HITACHI

GE Hitachi Nuclear Energy

James C. Kinsey
Vice President, ESBWR Licensing

PO Box 780 M/C A-55
Wilmington, NC 28402-0780
USA

T 910 675 5057
F 910 362 5057

MFN 08-303

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

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application - Containment Systems - RAI Number 6.2-160**

Enclosure 1 contains the GE Hitachi Nuclear Energy (GEH) response to the subject NRC RAI transmitted via the Reference 1 letter. DCD Markups related to this response are provided in Enclosure 2.

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

Sincerely,

James C. Kinsey

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 07-327, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application*, May 30, 2007

Enclosures:

1. MFN 08-303 - Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application - Containment Systems - RAI Number 6.2-160
2. MFN 08-303 - Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application - Containment Systems - RAI Number 6.2-160 - DCD Markups

cc:

AE Cubbage	USNRC (with enclosures)
DH Hinds	GEH/Wilmington (with enclosures)
GB Stramback	GEH/San Jose (with enclosures)
RE Brown	GEH/Wilmington (with enclosures)
eDRF	0000-0075-3365, 0000-0073-4120R1

Enclosure 1

MFN 08-303

Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application

Containment Systems

RAI Number 6.2-160

NRC RAI 6.2-160:

Concerning DCD Tier 2, Rev. 3, Section 6.2.1.3:

NEDE-33261P implies that GE used the PICSM computer code to compare Mark III suppression pool swell test data from the pressure suppression test facility (PSTF) with analytical predictions. The code, described in GE technical report NEDE-21544, was not reviewed and approved by the staff.

A. *If the PICSM code was used, what liquid and froth impacts were predicted to occur on the vacuum breaker (VB) valves? If impact loads are predicted, then what design features are included providing structural shielding of VB valves from pool swell loads?*

B. *If liquid and froth impacts are not predicted, provide a discussion of the minimum height between the pool surface and the VB to ensure that structural protection is not necessary.*

C. *Provide an ITAAC to verify the minimum height between the pool surface and the VB.*

D. *If the PICSM computer code was not used, how were potential challenges to the VBs and horizontal diaphragm evaluated?*

Please include the pertinent information requested above in the DCD.

GEH Response:

A. The ESBWR hydrodynamic load definitions and bases are described in the ESBWR Containment Load Definition Licensing Topical Report (Reference 6.2-160-1). These include the LOCA pool swell loads. Reference 6.2-160-1 was submitted by letter MFN 07-563, dated November 8, 2007.

   The PICSM code derives the key parameters used to define the impact loads above the suppression pool during pool swell. Those key parameters are maximum pool surface height, maximum surface velocity, peak wetwell pressure and peak bubble pressure. The results are presented in Section 3 of Reference 6.2-160-1. The froth impact that can occur above the maximum pool surface height is also included in Reference 6.2-160-1. The pool swell methodology used for ESBWR is the same as that used for ABWR, which was reviewed by the NRC in Reference 6.2-160-2. Reference 6.2-160-1 describes the similarities between the ABWR and ESBWR containment designs and, thus, the applicability of using the ABWR methodology for ESBWR.

   DCD Tier 2, Subsection 6.2.1.1.2 provides for protecting the vacuum breaker valves from pool swell loads by structural shielding.

B. Froth impacts are predicted by the analysis as documented in Reference 6.2-160-1. The general arrangement of the wetwell precludes the liquid impact. The maximum pool depth is 5.5 m, which provides a clearance of 6.75 m from the surface of the suppression pool to the ceiling of the wetwell. This clearance of 6.75 m exceeds the maximum pool swell of 4100 mm predicted in Reference 6.2-160-1.

C. DCD Tier 1, Figure 2.15.1-1 will be revised to require the diaphragm floor slab to be greater than 9600 mm above the wetwell floor. This physical dimension is the combination of the maximum pool depth (5500 mm) and the maximum pool swell (4100 mm).

The contents of Figure 2.15.1-1 are covered by Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) in DCD Tier 1, Table 2.15.1-2, item 1. The maximum pool depth is covered by DCD Tier 2, Chapter 16, Technical Specification Surveillance Requirement 3.6.2.2.1, as a condition for plant operation.

D. As stated above in the response to Part A, the PICSM code was used and details of the methodology are found in Reference 6.2-160-1.

References:

6.2-160-1 General Electric Company, "ESBWR Containment Load Definition," NEDE-33261P, Class III (Proprietary), Revision 1, October 2007, and NEDO-33261, Class I (Non-proprietary), Revision 1, October 2007.

