification Testing," in the ASME OM Code, 2012 Edition through the latest edition and addenda of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section, licensees shall verify that valve operation is accurately indicated by supplementing valve position indicating lights with other indications, such as flow meters or other suitable instrumentation to provide assurance of proper obturator position for valves with remote position indication within the scope of Subsection ISTC including its mandatory appendices and their verification methods and frequencies.

- ASME OM Code, Subsection ISTC-3700 states:

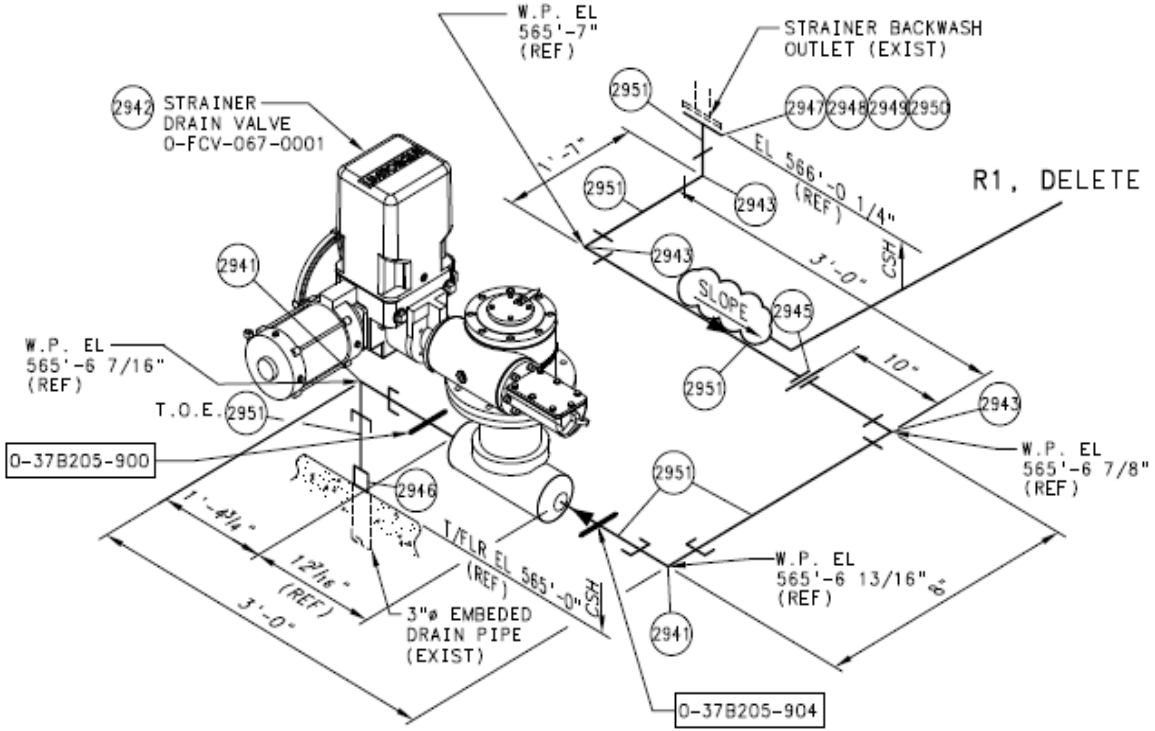
  Valves with remote position indicators shall be observed locally at least once every 2 yr to verify that valve operation is accurately indicated. Where practicable, this local observation should be supplemented by other indications such as use of flow meters or other suitable instrumentation to verify obturator position. These observations need not be concurrent. Where local observation is not possible, other indications shall be used for verification of valve operation.

  Position verification for active MOVs shall be tested in accordance with Division 1, Mandatory Appendix III.

BFN-IST-5 - Reason for Request

- EECW strainer backwash valves are MOVs located in the intake pumping station. The valves are installed on the backwash drain lines for the EECW strainers and are not provided with the capability to perform supplemental position verification as required by 10 CFR 50.55a(b)(3)(xi) (Figure 6)
- Each EECW supply header has a continuous self-cleaning backwash strainer to minimize clogging of downstream cooler flow passages. EECW strainer backwash valves automatically open when the strainer turns on to provide a discharge flow path from the strainer into the Wheeler Reservoir. There is instrumentation across the inlet and outlet of the strainer to alert the MCR when the pressure drop across the strainer is too high to operate safely. However, there is no annunciation in the MCR for the position of the backwash drain valves.
- Therefore, in accordance with 10 CFR 50.55a(z)(1), TVA is requesting the use of an alternative that would provide an acceptable level of quality and safety.

Figure 6 - EECW Valve Flow Path



DET B10-14
SCALE: NONE

TENNESSEE VALLEY AUTHORITY

BFN-IST-5 - Proposed Alternative

- TVA proposes to credit satisfactory operation of the continuous self-cleaning EECW strainers as supplemental verification of position indicating lights in the open safety position.

BFN-IST-5 - Basis for Proposed Alternative

- The EECW strainer backwash valves were replaced with stainless steel ball valves with Limitorque operators in compliance with ASME OM Code Mandatory Appendix III. This valve design utilizes a one-piece ball and stem. For this design, there is no stem-to-disk connection that can fail.
- Industry and BFN operating experience was reviewed as part of the design change process. The internals of the new ball valves were designed specifically for use in the EECW strainer backwash drain pathway. The ball valve body is top-entry with socket weld end connections, which allow the valve internals to be repaired/replaced without removing the entire assembly from the process line. The ball and stem are one integral piece and are supported on their vertical axis by an upper and lower trunnion. The ball is supported on both ends by spring-loaded seats that remain in constant contact with the ball. The trunnions absorb pressure from the flow and ensure the contact between the ball and seats is not excessively stressed, leading to lower operating torque compared to a free-floating ball design. Minimizing required torque for the valve and the required size of its actuator was a critical consideration due to congestion in the area around the valve.

BFN-IST-5 - Basis for Proposed Alternative (cont'd)

- The valves in the scope of this alternative request only have a safety function in the open position.
- Proper operation of the EECW strainers provides supplemental verification of the EECW strainer backwash valves in the open safety position. Failure of a backwash valve to open would readily be detected by alarms on high strainer differential pressure.
- Periodic MOV testing in accordance with OM Code Mandatory Appendix III does not provide adequate data for supplementing valve position indication.

Duration of Proposed Alternatives

- The proposed alternative requests are in support of the BFN Unit 1, 2, and 3 fifth IST interval scheduled to commence on August 31, 2023.

Precedents

- TVA is not aware of any precedents for the proposed alternative requests.

Schedule for Submittal

- TVA plans to submit the alternative requests and the request to adopt the 2020 Edition of the ASME OM Code (one submittal) to NRC by November 30, 2022.
- Requesting NRC approval no later than August 31, 2023, to support the BFN fifth 10-year IST interval.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