

A Joint Venture of GE, Toshiba, & Hitachi

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#### Subject: Proposed Amendment 45 to NEDE-24011-P-A-24, General Electric Standard Application for Reactor Fuel (GESTAR II) to Clarify the Application of GESTAR II to Plants that Have Specific Approval to Operate at Greater Than 120% OLTP in the MELLLA+ Domain

The enclosed changes to Section S.5.2.13 of the US Supplement to GESTAR II are being proposed to clarify the application of GESTAR II to plants that have specific approval to operate at greater than 120% Original Licensed Thermal Power (OLTP) in the Maximum Extended Load Line Limit Analysis Plus (MELLLA+) domain. The revision to US Supplement Section S.5.2.13 involves editorial changes to make clear the possibility that specific plants may be approved to operate with a licensed thermal power greater than 120% OLTP. The reference to the topical report, *Generic Guidelines and Evaluations for General Electric Boiling Water Reactor Thermal Power Optimization*, NEDC-32938P-A, Revision 2, May 2003 has also been added to Section S.6.

The NRC is now estimating that the Peach Bottom Thermal Power Optimization (TPO) License Amendment Request (LAR) review will be completed in early November 2017 versus the initially expected date of April 2018. Thus, GNF is requesting that the proposed changes be reviewed and approved by August 18 to support the expedited TPO LAR implementation at Peach Bottom. Only pages with changes are enclosed.

If you have any questions about the information provided here, please contact me at (910) 819-6684 or Jim Harrison at (910) 620-1826.

Sincerely,

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Brian R. Moore, Ph.D General Manager, Core & Fuel Engineering Global Nuclear Fuel – Americas, LLC

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## **Enclosure:**

- 1. Proposed Amendment 45 to GESTAR II US Supplement Sections S.5.2.13 and S.6 Non-Proprietary Information Class I (Public)
- cc: J Golla, USNRC
  PL Campbell, GEH/Washington
  JG Head, GEH/Wilmington
  JF Harrison, GEH/Wilmington
  PLM Specifications NEDE-24011 Revision 24.1

## ENCLOSURE 1

# M170089

# Proposed Amendment 45 to GESTAR II US Supplement Sections S.5.2.13 and S.6

Non-Proprietary Information – Class I (Public)

#### S.5.2.9 Safety/Relief Valves Out of Service.

This option provides support to operate the plant with one or more safety and/or relief valves declared out of service and is normally included with the SRV setpoint tolerance increase (References S–64 and S–65). The analysis shall include the vessel overpressure, fuel thermal limits, fuel performance during ECCS–LOCA events, high pressure systems performance (HPCS, RCIC, SLCS) and responses to Anticipated Transients Without Scram.

### S.5.2.10 ADS Valve Out of Service.

This option provides justification for continuous operation with the automatic depressurization function of one automatic depressurization valve declared out of service. This contingency analysis shall allow flexibility when complying with the technical specification for continuous operation at full power with one ADS valve declared out of service.

### S.5.2.11 End-of-Cycle Recirculation Pump Trip Out of Service.

In the event that the end-of-cycle recirculation pump trip becomes inoperable and is therefore not capable of performing its intended function (a recirculation pump trip during specific AOOs), operation can continue at full power when this option is included. Specific AOOs that are terminated by scram due to turbine control valve or turbine stop valve closure will be analyzed without credit to having the recirculation pumps trip system operable.

#### S.5.2.12 Main Steam Isolation Valves Out of Service.

This option provides justification for continuous operation with a main steam isolation valve out of service when there is not compliance with the requirements of the technical specifications for the main steam isolation valves closure characteristics. The analyses include: fuel thermal limits analysis, vessel overpressure, fuel performance during events of ECCS–LOCA, and analysis of operational aspects, such as margin or adjustment to main steam high flow.

#### S.5.2.13 Maximum Extended Load Line Limit Analysis Plus

This option is based on the expanded operating range described in Reference S-66 as the Maximum Extended Load Line Limit Analysis Plus (MELLLA+). MELLLA+ extends the licensed operating ranges identified as Extended Load Line Limit Analysis (ELLLA), Maximum Extended Load Line Limit Analysis (MELLLA), and Maximum Extended Operating Domain (MEOD), which includes MELLLA with increased core flow (ICF). The MELLLA/MEOD operating range boundary is characterized by the statepoint of 100% OLTP at 75% of rated core flow. Uprated BWRs have restricted their operation consistent with the MELLLA boundary, which reduces the core flow range available for operation at uprated power. For plants that are uprated to 120% OLTP, the MELLLA boundary restricts the minimum core flow to 99% of rated core flow at full power operation. Figure S-5 provides a general illustration of the history of power-flow domain changes.

