



HITACHI

GE Hitachi Nuclear Energy

Richard E. Kingston
Vice President, ESBWR Licensing

PO Box 780 M/C A-55
Wilmington, NC 28402-0780
USA

T 910 819 6192
F 910 362 6192
rick.kingston@ge.com

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 08-818

Docket No. 52-010

October 28, 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. 234 – Related to ESBWR Design Certification
Application – RAI Numbers 21.6-117, 21.6-121 and 21.6-122**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by the Reference 1 NRC letter. GEH response to RAI Numbers 21.6-117, 21.6-121 and 21.6-122 is addressed in Enclosures 1, 2 and 3.

Enclosure 1 contains GEH proprietary information as defined by 10 CFR 2.390. GEH customarily maintains this information in confidence and withholds it from public disclosure. Enclosure 2 is the non-proprietary version, which does not contain proprietary information and is suitable for public disclosure.

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 in Enclosure 1 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 10 CFR 9.17.

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

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

DOB
NRC

References:

1. MFN 08-629 Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 234 Related To ESBWR Design Certification Application*, dated August 5, 2008

Enclosures:

1. MFN 08-818 – Response to Portion of NRC Request for Additional Information Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-117, 21.6-121 and 21.6-122 – GEH Proprietary Information
2. MFN 08-818 – Response to Portion of NRC Request for Additional Information Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-117, 21.6-121 and 21.6-122 – Non-Proprietary Version
3. MFN 08-818 – Response to Portion of NRC Request for Additional Information Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-117, 21.6-121 and 21.6-122 – Affidavit

cc: AE Cabbage USNRC (with enclosures)
RE Brown GEH/Wilmington (with enclosures)
DH Hinds GEH/Wilmington (with enclosures)
eDRF 0000-0087-3467 (RAI 21.6-117)
eDRF 0000-0087-3466 (RAIs 21.6-121 and 21.6-122)

Enclosure 2

MFN 08-818

Response to Portion of NRC Request for

Additional Information Letter No. 234

Related to ESBWR Design Certification Application

RAI Numbers 21.6-117, 21.6-121 and 21.6-122

Non-Proprietary Version

NRC RAI 21.6-117

Why the larger bias based on the GIRAFFE critical flow data not used.

NEDE 33083P, Supp. 3, Chapter 5:

Critical flow bias is stated to be 0. In Chapter 5.1 (page 53), in the section of L1 Critical Flow, experimental data comparisons with GIRAFFE SIT data at the maximum break flow indicate a bias of [[]] and a standard deviation of [[]]; twenty minutes after test initiation, test results indicate a bias of [[]] and a standard deviation of [[]]. Experimental data comparisons with PSTF/Marviken indicate a bias of [[]] and a standard deviation of [[]]. The critical flow bias and uncertainty to be used with the TRACG code relative to AOO calculations is a bias of [[]] and a standard deviation of [[]]. Since the larger uncertainty based on the GIRAFFE data is used, why is the larger bias based on the GIRAFFE data not also used?

GEH Response

The larger bias based on the GIRAFFE data is not used because a [[]] bias is not supported by comparison with the full range of critical flow data. The Marviken test results show that the TRACG critical flow model has no strong bias for different values of the ratio of discharge pipe length to pipe diameter (L/D). A combined bias of [[]] has been derived from comparisons with the PSTF/Marviken data set in Section 5.1 of NEDE 33083P, Supp 3. Correction for the [[]] bias, based only on the GIRAFFE SIT data for one break size, would result in a [[]] of the TRACG calculated break flow by this amount, which could potentially be [[]] in terms of vessel inventory and level response. This would not be an appropriate application of a realistic method with quantified biases and uncertainties.

The use of the maximum uncertainty of [[]] based on the GIRAFFE SIT comparison will slightly over-estimate the uncertainty since the average uncertainty of [[]] was obtained when all comparisons with data were considered. The use of the maximum uncertainty of [[]], based on the GIRAFFE SIT comparisons, is sufficient to cover the combined effect of the [[]] uncertainty and the [[]] bias derived from the comparisons with the PSTF/Marviken data set.

DCD or LTR Impact

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

No changes to the subject LTR will be made in response to this RAI.

NRC RAI 21.6-121

Editorial comment.

NEDE 33083P, Supp. 3, Page 105:

Table 8-10, references Figure 8-19, "Axial Power Shape". However, Figure 8-19 is for downcomer water level response in LOFW event. Please make the appropriate correction.

GEH Response

NEDE-33083P, Supplement 3 will be modified to provide the correct references. The correct reference should be Figure 8-31, "EOC Axial Power Shape". A search of the document found that several other tables referenced the incorrect figure. The tables are: 8-12, 8-14, 8-16, 8-19, 8-21, and 8-25. A clarification will be made to Table 8-10 to reference the HBB axial power shape on Figure 8-31 as the "top peaked" case, and the UB axial power shape as the "bottom peaked" case.

DCD or LTR Impact

Changes to NEDE-33083P, Supplement 3 are shown in the attached markup.

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

NRC RAI 21.6-122

Editorial comment.

NEDE 33083P, Supp. 3, Page 112:

First sentence at the top has the statement, "As described in Section,". Please indicate which section you are referring.

GEH Response

The correct reference should be Section 6.2. NEDE-33083P, Supplement 3 will be modified to provide the correct reference.

