HITACHI

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Proprietary Notice
This letter forwards proprietary information in accordance with 10CFR2.390. Upon the removal of Enclosure 1 and 3, the balance of this letter may be considered non-proprietary.

MFN 09-392

Docket No. 52-010

June 18, 2009

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

Subject: **Response to Portion of NRC RAI Letter No. 339 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to a portion of the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) letter number 339 sent by NRC letter dated May 26, 2009 (Reference 1). RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 and –246 S01 are addressed in Enclosure 1. Enclosure 3 contains the DCD changes, changes to NEDE-33312P and NEDE-33313P as a result of GEH's response to these RAIs. Verified DCD changes associated with these RAI responses are identified in the enclosed DCD markups by enclosing the text within a black box.

Enclosures 1 and 3 contain GEH proprietary information as defined by 10 CFR 2.390. GEH customarily maintains this information in confidence and withholds it from public disclosure. Enclosures 2 and 4 are the non-proprietary versions, which do not contain proprietary information and are suitable for public disclosure.

The affidavit contained in Enclosure 5 identifies that the information contained in Enclosures 1 and 3 have been handled and classified as proprietary to GEH. GEH hereby requests that the information in Enclosures 1 and 3 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17.

D068
NRO

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

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 09-365 Letter from U.S. Nuclear Regulatory Commission to J. G. Head, GEH, *Request For Additional Information Letter No. 339 Related to ESBWR Design Control Document* dated May 26, 2009

Enclosures:

1. Response to Portion of NRC RAI Letter No. 339 Related to ESBWR Design Certification Application - DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01 - Proprietary Version
2. Response to Portion of NRC RAI Letter No. 339 Related to ESBWR Design Certification Application - DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01 - Public Version
3. Response to Portion of NRC RAI Letter No. 339 Related to ESBWR Design Certification Application - DCD and LTR Markups RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01 - Proprietary Version
4. Response to Portion of NRC RAI Letter No. 339 Related to ESBWR Design Certification Application - DCD and LTR Markups RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 - Public Version
5. Affidavit

cc:	AE Cubbage	USNRC (with enclosures)
	JG Head	GEH/Wilmington (with enclosures)
	DH Hinds	GEH/Wilmington (with enclosures)
	eDRF Section	0000-0102-2833 (RAIs 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01)

Enclosure 2

MFN 09-392

Response to Portion of NRC Request for

Additional Information Letter No. 339

Related to ESBWR Design Certification Application

DCD Tier 2 Section 3.9 –

Mechanical Systems and Components;

RAI Numbers 3.9-211 S01, 3.9-212 S01, 3.9-215 S01, 3.9-219 S01, 3.9-220 S01, 3.9-244 S01, 3.9-246 S01

Public Version

NRC RAI 3.9-211 S01

RAI Summary

Include final load definitions in LTR NEDE-3312P.

RAI Text

GEH is requested to include their final dryer load definition(s), over key portions of the dryer surfaces, in a revised version of LTR NEDE-33312P, "ESBWR Steam Dryer Acoustic Load Definition." All bias errors and uncertainties should be clearly explained in the load definition.

GEH Response

NEDE-33312P will be revised to include the final load dryer definition. The load dryer definition, which was presented in the response to RAI 3.9-211, will include the required bias values. Because the ESBWR prototype dryer will be instrumented, startup acceptance limits will assure that acceptable stress is maintained during power ascension testing. The final assessment of the bias and uncertainty errors associated with the peak stress regions of the dryer will be assessed based on data from the instrumented dryer.

DCD Impact

No changes to the DCD will be made in response to this RAI. The abstract, the list of references and Sections 1.0 and 4.1 of NEDE-33312P will be revised as shown in the attached markup.

NRC RAI 3.9-212 S01

RAI Summary

Additional information regarding details of the stress evaluation of steam dryer.

