Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

March 28, 2003

Docket No. 50-336
B18853

Director, Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Millstone Power Station, Unit No. 2
Request for Relaxation from Section IV.C(a)(1) of the Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads

On February 11, 2003,[1] the Nuclear Regulatory Commission (NRC) issued an Order for Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactor (PWR) facilities. The Order requires specific inspection of the reactor pressure vessel (RPV) head and associated penetration nozzles. The Commission stated that the actions in the Order are interim measures, necessary to ensure that licensees implement and maintain appropriate measures to inspect and, as necessary, repair RPV heads and associated penetration nozzles. The Order required that licensees immediately start implementation of the requirements of the Order and respond to specific actions within twenty (20) days of the date of the Order. Dominion Nuclear Connecticut, Inc. (DNC) submitted the Millstone Unit No. 2 response to the Order by letter dated February 28, 2003,[2] and indicated that it would be seeking relaxation of requirements contained in Section IV.C(1)(a) of the Order. Accordingly, as provided for by Section IV.F of the Order, this letter requests a one-time relaxation from Section IV.C(1)(a) of the Order, which requires a bare metal visual (BMV) examination of 100 percent of the RPV head surface. This requested relaxation would apply during the upcoming Fall 2003 refueling outage. Replacement of the Unit 2 RPV head is planned to occur during the Spring 2005 outage.

The request for relaxation is included as Attachment 1. To assist in the review and approval of this request, Attachment 1 has been formatted consistent with the Nuclear Energy Institute (NEI) white paper for 10 CFR 50.55a requests.[3]

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(1) NRC letter, "Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 11, 2003.

(2) DNC letter, "Millstone Power Station Unit No. 2, Answer to Order for Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 28, 2003.

(3) NEI White Paper, "Standard Format for Requests From Commercial Reactor Licensees Pursuant to 10 CFR 50.55a," dated September 30, 2002.

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In the judgement of DNC, the benefit derived from a BMV examination of the Millstone Unit No. 2 RPV head as required in the Order is not commensurate with the difficulty and impact of its performance. DNC believes the benefit of the examination may be further limited by disruption of surface conditions as a result of insulation removal. The request for relaxation proposes an alternate means of examination using ultrasonic (UT) scans of the RPV head internal surface to inspect for degradation of low alloy steel in areas between the nozzle penetrations. Since DNC has consented to comply with the inspection requirements in the Order, including the requirements of Section IV.C(1)(b)(i) for UT testing of each RPV head penetration nozzle, we consider the combined inspection effort will provide an acceptable level of quality and safety. Accordingly, there is good cause for the NRC to relax the requirements contained in Section IV.C(1)(a) of the Order during the Fall 2003 refueling outage.

DNC requests expedited review and approval of this request by May 30, 2003, to support planning for the Fall 2003 refueling outage.

There are no regulatory commitments contained within this letter.

Should you have any questions regarding this submittal, please contact Mr. Ravi Joshi at (860) 440-2080.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.

David A. Christian
Senior Vice President and Chief Nuclear Officer

Attachment (1)

cc: H. J. Miller, Region I Administrator
R. B. Ennis, NRC Senior Project Manager, Millstone Unit No. 2
NRC Senior Resident Inspector

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No.: B18853
Docket No.: 50-336

Subject: Relaxation from RPV Head and Penetration Nozzles Inspection Order

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by David A. Christian who is Senior Vice President – Nuclear Operations and Chief Nuclear Officer of Dominion Nuclear Connecticut, Inc. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 28TH day of March, 2003.

My Commission Expires: May 31, 2006.

