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Revision 1

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Subject: **Revised Response to Portion of NRC Request for Additional Information Letter No. 275 Related to ESBWR Design Certification Application – RAI Number 14.3-442**

The purpose of this letter is to submit supplemental information to the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI), Reference 1 for RAI 14.3-442 submitted previously in Reference 2.

Responses to RAIs 14.3-443 and 14.3-444 submitted in Reference 2 remain unchanged and are not repeated in the response enclosures to this MFN. Enclosure 1 provides the original response to RAI 14.3-442 with explanation and description for the supplemental information added to the original response.

Enclosure 2 provides the DCD markups as a result of the supplemental information included in this revised response. Verified DCD changes as a result of this revised response are enclosed within a black box.

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

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

D068
NRO

References:

1. MFN 08-967 - Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request For Additional Information Letter No. 275 Related To ESBWR Design Certification Application*, dated December 11, 2008
2. MFN 09-117 – Response to NRC Request for Additional Information Letter No. 275 Related to ESBWR Design Certification Application - RAI Numbers 14.3-442, 14.3-443, and 14.3-444, dated March 19, 2009

Enclosures:

1. MFN 09-117, Revision 1 – Revised Response to Portion of NRC Request for Additional Information Letter No. 275 Related to ESBWR Design Certification Application - RAI Number 14.3-442
2. MFN 09-117, Revision 1 – Revised Response to Portion of NRC Request for Additional Information Letter No. 275 Related to ESBWR Design Certification Application - RAI Numbers 14.3-442 – DCD Markups

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Enclosure 1

MFN 09-117
Revision 1

Revised Response to Portion of NRC Request for

Additional Information Letter No. 275

Related to ESBWR Design Certification Application

RAI Number 14.3-442

NRC RAI 14.3-442

Explain why some SFP and buffer pool design features do not appear in ITAAC

10 CFR 52.47(b)(1), which requires that a design certification application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC)that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC regulations. Important to safety functions should be described in the DCD Tier 1. Based on the review of DCD Tier 2 section 9.1, several apparent important to safety design features have been omitted from Tier 1. Please explain why the applicant did not require that the following design features be added to ITAAC specified as Tier 1 material:

- *The spent fuel pool and buffer pool are reinforced concrete structures with a stainless steel liner.*
- *Spent fuel pool and buffer pool liner embedments are designed to meet seismic Category I requirements.*
- *The bottoms of the spent fuel pool and buffer pool gates are higher than the minimum water level required over the spent fuel storage racks to provide adequate shielding and cooling.*
- *Lines to fill and drain the spent fuel pool and buffer pool enter the pools above the safe shielding water level.*
- *Redundant anti-siphon vacuum breakers are located at the high point of the pool lines in the spent fuel pool and the buffer pool to preclude a pipe break from siphoning the water from the pools and jeopardizing the safe water level.*
- *Individual spent fuel racks are spaced less than one fuel assembly apart so that a fuel assembly cannot be inserted between racks.*
- *Materials used for construction of the spent fuel pool and buffer pool are specified in accordance with the latest issue of applicable ASTM specifications at the time of equipment order.*

GEH Original Response

Response to First Bullet:

- ITAAC for these features will be added to Tier 1 Tables 2.16.5-2 and 2.16.7-2.

Response to Second Bullet:

- ITAAC for these features will be added to Tier 1 Tables 2.16.5-2 and 2.16.7-2.

Response to Third Bullet:

- This is related to concern over an uncontrolled draindown due to a failure of the pool liner. This RAI response addresses the consequences of an uncontrolled drain-down due to ruptures in adjacent pools. A statement will be added to Tier 2 Subsection 9.1.3.2 to describe the elevation of the gates and a corresponding ITAAC will be added to Tier 1 Subsection 2.16.7 to put limits on the elevation of the bottom of the transfer gates in the SFP. For the buffer pool, this commitment is not necessary because spent fuel can only be stored in the deep pit which, at a depth of 9.5 m, ensures that fuel remains covered even if the entire shallow portion of the buffer pool drains through the transfer gates.

Response to Fourth Bullet:

- ITAAC for this design feature will be added to Tier 1 Table 2.6.2-2

Response to Fifth Bullet:

- ITAAC for this design feature will be added to Tier 1 Table 2.6.2-2

Response to Sixth Bullet:

- The topic of criticality as it related to fuel rack design is not covered in Tier 1, but rather in Licensing Topical Report NEDE-33374P, "Safety Analysis Report for Fuel Storage Racks Criticality Analysis for ESBWR Plants". This report confirms that the gaps between racks are very small and cannot accommodate a spent fuel bundle.

Response to Seventh Bullet:

- DCD Tier 1 is not intended to govern details such as material specifications at the time of order. This information can be found in DCD Tier 2, Subsection 3.8.4, which describes the design features of the reactor building and fuel building structure.

GEH Supplemental Information Provided in This Letter

In an NRC phone call, a concern was communicated that a more definitive statement was needed in Tier 1 to emphasize that submerged piping entered pools above the normal water level.

The revised markups to Tier 1 Section 2.6.2 include this statement.

Original DCD Impact

DCD Tier 2, Subsection 9.1.3.2 and Tier 1 Tables 2.6.2-2, 2.16.5-2, and 2.16.7-2 will be modified for Revision 7.

Supplemental Information DCD Impact

DCD Tier 2, Subsection 2.6.2 and Table 2.6.2-2 will be modified in Revision 7, as noted in the attached markups.

