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MFN 06-298
Supplement 2

Docket No. 52-010

March 26, 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 – Structural Analysis - RAI Number 3.8-8 S01**

Enclosure 1 contains a supplemental response to the subject NRC RAI resulting from the December 2006 Seismic Follow-up audit. The original response to this RAIs was submitted in Reference 1.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

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Enclosure:

1. MFN 06-298, Supplement 2 - Response to Portion of NRC Request for Additional Information Letter No. 38 Related to ESBWR Design Certification Application – Structural Analysis - RAI Number 3.8-8 S01

Reference:

1. MFN 06-298, Letter from David H. Hinds to U. S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 38 Related to ESBWR Design Certification Application – Structural Analysis - RAI Numbers 3.8-1, 3.8-2, 3.8-4, 3.8-5, 3.8-7 through 3.8-12, 3.8-15, 3.8-16, 3.8-21, 3.8-22, 3.8-29 through 3.8-31, 3.8-39, 3.8-42, 3.8-43, 3.8-45, 3.8-50, 3.8-52 through 3.8-55, 3.8-57, 3.8-58, 3.8-60, 3.8-61, 3.8-66 through 3.8-68, 3.8-70 through 3.8-72, 3.8-74, 3.8-75, 3.8-78, and 3.8-98,* August 31, 2006
2. MFN 06-298, Supplement 1, Letter from James C. Kinsey to U. S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 38 Related to ESBWR Design Certification Application – Structural Analysis - RAI Numbers 3.8-1 S01, 3.8-2 S01, 3.8-4 S01, 3.8-5 S01, 3.8-7 S01, 3.8-9 S01, 3.8-10 S01, 3.8-12 S01, 3.8-15 S01, 3.8-29 S01, 3.8-30 S01, 3.8-31 S01, 3.8-42 S01, 3.8-52 S01, 3.8-53 S01, 3.8-54 S01, 3.8-58 S01, 3.8-60 S01, 3.8-61 S01, 3.8-67 S01, 3.8-70 S01, 3.8-71 S01, 3.8-72 S01, 3.8-74 S01 & 3.8-98 S01 - Supplement 1,* January 29, 2007

cc:	AE Cubbage	USNRC (with enclosures)
	DH Hinds	GE (with enclosures)
	RE Brown	GE (w/o enclosures)
	eDRF	0000-0064-1126/1

ENCLOSURE 1

MFN 06-298, SUPPLEMENT 2

Response to Portion of NRC Request for

Additional Information Letter No. 38

Related to ESBWR Design Certification Application

Structural Analysis - RAI Number 3.8-8 S01

Original Response previously submitted under MFN 06-298 without DCD updates is included to provide historical continuity during review.

NRC RAI 3.8-8

a) *Explain how the requirements contained in 10 CFR 50.34(f)(3)(v) regarding loads, loading combinations, and design for the ESBWR containment are addressed.*

b) *Explain whether internal flooding of the containment, subsequent to a Loss of Coolant Accident (LOCA), is also applicable to the ESBWR containment design. If so, how is it included in the loading combinations described in DCD Section 3.8.1.3?*

GE Response

a) To satisfy 10 CFR 50.34(f)(3)(v)(A), an evaluation of the Level C pressure capability of major penetrations (Drywell Head, Equipment Hatch, Personnel Airlock and Wetwell Hatch) in the ESBWR concrete containment was performed per ASME Section III, Division 1, Sub article NE-3220. To meet concrete containment requirements of ASME Section III, Division 2, Sub article CC-3720, Factored Load Category, a nonlinear finite element analysis of the RCCV structure including liner plates was performed for over-pressurization. Level C (or Factored Load Category Level) pressure capacity of the concrete containment vessel is at least 1.468 MPa and it is higher than the 1.182 MPa (or 171psi) controlling value of the steel components. The most critical of the piping penetrations is the one for the main steam line. The maximum Level C pressure capability is calculated as 3.377 MPa. The discussion and results are presented in DCD Subsection 6.2.5.4.2 and DCD Table 6.2-46.

   As discussed in DCD Section 6.2.5, ESBWR relies on an inerted containment to control combustible gas. Post accident hydrogen control is not required for an inerted containment according to 10CFR50.44(c)(2). Thus, the requirements in 10 CFR 50.34(f)(3)(v)(B) do not apply.

b) Hydrostatic pressure associated with LOCA flooding during the design phase (i.e. within 72 hours after LOCA) is considered together with other LOCA loads. Internal flooding of the ESBWR containment during fuel recovery stage (i.e. beyond 72 hours after LOCA) is not controlling because the hydrostatic pressure associated with the flooding is less than the containment design pressure.

Markups of DCD Tables 3.8-2, 3.8-4 and 3.8-7 were provided under MFN 06-298.

NRC RAI 3.8-8, Supplement 1

NRC Assessment Following the December 14, 2006 Audit

a) Further review needed to confirm GE's conclusion; b) Response does not address the post-flooding load combination (includes OBE) defined by SRP 3.8.1. How has GE satisfied this load combination? Discuss with GE.

Item a) is being reviewed by the staff under the containment pressure capacity review (i.e., portions of DCD Chapters 6 and 19). Item b) GE will provide a supplemental response to this RAI to demonstrate that the accident pressure + SSE + flooding during LOCA (used in design) bounds the post-LOCA flooding event with OBE, and therefore, the post-LOCA flooding load combination with OBE does not need to be considered explicitly.

GE Response

No OBE loads were calculated since explicit OBE analysis is not required for the ESBWR. The post-LOCA containment flooding load combination including OBE is not controlling since the design considers a more critical load combination of SSE and LOCA, which includes the DBA pressure and the flooding of the containment during LOCA.

The post-LOCA containment flooding level for fuel recovery is at the RPV main steam nozzle elevation. According to SRP 3.8.1, DBA pressure does not need to be combined with post-LOCA flooding pressure. As shown in Table 3.8-8 (1), the maximum RCCV internal pressures resulting from containment flooding for post-LOCA fuel recovery are less than those for DBA including LOCA flooding, which are considered in the ESBWR design.

Furthermore, the OBE ground motion is only one-third of the SSE. Since the much more severe load combination of LOCA flooding with DBA pressure and SSE has been considered in the design, the post-LOCA flooding load combination with OBE does not need to be considered explicitly.

Table 3.8-8 (1) Comparison of Maximum Pressure between DBA including LOCA Flooding and post-LOCA Flooding

Event	Location	Water Depth (m)	Maximum Pressure (MPa)		
			Flooding	DBA	Total
LOCA Flooding with DBA Pressure	Drywell	21.17	0.21	0.31	0.52
	Wetwell	6.55	0.06	0.31	0.37
Post-LOCA Flooding	Drywell	31.64	0.31	0.00	0.31
	Wetwell	18.19	0.18	0.00	0.18

DCD Impact

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