



# HITACHI

## Proprietary Notice

This letter forwards proprietary information in accordance with 10 CFR 2.390. Upon the removal of Enclosure 1, the balance of this letter may be considered non-proprietary.

## GE Hitachi Nuclear Energy

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MFN 12-051

Docket number: 05200010

June 13, 2012

Attn: David Misenhimer  
US Nuclear Regulatory Commission  
Washington, DC 20555-0001

**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 – Draft Response for RAI 3.9-280**

In regard to the Requests for Additional Information transmitted in your May 1, 2012 Letter, Reference 1, to support the NRC ESBWR Steam Dryer Methodology Audit conducted March 21–23, 2012, Docket 05200010, please find attached draft response for RAI 3.9-280.

Enclosure 1 contains the complete draft response, with proprietary information identified within brackets [[ ]], and designated in red and dotted underline text, to assist in identification. The proprietary information, as identified by GE Hitachi Nuclear Energy, Americas LLC., should be protected accordingly.

Enclosure 2 contains the draft response with the proprietary information redacted, and is acceptable for public release. Enclosure 3 provides an affidavit which sets forth the basis for requesting that Enclosure 1 be withheld from the public.

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HRO

If you have any questions concerning this letter, please contact Peter Yandow at 910-819-6378.

Sincerely,



Jerald G. Head  
Senior Vice President, Regulatory Affairs

Commitments: None

Reference:

1. Letter from USNRC to Jerald G. Head, GEH, Subject: Request for Additional Information Letter No. 414 related to ESBWR Design Certification Application (DCD) Revision 9, received May 1, 2012

Enclosures:

1. Draft Response for RAI 3.9-280 - Proprietary Version
2. Draft Response for RAI 3.9-280 – Non-Proprietary Version
3. Affidavit for MFN 12-051

cc: Glen Watford, GEH  
Peter Yandow, GEH  
Patricia Campbell, GEH  
Mark Colby, GEH  
Tim Enfinger, GEH  
Gerald Deaver, GEH  
eDRF Section: 0000-0147-3902

## **Enclosure 2**

**MFN 12-051**

### **Draft Response for RAI 3.9-280**

#### **NON-PROPRIETARY 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 shown here [[ ]].

#### **IMPORTANT NOTICE REGARDING CONTENTS OF THIS DOCUMENT**

##### **Please Read Carefully**

The information contained in this document is furnished solely for the purpose(s) stated in the transmittal letter. The only undertakings of GEH with respect to information in this document are contained in the contracts between GEH and its customers or participating utilities, and nothing contained in this document shall be construed as changing that contract. The use of this information by anyone for any purpose other than that for which it is intended is not authorized; and with respect to any unauthorized use, GEH makes no representation or warranty, and assumes no liability as to the completeness, accuracy, or usefulness of the information contained in this document

*GEH is requested to provide a description of the [[  
]], including a description of how the  
dimensions (length and thickness) of the layer plate elements, [[  
]], is determined. GEH is also requested to clearly  
describe the criterion for how the [[  
]], is determined.  
Additionally, GEH should address overlay shell elements concerns identified in  
letters from Entergy in support of the Grand Gulf EPU license amendment and [[  
]].*

## **GEH Response**

### **1. Response summary**

The steam dryer Finite Element Model (FEM) is primarily made of shell elements. There are dryer components, such as the [[  
]], which are modeled using solid elements. In order to properly transfer the moments between the shell elements and solid elements, [[  
]] are used to model the transition interface between the two types of elements.

As part of GEH's continuous improvement program, efforts have been applied to refine, standardize, and document the steam dryer analysis process. To this end, a study was performed to provide a firm basis for the appropriate [[  
]] applied in dryer finite element models. The results from the study (as shown in Figure 4) validate the [[  
]] used in the GGNS model. The overlay shell element is a modeling technique that the dryer team would apply to an ESBWR dryer model. This technique and the thickness criterion are part of the design process and controlled by internal procedures.

