



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

February 28, 2019

Mr. Daniel G. Stoddard
Senior Vice President and
Chief Nuclear Officer
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION UNIT NO. 1 - RELIEF REQUESTS REGARDING EXAMINATION COVERAGE FOR PRESSURIZER NOZZLE INNER RADIUS SECTION AND CERTAIN STAINLESS STEEL PIPING WELDS (S1-I5-LMT-C01 AND S1-I5-LMT-P01) (EPID L-2018-LLR-0041)

Dear Mr. Stoddard:

By letter dated March 21, 2018, as supplemented by letter dated July 25, 2018, Virginia Electric and Power Company (Dominion Energy Virginia, the licensee) submitted two requests, S1-I5-LMT-C01 and S1-I5-LMT-P01, respectively, for relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. The relief requests pertain to examination coverage of ASME Class 1 pressurizer nozzle inner radius section and certain stainless steel piping welds achieved during the fifth 10-year inservice inspection (ISI) interval at the Surry Power Station (SPS) Unit No. 1.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), the licensee requested relief from the required examination coverage and approval to use alternative methods for inspection of Category B-D, Item No. B3.120 (Pressurizer Nozzle Inner Radius Section of the pressurizer nozzle) and Category R-A, Item No. R1.20 (austenitic pipe to valve welds), respectively, on the basis that the ASME Code requirements are impractical.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the relief requests and concludes, as set forth in the enclosed safety evaluation, that it is impractical for the licensee to comply with the requirements of the ASME Code, Section XI. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55(g)(5)(iii) and is in compliance with the ASME Code's requirements. The NRC staff determines that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Therefore, the NRC grants relief requests S1-I5-LMT-C01 and S1-I5-LMT-P01 at Surry Power Station Unit No. 1, for the fifth 10-year ISI interval, which commenced on December 14, 2013, and will end on October 13, 2023.

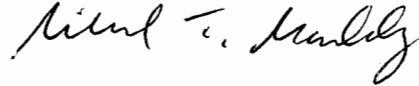
All other ASME Code, Section XI requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including the third-party review by the Authorized Nuclear Inservice Inspector.

D. Stoddard

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If you have any questions, please contact Karen Cotton at (301) 415-1438, or via email at karen.cotton@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael T. Markley". The signature is written in a cursive style with a large initial "M".

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

Docket No. 50-280

Enclosure: Safety Evaluation

cc: via Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUESTS S1-I5-LMT-C01 AND S1-I5-LMT-P01

REGARDING EXAMINATION COVERAGE FOR PRESSURIZER NOZZLE INNER RADIUS

SECTION AND CERTAIN STAINLESS STEEL PIPING WELDS

FIFTH 10-YEAR INSERVICE INSPECTION INTERVAL

DOMINION ENERGY VIRGINIA

SURRY POWER STATION UNIT NO. 1

DOCKET NO. 50-280

1.0 INTRODUCTION

By letter dated March 21, 2018, as supplemented by letter dated July 25, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML18086A029 and ML18212A219, respectively), Virginia Electric and Power Company (Dominion Energy Virginia, the licensee) submitted two requests, S1-I5-LMT-C01 and S1-I5-LMT-P01, respectively, for relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. The relief requests pertain to examination coverage of ASME Class 1 pressurizer nozzle inner radius section and certain stainless steel piping welds achieved during the fifth 10-year in service inspection (ISI) interval at the Surry Power Station (SPS) Unit No. 1.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), the licensee requested relief from the required examination coverage and approval to use alternative methods for inspection of Category B-D, Item No. B3.120 (Pressurizer Nozzle Inner Radius Section of the pressurizer nozzle) and Category R-A, Item No. R1.20 (austenitic pipe to valve welds), respectively, on the basis that the ASME Code requirements are impractical.

2.0 REGULATORY EVALUATION

Paragraph 10 CFR 50.55a(g)(1) states that for a boiling or pressurized water-cooled nuclear power facility whose construction permit was issued before January 1, 1971, components (including supports) must meet the requirements of paragraphs (g)(4) and (g)(5) of this section to the extent practical.

Adherence to Section XI of the ASME Code is mandated by 10 CFR 50.55a(g)(4), which states, in part, that ASME Code Class 1, 2, and 3 components will meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in ASME Code, Section XI.

Paragraph 10 CFR 50.55a(g)(5)(iii) states that if the licensee has determined that conformance with an ASME Code requirement is impractical for its facility, the licensee must notify the U.S. Nuclear Regulatory Commission (NRC) and submit, as specified in 10 CFR 50.4, information to support the determinations. Determinations of impracticality in accordance with this section must be based on the demonstrated limitations experienced when attempting to comply with the ASME Code requirements during the ISI interval for which the request is being submitted.

