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MFN 07-359
Supplement 2

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**Subject: Response to Portion of NRC Request for Additional Information
Letter No. 176 Related to ESBWR Design Certification Application
– DCD Tier 2 Section 3.8 – Seismic Category I Structures – RAI
Number 3.8-110 S02**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) revised response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) received from the NRC via Reference 1 (RAI 3.8-110 S02).

Enclosure 1 contains the GEH response to NRC RAI 3.8-110 S02 that was received from the NRC on April 10, 2008 via MFN 08-375 (NRC Letter 176) (Reference 1). The original RAI and previous supplements from the NRC and GEH responses are listed in References 2 through 5.

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

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

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References:

1. MFN 08-375, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 176 Related to ESBWR Design Certification Application*, April 10, 2008
2. MFN 07-359, Supplement 1, Letter from James C. Kinsey, GEH to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 124 Related to ESBWR Design Certification Application DCD Tier 2 Section 3.8 – Seismic Design*, RAI Number 3.8- 110 S01, February 26, 2008
3. MFN 08-029, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 124 Related to ESBWR Design Certification Application*, January 14, 2008
4. MFN 07-359, Letter from James C. Kinsey, GEH to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 97 Related to ESBWR Design Certification Application – Seismic Category I Structures*, RAI Number 3.8-110, June 29, 2007
5. MFN 07-292, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 97 Related to ESBWR Design Certification Application*, May 21, 2007

Enclosure:

- 1 Response to Portion of NRC Request for Additional Information Letter No. 176 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.8 – Seismic Category I Structures – RAI Number 3.8-110 S02

cc:	AE Cubbage	USNRC (with enclosures)
	RE Brown	GEH/Wilmington (with enclosures)
	GB Stramback	GEH/San Jose (with enclosures)
	DH Hinds	GEH/Wilmington (with enclosures)
	eDRF	0000-0084-3379 (RAI 3.8-110)

ENCLOSURE 1

**MFN 07-359
Supplement 2**

**Response to Portion of NRC RAI Letter No. 176
Related to ESBWR Design Certification Application¹**

DCD Tier 2 Section 3.8 – Seismic Category I Structures

RAI Number 3.8-110 S02

¹ Original Response and Supplement 1 previously submitted under MFNs 07-359 and 07-359, Supplement 1 without DCD updates are included to provide historical continuity during review.

NRC RAI 3.8-110

The applicant has referenced the 2004 edition of ASME Code Section III, Subsection NE. The staff notes that Regulatory Guide (RG) 1.57, Revision 1, entitled "Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components," was officially issued in March 2007. This regulatory guide endorses the 2001 Edition of the ASME Code, Section III, Division 1, through the 2003 addenda, subject to the exceptions cited in Section C, Regulatory Position, of the RG. Since the staff has officially accepted the code, through the 2003 addenda, the applicant needs to identify any relaxations between the 2004 Code referenced for the ESBWR design and RG 1.57, Rev. 1, including the regulatory positions. Any deviation from the staff positions identified will require a technical justification. As an alternative, the applicant may choose to reference RG 1.57, Rev. 1 directly.

GE Response

As stated in DCD Tier 2 Table 1.9-21, the ESBWR design certification is based on Regulatory Guide 1.57, Revision 0, which is the version in effect six months prior to the design certification application. Revision 0 of RG 1.57 does not cite any specific version of ASME Code, Section III (other than a reference in a note to "that part of the Summer 1973 Addenda that pertains to Class MC components"). Consequently, RG 1.57, Revision 0, allows use of the version of ASME Code, Section III that is currently endorsed by 10 CFR 50.55a.

In the April 5, 2007 Federal Register (Volume 72, No. 65, Pages 16731 through 16741), the NRC published notice of its intention to amend 10 CFR 50.55a to endorse the 2004 Edition of ASME Code, Section III, Division 1. This Federal Register notice demonstrates that the NRC has officially accepted ASME Code, Section III, Division 1, through the 2004 version, subject to any exceptions cited in the Federal Register notice.

Therefore, GE's position on the use of the 2004 Edition of the ASME Code, Section III, Division 1, for ESBWR is consistent with published NRC endorsements.

