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MFN 08-086
Supplement 72

Docket No. 52-010

October 3, 2008

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. 215 Related to ESBWR Design Certification Application ESBWR RAI Numbers 14.3-373 S01, 14.3-380 S02 and Response to Portion of NRC Request for Additional Information Letter No. 231 Related to ESBWR Design Certification Application ESBWR RAI Numbers 14.3-400 and 14.3-401

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 June 23, 2008 (Reference 1 and 2).

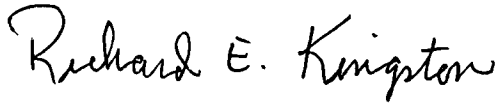
Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box. The marked-up pages may contain unverified changes in addition to the verified changes resulting from this RAI response. Other changes shown in the markup(s) may not be fully developed and approved for inclusion in the DCD.

Enclosure 1 contains the GEH response to each of the subject RAIs. Previous RAIs and responses were transmitted in References 3 through 7. The enclosed changes will be incorporated in an upcoming DCD Revision.

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

*DO68
NRD*

Sincerely,



Richard E. Kingston
Vice President, ESBWR Licensing

References:

1. MFN 08-550, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 215 Related To ESBWR Design Certification Application*, dated June 23, 2008.
2. MFN 08-628, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 231 Related To ESBWR Design Certification Application*, dated August 5, 2008.
3. MFN 07-718, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 126 Related To ESBWR Design Certification Application*, dated December 20, 2007.
4. MFN 08-086, *Partial GEH Response to NRC Request for Additional Information Letter No. 126 Related to ESBWR Design Certification Application*, dated February 6, 2008.
5. MFN 08-352, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 169 Related To ESBWR Design Certification Application*, dated April 8, 2008.
6. MFN 08-086, Supplement 51, *Response to Portion of NRC Request for Additional Information Letters No. 126 Related to ESBWR Design Certification Application ESBWR RAI Number 14.3-380*, dated May 15, 2008.
7. MFN 08-086, Supplement 26, *Response to Portion of NRC Request for Additional Information Letters No. 126 Related to ESBWR Design Certification Application ESBWR RAI Numbers 14.3-197, 14.3-245, 14.3-318, 14.3-319, 14.3-327, 14.3-373, 14.3-374*, dated April 2, 2008.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 215 Related to ESBWR Design Certification Application DCD Tier 1 RAI Numbers 14.3-373 S01, 14.3-380 S02 (NRC Letter 215) 14.3-400 and 14.3-401 (NRC Letter 231)

cc: AE Cubbage USNRC (with enclosure)
 RE Brown GEH/Wilmington (with enclosure)
 EDRF Section 0000-0091-2260 RAI 14.3-373 S01
 0000-0087-6881/1 RAI R0 14.3-380 S02
 0000-0091-2262 RAI 14.3-400
 0000-0091-2261 RAI 14.3-401

Enclosure 1

MFN 08-086 Supplement 72

Response to Portion of NRC Request for

Additional Information Letter Nos. 215 and 231

Related to ESBWR Design Certification Application

DCD Tier 1

**RAI Numbers 14.3-373 S01 and 14.3-380 S02, 14.3-400 and
14.3-401**

* Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box. The marked-up pages may contain unverified changes in addition to the verified changes resulting from this RAI response. Other changes shown in the markup(s) may not be fully developed and approved for inclusion in DCD Revision 6.

*Original Responses previously submitted are included without DCD updates to provide historical continuity during review.

NRC RAI 14.3-373 (original response transmitted by MFN 08-086, Supplement 26)

MWS safety-related containment penetrations and isolation valves

NRC Full Text:

For ITAAC Table 2.12.1-1 Item 1, refers to Subsection 2.15-1 for verification of the safety-related containment penetrations and isolation valves, however, no mention is made of these MWS components in Subsection 2.15.1. The staff requests that the applicant provides a list of the MWS penetrations and isolation valves for verification in Subsection 2.15.1 or provide a suitable Justification for not including such a list.

