UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 1, 2013

LICENSEE: Tennessee Valley Authority

FACILITY: Sequoyah Nuclear Plant, Units 1 and 2

SUBJECT: SUMMARY OF TELEPHONE CONFERENCE CALL HELD ON JUNE 13, 2013, BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION AND TENNESSEE VALLEY AUTHORITY, CONCERNING REQUESTS FOR ADDITIONAL INFORMATION PERTAINING TO THE SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION (TAC. NOS. MF0481 AND MF0482)

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of Tennessee Valley Authority held a telephone conference call on June 13, 2013, to discuss and clarify the staff's requests for additional information (RAIs) concerning the Sequoyah Nuclear Plant, Units 1 and 2, license renewal application. The telephone conference call was useful in clarifying the intent of the staff's RAIs.

Enclosure 1 provides a listing of the participants and Enclosure 2 contains a listing of the RAIs discussed with the applicant, including a brief description on the status of the items.

The applicant had an opportunity to comment on this summary.

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

Docket Nos. 50-327 and 50-328

Enclosures:
1. List of Participants
2. List of Requests for Additional Information

cc w/encls: Listserv

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/RA/
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TELEPHONE CONFERENCE CALL
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION

LIST OF PARTICIPANTS
JUNE 6, 2013

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REQUESTS FOR ADDITIONAL INFORMATION DISCUSSED
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION
JUNE 6, 2013

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of Tennessee Valley Authority held a telephone conference call on June 6, 2013, to discuss and clarify the following requests for additional information (RAIs) concerning the license renewal application (LRA).

RAI 3.1.1-44-01 – changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

License renewal application (LRA) Table 3.1.1, Item 3.1.1-44, addresses carbon steel manway and handhole covers exposed to air with leaking secondary-side water and/or steam subject to loss of material due to erosion for this component group. In its discussion for the component group, the applicant states that a leaking closure seal is an event driven condition that is not expected to occur with proper maintenance. The applicant also states that ASME Section XI, Class 2 pressure testing requirements would apply to the secondary side closures of its steam generators. The staff noted that erosion is an applicable aging effect for the component group, given the environment (water and/or steam) and the material group (carbon steel). The staff also noted that adherence to proper maintenance practices does not preclude the associated aging effect.

Issue:

It is not clear to the staff if the applicant's aging management review (AMR) has ~~appropriettly~~appropriately evaluated loss of material due to erosion as an applicable aging effect for the carbon steel manway and handhole covers for the secondary side of its steam generators, and which aging management program will be used to manage loss of material due to erosion during the period of extended operation.

Request:

1. Provide technical basis to justify why ~~errosion~~loss of material due to erosion is not an applicable aging effect for the carbon steel manway and handhole covers. Otherwise, explain which aging management program (AMP) will be creditied to manage loss of material due to erosion for these components.
2. Revise the LRA, as necessary consistent with the response.

RAI 3.1.2-4-1 – changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

LRA Table 3.1.2-4 indicates that, for steam generator (SG) tubes made of nickel alloy, heat transfer is one of the intended functions and there is no ~~applicable aging effect~~aging effect requiring management for this intended function.

Issue:

The LRA does not provide any technical justification for why reduction of heat transfer is not an applicable aging effect for the SG tubes with an intended function of heat transfer.

Request:

Provide technical justification for why reduction of heat transfer is not an aging effect requiring management~~applicable aging effect for the SG tubes~~. Alternatively, discuss how reduction of heat transfer will be managed for the SG tubes. Revise the LRA as necessary consistent with the response.

RAI 3.5.2.2.1.6-1 – discussed but no changes were made and a mutual understanding was reached by the staff and the applicant.

RAI 3.6-1 – discussed but no changes were made and a mutual understanding was reached by the staff and the applicant.

RAI 3.6-2 – changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

The GALL Report, Vol. 2, Rev. 2, Item VI.A-8, "Fuse Holders (Not Part of an ~~Larger Assembly~~ active equipment; Metallic Clamp," identifies the aging effect and aging mechanism as fatigue, ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination, corrosion and oxidation. The associated aging management program (AMP) XI.E5, "Fuse Holders," states that fuse holders within the scope of license renewal should be tested to provide an indication of the condition of the metallic clamps of fuse holders. In LRA, Table 3.6.1, Item 3.6.1-16 and 3.6.1-17 of the LRA states that there are no AMPs required for fuse holders based on a review of the environment of the fuse holders and are not subject to the aging effect and aging mechanisms as identified in Item VI.A-8 of GALL Report.

Issue:

Although the applicant concludes in Table 3.6.1, Item 3.6.1-16 and 3.6.1-17 that the aging effects and aging mechanisms identified by the GALL Report are not applicable to the fuse holders at SQN, the applicant did not provide an evaluation to substantiate the conclusion.