The MELLLA+ operating range expansion is applied as an incremental change to previously approved licensed power uprates. This option supports operation up to 120% OLTP with core flow as low as 80% of rated. For plants that have the MELLLA+ operating domain as part of their licensing basis, the limitations, conditions, and requirements of Reference S-66 are included in the analysis and licensing basis for the reload. Specific plants may be licensed for operation at greater than 120% OLTP based on the provisions of Reference S-67, *Generic Guidelines and Evaluations for General Electric Boiling Water Reactor Thermal Power Optimization.* The limitations, conditions, and requirements of Reference S-66 will continue to be applicable unless specifically modified by the NRC Safety Evaluation for the Thermal Power Optimization uprate at the specific plant.

#### S.5.3 Fuel Loading Error Analysis Requirements

Since 1978, the fuel loading error (FLE) has been analyzed as an AOO and, as such, the change in CPR for the event has been factored into the determination of the MCPR operating limit for each cycle. Section 6.3 of the GESTAR Rev 0 SER May 12, 1978 (Appendix C, Pg. US.C-4) describes the basis for this treatment of the FLE, which includes fuel-loading experience in that time period. In 1981, utilities began improving the procedures used for core verification following refueling. As shown in Reference S-14, the fuel loading error rate for the recent 25-year period and the trend for the most recent 10 years of refueling outages support the classification of the FLE event as an "Infrequent Incident." Section S.2.1 provides the basis for categorizing the FLE as an Infrequent Incident and the analysis limits.

The FLE will be analyzed as an Infrequent Incident provided that the plant confirms the requirements for application of the generic analysis. Should the plant be unable to confirm the requirements, the FLE will be evaluated to meet the fuel cladding integrity safety limit MCPR. Several items must be confirmed and documented through the reload design documentation. The first confirmation involves the core verification procedures applied following refueling, and the second involves the basis for the dose analyses and plant off-gas system bases used to perform the generic radiological analysis. The requirements apply for plants with either 10CFR100 or 10CFR50.67 radiological licensing bases.

#### **Core Verification**

The application of the Reference S-14 basis for the FLE requires that plant's core verification procedures must be consistent with those generally used during the recent historical period forming the basis for the Amendment 28 analysis of the event frequency. Therefore, the plant must confirm that their core verification procedures have the following characteristics:

- 1. During fuel movement, each move (location, orientation, and seating) is observed and checked at the time of completion by the operator and a spotter.
- 2. After completion of the core load, the core is verified by video recording the core using an underwater camera. The recording may involve two or more records made at different ranges to: provide clear resolution of the bundle serial number, illustrate the orientation in four bundle clusters, and illustrate the proper seating of the bundles. The core verification may take place during the recording process, by viewing after recording, or a combination.

- S–58 Reactor Stability Long–Term Solution: Enhanced Option I–A, Flow Mapping Methodology, NEDO–32339–A Supplement 3, Revision 1, April 1998.
- S–59 Reactor Stability Long–Term Solution: Enhanced Option I–A, Generic Technical Specifications, NEDO–32339–A Supplement 4, Revision 1, April 1998.
- S-60 *Applicability of GE Methods to Expanded Operating Domains*, Licensing Topical Report, NEDC-33173P-A, Revision 4, Class III, November 2012.
- S-61 Applicability of GE Methods to Expanded Operating Domains Supplement for GNF2 Fuel, NEDC-33173 Supplement 3P-A, Revision 1, July 2011.
- S-62 Applicability of GE Methods to Expanded Operating Domains Power Distribution Validation for Cofrentes Cycle 13, NEDC-33173, Supplement 2, Part 1P-A, Revision 1, Applicability of GE Methods to Expanded Operating Domains – Pin-by-Pin Gamma Scan at FitzPatrick October 2006, NEDC-33173, Supplement 2, Part 2P-A, Revision 1, Applicability of GE Methods to Expanded Operating Domains – Power Distribution Validation for Cofrentes Cycle 15, NEDC-33173, Supplement 2, Part 3P-A, Revision 1, April 2012.
- S-63 *Implementation of PRIME Models and Data in Downstream Methods*, NEDO-33173 Supplement 4-A, Revision 1, November 2012.
- S-64 BWROG In-Service Pressure Relief Technical Specification Revision Licensing Topical Report, NEDC-31753P, February 1990.
- S-65 Letter from Ashok Thadani (USNRC) to Cynthia Tully (BWROG), Acceptance for Referencing of Licensing Topical Report NEDC-31753P 'BWROG In-Service Pressure Relief Technical Specification Revision Licensing Topical Report' (TAC No. M79265), March 8, 1993.
- S-66 *General Electric Boiling Water Reactor, Maximum Extended Load Line Limit Analysis Plus*, NEDC-33006P-A, Revision 3, June 2009.
- S-67 Generic Guidelines and Evaluations for General Electric Boiling Water Reactor Thermal Power Optimization, NEDC-32938P-A, Revision 2, May 2003.