



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

January 2, 2024

David P. Rhoades  
Senior Vice President  
Constellation Energy Generation, LLC  
President and Chief Nuclear Officer  
Constellation Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: CALVERT CLIFFS, UNIT 1 - ISSUANCE OF AMENDMENT NO. 349 RE: TO  
MODIFY THE LONG-TERM COUPON SURVEILLANCE PROGRAM  
(EPID L-2023-LLA-0023)

Dear David Rhoades:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 349 to Renewed Facility Operating License No. DPR-53 for the Calvert Cliffs Nuclear Power Plant, Unit No. 1 (CCNP, Unit 1). This amendment consists of changes to the Long-Term Coupon Surveillance (LTCS) program in response to your application dated February 21, 2023.

The proposed amendment revised the CCNP, Unit 1, licensing basis by modifying the LTCS program previously approved by NRC staff. The proposed changes include revising the weight change acceptance criteria to less than 38 percent change in weight for two coupons in a packet sample location (combined weight of upper and lower coupon by location) compared to the baseline, modifying the visual examination criteria to exclude degradation from packet configuration-related erosion and clarifying the areal density testing frequency and associated corrective actions.

D. Rhoades

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A copy of our related safety evaluation is enclosed. A Notice of Issuance will be included in the Commission's monthly *Federal Register* notice.

Sincerely,

***/RA/***

V Sreenivas, Project Manager  
Plant Licensing Branch I  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-317

Enclosures:

1. Amendment No. 349 to DPR-53
2. Safety Evaluation

cc: Listserv



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

CONSTELLATION ENERGY GENERATION, LLC

DOCKET NO. 50-317

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 349  
Renewed License No. DPR-53

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Constellation Energy Generation, LLC (CEG, the licensee) dated February 21, 2023, as supplemented by letter dated June 15, 2023, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to licensing basis by modifying the Long-Term Coupon Surveillance program to Facility Operating License No. DPR-53, as indicated in the attachment to this license amendment.
3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Hipólito J. González, Chief  
Plant Licensing Branch I  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Renewed Facility  
Operating License DPR-53

Date of Issuance: January 2, 2024

ATTACHMENT TO LICENSE AMENDMENT NO. 349  
CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT 1  
RENEWED FACILITY OPERATING LICENSE NO. DPR-53  
DOCKET NO. 50-317

Replace the following page of the Renewed Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove Page  
3

Insert Page  
3

- (4) Constellation Energy Generation, LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use, in amounts as required, any byproduct, source, and special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
  - (5) Constellation Energy Generation, LLC, pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.
- C. This license is deemed to contain and is subject to the conditions set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act, and the rules, regulations, and orders of the Commission, now or hereafter applicable; and is subject to the additional conditions specified and incorporated below:
- (1) Maximum Power Level

Constellation Energy Generation, LLC is authorized to operate the facility at steady-state reactor core power levels not in excess of 2737 megawatts-thermal in accordance with the conditions specified herein.
  - (2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 349, are hereby incorporated into this license. Constellation Energy Generation, LLC shall operate the facility in accordance with the Technical Specifications.

    - (a) For Surveillance Requirements (SRs) that are new, in Amendment 227 to Facility Operating License No. DPR-53, the first performance is due at the end of the first surveillance interval that begins at implementation of Amendment 227. For SRs that existed prior to Amendment 227, including SRs with modified acceptance criteria and SRs whose frequency of performance is being extended, the first performance is due at the end of the first surveillance interval that begins on the date the Surveillance was last performed prior to implementation of Amendment 227.
  - (3) Additional Conditions

The Additional Conditions contained in Appendix C as revised through Amendment No. 345 are hereby incorporated into this license. Constellation Energy Generation, LLC shall operate the facility in accordance with the Additional Conditions.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 349 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-53

CONSTELLATION ENERGY GENERATION, LLC

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT 1

DOCKET NO. 50-317

1.0 INTRODUCTION

By letters dated February 21, 2023 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML23052A063), and June 15, 2023 (ML23166A105), Constellation Energy Generation, submitted a license amendment request for Calvert Cliffs Nuclear Power Plant, Unit 1 (CCNP, Unit 1). The proposed amendment revises the CCNP, Unit 1, licensing basis by modifying the Long-Term Coupon Surveillance (LTCS) program previously approved by U.S. Nuclear Regulatory Commission (NRC) staff. The proposed changes include revising the weight change acceptance criteria to less than 38 percent change in weight for two coupons in a packet sample location (combined weight of upper and lower coupon by location) compared to the baseline, modifying the visual examination criteria to exclude degradation from packet configuration-related erosion and clarifying the areal density testing frequency and associated corrective actions.

