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**Proprietary Notice**

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

MFN 09-773, Revision 1

Docket No. 52-010

January 26, 2010

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

**Subject: Revised Response (Revision 1) to Portion of NRC Request for Additional Information Letter No. 398 Related to ESBWR Design Certification Application – Fuel Racks – RAI Numbers 9.1-149 and 9.1-150**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) revised response to the U.S. Nuclear Regulatory Commission (NRC) Requests for Additional Information (RAIs) 9.1-149 and 9.1-150 sent by NRC Letter No. 398, Reference 1.

The GEH revised responses (Revision 1) to RAIs 9.1-149 and 9.1-150 are addressed in Enclosure 1. Enclosure 2 contains the LTR markups associated with these revised responses. Enclosure 2 contains GEH proprietary information as defined by 10 CFR 2.390. GEH customarily maintains this information in confidence and withholds it from public disclosure. 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."

The affidavit contained in Enclosure 3 identifies that the information contained in Enclosure 2 has been handled and classified as proprietary to GEH. GEH hereby requests that the information in Enclosure 2 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17.

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

Sincerely,

Richard E. Kingston  
Vice President, ESBWR Licensing

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**Enclosure 1**

**MFN 09-773, Revision 1**

**Revised Response (Revision 1) to Portion of NRC Request  
for Additional Information Letter No. 398  
Related to ESBWR Design Certification Application**

**Fuel Racks**

**RAI Numbers 9.1-149 and 9.1-150**

**NRC RAI 9.1-149**

*When the stress limits based on F-1332 of Appendix F to ASME B&PV Code, Section III, Division I are used for plate type supports, sizeable contribution from bending stress should be present in the plate in addition to the membrane stresses. Therefore, the stress limits per F-1332.2 for membrane plus bending are characterized as peak stresses (recognizing the effect of bending on stress distribution across the plate section) and are much higher than the membrane stress limits provided per F-1332.1.*

*While the applicant stated in Sections 1, 2 and 3 related to plate stress results that bending plate stresses are negligible, the allowable stresses for Service Level D were chosen from F-1332.2. The staff believes that if bending effect is negligible, then the plate stress state is controlled by the membrane stresses. Therefore, the stress allowable per F-1332.1 should apply. The staff requests that the applicant make appropriate corrections to the allowable stresses based on F-1332.1 if bending stress is determined insignificant.*

**GEH Response (Original)**

In reviewing this issue, it was found that the information shown in NEDC-33373P was not fully explained with respect to the bending stresses. The statement "bending plate stresses are negligible," which applies only to specific locations (10 mm enveloping plates, 7 mm upper plates, and 20 mm base plate stiffeners), refers to local stress variations across the plate thickness, which are classified as secondary stresses and are not subject to Subsection NF or Appendix F ASME Code limits, i.e., for the service level D category only primary stresses need to be calculated per the criteria specified by the ASME Code. As defined in paragraph NF-3121.3, stresses located at local structural discontinuities are classified as secondary stresses, and high stresses resulting from local structural discontinuities redistribute as necessary to maintain the structural integrity of the fuel storage rack. An example of a secondary stress is bending stress at a gross structural discontinuity.

At these specific locations, the maximum calculated stresses at the middle of the plates represent the maximum primary local membrane plus bending stresses. For example, the stress at the middle of the rack lateral plates represents the primary bending stress across the rack section as a result of the bending moment at the rack body-to-base plate junction. Therefore, since primary bending stresses are included in the analysis results, it is appropriate to compare the results to the  $P_m + P_b$  code allowable stress limit.

To clarify NEDC-33373P, the locations that contain the statement that bending plate stresses are negligible will be changed to the following:

“Bending stresses across the plate thickness are negligible and are classified as secondary stresses; however, other directions of the plate contain primary bending stresses that are included in the stress analysis results.”

### **GEH Response (Revision 1)**

The original response is unchanged. The LTR markup pages are replaced in their entirety by this revised response.

### **DCD/LTR Impact**

No DCD changes will be made in response to this RAI.

LTR NEDC-33373P, Sections 1.5.4.3.1, 1.5.4.3.2, 1.5.4.3.3, 2.5.2.1, 2.5.2.2, 2.5.2.3, 3.5.2.1, 3.5.2.2, 3.5.2.3, 3.5.2.4 and 3.5.2.5 will be revised in response to this RAI as shown in the attached markup.

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### **NRC RAI 9.1-150**

*Sections 2.5.4 and 3.5.4 provided analyses of fuels impacting the rack cells. These analyses first utilized simplified beam mass models to develop impact forces on the rack cells, and then applied these forces to detailed finite element models for the racks and performed plastic analyses to determine the stresses in the cell plates. The applicant referred to NF-1342.2 which the staff cannot locate in the Subsection NF. The staff requests that the applicant clarify the apparent incorrect reference. Further, the staff requests that the applicant identify applicable and specific ASME code requirements which were based for these plastic analyses.*

### **GEH Response (Original)**

In NEDC-33373P, Sections 2.5.4 and 3.5.4, there are references to NF-1341.2 of the ASME Boiler and Pressure Vessel Code. It appears it is these references that this RAI is referring to rather than references to NF-1342.2, as stated in the text of the RAI. In reviewing these references, it was found that these references were typographical errors and should have been to Appendix F, F-1341.2.

