Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2
NRC Docket No. 50-391

Subject: **WATTS BAR NUCLEAR PLANT (WBN) UNIT 2 - NRC BULLETIN NO. 88-08, "THERMAL STRESSES IN PIPING CONNECTED TO REACTOR COOLANT SYSTEMS (RCS)" - CLARIFICATION**

References:
1. TVA letter dated March 29, 1994, "Watts Bar Nuclear Plant (WBN) Units 1 and 2 - NRC Bulletin 88-08 - Thermal Stresses in Piping Connected to Reactor Coolant Systems (RCS)"
2. TVA letter dated August 15, 2012, "Watts Bar Nuclear Plant (WBN) Unit 2 - Status of Regulatory Framework for the Completion of Construction and Licensing for Unit 2 - Revision 8 (TAC No. MD6311), and Status of Generic Communications for Unit 2 - Revision 8 (TAC No. MD8314)"

The purpose of this letter is to provide the current WBN Unit 2 plan for addressing NRC Bulletin 88-08. Based on analysis and experience gained from WBN Unit 1, WBN Unit 2 has developed an acoustic monitoring program similar to the one currently used on WBN Unit 1. Enclosure 1 provides the background and the basis for this action. The Regulatory Framework status for NRC Bulletin 88-08 shown in Reference 2 will be revised to reflect this change in the next update.

Enclosure 2 provides the new commitment made in this letter.

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I declare under penalty of perjury that the foregoing is true and correct. Executed on the 4th day of October, 2012.

If you have any questions, please contact me at (423) 365-2351.

Respectfully,

R. A. Hruby, Jr.

Raymond A. Hruby, Jr.
General Manager, Technical Services
Watts Bar Unit 2

Enclosures:
1. NRC Bulletin 88-08, "Thermal Stresses In Piping Connected to Reactor Coolant Systems (RCS)" - Clarification

2. List of Commitments

cc (Enclosures):

U. S. Nuclear Regulatory Commission
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ENCLOSURE 1

NRC BULLETIN 88-08, "THERMAL STRESSES IN PIPING CONNECTED TO REACTOR COOLANT SYSTEMS (RCS)" - CLARIFICATION

Background

The purpose of NRC Bulletin 88-08 was to review the reactor coolant systems (RCS) to identify any connected, non-isolable piping that might be subjected to temperature distributions which result in unacceptable thermal stresses and to take action, where such piping is identified, to ensure that the piping will not be subjected to unacceptable thermal stresses.

In 1987 and 1988, thermal fatigue cracking and leakage in several PWR plants resulted in the issuance of NRC Bulletin 88-08. In each of those events, the cracking was attributed to thermal cycling mechanisms not considered in initial plant design, and several actions were required of operating plants to assess susceptibility. The cracking was in normally stagnant non-isolable lines attached to RCS piping.

EPRI investigations into these events showed that two of the three cases described in the Bulletin could be attributed to in-leakage of cold water toward the RCS. Interaction of this leakage with turbulence/swirl penetration effects from the reactor coolant piping resulted in cyclic conditions of hot and cold water on the inside of the attached piping, eventually leading to thermal fatigue cracking and leakage. In the third case, the leakage was attributed to cyclic out-leakage past a normally closed valve. These events were summarized in an EPRI Materials Reliability Program (MRP). In none of these cases did the occurrence of thermal fatigue cracking result in a pipe rupture; however, leakage had occurred. For each of the events, the costs associated with evaluation, repair and plant unavailability were significant.

In 1994, Aptech Engineering prepared a response to NRC Bulletin 88-08 for Watts Bar Nuclear Plant (WBN) Unit 2. Similar to Unit 1, RCS branch lines were assessed for potential thermal fatigue concerns. For Unit 2, the Loop 1, boron safety injection (SI) branch line was identified as the only line requiring future action. One of the recommended actions for this line was for the SI check valve to be physically relocated such that the distance between the RCS connection and the check valve exceeded 25 branch diameters (i.e., an increase in the non-isolable section length). At that time, it was believed that this modification would render this branch line unsusceptible to swirl penetration cyclic stratification.

In March 1999, the EPRI MRP Executive Group and Senior Representatives approved formation of the Thermal Fatigue Issue Task Group. Testing and evaluations were undertaken to better understand the thermal fatigue mechanisms that had been responsible for cracking in the non-isolable normally-stagnant branch lines. This research culminated in the development of a methodology for evaluation of the phenomena that could lead to thermal cracking. Based on current understanding of the phenomenon and operating experience since 1994, the piping change described above would have no real influence on mitigating possible swirl penetration thermal fatigue. Thus, this modification is no longer recommended for mitigation of this thermal fatigue mechanism.

ENCLOSURE 1

NRC BULLETIN 88-08, "THERMAL STRESSES IN PIPING CONNECTED TO REACTOR COOLANT SYSTEMS (RCS)" - CLARIFICATION

WBN Unit 2 Action

In response to the experience gained from WBN Unit 1, the methodology used for WBN Unit 2 was to perform an engineering assessment of the RCS branch piping as described in MRP-146, "Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines." Unit 2 Calculation 1100448.301 entitled "MRP-146 Assessment of Normally Stagnant Non-Isolable Branch Lines" was performed to determine the susceptibility of non-isolable and stagnant branch lines off the RCS to thermal cycling mechanisms. The results of this assessment identified four lines that are susceptible to turbulence/swirl penetration effects that could lead to thermal fatigue cracking and leakage.

In compliance with NRC Bulletin 88-08, a susceptible drain line on each of the RCS Loops 1, 2, and 4 crossover legs was identified. Those three lines have been added to the augmented Pre-service Inspection Program WBN-2 PSI for baseline inspections of those areas deemed most susceptible to thermal fatigue cracking as noted in MRP-146. The RCS Loop 1 cold leg SI boron injection line is the fourth line identified which will be monitored for in-leakage. Cyclic stratification only occurs when in-leakage is present. Lack of in-leakage could reduce the need for future inspections.

Clarification

For WBN Unit 2, TVA will utilize the WBN Unit 1 approach which utilizes an EPRI calculational methodology and an augmented Pre-service Inspection Program for the three Unit 2 drain lines.

In addition, WBN Unit 2 has developed an acoustic monitoring program for the Unit 2 SI boron injection line governed by Procedure 2-TI-305, "Acoustic Monitoring to Detect Leakage Through 2-FCV-63-25 & -26," which is similar to that used on WBN Unit 1 for monitoring its susceptible SI boron injection lines for in-leakage.

ENCLOSURE 2

LIST OF COMMITMENTS

1. The Regulatory Framework status for NRC Bulletin 88-08 shown in Reference 2 will be revised to reflect this change in the next update.