The NRC staff has reviewed the information regarding the proposed changes to the LTCS program pertaining to the weight change acceptance criteria, the visual examination corrective action criteria, and the areal density testing frequency and associated corrective actions. The letter dated June 15, 2023, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on June 13, 2023 (88 FR 38550). The safety evaluation is provided below.

2.0 REGULATORY EVALUATION

2.1 Regulatory Requirements and Guidance Documents

The regulatory requirements and guidance documents which the NRC staff used in the review of the license amendment request (LAR) are listed below:

- Title 10 of the *Code of Federal Regulations* (10 CFR) 50.68(b)(4), "Criticality accident requirements," states that if the licensee does not credit soluble boron in the Spent Fuel Pool (SFP) criticality Analysis of Records (AOR), the k-effective ( $k_{\text{eff}}$ ) 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  $k_{\text{eff}}$  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  $k_{\text{eff}}$  must remain below 1.0 at a 95 percent probability, 95 percent confidence level.

- 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 61, "Fuel Storage and Handling and Radioactivity Control," states, in part, 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..."
- 10 CFR Part 50, Appendix A, 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."
- NUREG-0800, "Standard Review Plan (SRP)," Section 9.1.1, "Criticality Safety of Fresh and Spent Fuel Storage and Handling." (ML070570006). This NUREG section provides guidance regarding the specific acceptance criteria and review procedures to ensure that the proposed changes satisfy 10 CFR 50.68 and GDC 62.
- NUREG-0800, SRP Section 9.1.2, "New and Spent Fuel Storage." (ML070550057). This NUREG section provides guidance regarding the specific acceptance criteria and review procedures to ensure that the proposed changes meet 10 CFR 50.68.
- Topical Report Nuclear Energy institute (NEI) 16-03-A Rev.0, "Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools." (ML17263A133). This topical report provides guidance endorsed by the NRC staff to the industry for developing adequate monitoring programs for fixed neutron absorbers in spent fuel pools.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Background

A license condition included in CCNP, Unit 1, License Amendment 267 required the development of a new LTCS program for the carborundum samples in the spent fuel pool. The program was modified due to the low number of accelerated coupons remaining. This modification was approved in 2008 with CCNP, Unit 1, Amendment 288 (ML082180478). The current surveillance program is designed to provide both accelerated and long-term exposure to gamma radiation and borated water from the spent fuel pool and it allows for carborundum coupons to be removed. The program allows for the evaluation of the condition of the carborundum through periodic testing. Sufficient boron carbide ( $B_4C$ ) is required in the sheet to maintain subcriticality in the pool in accordance with 10 CFR 50.68. Currently, coupons are removed every four years and undergo visual inspection, areal density testing, and weight and dimensional measurements. The results of the tests are considered acceptable if the



established acceptance criteria are met. Currently, the acceptance criteria for basic testing, as described in NEI 16-03, at CCNP, Unit 1, are:

- Visual Examination - The visual examination consists of inspecting for evidence of gross changes or degradation.
- Dimensional Measurement - Any change in a length or a width measurement of  $\pm 0.5$  in from a baseline.
- Weight Measurement - Any change in weight of  $\pm 26$  percent as compared to a baseline.

