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

Dominion

MAY 16 2002

Docket Nos. 50-336
50-423
B18640

RE: 10 CFR 50.54(f)

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

Millstone Nuclear Power Station, Unit Nos. 2 and 3
Response to NRC Bulletin 2002-01
Reactor Pressure Vessel Head Degradation and
Reactor Coolant Pressure Boundary Integrity

This submittal is the Dominion Nuclear Connecticut, Inc. (DNC) 60 day response to the Nuclear Regulatory Commission (NRC) Bulletin 2002-01, dated March 18, 2002.[1] Attachment 1 provides the information for Millstone Unit Nos. 2 and 3.

The boric acid inspection program implemented at Millstone Station, as described in the attachment to this letter, has been and continues to be effective at detecting boric acid that could cause wastage or degradation of the remainder of the RCS pressure boundary. Therefore, the program provides assurance of compliance with the applicable regulatory requirements. In light of the recent reactor vessel head corrosion identified at Davis-Besse, Dominion is reviewing its boric acid inspection programs to ensure that the lessons learned and operating experiences will be appropriately addressed in our inspection program.

There are no regulatory commitments contained within this letter.

---

(1) Nuclear Regulatory Commission Bulletin from D. B. Matthews to the industry, "NRC Bulletin 2002-01: Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," dated March 18, 2002.

A095

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

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.

J. Alan Price
Site Vice President - Millstone

Attachment (1)

cc: H. J. Miller, Region I Administrator
R. B. Ennis, NRC Senior Project Manager, Millstone Unit No. 2
NRC Senior Resident Inspector, Millstone Unit No. 2
V. Nerses, NRC Senior Project Manager, Millstone Unit No. 3
NRC Senior Resident Inspector, Millstone Unit No. 3

B18640

Affirmation

I, J. Alan Price, being duly sworn, state that I am Site Vice President of Dominion Nuclear Connecticut, Inc., that I am authorized to sign and file this information with the Nuclear Regulatory Commission on behalf of Dominion Nuclear Connecticut, Inc., and that the statements made and the matters set forth herein pertaining to Dominion Nuclear Connecticut, Inc. are true and correct to the best of my knowledge, information and belief.

Dominion Nuclear Connecticut, Inc.

J. Alan Price
Site Vice President - Millstone

STATE OF Connecticut
COUNTY OF New London

Subscribed and sworn to before me, a Notary Public, in and for the County and State above named, this 16 day of May, 2002.

My Commission Expires: 2/28/02

Lorrie A. Arzamarski
Notary Public
Commission Expires
February 28, 2006

Docket Nos. 50-336
50-423
B18640

Attachment 1

Millstone Nuclear Power Station, Unit Nos. 2 and 3

60 Day Required Response to NRC Bulletin 2002-01

Millstone Nuclear Power Station, Unit Nos. 2 and 3
60 Day Required Response to NRC Bulletin 2002-01

On March 18, 2002, the Nuclear Regulatory Commission (NRC) issued Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," to all holders of operating licenses for nuclear power pressurized-water reactors (PWRs). Dominion Nuclear Connecticut, Inc. (DNC), recognizes the seriousness of the condition encountered at the Davis Besse station and has reexamined its processes to assure the soundness of its inspections. DNC has a rigorous program to ensure the integrity of the reactor coolant system boundary and that of other borated systems. As indicated below, DNC reviews industry operational experience (OE) for up-to-date information regarding Generic Letter 88-05 boric acid inspections and makes adjustments to its program accordingly.

Millstone Unit No. 2 is considered as having a moderate susceptibility to primary water stress-corrosion cracking (PWSCC) and is ranked 29th out of 69 operating PWRs in the United states per NEI letter to the NRC dated August 21, 2001.(1). Additionally Unit No. 3 is considered as having a low susceptibility to PWSCC and is ranked 56th out of the 69 operating PWRs in the United States per the NEI letter. A 60 day response to NRC Bulletin 2002-01 was required per question three of the Required Information section. Below is the response for Millstone Unit Nos. 2 and 3.

Question 3.

Within 60 days of the date of this bulletin, all PWR addressees are required to submit to the NRC the following information related to the remainder of the reactor coolant pressure boundary:

A. the basis for concluding that your boric acid inspection program is providing reasonable assurance of compliance with the applicable regulatory requirements discussed in Generic Letter 88-05 and this bulletin. If a documented basis does not exist, provide your plans, if any, for a review of your programs.

