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

August 12, 2024

Eric S. Carr
President – Nuclear Operations and
Chief Nuclear Officer
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION, UNIT NOS. 1 AND 2 – PROPOSED ALTERNATIVE RELIEF REQUEST V-1 INSERVICE TESTING OF PRESSURE ISOLATION VALVES (EPID L-2023-LLR-0060)

Dear Eric Carr:

By letter dated October 12, 2023 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML23285A092), as supplemented by letters dated May 7, 2024, and July 8, 2024 (ML24130A119 and ML24190A419, respectively), Virginia Electric and Power Company (the licensee) submitted Alternative Request V-1 to the U.S. Nuclear Regulatory Commission (NRC) requesting authorization of proposed alternatives to certain inservice testing (IST) requirements of the 2020 Edition of the American Society of Mechanical Engineers (ASME) *Operation and Maintenance of Nuclear Power Plants*, Division 1, OM Code: Section IST (OM Code) for the Sixth 10-year IST Interval at Surry Power Station, Unit Nos. 1 and 2 (SPS).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 55.55a(z)(2), the licensee requested that the NRC authorize Alternative Request V-1 for certain pressure isolation valves at SPS on the basis that compliance with the ASME OM Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety.

Accordingly, the NRC staff has reviewed Alternative Request V-1 and concludes, as set forth in the enclosed safety evaluation, that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, the NRC staff authorizes the use of alternative Request V-1 at SPS, for the Sixth 10-year IST Interval, which is scheduled to begin on May 10, 2025, and end on May 9, 2034.

All other ASME OM Code requirements as incorporated by reference in 10 CFR 50.55a for which relief or an alternative was not specifically requested, and granted or authorized (as appropriate), in the subject request remain applicable.

If you have any questions, please contact the Surry Project Manager at (301) 415-5136, or via email at John.Klos@nrc.gov.

Sincerely,

MICHAEL MARKLEY

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Date: 2024.08.12 14:38:14 -04'00'

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-280 and 50-281

Enclosure:
Safety Evaluation

cc: Listserv

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR ALTERNATIVE REQUEST V-1

RELATED TO THE SIXTH INSERVICE TESTING INTERVAL

VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-280 AND 50-281

1.0 INTRODUCTION

By a letter dated October 12, 2023 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML23285A092), as supplemented by letters dated May 7, 2024, and July 8, 2024 (ML24130A119 and ML24190A419, respectively), Virginia Electric and Power Company (the licensee) submitted Alternative Request V-1 to the U.S. Nuclear Regulatory Commission (NRC) requesting authorization of proposed alternatives to certain inservice testing (IST) requirements of the 2020 Edition of the American Society of Mechanical Engineers (ASME) *Operation and Maintenance of Nuclear Power Plants*, Division 1 (OM Code) for the Sixth 10-year IST Interval at Surry Power Station, Unit Nos. 1 and 2 (SPS).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 55.55a(z)(2), "Hardship without a compensating increase in quality and safety," the licensee requested that the NRC authorize Alternative Request V-1 for certain pressure isolation valves (PIVs) to implement at SPS on the basis that compliance with specified requirements of the ASME OM Code would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety.

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a(f)(4), "Inservice testing standards requirement for operating plants," state, in part:

> Throughout the service life of a boiling or pressurized water-cooled nuclear power facility, pumps and valves that are within the scope of the ASME OM Code must meet the inservice test requirements (except design and access provisions) set forth in the ASME OM Code and addenda that become effective subsequent to editions and addenda specified in paragraphs (f)(2) and (3) of this section [10 CFR 50.55a] and that are incorporated by reference in paragraph (a)(1)(iv) of this section [10 CFR 50.55a], to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The regulations in 10 CFR 50.55a(z), "Alternative to codes and standards requirements," state, in part, that alternatives to the requirements of paragraphs (b) through (h) of 10 CFR 50.55a or portions thereof may be used when authorized by the Director, Office of Nuclear Reactor Regulation. A proposed alternative must be submitted and authorized prior to implementation. The applicant or licensee must demonstrate that:

(1) *Acceptable level of quality and safety.* The proposed alternative would provide an acceptable level of quality and safety; or

(2) *Hardship without a compensating increase in quality and safety.* Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Alternative Request V-1

Applicable ASME OM Code Edition

The ASME OM Code of Record for the Sixth 10-year IST Interval at SPS is the 2020 Edition of the ASME OM Code as incorporated by reference in 10 CFR 50.55a. The Sixth 10-year IST Interval is scheduled to begin on May 10, 2025 and end on May 9, 2034.