Paragraph 10 CFR 50.55a(g)(5)(iv) requires that where an examination requirement by the ASME Code or Addenda is determined to be impractical by a licensee, the basis for this determination must be demonstrated to the satisfaction of the Commission not later than 12 months after the expiration of the initial 120-month period of operation from the start of facility commercial operation and each subsequent 120-month period of operation during which the examination is determined to be impractical.

Paragraph 10 CFR 50.55a(g)(6)(i) states in part that the Commission will evaluate determinations, under paragraph 10 CFR 50.55a(g)(5), that ASME Code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law.

Based on the above, and subject to the following technical evaluation, the NRC staff concludes that regulatory authority exists for the NRC to grant relief and the use of a proposed alternative.

3.0 TECHNICAL EVALUATION

3.1 Relief Request S1-I5-LMT-C01

3.1.1 Licensee's Relief Request

Applicable Code Edition and Addenda

The Fifth 10-year ISI interval program at Surry Power Station Unit No. 1 was based on the 2004 Edition of ASME Code, Section XI. The Appendix VIII examinations were performed using the 2001 Edition of ASME Code Section XI.

Applicable Code Requirements

Paragraph 10 CFR 50.55a(2)(xxi) requires the use of the 1998 Edition of requirements of ASME Section XI for pressurizer nozzle inner radius examinations. These requirements are described in Table IWB-2500-1, Examination Category B-D, Items B3.120 and B3.140. To meet these requirements the licensee must perform an ultrasonic examination or enhanced visual examination from the inner diameter.

ASME Code Components Affected

The component described in this relief request is the inner radius section, ASME Category B-D, Item No. B3.120 of the Surry pressurizer nozzle designated weld number 18NIR. The nozzle

connects to a pressurizer safety valve at the top of the pressurizer and is constructed from SA-216 cast carbon steel. The inner radius is clad with stainless steel.

Impracticality of Compliance

The licensee is requesting relief on the basis that the ASME Code, Section XI “essentially 100%” volumetric examination coverage requirements for this component are impractical due to physical obstructions. In order to maintain compliance with the applicable volumetric examination requirements in ASME Code, Section XI, the licensee would have to remove the insulation support structure. Removing the structure would require cutting the structure and could damage nearby components.

Basis for Relief

The licensee has performed the ASME Code, Section XI-required examinations to the maximum extent practical. Due to the physical interferences causing these limitations, there are no alternative examination techniques currently available to increase coverage.

Duration of Alternative

The proposed alternative is applicable to the fifth 10-year ISI interval, which began on December 14, 2013 and is currently scheduled to end on October 13, 2023.

3.1.2 NRC Staff Evaluation

The ASME Code requires 100 percent volumetric examination for the pressurizer nozzle inner radius sections. Obtaining 100 percent volumetric coverage for the nozzle inner radius section is prevented by the insulation support structure. To achieve 100 percent coverage, the insulation support structure would require removal and design modifications. Removal of the insulation support structure would risk damaging cross supports and nearby welded connections. Therefore, obtaining 100 percent of ASME Code-required volumetric examinations for the nozzle inner radius section is considered impractical.

The requirement for examinations of inner nozzle radii is associated with the discovery of cracks located in the inner radius section of feedwater nozzles in the 1970's and 1980's. The cracks were identified as thermal fatigue from internal water temperature fluctuation. In this safety evaluation the staff considered the likelihood of this degradation mechanism on the inner radius of the main steam outlet nozzle.

The 18NIR nozzle inner radius section is located at the top of the pressurizer. During plant operations, this location is subjected to a relatively constant temperature. The primary temperature fluctuations are associated with reactor heat up and cool down, and these are controlled for the thermal effects on components.

The ultrasonic exams were conducted in accordance with ASME Code, Section XI, Appendix VIII. The licensee's submittal provides coverage plots showing where they were not able to obtain coverage. The total coverage was calculated by averaging the coverages obtained for each scan in each direction. The licensee was able to obtain 81.67% coverage of the nozzle inner radius section.

The licensee has shown that it is impractical to meet the ASME Code, Section XI-required volumetric examination coverage for the nozzle inner radius section due to the insulation support structure. Given the coverage obtained and the operational experience for these components, the NRC staff has determined that the ultrasonic examinations performed, despite the limitations in coverage, provide reasonable assurance of the leak tightness and structural integrity of the nozzle inner radius section. Based on the above, the NRC staff concludes that obtaining the required ASME Code volumetric coverage is impractical in accordance with 50.55a(g)(5)(iii).

3.2 Relief Request S1-I5-LMT-P01

3.2.1 Licensee's Relief Request

Applicable Code Edition and Addenda

The fifth 10-year ISI interval program at Surry Power Station Unit No. 1 is based on ASME Code, Section XI, 2004 Edition. The Appendix VIII examinations were performed using the 2001 Edition of ASME Code Section XI.

