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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 08-946 Revision 1

Docket No. 52-010

March 30, 2009

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Revised Response to Portion of NRC Request for Additional Information Letter No. 243 – Related To Design Control Document (DCD) Revision 5 – RAI Number 4.2-33**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by the Reference 1 NRC letter. GEH response to RAI Number 4.2-33 is addressed in Enclosures 1, 2 and 3. The original response was submitted in the Reference 2 GEH letter. This revised response supersedes the Reference 2 GEH response.

Enclosure 1 contains GEH proprietary information as defined by 10 CFR 2.390. GEH customarily maintains this information in confidence and withholds it from public disclosure. Enclosure 2 is the public version, which does not contain proprietary information and is suitable for public disclosure.

The affidavit contained in Enclosure 3 identifies that the information contained in Enclosure 1 has been handled and classified as proprietary to GEH. GEH hereby requests that the information in Enclosure 1 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 10 CFR 9.17.

If you have any questions or require additional information, please contact me.

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

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NRO

References:

1. MFN 08-689 Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 243 Related To Design Control Document (DCD) Revision 5,* dated September 4, 2008
2. MFN 08-946, Letter from Richard E. Kingston to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 243 - Related To Design Control Document (DCD) Revision 5 – RAI Number 4.2-33*, dated December 8, 2008.

Enclosures:

1. MFN 08-946 Revision 1 – Revised Response to Portion of NRC Request for Additional Information Letter No. 243 – Related To Design Control Document (DCD) Revision 5 – RAI Number 4.2-33 – GEH Proprietary Information
2. MFN 08-946 Revision 1 – Revised Response to Portion of NRC Request for Additional Information Letter No. 243 – Related To Design Control Document (DCD) Revision 5 – RAI Number 4.2-33 – Public Version
3. MFN 08-946 Revision 1 – Revised Response to Portion of NRC Request for Additional Information Letter No. 243 – Related To Design Control Document (DCD) Revision 5 – RAI Number 4.2-33 – Affidavit

cc: AE Cubbage USNRC (with enclosures)
JG Head GEH/Wilmington (with enclosures)
DH Hinds GEH/Wilmington (with enclosures)
eDRF 0000-0099-3538

Enclosure 2

MFN 08-946 Revision 1

Revised Response to Portion of NRC Request for Additional Information Letter No. 243 Related to ESBWR Design Certification Application

RAI Number 4.2-33

Public Version

NRC RAI 4.2-33

Is GE14E water rod capable of withstanding design handling loads?

NEDE-33240P, Please demonstrate that the GE14E water rod is capable of withstanding design handling loads with proper consideration of the [[ ]]. The current assessment, which did not specifically address the [[ ]] ksi which is approximately [[ ]] of the reported yield stress.

GNF Response

I. Purpose

This study demonstrates the mechanical design adequacy of the GE14E water rod with respect to shipping and handling loads, specifically [[ ]], as defined in shipping and handling specification and analyzed per applicable procedures.

A revision has been made to this analysis to incorporate a [[ ]]. In the process of making this change, material properties dependent on the stress strain curve will be appropriately adjusted. In using the Bilinear Isotropic Hardening stress strain curve, the yield stress and the tangent modulus of the water rod material property are affected. The update will concurrently correct an incorrect tangent modulus conversion. The original conversion value was supplied for information only, and it in no way affected the original analysis. As a simplification to the revision, both end plugs were suppressed in this run. This in no way affected the results.

II. References

1. ANSYS Workbench 11.0, SP1, SAS IP, Inc, 2006.
2. Autodesk Inventor Professional 2008.

III. Assumptions

The lower end of the water rod is assumed to be at elevation 0 mm. This is approximately [[ ]] above its location as defined in the GE14E water rod design. This affects the location of each spacer by an equal amount but has a negligible effect on the results of this analysis.

The water rod used in this analysis is the theoretical design of the GE14E water rod. The upper and lower end plugs are suppressed during ANSYS Simulation. Additional assumptions are included within this document.

[[

]]

The water inlet holes at the lower end of the water rod have [[ ]] diameter in the model instead of the [[ ]] as specified in the drawing for the GE14 water rod. This is a conservative difference.

IV. Results

[[				
				]]

V. Conclusion

This finite element analysis of the GE14E water rod demonstrates that the design adequately sustains the design handling loads, because buckling does not occur under the applied [[ ]].