ASME OM Code Components Affected

In its letter dated October 12, 2023, the licensee proposed alternative testing for certain reactor coolant system (RCS) PIVs that are safety injection (SI) check valves, as identified in Table 1:

Table 1

Component Number	Component Description	Code Class	OM Category
1/2-SI-79	RCS Cold Leg SI Admission Check Valve	1	AC
1/2-SI-82	RCS Cold Leg SI Admission Check Valve	1	AC
1/2-SI-85	RCS Cold Leg SI Admission Check Valve	1	AC
1/2-SI-241	Low Head SI to RCS Cold Leg Isolation Check Valve	1	AC
1/2-SI-242	Low Head SI to RCS Cold Leg Isolation Check Valve	1	AC
1/2-SI-243	Low Head SI to RCS Cold Leg Isolation Check Valve	1	AC

In its letter dated May 7, 2024, the licensee confirmed that the PIVs listed in Table 1 above, are 6-inch Velan swing check valves.

Applicable ASME OM Code Requirements

The requirements in the ASME OM Code, Subsection ISTC, "Inservice Testing of Valves in Light-Water Reactor Nuclear Power Plants," as incorporated by reference in 10 CFR 50.55a, related to Alternative Request V-1 are as follows:

Paragraph ISTC-3630, "Leakage Rate for Other Than Containment Isolation Valves," states, in part:

> Valve closure before seat leakage testing shall be by using the valve operator with no additional closing force applied.

Paragraph ISTC-3630(a), "Frequency," requires PIV leakage rate testing to be conducted at least once every two years.

Paragraph ISTC-3630(f), "Corrective Action," states, in part:

> Valves or valve combinations with leakage rates exceeding the values specified by the Owner per ISTC-3630(e) shall be declared inoperable and either repaired or replaced.

Paragraph ISTC-5221, "Valve Obturator Movement," subparagraph (a)(1) states:

> Check valves that have a safety function in both the open and close directions shall be exercised by initiating flow and observing that the obturator has traveled to either the full open position or to the position required to perform its intended function(s) (see ISTA-1100), and verify that on cessation or reversal of flow, the obturator has traveled to the seat.

Paragraph ISTC-5224, "Corrective Action," states, in part:

> If a check valve fails to exhibit the required change of obturator position, it shall be declared inoperable. A retest showing acceptable performance shall be run following any required corrective action before the valve is returned to service.

Proposed Alternative and Basis for Use

In its letter dated October 12, 2023, the licensee states, in part:

> Dominion Energy Virginia is requesting an alternative to the ISTC-3630 requirements as they relate to use of additional closing force to achieve PIV closure before seat leakage testing; ISTC-3630(f) requirements as they relate to corrective action following a failed seat leakage test; ISTC-5221 (a)(1) requirements as they relate to demonstrating that a PIV check valve disc travel to its seat following cessation of flow; and ISTC-5224 requirements as they relate to retesting following any required corrective action before the valve is returned to service. The proposed alternative is applicable to the valves listed in Section 1 of this AR [alternative request].

Seat leakage testing for the TS [Technical Specification] PIVs occurs at low pressures to expedite unit startup activities following an RFO. When seat leakage testing does not meet the acceptance criteria, the following actions will be taken:

- Each PIV that does not meet the leakage test acceptance criteria will be declared inoperable in accordance with the applicable TS, and the failed PIV will be entered into the site corrective action program, which will allow the provisions of this alternative to be invoked.

- Rather than performing an ASME Code repair or replacement, the check valve may be mechanically agitated in accordance with the guidance provided in Section 6.B of this alternative [Request V-1].

- After mechanical agitation, the valve will be retested using normal test procedures. The incremental agitation and testing process may be repeated until seat leakage or closure test acceptance criteria are met, or if it is determined that corrective action is required.

    - If the seat leakage or closure test meets the acceptance criteria, then the PIV will be declared operable.

    - If the seat leakage or closure test does not meet the acceptance criteria, the PIV will be repaired or replaced during the outage of discovery.