RAI Text

For the stress evaluation of steam dryer in the prototype ESBWR plant, GEH plans to use the method described in Section 3L.5.5.3 of Revision 5 of ESBWR DCD, Appendix 3L. According to this method, GEH will install a population of [[

]]. *GEH is requested to provide an explanation about the number of* [[ ]] *that will be installed at each location identified in Table 3L-4 of Appendix 3L. GEH is also requested to confirm whether it will employ* [[

]].

GEH Response

In response to RAI 3.9-138 S02, GEH provided the criteria and methods that will be used to determine the locations of pressure sensors, strain gages and accelerometers installed on the steam dryer for startup testing of the prototype ESBWR. Corresponding ITAAC were also added to verify that the sensors are installed at appropriate locations.

Consistent with the approach used by GEH for steam dryers in existing plants, [[

]]

GEH will not install a population of strain gages and accelerometers at each monitoring location. For the uncertainty assessment a population of strain or accelerometer predictions at each monitoring location is used. The predictions will be for the specified strain gage and accelerometer locations and for four points within the range of possible locations based on the specified tolerance.

DCD Impact

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

NRC RAI 3.9-215 s01, Part D

RAI Summary

Information summarizing the results of the metallurgical evaluations and stress concentration factor (SCF) that may be used with finite element analysis.

RAI Text (Part D only)

D) GEH states that it will treat the [[

]]. *The staff agrees with GEH that this is a conservative method to assess fatigue damage. However, this particular method should be included in LTR NEDE-33313P. In addition, the LTR should be revised to include a summary and conclusions of the GENE report, DRF GE-NE 0000-0092-7093-1 P, Class II, April 2005.*

GEH Response

LTR NEDE-33313P will be revised as requested.

DCD Impact

No changes will be made to the DCD in response to this RAI. Section 4.1 of NEDE-33313P will be revised as shown in the attached markup.

NRC RAI 3.9-219 s01

RAI Summary

Include discussion addressing the length of the pressure time history considered in performing steam dryer stress and high cycle fatigue analyses.

RAI Text

The NRC staff finds the response to NRC RAI 3.9-219 acceptable, but requests that GEH update LTR NEDE-33313P by including the RAI response discussion addressing the length of the pressure time history considered in performing steam dryer stress and high cycle fatigue analyses.

GEH Response

LTR NEDE-33313P will be revised as requested.

DCD Impact

No changes will be made to the DCD in response to this RAI. Section 5.2 of NEDE-33313P will be revised as shown in the attached markup.

NRC RAI 3.9-220 s01

RAI Summary

Include table comparing flow rates and geometric properties of the ABWR, ESBWR, and currently operating BWRs.

RAI Text

The NRC staff finds the response to NRC RAI 3.9-220 acceptable, but requests that GEH update LTR NEDC-33408P, Supplement 1 by including the table presented in the RAI response which compares flow rates and geometric properties of the ABWR, ESBWR, and currently operating BWRs.

GEH Response

NEDE-33312P, rather than NEDC-33408P, Supplement 1, will be revised to include the table presented in the response to RAI 3.9-220.

DCD Impact

No changes will be made to the DCD in response to this RAI. Section 4.1 of NEDE-33312P will be revised as shown in the attached markup.

NRC RAI 3.9-244 s01

RAI Summary

Include explanation of weld quality and fatigue factors in the topical report, NEDE-33313P.

RAI Text

In its response to NRC RAI 3.9-244. GEH states that the statement in Section 4.0 was only intended to apply to the design article of ASME Subsection NG with an exception to the weld quality and fatigue factors as explained in Subsections 4.1 and 7.1 of the LTR (NEDE-33313P). However, the staff finds that neither Subsection 4.1 nor 7.1 explains weld quality factor. The staff also notes that the weld quality factor and fatigue factor for use in the steam dryer analysis are explained in the GENE Report DRFGE-NE 0000-0092-7093-1P, Recommended Weld Quality and Stress Concentration Factors for Use in the Structural Analysis of Exefon Replacement Steam dryer. The staff requests that GEH include this explanation of weld quality and fatigue factors in the topical report. NEDE-33313P.

