

U. S. NUCLEAR REGULATORY COMMISSION
FINAL SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
GLOBAL NUCLEAR FUELS - AMERICAS TOPICAL REPORT
“PROPOSED ADMINISTRATIVE AMENDMENT 52 TO NEDE-24011-P-A-31,
‘GENERAL ELECTRIC STANDARD APPLICATION FOR REACTOR FUEL (GESTAR II)’”
EPID L-2023-TOP-0059
DOCKET NO. 99901376

1.0 INTRODUCTION AND BACKGROUND

By letter dated December 15, 2023 (Ref. 1), Global Nuclear Fuel – Americas, LLC (GNF or GNF-A) submitted Topical Report (TR) “Proposed Administrative Amendment 52 to NEDE-24011-P-A-27, ‘General Electric Standard Application for Reactor Fuel (GESTAR II)’” (Ref. 2) to the U.S. Nuclear Regulatory Commission (NRC) staff for review and approval. The proposed amendments are included as proprietary Enclosure 1 titled “Proposed Administrative Amendment 52 to GESTAR II Main and US Supplement with Bases Summary” (Ref. 3) and non-proprietary Enclosure 2 titled “Proposed Administrative Amendment 52 to GESTAR II Main and US Supplement with Bases Summary” (Ref. 2) to Reference 1.

In Amendment 52, GNF requests to amend GESTAR II to incorporate the use of additive fuel pellets (Ref. 4) and to include the use of Ziron cladding material (Ref. 5), which were previously approved by the NRC. Additionally, the proposed changes remove the old and outdated GESTR-M methodology that has been superseded by the PRIME methodology (Ref. 6).

GESTAR II is a TR that contains the GNF methodology approach for analyzing boiling water reactor (BWR) fuel performance. It is a compilation of approved methodologies that provides a description of how all of those methodologies are used together to maintain a full licensing basis description for licensees using GNF fuel. GESTAR II allows a licensee to reference one document rather than each individual TR that contains only a portion of the analyses required to be performed. As one or more changes are made to individual aspects of fuel licensing methodologies, changes to GESTAR II will need to be made to update the overall licensing approach.

2.0 REGULATORY EVALUATION

The NRC staff has reviewed the proposed changes to the GNF’s process to ensure that GESTAR II remains appropriate and acceptable when compared to the acceptance criteria stated in NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition” (SRP). NUREG-0800 is used by the NRC staff as guidance for acceptability of applications made to the NRC. The staff’s review of GESTAR II Amendment 52 confirmed that the proposed changes do not create any new or unreviewed acceptance criteria.

3.0 TECHNICAL EVALUATION

In Amendment 52, GNF requests to amend GESTAR II to incorporate the use of additive fuel pellets and Ziron cladding material (Refs. 4 and 5, respectively), which were previously approved by the NRC staff. The proposed changes also remove the old and outdated GESTR-M methodology that has been superseded by the NRC-approved PRIME methodology (Ref. 6).

The proposed changes to GESTAR II are described in the following sections of Enclosures 1 and 2 to Reference 1 (Refs. 3 and 2, respectively) that cover additive fuel pellets, Ziron cladding material, and removal of the outdated GESTR-M with PRIME:

- Bases Document
- Sections 2.2, 2.2.2.5.2, 2.4, and Table 2-1 of GESTAR II Main provide the process and methodology elements to implement use of additive fuel pellets.
- Sections 2.2, 2.4, and Table 2-1 of GESTAR II Main provide the process and methodology elements to implement use of Ziron material.
- Table 1-1: Updated to identify which of the domestic US BWRs have been decommissioned. (editorial)
- Section 1.5: Updated Reference 1-6 to reflect the correct date of January 23 as opposed to January 25. (editorial)
- Section 2.2: Deleted text describing the peak pellet exposure and moved it to a new Table 2-1. (editorial)
- Section 2.2, 2.2.1.1.3, 2.2.1.2.3, 2.2.1.6.3, 2.2.2.5.3, and 2.2.2.7.3: Removed the use of GESTR-M as this methodology has been superseded by PRIME.
- Table 2-1: Added this new table to provide a consolidated location for the limiting values which can be used for GNF fuel product lines.
- Section 2.4: Updated Reference 2-19 to reflect Revision 2 of the PRIME TR, the current NRC accepted revision. Deleted References 2-14, 2-20, and 2-21, which are not used.
- Updated Reference S-31 to reflect Revision 2 of the PRIME TR, the current NRC-approved revision.

The NRC staff reviewed the changes described above and confirmed that the proposed changes to GESTAR II are a result of changes that have been previously reviewed and approved by the NRC staff in References 4, 5, and 6. In addition, the NRC staff found the description of the proposed changes to be correct and consistent with GNF's NRC-approved methodology for use of additive fuel pellets, Ziron cladding material, and fuel rod fuel thermal mechanical performance evaluations.

In addition, a statement from the Reference 5 TR regarding the use of Ziron cladding material was placed in a note to Table 2-1. Specifically, this note clarifies that the use of Ziron cladding material requires an exemption from Section 50.46 to Title 10 of the *Code of Federal Regulations* (10 CFR) and 10 CFR Part 50 Appendix K for applications outside the scope of the lead test assembly provisions described in GESTAR II Appendix B. Based on its review, the NRC staff finds that the note included in Table 2-1 regarding the use of Ziron cladding material is consistent with Reference 5, which was previously reviewed and approved by the NRC staff, and therefore, incorporation of the note into GESTAR II is acceptable.

