Enclosure 2

MFN 13-075

GEH Revised Response to RAI 3.9-286 and

Response to RAI 3.9-286 S01

Public Version

This is a non-proprietary version of Enclosure 1, from which the proprietary information has been removed. Portions of the document that have been removed are identified by white space within double brackets, as show here [[ ]].

NRC RAI 3.9-286

Summary: The staff's question is in regard to developing alternating peak stress intensity predictions using the solid element submodel approach for a representative set of cases, and to compare the results with the corresponding method (1) and method (2) results.

During the audit, the staff and GEH also discussed the solid element submodel approach identified in Section 4.1 and Figure 4-1 of Reference 1, for predicting the alternating peak stress intensity for the fatigue evaluation of fillet welds. This method is applied when [[ ]] *(top of page 6 of 37).*

In prior RAI responses, GEH has stated that the submodel approach is used when[[ ]], *and that the submodel approach leads to reduced stresses. The staff inquired how many submodels are typically developed. GEH indicated that for GGNS, there are* [[ ]] *developed. Alternating peak stress intensity at all other locations are based on the shell model results. In a solid element submodel, the fillet is added. The fillet representation in the submodel is textbook – triangular with the design leg length. While multiple solid elements are used* [[ ]]. *As stated in Reference 1, top of page 6 of 37, "…,* [[

]]."

As an adjunct to the parametric study comparing methods (1) and (2) for shell models (see Question 4), the staff requests GEH to develop alternating peak stress intensity predictions using the solid element submodel approach for a representative set of cases, and to compare the results with the corresponding method (1) and method (2) results. Include one example calculation that demonstrates the procedure defined in the statement quoted in the preceding paragraph.

GEH Revised Response:

This revised response to RAI 3.9-286 supersedes all previous responses.

In steam dryer structural stress evaluations, when the global shell model is inadequate to resolve the load path in small local regions of the steam dryer, [[

]] The results will then be compared to the ASME fatigue limit to ensure there is enough margin to the acceptance criterion for the fillet weld stress.

To demonstrate the validity of the [[ ]], as shown in Figure 1, was used. This joint design is a good configuration for demonstrating the methodologies as they are applied in the fatigue

analyses for determining the peak FIV stresses in the various joint designs used in the ESBWR dryer. [[ ]] from Table 2 in the revised response to RAI 3.9-285 [1]; namely configurations [[ ]]. Table 1 lists the [[ ]]. They are representative of austenitic stainless steel plate used in ESBWR steam dryer T-joint design. Similar to RAI 3.9-285, [[ ]] were evaluated:

[[

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[[

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Figure 1 - [[ ]]

Table 1- [[ ]]

[[			
			]]

Note: In the revised response to RAI 285 [1], $t_H = t_c$ and $t_V = t_i$.

For a fillet weld, the maximum peak stress usually occurs at the weld root or the weld toe. In this RAI, the stresses [[ ]] were used to [[ ]] for the fatigue strength evaluation. Due to the [[ ]] are shown in Figure 2. [[ ]] were used in the weld stress evaluation.

[[ ]]

Figure 2 - [[ ]]

The finite element (FE) models for the [[ ]] were built using the mesh size of [[ ]], which is similar to the mesh sizes used in our prior production solid submodel analysis [[ ]]. Based on the mesh convergence process defined in the response to ESBWR RAI 3.9-292 S02 [2], [[ ]], were used to determine the [[ ]]. The results of the maximum linearized stress intensity at the root of the welds along the two throat paths, the maximum linearized stress intensity at the toe of the welds along the two toe paths, and the maximum stress intensity at two free surfaces of throat paths are presented in Tables 2 through 4, respectively, for three different mesh sizes. These results from [[ ]] were used to obtain the [[ ]] as shown in Figure 3. The results are listed in Tables 2 through 4.

