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Proprietary Notice
This letter forwards proprietary information in accordance with 10CFR2.390. Upon the removal of Enclosure 1, the balance of this letter may be considered non-proprietary.

MFN 07-321, Supplement 2

Docket No. 52-010

July 11, 2008

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 105 Related to ESBWR Design Certification Application – RAI Number 7.2-20 Supplement 1, Part B**

Enclosure 1 contains GEH's response to the subject NRC RAI transmitted via the Reference 1 letter. The original RAI response was submitted to the NRC via the Reference 2 letter.

Enclosure 1 contains GEH proprietary information. GEH customarily maintains this information in confidence and withholds it from public disclosure. A non-proprietary version is provided in Enclosure 2.

The affidavit contained in Enclosure 3 identifies that the information contained in Enclosure 1 has been handled and classified as proprietary to GEH. GEH hereby requests that the information of Enclosure 1 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17.

Note that the response to 7.2-20 Supplement 1, Part G is not included in this response. RAI 7.2-20 Supplement 1, Part G will be submitted by August 22, 2008.

D068
NRO

If you have any questions or require additional information, please contact me.

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

References:

1. MFN 07-460, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 105 Related To ESBWR Design Certification Application*, August 16, 2007
2. MFN 07-321, Letter from James Kinsey to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 78 Related to ESBWR Design Certification Application – Gamma Thermometers - RAI Numbers 7.2-19, 7.2-20, 7.2-51*, June 20, 2007

Enclosures:

1. MFN 07-321 Supplement 2 - Enclosure 1 - Response to Portion of NRC Request for Additional Information Letter No. 105 Related to ESBWR Design Certification Application – RAI Number 7.2-20 Supplement 1, Part B - GEH Proprietary Information

2. MFN 07-321 Supplement 2 - Enclosure 2 - Response to Portion of NRC Request for Additional Information Letter No. 105 Related to ESBWR Design Certification Application – RAI Number 7.2-20 Supplement 1, Part B Non-Proprietary Version

3. MFN 07-321 - Affidavit

cc:	AE Cubbage	USNRC (with enclosures)
	RE Brown	GEH/Wilmington (with enclosures)
	GB Stramback	GEH/San Jose (with enclosures)
	eDRF	0000-0087-9072

MFN 07-321
Supplement 2

Enclosure 2

Response to Portion of NRC Request for Additional Information Letter No. 105 Related to ESBWR Design Certification Application – RAI Number 7.2-20 Supplement 1, Part B

Non-Proprietary Version

For historical purposes, the text of the GEH response to RAI 7.2-20 is included below.

NRC RAI 7.2-20

[[ ]] uncertainties are provided in Table 9-14 and 9-15 of NEDE-33197P. Provide more discussion on how these uncertainties are determined. Specifically:

A. *Explain why [[ ]] is applied in NEDC-33237P instead of [[ ]] shown in Table 9-14.*

B. Explain the uncertainties for GT sensor arrangements in terms of the *uncertainty in [[ ]]*

C. *How are GT uncertainties the same as traversing incore probe (TIP) uncertainties for integral power, regardless of arrangement (Table 9-14)? The TIP power allocation uncertainty from NEDC-32601P-A is based on TIP adaption and gamma scan data, how is it the same for the GT arrangements; particularly address the difference between LPRM-only adaption versus LPRM with TIP adaption (Table 9-14)?*

D. *Explain the [[ ]] quoted in Table 9-15 for both integral power and four bundle allocation. Specifically explain how GT sensor signals were compared to gamma scan data in the axial spans between GT sensor locations. Explain the procedure for calculating the axial power distribution and four bundle power allocation based on the GT sensors, or alternatively, describe how the gamma scan results were compared to the GT sensor indications.*

E. *What is the GT to neutron TIP Bundle Uncertainty? Provide greater discussion as to how this value was determined.*

F. *Explain the rationale behind the GT sensor failed uncertainty.*

G. *Do these uncertainties change assuming LPRM adaption versus GT adaption?*

H. *How are the uncertainties in Table 9-13 related to the [[ ]]?*

GE Response

A. The uncertainties in Table 9-14 are based on limited data obtained from the comparison of GT to n-TIP data at the Tokai 2 reactor. [[ ]] is based on thousands of comparisons between measurements and predictions and represents the true expected uncertainty in the ability of 3D-Monicore to predict the power distribution.