Applicable Code Requirements

A volumetric examination of "essentially 100%" of the length of the Risk-Informed ISI (RI-ISI) welds is required in Examination Category R-A, Item Nos. R1.11 and R1.20, per Table 1 of ASME Code Case N-716-1.

The licensee has adopted ASME Code Case N-460 ("Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1"), which defines "essentially 100%" as greater than 90% coverage of the examination volume or surface area, as applicable. ASME Code Case N-460 is an alternative approved for use by the NRC in Regulatory Guide 1.147, Revision 18, "Inservice Inspection Code Case Acceptability."

ASME Code Components Affected

The welds covered by the relief request S1-I5-LMT-P01 are Class 1 Inspection Category R-A, Item No. R1.20, as defined in ASME Code Case N-716-1. All four welds are austenitic pipe to valve welds and the limitations are caused by the geometry of the pipe-to-valve weld configuration. To date, no ultrasonic inspection procedure has succeeded in qualifying for single-sided inspections of austenitic stainless steel welds. The welds and coverage obtained for the welds are described in Table 1. The coverage obtained includes the volume of the weld inspected using ASME Code, Section XI, Appendix VIII-qualified procedures, equipment, and personnel. The "best effort" coverage is the region of the weld inspected but is outside the range of the qualified inspection volume.

Table 1: Welds covered in relief request S1-I5-LMT-P01

Weld ID	Qualified Coverage Achieved	Best Effort Coverage
2-17B	50%	20.75%
2-18B	50%	20.75%
1-18A	50%	12.50%
1-19A	50%	20.75%

Impracticality of Compliance

The licensee is requesting relief on the basis that the ASME Code, Section XI “essentially 100%” volumetric examination coverage requirements for these components are impractical due to physical obstructions and/or component geometry. In order to maintain compliance with the applicable volumetric examination requirements in ASME Code, Section XI, the licensee would have to redesign and refabricate the subject and/or surrounding components.

Basis for Relief

The licensee has performed the ASME Code, Section XI-required examinations to the maximum extent practical or best effort. Due to the physical interferences causing these limitations, there are no alternative examination techniques currently available to increase coverage.

Duration of Alternative

The proposed alternative is applicable to the fifth 10-year ISI interval, which began on December 14, 2013 and will end on October 13, 2023.

3.2.2 NRC Staff Evaluation

Items No. R1.20 in Examination Category R-A of ASME Code Case N-716-1 require a volumetric examination of “essentially 100%” of RI-ISI welds. Obtaining “essentially 100%” volumetric coverage for the welds in Table 1 is prevented by component geometry. To achieve “essentially 100%” coverage, the weld and piping would require design modifications. This would place a burden on the licensee by causing significant engineering, material, and installation costs to perform such modifications without a compensating increase in the level of quality and safety. Therefore, obtaining 100 percent of ASME Code-required volumetric examinations for the subject welds is considered impractical.

The ultrasonic exams were conducted in accordance with ASME Code, Section XI, Appendix VIII. The licensee’s submittal provides coverage plots for each scan and a list of the coverage obtained by each scan. The total coverage was calculated by averaging the coverages obtained for each scan in each direction. After reviewing the licensee’s coverage plots and calculations, the NRC staff determined that, due to the configuration of the pipe to valve welds, the licensee obtained the maximum practical volumetric coverage of the welds. Given the coverage obtained and the operational experience for these components, the NRC staff has determined that the ultrasonic examinations performed, despite the limitations in coverage, provide reasonable assurance of the leak tightness and structural integrity of welds 2-17B, 2-18B, 1-18A, and 1-19A.

Based on the above, the NRC staff concluded that obtaining the required ASME Code volumetric coverage would impose an unnecessary burden on the licensee and is impractical in accordance with 50.55a(g)(5)(iii).

4.0 CONCLUSION

As set forth above, the NRC staff concludes that it is impractical for the licensee to comply with the requirements of the ASME Code, Section XI. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(5)(iii) and is in compliance with the ASME Code’s requirements. The NRC

staff determines that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Therefore, the NRC grants relief requests S1-I5-LMT-C01 and S1-I5-LMT-P01 at Surry Power Station Unit No. 1, for the fifth 10-year ISI interval, which commenced on December 14, 2013 and will end on October 13, 2023.

All other ASME Code, Section XI requirements for which relief was not specifically requested and authorized herein by the staff remain applicable, including the third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor, S.Cumblidge, NRR/DMLR/MPHB

SUBJECT: SURRY POWER STATION UNIT NO. 1 - RELIEF REQUESTS REGARDING EXAMINATION COVERAGE FOR PRESSURIZER NOZZLE INNER RADIUS SECTION AND CERTAIN STAINLESS STEEL PIPING WELDS (S1-I5-LMT-C01 AND S1-I5-LMT-P01) (EPID L-2018-LLR-0041) DATED FEBRUARY 28, 2019

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