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MFN 06-407 Supplement 4

Docket No. 52-010

November 20, 2007

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

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 38 – Related to ESBWR Design Certification Application – RAI Numbers 3.8-79 Supplement 2 and 3.8-80 Supplement 2**

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 Numbers 3.8-79 S02 and 3.8-80 S02 is addressed in Enclosure 1.

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

Sincerely,

Kathy Sedney for

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 06-197, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 38 Related to the ESBWR Design Certification Application*, June 23, 2006.

Enclosure:

1. MFN 07-407 Supplement 4 – Response to Portion of NRC Request for Additional Information Letter No. 38 – Related to ESBWR Design Certification Application – RAI Numbers 3.8-79 S02 and 3.8-80 S02

cc: AE Cubbage USNRC (with enclosure)
GB Stramback GEH/San Jose (with enclosure)
RE Brown GEH/Wilmington (with enclosure)
eDRF 0000-0076-1096

ENCLOSURE 1

MFN 06-407, SUPPLEMENT 4

Partial Response to NRC RAI Letter No. 38
Related to ESBWR Design Certification Application[1]

RAI Numbers 3.8-79 S02 and 3.8-80 S02

[1] Original Response and Supplement 1 previously submitted under MFNs 06-407 and 06-407S1 without DCD updates are included to provide historical continuity during review.

NRC RAI 3.8-79

Confirm that the Turbine Building (TB), Service Building (SB), and Radwaste (RW) Building, which are in close proximity to Category I structures, are designed to Seismic Category II requirements. If not, explain why not.

Include this information in DCD Section 3.8.4.

GEH Response

The TB, SB and RW seismic category classifications are shown in DCD Tier 2 Table 3.2-1. The TB is classified as Seismic Category II, and the SB is classified as Non-seismic. Since SB is in close proximity to RB/FB, its classification will be changed to Seismic Category II in DCD Tier 2 Table 3.2-1. The RW is remotely located from C-I structures and is classified as Non-Seismic Category. It is, however, designed to the special prescriptive provisions of RG 1.143, Category RW-IIa.

DCD Impact

A markup of DCD Tier 2 Table 3.2-1 was provided in MFN 06-407.

NRC RAI 3.8-79. Supplement 1

NRC Assessment Following the December 14, 2006 Audit

For the RW building, the term "remote" needs to be clarified. Does this building meet the criteria in SRP 3.7.2.8.a, which states that the collapse of any non-Category I structure will not cause the non-Category I structure to strike a seismic Category I structure or component? If so, provide a description of what was done to demonstrate this, since the RB/FB and RW buildings appear to be relatively close (see DCD Figure 1.1-1).

During the audit, GE indicated that they will document that the distance between the RW building and any SC I structure, system, and component is greater than the height of the RW above grade.

GEH Response

An exception to the requirement that any NS structure be located at least a distance of its height above grade from C-I or C-II structures was taken for the RW building in DCD Tier 2 Rev. 2 Subsection 3.5.3.3 as shown in the DCD Tier 2 excerpt below:

3.5.3.3 Impact of Failure of Nonsafety-Related Structures, Systems and Components

Non-safety related structures could be either Seismic Category II (C-II) or NS. C-II structures are designed not to collapse under tornado wind loads. Any NS structure (except the Radwaste Building) is located at least a distance of its height above grade from C-I or C-II structures. Per Section 3.5.2, Offgas Charcoal Bed Adsorbers are provided with missile protection.

The RW building has a height of 12 m above grade and is at least 10 m away from the RB (measured corner to corner). The RW building is designed to RG 1.143 (Category RW-IIa), which exceeds NS requirements for seismic design. Therefore, potential failure of the RW building under full SSE will have negligible impact on C-I or C-II structures.

DCD Impact

No DCD change was made in response to this RAI Supplement.

NRC RAI 3.8-79, Supplement 2

NRC Assessment from Chandu Patel E-mail Dated May 24, 2007

The applicant stated that the Radwaste Building (RW) has a height of 12 m above grade and is at least 10 m away from the RB (measured corner to corner). The RW building is designed to RG 1.143 (Category RW IIa), which exceeds NS requirements for seismic design. Therefore, potential failure of the RW building under full Safe Shutdown Earthquake will have negligible impact on C I or C II structures.

The staff determined that this exception was not identified in DCD Tier 2 Section 3.7, and has not been reviewed by the staff for acceptability. Given the possibility that the RB may be impacted by collapse of the RW building, the staff requires a detailed technical evaluation to support the conclusion that there would be no unacceptable damage to the RB. This information needs to be documented in the DCD.

