



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

November 25, 2014

Mr. David A. Heacock
President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Blvd.
Glenn Allen, VA 23060

SUBJECT: SURRY POWER STATION, UNIT NO 1 - FIFTH 10-YEAR INSERVICE
INSPECTION PROGRAM RELIEF REQUEST S1-I5-ISI-02 (TAC NO. MF3200)

Dear Mr. Heacock:

By letter dated November 26, 2013, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13336A142), as supplemented by letter dated May 20, 2014 (ADAMS Accession No. ML14148A166), Virginia Electric and Power Company (Dominion), (the licensee), submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for relief from inspection requirements for the fifth 10-year Inservice Inspection Program for Surry Power Station, Unit 1 (Surry).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii), the licensee submitted request for relief number S1-I5-ISI-02 proposing an alternative to the weld examination requirements specified in the 1998 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Table IWB-2500-1, explicitly required for use by the condition in 10 CFR 50.55a(b)(2)(xxi) for Category B-D, Item B3.120, components. The requirements pertain to volumetric examination and the alternative enhanced visual examination of the nozzle inner radius section of the integrally cast pressurizer surge line nozzle at Surry. The basis for the alternative is that complying with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The NRC staff has determined that authorizing the use of the alternative presented in relief request S1-I5-ISI-02 provides reasonable assurance of structural integrity and leak tightness, and that complying with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concluded that the licensee has adequately addressed all of the regulatory requirements set forth in 10.CFR 50.55a(a)(3)(ii). Therefore, the NRC authorizes relief pursuant to 10 CFR 50.55a(a)(3) for the fifth 10-year inservice inspection interval at Surry Power Station, Unit 1, which is currently scheduled to end on October 13, 2023.

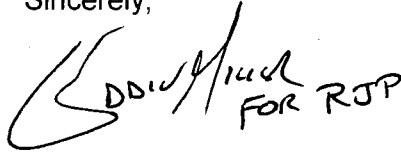
All other ASME Code, Section XI requirements for which relief was not specifically requested and authorized in the subject proposed alternative remain applicable, including third-party review by the Authorized Nuclear In-service Inspector.

D. Heacock

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If you have any questions, please contact the Project Manager, Karen Cotton at 301-415-1438 or via e-mail at Karen.Cotton@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "R. Pascarelli" with a stylized flourish. Below the signature, the text "FOR RJP" is written in a similar hand.

Robert Pascarelli, Chief
Plant Licensing Branch 2-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No: 50-280

Enclosure:
Safety Evaluation

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR RELIEF REQUEST NO. S1-I5-ISI-02

FIFTH 10-YEAR INSERVICE INSPECTION INTERVAL

VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION, UNIT 1

DOCKET NO. 50-280

1.0 INTRODUCTION

By letter dated November 26, 2013, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13336A142), as supplemented by letter dated May 20, 2014 (ADAMS Accession No. ML14148A166), Virginia Electric and Power Company (Dominion), the licensee, submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for relief from inspection requirements for the fifth 10-year Inservice Inspection (ISI) Program for Surry Power Station, Unit 1 (Surry).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii), the licensee submitted a relief request (RR) for S1-I5-ISI-02 proposing an alternative to the weld examination requirements specified in the 1998 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Table IWB-2500-1, explicitly required for use by the condition in 10 CFR 50.55a(b)(2)(xxi) for Category B-D, Item B3.120, components. The requirements pertain to volumetric examination and the alternative enhanced visual examination of the nozzle inner radius (NIR) section of the integrally cast pressurizer surge line nozzle at Surry. The basis for the alternative is that complying with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

By letter dated November 26, 2013, the licensee has requested relief from weld examination requirements specified in the 1998 Edition of the ASME Code, Section XI. The 10 CFR 50.55a(g)(4)(ii) states, in part, that inservice examination of components conducted during 120-month intervals must comply with the latest edition and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) twelve months before the start of the 120-month inspection interval or the optional ASME Code cases listed in NRC Regulatory Guide 1.147.

