



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

November 17, 2022

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

SUBJECT: BYRON STATION, UNIT NO. 2 – AUDIT PLAN IN SUPPORT OF REVIEW OF
LICENSE AMENDMENT REQUEST REGARDING REINSERTION OF A HIGH
BURNUP ACCIDENT TOLERANT FUEL LEAD TEST ASSEMBLY
(EPID L-2022-LLA-0131)

Dear Mr. Rhoades:

By letter dated August 31, 2022, Constellation Energy Generation, LLC (Constellation) submitted a license amendment request (LAR) for Byron Station, Unit No. 2 (Byron). In its LAR, Constellation proposes to revise language in Technical Specifications 2.1.1, "Reactor Core SLs [Safety Limits]," and 4.2.1, "Fuel Assemblies," to allow a previously irradiated accident tolerant fuel (ATF) lead test assembly (LTA) to be further irradiated during Byron Station, Unit 2, Cycle 25.

During the acceptance review of the LAR, the U.S. Nuclear Regulatory Commission (NRC) staff identified several items that require further clarification and additional detail. The NRC staff will conduct a regulatory audit to support its review of the LAR in accordance with the enclosed audit plan. A regulatory audit is a planned activity that includes the examination and evaluation of primarily non-docketed information. The audit will be conducted to increase the NRC staff's understanding of the LAR and identify information that will require docketing to support the NRC staff's regulatory finding.

The audit will be conducted December 12-16, 2022, using audio/video conferencing and a portal to allow the NRC staff to review non-docketed information and details regarding the analysis to demonstrate safe operation of the ATF LTA during further operation. The logistics and scope of this audit were discussed with your staff on November 15, 2022. The audit plan is enclosed.

D. Rhoades

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If you have any questions, please contact me by telephone at 301-415-6606 or by e-mail to Joel.Wiebe@nrc.gov.

Sincerely,

/RA/

Joel S. Wiebe, Senior Project Manager
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. STN 50-455

Enclosure:
Audit Plan

cc: Listserv

AUDIT PLAN

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING LICENSE AMENDMENT REQUEST REGARDING THE REINSERTION OF AN

ACCIDENT TOLERANT FUEL LEAD TEST ASSEMBLY

BYRON STATION, UNIT NO. 2

DOCKET NO. STN 50-455

EPID L-2022-LLA-0131

1.0 BACKGROUND

By letter dated August 31, 2022 (Agencywide Documents and Management System ML22243A094), Constellation Energy Generation, LLC (Constellation) submitted a license amendment request (LAR) for Byron Station, Unit No. 2 (Byron). In its LAR, Constellation proposes to revise language in Technical Specifications (TSs) 2.1.1, "Reactor Core SLs [Safety Limits]," and 4.2.1, "Fuel Assemblies," to allow a previously irradiated accident tolerant fuel (ATF) lead test assembly (LTA) to be further irradiated during Byron Station, Unit No. 2, Cycle 25.

During the acceptance review of the LAR, the U.S. Nuclear Regulatory Commission (NRC) staff identified several items that require further clarification and additional detail. The NRC staff will conduct a regulatory audit December 12-16, 2022, to support its review of the LAR in accordance with the enclosed audit plan. A regulatory audit is a planned activity that includes the examination and evaluation of primarily non-docketed information. The audit will be conducted to increase the NRC staff's understanding of the LAR and identify information that will require docketing to support the NRC staff's regulatory finding.

2.0 REGULATORY AUDIT BASES

The NRC staff will perform the audit to support its evaluation of whether the licensee's request can be approved per Title 10 of the *Code of Federal Regulations* (10 CFR), section 50.92, "Issuance of Amendment, which states, in part, that, "In determining whether to issue an amendment to a license, ..., the Commission will be guided by the considerations which govern issuance of initial licenses...." Applicable regulations considered in that review include 10 CFR, section 50.34, "Contents of Applications; Technical Information," and applicable general design criteria (GDC) from appendix A to 10 CFR part 50.

Consistent with section 50.90 of 10 CFR, an application for an amendment to a license (including the TSs) must fully describe the changes requested, and following as far as applicable, the form prescribed for original applications. Section 50.34 of 10 CFR addresses the content of technical information required. This section stipulates that the submittal address the

design and operating characteristics, unusual or novel design features, and principal safety considerations.

Regulation 10 CFR 50.46(b)(4) requires emergency core cooling systems to maintain a coolable core geometry during a postulated loss-of-cooling accident (LOCA).

