



# HITACHI

## GE Hitachi Nuclear Energy

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### ~~Proprietary Notice~~

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

MFN 12-046

Docket number: 05200010

May 17, 2012

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

**Subject: NRC Requests for Additional Information 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 – RAI 3.9-272**

In regard to the Requests for Additional Information that you have transmitted in your May 1, 2012 Letter, Reference 1, to support the NRC ESBWR Steam Dryer Methodology Audit conducted March 21 – 23, 2012 Docket 5200010, please find attached draft response for RAI 3.9-272. Enclosure 1 contains proprietary information. The proprietary information is contained within brackets [[ ]] and is designated in red and underlined to assist in identification. These draft RAIs contain proprietary information identified by GE Hitachi Nuclear Energy, Americas LLC., and should be protected accordingly. It is our understanding that these documents will be either destroyed after the NRC has completed the audit report, or protected from disclosure. An affidavit (provided as Enclosure 3) dated May 17, 2012, sets forth the basis for requesting that Enclosure 1 be withheld.

In the event that further revisions to requested documents, or other documents, are required to support post audit activities, GEH requests that the enclosed affidavit apply accordingly. A separate cover letter and affidavit will be provided for the final submitted responses.

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

Sincerely,

A handwritten signature in black ink, appearing to read "Jerald G. Head". The signature is fluid and cursive, with the first name "Jerald" being more prominent than the last name "Head".

Jerald G. Head  
Senior Vice President, Regulatory Affairs

Commitments: None

Reference:

1. MFN 12-037 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 Responses to RAI 3.9-272 - Proprietary versions
2. Draft Responses to RAI 3.9-272 - Public versions
3. Affidavit

cc: Glen Watford, GEH  
Peter Yandow, GEH  
Patricia Campbell, GEH  
Mark Colby, GEH

**Enclosure 2**

**MFN 12-046**

**Responses to NRC Request for**

**Additional Information Letter No. 414**

**Related to ESBWR Design Certification Application**

**Reactor Vessel Internals**

**RAI Numbers 3.9-272**

**Public**

*RAI 3.9-272*

*GEH is requested to submit the performance and results of the ongoing strain gage calibration studies, with adjustments to the bias errors and uncertainties for strain gages. Accordingly, GEH is requested to specify applicable ESBWR Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) to confirm the accuracy of the strain gages prior to plant startup.*

**GEH Response**

RAI Response Summary

As a result of testing performed at the strain gage manufacturer's facility in Japan, GEH has determined [[

]] The final stress table will be included in the Power Ascension Test Plan (PATP) and will be used in determining the acceptance limits for the startup. No changes are proposed for the DCD or referenced LTRs.

1. Review of the Installation Procedure

In response to Round 5 RAI 09 (the response to EMCB-GGNS1-SD-4-RAI-09 provided in Reference 2), the following action was defined by GEH: [[

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GEH visited the strain gage manufacturer's facility (Kyowa) in Japan to review vendor recommended installation procedures for welding the strain gages to the steam dryer. GEH reviewed with the manufacturer the installation instructions and best practices for ensuring consistent installation of the strain gages, including taking part in an exercise to weld "dummy" strain gages onto test surfaces while under the manufacturer's oversight. Applicable lessons learned were incorporated into the GEH

welding procedure specification. Furthermore, knowledge was passed to the welders by holding pre-job briefs and discussing the proper technique for applying the gages, emphasizing the uniform placement of spot welds at approximately 0.7 – 0.8 mm intervals. Afterwards, the welders practiced on shims until peel tests were successfully completed. Quality Control personnel were present to accept the weld process.

GEH also reviewed with Kyowa the calibration process used to establish the Gage Factors (GF) for the strain gages. For each strain gage order, Kyowa fabricates five additional gages for the purpose of GF measurement. This testing is performed on the sample strain gages prior to the attachment of the Mineral-Insulated (MI) and soft cables, such that just the sensor portion (flange and capsule) is tested. The GF is tested in accordance with NAS942 standards at room temperature. The capsule gage is welded in tension in the middle of the test beam to get a positive (+) output. A displacement sensor on top of the apparatus measures the displacement of the beam. A bending strain of  $1000 \times 10^{-6}$  is then applied to the test beam and the gage output is measured. This is done for each of the five strain gages. The individual GFs are then calculated from the mechanical strain of the test apparatus and the strain gage output. The GF value assigned to the lot is based on these five measured gages. Since the finished strain gages include the MI cable, soft cable and compensation resistors, the GF is adjusted to reflect this configuration and is included on the calibration sheets supplied with the gages along with information on the temperature dependence of the gage factor.

To demonstrate that [[

]]

Table 1  
Comparison of [[


]]

The differences in Table 1 range from approximately [[

]]

## 2. Review of the Prototype Strain Gage Measurements

To assess the impact of the [[

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Because of the variability in the manufacturing of strain gages, [[

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<sup>1</sup> [[

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**Table 2**  
Comparison of [[


]]

3. Impact of the [[



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## 5. ESBWR Applicability

The ESBWR FE model will incorporate the same bias and uncertainty considerations as discussed above. This will be determined during the new benchmark being performed to address RAI 3.9-269.