B. The uncertainty in [[ ]] represent the ability of 3D Monicore to predict [[ ]] These uncertainties are based on thousands of comparisons between measurements and predictions and are not expected to change by using GTs instead of TIPs. The ability to extrapolate from the GT detector to individual bundle power is addressed in the response to RAI 7.2-9 (MFN 07-162, dated 5/11/07).

C. Table 9-14 summarizes the bundle uncertainties as determined from limited testing at Tokai-2. The GT bundle uncertainty was calculated relative to TIP indication. Therefore, in totaling the GT uncertainty, both the TIP integral and the GT-to-TIP uncertainty are stacked together. [[ ]] is the existing TIP integral uncertainty component of the overall GT uncertainty. The TIP power allocation uncertainty from NEDC-32601P-A is the 3D Monicore modeling uncertainty based on thousands of measurements and is not expected to change by using GTs instead of TIPs.

A 7-GT AFIP design will be used in place of TIPs to calibrate LPRMs and perform steady-state power distribution monitoring.

D. The [[ ]] quoted in Table 9-15 is from gamma scan results documented in Table 7-18 of the LTR. The GT sensor signals themselves were not compared to gamma scan data. Rather, the GT signals were used to adapt the BWR core simulator solution, which in turn calculated the isotopics for comparison to the gamma scan data. Information on the adaption techniques used with gamma thermometers is discussed in the response to RAI 7.2-51 (included in this response letter Enclosure).

E. This uncertainty is obtained from Tables 7-3 and 7-4 in NEDE-33197P as the maximum average of the standard deviations for the 9 GT sensors and for rated power cases.

F. The failed GT sensor uncertainty of]] was an estimate. The rationale was as follows: The uncertainty associated with the failure of one TIP detector resulting in the loss of up to 1/3 of the core TIP data is [[ ]] (reference NEDC–32694P). The failure of one GT detector string would result in losing much less than 1/3 of the core data, by at least an order of magnitude.

Therefore, it was estimated that the effect of a failed GT string would be an order of magnitude less than that of a failed TIP. For practical reasons, the allowable number of GT failures will be such that the GT failure uncertainty will be equal to or less than the [[ ]] currently used for the TIP failure uncertainty.

G. No. Since GT signals are always available, LPRM adaption will no longer be necessary during normal steady state power distribution monitoring. LPRM adaption will be used only during transients since GTs do not respond quickly to power distribution changes. [[ ]] In the case of a core power distribution calculation utilizing solely GT adaption, the total bundle power uncertainty is expected to be unchanged.

H. The expected and observed differences in Table 9-13 are not related to the [[ ]]. These values are based solely on the difference between the two methods. The Table was used to develop expected results for validation of the tests and not intended to be an indication of [[ ]].

Affected Documents

No DCD changes will be made in response to this RAI.

The following changes will be made in the next revision of the LTR NEDE-33197P: remove the sentence regarding safety analyses below Table 9-14. This LTR will be submitted to the NRC by September 28, 2007.

NRC RAI 7.2-20 S01

Proprietary information is in brackets.

