



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

February 29, 2016

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 – REVISION TO ALTERNATIVE REQUEST RR-04-20, USE OF WELD OVERLAYS AS AN ALTERNATIVE REPAIR AND MITIGATION TECHNIQUE – RE: ALTERNATIVE TO PRE-WELD OVERLAY LIQUID PENETRANT EXAMINATION (CAC NO. MF6982)

Dear Mr. Heacock:

By letter dated October 18, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15294A382), Dominion Nuclear Connecticut, Inc. (the licensee) submitted Revision to Alternative Request RR-04-20, "Use of Weld Overlays as an Alternative Repair and Mitigation Technique Re: Alternative to Pre-Weld Overlay Liquid Penetrant Examination," for Millstone Power Station, Unit No. 2 (MPS2), which was approved by the U.S. Nuclear Regulatory Commission (NRC) on April 24, 2015 (ADAMS Accession No. ML15082A409). The proposed Revision to Alternative Request RR-04-20 modifies the previously approved alternative request by eliminating the RR-04-20 requirement to perform liquid penetrant (PT) examination of the base material prior to performing weld overlays.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(z)(2), the licensee requested to eliminate the RR-04-20 requirement to perform a PT examination of the base metal prior to performing weld overlays on the basis that performing the PT examination prior to welding would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The NRC staff has reviewed the subject request and has concluded, as set forth in the enclosed safety evaluation (SE), 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 the revised Alternative Request RR-04-20 for the remainder of the current MPS2 fourth 10-year inservice inspection interval, which is scheduled to end on March 31, 2020. In addition, on October 19, 2015, the NRC staff verbally authorized the use of the revised Alternative Request RR-04-20. The script for the verbal authorization was issued on October 19, 2015 (ADAMS Accession No. ML15292A234). The enclosed SE documents the NRC staff's detailed technical basis for the verbal authorization.

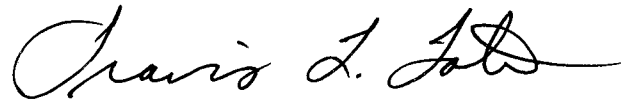
All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

D. Heacock

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If you have any questions, please contact the project manager, Richard Guzman, at (301) 415-1030 or Richard.Guzman@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Travis L. Tate". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Travis L. Tate, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosure:
Safety Evaluation

cc w/enclosure: Distribution via Listserv



UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REVISION TO ALTERNATIVE REQUEST RR-04-20,

USE OF WELD OVERLAYS AS AN ALTERNATIVE REPAIR AND MITIGATION TECHNIQUE -

RE: ALTERNATIVE TO PRE-WELD OVERLAY LIQUID PENETRANT EXAMINATION

DOMINION NUCLEAR CONNECTICUT, INC.

MILLSTONE POWER STATION, UNIT NO. 2

DOCKET NO. 50-336

1.0 INTRODUCTION

By letter dated October 18, 2015, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15294A382), Dominion Nuclear Connecticut, Inc. (the licensee) requested to revise Alternative Request RR-04-20, "Use of Weld Overlays as an Alternative Repair and Mitigating Technique," for Millstone Power Station, Unit No. 2 (MPS2), which was approved by the U.S. Nuclear Regulatory Commission (NRC) pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(z)(1), by letter dated April 24, 2015 (ADAMS Accession No. ML15082A409). Alternative Request RR-04-20 involved relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," to allow the application of two full structural weld overlays (FSWOLs) over two dissimilar metal welds (DMWs) at MPS2. After the installation of the weld overlays, the licensee determined that the NRC-approved ASME Code alternative (Alternative Request RR-04-20) requirement to perform a liquid penetrant (PT) examination prior to the beginning of the application of the weld overlay was not performed in accordance with the applicable requirements. The licensee also determined that complying with the applicable pre-overlay PT examination requirement, after the weld overlay was completed, would result in a hardship without a compensating increase in the level of quality and safety.

