

From: [Kimberly Green](#)
To: [ext Andrew Taylor](#)
Subject: 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)
Date: Tuesday, May 19, 2026 10:28:00 AM
Attachments: Sequoyah KOH RAI - Qualitative Dose Comparison.docx

Dear Mr. Taylor:

By letter dated January 15, 2026 (Agencywide Documents Access and Management System Accession No. ML26015A134), Tennessee Valley Authority (TVA) submitted a license amendment request (LAR) for Sequoyah Nuclear Plant (SQN), Units 1 and 2. The proposed amendments would revise SQN, Units 1 and 2, Technical Specification 5.5.3, "Radioactive Effluent Controls Program," to allow the use of International Commission on Radiological Protection (ICRP) Publications 72, 119, 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.

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing your submittal and has identified an area where additional information is needed to complete its review. A draft request for additional information (RAI) was previously sent to you via email on May 12, 2026. You indicated that a clarification call was not necessary; therefore, no changes to the RAI have been made.

A response to the attached RAI is requested within 30 days of this email. The NRC staff considers that timely responses to RAIs help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources. If circumstances result in the need to revise the requested response date, please me at (301) 415-1627 or via email at Kimberly.Green@nrc.gov.

Sincerely,
Kimberly Green, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

REQUEST FOR ADDITIONAL INFORMATION
BY OFFICE OF NUCLEAR REACTOR REGULATION
REGARDING LICENSE AMENDMENT REQUEST TO REVISE
TECHNICAL SPECIFICATION 5.5.3
TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2
DOCKET NOS. 50-327 AND 50-328
EPID: L-2026-LLA-0006

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 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 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.