With regard to the applicable and specific ASME code requirements associated with the plastic analysis, ASME Section III, Subsection NF is applicable, and the non-mandatory Appendix F is applicable for Level D Service Limits; however, the fuel storage racks are not safety-related, and there is no regulatory requirement to meet these standards. In using Appendix F, several analytical methods are permitted, including plastic analysis. As stated above, the plastic analysis was performed in accordance with F-1341.2. This code paragraph is sub to F-1340, which is also applicable. Paragraph F-1340 states that the criteria is subject to the restrictions on methods of evaluation stated in F-1322. Paragraph F-1332 has several requirements that pertain to plastic analysis methods. For example, the most significant requirement is shown in F-1322.3, which contains material behavior requirements.

In Sections 2.5.4 and 3.5.4 of NEDC-33373P, it is explained that the appropriate plastic stress-strain material curves as specified in NUREG/CR-0841 have been used. Therefore, this ASME code requirement has been met. In the performance of the analysis, it was determined that the conservative temperature conditions imposed, which are not expected during actual plant operation, led to the need to do a plastic analysis. The stress results (206.8 and 180 N/mm<sup>2</sup> vs. the 436 N/mm<sup>2</sup> allowable) demonstrate that under these design conditions, the plastic deformation is local and very minimal. Considering that the stresses are local, the elastic stress limit of 292.8 N/mm has also been met. In conclusion, ASME code requirements have been met, and the use of plastic analysis methods is considered conservative for these applications.

### **GEH Response (Revision 1)**

In NEDC-33373P, Sections 2.5.4 and 3.5.4, there are references to NF-1341.2 of the ASME Boiler and Pressure Vessel Code. It appears it is these references that this RAI is referring to rather than references to NF-1342.2, as stated in the text of the RAI. In reviewing these references, it was found that these references were typographical errors and should have been to Appendix F, F-1341.2.

With regard to the applicable and specific ASME code requirements associated with the plastic analysis, ASME Section III, Subsection NF is applicable, and the non-mandatory Appendix F is applicable for Level D Service Limits. In using Appendix F, several analytical methods are permitted, including plastic analysis. As stated above, the plastic analysis was performed in accordance with F-1341.2. This code paragraph is sub to F-1340, which is also applicable. Paragraph F-1340 states that the criteria is subject to the restrictions on methods of evaluation stated in F-1322. Paragraph F-1332 has several requirements that pertain to plastic analysis methods. For example, the most significant requirement is shown in F-1322.3, which contains material behavior requirements.

In Sections 2.5.4 and 3.5.4 of NEDC-33373P, it is explained that the appropriate plastic stress-strain material curves as specified in NUREG/CR-0841 have been used.

Therefore, this ASME code requirement has been met. In the performance of the non-linear analysis of fuel rack loads, as discussed in NEDC-33373P, it was determined that the conservative temperature conditions imposed, which are not expected during actual plant operation, led to the need to do a plastic analysis. The stress results (206.8 and 180 N/mm<sup>2</sup> vs. the 436 N/mm<sup>2</sup> allowable) demonstrate that under these design conditions, the plastic deformation is local and doesn't lead to any global plastic deformation that would impact the function or performance of the fuel storage racks. Considering that the stresses are local, the elastic stress limit of 292.8 N/mm<sup>2</sup> has also been met. In conclusion, ASME code requirements have been met, and the use of plastic analysis methods is considered conservative for these applications.

The LTR markup pages are replaced in their entirety by this revised response.

### **DCD/LTR Impact**

No DCD changes will be made in response to this RAI.

LTR NEDC-33373P, Sections 2.5.4 and 3.5.4, will be revised in response to this RAI as shown in the attached markup.

**Enclosure 3**

**MFN 09-773, Revision 1**

**Revised Response (Revision 1) to Portion of NRC Request  
for Additional Information Letter No. 398  
Related to ESBWR Design Certification Application**

**Fuel Racks**

**RAI Numbers 9.1-149 and 9.1-150**

**Affidavit**



## GE-Hitachi Nuclear Energy Americas LLC

### AFFIDAVIT

I, **Larry J. Tucker**, state as follows:

- (1) I am Manager, ESBWR 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 09-773, Revision 1, Mr. Richard E. Kingston to U.S. Nuclear Regulatory Commission, entitled “Revised Response (Revision 1) to Portion of NRC Request for Additional Information Letter No. 398 Related to ESBWR Design Certification Application – Fuel Racks - RAI Numbers 9.1-149 and 9.1-150” dated January 26, 2010. The proprietary information in enclosure 2, entitled “*Revised Response (Revision 1) to Portion of NRC Request for Additional Information Letter No. 398 Related to ESBWR Design Certification Application – Fuel Racks – RAI Numbers 9.1-149 and 9.1-150 – LTR Markups – GEH Proprietary Information,*” 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 <sup>{3}</sup> 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.

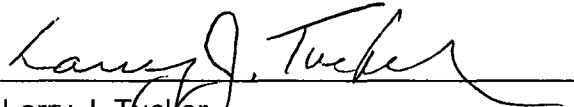
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

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 26<sup>th</sup> day of January 2010.

  
Larry J. Tucker  
GE-Hitachi Nuclear Energy Americas LLC