GEH Response

NEDE-33313P will be revised to explain the use of weld quality and fatigue factors in the steam dryer analyses.

DCD Impact

No changes will be made to the DCD in response to this RAI. Section 4.1 of NEDE-33313P will be revised as shown in the attached markup.

NRC RAI 3.9-246 s01

RAI Summary

Include discussion of conclusions from NEDC-33408P, Supplement 1 in Appendix 3L of the DCD. and include NEDE-33408P, Supplement 1 in its reference section.

RAI Text

The staff accepts the GEH response to RAI 3.9-246 but requests that GEH also discuss the importance of conclusions from NEDC-33408P, Supplement 1- ESBWR Steam Dryer Plant Based Load Evaluation Methodology - Additional Benchmarking, in Appendix 3L of the DCD, and include NEDE-33408P, Supplement 1 in its reference section.

GEH Response

DCD Tier 2, Appendix 3L will be revised as requested to discuss the conclusions from NEDC-33408P Supplement 1. Note that NEDE-33408P, Supplement 1 was added to the Appendix 3L reference list by the response to RAI 3.9-138 S02.

DCD Impact

DCD Tier 2, Subsection 3L.4.4 will be revised as shown in the attached markup.

Enclosure 4

MFN 09-392

Response to Portion of NRC Request for

Additional Information Letter No. 339

Related to ESBWR Design Certification Application

DCD and LTR Markup for RAI Numbers:

3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01

Public Version

Abstract

This document describes the GE Hitachi Nuclear Energy (GEH) approach used to develop the ESBWR flow induced vibration load (FIV) definition for the ESBWR steam dryer. There has been much development in FIV load modeling in the last several years, including techniques developed using measurements taken from several operating plants. Events in the industry including technical developments and regulatory interactions have dictated that GEH further develop the ESBWR Steam Dryer Load Definition approach. The current GEH approach to load definition is defined as the Plant Based Load Evaluation (PBLE) method.

Revision ~~0~~ 1 of this report describes the ~~background and provides an overview of the methodology that will be utilized for producing the final~~ ESBWR Steam Dryer Load Definitions with the PBLE method. The GEH approach to the ESBWR FIV load definition focuses on utilizing an ABWR-based steam dryer design, allowing the use of instrumented ABWR in-plant steam dryer test data to form the basis for the ESBWR load definition. This basic load definition will then be further improved through comparison with testing and operating experience gained from GEH Extended Power Uprates (EPUs) conducted on several operating plants.

The development of the FIV loads as described here are in accordance with Regulatory Guide 1.20 Revision 3. The FIV loads will be used in combination with other design loads in qualifying the steam dryer as described in Topical Report NEDE 33313P.

1.0 EXECUTIVE SUMMARY

This document describes the ~~methodology being used by GEH to develop~~ Flow Induced Vibration (FIV) loads for the ESWR steam dryer. The development of the FIV loads as described here are in accordance with Regulatory Guide 1.20 Revision 3. The FIV loads will be used in combination with other design loads in order to qualify the dryer as described in NEDE-33313P.

The FIV loads are unsteady differential pressure loads created by the unsteady flow adjacent to the dryer (hydrodynamic FIV loads) and from acoustic pressure waves present in the reactor dome and and steam lines that create unsteady differential pressure forces on dryer components (acoustic loads). The loads addressed here are associated with normal operation of the plant.

There is no purely analytical methodology for accurately predicting the FIV loads resulting from hydrodynamic and acoustic load sources in a complex system such as the Reactor Pressure Vessel (RPV) reactor dome and steam lines. Therefore, the approach used on the ESBWR includes the following:

[[

]]

4.0 FIV LOAD DEFINITION BASED ON DATA FROM PLANT INSTRUMENTATION

4.1 FIV LOADS DEVELOPED FROM DATA FROM MULTIPLE PLANTS

[[

]]

Figure 4.1-1 includes comparison of instrumented steam dryer data for [[

]]

Table 4.1-1 provides a comparison of geometry and flow parameters for the ESBWR, the ABWR at full power and the BWRs at extended power uprate conditions.

