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

July 11, 2013

10 CFR Part 54

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

Sequoyah Nuclear Plant, Units 1 and 2
Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327 and 50-328

Subject: **Response to NRC Request for Additional Information Regarding the Reactor Vessel Internals Review of the Sequoyah Nuclear Plant, Units 1 and 2, License Renewal Application, Set 6 (TAC Nos. MF0481 and MF0482)**

References:

1. TVA Letter to NRC, "Sequoyah Nuclear Plant, Units 1 and 2 License Renewal," dated January 7, 2013 (ADAMS Accession No. ML13024A004)
2. NRC Letter to TVA, "Requests for Additional Information for the Review of the Sequoyah Nuclear Plant, Units 1 and 2, License Renewal Application, Set 6," dated June 11, 2013 (ADAMS Accession No. ML13109A515)

By letter dated January 7, 2013 (Reference 1), Tennessee Valley Authority (TVA) submitted an application to the Nuclear Regulatory Commission (NRC) to renew the operating license for the Sequoyah Nuclear Plant, Units 1 and 2. The request would extend the license for an additional 20 years beyond the current expiration date. By letter dated June 11, 2013 (Reference 2), the NRC forwarded a request for additional information (RAI). The required date for the response is within 30 days of the date stated in the RAI, i.e., no later than July 11, 2013.

The enclosure to this letter provides TVA's response to the Reference 2 RAI, except for question 1.41-4. Mr. Richard Plasse, the NRC License Renewal Project Manager, has given a verbal extension to August 12, 2013 for this question. Also in this letter the NRC included four questions with 60 days for TVA to response. TVA will provide that response by August 12, 2013.

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NRR

There are no commitments contained in this submittal.

Consistent with the standards set forth in 10 CFR 50.92(c), TVA has determined that the additional information, as provided in this letter, does not affect the no significant hazards considerations associated with the proposed application previously provided in Reference 1.

Please address any questions regarding this submittal to Henry Lee at (423) 843-4104.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 11th day of July 2013.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosure: TVA Responses to NRC Request for Additional Information

cc (Enclosure):
NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Sequoyah Nuclear Plant

ENCLOSURE

Tennessee Valley Authority

Sequoyah Nuclear Plant, Units 1 and 2 License Renewal

TVA Responses to NRC Request for Additional Information

RAI 4.1-1

Background:

Updated final safety analysis report (UFSAR) Section 3.5, "Missile Protection," and 5.2.6, "Pump Flywheel," provide the relevant information on the inspection and evaluation bases that are used to protect the plant against the consequences of postulated reactor coolant pump (RCP) flywheel generated missiles.

The staff has two recommended positions that may have been adopted by licensees in the current license basis (CLB) as the basis for evaluating postulated RCP flywheel missile events: (a) the position in Section 5.4.1.1 of NUREG-0800 (Standard Review Plan or SRP), "Pump Flywheel Integrity," and (b) the regulatory position in Regulatory Guide (RG) 1.14, "Reactor Coolant Pump Flywheel Integrity."

Issue:

In LRA Table 4.1-2, the applicant states that the flaw growth analysis for the RCP flywheels is not an analysis the meets the definition of a time-limited aging analysis (TLAA) in 10 CFR 54.3. However, the applicant did not explain why the flaw analysis would not need to be identified as a TLAA.

Request:

1. *Identify the position(s) (i.e., the position in SRP Section 5.4.1.1, the position in RG 1.14 or both positions) that is (are) being relied upon in the current design basis to assess the plant against the consequences of postulated RCP flywheel missile events.*

2. *If RG 1.14 or SRP 5.4.1.1 is being relied upon as part of the design basis, provide the following additional information:*
   a. *identify the plant-specific document, analysis, calculation, or record that is being used to conform to the time-dependent flaw growth analysis (i.e., non-ductile failure analysis) that is recommended in RG 1.14 or the recommended analysis in SRP Section 5.4.1.1;*
   b. *identify and discuss all flaw initiation and growth mechanisms that are conservatively assumed for in the RCP flywheel flaw analysis; and*
   c. *justify why the flaw analysis would not need to be identified as a TLAA for the LRA.*