[[

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Figure 3 - [[ ]]

Table 2 - [[ ]]

[[			
			]]

Table 3 - [[ ]]

[[			
			]]

Table 4 - [[ ]]

[[			
			]]

[[ ]] should be used when performing the weld fatigue strength evaluation to [[

]] As stated in the revised response to RAI 3.9-277 [3], when a detailed solid submodel is used to evaluate stress at a junction in the steam dryer, [[

]]

The T-joint double fillet weld fatigue strength can be assessed by applying the corresponding [[ ]]. The results are summarized in Table 5. For each configuration and load case, [[

]] is used to assess the fatigue strength [[

]]

in Table 5. In Table 5 the [[ ]] in the revised response to RAI 3.9-285 is also included, which is the [[ ]] As stated in the revised response to RAI 3.9-285, [[

]] are shown in Table 5. Compared with the [[

]] This demonstrates the validity of the solid model evaluation approach [[

]]

The [[ ]] calculated by the solid-model approach [[ ]] are listed in Table 6 together with the [[ ]] calculated by the shell model using [[ ]] from RAI 3.9-285. The results of all the three methods [[

]]

Therefore, this study demonstrates the adequacy of [[ ]] in analyzing the fillet weld joint designs used in the ESBWR dryer.

Table 5 - [[ ]]

[[						
						]]

Table 6 - [[ ]]

[[					
					]]

Summary

In steam dryer structural stress evaluations, if the [[

]] This demonstrates the adequacy of Method 3 in analyzing the fillet weld joint designs used in the ESBWR dryer.

References

[1] MFN 12-077, Revision 3, Letter from Jerald G. Head, GEH, to USNRC, Subject: NRC Requests for Additional Information (RAI) Related to the Audit of the Economic Simplified Boiling Water Reactor (ESBWR) Steam Dryer Design Methodology Supporting Chapter 3 of the ESBWR Design Control Document – GEH Revised Response to RAI 3.9-285 and Response to RAI 3.9-285 S01, dated September 24, 2013

[2] MFN 13-007, Revision1, Letter from Jerald G. Head, GEH, to USNRC, Subject: NRC Requests for Additional Information (RAI) Related to the Audit of the Economic

Simplified Boiling Water Reactor (ESBWR) Steam Dryer Design Methodology Supporting Chapter 3 of the ESBWR Design Control Document – GEH Response to RAI 3.9-292 S02 and Revised Engineering Report - NEDE-33313P, ESBWR Steam Dryer Structural Evaluation, Revision 4, September 2013

[3] MFN 12-086, Revision 3, Letter from Jerald G. Head, GEH, to USNRC, Subject: NRC Requests for Additional Information (RAI) Related to the Audit of the Economic Simplified Boiling Water Reactor (ESBWR) Steam Dryer Design Methodology Supporting Chapter 3 of the ESBWR Design Control Document – GEH Revised Response to RAI 3.9-277 and Response to RAI 3.9-277 S01, dated September 19, 2013

ESBWR Licensing Basis Changes

No change is proposed in regard to this response for the DCD or other licensing basis documents.

NRC RAI 3.9-286 S01

Summary: The staff's question is in regard to GEH's response to RAI 3.9-286.

GEH submitted the response to RAI-286 (MFN 12-077, Revision 2, February 15, 2013). The staff reviewed the response, and also discussed it with GEH during a telephone call on 03/06/2013. This RAI response provides a comparison of GEH Method 3, [[ ]], *to the results compiled in the response to RAI-285 for GEH Method 1, GEH Method 2, and a traditional strength of materials approach. GEH selected configurations 8, 9, and 10 from RAI-285 for this comparison.*

The staff finds that the response does not adequately address all of the staff comments provided to GEH on 11/14/2012. In addition, the response to RAI-286 does not establish a sound technical basis for Method 3 as a conservative procedure [[ ]]. *On 03/05/2013, in advance of the 03/06/2013 telephone call with GEH, the staff communicated the following to GEH:*

