TENNESSEE VALLEY AUTHORITY

1101 Market Street, Chattanooga, Tennessee 37402

CNL-22-090

December 12, 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 - Request to Use a Later Edition of the American Society of Mechanical Engineers Operation and Maintenance Code and Alternative Requests for the Fifth Inservice Testing Interval**

Tennessee Valley Authority (TVA) hereby submits, for Nuclear Regulatory Commission (NRC) approval, the following inservice testing (IST) alternative requests in support of the upcoming Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3 fifth IST interval:

- In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a, “Codes and standards,” paragraphs (f)(4)(iv), and the guidance provided in Regulatory Issue Summary (RIS) 2004-12, "Clarification on Use of Later Editions and Addenda to the ASME OM Code and Section XI," Enclosure 1 to this submittal contains the TVA request to use a later edition of the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) for BFN Units 1, 2, and 3. Specifically, TVA proposes to adopt, in its entirety, the 2020 Edition of the ASME OM Code, subject to the conditions in 10 CFR 50.55a(b)(3), “Conditions on ASME OM Code,” for the pumps, valves, and snubbers contained in the BFN IST Program.
- In accordance with 10 CFR 50.55a(z)(2), Enclosure 2 to this submittal contains TVA alternative request BFN-IST-01. This proposal requests an alternative to 10 CFR 50.55a(b)(3)(xi), “OM condition: Valve Position Indication,” for implementing ASME OM Code subsection ISTC-3700, “Position Verification Testing,” for supplementing the control rod drive system scram discharge volume vent and drain valve position indicating lights with other indications.

- In accordance with 10 CFR 50.55a(z)(2), Enclosure 3 to this submittal contains TVA alternative request BFN-IST-02, which requests an alternative to 10 CFR 50.55a(b)(3)(xi) for implementing ASME OM Code subsection ISTC-3700 for supplementing manually operated passive residual heat removal system valve position indicating lights with other indications.
- In accordance with 10 CFR 50.55a(z)(2), Enclosure 4 to this submittal contains TVA alternative request BFN-IST-03, which requests an alternative to 10 CFR 50.55a(b)(3)(xi) for implementing ASME OM Code subsection ISTC-3700 for supplementing main steam line drain valve position indicating lights with other indications.
- In accordance with 10 CFR 50.55a(z)(2), Enclosure 5 to this submittal contains TVA alternative request BFN-IST-04, which requests an alternative to 10 CFR 50.55a(b)(3)(xi), ASME OM Code Subsection ISTC subsections ISTC-3500 and ISTC-3700, and OM Code Mandatory Appendix IV, “Preservice and Inservice Testing of Active Pneumatically Operated Valve Assemblies in Nuclear Reactor Power Plants,” for main steam relief valve testing requirements.
- In accordance with 10 CFR 50.55a(z)(1), Enclosure 6 to this submittal contains TVA alternative request BFN-IST-05, which requests an alternative to 10 CFR 50.55a(b)(3)(xi) for implementing ASME OM Code subsection ISTC-3700 for supplementing emergency equipment cooling water strainer backwash valve position indicating lights with other indications.

TVA is currently in the fourth IST interval for BFN Units 1, 2, and 3. The applicable ASME OM Code of Record for the fourth IST interval is the 2004 Edition through 2006 Addenda for each unit. However, as noted in Enclosure 1, TVA is requesting NRC approval to adopt the 2020 Edition of the ASME OM Code, in its entirety, for the BFN fifth IST interval. The fourth IST interval, originally scheduled to end on August 30, 2022, was extended to August 30, 2023, as allowed by ISTA-3120(d). Therefore, the fifth IST interval is required to begin no later than August 31, 2023.

The proposed requests in Enclosures 1 through 6 are in support of the fifth IST interval for BFN Units 1, 2, and 3. Therefore, TVA requests approval of these requests no later than August 31, 2023.

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

Respectfully,

Stuart L Rymer Digitally signed by Rymer, Stuart Loveridge
Date: 2022.12.12 13:27:04 -05'00'

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

Enclosures:

1. Request to Use a Later Edition of the American Society of Mechanical Engineers Operation and Maintenance Code
2. Browns Ferry Nuclear Plant Units 1, 2, and 3 American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternative BFN-IST-01
3. Browns Ferry Nuclear Plant Units 1, 2, and 3 American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternative BFN-IST-02
4. Browns Ferry Nuclear Plant Units 1, 2, and 3 American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternative BFN-IST-03
5. Browns Ferry Nuclear Plant Units 1, 2, and 3 American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternative BFN-IST-04
6. Browns Ferry Nuclear Plant Units 1, 2, and 3 American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternative BFN-IST-05

cc:

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

Request to Use a Later Edition of the American Society of Mechanical Engineers Operation and Maintenance Code

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a, “Codes and standards,” paragraph (f)(4)(iv), and the guidance provided in Regulatory Issue Summary (RIS) 2004-12, "Clarification on Use of Later Editions and Addenda to the ASME OM Code and Section XI," Tennessee Valley Authority (TVA) requests Nuclear Regulatory Commission (NRC) approval to use a later edition of the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) for the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3. Specifically, TVA proposes to adopt, in its entirety, the ASME OM Code 2020 Edition, subject to the conditions in 10 CFR 50.55a(b)(3) for the pumps, valves, and snubbers contained in the BFN Inservice Testing (IST) Program.

On October 27, 2022, the NRC published the final rule to amend its regulations to adopt the 2020 Edition of the OM Code [Federal Register Notice (FRN) 87FR65128]. The final rulemaking became effective on November 28, 2022. The NRC did not impose any conditions in the final rulemaking for use of the 2020 Edition of the OM Code.

TVA is currently in the fourth IST interval for BFN Units 1, 2, and 3. The applicable ASME OM Code of Record for the fourth IST interval is the 2004 Edition through 2006 Addenda for each unit. The fourth IST interval was extended from August 30, 2022, to August 30, 2023, as allowed by ISTA-3120(d). Therefore, the fifth IST interval is required to begin no later than August 31, 2023, as required by ISTA-3120(d). .

As stated in RIS 2004-12:

> *The request to use a later edition and addenda is not a relief request; it is simply a request to use a later Code. ...The amount of written documentation needed for a request to use a later Code edition and addenda is significantly less than for a relief request or a request to use an alternative requirement.*
>
> *If portions of a later Code edition and addenda are used, licensees must assure that all related requirements of the respective editions and addenda are met. A discussion of the related requirements should be included in the letter to the NRC. The regulations do not specify when the letter must be submitted, only that it be submitted before using the proposed later Code edition and addenda.*

Because TVA plans to adopt the 2020 Edition of the OM Code, in its entirety, there are no related requirements associated with the proposed later Code edition for consideration associated with this request.

TVA plans to update the applicable procedures and processes to comply with the provisions of the 2020 OM Code Edition, subject to the conditions in 10 CFR 50.55a(b)(3), and commence using the proposed later Code Edition at the beginning of the BFN fifth IST interval, scheduled to start no later than August 31, 2023. Furthermore, as specified in the BFN IST program plan, during the BFN fifth IST interval, TVA intends to only use those ASME OM Code Cases, as applicable, that have been endorsed by the NRC in Regulatory Guide (RG) 1.192, “Operation and Maintenance Code Case Acceptability, ASME OM Code.”

Browns Ferry Nuclear Plant Units 1, 2, and 3
American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternative BFN-IST-01

I. ASME OM Code Components Affected

Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	Valve Size	OM Category
BFN Units 1, 2, and 3	1/2/3-FCV-85-37C	SDIV DRN ISOL WEST	Globe	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-85-37E	SDIV DRN ISOL EAST	Globe	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-85-82A	SCRM DISCH HDR VT WEST	Globe	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-85-83A	SCRM DISCH HDR VT EAST	Globe	2	2”	B

II. ASME Code Edition and Addenda

In accordance with Enclosure 1, TVA is requesting NRC approval to utilize the 2020 Edition of the ASME OM Code, in its entirety, as the Code of Record for the BFN Unit 1, 2, and 3 fifth IST interval.

