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Subject: Response to Portion of NRC Request for Additional Information Letter No. 126 Related to ESBWR Design Certification Application, RAI Numbers 14.3-296, 14.3-297, 14.3-383, and 14.3-386

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 NRC letter dated December 20, 2007 (Reference 1). RAI Numbers 14.3-296, 14.3-297, 14.3-383, and 14.3-386 are addressed in Enclosure 1.

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

Sincerely,

James C. Kinsey
Vice President, ESBWR Licensing

DO68
NRO

Reference:

1. MFN 07-718, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request For Additional Information Letter No. 126 Related To ESBWR Design Certification Application*, dated December 20, 2007

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 126 Related to ESBWR Design Certification Application, RAI Numbers 14.3-296, 14.3-297, 14.3-383, and 14.3-386

cc:

AE Cubbage	USNRC (with enclosure)
GB Stramback	GEH/San Jose (with enclosure)
RE Brown	GEH/Wilmington (with enclosure)
DH Hinds	GEH/Wilmington (with enclosure)
eDRF	0000-0080-4821
	NRC RAI 14.3-296
	NRC RAI 14.3-297
	NRC RAI 14.3-383
	NRC RAI 14.3-386

MFN 08-086 Supplement 6

Enclosure 1

Response to Portion of NRC Request for Additional Information Letter No. 126 Related to ESBWR Design Certification Application

RAI Numbers 14.3-296, 14.3-297, 14.3-383, and 14.3-386

NRC RAI 14.3-296

NRC Summary:

Nuclear Island

NRC Full Text:

In ITAAC Table 2.1.2-3, the ITA i) for DC 5a). refers to "the Nuclear Island" which is not defined anywhere in the ITAAC. The staff requests the applicant to either provide a definition for Nuclear Island or revise it to refer to the Reactor Building or other seismic Category I structure, as applicable.

This is typical throughout the ITAAC and the applicant should ensure that all other applicable ITAAC are appropriately revised.

NRC RAI 14.3-297

NRC Summary:

Seismic structure

NRC Full Text:

In ITAAC Table 2.1.2-3, the AC i) for DC 5a). refers to "a seismic structure" which is not defined anywhere in the ITAAC. The staff requests that the applicant clarify the meaning of "a seismic structure" or refer to a specific building (e.g., the reactor building or other building, as appropriate, which has its own ITAAC to verify its seismic pedigree) in the acceptance criteria.

NRC RAI 14.3-383

NRC Summary:

Nuclear Island definition

NRC Full Text:

For ITAAC Table 2.15.4-2 Item 5a-i, the staff requests that the applicant either provides a definition for "Nuclear Island" or replaces it with a reference to the appropriate seismic Category I structure (e.g., the Reactor Bldg) for which another ITAAC is provided to verify its seismic pedigree.

NRC RAI 14.3-386

NRC Summary:

Nuclear Island definition

NRC Full Text:

For ITAAC Table 2.15.7-2 Item 6i, the staff requests that the applicant either provides a definition for "Nuclear Island" or replaces it with a reference to the appropriate seismic Category I structure (e.g., the Reactor Bldg) for which another ITAAC is provided to verify its seismic pedigree.

GEH Response to RAIs 14.3-296, 297, 383, and 386

Tier 1 DCD will be modified to state, "seismic Category I structure" in place of "Nuclear Island" or "seismic structure" throughout the ITAAC Tables. The Seismic Category I structures as specified in the Tier 2 DCD Section 3.8 include, the Concrete Containment, Reactor Building (RB), Control Building (CB), Fuel Building (FB) and Fire Water Service Complex (FWSC).

DCD Impact

The following DCD Tier 1 Tables will be revised as noted in the attached markup:

Table 2.1.1-3	Item 6
Table 2.1.2-3	Item 5a
Table 2.2.4-6	Item 13
Table 2.3.1-2	Item 3
Table 2.4.1-3	Item 5a
Table 2.4.2-3	Item 5a
Table 2.5.10-1	tem 2
Table 2.6.1-2	Item 7
Table 2.15.4-2	Item 5a
Table 2.15.7-2	Item 6

Table 2.1.1-3

ITAAC For Reactor Pressure Vessel System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a2) The RPV components identified in Table 2.1.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the RPV components identified in Table 2.1.1-1 as ASME Code Section III.
4. Pressure boundary welds in components identified in Table 2.1.1-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report~~(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the RPV system.
5. The components in Table 2.1.1-1 identified as ASME Code Section III retain their pressure boundary integrity ~~under internal pressure that will be experienced during service~~at their design pressure.	A hydrostatic test will be conducted on those components of the RPV system required to be hydrostatically tested by the ASME Code.	An ASME Code Report~~(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code components of the RPV system ~~conform~~ comply with the requirements ~~in~~ of the ASME Code~~,~~ Section III.
6. The seismic Category I equipment identified in Table 2.1.1-1 can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.1.1-1 is located ~~on a seismic structure.~~in a seismic Category I structure.	Report(s) document that: i) The seismic Category I equipment identified in Table 2.1.1-1 is located ~~on a seismic structure~~in a seismic Category I structure.