TVA RESPONSE

1. Regulatory Guide 1.14 is identified in the SQN Unit 1 and 2 Technical Specifications 4.0.5.c as the position being relied upon in the current design basis to assess the plant against the consequences of postulated RCP flywheel missile events:

   "c. Inspection of each reactor coolant pump (RCP) flywheel per the recommendation of Regulation Position c.4.b of Regulatory Guide 1.14, Revision 1, August 1975 or in lieu of Position c.4.b(1) and c.4.b(2), a qualified in-place ultrasonic examination over the volume from the inner bore of the flywheel to the circle one-half of the outer radius or a surface examination (magnetic particle and/or liquid penetrant) of exposed surfaces of the removed flywheels may be conducted at 20-year intervals (the provisions of SR 4.0.2 are not applicable);"

2. (a) The plant specific document for extending the RCP flywheel inspections from a 10-year inspection interval to an interval not to exceed 20 years was provided by the Westinghouse Owners Group (WOG) in Topical Report WCAP-15666, "Extension of RCP Motor Flywheel Examination," transmitted to NRC by letter dated August 24, 2001 (ADAMS Accession No. ML012420149). The topical report was not a plant-specific analysis because it addressed the proposed extension consistent with RG 1.14 requirements for all domestic WOG plants. The NRC accepted the topical report for referencing in license applications in the safety evaluation dated May 5, 2003 (ADAMS Accession No. ML031250595).

   (b) WCAP-15666 provides the results of a fatigue crack growth analysis that assumed an initial crack length of 10 percent of the distance from the keyway to the flywheel outer radius. The growth mechanisms included in the analysis are the result of 6000 cycles of RCP starts and stops.

   (c) The WCAP-15666 analysis includes 6000 cycles of RCP starts and stops, which represents a conservative rate of RCP starts and stops of 100 per year for a 60 year operating period. Because this analysis was completed for 60 years, this analysis does not meet part (3) of the 10 CFR 54.3 definition of a TLAA (i.e., involve time-limited assumptions defined by the current term of operation, for example, 40 years) and therefore, is not a TLAA.

RAI 4.1-2

Background:

In LRA Table 4.1-2, the applicant stated that the containment penetration cycle analyses TLAA in SRP-LR Table 4.1-3 is not applicable. In LRA Section 4.6, the applicant identifies the bellow assemblies for the containment penetrations were qualified for 7000 displacement cycles over the initial 40 year life of the plant and that this analysis is a TLAA for the LRA.

Issue:

The staff noted that the information in LRA Section 4.6 for identifying cycle-based displacement analysis for the containment penetration bellow assemblies is not consistent with the statement in LRA Table 4.1-2 that the CLB does not include any containment penetration pressurization cycle analyses.

Request:

Clarify the apparent discrepancy between LRA Table 4.1-2 and Section 4.6 regarding whether the cycle-based displacement analysis for the containment penetration bellow assemblies is a TLAA. Provide the basis why LRA Table 4.1-2 indicates an absence of TLAA for containment penetration pressurization cycle analyses when LRA Section 4.6 identifies the cycle-based displacement analysis for the containment penetration bellow assemblies as a TLAA for the LRA.

TVA RESPONSE

The containment penetration pressurization cycle TLAA in LRA Table 4.1-2 specifically addresses pressurization cycles for penetrations. LRA Section 4.6 discusses design displacements for a limited number of repaired or replacement penetration bellows. The displacements discussed in Section 4.6 include those due to thermal cycles in addition to those due to pressurization cycles. To eliminate the apparent discrepancy, the change to LRA Table 4.1-2 follows with additions underlined and deletions lined through.

LRA Table 4.1-2

Containment penetration pressurization cycles	~~No. No specific fatigue analyses for SQN.~~ See Section 4.6 for the evaluation of an associated TLAA that includes thermal cycles and pressurization cycles.	~~NA~~4.6

RAI 4.1-3

Background:

In LRA Table 4.1-2, the applicant stated that the metal corrosion allowance analysis in SRP-LR Table 4.1-3 is not applicable to its CLB. UFSAR Section 9.5.4, "Diesel Generator Fuel Oil System," the applicant identifies that the design of the embedded diesel fuel oil storage tanks includes an additional 0.125 inch corrosion allowance in the design of the wall thickness of the tanks. UFSAR Section 9.5.4 also indicates that the emergency diesel generator fuel oil piping has ample corrosion allowance.