III. Applicable Code Requirement

Title 10 of the *Code of Federal Regulations* (10 CFR), 50.55a(b)(3)(xi), “OM condition: Valve Position Indication,” states:

> *When implementing paragraph ISTC–3700, ‘‘Position Verification Testing,’’ in the ASME OM Code, 2012 Edition through the latest edition of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section, licensees must 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. For valves not susceptible to stem-disk separation, licensees may implement ASME OM Code Case OMN–28, ‘‘Alternative Valve Position Verification Approach to Satisfy ISTC–3700 for Valves Not Susceptible to Stem-Disk Separation,’’ which is incorporated by reference in paragraph (a)(1)(iii)(H) of this section. Where plant conditions make it impractical to perform the initial ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section by the date 2 years following the previously performed ISTC–3700 test, a licensee may justify an extension of this initial supplemental valve position verification provided the ISTC–3700 test as supplemented*

by paragraph (b)(3)(xi) of this section is performed at the next available opportunity and no later than the next plant shutdown. This one-time extension of the ISTC–3700 test schedule as supplemented by paragraph (b)(3)(xi) of this section is acceptable provided the licensee has available for NRC review documented justification based on information obtained over the previous 5 years of the structural integrity of the stem-disk connection for the applicable valves. The licensee's justification could be based on, for example, verification of the valve stem- disk connection through an appropriate weak link analysis, appropriate disk motion confirmed during diagnostic testing, or allowance and cessation of flow through the valves. The licensee's justification must provide reasonable assurance that the remote indicating lights accurately reveal the position of the valve obturator until the next ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section is performed.

ASME OM Code, 2020 Edition, Subsection ISTC-3700, "Position Verification Testing," 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.

IV. Reason for Request

Due to the design of the BFN Unit 1, 2, and 3 Control Rod Drive (CRD) system, the scram discharge volume (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 vent air operated valves (AOV) 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. 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. 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 (e.g., 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 have two AOVs in series, with no installed capability to verify individual valve obturator position with supplemental indications.

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 SDV vent and drain valves, within the scope of this alternative request, constitutes a hardship without a compensating increase in quality and safety.

V. Proposed Alternative

For the open position, local verification (e.g., limit switches, position indicators on the valve, valve stem travel) will be used to determine valve movement is accurately indicated by the remote position indicators (red lights) located in the main control room (MCR). Supplemental position verification of the SDV vent and drain valves in the open position will be satisfied by demonstrating the ability to maintain the SDV drained below applicable level alarm setpoints during unit operation.

For the closed position, local verification (e.g., limit switches, position indicators on the valve, valve stem travel) will be used to determine valve movement to the closed position is accurately indicated by the remote position indicators (green lights) located in the MCR. Supplemental position verification of the SDV vent and drain valves in the closed position will be satisfied by demonstrating 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.

The proposed alternative testing will be performed at the OM Code Subsection ISTC-3700 frequency of at least once every two years. TVA may adopt OM Code cases that modify the two-year frequency when approved by the NRC or once endorsed in Regulatory Guide (RG) 1.192.

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-OM Code SDV vent and drain valves in the BFN augmented IST program.

VI. Basis for Proposed Alternative

For open and closed positions, local verification during stroke time testing demonstrates valve movement occurs and remote position indicators located in the MCR accurately reflect the locally observed valve position.

Supplemental position verification of the SDV vent and drain valves in the open position is provided by demonstrating the ability to maintain the SDIV drained below applicable level alarm setpoints during unit operation and by demonstrating the ability to drain the SDV and perform a scram reset. Each SDV is provided with three level switches that provide alarms in the MCR to alert operators of water accumulation in the SDIV. The first alarm received notifies operators that the SDV is not fully drained. The next level alarm received results in rod block. The final SDV level alarm results in a scram. Therefore, the continuous monitoring of SDV level provided by the system design provides supplemental verification that the open position of the SDV vent and drain valves is accurately indicated. Failure of an SDV vent or drain valve in the closed position would be detected by indicating lights or SDV level increase, and there would be ample

time and warning available to drain the SDV before an automatic scram would occur due to SDV high level.

Supplemental position verification of the SDV vent and drain valve pairs in the closed position is provided by demonstrating annunciation of the SDIV high level alarms during a scram. Failure of any individual valve to close would be detectable using remote position indication in the control room.

Therefore, TVA is submitting this request for alternative in accordance with 10 CFR 50.55a(z)(2) in that 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.

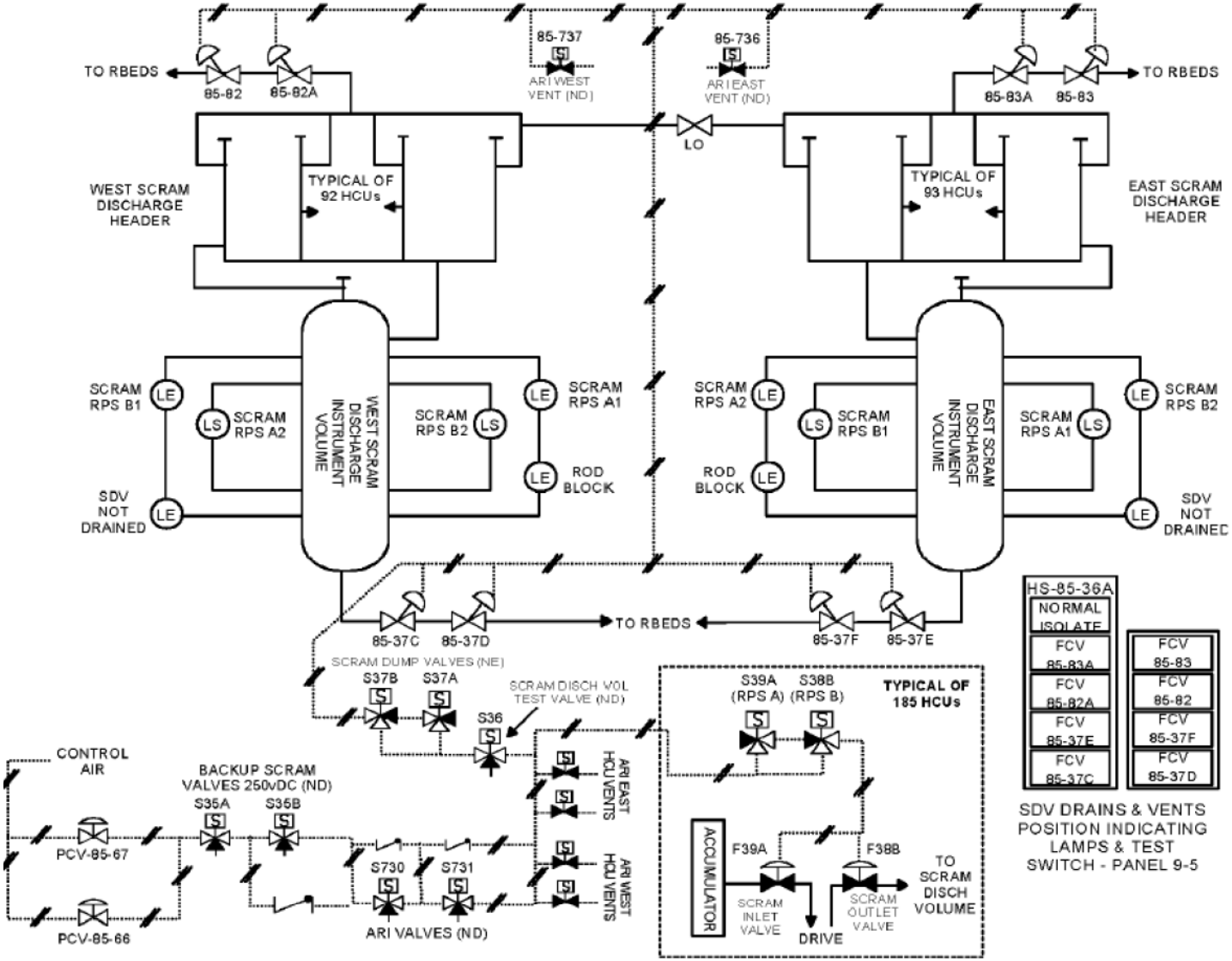
VII. Duration of Proposed Alternative

This alternative request is in support of the BFN Unit 1, 2, and 3 fifth IST interval scheduled to commence on August 31, 2023.

