



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

JUN 12 2006

WBN-TS-05-10

10 CFR 50.90

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

Gentlemen:

In the Matter of ) Docket No. 50-390  
Tennessee Valley Authority )

**WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - TECHNICAL  
SPECIFICATIONS (TS) CHANGE WBN-TS-05-10 - APPLICATION FOR  
TECHNICAL SPECIFICATION IMPROVEMENT REGARDING STEAM GENERATOR  
TUBE INTEGRITY - REQUEST FOR ADDITIONAL INFORMATION  
(TAC NO. MC 9271)**

The purpose of this letter is to provide TVA's response to the request for additional information dated May 9, 2006, concerning the subject amendment request that was submitted to NRC on December 15, 2005.

Enclosure 1 provides TVA's response to NRC's questions. There are no regulatory commitments associated with this submittal. If you have any questions concerning this matter, please call me at (423) 365-1824.

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JUN 12 2006

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 12<sup>th</sup> day of June 2006.

Sincerely,



P. L. Pace  
Manager, Site Licensing  
and Industry Affairs

Enclosures

1. Response to RAI Questions
2. Revised Technical Specification Page
3. Revised Technical Specification Bases Pages

cc (Enclosures):

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## ENCLOSURE 1

### WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 TECHNICAL SPECIFICATION CHANGE REQUEST WBN-TS-05-10 STEAM GENERATOR TUBE INTEGRITY - TSTF-449, REVISION 4

TVA submitted an application for an amendment to revise the WBN Unit 1 technical specification (TS) requirements to be consistent with Technical Specification Task Force (TSTF) Traveler, TSTF-449, Revision 4, "Steam Generator Tube Integrity," by letter dated December 15, 2005. As stated on page E1-3 of Enclosure 1 to the application, the current steam generators will be replaced in the Fall 2006. In addition, the approved alternate repair criteria (ARC) (i.e., voltage based ARC for outside diameter stress corrosion cracking and the use of the F-star), and the sleeving repair method will be deleted as part of this TS change. NRC issued a request for additional information concerning the subject TS change dated May 9, 2006. TVA's response is provided below:

#### NRC QUESTION 1

*Insert A of Enclosure 2 to the application contains TS 5.7.2.12, "Steam Generator (SG) Program," and corresponds to Insert 5.5.9 of TSTF-449, Revision 4.*

*The last sentence in TS 5.7.2.12.a states, "Condition monitoring assessments shall be conducted during each outage during which the SG tubes are inspected and/or plugged, to confirm that the performance criteria are being met." The intent of this paragraph is to ensure that condition monitoring assessments are conducted when the SG tubes are inspected or plugged as stated in paragraph a of Insert 5.5.9 of TSTF-449, Revision 4. The staff requests the licensee to either justify the use of "and/or" in the last sentence of TS 5.7.2.12.a or to replace "and/or" with "or."*

#### RESPONSE

See attached change to TS 5.7.2.12.a. - "and/or" has been replaced with "or."

#### NRC QUESTION 2

*Insert A of Enclosure 2 to the application contains TS 5.7.2.12, "Steam Generator (SG) Program," and corresponds to Insert 5.5.9 of TSTF-449, Revision 4.*

*The last sentence in TS 5.7.2.12.b.2 states, "The accident induced leakage is not to exceed 1.0 gpm for the faulted SG." The corresponding sentence in Insert 5.5.9 of TSTF-449, Revision*

## ENCLOSURE 1

### WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 TECHNICAL SPECIFICATION CHANGE REQUEST WBN-TS-05-10 STEAM GENERATOR TUBE INTEGRITY - TSTF-449, REVISION 4

4, states, "Leakage is not to exceed [1 gpm] per SG [, except for specific types of degradation at specific locations described in paragraph c of the Steam Generator Program]." The intent of this sentence is to ensure that leakage does not exceed 1 gpm in any SG except for those instances defined in paragraph c of the SG program. The staff requests the licensee to discuss its plans to modify this sentence consistent with TSTF-449, Revision 4.

