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Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

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10 CFR § 50.36(a)

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 Unit 2 – Response to NRC Requests Related to Granting an Operating License**

Reference:
1. Electronic Mail from Michael Miernicki (NRC) to Gordon Arent (TVA), "Watts Bar 2 – RAIs – Developmental Tech Specs Rev I – Steam Generators," dated July 7, 2014
2. TVA Letter to NRC, "Watts Bar Nuclear Plant Unit 2 – Submittal of Developmental Revision I of the Unit 2 Technical Specification & Technical Specification Bases and Developmental Revision D of the Unit 2 Technical Requirements Manual and Technical Requirements Manual Bases," dated June 16, 2014 [ML14169A525]
3. TVA Letter to NRC, "Watts Bar Nuclear Plant, Unit 2 Response to NRC Bulletin 2012-01, "Design Vulnerability in Electrical Power System," dated June 12, 2014 [ML14163A606]
4. Electronic Mail from Michael Miernicki (NRC) to Robert Bryan (TVA), "Proposed Watts Bar, Unit 2 - Bulletin 2012-01 License Condition," dated June 19, 2014

The purpose of this letter is to respond to a request for additional information (RAI) (Reference 1) from the Nuclear Regulatory Commission (NRC) related to submittals from the Tennessee Valley Authority (TVA) on the Watts Bar Nuclear Plant (WBN) Unit 2 Technical Specifications and NRC Bulletin 2012-01, "Design Vulnerability in Electrical Power System."

TVA submitted the WBN Unit 2 Developmental Revision I of the Unit 2 Technical Specification (TS) and Technical Specification Bases (TSB) and Developmental Revision D of the Unit 2 Technical Requirements Manual (TRM) and Technical Requirements Manual Bases (TRMB) to the NRC in Reference 2. The NRC transmitted the RAI (Reference 1) to facilitate its review of the Developmental Revision I TS and TSB, specifically associated with steam generators. Enclosure 1 provides TVA's response to the NRC additional RAIs associated with the Developmental Revision I TS and TSB. If applicable for a specific RAI response, Developmental Revision I TS and TSB marked-up text is provided to show changes that will be incorporated into future TS and TSB, Developmental Revision J.

TVA submitted a proposed WBN Unit 2 license condition associated with actions associated with NRC Bulletin 2012-01 in Reference 3. The NRC requested a change to the proposed license condition in Reference 4. Enclosure 2 provides the revised license condition.

There are two new regulatory commitments associated with this submittal as detailed in Enclosure 3 of this letter. If you have any questions, please contact Gordon Arent at (423) 365-2004.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 3rd day of September 2014.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosures:
1. Response to NRC Request for Additional Information - Watts Bar Nuclear Plant Unit 2 - Technical Specification and Technical Specification Bases, Developmental Revision I
2. Watts Bar Nuclear Plant Unit 2 – Proposed License Condition for Bulletin 2012-01
3. List of Regulatory Commitments

cc (Enclosures):

NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Watts Bar Nuclear Plant, Unit 2
NRC Project Manager – Watts Bar Nuclear Plant, Unit 2

ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT, UNIT 2

Response to NRC Request for Additional Information - Watts Bar Nuclear Plant Unit 2 - Technical Specification and Technical Specification Bases, Developmental Revision I

INTRODUCTION

This Enclosure provides TVA's response to four NRC requests for additional information (RAI) that were transmitted via staff e-mail on July 7, 2014 (Reference 1).

Specifically, the NRC staff reviewed sections 3.4.17 "Steam Generator (SG) Tube Integrity," B 3.4.17 "Steam Generator (SG) Tube Integrity Bases," 5.7.2.12 "Steam Generator (SG) Program," and 5.9.9 "Steam Generator Tube Inspection Report," and determined that additional information is required in order to complete their review.

Revised TS or TSB text associated with RAIs 1 – 4 will be included in the future TS and TSB, Developmental Revision J.

NRC RAI Number: 1

NRC RAI:

On page B 3.4-90, the "Applicable Safety Analyses" section of B 3.4.17, "Steam Generator (SG) Tube Integrity Bases" does not adequately identify the leakage rates associated with the faulted and non-faulted SGs. The described leakage rates do not appear to be consistent with Section 15 of the Final Safety Analysis Report (Amendment 106). Please clarify which leakage rates are associated with the appropriate SGs.