VIII. Precedents

None

Figure 1 - Scram Discharge Instrument Volume Layout



Browns Ferry Nuclear Plant Units 1, 2, and 3
American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternative BFN-IST-02

I. ASME OM Code Components Affected

Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	Valve Size	OM Category
BFN Units 2 and 3	2/3-FCV-74-46	RHR SYS I-II CROSSTIE VLV	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-SHV-74-150	RHR SYS I and II DISCH CROSSTIE SOV	Gate	2	24”	B

II. ASME Code Edition and Addenda

In accordance with Enclosure 1, TVA is requesting NRC approval to utilize the 2020 Edition of the ASME OM Code, in its entirety, as the Code of Record for the BFN Unit 1, 2, and 3 fifth IST interval.

III. Applicable Code Requirement

Title 10 of the *Code of Federal Regulations* (10 CFR), 50.55a(b)(3)(xi), “OM condition: Valve Position Indication,” states:

> *When implementing paragraph ISTC–3700, “Position Verification Testing,” in the ASME OM Code, 2012 Edition through the latest edition of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section, licensees must 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. For valves not susceptible to stem-disk separation, licensees may implement ASME OM Code Case OMN–28, “Alternative Valve Position Verification Approach to Satisfy ISTC–3700 for Valves Not Susceptible to Stem-Disk Separation,” which is incorporated by reference in paragraph (a)(1)(iii)(H) of this section. Where plant conditions make it impractical to perform the initial ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section by the date 2 years following the previously performed ISTC–3700 test, a licensee may justify an extension of this initial supplemental valve position verification provided the ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section is performed at the next available opportunity and no later than the next plant shutdown. This one-time extension of the ISTC–3700 test*

schedule as supplemented by paragraph (b)(3)(xi) of this section is acceptable provided the licensee has available for NRC review documented justification based on information obtained over the previous 5 years of the structural integrity of the stem-disk connection for the applicable valves. The licensee's justification could be based on, for example, verification of the valve stem- disk connection through an appropriate weak link analysis, appropriate disk motion confirmed during diagnostic testing, or allowance and cessation of flow through the valves. The licensee's justification must provide reasonable assurance that the remote indicating lights accurately reveal the position of the valve obturator until the next ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section is performed.

ASME OM Code, 2020 Edition, Subsection ISTC-3700, "Position Verification Testing," 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.

IV. Reason for Request

Due to the design of the BFN Unit 1, 2, and 3 residual heat removal (RHR) system (Figures 2 and 3), limited provisions exist that could readily be used to perform supplemental position indication verification of the manually operated passive RHR valves in this alternative request, as required by 10 CFR 50.55a(b)(3)(xi). The valves within the scope of this request are normally closed (except for 3-FCV-74-46, which is normally open) and are required to remain in the required position at all times when both loops of RHR are required to be operable for low pressure coolant injection (LPCI).

The manually operated passive RHR system valves within the scope of this request are required to maintain obturator position, for RHR system train/loop boundary purposes, and are not required to change obturator position to accomplish any required function for safe shutdown, maintain safe shutdown, or mitigate the consequences of an accident, and are considered passive in accordance with ISTA-2000. These valves are only taken out of the required safety positions for infrequent operations such as supplemental fuel pool cooling (FPC) and system flushes when the affected loops of RHR are not required for LPCI. For example, when RHR drain pump A or RHR pump A or C is used for supplemental FPC, Loop I of the RHR System is inoperable for LPCI. When RHR drain pump B or RHR pump B or D is used for supplemental FPC, Loops I and II of the RHR System are inoperable for LPCI. When flushing of the Loop I to Loop II crosstie is performed, both loops of RHR are inoperable for LPCI (only performed in Mode 5 with the reactor pressure vessel cavity flooded).

The requirement imposed by 10 CFR 50.55a(b)(3)(xi) to verify that valve operation, in both open and closed positions, is accurately indicated by supplementing valve position indicating lights with other indications (e.g., 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 of the valves (eight-inch and 24-inch) and that they are water filled, radiography is not a viable option. Therefore, disassembly, extensive valve maintenance, or modification of the system to facilitate testing would be required to comply with 10 CFR 50.55a(b)(3)(xi).

Each of the RHR system valves, within the scope of this alternative request, is required to be locally manually operated. To satisfy the requirements of ISTC-3700, extensive effort and dose is required to fully open these valves.

Therefore, TVA is submitting this request for alternative in accordance with 10 CFR 50.55a(z)(2) in that 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.

V. Proposed Alternative

In lieu of OM Code Subsection ISTC-3700, TVA will perform the following:

- For RHR Crosstie valves 2-FCV-74-46 and 3-SHV-74-150 in the closed safety position, TVA will supplement valve closure indication by monitoring system pressure in the out of service loop during pump testing. For the open non-safety position, TVA will manually open these valves to verify dual-indication when the valves are partially opened.
- For RHR Crosstie valve 3-FCV-74-46, when closed to isolate the Loop 1 to Loop 2 crosstie in lieu of 3-SHV-74-150, TVA will supplement valve closure indication by monitoring system pressure in the out of service loop during pump testing. When valve 3-FCV-74-46 is in its normal open non safety position, TVA will manually close this valve to verify dual-indication when the valve is partially closed.
- For valves 1/2/3-SHV-74-91 in the closed safety position, TVA will manually open these valves to verify the closed indicating light extinguishes when the valves are partially opened. TVA will supplement valve closure indication by using pressure or flow measurement techniques.
- Supplemental indication is not required for the partial stroke open (to the non-safety position) because the manually operated passive RHR system valves within the scope of this request do not have a safety function in the open position.

The proposed alternative testing will be performed at the OM Code Subsection ISTC-3700 frequency of at least once every two years. TVA may adopt OM Code cases that modify the two-year frequency when approved by the NRC or once endorsed in RG 1.192.

VI. Basis for Proposed Alternative

The manually operated passive RHR valves, within the scope of this alternative 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 frequency 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.

On BFN Unit 2, a single crosstie valve is provided in the loop crosstie 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 supplemented observation by monitoring system pressure in the opposite loop during quarterly or comprehensive pump testing for anomalous pressure increases.

On BFN Unit 3, two crosstie valves are provided in the loop crosstie line (3-FCV-74-46 and 3-SHV-74-150). Manually operated valve 3-SHV-74-150 remains in the closed position and has no credited open safety function. Valve 3-FCV-74-46 remains in the open position with motor operator power removed and has no credited open safety function. Valve 3-SHV-74-150 is normally closed to provide crosstie operation; however, either valve 3-SHV-74-150 or valve 3-FCV-74-46 may be used to perform this function. In the event 3-FCV-74-46 is utilized for Loop I to Loop II isolation instead of 3-SHV-74-150, supplemental verification testing in the closed safety position will be performed. Testing performed to demonstrate the closed safety position indication is supplemented by monitoring of system pressure in the opposite loop during pump testing for anomalous pressure increases.

Supplemental position indication will be performed at the frequency specified in ISTC-3700 for the closed (safety) position only. This testing demonstrates the valve will perform its closed safety function as indicated. Demonstrating that the valve indicates mid-position will provide reasonable assurance that operators have indication if the valve is removed from its safety position.

Failure of the stem to disk connection in the closed position would be evident when the cross-tie valves are operated for infrequent operations or flushes. Failure in the open or partially open position would be evident by pressure anomalies in the opposite RHR loop.

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.

Valves 1/2/3-SHV-74-91 have a single closed position indicating light. Manually opening these valves to verify the closed indicating light extinguishes when the valves are partially opened is sufficient to demonstrate proper indication. Position indication will be supplemented by pressure or flow measurement techniques. Alternatively, for the open non-safety position, supplemental verification will be performed when the valve is aligned for supplemental FPC.

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 by verifying that the valve indicates closed and when partially opened that 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) is considered to adequately demonstrate the ability of the indicating lights to properly indicate valve position.

Therefore, TVA is submitting this request for alternative in accordance with 10 CFR 50.55a(z)(2) in that 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.

VII. Duration of Proposed Alternative

This alternative request is in support of the BFN Unit 1, 2, and 3 fifth IST interval scheduled to commence on August 31, 2023.

