



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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June 11, 2013

Mr. Joe W. Shea
Vice President, Nuclear Licensing
Tennessee Valley Authority
P.O. Box 2000
Soddy-Daisy, TN 37384

SUBJECT: REQUESTS FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2, LICENSE RENEWAL
APPLICATION (TAC NOS. MF0481 AND MF0482) – SET 6.

Dear Mr. Shea:

By letter dated January 7, 2013, Tennessee Valley Authority submitted an application pursuant to Title 10 of the *Code of Federal Regulations (CFR) Part 54*, to renew the operating license DPR-77 and DPR-79 for Sequoyah Nuclear Plant, Units 1 and 2, for review by the U.S. Nuclear Regulatory Commission staff. The staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete the review.

These requests for additional information were discussed with Gary Adkins, and a mutually agreeable date for the response for RAs 4.1-7, 4.1-9, 4.1-10, and 4.2-1 is within 60 days from the date of this letter. The rest of the enclosed RAs in this within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-1427 or by e-mail at Richard.Plasse@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Plasse", written in a cursive style.

Richard A. Plasse, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

Enclosure:
Requests for Additional Information

cc w/encl: Listserv

June 11, 2013

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Vice President, Nuclear Licensing
Tennessee Valley Authority
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**SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION
REQUESTS FOR ADDITIONAL INFORMATION – SET 6**

RAI B.1.41-4

Background:

License renewal application (LRA) Section B.1.41 states that this program is a new program to manage cracking and reduction in fracture toughness due to thermal aging embrittlement in cast austenitic stainless steel (CASS) piping and piping components, consistent with the Generic Aging Lessons Learned (GALL) Report aging management program (AMP) XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel Program (CASS)." GALL Report AMP XI.M12 states that flaw tolerance evaluation for components with a ferrite content up to 25 percent is performed according to the principles associated with ASME Code, Section XI, IWB-3640 for submerged arc welds. The GALL Report also states that flaw tolerance evaluation for piping with greater than 25 percent ferrite is performed on a case-by-case basis by using the applicant's fracture toughness data.

Issue:

The LRA does not address whether the applicant has any susceptible CASS components with a ferrite content greater than 25 percent. In addition, the LRA does not clearly address whether the flaw tolerance evaluation for susceptible CASS components with greater than 25 percent ferrite will be performed on a case-by-case basis in the applicant's program. The staff also needs additional information regarding the high-ferrite CASS components in the applicant's program and flaw tolerance evaluation for the components.

Request:

1. Clarify whether the applicant has any susceptible CASS components with a ferrite content greater than 25 percent.
2. If the applicant has any susceptible CASS components that have a ferrite content greater than 25 percent, provide the following information for the CASS components: (1) component name, (2) casting method and material grade (e.g., centrifugally cast CF8M), (3) ferrite content based on a method consistent with GALL Report AMP XI.M12, (4) clarification as to whether applicant's flaw tolerance evaluation will be performed on a case-by-case basis using relevant fracture toughness data, and (5) applicant's methodology to be used in the flaw tolerance evaluation and the technical basis for the methodology.

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.

Enclosure

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 that 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.

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.

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. In 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.

RAI 4.1-4

Background:

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.

Issue:

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.

Request:

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.

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-limited 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 TLAA's in 10 CFR 54.3.

RAI 4.1-6

Background:

Paragraph 54.21(c) indicates that license renewal applicants must include a list of TLAA's, as defined in 10 CFR 54.3 and that all identified TLAA's 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 March 18-22, 2013 staff's safety AMP audit for mechanical systems, 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 TLAA's 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 TLAA's, 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. 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).

RAI 4.1-7

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 March 18-22, 2013 staff's safety AMP audit for mechanical systems, the staff noted that the design analyses of for the following reactor coolant system or non-Safety Class 1/non-Safety Class A components may include cyclic assumptions based on 40 years of operation: (a) non-class 1 flexible connections and instrumentation flexible hoses in the reactor coolant system pressure boundary; (b) flexible hose and flexible joints in the component cooling water system; (c) expansion joints in spent fuel cooling systems; and (d) flexible hoses in essential raw cooling water System. However, the applicant has not identified these analyses as TLAAs 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 the design analyses of each of the components in items (a) through (d) above compares to the six criteria for a TLAA as defined in 10 CFR 54.3.
2. Based on the response to Part a. of this request for additional information (RAI), justify whether the design analysis for each of the components should be identified as a TLAA in accordance with 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 design analyses for non-Class 1 non-piping components in the CLB that should be identified as a TLAA in accordance with 10 CFR 54.21(c)(1).

