



June 29, 2017

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Serial No. 17-234
NLOS/DEA R2'
Docket Nos.: 50-305
50-336/423
50-338/339
50-280/281
License Nos.: DPR-43
DPR-65/49
NPF-4/7
DPR-32/37

DOMINION NUCLEAR CONNECTICUT, INC.
VIRGINIA ELECTRIC AND POWER COMPANY
MILLSTONE POWER STATION UNITS 2 & 3
NORTH ANNA POWER STATION UNITS 1 & 2
SURRY POWER STATION UNITS 1 & 2
PROPOSED ALTERNATIVE FOR THE USE OF ENCODED
PHASED ARRAY ULTRASONIC EXAMINATION
TECHNIQUES IN LIEU OF RADIOGRAPHY

Pursuant to 10 CFR 50.55a(z)(1), Dominion Nuclear Connecticut, Inc. (DNC), and Virginia Electric and Power Company (Dominion Energy Virginia) hereby request Nuclear Regulatory Commission (NRC) approval of the proposed inservice inspection (ISI) alternative for Millstone Power Station (MPS) Units 2 and 3, North Anna Power Station (NAPS) Units 1 and 2, and Surry Power Station (SPS) Units 1 and 2. For American Society of Mechanical Engineers (ASME) Section XI repair and replacement activities of ferritic circumferential pipe weld joints, radiographic examination techniques are performed to satisfy volumetric nondestructive examination requirements. Approval to use encoded Phased Array Ultrasonic Examination Techniques (PAUT) as an alternative to radiographic examination is requested.

The use of encoded PAUT in lieu of radiography (RT) to perform the required examinations of the replaced welds would eliminate the safety risk associated with performing RT, which includes both planned and unplanned radiation exposure to plant workers. The proposed alternative is provided in Attachment 1. The duration of the proposed alternative is requested for the remainder of the ISI interval for MPS 2 and 3, NAPS 1 and 2, and SPS 1 and 2.

NRC review and approval of the proposed ISI alternative is respectfully requested to support anticipated piping repair and replacement activities for the next upcoming refueling outages, currently scheduled to occur during fall 2017. Timely approval of the proposed ISI alternative request supports an industry initiative to establish an acceptable standardized template for the PAUT in lieu of RT alternative request.

A047
NRR

Should you have any questions in regard to this submittal, please contact Ms. Diane E. Aitken at (804) 273-2694.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark D. Sartain", followed by a horizontal line.

Mark D. Sartain
Vice President – Nuclear Engineering and Fleet Support
Virginia Electric and Power Company
Dominion Energy Nuclear Connecticut, Inc.

Attachment:

1. Proposed Alternative for the Use of Encoded Phased Array Ultrasonic Examination Techniques In Lieu of Radiography In Accordance with 10 CFR 50.55a(z)(1)

Commitments made in this letter: None.

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ATTACHMENT 1

PROPOSED ALTERNATIVE FOR THE USE OF
ENCODED PHASED ARRAY ULTRASONIC EXAMINATION
TECHNIQUES IN LIEU OF RADIOGRAPHY
IN ACCORDANCE WITH 10 CFR 50.55a(z)(1)

Millstone Power Station, Units 2 and 3
North Anna Power Station, Units 1 and 2
Surry Power Station, Units 1 and 2

**Proposed Alternative for the Use of Encoded Phased Array Ultrasonic
Examination Techniques In Lieu of Radiography
In Accordance with 10 CFR 50.55a(z)(1)**

-- Proposed Alternative Provides an Acceptable Level of Quality and Safety --

1. ASME Code Components Affected

All American Society of Mechanical Engineers (ASME), Boiler & Pressure Vessel (B&PV) Code, Section XI, ferritic piping welds requiring radiography during repair/replacement activities.

