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MFN 06-308
Supplement 16

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**Subject: Response to Portion of NRC Request for Additional Information
Letter No. 160 Related to ESBWR Design Certification Application,
Classification of Structures, Systems and Components, RAI
Number 3.2-34 S03**

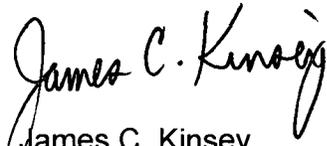
The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) partial response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) received from the NRC on March 6, 2008, via MFN 08-221 (NRC Letter No. 160) (Reference 1). Enclosure 1 contains the GEH response to NRC RAI 3.2-34 S03.

Previously RAI 3.2-34 S02 was received from the NRC on May 24, 2007, via an e-mail from the NRC (Chandu Patel) (Reference 3), to which GEH responded on January 25, 2008, via MFN 06-308, Supplement 13 (Reference 2). RAI 3.2-34 S01 was received from the NRC on November 20, 2006, via an e-mail from the NRC (Jim Gaslevic) (Reference 5), to which GEH responded on March 26, 2007, via MFN 06-308, Supplement 2 (Reference 4). Original RAI 3.2-34 was received from the NRC on August 8, 2006, via MFN 06-277 (NRC Letter No. 51) (Reference 7), to which GEH responded on September 8, 2006, via MFN 06-308 (Reference 6).

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

Sincerely,



James C. Kinsey
Vice President, ESBWR Licensing

References:

1. MFN 08-221 from Leslie Perkins, Project Manager, ESBWR/ABWR Projects Branch 2, Division of New Reactor Licensing, Office of New Reactors, to Robert E. Brown, *Request for Additional Information Letter No. 160 Related to ESBWR Design Certification Application*, dated March 6, 2008.
2. MFN 06-308, Supplement 13, from James C. Kinsey to the U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Related to ESBWR Design Certification Application – Classification of Structures, Systems and Components – RAI Number 3.2-34 S02*, dated January 25, 2008.
3. E-mail from Chandu Patel, U.S. Nuclear Regulatory Commission, to GEH (RAI 3.2-34 S02), comment on response to RAI 3.2-34, Supplement 1 (MFN 06-308, Supplement 2), dated May 24, 2007.
4. MFN 06-308, Supplement 2, from James C. Kinsey to the U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 51 Related to ESBWR Design Certification Application – RWCU System – RAI Number 3.2-34 S01*, dated March 26, 2007.
5. E-mail from Jim Gaslevic, U.S. Nuclear Regulatory Commission, to GEH (RAI 3.2-34 S01), comment on response to RAI 3.2-34 safety classification issues, dated November 20, 2006.
6. MFN 06-308 from James C. Kinsey to the U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 51 – Classification of Structures, Systems and Components – RAI Number 3.2-1 S02*, dated September 8, 2006.

7. MFN 06-277 from Lawrence Rossbach, Project Manager, ESBWR/ABWR Projects Branch, Division of New Reactor Licensing, Office of Nuclear Reactor Regulation, to David H. Hinds, *Request for Additional Information Letter No. 51 Related to ESBWR Design Certification Application*, dated August 8, 2006.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 160 Related to ESBWR Design Certification Application – Classification of Structures, Systems and Components – RAI Number 3.2-34 S03

cc: AE Cubbage
RE Brown
GB Stramback
DH Hinds
eDRF

USNRC (with enclosure)
GEH/Wilmington (with enclosure)
GEH/San Jose (with enclosure)
GEH/Wilmington (with enclosure)
0000-0083-0103, Revision 0

Enclosure 1

**MFN 06-308
Supplement 16**

**Response to Portion of NRC Request for
Additional Information Letter No. 160
Related to ESBWR Design Certification Application
Classification of Structures, Systems and Components
RAI Number 3.2-34 S03**

Original responses to RAIs 3.2-34, 3.2-34 S01, and 3.2-34 S02, which were previously submitted via MFNs 06-308, 06-308 Supplement 1, and 06-308 Supplement 12, respectively, are included without DCD updates to provide historical continuity during review.