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.

RAI 4.1-9

Background:

UFSAR Section 5.5.12 provides the applicant's design bases for valves that are part of the reactor coolant pressure boundary (i.e., for the Safety Class 1 or Class A valves in the plant design; that is the Group A valves) and identifies that the Group A valves for the facility were "designed and fabricated in accordance with ANSI B16.5, MSS-SP-66, and ASME Section III, 1968 Edition." UFSAR Table 3.2.2-1 lists a slightly different design basis for these valves by

stating that the Group A valves were designed to MSS-SP-66, ANSI B16.5, and the draft ASME Code for Pumps and Valves.

Issue:

The LRA does not address the fatigue assessments or cyclical loading analyses that may have been required for the specific Group A valves. Specifically, the LRA does not identify the design code of record that was used to design each of the Group A valves for the facility or whether the design code for a given Group A valve would have required the applicant to perform a time-dependent fatigue analysis for the valve. The provisions in the Draft 1968 ASME Pump and Valve Code include applicable time-dependent cyclic or fatigue assessment criteria for Safety Class 1 or Class A valves exceeding 4-inches in nominal valve size. If a fatigue analysis was performed as part of the design basis for each of these valves, the applicant has not explained why the applicable fatigue analysis would not need to be identified as a TLAA in accordance with the requirement in 10 CFR 54.21(c)(1). Thus, the staff does not have sufficient information to determine whether the applicant should have identified any metal fatigue TLAAs for the Safety Class 1 or Class A valves that are included its plant design.

Request:

1. Group the Safety Class 1 valves or Safety Class A valves by design code(s) of record. For each group of Safety Class 1 valves or Class A valves, identify the design code(s) of record, and summarize how the specific design code addresses potential cyclical loading conditions.
2. In consideration of the response to Part 1 of the RAI, clarify whether the design code of record for the valves would have required the performance of fatigue analysis for the given Safety Class 1 or Class A valve. If so, clarify how the fatigue analysis compares to the six criteria for a TLAA as defined in 10 CFR 54.3 and justify why the given fatigue analysis would not need to be identified as a TLAA in accordance with 10 CFR 54.21(c)(1).

RAI 4.1-10

Background:

The applicant's metal fatigue analysis for the reactor vessel internal (RVI) components are given in LRA Section 4.3.1.2.

Issue:

LRA Table 4.3-4 identifies that the following RVI core support structure components were analyzed in accordance with fatigue analysis requirements in the ASME Code Section III: (a) control rod guide tube (CRGT) assembly support pins, and (b) lower core plate. The LRA states that the remaining RVI components were not subject to metal fatigue analyses because they were not designed to the ASME Code Section III requirements.

UFSAR Section 4.2.2 identifies that the RVI design includes both an "upper core support assembly" and a "lower core support assembly" and defines the RVI core support structure

components that make up these assemblies. UFSAR Section 4.2.2 also states that the RVI core support structure assemblies and their components were analyzed to the requirements in the ASME Code Section III and that the analyses considered both the impacts of low-cycle and high-cycle fatigue stresses in the stress analyses.

It is not evident to the staff which specific edition of ASME Section III was used for the stress analyses of the core support structure components in the upper and lower core support structure assemblies. It is also not evident to the staff why these components would not have been required to be analyzed in accordance with the applicable fatigue calculation requirements in the ASME Code Section III edition of record for the components, or at least waived from the applicable calculation requirements in accordance with fatigue waiver analysis provisions in that edition of the code, and if fatigue analyses or fatigue waiver analyses were required as part of the design stress analyses for the components, why the analyses would not need to be identified as TLAA's for the LRA when compared to the six (6) criteria for TLAA's in 10 CFR 54.3.