Specifically, pursuant to 10 CFR 50.55a(z)(2), the licensee requested to use its proposed Revision to Alternative Request RR-04-20 to forego the Alternative Request RR-04-20 requirement to perform a PT examination prior to beginning the application of the weld overlays, on the basis that complying with the PT examination requirement would result in a hardship without a compensating increase in quality and safety.

On October 19, 2015 (ADAMS Accession No. ML15292A234), the NRC staff verbally authorized the use of the licensee Revision to Alternative Request RR-04-20 for the remainder of the

Enclosure

current MPS2 fourth 10-year inservice inspection (ISI) interval, which is scheduled to end on March 31, 2020.

2.0 REGULATORY EVALUATION

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 (including supports) will meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI.

The regulation in 10 CFR 50.55a(z) states that alternatives to the requirements of paragraph (g) of 10 CFR 50.55a may be used, when authorized by the NRC, if the licensee demonstrates (1) the proposed alternatives would provide an acceptable level of quality and safety or (2) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request, and the Commission to authorize, the proposed alternative requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Proposed Revision to Alternative Request RR-04-20

The licensee has requested approval of a revision to its previously approved alternative (RR-04-20) to the relevant requirements of the ASME Code, Section XI, related to weld overlay repairs and preemptive type weld overlay applications for mitigation of primary water stress corrosion cracking.

3.2 ASME Code Components Affected

Two preemptive FSWOLs over DMWs and similar metal welds identified in Table 1 below.

TABLE 1: Welds Affected by Revision to Alternative Request RR-04-20

Location of weld overlay	Identification of Material Under Each Weld Overlay				
	Nozzle (carbon steel)	DMW weld (nickel alloy)	Safe-end (stainless steel)	Safe-end to Pipe/fitting Weld (stainless steel)	Pipe/fitting (stainless steel)
Hot Leg drain line, 2 inch NPS	A-105, Gr.2 (P1)	BPD-C-1001	SA-182, TP-316 (P8)	BPD-C-1003	A-376, 316 (P8)
RCS Cold Leg Letdown Line, 2 inch	A-105, Gr.2 (P1)	BPD-C-4000	SA-182, TP-316 (P8)	BPD-C-4002	A-376, 316 (P8)

3.3 Applicable Code Requirements

The code of record for MPS2 repair/replacement activities for the current fourth ISI interval is the 2004 Edition, no Addenda, of the ASME Code, Section XI. In addition, as required by 10 CFR 50.55a, the licensee used Appendix VIII, "Performance Demonstration for Ultrasonic Examinations," of the 2001 Edition of the ASME Code, Section XI, for ultrasonic testing (UT) examination of the weld overlay.

The ASME Code, Section XI, 2004 Edition, no Addenda, IWA-4000, is used for the MPS2 repair/replacement program, which does not include the needed requirements for the weld overlay repair.

The requirement for which the licensee seeks relief is the licensee's previously approved Alternate Request RR-04-20, Attachment 1, Enclosure 1, paragraph 1(d).

Appendix VIII, Supplement 11, of the ASME Code, Section XI, specifies performance demonstration requirements for UT examination of weld overlays.

3.4 Reason for Request

On October 15, 2015, following the installation of two FSWOLs at MPS2, the licensee determined that the initial pre-overlay PT base metal examinations performed on October 9, 2015, which were required by Alternative Request RR-04-20, were not performed in accordance with the applicable examination procedure prior to beginning application of the weld overlays. Therefore, the pre-overlay PT examinations on the underlying base material cannot be credited. Given that the FSWOLs were completed prior to the discovery of the improperly performed PT examinations, complying with the PT examination requirement would require that the overlays be removed, followed by properly performing the PT examination and then reinstalling the FSWOLs.