6.2-160-2 Nuclear Regulatory Commission, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor Design," NUREG-1503, July 1994.

DCD Impact:

DCD Tier 1, Figure 2.15.1-1 will be revised as shown in the attached markup.

Enclosure 2

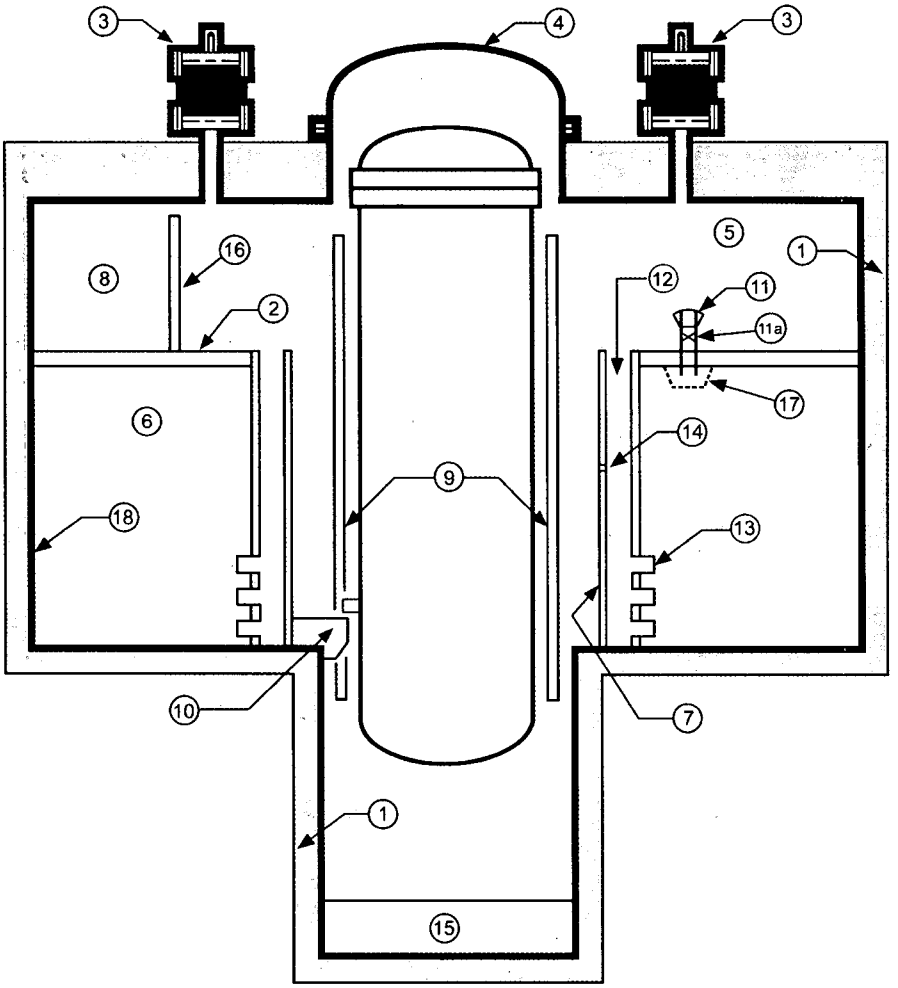
MFN 08-303

Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application

Containment Systems

RAI Number 6.2-160

DCD Markups

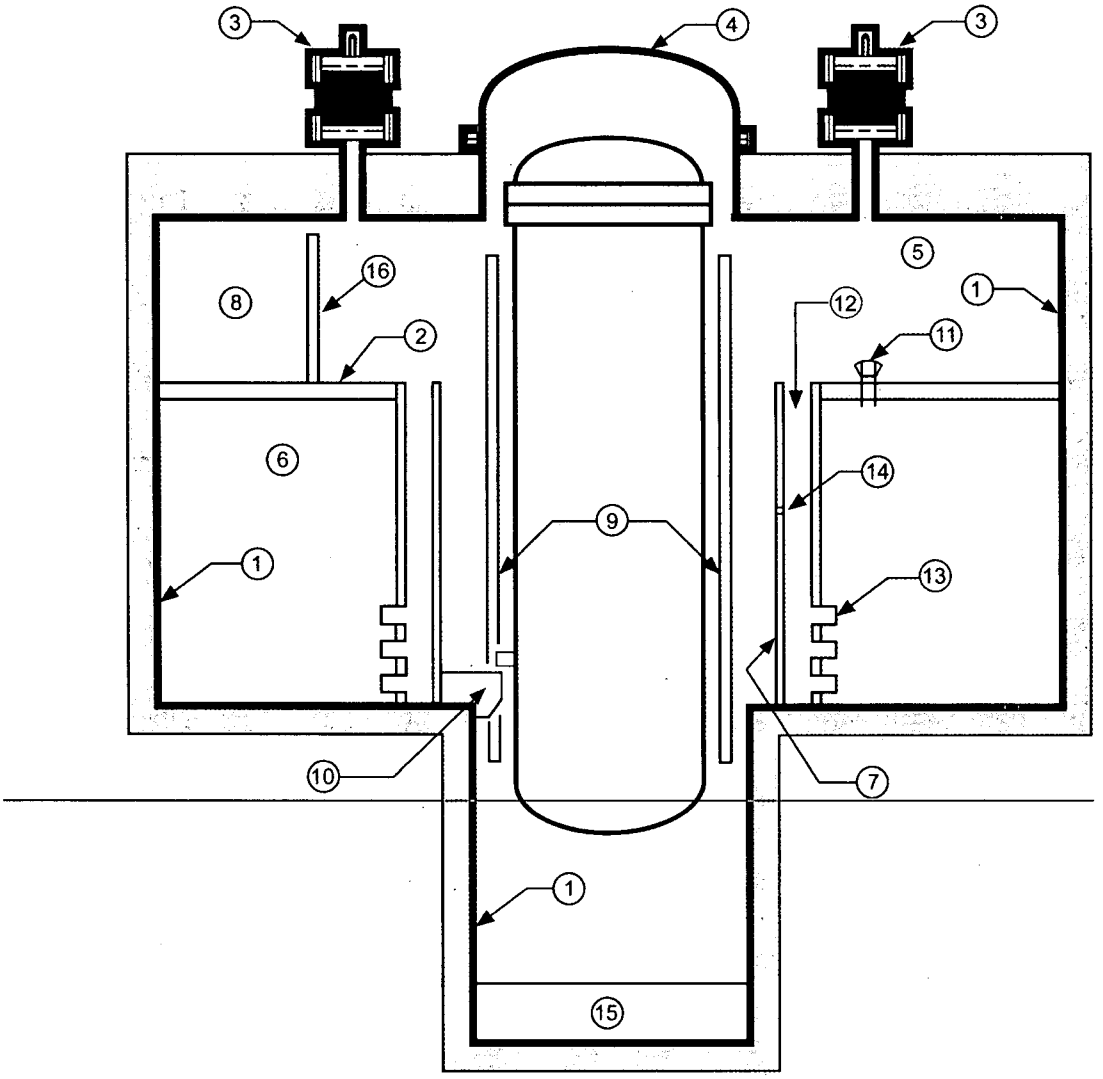


LEGEND

1. Reinforced Concrete Containment Vessel (RCCV)
2. Diaphram Floor Slab, Distance from bottom of slab to the Wetwell Floor > 9600mm
3. (6) Passive Containment Cooling System (PCCS)
4. Drywell Head
5. Drywell
6. Wetwell
7. Vent Wall
8. (3) GDCS Pools
9. Reactor Shield Wall
10. (8) RPV Support Brackets
11. (3) Vacuum Breakers, ≥ 0.6m^2 (6.46 ft^2) Total