Please also note that the ASME Code, Section III comparisons presented in the response to NRC RAI 3.8-5 include the differences between the 2004 Edition of the ASME Code, Section III and the 2001 Edition of the ASME Code, Section III through the 2003 addenda. None of the changes in the 2004 Edition reduce the levels of previous conservatism in the Code since the 1989 Edition as stated in the response to NRC RAI 3.8-5S1.

DCD Impact

No DCD change was made in response to this RAI.

NRC RAI 3.8-110, Supplement 1

In the response dated June 29, 2007, GEH stated that the ESBWR design certification is based on RG 1.57, Revision 0, which is the version in effect six months prior to the design certification application. In addition, GEH referred to the ASME Code Section III comparisons presented in the response to RAI 3.8-5 which included the differences between the 2004 Edition of the ASME Code, Section III and the 2001 Edition of the ASME Code, Section III through the 2003 Addenda. RG 1.57, Revision 1 endorses the 2001 Edition of the ASME Code through the 2003 Addenda.

The staff reviewed the comparisons presented in the original and the Supplement 1 responses to RAI 3.8-5, which included the differences between the 2004 Edition of the ASME Code, Section III and the 2001 Edition of the ASME Code, Section III through the 2003 edition. The staff agrees with GEH that the revisions identified in the 2004 Edition of the ASME Code, Section III, Subsection NE for the applicable steel portions of the containment are acceptable. However, since GEH utilized the recent 2004 Edition of the ASME Code, Section III, Division 1, Subsection NE, based on a comparison to the Code through the 2003 Addenda, GEH needs to confirm that the regulatory positions in the current RG 1.57, Revision 1, which endorses the Code through the 2003 Addenda, are also met.

GEH Response

GEH confirms that the ESBWR design certification meets the regulatory positions stated in Regulatory Guide 1.57, Revision 1, which endorses the ASME Section III, Division 1, Subsection NE, 2001 Edition through the 2003 Addenda.

DCD Tier 2 Table 1.9-21 and Subsection 3.8.2.2 will be revised to show Regulatory Guide 1.57, Revision 1 as being applicable to the ESBWR design certification.

DCD Tier 2 Table 3.8-4 will be revised to agree with the load combinations in Regulatory Guide 1.57, Revision 1.

The materials listed in DCD Tier 2 Subsection 3.8.2.6 have been made consistent with the materials listed in ASME Section III, Division 1, Subsection NE, Article NE-2121. Any materials listed in DCD Tier 2 Subsection 3.8.2.6 that are applicable to ASME Section III, Division 1, Subsection NF, ASME Section III, Division 2, Subsection CC or any materials not shown on DCD Tier 2 Appendix 3G drawings of the steel components of the RCCV have been removed.

DCD Impact

Revision 5 markups of DCD Tier 2 Subsections 3.8.2.2, 3.8.2.6 and Tables 1.9-21 and 3.8-4 were provided in MFN 07-359, Supplement 1 dated February 26, 2008.

NRC RAI 3.8-110, Supplement 2

In the Supplement 1 response dated February 26, 2008, GEH stated that the ESBWR design certification meets the regulatory positions stated in Regulatory Guide 1.57, Revision 1, which endorses the ASME Section III, Division 1, Subsection NE, 2001 Edition through the 2003 Addenda; and DCD Tier 2 Table 1.9-21 and Subsection 3.8.2.2 will be revised to show Regulatory Guide 1.57, Revision 1, as being applicable to the ESBWR design certification. The staff reviewed the proposed revision and finds it acceptable.

- (a) *In the response, GEH also identified that DCD Tier 2 Table 3.8-4 will be revised to agree with the load combinations in Regulatory Guide 1.57, Revision 1. The staff reviewed the proposed revision; compared it to RG 1.57, Rev. 1; and noted that DCD Table 3.8-4 does not address Service Level A load combinations (5) and (6) and Service Level C load combinations (4) and (5), which originate from 10 CFR 50.34 and 10 CFR 50.44, and include P_{g1} , P_{g2} , and/or P_{g3} .*

In order to be consistent with RG 1.57, Rev. 1, please describe in DCD Section 3.8.2 how GEH has addressed the cited load combinations. Similarly, the staff notes that for the concrete portion of containment, DCD Tier 2, Table 3.8-2 does not address the load combinations 5.B.(1), (2), and (3) in RG 1.136, Rev. 3, which originate from 10 CFR 50.34/10 CFR 50.44. In order to be consistent with RG 1.136, Rev. 3, describe in DCD Section 3.8.1 how GEH has addressed the cited load combinations.

