October 28, 2008

Mr. Robert E. Brown
Senior Vice President, Regulatory Affairs
GE Hitachi Nuclear Energy
3901 Castle Hayne Road MC A-50
Wilmington, NC 28401

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 267 RELATED TO DESIGN CONTROL DOCUMENT (DCD) REVISION 5

Dear Mr. Brown:

By letter dated August 24, 2005, GE Hitachi Nuclear Energy (GEH) submitted an application for final design approval and standard design certification of the economic simplified boiling water reactor (ESBWR) standard plant design pursuant to 10 CFR Part 52. The Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed design.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the enclosure to this letter.

Pursuant to 10 CFR 2.390, we have determined that the enclosed RAIs contain proprietary information. We have prepared a non-proprietary version of the RAIs (Enclosure 1) that does not contain proprietary information. The proprietary information is indicated in brackets and underlined in Enclosure 2. We will delay placing this document in the public document room for a period of ten (10) working days from the date of this letter to provide you with the opportunity to comment on the proprietary aspects only. If you believe that any additional information in the enclosure is proprietary, please identify such information line by line and define the basis pursuant to the criteria of 10 CFR 2.390 before the public release date.

If you have any questions or comments concerning this matter, you may contact me at 301-415-6715 or Bruce.Bavol@nrc.gov or you may contact Amy Cubbage at 301-415-2875 or Amy.Cubbage@nrc.gov.

Sincerely,

/RA/

Bruce M. Bavol, Project Manager
ESBWR/ABWR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010

Enclosure:
1. Request for Additional Information (Non-Proprietary)
2. Request for Additional Information (Proprietary)

cc: See next page (w/o enclosure 2)

If you have any questions or comments concerning this matter, you may contact me at 301-415-6715 or Bruce.Bavol@nrc.gov or you may contact Amy Cubbage at 301-415-2875 or Amy.Cubbage@nrc.gov.

Sincerely,

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Enclosure: 1. Request for Additional Information (Non-Proprietary)
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Requests for Additional Information (RAIs)
ESBWR Design Control Document (DCD) Revision 5

RAI Number	Reviewer	Question Summary	Full Text
7.2-71	Yarsky P	Update NEDE-33197P and/or NEDC-33239P with Conditions 1 through 21	Prior to issuing the –A versions of NEDE-33197P or NEDC-33239P please include the following conditions as applicable. 1. The calculated peak pellet exposure cannot exceed the validation range of the T-M methodology qualification database. The peaking factor uncertainties used in the MLHGR limit must be representative of the full range of fuel exposure. 2. TGBLA06 is not approved to analyze fuel lattices with gadolinia burnable poison loadings in excess of 8 w/o gadolinia because the gadolinia bias has not been quantified and reviewed by the staff. 3. Licensing evaluations performed using either PANAC11 or TRACG04 for ESBWR operating state points other than the nominal operating state point (SP0) require that the bypass flow fraction look-up tables be evaluated for acceptability and, if found unacceptable, must be regenerated by TRACG and input in the core-simulator in order to accurately determine the bypass flow. 4. Bypass voiding under conditions of steady state operation within the allowable operating domain must be analyzed and shown to not exceed 5 percent at any LPRM location. 5. The bundle R-factor must be calculated using representative lattice pin power distributions and axial void and power profiles.

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			6. The SCRAM reactivity calculated using the PANAC11 neutronic solver must be calculated with Doppler reactivity feedback modeling activated to accurately determine the reactivity effect of the blades without including the Doppler reactivity in the SCRAM reactivity. 7. The TGBLA06 borated libraries shall be generated with lattice boron inventories between 600 ppm and 1000 ppm natural boron equivalent. 8. The R-factor uncertainty used in determining the OLMCPR must be consistent with the LHGR uncertainty determined consistent with condition 0 or a conservative value. 9. The bundle power distribution uncertainty used in determining the OLMCPR must be calculated according to a power allocation uncertainty prescribed in the most recently reviewed and approved version or supplement of NEDC-33173P-A, or a conservative value. 10. The regional mode stability analysis must be performed using a radial nodalization in TRACG04 based on the PANAC11 generated first harmonic mode. The harmonic calculation performed by PANAC11 must use a full-core representation. 11. Use of PANAC11 generated nuclear data for ESBWR reload transient analyses (AOO, stability, or ATWS) requires that TRACG utilize the void reactivity coefficient correction model described in response to RAI 21.6-111. The fuel lattices input to the model must be representative of the cycle specific fuel loading.