GEH Response

GEH agrees that Section 2.15-1 should include a list of MWS penetrations and isolation valves. Table 2.15-1 will be revised to include this information.

DCD Impact

DCD Tier 1, Table 2.15.1-1 will be revised as noted in the attached markup.

NRC RAI 14.3-373 S01

GEH added a Table 2.15.1-1a to address the requests of the staff for RAI 14.3-373, and the applicable Makeup Water System (MWS) isolation valves are indicated in the new table, however, the valve numbers and penetration identification numbers are not provided. The staff requests that GEH provide the MWS isolation valve numbers and the associated penetration identification numbers.

GEH Response

MWS isolation valve numbers and associated penetrations numbers were not provided consistent with the rest of Tier 1. This level of detail is provided in Tier 2 of the DCD.

DCD Tier 2 Tables 6.2-15 through 6.2-47 provide detailed information regarding all of the containment isolation valves including associated penetrations listed in Table 2.15.1-1a.

DCD Impact

No changes to DCD Tier 1 will be made as a result of this RAI.

NRC RAI 14.3-380

NRC Summary:

Containment system pressure boundary

NRC Full Text:

For ITAAC Table 2.15.1-2 Item 8, it appears that the applicant has interchanged the applicable content between the DC and AC. The staff requests that the applicant include the specific design pressure in the AC to demonstrate compliance with the ASME Code and requests that the DC include reference to design and construction to ASME Code Section III, Div. 2. requirements.

GEH Response

Note Table 2.15.1-2 was revised and provided in MFN 08-086 dated February 6, 2008.

NRC RAI 14.3-380 S01

The RAI requested revision of the ITAAC Table 2.15.1-2 "ITAAC For The Containment System," Item 9. Specifically, the RAI requested that the Design Commitment (DC) be revised to indicate what the design is committed to comply with, a citation of the code section. Additionally, the staff requested that the Acceptance Criteria (AC) be revised to give the specific design pressure required to demonstrate compliance.

In the response GEH has removed the design pressure from the DC, but not added a design code commitment. The revision states merely that the system "... retains its integrity when subject to design pressure." Additionally the AC is revised to say, "Test report documents that a pressure at or above 310 kpa gauge (45 psig) does not affect containment integrity." Per DCD Paragraph 2.15(8) that is the design pressure. While this does observe the request of adding the specific design pressure to the AC, it is such that it could be misinterpreted as the test pressure. If that were to happen, the test pressure would be in conflict with the ITA requirements as stated because ASME Section III, Division 2 article CC- 110 states the test pressure shall be 1.15 times the design pressure.

The DC is not clearly stated, when combined with the revised AC, there is not a clearly acceptable point to demonstrate compliance and allow closure of this ITAAC. GEH is requested to revise the ITAAC to clearly state the DC and the AC.

GEH RESPONSE

Note on Items referred to in RAI above, on 4/30/2008 the NRC confirmed that its intention is to refer to Table 2.15.1-2 Item 8 (not Item 9) and DCD Paragraph 2.15.1(8) (not 2.15(8)).

GEH accepts the comment and has revised the ITAAC to more clearly restate the DC and AC in Table 2.15.1-2, and has revised the referencing statement in 2.15.1 (8).

DCD IMPACT

DCD Tier 1 Section 2.15.1(8) and the associated Table (Item 8) will be revised in Rev 5 to more clearly restate the DC and AC.

Not related to this RAI, a new table has been inserted; therefore the table previously referred to as Table 2.15.1-2 is now Table 2.15.1-3. These changes are reflected in the attached markup.

NRC RAI 14.3-380 S02

Question Summary:

Revised acceptance criteria in Table 2.15-3

Full Text:

The staff accepts the revision to Item 8 of Table 2.15-3 except the staff requests that GEH modify the AC to begin as follows:

"A test report exists and concludes, " and delete the word "documents"

GEH RESPONSE

GEH agrees with the proposed modification. Note that the correct Table reference, based on the previous supplement, is Table 2.15.1-2. The wording in the acceptance criteria for Table 2.15.1-2, Item 8, will be changed as requested.

