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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 348 Related to ESBWR Design Certification Application – Isolation Condenser System - RAI Number 5.4-65**

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) 5.4-65 sent by NRC Letter 348, Reference 1.

GEH response to RAI Number 5.4-65 is addressed in Enclosure 1.

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

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 09-396, Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, *Request for Additional Information Letter No. 348 Related to ESBWR Design Certification Application*, June 5, 2009

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 348 Related to ESBWR Design Certification Application – Isolation Condenser System - RAI Number 5.4-65

cc:	AE Cubbage	USNRC (with enclosure)
	JG Head	GEH/Wilmington (with enclosure)
	DH Hinds	GEH/Wilmington (with enclosure)
	eDRF Section	0000-0104-7780

Enclosure 1

MFN 09-500

Response to Portion of NRC Request for Additional Information Letter No. 348 Related to ESBWR Design Certification Application

Isolation Condenser System

RAI Number 5.4-65

NRC RAI 5.4-65

Maintenance on the Liquid Control System (SLCS) and the Isolation Condenser (IC) will include the periodic replacement of leaking tubes in the Isolation Condenser. Since most of this maintenance will be performed during normal operation, there is a potential for significant radioactive leakage and radioactive contamination of the plant areas surrounding the Isolation Condenser. Describe in the appropriate portions of DCD Section 5.4.6 and/or Section 12.3.1.5 how the operation of the IC system (and the associated maintenance activities related to tube replacement) meet the guidance given in Regulatory Guide 4.21 with respect to minimizing leakage and spills and the associated contamination of plant structures.

GEH Response

No periodic replacement of isolation condenser (IC) tubes is expected for the ESBWR standard design. The ESBWR standby liquid control system has no component similar to an IC, and does not share any piping with the IC system. Details regarding the IC design and fabrication, and relevant operating experience have previously been provided by letters MFN 06-249, MFN 06-365, MFN 06-479, MFN 06-501 (including Supplements 1 & 2), MFN 07-192, MFN 08-152, and MFN 08-345. Cracking in Alloy 600 material has only occurred under specific conditions described in response to RAI 6.1-10 (MFN 06-365). ESBWR standard design for the isolation condenser fabrication does not permit either the physical configurations or use of the material specification (Alloy 182) involved in these cracking events.

As noted in the request, most routine maintenance and surveillance activities for the ESBWR standard design will be performed during unit normal operating conditions. Given the rarity of tube cracking incidents at operating BWRs using the same material as proposed for the ESBWR IC modules, no development or qualification of any repair method for an ESBWR IC module has been performed. Maintenance methods development for an IC module is deferred to the actual procurement and delivery of IC module components for an ESBWR construction project.

The issues of contamination control and decommissioning are considered in the ESBWR standard design of the ICS, including power industry experiences with Alloy 600 component repairs or tubular heat exchanger repair methods that may be postulated for an IC module. The following table provides a cross-reference from the objectives of Regulatory Guide 4.21 as they are listed under DCD Tier 2 Subsection 12.3.1.5 (Preliminary Revision 6 version), to corresponding DCD sections, tables or figures that are responsive to the key points:

No.	Objective Key Points	DCD Reference	Issue(s) Addressed
1a	Minimize leaks and spills.	5.4.6.1.1	Passive heat removal design/no active driving components with mechanical seals; IC/PCC pools cross connections use double valve isolation
		5.4.6.2.2	IC steam line guard pipe and IC steam line flow limiters
		5.4.9, 5.4.12	ICS steam piping sloped to drain moisture
		Figure 5.4-4a	IC is a welded installation except for steam connection flanges at header drum
1b	Provide containment in susceptible areas.	5.4.6.2.2	IC steam line guard pipe, IC steam and condensate return line isolation valves inside containment, and IC train modules in individual compartmented pools
		6.2.1.1.2, 6.2.4.3.1	Containment design features - including ICS piping
		Tables 6.2-23 thru 6.2-30	ICS isolation valves
2	Provide adequate leak detection capability for prompt detection.	5.2.5 with Tables 5.2-6 and 5.2-7	Steam and condensate flow monitoring, IC radiation leakage monitoring
		5.4.6.2.2	IC radiation leakage monitoring and flow monitoring
		11.5.3.1.6	IC pools vent exhaust radiation monitoring
3	Use leak detection methods in areas where it is difficult (inaccessible) to conduct regular inspections.	See 2 above	See response to Objective 2, which covers ICS piping located inside guard piping
4a	Reduce the need to decontaminate equipment and structures by: (1) decreasing the probability of any release;	5.2.3.2.2	Alloys selected to minimize cobalt-bearing material exposure to reactor fluence
		Table 5.2-4	RCPB (Class 1) materiel selection
		Table 6.1-1	Class 2 materiel selection
		12.3.1	Facility Design Features

No.	Objective Key Points	DCD Reference	Issue(s) Addressed
4b	(2) reducing any amounts released; and,	5.4.6.2.2	IC continuous noncondensables vent
4c	(3) decreasing the spread of the contaminant from the source.	9.1.3.2	IC/PCC pools dedicated cooling and cleanup subsystem of FAPCS
5a	Facilitate decommissioning by: (1) minimizing embedded and buried piping; and	None	No embedded ICS piping
5b	(2) design to facilitate the removal of equipment or components during facility operation or decommissioning.	Figure 1.2-8	Hatches provided for access to each condenser compartment from refuel deck
		5.4.6.2.2	Valves provided to permit isolating and draining individual condenser compartments
6	Minimize the generation and volume of radioactive waste.	Table 5.2-4	RCPB (Class 1) materiel selection
		Table 6.1-1	Class 2 materiel selection
		12.3.1	Facility Design Features

DCD/LTR Impact

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

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