Issue:

It is not evident to the staff what design factor or decision basis (i.e., analysis, vendor recommendation, or owner established decision) was used to justify the additional 0.125 inch metal corrosion allowance in the design of the embedded diesel fuel oil storage tanks. It is also not evident to the staff how much additional metal was included in the design of the diesel fuel oil piping or what type of design factor or decision basis was used to establish the amount of additional metal that was included in the original design of the fuel oil piping

Request:

1. *Identify and explain the design factor or decision basis (i.e., analysis, vendor recommendation, or owner established decision) that was used to establish the 0.125 inch metal corrosion allowance for the tanks. If the corrosion allowance for the storage tanks was established by analysis, justify why the analysis would not need to be identified as a TLAA.*
2. *Identify the amount of additional corrosion allowance that was included in the design of the diesel fuel oil piping and explain the design factor or decision basis (i.e.,, analysis, vendor recommendation, or owner established decision) that was used to establish the amount of additional metal that was included in the design of the diesel fuel oil piping. If the corrosion allowance for the piping was established by analysis, justify why the analysis would not need to be identified as a TLAA.*

TVA RESPONSE

1. There was no specific design analysis identified to establish the 0.125 inch corrosion allowance identified in the UFSAR Section 9.5.4 for the fuel oil tanks. The 0.125 corrosion allowance was likely considered a conservative corrosion allowance based on the low system design pressure, the concrete encasement and the nominal 0.25 inch nominal tank wall thickness. Because there is not an analysis, there is not a TLAA. LRA Table 3.3.2-1 provides the results of the aging management reviews for the internal and external surfaces of the fuel oil tanks.
2. There is not a specific corrosion allowance value for the piping. There was no analysis identified to establish a specific corrosion allowance for the fuel oil piping. Because there is not an analysis, there is not a TLAA. LRA Table 3.3.2-1 provides the results of the aging management reviews for the internal and external surfaces of the piping.

RAI 4.1-4

<u>Background:</u>

By letter dated August 4, 2006, the applicant submitted its inservice inspection summary report for Unit 1 Cycle 14. The "Examination Credit Summary" section of the inspection summary report indicates that the applicant performed a flaw tolerance evaluation in accordance with ASME Code Case N-481 in order to support the alternative inservice inspection visual examinations of the RCP casings.

<u>Issue:</u>

The LRA does not address the applicant's flaw tolerance evaluation that was performed in accordance with alternative inservice inspection of ASME Code Case N-481. The staff needs clarification as to whether the stated flaw tolerance evaluation for the RCP casings is a time-dependent flaw analysis and whether this analysis conforms to an analysis that meets the definition of a TLAA in 10 CFR 54.3.

<u>Request:</u>

1. *Identify the type of flaw tolerance analysis (e.g., fatigue flaw growth analysis, linear elastic fracture mechanics analysis or elastic-plastic fracture mechanics analysis) that was performed on the RCP casings in support of the ASME Code Case N-481 alternative inservice inspection bases for the RCP casings. Clarify whether the flaw tolerance evaluation for the RCP casings was based on the evaluation of a time-dependent parameter and whether the evaluation had been previously approved for use by the NRC, consistent with the Code Case criteria. Provide the basis why this flaw tolerance evaluation would not need to be identified as a TLAA for the LRA, when compared to the six criteria for defining an analysis as a TLAA in 10 CFR 54.3. If it is determined that the flaw tolerance evaluation for the RCP casings does need to be identified as a TLAA, amend the LRA accordingly and provide your basis for accepting the TLAA in accordance with 10 CFR 54.21(c)(1)(i), (ii), or (iii).*
2. *Clarify how the applicable flaw tolerance evaluation addressed a potential reduction in the fracture toughness property (i.e., loss of fracture toughness) of the CASS RCP casing material during the period of extended operation.*

<u>TVA RESPONSE</u>

1. ASME Code Case N-481, Alternative Examination Requirements for Cast Austenitic Pump Casings, was originally developed to allow fracture mechanics-based evaluation supplemented by visual inspections in lieu of the volumetric examinations that had been required in earlier editions of the ASME Boiler & Pressure Vessel Code Section XI. In more recent Code editions, the exam requirement was changed from a volumetric to a visual examination, thereby eliminating the need for Code Case N-481 and the associated analyses. Although the flaw tolerance analysis for the RCP casings in support of Code Case N-481 was based on time-limited assumptions, the analysis will not be used during the period of extended operation and therefore is not identified as a TLAA that must be demonstrated acceptable for the period of extended operation. No LRA change is necessary.
2. The requested clarification is not required. As noted above, the analysis including the flaw tolerance evaluation will not be used during the period of expended operation and therefore there is no associated TLAA.

