July 12, 2016

Mr. Jerald G. Head
Senior Vice President, Regulatory Affairs
GE-Hitachi Nuclear Energy
P.O. Box 780 M/C A-18
Wilmington, NC 28401

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING REVIEW OF AMENDMENT 42 TO GESTAR II SUPPORTING THE TRANSITION FROM THE 3D-MONICORE CORE MONITORING SYSTEM TO ACUMEN (TAC NO. MF7438)

Dear Mr. Head:

By letter dated March 2, 2016, Global Nuclear Fuel – Americas, LLC (GNF) submitted for U.S. Nuclear Regulatory Commission (NRC) staff review Amendment 42 to GESTAR II Supporting the Transition from the 3D-MONICORE Core Monitoring System to ACUMEN. (Agencywide Documents Access and Management System Accession No. ML16063A403).

Upon review of the information provided, the NRC staff has determined that additional information is needed to complete the review. Enclosed with this letter is a Request for Additional Information (RAI). On July 8, 2016, James Harrison, GEH Vice President, Fuels Licensing, Regulatory Affairs, and I agreed that the NRC staff will receive your response to the enclosed RAI questions within 15 days of receipt of this letter.

If you have any questions regarding the enclosed RAI questions, please contact me at (301) 415-1002.

Sincerely,

/RA/

Joseph A. Golla, Project Manager
Licensing Processes Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 712

Enclosure:
As stated

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ADAMS Accession No.: ML16190A354; *concurred via e-mail **NRR-106**

OFFICE	NRR/DPR/PLPB	NRR/DPR/PLPB*	NRR/DSS/SNPB	NRR/DPR/PLPB	NRR/DPR/PLPB
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DATE	07/11/2016	07/11/2016	07/12/2016	07/12/2016	07/12/2016

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OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ADDITIONAL INFORMATION

GLOBAL NUCLEAR FUEL

AMENDMENT 42 TO GESTAR II SUPPORTING TRANSITION

FROM THE 3D-MONICORE MONITORING SYSTEM TO ACUMEN (TAC NO. MF7438)

By letter dated March 2, 2016, Global Nuclear Fuel-Americas (GNF-A) proposed Amendment 42 to GESTAR II supporting transition from the 3D-MONICORE Core Monitoring System (CMS) to ACUMEN. GNF-A proposes to update its core monitoring system for compatibility with Windows-based computer platforms and operating systems, and to streamline the cyber security aspects of core monitoring and implements improved user interface to be consistent with the modern functionalities and expectations. To achieve these capabilities, GNF-A is proposing to change the name of the CMS from 3D-MONICORE to ACUMEN.

GNF-A indicates that the change in name to ACUMEN is a commercial decision and not a methodology change. The inputs, internal algorithms and models, and key outputs of GNF-A's new core monitoring system ACUMEN are the same as 3D-MONICORE. For both 3D-MONICORE and for ACUMEN, the same PANACEA nuclear core simulator methodology is used. Also, the submittal indicates that the change does not affect the power uncertainty basis approved by the U.S. Nuclear Regulatory Commission (NRC) and the design methodologies.

The Nuclear Performance and Code Review (SNPB) staff has reviewed the request and determined that responses to the following requests for additional information (RAIs) will be required to finalize the safety evaluation for Amendment 42.

A list of RAI is provided below:

SNPB RAI 1

Enclosure 1 of letter MFN 16-011 (Amendment 42 to GESTAR II) indicates that there will be improvements in cyber security, consistency with modern functionalities and expectations. Please provide justifications for the following claims and specifications associated with this amendment:

(a) GNF-A indicates that it is "*in the process of updating its core monitoring system for compatibility with Windows-based computer platforms and operating systems, and to streamline the cybersecurity aspects of core monitoring.*" Please provide justification to your statement that there will be improvements in cybersecurity aspects of the software when the computing platform is switched from a Virtual Memory System (VMS)-based core simulator to a Windows-based platform.

(b) With the change in computing platform from a VMS-based system to a Windows-based system for the core monitoring function, is/are the licensee(s) capable of continuing to

comply with Appendix B to Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR), "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," specifically with respect to Section XVII, "*Quality Assurance Records."*

(c) Explain what is meant by "*consistency with modern functionalities and expectations"* with the transformation from a VMS-based platform to Windows-based platform for GE's core monitoring system.

SNPB RAI 2

Describe the impact of the change of computing platforms for the 3D-MONICORE (3DM) core monitoring system on the following operating parameters that are monitored and their related uncertainties:

(a) Safety limit minimum critical power ratio (SLMCPR)
(b) Linear heat generation rates (LHGR), and
(c) Maximum planar LHGR (MAPLHGR)

SNPB RAI 3

Enclosure 1 of letter MFN 16-011 shows the comparison of ACUMEN and 3D-MONICORE outputs when the same input data is fed to both the systems. The ACUMEN monitoring system was installed at the Global Nuclear Fuel facility in Wilmington, NC. The test data file was created from one set of plant process data taken at rated power and was the basis for all data entered into ACUMEN and 3DM. Parameters in the test data file were manually changed to simulate different plant power and flow conditions allowing calculated thermal margin comparison between the respective core monitoring systems in a typical power maneuver situation.

Enclosure 1 of letter MFN-16-011 has summarized a comparison of two thermal margin calculations from the core monitoring system, mainly, fraction of limiting critical power ratio (CPRRAT) - related to fuel bundle power) and fraction of limiting power density (FLPD) – related to fuel pin local power. The NRC staff recognizes the fact that the minimum and maximum CPRRAT and FLPD differences from Table 1 are acceptable. However, the staff would like to examine the accuracy of other core operating parameters, either automatic or on demand, such as, control rod positions, plant heat balance results, core average axial relative power, core average radial power distribution, and any other significant operational parameters that are monitored by the core monitoring system.

SNPB RAI 4

Enclosure 2 to letter MFN 16-011 provides texts that will be inserted in GESTAR II Amendment 42 for Sections 3.2.2.2 and S.5.2. Review of S.5.2 in the GESTAR II US supplement for the Amendment 42 and the text for S.5.2 in GESTAR II Amendment 37 (currently under review) (NEDE-24011-P-Draft-US), shows that the references listed in Amendment 42 text have different numbers from reference numbers in the text for Amendment 37 for the same section. Please explain how this discrepancy in the numbering of the references will be resolved.