



1101 Market Street, Chattanooga, Tennessee 37402

CNL-26-041

June 15, 2026

10 CFR 50.90

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, 50-328, and 72-034

Subject: **Response to Request for Additional Information - TVA LAR to Revise Sequoyah Nuclear Plant, Units 1 and 2, Technical Specification 5.5.3, "Radiological Effluent Controls Program," for Use of Potassium Hydroxide (EPID L-2026-LLA-0006)**

- References:
1. TVA Letter to NRC, CNL-25-048, "Application to Revise Sequoyah Nuclear Plant, Units 1 and 2 Technical Specification 5.5.3 'Radioactive Effluent Controls Program' to Support Revision of the Offsite Dose Calculation Manual that Accounts for Radionuclides Generated When Using Potassium Hydroxide (SQN-TS-25-07)," dated January 15, 2026 (ML26015A134)
  2. NRC Electronic Mail to TVA, "Request for Additional Information - TVA LAR to Revise Sequoyah Nuclear Plant, Units 1 and 2, Technical Specification 5.5.3, 'Radiological Effluent Controls Program,' for Use of Potassium Hydroxide (EPID L-2026-LLA-0006)," dated May 19, 2026 (ML26153A322)

In Reference 1, Tennessee Valley Authority (TVA) requested a license amendment for the Sequoyah Nuclear Plant (SQN), Units 1 and 2. The proposed amendments would revise SQN Units 1 and 2, Technical Specification (TS) 5.5.3, "Radioactive Effluent Controls Program," to allow the use of International Commission on Radiological Protection Publications 72, 119, and 144, along with Environmental Protection Agency Federal Guidance Report (FGR) methodologies FGR-12 and FGR-15 for the purpose of determining dose coefficients for potassium hydroxide-related radionuclides.

In Reference 2, the Nuclear Regulatory Commission (NRC) issued a request for additional information (RAI), and requested that TVA provide a response by June 18, 2026.

Enclosure 1 to this submittal provides the TVA response to the RAI.

In support of the response to the RAI, Enclosure 2 to this submittal provides a page from the SQN Offsite Dose Calculation Manual (ODCM) marked up to show proposed changes. The markup of changes to the existing ODCM is a draft provided for NRC information only. The revised ODCM will be implemented under the SQN ODCM program and will be formally submitted to the NRC in accordance with SQN Units 1 and 2 TS 5.5.1, "Offsite Dose Calculation Manual (ODCM)." The ODCM markup in Enclosure 2 supplements those provided in Reference 1.

This submittal does not change the no significant hazards consideration nor the environmental consideration contained in Reference 1. In accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosure to the Tennessee Department of Environment and Conservation.

There are no new regulatory commitments associated with this submittal. Please address any questions regarding this submittal to Amber V. Aboulfaida, Senior Manager, Fleet Licensing, at [avaboulfaida@tva.gov](mailto:avaboulfaida@tva.gov).

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 15th day of June 2026.

Respectfully,  
**Fegley,  
Damon  
Allan**

Digitally signed by  
Fegley, Damon  
Allan  
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Damon A. Fegley  
General Manager, Nuclear Regulatory Affairs & Emergency Preparedness

Enclosures

1. TVA Response to NRC Request for Additional Information
2. Proposed ODCM Changes (Mark-Ups) for SQN (For Information Only)

cc (Enclosures):

NRC Project Manager - Sequoyah Nuclear Plant  
NRC Regional Administrator - Region II  
NRC Senior Resident Inspector - Sequoyah Nuclear Plant  
Director, Division of Radiological Health - Tennessee Department of Environment  
and Conservation

