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

CNL-19-057

June 19, 2019

10 CFR 50.55a

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

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

Subject: **Response to Request for Additional Information Regarding Sequoyah Nuclear Plant, Units 1 and 2, American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, Inservice Inspection Program, Request for Alternative, 18-ISI-1 (EPID L-2019-LLR-0006)**

References: 1. TVA letter to NRC, CNL-19-012, "Sequoyah Nuclear Plant, Units 1 and 2, American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, Inservice Inspection Program, Request for Alternative, 18-ISI-1," dated January 30, 2019 (ML19031C848)

2. NRC Electronic Mail to TVA, "Request for additional information - Sequoyah Nuclear Plant, Units 1 and 2, Request for Alternative to 18-ISI-1 EPID: L-2019-LLR-0006," dated May 29, 2019 (ML19149A622)

In the Reference 1, Tennessee Valley Authority (TVA) submitted an alternative request (18-ISI-1) for Nuclear Regulatory Commission (NRC) approval for the Sequoyah Nuclear Plant (SQN) Units 1 and 2 for the remainder of the current renewed operating licenses for SQN Units 1 and 2. SQN Units 1 and 2 are in the fourth 10-Year inservice inspection (ISI) interval scheduled to end on April 30, 2025. In Reference 2, the NRC issued a Request for Additional Information (RAI) and requested a response by June 21, 2019.

The enclosure to this letter provides the response to the RAI. There are no new regulatory commitments associated with this submittal. Please address any questions regarding this request to Kimberly Hulvey at 423-751-3275.

Respectfully,

Kimberly Hulvey for J. W. Shea

J. W. Shea
Vice President, Nuclear Regulatory Affairs and Support Services

cc (see Page 2)

Enclosure: Response to Request for Additional Information Regarding Sequoyah Nuclear Plant, Units 1 and 2, American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, Inservice Inspection Program, Request for Alternative, 18-ISI-1 (EPID L-2019-LLR-0006)

cc (w/Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Sequoyah Nuclear Plant
NRC Project Manager - Sequoyah Nuclear Plant

Enclosure

Response to Request for Additional Information Regarding Sequoyah Nuclear Plant, Units 1 and 2, American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, Inservice Inspection Program, Request for Alternative, 18-ISI-1 (EPID L-2019-LLR-0006)

NRC Request for Information (RAI)

REGULATORY BASIS

Title 10 of the Code of Federal Regulations (10 CFR)

- *50.55a(z)(2)*

Hardship without a compensating increase in quality and safety. Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety…

- *50.55a(g)(4)(ii)*

Applicable ISI Code: Successive 120-month intervals. Inservice examination of components and system pressure tests conducted during successive 120-month inspection intervals must comply with the requirements of the latest edition and addenda of the ASME Code incorporated by reference in paragraph (a) of this section 12 months before the start of the 120-month inspection interval (or the optional ASME Code Cases listed in NRC Regulatory Guide 1.147, when using ASME BPV Code, Section XI, or NRC Regulatory Guide 1.192, when using the ASME OM Code, as incorporated by reference in paragraphs (a)(3)(ii) and (iii) of this section), subject to the conditions listed in paragraph (b) of this section.

REQUESTS FOR ADDITIONAL INFORMATION

1. *The licensee specified the dates of the fourth inservice inspection (ISI) interval (i.e., present through April 30, 2025). However, the licensee does not specify the dates of the fifth and sixth intervals. The dates of the intervals are important for specifying the time period for which a proposed alternative may be granted. Please provide the dates for the fifth and sixth ISI intervals.*
2. *The licensee is requesting an alternative for three consecutive ISI intervals, spanning approximately 21 years of operating service. 10 CFR 50.55a(g)(4)(ii) requires that licensees update their ISI programs to reflect the latest edition of ASME Code Section XI incorporated by reference in 10 CFR 50.55a at the time corresponding to 12 months prior to the start of the next ISI interval. This means that ISI requirements evolve over time. Over 30 years of operation, plant-specific or fleet-wide operating experience may necessitate revising ISI requirements in order to provide reasonable assurance of the public health and safety. Primary water stress corrosion cracking (PWSCC), in particular, is known to be slower at cold-leg temperatures. Therefore, the absence of cracking at cold-leg temperature locations (such as those mentioned in 18-ISI-1) is not indicative of future performance. Please describe how (a) evolving ISI requirements in the ASME Code and (b) future operating experience will be accounted for over the 30-year period over which the alternative is proposed.*
3. *The licensee's basis for a hardship relies on the fact that multiple deployments of remote examination tooling within one interval results in unnecessary accumulation of radiological exposure to personnel. Aligning the exam schedules of the upper head injection, control rod drive, and incore instrumentation housing welds with the Code Case N-729-4, Table 1, Item No. B.20 exams of the upper head results in decreased radiological exposure. However,*

Note 8 of Table 1 of Code Case N-729-4 states that if found flaws are attributed to PWSCC, then the reinspection interval is changed to each refueling outage. Similarly, Note 5 of Table 1 of N-770-2 updates the required exam frequency in the case that a planar surface flaw is detected. Therefore, the licensee's basis for hardship is at risk, due to the possibility that a flaw attributable to PWSCC is found during an exam. Please explain or update TVA's basis for hardship in light of this discussion.