- If the PIV needs to be mechanically agitated and subsequently passes the seat leakage or closure test, it will be repaired or replaced during the next affected unit's RFO.

- When the PIV is either repaired or replaced during the next outage, it must pass post-maintenance tests (including seat leakage test, as applicable) before being declared operable.

The licensee further stated, "Using the provisions of this request as an alternative to the specific requirements of as Request V-1, in lieu of the specific ASME OM Code requirements of ISTC-3630, ISTC-3630(f), ISTC-5221(a)(1), and ISTC-5224, which have been identified as a hardship without a compensating increase in the quality and safety pursuant to 10 CFR 50.55a(z)(2), will provide adequate indication of the function and operability of these PIVs."

In its letter dated October 12, 2023, the licensee's basis for the proposed alternative states:

> The PIVs are a standard design check valve model for RCS system conditions and typically perform well until operation eventually results in degradation of the seating surfaces.
>
> Back-leakage testing of the PIVs requires pressure from either the RCS below 365 psig [pounds per square inch gauge] or the SI Accumulators below 300 psig. To test back-leakage characteristics, any leakage is measured from drain valves upstream of the check valves which would demonstrate quantifiable leakage past the check valves. Unless there is a significant pressure differential across the

seat, the disk might not be pushed into the seat with sufficient force to achieve full contact. The disks are slightly inclined so gravity does not help keep the disks closed to the extent that it would for a vertically mounted check valve.

SPS has experienced problems achieving consistent pressure differential across the seats due to numerous connections and branches in the piping configuration. SPS has been able to achieve the required pressure differential through valve realignment and venting and cycling of valves, but only after extensive troubleshooting and procedure changes. However, a failed test for these valves would require emergent activities discussed previously to effect repair or replacement.

Once the check valves are closed with acceptable seat leakage, the valves would not be required to open unless a large break loss-of-coolant accident (LBLOCA) occurred and would not be required to perform a PIV or closure function again following a LBLOCA. Should a LBLOCA occur, the plant would be shut down for an extended period of time, which would allow the maintenance planned for the next RFO to be performed prior to startup following the LBLOCA.

The licensee provided additional justification for its proposed alternative that the NRC staff summarizes below:

1. Review of Maintenance History of the PIVs

   The licensee provided a detailed description of its review of the maintenance history of the PIVs within the scope of Alternative Request V-1 in its letter dated May 7, 2024. Leakage testing results for PIVs within the scope of Alternative Request V-1 were presented back to the Cycle 20 RFO for both units (Spring 2006 for Unit 1 and Fall 2006 for Unit 2). The licensee identified and discussed unsatisfactory testing results and the applicable corrective actions, including disk and seat replacements and improved maintenance practices after consulting with a valve specialist from Velan to determine better lapping techniques for the Velan check valves. The licensee discussed historically reliable performance of the PIVs for closure during power operations (seating issues were stated to occur during leakage testing at lower pressures rather than during power operations) and for opening during accident conditions (credited safety functions). The licensee stated that no active preventative maintenance tasks are in place for these valves, and they have proven to be reliable.

2. Requirements for Application of Mechanical Agitation to Seat PIVs

   The licensee described the requirements for the mechanical agitation method to be used for the PIVs. For example, as-found test results and visual inspection of the valve body for pre-existing damage, markings, and defects are needed to establish the initial condition of the valve. The valve is required to be declared inoperable prior to mechanical agitation. Mechanical agitation is to be performed using a 15-pound (maximum) flat faced or rounded, rubber or dead blow hammer swung approximately 120 degrees about the elbow without excessive use of the body to accelerate the hammer head. The diameter of the hammer face shall be ½ inch or greater. The surface to be agitated shall not include valve bolting or flanges, and the area should be visually inspected after mechanical agitation to ensure no physical external damage occurred. Only the lower two-thirds of the valve body shall be struck, and the valve shall only be

struck one time with leakage reassessed prior to striking again. The valve shall be scheduled for disassembly during the next RFO following application of mechanical agitation to inspect the valve for damage and determine whether the agitation caused an adverse effect on valve performance. If the mechanically agitated check valve subsequently passes its seat leakage test, it shall be repaired or replaced during the next RFO. Because mechanical agitation is not a repair or replacement activity, this alternative is needed to avoid potential unnecessary emergent demands on plant equipment, resources, and personnel.

