November 9, 2004

MEMORANDUM TO: James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Victor Nerses, Senior Project Manager, Section 2 ***/RA/***
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: MILLSTONE POWER STATION, UNIT NO. 2,
FACSIMILE TRANSMISSION, ISSUES TO BE DISCUSSED IN AN UPCOMING CONFERENCE CALL (TAC NO. MC3396)

The attached draft RAI was transmitted by facsimile on November 9, 2004, to Mr. Paul R. Willoughby, Dominion Nuclear Connecticut, Inc. (DNC). This draft RAI was transmitted to facilitate the technical review being conducted by the NRC staff and to support a conference call with DNC in order to clarify certain items in the licensee's submittal. This draft RAI is related to DNC's submittal dated June 3, 2004, regarding a request for NRC approval to use Mechanical Nozzle Seal Assemblies as permanent repairs to degraded Reactor Coolant Pressure System pressurizer heater penetration nozzles. Review of the RAI would allow DNC to determine and agree upon a schedule to respond to the RAI. This memorandum and the attachment do not convey a formal request for information or represent an NRC staff position.

Docket No. 50-336

Enclosure: Draft Request for Additional Information

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DATE	11/9/04	11/9/04	11/9/2004	11/8/2004

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ISSUES FOR DISCUSSION IN UPCOMING TELEPHONE CONFERENCE

RELATED TO RELIEF REQUEST RR-89-35, REV. 1

MILLSTONE POWER STATION, UNIT NO. 2

DOCKET NO. 50-336

By letter dated June 3, 2004, Dominion Nuclear Connecticut, Inc. (DNC) submitted relief request RR-89-35, Rev. 1 for Millstone Power Station, Unit No. 2. DNC's submittal requests approval to use Mechanical Nozzle Seal Assemblies (MNSAs) as permanent repairs to degraded Reactor Coolant Pressure System pressurizer heater penetration nozzles. The NRC has developed the following draft questions during its review of the application:

1. Attached is a proposed draft code case that represents the NRC staff's current position on permanent installation of an MNSA. The NRC staff requests that DNC provide analyses that satisfy the proposed draft code case or indicate whether the existing analyses satisfies the requirements in the proposed draft code case. In addition, identify the inspections to be performed to satisfy the inspection requirements of the proposed draft code case.

Enclosure

PROPOSED DRAFT CODE CASE

PERMANENT INSTALLATION OF MECHANICAL NOZZLE SEAL ASSEMBLIES (MNSAs)

(a) Mechanical connection assemblies are permitted only for nozzles on which there are no substantial piping reactions, such as pressurizer heater penetrations and openings for instrumentation. The mechanical connection assembly and the component or piping location where the mechanical connection assembly is installed shall be designed taking no structural credit for the existing Category D or branch connection partial penetration weld and shall be based on the stress and fatigue limits identified in NB-3200 of Section III, 1989 Edition thru the 2004 Edition. The structural integrity of the component or piping with the mechanical connection assembly installed shall be reevaluated for the connection loads and design basis loads using the rules of NB-3300 for components and NB-3600 for piping, and the stress and fatigue rules of NB-3200. All reinforcement required by the opening shall be in accordance with NB-3300 for components and NB-3600 for piping, and shall be integral with the component or piping to which the nozzle is attached. When performing a reinforcement analysis in accordance with NB-3300, a corrosion allowance of 5% shall be included. The NB-3200 stress analysis shall evaluate all nozzle loads. The design shall include provisions to prevent separation of the mechanical connection under all design and service loading conditions. NB-3200 analysis of a mechanical connection assembly installed on a piping branch connection shall include consideration of vibration loading as addressed in the original piping design in accordance with NB-3622.3. A Design Report amendment certified in accordance with Section III NCA-3555 shall be provided for the component or piping with the mechanical connection modification installed.

(b) Flaws in the nozzle and/or nozzle partial penetration welds shall be characterized to the extent practical. A maximum postulated planar flaw size shall be assumed for the evaluation that bounds the original partial penetration weld configuration, including the partial penetration weld and weld deposited buttering or overlay applied to the weld preparation in the component or piping base material. The assumed flaw size is shown schematically in Figure 1. The total expected service life of the mechanical connection assembly, and the component or piping to which it is attached, shall be evaluated. The applicable acceptance criteria of IWB-3600 shall apply. Crack growth into the ferritic component or piping must consider fatigue as well as stress corrosion cracking mechanisms. When the mechanical connection assembly installation potentially results in the exposure of the annulus between the nozzle and the component to primary coolant environment, the evaluation shall also include an assessment of potential corrosion of material in the annulus between the component or piping and the nozzle due to exposure to primary coolant. Degradation due to corrosion shall not affect the operability of the mechanical connection assembly nor the ability of the component or piping to meet the stress limits of NB-3000.

(c) A prototype joint shall be fabricated that is representative of the component and nozzle geometry and materials with the mechanical connection assembly installed. Leak tightness of the mechanical connection assembly shall be demonstrated by testing of the prototype joint at 1.25 times the design pressure. Evidence of leakage is unacceptable. The prototype joint shall be subjected to performance tests to

demonstrate that structural integrity and leak tightness of the joint are maintained under simulated service conditions, including thermal cycling and seismic loading. Thermal cycle testing shall consist of simulated plant heatup and cooldown cycles, the number of cycles shall bound the design life of the repair. Seismic qualification shall follow the guidelines of IEEE-344 or ASME/QME-1, including at least five operating basis earthquake events and one safe shutdown earthquake event. Evidence of leakage at conclusion of these tests is unacceptable. Records of the prototype joint testing shall be maintained by the Owner.