DCD or LTR Impact

Changes to NEDE-33083P, Supplement 3 are shown in the attached markup.

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

MFN 08-818
Enclosure 2

Attachment

Revision Pages for NEDE-33083P, Supplement 3

Only the pressurization events and the LOFW-SCRRI will be considered for the allowable control rod pattern since they are the only events where scram (or SCRRI) effectiveness is critical to the severity of the event.

8.2.1.1 LRHBP Allowable Operating Range Results

A summary of the results of the sensitivity analysis for the LRHBP transient is provided in Table 8-10, the characterization of the sensitivities is shown in Table 8-11.

**Table 8-10
 LRHBP Allowable Operating Range Results**

[[
]]

[[

]]

8.2.1.2 MSIVF Allowable Operating Range Results

A summary of the results of the sensitivity analysis for the MSIVF transient is provided in Table 8-12. Based on the analysis results, all trends could be characterized. Where applicable, the application procedure will require analysis at the limiting initial condition.

**Table 8-12
 MSIVF Allowable Operating Range Results**

[[
]]

NOTE: The characterization of these results is described in Table 8-13.

**Table 8-13
 MSIVF Allowable Operating Range Characterizations**

[[
]]

8.2.1.3 LFWH-SCRRI Allowable Operating Range Results

A summary of the results of the sensitivity analysis for the LFWH-SCRRI transient is provided in Table 8-14. The characterization of these results is described in Table 8-15. Based on the analysis results, all trends could be characterized. Where applicable, the application procedure will require analysis at the limiting initial condition.

Note these results apply to Selected Control Rod Run In (SCRRI). However, the trend will be similar to that of SRI. DCD Rev. 4 provides results with SRI and SCRRI, considering failure of an SRI HCU to function.

Also this trend is expected to be applicable to IICI because of the similarity of the transient phenomenon.

**Table 8-14
 LFWH-SCRRI Allowable Operating Range Results**

[[
]]

[[

]]

Table 8-15
LFWH-SCRRI Allowable Operating Range Characterizations

[[
]]

8.2.1.4 LOFW Allowable Operating Range Results

A summary of the results of the sensitivity analysis for the LOFW transient is provided in Table 8-16. The characterization of these results is described in Table 8-17. Based on the analysis results, all trends could be characterized. The nominal initial condition may be assumed for all parameters.

Table 8-16
LOFW Allowable Operating Range Results

[[
]]

Table 8-19
LRHBP Initial Condition Uncertainty Results

[[
]]

Table 8-20
LRHBP Initial Condition Uncertainty Characterizations

[[
]]

8.2.2.2 MSIVF Initial Condition Uncertainty Results

A summary of the results of the core power sensitivity analysis for the MSIVF transient is provided in Table 8-21. The characterization of these results is described in Table 8-22.

**Table 8-21
 MSIVF Initial Condition Uncertainty Results**

[[
]]

**Table 8-22
 MSIVF Initial Condition Uncertainty Characterizations**

[[
]]

8.2.2.3 PRFO Initial Condition Uncertainty Results

8.2.2.5 LOFW Initial Condition Uncertainty Results

A summary of the results of the core power sensitivity analysis for the FWCF transient is provided in Table 8-25. The characterization of these results is described in Table 8-26.

**Table 8-25
 LOFW Initial Condition Uncertainty Results**

[[
]]

**Table 8-26
 LOFW Initial Condition Uncertainty Characterizations**

[[
]]

8.2.2 Initial Conditions Uncertainty

As described in Section 6.2, the initial condition is monitored through the use of plant sensors or on-line calculations based on plant sensors. Because of instrument or simulation uncertainty, the plant condition may vary from the indicated value. The results are characterized in the following manner:

- (A) The results are sensitive to the uncertainty in the initial condition and the uncertainty in the initial condition will be included in the statistical analysis.
- (B) The results are not sensitive to the uncertainty in the initial condition and the uncertainty does not need to be accounted for.
- (C) The uncertainty in initial condition were evaluated and characterized for each baseline event. The characterization analysis bases are described in Table 8-18.

With the exception of core power, the results from the allowable operating range evaluations, documented in Subsection 8.2.1, are used for the characterization.

Enclosure 3

MFN 08-818

**Response to Portion of NRC Request for
Additional Information Letter No. 234
Related to ESBWR Design Certification Application
RAI Numbers 21.6-117, 21,6-121 and 21.6-122
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 ("GEH"), and 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 08-818, Mr. Richard E. Kingston to U.S. Nuclear Energy Commission, entitled "*Response to Portion of NRC Request for Additional Information Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-117, 21.6-121 and 21.6-122,*" dated October 28, 2008. The proprietary information in enclosure 1, which is entitled "*MFN 08-818 – Response to Portion of NRC Request for Additional Information Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-117, 21.6-121 and 21.6-122 – GEH Proprietary Information,*" is delineated by a [[dotted underline inside double square brackets⁽³⁾]]. Figures and large equation objects 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) is classified as proprietary because it contains details of GEH's design and licensing methodology. The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost to GEH.
- (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.

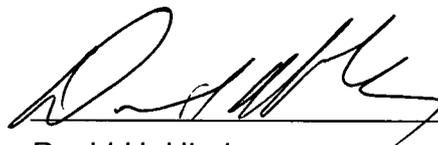
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

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 28th day of October 2008.



David H. Hinds
GE-Hitachi Nuclear Energy Americas LLC