GEH Response

The Radwaste (RW) building is primarily a reinforced concrete box type structure. The roof trusses are the only significant steel structures. Its design classification is RW-IIa (High Hazard). Per RG 1.143, the seismic loading for the RW-IIa classification is OBE (Operating Basis Earthquake) or ½ SSE (Safe Shutdown Earthquake). Therefore, for the ESBWR design, the seismic design load for RW building is taken as ½ SSE. The load factors and capacity criteria for reinforced concrete structures are per ACI 349-01 as modified by RG 1.142. The load factors per ACI 349-01 for the load combinations with OBE (i.e. 1/2 SSE) (i.e. loading combination 2 in Subsection 9.2.1) are as follows: 1.4 for dead loads (D), and 1.7 for live loads (L), soil pressure loads (H) and OBE loads (E_0). The load factors for the SSE load combinations (i.e. loading combination 4 in Subsection 9.2.1 of ACI 349-01) are all equal to 1.0 for loads D, L, H and SSE (E_{ss}). By comparison, the load effects of the OBE load combinations are at least 1.7/2.0 = 0.85 of those SSE load combinations assuming that there are no D, L and H loads and SSE response loads are two times the OBE loads. However, the SSE response loads will be less than two times the OBE loads, because the damping for the SSE loads is significantly higher than OBE loads. Furthermore, D, L and H loads are significant for the RW building design. Therefore, the load effects of OBE load combinations will be larger than 0.85 and closer to 1.0 of the SSE load combinations. Thus, a total collapse of the RW building with unacceptable damage to the RB located 10 m away will not occur.

DCD Tier 2 Subsection 3.7.2.8 was revised in Rev. 4 to identify that the RW building is an exception to the proximity criteria for locating NS buildings.

DCD Impact

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

NRC RAI 3.8-80

What buildings other than the RB, FB and CB have been designed and evaluated to applicable acceptance criteria? What is the status of the EBAS and RW Building designs? What are the COL applicant responsibilities and what are the standard plant design restrictions/limitations/requirements for the design of buildings not covered in the DCD?

Include this information in the DCD.

GEH Response

The analytical design of the RB, CB and FB is done and documented in DCD Tier 2 Appendices 3A and 3G. The preliminary design of the EBAS is done. The RW design has not started.

The COL applicant responsibilities are addressed in DCD Tier 2 Section 3.8.6.

DCD Impact

No DCD change was made in response to this RAI.

NRC RAI 3.8-80, Supplement 1

NRC Assessment Following the December 14, 2006 Audit

Will the design of the EBAS and RW be completed soon enough to allow the NRC staff to review it before issuing the SER? Otherwise, this will likely be an Open Item in the SER. Also, DCD Section 3.8.6 is not labeled "COL applicant responsibilities", but rather "COL Information." For COL applicant responsibilities, are there additional items specified somewhere else in the DCD that must be satisfied? Currently there is only one item in DCD Section 3.8.6; it refers to the structural integrity test (SIT) of the ESBWR containment.

During the audit, GE indicated that the status of the EBAS design is addressed in RAI 3.8-65. GE stated that since the RW building is a non safety-related and non SCI or SC II structure, it does not need to be designed as part of the design certification, nor will it be a COL Action Item. GE also provided a draft supplemental response to address the questions related to Section 3.8.6 - COL Information. During the meeting GE indicated that structural related COL Action Items will be included in Section 3.8.6.

GEH Response

See response to NRC RAI 3.8-65, Supplement 1 for EBAS status. The RW building is a non C-I structure.

The SIT information contained in DCD Tier 2 Subsection 3.8.6 has been moved to DCD Tier 1 Table 2.15.1-1, Item 5 per NRC RAI 14.3-101 as an ITAAC item. There will be no COL Action Items in DCD Tier 2 Section 3.8, Revision 3.

DCD Impact

Markups of DCD Tier 2 Subsections 3.8.1.7.3.12 and 3.8.6 were provided in MFN 06-407S1.

NRC RAI 3.8-80, Supplement 2

NRC Assessment from Chandu Patel E-mail Dated May 24, 2007

The DCD Section 3.8.4 introductory paragraph discusses the RW building as if it is part of the design certification scope. In its response to RAI 3.8-79, the applicant identified the RW building height above grade, its distance from the RB, and the potential for impact of the RB if the RW should collapse in a seismic event. However, during the December 2006 audit discussion, the applicant indicated that it does not need to be designed as part of the design certification nor identified as a COL action item. Consequently, the staff is unclear about the status of the RW building, with respect to design certification or COL applicant responsibility. The staff requests the applicant to clearly define the design responsibility for this essential building, in accordance with RG 1.143. This information needs to be documented in the DCD.

GEH Response

The RW is identified as being part of the ESBWR Standard Plant in DCD Tier 2 Subsection 1.1.2.1 and is therefore a part of the design certification scope.

Please also see the response to NRC RAI 3.8-79, Supplement 2.

DCD Impact

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