

May 4, 2004

Mr. David A. Christian
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SUBJECT: NORTH ANNA POWER STATION, UNITS 1 AND 2, SURRY POWER STATION, UNIT 2, AND MILLSTONE POWER STATION, UNITS 2 AND 3 - REQUEST TO USE CODE CASE N-663 AS AN ALTERNATIVE FOR SURFACE EXAMINATION OF ASME CODE CLASS 2 PIPING WELDS (TAC NOS. MC2489, MC2490, MC2491, MC2523, AND MC2524)

Dear Mr. Christian:

By letter dated March 30, 2004, Virginia Electric and Power Company and Dominion Nuclear Connecticut, Inc. (the licensee) requested to use American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Case N-663, "Alternative Requirements for Class 1 and 2 Surface Examinations," as a proposed alternative to the requirements of ASME Code, Section XI, Subsection IWC-2500, "Examination and Pressure Test Requirements," for the examination of Class 2 piping welds, Examination Categories C-F-1 and C-F-2, Table IWC-2500-1. You requested this relief for the North Anna Power Station, Units 1 and 2 (NAPS-1 and NAPS-2), Surry Power Station, Unit 2 (SPS-2), and Millstone Power Station, Units 2 and 3 (MPS-2 and MPS-3).

Our evaluation and conclusion are contained in the enclosed Safety Evaluation. The NRC staff has concluded that Relief Request Nos. CMP-21, CMP-22, CC-001, RR-89-49, and IR-02-36 for NAPS-1, NAPS-2, SPS-2, MPS-2, and MPS-3, respectively, provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative is authorized for the remainder of the second 10-year inservice inspection (ISI) interval for MPS-3, the remainder of the third 10-year ISI intervals for NAPS-1, NAPS-2, and MPS-2, and for the remainder of the fourth 10-year ISI interval for SPS-2. The use of Code Case N-663 is authorized until such time as Code Case N-663 is published in a future version of Regulatory Guide (RG) 1.147, "Inservice Inspection Code Case Acceptability -- ASME Section XI, Division 1." At that time, if the licensee intends to continue implementing this Code case, it must follow all provisions of Code Case N-663 with limitations or conditions specified in RG 1.147, if any.

The NRC staff has completed its evaluation of this request; therefore, we are closing TAC Nos. MC2489, MC2490, MC2491, MC2523, and MC2524.

D. Christian

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If you have any questions regarding this approval, please contact the NAPS-1, NAPS-2, and SPS-2 Project Manager, Stephen Monarque, at 301-415-1544, or the MPS-2 and MPS-3 Project Manager, Victor Nerses, at 301-415-1484.

Sincerely,

/RA by Stephanie M. Coffin for/

John A. Nakoski, Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Reactor Regulation

Docket Nos. 50-281, 50-336, 50-338,
50-339, and 50-423

Enclosure: Safety Evaluation

cc w/encl: See next page

D. Christian

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELIEF REQUESTS FROM THE ASME CODE, SECTION XI, SUBSECTION IWC-2500
REQUIREMENTS AND THE USE OF CODE CASE N-663
NORTH ANNA POWER STATION UNIT NOS. 1 AND 2
SURRY POWER STATION UNIT NO. 2
MILLSTONE POWER STATION UNIT NOS. 2 AND 3
DOCKET NUMBERS 50-281, 50-336, 50-338, 50-339, AND 50-423

1.0 INTRODUCTION

By letter dated March 30, 2004 (Reference 1), Virginia Electric and Power Company and Dominion Nuclear Connecticut, Inc. (the licensee), submitted a relief request from certain inspection requirements of American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for the North Anna Power Station, Units 1 and 2 (NAPS-1 and NAPS-2), Surry Power Station, Unit 2 (SPS-2), and Millstone Power Station, Units 2 and 3 (MPS-2 and MPS-3). Specifically, the licensee proposed using ASME Code Case N-663, "Alternative Requirements for Class 1 and 2 Surface Examinations" (Reference 2), as an alternative to the requirements in Subsection IWC-2500, "Examination and Pressure Test Requirements," of ASME Code, Section XI, for Class 2 piping welds, Examination Categories C-F-1 (pressure-retaining welds in austenitic stainless steel or high alloy piping) and C-F-2 (pressure-retaining welds in carbon or low alloy steel piping). The request is for the remainder of the second 10-year inservice inspection (ISI) interval for MPS-3, the remainder of the third 10-year ISI intervals for NAPS-1, NAPS-2, and MPS-2, and for the remainder of the fourth 10-year ISI interval for SPS-2.