Vicki L. Hull
Notary Public

(SEAL)

Docket No. 50-336
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Attachment 1

Millstone Power Station, Unit No. 2

Request for Relaxation from
Section IV.C(a)(1) of the Order Establishing Interim
Inspection Requirements for Reactor Pressure Vessel Heads

Millstone Power Station, Unit No. 2
Request for Relaxation from Section IV.C(a)(1) of the Order
Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads

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1.0 BACKGROUND

On February 11, 2003, the U.S. Nuclear Regulatory Commission (NRC) issued an Order with interim requirements to ensure that licensees implement and maintain appropriate measures to inspect and, as necessary, repair reactor pressure vessel (RPV) heads and associated penetration nozzles at pressurized water reactors. The Order is effective immediately and modifies the license for Millstone Unit No. 2. The Order establishes a minimum set of RPV head inspection requirements as a supplement to existing inspection requirements contained within the ASME Code and NRC regulations.

Based upon criteria in Section IV.B of the Order, the Millstone Unit No. 2 RPV head has a high primary water stress corrosion cracking (PWSCC) susceptibility. The category of high susceptibility is based in part upon having effective degradation years (EDY) of greater than 12. The Millstone Unit No. 2 RPV is expected to accrue 12.74 EDY by the end of cycle 15. The susceptibility category is also based upon the identification and repair of indications found in three control element drive mechanism (CEDM) penetration nozzles as a result of inspections conducted during 2R14. None of those indications were through wall and leak paths were not detected.

2.0 THE REACTOR PRESSURE VESSEL HEAD

The Millstone Unit No. 2 RPV head was fabricated by Combustion Engineering and has 69 penetrations for CEDMs, eight for incore instrumentation (ICI) and one head vent connection (Refer to the profile and plan views of the RPV head in the attached figures). The penetrations are all made of ASME SB 167, Alloy 600 material produced by Huntington Alloys. The vent line is a three-quarter inch NPS Schedule 80S pipe. The Millstone Unit No. 2 reactor vessel was built to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section III, Nuclear Vessels, Class A, 1968 edition with addenda through Summer 1969.

3.0 APPLICABLE REQUIREMENT

The Order establishes a minimum set of RPV head inspection requirements, as a supplement to existing inspection and other requirements in the ASME Code and NRC regulations. The requirement addressed by this request involves Section IV.C(1)(a) of the Order, which states that those plants with RPV heads with a high PWSCC susceptibility are required to perform a bare metal visual (BMV) examination of 100 percent of the RPV head surface (including 360 degrees around each RPV head penetration nozzle each refueling outage). The Order further provides that the NRC may relax any of the conditions of the Order upon demonstration by the Licensee of good cause. DNC considers that the balance of this Attachment demonstrates a good cause for relaxation. Accordingly, and as provided for by Section IV.F of the Order, DNC requests relaxation from Section IV.C(1)(a) of the Order.

4.0 REASON FOR RELAXATION

The insulation package for the RPV head is contoured and tightly fitting to the curvature of the head (Refer to the profile and plan views of the RPV head in the attached figures). The insulation consists of individual collars around each penetration. Stainless steel clad panel blankets are positioned between sets of penetration collars. These panels were placed in position before the control rod housings were installed and welded and therefore result in a tight fit below the seal welds. The majority of the collars (60 of 69 CEDM nozzles) are constructed of asbestos cloth material. The collars and blankets are tight fitting and are banded or wired together. Insufficient gap exists between the insulation and the head to allow the required BMV examination to be performed without removal of the insulation package. Extensive demolition would be required for the removal of the insulation package and an abatement process would be required to deal with the asbestos materials. The removal process is expected to disturb evidence of leakage and thereby reduce the effectiveness of a full BMV examination of the RPV head. Based upon this information, DNC has concluded that a BMV inspection of the surface of the RPV head would not yield a commensurate safety benefit when considering the significant radiation exposure (estimated at 35 person REM) which would be accumulated during the removal and subsequent reinstallation of the insulation package as well as the potential personnel hazards of exposure to asbestos materials.

The request for relaxation proposes an alternative to the BMV examination that will use ultrasonic (UT) scans of the RPV head external surface to inspect the low alloy steel between the nozzle penetrations for indications of degradation. Since DNC has consented to comply with the inspection requirements in the Order, including requirements of Section IV.C(1)(b)(i) for UT testing of each RPV head penetration nozzle, we believe the combined inspection effort will represent an acceptable level of quality and safety.

