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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 340 Related to ESBWR Design Certification Application – Electrical Power – RAI 14.3-443 S01**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) partial response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAIs) sent by NRC letter No. 340, dated June 9, 2009 (Reference 1).

GEH response to RAI 14.3-443 S01 is provided in Enclosure 1. Enclosure 2 provides associated DCD and LTR Section markups.

Sincerely,

Richard E. Kingston

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Vice President, ESBWR Licensing

Reference:

1. MFN 09-259 - Letter from U.S. Nuclear Regulatory Commission to Mr. Jerald G. Head, GEH, *Request For Additional Information Letter No. 319 Related To ESBWR Design Certification Application*, dated April 15, 2009

Enclosures:

1. MFN 09-431- Response to Portion of NRC Request for Additional Information Letter No. 340 Related to ESBWR Design Certification Application – Electrical Power - RAI Number 14.3-443 S01

2. MFN 09-431- Response to Portion of NRC Request for Additional Information Letter No. 340 Related to ESBWR Design Certification Application – Electrical Power - RAI Number 14.3-443 S01, DCD Tier 1 Markups - DCD Tier 1, Section 2.6.2 and Table 2.6.2-2.

cc:

AE Cubbage	USNRC (with enclosures)
JG Head	GEH/Wilmington (with enclosures)
DH Hinds	GEH/Wilmington (with enclosures)
eDRF Section	0000-0103-5251 (RAI 14.3-443 S01)

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Enclosure 1

Response to Portion of NRC Request for Additional Information Letter No. 340 Related to ESBWR Design Certification Application – Electrical Power

RAI Number 14.3-443 S01

NRC RAI 14.3-443

The SRP calls for the electrical power supplies, control and instrumentation of the trains and their supporting systems that provide long term decay heat removal to be electrically and physically separated. In RAI 14.3-443 the staff asked the applicant to justify why it had not included the design feature that the electrical power supplies, control and instrumentation of the two FAPCS trains and their supporting systems are electrically and physically separated. In its response dated March 18, 2009, the applicant referred the staff to the applicant's response to RAI 14.3-394, S01 and the corresponding Tier 1 markup. The staff found this response unacceptable.

The RAI response to RAI 14.3-394 does not necessarily imply that the electrical loads and cables are physically separated from one another. The separation provided by the RAI response appears to provide separation to breakers, but not to the loads drawn from the breakers. Please provide criteria in Tier 1 that assure the control cables, instrument cables, and power cables for equipment in the two FAPCS trains are physically and electrically separated.

GEH Response

In response to the last sentence of the RAI, "Please provide criteria in Tier 1 that assure the control cables, instrument cables, and power cables for equipment in the two FAPCS trains are physically and electrically separated", GEH will add a new design description to Section 2.6.2 (16) and a new ITAAC in Table 2.6.2-2 (16) to test and inspect that "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".

The SRP as clarified in SECY-94-084 and 95-132 recognizes that the passive plants have now designated many systems as nonsafety-related that are designated as safety-related in the active power plants that rely on an AC source of power to support safe shutdown of the reactor. The passive plants do not have ITAAC required for the majority of nonsafety-related systems or components of nonsafety-related systems. FAPCS does have both electrical and mechanical safety-related components that have ITAAC.

A section of Seismic Category 2 RTNSS B pipe from the Fire Protection Equipment building to the Fuel Building is provided to ensure that 72 hours after a DBE a path is provided for reactor makeup. Fire Protection ITAAC 2.16.3 (7): FPS provides post 72-hour make-up for IC/PCCS pools and Spent Fuel Pool. Other ITAAC for the safety-related FAPCS penetrations which serve to isolate the nonsafety-related system during operation and a design basis event are found in Table 2.15.1-2 (6), (9) and (10). FAPCS ITAAC 2.6.2-2(1) and Figure 2.6.2-1 are also provided for safety-related portions at the interface with safety-related systems for isolation purpose. DCD Tier 2 Section 14.2.8.1.14 1 identifies that there is proper redundancy and electrical independence of the safety-related FAPCS controls and instrumentation that comes from Q-DCIS.