RAI 4.1-5

Background:

In LRA Section 4.3.1.3 states that structural weld overlays were installed on the pressurizer surge, spray, and safety and relief nozzles to eliminate concerns with stress corrosion cracking (SCC) of Alloy 600 materials. LRA Section 4.3.1.3 also states that the analysis of these locations now includes a postulated flaw growth analysis, but clarifies that the associated flaw growth analysis is used only to justify the inspection interval and not to justify operation to the end of the current license term. Therefore, the applicant concludes that this analysis does not need to be defined as a TLAA for the LRA.

Issue:

The applicant's basis for concluding that the flaw growth analysis is not a TLAA is based on a comparison to Criterion 3 in 10 CFR 54.3, which states that the analysis needs to be based on time-dependent assumptions defined by the life of the plant. The applicant has not demonstrated that the number of design transients cycles assumed in the flaw growth analysis were not based on a 40-year design basis.

Request:

Identify the type of analysis (e.g., fatigue flaw growth analysis, linear elastic fracture mechanics analysis or elastic-plastic fracture mechanics analysis) that was performed in analysis of pressurizer surge nozzle, spray nozzle, safety nozzle, and relief nozzle overlays. Clarify whether the analysis was based on a time limited assumption. If so, identify the time-limited assumption that was used in the assessment of the structural weld overlays on these nozzles and define the time period that was assumed for in the analysis. Based on the information, justify why the flaw growth analysis for the pressurizer surge, spray, safety, and relief nozzles would not need to be identified as a TLAA for the LRA, when compared to the six criteria for defining analyses as TLAAs in 10 CFR 54.3.

TVA RESPONSE

To eliminate Alloy 600 concerns, structural weld overlays (SWOLs) were installed for the SQN-1 and -2 pressurizer safety/relief, spray and surge nozzles. The SWOL analyses include an elastic-plastic analysis for a structural evaluation and a fatigue crack growth analysis of a postulated flaw for each nozzle type/structural weld overlay location. The objective of this analysis was to determine SWOL service life for a flaw in the original wall to propagate to the maximum allowable depth. The SWOL service life is a function of the flaw size in the region being overlaid and the projected growth of that flaw. No specific time period is used as input to determine SWOL service life; rather, a constant rate of cycle occurrences is an input to the fatigue crack growth analysis.

The results of the analysis are plots of the total number of years of allowable operation versus the initial crack size. For example, if a circumferential flaw was identified on the spray nozzle at 80 percent of the original wall thickness, the calculated service life would be 40 additional years beginning at the time of inspection. That is, the analysis provides the maximum allowable time in years between inspections for various initial crack sizes.

The SWOLs are being inspected in accordance with ASME Code Case N-770-1. Code Case N-770-1 requires the overlays be reexamined in the first or second refueling outage following installation. The subsequent examinations of the pressurizer SWOLs were performed with no indication of crack growth or new cracking. Code Case N-770-1 requires periodic sample inspection of these SWOLs which will continue into the period of extended operation.

The fatigue crack growth analysis does not meet element (3) of the10 CFR 54.3 definition of time-limited aging analyses (i.e., involve time-limited assumptions defined by the current operating term, for example, 40 years). A constant rate of cycle occurrences is an input to the analysis. The rate of cycle occurrences does not vary with time and is not limited by a specified time period. Therefore, the fatigue crack growth analysis does not need to be identified as a TLAA.

RAI 4.1-6

Background:

Paragraph 54.21 (c) indicates that license renewal applicants must include a list of TLAAs, as defined in 10 CFR 54.3 and that all identified TLAAs must be dispositioned in accordance with one of the three acceptance criteria that are specified in 10 CFR 54.21 (c)(1).