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			12. As required on a cycle specific basis, the methodology used to generate the response to RAI 7.2-20 S01-B, must be used to quantify any GT specific spacer geometry biases. These biases must be input and utilized in the CMS. 13. Nuclear design methodology uncertainties applied in the MLHGR are expected to be fuel product dependent. Infinite lattice peaking factor uncertainties applied in the MLHGR must be: (1) consistent with the 95th percentile upper tolerance limit approach as reported in the response to RAI 4.3-2 S02-A, for the specific GE14E fuel design when GE14E is loaded, (2) generated using the statistical approach approved in the most recently approved revision of or supplement to NEDC-33173 and based on the specific fuel product, or (3) conservative relative to (1) and (2). Changes to the infinite lattice peaking factor uncertainty that conform to the above requirements would not be considered by the NRC staff to constitute a departure from a method of evaluation in the safety analysis (i.e., may be used for licensing calculations without prior NRC review and approval). Any such change shall be transmitted by GNF to the NRC prior to being utilized in support of any licensee's safety analysis. 14. Failure of a GT heater requires that the GT string be declared as inoperable. 15. The limitations on TGBLA06 and PANAC11 code usage as described in the user manuals are a condition of the acceptance of these methodologies for the ESBWR. Changes to the manuals that are made in accordance with the quality assurance procedures audited by the staff as documented in the applicable reference do not require NRC review and approval. Any such

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			change shall be transmitted by GNF to the NRC prior to being utilized in support of any licensee's safety analysis. For conditions 16 through 21: 10 CFR 52.98 outlines the regulatory change processes that may apply to address the potential for future code updates. Requirements for prior NRC review and approval of future code updates are consistent with the definition of a methodology change in 10 CFR 50.59(a)(1) and the criteria of 10 CFR 50.59(c)(2)(viii) to ensure that the methodology is not adversely impacted for reload licensing or core monitoring purposes. 16. Modifications to the models described in NEDC-33239P or MFN 098-96 are considered by the NRC staff to constitute a departure from a method of evaluation in the safety analysis and may not be used for licensing calculations without prior NRC review and approval. 17. Modifications to the adaption technique in the PANAC11 based GT-CMS described in NEDE-33197P are considered by the NRC staff to constitute a departure from a method of evaluation in the safety analysis and may not be used for licensing calculations without prior NRC review and approval. 18. Modifications to the TGBLA06/PANAC11 codes or the GT-CMS software that result in inconsistency with the NEDC-33239P-A and NEDE-33197P-A LTRs are considered by the NRC staff to constitute a departure from a method of evaluation in the safety analysis and may not be used for licensing calculations without prior NRC review and approval of the necessary revision(s) to the LTR(s).

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			19. Updates to the PANAC11 nuclear methods to ensure compatibility with other NRC-approved methods (e.g. TGBLA06) would not be considered by the NRC staff to constitute a departure from a method of evaluation in the safety analysis (i.e., may be used for licensing calculations without prior NRC review and approval) as long as the predicted ESBWR equilibrium cycle MLHGR or the downstream DCPR/ICPR for the potentially limiting transients (calculated by TRACG04) show less than a one standard deviation difference. 20. Increases in the spatial or energy resolution in the TGBLA06 lattice physics method would not be considered by the NRC staff to constitute a departure from a method of evaluation in the safety analysis (i.e. may be used for licensing calculations without prior NRC review and approval) so long as the uncertainties in the lattice parameters do not increase as a result. Any such change shall be transmitted by GNF to the NRC prior to being utilized in support of any licensee's safety analysis. 21. Changes in the numerical methods to improve code convergence would not be considered by the NRC staff to constitute a departure from a method of evaluation in the safety analysis (i.e. may be used in licensing calculations without prior NRC review and approval).
7.2-72	Yarsky P	Describe treatment of axial region of interest in the core monitoring software	The staff notes that PANACEA tracks the precise bundle geometry and lattice geometry prior to performing the hybridization and nodal diffusion calculations, and therefore, retains sufficient information in the code to correct for the hybridization effect on the nodal GT J-factors. The use of the GT CMS for dominant and plenum lattices that are hybridized must include a correction to the GT instrument

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			response calculation to account for the specific axial geometry to ensure that biases are not introduced in the adaption and calibration process as a result of nodal hybridization. PANAC11 retains the lattice specific J-factors prior to hybridization, the GT sensor location, and the stack size of the lattices within the hybrid node. Therefore, refinement of the J-factor methodology is possible within PANAC11. The J-factors may be generated using a preprocessing step around the smaller region of interest about the GT sensor itself. [[_____ _____ _____]] In either case the accuracy of the GT prediction may be easily maintained within hybridized nodes by implementing a preprocessing step utilizing the information already within the PANAC11 representation of the core in the GT CMS. Therefore, the staff requires that such a refinement be used within the GT CMS. Please describe how this refinement will be implemented in 3D MONICORE. Prior to issuing the –A version of NEDE-33197P please include a section that includes this description.

cc:

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