Relaxation from the requirement for a 100 percent BMV examination of the RPV head surface is requested to support the Fall 2003 refueling outage. Actions to replace the Unit No. 2 RPV during the Spring 2005 refueling outage head have been initiated. The new RPV head package will include an insulation design that supports subsequent compliance with the Order requirement for 100 percent visual examination of the bare metal RPV head surface.

It is DNC's belief that the proposed alternative inspection provides an equivalent level of quality and safety. Additionally, the alternative helps to maintain As Low As Reasonably Achievable (ALARA) program exposure goals.

5.0 PROPOSED ALTERNATIVE AND BASIS FOR RELAXATION

A. Inspection Strategies

DNC's requested alternative is limited to the inspection required in Section IV.C(1)(a) of the Order relating to the performance of a BMV examination of 100 percent of the RPV head surfaces, as described in A.1 below. DNC will continue to comply with the balance of inspection requirements in the Order, including the requirements of Section IV.C(1)(b)(i) for UT testing of each RPV head penetration nozzle. The combined inspection effort is described in greater detail below.

A.1 UT examination of the low alloy steel

In place of the BMV examination of 100 percent of the RPV head surfaces, DNC proposes the use of ultrasonic (UT) scanning of the low alloy steel vessel head material from the clad surface underside of the vessel head. This inspection technique will scan for acceptable vessel head material thickness in the areas between nozzle penetrations. This inspection technique will provide additional assurance that the material is in sound condition and absent degradation. This technique was successfully performed to obtain thickness measurements and ensure the absence of degradation in selected areas during refueling outage 14.

UT scanning will employ multiple transducers in a sled device that is manually manipulated along the underside of the vessel head. The sled will utilize beam patterns that will permit coverage of 100 percent of the external surface of the RPV head low alloy steel that is inaccessible to BMV examination. If data reveals measurements that could represent significant degradation, the Millstone Station Corrective Action Program will be used to address the finding and additional nondestructive examinations (NDE) will be performed as appropriate.

A.2 UT volumetric examination of penetration nozzles

DNC has planned for UT inspection of 100 percent of the Millstone Unit No. 2 RPV head nozzles and the vent line during the refueling outage scheduled for Fall 2003. The volumetric examination technique to be utilized is identical to the inspection performed during the last refueling outage. This is an inspection technique that satisfies Section IV.C(1)(b) of the Order.

The UT inspection technique for the inspection of the penetration nozzles was presented to the NRC Staff on January 24, 2002, and was performed on all penetrations during refueling outage 14. A detailed description of this technique was provided in DNC letters dated February 18, 2002,[1] and December 10, 2002.[2] The results of the inspection were then presented in a DNC letter to the NRC, dated April 30, 2002.[3] In a letter dated June 18, 2002,[4] the NRC Staff documented their assessment that these inspections for refueling outage 14 provided a reasonable assurance of adequate protection of public health and safety.

The UT inspections of the nozzles during the Fall 2003 refueling outage will be performed using demonstrated volumetric examination techniques, involving multiple transducers at varying angles to support an examination of the low alloy steel directly adjacent to the nozzles above the weld. The absence of thermal sleeves allows the use of a probe with multiple transducers to obtain the maximum amount of information during this examination. During the February 2002 refueling outage the UT probe was able to fully scan each of the penetrations. The examination is capable of detecting both axial and circumferential cracks in the nozzle base material. The examination is capable of scanning above the J-groove weld and into the interference fit region between the RPV head and nozzle where any leakage would be expected. For this reason, precursors to PWSCC initiated leakage will be identified and evaluated,

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(1) J. A. Price letter to U. S. Nuclear Regulatory Commission, "Supplemental Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," dated February 18, 2002.

(2) J. A. Price letter to U. S. NRC, "Supplemental Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," dated December 10, 2002.

(3) J. A. Price letter to U. S. Nuclear Regulatory Commission, "Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," dated April 30, 2002.