NEI 16-03 recommends that basic testing be done every 10 years; however, at CCNP, Unit 1, this testing is done every four years. CCNP, Unit 1, also performs areal density testing which is considered to be full testing according to NEI 16-03. The acceptance criteria for that testing is:

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

This testing is done to quantify the changes occurring in the material. "For material with known degradation or degradation mechanisms effecting the efficacy of the neutron absorbing material (e.g., boraflex, carborundum, tetrabor and other phenolic resin-based materials)," NEI 16-03 recommends testing every 5 years. CCNP, Unit 1, does this testing every 4 years. If the test does not meet the acceptance criteria, the LTCS provides those additional coupons be removed, and that areal density testing be performed on the expanded set regardless of whether that testing was already scheduled. If the acceptance criteria for the expanded set are not met, an investigation will be conducted evaluating the neutron absorbing capabilities that specifically impact criticality control. The current corrective actions do not consider the fact that CCNP, Unit 1, performs areal density testing every 4 years.

The proposed LAR revises the LTCS program by revising the weight change acceptance criteria, revising the visual examination corrective action criteria to exclude packet related degradation, and clarifying the areal density testing frequency and associative corrective actions.

### 3.2 Weight Change Acceptance Criteria

#### 3.2.1 Weight Change Acceptance Criteria Change Description

The current acceptance criterion for weight change is limited to any change in weight  $\pm 26$  percent for one coupon compared to the baseline. However, the criticality analysis is based on the fact that the thickness of the carborundum is 0.09, which was built from two 0.045 in thick carborundum sheets. Each coupon packet contains four coupons and two coupons together from the same packet location represent the thickness of the carborundum in the rack. The new acceptance criterion proposed in this amendment would revise the weight change acceptance criteria to less than 38 percent change in weight compared to the baseline for two coupons in a packet sample location (combined weight of upper and lower coupon by location). This criterion was developed based on the as-built areal density and rounded down conservatively in this LAR.

### 3.2.2 Weight Change Acceptance Criteria Change NRC Staff Evaluation

The NRC staff has reviewed the portions of the application that pertain to the weight change acceptance criteria. The NRC staff has found this change acceptable because changing the weight change acceptance criteria will not affect the ability of the pool to maintain subcriticality. Changing the acceptance criteria will not impact the areal density testing and the areal density criteria used in the criticality analysis. This limit will not be adjusted by changing the acceptance criteria for weight change. Areal density testing is the main way in which the loss of  $^{10}\text{B}$  can be detected. As the areal density testing would not be impacted, this change would not impact the ability to detect degradation in the material. Also, changes to the basis of the measurement to being based on the two coupons align this criterion to be on the same basis as the areal density requirement used in the criticality analysis. The weight change criterion is also appropriately conservative. The weight change caused by erosion induced by flow caused by an inspection hole in the packet cover will not be adjusted. This will result in the weight change being overestimated as the racks do not have these same holes at the height of the fuel active region. Therefore, the staff finds the proposed change acceptable as it does not affect the ability of the spent fuel pool to maintain subcriticality.

### 3.3 Visual Examination Corrective Action Criteria

#### 3.3.1 Visual Examination Corrective Action Criteria Change Description

Currently the visual inspection criterion looks for any evidence of gross changes or degradation. If any such evidence is discovered, the surveillance program is to be expanded and additional coupons are to be pulled for additional examination. However, specific packet related characteristics such as inspection holes and the packet edge are allowing for flow related erosion of the carborundum coupons. This erosion is causing failure of the visual examination and causing the licensee to pull additional coupons for examination when the cause of the degradation is already known. Coupons are not returned to the tree after testing so pulling additional coupons for testing decreases the population of coupons in the spent fuel pool. The proposed change revises the visual examination criteria to exclude flow related erosion at the coupon edges and inspection hole.