2.0 REGULATORY EVALUATION

The ISI of the ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g), except where specific relief has been granted by the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(g)(6)(i). As stated in 10 CFR 50.55a(a)(3), 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.

ENCLOSURE

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in ASME Code, Section XI, to the extent practical within the limitations 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. The Code of Record for the second ISI interval at MPS-3, the third ISI interval at NAPS-1, and the third ISI interval at MPS-2 is the 1989 Edition. Additionally, the Code of Record for the third ISI interval at NAPS-2 is the 1995 Edition through the 1996 Addenda, and for the fourth ISI interval at SPS-2 is the 1998 Edition through the 2000 Addenda.

3.0 TECHNICAL EVALUATION

3.1 System/Component(s) for Which Relief is Requested:

This relief request applies to ASME Code, Section XI, Subsection IWC-2500, Class 2 piping welds, Examination Categories C-F-1 and C-F-2, item numbers C5.10 through C5.42 and C5.50 through C5.82, Table IWC-2500-1.

3.2 Code Requirements for which Relief is Requested:

The ASME Code, Section XI, Subsection IWC-2500 requires components be examined as specified in Table IWC-2500-1. This table requires a sampling of piping welds (as well as other components) be subjected to various types of non-destructive examinations (i.e., volumetric and/or surface examinations). The ASME Code requires that 7.5 percent, but not less than 28 welds, of the total population of non-exempt Category C-F-1 and C-F-2 piping welds be selected for surface examination.

3.3 Licensee's Proposed Alternative:

In accordance with the provisions of 10 CFR 50.55a(a)(3)(i), the licensee proposed to use Code Case N-663 in its entirety as an alternative to the surface examination requirements for Table IWC-2500-1, Examination Categories C-F-1 and C-F-2. All areas of the subject welds identified as susceptible to outside surface attack shall be surface examined during the current 10-year ISI interval in accordance with Code Case N-663.

3.4 Licensee's Basis for Use of Proposed Alternative

Code Case N-663 provides that in lieu of the surface examination requirements for piping welds of Categories C-F-1 and C-F-2, surface examinations may be limited to areas identified by the Owner as susceptible to outside surface attack. Other ASME Section XI examination requirements for the subject piping welds, including volumetric examinations and pressure testing, will continue to be performed.

Code Case N-663 was approved by the ASME Boiler and Pressure Vessel Code Committee on September 17, 2002, but has not yet been included in the most recent listing of NRC approved code cases provided in Revision 13 of Regulatory Guide 1.147.

The proposed use of Code Case N-663 as an alternative to Code required surface examinations for piping welds of Categories C-F-1 and C-F-2 is consistent with the approved Westinghouse methodologies on risk-informed ISI contained in WCAP-14572, Revision 1-NP-A. This topical report concludes that the only degradation mechanism that requires a surface examination is outside diameter chloride cracking. Consequently, surface examination need only be performed when outside diameter chloride cracking is identified to be the degradation mechanism affecting the structural integrity of the subject piping welds.

Code Case N-663 incorporates lessons learned from the risk-informed initiatives and industry examination experience into ASME Section XI by requiring that an evaluation be conducted to identify locations, if any, where surface examinations would be of benefit from a generic piping degradation perspective. The results of this evaluation identify where outside diameter degradation is most likely to occur by reviewing plant specific programs and practices, and operating experience. If the potential for degradation is identified, Code Case N-663 defines examination techniques, volumes, and frequencies. As such, implementing Code Case N-663 will identify appropriate locations for surface examination, if any, and eliminate unnecessary examinations.

The additional requirement of N-663 to evaluate susceptibility to outside diameter degradation is an improvement to the existing "random" examination requirements. Therefore, the proposed alternative specified in ASME Code Case N-663 provides an acceptable level of quality and safety.

3.5 Staff Evaluation:

The proposed use of Code Case N-663 by the licensee as an alternative to the ASME Code, Section XI, required surface examinations for piping welds of Examination Categories C-F-1 and C-F-2 is consistent with the NRC-approved underlying Electric Power Research Institute (EPRI) and Westinghouse Owners Group (WOG) methodologies on risk informed ISI (References 4 and 6). These methodologies are contained in EPRI TR-112657, Revision B-A, "Revised Risk-informed Inservice Inspection Evaluation Procedure" (Reference 3), and WOG WCAP-14572, Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report" (Reference 5). Although the two topical reports use different approaches, both have reached their objectives of identifying the risk-important areas of the piping systems and defining the appropriate examination methods, examination volumes, procedures, and evaluation standards necessary to address the degradation mechanisms of concern and the ones most likely to occur at each location to be inspected. Risk-informed ISI analyzes specific pipe segments for probability of failure and operational safety significance.