### **2. Response**

#### **2.1 Description of Susquehanna overlay elements**

In the Susquehanna Steam Electric Station (SSES) replacement dryer global Finite Element Model (FEM), [[

]] The skin shell elements are not included in the solution of the structural analysis. Therefore, these skin shell elements have no impact on the SSES dryer stress calculations.

[[

]]

**Figure 1: Skin Shell Overlay Elements in SSES Finite Element Model**

## 2.2 Description of GGNS overlay elements

In the GGNS FEM, [[

]] (see Figure 2). They are not used in the structural solution. There are no overlay elements used in the GGNS FEM other than those used for the [[ ]]

]] as described in previous GGNS RAI responses.

[[

]]

**Figure 2: Skin Shell Overlay Elements in GGNS Finite Element Model**

## 2.3 Criterion for [[ ]]

The steam dryer Finite Element Model (FEM) is primarily made of shell elements. There are dryer components, such as the [[ ]], which are modeled using solid elements. The shell elements have three translational and three rotational Degrees of Freedom (DOF) on each node. However, the solid elements do not have rotational DOFs. In order to properly transfer the moments between the shell elements and solid elements, [[ ]]

]] are used to model the transition interface between the two types of elements.

## Enclosure 2

## DRAFT RESPONSE FOR REVIEW

The Grand Gulf Nuclear Station (GGNS) replacement steam dryer design is based on the valid BWR/4 prototype replacement steam dryer (i.e. SSES). For the GGNS evaluation, modeling procedures were applied in a consistent manner with the prototype dryer model, in order to maintain consistency with the prototype end-to-end benchmarking results. Any significant changes in the modeling would potentially require a re-evaluation of the benchmark. The GGNS replacement dryer FEM was generated directly from the prototype replacement dryer FEM with only minor modifications due to design. The [[ ]] was kept the same as in the prototype dryer model for consistency.

As part of GEH's continuous improvement program, efforts have been applied to refine, standardize, and document the steam dryer analysis process. To this end, a study was performed to provide a firm basis for the appropriate [[ ]] applied in dryer finite element models. [[ ]]

]]

[[

]]

Figure 3: Cantilever Beam Finite Element Model

[[

]]

Figure 4: [[

]]



## Enclosure 2

## DRAFT RESPONSE FOR REVIEW

The results from the study (as shown in Figure 4) validate the [[  
]] used in the GGNS model. For example, [[  
]] transition elements were applied in the [[  
]], which is also consistent with prototype replacement dryer model. [[

]] Because the overlay shell thickness is most sensitive and critical to the predicted stresses at the high stress (limiting) location, which is [[  
]], the [[  
]] baseplate thickness was used as "plate thickness" in Figure 2. [[

]] Figure 2 gives [[  
]] This result confirmed the applicability of the [[  
]] used in the GGNS flow induced vibration analysis.

**3.0 DCD or LTR Impact**

No change is proposed for the DCD or referenced License Topical Reports.

**Enclosure 3**

**MFN 12-051**

**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 12-051, Mr. Jerald G. Head 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 –Draft Response for RAI 3.9-280," dated June 13, 2012. The proprietary information in enclosure 1, entitled "Draft Response for RAI 3.9-280 - 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 {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

GEH does not consider this document to be transmitted to the NRC as a record. Rather, the document is provided solely for purposes of facilitating NRC/GEH discussions in a timely manner. GEH will submit final responses using its normal process and include a separate affidavit accordingly. Providing this affidavit to cover proprietary information that the NRC may have in its possession for purposes of performing a review of information during said discussions is consistent with NRC guidance (see NRC MC 0620).

- (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.

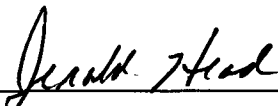
- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial 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 13<sup>th</sup> day of June 2012.

  
\_\_\_\_\_  
Jerald G. Head  
GE-Hitachi Nuclear Energy Americas LLC