VI. Discussion

When the water rod is subjected to maximum handling and shipping loads, the stress due to axial compression is of primary concern. Because of the long, thin geometry of the water rod, it is necessary to evaluate the buckling behavior in compression. The following load from the shipping and handling specification is considered. All dimensions applied are nominal. The load has been chosen, because it is the current handling requirement, which all current fuel designs fulfill.

[[			]]

Beginning of life: Water Rod Buckling

[[

]] The water rod buckling analysis is performed in ANSYS 11.

The force of each spring was calculated by determining the nominal, minimum, and maximum spring constants. These values were calculated from supplied characteristics of the spring shear modulus modified for the applicable handling temperature of [[ ]].

[[

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Axial Coordinates: The water rod was modeled from the lower end plug to the top of the water rod.

[[		
		]]

Solid Model: The solid models of the [[ ]], upper end plug, and lower end plug were generated using AutoDesk Inventor 2008. To aid in the application of constraints using ANSYS, the [[ ]]. The [[ ]], to reduce run time.

[[

]]

Single Piece Water Rod

ANSYS Workbench Model: Both the end plugs and the water rod were modeled in Inventor. Once imported into Design Modeler of ANSYS Workbench, [[

]]. The simplified model was then imported into Simulation, where it was meshed, constraints were defined, material properties were specified, and loads were applied. The upper and lower end plugs were suppressed in the final analysis, and the water rod surfaces were given a thickness of [[ ]].

The force was applied remotely to the end of the water rod. [[

]] with respect

to the local coordinate system. A rigid part was automatically modeled between the area, where the remote force was applied, and the water rod edge.

The model was constructed of ANSYS SOLID187 10-node and SHELL181 4-node elements. Contacts were modeled with CONTA174 8-node elements and TARGE170 elements.

[[

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Lower Water Rod Section

[[

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Center Water Rod Section

[[

]]

Upper Water Rod Section

Material Properties: Material properties were determined from applicable material handbook sections. [[

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The following material properties were inserted into a Bilinear Isotropic Hardening Curve at the specified strain rate. [[

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[[

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Boundary Conditions:

- [[
-
-
-
-
-]]

[[		
		]]

Water Rod Characteristics:

[[		
		]]

Water Rod Stresses:

[[

]] A static structural analysis was run in ANSYS to determine the equivalent stress throughout the water rod. [[

]]. However, this was a very localized stress that did not compromise the integrity of the water rod.

[[

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Water Rod Hole Stress – Bilinear Isotropic Hardening

Buckling Capability:

A linear buckling analysis was performed in ANSYS at the applied load. The buckling load was found to be [[ ]] times the applied load, equaling approximately [[ ]]. No buckling occurred in this analysis.

[[

]]

Water Rod Deformation due to Buckling

Hoop Stress Confirmation:

To confirm the validity of the model, an internal pressure of 6.8948E-2 MPa was applied to a portion of the large diameter section, and the resulting stresses were calculated using ANSYS and a hoop stress calculation. ANSYS calculated a hoop stress of [[ ]]. There was a [[ ]] between the stress measured by ANSYS and that measured by the hoop stress equation, demonstrating the validity of the model.

[[

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[[

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DCD Impact

No changes to the DCD or the subject LTR will be made in response to this RAI.

Enclosure 3

MFN 08-946 Revision 1

Revised Response to Portion of NRC Request for

Additional Information Letter No. 243

Related to Design Control Document (DCD) Revision 5

RAI Number 4.2-33

Affidavit

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, David H. Hinds, state as follows:

(1) I am Manager, New Units Engineering, GE Hitachi Nuclear Energy ("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 08-946 Revision 1, Mr. Richard E. Kingston to U.S. Nuclear Energy Commission, entitled "*Revised Response to Portion of NRC Request for Additional Information Letter No. 243 – Related to Design Control Document (DCD) Revision 5 – RAI Number 4.2-33,*" dated March 30, 2009. The proprietary information in enclosure 1, which is entitled "*MFN 08-946 Revision 1 – Revised Response to Portion of NRC Request for Additional Information Letter No. 243 – Related to Design Control Document (DCD) Revision 5 – RAI Number 4.2-33 – GEH Proprietary Information,*" 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 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 qualify 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, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which 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 other companies;

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

c. Information which reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to 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, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

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

(8) The information identified in paragraph (2) is classified as proprietary because it contains details of GEH's design and licensing methodology. The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost to GEH.

(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 30th day of March 2009.

David H. Hinds
GE-Hitachi Nuclear Energy Americas LLC