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MFN 08-654

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U.S. Nuclear Regulatory Commission
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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 213 Related to the ESBWR Design Certification – Passive Containment Cooling System – RAI Number 6.2-181**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) responses to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by Reference 1. GEH response to RAI Number 6.2-181 is addressed in Enclosure 1. DCD Tier 1 markups associated with this response are provided in Enclosure 2.

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

Sincerely,

Charles W. Bergendahl for

Richard E. Kingston
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 08-511, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 213 Related To ESBWR Design Certification Application*, dated April 22, 2008

Enclosures:

1. Response to Portion of NRC Request for Additional Information Letter No. 213 Related to ESBWR Design Certification Application – Passive Containment Cooling System – RAI Number 6.2-181
2. MFN 08-654 DCD Tier 1 Markups

cc:	AE Cubbage	USNRC (with enclosure)
	RE Brown	GEH/Wilmington (with enclosure)
	eDRFs	0000-0088-6272

Enclosure 1

MFN 08-654

Response to Portion of NRC Request for Additional Information Letter No. 213 Related to ESBWR Design Certification Application

Passive Containment Cooling System (PCCS)

RAI Number 6.2-181

NRC RAI 6.2-181:

ESBWR LOCA analyses assume that condensate from the passive containment cooling system (PCCS) drains to the gravity-driven cooling system (GDCS) tanks and then to the reactor pressure vessel. To ensure proper gravity drainage of water following a LOCA, the piping from the PCCS condensers to the GDCS tanks should be designed to minimize the possibility of forming gas pockets in the piping. Staff has issued RAI 21.6-112 requesting design information on injection piping from GDCS to the vessel.

Please discuss how the piping from the PCCS condensers to the GDCS tanks will be designed to ensure that non-condensable gases will not collect in the lines and how features and design parameters that prevent collection of noncondensable gases in the lines will be verified through ITAAC.

GEH Response:

The formation of gas pockets does not occur in the Passive Containment Cooling System (PCCS) because the piping is sloped in a way to allow gasses to travel up into the condenser drum where they can be vented to the wetwell.

Item 13 is added to Tier 1 Table 2.15.4-2 to ensure that the ITAAC confirms this design feature similarly to the Gravity-Driven Cooling System (GDCS) ITAAC in Tier 1 Table 2.4.2-3, Item 24.

DCD Impact:

The DCD Tier 1, Subsection 2.15.4 and Table 2.15.4-2 changes will be reflected in Revision 6 as shown on the attached markup.

Enclosure 2

MFN 08-654

DCD Tier 1 Markups

2.15.4 Passive Containment Cooling System

Design Description

The Passive Containment Cooling System (PCCS), in conjunction with the suppression pool, maintains the containment within its pressure limits for DBAs such as a LOCA, by condensing steam from the DW atmosphere and returning the condensed liquid to the Gravity Driven Cooling System (GDCS) pools. The system is passive, with no components that must actively function in the first 72-hours after a DBA.

(1) The functional arrangement for the PCCS is as described in the Design Description in this subsection 2.15.4, Table 2.15.4-1 and Figure 2.15.4-1.

(2) ASME Code Section III

a1. The components identified in Table 2.15.4-1 as ASME Code Section III are designed in accordance with ASME Code Section III requirements and seismic Category I requirements.

a2. The components identified in Table 2.15.4-1 as ASME Code Section III shall be reconciled with the design requirements.

a3. The components identified in Table 2.15.4-1 as ASME Code Section III are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

b1. The piping identified in Table 2.15.4-1 as ASME Code Section III is designed in accordance with ASME Code Section III requirements and seismic Category I requirements.

b2. The as-built piping identified in Table 2.15.4-1 as ASME Code Section III shall be reconciled with the with the piping design requirements.

b3. The piping identified in Table 2.15.4-1 as ASME Code Section III is fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

(3) Pressure Boundary Welds

a. Pressure boundary welds in components identified in Table 2.15.4-1 as ASME Code Section III meet ASME Code Section III requirements.

b. Pressure boundary welds in piping identified in Table 2.15.4-1 as ASME Code Section III meet ASME Code Section III requirements.

(4) The pressure boundary of the PCCS retains its integrity under the design pressure of 310 kPa gauge (45 psig).

(5) The seismic Category I components identified in Table 2.15.4-1 can withstand seismic design basis loads without loss of safety function.

(6) Deleted

(7) The PCCS together with the pressure suppression containment system will limit containment pressure to less than its design pressure for 72 hours after a LOCA.

(8) The equipment qualification of PCCS components is addressed in Tier 1 Section 3.8.

(9) The elevation of the PCCS vent line discharge point is submerged in the Suppression Pool at an elevation below low water level and above the uppermost horizontal vent.

(10) The PCCS will be designed to limit the fraction of containment leakage through the condensers to an acceptable value.

(11) The PCCS vent fans flow rate is sufficient to the meet beyond 72 hours containment cooling requirements.

(12) The PCCS vent fans can be remotely operated from the MCR.

(13) The PCCS drain piping is installed to allow venting of non-condensable gases from the PCCS drain lines to the PCCS condenser vent lines to prevent collection in the PCCS drain lines.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.15.4-2 provides a definition of the inspections, tests and/or analyses, together with associated acceptance criteria for the Passive Containment Cooling System.

Table 2.15.4-2

ITAAC For The Passive Containment Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10. The PCCS will be designed to limit the fraction of containment leakage through the condensers to an acceptable value.	A pneumatic leakage test of the PCCS will be conducted.	Test report(s) and analysis document that the combined leakage from each of the PCCS heat exchangers is $\leq 0.025L_a$
11. The PCCS vent fans flow rate is sufficient to meet the beyond 72 hours containment cooling requirements.	Flow rate will be measured. A type test of the vent fan to be installed.	Test and Analyses show that the PCC vent fans can provide a flow rate of 0.271 m^3/s (575 CFM) under the following conditions: • Pressusre 299 KPa (43.4 psi) • Density 2.29 Kg/m^3 (0.143 Lbs/ft^3) • Head across fan 5.50 KPa (0.80 psi)
12. The PCCS vent fans can be remotely operated from the MCR.	PCCS vent fans will be started using manually initiated signals from the MCR.	Report(s) exist and conclude that the PCCS vent fans start when manually initated signals are sent from the MCR.
13. The PCCS drain piping is installed to allow venting of non-condensable gases from the PCCS drain lines to the PCCS condenser vent lines to prevent collection in the PCCS drain lines.	Inspection(s) will be conducted of as-built PCCS drain piping to ensure there are no elevated piping loops or high-point traps in piping runs to the GDCS pools.	Report(s) document(s) that based on inspection(s) of as-built PCCS drain piping, the as-built piping conforms to a design that allows venting of non-condensable gases from the PCCS drain lines to the PCCS condenser vent lines.