The 10 CFR 50.55a(a)(3) states, in part, that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee demonstrates that (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the

Enclosure

specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Based on analysis of the regulatory requirements, the NRC staff concludes that regulatory authority exists to authorize the proposed alternative pursuant to 10 CFR 50.55a(a)(3)(ii).

3.0 TECHNICAL EVALUATION

3.1 The Licensee's Relief Request

Component Affected

ASME Code Class:	1
Examination Category:	B-D
Item No.:	ASME Code, Section XI, Item B3.110 (2004 Edition) ASME Code, Section XI, Item B3.120 (1998 Edition)
ISI Component ID:	PZR Surge Line Nozzle 1-RC-E-2, Weld 23NIR
Description:	Nozzle Inner Radius Section (Pressurizer Surge Nozzle)

ASME Code Requirements

The current Code of Record for Surry is the 2004 Edition of the ASME Code with no addenda. The Surry fifth 10-year ISI interval started on December 14, 2013, and is currently scheduled to end on October 13, 2023.

The 2004 Edition of ASME Code, Section XI, Table IWB-2500-1, Category B-D, Item B3.110, requires a volumetric examination of Pressurizer Surge Line Nozzle-to-Vessel Weld. The 2004 Edition of Section XI does not require an examination of the pressurizer surge NIR. However, 10 CFR 50.55a(b)(2)(xxi)(A) mandates use of the 1998 Edition of Section XI for the examination requirements of full penetration welded nozzles in vessels.

Category B-D, Item B3.120 of Table IWB-2500-1 in the 1998 Edition of the ASME Code, Section XI requires a volumetric examination of the NIR section of the pressurizer surge nozzle; however, 10 CFR 50.55a(b)(2)(xxi)(A) allows an enhanced visual testing (VT-1) on the inside surface in lieu of a volumetric requirement that is performed from the outside surface.

The Licensee's Alternative and Basis for Relief Request

The licensee's proposal is for the pressurizer surge line nozzle-to-vessel inner radius section to be examined as part of the normally scheduled Class 1 system leakage tests each refueling. The surveillance requirements of technical specifications (TSs) that determine the reactor coolant system leak rate and the containment atmosphere radioactivity will be met as part of normal reactor operation.

The pressurizer surge line nozzle is located under the pressurizer skirt and is surrounded by 78 heater penetrations. The insulation and cables for the pressurizer heaters, the heater penetrations and cables, and the pressurizer skirt restrict access to the nozzle. The integrally cast nozzles have an irregular profile, a rough surface which can interfere with ultrasonic

inspections. Any ultrasonic examination on this nozzle was described as "best effort" by the licensee.

A remote visual inspection would only achieve partial coverage. This examination would be partially obscured by the thermal sleeves, which extends beyond the inside radius area into the volume of the pressurizer.

The licensee estimated the dose to perform the nozzle inner radius inspections in the letter dated May 20, 2014. The dose estimate is 56 man-rem if all 78 heater cables have to be disconnected and pulled back. Temporary shielding is considered impractical in this situation because placement of the shielding material would obstruct, and potentially preclude, accessibility to the examination surface.

Westinghouse performed an evaluation to address the impact of operational transients for Surry to account for insurge/outsurge transients in addition to design transients in the pressurizer lower head. The evaluation is documented in Dominion Technical Report: LR-1020/LR-2020, "License Renewal Project Time-Limited Aging Analyses Review" and in Westinghouse WCAP-15607, "Evaluation of Pressurizer Insurge/Outsurge for Surry and North Anna," (Proprietary Class 2).

The results of the Westinghouse evaluation show that the Cumulative Usage Factor (CUF) for the surge line NIR is 0.29 (inside surface) and 0.11 (outside surface). The CUF estimates are based upon the number of design basis cycles for the pressurizer, which is 200 cycles. The number of cycles is tracked over the lifetime of the plant. As noted in the Surry Updated Final Safety Analysis Report, Section 4.1.4, the 200-cycle estimate has been retained for the 60-year renewed operating license period. These CUFs are considerably less than the design limit of 1.0, showing a low potential for failure in this area.

