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

January 21, 2010

Mr. Ashok Bhatnagar
Senior Vice President
Nuclear Generation Development
and Construction
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – SAFETY EVALUATION REGARDING MULTIPLE GENERIC LETTERS ON STEAM GENERATOR TUBE INTEGRITY (TAC NOS. MD6715, MD6716, MD6720, MD6721, MD6725, MD6727)

Dear Mr. Bhatnagar:

By letters dated September 7, 2007 (Agencywide Document and Access Management Systems Accession No. ML072570676), and December 17, 2007 (Accession No. ML073531337), the Tennessee Valley Authority (TVA) submitted a response to the following Generic Letters (GLs) for Watts Bar Nuclear Plant (WBN), Unit 2:

(1) GL 1995-03, "Circumferential Cracking of Steam Generator Tubes,"
(2) GL 1995-05, "Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking,"
(3) GL 1997-05, "Steam Generator Tube Inspection Techniques,"
(4) GL 1997-06, "Degradation of Steam Generator Internals,"
(5) GL 2004-01, "Requirements for Steam Generator Tube Inspections," and
(6) GL 2006-01, "Steam Generator Tube Integrity and Associated Technical Specifications."

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed TVA's response. Enclosed is the NRC staff's safety evaluation. This completes the NRC staff's efforts regarding WBN Unit 2 for TAC Nos. MD6715, MD6716, MD6720, MD6721, MD6725, and MD6727.

Sincerely,

Patrick Milano, Acting Chief
Watts Bar Special Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-391

Enclosure: As stated

cc w/encl: Distribution via Listserv

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SAFETY EVALUATION BY THE

OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO

MULTIPLE GENERIC LETTERS PERTAINING TO STEAM GENERATOR TUBE INTEGRITY

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-391

1.0 INTRODUCTION

In letters dated September 7, 2007 (Agencywide Document and Access Management System Accession No. ML072570676), and December 17, 2007 (Accession No. ML073531337), the Tennessee Valley Authority (TVA) provided information in response to the following Generic Letters (GLs) related to steam generator (SG) tube integrity for Watts Bar Nuclear Plant (WBN), Unit 2 :

(1) GL 1995-03, "Circumferential Cracking of Steam Generator Tubes,"
(2) GL 1995-05, "Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking,"
(3) GL 1997-05, "Steam Generator Tube Inspection Techniques,"
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WBN Unit 2 has four Westinghouse model D3 SGs. Each SG contains approximately 4700 mill annealed, Alloy 600 tubes. Each tube has a nominal outside diameter of 0.75 inches and a wall thickness of 0.043 inches. The tubes were expanded for the full length of the tubesheet by hard rolling. The tubes are supported by a number of horizontally-oriented carbon steel tube support plates.

The portion of the tube within the hot-leg tubesheet was roto-peened. No peening was performed on the portion of the tube in the cold-leg. The U-bend region of the row 1 and 2 tubes was thermally stress relieved. No tubes were expanded at tube support plate intersections.

2.0 REGULATORY EVALUATION

The general design criteria (GDC) establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems and components important to safety. The applicable GDC for SG tube integrity are

- GDC 14, "Reactor Coolant Pressure Boundary,"
- GDC 15, "Reactor Coolant System Design,"
- GDC 30, "Quality of Reactor Coolant Pressure Boundary," and
- GDC 32, "Inspection of Reactor Coolant Pressure Boundary."

The GDC state that the reactor coolant pressure boundary shall "have an extremely low probability of abnormal leakage" (GDC 14), "shall be designed with sufficient margin to assure that the design conditions of the reactor coolant pressure boundary are not exceeded during any condition of normal operation" (GDC 15), "designed, fabricated, erected, and tested to the highest quality standards practical" (GDC 30) and "shall be designed to permit periodic inspection and testing of important areas and features to assess their structural and leaktight integrity" (GDC 32).

Once a plant is in operation, licensees are required by their technical specifications (TSs) to perform periodic in-service inspections of the SG tubing and to repair or remove from service all tubes with degradation exceeding the SG tube repair limits. Eddy-current inspection techniques are the primary means by which licensees assess the condition of the SG tubes. Such inspections are an important component of the defense-in-depth measures to ensure the structural and leaktight integrity of the SG tubes.