Request:

Provide an evaluation that addresses the aging effect/mechanisms identified in the GALL Report, Vol. 2, Rev. ~~2~~1, Item VI.A-8 that supports the conclusions made in LRA Table 3.6.1, Item 3.6.1-06 and 3.6.1-17.

RAI B.1.14-1 – discussed but no changes were made and a mutual understanding was reached by the staff and the applicant.

RAI B.1.21-4 – deleted as it was a duplicate of an already issued RAI.

RAI B 1.27-1 – discussed but no changes were made and a mutual understanding was reached by the staff and the applicant.

RAI B.1.38-1 – changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

LRA Section B.1.38 states that the Service Water Integrity program is consistent with the GALL Report AMP XI.M20, "Open-Cycle Cooling Water System," and that it manages loss of material and fouling of components exposed to essential raw cooling water (ERCW) as described in the SQN response to Generic Letter (GL) 89-13. SQN's response dated September 22, 1995, to GL 89-13 states that SQN's preventive maintenance program provides for routine inspections and maintenance of piping and components to ensure that corrosion, erosion, protective coating failure, silting, and biofouling does not degrade the performance of safety-related components supplied by ERCW. The response also notes that SQN's inspection/maintenance program includes ultrasonic inspections of selected ERCW piping [using] SQN's "**raw water fouling and corrosion control program**" [emphasis added] to monitor for piping degradation and to verify minimum wall thickness.

The operating experience discussion in LRA Section B.1.38 states that SQN performs quarterly testing using ultrasonic inspections of the raw cooling water and ERCW systems and that there are approximately 150 locations concentrating on low flow and stagnant areas. The source of this statement appears to be from program basis document SQN-RPT-10-LRD09, "Operating Experience Review Results – Aging Management Program Effectiveness," Section 3.1.27, which states that the "MIC and Cavitation Degradation Monitoring Program 0-PI-DXX-000-704.1" performs quarterly ultrasonic inspections. However, the associated reference for that statement in SQN-RPT-10-LRD09 is "interviews with the service water program owners."

The staff notes that SQN procedure 0-TI-SXX-000-146.0, "Program for Implementing NRC Generic Letter 89-13," lists 0-PI-DXX-000-704.1, "MIC and Cavitation Degradation Monitoring Program," as a procedure related to NRC GL 89-13. However, program basis document SQN-RPT-10-LRD03, "Aging Management Program Evaluation Report," Section 4.12, "Service Water Integrity," does not mention 0-PI-DXX-000-704.1, and a copy of 0-PI-DXX-000-704.1 was not included as a reference for this program. In addition, corporate procedure NPG-SPP-09.7, "Corrosion Control Program," which is cited in SQN-RPT-10-LRD03, does not include 0-PI-DXX-000-704.1 as a developmental reference in Section 6.3.37 for SQN.

The staff also notes that program basis document SQN-RPT-10-LRD08, "Operating Experience Report – Aging Effects Requiring Management," cites a number of operating experience reports that discuss cavitation as the cause of piping degradation in the ERCW system. In each case the associated evaluation states that loss of material due to erosion is an aging effect identified in mechanical tools [EPRI 1010639, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools," Revision 4] for stainless steel or carbon steel in raw water. In addition, during its review of related operating experience reports, the staff noted that several reports (21420, 70344, and 70681) that attributed the apparent cause a "due to cavitation as the valve opens and closes," as opposed to steady state cavitation due to a fixed pressure drop in the system.

The staff notes that GL 89-13, Enclosure 4, NUREG-1275, Volume 3, "Operating Experience Feedback Report – Service Water System Failures and Degradation in Light Water Reactors," Section 3.1.3, "Corrosion/Erosion," states: "[t]he most commonly specified cause for corrosion/erosion of service water systems at [light water reactors] LWR was the nature of the system's water source. Suspended solids in the water source (e.g., silt or fine sand particles) was most frequently cited as the cause of the erosion of system components."

Issue:

Based on Enclosure 4 of GL 89-13 and the lack of any further clarification, the staff does not consider erosion due to cavitation as an aging mechanism that was addressed by GL 89-13. However, based on operating experience reports cited in the program basis documents, loss of material due to cavitation is an aging effect requiring management at SQN. The staff notes that although EPRI 1010639 identifies loss of material due to erosion as an aging effect for stainless steel and carbon steel in raw water, it also indicates that there is no corresponding item number in the GALL Report and there is no "Tool vs GALL Match." Based on this, if SQN is managing loss of material due to cavitation erosion with the Service Water Integrity program, then this approach is inconsistent with the GALL Report.

