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MFN 08-295

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**Subject:** **Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application - System Leakage and Hydrostatic Pressure Tests, ASME Code Sections - RAI Number 5.2-65**

Enclosure 1 contains the GE Hitachi Nuclear Energy (GEH) response to the subject NRC RAI transmitted via the Reference 1 letter.

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 5.

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

Sincerely,

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

Enclosure:

1. MFN 08-295 - Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application - System Leakage and Hydrostatic Pressure Tests, ASME Code Sections - RAI Number 5.2-65

cc:

| | |
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| AE Cubbage | USNRC (with enclosures) |
| DH Hinds | GEH/Wilmington (with enclosures) |
| GB Stramback | GEH/San Jose (with enclosures) |
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# Enclosure 1

# MFN 08-295

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

# System Leakage and Hydrostatic Pressure Tests, ASME Code Sections

# RAI Number 5.2-65

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 5.

**NRC RAI 5.2-65:**

*DCD, Tier 2, Revision 3, Chapters 5.2.4.6 and 6.6.6 reference certain portions of IWA-5000, IWB-5000, IWC-5000 and IWD-5000 in the description of System Leakage and Hydrostatic Pressure Tests.*

*Revise DCD, Chapters 5.2.4.6 and 6.6.6 to clarify that System Leakage and Hydrostatic Pressure Tests will meet all requirements of ASME Code Section XI, IWA-5000, IWB-5000, IWC-5000 and IWD-5000.*

**GEH Response:**

As requested by the staff, DCD Tier 2, Subsection 5.2.4.6 will be revised to clearly state the requirement that "System Leakage and Hydrostatic Pressure Tests will meet all requirements of ASME Code Section XI, IWA-5000 and IWB-5000 for Class 1 components." In addition, DCD Tier 2, Subsection 6.6.6 will be revised to clearly state "System Leakage and Hydrostatic Pressure Tests will meet all applicable requirements of ASME Code Section XI, IWA-5000 and IWC-5000 for Class 2 components; and IWA-5000 and IWD-5000 for Class 3 components." The distinction between Classes in the ASME Code is addressed in the Subsections IWA, IWB, IWC and IWD.

ASME Code Section XI allows either System Leakage or Hydrostatic Pressure Testing. Regardless of which test method is chosen, System Leakage and Hydrostatic Pressure Tests will meet all requirements of ASME Code Section XI as specified in the DCD mark-ups.

**DCD Impact:**

DCD Tier 2, Subsections 5.2.4.6 and 6.6.6 will be revised as shown in the attached markups.

Components containing flaws or relevant conditions and accepted for continued service in accordance with the requirements of IWB-3132.4-3 or IWB-3142.4 are subjected to successive period examinations in accordance with the requirements of IWB-2420 (b) and (c). Examinations that reveal flaws or relevant conditions exceeding Table IWB-3410-1 acceptance standards are extended to include additional examinations in accordance with the requirements of IWB-2430.

*5.2.4.6 System Leakage and Hydrostatic Pressure Tests*

The requirements for System Leakage and Hydrostatic Pressure Tests are described in this section. System leakage or hydrostatic testing is required in accordance with ASME Code Section XI. Regardless of which test method is chosen, System Leakage and Hydrostatic Pressure Tests will meet all requirements of ASME Code Section XI, IWA-5000 and IWB-5000 for Class 1 components.

**System Leakage Tests**

As required by Section XI, IWB-2500 for Category B-P, a system leakage test shall be performed in accordance with IWB-5200 on all Class 1 components and piping within the pressure-retaining boundary following each refueling outage. For the purposes of the system leakage test, the pressure-retaining boundary is defined in IWB-5222. The system leakage test includes a VT-2 examination in accordance with IWA-5240. The system leakage test is conducted at a pressure not less than that corresponding to 100% rated reactor power. The system hydrostatic test (described below), when performed, is acceptable in lieu of the system leakage test.

**Hydrostatic Pressure Tests**

A system hydrostatic test may be performed in lieu of a system leakage test, and when required for repairs, replacements, and modifications per IWA-4540. The test includes all Class 1 pressure retaining components and piping within the boundaries defined by IWB-5230 or the boundary of a repair or replacement as applicable. The system hydrostatic test shall include a VT-2 examination in accordance with IWA-5240. For the purposes of determining the test pressure for the system hydrostatic test in accordance with IWB-5230, the nominal operating pressure shall be the maximum operating pressure indicated in the process flow diagram (PFD) for the NBS.

*5.2.4.7 Code Exemptions*

As provided in ASME Section XI, IWB-1220, certain portions of Class 1 systems are exempt from the volumetric and surface examination requirements of IWB-2500. Components exempt from preservice inspection and inservice inspection requirements are identified in the inservice inspection program.

*5.2.4.8 Code Cases*

Section XI requirements can be modified by invoking approved Section XI Code Cases. Approved Code Cases for inservice inspection are listed in Regulatory Guide 1.147. As applicable, the provisions of the Code Cases listed in Table 5.2-1 may be used for preservice and inservice inspections, evaluations, and repair and replacement activities.

### 6.6.6 System Pressure Tests

The requirements for System Leakage and Hydrostatic Pressure Tests are described in this Section. System Leakage and hydrostatic testing is required in accordance with ASME Code Section XI. Regardless of which test method is chosen, System Leakage and Hydrostatic Pressure Tests will meet all applicable requirements of ASME Code Section XI: IWA-5000 and IWC-5000 for Class 2 components; and IWA-5000 and IWD-5000 for Class 3 components.

#### *6.6.6.1 System Leakage Test*

As required by Section XI, IWC-2500 for category C-H and by IWD-2500 for category D-B a system leakage test is performed in accordance with IWC-5220 on Class 2 systems, and IWD-52210 on Class 3 systems. The test include all Class 2 or 3 pressure retaining components and piping within the boundaries defined by IWC-5222 and IWD-524022. The test is performed once during each inspection period as defined in Tables IWC-2412-1 and IWD-2412-1 for Program B. The system leakage test includes a VT-2 examination in accordance with IWA-5222. The system leakage test is conducted at the system pressure during operation or the test pressure used for systems that are not required to function during normal operation. The system hydrostatic test, when performed, is acceptable in lieu of the system leakage test.

#### *6.6.6.2 Hydrostatic Pressure Tests*

A system hydrostatic test may be performed in lieu of a system leakage test, and when required for repairs, replacements, and modifications per IWA-4540. The test includes all Class 2 or 3 pressure retaining components and piping within the boundaries defined by IWC-5222 and IWD-5222-5240 or the boundary of a repair or replacement as applicable.

### 6.6.7 Augmented Inservice Inspections

**High Energy Piping**

High energy piping (defined within Subsection 3.6.2 and associated tables) between the containment isolation valves is subject to the following additional inspection requirements.

Circumferential welds are 100 percent volumetrically examined each inspection interval as defined within Subsections 6.6.3.2 and 6.6.4. Accessibility, examination requirements, and procedures are as discussed in Subsections 6.6.2, 6.6.3 and 6.6.5, respectively. Piping in these areas is seamless, thereby eliminating longitudinal welds.

**Erosion-Corrosion**

Piping systems, ASME Section III Code Class 1, 2, 3 and nonsafety-related piping and components as described in NRC Generic Letter 89-08, determined to be susceptible to erosion-corrosion are subject to a program of nondestructive examinations to verify system structural integrity. The examination schedule and examination methods are determined in accordance with the Electric Power Research Institute (EPRI) guidelines in NSAC-202L-R2, which satisfies NRC Generic Letter 89-08, or the latest revision approved by NRC (or equally effective program), and applicable rules of ASME Section XI.