TVA Response

1. The dates for the fifth and sixth ISI intervals have not yet been determined. Based on the dates of the current fourth ISI interval for SQN Unit 1, the dates of the SQN Unit 1 fifth and sixth ISI intervals are estimated to be May 1, 2025 through April 30, 2035, and May 1, 2035 through September 17, 2040 (current expiration date of the SQN Unit 1 Renewed Facility Operating License), respectively. Based on the dates of the current fourth ISI interval for SQN Unit 2, the dates for the fifth and sixth ISI intervals for SQN Unit 2 are estimated to be May 1, 2025 through April 30, 2035, and May 1, 2035 through September 15, 2041 (current expiration date of the SQN Unit 2 Renewed Facility Operating License), respectively. These dates are subject to change based on the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, Division 1, Article IWA-2430, "Inspection Intervals."

   Additional information to support the basis for the alternative request for the remainder of the current renewed operating licenses for SQN Units 1 and 2 is provided below:

   - When submitted as a whole, the requested alternative results in a routine examination frequency throughout the remainder of plant life, as shown in Table 1 and Table 2 of the request for alternative 18-ISI-1. As described in the proposed alternative, this method maintains the overall inspection program as near to risk-neutral as possible, by a net reduction of only one weld examination throughout the remaining life of the plant, while allowing for a significant reduction in radiological exposure to plant personnel.
   - Conversely, when comparing each individual ISI interval within that timeframe, the number of examinations, examination schedules, and reduction in radiological exposure vary significantly. For example, for SQN Unit 1, approval of this request in the fourth interval alone would result in an estimated dose reduction of over 4.5 rem, elimination of two tooling deployments, and no change in the number of welds examined. Approval of this request in the fifth interval alone would result in an estimated dose reduction of approximately 9 rem and elimination of two tooling deployments, but also results in a reduction of four weld examinations (one set of UHI weld exams per N-770-2). Approval of this request in the sixth interval alone would result in an estimated dose reduction of over 4 rem, elimination of one tooling deployment, and an increase of 3 examinations (one set of ASME Category B-O weld exams). If each interval is considered independently, this alternative may give the appearance of increased risk, particularly in the fifth interval when the number of weld examinations is reduced. Note that the N-729-4 and N-770-2 examination frequencies are not based on ISI interval dates. Only the Category B-O welds are performed on an interval basis, and the use of this alternative will result in an increased exam frequency for those components.

Additionally, if faced with the uncertainty of approval from interval to interval, this would pose concerns for planning future examinations that rely on long-lead time vendor contract support and specialized NDE tooling. TVA business practices and procedures require these significant outage costs and schedule impacts to be planned years in advance. These planning milestones may not be achievable when the status of approval is unknown, especially when the examinations are required early in an interval.

2. All requirements of 10 CFR 50.55a and ASME Code Section XI, other than those where an alternative has been approved by the NRC, will remain applicable over the period for which alternative request 18-ISI-1 is proposed. This includes the 10 CFR 50.55a(g)(4)(ii) requirement for periodic ISI program updates. Over the remaining duration of the current plant licenses, each unit will undergo two ISI interval updates, and are also subject to mid-interval inspection program revisions due to industry operating experience or revised regulations. TVA does not intend for this alternative to supersede or circumvent any of these existing regulatory process. In accordance with 10 CFR 50.55a, and the process for updating the SQN ISI program for subsequent 10-year intervals, the following actions are performed:

   - In the event of regulatory changes, ASME Section XI interval updates, or significant operating experiences resulting in a more frequent examination of any of the subject welds, the program will be revised and the examination frequency changes will be incorporated as required for the affected component(s). If the examination frequency change adversely impacts the basis for this alternative, TVA will either submit a new request to the NRC or will revert to the examination frequencies required by ASME Code Cases N-770-2, and N-729-4 (or later versions as required by 10 CFR 50.55a(b)(5)).
   - Regulatory changes, ASME Section XI interval updates, or operating experiences resulting in other programmatic changes (e.g., qualification requirements, acceptance criteria) will be incorporated as required, but TVA will continue to utilize the alternative examination frequencies for SQN described in alternative request 18-ISI-1, and will continue remote inspection of ASME Code Category B-O welds at CRD locations other than the periphery.
   - Regulatory changes, ASME Section XI interval updates, or operating experiences resulting in more significant, fundamental technical changes [e.g., new non-destructive examination (NDE) techniques or newly identified failure mechanisms] will be incorporated as required. If the change results in an adverse impacts to the basis for this alternative, TVA will either submit a new request to the NRC or will revert to the examination frequencies required by ASME Code Cases N-770-2, and N-729-4 (or later versions as required by 10 CFR 50.55a(b)(5)).

3. The RAI states "*the licensee's basis for hardship is at risk, due to the possibility that a flaw attributable to PWSCC is found during an exam."* The below information addresses the NRC concern.

   The requirements of Code Cases N-770-2 and N-729-4 (or later versions as required by 10 CFR 50.55a(b)(5)), other than those where an alternative has been approved by the NRC, remain applicable.

   - In the event that a PWSCC flaw is detected in a RPV head penetration weld, the program will be revised and the applicable examination requirements will be met. In this event, the alternative examination frequency of ASME Code Category B-O welds and the Code Case N-770-2 upper head injection (UHI) welds will no longer be applied. However, the remote inspection of ASME Code Category B-O welds at control rod drive (CRD) locations other than the periphery, will still be utilized for dose reduction.
   - In the event that a planar surface flaw is detected in a UHI housing weld, the program will be revised and the applicable examination requirements will be met for that component. Other component examinations will continue to utilize the alternative frequency approved in this request.