## 6. Applicable ITAAC and Tier 2 References

Section 3L.4.6, "Instrumentation and Startup Testing", on the DCD discusses the ESBWR Steam Dryer startup tests specifically state *"Strain gages and accelerometers are used to monitor the structural response during power ascension."* And *"The steam dryer startup test and monitoring power ascension limits are developed on a similar basis as the monitoring limits used for recent extended power uprate replacement steam dryers."* Therefore the lessons learned from ongoing EPU projects will be used during the ESBWR PBLE methodology implementation. That section further states *"The strain gages, accelerometer and pressure transducers are field calibrated prior to data collection and analysis."*

Section 2.1.1, Reactor Pressure Vessel and Internals, of DCD Tier 1, Items (12), (13) and (14) all describe the strain gauges installed on the Steam Dryer. ITAAC 12, and 13 are the specific ITAAC related to the strain gauges. Section 3.9.2.3, which is designated as Tier 2\*, describes the performance criteria of the strain gauges. Section 3.9.2.4 further amplifies the Initial Startup testing requirements including a discussion of the process, using the guidance of Regulatory Guide 1.20, for analyzing and using the information from these strain gauges.

In addition Section 3.9.2.4 of the DCD, Tier 2 states *"The Combined License (COL) Applicant will classify its reactor per the guidance in RG 1.20 and provide a milestone for submitting a description of the inspection and measurement programs to be performed (including measurement locations and analysis predictions) and the results of the vibration analysis, measurement and test program (COL 3.9.9-1-A)."* COL item **3.9.9-1-A Reactor Internals Vibration Analysis, Measurement and Inspection Program** states:

*The COL Applicant will classify its reactor per the guidance in RG 1.20 and provide a milestone for submitting a description of the inspection and measurement programs to be performed (including measurement locations and analysis predictions) and the results of the vibration analysis, measurement and test program (Subsection 3.9.2.4).* This description of the inspection includes analysis predictions and the results of the tests which would address accuracy of the strain gauges.

## 7. ITAAC Closure Plan

The ESBWR Design-Centered Working Group will develop an ITAAC Closure Plan (also referred to as an ITAAC Completion Plan). As defined in NEI 08-01, this Plan will address how to execute and document each ITAAC, including the methods to be used to perform required inspections, tests, and analyses, and the documentation necessary to demonstrate that specified acceptance criteria are met. Through this process, each ITAAC will be reviewed, activities necessary to complete the ITAAC will be identified, and the types of documentation that will need to be created will be listed. In addition, a schedule will be developed that will identify pre-cursor activities that relate to an ITAAC or must be completed before certain actions can be taken. Through this process, relationships between different ITAAC will become evident. For example, as discussed in response to this RAI, it is clear that Section 2.1, ITAACs 12 and 13 are the specific ITAAC related to the strain gauges use and calibration. Section 3L.4.6 requires these instruments to be calibrated prior to use.

## 9. Conclusion

In conclusion, the above statements provide a design basis process to document the calibration of these instruments.

## 10. DCD and LTR Impact

No changes will be made to the DCD or applicable LTRs.

## 11. References:

1. NEDC-33601P, Engineering Report – Grand Gulf Replacement Steam Dryer Fatigue Stress Analysis Using PBLE Methodology, Class III, Revision 1, February 2012.
2. Entergy Operations, Inc., letter to the NRC (GNRO-2012/00009), Response to NRC Request for Additional Information Regarding Extended Power Uprate, February 15, 2012.

**Enclosure 3**

**MFN 12-046**

**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 and have determined that it should be withheld from public disclosure for reason(s) identified in paragraph (4).
- (2) The information sought to be withheld is contained in GEH draft responses to NRC Requests for Additional Information, as provided, in the NRC Letter "Requests for Additional Information Letter NO. 414 Related To ESBWR Design Certification Application (DCD) Revision 9." The information includes draft documents transmitted electronically as attachments to an electronic message from Peter Yandow (GEH) to David Misenhimer (NRC), with the subject "Draft ESBWR SD RAI 3.9-272", May 17, 2012. GEH considers parts or all of these documents to be proprietary and therefore are so delineated by a [[dotted underline inside double square brackets<sup>{3}</sup>]] and are GEH proprietary information. In each case, the superscript notation <sup>{3}</sup> refers to Paragraph (3) of this affidavit, which provides the basis for this proprietary information. GEH does not consider these documents to be transmitted to the NRC as records. Rather, the documents are provided solely for purposes of facilitating the referenced NRC/GEH discussions in a timely manner and GEH expects that the documents will be returned to GEH at the end of the discussions. This affidavit also covers any other proprietary documents that GEH may provide to the NRC during further discussions related to the subject RAI, while those documents may be in the possession of the NRC for purposes of the discussion. 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.

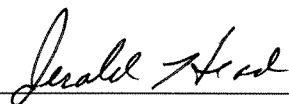
- (8) The information identified in paragraph (2) above is classified as proprietary because it communicates sensitive business information regarding commercial communications, plans, and strategies associated with future actions related to GEH's extensive body of technology, design, and regulatory information.
- (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 17<sup>th</sup> day of May 2012.

  
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Jerald G. Head  
GE-Hitachi Nuclear Energy Americas LLC