(4) R. B. Ennis letter to J. A. Price, "Bulletin 2001-01, Circumferential Cracking of Reactor Pressure Vessel Head Inspection, Response for Millstone Nuclear Power Station, Unit No. 2 (TAC No. MB2639)," dated June 8, 2002.

and repaired as required. The information gathered from an examination of the interference fit above the J-groove weld also provides a reliable verification of the condition of the low alloy steel directly adjacent to the penetration nozzle.

A.3 Visual inspections

A visual inspection of the top of the insulation as well as the portion of the nozzles above the insulation will be performed to verify that no leakage onto the head from above is occurring. Performing a visual inspection on top of the insulation to look for any leakage from CEDM vent valves or other sources is also a part of the Boric Acid Corrosion Control Program. This inspection will be performed by trained DNC inspection personnel and will consist of a thorough visual examination of all exposed external surfaces above the head for evidence of leakage and/or boric acid deposit, as well as any distortion to or deformation of the insulation. The perimeter and seams of the insulation will be specifically scrutinized for signs of boric acid leaking out from under the insulation or evidence of leakage from above.

A.4 Additional nondestructive examinations

Additional NDE will be performed, should any indications suggest a potential for through wall flaws in the nozzle base material, degradation of the low alloy steel vessel head material, or evidence of leakage paths through the interference fit region. The NDE will include liquid penetrant testing of the nozzle base material and of the J-groove weld as needed to characterize flaws.

A.5 Additional information

Personnel performing UT examinations will be qualified and certified in accordance with the American Society for Nondestructive Testing (ASNT) CP-189, 1991 Edition.[5] The acceptance criteria for any indications found will be through the use of a "Flaw Handbook" developed specifically for Millstone Unit No. 2. This handbook incorporates the ASME flaw tolerance methods with the acceptance criteria as modified by the NRC recommendation letter ("Flaw Evaluation Criteria", Jack Strosnider, NRC to Alex Marion, NEI, November 21, 2001). The disposition of degradations identified through these inspections, and their repair, will be administrated under the Millstone Station Corrective Action Program.

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[5] ASNT CP-189-1991, "ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel," approved March 15, 1991.