VIII. Precedents

None

Figure 2 - RHR System Volume Layout

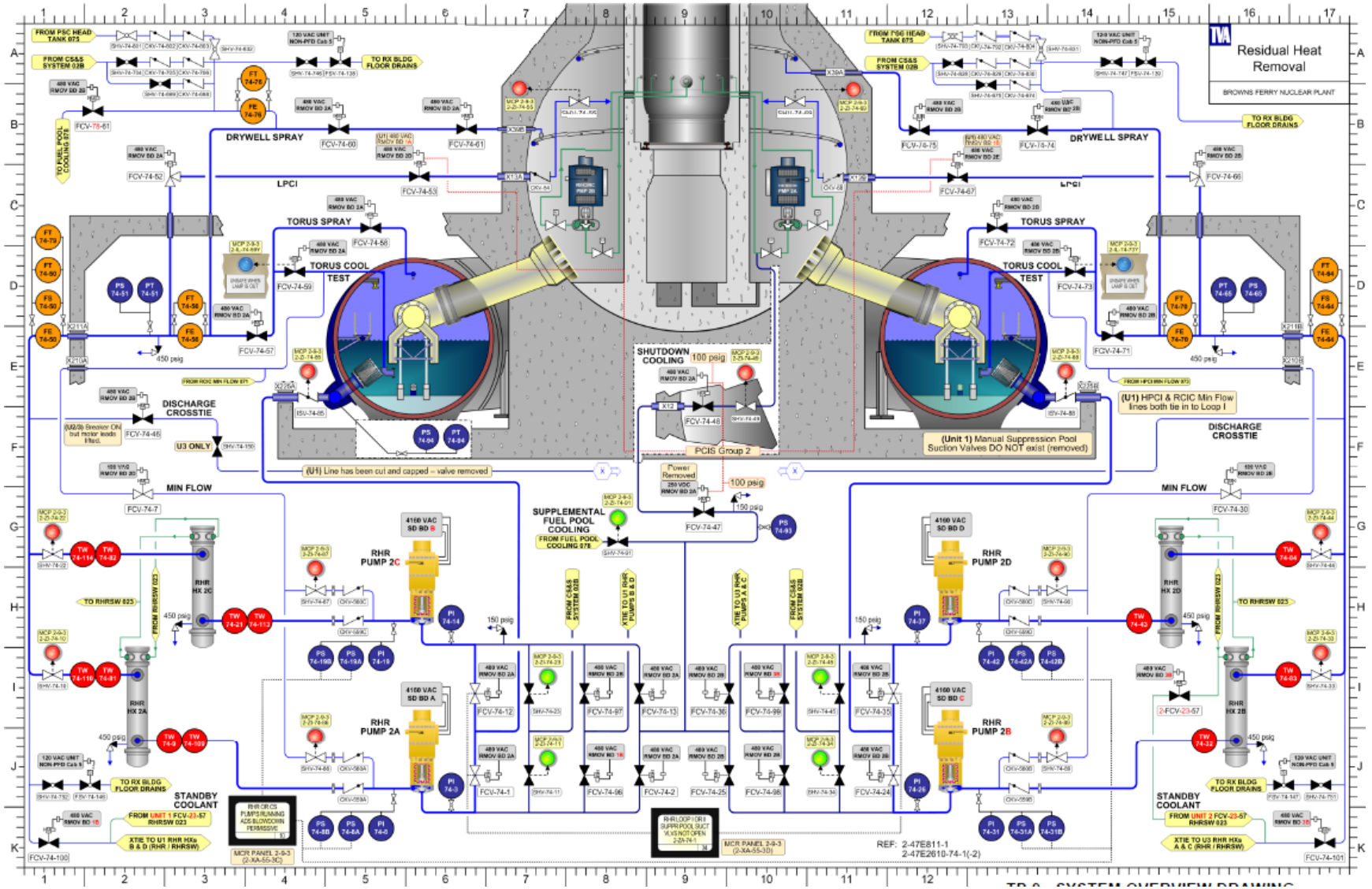


Figure 3 - RHR System

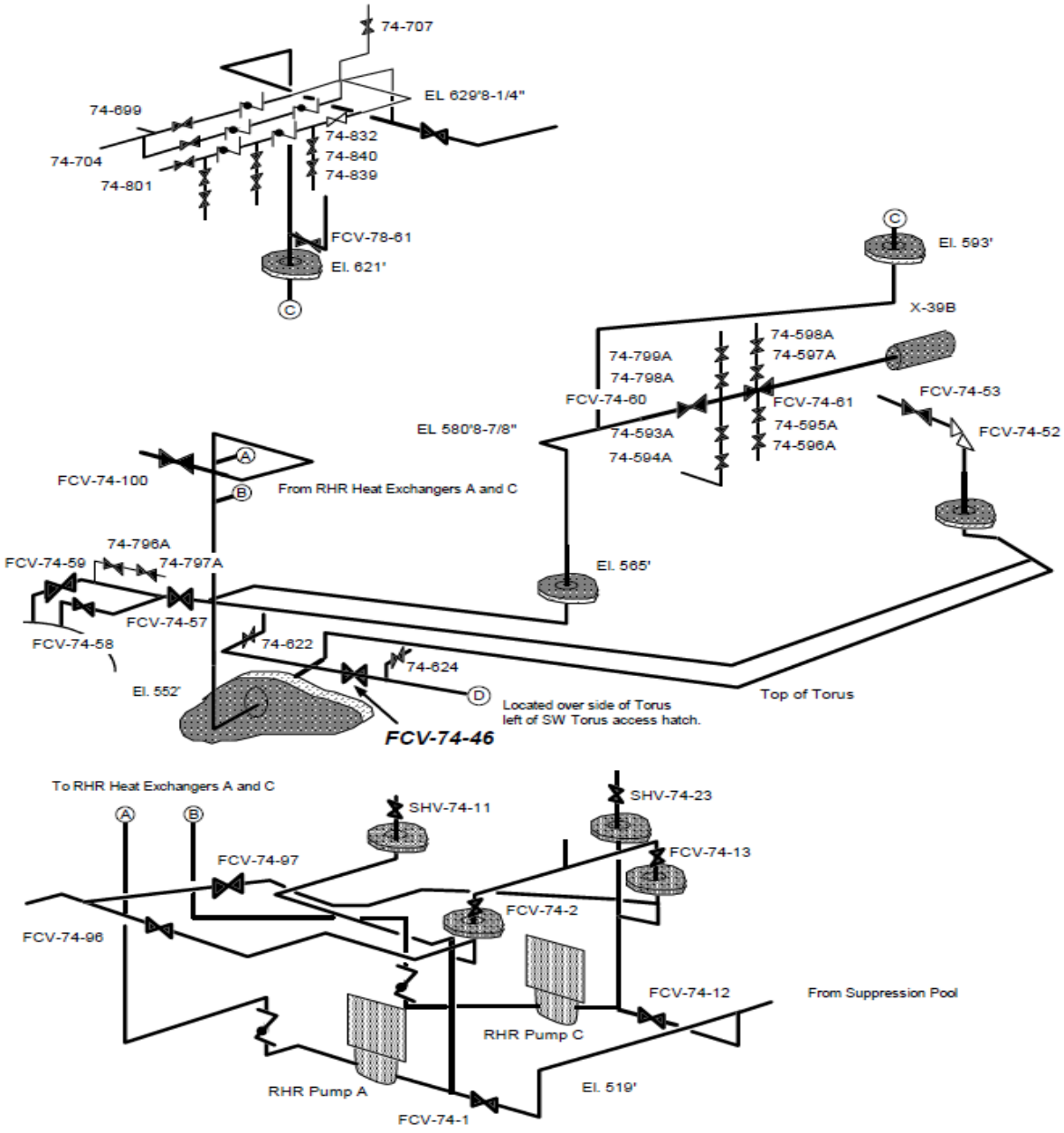
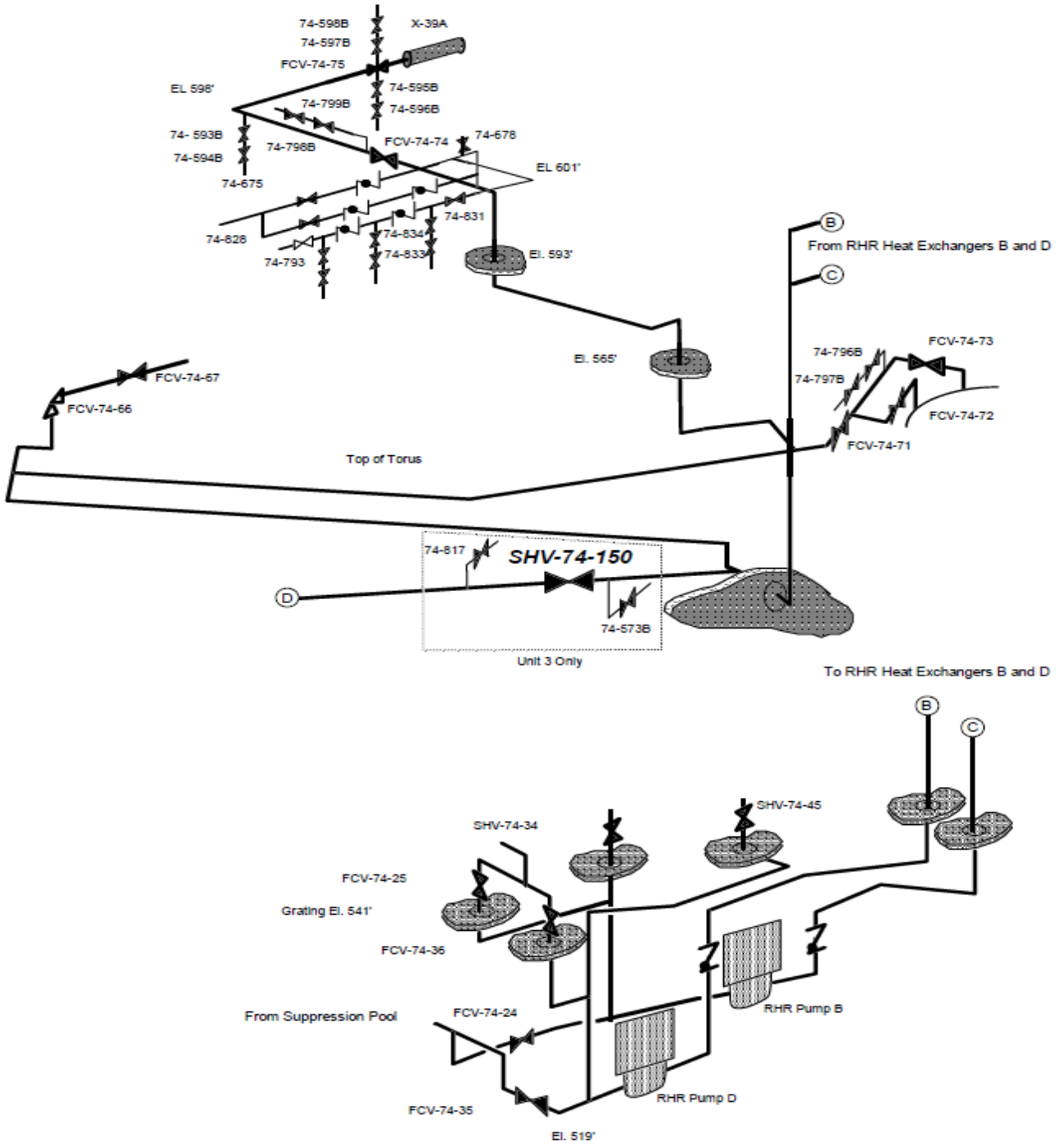


