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Subject: **Response to NRC RAI Letter No. 374 Related to ESBWR Design Certification Application - PRA - RAI Number 19.5-15**

Enclosure 1 contains the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) Number 19.5-15 (Reference 1).

ESBWR Design Control Document (DCD) markups are provided in Enclosure 2.

If you have any questions about the information provided, please contact me.

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

References:

1. MFN 09-622, Letter from the U.S. Nuclear Regulatory Commission to Jerald G. Head, Request for Additional Information Letter No. 374, Related to ESBWR Design Certification Application, dated September 28, 2009.

Enclosures:

1. Response to NRC Request for Additional Information Letter No. 374 Related to ESBWR Design Certification Application – PRA – RAI Number 19.5-15.
2. Response to NRC Request for Additional Information Letter No. 374 Related to ESBWR Design Certification Application – PRA – RAI Number 19.5-15 – ESBWR DCD Markups.

cc:	AE Cubbage	USNRC (with enclosures)
	J G Head	GEH/Wilmington (with enclosures)
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	eDRF Section	0000-0108-7939

Enclosure 1

MFN 09-683

Response to NRC Request for

Additional Information Letter No. 374

Related to ESBWR Design Certification Application

PRA

RAI Number 19.5-15

NRC RAI 19.5-15

It is stated in Section 19D.1 of the ESBWR DCD, Revision 6 that the methodology used for assessing effects of aircraft impact is described in NEI 07-13, "Methodology for Performing Aircraft Impact Assessments for New Plant Designs," Revision 7 (NEI 07-13). Tables 3-4 and 3-5 of NEI 07-13 describe the guidelines for assessing the effects of an aircraft impact that could occur while the plant is shut down and the reactor is being cooled via the shutdown cooling system. Contrary to the requirements of paragraph (b)(1) of 10 CFR 50.150, Section 19D.4 does not contain a description of design features nor functional capabilities relied upon to ensure that the assessment requirements in paragraph (a)(1) of 10 CFR 50.150 are met while the plant is shut down and the reactor is being cooled via the shutdown cooling system. Please modify Section 19D to include a description of (1) design features and/or functional capabilities relied upon to ensure that the assessment requirements in paragraph (a)(1) of 10 CFR 50.150 are met while the plant is shut down and the reactor is being cooled via the shutdown cooling system, and (2) how these design features and/or functional capabilities meet the assessment requirements in paragraph (a)(1) of 10 CFR 50.150. Please provide the staff with marked-up copy of Section 19D that shows the required descriptions and include the descriptions in the next Revision of the DCD.

GEH Response

A description of the design features relied upon to ensure that the assessment requirements in paragraph (a)(1) of 10 CFR 50.150 are met while the plant is shut down and the reactor is being cooled via the shutdown cooling system, including a discussion of their functional capabilities and how they meet the requirements will be added to Revision 7 of DCD Tier 2, Section 19D.4.4.

In addition, Section 19D.4.4 paragraph 2 is edited to remove superfluous information relative to the Automatic Depressurization System and the Gravity Driven Cooling System. The context of these systems pertained to having redundant core cooling functions available in an aircraft impact scenario. Based on a meeting with the NRC staff, it was agreed that this information was not necessary to support the conclusions on core cooling and should be removed to eliminate a potential point of confusion.

DCD Impact

DCD Tier 2, Section 19D.4.4 will be revised as noted in the attached markup.

Enclosure 2

MFN 09-683

Response to NRC Request for Additional Information Letter No. 374 Related to ESBWR Design Certification Application - PRA

RAI Number 19.5-15

ESBWR DCD Markups

(3) The location and design of the FB Building structure, as described in Sections 3.8 and Appendix 3G and as shown on Figures 1.1-1 and 1.2-1 through 1.2-10, are key design features that protect the south wall (180° azimuth) elevations 4650, 9060, 13570, 17500 of the RB from the impact of a large commercial aircraft.

