May 2, 2007

Mr. David A. Christian
Sr. Vice 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 NOS. 2 AND 3 — RELIEF REQUESTS RR-89-59 AND IR-2-43 FOR RELIEF FROM THE 10-YEAR REACTOR VESSEL EXAMINATION REQUIREMENTS (TAC NOS. MD1717 AND MD1718)

Dear Mr. Christian:

By letter dated May 11, 2006, [Agency Documents Access and Management System (ADAMS) accession number ML061530137] Dominion Nuclear Connecticut, Inc. (DNC) submitted to the U.S. Nuclear Regulatory Commission (NRC), Relief Requests RR-89-59 and IR-2-43 for approval to use alternatives to the examination requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI at the Millstone Power Station, Unit Nos. 2 and 3 (MPS2 and MPS3). Specifically, DNC requests to use Code Case N-696, as administered through the Performance Demonstration Initiative Program, as an alternative to the requirements of ASME Code, Section XI, 1995 Edition, 1996 Addenda, Appendix VIII, to complete Supplements 2, 3, and 10, qualifications for piping examinations that are performed from the inside surface. The relief is requested pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i).

Based upon the review of the information you provided, the NRC concluded that the proposed alternative provides reasonable assurance of satisfactory piping examinations that are performed from the inside surface, and the NRC finds that the use of Code Case N-696 as an alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), your proposed alternative is authorized for the remainder of the third 10-year inservice inspection (ISI) interval at MPS2 and the second 10-year ISI interval at MPS3, or until such time as Code Case N-696 is referenced in Regulatory Guide (RG) 1.147. At that time, if the licensee intends to continue to use this code case, the licensee must follow all provisions of Code Case N-696 with limitations or conditions specified in RG 1.147, if any. The NRC staff's Safety Evaluation is enclosed. If you have any questions, please contact the project manager, John Hughey at (301) 415-3204.

Sincerely,
/ra/

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

Docket Nos. 50-336 and 50-423
Enclosure: As stated
cc: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST RR-89-59 AND IR-2-43

MILLSTONE POWER STATION, UNIT NOS. 2 AND 3

DOMINION NUCLEAR CONNECTICUT, INC.

DOCKET NUMBERS 50-336 AND 50-423

1.0 INTRODUCTION

By letter dated MAY 11, 2006, Dominion Nuclear Connecticut, Inc. (DNC) submitted to the U.S. Nuclear Regulatory Commission (NRC, or the Commission), Relief Requests RR-89-59 and IR2-43 for approval to use alternatives to the examination requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI at the Millstone Power Station, Unit Nos. 2 and 3 (MPS2 and MPS3). Specifically, in Relief Requests RR-89-59 and IR-2-43, DNC requests to use Code Case N-696, as administered though the Performance Demonstration Initiative (PDI) Program, as an alternative to the requirements of ASME Code, Section XI, 1995 Edition, 1996 Addenda, Appendix VIII, to complete Supplements 2, 3, and 10, qualifications for piping examinations that are performed from the inside surface. The relief is requested pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i).

2.0 REGULATORY EVALUATION

Inservice Inspection (ISI) of the ASME Code Class 1, Class 2, and Class 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). As stated in part 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.

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 ISI of Nuclear Power Plant Components," 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 ISI Code of Record for the third 10-year ISI interval for MPS2 and the second 10-year ISI interval for MPS3 is the 1989 Edition of the ASME Code, Section XI. In addition, 10 CFR 50.55a(g)(6)(ii)(C)(2) requires that licensees using the 1989 Edition or earlier editions must implement the 1995 Edition with the 1996 Addenda of Appendix VIII and the supplements to Appendix VIII of Section XI of the ASME Code.

3.0 EVALUATION FOR RELIEF REQUEST NOS. RR-89-59 AND IR-2-43

3.1 Components for Which Relief is Requested

Relief is requested for the following nozzle to transition piece welds at MSP2:

Weld ID	Description	Internal Diameter (inches)	Wall Thickness (inches)
P-5-C-1-A	Inlet nozzle to transition piece (RC loop 1A)	30	3.6
P-3-C-1-A	Inlet nozzle to transition piece (RC loop 1B)	30	3.6
P-14-C-1-A	Inlet nozzle to transition piece (RC loop 2A)	30	3.6
P-18-C-1-A	Inlet nozzle to transition piece (RC loop 2B)	30	3.6
P-1-C-1-A	Inlet nozzle to transition piece (RC loop 1)	42	3.6
P-10-C-1-A	Outlet nozzle to transition piece (RC loop 2)	42	3.6

The base materials of the above components are SA-533-65, Grade B, Class 1 and SA-515 GR 70 carbon steel (with cladding). The weld is ferritic carbon steel (with cladding).

