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Subject: Proposed Administrative Amendment 50 to NEDE-24011-P-A-27, General Electric Standard Application for Reactor Fuel (GESTAR II)

The enclosed changes to the US Supplement to GESTAR II are being proposed to remove an outdated reference to the compilation of improvements to the SAFER/GESTR-LOCA evaluation model. GNF tracks improvements to the SAFER/GESTR-LOCA evaluation model consistent with the reporting requirements of 10 CFR 50.46. The proposed revisions to the US Supplement and a basis discussion are included in Enclosure 1.

Sections S.2.2.3.2.1, S.2.2.3.2.2, and S.6 in the US Supplement to GESTAR II are affected by this amendment. All changes are shown in revision mode to ease the review.

If you have any questions about the information provided here, please contact me at (910) 819-6684 or Lisa Schichlein at (910) 819-4815.

Sincerely,

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Project No. 712
Docket No. 99901376

Enclosure:

1. Proposed Amendment 50 to GESTAR II US Supplement – Non-Proprietary Information

cc: J Golla, USNRC
MP Catts, GEH/Wilmington
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PLM Specification 005N2310 R0

ENCLOSURE 1

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Proposed Amendment 50 to GESTAR II US Supplement

Non-Proprietary Information

GESTAR II Bases Document

The following is a description of the basis for the change. Overall, the primary purpose of the revision is to remove an outdated document reference, S-33.

S–33 *Compilation of Improvements to GENE's SAFER ECCS–LOCA Evaluation Model,* NEDC–32950P, January 2000 as reviewed by letter from S. A. Richards (NRC) to J. F. Klapproth (GE), *General Electric Nuclear Energy (GENE) Topical Reports NEDC-32950P and NEDC–32084P Acceptability Review*, May 24, 2000.

NEDC-32950P is a summary of changes to the SAFER/GESTR-LOCA evaluation model and a repository of 10 CFR 50.46 Notification Letters up to that point in time that NEDC-32950P was issued. However, this document is not current and does not include more recent changes made to the SAFER/GESTR-LOCA evaluation model.

Ongoing changes to the SAFER/GESTR-LOCA evaluation model are tracked via the reporting of evaluation model changes to the NRC in accordance with the reporting requirements of 10 CFR 50.46(a)(3)(ii) and 10 CFR 50.46(a)(3)(iii).

Proposed revisions to the US Supplement to GESTAR II are shown on the following pages.

The first methodology, which was designated SAFE/REFLOOD has now been replaced by the SAFER/GESTR or SAFER/PRIME methodology in all U.S. plants utilizing GEH LOCA evaluation methodology. The content pertaining to SAFE/REFLOOD has been deleted and the sections renumbered such that the SAFER/GESTR or SAFER/PRIME methodology comes first. The SAFER/GESTR methodology, identified in Sections S.2.2.3.2.1 and S.2.2.3.2.2, utilizes improved ECCS evaluation models (References S–27 and S–28) along with a more realistic application approach (Reference S–29) to calculate a licensing PCT with margin substantiated by statistical considerations. Nominal values are used for most inputs, and Appendix K required inputs are utilized only for the limiting break in order to establish a licensing margin to 10CFR50.46 limits. This methodology was revised in Reference S–30 to extend the application to non–jet pump plants.

The SAFER/GESTR methodology has been updated to include the fuel and gap properties from the PRIME fuel performance methodology which was approved by the NRC (Reference S-31). This methodology is being designated as SAFER/PRIME. All other aspects of the SAFER/GESTR methodology which was reviewed and approved by the NRC remain unchanged.

In addition to the SAFER/PRIME methodology, a best-estimate plus uncertainties method is also available for ECCS performance evaluation. This methodology (Reference S-32), designated as TRACG-LOCA, is briefly described in Section S.2.2.3.2.4.

Either SAFER/PRIME or TRACG-LOCA methodology can be used for ECCS performance evaluation calculations for postulated LOCAs. The method used will be indicated in the FSAR for initial cores or the supplemental reload licensing report for each cycle (see Appendix A of country–specific supplement).

S.2.2.3.2.1 SAFER/GESTR LOCA Model Code Descriptions

The thermal–hydraulic model (SAFER) and fuel rod thermal–mechanical model (GESTR–LOCA) have been developed to provide more realistic calculations for LOCA analyses. The SAFER and GESTR–LOCA models are summarized below and discussed in detail in References S–27, S–28, S–30, ~~S–33 (as reviewed by the NRC in the letter specified in Reference S–33)~~ and S–34. The SAFER/GESTR methodology has been updated to include the fuel and gap properties from the PRIME fuel performance methodology which was approved by the NRC (Reference S-31). This methodology is designated as SAFER/PRIME. All other aspects of the SAFER/GESTR methodology which was reviewed and approved by the NRC remain unchanged.

SAFER/GESTR–LOCA and SAFER/PRIME are also applicable to prepressurized fuel. Non–prepressurized fuel calculations result in conservative limits with respect to prepressurized fuel. The MAPLHGR values calculated by the codes are applicable to both nonbarrier and barrier fuel.

S.2.2.3.2.1.1 Realistic Thermal–Hydraulics Model (SAFER)

The SAFER code employs a heatup model with a simplified radiation heat transfer correlation to calculate PCT and local maximum oxidation. The PCT and local maximum oxidation fraction from SAFER can be used directly.

S.2.2.3.2.1.2 Best Estimate Fuel Rod Thermal Mechanical Model

The GESTR–LOCA model has been developed to provide best–estimate predictions of the thermal performance of GE nuclear fuel rods experiencing variable power histories. For ECCS analyses, the GESTR–LOCA model is used to initialize the fuel stored energy and fuel rod fission gas inventory at the onset of a postulated LOCA. Details of the GESTR–LOCA models are provided in Reference S–27.

The fuel and gap properties have been updated based on the PRIME fuel performance methodology which was approved by the NRC (Reference S-31). This methodology is designated as SAFER/PRIME. All other aspects of the SAFER/GESTR methodology which was reviewed and approved by the NRC remain unchanged.

S.2.2.3.2.1.3 Transient Boiling Transition Model (TASC)

The TASC model is used to evaluate the short–term thermal–hydraulic response of the coolant in the core during a postulated loss–of–coolant accident. In particular, the convective heat transfer response in the thermally limiting fuel bundle is analyzed during the transient. For a detailed description of the model and a discussion regarding sources of input to the model, refer to Reference S–35.

S.2.2.3.2.2 SAFER/GESTR–LOCA Model Application Methodology

Using the SAFER/GESTR–LOCA or SAFER/PRIME models, the LOCA events are analyzed with nominal values of inputs and correlations. A calculation is performed in conformance to Appendix K and checked for consistency with generic statistical upper bound analyses that encompass modeling uncertainties in SAFER/GESTR–LOCA or SAFER/PRIME and uncertainties related to plant parameters.

The effects of power spiking due to in–reactor densification are considered negligible for SAFER/GESTR–LOCA or SAFER/PRIME analyses.

The details of the application methodology are summarized below and discussed in detail in References S–29~~, S–33~~ and S–34.

S.2.2.3.2.2.1 Appendix K Conformance

The SAFER/GESTR–LOCA or SAFER/PRIME Appendix K conformance calculation will be performed only for the limiting break of a nominally calculated break spectrum with a range of break flow multipliers between 0.6 and 1.0. The licensing PCT is obtained as described in Reference S–29.

S.6 References

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