## Enclosure 1

### Tennessee Valley Authority Response to Nuclear Regulatory Commission Request for Additional Information

#### Introduction

By letter dated January 15, 2026, Tennessee Valley Authority (TVA) submitted a request for an amendment to Renewed Facility Operating License Nos. DPR-77 and DPR-79 for the Sequoyah Nuclear Plant (SQN), Units 1 and 2. The proposed license amendment is required for SQN to revise the offsite dose calculation manual (ODCM) to include radionuclides generated when using potassium hydroxide (KOH) for the purpose of potential of hydrogen (pH) control of the primary reactor system coolant. The proposed license amendment would allow for application of specific International Commission on Radiological Protection (ICRP) Publications 72, 119, and 144 and Environmental Protection Agency (EPA) Federal Guidance Report (FGR) FGR-12 and FGR-15 methodologies to determine dose coefficients associated with KOH radionuclides. The dose coefficients determined using the listed ICRP and FGR methodologies will be used in the establishment of the elements of the SQN, Units 1 and 2, Technical Specification (TS) 5.5.3 "Radioactive Effluent Controls Program."

The U.S. Nuclear Regulatory Commission (NRC) staff is currently reviewing the license amendment request (LAR) and has identified an area where additional information is needed to complete its review. The request for additional information (RAI) is identified below.

#### Regulatory Basis

Title 10 of the Code of Federal Regulations (10 CFR) Section 20.1101(b) requires that each licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA).

The regulation at 10 CFR Part 20.1301 requires that each licensee shall conduct operations so that the total effective dose equivalent to individual members of the public from the licensed operations does not exceed 0.1 rem (100 millirem (mrem)) in a year.

The regulation at 10 CFR Part 20.1301(e) requires that each licensee shall comply with EPA's environmental radiation standards contained in 40 CFR Part 190, i.e., 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ of any member of the public from the uranium fuel cycle.

The regulation at 10 CFR 50.36a(a) requires that each licensee shall develop technical specifications to keep levels of radioactive materials in effluents released in unrestricted areas ALARA.

Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation To Meet the Criterion "As Low as is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," assigns design objectives for doses due to liquid and gaseous effluents to meet the ALARA criterion. Under Section II.A of appendix I, the annual design objectives for liquid effluents from all pathways of exposure are 3 mrem to the total body and 10 mrem to any organ. Under Section II.B, the annual design objectives for noble gases in gaseous effluents are 10 millirad (mrad) gamma-air dose and 20 mrad beta-air dose, with provisions for increasing or decreasing the design objectives based on total body dose and skin dose. Under Section II.C of Appendix I, the

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*annual design objective for radioactive iodines and particulates in gaseous effluents is 15 mrem to any organ. These design objectives are referenced to the total body and various organs of the human body in accordance with the recommendations of ICRP Publication 2.*

*NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors," provides guidance for pressurized water reactor (PWR) licensees that may be used to implement the provision of Generic Letter 89-01, which allows Radiological Effluent Technical Specifications to be removed from the main body of the Technical Specifications and placed in the ODCM.*

*Regulatory Guide (RG) 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," provides methods acceptable for the calculation of preoperational estimates of effluent releases, dispersion of the effluent in the atmosphere and different water bodies, and estimation of the associated radiation doses to man to show compliance with Appendix I to 10 CFR Part 50. RG 1.109 describes basic features of these calculational models and suggests parameters for the estimation of radiation doses to man from effluent releases using dose methodology and terminology from ICRP Publication 2.*

*RG 1.21, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste," provides methods acceptable for measuring, evaluating, and reporting licensed radioactivity in effluents and assessing and reporting the public dose to demonstrate compliance with 10 CFR Part 20, 40 CFR 190, and Appendix I to Part 50.*

### Issue

*In the LAR, TVA specifies that the introduction of KOH as pH control additive to the primary reactor system coolant will change their reactor coolant source term. TVA specifies that the newly generated radionuclides from the use of KOH will require a review of the source term basis and impact on the radioactive effluent controls program to ensure conformance with regulatory requirements. The newly generated radionuclides, including argon (Ar-39 and Ar-42) chlorine (Cl-36), potassium (K-40, K-42, and K-43), phosphorus (P-33), and sulfur (S-35) are not listed or have limited information in RG 1.109. Therefore, TVA will need to use different calculational methodologies, including different dose conversion factors from RG 1.109, to calculate their respective effluent doses. TVA specifies that updating its ODCM with the calculational methodologies and dose conversion factors in ICRP Publication 72, ICRP Publication 119, ICRP Publication 144, FGR 12, and FGR 15 will allow for the calculation of effluent doses from the KOH radionuclides to show compliance with radiological effluent technical specifications and 10 CFR 20.1301(e).*