"Based on its review of the GEH response dated February 15, 2013, to RAI 3.9-286, the NRC staff finds that GEH has not justified the application of GEH Method 3 [[ ]] *in the ESBWR steam dryer. This conclusion is based on* [[ ]], *and the staff's lack of confidence in GEH's implementation of the* [[ ]]. *For the specific ESBWR steam dryer locations where GEH planned to apply Method 3, GEH must present a different fatigue evaluation method that is acceptable, or must justify the validity of Method 3."*

During the 03/06/2013 telephone call, the staff discussed with GEH all of the staff's findings leading up to the above conclusion, and also identified GEH actions that would help the staff make a final determination on the acceptability of Method 3. These are identified below.

- *Regarding staff comment 1 from November 14, 2012, the staff requests that GEH explain how the validity of Method 3 is demonstrated by the information in the final draft response to RAI-286. As necessary, provide additional validation information.*
- *Regarding staff comment 2 from November 14, 2012, see discussion under comment 4 below.*
- *Regarding staff comment 3 from November 14, 2012, the staff does not accept the data presented in Table 7.3 as evidence that a* [[ ]]. *The staff also noted an apparent error in Table 7.3 that may be indicative of a problem with the* [[ ]]. *This is not typical, and requires explanation. The staff requests that GEH review their*

calculations for possible errors in the [[ ]], *and either correct the data or provide a quantitative explanation for the result. The staff will re-assess GEH's claim that* [[ ]] *after receipt and review of the requested additional information.*

- *Regarding staff comment 4 from November 14, 2012, the staff cannot determine if any of the examples of* [[ ]]. *The staff requests that GEH clarify whether Method 3 has been used in any prior production analyses of steam dryers for* [[ ]] *evaluation.*

  If Method 3 has been implemented in a production analysis, the staff requests that GEH provide the following information for a representative case:

  a. *sketch of the joint geometry analyzed, with dimensions.*
  b. *a picture of the* [[ ]], *with element dimensions.*
  c. *a discussion of how the analyzed mesh size was determined to be adequate.*
  d. *a comparison of the Method 2 and Method 3 predictions of alternating peak stress intensity.*

- *Regarding staff comment 5 from November 14, 2012, GEH has concluded that the results presented in the response for the* [[ ]] *element sizes are not reliable, because the element size is too large to model shell membrane plus bending behavior for configurations 8, 9, and 10. To assist the staff in evaluating the reliability of Method 3 for the smallest element size used in the study, the staff requests that GEH apply Method 3 to configuration 1,* [[ ]]. *Provide the following information:*

  a. *the* [[ ]] *of both fillet welds,*
  b. *the 6 element coordinate stresses (3 normal, 3 shear) in all of the* [[ ]], *for both fillet welds.*
  c. *the* [[ ]]
  d. *the final Method 3 result for* [[ ]].

- *Regarding staff comment 6 from November 14, 2012, as quantitative confirmation that the interface is modeled correctly, the staff requests that GEH tabulate the element stress component normal to the interface,* [[ ]], *and from both sides of the interface, for Configuration 9, Horizontal Force only loading,* [[ ]]. *For this case, there are* [[ ]].

Also, explain the statement: "Furthermore, there is [[ ]] *in the current steam dryer design." The staff requests that GEH identify whether* [[ ]] *has ever been used in production analyses. If so, provide a description of the application.*

- *Regarding staff comment 7 from November 14, 2012, GEH's explanation of the "dip" is insufficient. The staff requests that GEH provide the necessary numerical data to demonstrate the validity of the dip in the 'MEM + BEND' curve.*

  In addition, the staff notes that the stress intensity at any location, per the Code, is the largest of the absolute value of ($\sigma 1$ - $\sigma 3$), the absolute value of ($\sigma 3 - \sigma 2$), or the absolute value of ($\sigma 2 - \sigma 1$), [[ ]] *was calculated (as indicated in the response), the results presented do NOT represent the stress intensity. The staff requests that GEH address this, by either correcting the statement in the response if it is inaccurate, or correcting the numerical data if the calculation was performed incorrectly.*

- *Regarding staff comment 8 from November 14, 2012, the staff noted that in Table 7.8, the* [[ ]]. *The staff requests that GEH explain this or correct the data in Table 7.8.*

  Also, the staff noted that the Method 1 results reported in Table 7.8 for Configuration 8 are not consistent with the Method 1, Configuration 8, results reported under RAI-285. The staff requests that GEH explain this or correct the data in Table 7.8.

