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 08-843

Docket No. 52-010

October 30, 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. 239 and Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-55 Supplement 2 and 21.6-119**

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 and Reference 2 NRC letters. GEH response to RAI Numbers 21.6-55 Supplement 2 and 21.6-119 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

Richard E. Kingston
Vice President, ESBWR Licensing

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NRO

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
2. MFN 08-624 Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 239 Related To ESBWR Design Certification Application,* dated August 5, 2008

Enclosures:

1. MFN 08-843 – Response to Portion of NRC Request for Additional Information Letter No. 239 and Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-55 S02 and 21.6-119 – GEH Proprietary Information
2. MFN 08-843 – Response to Portion of NRC Request for Additional Information Letter No. 239 and Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-55 S02 and 21.6-119 – Non-Proprietary Version
3. MFN 08-843 – Response to Portion of NRC Request for Additional Information Letter No. 239 and Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-55 S02 and 21.6-119 – Affidavit

cc: AE Cubbage USNRC (with enclosures)
RE Brown GEH/Wilmington (with enclosures)
DH Hinds GEH/Wilmington (with enclosures)
eDRF 0000-0091-1644 (RAI 21.6-55 S02)
0000-0091-8131 (RAI 21.6-119)

Enclosure 2

MFN 08-843

Response to Portion of NRC Request for

Additional Information Letter No. 239 and Letter No. 234

Related to ESBWR Design Certification Application

RAI Numbers 21.6-55 S02 and 21.6-119

Non-Proprietary Version

NRC RAI 21.6-55 S02

TRACG Heat Transfer Rate

In Item # 1 of RAI 21.6-55 S01, GEH needs to supplement this response by addressing a new RAI in NRC Letter 234, RAI 21.6-119. In Item # 2 of RAI 21.6-55 S01, GEH provided Figure 2 to demonstrate comparison for TRACG heat transfer rate verse inlet pressure. Does this figure include the effect of non-condensable gases? If not: (1) discuss the accuracy of the heat transfer rate prediction when non-condensable gases are present; and (2) provide a similar heat transfer rate vs. inlet pressure figure considering the effect of non-condensable gases.

GEH Response

The GEH response to Item #1 of RAI 21.6-55 S01 regarding azimuthal subcooling distribution is provided in the response to RAI 21.6-119.

Questions on Item #2 of RAI 21.6-55 S01 response are addressed below.

Does this figure include the effect of non-condensable gases?

No. Figure 2 in RAI 21.6-55 S01 response does not include the effect of non-condensable gases. It is the Isolation Condenser (IC) PANTHERS test and TRACG result comparisons for pure steam, steady state condition (Reference 1).

(1) Discuss the accuracy of the heat transfer rate prediction when non-condensable gases are present.

Non-condensable gases [[ ]] in the ESBWR AOO/ATWS analysis and [[ ]]. The reasons are:

a) There is a purge line provided to assure that during normal plant operation (ICS standby conditions), non-condensable gas will not accumulate in the IC steam supply line and tubes, thus assuring that the IC tubes will not be blanketed with non-condensable gas when the system is first started.

b) The AOO/ATWS analysis duration is short (within [[ ]]) and non-condensable [[ ]] (ratio of non-condensable gas partial pressure and total pressure is less than [[ ]]) and can be [[ ]]. Furthermore, TRACG AOO/ATWS analysis only takes credit for 75% of total IC capacity for conservative consideration, and the IC capacity sensitivity study shows very little change from the 75% IC capacity case in terms of impact on the key parameters such as suppression pool temperature, peak power, peak cladding temperature and reactor pressure vessel pressure. (Reference 2, Table 8.2-5)

(2) *Provide a similar heat transfer rate vs. inlet pressure figure considering the effect of non-condensable gases*

The figures that are most similar to Figure 2 in RAI 21.6-55 S01 are Figures 4.2-7 and 4.2-8 in Reference 1. This is a slow transient test with non-condensable gas injected into steam flow, and eventually reached a quasi-equilibrium state before the venting occurs. It is the PANTHERS test (Test 13 in Section 4.2 of Reference 1) that demonstrates that non-condensable gas can be successfully purged from the IC. Pressure and non-condensable gas conditions varied during the test and TRACG shows good agreement to the test.

References:

1. NEDC-32725P, "TRACG Qualification for SBWR ", Volume 1, Revision 1, August 2002
2. NEDE-33083P Supplement 2, Revision 1 "TRACG Application for ESBWR Anticipated Transient without Scram Analysis", February 2008

DCD Impact:

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

NRC RAI 21.6-119

Conservatism in reduced azimuthal subcooling distribution.

NEDE 33083P, Supp. 3:

Table 4-2 E4 - 3D-Effects (page 33) indicates no qualification basis for this phenomena and it is [[ ]]. In Chapter 5.1 under E4 3D-Effects on path 52, it is stated that IC nozzles are located [[

]]. The statement is made that this configuration [[

]]

GEH Response

Justification is provided below of why the reduced azimuthal sub-cooling distribution produced by connecting the Isolation Condenser nozzles to VSSL cells [[ ]], is conservative.

The design of the Isolation Condensers is discussed in Subsection 5.4.6 of DCD Tier 2, Revision 5, Chapter 5. The Isolation Condenser design has 4 independent trains; each train has a connection to the vessel. [[ ]]. Injecting one train into each of the small azimuth sectors increases the sub-cooling more than expected by the physical azimuthal separation of the nozzles, increasing the power excursion in the bundles in these small azimuth sectors.

Since the critical power ratio (CPR) response is the focus of the Inadvertent Isolation Condenser Initiation (IICI) analysis, increasing the power excursion in a small area will yield more conservative CPR results. Reducing the azimuthal sub-cooling distribution by the method described in part E4 of Section 5.1 of NEDE-33083P, Supplement 3 is conservative because it causes an increased power excursion in the small azimuth sectors providing conservative CPR results. Figure 8-17 of NEDE-33083P, Supplement 3 shows the sub-cooling increase in [[ ]].

Connecting all the nozzles to vessel [[ ]] would be inconsistent with and unrealistically different from the physical azimuthal separation of the nozzles.

A 1D downcomer model will produce instantaneous azimuthal mixing and lead to enhanced, not "reduced" azimuthal sub-cooling distribution thus reducing the power excursion of the limiting bundle compared to the current analysis.

DCD 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.

Enclosure 3

MFN 08-843

Response to Portion of NRC Request for

Additional Information Letter No. 239 and Letter No. 234

Related to ESBWR Design Certification Application

RAI Numbers 21.6-55 S02 and 21.6-119

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 08-843, Mr. Richard E. Kingston to U.S. Nuclear Energy Commission, entitled "*Response to Portion of NRC Request for Additional Information Letter No. 239 and Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-55 Supplement 2 and 21.6-119,*" dated October 30, 2008. The proprietary information in enclosure 1, which is entitled "*MFN 08-843 – Response to Portion of NRC Request for Additional Information Letter No. 239 and Letter No. 234 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-55 S02 and 21.6-119 – 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.

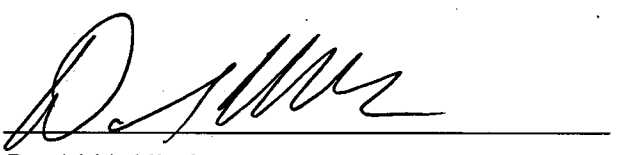
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

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 30th day of October 2008.



David H. Hinds
GE-Hitachi Nuclear Energy Americas LLC