In addition, relief is requested for the following Nozzle-to-Safe end welds at MSP3:

Weld ID	Description	Internal Diameter (inches)	Wall Thickness (inches)
301-121-A	Inlet nozzle to safe end (RC loop 3)	27.5	2.32
301-121-B	Inlet nozzle to safe end (RC loop 4)	27.5	2.32
301-121-C	Inlet nozzle to safe end (RC loop 1)	27.5	2.32
301-121-D	Inlet nozzle to safe end (RC loop 2)	27.5	2.32
302-121-A	Outlet nozzle to safe end (RC loop 3)	29	2.45
302-121-B	Outlet nozzle to safe end (RC loop 4)	29	2.45
302-121-C	Outlet nozzle to safe end (RC loop 1)	29	2.45
302-121-D	Outlet nozzle to safe end (RC loop 2)	29	2.45

The base materials of the above components are SA-508 Class 2 and SA-182 F316. The weld metal is austenitic stainless steel.

3.2 Code Requirements

The applicable code requirements are the 1989 Edition with no Addenda of the ASME Code, Section XI, and the 1995 Edition with the 1996 Addenda, of the ASME Code, Section XI, Appendix VIII, Table VIII-3110-1, and Supplements 2, 3, and 10.

3.3 Licensee's Proposed Alternative and Basis for Use

The licensee requests that as an alternative, Code Case N-696, "Qualification Requirements for Appendix VIII Piping Examinations Conducted from the Inside Surface, Section XI, Division 1", be used for implementation and coordination of Supplements 2, 3, and 10 during the MPS2 and MPS3 reactor pressure vessel (RPV) examinations. Code Case N-696 has been adopted into the 2004 Edition of ASME Code, Section XI as Supplement 14, "Qualification Requirements for Coordinated Implementation of Supplements 10, 2, and 3, for Piping Examination Performed from the Inside Surface."

Depending upon the particular design, the RPV nozzle to main coolant piping may be fabricated using ferritic, austenitic, or cast stainless components and assembled using ferritic, austenitic, or dissimilar metal welds. Additionally, differing combinations of these assemblies may be in close proximity, which typically means the same ultrasonic essential variables are used for each weld, and the most challenging ultrasonic examination process is employed (e.g., the ultrasonic examination process associated with a dissimilar metal weld would be applied to a ferritic or austenitic weld.)

At MPS2 the applicable weld joint is the nozzle to transition weld with ferritic reactor vessel nozzle to a ferritic transition piece assembled with ferritic weld metal, and an internal diameter (ID) clad. At MPS3 the applicable weld joint is the reactor vessel nozzle to safe-end dissimilar metal weld, which is a combination of ferritic and austenitic components assembled with Alloy 82 / 182 weld metal.

Separate qualification to Supplements 2, 3, and 10 are redundant when done in accordance with the industry's PDI Program. For example, during a personnel qualification to the PDI Program, the candidate would be exposed to a minimum of ten flawed grading units for each individual supplement. Personnel qualification to Supplements 2, 3, and 10, would therefore require a total of 30 flawed grading units. Test sets this large and tests of this duration are impractical. Additionally, a full procedure qualification (i.e., 3 personnel qualifications) to the PDI Program requirements would require 90 flawed grading units. This is particularly burdensome for a procedure that will use the same essential variables or the same criteria for selecting essential variables for all three supplements.

To resolve these issues, the PDI Program recognizes the Supplement 10 qualification as the most stringent and technically challenging ultrasonic application. The essential variables used for the examination of Supplements 2, 3, and 10, are the same. A coordinated add-on implementation would be sufficiently stringent to qualify Supplements 2 and 3 if the requirements used to qualify Supplement 10 are satisfied as a prerequisite. The basis for this conclusion is the fact that the majority of the flaws in Supplement 10 are located wholly in austenitic weld material. This configuration is known to be challenging for ultrasonic techniques

due to this variable dendritic structure of the weld material. Conversely, flaws in Supplements 2 and 3 initiate in fine-grained base material.

Additionally, the proposed alternative is more stringent than current ASME Code requirements for a detection and length sizing qualification. For example, the current ASME Code would allow a detection procedure, personnel, and equipment to be qualified to Supplement 10 with five flaws, Supplement 2 with five flaws, and Supplement 3 with five flaws, yielding a total of 15 flaws. The proposed alternative of qualifying Supplement 10 using ten flaws and adding on Supplement 2 with five flaws and Supplement 3 with three flaws results in a total of 18 flaws which will be multiplied by a factor of three for the procedure qualification.