DNC Response

Boric Acid Inspection Program Description:

As noted in the Millstone Station response to Generic Letter 88-05,(2) there are a number of procedures that jointly address the concerns of Generic Letter 88-05:

(1) NEI letter to Dr. Brian Sheron, U. S. Nuclear Regulatory Commission, "Generic Information for Use by Licensees in Response to NRC Bulletin 2001-01," dated August 21, 2001.

(2) Letter from E. J. Mroczka to U. S. Nuclear Regulatory Commission, "Haddam Neck Plant, Millstone Nuclear Power Station, Unit Nos. 2 and 3, Generic Letter 88-05, Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," dated May 27, 1988.

Visual Inspection:

Both Millstone Unit Nos. 2 and 3 have procedures for the inspection of likely locations for leakage of borated water. The procedure at Millstone Unit No. 2 was put in place in 1981; the Unit No. 3 procedure became effective in 1987. These procedures have inspection forms to document inspection results and steps to initiate action should adverse conditions be noted. Originally these procedures targeted bolted connections since these were the likely sources of leakage. The procedures have undergone several revisions in the past decade to incorporate current information when leakage has been found in other locations, e.g., valve packing leaks, canopy seal weld leaks, etc. Currently these inspections are performed with the insulation in place as permitted by the ASME codes. Recent changes in the pressure testing requirements regarding bolted connections in borated systems require that the insulation be removed prior to the examination. These examinations are performed separately and for the sole purpose of evaluating the impact of boric acid corrosion. The Millstone Unit No. 2 and Unit No. 3 procedures have now been merged into a common procedure which includes provisions to inspect supporting systems beyond the reactor coolant system (RCS) that contain borated water. All inspections are performed by personnel who are ASME VT-2 qualified.

Inspections of the RCS are, as a minimum, completed each refueling outage. Other systems with borated water are inspected either when leakage is identified or every other outage as part of the pressure test program.

If evidence of leakage is identified an evaluation is conducted to determine if damage has been initiated by the leakage. Evidence of leakage will result in a condition report (CR) being generated, and the station's corrective action program is then followed. The investigation of the CR will determine the cause of the leakage, and actions to stop the leakage and prevent recurrence.

Leakage Monitoring and Detection:

The RCS leak rate, both identified and unidentified, is monitored during plant operation on a daily basis. An increase in a leak rate is cause for further investigation to locate the source of the increase.

Other parameters that are monitored are:

- Containment sump pump run time on a daily basis.
- Reactor Coolant Pump seal leakage. This leakage is controlled but changes can be indications of potential equipment problems.
- The gaseous and particulate radiation monitors have alarm points that are potential indicators of equipment problems.

A significant change in any of the parameters noted above is cause to write a CR and have the situation tracked in the station's corrective action program.

Component Performance Monitoring:

Millstone Unit Nos. 2 and 3 have containment coolers and fans inside containment whose performance can provide indications of RCS leakage. The containment air recirculation (CAR) coolers and control drive mechanism coolers can provide an indication of leakage within containment. The performance of the CAR cooler and control drive mechanism cooler is monitored by measurement of inlet and outlet air temperatures. In addition, the water temperature of the CAR coolers at Millstone Unit No. 3 is monitored.

The reactor coolant pump motor stator temperatures at Millstone Unit Nos. 2 and 3 are also monitored and have proven to be a good indicator of leakage. Additionally, the containment temperature and dew point are monitored at Unit No. 3.

Program Oversight:

In light of the recent reactor vessel head corrosion identified at Davis-Besse, Dominion is reviewing its boric acid inspection programs to ensure that the lessons learned and operating experiences will be appropriately addressed in our inspection program. This review and assessment will provide a comparison of how well the Millstone Station program performs.

Given the description of the boric acid inspection program above, the following is the basis for compliance with the Regulatory Requirements noted in Bulletin 2002-01 and Generic Letter 88-05.

Basis for Compliance:

A number of different Regulatory requirements are included in Bulletin 2002-01.

Design Requirements: 10 CFR 50, Appendix A – General Design Criteria

The Bulletin States:

> The applicable GDC include GDC 14 (Reactor Coolant Pressure Boundary), GDC 31 (Fracture Prevention of Reactor Coolant Pressure Boundary), and GDC 32 (Inspection of Reactor Coolant Pressure Boundary). GDC 14 specifies that the reactor coolant pressure boundary (RCPB) has an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture. GDC 31 specifies that the probability of rapidly propagating fracture of the RCPB be minimized. GDC 32 specifies that components which are part of the RCPB have the capability of being periodically inspected to assess their structural and leaktight integrity; inspection practices that do not permit reliable detection of degradation are not consistent with this GDC.