2. Applicable Code Edition and Addenda

Plant	Interval	Edition	Start	End
North Anna Power Station, Unit 1	Fourth	2004	May 1, 2009	April 30, 2019
North Anna Power Station, Unit 2	Fourth	2004	December 14, 2010	December 13, 2020
Surry Power Station, Unit 1	Fifth	2004	December 14, 2013	October 13, 2023
Surry Power Station, Unit 2	Fifth	2004	May 10, 2014	May 9, 2024
Millstone Power Station, Unit 2	Fourth	2004	April 1, 2010	March 31, 2020
Millstone Power Station, Unit 3	Third	2004	April 23, 2009	April 22, 2019

3. Applicable Code Requirement

The 2004 Edition of ASME Section XI, paragraph IWA-4221 requires that items used for repair/replacement activities meet the applicable Owner's Requirements and Construction Code requirements when performing repair/replacement activities. IWA-4520 requires that welded joints made for installation of items be examined in accordance with the Construction Code identified in the Repair/Replacement Plan.

4. Reason for Request

Replacement of piping is periodically performed in support of the Flow Accelerated Corrosion (FAC) program as well as other repair and replacement activities. The use of encoded Phased Array Ultrasonic Examination Techniques (PAUT) in lieu of radiography (RT) to perform the required examinations of the replaced welds reduces both safety and radiological risk to plant workers. PAUT also minimizes the impact on other outage activities normally involved with performing RT such as

limited access to work locations. In addition, encoded PAUT is equivalent or superior to the code-required RT examination for ASME ferritic piping repair/replacement welds for detecting and sizing critical (planar) flaws, such as cracks and lack of fusion (Reference 15). PAUT provides sizing capabilities for both depth and length dimensions of the flaw which are required to apply the acceptance criteria of the applicable code case. RT does not provide depth sizing capabilities.

This proposed alternative is requested to support anticipated piping repair and replacement activities starting in the fall 2017 outage season. The duration of the proposed alternative request is for the remainder of the inservice inspection interval for the plants defined in Section 2 of this request.

5. Proposed Alternative and Basis for Use

The use of encoded PAUT examination technique is proposed in lieu of the code-required RT examination for ASME ferritic piping repair/replacement welds. Similar techniques are being used throughout the nuclear industry for examination of dissimilar metal welds, overlaid welds, as well as other applications including B31.1 piping replacements. This proposed alternative request includes requirements that provide an acceptable level of quality and safety that satisfies the requirements of 10 CFR 50.55a(z)(1). The capability of the alternative technique is comparable to the examination methods documented in the ASME Code Sections III, VIII, and IX, and associated code cases (References 1, 3, 5, 6, 8, 9, 10, 11, 12, 13 and 14) using ultrasonic examination techniques for weld acceptance. The examinations will be performed using personnel and procedures qualified by performance demonstration in accordance with Section 5.1 below.

5.1 Proposed Alternative

Perform encoded PAUT examination techniques using demonstrated procedures, equipment and personnel in accordance with the process defined in ASME approved Code Case N-831, Ultrasonic Examination in Lieu of Radiography for Welds in Ferritic Pipe, dated October 26, 2016.

5.2 Basis for Use

The overall basis for this proposed alternative is that encoded PAUT is equivalent or superior to RT for detecting and sizing critical (planar) flaws. In this regard, the basis for the proposed alternative was developed from numerous codes, code cases, associated industry experience, articles, and the results of RT and encoded PAUT examinations. The examination procedure and personnel performing examinations are qualified using representative piping conditions and flaws that demonstrate the ability to detect and size flaws that are both acceptable and unacceptable to the

defined acceptance standards. The demonstrated ability of the examination procedure and personnel to appropriately detect and size flaws provides an acceptable level of quality and safety alternative as allowed by 10 CFR 50.55a(z)(1).

6. Duration of Proposed Alternative

This alternative request will be applied for the remainder of the inservice inspection intervals for the plants defined in Section 2 of this request.