11a. (3) Vacuum Breaker Isolation Valves, ≥ 0.6m^2 (6.46 ft^2) Total

12. (12) Vertical Vents, ≥ 13.6m^2 (146 ft^2) Total
13. (36) Horizontal Vents, ≥ 0.7m (2.30 ft) I.D.
14. (12) Spillover Holes, 200mm (8 inch) Nominal Diameter, Elevation 12370 mm
15. BiMAC
16. GDCS Pool Wall (Typical)
17. Protective Shield/Debris Screen
18. Suppression Pool Stainless Steel Liner



LEGEND

1. Containment Vessel (RCCV)
2. Diaphram Floor Slab
3. Passive Containment Cooling System (PCCS), Total 6
4. Drywell Head
5. Drywell
6. Wetwell
7. Vent Wall
8. GDCS Pools, Total 3
9. Reactor Shield Wall
10. RPV Support Bracket (Typical 8)
11. Vacuum Breaker, Total 3
12. Vertical Vents, ≥ 13.6m^2 (146 ft^2) Total
13. Horizontal Vent, ≥ 0.7m (2.30 ft) I.D., 36 Total
14. Spillover Hole, 200mm (8 inch) Nominal Diameter, 12 Total
15. BiMAC
16. GDCS Pool Wall (Typical)

Figure 2.15.1-1. Containment System