*Since the effluent doses calculated for the new KOH radionuclides will use different calculational methodologies and dose conversion factors than those found in RG 1.109, their values will be based on different units of dose (i.e., effective dose vs. whole body dose). Practically, these values are very similar, especially for uniform whole body dose where the correction factors that are applied to develop effective dose sum to 1.*

*The new KOH radionuclide doses calculated from the different ICRP publications and FGR documents cannot be added together with the current RG 1.109 ICRP Publication 2 doses because they are based on fundamentally different methodologies. Simply adding them directly can cause errors in radiation protection assessments. As per NUREG-1301, one purpose of the ODCM is to provide a basis for accurate dose assessments. Therefore, the TVA should describe how the new*

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*KOH radionuclide doses will be incorporated within the dose results that are used to demonstrate compliance. During prior public engagements, the NRC staff, while observing the very low levels of dose involved, recommended that TVA qualitatively compare the values to the current ODCM effluent doses, calculated from RG 1.109, to show compliance with Appendix I to 10 CFR Part 50, 10 CFR Part 20, and 40 CFR 190. However, TVA can elect another approach that is technically sound, if desired.*

### **Request**

*Describe how the new KOH radionuclide effluent doses, calculated with the methodologies and dose conversion factors in ICRP Publication 72, ICRP Publication 119, ICRP Publication 144, FGR 12, and FGR 15 will be compared to the current ODCM effluent doses, calculated from the methodologies and dose conversion factors in RG 1.109, to show compliance with Appendix I to 10 CFR Part 50, 10 CFR Part 20, and 40 CFR 190.*

### **TVA Response**

Due to advancements in dosimetric and biokinetic modeling introduced in ICRP-60 and later references, TVA recognizes the need to qualitatively compare doses calculated with updated proposed dose coefficients to those produced using older methodologies when demonstrating compliance with applicable CFRs. This distinction will be directed by the ODCM and implemented in the Radioactive Effluent Release Report.

When demonstrating compliance with 10 CFR 50 Appendix I, doses calculated using updated dose coefficient modeling will be independently compared to the applicable limits and presented alongside the currently calculated doses. If both methodologies independently show that doses remain well within the limits, an inference can be made that overall doses from legacy sources and KOH-specified sources are also well within the limits. Similarly, when reporting Total Dose in accordance with 40 CFR 190, separate total doses will be calculated using the applicable dose coefficients and qualitatively compared to each specified limit. A similar inference regarding compliance with 40 CFR 190 can be made by reviewing the side-by-side comparison of the calculated doses and their respective limits.

If calculated doses comply with the more restrictive public dose limits in 40 CFR 190 (25 mrem/year), then they are considered compliant with the less restrictive public dose limits in 10 CFR 20 (100 mrem/year Total Effective Dose Equivalent). A statement to this effect will be incorporated into the Effluent Release Report (Section VII-H), presented alongside the current demonstration method using onsite dosimeter readings for a hypothetical worker positioned just outside the restricted area boundary.

All dose calculations will be performed in accordance with the SQN ODCM methodology and implemented using the OpenEMS software. Any dose calculation involving radionuclides associated with the use of KOH in the reactor coolant system that do not have dose coefficients derived from older ICRP methodology (i.e., Cl-36, K-40, K-42, K-43) will be independently assessed for compliance with the applicable CFRs, and qualitatively compared to the doses for the same event or time period to support an appropriate inference of compliance.