3. Design of the Safety Injection Check Valves

   The licensee described the design of the SI Check Valves. For example, the failure of a check valve disk to open (i.e., stuck closed), or detachment of the disk from valve internals, is normally due to service conditions and/or process fluid. The licensee stated that most failures are associated with carbon steel valves in raw water systems where the disk is closed for long periods of time, thereby allowing corrosion to bond the disk to other parts of the valve internals. Another failure mechanism is when the disk operates long term in a less than full open position, thus allowing hinge pin wear in a raw water environment. The process fluid for the SI Check Valves at SPS is RCS water, which is maintained within strict chemistry and cleanliness standards. The valves are designed for service in a boric acid solution and are composed of stainless steel materials. The licensee asserts that it is unlikely that the disk will fail to open or become detached when flow is required, because the conditions for corrosion are not present and the open position occurs a small percentage of the time.

4. Description of PIV and Check Valve Open Exercise Testing

   The licensee described the open exercise testing of the PIVs. Specifically, the PIVs are tested in the open direction during comprehensive pump testing of the low head safety injection (LHSI) pumps with design-basis accident flow rates. Temporary flow instrumentation is used to monitor flow through the LHSI piping branches each RFO, and the licensee reported no valve failures during this testing.

Engineering Assessment

The licensee, in the letter dated October 12, 2023, provided an engineering assessment of the proposed methodology for seating the PIVs as well as the structural impact of the mechanical agitation. The assessment referenced an NRC safety evaluation for Sequoyah Nuclear Plant (Sequoyah), Units 1 and 2, dated December 1, 2022 (ML22304A186) and an NRC safety evaluation for Surry, Unit 1, dated April 25, 2023 (ML23102A283).

In the engineering assessment, the licensee assumed a 20-pound maul would be used as described in the Surry evaluation. The licensee assessed the SPS 6-inch Class 1500 Velan swing check valves as bounded by the 6-inch Velan swing check valves within the TVA request for Sequoyah. The licensee used a similar methodology as described in the TVA request, noting that a dynamic load factor of 4 was used in lieu of the value of two, which would result from using the equation for a pendulum coupled with Roark's Formulas for Stress and Strain. Localized stress was estimated using Roark's Formulas for Stress and Strain, which was found acceptable by the NRC in the Sequoyah and Surry precedents. The assessment concluded that the induced stress is very low compared to the allowable stress and Velan had no concern for potential valve damage as a consequence of the proposed mechanical agitation method. The

licensee's guidance includes recommendations to strike the thickest portion of the valve body, to avoid striking the bonnet, and to avoid point impact, using a second piece of metal plate to distribute the impact force, if practical. The assessment contains requirements for mechanical agitation that the licensee considers consistent with the NRC safety evaluation for the Sequoyah request and the prior Surry request. The licensee clarified those requirements in response to the staff's request for additional information, as discussed below.

Reason for Request

In the letter dated October 12, 2023, the licensee stated, in part, that the proposed alternative request does not affect the TS requirements discussed within the letter.

In its letter dated October 12, 2023, the licensee stated the following related to ASME OM Code requirements:

> ASME OM Code Requirements - The SPS Units 1 and 2 IST Programs implement the ASME OM Code as required by SPS TS 6.4.I, "Inservice Testing Program," and 10 CFR 50.55a(f). As previously noted, the Code of Record for SPS Units 1 and 2 is the ASME OM Code 2020 Edition, which requires the following:
>
> - OM Code, Subsection ISTC-3630, requires Category A testing to verify seat leakages are within acceptable limits and states, "Valve closure before seat leakage testing shall be by using the valve operator with no additional closing force applied."
>
> - OM Code, Subsection ISTC-3630(a) requires Category A leakage rate testing to be conducted at least once every two years.
>
> - OM Code, Subsection ISTC-3630(b)(4) allows testing to be performed at reduced differential test pressure if the leakage result is correlated to leakage at an RCS pressure. SPS calculates this acceptance criterion by taking the square root of the ratio between the test and functional pressure and multiplies it by the TS leakage limit of 1 gpm as prescribed by this paragraph. Currently, the reduced pressure acceptance criterion is set to 0.259 gpm for each Low Head SI to RCS Cold Leg Isolation check valve, and the leakage for all three valves must be less than 0.450 gpm. The RCS cold leg SI admission check valves are limited to a leakage of 0.366 gpm.
>
> - The leakage testing requirement of ISTC-3630 is used to satisfy the requirements of ISTC-5221(a)(1) and ISTC-5224.
>
> Historically, TS PIVs have been leak tested during startup from RFOs (and certain other non-RFOs) at lower differential test pressures (starting around 150 psi [pounds per square inch]). Leak testing of the LHSI to RCS Cold Leg isolation valves is accomplished by using pressure from a partially pressurized SI Accumulator at the check valve and collecting and measuring leakage over time at an upstream low pressure drain valve. The leak testing of the RCS Cold Leg SI Admission Check Valves is performed with RCS pressure between 300 and 365 psig.

