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September 27, 2007



U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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Serial No. 07-0533
MPS Lic/ME R2
Docket No. 50-336
License No. DPR-65

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2
ALTERNATIVE REQUEST RR-89-64 FOR USE OF A LIMITED
ONE-SIDED ULTRASONIC EXAMINATION TECHNIQUE
LBDCR 07-MP2-034

Pursuant to 10 CFR 50.55a(a)(3)(ii), Dominion Nuclear Connecticut, Inc. (DNC) requests approval of an alternative to the Millstone Power Station Unit 2 (MPS2) Risk-Informed Inservice Inspection (RI-ISI) program to allow use of a limited one-sided ultrasonic test (UT) examination technique. A discussion of this request is provided as an attachment to this letter. This alternative is needed for eight 36-inch outside diameter (OD) reactor coolant system (RCS) cold leg dissimilar metal welds with cast austenitic stainless steel safe ends that are welded with Alloy 82/182 material.

The MPS2 RI-ISI program, as approved by the NRC, lists these welds as requiring UT examination for the purpose of identifying Primary Water Stress Corrosion Cracking (PWSCC). The RI-ISI program requires that the ASME Code Section XI, 1989 Edition with no Addenda be used in conjunction with the UT examination requirements outlined in WCAP-14572 Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report." These requirements cannot be met because of the cast austenitic stainless steel safe end base material and the weld design configuration.

DNC proposes within this request to use a one-sided UT examination technique from the ferritic side of these RCS dissimilar metal welds supplemented with bare metal visual examination for the UT coverage that is outlined in the enclosed Electric Power Research Institute (EPRI) Internal Report IR-2007-277, "EPRI Review of Millstone Unit 2 Dissimilar Metal Weld Walkdown Information," dated June 2007.


DNC requests approval of this alternative request by April 1, 2008 to support the

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MPS2 spring 2008 refueling outage. If you have any questions regarding this submittal, please contact Margaret Earle at (804) 273-2768.

Sincerely,



Gerald T. Bischof
Vice President – Nuclear Engineering

Commitments in this letter: None

Attachment: Alternative Request RR-89-64 For Use Of A Limited One-Sided Ultrasonic Examination Technique

Enclosure: EPRI Internal Report, IR-2007-277, "EPRI Review of Millstone Unit 2 Dissimilar Metal Weld Walkdown Information," dated: June 2007

cc: U.S. Nuclear Regulatory Commission
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ATTACHMENT

**ALTERNATIVE REQUEST RR-89-64 FOR USE OF A LIMITED
ONE-SIDED ULTRASONIC EXAMINATION TECHNIQUE**

**DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2**

ATTACHMENT
ALTERNATIVE REQUEST RR-89-64 FOR USE OF A LIMITED
ONE-SIDED ULTRASONIC EXAMINATION TECHNIQUE

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ATTACHMENT
ALTERNATIVE REQUEST RR-89-64 FOR USE OF A LIMITED
ONE-SIDED ULTRASONIC EXAMINATION TECHNIQUE

*Proposed Alternative
In Accordance with 10 CFR 50.55a(a)(3)(ii)*

*- Compliance With The Specified Requirements Results In A Hardship or Unusual
Difficulty Without A Compensating Increase In The Level Of Quality And Safety -*

1.0 REASON FOR THE REQUEST

For the upcoming spring 2008 Millstone Power Station Unit 2 (MPS2) refueling outage (2R18), eight high safety significant (HSS) dissimilar metal welds located on the reactor coolant pump (RCP) inlet and outlet reactor coolant system (RCS) cold leg piping are scheduled for ultrasonic test (UT) examination. If for some reason the welds cannot be examined during 2R18, they are required to be examined by the end of the following refueling outage (2R19). Currently, MPS2 has these weld examinations scheduled under the Risk-Informed Inservice Inspection (RI-ISI) program⁽¹⁾ as HSS welds that are susceptible to Primary Water Stress Corrosion Cracking (PWSCC). The RI-ISI program refers to the 1989 Edition of Section XI with no Addenda (Reference 1), Figure IWB-2500-8, for the required volume examination and to the requirements in Examination Category R-A, Risk-Informed Piping Examinations within WCAP-14572 Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report," (Reference 2), Table 4.1-1. Figure IWB-2500-8 requires that the bottom one-third of the weld and some associated base material be volumetrically examined, but does not require examination of the entire weld end butting material. Industry guidance contained in the Materials Reliability Program: Primary System Piping Butt Weld Inspection and Evaluation Guidelines (MRP-139) (Reference 3) includes weld butter in the examination volume. Both the RI-ISI program requirement and the industry guidance require that some of the base material on either side of the weld and butter be UT examined.

