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Proprietary Notice

This letter forwards proprietary information in accordance with 10CFR2.390. Upon the removal of Enclosures 1 and 2, the balance of this letter may be considered non-proprietary.

MFN 12-038, Revision 1

Docket number: 05200010

June 1, 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 3.9-273

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 response for RAI 3.9.273.

Enclosures 1 and 2 contain proprietary information. The proprietary information is contained within brackets [[]] and designated in red and dotted underline text, to assist in identification. This RAI contains proprietary information identified by GE Hitachi Nuclear Energy, Americas LLC., and should be protected accordingly. An affidavit (provided as Enclosure 4) sets forth the basis for requesting that information identified in Enclosures 1 and 2 be withheld.

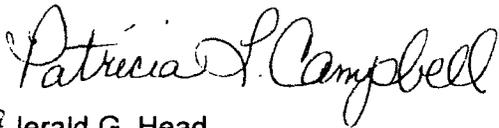
GEH has not submitted a nonproprietary version of Enclosure 2 in accordance with NRC information Notice 2009-07, Requirements for Submittals, (2): "In instances in which a nonproprietary version would be of no value to the public because of the extent of the proprietary information, the agency does not expect a nonproprietary version to be submitted." Enclosure 3 contains the redacted version of the response contained in Enclosure 1

JDG8
NRD

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

I declare under penalty of perjury that the foregoing information is true and correct to the best of my knowledge, information, and belief.

Sincerely,



for 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. Response to RAIs 3.9.273– Proprietary version
2. GENE-0000-0083-7694-R4 - Proprietary Document
3. Response to RAIs 3.9.273 - Public version
4. Affidavit

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

MFN 12-038, Rev 1
Enclosure 3

Enclosure 3

MFN 12-038, Revision 1

Response for RAI 3.9-273

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.

NRC RAI 3.9.273

GEH is requested to describe the performance and results of the hammer tests on the SSES steam dryer, and the lessons learned for the FE model of the steam dryer.

GEH Response:

The information below has been extracted from Reference 1, GENE-0000-0083-7694-R4, "Test and Analysis Report SSES New Design Steam Dryer Unit #1 Replacement Dryer Experimental Modal Analysis and Correlation with Finite Element Results" and provides a summary of the performance and results of the hammer tests on the SSES steam dryer. Lessons learned are discussed in section 4.0 of this summary.

1.0 Hammer Test Performance and Tests Summary

An experimental modal analysis was performed on the new design replacement dryer intended for the Susquehanna Steam Electric Station (SSES) Unit 1, and the results were compared to finite element analysis results on a frequency basis, on a Frequency Response Function (FRF) basis and on a mode shape basis. The finite element analysis included a modal analysis and, using those modes from the modal analysis, a mode superposition to obtain FRFs that match the input and response points of the test data.

In terms of frequencies, the finite element model component frequencies of the skirt and outer hoods are in good agreement with the test component frequencies, with most differences being less than [[]] Given the size and complexity of the model, **some** generalizations about the agreement are needed.

- The results from the outer hood and the end plates/closure plates indicate that the actual hardware is slightly stiffer than the FE model but generally has frequencies that differ less than [[]] between test results and FE results
- The results for the top indicate that the top appears stiffer in the FE model than in the tested components
- The skirt has frequencies that appear to match most closely between test and FE

In terms of FRF comparisons, the various components examined showed good agreement in trends and levels between summation FRFs for test and FE for that specific component.

In addition to determining the natural frequencies and mode shapes, the hammer test responses are used to experimentally determine damping values on the skirt and hood at medium water level. The purpose of the experimentally determined damping values was to validate in terms of general range the damping values used in the stress prediction analyses. The damping measurement results showed a range of damping values which validate the damping values used for structural response analyses: [[
]].

From the above discussion on the good agreement of the frequency comparisons and the FRF comparisons, it is concluded that the impact hammer test results verify that the finite element model used for dryer design calculations is sufficiently dynamically similar to the as-built dryer for engineering purposes.

2.0 Test Purpose

The testing and analysis were defined to accomplish the following main objective:

- Determine if the lowest or first dominant frequencies of major components of the new design steam dryer are within [[]] of the frequencies predicted by finite element analysis for the dryer configuration at medium water level

The specific purpose of the testing, the experimental modal analysis, was to identify the as-built frequencies and mode shapes of the dryer's key components at [[]].

These as-built frequencies and mode shapes were then compared with mode shapes, frequencies and FRFs generated from the finite element model of the dryer.

The program had several side objectives as well:

3. To experimentally measure damping values on the skirt and hood at Medium Water Level to validate assumptions used in the stress prediction analyses
4. To determine the differences in frequency for specific modes of the skirt and the outer hoods between test and FE.

3.0 Test Configuration

The replacement dryer for Unit 1 at SSES was tested in the Unit 1 Equipment Pit on the Refueling Floor at SSES near Berwick, Pennsylvania. The testing was performed in February 2008. For the experimental modal test, the steam dryer was supported in a water tank by 4 tripods with extensions that fit under the support ring. These tripods were welded to metal plates. The tops of the tripods and their plates were connected to one another by beams. The tripod extensions fit under the support ring at azimuths of 4°, 94°, 184° and 274°. A circular tank with a liner was used to hold water for the testing with water. The tank's inner diameter was 251 inches. The tank walls were carbon steel 1.0 inch thick, 60 inches tall. The tank was formed from 4 curved sections or arcs bolted together by flanges at the joints between the sections. Testing was performed at 2 different water levels:

3. Dry – no water (for Skirt, Ring and part of 0° side)
4. Wet (also referred to as Medium Water Level) – water at [[]] inches below the top of the support ring of the dryer.

Both the test frame and the tank were resting on the equipment pit floor. There was no rigid attachment (by bolts or weld) of the test frame or the tank to the equipment pit. All testing was performed at [[]] conditions at the test site, with the temperature ranging from [[]].

[[]] sensors were located at various elevations and quadrants of the steam dryer including tie bars and the dryer skirt.

damping value ranges of [[

]] These damping measurement ranges provide a starting point for arriving at appropriate damping values to be used for structural response analyses under reactor conditions

The tests verified the FE FRFs predicted results for the dryer correlated with the test FRF within [[]].

5.0 References:

2. GENE-0000-0083-7694-R4 "Test and Analysis Report SSES New Design Steam Dryer Unit #1 Replacement Dryer Experimental Modal Analysis and Correlation with Finite Element Results"

6.0 DCD and LTR Impact

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

Enclosure 4

MFN 12-038, Revision 1

Affidavit

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, **Patricia L Campbell**, state as follows:

- (1) I am the 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 enclosures 1 and 2 of GEH's letter MFN 12-038, Revision 1 in response 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." GEH considers parts or all of these documents to be proprietary and therefore are so marked with [[dotted underline inside double square brackets^{3}]]. 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 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 1st day of June 2012.



Patricia L. Campbell
GE-Hitachi Nuclear Energy Americas LLC