Figure 4.1-1 includes design PBLE load projections based on test data from both [[

]] The design loads have been factored by [[ ]] to reflect the bias and uncertainty of the PBLE loads developed from dryer pressure sensors as described in Reference (4).

More information on the PBLE pressure loads on other areas of the dryer is included in Reference (3). [[

]]

Figure 4.1-1 also includes the PSD curves for the measured differential pressure for the ABWR dryer at 100% power. [[

]]

A comparison of the RMS values of the design loads and test data shown in Figure 4.1-1 is included in Table 4.1-2. The design loads RMS values are approximately 50% higher than the factored measured ABWR data.

~~The FIV design loads based on the instrumented plant data include high amplitude, low and high frequency data that encompasses a wide spectrum of acoustic load frequencies.~~ The structural assessment for each set includes a +/-10% frequency variation to provide a range of applied load frequencies. [[

]]A frequency dependent bias and uncertainty evaluation will be included in the structural evaluation for areas of the dryer with the highest alternating stress.

[[

]] This methodology will identify the acoustic load frequencies and associated dryer structural response modes that are most affected by FIV loads. [[

]]

Table 4.1-1. Comparison of Geometry and Flow Parameters

[[

{3}]]

Table 4.1-2: RMS Comparison of Loads and Test Data

[[

{3}]]

[[

{3}]]

Figure 4.1-1. PSD Comparison of Loads and Test Data

REFERENCES

[1] Regulatory Guide 1.20, "Comprehensive Vibration Assessment Program For Reactor Internals During Preoperational And Initial Startup Testing," March 2007.

[2] NEDE 33313P, "ESBWR Steam Dryer Structural Evaluation", November 2007

[3] GE Hitachi Nuclear Energy, "ESBWR Steam Dryer – Plant Based Load Evaluation Methodology," NEDC-33408P, Class III (Proprietary), February 2008, and NEDO-33408, Class I (Non-proprietary), February 2008.

[4] GE Hitachi Nuclear Energy, "ESBWR Steam Dryer - Plant Based Load Evaluation Methodology Supplement 1," NEDC-33408P, Supplement 1, Class III (Proprietary), October 2008, and NEDO-33408, Supplement 1, Class I (Non-Proprietary), October 2008.

~~10.0~~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. 4, ""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. 4, "ESBWR Design Control Document", Tier 2, Chapter 3, Appendices 3G to 3L.

[6] ANSYS Release 10.0, ANSYS Incorporated, 2005.

[7] GENE Report, DRF GE-NE 0000-0092-7093-1P, "Recommended Weld Quality and Stress Concentration Factors for use in the Structural Analysis of Exelon Replacement Steam Dryer," Class II, April 2005.

5.0 STEAM DRYER FEA MODEL AND APPLIED LOADS

5.1 FULL STEAM DRYER SHELL FINITE ELEMENT MODEL

[[

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5.2 DYNAMIC PRESSURE LOADS

The FIV loading time history and any necessary loading scale factors will be taken from Reference 1. [[

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

]]

5.3 ASME LOADS

The loads representing normal plant operation and other operating events as described in Section 8 will be generated for the FEM.

3L.4.3 Load Combinations

Design loads for the steam dryer are based on evaluation of the ASME load combinations provided in Table 3.9-2 except that the load definitions that pertain to the steam dryer are modified as shown in Table 3L-2. These load combinations consist of deadweight loads, static and fluctuating differential pressure loads (including turbulent and acoustic sources), seismic, thermal, and transient acoustic and fluid impact loads.

3L.4.4 Fluid Loads on the Steam Dryer

During normal operation, the steam dryer experiences a static differential pressure loading across the steam dryer plates resulting from the pressure drop of the steam flow across the vane banks. The steam dryer also experiences fluctuating pressure loads resulting from turbulent flow across the steam dryer and acoustic sources in the vessel and main steamlines. During transient and accident events, the steam dryer also experiences acoustic and flow impact loads that result from system actions (e.g., turbine stop valve closure) or from the system response (e.g., the two-phase level swell following a main steamline break).

