



Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37384-2000

August 7, 2006

10 CFR 50.90

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

Gentlemen:

In the Matter of) Docket No. 50-328
Tennessee Valley Authority)

**SEQUOYAH NUCLEAR PLANT (SQN) - RESPONSE TO REQUEST FOR
ADDITIONAL INFORMATION (RAI) REGARDING STEAM TUBE INTEGRITY
(TSTF-449) (TAC NO. MD0145)**

Reference: NRC letter to TVA dated June 6, 2006, "Sequoyah
Nuclear Plant, Unit 2 - Request for Additional
Information Regarding Steam Generator Tube
Integrity (TSTF-449) (TAC NO. MD0145)"

Enclosed are TVA's responses to your request for additional
information from the reference letter. TVA's responses were
discussed with your staff during a telephone conference call
on June 06, 2006. TVA's responses support the discussions
from the June telephone call for staff review of TVA's
Technical Specification Change 05-09 for SQN Unit 2.

TVA plans to provide a revision to TS Change 05-09 in early
August 2006 to incorporate changes as described in the
enclosed RAI response.

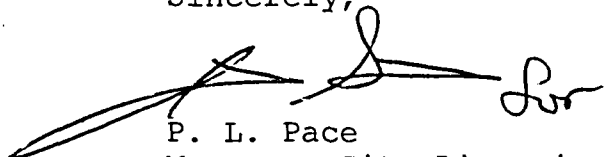
Please direct questions concerning this issue to J. D. Smith
at (423) 843-6672.

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I declare under penalty of perjury that the foregoing is true and correct. Executed on this 7th day of August, 2006.

Sincerely,



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

Enclosure

1. TVA Summary of the Proposed Changes
2. Proposed Technical Specifications Changes (mark-up)
3. Changes to Technical Specifications Bases Pages

cc (Enclosure):

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ENCLOSURE

TENNESSEE VALLEY AUTHORITY (TVA) SEQUOYAH NUCLEAR PLANT (SQN) UNIT 2

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION FOR SQN TECHNICAL SPECIFICATION (TS) CHANGE 05-09, STEAM GENERATOR TUBE INTEGRITY

NRC Question 1

In Insert A of the application, the SG Tube Integrity limiting conditions for operation (LCO), on page E2-16 of the application, the "Applicability" is described in terms of operational mode numbers ("MODES 1, 2, 3, and 4"), but the "Actions" use word descriptions ("HOT STANDBY" and "COLD SHUTDOWN"). Since TSTF-449 uses mode numbers, please discuss why you used the word descriptions rather than the mode numbers, or discuss your plans to modify your proposal to be consistent with the TSTF-449 terminology.

TVA Response

SQN has older standard TSs with defined terms in the action requirements such as HOT STANDBY and COLD SHUTDOWN. The defined terms have equivalence to certain plant mode conditions (i.e., MODE 3 is equivalent to HOT STANDBY). TVA's use of these defined terms is in keeping with SQN's current standard usage of these terms for action requirements. This approach was discussed with NRC staff during a June 06, 2006, telephone conference call and was considered acceptable to the staff.

NRC Question 2

Insert A, the SG Tube Integrity LCO, page E2-16, the second part of TSTF-449 Condition B is not included. Condition B in the TSTF is as follows: "Required action and associated completion time of Condition A not met OR SG tube integrity not maintained." In the proposed TS for SQN, Unit 2, the second part of this condition is excluded (i.e., "SG tube integrity not maintained"). Please provide justification for removing the key requirement to shut down the reactor if SG tube integrity is not being maintained, or alternatively, discuss your plans to modify your proposed TS LCO to include this key requirement and be consistent with TSTF-449. Since this requirement was not included in the TS submitted for SQN, Unit 1, please discuss whether you have any plans to modify your SQN, Unit 1 TS.

