



**HITACHI**

**GE Hitachi Nuclear Energy**

**Richard E. Kingston**  
Vice President, ESBWR Licensing

P.O. Box 780  
3901 Castle Hayne Road, M/C A-65  
Wilmington, NC 28402 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 2, the balance of this letter may be considered non-proprietary.

MFN 09-755 Revision 1

Docket No. 52-010

January 21, 2010

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

**Subject: Revised Response to Portion of NRC RAI Letter No. 392 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 Mechanical Systems and Components; RAI Number 3.9-219 S02 Revision 1)**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) revised response to a portion of the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) letter number 392 sent by NRC letter dated November 5, 2009 (Reference 1). GEH initially responded to RAI 3.9-219 S02 in Reference 2. This letter transmits a revised response to RAI 3.9-219 S02 (Revision 1) after interactions with the staff to clarify Reference 2. RAI Number 3.9-219 S02 (Revision 1) is addressed in Enclosure 1. Revision bars in the right hand column and text strike throughs identify the changes to Reference 2. All other RAI response and enclosures transmitted by Reference 2 remain valid and these RAIs are considered resolved.

Enclosure 2 contains the revised changes to the affected LTRs as a result of GEH's response to this RAI. Verified LTR changes associated with these RAI responses are identified in the enclosed markups by enclosing the text within a black box. Enclosure 2 contains GEH proprietary information as defined by 10 CFR 2.390. GEH customarily maintains this information in confidence and withholds it from public disclosure.

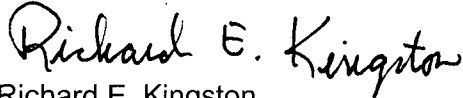
Enclosure 3 is a nonproprietary version of the revised changes to the affected LTRs as a result of GEH's response to this RAI and is suitable for public disclosure.

The affidavit contained in Enclosure 4 identifies that the information contained in Enclosure 2 has been handled and classified as proprietary to GEH. GEH hereby requests that the information in Enclosure 2 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17.

DD68  
NR0

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

Sincerely,



Richard E. Kingston  
Vice President, ESBWR Licensing

References:

1. MFN 09-699 Letter from U.S. Nuclear Regulatory Commission to J. G. Head, GEH, *Request For Additional Information Letter No. 392 Related to ESBWR Design Control Document* dated November 5, 2009
2. MFN 09-755 Letter from R. E Kingston, GEH to Nuclear Regulatory Commission *Response to Portion of NRC RAI Letter No. 392 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Numbers 3.9-212 S02, 3.9-219 S02 & 3.9-258 S01* dated December 12, 2009

Enclosures:

1. Revised Response to Portion of NRC RAI Letter No. 392 Related to ESBWR Design Certification Application - DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Number 3.9-219 S02 (Revision 1)
2. Revised Response to Portion of NRC RAI Letter No. 392 Related to ESBWR Design Certification Application - LTR Markups for RAI Numbers 3.9-219 S02 (Revision 1) – Proprietary Version
3. Revised Response to Portion of NRC RAI Letter No. 392 Related to ESBWR Design Certification Application - LTR Markups for RAI Numbers 3.9-219 S02 (Revision 1) – Public Version
4. Affidavit

cc:	AE Cabbage	USNRC (with enclosures)
	JG Head	GEH/Wilmington (with enclosures)
	DH Hinds	GEH/Wilmington (with enclosures)
	HA Upton	GEH/San Jose (with enclosures)
	eDRF Section	0000- 0110-1045 R2 (RAI 3.9-219 S02 (Rev 1))

**Enclosure 1**

**MFN 09-755 Revision 1**

**Revised Response to Portion of NRC Request for  
Additional Information Letter No. 392  
Related to ESBWR Design Certification Application  
DCD Tier 2 Section 3.9 – Mechanical Systems and  
Components  
RAI Number 3.9-219 S02 (Revision 1)**

**NRC RAI 3.9-219 S02<sup>[1]</sup> (Revision 1)**

*RAI Summary*

*Clarify the meaning of time interval, time segment, and subinterval*

*RAI Text*

*GEH should clarify the meanings of the terms: time interval, time segment, and subinterval. GEH should also document the length(s) of the stress analysis time histories. Finally, GEH should further clarify how time interval bias factors are determined, including explaining their frequency dependence (if any), and location dependence. GEH is requested to include these explanations in a revised version of LTR NEDE-33313P.*

**GEH Response (Original)**

Section 5.2.4 of LTR NEDE-33313P [2] has been expanded to describe the terms time interval and time segment. The term subinterval is not used. We have added a description of the lengths of the stress analysis time histories. We have clarified how time interval bias factors are determined including their frequency dependence and location dependence. The equations added to this section were previously provided in Reference [3].

**GEH Response (Revision 1)**

The original response is still valid. Based on follow-up discussions with the NRC, Section 5.2.4 of NEDE-33313P will be further revised to incorporate further details from RAI responses. This includes:

- Delineating the process used to perform the time interval bias assessment,
- Differentiating the equations used in the two analytical methods,
- Provide further detail on the application bias and uncertainty, and
- Incorporate benchmarks references to the LTR section.

**DCD Impact (Unchanged)**

No DCD changes will be made in response to this RAI. LTR NEDE-33313P [2] Sections 5.2.4 and 11.0 will be revised as noted in the attached markup.