Table 2.1.2-3

ITAAC For The Nuclear Boiler System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. Seismic Capability		Report(s) document that:
a) The seismic Category I equipment identified in Tables 2.1.2-1 and 2.1.2-2 can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Tables 2.1.2-1~~a~~ and 2.1.2-2 are located ~~on~~ in ~~the~~a ~~Nuclear Island~~seismic Category I structure.	i) The seismic Category I equipment identified in Tables 2.1.2-1 and 2.1.2-2 is located ~~on a seismic structure~~ in a seismic Category I structure.
	ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.	ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function.
	iii) Inspection will be performed ~~for the existence of a report verifying~~to verify that the as-installed equipment including anchorage is ~~seismically~~ bounded by the tested or analyzed conditions.	iii) A report exists and concludes that the loading on the as-installed equipment including associated anchorage falls within the design basis seismic load conditions ~~is seismically bounded by the tested or analyzed conditions~~used for type testing or analysis.

Table 2.2.4-6

ITAAC For The Standby Liquid Control System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
13. The seismic Category I equipment identified in Tables 2.2.4-4 and 2.2.4-5 can withstand seismic design basis loads without loss of safety function.	a. ~~i)~~ Inspection will be performed to verify that the seismic Category I equipment and valves identified in Tables 2.2.4-4 and 2.2.4-5 are located in a seismic Category I structure~~on the Nuclear Island~~. b. ~~ii)~~Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. c.~~iii)~~Inspection will be performed for the existence of a report verifying that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.	a. Report(s) document that: ~~i)~~ T the seismic Category I equipment identified in Tables 2.2.4-4 and 2.2.4-5 is located ~~on a seismic structure~~in a seismic Caterogy I structure. b. ~~ii)~~ A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. c. ~~iii)~~ A report exists and concludes that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.
14. Each of the components identified in Table 2.2.4-4 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.	Inspection will be performed for the existence of a report verifying that the as-built piping meets the requirements for functional capability.	Report(s) document that a report exists and concludes that each of the as-built lines identified in Table 2.2.4-4 for which functional capability is required meets the requirements for functional capability.

Table 2.3.1-2

ITAAC For The Process Radiation Monitoring System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. The safety-related process radiation monitors listed in Table 2.3.1-1 are seismic Category I and can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the seismic Category I process radiation monitors identified in Table 2.3.1-1 are located ~~on a seismic structure.~~in a seismic Category I structure.	i) Inspection report(s) document that the seismic Category I process radiation monitors identified in Table 2.3.1-1 are located ~~on a seismic structure.~~in a seismic Category I structure.
	ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I process radiation monitors will be performed.	ii) Test/analysis reports exist and conclude that the seismic Category I process radiation monitors can withstand seismic design basis loads without loss of safety function.
	iii) Inspection will be performed for the existence of a report verifying that the as-installed process radiation monitors including anchorage are seismically bounded by the tested or analyzed conditions.	iii) Inspection reports exist and conclude that the as-installed process radiation monitors including anchorage are seismically bounded by the tested or analyzed conditions.

Table 2.4.1-3

ITAAC For The Isolation Condenser System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5a. The seismic Category I equipment identified in Tables 2.4.1-1 and 2 can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Tables 2.4.1-1 and 2 are located ~~on the Nuclear Island~~in a seismic Category I structure.	Report(s) document that: i) The seismic Category I equipment identified in Table Tables 2.4.1-1 and 2 is located in ~~a seismic structure.~~in a seismic Category I structure.
	ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.	ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function.
	iii) Inspection will be performed for the existence of a report verifying that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.	iii) A report exists and concludes that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.
b. Each of the lines identified in Table 2.4.1-1 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.	Inspection will be performed for the existence of a report verifying that the as-built piping meets the requirements for functional capability.	Report(s) document that a report exists and concludes that each of the as-built lines identified in Table 2.4.1-1 for which functional capability is required meets the requirements for functional capability.