7. Precedents

- 7.1 Oconee Request for Relief No. 2006-ON-001, dated June 20, 2006; requested relief on butt welds between the Pressurizer Level and Sample Tap nozzles and their respective Safe Ends. The reason for the request was based on the difficulty to perform the code required radiography. The alternative was to perform ultrasonic examination per similar requirements to Code Case N-659-0. (ML061210495)
- 7.2 Wolf Creek 10 CFR 50.55a Request ET 06-0029, dated September 1, 2006; requested relief on main steam and feedwater piping welds being replaced. The reason for the request was based on the acceptability of the proposed ultrasonic examination alternative process, radiation exposure reduction, outage costs and duration, and radiography exposure risk. (ML062500093)
- 7.3 Palo Verde Nuclear Generating Station Relief Request 48, dated August 1, 2012 (ML12229A046). NRC approval dated April 12, 2013 (ML13091A177).
- 7.4 Millstone Power Station Unit 2 Alternative Request RR-04-16, dated August 1, 2013 (ML13220A019). NRC approval dated April 4, 2014 (ML14091A973).
- 7.5 Millstone Power Station Unit 2 Alternative Request RR-04-21, dated October 6, 2014 (ML14283A128). NRC approval dated September 21, 2015 (ML15257A005).
- 7.6 Millstone Power Station Unit 3 Alternative Request IR-3-25, dated October 6, 2014 (ML14283A128). NRC approval dated September 21, 2015 (ML15257A005).
- 7.7 Millstone Power Station Unit 2 Alternative Request RR-04-023, dated April 11, 2016 (ML16106A105). NRC approval dated January 23, 2017 (ML16363A089).
- 7.8 Millstone Power Station Unit 3 Alternative Request IR-3-28, dated April 11, 2016 (ML16106A105). NRC approval dated January 23, 2017 (ML16363A089).

- 7.8 Millstone Power Station Unit 3 Alternative Request IR-3-28, dated April 11, 2016 (ML16106A105). NRC approval dated January 23, 2017 (ML16363A089).

8. References

- 8.1. ASME Section III Code Case N-659-2, "Use of Ultrasonic Examination in Lieu of Radiography for Weld Examination Section III, Divisions 1 and 3," dated June 9, 2008.
- 8.2. Pacific Northwest National Laboratory Report PNNL-19086, "Replacement of Radiography with Ultrasonics for the Nondestructive Inspection of Welds - Evaluation of Technical Gaps - An Interim Report," dated April 2010.
- 8.3. ASME B31.1, Case 168, "Use of Ultrasonic Examination in Lieu of Radiography for B31. 1 Application," dated June 1997.
- 8.4. ASME Sections III and XI, 2004 Edition, No Addenda.
- 8.5. ASME Section III, Code Case N-818, "Use of Analytical Evaluation approach for Acceptance of Full Penetration Butt Welds in Lieu of Weld Repair," dated December 6, 2011.
- 8.6. ASME Code Case 2235-9, 2005; "Use of Ultrasonic Examination in Lieu of Radiography Section I, Section VIII, Divisions 1 and 2, and Section XII," dated October 11, 2005.
- 8.7. Journal of Pressure Vessel Technology, "Technical Basis for ASME Section VIII Code Case 2235 on Ultrasonic Examination of Welds in Lieu of Radiography;" Rana, Hedden, Cowfer and Boyce, Volume 123, dated August 2001.
- 8.8. ASME Code Case 2326, "Ultrasonic Examination in Lieu of Radiographic Examination for Welder Qualification Test Coupons Section IX," dated January 20, 2000.
- 8.9. ASME Code Case 2541, "Use of Manual Phased Array Ultrasonic Examination Section V," dated January 19, 2006.
- 8.10. ASME Code Case 2558, "Use of Manual Phased Array E-Scan Ultrasonic Examination Per Article 4 Section V", dated December 30, 2006.
- 8.11. ASME Code Case 2599, "Use of Linear Phased Array E-Scan Ultrasonic Examination Per Article 4 Section V," dated January 29, 2008.
- 8.12. ASME Code Case 2600, "Use of Linear Phased Array S-Scan Ultrasonic Examination Per Article 4 Section V," dated January 29, 2008.

- 8.13. ASME Section XI, Code Case N-713, "Ultrasonic Examination in Lieu of Radiography," dated November 10, 2008.
- 8.14. ASME Section XI, Code Case N-831, "Ultrasonic Examination in Lieu of Radiography for Welds in Ferritic Pipe," dated October 26, 2016.
- 8.15. US NRC, NUREG/CR-7204, "Applying Ultrasonic Testing in Lieu of Radiography for Volumetric Examination of Carbon Steel Piping" (ML15253A674).