TVA Response:

In order to ensure consistency between the "Applicable Safety Analyses" section of Technical Specification Bases B 3.4.17, "Steam Generator (SG) Tube Integrity Bases" and FSAR Section 15, TVA will revise the text in the "Applicable Safety Analyses" section of TS Bases B 3.4.17 to read as follows:

> In these analyses, the steam discharge to the atmosphere is based on the total primary to secondary LEAKAGE ***of*** ~~***from***~~ 150 gallons per day (gpd) per ***unfaulted*** steam generator and 1 gallon per minute (gpm) in the faulted steam generator.

The proposed TS Bases B 3.4.17 revision appears on the next page. Specific text revisions appear in bold font.

Reference:

WBN Unit 2 FSAR, Amendment 112, Chapter 15

NRC RAI Number: 1 (continued)

Proposed Revision to Technical Specification Bases Section B.3.4.17, Steam Generator (SG) Tube Integrity Bases

BASES (continued)

APPLICABLE SAFETY ANALYSES

The steam generator tube rupture (SGTR) accident is the limiting design basis event for SG tubes and avoiding an SGTR is the basis for this Specification. The analysis of a SGTR event assumes a bounding primary to secondary LEAKAGE rate equal to the operational LEAKAGE rate limits in LCO 3.4.13, "RCS Operational LEAKAGE," plus the leakage rate associated with a double-ended rupture of a single tube. The accident analysis for a SGTR assumes the contaminated secondary fluid is initially released to the atmosphere via safety valves before the operators identify the faulted, isolate it, and the subsequent contaminated secondary fluid is then discharged to the main condenser.

The analysis for design basis accidents and transients other than a SGTR assume the SG tubes retain their structural integrity (i.e., they are assumed not to rupture). In these analyses, the steam discharge to the atmosphere is based on the total primary to secondary LEAKAGE **of** ~~**from**~~ 150 gallons per day (gpd) per **unfaulted** steam generator and 1 gallon per minute (gpm) in the faulted steam generator. For accidents that do not involve fuel damage, the primary coolant activity level of DOSE EQUIVALENT I-131 is assumed to be equal to the LCO 3.4.16, "RCS Specific Activity," limits. For accidents that assume fuel damage, the primary coolant activity is a function of the amount of activity released from the damaged fuel. The dose consequences of these events are within the limits of GDC 19 (Ref. 2), and 10 CFR 100 (Ref. 3) or the NRC approved licensing basis.

Steam generator tube integrity satisfies Criterion 2 of the NRC Commission Interim Policy Statement (Ref. 8).

NRC RAI Number: 2

NRC RAI:

On page B 3.4-95, the "Surveillance Requirements" section of B 3.4.17, "Steam Generator (SG) Tube Integrity Bases" contains an extraneous paragraph. The second paragraph on this page is an optional paragraph from Technical Specification Task Force 510 (TSTF-510) that is only used when approved repair methods are contained in the Technical Specification 5.7.2.12, "Steam Generator (SG) Program." Since Watts Bar Unit 2 has no approved repair methods, please confirm that this paragraph will be removed.

TVA Response:

TVA will revise the text in SR 3.4.17.2 to delete the second paragraph to ensure consistency between the *SURVEILLANCE REQUIREMENTS* section of Technical Specification Bases B 3.4.17, "Steam Generator (SG) Tube Integrity Bases" and TSTF-510, Revision 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection*."*

The proposed TS Bases B 3.4.17 revision appears on the next page. Specific text revisions appear in bold font.

Reference:

TSTF-510, Revision 2, *Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection*

NRC RAI Number: 2 (continued)

Proposed Revision to Technical Specification Bases Section B.3.4.17, *Steam Generator (SG) Tube Integrity Bases*

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.17.2

During a SG inspection, any inspected tube that satisfies the Steam Generator Program (Ref. 7) plugging criteria is removed from service by plugging. The tube plugging criteria delineated in Specification 5.7.2.12 (Ref. 7) are intended to ensure that tubes accepted for continued service satisfy the SG performance criteria with allowance for error in the flaw size measurement and for future flaw growth. In addition, the tube plugging criteria, in conjunction with other elements of the Steam Generator Program (Ref. 7), ensure that the SG performance criteria will continue to be met until the next inspection of the subject tube(s). Reference 1 provides guidance for performing operational assessments to verify that the tubes remaining in service will continue to meet the SG performance criteria.