Issue:

During the staff's safety audit of the AMPs for mechanical systems in the LRA (i.e., the NRC's audit of March 18 – 22, 2013), the staff noted that the CLB included the following additional flaw growth analyses:

(1) a flaw growth analysis for an existing flaw on Unit 2 charging line boron injection tank;

(2) a flaw growth analysis for an existing flaw on Unit 1 reactor vessel closure head weld, which assumed that the total number of design cycles has been reached for all transients; and,

(3) A flaw growth analysis for the structural weld overlays on Unit 1 control rod drive mechanism lower canopy seal welds;

These flaw growth analyses may be based on the assessment of design transient cycles, which is a time-dependent parameter input for the analysis calculations. However, the applicant has not identified these analyses as TLAAs for the LRA in accordance with 10 CFR 54.21(c)(1) or provide appropriate justifications that these analyses would not need to be identified as TLAAs, when compared to the six criteria in 10 CFR 54.3 for defining a plant analysis as a TLAA.

Request:

1. *Clarify how each of these flaw growth analyses compares to the six criteria for defining a plant analysis as a TLAA in 10 CFR 54.3.*
2. *Based on the response to Part a. of this RAI, justify whether each of these flaw growth analyses should be identified as a TLAA in accordance with TLAA identification requirements in 10 CFR 54.21(c)(1). If the given analysis does need to be identified as a TLAA, amend the LRA accordingly and provide the basis for dispositioning the TLAA in accordance with 10 CFR 54.21(c)(1)(i), (ii), or (iii).*
3. *Identify any additional flaw growth analyses in the CLB that should be identified as a TLAA in accordance with 10 CFR 54.21(c)(1).*

TVA RESPONSE

1. None of the analyses identified above need to be identified as TLAAs. The following discussion provides justification for this conclusion.

   1.a. **Unit 2 Charging Line Boron Injection Tank**

   This tank (2-TNK-063-0037) is shown on LRA drawing LRA-2-47W811-1. In 1994, a flaw was detected in the bottom head to shell weld. This tank does not operate at elevated temperatures and is not affected by the normal postulated set of plant transients (such as normal plant heatups and cooldowns). A location-specific flaw growth analysis was completed based on a postulated rate of pressurizations that does not change over time. A rate of 438 pressurization cycles per ten-year period was postulated. The analysis determined that the growth rate is small and it would take over 20 years to reach a critical flaw depth. Augmented inspections have been performed that have determined the actual size of the flaw is not increasing significantly and an augmented inspection is periodically completed at this flaw location that will continue as required during the period of extended operation . Because the analysis does not involve time-limited assumptions defined by the current operating term (element (3) in the definition of TLAA in 10 CFR 54.3), it is not a TLAA.

1.b. **SQN Unit 1 Reactor Vessel Closure Head Weld**

A preservice ultrasonic examination revealed a flaw indication in the SQN Unit 1 reactor vessel closure head weld. An evaluation was completed in February 1979 to show that the expected flaw growth was negligible. This evaluation determined the flaw growth assuming the total number of design cycles had been reached for all the transients. The calculated flaw growth was then conservatively multiplied by 1000 and the resulting flaw size was found acceptable. This analysis was completed only to show anticipated flaw growth would be negligible and to justify operation with the flaw until additional inspections were completed. Because the flaw growth was multiplied by 1000, this analysis is not based on a time-limited assumption defined by the current operating term, for example, 40 years. This flaw is also identified in SQN SER NUREG-0011, Supplement No. 1 to the Safety Evaluation Report, with the determination that the flaw growth was negligible and that augmented inspections should be performed for the first three intervals. Subsequent inspections have determined the flaw is not growing and the augmented inspections completed for the first three intervals need not continue. The analysis is no longer relied upon for justification of continued operability, because the augmented inspections for the first three intervals have demonstrated acceptability of the flaw.

Because the analysis does not involve time-limited assumptions defined by the current operating term (element (3) in the definition of TLAA in 10 CFR 54.3) and does not involve conclusions or provide the basis for conclusions related to the capability of the component to perform its intended function (element (5) in the definition of TLAA in 10 CFR 54.3), it is not a TLAA.