In addition, the staff does not consider that the information and documentation necessary to document compliance with the provisions of Part 54 are in an auditable and retrievable form as required by 10 CFR 54.37, "Additional records and record-keeping requirements." This is based on: 1) the apparent need for SQN to manage loss of material due to cavitation, and the lack of documentation for this aspect in LRD03, Section 4.12, Service Water Integrity, and 2) including statements in the LRA concerning quarterly ultrasonic inspections of ERCW piping that are based on interviews with the service water program owners.

Request:

1. Discuss whether loss of material due to cavitation is an AERM at SQN. If not, provide bases for not requiring management with respect to the associated operating experience reports discussed in SQN-RPT-10-LRD08. If cavitation does require management, provide bases to demonstrate that the implementing procedure(s) will manage the effects of aging so that the intended function(s) will be maintained.
2. If loss of material due to cavitation does require management by the Service Water Integrity program, discuss whether the existing information and documentation required to document compliance with the provisions of Part 54 are being retained in an auditable and retrievable form with respect to managing loss of material due to cavitation.

RAI B.1.41-4 – discussed but no changes were made and a mutual understanding was reached by the staff and the applicant.

RAI E2 – deleted as it was a duplicate of an already issued RAI.~~-~~

RAI 4.2-3 – discussed but no changes were made and a mutual understanding was reached by the staff and the applicant.

RAI 4.2-4 – changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

LRA Section 4.2.4 provides the applicant TLAA for the plant pressure-temperature (P-T) limit curves (hence, TLAA on P-T limits). The process for generating the P-T limit curves is currently governed by the requirements in Technical Specification (TS) 6.9.1.15 for Unit 1 and for Unit 2. The CLB includes these administrative TS requirements to ensure that the applicant will implement future updates of the P-T limit curves in accordance with the applicant's P-T limits report (PTLR) process and the approved P-T limit curves generation methodologies in the latest NRC-approved version of Westinghouse TR No. WCAP-14040-A and other unit-specific WCAP reports.
~~LRA Section 4.2.4 provides the applicant TLAA for the plant pressure-temperature (P-T) limit curves (hence, TLAA on P-T limits). The process for generating the P-T limit curves are currently governed by the requirements in Technical Specification (TS) 6.9.1.15 for Unit 1 and for Unit 2. These TS requirements require the applicable to generate future updates of the P-T limits in accordance with the applicant P-T limits report (PTLR) process and the approved P-T limit curves generation methodology in the latest NRC-approved version of Westinghouse TR No. WCAP-14040-A.~~

The regulation in 10 CFR Part 50, Appendix G requires that the P-T limit curves for a light water reactor unit must be at least as conservative as those that would be generated if the methods of analysis in the ASME Code Section XI, Appendix G edition of record were used to generate the curves. The regulation in 10 CFR Part 50, Appendix G also requires licensees to consider all RV components in the evaluation of their P-T limits, and does not limit the evaluation only to an assessment of the RV components that are defined in the rule as RV beltline components.

Issue:

Based on the requirements in 10 CFR Part 50, Appendix G, there may be plant-specific cases where an evaluation of RV non-beltline nozzle components at a given nuclear plant could generate P-T limit curve points (based on their stress concentrations and loading conditions) that are more conservative than those that would be generated if only the RV beltline components were considered in the scope of the P-T limits analysis assessment. The methods of analysis in WCAP-14040-NP-A, as invoked by the TS 6.9.1.15 requirements, do not specifically address this possibility~~; nor does LRA Section 4.2.4 discuss this issue~~.

The applicant has attempted to resolve this issue for in the LRA by including the following enhancement on the "Scope of Program" and "Monitoring and Trending" program elements of LRA AMP B.1.35, "Reactor Vessel Surveillance" and including the enhancement in LRA Commitment No. 28, Subsection.A (LRA Commitment 28.A):

"Revise Reactor Vessel Surveillance Program procedures to consider the area outside the beltline such as nozzles, penetrations and discontinuities to determine if more restrictive pressure-temperature limits are required than would be determined by just considering the reactor vessel beltline materials."

The stated enhancement to consider RV areas outside of the RV beltline regions (including RV non-beltline nozzles, penetrations and discontinuities) for future generation of plant P-T limits has direct relevance to: (a) the applicant's methodology and process for performing updates of the P-T limit curves in accordance with the applicant's PTLR process, and (b) whether the methodology for generating P-T limit curves in TR No. WCAP-14040-A adequately addresses potentially more limiting impacts that might be caused by the inclusion of RV non-beltline components in the P-T limit curve evaluation bases. It is not evident why a change to the TS 6.9.1.15 provisions would not need to be identified under 10 CFR 54.22 to indicate ~~indicating~~ that the generation of P-T limit curves under the PTLR process will include the consideration and evaluation of RV non-beltline areas as part of the P-T limit curve generation methodology and that this represents a modification of the NRC-approved methodology in WCAP-14040-A. It is also not evident why the applicant would not need to update the plant implementation procedures for PTLR processes for Units 1 and 2, accordingly.