NRC RAI 3.2-34

Table 3.2-1, Component G31, Items 3, 4, 5, 6, and 7: The Table indicates Quality Group C and Quality Assurance E for the RWCU/SDC vessels, heat exchangers carrying reactor water, and other piping between containment isolation valves and shutoff valves at feedwater line connections, and nonregenerative heat exchanger tube side and piping. Consistent with SRP 3.2.2 and RG 1.26 guidance regarding components designed for reactor shutdown and decay heat removal, these components should be designated safety-related Quality Group B and Quality Assurance B. Please revise the Table accordingly or provide a justification for your position.

GE Response

The system designed to perform the safety-related shutdown decay heat removal function in ESBWR (a passive plant) is the Isolation Condenser System (ICS), designated as B32 in DCD Tier 2, Table 3.2-1. As per this table, the ICS is designed to Quality Group A and Quality Assurance B for piping and valves (including supports) inside containment between reactor and the containment penetration, and to Quality Group B and Quality Assurance B for the remaining portion of the system. Therefore the ESBWR shutdown decay heat removal system meets the SRP 3.2.2 and regulatory position C.1.b in RG 1.26. The ICS design also meets the NRC position in SECY-94-084 for shutdown decay heat removal. Refer to DCD Tier 2, Sections 5.4.6, 5.4.7 and 5.4.8 for design information for the shutdown decay heat removal systems in ESBWR.

The RWCU/SDC system, as per DCD Tier 2, Section 5.4.8.1.1 does not perform any safety-related function except the containment isolation and detection of pipe break outside the containment. In addition, no credit is taken for the heat removal capability of the RWCU/SDC system in any plant safety analysis. Consequently, its ability to remove decay heat is a defense-in-depth feature of the ESBWR design rather than a safety-related function. This system is designated as G31 in DCD Tier 2, Table 3.2-1. In this table, the system piping and equipment such as pumps, regenerative and non-regenerative (tube side only) heat exchangers, demineralizer vessel are therefore accordingly defined as nonsafety-related with a Quality Group C. Also note that the components performing the safety-related containment isolation function are defined as safety-related with a Quality Group A and Quality Assurance B. The electrical equipment performing the detection of pipe break outside the containment are defined as safety-related with Quality Assurance B.

The above explanation justifies the Quality Group and Quality Assurance designation for RWCU/SDC system components in DCD Tier 2, Table 3.2-1.

DCD Impact

No DCD change was made in response to this RAI.

NRC RAI 3.2-34 S01

Email from Jim Gaslevic on 11/20/06

Item 3.2-34 a.

The response to RAI 3.2-34 indicated that portions of nonsafety-related RWCU are correctly classified and are considered a defense-in-depth feature rather than a safety-related function. It is not clear why portions of the RWCU system that contain reactor water and are classified as Quality Group C and Seismic Category I, whose failure may result in offsite exposures greater than 0.5 rem are not Safety Class 3 on the basis of Table 3.2-2. DCD Table 15.4-23 appears to demonstrate that a failure in this piping will exceed 0.5 rem such that Quality Group C is appropriate. This table also shows that the calculated exposure does not exceed 10% of 10 CFR 100 offsite exposure limits and as such this segment of RWCU piping need not be considered safety-related. GE is requested to either confirm that these results presented in Table 15.4-23 represent the basis for classifying this section of the RWCU piping as nonsafety-related or identify the basis for the classification.

Item 3.2-34 b.

For portions of systems classified as both Safety Class N and either Quality Group B or C, it is not clear which code class applies. DCD Table 3.2-2 identifies that Safety Class N does not require the application of ASME Section III. However, to be consistent with RG 1.26 and Table 3.2-3, ASME Section III Class 2 or 3 applies to Quality Group B and C, respectively. Please clarify the criteria in Table 3.2-2 to define the code class for nonsafety-related Quality Group B and C components such as MD Drains and RWCU.

GE Response

Part (a): The RWCU/SDC piping outside the containment was originally classified using good engineering judgment based on RWCU safety analysis performed for the ABWR DCD. It is important to note that RWCU/SDC performs no safety-related functions other than its containment isolation valves. These containment isolation valves are sufficient to prevent exceeding offsite exposure limits in the event of a pipe break outside the containment. For this reason, the pipe outside the containment does not need to be safety-related. However, because the piping contains reactor water during normal operation, GE considered it prudent to upgrade the quality group and seismic classification of this piping. Table 15.4-23 in the ESBWR DCD confirms that GE's original classification was appropriate and now represents the basis for the piping classification.