(d) Bolting of the mechanical connection assembly shall not be in contact with the contained fluid. Threaded nozzles in which the threads provide the primary seal shall not be used. Materials chosen for the mechanical connection, including threaded fasteners and bolting, shall not be subject to degradation due to exposure to primary coolant. If used as part of the mechanical connection assembly, prestress level for SA-453 Grade 660 bolting or fasteners shall be less than 100 ksi (690 MPa).

(e) The machined sealing surfaces shall be inspected to verify that no foreign material is present that could interfere with the sealing capability of the connection. Bolting shall be torqued into the component or piping material at temperatures at or above the RTNDT of the material.

(f) As part of returning the system to service following initial installation of the mechanical connection assembly, a VT-2 visual examination with insulation removed in conjunction with a system leakage test as described in IWA-5211(a) shall be performed in accordance with IWA-5000 on the portion of the system containing the mechanical connection assembly. The test pressure shall be maintained a minimum of 10 min prior to initiation of the examination for leakage. The examination procedure shall identify any special requirements for examining parts of the mechanical connection assembly designed to divert or collect any seal leakage. Any leakage detected during the test shall be evaluated and corrected by retorquing prior to startup. If retorquing is to values above those used in the analysis described in paragragh (a), perform a revised analysis using the torque values used to eliminate the leakage. If leakage is not corrected, the entire mechanical connection assembly shall be disassembled and the assembly and surrounding base metal of the component or piping shall be VT-3 inspected. The following relevant conditions shall require corrective action:

(a) structural distortion or displacement of parts to the extent that component function may be impaired;
(b) loose, missing, cracked, or fractured parts, bolting, or fasteners;
(c) foreign materials or accumulation of corrosion products;
(d) corrosion or erosion that reduces the nominal section thickness by more than 5%; or
(e) wear of mating surfaces that may lead to loss of function.

There shall be no evidence of leakage upon startup.

(g) Preservice inspection of the mechanical connection assembly shall be performed as follows:

(1) A VT-1 visual examination shall be performed for all pressure retaining bolting prior to assembly. The acceptance standards of IWB-3517 apply.

(2) A VT-3 visual examination with insulation removed shall be performed. The following relevant conditions shall require corrective action:

(a) structural distortion or displacement of parts to the extent that component function may be impaired;
(b) loose, missing, cracked, or fractured parts, bolting, or fasteners;
(c) foreign materials or accumulation of corrosion products;
(d) corrosion or erosion that reduces the nominal section thickness by more than 5%; or
(e) wear of mating surfaces that may lead to loss of function.

(h) Inservice inspection of the mechanical connection assembly shall be performed as follows:

(1) The mechanical connection assembly shall be added to the inspection plan.

(2) If the mechanical connection assembly includes a leakage detection/diversion fitting, it shall be examined for evidence of leakage before the other visual examinations are performed.

(3) Pressure retaining bolting shall be subject to the equivalent of a Table IWB-2500-1 Category B-G-1 examination with bolting in place. Category B-G-2 examination shall be performed when the mechanical connection assembly is disassembled for any reason after the initial installation. Category B-G-2 examination shall be performed for the type of component on which the mechanical connection assembly is installed on component surfaces, including bore, counterbore (if any), bolt holes and bolting, following disassembly.

(4) Disassembly of a sample (10%, rounded to the next larger integer value) of mechanical connection assemblies shall be performed once an interval. Category B-G-2 examination shall be performed on component surfaces, including bore, counterbore (if any), bolt holes and bolting, following disassembly. The mechanical connection assembly to be disassembled shall be selected based on the longest installed service life with preference given to the presence of known through-wall flaws in the original pressure boundary, if any, or locations identified for high susceptibility to PWSCC (primary water stress corrosion cracking).

(5) During each refueling outage, a VT-3 visual examination of each mechanical connection assembly shall be performed. The following relevant conditions shall require corrective action:

(a) structural distortion or displacement of parts to the extent that component function may be impaired;
(b) loose, missing, cracked, or fractured parts, bolting, or fasteners;
(c) foreign materials or accumulation of corrosion products;
(d) corrosion or erosion that reduces the nominal section thickness by more than 5%; or
(e) wear of mating surfaces that may lead to loss of function.

(6) VT-2 visual examination shall be performed with insulation removed in accordance with IWA-5240 on each mechanical connection assembly location during the IWB-5000 System Pressure Test conducted in accordance with Table IWB-2500-1, Category B-P during each refueling outage. Mechanical connection assemblies shall be VT-2 examined. If leakage is detected, the entire mechanical connection assembly shall be disassembled and inspected. The following relevant conditions shall require corrective action:

(a) structural distortion or displacement of parts to the extent that component function may be impaired;
(b) loose, missing, cracked, or fractured parts, bolting, or fasteners;
(c) foreign materials or accumulation of corrosion products;
(d) corrosion or erosion that reduces the nominal section thickness by more than 5%; or
(e) wear of mating surfaces that may lead to loss of function.

There shall be no evidence of leakage upon startup.

(i) All applicable requirements of Section XI shall be met except for IWB-2420(b) and IWA-4340 (for the 1998 Edition including the 2000 Addenda or later).

(j) Inspection requirements included in this Case shall be incorporated in the ISI program requirements for the component on which the mechanical connection assembly is installed. Alternative inspection requirements permitted by other Cases shall not be substituted for the requirements defined by this Case. Use of this Case shall be documented on Form NIS-2.