DCD Impact

DCD Tier 1, Table 2.15.1-2 will be revised as noted in the attached markup.

Table 2.15.1-2
ITAAC For The Containment System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
c. The circuits of each electrical penetration are of the same voltage class.	Inspections of the as-built containment electrical penetrations will be performed.	Inspection report(s) document-exist and <u>conclude</u> that each as-built circuit of each electrical penetration is of the same voltage class.
7. The containment system provides a barrier against the release of fission products to the atmosphere.	Perform Type A, B and C leakrate tests in accordance with 10 CFR 50 Appendix J.	Test report(s) <u>exist and</u> conclude that leak rates are less than the acceptance criterion established per 10CFR 50 Appendix J.
8. The containment system pressure boundary retains its structural integrity when subject to design pressure.	A Structural Integrity Test (SIT) of the containment structure is performed in accordance with Article CC-6000 of ASME Code Section III, Division 2 and Regulatory Guide 1.136, after completion of the containment construction. The first prototype containment structure will be instrumented to measure strains per ASME Code Section III, Division 2, CC-6370.	Test report(s) <u>exist and documents conclude</u> that the containment system pressure boundary retains its structural integrity when tested and evaluated in accordance with ASME Code Section III, Division 2 at a test pressure of at least 115% of the design pressure of 310 KPa gauge (45 psig).
9. The containment system provides the safety-related function of containment isolation for containment boundary integrity.	i) Tests will be performed to demonstrate that containment isolation valves close within the required response times.	i) Report(s) document-exist and <u>conclude</u> that the containment isolation valves close within the required response times identified in Table 2.15.1-1d.

NRC RAI 14.3-400

In Tier 1 Tables 2.2.4-5 and 2.4.1-2 standby liquid control system (SLCS), ICS Electrical equipment the "Active Function" column is deleted in Rev.5.

RAI 14.3-354 response is given as the basis for the deletion. But the response to RAI 14.3-354 is related to mechanical equipment rather than electrical equipment, therefore, clarification is needed.

The active safety function column was kept in Tier 1, Table 2.1.2-2 Nuclear Boiler System Electrical equipment. Explain the inconsistency.

GEH Response

The information provided in the columns entitled "Active Safety Function" is either provided in the Table 2.1.2-1 (e.g valve safety related position) or is not necessary (e.g. there is no inspection performed to specifically verify that the reactor pressure transmitters have an active function).

The column entitled "Active Safety Function" will be deleted from Table 2.1.2-2 consistent with the rest of Tier 1.

DCD Impact

DCD Tier 1 Table 2.1.2-2, Revision 6 will be revised to eliminate the column entitled "Active Safety Function" as shown on the attached markup.

Table 2.1.2-2
Nuclear Boiler System Electrical Equipment

Equipment Name	Equipment ID on Figure 2.1.2-2	Control Q-DCIS/ DPS ¹	Safety- Related Electrical Equipment	Safety- Related Display	Deleted Active Safety Function	Seismic Category I	Remotely Operated	Containment Isolation Valve Actuator
Inboard Main steam isolation valves	V8 (Typ. of 4)	Yes	Yes	Yes	Close	Yes	Yes	Yes
Outboard Main steam isolation valves	V9 (Typ. of 4)	Yes	Yes	Yes	Close	Yes	Yes	Yes
Safety relief valves (SRV)	V6 (Typ. of 10)	Yes (ADS – See Section 2.2.13)	Yes	Yes	Open	Yes	Yes	No
Depressurization valves	V5 (Typ. of 8 total)	Yes	Yes	Yes	Open	Yes	Yes	No
Feedwater outboard isolation valves	V14, V17, V20, V21	Yes	Yes	Yes	Close	Yes	Yes	Yes
Feedwater branch line outboard isolation check valves	V13, V16	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reactor Pressure Transmitters (1 each in 4 divisions)	-	Yes	Yes	Yes	Yes	Yes	-	-
Reactor water level transmitters (1 each in 4 divisions)	-	Yes	Yes	Yes	Yes	Yes	-	-
MSIV Isolation Logic	-	Yes	Yes	Yes	Yes	Yes	-	-