TVA Response

TVA's proposed TS Change 05-09 combines the action requirements from Condition A and Condition B of TSTF-449 into two action requirements (a) and (b) for SQN. The actions (a) and (b) are required if the conditions of the LCO cannot be met. One condition of the LCO requires SG tube integrity be maintained. In the event SG tube integrity cannot be maintained, the LCO condition would not be satisfied, and action must be taken to

bring the unit to a shutdown condition. During discussion with the staff regarding this issue in the June 16, 2006 phone call, TVA indicated that for conditions where a TS LCO can not be met, TS 3.0.3 applies. Further discussions with the SQN plant operations staff has concluded that the correct action to take upon determining that tube integrity is not maintained, is a unit shutdown in accordance with the proposed action (a) of TS change 05-09. TVA is processing a revision to the Bases to ensure consistent application of this action when SG tube integrity can not be maintained.

NRC Question 3

In proposed TS 3.4.5.b and the associated Surveillance Requirement 4.4.5.1 (page E2-16), the proposed timing requirement is "prior to startup following a SG tube inspection." The corresponding requirement in TSTF-449 is "prior to entering MODE 4 following a SG tube inspection." Since MODE 4 is defined as "Hot Shutdown" and "Startup" is defined as MODE 2 in the standard technical specifications, the proposed SQN, Unit 2 TS are inconsistent with TSTF-449. Please provide a justification for this difference, or discuss your plans for modifying your proposal to make it consistent with TSTF-449.

TVA Response

TVA evaluated the action and surveillance requirement language from TSTF-449 (i.e., "prior to entering MODE 4 following a SG tube inspection") and found that SQN plant operators had varied interpretations of what was intended by this language. The TSTF language "prior to entering MODE 4" was, in some cases, misinterpreted by operators to mean that the action or surveillance requirement must be completed prior to plant shutdown or prior to entry into MODE 4 during plant shutdown. Based on this potential for misinterpretation, TVA proposed a preferred language of "prior to startup following a SG tube inspection." This language made it clear that the action was to be accomplished during plant startup. Accordingly, TVA is retaining the language "prior to startup" to ensure proper interpretation by the operator for completing the TS action or surveillance requirement during startup.

During a June 06, 2006, telephone conference call, NRC staff expressed concern that "prior to startup" could allow the plant to achieve MODE 2 without completing the action or surveillance requirement. TVA

noted during subsequent discussion with the staff that the word startup (as used in the lowercase) is not defined as MODE 2 and applies to the LCO and its mode of applicability (i.e., MODE 4). SQN TS would not allow mode changes up to MODE 2 without meeting the LCO. Clarification is being made to the TS Bases and will be submitted in a supplement submittal to TS change 05-09.

NRC Question 4

The fourth and fifth items listed in your proposal under "Provisions for SG tube inspections," (TS 6.8.4.k.d on pages E2-21 to E2-22, Insert B of your proposed TS) are the Generic Letter (GL) 95-05 voltage-based alternative repair criteria (ARC) at tube support plates (TSPs) and the W* methodology ARC. Since it may be necessary to reference these provisions in other parts of the TS, please discuss your plans for assigning numbers to these items, for example 6.8.4.k.d.4 and 6.8.4.k.d.5.

In addition, please discuss your plans for modifying your proposed TS 6.8.4.k.d to add these two repair criteria to the sentence that reads, "In addition to meeting the requirements of d.1, d.2, and d.3 below," For example, "In addition to meeting the requirements of d.1, d.2, d.3, d.4, and d.5 below ..."

Please discuss your plans for moving the repair criteria associated with implementation of the W* criteria to the repair criteria section of the TS (6.8.4.k.c).

Please discuss your plans for removing the last sentence in proposed TS 6.8.4.k.d under W* methodology. This sentence addresses postulated leakage and is not needed since it is addressed under TS 6.8.4.k.b.2

TVA Response

TVA is processing a revision to TS change 05-09 to incorporate the suggestions above. The following changes are made to TS 6.8.4:

The SQN TS section entitled "GL 95-05 Voltage-Based ARC for TSP" is given a reference number 6.8.4.k.d.4.

Section 6.8.4.k.d is modified to add a new reference to 6.8.4.k.d.4. The sentence now reads, "In addition to meeting the requirements of d.1, d.2, d.3, and d.4 below, . . . "

The W* methodology is moved from the inspection section to the repair section.