~~**Steam Generator tube plugging is only performed using approved plugging methods as described in the Steam Generator Program (Ref. 7).**~~

The Frequency of prior to entering MODE 4 following an SG inspection ensures that the Surveillance has been completed and all tubes meeting the plugging criteria are plugged prior to subjecting the SG tubes to significant primary-to-secondary pressure differential.

NRC RAI Number: 3

NRC RAI:

On pages 5.0-14 and 5.0-15, in Technical Specification 5.7.2.12, "Steam Generator (SG) Program," the incorporated wording is inconsistent with the wording in TSTF-510. In TSTF-510, at the end of the opening paragraph, the word "provisions" was deleted because it is repeated at the beginning of paragraph 5.7.2.12.a. The closing parenthesis in paragraph 5.7.2.12.b.1 was moved, because not all of the anticipated transients in the design specification are considered part of normal operating conditions. Finally, in paragraph 5.7.2.12.d, the phrase, "An assessment of degradation" was replaced with, "A degradation assessment" so that the wording would be consistent with that used in industry SG program documents. Please revise these pages to be consistent with TSTF-510.

TVA Response:

TVA will revise the text in TS 5.7.2.12, "Steam Generator (SG) Program," specifically paragraphs 5.7.2.12, 5.7.2.12.b.1, and 5.7.2.12.d, to ensure consistency between TS 5.7.2.12 and TSTF-510, Revision 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection."

The proposed TS 5.7.2.12 revision appears on the next page. Specific text revisions appear in bold font.

Reference:

TSTF-510, Revision 2, *Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection*

NRC RAI Number: 3 (continued)

Proposed Revision to Technical Specification 5.7.2.12, *Steam Generator (SG) Program*

5.7 Procedures, Programs, and Manuals (continued)

5.7.2.12 Steam Generator (SG) Program

A Steam Generator Program shall be established and implemented to ensure that SG tube integrity is maintained. In addition, the Steam Generator Program shall include the following: ~~**provisions:**~~

a. Provisions for condition monitoring assessments. Condition monitoring assessment means an evaluation of the "as found" condition of the tubing with respect to the performance criteria for structural integrity and accident induced leakage. The "as found" condition refers to the condition of the tubing during a SG inspection outage, as determined from the inservice inspection results or by other means, prior to the plugging of tubes. Condition monitoring assessments shall be conducted during each outage during which the SG tubes are inspected or plugged, to confirm that the performance criteria are being met.

b. Performance criteria for SG tube integrity. SG tube integrity shall be maintained by meeting the performance criteria for tube structural integrity, accident induced leakage, and operational LEAKAGE.

1. Structural integrity performance criterion: All in-service steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, hot standby, and cooldown), ~~**and**~~ all anticipated transients included in the design specification~~**,),**~~ and design basis accidents. This includes retaining a safety factor of 3.0 against burst under normal steady state full power operation primary-to-secondary pressure differential and a safety factor of 1.4 against burst applied to the design basis accident primary-to-secondary pressure differentials. Apart from the above requirements, additional loading conditions associated ….

NRC RAI Number: 3 (continued)

Proposed Revision to Technical Specification 5.7.2.12, *Steam Generator (SG) Program*

5.7 Procedures, Programs, and Manuals (continued)

5.7.2.12 Steam Generator (SG) Program (continued)

2. Accident induced leakage performance criterion: The primary-to-secondary accident induced leakage rate for any design basis accident, other than an SG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all SGs and leakage rate for an individual SG. Leakage is not to exceed1 gpm per SG.

3. The operational leakage performance criterion is specified in LCO 3.4.13, "RCS Operational LEAKAGE."

c. Provisions for SG tube plugging criteria. Tubes found by inservice inspection to contain flaws with a depth equal to or exceeding 40% of the nominal tube wall thickness shall be plugged.

d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube plugging criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. A ~~**n degradation**~~ **degradation** assessment ~~**of degradation**~~ shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

1. Inspect 100% of the tubes in each SG during the first refueling outage following SG installation.

NRC RAI Number: 4

NRC RAI:

In Technical Specification 5.7.2.12, "Steam Generator (SG) Program," the most restrictive SG inspection periods were chosen from TSTF-510 (i.e., inspect 100% of the tubes at sequential periods of 60 effective full power months). Please confirm that the SGs at Watts Bar Unit 2 contain mill annealed Alloy 600 tubes. Also, please provide the model designation of the Watts Bar Unit 2 SGs.