3.2 NRC Staff Evaluation

The licensee is proposing to perform VT-2 examinations of Pressurizer Surge Line Nozzle-to-Vessel Weld as part of the normally scheduled ASME Code, Class 1, system leakage test each refueling outage in lieu of the ASME Code and 10 CFR 50.55a(b)(2)(xxi)(A) requirements. The licensee has stated that in order for the licensee to volumetrically examine Pressurizer Surge Line Nozzle-to-Vessel Weld and pressurizer NIR section, it would have to remove the insulation and heater cables exposing the licensee's personnel to an estimated dose of 56 man-REM and the potential for personnel contamination from newly exposed surfaces.

The requirements for examinations of inner nozzle radii were developed in the ASME Code in reaction to the discovery of thermal fatigue cracks in the inner-radius section of boiling water reactor feedwater nozzles. These thermal fatigue cracks were the result of internal water temperature fluctuations in the feedwater system. The NRC staff is unaware of any operating experience involving degradation (i.e., indications) in pressurizer NIR sections or for any reactor or steam generator NIR sections at pressurized water reactor plants.

The calculated CUF of the surge line NIR for the design basis 200 cycles during the life of the plant is 0.29 (inside surface) and 0.11 (outside surface), which are considerably less than the design limit of 1.0.

The licensee provided evidence of the last 11 VT-2 examinations with no indication of leakage. Furthermore, the licensee has an active Boric Acid Corrosion Control Program that identifies and monitors borated water leakage to prevent boric acid-related degradation of the reactor coolant system. The Surry TS surveillance requirements regarding reactor coolant system leak rate and the containment atmosphere radioactivity will further ensure the integrity of the pressurizer surge line nozzle.

The NRC staff finds that the ultrasonic examination limitations described by the licensee (obstructions to search unit manipulation and coverage, irregular outer diameter (O.D.) profile, rough surface coupling condition and attenuating grain structure) would likely limit the volumetric examination coverage to below the ASME Code requirement of "essentially 100 percent" and require a relief request through 10 CFR 50.55a(g)(5)(iii) for the missed coverage. Additionally, based on the description of the pressurizer access provided in the licensee's submittal, the alternative VT-1 examination with a remote visual technology would have a limited coverage.

The NRC staff also finds that in order for the licensee to volumetrically examine Pressurizer Surge Line Nozzle-to-Vessel Weld and pressurizer NIR section, it would have to remove the insulation and heater cables exposing the licensee's personnel to an estimated dose of 56 man-REM and the potential for personnel contamination from newly exposed surfaces. The NRC staff also finds that use of temporary shielding to mitigate exposure would be impractical because the shielding material would further obstruct the examination surface. These issues pose a hardship on the licensee.

Therefore, the NRC staff determined, based on the above, the ASME Code-required volumetric examination and/or the optional visual examination discussed in 10 CFR 50.55a(b)(2)(xxi)(A) would impose a hardship on the licensee without a compensating increase in quality and safety. The NRC staff has determined that the required system leakage test, the Boric Acid Corrosion Control Program, the reactor coolant leak detection systems, and the low component CUF, and no industry operational experience of pressurizer NIR material degradation provide reasonable assurance of structural integrity and leak tightness.

4.0 CONCLUSION

As set forth above, the NRC staff determines that authorizing the use of the alternative presented in relief request S1-I5-ISI-02 provides reasonable assurance of structural integrity and leak tightness, and that complying with the specified requirement would result in 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(a)(3)(ii). Therefore, the NRC authorizes relief pursuant to 10 CFR 50.55a(a)(3) for the fifth 10-year ISI interval at Surry Power Station, Unit 1, which is currently scheduled to end on October 13, 2023.

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

Principal Contributor: Stephen Cumblidge

Date of issuance: November 25, 2014

D. Heacock

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If you have any questions, please contact the Project Manager, Karen Cotton at 301-415-1438 or via e-mail at Karen.Cotton@nrc.gov.

Sincerely,

/RA/ G. Edward Miller for

Robert Pascarelli, Chief
Plant Licensing Branch 2-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No: 50-280

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Safety Evaluation

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