#### RESPONSE

TVA acknowledges that the TSTF, Insert 5.5.9 states "per SG." However, the use of the words "per SG" indicates WBN could have a total from all four steam generators of four gallons per minute (gpm) primary-to-secondary leakage during an Main Steam Line Break (MSLB) accident. The MSLB dose calculation for the replacement steam generators uses one gpm in the faulted steam generator and 150 gallons per day (gpd) which is 0.10 gpm in the non-faulted steam generators (See Technical Specification Bases 3.4.13, RCS Operational Leakage, under Applicable Safety Analysis, page B 3.4-75, contained in TVA's request, WBN-TS-05-10, dated December 15, 2005). Therefore, TVA considers the wording change justified to prevent a misinterpretation which would be outside the WBN design basis.

#### NRC QUESTION 3

Enclosure 3 to the application includes the new bases for TS 3.4.17, "Steam Generator (SG) Tube Integrity," and corresponds to section B 3.4.20, "Steam Generator (SG) Tube Integrity," found on pages B 3.4.20-1 through B 3.4.20-7 of TSTF-449, Revision 4.

On page B 3.4-100 of the application, second paragraph under "Applicable Safety Analysis," the last sentence reads, "The dose consequences of these events are within the limits of GDC 19 (Ref. 2), and 10 CFR 100 (Ref. 3)." The corresponding sentence on page B 3.4.20-2 of TSTF-449, Revision 4, includes, "or the NRC approved licensing basis (e.g., a small fraction of these limits)." The staff requests the licensee to justify the exclusion of this phrase from its application.

#### RESPONSE

The calculated Main Control Room thyroid dose for the replacement steam generators in the MSLB radiological dose calculation is 12.5 rem versus the limit of 30 rem. Therefore, TVA did not include the words in parenthesis that state "(e.g., a small

## ENCLOSURE 1

### WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 TECHNICAL SPECIFICATION CHANGE REQUEST WBN-TS-05-10 STEAM GENERATOR TUBE INTEGRITY - TSTF-449, REVISION 4

fraction of these limits)," as 12.5 rem can not be considered a small fraction of 30 rem. However, 12.5 rem is well within the NRC's regulatory limits. TVA has added the words to the end of Bases second paragraph under Applicable Safety Analyses, page B 3.4-100, "or the NRC approved licensing basis." See attached mark-up of page B 3.4-100.

#### NRC QUESTION 4

*Enclosure 3 to the application includes the new bases for TS 3.4.17, "Steam Generator (SG) Tube Integrity," and corresponds to section B 3.4.20, "Steam Generator (SG) Tube Integrity," found on pages B 3.4.20-1 through B 3.4.20-7 of TSTF-449, Revision 4.*

*On page B 3.4-102 of the application, second paragraph under "Actions," the last sentence reads, "If it is determined that tube integrity is not being maintained until the next SG inspection, Condition B applies." The corresponding sentence on page B.3.4.20-4 of TSTF-449, Revision 4, does not include the phrase "until the next SG inspection," however, the required action found in Enclosure 2 of the application, page 3.4-43, includes the phrase, "until the next refueling outage or SG tube inspection." The staff requests the licensee to justify the deviation from the action described in TS 3.4.17 and the wording in TSTF-449, Revision 4.*

#### RESPONSE

See attached change to B 3.4-102. "...until the next SG inspection," has been deleted to be consistent with the TSTF.

ENCLOSURE 2

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1  
TECHNICAL SPECIFICATION CHANGE REQUEST WBN-TS-05-10  
STEAM GENERATOR TUBE INTEGRITY - TSTF-449, REVISION 4

REVISED PROPOSED TECHNICAL SPECIFICATION PAGES (MARK UP)

I. Affected Page List

5.0-15 Insert A

II. Marked Pages

See Attached

## INSERT A

### 5.7 Procedures, Programs, and Manuals (continued)

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#### 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 an 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, 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 with the design basis accidents, or combination of accidents in accordance with the design and licensing basis, shall also be evaluated to determine if the associated loads contribute significantly to burst or collapse. In the assessment of tube integrity, those loads that do significantly affect burst or collapse shall be determined and assessed in combination with the loads due to pressure with a safety factor of 1.2 on the combined primary loads and 1.0 on axial secondary loads.
  2. **Accident induced leakage performance criterion:** The primary-to-secondary accident induced leakage rate for any design basis accident, other than a 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. The accident induced leakage is not to exceed 1.0 gpm for the faulted SG.
  3. **The operational leakage performance criterion is specified in LCO 3.4.13, "RCS Operational LEAKAGE."**
- c. **Provisions for SG tube repair 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 repair 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. An assessment of degradation shall be performed to determine the type and

