



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

January 18, 2011

Mr. David A. Heacock
President and Chief Nuclear Officer
Dominion Nuclear Connecticut, Inc.
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION, UNIT NO. 2 – ISSUANCE OF RELIEF
REQUEST RR-04-06 REGARDING USE OF PERFORMANCE
DEMONSTRATION INITIATIVE QUALIFIED PROCEDURES, PERSONNEL
AND EQUIPMENT (TAC NO. ME4474)

Dear Mr. Heacock:

By letter dated July 29, 2010, as supplemented by letter dated August 5, 2010 (Agencywide Document Access and Management System (ADAMS) Accession Nos. ML102580204 and ML102220527, respectively), Dominion Nuclear Connecticut, Inc. (DNC or the licensee), submitted relief requests for the fourth 10-year inservice inspection (ISI) interval program at Millstone Power Station, Unit No. 2 (MPS2). DNC requested the use of alternatives to certain American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI requirements. Included in this submittal was Relief Request RR-04-06. Relief Request RR-04-06 proposes the use of Performance Demonstration Initiative (PDI) qualified procedures for the performance of the ultrasonic testing examination of the reactor pressure vessel shell-to-flange weld in accordance with ASME Code, Section XI, Division 1, 2001 Edition, No Addenda, Appendix VIII, Supplements 4 and 6. Each relief request contained in the July 29, 2010, submittal will be addressed separately.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that the proposed alternative provides reasonable assurance of satisfactory ultrasonic testing examination of the reactor pressure vessel shell-to-flange weld, performed from the vessel side of the weld, and that the use of PDI qualified procedures as an alternative provides an acceptable level of quality and safety.

Therefore, pursuant to Title 10 of the *Code of Federal Regulations* Part 50, Section 50.55a(a)(3)(i), the NRC authorizes the use of RR-04-06 for the RPV Shell-to Flange weld No. FS-1 for the remainder of the fourth 10-year ISI interval at MPS2. The fourth 10-year ISI interval began on April 1, 2010, and is scheduled to be completed on March 31, 2020.

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

D. Heacock

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If you have any questions, please contact the Project Manager, Carleen Sanders, at 301-415-1603.

Sincerely,

A handwritten signature in black ink, appearing to read "H. Chernoff". The signature is written in a cursive style with a small "for" written below the main signature.

Harold K. Chernoff, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosure:
As stated

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL

RELIEF REQUEST RR-04-06

MILLSTONE POWER STATION UNIT NO. 2

DOMINION NUCLEAR CONNECTICUT, INC.

DOCKET NUMBER 50-336

1.0 INTRODUCTION

By letter dated July 29, 2010, as supplemented by letter dated August 5, 2010 (Agencywide Document Access and Management System (ADAMS) Accession Nos. ML102580204 and ML102220527, respectively), Dominion Nuclear Connecticut, Inc. (DNC or the licensee), submitted relief requests for the fourth 10-year inservice inspection (ISI) interval program at Millstone Power Station, Unit No. 2 (MPS2). DNC requested the use of alternatives to certain American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI requirements. Included in this submittal was Relief Request RR-04-06. Relief Request RR-04-06 proposes the use of Performance Demonstration Initiative (PDI) qualified procedures for the performance of the ultrasonic testing (UT) examination of the reactor pressure vessel (RPV) shell-to-flange weld in accordance with ASME Code, Section XI, Division 1, 2001 Edition, No Addenda, Appendix VIII, Supplements 4 and 6.

This relief is requested for the fourth 10-year inservice inspection (ISI) interval which began on April 1, 2010 and ends on March 31, 2020.

2.0 REGULATORY EVALUATION

The ISI of ASME Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g), except where specific relief has been granted by the U.S. Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states 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 specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations

Enclosure

of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

3.0 TECHNICAL EVALUATION

3.1 Applicable Code Edition and Addenda

The ASME Code of Record for the fourth 10-year ISI program at MPS2 is the 2004 Edition, No Addenda, Division 1, Section XI. The fourth 10-year ISI interval for MPS2 began on April 1, 2010, and is scheduled to end on March 31, 2020.

In addition, as required by 10 CFR 50.55a(b)(2)(xv), licensees which use a later Edition and Addenda than the 2001 Edition of the ASME Code, shall use the 2001 Edition of Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems."

3.2 Components for Which Relief is Requested

ASME Code Class 1, Examination Category B-A, Item Number B1.30, RPV shell-to-flange weld No. FS-1.

3.3 Code Requirements

ASME Code, Section XI, Table IWB-2500 requires the RPV shell-to-flange be volumetrically examined.

ASME Code, Section XI, Subsection IWA-2232 requires UT examinations be performed in accordance with Mandatory Appendix I. Paragraph I-2110(b) of Mandatory Appendix I requires that examination of the RPV shell-to-flange welds be conducted in accordance with ASME Code, Section V, Article 4, as supplemented by requirements of Table I-2000-1.