Table 2.4.2-3

ITAAC For The Gravity-Driven Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5a. The seismic Category I equipment identified in Table 2.4.2-1 can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Table 2.4.2-1 are located in a seismic Category I structure. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.	i) Report(s) document that the seismic Category I equipment identified in Table 2.4.2-1 is located ~~on a seismic structure~~in a seismic Category I structure. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.
b. Each of the lines identified in Table 2.4.2-1 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.	Inspection will be performed for the existence of a report verifying that the as-built piping meets the requirements for functional capability.	A report exists and concludes that each of the as-built lines identified in Table 2.4.2-1 for which functional capability is required meets the requirements for functional capability.

Table 2.5.10-1

ITAAC For The Inclined Fuel Transfer System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the IFTS is as described in this Section 2.5.10.	Inspections of the as-built system will be performed.	Report(s) document that the as-built IFTS conforms to the functional arrangement as described in this Section 2.5.10.
2. The seismic Category I, nonsafety-related IFTS tubes and supporting structure can withstand seismic design basis loads without failure of the basic structure or compromising the integrity of adjacent equipment and structures. The seismic portion of the IFTS tubes and supporting structure includes the portion of the IFTS transfer tube assembly from where it interfaces with the upper fuel pool, the portion of the tube assembly extending through the building, the drain line connection, and the lower spent fuel pool terminus equipment (e.g., tube, valve, support structure, and bellows).	i) Inspection will be performed to verify that the seismic Category I equipment is located ~~on a seismic structure~~in a seismic Category I structure. ii) Type tests, analyses, or a combination of type tests and analyses of Seismic Category I equipment will be performed.	Report(s) document that: i) Inspection results verify that the seismic Category I equipment is located ~~on a seismic structure~~in a seismic Category I structure. ii) A report exists and concludes that the Seismic Category I equipment can withstand seismic design basis loads without loss of safety function.
3. The IFTS is functionality capable of moving fuel.	Tests will be performed using installed controls and power supplies utilizing dummy fuel bundles for successful demonstration of fuel movement from the refuel pool to the spent fuel pool and return.	Report(s) document that tests conclude that the as-built IFTS passes functional testing.

Table 2.6.1-2

ITAAC For The Reactor Water Cleanup/Shutdown Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7. The Seismic Category I equipment identified in Table 2.6.1-1 can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the Seismic Category I equipment and valves identified in Table 2.6.1-1 are located in ~~the~~a ~~Nuclear Island~~seismic Category I structure.	Report(s) document that: i) The Seismic Category I equipment identified in Table 2.6.1-1 is located ~~on a seismic structure~~in a seismic Category I structure.
	ii) Type tests, analyses, or a combination of type tests and analyses of Seismic Category I equipment will be performed.	ii) A report exists and concludes that the Seismic Category I equipment can withstand seismic design basis loads without loss of safety function.
	iii) Inspection will be performed for the existence of a report verifying that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.	iii) A report exists and concludes that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.

Table 2.15.4-2

ITAAC For The Passive Containment Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. The pressure boundary of the PCCS retains its integrity under the containment design pressure of 310 kPa gauge (45 psig)	A containment Structural Integrity Test (SIT) will be conducted per ASME requirement at a test pressure of 1.15 times the design pressure. The first prototype containment structure will be instrumented to measure strains per ASME Code Section III, Div 1, NE-6320.	Test results demonstrate compliance to ASME Code Section III, Div 1, NE-3226.
5a. The seismic Category I equipment identified in Table 2.15.4-1 can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.15.4-1 are located ~~on the Nuclear Island~~in a seismic Category I structure. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.	Report(s) document that: i) The seismic Category I equipment identified in Table 2.15.4-1 is located ~~on a seismic structure~~in a seismic Category I structure. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.

Table 2.15.7-2

ITAAC For The Containment Monitoring System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. The seismic Category I equipment identified in Table 2.15.7-1 can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Table 2.15.7-1 are located ~~on the Nuclear Island~~in a seismic Category I structure. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.	Report(s) document that: i) The seismic Category I equipment identified in Table 2.15.7-1 is located ~~on a seismic structure~~ in a seismic Category I structure. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.
7. The equipment qualification of CMS components is addressed in Tier 1 Section 3.8.	See Tier 1 Section 3.8.	See Tier 1 Section 3.8.
8. The containment isolation portions of the CMS system are addressed in Tier 1, Subsection 2.15.1.	See Tier 1 Subsection 2.15.1.	See Tier 1 Subsection 2.15.1.