Enclosure 2

MFN 09-117
Revision 1

Revised Response to Portion of NRC Request for

Additional Information Letter No. 275

Related to ESBWR Design Certification Application

RAI Number 14.3-442

DCD Markups

2.6.2 Fuel And Auxiliary Pools Cooling System

Design Description

The Fuel and Auxiliary Pools Cooling System (FAPCS) provides cooling and cleaning of pools located in the containment, reactor building and fuel building during normal plant operation. The FAPCS provides flow paths for filling and makeup of these pools during normal plant operation and under post-accident conditions. The FAPCS provides suppression pool cooling and Low Pressure Coolant Injection (LPCI) as active backup of the passive containment heat removal systems.

The FAPCS is as shown in Figure 2.6.2-1.

The containment isolation portions of the FAPCS are addressed in Subsection 2.15.1.

The FAPCS alarms, displays, and status indications in the MCR are addressed by Section 3.3.

~~Equipment~~ Environmental qualification for the FAPCS equipment is addressed in Section 3.8.

(1) The functional arrangement of the FAPCS is as described in the Design Description of this Subsection 2.6.2 and as shown in Figure 2.6.2-1.

(2) a1. The components identified in Table 2.6.2-1 as ASME Code Section III are designed in accordance with ASME Code Section III requirements.

a2. The components identified in Table 2.6.2-1 as ASME Code Section III shall be reconciled with the design requirements.

a3. The components identified in Table 2.6.2-1 as ASME Code Section III are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

b1. The piping identified in Table 2.6.2-1 as ASME Code Section III is designed in accordance with ASME Code Section III requirements.

b2. The as-built piping identified in Table 2.6.2-1 as ASME Code Section III shall be reconciled with the piping design requirements.

b3. The piping identified in Table 2.6.2-1 as ASME Code Section III is fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

(3) a. Pressure boundary welds in components identified in Table 2.6.2-1 as ASME Code Section III meet ASME Code Section III non-destructive examination requirements.

b. Pressure boundary welds in piping identified in Table 2.6.1-1 as ASME Code Section III meet ASME Code Section III non-destructive examination requirements.

(4) a. The components identified in Table 2.6.2-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.

b. The piping identified in Table 2.6.2-1 as ASME Code Section III retains its pressure boundary integrity at its design pressure.

(5) The equipment identified in Table 2.6.2-1 as Seismic Category I can withstand Seismic Category I loads without loss of safety function.

(6) (Deleted)

(7) a. The FAPCS performs the nonsafety-related suppression pool cooling functions.

b. The FAPCS performs the nonsafety-related low-pressure coolant injection function.

c. The FAPCS provides the nonsafety-related external connection for emergency water to IC/PCCS pool and Spent Fuel Pool functions.

(8) (Deleted)

(9) Safety-related ~~L~~level instruments with adequate operating ranges are provided for the Spent Fuel Pool, buffer pool, and IC/PCCS pools.

(10) (Deleted)

(11) Following a loss of active cooling without makeup that persists for 72 hours, the water level in the Spent Fuel Pool remains above the top of active fuel.

(12) Following a loss of active cooling without makeup that persists for 72 hours, the water level in the Buffer Pool remains above the top of active fuel.

(13) a. Valves on lines attached to the RPV that require maintenance have maintenance valves such that freeze seals will not be required.

b. The as-built location of valves on lines attached to the RPV in the FAPCS that require maintenance shall be reconciled to design requirements

(14) Lines that are submerged in the spent fuel pool or buffer pool enter the pools above the normal water level and are equipped with redundant anti-siphon holes that will preserve ~~the~~ a water inventory above TAF sufficient for safe shielding ~~in the event of a break at a lower~~ elevation.

(15) For all~~All~~ low-pressure coolant injection piping and components between the RWCU/SDC System and the FAPCS, including the check valves and motor operated valves, ~~are designed to~~the ultimate rupture strength can withstand the full reactor pressure.

(16) The nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are ~~physically separated and~~ electrically independent.

(17) The nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are physically separated.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.2-2 provides a definition of the inspections, tests and analyses, together with associated acceptance criteria for the FAPCS.

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
12. Following a loss of active cooling without makeup that persists for 72 hours, the water level in the Buffer Pool remains above the top of active fuel.	Inspection of the Buffer Pool as-built dimensions will be performed to determine the elevation of the pool weir relative to the bottom of the pool and the free volume between the top of the active fuel and the weir elevation.	The elevation of the Buffer Pool weir relative to the bottom of the pool is at least 6.7 m (22 ft) and that there is at least 288 m^3 (10,100 ft^3) of free volume above the top of the active fuel that can be filled with water.
13a. Valves on lines attached to the RPV that require maintenance have maintenance valves such that freeze seals will not be required.	Inspections of piping design isometric drawings will be conducted. {{Design Acceptance Criteria}}	A review of piping design isometric drawings confirms that maintenance valves are included such that freeze seals will not be required. {{Design Acceptance Criteria}}
13b. The as-built location of valves on lines attached to the RPV in the FAPCS that require maintenance shall be reconciled to design requirements.	A reconciliation evaluation of valves on lines attached to the RPV that require maintenance using as-designed and as-built information will be performed	A design reconciliation has been completed for the as-built location of valves relative to the design requirements. The report documents the results of the reconciliation evaluation.
14. Lines that are submerged in the spent fuel pool or buffer pool enter the pools above the normal water level are equipped with redundant anti-siphon holes that will preserve ~~the~~ a water inventory above TAF sufficient for safe shielding in the event of a break at a lower elevation.	Inspection of as-built submerged piping in the Spent Fuel Pool and Buffer Pool will be performed. ~~to confirm the presence of redundant anti-siphon holes.~~	Redundant anti-siphon holes are present on all submerged piping in the Spent Fuel Pool and Buffer Pool and the piping enters the pools above the normal water level to preserve the water inventory to a minimum of 3.05 m (10.0 ft) above TAF in the event of a break at a lower elevation.