The last sentence in proposed TS 6.8.4.k.d under the W* methodology is deleted.

NRC Question 5

The staff has made several observations, which are listed below, regarding the section titled "GL 95-05 Voltage-Based ARC (Tubes

Support Plate)." This section begins on page E2-20 of your proposal, as part of your proposed TS 6.8.4.k.c (Provisions for SG tube repairs.)

- a. Please discuss your plans for assigning a number to this section so it may be referenced in other parts of your TS (i.e., the accident induced leakage performance criterion).
- b. The second sentence of the introductory paragraph in this section states that the plugging (repair) limit at tube support plate intersections is based on maintaining SG tube serviceability. Please discuss your plans for removing the phrase "maintaining SG tube serviceability," since serviceability is not defined in your proposed TS.
- c. In several locations in the this section, the proposed TS use the phrase "the lower voltage repair limit (Note 1)." Please discuss your plans for removing this phrase and replacing it with "2.0 volts," since this is the value applicable to SQN, Unit 2. Keeping Note 1 complicates the proposed TS.
- d. Paragraph (b) of this section states that SG tubes with TSP outside diameter stress corrosion cracking (ODSCC) bobbin voltage greater than the repair limit (i.e., >2.0 volts) will be "repaired or plugged." Since SQN, Unit 2 does not have an option for tube repair (i.e., sleeving), please discuss your plans to remove this phrase from your proposed TS.
- e. Paragraph (c) of this section specifies a particular eddy current probe (i.e., "rotating pancake coil inspection"). The proposal would require you to use this technology even if other, more advanced, probes were developed for detecting ODSCC at tube support plates. Please discuss your plans for modifying the technical specifications to avoid this limitation (e.g., "rotating pancake coil inspection or comparable technology").
- f. Paragraph (d) of this section states "Not applicable to SQN." Please discuss your plans for removing this item from the proposed TS since it is not needed.
- g. In several places in this section of the proposed TS you refer to other paragraphs within the section (e.g., "as noted in Item c below"). Please discuss your plans for making these references more clear by including the full TS number in these references (e.g., Item 6.8.4.k.c.1.a).
- h. The final statement in this TS section refers to an accident leakage limit for the ODSCC ARC and for W* calculated leakage. Since there is a separate section for accident induced leakage, please discuss your plans for moving this requirement to TS section 6.8.4.k.b.2, "Accident induced leakage performance criteria." With respect to the accident induced leakage performance criteria, you proposed that the accident induced leakage is not to exceed 1 gallon per minute (gpm) for the faulted steam generator except for ODSCC and W* indications that have an approved limit of 3.7 gpm.

The staff notes that this sentence could be misinterpreted to mean ODSCC indications have a limit of 3.7 gpm and W* indications have a limit of 3.7 gpm. In addition, the reference to "3.7 gpm" should not be needed since it should be consistent with your design and licensing basis (i.e., the second sentence in proposed TS 6.8.4.k.b.2). Please discuss your plans to clarify the accident induced leakage limit. For example, "leakage from all sources, excluding the leakage attributed to the degradation described in TS 6.8.4.k.c.1 and 6.8.4.k.c.2, is not to exceed 1 gpm per SG."

TVA Response

TVA is processing a revision to TS change 05-09 that incorporates the suggestions above. The following changes are made to TS 6.8.4.k.c:

The section entitled, "GL 95-05 Voltage-Based ARC (Tubes Support Plate [TSP])" is given section number 6.8.4.k.c.1.

The second sentence of the introductory paragraph has been reworded to remove the phrase, "maintaining SG tube serviceability."

In all locations where the reference is made to the "lower voltage repair limit (Note 1)," the language is changed to state 2 volts. In addition, Note 1 is deleted.

Paragraphs (b) and (c) have been modified to remove the word "repaired."

Paragraph (c) is modified to add the phrase "or comparable technology" when the rotating pancake coil inspection is referenced.

Paragraph (d) is deleted and the subsequent paragraph (e) is re-lettered as paragraph (d).