DNC Response:

The three referenced General Design Criteria (GDC) state the following:

- Criterion 14 – Reactor Coolant Pressure Boundary

  "The reactor coolant pressure boundary shall be designed, fabricated, erected and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture."

- Criterion 31 – Fracture Prevention of Reactor Coolant Pressure Boundary

  "The reactor coolant pressure boundary shall be designed with sufficient margin to assure that when stressed under operating, maintenance, testing, and postulated accident conditions (1) the boundary behaves in a non-brittle manner, and (2) the probability of rapidly propagating fracture is minimized. The design shall reflect consideration of service temperatures and other conditions of the boundary material under operating, maintenance, testing and postulated accident conditions and the uncertainties in determining (1) material properties, (2) the effects of irradiation on material properties, (3) residual, steady state and transient thermal stresses, and (4) size of flaws."

- Criterion 32 – Inspection of Reactor Coolant Pressure Boundary

  "Components which are part of the reactor coolant pressure boundary shall be designed to permit (1) periodic inspection and testing of important areas and features to assess their structural and leaktight integrity, and (2) an appropriate material surveillance program for the reactor pressure vessel."

During the initial plant licensing of Millstone Unit No. 2 and Unit No. 3, it was demonstrated that the design of the reactor coolant pressure boundary met the regulatory requirements in place at that time. The GDC included in Appendix A to 10 CFR Part 50 became effective May 21, 1971. The Construction Permit for Millstone Unit No. 2 was issued prior to May 21, 1971; consequently, this unit was not subject to GDC requirements. (Reference SECY-92-223 dated September 18, 1992.) The construction permit for Millstone Unit No. 3 was issued after May 21, 1971, so during initial licensing, Millstone Unit No. 3 demonstrated that the GDC were met.

Pressurized water reactors licensed both before and after issuance of Appendix A to 10 CFR Part 50 complied with these criteria in part by: 1) selecting Alloy 600 or other austenitic materials with excellent corrosion resistance and extremely high fracture toughness, for reactor coolant pressure boundary materials, and 2) following ASME Codes and Standards and other applicable requirements for fabrication, erection, and testing of the pressure boundary parts. NRC reviews of operating license submittals subsequent to issuance of Appendix A included evaluating designs for compliance with the General Design Criteria.

The inspections, surveillances and monitoring in place at Millstone Unit Nos. 2 and 3 identify possible areas of damage caused by boric acid corrosion. Once a potential problem is identified, the issue is entered into the station corrective action program for resolution.

Inspection Requirements: 10 CFR 50.55a and ASME Section XI:

The Bulletin States:

> NRC regulations contained in 10 CFR 50.55a state that American Society of Mechanical Engineers (ASME) Class 1 components (which includes the reactor coolant pressure boundary) must meet the requirements of Section XI of the ASME Boiler and Pressure Vessel Code. The Code requires that if boric acid residues are detected on components, the leakage source and area of corrosion be located and evaluated for continued service.

DNC Response:

For both Millstone Unit Nos. 2 and 3, these requirements come from the 1989 Edition of ASME Section XI as referenced in the Inservice Inspection Programs and supplemented by NRC approved relief requests and Code Cases. The supplemental requirements contained in these relief requests and Code Cases are centered on the examinations associated with bolted connections of borated systems and required corrective actions for identified leakage.

Quality Assurance Requirements: 10 CFR 50, Appendix B:

The Bulletin States:

> Criterion V (Instructions, Procedures, and Drawings) of Appendix B to 10 CFR Part 50 states that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Criterion V further states that instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. Visual and volumetric examinations of the reactor coolant pressure boundary are activities that should be documented in accordance with these requirements.

DNC Response:

Work undertaken to inspect, evaluate, and/or repair either Millstone Unit Nos. 2 or 3 RCS pressure boundary or supporting subsystems has been and will be conducted and documented in accordance with procedures which comply with the company's Quality Assurance (QA) Program Topical Report and Criterion V of Appendix B to 10 CFR Part 50.

The Bulletin States:

> Criterion IX (Control of Special Processes) of Appendix B to 10 CFR Part 50 states that special processes, including nondestructive testing, shall be controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.

DNC Response:

The visual inspections completed as part of the boric acid inspection program are performed by personnel qualified to the appropriate ASME standard in accordance with approved procedures. Follow-up non-destructive examinations (NDE) that may be required are completed using procedures that follow ASME guidelines using qualified inspectors. Similarly, repairs or rework involving special processes, i.e. welding, are performed with procedures qualified to the appropriate ASME standard using personnel who have been similarly qualified.