ENCLOSURE 3

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1  
TECHNICAL SPECIFICATION CHANGE REQUEST WBN-TS-05-10  
STEAM GENERATOR TUBE INTEGRITY - TSTF-449, REVISION 4

REVISED PROPOSED TECHNICAL SPECIFICATION PAGES

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I. Affected Page List

B 3.4-100  
B 3.4-102

II. Marked Pages

See Attached

BASES

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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 only briefly released to the atmosphere via safety valves and the majority is 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 from 150 gallons per day (gpd) per 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 10 CFR 50.36(c)(2)(ii).

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LCO

The LCO requires that SG tube integrity be maintained. The LCO also requires that all SG tubes that satisfy the repair criteria be plugged in accordance with the Steam Generator Program.

During an SG inspection, any inspected tube that satisfies the Steam Generator Program repair criteria is removed from service by plugging. If a tube was determined to satisfy the repair criteria but was not plugged, the tube may still have tube integrity.

*In the context of this Specification, a SG tube is defined as the entire length of the tube, including the tube wall, between the tube-to-tubesheet weld at the tube inlet and the tube-to-tubesheet weld at the tube outlet. The tube-to-tubesheet weld is not considered part of the tube.*

A SG tube has tube integrity when it satisfies the SG performance criteria. The SG performance criteria are defined in Specification 5.7.2.12, "Steam Generator Program," and describe acceptable SG tube performance. The Steam Generator Program also provides the evaluation process for determining conformance with the SG performance criteria.

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BASES

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LCO  
(continued)

The operational LEAKAGE performance criterion provides an observable indication of SG tube conditions during plant operation. The limit on operational LEAKAGE is contained in LCO 3.4.13, "RCS Operational LEAKAGE," and limits primary to secondary LEAKAGE through any one SG to 150 gallons per day. This limit is based on the assumption that a single crack leaking this amount would not propagate to a SGTR under the stress conditions of a LOCA or a main steam line break. If this amount of LEAKAGE is due to more than one crack, the cracks are very small, and the above assumption is conservative.

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APPLICABILITY

Steam generator tube integrity is challenged when the pressure differential across the tubes is large. Large differential pressures across SG tubes can only be experienced in MODE 1, 2, 3, or 4.

RCS conditions are far less challenging in MODES 5 and 6 than during MODES 1, 2, 3, and 4. In MODES 5 and 6, primary to secondary differential pressure is low, resulting in lower stresses and reduced potential for LEAKAGE.

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ACTIONS

The ACTIONS are modified by a Note that the Conditions may be entered independently for each SG tube. This is acceptable because the Required Actions provide appropriate compensatory actions for each affected SG tube. Complying with the Required Actions may allow for continued operation, and subsequent affected SG tubes are governed by subsequent Condition entry, and application of associated Required Actions.

A.1 and A.2

Condition A applies if it is discovered that one or more SG tubes examined in an inservice inspection satisfy the tube repair criteria but were not plugged in accordance with the Steam Generator Program as required by SR 3.4.17.2. An evaluation of SG tube integrity of the affected tube(s) must be made. Steam generator tube integrity is based on meeting the SG performance criteria described in the Steam Generator Program. The SG repair criteria define limits on SG tube degradation that allow for flaw growth between inspections while still providing assurance that the SG performance criteria will continue to be met. In order to determine if a SG tube that should have been plugged, has tube integrity, an evaluation must be completed that demonstrates that the SG performance criteria will continue to be met until the next refueling outage or SG tube inspection. The tube integrity determination is based on the estimated condition of the tube at the time the situation is discovered and the estimated growth of the degradation prior to the next SG tube inspection. If it is determined that tube integrity is not being maintained ~~until the next SG inspection~~, Condition B applies.

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