Figure 3 - RHR System (cont'd)



Browns Ferry Nuclear Plant Units 1, 2, and 3
American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternative BFN-IST-03

I. ASME OM Code Components Affected

Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	Valve Size	OM Category
BFN Units 1, 2, and 3	1/2/3-FCV-1-168	MS LN A DRN ISOL	Ball	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-1-169	MS LN B DRN ISOL	Ball	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-1-170	MS LN C DRN ISOL	Ball	2	2”	B
BFN Units 1, 2, and 3	1/2/3-FCV-1-171	MS LN D DRN ISOL	Ball	2	2”	B

II. ASME Code Edition and Addenda

In accordance with Enclosure 1, TVA is requesting NRC approval to utilize the 2020 Edition of the ASME OM Code, in its entirety, as the Code of Record for the BFN Unit 1, 2, and 3 fifth IST interval.

III. Applicable Code Requirement

Title 10 of the *Code of Federal Regulations* (10 CFR), 50.55a(b)(3)(xi), “OM condition: Valve Position Indication,” states:

> *When implementing paragraph ISTC–3700, ‘‘Position Verification Testing,’’ in the ASME OM Code, 2012 Edition through the latest edition of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section, licensees must 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. For valves not susceptible to stem-disk separation, licensees may implement ASME OM Code Case OMN–28, ‘‘Alternative Valve Position Verification Approach to Satisfy ISTC–3700 for Valves Not Susceptible to Stem-Disk Separation,’’ which is incorporated by reference in paragraph (a)(1)(iii)(H) of this section. Where plant conditions make it impractical to perform the initial ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section by the date 2 years following the previously performed ISTC–3700 test, a licensee may justify an extension of this initial supplemental valve position verification provided the ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section is performed at the next available opportunity and*

no later than the next plant shutdown. This one-time extension of the ISTC–3700 test schedule as supplemented by paragraph (b)(3)(xi) of this section is acceptable provided the licensee has available for NRC review documented justification based on information obtained over the previous 5 years of the structural integrity of the stem-disk connection for the applicable valves. The licensee's justification could be based on, for example, verification of the valve stem- disk connection through an appropriate weak link analysis, appropriate disk motion confirmed during diagnostic testing, or allowance and cessation of flow through the valves. The licensee's justification must provide reasonable assurance that the remote indicating lights accurately reveal the position of the valve obturator until the next ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section is performed.

ASME OM Code, 2020 Edition, Subsection ISTC-3700, "Position Verification Testing," 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.

IV. Reason for Request

Due to the design of the BFN Unit 1, 2, and 3 main steam (MS) system, the MS line (MSL) drain valves do not have isolations, instrumentation for local system parameters, or test connections to perform supplemental position indication verification as required by 10 CFR 50.55a(b)(3)(xi). The two-inch air operated (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 MS isolation valve (MSIV) leakage to be routed to the holding volume of the main condenser.

These valves were not provisioned 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 potential testing methods. Figure 4 provides a layout of the MSL drain valves and associated nearby piping components.

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 (e.g., 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.

Therefore, TVA is submitting this request for alternative in accordance with 10 CFR 50.55a(z)(2) in that 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.

V. 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.

The proposed alternative testing will be performed at the OM Code Subsection ISTC-3700 frequency of at least once every two years. MSL drain valve remote position indicators will be verified at least once every two years to verify that valve operation is accurately indicated. TVA may adopt OM Code cases that modify the two-year frequency when approved by the NRC or once endorsed in RG 1.192.

VI. Basis for Proposed Alternative

TVA has replaced the existing motor operated valves with air operated ball valves on BFN Units 1, 2, and 3. The ball valves installed are a slotted ball valve design (i.e., the end of the stem fits into a slot in the ball). This design has no connection devices (e.g., pins or keys) to fail. Industry and BFN operating experience was reviewed as part of the design change process. The internals of the new ball valves were selected specifically for use in the drain pathway.

Electric Power Research Institute (EPRI) Technical Report (TR) 3002019621, Revision 0 (Reference 1) provides a technical basis for determining valves not susceptible to stem-disk separation. In Reference 2, which approved Reference 1, the NRC concluded that ball valves of this design are rugged, have very few failures, and may be considered not susceptible to stem-to-disk failure. Verification methods described in the report for ball valves (e.g., stroking the valve while monitoring system pressure and/or flow) is not possible due to system design. However, radiography is considered be effective for these valves because there are no internal components (such as pins) that would not be visible in the image generated.

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. TVA considers supplemental position indication of the safety direction only an acceptable alternative for valves where testing in the non-safety direction provides an unnecessary burden without a compensating increase in the level of quality and safety. 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.

Therefore, TVA is submitting this request for alternative in accordance with 10 CFR 50.55a(z)(2) in that 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.

VII. Duration of Proposed Alternative

This alternative request is in support of the BFN Unit 1, 2, and 3 fifth IST interval scheduled to commence on August 31, 2023.