With regard to the current issue of surface examinations for piping welds of Examination Categories C-F-1 and C-F-2, all plants that performed risk-informed ISI of their Class 2 piping systems in accordance with the topical reports referenced above concluded that the only degradation mechanism that required surface examination is outside diameter (O.D.) chloride

cracking. Consequently, within these plants, surface examination would be considered only when O.D. chloride cracking is identified to be the degradation mechanism affecting the structural integrity of the subject piping welds.

Code Case N-663 provides that "...in lieu of the surface examination requirements for piping welds of Examination Category ... C-F-1, and C-F-2, surface examinations may be limited to areas identified by the Owner [the licensee] as susceptible to outside surface attack." The susceptibility criteria are listed in Table 1 of Code Case N-663 for two types of degradation mechanisms: (1) O.D. chloride stress corrosion cracking, and (2) other outside surface-initiated mechanisms. These other outside surface-initiated mechanisms include thermal fatigue, boric acid corrosion, and any other owner-identified mechanisms.

The NRC staff determined that the surface inspection requirements of Code Case N-663 are acceptable because the inspection requirements defined in the Code case are comparable to the corresponding inspection requirements approved by the NRC and adopted by using risk-informed ISI programs. Further, the Code case requires that licensees conduct a plant-specific service history review to identify other mechanisms that can result in outside surface attack, and to include plant-specific processes and programs that minimize chlorides and other contaminants. Hence, the alternative provides reasonable assurance that the proposed inspections will not lead to degraded piping performance when compared to the existing performance levels.

4.0 CONCLUSION

Based upon review of the information provided by the licensee in support of its request for relief, the NRC staff concludes that use of ASME Code Case N-663 for surface examinations, in lieu of the Table IWC-2500-1, Class 2, Examination Categories C-F-1 and C-F-2 requirements, provides an acceptable level of quality and safety. The NRC staff based its conclusion on the fact that inspection requirements defined in Code Case N-663 are comparable to the inspection requirements adopted by plants employing risk-informed ISI programs, and the licensee will be required to conduct a plant-specific service history review to identify other possible mechanisms besides chloride-induced mechanisms that will cause outside surface attack upon the subject plant components.

Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposal to use Code Case N-663 for ASME Class 2 piping welds, Examination Categories C-F-1 and C-F-2, Item Nos. C5.10 through C5.42 and C5.50 through C5.82 of Table IWC-2500-1, is authorized for the remainder of the second 10-year ISI interval for MPS-3, the remainder of the third 10-year ISI intervals for NAPS-1, NAPS-2, and MPS-2, and for the remainder of the fourth 10-year ISI interval for SPS-2. The use of the Code case is authorized until such time that Code Case N-663 is referenced in a future revision of RG 1.147, "Inservice Inspection Code Case Acceptability -- ASME Section XI, Division 1" (Reference 7). At that time, if the licensee intends to continue to implement Code Case N-663, the licensee must follow all provisions of Code Case N-663 with limitations or conditions specified in RG 1.147, if any.

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

5.0 REFERENCES

1. Letter from L. Hartz (Dominion/DNC) to the NRC, "Virginia Electric and Power Company (Dominion), Dominion Nuclear Connecticut, Inc. (DNC), North Anna Power Station Units 1 and 2, Surry Power Station Unit 2, Millstone Power Station Units 2 and 3, ASME Section XI Inservice Inspection Program Request to Use Code Case N-663 as an Alternative," dated March 30, 2004.
2. ASME Code Case N-663, "Alternative Requirements for Class 1 and 2 Surface Examinations Section XI, Division 1."
3. Electric Power Research Institute (EPRI), TR-112657, Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," dated July 1999.
4. Letter from the NRC to G. Vine (EPRI), "Safety Evaluation Report Related to EPRI Risk-Informed Inservice Inspection Evaluation Procedure (EPRI TR-112657, Revision B, July 1999)," dated October 28, 1999.
5. Westinghouse WCAP-14572, Revision 1-NP-A, "Westinghouse Owners Group (WOG) Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report," dated October 10, 1997.
6. Letter from the NRC to L. Libertori (WOG), "Safety Evaluation of Topical Report WCAP-14572, Revision 1-NP-A, 'Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report'," dated December 15, 1998.
7. NRC Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability – ASME Section XI Division 1," Revision 13.

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Date: May 4, 2004

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