



# 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

Jerald G. Head  
Senior Vice President, Regulatory Affairs

3901 Castle Hayne Road  
PO Box 780 M/C A-18  
Wilmington, NC 28402-0780  
USA

T 910 819 5692  
F 910 362 5692  
jerald.head@ge.com

MFN 12-058

Docket number: 05200010

September 18, 2012

U.S. Nuclear Regulatory Commission  
Document Control Desk  
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 3.9-287**

### 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

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 the draft response for RAI 3.9-287.

Enclosure 1 contains the complete 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.

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Enclosure 2 contains the 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.

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: No additional commitments are made in this response.

Enclosures:

1. Draft Response for RAI 3.9-287 - Proprietary Version
2. Draft Response for RAI 3.9-287 - Public Version
3. Affidavit for MFN 12-058

cc: David Misenhimer, NRC  
Glen Watford, GEH  
Tim Niggel, GEH  
Peter Yandow, GEH  
Patricia Campbell, GEH  
Mark Colby, GEH  
Tim Enfinger, GEH  
Gerald Deaver, GEH  
David Keck, GEH  
eDRF Section: 0000-0147-3914

**Enclosure 3**

**MFN 12-058**

**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 12-058, 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 3.9-287," dated September 18, 2012. The proprietary information in enclosure 1, entitled "Draft Response for RAI 3.9-287 - 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.
- (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

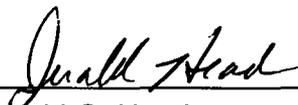
evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

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 18<sup>th</sup> day of September, 2012.

  
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Jerald G. Head  
GE-Hitachi Nuclear Energy Americas LLC

**Enclosure 2**

**MFN 12-058**

**Draft Response for RAI 3.9-287**

**Public Version**

**DRAFT RESPONSE FOR REVIEW**

**NRC RAI 3.9-287**

*GEH is requested to describe the structural finite element model for the SSES steam dryer for use in benchmarking the ESBWR steam dryer analysis in support of the ESBWR design certification application. GEH should address concerns identified during review of the Grand Gulf EPU license amendment request and issues raised during the March audit. For example, GEH should discuss (a) resolution of unconnected nodes, (b) partial penetration welds, (3) dummy elements, and (d) load transfer concerns. Additionally, GEH is requested to update the dryer stresses to address the recently found errors (e.g., disconnected nodes, partial penetration welds, use of overlay) in the finite element model of SSES.*

**GEH Response**

**Summary:**

The NRC staff's concerns outlined in the RAI have been addressed for GGNS, which is provided as a validation of steam dryer strain and acceleration predictions in response to RAIs 3.9-269 and 270. The identified issues do not impact the benchmark results for the steam dryer "global model" for either SSES or GGNS.

**Detailed response:**

On March 21-23, 2012, the U.S. Nuclear Regulatory Commission (NRC) conducted an audit at the General Electric Hitachi (GEH) facility in Wilmington, NC, to review the GEH documents pertaining to the ESBWR Licensing Topical Reports (LTRs) that support the steam dryer evaluation methodology. In early discussions concerning the requests for information issued after the audit, GEH indicated that PBLE evaluations of the Susquehanna Steam Electric Station (SSES) replacement dryer could be provided as an alternate validation demonstration in order to resolve concerns associated with Quad Cities Unit 2 benchmarks. As work progressed to support the Grand Gulf Nuclear Station (GGNS) power uprate during the summer of 2012, it became apparent that plant data obtained from the GGNS would provide a current benchmark for the PBLE methodology. Rather than reanalyzing the data from SSES, it made sense to use the GGNS data and supporting analysis as the most current benchmark available to address all NRC staff concerns. Given that the GGNS data are comprehensive, address NRC questions and concerns, and therefore provide a more useful benchmark for the ESBWR steam dryer, GEH does not intend to revise the SSES analysis and benchmarking contained in NEDC-33408 Supplement 1P-A, Reference 1.

## DRAFT RESPONSE FOR REVIEW

RAI 3.9-287 is written in the context of SSES; however, the objective is to provide model information relevant to the requested benchmark, so there is an implied connection with RAIs 3.9-269 and 270. As discussed in the GEH (combined) response to RAI 3.9-269 and 270, the GGNS replacement steam dryer evaluation, References 2 and 3, has been used to provide a validation of the ESBWR steam dryer analysis methodology in support of the ESBWR design certification application. The issues listed in the staff's request for information have been addressed and are summarized below.

### Unconnected nodes

The disconnected nodes in the GGNS structural Finite Element (FE) model are addressed in the responses to EMCB-GGNS1-SD-4-RAI-08, Reference 4, and EMCB-GGNS1-SD-6-RAI-02, Reference 5. In the response to Request for Additional Information (RAI) EMCB-GGNS1-SD-4-RAI-08, GEH re-verified the structural model due to concerns associated with disconnected nodes, mesh quality and element shapes, as well as presented the results of mesh density convergence studies. The response to EMCB-GGNS1-SD-6-RAI-02 contained additional information regarding mesh convergence studies and disconnected nodes. The results presented in the RAI responses show that the predicted steam dryer frequency response is not significantly affected by the disconnected nodes. Given that the initial GGNS model was based on the SSES model, GEH believes that any reanalysis of the SSES model would provide similar results.