Part (b): Table 3.2-2 and related text in Section 3.2.1 have been revised based on this RAI. This table shows the minimum design requirements for each individual Safety Class. For example, the minimum design requirements for Safety Class N components are Quality Group D and no ASME Section III Code Class. However, notation "3" states that some Safety Class N components are optionally designed to Quality Group B or C requirements. This means that

Safety Class N components optionally designed to Quality Group B or C require application of ASME Section III Code Class 2 or 3, respectively, based on RG 1.26.

DCD Impact

Part (b) of this response resulted in a DCD change. The DCD markup for this response is provided in MFN 06-308 Supplement 1.

NRC RAI 3.2-34 S02

The response to RAI 3.2-34 Supplement 1 revised DCD Table 3.2-2 to show the minimum design requirements for each individual safety class and clarified that it was prudent for GE to upgrade the quality group and seismic classification for the nonsafety-related RWCU/SDC piping outside containment. For Safety Class N, Table 3.2-2 shows Quality Group D as the minimum requirement with a provision to optionally design such nonsafety-related SSCs to Quality Group B or C requirements. It is not clear if selecting the option to design these components as Quality group B or C and the ASME Section III Code represents a commitment to also construct to the ASME Section III Code and perform Inservice Inspection to the ASME Section XI Code for such nonsafety-related SSCs designed to Section III. The applicant is requested to clarify if all systems that are optionally designed to ASME Section III are also constructed to ASME Section III and subject to all ASME Section XI Inservice Inspection requirements. If selecting this optional upgrade does not represent a commitment to construct to Section III, including N stamping, and inspect to Section XI, the applicant is requested to clarify what supplemental construction and inspection requirements, if any, are imposed to upgrade the quality and inservice inspection of such SSCs. Also include a detailed description of the difference between the supplemental construction requirements and inservice inspection requirements compared to the requirements of ASME Sections III and XI. The applicant is also requested to clarify if upgraded nonsafety-related SSCs in systems such as RWCU and TMSS are to be included as RTNSS candidates.

GEH Response

The following ESBWR systems contain nonsafety-related SSCs that are assigned to Quality Group B or C:

- Nuclear Boiler System (Table 3.2-1, System B21, Items 12 and 13)
- FAPCS (Table 3.2-1, System G21, Items 5 through 7)
- RWCU/SDC (Table 3.2-1, System G31, Items 3 through 7 and 12)
- Turbine Main Steam System (Table 3.2-1, System N11, Item 1)

GEH hereby amends its previous position and commits that these components will be constructed to ASME Section III, including N stamping. See also the response to RAI 3.2-1 S02 for the TMSS piping.

For some FAPCS components, the request in this RAI to commit to Section XI inspections goes beyond the requirements of SRP 9.1.3, which in Section II.1.a states: "However, when the cooling system is not designated Category I it need not meet the requirements of ASME Section XI for inservice inspection of nuclear plant components." The FAPCS SSCs in question are a combination of Seismic Category I and Category II. GEH commits to Section XI inspection requirements for the nonsafety-related Category I portions of the FAPCS (Table 3.2-1, System G21, Items 6 and 7). The exemption from Section XI inspection requirements allowed by SRP

9.1.3 is credited for the portions of the FAPCS (Table 3.2-1, System G21, Item 5) that are not Category I.

GEH makes the same commitment for Nuclear Boiler System and RWCU/SDC system nonsafety-related SSCs in Quality Group B or C as that made above for FAPCS. Section XI inspection requirements will be applied to B21 Item 12 and G31 Items 3 through 7, which are designated Seismic Category I. Nonsafety-related SSCs in Quality Group B or C that are not Seismic Category I (B21 Item 13 and G31 Item 12) will not be subject to Section XI inspection requirements.