The licensee stated that reworking the FSWOLs in order to perform the required PT examination would result in a hardship without a compensating increase in quality and safety. The licensee further stated that reworking the FSWOLs would result in a significantly higher dose than the approximately 6.3 roentgen equivalent man (rem) of dose received from the initial FSWOL work. Therefore, pursuant to 10 CFR 50.55a(z)(2), the license is requesting approval of an alternative to the base metal PT examination requirements.

3.5 Proposed Alternative

The licensee requested approval of an alternative to the pre-overlay base metal PT examination requirements of Alternative Request RR-04-20. The licensee proposes to credit the phased array ultrasonic inspection (PAUT) examination of the final weld overlays in lieu of the required pre-overlay base metal PT examination of the RCS hot leg drain line and the RCS cold leg letdown line.

3.6 Basis for Use

The licensee stated that Alternate Request RR-04-20, Attachment 1, Enclosure 1, paragraph 1(d), required a PT examination be performed on the surface to be overlaid prior to application of the weld overlay. The PT examination requirement was derived from, and is consistent with, ASME Code rules for application of weld overlays (e.g., N-504-4 paragraph (c), N-740-2 paragraph 1.2(d), and ASME XI Nonmandatory Appendix Q Article Q2000(b)). The licensee stated that the primary purpose of the pre-weld overlay PT examination is to reduce the risk that the quality of the weld overlay would be adversely affected by potential defects or flaws that might exist in the area covered by the weld overlay.

The final volumetric examination PAUT performed on each of the two FSWOLs encompassed the weld overlay material and the interface of the FSWOL with the underlying base metal and existing full penetration welds identified in the preceding Table 1. In addition, the volumetric examination included the outer 25 percent of the underlying base material (including existing welds) and adjacent base material for a distance of 0.5-inch from the toe on each side of the overlay welds. The licensee stated that the volumetric examinations of the weld overlays were acceptable with no recordable indications identified. The licensee contends that any surface flaws that may have been detected by PT examination prior to the application of the weld overlay, but not detected by the post-overlay volumetric examination, would be small and not cause any significant degradation or the weld overlay quality.

The licensee also stated that it performed a bare metal visual examination of underlying base material (which includes existing welds), as well as the adjacent base metal, prior to the installation of the FSWOLs and a final PT examination of the FSWOL surfaces and adjacent base metal. No recordable indications were identified.

Accordingly, the licensee believes that (1) the use of the bare metal visual examination prior to welding, (2) the PAUT of the completed FSWOL welds and 25 percent of the underlying material, and (3) the final FSWOL PT examinations provide reasonable assurance of the quality and structural integrity of the FSWOLs on the RCS hot leg drain line and RCS cold leg letdown line welds, and is an acceptable alternative to the performance of pre-overlay PT surface examinations of the base metal. In addition, the licensee stated that reworking these welds to perform the required PT examination would result in a considerable dose expected to significantly exceed the 6.3 rem occupational dose received during the initial installation of the FSWOLs. This would result in a hardship without a compensating increase in quality and safety.

3.7 Duration of Proposed Alternative

The licensee stated that the proposed alternative is requested for the remainder of the current MPS2 fourth 10-year ISI interval, which is scheduled to end on March 31, 2020.

3.8 NRC Staff Evaluation

The NRC staff evaluated the licensee's proposed alternative to forego the pre-weld overlay PT examination requirement in Alternative Request RR-04-20, which was previously approved by the NRC on April 24, 2015. The licensee's proposed Revision to Alternative Request RR-04-20

is limited to the pre-weld overlay PT examination. The licensee followed all other examination requirements, as well as weld acceptance standards specified in Alternative Request RR-04-20. The staff's evaluation focused on the adequacy of the licensee's alternative as it relates to providing reasonable assurance of structural integrity of the FSWOLs and the hardship of performing the required PT examination, given that the FSWOLs have been completed. Additionally, as part of the NRC's routine baseline inspection process, the regional inspectors reviewed the results of the phased array ultrasonic examination of the FWSOLs (Integrated Inspection Report dated February 4, 2016, ADAMS Accession No. ML16035A119).