The NRC staff notes that GNF also proposed other minor changes to GESTAR II which were editorial in nature, and therefore, acceptable. For the reasons discussed above, the NRC staff finds the proposed changes to GESTAR II as part of Amendment 52 to be acceptable.

4.0 LIMITATIONS AND CONDITIONS

There are no new limitations and conditions (L&Cs) for Amendment 52 to GESTAR II.

However, L&Cs 3 and 4 (below) from the NRC SE for Reference 4 were placed directly into GESTAR II Section 2.2.2.5.2 as single, multi-part criterion:

3. The time for AOO events with fuel near the [[criterion shall be limited to less than or equal to [[]]

4. Steady-state power operation shall be limited to less [[]] of liquid unless further testing at long time periods typical for steady-state operation or analysis are provided.

Based on the NRC staff's review of GESTAR II Section 2.2.2.5.2, the NRC staff found the inclusion of the above L&C 3 and 4 directly into GESTAR II acceptable.

5.0 CONCLUSION

The NRC staff has reviewed and evaluated the GNF request for Amendment 52 to GESTAR II for accuracy, completeness, and alignment with the SRP NUREG-0800. Based on its review, the NRC staff finds that the proposed changes to GESTAR II as part of Amendment 52 to be acceptable.

6.0 REFERENCES

1. GNF-A Letter, M230160 from Brian Moore (GNF-A) to US NRC, "Proposed Administrative Amendment 52 to NEDE-24011-P-A-31, General Electric Standard Application for Reactor Fuel (GESTAR II)," dated December 15, 2023 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML23352A008 (Non-proprietary/Publicly available)).
2. Enclosure 2 to M230160, "Proposed Administrative Amendment 52 to GESTAR II Main and US Supplement with Bases Summary," NEDE-24011-P-A, Revision 31, dated November 2020 (ADAMS Accession No. ML23352A010 (Non-proprietary/Publicly available)).

3. Enclosure 1 to M230160, "Proposed Administrative Amendment 52 to GESTAR II Main and US Supplement with Bases Summary," NEDE-24011-P-A, Revision 31, dated November 2020 (ADAMS Accession No. ML23352A009 (Proprietary/Non-publicly available)).
4. GNF-A, NEDC-33406P-A, Revision 3, "Additive Fuel Pellets for GNF Fuel Designs," December 2015 (ADAMS Accession No. ML15352A120 (Proprietary/Non-publicly available)).
5. GNF-A, NEDC-33353P-A, Revision 1, "Application of GNF - Ziron to GNF Fuel Designs," dated April 2019 (ADAMS Accession No. ML19100A263 (Proprietary/Non-publicly available)).
6. GNF-A, NEDC-33258P-A, Revision 2, "The PRIME Model for Analysis of Fuel Rod Thermal - Mechanical Performance, Part 1 - Technical Bases, NEDC-33256P-A, Revision 2, October 2021, Part 2 - Qualification, NEDC-33257P-A, Revision 2, October 2021, Part 3 – Application Methodology, NEDC-33528P-A, Revision 2, October 2021," dated October 2021 (ADAMS Accession No. ML21279A282 (Proprietary/Non-publicly available)).

Principal Contributor: Jeremy L. Dean, NRR/DSS/SNFB

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The table below is a record of GNF-A suggested revisions on the draft SE submitted via letter dated May 31, 2024 (ADAMS Package Accession No. ML24152A015) and the NRC staff's response to them.

Location	GNF Suggested Revision	NRC Resolution
Section 4.0 Limitations and Conditions	Page 3: Limitation and Condition 3: GNF suggests deleting the "{3}", which is part of the GNF marking of proprietary information but is not typically included when GNF proprietary information is marked in the NRC draft Safety Evaluation.	That is a direct quote of what is included into GESTAR. It has no meaning to SE other than a quotation. Revision is acceptable. Edit made.
Section 6.0 References	<p>Pages 3 and 4: Reference 1:</p> <ul style="list-style-type: none"> • Correct the GESTAR revision number in the letter title. GNF suggests the following change: "...NEDE-24011-P-A-2731..." • Correct the date of the letter from March 18, 2019, to December 15, 2023. <p>Reference 2:</p> <ul style="list-style-type: none"> • Add the title of Enclosure 2 after "Enclosure 2 to M230160," so it is consistent with how Reference 3 cites Enclosure 1 of M230160. GNF suggests adding "Proposed Administrative Amendment 52 to GESTAR II Main and US Supplement with Bases Summary" before "NEDE-24011-P-A". <p>Reference 4:</p> <ul style="list-style-type: none"> • Delete "Enclosure 1,". The reference is not an enclosure but rather a stand-alone licensing topical report. • Reference 4 contains the text: "(Proprietary/Non-publicly available)"; however, References 5 and 6, which are also proprietary versions of stand-alone licensing topical reports, do not. GNF suggests either adding the text to References 5 and 6 or deleting it from Reference 4. 	Revisions are acceptable. Edits made.