The response to RAI 3.2-1 S02 transmitted via MFN 06-308 Supplement 9 commits to both ASME Section III (including N stamping) and Section XI inspections for the Quality Group B TMSS piping (N11, Item 1).

Systems or portions thereof classified as RTNSS are defined in DCD Tier 2 Appendix 19A, Table 19A-2. RWCU and TMSS are not considered to be RTNSS candidates.

The following new paragraph will be added to the end of DCD Tier 2 Subsection 3.2.3.4 to clarify this position:

Nonsafety-related SSCs that are classified Seismic Category I and Quality Group B or C are subject to ASME Section III requirements (including N stamping) and ASME Section XI inspection requirements. Nonsafety-related SSCs that are classified as Seismic Category II and Quality Group B or C are subject to ASME Section III requirements (including N stamping), but are not subject to ASME Section XI inspection requirements.

DCD Impact

DCD Tier 2 Subsection 3.2.3.4 will be revised as noted in the attached markup.

NRC RAI 3.2-34 S03

The response to RAI 3.2-34 S02 includes criteria to be included in DCD Tier 2 Subsection 3.2.3.4 that is inconsistent with the applicant's response on RAI 3.2-1 S02 in regard to a commitment to ASME Section XI inspections for the Quality Group (QG) B Turbine main Steam (TMSS) piping (N11, Item 1). Seismic Category II QG B piping that is upgraded to ASME Section III should be subject to ASME Section XI inspections, unless adequate technical justification is provided. The applicant is requested to modify the criteria relative to ASME Section XI inspections for the N11 TMSS Item 1 and B21 Item 13 main steam drains to be consistent with the response to RAI 3.2-1 S02.

GEH Response

The exception inserted into DCD Tier 2 Subsection 3.2.3.4 that excluded component piping systems categorized as ASME Section III, Class 2 or 3 (Quality Group B or C), and Seismic Category II from inspections or examinations per ASME Section XI is deleted. This resolution alters the change to the DCD made by the response to RAI 3.2-34 Supplement 02 (MFN 06-308, Supplement 13).

DCD Impact

DCD Tier 2, Subsection 3.2.3.4 will be changed in Revision 5, as shown in the attached markup of the DCD.

Safety Class 3 includes the following:

- (1) Reactor protection system
- (2) Electrical and instrumentation auxiliaries necessary for operation of the safety-related systems and components.
- (3) Systems or components that restrict the rate of insertion of positive reactivity
- (4) Initiating systems required to accomplish emergency core cooling, containment isolation and other safety-related functions
- (5) Spent fuel pool
- (6) Batteries for the onsite emergency electrical system
- (7) Emergency equipment area cooling
- (8) Compressed gas or hydraulic systems required to provide control or operation of safety-related systems

Safety Class 3 structures, systems and components are identified in Table 3.2-1. All Safety Class 3 SSCs are subject to 10 CFR 50 Appendix B quality assurance requirements. Safety Class 3 SSCs that are pressure-retaining components belong to Quality Group C (as a minimum) as defined in Subsection 3.2.2.3.

3.2.3.4 NonSafety-Related

Structures, systems and components that do not fall into Safety Classes 1, 2 or 3 are classified as "Nonsafety-Related," which is abbreviated as "N" in Table 3.2-1.

The design requirements for Nonsafety-Related equipment are specified by the designer with appropriate consideration of the intended service of the equipment and expected plant and environmental conditions under which it will operate.

Where appropriate or required by specific regulations, Seismic Category I requirements are specified for Nonsafety-Related equipment in Table 3.2-1. Generally, design requirements for Nonsafety-Related equipment are based on applicable industry codes and standards as summarized in Table 3.2-3. Where these are not available, accepted industry or engineering practice is followed.

Nonsafety-related SSCs that are classified Seismic Category I or II and Quality Group B or C are subject to ASME Section III requirements (including N stamping) and ASME Section XI inspection requirements.

3.2.4 COL Information

None.

3.2.5 References

Note: Detailed references for all Regulatory Guides and Industry Codes and Standards referred to in Tables 3.2-1 through 3.2-3 can be found in Tables 1.9-21 and 1.9-22.

3.2-1 USNRC, "Seismic Classification," NUREG-0800, SRP 3.2.1.