3.4 Licensee's Proposed Alternative and Basis for Use (as stated)

Dominion Nuclear Connecticut, Inc. (DNC) proposes to perform UT examinations of the RPV shell-to-flange weld [from the vessel side of the weld] using procedures, personnel, and equipment that have been demonstrated and qualified in accordance with ASME Code, Section XI, 2001 Edition (No Addenda), Appendix VIII, Supplements 4 and 6 as amended by 10 CFR 50.55a and industry's PDI Program. Since the examinations will be performed from a single side due to the weld configuration, all procedures, personnel, and equipment will be qualified for single sided access for examination of these welds.

Appendix VIII requirements were developed and adopted to ensure the effectiveness of UT examinations within the nuclear industry by means of a rigorous, item specific performance demonstration containing flaws of various

sizes, locations and orientations. The PDI process has established with a high degree of confidence, the capability of personnel, procedures, and equipment to detect and characterize flaws that could be detrimental to the structural integrity of the RPV. The PDI approach has demonstrated that for detection and characterization of flaws in the RPV the UT examination techniques are equal to, or surpass the requirements of the ASME Section V, Article 4 UT examination requirements. Though Appendix VIII is not required for the RPV shell-to-flange weld examination, the use of Appendix VIII, Supplements 4 and 6 criteria for detection and sizing of flaws in this weld will be equal to or exceed the requirements of ASME Section V, Article 4. Therefore, the use of the proposed alternative will continue to provide an acceptable level of quality and safety, and approval is requested pursuant to 10 CFR 50.55a(a)(3)(i).

3.5 Duration of Proposed Alternative

The proposed alternative is requested for the duration of the fourth 10-year ISI interval for MPS2.

3.6 NRC Staff Evaluation

The ASME Code requires that ultrasonic examination of shell-to-flange welds in vessels greater than 2 inches in thickness be conducted in accordance with ASME Code, Section V, Article 4, as supplemented by requirements in Table I-2000-1. ASME Code, Section V, Article 4 provides a prescriptive process for qualifying UT procedures and performing examinations. As an alternative, DNC proposes to use procedures and personnel qualified in accordance with performance-based criteria listed in the ASME Code 2001 Edition, No Addenda, Section XI, Appendix VIII, Supplements 4 and 6, as modified by 10 CFR 55a(b)(2)(xv) and implemented by the industry's PDI program. These performance-based methods are currently required by 10 CFR 50.55a for examination of all other RPV shell welds (having replaced the Article 4 techniques).

Amplitude-based examination techniques such as the prescriptive UT procedures that comply with the requirements of Article 4 of ASME Code, Section V, are based on the amplitude of the returned signal and correlating that amplitude with an equivalent machined reflector such as a notch or a side-drilled hole. However, correlation between defect size and amplitude has been poor. This is not unexpected given the number of variables from the material, equipment and defect. The material has potential velocity and microstructure variations. The equipment has potential amplitude variations due to the type of pulser, frequency band, cabling, and other inherent electrical parameters. Ultrasonic examination is highly sensitive to defect orientation. Roughness, curvature, and location also play a role in the ability to detect and size defects.

When prescriptive UT procedures that comply with the requirements of Article 4 of ASME Code, Section V, were used in round robin tests containing real flaws in RPV mockups and the results statistically analyzed according to the screening criteria of ASME Code, Section XI, Appendix VIII, the procedures proved to be less effective than examinations that utilize Appendix VIII, Supplements 4 and 6, qualified procedures. Performance-based UT is generally applied with higher sensitivity, which increases the probability of detecting a flaw when compared to prescriptive Section V, Article 4 requirements. Procedures, equipment, and

personnel qualified through the PDI program have demonstrated their skill level to detect flaws common to nuclear power plants and have shown high probability of detection levels. This has resulted in an increased reliability of inspections for weld configurations subject to the requirements of Appendix VIII.

Due to the weld configuration, the examination will be performed from a single side. Therefore, all procedures, personnel, and equipment will be qualified for single-sided access for examination of the subject welds.

Based on the above discussion, the NRC staff concludes that the use of UT procedures and personnel qualified to the ASME Code 2001 Edition, No Addenda, Section XI, Appendix VIII, Supplement 4 and 6 requirements, as modified by 10 CFR 50.55a(b)(2)(xv) and demonstrated through the PDI program for the RPV shell-to-flange weld, provides equivalent or better examination results than those obtained from ASME Code, Section V requirements. Therefore, the NRC staff concludes that the proposed alternative provides an acceptable level of quality and safety.

4.0 CONCLUSION

Based on the discussion presented above, the NRC staff concludes that the licensee's proposed alternative, in relief request RR-04-06, provides equivalent or better examination results of the RPV shell-to-flange weld than those realized from the ASME Code, Section V requirements. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC authorizes the use of RR-04-06 for the RPV shell-to-flange Weld No. FS-1 for the remainder of the fourth 10-year ISI interval at MPS2. The fourth 10-year ISI interval began on April 1, 2010, and is scheduled to be completed on March 31, 2020.

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

Principal Contributor: C. Nove

Date: January 18, 2011

D. Heacock

- 2 -

If you have any questions, please contact the Project Manager, Carleen Sanders, at 301-415-1603.

Sincerely,

/ra/

Harold K. Chernoff, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosure:
As stated

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