October 14, 2003

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: RELAXATION OF THE REQUIREMENTS OF ORDER EA-03-009 REGARDING REACTOR PRESSURE VESSEL HEAD INSPECTIONS, MILLSTONE POWER STATION, UNIT NO. 2 (TAC NO. MC0619)

Dear Mr. Christian:

On February 11, 2003, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-03-009 requiring specific inspections of the reactor pressure vessel (RPV) head and associated penetration nozzles at pressurized water reactors. The NRC issued an errata to the Order on March 14, 2003, to correct an administrative part of the Order related to requests for relaxation of the Order requirements. Section IV.F of the Order states that requests for relaxation associated with specific penetration nozzles will be evaluated by the NRC staff using its procedure for evaluating proposed alternatives to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) in accordance with Section 50.55a(a)(3) of Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a(a)(3)).

Sections IV.A and IV.B of the Order provide criteria to categorize each plant's RPV head with respect to its susceptibility to primary water stress corrosion cracking (PWSCC). For plants such as Millstone Power Station, Unit No. 2 (MP2), with RPV heads that are categorized as being highly susceptible to PWSCC, Section IV.C(1)(b) of the Order requires that the RPV head penetration nozzles be inspected each refueling outage using either of the following techniques: (1) ultrasonic testing (UT) from two inches above the J-groove weld to the bottom of the nozzle and an assessment to determine if leakage has occurred in the interference fit zone, or (2) eddy current testing or dye penetrant testing (PT) of the wetted surface of each J-groove weld and nozzle base material to at least two inches above the J-groove weld.

By letter dated September 3, 2003, Dominion Nuclear Connecticut, Inc. (DNC) requested relaxation from the requirements in Section IV.C(1)(b) of the Order for MP2. The relaxation request was made pursuant to the procedure specified in Section IV.F of the Order. Specifically, for inspection of the RPV head vent line penetration nozzle, DNC requested authorization to use a combination of UT on the nozzle base material, and PT on the nozzle J-groove weld.

The NRC staff has reviewed and evaluated the information provided in support of your request for relaxation as documented in the enclosed Safety Evaluation (SE). The staff's SE concludes that DNC has demonstrated good cause for the requested relaxation and that the proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to Section IV.F of the Order, and 10 CFR 50.55a(a)(3), the NRC staff authorizes the proposed relaxation and alternative inspection of the RPV head vent line penetration nozzle at MP2 during the period while NRC Order EA-03-009 remains in effect.

Be aware that when vessel head inspections are performed using ASME Code requirements, acceptance criteria, or qualified personnel, those activities and all related activities fall within the jurisdiction of the ASME Code. Therefore, Order-related inspection activities may be subject to third party review, including those by the Authorized Nuclear Inservice Inspector.

The NRC staff considers that the non-timely submittal of your request (September 3, 2003, with a licensee need date of October 15, 2003) created an unacceptable short staff review time and did not contribute toward the NRC's goal of efficient and effective use of staff resources. This issue was discussed with Mr. David Dodson of your staff.

Sincerely,

/RA/

Cornelius F. Holden, Director
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosure: Safety Evaluation

cc w/encl: See next page

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Sincerely,

/RA/

Cornelius F. Holden, Director
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

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Enclosure: Safety Evaluation

cc w/encl: See next page

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Millstone Power Station, Unit No. 2

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELAXATION OF THE REQUIREMENTS OF ORDER EA-03-009 REGARDING

REACTOR PRESSURE VESSEL HEAD INSPECTIONS AT

MILLSTONE POWER STATION, UNIT NO. 2

DOMINION NUCLEAR CONNECTICUT, INC.

DOCKET NO. 50-336

1.0 INTRODUCTION

On February 11, 2003, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-03-009 requiring specific inspections of the reactor pressure vessel (RPV) head and associated penetration nozzles at pressurized water reactors. The NRC issued an errata to the Order on March 14, 2003, to correct an administrative part of the Order related to requests for relaxation of the Order requirements.

Section IV.F of the Order states that the NRC may relax or rescind any of the Order requirements upon demonstration by the licensee of good cause. Section IV.F of the Order also states that a request for relaxation of the Order requirements for inspection of specific penetration nozzles shall address the following criteria: (1) the proposed alternative(s) for inspection of specific nozzles will provide an acceptable level of quality and safety, or (2) compliance with this Order for specific nozzles would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. This section of the Order states that requests for relaxation associated with specific penetration nozzles will be evaluated by the NRC staff using its procedure for evaluating proposed alternatives to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) in accordance with Section 50.55a(a)(3) of Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a(a)(3)).

Sections IV.A and IV.B of the Order provide criteria to categorize each plant's RPV head with respect to its susceptibility to primary water stress corrosion cracking (PWSCC). For plants such as Millstone Power Station, Unit No. 2 (MP2), with RPV heads that are categorized as being highly susceptible to PWSCC, Section IV.C(1) of the Order requires the following inspections be performed every refueling outage:

a. Bare metal visual examination of 100% of the RPV head surface (including 360° around each RPV head penetration nozzle), AND

b. Either:

   i. Ultrasonic testing (UT) of each RPV head penetration nozzle (i.e., nozzle base material) from two (2) inches above the J-groove weld to the bottom of the nozzle and an assessment to determine if leakage has occurred into the interference fit zone, OR

ii. Eddy current testing or dye penetrant testing (PT) of the wetted surface of each J-groove weld and RPV head penetration nozzle base material to at least two (2) inches above the J-groove weld.

Footnote 3 of the Order provides specific criteria for inspection of repaired RPV head penetration nozzles.

