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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 08-344 Supplement 2

Docket No. 52-010

November 17, 2009

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. 375 Related to ESBWR Design Certification Application – Engineered Safety Systems – RAI Number 6.2-148 S02**

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 Number 6.2-148 S02 is addressed in Enclosure 1.

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

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

Sincerely,

Richard E. Kingston  
Vice President, ESBWR Licensing

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Reference:

1. MFN 09-624, Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, *Request for Additional Information Letter No. 375 Related to ESBWR Design Certification Application*, October 1, 2009

Enclosures:

1. MFN 08-344 Supplement 2 - Response to Portion of NRC Request for Additional Information Letter No. 375 Related to ESBWR Design Certification Application – Reactor – RAI Number 6.2-148 S02 – GEH Proprietary Information
2. MFN 08-344 Supplement 2 - Response to Portion of NRC Request for Additional Information Letter No. 375 Related to ESBWR Design Certification Application – Reactor – RAI Number 6.2-148 S02 – Public Version
3. MFN 08-344 Supplement 2 - Response to Portion of NRC Request for Additional Information Letter No. 375 Related to ESBWR Design Certification Application – Reactor – RAI Number 6.2-148 S02 – Affidavit

cc: AE Cubbage USNRC (with enclosures)  
JG Head GEH (with enclosures)  
DH Hinds GEH (with enclosures)  
SC Moen GEH (w/o enclosures)  
eDRFsection 0000-0109-3010

**Enclosure 2**

**MFN 08-344 Supplement 2**

**Response to Portion of NRC Request for**

**Additional Information Letter No. 375**

**Related to ESBWR Design Certification Application**

**Reactor**

**RAI Number 6.2-148 S02**

**Public Version**

**NRC RAI 6.2-148 S02**

*Provide details of temperature predictions and testing to detect vacuum breaker leakage*

*The following refers to GEH's response to RAI 6.2-148, Supplement 1.*

*A. Part A of the response states that "DCD Tier 1, Table 2.15.1-2, ITAAC 16b will be changed to a type test to detect bypass leakage from 0.3 cm<sup>2</sup> to 0.6 cm<sup>2</sup> (A/K) using temperature sensors. Detecting leakage starting from 0.3 cm<sup>2</sup> (A/K) assures the setpoint calculation will have margin to the 0.6 cm<sup>2</sup> (A/K) analytical limit to close a VBIV."*

*Describe test conditions and how the tests will be performed, and clarify ITAAC to state that the design basis accident conditions cover 30 days following a loss-of-coolant accident.*

*B. Part E of the response notes that a 1-D vacuum breaker component was modeled in TRACG.*

*Provide the initial and boundary conditions of the model and the TRACG input file for staff review.*

*C. Table 1 in the response provides predicted steady state temperature differential between two selected locations and the wetwell air space.*

*a. Considering transient conditions in the drywell and wetwell, explain the validity of steady state temperature predictions to make setpoints for detecting vacuum breaker leakage and closing the vacuum breaker isolation valves.*

*b. Following its response GEH stated during a telephone call that the boundary conditions used for calculation were from drywell and wetwell pressures and temperatures at 50 seconds after blowdown for the bounding case of the main steam line break accident in the containment. A significant temperature difference exists between the drywell and wetwell at the selected time, and therefore, resulting in significant temperature differences between the selected locations and the wetwell air space. However, temperature difference between the drywell and wetwell diminishes with time. When vacuum breakers open after 72 hours following a LOCA, considering accuracy of temperature sensors, confirm that the predicted temperature difference between a selected location and the wetwell can be reasonably predicted to detect vacuum breaker leakage.*

**GEH Response**

*A. Regarding DCD Tier 1, Table 2.15.1-2 ITAAC 16b, type tests are defined in DCD Tier 1 Section 1.1.1.*

The test conditions and how the tests will be performed are described in DCD Tier 2, Section 3.11. The ITAAC reference to design basis accident conditions is presently clarified by the information in DCD Tier 2, Table 3.11-1.

- B. The boundary conditions used in the 1-D model are those at 50 seconds after blowdown for the Drywell (DW) and Wetwell (WW) from the main steam line break containment bounding case. The TRACG inputs used for the 0.3 cm<sup>2</sup> (A/√K) and the 0.6 cm<sup>2</sup> (A/√K) leakage cases are given in Exhibits 1 and 2 respectively. Below are the boundary conditions.

Boundary Conditions Used in TRACG Model

	<u>Temperature (K)</u>	<u>Pressure (kPa)</u>
DW	439	245
WW	372	215

The DW boundary conditions were used at the inlets to the assembly, components BREK10 and BREK20 (See Exhibits 1 and 2 for TRACG components). Above the diaphragm floor, the assembly wall temperature was fixed to the DW temperature, component PIPE40. Initial conditions inside the assembly but below the disc were set to WW conditions, components PIPE40 and PIPE60. WW boundary conditions were used at the outlet of the pipe extension in the WW, component BREK50. Natural convection was modeled in the WW with the initial wall temperature of the pipe extension at WW temperature. Initial partial pressure of non-condensable gases inside the assembly and the pipe extension was set to [ ] kPa. The boundary condition for non-condensable partial pressure at the pipe extension outlet was set to [ ] kPa with a total pressure of 215 kPa.

