



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

November 21, 2008

Mr. David A. Christian
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 – REVIEW OF STEAM
GENERATOR TUBE INSPECTION REPORT FOR 2007 REFUELING OUTAGE
(TAC NO. MD8659)

Dear Mr. Christian:

By letter dated May 8, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML071350249), and April 11, 2008 (ADAMS Accession No. ML081140138), Dominion Nuclear Connecticut, Inc., (DNC) submitted information summarizing the steam generator (SG) tube inspections performed at Millstone Power Station, Unit No. 3 (MPS3) during the 2007 refueling outage (3R11). DNC provided additional information regarding the SG inspections in letter dated September 17, 2008 (ADAMS Accession No. ML082680092).

The Nuclear Regulatory Commission (NRC) staff has completed its review of your submittals as documented in the enclosed evaluation. The staff concludes that DNC has provided the information required by the Technical Specifications and that no additional follow-up is required. This completes the NRC staff efforts for TAC No. MD8659.

If you have any questions regarding this matter, I may be reached at 301-415-1603.

Sincerely,

A handwritten signature in black ink, appearing to read "Carleen J. Sanders".

Carleen J. Sanders, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-423

Enclosures: As stated

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EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

STEAM GENERATOR TUBE INSPECTION REPORT FOR 2007

MILLSTONE POWER STATION, UNIT NO. 3

DOCKET NO. 50-423

1.0 INTRODUCTION

By letters dated May 8, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML071350249), and April 11, 2008 (ADAMS Accession No. ML081140138), Dominion Nuclear Connecticut, Inc., (DNC or the licensee) submitted information summarizing the results of the 2007 steam generator (SG) tube inspections performed at Millstone Power Station, Unit No. 3 (MPS3) during the 2007 refueling outage (3R11). DNC provided additional information regarding the SG tube inspections in letter dated September 17, 2008 (ADAMS Accession No. ML082680092).

2.0 BACKGROUND

MPS3 has four Westinghouse Model F SGs, each of which contains 5,626 U-bend thermally treated Alloy 600 tubes. Each tube has a nominal outside diameter of 0.688 inches and a nominal wall thickness of 0.040 inches. During SG fabrication, the tubes were hydraulically expanded at both ends, over the full depth of the 21.23-inch thick tubesheet. The tubesheet was drilled on a square pitch with 0.98-inch spacing. There are 59 rows and 122 columns in each SG. The radius of the row 1 U-bends is 2.20 inches. The U-bends in rows 1 through 10 were stress relieved after bending. Eight Type 405 stainless steel support plates, which have broached quatrefoil holes, support the vertical section of the tubes, and six antivibration bars support the U-bend section of the tubes.

DNC provided the scope, extent, methods, and results of its SG tube inspections in the documents referenced above.

At the time of this inspection the SGs had accumulated 15.191 effective full-power years of operation.

3.0 EVALUATION

Based on the Nuclear Regulator Commission (NRC) staff's review of the information submitted by DNC, the NRC staff had the following observations and comments:

- The licensee reported that J-Tubes 1, 15, 16, and 30 in SG 'A' showed signs of erosion at the interface between the nozzle weld and the header interface, on the inside diameter

Enclosure

of the header. Ultrasonic testing and weld repair (overlay) was performed on these nozzles during the outage. These same J-Tubes were also repaired in SGs 'B' and 'C' during 3R10, and in SG 'D' during 3R9.

- The licensee stated that the upper bundle flush performed in 3R11 appears to have been successful in removing most of the fouling that was in the broached openings of the seventh tube support plate in SG 'C', although it appears to have been more effective on the broached openings that faced the annulus when compared to those that faced away from the annulus. The broached openings in SG 'A' were very clear.
- The licensee noted six single volumetric indications and seven volumetric indications in the 2007 Annual Report and provided depth ranges for the indications (i.e., less than 20 percent, greater than or equal to 20 percent but less than 40 percent, and greater than or equal to 40 percent).
- The licensee focused their inspections of dents and dings on the hot-leg. They indicate that with all other variables being equal (e.g., material susceptibility, chemical environment, stress levels), the temperature dependency of cracking makes it much more likely to develop in the highest temperatures portions of the tube first. The NRC staff agrees that, with all other factors being equal, the lower the temperature the less likely cracking will occur. However, it is often difficult to demonstrate that all of the other factors are equal. This is supported by operating experience where certain regions of the tube (at cooler temperatures) may crack before similar but hotter locations. These considerations are important in developing an inspection strategy.

3.0 CONCLUSION

The NRC staff concludes that the licensee provided the information required by the MPS3 Technical Specifications and that no additional follow-up is required at this time. The inspections appear to be consistent with the objective of detecting potential tube degradation and the inspection results appear to be consistent with industry operating experience at similarly designed and operated units.

Principal Contributor: A. B. Johnson

Date: November 21, 2008

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Sincerely,

/ra/

Carleen J. Sanders, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
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*By Memo Dates

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