- (b) *In the last part of the response, GEH indicated that the materials listed in DCD Tier 2 Subsection 3.8.2.6 have been made consistent with the materials listed in ASME Section III, Division 1, Subsection NE, Article NE-2121. Materials previously listed in DCD Tier 2 Subsection 3.8.2.6 that are applicable to ASME Section III, Division 1, Subsection NF, or to ASME Section III, Division 2, Subsection CC, or any materials not shown on DCD Tier 2 Appendix 3G drawings of the steel components of the RCCV, have been removed. The staff reviewed the proposed revision to Subsection 3.8.2.6, and finds it acceptable, except for "Clad (SA-240, type 304L)". The staff confirmed that Figure 3G.1-51 specifies 2.5 mm cladding on the exterior surface of the drywell head, and references SA-240, type 304L. However, the staff notes that SA-240 is a plate material designation. Therefore, please either confirm the applicability of SA-240 to cladding material, or revise the referenced material specification accordingly, in both DCD Subsection 3.8.2.6 and Figure 3G.1-51.*
- (c) *The DCD Tier 2 Chapter 3 Revision 3 to Revision 4 Change List, item 46, identified the following change to Subsection 3.8.2.6, 1st paragraph, 4th bullet:*

Inserted "or SA-540 Gr. B24 Class 3" as bolting material and "or SA-479 Type 304" as nut material to be in accordance with F3G.1-51 through F3G.1-53.

The staff confirmed that DCD Rev. 4 Figures 3G.1-51 through 3G.1-53 reference SA-540 Gr. B24 Class 3 bolting material. There is no reference to a nut material. However, the staff noted in its review of GEH's Supplement 1 response to RAI 3.8-110, that these bolt and nut materials have been deleted in the proposed revision to

Subsection 3.8.2.6. This is appropriate because neither the bolt material nor the nut material is listed in ASME Section III, Division 1, Subsection NE, Article NE-2121.

Please revise Figures 3G.1-51 through 3G.1-53, to reference a bolting material that is listed in ASME Section III, Division 1, Subsection NE, Article NE-2121, and also describe any corresponding design modifications to the bolted closures that may be needed as a result of the material change. In lieu of this, GEH may submit its technical basis for the acceptability of SA-540 Gr. B24 Class 3 bolting material and SA-479 Type 304 nut material for this containment pressure boundary application. If the second alternative is pursued, then DCD Subsection 3.8.2.6 must be revised, to discuss the use of the non-NE materials for this application.

GEH Response

- (a) Pressure loads P_{g2} and P_{g3} , as defined in Regulatory Guide 1.57, Revision 1, Service Level A load combinations (5) and (6) and Service Level C load combinations (4) and (5), which originate from 10 CFR 50.34 and 10 CFR 50.44, do not apply to the ESBWR since the containment is inerted with nitrogen. Pressure load P_{g1} related to 100% fuel-clad metal water reaction is considered in DCD Tier 2 Subsection 19B, Deterministic Analysis for Containment Pressure Capability.

Pressure loads P_{g2} and P_{g3} , as defined in Regulatory Guide 1.136, Revision 3 load combinations 5.B.(1), (2), and (3), which originate from 10 CFR 50.34/10 CFR 50.44, do not apply to the ESBWR since the containment is inerted with nitrogen. Pressure load P_{g1} related to 100% fuel-clad metal water reaction is considered in DCD Tier 2 Subsection 19B, Deterministic Analysis for Containment Pressure Capability.

- (b) SA-240 Type 304L as shown in DCD Tier 2 Figure 3G.1-51 is the cladding material roll bonded to the base metal SA-516 shown in the same figure using the SA-264 process.
- (c) In response to NRC RAI 3.8-118, which was transmitted by MFN 08-243 dated April 3, 2008, GEH revised the bolting material shown on DCD Tier 2 Figures 3G.1-51 through 3G.1-53 in Revision 5 to be in accordance with ASME Section III, Division 1, Subsection NE, Article NE-2121 and described the corresponding design change to the bolted closures as a result of the material change.

DCD Impact

No DCD change is required in response to this RAI Supplement.