The Bulletin States:

> Criterion XVI (Corrective Action) of Appendix B to 10 CFR Part 50 states that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. For significant conditions adverse to quality, the measures taken shall include root cause determination and corrective action to preclude repetition of the adverse conditions. For degradation of the reactor coolant pressure boundary, the root cause determination is important to understanding the nature of the degradation present and the required actions to mitigate future degradation. These actions could include proactive inspections and repair of degraded portions of the reactor coolant pressure boundary.

DNC Response:

Criterion XVI provides the objectives and goals followed by the Millstone Corrective Action Program. These include provisions in procedures used for inspecting and monitoring the RCS for leakage to ensure that any issues where leakage is found are entered into the corrective action program for repair.

This criterion infers a licensee's responsibility to be aware of industry experience, and has been interpreted in this manner in the Millstone Corrective Action Program. A licensee should determine if industry experience applies to its plant and what, if any, corrective actions are appropriate. This approach is consistent with the NRC's generic communication process which reports industry experience, but does not require a response to the NRC. Licensees are expected to evaluate the applicability of the occurrence to their plant and document a record of the plant specific assessment for possible NRC review during inspections. As noted above, the procedures for the visual inspection of areas of likely leakage from the RCS have undergone change as new sources of leakage have become known either through industry experience or internal experience. The scope of visual inspections will need to be revised, now that the small bore leakage on the Millstone Unit No. 2 pressurizer has been found. During the last refueling outage at Millstone Unit No. 3, a walkdown of the area under the hot leg nozzles was conducted in response to the cracking found at VC Summer. These actions illustrate how Millstone Station has responded to external events relative to boric acid leakage and potential corrosion.

Operating Requirement: 10 CFR 50.36 - Plant Technical Specifications:

The Bulletin States:

Plant technical specifications pertain to the issue insofar as they do not allow operation with known reactor coolant system pressure boundary leakage.

DNC Response:

Title 10 of the Code of Federal Regulations, Part 50.36 (10 CFR 50.36) contains requirements for Plant Technical Specifications. Paragraphs 2 and 3 of 10 CFR 50.36 are particularly relevant:

- 10 CFR 50.36 (2) Limiting Conditions for Operation

  "Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met. A technical specification limiting condition for operation of a nuclear reactor must be established for each item meeting one of the following criteria:

  Criterion 3: A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

  Criterion 4: A structure, system or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety."

- 10 CFR 50.36 (3) Surveillance Requirements

  "Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions will be met."

The reactor coolant boundary is the second of three barriers for the release of radioactivity into the environment. Therefore the technical specifications for Millstone Units Nos. 2 and 3 include a requirement and associated action statements addressing reactor coolant pressure boundary leakage. The limits for reactor coolant pressure boundary leakage at Millstone Unit Nos. 2 and 3 are one gpm for unidentified leakage, ten gpm for identified leakage and no leakage from a non-isolable fault in the RCS pressure boundary.

Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," requested licensees to provide assurance that a program was implemented at their facility to ensure that boric acid corrosion due to leakage will not lead to degradation of the RCS Pressure Boundary. The program was to include the following attributes:

- Determination of the principal locations where leaks may occur and cause significant boric acid corrosion of the primary pressures boundary.

- Procedures for the location of small coolant leaks (i.e., leakage rates at less than technical specification limits).

- Methods for conducting examinations and performing engineering evaluations to establish the impacts on the RCS pressure boundary when leakage is located.

- Corrective actions to prevent recurrence of this type of corrosion.

Both Millstone Unit Nos. 2 and 3 have a program in place that cover the four attributes described above. The visual inspection procedure has identified locations of likely leakage. The visual inspection procedures coupled with the leakage detection surveillances and monitoring help identify new locations where any leakage may be occurring. The visual inspection procedure and the Station Corrective Action Program ensure that the appropriate examinations and engineering evaluations are performed if leakage is located and helps ensure that actions are taken to prevent leakage in the future.

Conclusion:

The boric acid inspection program implemented at Millstone Station has been and continues to be effective at detecting boric acid that could cause wastage or degradation of the remainder of the RCS pressure boundary. Therefore, the program provides assurance of compliance with the applicable regulatory requirements. In light of the recent reactor vessel head corrosion identified at Davis-Besse, Dominion is reviewing its boric acid inspection programs to ensure that the lessons learned and operating experiences will be appropriately addressed in our inspection program.