#### 3.3.2 Visual Examination Corrective Action Criteria Change NRC Staff Evaluation

The NRC staff has reviewed the portions of the application related to the visual examination corrective action criteria. The staff finds the proposed change acceptable because it will not affect the ability of the licensee to detect degradation in the carborundum material and will not affect the ability of the pool to maintain subcriticality. The degradation in the carborundum coupons is caused by certain characteristics such as the inspection holes and the packet edges which are unique to the coupon packet. These characteristics are not present in the racks themselves so it is unlikely that the carborundum in the racks will be experiencing the same flow related erosion. Steps have also been taken to mitigate this by installing bracket covers over the inspection holes. Also, changing the visual examination acceptance criteria will not affect the ability of the licensee to detect degradation in the carborundum material as it does not affect areal density testing requirements and frequency and will not impact weight and dimensional testing which are other ways of detecting degradation of the carborundum material. Because the factors that cause this corrosion are unique to the coupon packets and changing the visual examination will not impact the ability of the licensee to detect degradation of the carborundum, the proposed change will not impact the pool's ability to maintain subcriticality. Therefore, the NRC staff finds the proposed change acceptable.

### 3.4 Areal Density Testing Frequency and Corrective Actions

#### 3.4.1 Areal Density Testing Frequency and Corrective Actions Change Description

Currently at CCNP, Unit 1, areal density testing is performed every four years. Also, as part of the licensee's response to Generic Letter (GL) 2016-01, which was accepted by the NRC in "Closeout of GL 2016-01, Monitoring of Neutron-Absorbing Materials in Spent Fuel Pools," (ML16097A169) areal density testing is required to be performed on all coupons removed during the performance of coupon testing. As part of the current corrective action program, areal density testing is required when a coupon does not meet the acceptance criteria for dimensional weight and visual examination. This corrective action does not consider the fact that areal density testing is already being performed on the removed coupon as part of the four-year coupon testing program. The proposed change to the corrective action would remove the areal density testing requirement as a corrective action if a coupon does not meet the established criteria for dimensional, visual, and weight examinations.

#### 3.4.2 Areal Density Testing Frequency and Corrective Action Change NRC Staff Evaluation

The NRC staff has reviewed the portions of the application regarding the areal density testing frequency and corrective actions. The NRC staff finds the proposed changes acceptable because conducting areal density testing every four years meets the guidelines for the full testing for carborundum outlined in NEI 16-03-A, and the proposed changes to the corrective action program do not impact the ability of the licensee to detect degradation in the carborundum material. As part of the coupon testing program at CCNP, Unit 1, areal density testing will be conducted every four years and this approach is acceptable because NEI 16-03-A, which is an NRC-endorsed topical report, recommends testing every 5 years for carborundum. Also, removing the areal density testing as a corrective action if a coupon does not meet the established acceptance criteria for dimensional, weight, and visual examination is acceptable as it will not affect the ability of the licensee to detect degradation. The coupon removed will already undergo areal density so that areal density test will be able to determine if <sup>10</sup>B has been lost. There is no need to remove a second coupon when the first coupon will undergo the areal density testing. However, if the removed coupon does not meet the established areal density acceptance criteria, the surveillance program will have to be expanded and additional coupons will have to be removed for visual, weight, dimensional, and areal density testing as part of the corrective action program as outlined in section 2.4 of the LAR which describes the corrective action program after the proposed changes. Also, removing the requirement for duplicate areal density testing will help preserve the population of coupons which will better allow the licensee to detect changes to the carborundum in the future. Therefore, the NRC staff finds the proposed changes acceptable.

### 4.0 TECHNICAL SUMMARY

The NRC staff has reviewed the information in the licensee's submittal and has determined that the LTCS program as described in the LAR will provide reasonable assurance that the licensee will be able to detect degradation of the neutron absorbing material before its ability to perform its safety function is impacted. On this basis, the staff concludes that the proposed changes to the LTCS program satisfy the requirements of 10 CFR 50.68 and GDCs 61 and 62, and are, therefore, acceptable.

## 5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the State of Maryland official was notified of the proposed issuance of the amendments on November 1, 2023. The official did not provide any comments.

## 6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding published in the *Federal Register* on June 13, 2023 (88 FR 38550). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

## 7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: R. Boruk, NRR

Date: January 2, 2024

SUBJECT: CALVERT CLIFFS, UNIT 1 - ISSUANCE OF AMENDMENT NO. 349 RE: TO MODIFY THE LONG-TERM COUPON SURVEILLANCE PROGRAM (EPID L-2023-LLA-0023) DATED JANUARY 2, 2024

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\*by memorandum

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