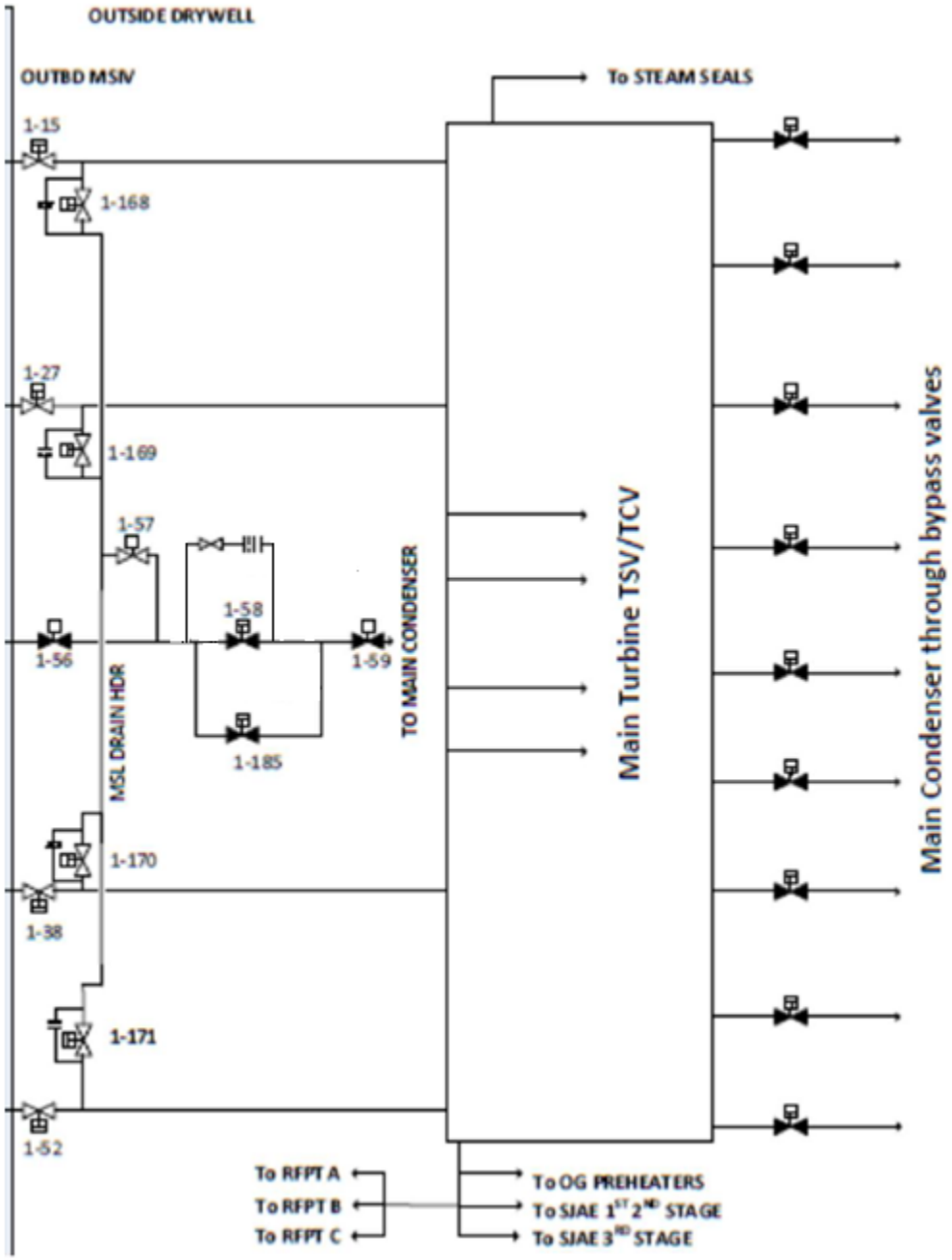
VIII. Precedents

None

IX. References

1. Susceptibility of Valve Applications to Failure of the Stem-to-Disk Connection. EPRI, Palo Alto, CA: 2020. 3002019621 (ML22200A295)
2. NRC letter to Electric Power Research Institute, “Final Safety Evaluation for EPRI Technical Report 3002019621, ‘Susceptibility of Valve Applications to Failure of the Stem-to-Disk Connection’ (EPID: L-2021-NTR-0003),” dated May 4, 2022 (ML22042A000)

Figure 4 - Main Steam Line Drain Valve Flow Path



Browns Ferry Nuclear Plant Units 1, 2, and 3
American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternative BFN-IST-04

I. ASME OM Code Components Affected

Site/Unit	Component ID (Note 1)	Component Description	Valve Type	OM Code Class	Valve Size	OM Category
BFN Units 1/2/3	1/2/3-PCV-1-4	MS LN A RLF	Relief Valve (RV)	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-5*	MS LN A RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-18	MS LN B RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-19*	MS LN B RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-22*	MS LN B RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-23	MS LN B RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-30*	MS LN C RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-31*	MS LN C RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-34*	MS LN C RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-41	MS LN D RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-42	MS LN D RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-179	MS LN A RLF	RV	1	6”	B/C
BFN Units 1/2/3	1/2/3-PCV-1-180	MS LN D RLF	RV	1	6”	B/C

Note 1: Main steam relief valves (MSRV) with an automatic depressurization system (ADS) function are annotated with an asterisk (*)

II. ASME Code Edition and Addenda

In accordance with Enclosure 1, TVA is requesting NRC approval to utilize the 2020 Edition of the ASME OM Code, in its entirety, as the Code of Record for the BFN Unit 1, 2, and 3 fifth IST interval.

III. Applicable Code Requirement

Title 10 of the *Code of Federal Regulations* (10 CFR), 50.55a(b)(3)(xi), "OM condition: Valve Position Indication," states:

> *When implementing paragraph ISTC–3700, "Position Verification Testing," in the ASME OM Code, 2012 Edition through the latest edition of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section, licensees must 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. For valves not susceptible to stem-disk separation, licensees may implement ASME OM Code Case OMN–28, "Alternative Valve Position Verification Approach to Satisfy ISTC–3700 for Valves Not Susceptible to Stem-Disk Separation," which is incorporated by reference in paragraph (a)(1)(iii)(H) of this section. Where plant conditions make it impractical to perform the initial ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section by the date 2 years following the previously performed ISTC–3700 test, a licensee may justify an extension of this initial supplemental valve position verification provided the ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section is performed at the next available opportunity and no later than the next plant shutdown. This one-time extension of the ISTC–3700 test schedule as supplemented by paragraph (b)(3)(xi) of this section is acceptable provided the licensee has available for NRC review documented justification based on information obtained over the previous 5 years of the structural integrity of the stem-disk connection for the applicable valves. The licensee's justification could be based on, for example, verification of the valve stem- disk connection through an appropriate weak link analysis, appropriate disk motion confirmed during diagnostic testing, or allowance and cessation of flow through the valves. The licensee's justification must provide reasonable assurance that the remote indicating lights accurately reveal the position of the valve obturator until the next ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section is performed.*

ASME OM Code, 2020 Edition, Subsection ISTC-3500, "Valve Testing Requirements," states:

> *Active and passive valves in the categories defined in ISTC-1300 shall be tested in accordance with the paragraphs specified in Table ISTC-3500-1 and the applicable requirements of ISTC-5100 and ISTC-5200.*

ASME OM Code, 2020 Edition, Subsection ISTC-3700, "Position Verification Testing," 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.*

OM Code Mandatory Appendix I, “Inservice Testing of Pressure Relief Devices in Water-Cooled Reactor Nuclear Power Plants,” for Class 1 main steam pressure relief valves with auxiliary actuating devices.

OM Code Mandatory Appendix IV, ”Preservice and Inservice Testing of Active Pneumatically Operated Valve Assemblies in Nuclear Reactor Power Plants.”

IV. 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 ASME 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 TSTC-3500, Valve Testing Requirements.”

The MSRV design configuration is not suited for implementation of OM Code Subsection ISTC requirements for remote position verification or Mandatory Appendix IV AOV testing. Application of ISTC-3500 and ISTC-3700 to MSRVs results in additional undesirable operational impact (e.g., the potential inadvertent blowdown of the primary system during MSRV exercise) and the potential to increase operational leakage from the primary system.

Therefore, TVA is submitting this request for alternative in accordance with 10 CFR 50.55a(z)(2) in that compliance with Subsection ISTC-3700, Subsection ISTC-3500, Mandatory App IV, 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.

V. Proposed Alternative

TVA proposes to test the MSRVs in accordance with the OM Code Mandatory Appendix I requirements for Class I Main Steam Pressure Relief Valves with Auxiliary Actuating Devices.