Request:

Identify all RVI components that are defined in the CLB as RVI core support components for the upper internals and lower internals core support assemblies. Identify the design code of record for the core support structure components and whether the components were subject to either an explicit fatigue calculation (i.e., CUF calculation or I_t type of fatigue calculation) or a fatigue waiver analysis. If the component was required to be the subject of either a fatigue analysis or alternatively a fatigue waiver analysis, justify why the specific fatigue or fatigue waiver analysis for the component would not need to be identified as a TLAA for the LRA when compared to the six criteria for TLAA's in 10 CFR 54.3.

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 RT_{NDT} 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.

RAI 4.2-1

Background:

The staff's questions are based on a review of the following background documents:

- LRA Section 4.2 and its five subsections: (a) Section 4.2.1, time-limited aging analysis (TLAA) on the reactor vessel (RV) neutron fluence methodology; (b) Section 4.2.2, TLAA on the upper shelf energy (USE) analysis; (c) Section 4.2.3, TLAA on the pressurized thermal shock (PTS) analysis; (d) Section 4.2.4, TLAA on pressure-temperature (P-T) limit analysis; and (e) Section 4.2.5, TLAA on the low temperature overpressure protection (LTOP) system analysis.
- Technical Specification 6.9.1.15 for Unit 1 and the current Pressure-Temperature Limits Report for Unit 1 (PTLR-1, Rev. 4)
- Technical Specification 6.9.1.15 for Unit 2 and the current Pressure-Temperature Limits Report for Unit 2 (PTLR-2, Rev. 5)
- NRC safety evaluation issued approving the license amendment for the PTLR process dated September 15, 2004 (ADAMS ML042600465)
- WCAP-14040-A, Rev. 4, "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves"
- WCAP-16083-NP-A, Rev. 0, "Benchmark Testing of the FERRET Code for Least Squares Evaluation of Light Water Reactor Dosimetry"
- Capsule reports for Units 1 and 2 (Refer to the Background section of RAI 4.2-2)

The regulation in 10 CFR 54.22 requires the applicant to identify all technical specification (TS) changes or additions that are needed to manage the effects of aging during the period of extended operation. LRA Appendix D states that there are not any TS additions or amendments that are needed to comply with the requirement in 10 CFR 54.22 and to manage the effects of aging during the period of extended operation.

Issue Part 1:

LRA Section 4.2.1 establishes that two methodologies are used as the basis for estimating neutron fluence to the end of the period of extended operation (i.e., to 52 EFPY): (a) WCAP-14040 -A, Revision 4, which is referenced in TS 6.9.1.15 for Unit 1 and for Unit 2¹, and (b) the FERRET least squares adjustment methodology in WCAP-16083-NP-A, Rev. 0, which has been generically approved by staff. Although WCAP-14040-A does include a general discussion on the topic of applying least squares adjustment, it does not specifically refer to WCAP-16083-NP-A as the basis for performing the least squares adjustment. The staff notes, however, that the FERRET methodology (i.e., WCAP-16083) is referenced in the CLB, in the Capsule Y reports for the units (i.e., WCAP-15224 for Unit 1 and WCAP-15320 for Unit 2). Yet the references located at TS 6.9.1.15 do not include WCAP-16083 as an analytical method used for determining the P-T limits for either unit.

Request Part 1:

Provide a basis why the TS 6.9.1.15 references list for the units would not need to be amended under the requirements of 10 CFR 54.22 to include WCAP-16083-NP-A as an additional methodology that will be used to determine future RV P-T limits.

Issue, Part 2:

By letter dated September 26, 2012 (ADAMS ML12249A394 for the cover letter and non-proprietary SE; and ML12249A415 for the proprietary SE), the NRC granted Tennessee Valley Authority (TVA) with a license amendment and applicable TS changes to use high thermal performance AREVA HTP-fuel at SQN Units 1 and 2. LRA Section 4.2.1 is silent on the subject and the staff is unable to determine whether the neutron fluence projections for 52 effective full-power year (EFPY) in the LRA account for the AREVA HTP-fuel that was approved in the NRC letter of September 26, 2012.

Request, Part 2:

Clarify whether the methodology and assumptions used to estimate the RV neutron fluence values to 52 EFPY account for the use of the AREVA HTP-fuel that was approved in the NRC letter September 26, 2012.