Most PIVs tested at the lower pressures meet the leakage rate acceptance criteria when correlated to RCS pressure. However, some PIVs have required higher test pressures (up to nominal RCS pressure) to achieve acceptable leakage results, and test procedures allow testing at low or higher pressures. In certain cases, mechanical agitation has been used to seat the valve to achieve an acceptable leakage rate. Dominion Energy Virginia recognizes that mechanical agitation is a troubleshooting activity rather than a repair method and also recognizes that the ASME OM Code ISTC-3630(f) requires valves with leakage rates that exceed their acceptance criteria to be declared inoperable and either repaired or replaced, followed by a re-test to confirm acceptable operation prior to being returned to service. Dominion Energy Virginia is also aware of a recent precedent where NRC approved an IST alternative request for the Tennessee Valley Authority (TVA) Sequoyah Nuclear Plant (SQN) to use mechanical agitation as a PIV leakage test troubleshooting tool, and for deferring repair or replacement of certain PIVs to the following RFO. Also, the NRC recently approved an emergency Alternative Request to use mechanical agitation for PIV 1-SI-241 during the Surry Unit 1 fall 2022 RFO in the 5th ten-year IST Interval.

3.2 NRC Staff Evaluation

At nuclear power plants, PIVs are defined as two valves in series within the reactor coolant pressure boundary that separate the high-pressure RCS from a lower pressure system. For SPS, these PIVs must be leak tested in accordance with the requirements of the applicable paragraphs of the ASME OM Code (2020 Edition), Subsection ISTC, as incorporated by reference in 10 CFR 50.55a. Specifically, paragraph ISTC-3630 requires "[v]alve closure before seat leakage testing shall be accomplished by using the valve operator with no additional closing force applied." Paragraph ISTC-3630(a) requires PIV leakage rate testing to be conducted at least once every 2 years. Paragraph ISTC-3630(f) requires "[v]alves or valve combinations with leakage rates exceeding values specified by the Owner per ISTC-3630(e) shall be declared inoperable and either repaired or replaced." Paragraph ISTC-5221(a)(1) requires "[c]heck valves that have a safety function in both the open and closed directions shall be exercised by initiating flow and observing that the obturator has traveled to either the full open position or to the position required to perform its intended function(s) …, and verify on cessation or reversal of flow, the obturator has traveled to the seat." Paragraph ISTC-5224 requires that "[i]f a check valve fails to exhibit the required change of obturator position, it shall be declared inoperable", and a "retest showing acceptable performance shall be run following any required corrective action before the valve is returned to service." The NRC staff reviewed the alternative to the applicable PIV leakage testing requirements of the ASME OM Code as incorporated by reference in 10 CFR 50.55a proposed by the licensee in Alternative Request V-1.

For Alternative Request V-1, the licensee stated in the letter dated October 12, 2023, that the subject PIVs have been seat leakage tested during plant startup from refueling outages at low differential pressures to expedite startup activities. The licensee stated that the mechanical agitation method described in Alternative Request V-1 is needed to avoid potential unnecessary emergent demands on plant equipment, resources, and personnel. For example, the licensee stated that a failed test would require valve realignment and venting/cycling of valves in order to achieve consistent pressure differential across the seats and effect repair or replacement. The licensee indicated that this alternative will apply to ISTC-3630 requirements as they relate to use of additional closing force to achieve PIV closure before seat leakage testing; ISTC-3630(f) requirements as they relate to corrective action following a failed seat leakage test; ISTC-5221(a)(1) requirements as they relate to demonstrating that a PIV check valve disk travel to its

seat following cessation of flow; and ISTC-5224 requirements as they relate to retesting following any required corrective action before the valve is returned to service. Based on the submitted information and operating experience with check valve performance, the NRC staff finds that compliance with the applicable requirements in the ASME OM Code would constitute a hardship without a compensating increase in the level of quality and safety. Attempting to obtain a successful leak rate test for check valves would result in significant maintenance activities, plant personnel radiation exposure, and plant startup delays.