A. The explanation provided in this response is not acceptable to the staff. The origin of the [[ ]] is NEDC-32964P-A. The measurements that the response refers to relied on using TIPs. TIPs are not included in the ESBWR design. Therefore, while a greater number of measurements were included in the determination of the NEDC-32964P-A uncertainty these measurements are not indicative of the monitoring to be performed for the ESBWR. Furthermore, the NEDC-32964P-A. A topical report requires that the applicability of the numbers be demonstrated, specifically item (3) requires that the 3D MONICORE bundle power calculational uncertainty should be verified when applied to fuel and core designs not included in the benchmark comparisons. It is worth noting that in developing the uncertainty [[

]] therefore the staff does not agree with the statement that these benchmark comparisons are necessarily indicative of the ESBWR 3D MONICORE. Please provide additional descriptive details, in light of more recent qualification against high power density plants and specific testing relevant to the ESBWR instrumentation design and core monitoring methodology.

B. The response states that [[ ]] is addressed in the response to RAI 7.2-9. The staff does not agree with the applicant because the response to RAI 7.2-9 addresses the [[ ]] only. Furthermore, the staff disagrees with the applicant's statement that the uncertainty is unexpected to change. The staff disagrees because a TIP trace provides direct measurement of the [[ ]] at every nodal level, while the GT arrangement cannot. The staff finds it counterintuitive to conclude that fewer measurements can result In the same uncertainty. Qualitatively address the unique aspects regarding the ESBWR specific core monitoring approach that would compensate for a reduced number of measurements. Comment specifically on the ramification of having an anomaly in one axial node that perturbs the power distribution locally and the efficacy of the GT arrangement to identify such an anomaly.

C. This response is acceptable.

D. The results in Table 7·18 refer to the GT core monitor study. It appears to the staff that a [[ ]] technique would have to be employed to perform core wide [[ ]]. Verify that the gamma scan comparisons were carried out based on off-line predicted barium concentrations where the power shapes input into the offline methodology were those that were determined by adapting the [[

]]. If intermediate TIP adaption was performed, justify the direct applicability of the gamma scan RMS differences.

E. The staff requested clarification of the term [[ ]] in a supplemental request for information pursuant to RAI 7.2-58. The staff also asked for clarification regarding the value In Table 8-7 in terms of its relation to the data in Tables 7-3 and 7-4. The staff does not understand the applicability of these data considering that they are based on [[ ]] GTs per string, which is not the proposed design for the ESBWR.
Provide justification for the applicability of the [[ ]] data considering the difference in the ESBWR design. This justification should consider any additional uncertainty associated with having fewer sensors including a determination of an equivalent [[ ]] value ignoring all but [[seven]] of the GT Instruments In a way that Is realistic by providing an equivalent [[ ]] uncertainty where all but [[ ]] of the GT signals per string in the [[ ]] are not considered in the adaption and RMS difference analysis.

F. This response is acceptable.

G. The staff finds this response to be inconsistent with general adaption practices and the uncertainly analysis provided in NEDE-33197P. First, the response indicates that [[ ]], is this practice proposed for the ESBWR? Second, the use of [[ ]], therefore the uncertainty analysis should consider LPRM uncertainties associated with LPRM drift between calibrations. Please clarify this response.

H. This response is acceptable.

A. The explanation provided in this response is not acceptable to the staff. The origin of the [[ ]] is NEDC-32964P-A. The measurements that the response refers to relied on using TIPs. TIPs are not included in the ESBWR design. Therefore, while a greater number of measurements were included in the determination of the NEDC-32964P-A uncertainty these measurements are not indicative of the monitoring to be performed for the ESBWR. Furthermore, the NEDC-32964P-A. A topical report requires that the applicability of the numbers be demonstrated, specifically item (3) requires that the 3D MONICORE bundle power calculational uncertainty should be verified when applied to fuel and core designs not included in the benchmark comparisons. It is worth noting that in developing the uncertainty [[

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GEH Response

GEH response provided via MFN 07-321 Supplement 1, dated April 4, 2008.