- *Regarding staff comment 9 from November 14, 2012, the staff notes that the additional results in Figure 7.9, for* [[ ]] *and raises a question about* [[ ]]. *There is a very significant difference in the "TOTAL" plot between* [[ ]]. *The staff sees no apparent reason for the significant difference. To assist the staff in its evaluation of this result, the staff requests that GEH submit plots similar to Figure 5.2C* [[ ]] *and Figure 7.9* [[ ]], *but for Horizontal Force Only loading. Include the* [[ ]] *that would be used by the* [[ ]]

  Submit this information for both fillet welds.

1. *Regarding staff comment 1 from November 14, 2012, the staff requests that GEH explain how the validity of Method 3 is demonstrated by the information in the final draft response to RAI-286. As necessary, provide additional validation information.*

GEH Response:

In Table 6 of the revised response to RAI 3.9-286, the peak stresses calculated by the solid-model approach [[
]], together with the stresses calculated by the [[
]], are compared to [[
]] from the revised response to RAI 3.9-285. The results of all three methods are [[
]]. These results demonstrate the validity of [[

]].

To validate the [[
]], a further mesh refinement study was performed at [[
]]. This study was performed for all four configurations using the three load cases. [[
]]. A typical plot of the [[
]] is presented in Figure 1A. [[
]] were used in the weld stress evaluation. [[
]] are presented in Tables 1A.

[[

]]

Figure 1A - [[

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Table 1A - [[ ]]

[[		
		]]

Table 2A presents [[ ]]
used in the revised response to RAI 3.9-286 and [[

]] used in the revised response to RAI 3.9-286 are [[
]] as shown in Table 5 [[

]] The reason for the [[

]] Figure 2A shows the [[ ]] in the FE model of the fillet weld for the four configurations studied with mesh size of [[

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Table 2A - [[ ]]

[[					
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[[

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Figure 2A- [[

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2. *Regarding staff comment 2 from November 14, 2012, see discussion under comment 4 below.*

GEH Response:

See the comment 4 response below.

3. *Regarding staff comment 3 from November 14, 2012, the staff does not accept the data presented in Table 7.3 as evidence that a* [[ ]]. *The staff also noted an apparent error in Table 7.3 that may be indicative of a problem with the* [[ ]] *This is not typical, and requires explanation. The staff requests that GEH review their calculations for possible errors in the* [[ ]], *and either correct the data or provide a quantitative explanation for the result. The staff will re-assess GEH's claim that* [[ ]] *after receipt and review of the requested additional information.*

<u>GEH Response</u>:

[[ ]] as part of developing the revised response to RAI 3.9-286. [[ ]] are given in Table 2A and plotted in Figure 3A for the configuration 10 combined load case at [[ ]] It can be seen that when the [[ ]] red curve in Figure 3A) [[ ]] purple curve in Figure 3A) presents the expected results, i.e., [[ ]] as shown in Figure 4A. Therefore, the [[ ]]

[[

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Figure 3A - [[ ]]

[[

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Figure 4A - [[

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4. *Regarding staff comment 4 from November 14, 2012, the staff cannot determine if any of the examples of* [[ ]]. *The staff requests that GEH clarify whether Method 3 has been used in any prior production analyses of steam dryers for* [[ ]] *evaluation.*