3.0 REGULATORY AUDIT SCOPE AND METHODOLOGY

Attachment 1 of Constellation's August 31, 2022, letter states the licensee's conclusion that the fuel rods in the high-burnup LTA will not rupture during a LOCA. The licensee further states that "The LTA will have significant reductions of power and peaking factors relative to the core lead such that the LTA does not pose any additional FFRD [fuel fragmentation, relocation, and disposal] risk."

As noted in the NRC staff's letter concerning the "Clarification of Regulatory Path for Lead Test Assemblies," dated June 24, 2019 (ML18323A169), the evaluation of LTAs may necessitate the use of modified or different codes and methods than those currently approved. The letter further emphasizes the expectation that uncertainties in inputs and models conservatively use available data to the extent practical.

4.0 INFORMATION AND OTHER MATERIAL NECESSARY FOR THE AUDIT

1. The licensee should provide an overview of all of the analyses used to demonstrate that the high burnup LTA will operate safely in the Byron, Unit No. 2, reactor during Cycle 25. The licensee should make these analyses available to the NRC staff via portal.
2. The licensee should specifically point out where engineering judgment was used to conclude the ATF LTA and rods will operate safely, during Cycle 25. Identify the basis for the engineering judgement conclusion. The analyses that use engineering judgment should be made available to the NRC staff via portal.
3. The licensee should make available the results of all applicable Post-irradiation Examinations that are applicable to the ATF LTA rods.
4. To determine whether the requirement in 10 CFR 50.46(b)(4) to maintain a coolable core geometry is satisfied, the licensee should make available to the NRC staff via portal the information relevant to the potential for the high-burnup LTA to experience fuel rod rupture during a LOCA, including:
 - a. Clarification of the existing LOCA analysis methods described in revision 18 of the UFSAR (apparently ASTRUM for large-break and NOTRUMP for small-break) for demonstrating non-rupture of high-burnup fuel, and the applicability of these methods to such analysis for high-burnup fuel.
 - b. Clarification of the fuel thermal-mechanical analysis methods used to provide input to the LOCA evaluation models and their applicability for calculating phenomena necessary to assure no dispersal of high-burnup fuel.
 - c. Clarification of the peaking factors assumed for fuel rods in the high-burnup LTA, the method for their determination, their relationship to operating limits in technical specifications and the core operating limits report, and the amount of margin they provide to cladding rupture after accounting for relevant uncertainties.
5. The licensee should clarify how the evaluations account for recent test data, analysis, and other information that relates to the potential for high-burnup fuel rods to rupture during a LOCA.

5.0 AUDIT TEAM

The audit team will consist of the following NRC staff from NRR:

- Joel Wiebe, Plant Licensing Branch III
- John Lehning, Nuclear Methods and Fuel Analysis Branch (SFNB)
- Hanry Wagage, Containment and Plant Systems Branch (SCPB)
- Nan Chien, SCPB
- Santosh Bhatt, Nuclear Systems Performance Branch (SNSB)
- Sean Meighan, Radiation Protection and Consequence Branch (ARCB)
- Robert Elliott, Technical Specifications Branch (STSB)

6.0 LOGISTICS

The audit will be conducted December 12-16, 2022, using audio/video conferencing via TEAMS. The NRC staff requests the licensee to have the information discussed in Section 4.0 readily available for the audit via portal. The NRC staff requests the licensee to have its staff available at a mutually agreeable time to present and discuss the information identified in section 4.0. The NRC staff will not take possession of any of the information made available by the licensee for discussion. If information is needed to be placed on the docket in order for the NRC staff to make a decision regarding the August 31, 2022, submittal, the information will be requested via a subsequent request for additional information.

7.0 DELIVERABLES

After the audit, the NRC staff will develop any requests for information which it will provide the licensee via separate docketed correspondence. The NRC staff intends to issue an audit summary within approximately 30 days of completion of the audit.

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|--------|--------------------|------------------|-----------------|
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| NAME | JWiebe | SRohrer | BWittick |
| DATE | 10/31/2022 | 11/1/2022 | 11/15/2022 |
| OFFICE | NRR/DSS/SNSB/BC(A) | NRR/DSS/STSB/BC | NRR/DEX/SFNB/BC |
| NAME | DWoodyatt | VCusumano | SKrepel |
| DATE | 11/15/2022 | 11/16/2022 | 11/15/2022 |
| OFFICE | NRR/DORL/LPL3/BC | NRR/DORL/LPL3/PM | |
| NAME | NSalgado | JWiebe | |
| DATE | 11/17/2022 | 11/17/2022 | |

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