**References**

1. MFN-09-699, Leslie Perkins to Gerald Head, "Request for Additional Information Letter No. 392 Related to ESBWR Design Certification Application", November 5, 2009.
2. GE Hitachi Nuclear Energy, "ESBWR STEAM DRYER STRUCTURAL EVALUATION, NEDE-33313P, Revision 1", July 2009
3. MFN 09-509, Richard E. Kingston (GEH) to USNRC Document Control Desk, "Response to Portion of NRC RAI Letter No. 220 and 339 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Numbers 3.9-213 and 3.9-217 S01", Docket Number 52-010, July 31, 2009.
4. MFN 09-755 Docket No. 52-010, Richard E. Kingston (GEH) to USNRC Document Control Desk, "Response to Portion of NRC RAI Letter No. 392 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Numbers 3.9-212 S02, 3.9-219 S02 & 3.9-258 S01", December 4, 2009.

**Enclosure 3**

**MFN 09-755 Revision 1**

**Response to Portion of NRC Request for**

**Additional Information Letter No. 392**

**Related to ESBWR Design Certification Application**

**LTR Markups for RAI Number 3.9-219 S02 (Revision 1)**

**Public Version**

]].

### **5.2.3 DYNAMIC TESTING**

On a new plant where there is more time and space to accommodate frequency response testing, shaker testing may be used in lieu of hammer testing. Either a hammer or a shaker with a force transducer will provide the excitation.

[[

]]. For each test, input force, accelerations, transfer functions, coherence at all accelerometers are measured. Multiple excitation locations are used. The transfer functions for each measurement location are calculated. [[

]].

### **5.2.4 PERIOD OF PEAK RESPONSE FOR FIV ASSESSMENT**

The FIV loading used in the finite element stress analysis considers peak stress intensities that occur at frequencies as low as ~1 cycle per 100 seconds. [[





]]

In the F-Factor method, [[

11

**Table 5.1**  
**Time Domain Strain Gage Data Statistics**

[[

]]

Assume that [[



|| (7)

The BiasFactor in Equation (7) is a ||

||

The ||

||

Therefore, it is assumed the same relation follows ||

||

The ||

||

As with the F-factor method, the acoustic and structural model is linear and therefore a ||



## 11.0 REFERENCES

- [1] NEDE 33312P, "License Topical Report, ESBWR Steam Dryer Acoustic Load Definition".
- [2] American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section II Part D, 2001 Edition, 2003 Addenda.
- [3] 26A6642AK, Rev. 5, "“ESBWR Design Control Document”, Tier 2, Chapter 3, Sections 3-9-3-11.
- [4] American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, 2001 Edition, 2003 Addenda.
- [5] 26A6642AN rev. 5, "ESBWR Design Control Document", Tier 2, Chapter 3, Appendices 3G to 3L.
- [6] ANSYS Release 11.0, ANSYS Incorporated, 2008.
- [7] GE Hitachi Nuclear Energy, "ESBWR Steam Dryer - Plant Based Load Evaluation Methodology Supplement 1," NEDC-33408P, Supplement 1, Revision 1, Class III (Proprietary), August 2009."
- [8] GEH Letter MFN 09-509 from Richard E. Kingston (GEH) to USNRC Document Control Desk, "Response to Portion of NRC RAI Letter No. 220 and 339 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Numbers 3.9-213 and 3.9-217 S01," Dated July 31, 2009, Docket Number 52-010.
- [9] GE Hitachi Nuclear Energy, "ESBWR Steam Dryer – Plant Based Load Evaluation Methodology," NEDC-33408P, Revision 1, Class III (Proprietary), July 2009, and NEDO-33408, Revision 1, Class I (Non-proprietary), July 2009.
- [10] Letter, Entergy to USNRC, "Vermont Yankee Nuclear Power Station Report on the Results of Steam Dryer Monitoring," BVY 06-056 (Docket No. 50-271, TAC No. MC0761), dated June 30, 2006.
- [11] 0000-0101-0766-P-R0, "Main Steam Line Limit Curve Adjustment During Power Ascension," Class III, April 2009.

**MFN 09-755 Revision 1**

**Enclosure 4**

**Affidavit**



# GE-Hitachi Nuclear Energy Americas LLC

## AFFIDAVIT

I, David A. Piepmeyer, state as follows:

- (1) I am the Senior Project Manager, ESBWR Certification, GE Hitachi Nuclear Energy ("GEH"), 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 2 of GEH letter MFN 09-755 Revision 1, Mr. Richard E. Kingston to U.S. Nuclear Regulatory Commission, entitled *Revised Response to Portion of NRC RAI Letter No. 392 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Number 3.9-219 S02 (Revision 1)* dated January 21, 2010. The GEH proprietary information in Enclosure 2, which is entitled *Revised Response to Portion of NRC RAI Letter No. 392 Related to ESBWR Design Certification Application - LTR Markups for RAI Number 3.9-219 S02 (Revision 1) – Proprietary Version* is delineated by a [[dotted underline inside double square brackets.<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. Enclosure 3, which is entitled *Revised Response to Portion of NRC RAI Letter No. 392 Related to ESBWR Design Certification Application - LTR Markups for RAI Number 3.9-219 S02 (Revision 1) – Public Version*, is a non-proprietary version of Enclosure 2 and is suitable for public disclosure.
- (3) In making this application for withholding of proprietary information of which it is the owner, 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 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, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, 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 identifies detailed GEH ESBWR design information. GEH utilized prior design information and experience from its fleet with significant resource allocation in developing the system over several years at a substantial cost.

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.

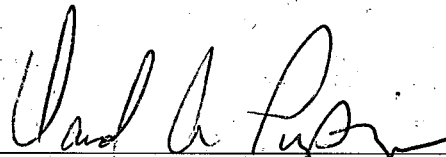
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

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 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 21st day of January 2010.



David A. Piepmeyer  
GE-Hitachi Nuclear Energy Americas LLC