Enclosure 2

**Proposed Offsite Dose Calculation Manual Changes (Mark-Ups)  
for SQN (For Information Only)**

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## 5.0 ADMINISTRATIVE CONTROLS

### 5.2 RADIOACTIVE EFFLUENT RELEASE REPORT (continued)

The Radioactive Effluent Release Report shall include information for solid waste as outlined in the Process Control Program (PCP) and shall also include any changes made to the PCP during the reporting period, to the ODCM pursuant to ODCM Administrative Control 5.3, as well as any major changes to Liquid, Gaseous, or Solid Radwaste Treatment Systems, pursuant to SQN Technical Specifications. It shall also include a listing of new location for dose calculations and/or environmental monitoring identified by the Land Use Census pursuant to ODCM Control 1.3.2.

The Radioactive Effluent Release Report shall also include the following: an explanation as to why the Nonfunctionality of liquid or gaseous effluent monitoring instrumentation was not corrected within the time specified in ODCM Controls 1.1.1 or 1.1.2 respectively.

The report does not require reporting of the meteorological data, but the data should be summarized and maintained in records as in Regulatory Guide 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants," Revision 1, March 2007. The file that shall be provided to NRC upon request. This same report shall include an assessment of the radiation doses due to radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. This same report shall also include an assessment of the radiation doses from radioactive liquid and gaseous effluents to members of the public due to their activities inside the UNRESTRICTED AREA BOUNDARY (Figure 3.1) during the report period. All assumptions used in making these assessments (i.e., specific activity, exposure time, and location) shall be included in these reports.

Deleted: The Radioactive Effluent Release Report (Radiological Impact) shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing of wind speed, wind direction, atmospheric stability, and precipitation (if measured) on magnetic tape, or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability. In lieu of submission with the annual radioactive effluent release report, this summary of required meteorological data may be retained on site in a

The assessment of gaseous radiation doses shall be performed in accordance with Sections 6.6 and 7.6.

The Radioactive Effluent Release Report to be submitted after January 1 of each year shall also include an assessment of radiation doses to the likely most exposed members of the public from reactor releases and other nearby uranium fuel cycle sources (including doses from primary effluent pathways and direct radiation) for the previous calendar year to show conformance with 40 CFR 190, Environmental Radiation Protection Standards for Nuclear Power Operation, in accordance with ODCM Section 8.0. Acceptable methods for calculating the dose contribution from liquid and gaseous effluents are given in NUREG 0133.

Deleted: The meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents (as determined by sampling frequency and measurement) shall be used for determining the gaseous pathway doses.

Calculated doses from the primary radionuclides generated by the addition of KOH for pH control will be reported as follows:

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- 10 CFR 50 Appendix I Reporting - All liquid and gaseous doses attributable to the principal noble gases and particulates produced from the addition of KOH will be reported separately from the total gaseous dose from all other noble gases, particulates, iodine, and tritium contributions. These KOH dose totals will be compared to the applicable 10 CFR 50 Appendix I dose limits, as specified in ODCM Controls 1.2.2.2 and 1.2.2.3.

- 40 CFR 190 Total Dose Reporting - Doses from the liquid and gaseous pathways, direct radiation, carbon-14 production, and contributions from nearby facilities will be reported in accordance with ODCM Control 1.2.3 to demonstrate compliance with 40 CFR 190. The gaseous and liquid particulate doses resulting from the addition of KOH will be compared to the limits of 40 CFR 190 separately.

The Radioactive Effluent Release Report shall include results from any groundwater samples obtained in accordance with the Radiological Environmental Monitoring Program during the reporting period that are not described in the ODCM.

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The Radioactive Effluent Release Report shall include any assigned doses that were performed as a result of a spill or leak from the site that occurred during the reporting period.

The Radioactive Effluent Release Report shall include a summary of any on-site spills, leaks, and/or on-site groundwater monitoring wells above ODCM reporting thresholds that occurred during the reporting period that were communicated to offsite agencies.