   If Method 3 has been implemented in a production analysis, the staff requests that GEH provide the following information for a representative case:

   a. *sketch of the joint geometry analyzed, with dimensions.*
   b. *a picture of the* [[ ]], *with element dimensions.*
   c. *a discussion of how the analyzed mesh size was determined to be adequate.*
   d. *a comparison of the Method 2 and Method 3 predictions of alternating peak stress intensity.*

<u>GEH Response</u>:

The solid submodel approach [[ ]] The example below is an application of the solid submodel approach at a high stress location in [[ ]]

Figure 5A shows the [[ ]]
A solid submodel was built [[ ]] Figure 6A provides an overview of this submodel [[ ]]

[[

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Figure 5A - [[ ]]

[[

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Figure 6A - [[ ]]

[[

]] and are presented in Table 3A. Per the revised response to RAI 3.9-277, [[
]] In this submodel analysis, [[

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[[

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Figure 7A - [[ ]]

[[

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Figure 8A - [[ ]]

Table 3A - [[

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[[						
						]]

Table 4A- [[ ]]

[[						
						]]

5. *Regarding staff comment 5 from November 14, 2012, GEH has concluded that the results presented in the response for the* [[ ]]*element sizes are not reliable, because the element size is too large to model shell membrane plus bending behavior for configurations 8, 9, and 10. To assist the staff in evaluating the reliability of Method 3 for the smallest element size used in the study, the staff requests that GEH apply Method 3 to configuration 1,* [[ ]] *Provide the following information:*

   a. *the* [[ ]] *of both fillet welds,*

   b. *the 6 element coordinate stresses (3 normal, 3 shear) in all of the* [[ ]], *for both fillet welds.*

   c. *the* [[ ]]

   d. *the final Method 3 result for* [[ ]]

<u>GEH Response:</u>

The requested information for configuration 1, using [[ ]] is provided below for both fillet welds. [[ ]] mesh size model are pointed out in the provided information below.

For the requested information (d), the final [[ ]] and presented in Table 2 and Table 4 in the revised RAI 3.9-286 response.

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Figure 9A - [[

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[[

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[[

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Figure 10A: [[

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[[

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6. *Regarding staff comment 6 from November 14, 2012, as quantitative confirmation that the interface is modeled correctly, the staff requests that GEH tabulate the element stress component normal to the interface,* [[ ]], *and from both sides of the interface, for Configuration 9, Horizontal Force only loading,* [[ ]] *For this case, there are* [[ ]].

   Also, explain the statement: "Furthermore, there is [[ ]] *in the current steam dryer design." The staff requests that GEH identify whether* [[ ]] *has ever been used in production analyses. If so, provide a description of the application.*

<u>GEH Response</u>:

The nodal stress component normal to the interface (SX), [[ ]] are provided in Figure 11A. It can be found that the [[ ]]

"Furthermore, there is [[ ]] *in the current steam dryer design."*

This statement means that the [[ ]] in the current operating plant steam dryer design.

In production analysis, there is [[ ]] The situation closest to the above scenario was found in the [[ ]] for the BWR/6 replacement steam dryer and is shown in Figure 12A. As can be seen, there are [[ ]]

[[

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Figure 11A - [[

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[[

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Figure 12A - [[

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7. *Regarding staff comment 7 from November 14, 2012, GEH's explanation of the "dip" is insufficient. The staff requests that GEH provide the necessary numerical data to demonstrate the validity of the dip in the 'MEM + BEND' curve.*

   In addition, the staff notes that the stress intensity at any location, per the Code, is the largest of the absolute value of (σ_1 - σ_3), the absolute value of (σ_3 – σ_2), or the absolute value of (σ_2 – σ_1), [[
   ]] *calculated (as indicated in the response), the results presented do NOT represent the stress intensity. The staff requests that GEH address this, by either correcting the statement in the response if it is inaccurate, or correcting the numerical data if the calculation was performed incorrectly.*

<u>GEH Response</u>:

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[[

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[[ ]]

Figure 13A - [[

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Table 5A- [[

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[[						
						{3}]]

[[

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Figure 14A - [[

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8. *Regarding staff comment 8 from November 14, 2012, the staff noted that in Table 7.8, the* [[

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The staff requests that GEH explain this or correct the data in Table 7.8.