Based on the above, the use of a limited number of Supplement 2 or 3 flaws is sufficient to assess the capabilities of procedures and personnel who have already satisfied Supplement 10 requirements. The statistical basis used for screening personnel and procedures is still maintained at the same level with competent personnel being successful and less skilled personnel being unsuccessful. The proposed alternative is consistent with other coordinated qualifications currently contained in Appendix VIII. Consequently, the licensee has determined that the proposed alternative will result in an acceptable level of quality and safety, pursuant to the provisions of 10 CFR 50.55a(a)(3)(i).

3.4 NRC Staff Evaluation

In lieu of the requirements listed in the 1995 Edition/1996 Addenda of the ASME Code, Section XI, Appendix VIII, Table VIII-3110-1, Supplement 2, Supplement 3 and Supplement 10, the licensee's proposed alternative is to use Code Case N-696, "Qualification Requirements for Appendix VIII Piping Examinations Conducted From the Inside Surface" for the remainder of the third 10-year ISI program at MPS2 and the second 10-year ISI program at MPS3. The ASME Code currently requires separate qualifications for Supplement 2 for austenitic piping, Supplement 3 for ferritic piping, and Supplement 10 for dissimilar metal piping. Qualifications for each supplement would entail a minimum of 10 flaws each for a total of 30 flaws minimum. The minimum number of flaws per supplement established a statistical-based pass\fail objective. The process of a single qualification for each supplement would greatly expand the minimum number of ferritic and austenitic flaws required to be identified which would also raise the pass\fail acceptance criteria.

The ASME Code recognized that flaws in austenitic material are more difficult to detect and size than flaws in ferritic material. The prevailing reasoning concluded that a Supplement 3 qualification following a Supplement 2 qualification had diminishing returns on measuring personnel skills and procedure effectiveness. Therefore, in lieu of separate Supplement 2 and Supplement 3 qualifications, the ASME Code developed Supplement 12 which provides a Supplement 3 add-on to a Supplement 2 qualification. The add-on consists of a minimum of three flaws in ferritic material. A statistical evaluation of Supplement 12 acceptance criteria satisfied the pass\fail objective established for Appendix VIII performance demonstration acceptance criteria.

The proposed alternative builds upon the experiences of Supplement 12 by starting with the most challenging Supplement 10 qualifications, and adding a sufficient number of flaws to demonstrate the personnel skills and procedure effectiveness of the less challenging Supplement 2 and Supplement 3 qualifications. A PDI Supplement 10 performance demonstration has at least one flaw with a maximum of 10 percent of the total number of flaws

being in the ferritic material. The rest of the flaws are in the more challenging austenitic material. When expanding the Supplement 10 qualification to include Supplement 2 and Supplement 3, the proposed alternative would add a minimum of five flaws in austenitic material and three flaws in ferritic material to the performance demonstration. Therefore, a combined Supplement 2, Supplement 3, and Supplement 10 qualification requires a minimum of 18 flaws in the performance demonstration test. The performance demonstration results added to the appropriate Supplement 10 results must satisfy the acceptance criteria of Supplement 10. A statistical evaluation performed by the Pacific Northwest National Laboratories, an NRC contractor, showed that the proposed alternative acceptance criteria satisfied the pass\fail objective established for Appendix VIII for an acceptable performance demonstration. Therefore, the NRC staff finds that the use of Code Case N-696, to coordinate qualification of Supplements 2, 3 and 10, will provide equivalent flaw detection performance to that of the ASME Code-required qualification for piping welds. As such, the licensee's proposed alternative provides an acceptable level of quality and safety.

3.5 Summary

Based on the NRC staff"s evaluation of the licensee's proposal as discussed above, the NRC staff determined that the use of Code Case N-696, to coordinate qualification of Supplements 2, 3, and 10, will provide equivalent flaw detection performance to that of the ASME Code-required qualification for piping welds. As such, the licensee's proposed alternative provides an acceptable level of quality and safety.

4.0 CONCLUSION

The NRC staff determined that the proposed alternative to use Code Case N-696, will provide an acceptable level of quality and safety, Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the proposed alternative for the remainder of the third 10-year ISI interval at MPS2 and the second 10-year ISI interval at MPS3, or until such time as Code Case N-696 is referenced in Regulatory Guide (RG) 1.147. At that time, if the licensee intends to continue to use this code case, the licensee must follow all provisions of Code Case N-696 with limitations or conditions specified in RG 1.147, if any. As an alternative to the ASME Code, the licensee must use the code case in its entirety.

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

Principal Contributor: A. Keim

Date: May 2, 2007