VI. 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.

Each BFN unit 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, within the scope of this alternative request, equally as OM Category B/C valves in order to simplify implementation of OM Code, Mandatory Appendix I.

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. 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 Subsection 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 as described below

The Target Rock Model 7567F pilot-operated safety/relief valve consists of two principle assemblies: a pilot stage assembly and the main stage assembly. These two assemblies are directly coupled to provide a unitized, dual function safety/relief valve. The pilot stage assembly is the pressure-sensing and control element, and the main stage assembly is a system fluid-actuated follower valve which provides the pressure relief function. The pilot assembly of the Target Rock safety/relief valve consists of two relatively small, low flow pressure-sensing elements. The spring-loaded pilot disc senses the set pressure, and the pressure-loaded stabilizer disc senses the reseat pressure. Spring force (preload force) is applied to the pilot disc by means of the pilot rod. The remotely controlled air operator is a diaphragm type pneumatic actuator fitted to the pilot stage assembly to provide selective operation of the valve at system pressures ranging from 50 psig to valve set pressure. The position indicating lights provided in the MCR indicate only the status of the solenoid valve (energized or de-energized) and do not indicate stem or obturator movement. Energizing the solenoid control valve admits plant air to the air operator piston chamber and strokes the air operator stem, in turn stroking the pilot disc via the pilot rod. De-energizing the solenoid vents the air operator diaphragm chamber causing the air operator stem to return to its unstroked position. The pilot stage then reseats if system pressure is at the valve design reseat pressure or below. The air operator provided is relied upon only to stroke the spring loaded pilot disc and is not relied upon to provide a required torque, thrust, stroke time, or seating force to perform a required function.

Mandatory Appendix I, I-3310 provides sufficient test requirements to ensure the MSRVs are capable of remote manual operation and automatic operation at set pressure including verification of the pressure integrity and stroke capability of the air actuator and verification of operation and electrical characteristics of position indicators. TVA considers the testing required by Mandatory Appendix I to fully satisfy the intent of 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), Subsection ISTC-3500, Subsection ISTC-3700, 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.

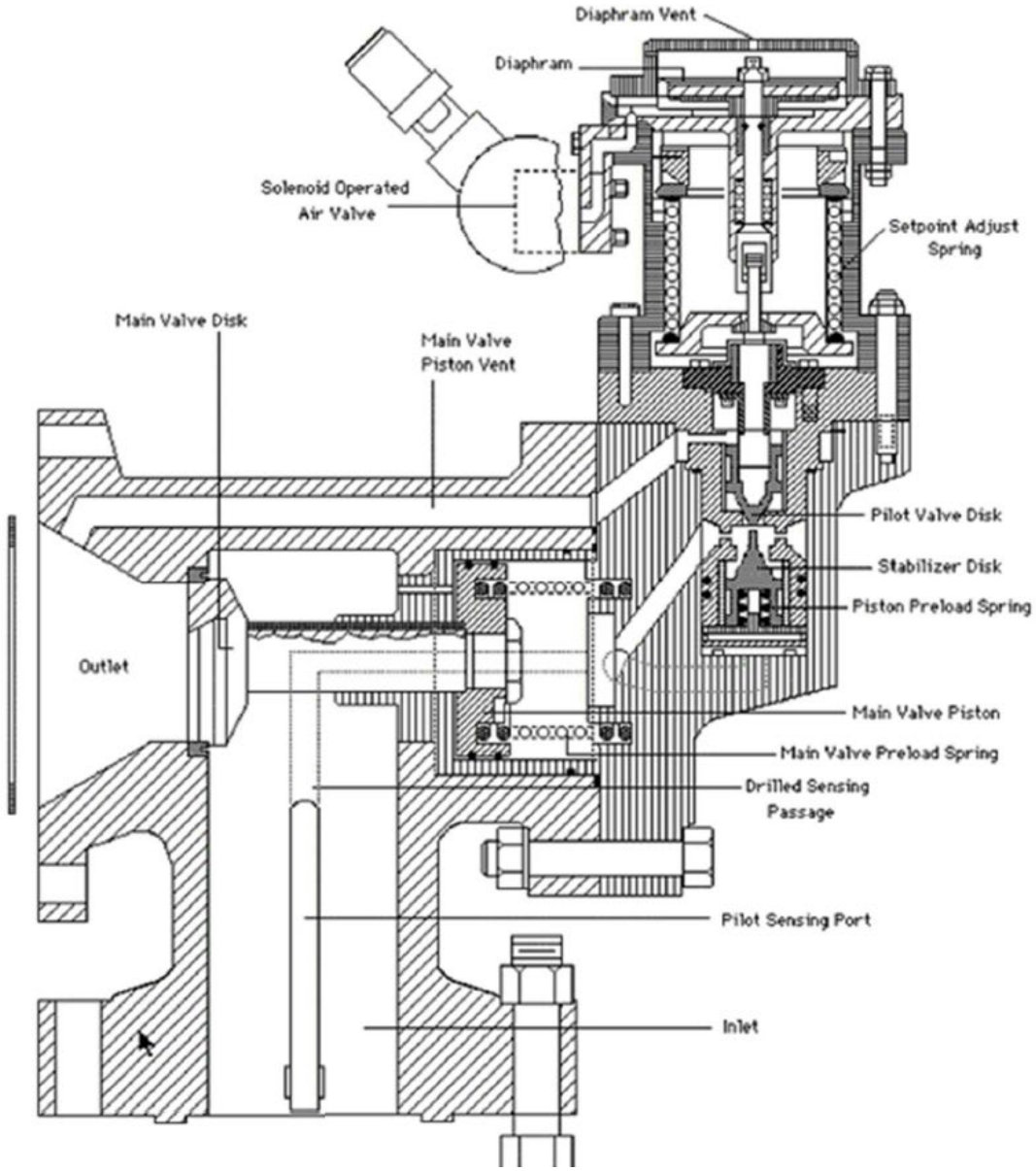
VII. Duration of Proposed Alternative

This alternative request is in support of the BFN Unit 1, 2, and 3 fifth IST interval scheduled to commence on August 31, 2023.

VIII. Precedents

None

Figure 5 - Main Steam Relief Valve Design



Browns Ferry Nuclear Plant Units 1, 2, and 3
American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternative BFN-IST-05

I. ASME OM Code Components Affected

Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	Valve Size	OM Category
BFN Unit 0	0-FCV-67-1	EECW HDR A STR BKWSH	Ball	3	1.25”	B
BFN Unit 0	0-FCV-67-5	EECW HDR B STR BKWSH	Ball	3	1.25”	B
BFN Unit 0	0-FCV-67-8	EECW HDR C STR BKWSH	Ball	3	1.25”	B
BFN Unit 0	0-FCV-67-11	EECW HDR D STR BKWSH	Ball	3	1.25”	B

II. ASME Code Edition and Addenda

In accordance with Enclosure 1, TVA is requesting NRC approval to utilize the 2020 Edition of the ASME OM Code, in its entirety, as the Code of Record for the BFN Unit 1, 2, and 3 fifth IST interval.

III. Applicable Code Requirement

Title 10 of the *Code of Federal Regulations* (10 CFR), 50.55a(b)(3)(xi), “OM condition: Valve Position Indication,” states:

> *When implementing paragraph ISTC–3700, ‘‘Position Verification Testing,’’ in the ASME OM Code, 2012 Edition through the latest edition of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section, licensees must 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. For valves not susceptible to stem-disk separation, licensees may implement ASME OM Code Case OMN–28, ‘‘Alternative Valve Position Verification Approach to Satisfy ISTC–3700 for Valves Not Susceptible to Stem-Disk Separation,’’ which is incorporated by reference in paragraph (a)(1)(iii)(H) of this section. Where plant conditions make it impractical to perform the initial ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section by the date 2 years following the previously performed ISTC–3700 test, a licensee may justify an extension of this initial supplemental valve position verification provided the ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section is performed at the next available opportunity and no later than the next plant shutdown. This one-time extension of the ISTC–3700 test schedule as supplemented by paragraph (b)(3)(xi) of this section is acceptable provided the licensee has available for NRC review documented justification based on information obtained over the previous 5 years of the structural integrity of the stem-disk connection*

for the applicable valves. The licensee's justification could be based on, for example, verification of the valve stem- disk connection through an appropriate weak link analysis, appropriate disk motion confirmed during diagnostic testing, or allowance and cessation of flow through the valves. The licensee's justification must provide reasonable assurance that the remote indicating lights accurately reveal the position of the valve obturator until the next ISTC–3700 test as supplemented by paragraph (b)(3)(xi) of this section is performed.

