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Subject: **Revised Response to Portion of NRC RAI Letter No. 382 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Number 3.9-247 S01**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) revised response to a portion of the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) letter number 382 sent by NRC letter dated October 19, 2009 (Reference 1). RAI Number 3.9-247 S01 is addressed in Enclosure 1. This revised response addresses comments received from the staff in Reference 2.

Enclosure 2 contains revised DCD changes to Tier 1 and Tier 2 to address staff comments received in Reference 2. Verified DCD changes associated with these RAI responses are identified in the enclosed DCD markups by enclosing the text within a black box.

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

Sincerely,

Richard E. Kingston

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Vice President, ESBWR Licensing

References:

1. MFN 09-675 Letter from U.S. Nuclear Regulatory Commission to J. G. Head, GEH, *Request For Additional Information Letter No. 382 Related to ESBWR Design Certification* dated October 19, 2009

2. eMail from Zahira Cruz to Hugh Upton dated 12/28/09, Subject: *Proposed ESBWR ITAAC for PCCS and ICE*

Enclosures:

1. Revised Response to Portion of NRC RAI Letter No. 382 Related to ESBWR Design Certification Application - DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Number 3.9-247 S01 (Revision 1)
2. Revised Response to Portion of NRC RAI Letter No. 382 Related to ESBWR Design Certification Application - DCD Tier 1 and Tier 2 Markups for RAI Number 3.9-247 S01 (Revision 1)

cc:	AE Cubbage	USNRC (with enclosures)
	JG Head	GEH/Wilmington (with enclosures)
	DH Hinds	GEH/Wilmington (with enclosures)
	HA Upton	GEH/San Jose (with enclosures)
	eDRF Section	0000-0109-8756 R1(RAI 3.9-247 S01 R1)

Enclosure 1

MFN 09-756 Revision 1

Revised Response to Portion of NRC Request for

Additional Information Letter No. 382

Related to ESBWR Design Certification Application

DCD Tier 2 Section 3.9 – Mechanical Systems and Components

RAI Number 3.9-247 S01 (Revision 1)

NRC RAI 3.9-247 S01 (Revision 1)

During the conference call on 10/14/2009, GEH presented the methodology of ICS and PCCS submerged heat exchanger. GEH stated that PCCS heat exchanger support design was completed, but ICS heat exchanger was not. The staff requests GEH to provide the followings:

1. Add a description in ESBWR DCD section 3.9.3.7 about the methodology of the RAI 3.9-247 seismic analysis with sloshing effect and the commitment to apply it to the seismic analysis of ICS and PCCS.

2. Develop and document an ITAAC to confirm the completion of ICS and PCCS submerged heat exchangers support structure design.

GEH Response

GEH Original Response (Letter MFN 09-756, dated December 4, 2009) for reference:

1. DCD Section 3.9.3.7.4 has been revised to incorporate the methodology of the seismic analysis with respect to the sloshing effect and the commitment to apply it to the seismic analysis of ICS and PCCS.
2. DCD Tier 1 Section 2.4.1 Table 2.4.1-3 and Section 2.15.4 Table 2.15.4-2 has been revised to confirm the completion of ICS and PCCS submerged heat exchangers support structure design.

GEH Revised Response (new information transmitted via this letter)

Following the original submittal, the NRC requested that the new language added to the ITA column also be included in the AC column for Tier 1 Tables 2.4.1-3 and 2.15.4-2. These changes have been made, and the new markups are attached.

DCD Impact

The following DCD Sections will be revised as noted in the attached markup:

- Tier 1, Table 2.4.1-3
- Tier 1, Table 2.15.4-2
- Tier 2, Section 3.9.3.7.4

Enclosure 2

MFN 09-756 Revision 1

Revised Response to NRC Request for

Additional Information Letter No. 382

Related to ESBWR Design Certification Application

DCD Tier 1 and Tier 2 Markups for

RAI Number 3.9-247 S01 (Revision 1)

Table 2.4.1-3

ITAAC For The Isolation Condenser System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	ii. Type tests, analyses, or a combination of type tests and analyses, of equipment identified in Table 2.4.1-1 and Table 2.4.1-2 as Seismic Category I, will be performed using analytical assumptions, or will be performed under conditions which bound the Seismic Category I equipment design requirements.	ii. The equipment identified in Table 2.4.1-1 and Table 2.4.1-2 as Seismic Category I can withstand Seismic Category I loads without loss of safety function.
	iii. Inspections and analyses will be performed to verify that the as-built equipment identified in Table 2.4.1-1 and Table 2.4.1-2, including anchorage, is bounded by the testing or analyzed conditions, including the hydrodynamic effects of surrounding water for submerged components.	iii. The as-built equipment identified in Table 2.4.1-1 and Table 2.4.1-2 as Seismic Category I, including anchorage, can withstand Seismic Category I loads including the hydrodynamic effects of surrounding water for submerged components without loss of safety function.
6a. Each of the ICS divisions (or safety-related loads/components) identified in Table 2.4.1-2 is powered from its respective safety-related division.	Testing will be performed on the ICS by providing a simulated test signal in only one safety-related division at a time.	A simulated test signal exists in the safety-related division (or at the equipment identified in Table 2.4.1-2 powered from the safety-related division) under test in the ICS.