Paragraphs (b) and (e) that currently make reference to "Items a, b and c," is revised to reference specific TS numbers (Items 6.8.4.k.c.1.a, b, and c).

The last statement in paragraph (e) that refers to the accident leakage limit is deleted.

Paragraph 6.8.4.k.b.2 is revised to clarify the accident induced leakage limit. The revision removes language from the end of the first sentence "except for outside diameter stress corrosion crack (ODSCC) and W* indications that have an approved limit of 3.7 gallons per minute (gpm)." The first sentence is revised to read:

"The accident induced leakage from all sources, excluding the leakage attributed to the degradation described in 6.8.4.k.c.1 and .2, is not to exceed 1.0 gpm for the faulted SG."

NRC Question 6

One of the purposes of TSTF-449 is to allow licensees to update their TS to accurately reflect their SG tube integrity program. For implementation of the voltage-based tube repair criteria, licensees have submitted "90-day reports" providing information concerning tube pulls and condition monitoring/operational assessment results. Consistent with the philosophy of TSTF-449, please discuss your plans to modify proposed Section 6.9.1.16, Steam Generator Tube Inspection Report, to include a requirement to provide the information described in Section 6b of Attachment 1 of GL 95-05 to the NRC.

TVA Response

TVA is processing a revision to TS change 05-09 that incorporates a specific reporting requirement for the voltage based alternate repair criteria (90-day report required in accordance with NRC Generic Letter 95-05).

NRC Question 7

According to your proposed structural integrity performance criterion in TS 6.8.4.k.b.1, a safety factor of 1.4 against burst will be applied to the design basis accident primary to secondary pressure differentials. However, GL 95-05, "Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking," indicated that there is a possibility that a tube may have a burst pressure less than 1.4 times the steam line break pressure differential (given the uncertainties associated with the various correlations). Therefore, the GL 95-05 ARC imposed a limit on the probability of burst (POB) of 1×10^{-2} . As a result, it is not clear from your submittal that the structural integrity performance criteria is complete since it does not fully address all the performance criteria for implementation of the voltage-based ARC. Please discuss your plans to modify the performance criteria to fully address the voltage-based ARC. For example, discuss your plans for modifying the structural integrity performance criteria to indicate that for predominantly axially oriented ODSCC at the TSP elevations the POB of one or more indications given a steam line break shall be less than 1×10^{-2} . Upon incorporation of this provision into the structural integrity performance criterion, please discuss your plans to eliminate the associated reporting requirement in proposed TS 6.9.1.16.i, since operation in excess of this limit will not be permitted.

TVA Response

TVA is processing a revision to TS change 05-09 that incorporates the suggestions above.

- 1) Structural integrity performance criteria for ODSCC is incorporated into SQN's Steam Generator (SG) Program (TS 6.8.4.k.b.1.)
- 2) The associated reporting requirement is eliminated from proposed TS 6.9.1.16.i (see elimination of item 5).

NRC Question 8

Given that the new TS provided in TSTF-449 does not allow operation when the accident induced leakage criteria is exceeded, please discuss your plans to omit TS Section 6.9.1.16.i.1.

TVA Response

TVA is processing a revision to TS change 05-09 that deletes TS Section 6.9.1.16.i.1.

NRC Question 9

Proposed TS 6.9.1.16 addresses the requirements for the report that must be submitted within 180 days after initial entry into MODE 4 following completion of an SG tube inspection in accordance with proposed TS 6.8.4.k. The list of requirements includes item 6.9.1.16.i, which requires NRC staff notification "prior to returning the steam generators to service" should any of the conditions listed in your proposed TS 6.9.1.16.i exist. Please discuss your plans for modifying your proposal to renumber proposed TS 6.9.1.16 so the current item i is separated from the 180-day report. For example, the 180-day report might be TS 6.9.1.16.1, the GL 95-05 90-day reporting requirements might be TS 6.9.1.16.2, the GL 95-05 notification prior to returning the steam generators to service might be TS 6.9.1.16.3, and so on. In addition, it is not clear that reference to 10 CFR 50.4 in proposed TS 6.9.1.16.j is needed.