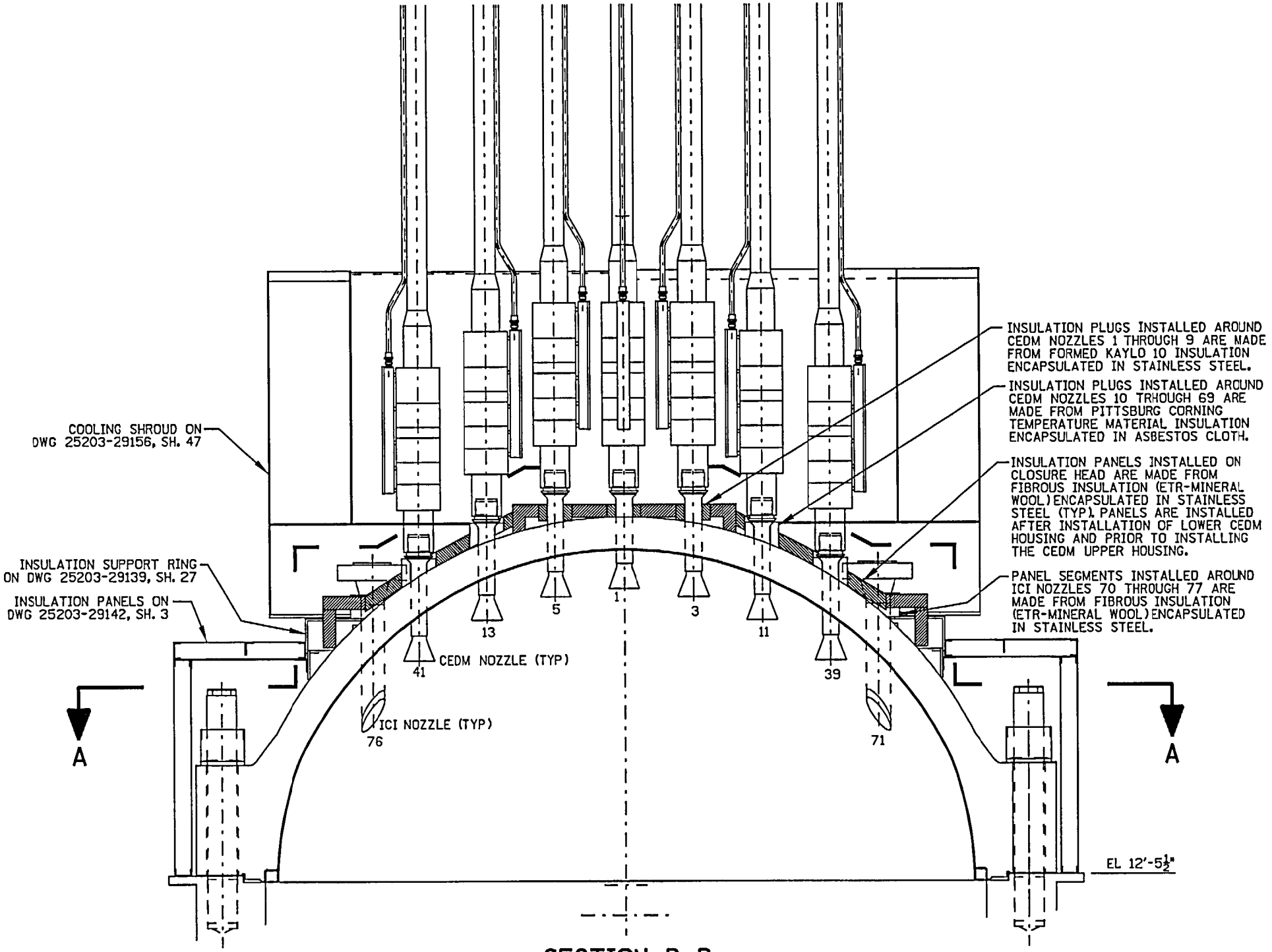
B. Basis for Relaxation

Industry experience has shown that circumferential cracking of CRDM nozzles can be identified by the presence of boric acid deposits on the RPV head. Volumetric UT examinations of nozzles during the last refueling outage did not show evidence of leak paths, either through wall or through weld indications, and all identified flaws were repaired. Therefore, if a through wall flaw and a leak path did develop since the last inspection, only minor indications of boric acid accumulation would be expected. The extensive process required to remove the Unit No. 2 insulation package and the associated asbestos abatement would likely disrupt evidence of small amounts of boric acid deposits and the traces of leakage.

Structural integrity of the RPV head is reasonably assured utilizing the inspection strategies described above. The data acquired from these inspections will provide reasonable assurance that operations can be conducted between inspection intervals without concern for a PWSCC initiated compromise in structural integrity due to pressure vessel wastage or RPV head nozzle ejection. The RPV head internal surface UT scan will inspect the vessel head thickness for degradation potentially hidden under insulation. The UT volumetric examinations of the RPV head nozzles has been demonstrated capable of finding evidence of leak paths, either through wall or through weld flaws, that are the precursors to wastage or corrosion in the low alloy steel of the vessel head. The collective application of these inspection strategies, including visual inspections associated with the Boric Acid Control Program, and additional NDE to address any findings, establishes a defense in depth strategy of equal or better effectiveness to the requirements in Section IV.C(1)(a) of the Order. Therefore, DNC believes the inspection strategies described by this request for relaxation to be an alternative that provides an acceptable level of quality and safety.