1.c. **Structural Weld Overlays on Control Rod Drive Lower Canopy Seal Welds**

Structural weld overlays were first installed during the SQN Unit 1 Cycle 7 refueling outage that was completed in 1995 on control rod drive mechanism lower canopy seal welds. One other canopy seal weld was modified with a structural weld overlay during the SQN Unit 1 Cycle 10 refueling outage in February 2000. The structural analysis for these overlays included a flaw growth analysis based on a stress corrosion crack growth rate that is constant with time and is not time-limited. This analysis determined it would take at least 57 years for a flaw to grow to an unacceptable length. The analysis result of 57 years indicates that all of the overlays will be acceptable until at least 2052, well beyond the end of the SQN Unit 1 period of extended operation in 2040.

Because this analysis does not involve time-limited assumptions defined by the current operating term (element (3) in the definition of TLAA in 10 CFR 54.3), it is not a TLAA.

2. As identified in the response to Part a, none of these analyses need to be identified as a TLAA in accordance with the requirements of 10 CFR 54.21(c)(1). No revision to the LRA is necessary.
3. No additional flaw analyses were identified in the current license basis (CLB) that should be identified as TLAAs.

RAI 4.1-8

Background:

UFSAR Section 3.5, "Missile Protection," and 10.2.3, "Turbine Missiles," provide the relevant information on the inspection and evaluation bases to protect the integrity of the units against the consequences of postulated turbine generated missiles from the high pressure turbines (HPTs) and low pressure turbines (LPTs). UFSAR Section 10.2.5 provides the reference documents that are relied upon for the plant turbine missile analysis design bases.

Issue:

UFSAR Section 10.2.3 indicates that the supporting fatigue or SCC analyses have been performed to support the applicant's evaluation of the probability of failure and missile generation probabilities for the rotational components in the HPTs and LPTs. The LRA does not include any discussion on whether the fatigue and SCC analyses discussed in UFSAR Section 10.2.3 for the rotational components in HPTs and LPTs would need to be identified as TLAAs for the LRA. In addition, it is not evident exactly which vendor-issued or plant-specific reports included the applicable supporting fatigue and SCC analyses or whether the bases for evaluating SCC-induced or fatigue-induced flaws in these assessments are predicated on time-dependent parameters that are defined by the life of the plant.

Request:

1. *Identify all analyses, evaluations, or calculations that are assumed in the design basis and contain the applicable SCC-based and fatigue-based flaw analyses for the HPTs and LPTs, as indicated in UFSAR Section 10.2.3.*
2. *Clarify whether the evaluations of the applicable SCC and fatigue mechanisms are based on a time-dependent analysis parameter that is defined in terms of the life of the plant (as defined in 10 CFR 54.3). Provide the basis why the supporting SCC-based and fatigue-based flaw analyses for the rotational components in the HPTs and LPTs do not need to be identified as TLAAs for the LRA.*

TVA RESPONSE

1. UFSAR Section 10.2.3 provides a summary of the historical evolution of the turbine missile hazard analysis and includes the effect of the Westinghouse evaluations of stress corrosion cracking (SCC) on the hazard analysis. None of the hazard analyses are based on time-dependent parameters that are defined by the life of the plant.

   As discussed in UFSAR Section 10.2.3.1, the HPTs are not considered sources of missiles. This is reinforced by the replacement of the original HPT rotors with the integral design discussed in Reference 6. Therefore, the only potential sources for turbine-generated missiles are the LPTs (Reference UFSAR Sections 10.2.3.1 and 10.2.3.4).

   The probability of a missile generation from the LPTs as reported in UFSAR Section 10.2.3.1 was from the 1973 Bush report (Reference 1) that assumed a conservative upper bounding value based on 70,000 turbine-years of operation. The basis for the Bush report was actual turbine operating experience; this was not a crack growth analysis that could be considered a TLAA.

   The probabilities of a missile impacting specific plant locations was determined using the Reference 2 methodology and was based on turbine configurations, rotor orientation and plant layout. In this case, the actual plant configuration was used; no time-limited assumptions were involved. Therefore, the overall probability provided in UFSAR Section 10.2.3.4 was not based on any time-limited assumptions.