Although the extension into the wetwell is modeled as simple vertical pipe, the final geometry of the extension into the wetwell will be optimized to enhance heat transfer to the surrounding wetwell gas space. This will increase the difference in temperature between the inside of the pipe extension in the wetwell and the drywell for a given vacuum breaker leakage.

C.

- a. The results of the 1-D TRACG model were presented to demonstrate a temperature difference between the allowed leakage value of 0.3 cm<sup>2</sup> (A/√K) by Technical Specifications and the maximum analytical leakage value of 0.6 cm<sup>2</sup> (A/√K) is detectable given the temperature measurement uncertainty. Setpoints will not be made based solely on the predictions of the 1-D model. Instrument accuracy and response times from qualification testing of the instruments in the VB/VBIV assembly arrangement will be used as inputs to the setpoint calculation.
- b. For the main steam line bounding LOCA case, the temperature in the drywell remains approximately constant at 140°C for the first 72 hours while the wetwell

temperature rises steadily with an approximate temperature of 124°C at the end of 72 hours. This provides a temperature difference of approximately 16°C that will be validated to provide a detectable leakage in the range of 0.3 cm<sup>2</sup> (A/√K) and the 0.6 cm<sup>2</sup> (A/√K) as provided by DCD Tier 1, Table 2.15.1-2 ITAAC 16b. Detailed design optimization of the placement of the temperature sensors and wetwell pipe extension geometry/configuration will assure the requirements are met for the ITAAC. DW and WW temperatures values are located in DCD Tier 2 Figures 6.2-14k1, 6.2-14k2, and 6.2-14k3.

After 72 hours following the main steam line bounding LOCA, the PCCS vent fans are credited with reducing containment pressure. When the vent fans are turned on, the DW pressure drops causing the vacuum breakers to open dropping WW pressure. The DW/WW pressure difference is reduced following fan operations. DW and WW pressure values are located in DCD Tier 2, Figures 6.2-14e1, 6.2-14e2, 6.2-14e3, and 6.2-14e4. The WW temperature stops rising and stabilizes and DW temperature decreases gradually over time and converges with the WW temperature while the vent fans are in operation. With both the DW and WW at the same pressure, bypass leakage cannot occur and the driving force for venting non-condensable gases from the PCCS condensers is provided by the fans. Therefore a temperature difference between the DW and the WW is not required while PCCS vent fans are in operation.

### **DCD Impact**

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

GEH Proprietary Information (Class II)  
**Exhibit 1. TRACG Input 0.3 cm<sup>2</sup> (A/√K) Leakage Case**

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GEH Proprietary Information (Class II)

**Exhibit 2. TRACG Input  $0.6 \text{ cm}^2 (A/\sqrt{K})$  Leakage Case**

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**Enclosure 3**

**MFN 08-344 Supplement 2**

**Response to Portion of NRC Request for**

**Additional Information Letter No. 375**

**Related to ESBWR Design Certification Application**

**Reactor**

**RAI Number 6.2-148 S02**

**Affidavit**

# GE-Hitachi Nuclear Energy Americas LLC

## AFFIDAVIT

I, **Larry J. Tucker**, state as follows:

- (1) I am the Manager, ESBWR 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 08-344 Supplement 2, Mr. Richard E. Kingston to U.S. Nuclear Energy Commission, entitled “*Response to Portion of NRC Request for Additional Information Letter No. 375 – Related to ESBWR Design Certification Application – Reactor – RAI Number 6.2-148 S02*,” dated November 17, 2009. The proprietary information in enclosure 1, which is entitled “*MFN 08-344 Supplement 2 – Response to Portion of NRC Request for Additional Information Letter No. 375 – Related to ESBWR Design Certification Application – Reactor – RAI Number 6.2-148 S02 – GEH Proprietary Information*,” is indicated as the content contained between opening double brackets ([[) and closing double brackets (]]), and underlined. [[This sentence is an example <sup>{3}</sup>]]. Figures and large equation objects are identified with double square brackets before and after the object. In each case, the superscript notation <sup>{3}</sup> 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.

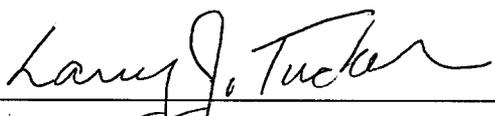
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

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 17<sup>th</sup> day of November 2009.

  
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Larry J. Tucker  
GE-Hitachi Nuclear Energy Americas LLC