19D4.3 Fire Barriers and Fire Protection Features

There are key ESBWR design features that ensure successful safe shutdown capabilities for postulated aircraft impact damage scenarios. In particular, the ESBWR safety-related control systems incorporate 4 redundant divisions, and each division is physically separated in its own quadrant in the RB. Although combustibles, fire and smoke could propagate vertically to floors above and below the damaged area, they cannot propagate horizontally (same elevation) to diametrically opposite quadrants. Thus, damage from an aircraft impact would be contained within one or two RB quadrants, for example, the entire west side of the RB could be affected, and the remaining quadrants would be unaffected, such that at least one division of safety-related controls is available. In addition, the safe shutdown components that must actuate are located within the RCCV and thus would not be affected by the aircraft damage, vibration, or fire effects.

The design and location of 3-hour fire barriers, including fire doors that separate safety divisions within the RB, are key design features for protection of core cooling equipment within these buildings from the impact of a large commercial aircraft. The assessment credited the design and location of fire barriers (including doors), as described in Sections 9.5.1 and 9A and shown on Figures 9A.2-1 through 9A.2-11, for the RB to limit effects of internal fires created by the impact of a large commercial aircraft. In particular, the fire barriers along the 0° - 180° azimuths confine the effects of an aircraft impact induced fire to either the east or west side of the RB on elevations 4650, 9060, and 13570. A postulated strike to the refueling floor would create localized damage, but fire barriers prevent propagation to other floors.

19D4.4 Core Cooling Features

The design and physical separation of the Emergency Core Cooling systems described in Section 6.3, the Isolation Condenser System (ICS) described in Section 5.4.6, the Control Rod Drive System described in Section 4.6, the Main Steam Isolation Valves (MSIV) described in Section 5.4.5, and the Safety-Related Instrumentation and Control System described in Section 7.1 are key design features for assuring core cooling following a reactor trip in response to an aircraft impact event.

In addition, the ~~The fail-safe operations~~actions of scramming the reactor, closing the ~~Main Steam Isolation Valves~~MSIVs and commencing operation of the I~~solation~~ C~~ondenser~~ S~~ystem~~ ensure the fuel in the reactor core is kept cooled. ~~In addition, the ability to initiate the Automatic Depressurization System and the Gravity Driven Cooling System is maintained in the event of an impact of a large commercial aircraft.~~

These design features also assure core cooling if the reactor is already shut down and is being cooled while the reactor is in Mode 5 via the shutdown cooling mode of the Reactor Water Cleanup/Shutdown Cooling System (RWCU/SDC) described in Section 5.4.8, or the Fuel and Auxiliary Pools Cooling System (FAPCS) alternate shutdown cooling mode described in Section 9.1.3.2.

During Mode 6, ICS is unavailable. Loss of the shutdown cooling function of RWCU/SDC is discussed in Section 15.2.2.9. In the event that both RWCU/SDC trains are unavailable and the FAPCS alternate shutdown cooling or low pressure injection modes are unavailable, then the Gravity Driven Cooling System is capable of providing sufficient inventory to ensure core cooling for at least 72 hours.

19D.4.5 Spent Fuel Pool Cooling

In accident scenarios where the Fuel and Auxiliary Pools Cooling System (FAPCS) is unavailable, the inventory of water in the spent fuel pool provides passive heat removal. Make-up inventory for passive heat removal for the spent fuel pool is available from the Fire Protection System.

19D.4.6 Spent Fuel Pool Integrity

The spent fuel pool structure is located entirely below grade, as shown on Figures 1.2-1 through 1.2-4, and is a key design feature that assures that the integrity of the spent fuel pool is maintained in the event of the impact of a large commercial aircraft.

19D.5 Conclusions of Assessment

This assessment concludes that key design features and functional capabilities of the ESBWR ensure adequate protection of public health and safety in the event of an impact of a large commercial aircraft, as defined by the NRC. The postulated aircraft impacts would not inhibit the ESBWR core cooling capability, and spent fuel pool integrity would be maintained, based on best estimate calculations. The assessment resulted in identification of key design features and functional capabilities described in Section 19.D.4, changes to which are required to be controlled in accordance with 10 CFR 50.150(c).

19D.6 References

19D-1 Letter from D. Matthews, NRC to R. Brown, GEH, Subject: “Transmittal of Beyond Design Basis , Large Commercial Aircraft Characteristics,” July 31, 2007.

19D-2 NEI 07-13, “Methodology for Performing Aircraft Impact Assessments for New Plant Designs,” Revision 7, May 2009.