In its letter dated October 12, 2023, and RAI responses to its letter dated May 7, 2024, the licensee stated that for a PIV within the scope of the request that does not meet the seat leakage testing acceptance criteria, the following actions will be taken:

- Each PIV that does not meet the leakage test acceptance criteria will be declared inoperable in accordance with the applicable TS, and the failed PIV will be entered into the site corrective action program, which will allow the provisions of this alternative to be invoked.

- Rather than performing an ASME Code repair or replacement, the check valve may be mechanically agitated in accordance with the guidance provided [below]:

    - To avoid preconditioning the check valves, obtain as-found test results and declare the valve(s) inoperable as required. Use other methods to try to seat the valve prior to use of mechanical agitation such as variance of pressure or venting.

    - Visually inspect the valve body prior to the use of mechanical agitation and record any pre-existing damage, markings, or defects.

    - Mechanical agitation of the check valve is to be performed by tapping the valve body using a 15-pound (maximum), flat faced, or rounded, rubber or dead blow hammer swung approximately 120 degrees about the elbow WITHOUT excessive use of the body to accelerate the hammer head. The diameter of the hammer face shall be ½ inch or greater.

    - The surface to be mechanically agitated shall NOT include valve bolting or flanges. Only the lower two-thirds of the valve body shall be struck.

    - The valve shall be visibly inspected after the application of mechanical agitation to ensure no physical external damage to the check valve has occurred.

    - The valve shall only be struck one time with leakage reassessed prior to striking again.

    - Should mechanical agitation need to be reapplied, the hammer can be applied to different areas of the valve body above minimum force within the noted limitations above.

    - The valve shall be scheduled for disassembly during the next RFO following the application of mechanical agitation to inspect the valve for

damage and determine whether the agitation caused an adverse effect on valve performance.

- If the mechanically agitated check valve subsequently passes its seat leakage test, it shall be repaired or replaced during the next RFO.

- After mechanical agitation, the valve will be rested using normal test procedures. The incremental agitation and testing process may be repeated until seat leakage or closure test acceptance criteria are met, or if it is determined that corrective action is required.

  - If the seat leakage or closure test meets the acceptance criteria, then the PIV will be declared operable.
  - If the seat leakage or closure test does not meet the acceptance criteria, the PIV will be repaired or replaced during the outage of discovery.

- If a PIV needs to be mechanically agitated and subsequently passes the seat leakage or closure test, it will be repaired or replaced during the next affected unit's RFO.

- When the PIV is either repaired or replaced during the next outage, it must pass post-maintenance tests (including seat leakage test, as applicable) before being declared operable.

The NRC staff finds that these procedural controls will provide reasonable assurance that mechanical agitation will prevent damage to the valve and injury to personnel.

The NRC staff provided a request for additional information (RAI) to clarify several aspects of Alternative Request V-1. In its RAI response dated May 7, 2024, the licensee clarified that the components to which this request applies are the 12 (6 per unit) 6-inch Velan swing check valves installed in the SI system at SPS.

In its RAI response dated May 7, 2024, the licensee provided detailed information regarding the maintenance history of the subject PIVs. Overall, the licensee indicated that the PIVs have historically proved to be reliable in performing their open and close safety functions and have only experienced seating issues for the close function during leakage testing. The licensee reported that no issues have been identified with the PIVs performing their open safety function. The licensee stated that currently there are no active preventative maintenance tasks in place for these valves because they have proven to be reliable in performing their safety functions, and are not subject to inservice conditions that would cause degradation or wear of the valve internals. The NRC staff finds the subject PIVs within the scope of Alternative Request V-1 at SPS to have acceptable maintenance history to support the requested alternative.

Alternative Request V-1 specifies that mechanical agitation of the subject PIVs described in the alternative request is not a repair or replacement activity. The NRC staff agrees with this characterization with respect to the mechanical agitation method specified in Alternative Request V-1 for the subject PIVs at SPS. The licensee further stated that prior to using mechanical agitation, as-found test results will be obtained and other measures such as varying pressure or venting will be applied, where possible, to seat the check valve. The NRC staff agrees with this approach, as it does not introduce the potential for unacceptable preconditioning of the applicable PIVs by the use of the mechanical agitation method.