As stated by the licensee, the basis for the PT examination requirement, prior to application of the FSWOLs, in Alternative Request RR-04-20, was derived from, and is consistent with, ASME Code rules for application of weld overlays (e.g., N-504-4 paragraph (c), N-740-2 paragraph 1.2(d), and ASME XI Nonmandatory Appendix Q Article Q2000(b)).

3.8.1 Structural Integrity

The NRC staff also finds that the purpose of the PT examination prior to welding is to ensure that no surface flaws greater than allowed by ASME Code are present in the material to be weld overlaid. Any surface flaws present could result in weld flaws at the interface of the weld overlay and the underlying material and could extend into the weld overlay. The staff notes that the licensee does not take credit for the first layer of weld metal as part of the structural design thickness of the weld overlay. Not performing the required PT examination prior to welding could result in lower overall weld quality and could contribute to a failed final volumetric examination requiring a weld repair. Performing a weld repair would result in more occupational exposure to radiation and is, therefore, undesirable. Flaws resulting from not performing the required pre-overlay PT examination could result in flaws that are undetected during volumetric examinations or could result in flaws that are detected by volumetric examination but determined to be acceptable. Flaws resulting from not performing the required PT examination and not detected during volumetric examination would be minor and would not impact the structural integrity of the FSWOL.

Detectable flaws resulting from not performing the required PT examination that are of an acceptable or unacceptable size are not present in the subject welds, as verified by the licensee's PAUT examination results that reported no recordable indications. In addition, no recordable indications were identified in the outer 25 percent of the underlying base material and existing welds. Based on the foregoing, the NRC staff finds that not performing the required PT examination on the pre-overlay base material and existing welds does not impact the structural integrity of the FSWOLs; and the licensee's PAUT and PT examination results for the completed weld overlays provide reasonable assurance of the structural integrity of the FSWOLs.

3.8.2 Hardship Justification

The licensee stated that the installation of the FSWOLs resulted in occupational radiation exposure of approximately 6.3 rem and that reworking these welds would result in a significantly higher dose than was received during initial installation. The NRC staff notes that reworking the welds would result in approximately the same amount of dose received during initial installation plus a considerable amount of additional dose to remove the existing FSWOLs and perform the

required pre-weld PT examination. In addition, reworking the welds presents the risk of further additional dose should weld repairs of the reworked welds be required. Given that the FSWOLs have been completed, and reasonable assurance of the structural integrity of the subject welds exists, as described above, the NRC staff finds reworking the referenced weld overlays would not provide any additional assurance of structural integrity and would result in unwarranted exposure of personnel to radiation.

Based on the above, the NRC staff finds that complying with the pre-weld overly area PT examination requirement in Alternative Request RR-04-20 would result in a hardship without a compensating increase in quality and safety.

4.0 CONCLUSION

As set forth above, the NRC staff finds that the proposed alternative provides reasonable assurance of the structural integrity of the FSWOLs of the DMWs and adjacent similar metal welds identified in Table 1 of this SE at MPS2. The NRC staff finds that complying with the requirements of Alternate Request RR-04-20, Attachment 1, Enclosure 1, paragraph 1(d), 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(z)(2).

Therefore, the NRC authorizes the use of Revision to Alternate Request RR-04-20 at MPS2. The effective period of Revision to Alternative Request RR-04-20 is the remainder of the fourth ISI interval, which ends on March 31, 2020.

All other requirements of the ASME Code, Section XI and Alternate Request RR-04-20 for which relief has not been specifically requested and authorized by NRC staff remain applicable, including a third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Robert Davis

Date: February 29, 2016

D. Heacock

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If you have any questions, please contact the project manager, Richard Guzman, at (301) 415-1030 or Richard.Guzman@nrc.gov.

Sincerely,

/RA/

Travis L. Tate, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosure:
Safety Evaluation

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