April 29, 2009

Andrew A. Lingenfelter
Vice President, Fuel Engineering
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Global Nuclear Fuel-Americas, LLC
P.O. Box 780, M/C J-70
Wilmington, NC 28401

SUBJECT: SUPPLEMENT TO REQUEST FOR ADDITIONAL INFORMATION RE: LICENSING TOPICAL REPORTS NEDC-33256P, NEDC-33257P, AND NEDC-33258P, "THE PRIME MODEL FOR ANALYSIS OF FUEL ROD THERMAL-MECHANICAL PERFORMANCE" (TAC NO. MD4114)

Dear Mr. Lingenfelter:

By letter dated January 19, 2007 (Agencywide Documents Access and Management System Package Accession No. ML070250414), Global Nuclear Fuel - Americas, LLC (GNF) submitted for U.S. Nuclear Regulatory Commission (NRC) staff review Licensing Topical Reports NEDC-33256P, NEDC-33257P, and NEDC-33258P, "The PRIME Model for Analysis of Fuel Rod Thermal-Mechanical Performance." By letter dated February 27, 2009, GNF submitted responses to the NRC staff's previous requests for additional information (RAIs). Upon review of the information provided, the NRC staff has determined that additional information is needed to complete the review. On April 8, 2009, James Harrison, Vice President - Fuel Licensing, and I agreed that the NRC staff will receive your response to the enclosed supplemental RAI questions by May 1, 2009. If you have any questions regarding the enclosed RAI questions, please contact me at 301-415-2365 or by electronic message to Stephen. Philpott@nrc.gov.

Sincerely,

/RA/

Stephen S. Philpott, Project Manager
Special Projects Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 712

Enclosures:
1. Non-proprietary Supplemental RAI questions
2. Proprietary Supplemental RAI questions

cc w/ Enclosure 1 only: See next page

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SUPPLEMENTAL REQUEST FOR ADDITIONAL INFORMATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

LICENSING TOPICAL REPORTS NEDC-33256P, NEDC-33257P, AND NEDC33258P,

"THE PRIME MODEL FOR ANALYSIS OF FUEL ROD

THERMAL-MECHANICAL PERFORMANCE"

GLOBAL NUCLEAR FUELS - AMERICAS, LLC (GNF)

PROJECT NO. 712

RAI 39, Supplement 3:

(A) Small Break Loss of Coolant Accident Results

Please provide sensitivity analysis results for small break (SB) loss-of-coolant-accident (LOCA) peak cladding temperature (PCT) and oxidation similar to the results provided for the large break (LB) LOCA analyses. It is preferable to perform these analyses for a boiling water reactor (BWR) plant design that is SB limited.

(B) LB LOCA Results

The response provides the sensitivity of the TRACG04 predicted second peak PCT. However, the second peak PCT is not necessarily the limiting PCT for all plant designs. Please provide separate results for the first peak PCT.

(C) Axial Power Shapes

For extended power uprate license applications, an analysis is performed for both mid-peaked and top-peaked power shapes at various points in the allowable operating domain. Similarly, plants may be either top-peaked or bottom-peaked limited in terms of PCT. Please clarify what power shapes were considered in the subject analyses. Please address both power shapes in the response.

(D) Core Coolability

The original response did not provide specific disposition of the coolability requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.46. Please address core coolability in the response.

ENCLOSURE 1

(E) Gap Gas Composition

Please clarify the source of the gap gas composition information used in the sensitivity analyses. Please confirm that the TRACG04/PRIME03 calculations were performed with gas gap compositions generated using the PRIME methodology. Likewise, please confirm that the TRACG04/GSTRM calculations were performed with gas gap compositions generated using the GSTRM methodology.

(F) Transient Fission Gas

[

].

42. Page 23 of RAI-32 states that GNF will implement the modified creep relation in the PRIME code, and the modified critical pressure correlation. Please provide details of the modified creep relation and the modified critical pressure correlation. Both of these correlations should use thick wall formulas.

43. In response to RAI-9, most of the growth data provided above [ ] are from water rods and channels, and these data appear to be under predicted. Please provide additional data above [ ] and propose an application limit of the growth model based on the available data.

44. Please provide fuel rod void volume data that can be used to justify the PRIME credit for stacking/chamfer volume.

45. Pacific Northwest National Laboratory (PNNL) contractors have noted that PRIME under predicts fuel centerline temperature at high rod powers and over predicts fuel conductivity between [ ]. Please provide an example calculation that shows how uncertainties will be applied to bound this non-conservatism for power-to-melt analyses assuming a [ ] over-power for UO2.

46. RAI-39, Supplement 1, requested a demonstration of the impact on LOCA PCT due to a 50 percent lower rod pressure than the LOCA input from PRIME. This was not provided in previous RAI responses. Please provide the impact of 50 percent lower and 50 percent higher rod internal pressure than PRIME calculates on LOCA PCT and cladding oxidation.