TVA Response

TVA is processing a revision to TS change 05-09 that revises TS 6.9.1.16 and renumbers this section to clearly separate the 180-day report, the 90-day report, and the NRC reporting requirements associated with GL 95-05 prior to startup. In addition, the reference to 10 CFR 50.4 and Special Reporting in the proposed TS 6.9.1.16.j is deleted.

NRC Question 10

In proposed TS 6.8.4.k.a, "Provisions for condition monitoring assessments," the last sentence 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. Please either provide a justification for using "and/or" in the last sentence of TS 6.8.4.k.a, or discuss your plans to replace "and/or" with "or".

TVA Response

TVA is processing a revision to TS change 05-09 that revises TS 6.8.4.k.a to replace "and/or" with "or".

NRC Question 11

The W* inspection methodology in proposed TS 6.8.4.k.c (insert B, page E2-22) begins by stating that implementation requires "a 100 percent rotating coil probe inspection of the hot-leg tubesheet W* distance." As currently written, the proposal would require you to use this technology even if other, more advanced probes are used to examine the hot-leg tubesheet W* distance. For example, non-rotating probe technology (e.g., array probes) could not be used to satisfy this technical specification. Multiple probe types may be required if, for example, a form of degradation occurs (or is postulated to occur) that cannot be reliably detected in the W* distance using a rotating coil probe. Given your proposed requirement to inspect with methods capable of detecting flaws of any type that may be present along the length of the tube and that may satisfy the applicable tube repair criteria, please discuss your plans to remove the reference to a rotating coil probe.

TVA Response

TVA is processing a revision to TS change 05-09 that revises the W* methodology to remove the reference to a specific probe type (i.e., "rotating coil probe").

NRC Question 12

Under the discussion on page E2-22 of the W* methodology in Insert B of the proposed TS, the final sentence of the first paragraph defines the length of tubing that constitutes a tube inspection. This definition excludes the portion of tubing from below the top support on the cold leg. This contradicts your proposed TS 6.8.4.k.d and TSTF-449, which define a tube inspection from the tube inlet end to the tube outlet end. Please discuss your plans for modifying the definition of tube inspection to ensure the cold leg is examined.

TVA Response

TVA is processing a revision to TS change 05-09 that will revise Insert B of the proposed TS to include cold leg tube examination.

NRC Question 13

Under the "Applicable Safety Analyses" section of your proposed TS bases B 3.4 Reactor Coolant System (Insert D, page E3-6) the last sentence of the second paragraph states, "the dose consequences of these events are within the limits of GDC 19 (Ref. 2), and 10 CFR 100 (Ref. 3)." The corresponding sentence in TSTF-449 is as follows:

The dose consequences of these events are within the limits of GDC 19 (Ref. 2) 10 CFR 100 (Ref. 3) or the NRC approved licensing basis (e.g., a small fraction of these limits). Please discuss your reason for omitting the phrase, "or the NRC approved licensing basis (e.g., a small fraction of these limits)" or discuss your plans to modify your proposal to include it in your TS Bases.

TVA Response

In accordance with the NRC Standard Review Plan, the phrase "small fraction" is applied to calculated radiological doses that are less than 10 percent of established 10 CFR 100 limits. This phrase is not included in SQN's TS Change 05-09 Bases because the "small fraction" criterion is more conservative than the current licensing basis for some SQN radiological consequence analyses. As indicated in Section 15.5 of

SQN's Final Safety Analysis Report, most of the design basis accident radiological consequence analyses meet the "well within" criterion of the Standard Review Plan (i.e., doses less than 25 percent of the 10 CFR 100 limits).

Based on the above discussion, TVA is processing a revision to TS change 05-09 that states:

"The dose consequences of these events are within the limits of GDC 19 (Ref. 2), 10 CFR 100 (Ref. 3) or the NRC approved licensing basis."

SQN cannot include the TSTF parenthetical statement (e.g., a small fraction of these limits). The SQN limits are well within the limits of GDC 19 and 10 CFR 100; however, they are not a small fraction of these limits.