Of particular interest are the fluctuating acoustic pressure loads that act on the steam dryer during normal operation that has led to fatigue damage in previous steam dryer designs. In the low frequency range, these pressure loads have been correlated with acoustic sources driven by the steam flow in the outer hood and vessel steam nozzle region. In the high frequency range, acoustic resonances in the stagnant steamline side branches (e.g., relief valve standpipes) have coupled with the vessel, thus imparting a pressure load on the steam dryer. Vessel acoustic modes may also be excited by sources inside and outside the vessel, resulting in additional acoustic pressure loads in the middle frequency range.

A detailed description of the pressure load definition ~~methodology~~ for the ESBWR steam dryer is provided in Reference 3L-5. The load definition is based on the Plant Based Load Evaluation Methodology described in Reference 3L-8. References 3L-8 and 3L-9 provide the theoretical basis of the methodology, describe the analytical model and provide benchmark and sensitivity comparisons of the methodology predictions with measured pressure data taken from instrumented steam dryers. The ~~ESBWR steam dryer~~ fluctuating load definition is based on the load definitions based on in-plant measurements that were developed for the steam dryer structural analyses in several extended power uprates. These load definitions provide a fine-mesh array of pressure time histories that are consistent with the structural finite element model nodalization. Multiple load definitions are used in the ESBWR steam dryer analysis in order to evaluate the steam dryer response over a wide frequency range. These load definitions include the limiting low and high frequency loads observed in plants with instrumented steam dryers. Based on the unique plant configurations (e.g., dead legs in the main steamlines that may amplify the low frequency acoustic response) and operating conditions (e.g., high steam line flow velocities) in these instrumented plants, the load definitions from these plants are expected to provide a robust load definition for the ESBWR. The load definitions developed for the ESBWR are also benchmarked against the instrumented steam dryer measurements taken during startup testing for the lead ABWR. The ESBWR and ABWR have the same vessel diameter and vessel steam nozzle design (with flow restricting venturi), and similar main steamline layouts; therefore, it is expected that the frequency content of the ESBWR steam dryer pressure loads will be similar to those measured on the ABWR.

Reference 3L-9 provides the results of benchmarking and sensitivity studies of the pressure load definition methodology against measured pressure data taken during power ascension testing of a replacement steam dryer installed at an operating nuclear plant. Reference 3L-9 concludes that, based on comparisons of model predictions to actual measurements, the methodology predicts good frequency content and spatial distribution, and the safety/relief valve resonances are well captured. The methodology provides accurate predictions of main steamline phenomena occurring downstream of the main steamline sensors, valve whistling (safety/relief valve branch line) and broadband excitations (venturi, main steam isolation valve turbulence). The methodology also accurately predicts the dryer pressure loads resulting from vessel hydrodynamic phenomena.

3L.4.5 Structural Evaluation

A FEA is performed to confirm that the ESBWR steam dryer is structurally acceptable for operation. The FEA uses the load definitions described in Subsection 3L.4.4. The FEA is performed using a whole steam dryer analysis model to determine the most highly stressed locations, also see Subsection 3L.5.5.1.3. The FEA consists of dynamic analyses for the load combinations identified in Subsection 3L.4.3. If required, locations of high stress identified in the whole steam dryer analysis are further evaluated using solid finite element models to more accurately predict stresses at these locations. Additional analysis confirms that the RPV steam dryer support lugs accommodate the predicted loads under normal operation and transient and accident conditions. (Also see Subsection 3L.5.5.1.3.)

The structural evaluation of the ESBWR steam dryer design is presented in (Reference 3L-6).