ASME OM Code, 2020 Edition, Subsection ISTC-3700, "Position Verification Testing," 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.

IV. Reason for Request

Emergency equipment cooling water (EECW) strainer backwash valves are motor operated valves (MOV) located in the intake pumping station (Figure 6). The valves are installed on the backwash drain lines for the EECW strainers and are not provided with installed capability to perform supplemental position verification as required by 10 CFR 50.55a(b)(3)(xi).

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 on the basis that the proposed alternative provides an acceptable level of quality and safety.

V. Proposed Alternative

For the open position, TVA will utilize continuous monitoring of the self-cleaning EECW strainer performance when the respective strainer is put into operation as supplemental verification of position indicating lights in the open position. The absence of strainer high differential pressure alarms when the respective strainer is in operation and illumination of the local open position indicating light verifies the respective EECW strainer backwash valve is open.

For the closed position, TVA will utilize continuous monitoring of self-cleaning EECW Strainer performance. The presence of a strainer high differential pressure alarm when the respective strainer is in operation will be used as an indication the respective EECW strainer backwash valve may have failed in the closed position. When the respective strainer is not in operation, verification the closed indicating light is illuminated and operator position indicators will be used to verify the respective EECW strainer backwash valve is closed.

The proposed alternative testing will be performed at the OM Code Subsection ISTC-3700 frequency of at least once every two years.

VI. Basis for Proposed Alternative

The EECW strainer backwash valves (0-FCV-67-1, 5, 8, 11) have a safety-related function to open when their respective strainer is put into operation and to close when the strainer is not in operation in order to isolate the backwash and to prevent diversion of EECW supply from essential components.

Continuous monitoring for 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. Alternatively, the presence of a strainer high differential pressure alarm when the respective strainer is in operation can be used as an indication the respective EECW strainer backwash valve may have failed in the closed position. When the respective strainer is not in operation, verification that the closed indicating light is illuminated, and operator position indicators will be used to verify the respective EECW strainer backwash valve is closed. Additionally, the strainer backwash valves are closed and de-energized during the performance of quarterly and comprehensive pump tests. Failure of the respective EECW strainer backwash to close would result in flow diversion and would be detected by the pump test.

The EECW strainer backwash valves (0-FCV-67-1, 5, 8, 11) were replaced to be compliant with ASME OM Code Appendix III. Stainless steel ball valves with Limitorque operators were installed. This valve design utilizes a one-piece ball and stem. This design has no connection devices (such as pins or keys) or stem-to-disk connection to fail. ASME OM Code App III testing is not expected to provide data that can be used to satisfy 10 CFR 50.55a(b)(3)(xi) due to ball valve design.

Industry and BFN operating experience was reviewed as part of the above 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.

Electric Power Research Institute (EPRI) Technical Report (TR) 3002019621, Revision 0 (Reference 1) provides a technical basis for determining valves not susceptible to stem-disk separation. In Reference 2, which approved Reference 1, the NRC concluded that ball valves of this design are rugged, have very few failures, and may be considered not susceptible to stem-to-disk failure. Verification methods described in the report for ball valves (e.g., stroking the valve while monitoring system pressure and/or flow) is not possible due to system design. However, TVA considers the proposed continuous monitoring approach to provide an equivalent method.

Therefore, TVA is submitting this request for alternative in accordance with 10 CFR 50.55a(z)(1) in that the proposed alternative provides an acceptable level of quality and safety.

VII. Duration of Proposed Alternative

This alternative request is in support of the BFN Unit 1, 2, and 3 fifth IST interval scheduled to commence on August 31, 2023.

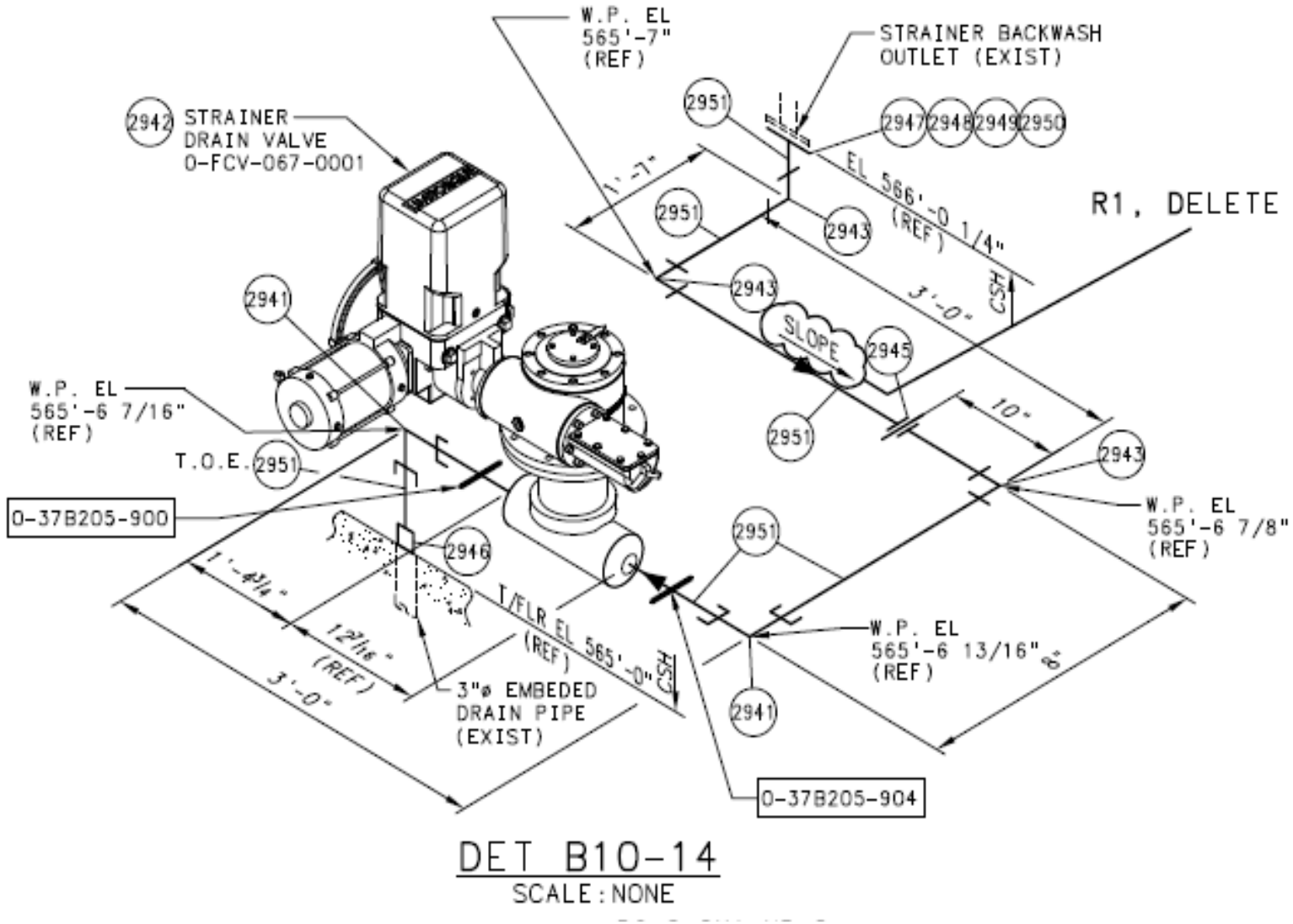
VIII. Precedents

None

IX. References

1. Susceptibility of Valve Applications to Failure of the Stem-to-Disk Connection. EPRI, Palo Alto, CA: 2020. 3002019621 (ML22200A295)
2. NRC letter to Electric Power Research Institute, “Final Safety Evaluation for EPRI Technical Report 3002019621, ‘Susceptibility of Valve Applications to Failure of the Stem-to-Disk Connection’ (EPID: L-2021-NTR-0003),” dated May 4, 2022 (ML22042A000)

Figure 6 - EECW Valve Flow Path



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SCALE: NONE