### Partial Penetration Welds

The response to RAI 3.9-279 discusses partial penetration welds in relation to FE model benchmarks and fatigue margin evaluations. In general, dryer welds are considered in the analysis process for the steam dryer fatigue assessment, but the presence of partial penetration welds in a dryer does not impact the global FE model benchmark comparisons. The dryer global model does not contain explicit modeling of detailed features such as welds, so the RAI 3.9-279 response discussion is general and applicable to either GGNS or SSES.

## DRAFT RESPONSE FOR REVIEW

### “Dummy Elements”

The NRC staff’s request for information EMCB-GGNS1-SD-7-RAI-04 during the GGNS review made reference to “fictitious overlay elements.” A response was provided in Reference 6. As explained in that response, these elements are not used in the structural solution and do not have any impact on the stresses determined for either SSES or GGNS.

### Load Transfer Concerns

As part of the GGNS replacement steam dryer review, GEH addressed load mapping concerns. The response to an audit action item (i.e., “show integrated forces and moments over regions and edges of the model”) is given in Reference 7. Responses to additional, follow-on questions (EMCB-GGNS1-SD-AA3-RAI-02) are provided in Reference 8. The responses provided in the references demonstrate that there are no unresolved concerns related to the load mapping (transfer) process used in PBLE evaluations.

### Applicability to Susquehanna

The SSES benchmark for PBLE supports the ESBWR design certification as a demonstration of the dryer analysis methodology as described in NEDC-33408 Supplement 1P-A, Reference 1. Furthermore, SSES is also relevant to benchmark discussions due to its similarity with GGNS. The SSES replacement steam dryer was the prototype<sup>1</sup> for the GGNS dryer [1]. [[

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<sup>1</sup> The term “prototype” is applied in the context of Regulatory Guide 1.20, “Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing,” Revision 3, March 2007.

<sup>2</sup> [[

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## DRAFT RESPONSE FOR REVIEW

]] Confirmatory SSES-specific evaluations corroborate the GGNS results, i.e., that the predicted steam dryer frequency response is not significantly affected by the (relatively few) disconnected nodes.

### References

1. NEDC-33408 Supplement 1P-A, *ESBWR Steam Dryer – Plant Based Load Evaluation Methodology Supplement 1*, Class III, Revision 2, October 2010.
2. NEDC-33601P, Engineering Report – *Grand Gulf Replacement Steam Dryer Fatigue Stress Analysis Using PBLE Methodology*, Class III, Revision 1, February 2012.
3. NEDC-33765P, *Grand Gulf Nuclear Station Replacement Steam Dryer Power Ascension Monitoring – Current Licensed Thermal Power Test Report*, Class II, Revision 0, July 2012.
4. Letter GNRO-2012/00011, Michael Krupa (Entergy) to the US NRC Document Control Desk, “Request for Additional Information Regarding Extended Power Uprate Grand Gulf Nuclear Station, Unit 1 Docket No. 50-416 License No. NPF-29,” February 20, 2012.
5. Letter GNRO-2012/00018, Michael Krupa (Entergy) to the US NRC Document Control Desk, “Request for Additional Information Regarding Extended Power Uprate Grand Gulf Nuclear Station, Unit 1 Docket No. 50-416 License No. NPF-29,” March 21, 2012.
6. Letter GNRO-2012/00023, Michael Krupa (Entergy) to the US NRC Document Control Desk, “Request for Additional Information Regarding Extended Power Uprate Grand Gulf Nuclear Station, Unit 1 Docket No. 50-416 License No. NPF-29,” April 5, 2012.
7. Letter GNRO-2011/00088, Michael Krupa (Entergy) to the US NRC Document Control Desk, “Request for Additional Information Regarding Extended Power Uprate Grand Gulf Nuclear Station, Unit 1 Docket No. 50-416 License No. NPF-29,” October 10, 2011.
8. Letter GNRO-2011/00107, Michael Krupa (Entergy) to the US NRC Document Control Desk, “Request for Additional Information Regarding Extended Power Uprate Grand Gulf Nuclear Station, Unit 1 Docket No. 50-416 License No. NPF-29,” November 28, 2011.

### DCD Impact

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

**DRAFT RESPONSE FOR REVIEW**

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**Figure 1 – SSES mode shape at [[                      ]] (corrected model)**      ]]

**Figure 2 - SSES mode shape at [[                      ]] (original model)**      ]]

**DRAFT RESPONSE FOR REVIEW**

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[[ **Figure 3 – SSES mode shape at [[            ]]** (corrected model) **]]**

**Figure 4 – SSES mode shape at [[            ]]** (original model) **]]**