3L.4.6 Instrumentation and Startup Testing

The ESBWR steam dryer is instrumented with temporary vibration sensors to obtain flow induced vibration data during power operation. The primary function of this vibration measurement program is to confirm FIV load definition used in the structural evaluation is conservative with respect to the actual loading measured on the steam dryer during power operation, and to verify that the steam dryer can adequately withstand stresses from flow induced vibration forces for the design life of the steam dryer. The detailed objectives are as follows:

- Determine the as-built modal parameters: This is achieved by impact (hammer) testing the steam dryer components. The results yield natural frequencies, mode shapes and damping of the components for the as-built steam dryer. These results are used to verify portions of the steam dryer analytical model.
- Confirm FIV loading: In order to confirm loading due to turbulence, acoustics and other sources, dynamic pressure sensors are installed on the steam dryer. These measurements will provide the actual pressure loading on the steam dryer under various operating conditions.
- Verify the design: Based on past knowledge gained from different steam dryers, as well as information gleaned from analysis, selected areas are instrumented with strain gages and accelerometers to measure vibratory stresses and displacements during power operation. The measured strain values are compared with the allowable values (acceptance criteria) obtained from the analytical model to confirm that the steam dryer alternating stresses are within allowable limits.

4.0 DESIGN CRITERIA

The steam dryer, including the dryer units, is a non-safety related item and is classified as an Internal Structure per Reference 3, as defined in Reference 4, Subsection NG, Paragraph NG-1122. The steam dryer is not an ASME Code component, but the design shall comply to the applicable requirements of ASME Code Subsection NG-3000 except for the weld quality and fatigue factors as discussed in Subsections 4.1 and 7., to the extent possible.

4.1 FATIGUE CRITERIA

The steam dryer fatigue evaluation consists of calculating the alternating stress intensity from FIV loading at all locations in the steam dryer structure and comparing it with the allowable design fatigue threshold stress intensity requirements from Reference 5. [[

]]

- A factor of 1.8 for fillet welds
- A factor of 1.4 for full penetration welds

[[

]] The justification for the use of these weld fatigue factors applied to the finite element model stress results is contained in Reference 7, which was developed to provide guidance for the selection of weld quality and fatigue factors for the analysis of replacement steam dryers. The guidance is based on Section III, Subsections NG and NB, of the ASME Boiler and Pressure Vessel Code. Section 2.3 of Reference 7 justifies the use of a 1.8 weld fatigue factor for fillet welds and a 1.4 factor for full penetration welds when these concentration factors are applied to the [[

]] as the alternating stress intensity. Consistent with Section 2.3 of Reference 7, a weld fatigue factor of 4.0 [[

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MFN 09-392

Enclosure 5

Affidavit

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, Larry J. Tucker, state as follows:

(1) I am Manager, ESBWR Engineering, 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 Enclosures 1 and 3 of GEH letter MFN 09-392, Mr. Richard E. Kingston to U.S. Nuclear Regulatory Commission, entitled *Response to Portion of NRC RAI Letter No. 339 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01,* dated June 18, 2009. The GEH proprietary information in Enclosure 1, which is entitled *Response to Portion of NRC RAI Letter No. 339 Related to ESBWR Design Certification Application - DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01 - Proprietary Version* and in Enclosure 3, which is entitled *Response to Portion of NRC RAI Letter No. 339 Related to ESBWR Design Certification Application - DCD and LTR Markups RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01 - Proprietary Version* 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. Non-proprietary versions of this information is provided in Enclosure 2 *Response to Portion of NRC RAI Letter No. 339 Related to ESBWR Design Certification Application - DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01 - Public Version* and in Enclosure 4 *Response to Portion of NRC RAI Letter No. 339 Related to ESBWR Design Certification Application - DCD and LTR Markups RAI Numbers 3.9-211 S01, -212 S01, -215 S01 Part D, -219 S01, -220 S01, -244 S01 & -246 S01 - Public Version.*

(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 GE ESBWR design information. GE 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 18th day of June, 2009.

Larry J. Tucker

Larry J. Tucker
GE-Hitachi Nuclear Energy Americas LLC