The design configuration of the eight HSS dissimilar metal welds limits examination of the base material from the ferritic steel side of the welds. Currently, the only possible solution for improving the inspectability of these welds would be to machine the welds; however, machining the welds could result in violating the necessary minimum wall thickness of the pipe or elbow. Additionally, all of the eight welds are fabricated with cast austenitic stainless steel safe ends and no UT technique

⁽¹⁾ NRC letter, "Safety Evaluation For Millstone Power Station, Unit No.2 - Risk-Informed Inservice Inspection Program (TAC No. MC1284)," dated April 1, 2005, (ADAMS Accession No. ML050740463).

requirements exist to qualify by demonstration UT examination of this cast austenitic stainless steel material. Based on this discussion, this alternative request is being proposed to allow a limited UT examination of the eight welds from the ferritic pipe or elbow side of these welds.

2.0 CODE COMPONENTS FOR WHICH THE ALTERNATIVE IS REQUESTED

Code components associated with the request consist of the eight 36-inch outside diameter (OD) HSS Class 1 cold leg dissimilar metal welds located within the RCS at the inlets and outlets of each RCP.

2.1 Category and System Details:

Code Class: All listed welds are ASME Code Class 1 welds.
System Welds: Welds are located in the RCS pressure boundary.
Code Category: Examination Category R-A, "Risk-Informed Piping Examinations."
Code Item No.: R1.15, "Elements Subject to PWSCC."

2.2 Component Descriptions:

36-inch OD, RCP Inlet (Suction) Nozzles = (Safe-End-To-Elbow Welds) – Cast Austenitic Stainless Steel (P-8) - To - Ferritic Steel (P-1) With Alloy 82/182 Weld Material.

1. Weld No. P-4-C-1
2. Weld No. P-8-C-1
3. Weld No. P-13-C-1
4. Weld No. P-17-C-1

36-inch OD, RCP Outlet (Discharge) Nozzles = (Safe-End-To-Pipe Welds) – Cast Austenitic Stainless Steel (P-8) - To - Ferritic Steel (P-1) With Alloy 82/182 Weld Material.

1. Weld No. P-5-C-3
2. Weld No. P-9-C-3
3. Weld No. P-14-C-3
4. Weld No. P-18-C-3

3.0 CODE REQUIREMENTS FOR WHICH THE ALTERNATIVE IS REQUESTED

MPS2 is in its third 10-year ISI interval, which started on April 1, 1999 and has been extended to end on March 31, 2010.⁽²⁾ The 1989 Edition of Section XI with no Addenda (Reference 1) applies to the ISI program and the RI-ISI program. The 1995 Edition of Section XI with the 1996 Addenda, Appendix VIII, Supplement 10 (Reference 4) is used for UT examination performance demonstration requirements for dissimilar metal welds including the limitations in 10 CFR 50.55a(b). These requirements are implemented under the industry Performance Demonstration Initiative (PDI). Accordingly, the UT examination volume shown in Figure No. IWB-2500-8 (Reference 1) is required to be met under the RI-ISI program. In this figure the bottom one-third of the weld volume and a small portion of the base materials on each side of the weld must be covered by the UT examination. A similar Figure 2-3 is depicted on page 2-2 of the enclosure to this submittal. The required examination volume in Figure 2-3 is shown as C-D-F-E.

4.0 PROPOSED ALTERNATIVES AND SUPPORTING INFORMATION

Based on: (1) the UT examination volume coverage that can be gained by multiple recommended search units (enclosure), (2) scanning the welds in the axial direction, and (3) the calculated coverage depicted and described in the enclosure, DNC has determined that it is possible to examine these dissimilar metal welds from the ferritic pipe or elbow side. This is true for both the RCP nozzle inlets and outlets.

In Summary Section 5 of the enclosure, EPRI essentially states that phased array technology (a different UT technology) could be used to improve the coverage on these dissimilar metal welds from the ferritic steel side of the welds. However, the sample configurations required to demonstrate this technology are not currently available. Future plans to have these sample configurations available will occur on a component-by-component basis.