B. The response states that [[ ]] is addressed in the response to RAI 7.2-9. The staff does not agree with the applicant because the response to RAI 7.2-9 addresses the [[ ]] only. Furthermore, the staff disagrees with the applicant's statement that the uncertainty is unexpected to change. The staff disagrees because a TIP trace provides direct measurement of the [[ ]] at every nodal level, while the GT arrangement cannot. The staff finds it counterintuitive to conclude that fewer measurements can result In the same uncertainty. Qualitatively address the unique aspects regarding the ESBWR specific core monitoring approach that would compensate for a reduced number of measurements. Comment specifically on the ramification of having an anomaly in one axial node that perturbs the power distribution locally and the efficacy of the GT arrangement to identify such an anomaly.

GEH Response

GNF-GEH concurs with the NRC on the uncertainty change for the GT-based monitoring system. More detailed studies for the Gamma Thermometer (GT) adaption have been completed since the issuance of this RAI. [[ ]] are presented in the response to RAI 4.2-12 S02 Parts 10 and 11 (submitted via MFN 08-293 dated April 3, 2008). [[ ]] is presented as a response to RAI 4.2-12 S02 Part 22 (submitted via MFN 08-293 S01, dated July 3, 2008). These responses will be incorporated in Revision 2 of NEDE-33197P.

The GT-based monitoring system uses [[

]]

The ramification of having an anomaly in one axial node that perturbs the power distribution locally can be described in terms of the information handled by the power monitoring system and for the actions that can be taken in-situ or previously to the core loading.

In case of unforeseen anomalies, [[

]]

Among potential perturbations that could occur in normal reactor operation and produce a signal bias, [[

]] This anomaly study was requested in the RAI 4.2-12 S02 Part 22. [[

]]

Consider that the ESBWR GT is located in the region between four fuel assemblies in the corner opposite from the control blade location. The spacer material [[

]]

[[

]]

[[

]]

D. The results in Table 7-18 refer to the GT core monitor study. It appears to the staff that a [[ ]] technique would have to be employed to perform core wide [[ ]]. Verify that the gamma scan comparisons were carried out based on off-line predicted barium concentrations where the power shapes input into the offline methodology were those that were determined by adapting the [[ ]]. If intermediate TIP adaption was performed, justify the direct applicability of the gamma scan RMS differences.

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GEH Response

The response to this item will be provided by August 22, 2008 in a separate transmittal.

DCD Impact

No DCD changes will be made in response to this RAI.

LTR Impact

The following text will be included in Revision 2 of NEDE-33197P, which is due to the NRC by September 1, 2008:

In case of unforeseen anomalies, [[

]]

Among potential perturbations that could occur in normal reactor operation and produce a signal bias, [[

]] This anomaly study was requested in the RAI 4.2-

12S02 Part 22. [[

]]

Consider that the ESBWR GT is located in the region between four fuel assemblies in the corner opposite from the control blade location. The spacer material [[

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[[

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[[

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MFN 07-321
Supplement 2

Enclosure 3

Affidavit

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, David H. Hinds, state as follows:

(1) I am General Manager, New Units Engineering, GE-Hitachi Nuclear Energy Americas LLC ("GEH"). I have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GEH's letter, MFN 07-321 Supplement 2, Richard E. Kingston to U.S. Nuclear Regulatory Commission, entitled "Response to Portion of NRC Request for Additional Information Letter No. 105 Related to ESBWR Design Certification Application – RAI Number 7.2-20 Supplement 1, Part B," dated July 11, 2008. GEH text proprietary information in Enclosure 1, which is entitled "Response to Portion of NRC Request for Additional Information Letter No. 105 Related to ESBWR Design Certification Application – RAI Number 7.2-20 Supplement 1, Part B", is identified by a dark red dotted underline inside double square brackets [[This sentence is an example.{3}]]. Figures and large equation objects containing GEH proprietary information are identified with double square brackets before and after the object. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) above is classified as proprietary because it because it identifies the detailed GEH ESBWR methods, techniques, information, procedures, and assumptions related to its gamma thermometer system.

The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 11th day of July 2008.

David H. Hinds
General Manager, New Units Engineering
GE-Hitachi Nuclear Energy Americas LLC