3.0 TECHNICAL EVALUATION

Generic Letter 1995-03: Circumferential Cracking of Steam Generator Tubes

GL 1995-03 required licensees to justify continued operation despite the potential for circumferential cracking to occur in SG tubes and to discuss their plans for their next SG tube inspections. TVA indicated that a justification for continued operation was not applicable to WBN Unit 2 since 100 percent of the tubes would be inspected prior to fuel load. In addition, TVA provided their assessment of the potential for circumferential cracking in their SGs along with a typical inspection scope based on current operating experience at similarly designed and operated units.

The U.S. Nuclear Regulatory Commission (NRC) staff concludes that TVA's response to this GL is acceptable since a justification for continued operation is not needed given that WBN Unit 2 has not operated and a 100 percent SG tube inspection will be performed prior to fuel load. Also, the planned inspections reflect operating experience at similarly designed and operated units and will be performed with the objective of detecting potential tube degradation including circumferential cracking.

Generic Letter 1995-05: Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking

GL 1995-05 describes an alternate tube repair criteria that units with certain types of SGs could implement with a license amendment. As indicated by TVA and confirmed by the NRC staff, no specific response was required to be submitted in regarding this GL; implementation of the guidance in this GL was voluntary. Because TVA does not intend to request the use of these repair criteria, the NRC staff considers this GL closed.

Generic Letter 1997-05: Steam Generator Tube Inspection Techniques

GL1997-05 requested licensees to provide information on flaws that remain in-service in SG tubes based on their size. Licensees that size flaws for the purpose of leaving the tubes in service must provide the basis for the method used to size the flaws. TVA indicated that it will not leave crack-like indications in-service based on their size and that its practices for sizing other degradation mechanisms at WBN Unit 2 will be consistent with the approach taken at WBN Unit 1.

The NRC staff concludes that the approach to be taken at WBN Unit 2 is acceptable since cracks will not be allowed to remain in service and the remaining degradation mechanisms will be sized using techniques that have been demonstrated (through operating experience and research) to be effective at ensuring tube integrity.

Generic Letter 1997-06: Degradation of Steam Generator Internals

GL 1997-06 requested licensees to describe their program for detecting degradation of SG internals and to describe their plans to inspect the internals. TVA provided its inspection plan for various SG internals including the strategy for managing the potential for the blowdown pipe to sever, which occurred at WBN Unit 1.

The NRC staff concludes that TVA's response is acceptable since the planned inspections are consistent with those at similarly designed and operated plants and these inspections have been effective at providing reasonable assurance of SG tube integrity.

Generic Letter 2004-01: Requirements for Steam Generator Tube Inspections

GL 2004-01 requested licensees to describe the last SG tube inspections performed at their plant. The intent is to determine whether the inspection practices resulted in detecting flaws that may potentially be present along the length of the tube required to be inspected and that may exceed the applicable tube repair criteria. TVA indicated that it would use inspection techniques capable of detecting all flaw types that may be present at locations required to be inspected by the TSs.

The NRC staff concludes that TVA's response is acceptable since the inspections techniques employed will be consistent with the requirements.

Generic Letter 2006-01: Steam Generator Tube Integrity and Associated Technical Specifications

GL 2006-01 focused on improvements that could be made to the SG portion of the TSs. The improvements were modeled after TS Task Force Traveler (TSTF) 449, "Steam Generator Tube Integrity." The GL requested that licensees either submit a description of their program for ensuring SG tube integrity for the intervals between inspections consistent with TSTF-449 or provide a description of the actions for ensuring SG tube integrity is being maintained. TVA indicated that it would include TSTF-449 in its TS submittal for WBN Unit 2.

The NRC staff concludes that the licensee's response is acceptable since TVA indicated that it will be adopting TSs that were previously reviewed and approved by the NRC staff.

4.0 CONCLUSION

The NRC staff has concluded, based on the considerations above, that TVA has provided acceptable responses for GL 1995-03, GL 1995-05, GL 1997-05, GL 1997-06, and GL 2004-01 regarding SG tube integrity for WBN Unit 2 and there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner. The NRC staff considers the program review of these GLs closed.

In TVA's response to GL 2006-01, TVA stated that it would include TSTF-449 into the TS submittal for WBN Unit 2. The NRC staff finds this response acceptable, however, independent verification that the TSTF becomes incorporated into the TSs will be required prior to closing out the implementation of GL 2006-01. The NRC staff concludes that GL 2006-01 will remain open until this confirmatory item is complete.

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Date: January 21, 2010

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/RA/
Patrick Milano, Acting Chief
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