TVA Response:

The WBN Unit 2 steam generators are Westinghouse Model D3 steam generators. The WBN Unit 2 steam generators utilize mill annealed Inconel 600 tubing for the steam generator tubes.

Reference:

WBN Unit 2, FSAR, Section 5.5.2 *Steam Generators*

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT, UNIT 2

Watts Bar Nuclear Plant Unit 2 - Proposed License Condition for Bulletin 2012-01

Watts Bar Nuclear Plant Unit 2
Enclosure 2
Proposed Watts Bar Nuclear Unit 2 License Condition for Bulletin 2012-01

In response to NRC's June 19, 2014 request to modify the language for the proposed WBN Unit 2 License Condition, TVA proposes the following:

> Actions will be implemented at WBN Unit 2 to resolve the issues identified in Bulletin 2012-01, "Design Vulnerability in Electrical Power System" on or before December 31, 2017.

In addition, the following page, E2-3, provides in bold italicized font the information related to Bulletin 2012-01 and the License Condition text that will be added to the WBN Unit 2 FSAR Section 8.2.2 "Analysis" as part of WBN Unit 2 FSAR Amendment 113. This FSAR change is being made in response to a verbal request from J. Quichocho (NRC) to R. Bryan (TVA).

(1) To shed the loads to prevent overloading the diesel generator and close the 480V shutdown-board current-limiting reactor-bypass breaker.

(2) Allow the diesel generator to recover to rated speed and voltage.

(3) And reconnect the loads in proper sequence.

Overcurrent and differential overcurrent protective relays are provided for each shutdown board to lockout all supply breakers if the loss of voltage is caused by overload or an electrical fault. This prevents transfer of a fault between offsite power circuits or to the diesel generator. This minimizes the probability of losing electrical power from the transmission network on the onsite electrical power source.

Each of the offsite preferred power sources is monitored by an undervoltage relay. In the event of a loss of voltage on either 6.9kV start bus A or B with both units tripped, the load-shedding scheme will be initiated. This load-shedding scheme will trip off part of the BOP loads. The alternate supply breakers on 6.9kV RCP boards 1C, 1D, 2C and 2D will be tripped and locked out. Two redundant trip and lockout circuits are provided for each circuit breaker being load-shed. These redundant circuits have coincident logic features to minimize the probability of failure to operate and spurious trips. Functional test capability is built into each load-shedding circuit. The test features allow independent testing of each circuit while maintaining the load-shedding feature of the circuit not undergoing testing. The redundant load-shedding circuits will be tested periodically.

The NRC issued Bulletin 2012-01, "Design Vulnerability in Electrical Power Systems" describing a condition resulting from the loss of a single phase between the transmission network and the onsite power distribution system at an operating nuclear plant in the United States. TVA has taken the short term actions described in the bulletin and the nuclear industry is developing a long term resolution. TVA has added the following license condition for the long term actions:

Actions to resolve the issues identified in the Bulletin will be implemented on or before December 31, 2017.

ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT, UNIT 2

Watts Bar Nuclear Plant Unit 2 – List of Regulatory Commitments

Watts Bar Nuclear Plant Unit 2
Enclosure 3
Watts Bar Unit 2 - List of Regulatory Commitments

List of Regulatory Commitments

Regulatory Commitments		
No.	**Commitment**	**Due Date**
1.	TVA will incorporate changes to the WBN Unit 2 TS and TS Bases described in the RAI response of Enclosure 1 in Developmental Revision J	Developmental Revision J will be submitted on or before November 14, 2014.
2.	WBN Unit 2 will implement actions to resolve the issues identified in Bulletin 2012-01, “Design Vulnerability in Electrical Power System.”	Actions will be implemented for WBN Unit 2 on or before December 31, 2017.
3.	TVA will add the License Condition to WBN Unit 2 FSAR section “8.2.2 Analysis” as part of WBN Unit 2 FSAR Amendment 113.	WBN Unit 2 FSAR Amendment 113 will be issued on or before October 30, 2014.