Also, the staff noted that the Method 1 results reported in Table 7.8 for Configuration 8 are not consistent with the Method 1, Configuration 8, results reported under RAI-285. The staff requests that GEH explain this or correct the data in Table 7.8

GEH response:

In the revised response to RAI 3.9-286, the [[

]] are presented in Tables 2 through 4 for [[

]]

[[

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The previous RAI 3.9-286 response has been superseded by the revised response. There was an error in Table 7.8 in the previous response as the Staff pointed out. In the revised response, the information has been verified to be the same as in the revised RAI 3.9-285 response when using the results from [[ ]] for revised RAI 3.9-286 response.

9. *Regarding staff comment 9 from November 14, 2012, the staff notes that the additional results in Figure 7.9, for* [[ ]], *and raises a question about* [[ ]]. *There is a very significant difference in the "TOTAL" plot between* [[ ]] *The staff sees no apparent reason for the significant difference. To assist the staff in its evaluation of this result, the staff requests that GEH submit plots similar to Figure 5.2C* [[ ]] *and Figure 7.9* [[ ]] *but for Horizontal Force Only loading. Include the* [[ ]] *that would be used by the* [[ ]]. *Submit this information for both fillet welds.*

GEH Response:

The requested information for configuration 8, [[ ]] is provided below for both fillet welds.

As discussed in the response to RAI 3.9-286 S01, Staff question #3, for the [[ ]] as the Staff pointed out in this question. [[ ]] as shown in Table 5 of the revised response to RAI 3.9-286.

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Figure 15A - [[

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Figure 16A - [[

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Figure 17A - [[

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Figure 18A - [[

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Figure 19A - [[

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Enclosure 3

MFN 13-075

Affidavit

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, **Jerald G. Head**, state as follows:

(1) I am the Senior Vice President, Regulatory Affairs of GE-Hitachi Nuclear Energy Americas LLC (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 13-075, Jerald G. Head (GEH) to U.S. Nuclear Regulatory Commission, entitled "NRC Requests for Additional Information (RAI) Related to the Audit of the Economic Simplified Boiling Water Reactor (ESBWR) Steam Dryer Design Methodology Supporting Chapter 3 of the ESBWR Design Control Document – GEH Revised Response to RAI 3.9-286 and Response to RAI 3.9-286 S01," dated September 27, 2013. The proprietary information in Enclosure 1, entitled "GEH Revised Response to RAI 3.9-286 and Response to RAI 3.9-286 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.

(3) In making this application for withholding and determination 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 qualifies 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, 975 F2d 871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F2d 1280 (DC Cir. 1983).

(4) The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a and (4)b. Some examples of categories of information that 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 GEH and/or other companies.

b. Information that, if used by a competitor, would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.

c. Information that reveals aspects of past, present, or future GEH customer-funded development plans and programs, that may include potential products of GEH.

d. Information that discloses trade secret and/or potentially patentable subject matter for which it may be desirable to obtain patent protection.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to the 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, not been disclosed publicly, and not been made available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary and/or confidentiality agreements that provide for maintaining the information in confidence. The initial designation of this information as proprietary information and the subsequent steps taken to prevent its unauthorized disclosure are as set forth in the following paragraphs (6) and (7).

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, who is the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or who is the person most likely to be subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited to 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 and/or confidentiality agreements.

(8) The information identified in paragraph (2) above is classified as proprietary because it communicates sensitive business information regarding commercial communications, plans, and strategies associated with future actions related to GEH's extensive body of ESBWR technology, design, and regulatory information.

(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 27th day of September 2013.

Jerald G. Head
GE-Hitachi Nuclear Energy Americas LLC