NRC Question 14

The "Actions" section of your proposed TS bases B 3.4 Reactor Coolant System (Insert D, page E3-9), states that the actions are required if "it is determined that tube integrity is not being maintained until the next SG inspection ...". Since your proposed TS require action if tube integrity is not maintained until the next refueling outage or SG tube inspection, please discuss your plans to modify your Bases to add "the next RFO" to this sentence.

TVA Response

TVA is processing a revision to TS change 05-09 that modifies the TS Bases sentence to state "the next refueling outage or SG inspection."

NRC Question 15

The "Actions" section of your proposed TS bases B 3.4 Reactor Coolant System (Insert D, page E3-9, next to last paragraph), states that "the reactor must be brought to HOT STANDBY within 6 hours and COLD SHUTDOWN within the next 30 hours" if SG tube integrity is not being maintained. TSTF-449 indicates these actions are required if, "the Required Actions and associated Completion Times of Condition A are not met or if SG tube integrity is not being maintained." For the Sequoyah Unit 2 proposal, consistency with TSTF-449 would mean that this requirement

(HOT STANDBY within 6 hours and COLD SHUTDOWN within the next 30 hours) would be required if SG tube integrity is not being maintained or is not verified within 7 days. Please discuss your reason for omitting this part of the requirement or your plans for modifying it to be consistent with TSTF-449.

TVA Response

Refer to TVA's response to NRC Question 2 above.

NRC Question 16

In your proposed Bases (e.g., Bases section 3/4.4.6.2 on pages E3-16 and E3-17), a maximum value of 0.4 gpm (0.1 gpm per steam generator) for allowable normal operational leakage was listed. Since your TS limit is 150 gallons per day (gpd) per SG (in proposed TS 3.4.6.2.c), please discuss the reason for this discrepancy. If your accident analysis assumes 144 gpd leakage per SG, discuss your plans for modifying your TS (3.4.6.2.c) to be consistent with your accident analysis. Alternatively, if 150 gpd was assumed in your accident analysis, discuss your plans to modify your Bases.

TVA Response

As indicated in Section 2.15.6.4 of Reference 1 (which was submitted to NRC by Reference 2), the main steam line break accident analyses conservatively assumes an amount of leakage is already present prior to the accident in the non-faulted steam generators. The assumed leakage is equivalent to the TS maximum operational leakage or 150 gallons per day. This leakage limit was truncated and expressed as 0.1 gpm in TVA's proposed TS Bases to be consistent with the units and significant figures expressed in the Bases for the faulted steam generator leakage limit (3.7 gpm).

For clarification of these leakage limits, TVA is processing a revision to TS Change 05-09 to clarify the TS Bases regarding the application of these leakage values.

NRC Question 17

In the Applicable Safety Analyses portion of proposed TS Bases section 3/4.4.6.2, Operational Leakage (page E3-17), the maximum assumed leakage rate from a steam generator tube rupture or steam line break accident is changed from 8.21 gpm to 3.7 gpm. It is not clear to the staff whether this change is an administrative change or if you have changed your accident analysis. Since this TS amendment request does not provide the basis for approving a new accident analysis, please confirm that your accident analysis has not changed (i.e., 3.7 gpm is consistent with your NRC approved licensing basis).

TVA Response

The change in the faulted steam generator leakage rate from 8.21 gpm to 3.7 gpm represents an administrative change. The accident analysis which established the acceptability of the 3.7 gpm leakage is summarized in Section 2.15.6.4 of Reference 1 (which was submitted to NRC by Reference 2). The analysis has been previously reviewed and approved by NRC (see Section 2.5.1.4 of the Safety Evaluation Report attached to Reference 3).

References

1. Topical Report No. BAW-10237, Revision 01, "Implementation and Utilization of Tritium Producing Burnable Absorber Rods (TPBARs) in Sequoyah Unit 1 and 2", September 2001.
2. TVA letter to NRC dated September 21, 2001, "Technical Specification Change No. TVA-SQN-TS-00-06.
3. NRC letter to TVA dated September 30, 2002, "Issuance of Amendments Regarding Technical Specification Change No. 00-06 (TAC Nos. MB2972 and MB2973)."