

From: Daniel King
Sent: Tuesday, June 6, 2023 3:48 PM
To: wendi.para@constellation.com
Cc: Sujata Goetz
Subject: Calvert Cliffs - Long Term Coupon Surveillance Program RAI (EPID L-2023-LLA-0023)
Attachments: RAI Calvert Cliffs Long Term Coupon Surveillance Program .docx

Ms. Para,

By letter dated February 21, 2023 (Agencywide Document and Access Management System (ADAMS) Accession No. ML23052A063), Constellation Energy Generation, submitted a license amendment request (LAR) for Calvert Cliffs Nuclear Power Plant, Units Nos. 1 and 2. The proposed amendment revises the Calvert Cliffs, Unit 1 licenses basis by modifying the Long-Term Coupon Surveillance Program previously approved by the NRC for the carborundum samples located in, Unit 1, Spent Fuel Pool.

The U.S. Nuclear Regulatory Commission staff has reviewed your LAR and determined that additional information is required to complete the review. A request for additional information is attached to this email.

Please let me know by June 9th if you would like a clarification call. Please note that the NRC staff's review is continuing and further requests for information may be developed.

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. Please contact me at (301) 415-1233 or Daniel.King@nrc.gov, if you have any questions.

Daniel King
Project Manager
NRR/DORL/LLPB
U.S. Nuclear Regulatory Commission
301-415-1233

Docket No.
50-317

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Options

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REQUEST FOR ADDITIONAL INFORMATION
RELATED TO THE LICENSE AMENDMENT REQUEST
TO MODIFY THE LONG-TERM COUPON SURVEILLANCE PROGRAM
CONSTELLATION ENERGY GENERATION, LLC
CALVERT CLIFFS NUCLEAR POWER PLAN, UNIT 1

DOCKET NO. 50-317

EPID L-2023-LLA-0023

INTRODUCTION

By letter dated February 21, 2023 (Agencywide Document and Access Management System (ADAMS) Accession No. ML23052A063), Constellation Energy Generation, submitted a license amendment request (LAR) for Calvert Cliffs Nuclear Power Plant, Units Nos. 1 and 2. The proposed amendment revises the Calvert Cliffs, Unit 1 licenses basis by modifying the Long-Term Coupon Surveillance Program previously approved by the NRC for the carborundum samples located in, Unit 1, Spent Fuel Pool.

REGULATORY BASIS

The credited neutron absorbing materials (NAMs) installed in spent fuel pool (SFP) storage racks ensures that the effective multiplication factor (k_{eff}) does not exceed the values and assumptions used in the criticality analysis of record (AOR) and other licensing basis documents. The AOR is the basis, in part, for demonstrating compliance with plant technical specifications and with applicable NRC regulations. Degradation or deformation of the credited NAM may reduce safety margin and potentially challenge the subcriticality requirement. NAMs utilized in SFP racks exposed to treated water or treated borated water may be susceptible to reduction of neutron absorbing capacity, changes in dimension that increase k_{eff} , and loss of material. A monitoring program is implemented to ensure that degradation of the NAM used in SFPs, which could compromise the ability of the NAM to perform its safety function as assumed in the AOR, will be detected. The NRC's regulatory requirements and corresponding staff review criteria and guidance for NAM monitoring programs are contained in the following documents:

10 CFR 50.68(b)(4), "Criticality accident requirements," states that if the licensee does not credit soluble boron in the SFP criticality AOR, the k_{eff} of the SFP storage racks must not exceed 0.95 at a 95 percent probability, 95 percent confidence level. If the licensee does take credit for soluble boron, the k_{eff} of the SFP storage racks must not exceed 0.95 at a 95 percent probability, 95 percent confidence level, if flooded with borated water, and if flooded with unborated water, the k_{eff} must remain below 1.0 at a 95 percent probability, 95 percent confidence level.

GDC 61, "Fuel storage and handling and radioactivity control," states that "The fuel storage and handling, radioactive waste, and other systems which may contain radioactivity shall be designed to assure adequate safety under normal and postulated

accident conditions. These systems shall be designed (1) with a capability to permit appropriate periodic inspection and testing of components important to safety...”

GDC 62, “Prevention of Criticality in Fuel Storage and Handling,” states that “Criticality in the fuel storage and handling system shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations.”

ISSUE

The LAR states that the NEI guidance recommends full testing every 10 years. However, the guidance document NEI 16-03 is clear that for Carborundum the full testing should be conducted every 5 years. Excerpts are provided below.

From the LAR:

“CCNPP’s LTCS program also includes acceptance criteria for areal density testing, considered by NEI 16-03 to be a full coupon test. The LTCS program’s acceptance criteria is as follows:

- Areal density – ^{10}B content of $\geq 0.0177 \text{ g/cm}^2$ (combined areal density of upper and lower coupon by location).

This parameter focuses on quantifying changes occurring in the materials. NEI 16-03 recommends that full testing occur at least every ten years; CCNPP performs this testing every four years.”

From NEI 16-03-A Rev 0:

“b) Full testing may consist of a combination of mass-density measurements, ^{10}B areal density measurements, microscopic analysis, and characterization of changes, in addition to the basic testing parameters. These parameters focus on quantifying changes if they are occurring in the materials. Basic testing may be used in combination with full testing for materials that have degradation resulting in loss of ^{10}B areal density to extend the interval of full testing, if appropriately justified. The ^{10}B areal density measurement will occur at least every ten years. For materials with known degradation or degradation mechanisms that impact the efficacy of the neutron absorber (e.g., Boraflex, Carborundum, Tetrabor or other phenolic resin based materials), the measurement of the areal density at least once every 5 years is acceptable.”

The staff understands that the timeline of 4 years proposed in the LAR for Calvert Cliffs meets the 5 year criteria in the NEI Guidance. The intention of this question is to ensure that the docketed information is accurate with respect to the NEI 16-03 guidance.

REQUEST

Section 2.3 of the LAR states that guidance in NEI 16-03 recommends neutron attenuation testing every 10 years. The NRC staff’s interpretation of the guidance is that for a plant with Carborundum as the neutron absorbing material neutron attenuation testing is recommended on a frequency not to exceed 5 years. Please provide justification for the statement that a 10-year frequency would be aligned with the guidance for Calvert Cliffs.