Table 2.15.4-2

ITAAC For The Passive Containment Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	ii. Type tests, analyses, or a combination of type tests and analyses, of equipment identified in Table 2.15.4-1 as Seismic Category I, will be performed using analytical assumptions, or will be performed under conditions which bound the Seismic Category I equipment design requirements.	ii. The equipment identified in Table 2.15.4-1 as Seismic Category I can withstand Seismic Category I loads without loss of safety function.
	iii. Inspections and analyses will be performed to verify that the as-built equipment identified in Table 2.15.4-1, including anchorage, is bounded by the testing or analyzed conditions, including the hydrodynamic effects of surrounding water for submerged components.	iii. The as-built equipment identified in Table 2.15.4-1 including anchorage, can withstand Seismic Category I loads and the hydrodynamic effects of surrounding water for submerged components without loss of safety function.
6. Each mechanical train of the PCCS located inside the containment is physically separated from the other train(s) so as not to preclude accomplishment of the intended safety-related function.	Inspections or analysis will be conducted for each of the PCCS mechanical trains located inside the containment.	Each mechanical train of PCCS located inside containment is protected against design basis events and their direct consequences by spatial separation, barriers, restraints, or enclosures so as not to preclude accomplishment of the intended safety-related function.

* Text sections that are bracketed and italicized with an asterisk following the brackets are designated as Tier 2*. Prior NRC approval is required to change.

3.9.3.7.2 Reactor Pressure Vessel Sliding Supports

[*The ESBWR RPV sliding supports are sliding supports as defined by NF-3124 of the ASME B&PV Code and are designed as an ASME B&PV Code Class 1 component support per the requirements of the ASME B&PV Code, Subsection NF.*]* The loading conditions and stress criteria are given in Tables 3.9-1 and 3.9-2, and the calculated stresses meet the ASME B&PV Code allowable stresses at all locations for various plant operating conditions. The stress level margins assure the adequacy of the RPV sliding supports.

* Text sections that are bracketed and italicized with an asterisk following the brackets are designated as Tier 2*. Prior NRC approval is required to change.

3.9.3.7.3 Reactor Pressure Vessel Stabilizer

The RPV stabilizer is designed as a safety-related linear type component support in accordance with the requirements of ASME B&PV Code Section III, Subsection NF. The stabilizer provides a reaction point near the upper end of the RPV to resist horizontal loads caused by effects such as earthquake, pipe rupture, and RBV. The design loading conditions and stress criteria are given in Table 3.9-2, and the calculated stresses meet the ASME B&PV Code allowable stresses in the critical support areas for various plant operating conditions.

3.9.3.7.4 Floor-Mounted Major Equipment

Because the major active valves are supported by piping and not tied to building structures, valve "supports" do not exist.

The ~~Isolation Condenser heat exchangers~~ condensers in the Isolation Condenser System (ICS) and Passive Containment Cooling System (PCCS) are analyzed to verify the adequacy of their support structure under various plant operating conditions. The analysis applies the maximum sheer, moment, and accelerations calculated from the seismic response analysis for the Reactor Building at the attachment locations on the pool floor. In the analysis, no credit is taken for damping effects of the pool water. Additionally, the mass of the condensers is increased by an amount equivalent to the weight of water they displace. This conservative factor accounts for the hydrodynamic effects that include impulsive loads and convective loads (sloshing of the pool water). In all cases, the load stresses in the critical support areas are within ASME B&PV Code allowables.

3.9.3.8 Other ASME B&PV Code Component Supports

The ASME B&PV Code component supports and their attachments (other than those discussed in the preceding subsection) are designed in accordance with Subsection NF of the ASME B&PV Code up to the interface with the building structure. The intermediate building structural steel component supports are designed in accordance with the codes as specified in Section 3.8. The loading combinations for the various operating conditions correspond to those used to design the supported component. The component loading combinations are discussed in Subsection 3.9.3.1. Active component supports are discussed in Subsection 3.9.3.7. The stress