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

April 29, 2010

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. 3 – ISSUANCE OF RELIEF REQUEST IR-3-11 REGARDING USE OF AMERICAN SOCIETY OF MECHNICAL ENGINEERING CODE, SECTION XI, 2004 EDITION (TAC NO. ME1263)

Dear Mr. Heacock:

By letter dated April 28, 2009 (Agencywide Documents Access and Management System Accession No. ML091310666), Dominion Nuclear Connecticut, Inc. (DNC or the licensee) submitted relief requests for the third 10-year inservice inspection (ISI) interval program at Millstone Power Station, Unit No. 3 (MPS3). DNC requested the use of alternatives to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements. Specifically, Relief Request IR-3-11 proposed to perform a VT-2 visual examination of the reactor pressure vessel (RPV) flange seal leak-off piping as an alternative to performing the ASME-required system pressure test. The remaining relief requests contained in the April 28, 2009, letter are being reviewed separately.

The Nuclear Regulatory Commission (NRC) staff has reviewed the subject request and concludes, as set forth in the enclosed Safety Evaluation, that performance of an ASME Code system pressure test would result in hardship without a compensating increase in the level of quality and safety. The NRC staff's review also concludes that the visual examination described in IR-3-11 is acceptable because it provides reasonable assurance of structural integrity of the RPV flange seal leak-off piping.

Therefore, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(a)(3)(ii), the NRC authorizes the use of visual examination as an alternative to the ASME Code, Section XI, required system leakage test of the RPV flange seal leak-off piping for the remainder of the third 10-year ISI interval for MPS3. The third 10-year ISI interval for MPS3 began on April 23, 2009, and is scheduled to be completed on April 22, 2019.

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

If you have any questions, please contact the Project Manager, Carleen Sanders, at 301-415-1603.

Sincerely,

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

Docket No. 50-423

Enclosure:
As stated

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INSERVICE INSPECTION INTERVAL

REQUEST FOR RELIEF NO. IR-3-11

MILLSTONE POWER STATION, UNIT NO. 3

DOMINON NUCLEAR CONNECTICUT, INC.

DOCKET NUMBER 50-423

1.0 INTRODUCTION

By letter dated April 28, 2009 (Agencywide Documents Access and Management System Accession No. ML091310666), Dominion Nuclear Connecticut, Inc. (DNC or the licensee) submitted relief requests for the third 10-year inservice inspection (ISI) interval program at Millstone Power Station, Unit No. 3 (MPS3). DNC requested the use of alternatives to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements. Specifically, Relief Request IR-3-11 proposed to perform a VT-2 visual examination each refueling outage of the unpressurized reactor pressure vessel (RPV) flange seal leak-off piping as an alternative to performing the ASME Code Section XI, 2004 Edition required Class 1 pressure boundary piping test.

The third 10-year ISI interval at MPS3 began on April 23, 2009, and is scheduled to end on April 22, 2019.

2.0 REGULATORY REQUIREMENTS

The ISI of the ASME Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda as required by 10 CFR 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). 10 CFR 50.55a(a)(3) states that 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 Inservice Inspection 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 ASME Code of Record for the MPS3 third 10-year ISI interval is the 2004 Edition with no Addenda of Section XI of the ASME Code.

3.0 TECHNICAL EVALUATION

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

Reactor Pressure Vessel (RPV) Flange Seal Leak-Off Piping

3.2 Applicable ASME Code Requirements

IWB-2500, Table IWB-2500-1, Examination Category B-P, Item Number B15.10, requires that all Class 1 pressure retaining components be VT-2 visually examined each refueling outage and system leakage tested in accordance with IWB-5220.

IWB-5221 states:

(a) The system leakage test shall be conducted at a pressure not less than the pressure corresponding to 100% rated reactor power.

(b) The system test pressure and temperature shall be attained at a rate in accordance with the heat-up limitation specified for the system.

IMB-5222 states:

(a) The pressure retaining boundary during the system leakage test shall correspond to the reactor coolant boundary, with all valves in the position required for normal reactor operation startup. The visual examination shall, however, extend to and include the second closed valve at the boundary extremity.

(b) The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 pressure retaining components within the system boundary.

3.3 Licensee's Request for Relief

Relief is requested from performing the system leakage test at a pressure corresponding to 100% rated reactor power. The licensee proposed an alternative pressure testing requirement in lieu of the system leakage test required under IWB-5222(b) for the RPV flange seal leak-off piping.

3.4 Licensee's Basis for Requesting Relief

The RPV flange seal leak detection piping is separated from the reactor pressure boundary by one passive membrane, which is an O-ring, located on the vessel flange. A second O-ring is located on the opposite side of the tap in the vessel flange. This piping is required during plant operation in order to indicate failure of the inner flange seal O-ring. Failure of the O-ring would result in the annunciation of an alarm in the Control Room. Failure of the inner O-ring is the only condition under which this line is pressurized. Therefore, the line is not expected to be pressurized during the system pressure test following a refueling outage.