1. If it is does, explain how source flux associated with the AREVA HTP-fuel has been worked into the neutron transport modeling accordant with WCAP-14040 -A, Revision 4.
2. If neutron fluence calculations supporting the LRA for 52 EFPY do not account for the use of the AREVA HTP-fuel, explain why the neutron fluence values reported in the LRA for 52 EFPY remain as valid inputs for the remaining neutron irradiation embrittlement TLAs that are evaluated in the subsections of LRA Section 4.2.

¹ The TS may refer to the "latest approved revision," rather than Revision 4, as is stated in the LRA.

Issue, Part 3:

The approved neutron transport methodology in WCAP-14040-A, Revision 4 states that, "The energy distribution of the source is determined on a fuel assembly specific basis by selecting a fuel assembly burnup representative of conditions averaged of each fuel cycle and an initial enrichment characteristic for each assembly. From this average burnup and initial enrichment, a fission split by isotope is derived; and, from that fission split, composite values of energy release per fission, neutron yield per fission, and fission spectrum are determined for each fuel assembly. These composite values are then combined with the spatial distribution to produce the overall absolute neutron source for use in the transport calculations."

However, the methodology in WCAP-14040-A, Revision 4 does not clearly establish how those neutron flux values would be used to project the neutron fluence values for future plant operations, including those that are projected to the end of licensed operating period (for LRA, this is the end of the period of extended operation). Instead, this part of the neutron fluence methodology appears to be established (for the CLB) in the respective Capsule Y report for the unit. The Capsule Y reports for Unit 1 and Unit 2 establish that the neutron fluence values for the end of the current licensing period (i.e., to 32 EFPY) and beyond (i.e., to 48 EFPY) are based on the "assumption that the operating cycles 5 – 9 neutron flux rates for low leakage fuel management will continue to be applicable throughout plant life." The applicant has yet to pull, test and report any surveillance capsule data for any reactor vessel surveillance capsules that would cover power operations through 52 EFPY and the RV neutron fluence values that have been reported in the LRA for 52 EFPY are not consistent with the neutron fluence projection basis assumption given in the Capsule Y reports for the units (i.e., limiting fluence for 52 EFPY is lower than that for limiting fluence value for 48 EFPY as indicated in the Capsule Y report). In many cases, the neutron fluence values reported in the LRA for the RV beltline components at 52 EFPY are less than the limiting best estimate 48 EFPY neutron fluence values that have been reported in the applicable Capsule Y report for the unit.

Request, Part 3:

1. Provide an explanation on the differences in neutron fluence values reported in the LRA as compared to those reported in the CLB (i.e., Capsule Y reports). Specifically, explain why the LRA reports some RV neutron fluence values for 52 EFPY that are approximately the same or lower than the limiting neutron fluence values that were reported for 48 EFPY in the respective Capsule Y report for the unit.
2. Justify why the neutron fluence values reported in the LRA for the clad-to-base metal interface locations and 1/4T locations of the RV beltline and extended beltline components at 52 EFPY are considered to be valid best estimate neutron fluence values when compared to the best estimate values for 48 EFPY that have been included for those locations in the respective Capsule Y reports for Unit 1 and for Unit 2.

Issue Part 4:

LRA Section A.2.1.1, "Reactor Vessel Fluence," provides the applicant's UFSAR supplement summary description for the applicant's TLA on RV neutron fluence methodology. In the UFSAR supplement, the applicant identifies the neutron fluence calculation methods for calculating the 52 EFPY neutron fluence values in the LRA "have been approved by the NRC and are described in detail in WCAP-14040-A, Revision 4, and WCAP-16083-NP-A, Revision 0." The staff seeks a justification why the UFSAR supplement summary description in LRA Section A.2.1.1 omits any reference of the applicable RV surveillance capsule reports (including the Capsule Y reports for the units).

Request Part 4:

Provide a justification why the UFSAR supplement summary description in LRA Section A.2.1.1 omits any reference of the applicable RV surveillance capsule reports (including the Capsule Y reports for the Units).

SUBJECT: REQUESTS FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION (TAC NOS. MF0481 AND MF0482)

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