Table 2.1.2-2
Nuclear Boiler System Electrical Equipment

Equipment Name	Equipment ID on Figure 2.1.2-2	Control Q-DCIS/ DPS ¹	Safety- Related Electrical Equipment	Safety- Related Display	Deleted Active Safety Function	Seismic Category I	Remotely Operated	Containment Isolation Valve Actuator
Leak Detection and Isolation System Logic	-	Yes	Yes	Yes	Yes	Yes	-	-

Note: A dash means not applicable.

Note 1: See Subsection 2.2.7.

NRC RAI 14.3-401

In Tier 1, Section 2.4.1, Isolation Condenser System, the staff requests that GEH add "ICS system minimum inventory of alarms, displays, controls and status indications in the main control room are addressed in Section 3.3."

GEH Response

DCD Tier 1 Section 2.4.1 and Table 2.4-1 will be revised to the requested wording.

DCD Impact

DCD Tier 1 Section 2.4.1 and Table 2.4-1 will be revised as noted in the attached markup.

- a. RPV high pressure following a time delay
 - b. RPV water level below level 2 following a time delay
 - c. RPV water level below level 1
 - d. Loss of power to 2 of 4 reactor feed pumps with the reactor mode switch in RUN
 - e. MSIVs in 2 of 4 steam lines less than fully open ($\leq 92\%$) with the reactor mode switch in RUN.
- (18) The two-series, solenoid-operated bottom vent line valves (V-9, and V-10) open on high RPV pressure after time delay following condensate return or condensate bypass valve opening signals.
- (19) The three vent lines with two-series, solenoid-operated top and bottom vent line valves (V-7 & V-8; V-9 & V-10; V-11 & V-12) open on manual actuation only if condensate return or condensate bypass valve is not closed.
- (20) The accumulator for the pneumatic isolation valves (V-1, V-2, V-3 and V-4) in the ICS steam supply and condensate return valves have the capacity to close the valves three times with the drywell at the drywell design pressure.
- (21) Upon loss of pneumatic pressure to the condensate bypass valve (V-6), the valve strokes to the fully open position.
- (22) Each ICS train minimum heat removal capacity with reactor at or above normal operating pressure.
- (23) Each ICS train provides at least the minimum drainable liquid volume available for return to the RPV.
- (24) The Dryer/Separator Pool and Reactor Well provide sufficient makeup water volume to the IC/PCC expansion pool to support operation of the ICS and PCCS for the first 72 hours.
- (25) The IC/PCC pools are safety-related and Seismic Category 1.
- (26) Each ICS flow path is constrained to a maximum flow area at transitions between Class 1 piping from containment to Class 2 piping outside containment in order to limit flow in the event of a break.
- (27) ICS software is developed in accordance with the software development program described in Section 3.2.
- (28) Conformance with IEEE Standard 603 requirements by the safety-related control system structures, systems, and components is addressed in Subsection 2.2.15.
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| (29) ICS system minimum inventory of alarms, displays, controls, and status indications in the main control room are addressed in Section 3.3. | |
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Inspections, Tests, Analyses and Acceptance Criteria

Table 2.4.1-3 provides a definition of the inspections, test and/or analyses, together with associated acceptance criteria for the Isolation Condenser System.

Table 2.4.1-3

ITAAC For The Isolation Condenser System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
27. ICS software is developed in accordance with the software development program described in Section 3.2.	See Section 3.2.	See Section 3.2.
28. <u>Conformance with IEEE Standard 603 requirements by the safety-related control system structures, systems, and components is addressed in Subsection 2.2.15.</u>	<u>See Subsection 2.2.15.</u>	<u>See Subsection 2.2.15.</u>
29. <u>ICS system minimum inventory of alarms, displays, controls, and status indications in the main control room are addressed in Section 3.3.</u>	<u>See Section 3.3.</u>	<u>See Section 3.3.</u>