The configuration of this piping precludes system pressure testing while the vessel head is removed because the configuration of the vessel tap, coupled with the high test pressure requirement, prevents the tap in the flange from being temporarily plugged or connected to other piping. The opening in the flange is smooth walled, making the effectiveness of a temporary seal very limited. Failure of this seal could possibly cause ejection of the device used for plugging or connecting to the vessel.

The configuration also precludes pressure testing with the vessel head installed because the seal prevents complete filling of the piping, which has no vent available. The top head of the vessel contains two grooves that hold the O-rings. The O-rings are held in place by a series of retainer clips that are housed in recessed cavities in the flange face. If a pressure test was performed with the head on, the inner O-ring would be pressurized in a direction opposite to what it would see in normal operation. This test pressure would result in a net inward force on the inner O-ring that would tend to push it into the recessed cavities that house the retainer clips. The thin O-ring material would very likely be damaged by this inward force.

Purposely failing or not installing the inner O-ring in order to perform a pressure test would require replacing the new outer and possibly the new inner O-ring each time the test is conducted. This would result in additional time needed during the outage and additional radiation exposure to personnel associated with the removal and reinstallation of the RPV head.

3.5 Licensee's Proposed Alternative

In lieu of the requirements of IWB-5222(b), a VT-2 visual examination will be performed each outage on the unpressurized subject piping as part of the Class 1 leakage test. If the inner O-ring should leak during the operating cycle, it will be identified by an increase in temperature of the leak-off line above ambient temperature. This increase in temperature is an indication of O-ring seal leakage. This high temperature would actuate an alarm in the Control Room, which would be closely monitored by procedurally controlled operator actions allowing identification of any further compensatory actions required. This leakage would be collected in the primary drain transfer tank.

Additionally, the flange seal leak-off line is essentially a leakage collection/detection system and the line would only function as a Class 1 pressure boundary if the inner O-ring fails, thereby pressurizing the line. If any significant leakage does occur in the leak-off line piping itself during this time of pressurization, it would then clearly exhibit boric acid accumulation and be discernable during the proposed VT-2 visual examination.

4.0 STAFF EVALUATION

The ASME Section XI Code of Record requires that all Class 1 components within the reactor coolant system boundary undergo a system leakage test at or near the end of each inspection interval. In IR-3-11, the licensee requested relief from performing a system leakage test of the RPV flange seal leak-off piping at the Code-required test pressure corresponding to 100% rated reactor power. The piping is located between the inner and the outer O-ring seals of the vessel flange and is required during plant operation in order to detect failure of the inner flange seal O-ring. The design of this line makes the Code-required system leakage test impractical either with the vessel head in place or removed. The piping cannot be filled completely with water since it can not be vented to remove entrapped air from the line either with the vessel head in place or removed due to its configuration.

The configuration of this piping precludes system pressure testing while the vessel head is removed because the configuration of the vessel tap coupled with the high test pressure requirement prevents the tap in the flange from being temporarily plugged or connected to other piping. The opening in the flange is smooth walled, making the effectiveness of a temporary seal very limited. Failure of this seal could possibly cause ejection of the device used for plugging or connecting to the vessel

If a pressure test were to be performed with the head in place, the space between the inner and the outer O-ring seals would be pressurized. The test pressure would exert a net inward force on the inner O-ring that would tend to push it into the recessed cavities that house the retainer with the possibility of damaging the inner O-ring seal.

The NRC staff concurs with licensee's finding that each pressure test at Code-required pressure, with the RPV head on, would require replacing at least one new O-ring each time the test is conducted. This would result in additional radiation exposure to personnel associated with the removal and reinstallation of the RPV head. Therefore, the NRC staff concludes that performing the ASME Code system pressure test would result in hardship or unusual difficulty to the licensee without a compensating increase in the level of quality and safety.

The leak detection line is essentially a leakage collection and detection system. The line would only function as a pressure boundary if the inner O-ring fails and pressurizes the line. If the inner O-ring should leak during the operating cycle, it will be identified by an increase in temperature of the leak-off line above ambient temperature. This high temperature would actuate an alarm in the Control Room, which would be closely monitored by procedurally controlled operator actions allowing identification of any further compensatory actions required. Additionally, if any significant leakage does occur in the leak-off piping itself during this time of pressurization then it would clearly exhibit boric acid accumulation and be discernable during the proposed VT-2 visual examination that will be performed each outage. Therefore, the NRC staff concludes that visual examination provides reasonable assurance of structural integrity of the RPV flange seal leak-off piping.

5.0 CONCLUSION

On the basis of the above review, the NRC staff concludes that a system leakage test of the RPV flange seal leak detection piping at the ASME Code-required test pressure corresponding to 100% rated reactor power is a hardship to the licensee without a compensating increase in the level of quality and safety. The NRC staff also concludes that the proposed alternative provides reasonable assurance of structural integrity. Therefore, the proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the third 10-year ISI interval at MPS3.

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

Principal Contributor: P. Patnaik

Date: April 29, 2010

If you have any questions, please contact the Project Manager, Carleen Sanders, at 301-415-1603.

Sincerely,

/ra/

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

Docket No. 50-423

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