Although DNC acknowledges the EPRI recommendation, DNC realizes the evaluation and application of this technology for the MPS2 subject welds will not be available until sometime in the future. The UT examination coverage that DNC can obtain using conventional techniques (described in the enclosure) forms the justification for this requested alternative.

To date, there is no qualified UT technique that has been demonstrated to be consistently reliable for cast stainless steel. Also, no ASME Code requirements exist to perform UT demonstrations for cast stainless steel. UT examination from the pipe

⁽²⁾ DNC letter to NRC, Millstone Units 2 & 3, Inservice Testing and Inservice Inspection Programs 10-Year Interval Changes," dated: May 3, 2007 (ADAMS Accession No. [ML071350369](#)).

or elbow side of these eight welds will cover the full inside diameter of the welds for identification of any suspected circumferential PWSCC that may be present in the Alloy 82/182 weld material. Susceptibility to PWSCC is the reason that these welds were selected for examination under the RI-ISI program. However, limited coverage of this same Alloy 82/182 weld material when scanning these welds in the circumferential direction due to the OD configuration shows that it is possible to miss some axial oriented PWSCC if it does exist.

Understanding this situation and the limitation of the UT examination, DNC proposes as an alternative to the UT examination volume coverage requirements of Fig. IWB-2500-8 of the 1989 Edition of Section XI, and Table 4-1.1 of WCAP-14572 Revision 1-NP-A, to perform a UT examination of the eight welds in this request with a PDI demonstrated procedure from the ferritic pipe or elbow side of the welds; and, perform a bare metal visual examination to provide the needed defense-in-depth in support of the limited UT for axial PWSCC when UT examination is not performed on these welds during a refueling outage. This proposed bare metal visual examination of these cold leg RCS welds exceeds the industry requirements available for use under ASME Code Case N-722, "Additional Examinations for PWR Pressure Retaining Welds in Class 1 Components Fabricated With Alloy 600/82/182 Materials Section XI, Division 1." Code Case N-722 was approved by ASME on July 5, 2005 (Reference 5) and is currently listed for mandatory use as part of a proposed change to 10 CFR 50.55a (Federal Register, Vol. 72, No. 65, pp. 16731-16741, Thursday, April 5, 2007).

DNC is proposing this alternative to close out the MPS2 current 10-year ISI interval by performing these examinations to meet the requirements for the RI-ISI program and to follow the industry guidance of MRP-139. Due to the size of these welds, additional time is needed to determine the appropriate mitigation strategy for these welds in the future.

This alternative is supported by the fact that the eight welds are cold leg RCS welds. They are not expected to be highly susceptible to PWSCC because of their lower operating temperature and industry experience has not shown any cracking in these specific types of welds.

5.0 DURATION OF THE PROPOSED REQUEST

This request will be applied for the remainder of the current MPS2 third 10-year ISI interval, which is scheduled to end on March 31, 2010.

6.0 PRECEDENTS

A search of the NRC's electronic correspondence database, ADAMS, has not identified any similar requests by other Licensees regarding similar RCS piping welds.

7.0 REFERENCES

1. 1989 Edition, American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, no Addenda.
2. WCAP-14572 Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report," dated February 1999.
3. Material Reliability Program: Primary System Piping Butt Weld Inspection and Evaluation Guideline (MRP-139), EPRI, Palo Alto, CA: 2005. 1010087.
4. 1995 Edition, ASME Code, Section XI, with the 1996 Addenda, Appendix VIII, Supplement 10.
5. ASME Code Case N-722, "Additional Examinations for PWR Pressure Retaining Welds in Class 1 Components Fabricated With Alloy 600/82/182 Materials Section XI, Division 1," Approved by ASME on July 5, 2005.

8.0 CONCLUSION

The information outlined above and in the enclosure supports the DNC conclusion that a one-sided UT examination from the ferritic pipe or elbow side of the subject welds will provide detection capability for circumferential PWSCC. Additionally, it provides an increased frequency for bare metal visual examination that will be used to address the limitations for UT examination coverage for the detection of axial PWSCC. DNC believes that this proposed alternative request meets the intent of the MPS2 RI-ISI program for the eight HSS welds and that the proposal provides an acceptable alternative where compliance with the specified requirements results in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.