Request:

1. Provide a basis for why the LRA does not include any proposed changes to TS 6.9.1.15 for Unit 1 and TS 6.9.1.15 for Unit 2 in accordance with 10 CFR 54.22 such that the TS provisions will state that the generation of P-T limit curves under the PTLR process will include the consideration and evaluation of RV non-beltline areas as part of the P-T limit curve generation methodology and will identify these considerations and evaluations as part of a modification of the NRC-approved methodology in WCAP-14040-A.

2. Provide a basis why the LRA does not include an enhancement to update the applicant's implementation procedures for PTLR processes such that the procedures will include the consideration and evaluation of RV non-beltline components as part of the P-T limits methodology bases for the PTLRs and why this type enhancement has not been

factored into the summary description in LRA UFSAR Supplement Section A.2.1.4, "Pressure Temperature Limits."

RAI 4.7.3-1 – changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

In LRA Section 4.7.3, the applicant states that the leak before break (LBB) analysis was is applicable to the primary coolant loops piping. However, UFSAR Section 3.6 and UFSAR Table 3.6.2-1 indicated that the piping locations for the LBB analysis also included the following interfacing branch connections to the primary coolant loops:

1. residual heat removal (RHR) line/primary coolant loop connection;
2. accumulator (ACC) line/primary coolant loop connection; and (c) pressurizer surge line/primary coolant loop connection. Relevant information is given in the following document sources:
   i. Westinghouse Proprietary Class 2 TR No. WCAP-12011, "Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for Sequoyah Units 1 and 2" (October 1988); WCAP-12012, which is referenced in UFSAR Table 3.6.2-1, is the non-proprietary version of the report.
   ii. Westinghouse Proprietary Class 2 TR No. WCAP-10456, "The Effects of Thermal Aging on the Structural Integrity of Cast Austenitic Stainless Steel Piping for Westinghouse Nuclear Steam Supply Systems" (November 1983).~~;~~
   iii. Westinghouse Proprietary Class 2 TR No. WCAP-10931, "Toughness Criteria for Thermally Aged Cast Stainless Steel" (July 1986).

Issue:

The staff needs a clarification on whether the NRC-approved LBB was limited solely to piping in the main coolant loops in the units or whether the scope of the approved LBB analysis also included other large bore, high energy Class 1 interfacing branch connections to the primary coolant loops (e.g., that for interfacing piping in the RHR, ACC, and pressurizer surge lines). In addition, the LRA Sections 4.7.3 and 4.8 do not reference any of the Proprietary Class 2 WCAP reports as the appropriate Westinghouse proprietary methodologies for the LBB analysis of the Sequoyah main coolant loops.

Request:

1. Identify all Safety Class A or Class 1 piping systems and locations that are within the scope of the applicant LBB analysis~~ and identify the boundary conditions for the applicable piping systems in the system diagrams that were provided for in the LRA.~~.

~~1~~2. Provide a basis why Westinghouse Class 2 Proprietary TR Nos. WCAP-12011, WCAP-10456, and WCAP-10931 have not been referenced in LRA Section 4.7.3 or 4.8 as the applicable methodology bases for the TLAA on LBB.

RAI 4.7.3-3 – changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.
~~(Clarifications on the Flaw Evaluation Used in the LBB Analysis)~~

Background and Issue:

In LRA Section 4.7.3, the applicant indicates that a fatigue flaw growth analysis was performed as the basis for demonstrating flaw stability in the LBB assessment; however the NRC's LBB Safety Evaluation dated July 19, 1989 (ADAMS Legacy Library, Accession No. 8907240133), identifies that the flaw stability for the LBB assessment was demonstrated though performance of an acceptable elastic-plastic, J-integral fracture toughness analysis.

LRA Section 4.7.3 also does not specifically identify which of the referenced Westinghouse Class 2 Proprietary Technical Reports (WCAP TRs) in RAI 4.7.3-1 includes the applicable cycle-based flaw growth assessment for the facilities. The staff needs this clarification to be capable of verifying ~~to verify~~ the validity of the applicant's 10 CFR 54.21(c)(1)(i) disposition basis for the flaw analysis TLAA on LBB.

Request:

Identify the Westinghouse Class 2 Proprietary TR in the CLB that contains the cycle-based LBB assessment. Clarify whether the flaw stability basis in the existing LBB analysis was performed using a fatigue flaw growth analysis or a cycle-dependent J-integral fracture mechanics analysis. Identify all design basis transients that were assumed for in the type of flaw stability analysis that was used for the LBB assessment and identify the number of cycles that were assumed ~~for~~ in the LBB analysis in assessment of these design transients.