The NRC staff reviewed the engineering assessment provided in the attachment to Alternative Request V-1, in the letter dated October 12, 2023, for the subject PIVs at SPS that evaluated seating the PIVs and the structural impact of the mechanical agitation. The NRC staff compared the SPS engineering plant-specific assessment to the mechanical agitation method that the staff approved for Sequoyah, Units 1 and 2, in NRC safety evaluation dated September 29, 2022 ADAMS ML22263A375). The NRC staff finds that the SPS licensee applied a similar assessment plant-specific methodology to that used in the TVA request. For example, the SPS licensee estimated localized stress using Roark's Formulas for Stress and Strain, a method which the NRC staff finds to be acceptable as proposed for this application. The NRC staff determined that calculated induced stress is very low compared to the allowable stress based on the SPS licensee's assessment. Further, the SPS submittal noted that the Velan valve company had no concern for potential valve damage as a consequence of the method proposed for mechanical agitation of these valves. The NRC staff finds that the licensee's proposed method for mechanical agitation of the subject PIVs at SPS is reasonable and provides sufficient plant-specific justification and guidance for implementation. The NRC staff also notes that the provisions for mechanical agitation, as supplemented, sufficiently address any differences with the cited precedents. For example, Alternative Request V-1 (as supplemented by the RAI response) specifies the use of a 15-pound (maximum), flat faced, or rounded, rubber or dead blow hammer and minimum hammer diameter for mechanical agitation of the subject PIVs at SPS.

Based on the above, the NRC staff finds that a hardship or unusual difficulty exists without a compensating increase in the level of quality and safety to perform the specified ASME OM Code requirements for the subject PIVs when their seat leakage cannot be mitigated by typical means and could lead to significant maintenance, personnel radiation exposure, and startup delays. The NRC staff evaluated whether the licensee adequately specified the provisions of the mechanical agitation method requested to be authorized for the PIVs within the scope of Alternative Request V-1 for SPS. The staff also evaluated whether the licensee demonstrated that the stress induced in the subject PIVs during the mechanical agitation method to be implemented under Alternative Request V-1 will not damage the valve body or cause localized deformation, nor endanger plant personnel performing the mechanical agitation of the subject PIVs. As indicated by the licensee, all steps taken to apply mechanical agitation as described in Alternative Request V-1 for the subject PIVs will be included in plant procedures at SPS. The NRC staff finds that the licensee has provided reasonable assurance that the subject PIVs will be capable of performing their safety functions following the mechanical agitation method described in Alternative Request V-1. As a result, the NRC staff finds that Alternative Request V-1 satisfies 10 CFR 50.55a(z)(2) for the subject PIVs at SPS.

4.0 CONCLUSION

Based on the above, the NRC staff concludes that the licensee has provided sufficient justification for its proposed mechanical agitation method described in Alternative Request V-1 to be applied if a PIV within the scope of the request fails its OM Code-required leakage test as an alternative to the applicable requirements in the ASME OM Code (2020 Edition) as incorporated by reference in 10 CFR 50.55a. The staff finds that the proposed alternative as specified in Alternative Request V-1 will provide reasonable assurance of the operational readiness of the applicable PIVs until the next refueling outage when repair and replacement activities will be conducted. The NRC concludes that compliance with the applicable ASME OM Code requirements would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the

licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(2) for Alternative Request V-1. Therefore, the NRC staff authorizes the use of Alternative Request V-1 (as supplemented) at SPS for the Sixth IST Interval, which is scheduled to begin on May 10, 2025, and ends May 9, 2034.

All other ASME OM Code requirements as incorporated by reference in 10 CFR 50.55a for which relief or an alternative was not specifically requested, and granted or authorized (as appropriate), in the subject request remain applicable.

Principal Contributors: Nicholas Hansing, NRR
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Dated: August 12, 2024

SUBJECT: SURRY POWER STATION, UNIT NOS. 1 AND 2 – PROPOSED ALTERNATIVE RELIEF REQUEST V-1 INSERVICE TESTING OF PRESSURE ISOLATION VALVES (EPID L-2023-LLR-0060) DATED AUGUST 12, 2024

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