The safety-related I&C and electrical components of FAPCS include the level indication instrumentation from the ICC and GDCS cooling pools, the controls for the isolation valves between FAPCS nonsafety-related pipe and reactor pressure boundary piping and instruments and controls at the reactor building to containment penetrations. All of these components have ITAAC, as listed above, that ensure they perform their safety function.

DCD Tier 2 Section 9A.4.1 identifies that FAPCS has redundant nonsafety-related pumps that are powered from separate diesel generator backed electrical load groups for the nonsafety-related functions. The power cables to these pump motors and the associated instrumentation cables are routed via train A and train B raceways in the Electric Building and then to the Reactor building in the seismic Category II raceway tunnels. The Electrical Building is a nonsafety-related structure but the train A and B raceways are routed in separate fire zones to the tunnel access. The Reactor building cabling, safety-related and nonsafety-related, is routed using a program that is Appendix B audited, approved, and Part 21 reportable for both physical/electrical and fire separation (reference RAI 9.5-92 MFN 08-761). The same cable routing program is also used for the balance of the nonsafety-related plant to maintain physical and electrical separation and fire separation as required.

DCD Impact

DCD Tier #1, Section 2.6.2 and Table 2.6.2-2 will be revised as noted in the attached markup.

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Enclosure 2

Response to Portion of NRC Request for Additional Information Letter No. 340 Related to ESBWR Design Certification Application – Electrical Power

DCD Tier 1 Markups, Section 2.6.2 and Table 2.6.2-2

(5) The Seismic Category I equipment~~components~~ identified in Table 2.6.2-1, can withstand ~~s~~Seismic ~~design basis~~Category loads without loss of safety-related function.

(6) ~~The containment isolation portions of the FAPCS are addressed in Tier 1, Subsection 2.15.1.~~(Deleted)

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

~~a.Suppression pool cooling mode~~

b. The FAPCS perfomes the nonsafety-realted l~~L~~ow-pressure coolant injection ~~mode~~function.

c. The FAPCS provides the nonsafety-related e~~E~~xternal connection for emergency water to IC/PCC pool and Spent Fuel Pool function.

(8) ~~FAPCS minimum inventory of alarms, displays, and status indications in the main control room (MCR) are addressed in Section 3.3.~~(Deleted)

(9) Level instruments with adequate operating ranges are provided for the Spent Fuel Pool and IC/PCC pools.

(10) ~~Equipment qualification for the FAPCS is addressed in Tier 1 Section 3.8.~~(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 valves installed such that freeze seals will not be required.

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

(14) Lines that are submerged in the spent fuel pool or buffer pool are equipped with redundant anti-siphon holes that will preserve the water inventory above TAF in the event of a break at a lower elevation.

(15) 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 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.

Inspections, Tests, Analyses and Acceptance Criteria

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

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling ~~Cleanup~~ System

Design Commitment	Inspections, Tests, Analyses	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	Report(s) exist and conclude that 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 are equipped with redundant anti-siphon holes that will preserve the water inventory above TAF 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.	Report(s) exist and conclude that redundant anti-siphon holes are present on all submerged piping in the spent fuel pool and buffer pool to preserve the water inventory above TAF in the event of a break at a lower elevation..
15. 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 withstand the full reactor pressure.	Inspection of the as-built low-pressure coolant injection piping between the RWCU/SDC System and the nonsafety-related motor operated valves will be performed.	Report(s) exist and conclude that the as-built 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 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.	i. Tests of the nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B will be performed to show electrical independence.	i. Report(s) exist and conclude that the nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are electrically independent.

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling ~~Cleanup~~ System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	ii. Inspections of the nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B will be performed to show physical separation.	ii. Report(s) exist and conclude that the nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are physically separated.