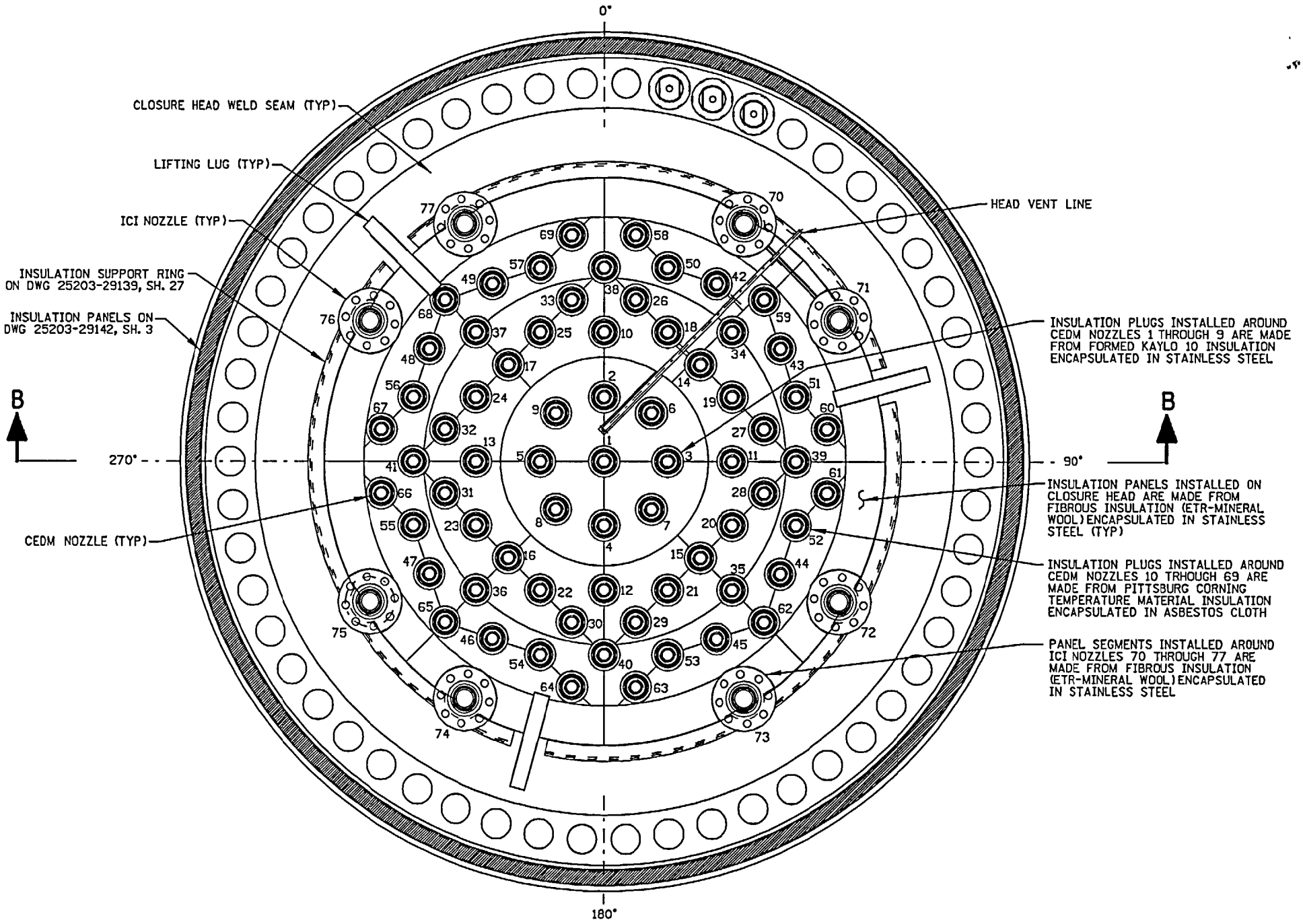
6.0 DURATION OF RELAXATION

The proposed request for relaxation from the requirements in Section IV.C(1)(a) of the Order that requires a 100 percent visual examination of the bare RPV head surfaces is a one-time request for relaxation until the planned replacement of the RPV head and insulation package in Spring 2005.



SECTION B-B

LOOKING EAST



PLAN VIEW A-A

(MP2 REACTOR VESSEL CLOSURE HEAD INSULATION IN NOZZLE AREA)
(DEVELOPED FROM DRAWING 25203-29142, SHEETS 5, 6 & 7)

NORTH