UFSAR Section 10.2.3.1 discusses the Westinghouse SCC analyses (References 3, 4, and 5) and concludes that "no appreciable change in the strike probabilities will occur. Consequently, the original FSAR analyses are still valid." Therefore, the missile generation probabilities were not revised based on the Westinghouse SCC results and the final probability presented in UFSAR Section 10.2.3.4 uses the value from the 1973 Bush report.

2. The Westinghouse evaluation of SCC was not based on an analysis involving any time-limited assumption. No fatigue-based analysis was required or used in the turbine missile evaluation. Therefore, there is not an associated TLAA and no LRA change is necessary.

References (Note that these references are repeated from UFSAR Section 10.2.5)

1. Bush, S.H., "Probability of Damage to Nuclear Components Due to Turbine Failure,", CONF-730304, Topical Meeting on Water-Reactor Safety, Salt Lake City, Utah, March 26-28, 1973, pp 84-104.
2. Semanderes, S. N., "Topical Report, Methods of Determining the Probability of a Turbine Missile Hitting a Particular Plant Region," WCAP-7861, February 1972.
3. Topical Report: Procedures for Estimating the Probability of Steam Turbine Disc Rupture from Stress Corrosion Cracking, submitted to the NRC May, 1981, by Westinghouse Steam Turbine Generator Division WSTG-1-NP.
4. Topical Report: Missile Energy Analysis Methods for Nuclear Steam Turbines, submitted to the NRC May, 1981, by Westinghouse Steam Turbine Generator Division WSTG-2-NP.
5. Memo from L. W. Boyd to C. A. Chandley dated September 27, 1988 transmitting copies of Turbine Missile reports:
   A. 1974 Analysis for Turbine Missiles
   B. CT-24076 SQN Methodology for Analyzing Turbine Missiles
   C. CT-24832 R1 Results of Turbine Missile Analysis for SQN U-1
   D. CT-24873 R0, Report of Turbine Missile Analysis for SQN U-2
   E. CT-24831 R1 Report of Turbine Missile Analysis for SQN U-1
6. Siemens-Westinghouse Report EC-02262, "Missile Generation Risk Assessment for Original and Retrofit Nuclear HP Rotors," dated December 17, 2002.

RAI 4.1-11

Background:

LRA Section 4.1 states that there are not any exemptions in the CLB that were granted under the provision in 10 CFR 50.12 and are based on a TLAA.

The regulation in 10 CFR 54.21(c)(2) requires applicants for license renewal to identify all exemptions that were granted under the provisions of 10 CFR 50.12 and are based on a TLAA. For those exemption that do conform to the criterion in 10 CFR 54.21(c)(2), the rule requires the applicant to provide an evaluation that justifies the continuation of the exemption during the period of extended operation.

The applicant's bases for low temperature overpressure protection (LTOP) system setpoints are currently given in the pressure temperature limits reports (PTLRs) that have been approved for both units. On June 18, 1993 (NRC Microfiche Accession No. 9306240205), the applicant was granted an exemption to use ASME Code Case N-514 as an alternative methodology for calculating LTOP system enable temperature setpoints for the units.

Issue:

The current PTLRs indicate that ASME Code Case N-514 is used in the CLB to establish LTOP system enable temperature setpoints, which are based on the RTNDT and neutron fluence values for the limiting RV beltline component at the expiration of the licensed operating period. The applicant has not explained why this exemption would not need to be identified, in accordance with 10 CFR 54.21(c)(2), as an exemption that has been granted in accordance with the provisions of 10 CFR 50.12 and is based on a TLAA.

Request:

Provide the basis why the exemption to use the methodology in Code Case N-514 has not be identified as an exemption that has been granted in accordance with 10 CFR 50.12 and is based on a TLAA, as required in accordance with 10 CFR 54.21(c)(2). If it is determined that the exemption to use Code Case N-514 does need to be identified as an exemption for the LRA, amend the application accordingly, and provide an evaluation that justifies continued use of the exemption during the period of extended operation.

TVA RESPONSE

Nuclear Code Case N-514 has been incorporated into ASME Section XI, Appendix G, and therefore, this exemption will not be required when the pressure-temperature limits are updated for the period of extended operation. No LRA amendment is required.