Section IV.C(1)(b) of the Order requires that the same non-destructive examination (NDE) technique be used to inspect the entire population of RPV head penetration nozzles; combining techniques, or using one technique on one nozzle and the other technique on another nozzle, is not permitted.

By letter dated September 3, 2003, Dominion Nuclear Connecticut, Inc. (DNC) requested relaxation from the requirements in Section IV.C(1)(b) of the Order for MP2. The relaxation request was made pursuant to the procedure specified in Section IV.F of the Order. Specifically, for inspection of the RPV head vent line penetration nozzle, DNC requested authorization to use a combination of UT on the nozzle base material, and PT on the nozzle J-groove weld. The relaxation was requested for the third 10-year interval of the inservice inspection program at MP2, which began on April 1, 1999, and ends on March 31, 2009. The authorization was requested until superceded by design changes to the RPV head or until superceded by changes made to 10 CFR 50.55a. As discussed in Section III of the Order, the long-term resolution of the RPV head penetration inspection requirements imposed by the Order is expected to involve changes to the ASME Code and to 10 CFR 50.55a.

2.0 PROPOSED ALTERNATIVE FOR RPV HEAD VENT PENETRATION NOZZLE

2.1 Licensee's Proposed Alternative

The licensee's submittal states that the control element drive mechanism (CEDM) nozzles and the incore instrumentation (ICI) nozzles will be inspected using the UT technique as specified in Section IV.C(1)(b)(i) of the Order. However, for the RPV head vent line nozzle, the absence of an interference fit region between the nozzle and its RPV penetration prevents an acceptable performance of a leakage assessment using the UT technique, as required by the same Order section. Since the Order requires that only one of the two NDE techniques specified in Section IV.C(1)(b) of the Order be used to inspect the entire population of RPV head penetration nozzles (i.e., technique specified in Section IV.C(1)(b)(i) or Section IV.C(1)(b)(ii)), DNC has determined that relaxation of the inspection requirements imposed in Order Section IV.C(1)(b) is necessary.

For the inspection of the RPV head vent line penetration nozzle, in lieu of the requirements in Section IV.C(1)(b)(i) of the Order, DNC requested authorization to perform UT of the nozzle base material from two inches above the J-groove weld to the bottom of the nozzle, and a PT of the wetted surface of the J-groove weld.

Contingent upon authorization of this relaxation request, DNC will provide in the 60-day report for MP2, as required by the Order, specific inspection information (i.e., extent of inspections and results of those inspections).

2.2 Licensee's Basis for Proposed Alternative

The licensee's submittal states that using only one of the NDE techniques specified in Section IV.C(1)(b) of the Order for the entire population of RPV head penetration nozzles limits the licensee's options without measurably increasing the level of quality and safety. DNC believes that using either inspection technique is sufficient to detect the PWSCC phenomena and that no significant benefit is gained by requiring the same technique to be used on all nozzles.

The configuration of the RPV head vent line nozzle at MP2 warrants using a different technique from the requirements in Section IV.C(1)(b)(i) of the Order. Specifically, the UT inspection that will be used to examine the CEDM and ICI nozzles is not suitable for the leakage assessment on the RPV head vent line nozzle due to the lack of an interference fit region on that nozzle. Accordingly, DNC proposes to use a different technique, PT in addition to UT. DNC believes that the proposed alternative to allow the use of a combination of UT on the nozzle base material, and PT on the nozzle J-groove weld, maintains the level of quality and safety prescribed in Section IV.C(1)(b).

3.0 EVALUATION

The NRC staff's review of this relaxation request is based on criterion (1) of Section IV.F of the Order which states:

> The proposed alternative(s) for inspection of specific nozzles will provide an acceptable level of quality and safety.

Order EA-03-009 requires inspection of the entire population of RPV head penetration nozzles using only one of the techniques specified in Section IV.C(1)(b) of the Order; it does not permit the combined use of mixed NDE methods. The licensee stated it would inspect the CEDM and ICI nozzles using the UT inspection technique as specified in Section IV.C(1)(b)(i) of the Order. However, unlike the CEDM and ICI nozzles, the RPV head vent line nozzle is a smaller diameter nozzle and is of a different configuration with no interference fit. As such, there is a slight gap between the nozzle and the vessel head. Performing the leakage assessment using only UT will not provide a completely meaningful assessment of the gap area intended by the Order due to the air/metal interface in the gap.

The licensee's proposed alternative will provide an acceptable leakage assessment of the RPV head vent line nozzle to RPV head interface by performing inspections of the nozzle base material using UT on the nozzle and using PT on the nozzle J-groove weld. Since either inspection technique is capable of detecting PWSCC, the proposed alternative will provide a leakage assessment of the RPV head vent line nozzle. Therefore, the proposed alternative provides reasonable assurance of the structural integrity of the RPV head vent line nozzle and the associated J-groove weld.

4.0 CONCLUSION

The NRC staff concludes that DNC has demonstrated good cause for the requested relaxation and that the proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to Section IV.F of the Order, and 10 CFR 50.55a(a)(3), the NRC staff authorizes the proposed relaxation and alternative inspection of the RPV head vent line penetration nozzle at MP2 during the period while NRC Order EA-03-009 remains in effect.

When vessel head inspections are performed using ASME Code requirements, acceptance criteria, or qualified personnel, those activities and all related activities fall within the jurisdiction of the ASME Code. Therefore, Order-related inspection activities may be subject to third party review, including those by the Authorized Nuclear Inservice Inspector.

Principal Contributors: Z. Fu
R. Ennis
Date: October 14, 2003