HITACHI

GE Hitachi Nuclear Energy

Richard E. Kingston
Vice President, ESBWR Licensing

P.O. Box 780 M/C A-65
Wilmington, NC 28402-0780
USA

T 910.675.6192
F 910.362.6192
rick.kingston@ge.com

MFN 09-696 Docket No. 52-010

November 16, 2009

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 375 Related to ESBWR Design Certification Application – Fuel Pools – RAI Number 12.3-15**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) 12.3-15 sent by NRC Letter No. 375, Reference 1.

GEH response to RAI Number 12.3-15 is addressed in Enclosure 1.

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

Sincerely,

FOR

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 09-624, Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, *Request for Additional Information Letter No. 375 Related to ESBWR Design Certification Application*, October 1, 2009

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 375 Related to ESBWR Design Certification Application – Fuel Pools - RAI Number 12.3-15

cc:	AE Cubbage	USNRC (with enclosure)
	JG Head	GEH/Wilmington (with enclosure)
	DH Hinds	GEH/Wilmington (with enclosure)
	TL Enfinger	GEH/Wilmington (with enclosure)
	eDRF Section	0000-0109-2143

Enclosure 1

MFN 09-696

Response to Portion of NRC Request for Additional Information Letter No. 375 Related to ESBWR Design Certification Application

Fuel Pools

RAI Number 12.3-15

NRC RAI 12.3-15

Background

GDC 61 requires that the fuel storage and transfer system, in addition to any other system which may contain radioactivity, be designed to ensure adequate safety and shielding, as well as designed to prevent the release of radioactive material during normal and accident conditions.

Generic Safety Issue 137 (GSI-137) "Refueling Cavity Seal Failure" was initiated to consider a Reactor Cavity Seal Ring failure as an initiating event for a Spent Fuel Pool accident sequence (see NRC Bulletin 84-03). GSI-137 noted the following possible consequences to a reactor cavity seal ring failure; (1) high radiation levels in the containment due to uncovering of spent fuel during transfer, (2) radioactive material release in the containment building due to rupture of fuel pins (by self-heating after uncovering), (3) high radiation levels in the spent fuel building due to uncovering of stored spent fuel, and (4) radioactive material release outside the containment building due to rupture of fuel pins in the storage pool. Mitigative measures to prevent the recurrence of this event and the possible resulting drainage of the spent fuel pool in the spent fuel building include the installation of permanent reactor cavity seal rings and the installation of coffer dams between the refueling cavity and the spent fuel pool to prevent draining the spent fuel pool.

In their response to NRC Bulletin 84-03, "Refueling Cavity Water Seal," a number of licensees indicated that if a large seal leak occurred, the refueling cavity could drain rapidly and the procedures and makeup capability for refilling the refueling cavity would be insufficient to prevent the potential uncovering of a fuel assembly in transit. In anticipation of such an event, the licensees developed an abnormal occurrence procedure for safely storing a fuel assembly under water if one was positioned above the vessel flange level in the event of a loss of the refueling cavity water.

Question

GSI 137 addresses rapid reactor cavity drain down due to cavity seal failure and the possibility of associated spent fuel pool drain down and the uncovering of stored spent fuel. GEH should address the following issues as they relate to high radiation doses and/or releases of radioactive material caused by inadvertent drain down of the reactor cavity:

a. *In the event that the reactor cavity underwent a rapid inadvertent drain down during refueling operations when a spent fuel assembly was positioned above the reactor vessel flange level, describe the location(s) (such as the buffer pool or the reactor vessel) where this spent fuel assembly could be safely lowered to minimize the potential for potential high radiation levels, fuel clad damage, and the subsequent release of radioactive material. For each of the possible*

locations available for fuel laydown, state the expected resultant water level over the top of the active portion of the fuel assembly following cavity drain down. For those locations where the water level at the lowest point following the drain down event is less than 10 feet above the fuel, provide the estimated resultant dose rates, and the associated methods, models and assumptions used to calculate these dose rates.

b. *If the volume of water in the safe storage area is less than the amount needed to ensure complete coverage of the fuel bundle for the 30 minutes allotted for ensuring containment closure, then justify the continued use of the Fuel Drop Accident Analysis methodology described in RG 1.183 Appendix B.*

c. *Describe and provide the estimated dose rates, from any other irradiated components, that may be exposed during an inadvertent refueling cavity drain down event.*

GEH Response

a. Bullet e), sub-bullet 1) of the response to RAI 9.1-128 (MFN 09-697) summarizes that a rapid inadvertent drain down of the reactor cavity during refueling activities is not a credible event for the ESBWR.

b. Bullet e), sub-bullet 6) of the response to RAI 9.1-128 (MFN 09-697) points out that the need to restore containment integrity within the allotted time of 30 minutes is not anticipated as a result of a slow loss of reactor cavity water.

c. Bullet e), sub-bullet 5) of the response to RAI 9.1-128 (MFN 09-697) has concluded that dose consequences associated with exposure of components stored in the pools during refueling are not considered as they will not become uncovered in the event of a slow loss of reactor cavity water.

DCD Impact

No DCD changes will be made in response to this RAI.