GE Hitachi Nuclear Energy

Richard E. Kingston
Vice President, ESBWR Licensing

PO Box 780 M/C A-65
Wilmington, NC 28402-0780
USA

T 910 675 6192
F 910 362 6192
rick.kingston@ge.com

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Subject: **Submittal of Response to Portion of NRC Request for Additional Information Letter No. 313 Related to ESBWR Design Certification Application Chapter 18 - Human Factors Engineering - RAI Number 18.5-33.**

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 (RAIs) sent by NRC letter No. 313, dated March 9, 2009 (Reference 1). RAI number 18.5-33 was requested by Reference 1.

Enclosure 1 provides the GEH response to the subject RAI as requested in References 1. Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text 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

References:

1. MFN 09-178 - Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request For Additional Information Letter No. 313 Related To ESBWR Design Certification Application*, dated March 9, 2009

Enclosure:

1. MFN 09-305 – Response to Portion of NRC Request for Additional Information Letter No. 313 Related to ESBWR Design Certification Application Chapter 18 - Human Factors Engineering - RAI Number 18.5-33

cc:	AE Cubbage	USNRC (with enclosure)
	JG Head	GEH/Wilmington (with enclosures)
	DH Hinds	GEH/Wilmington (with enclosures)
	RE Kingston	GEH/Wilmington (with enclosures)
	eDRF Section	0000-0099-5405 RAI 18.5-33

Enclosure 1

MFN 09-305

Response to Portion of NRC Request for

Additional Information Letter No. 313

Related to ESBWR Design Certification Application

Chapter 18 – Human Factors Engineering

RAI Number 18.5-33

NRC RAI 18.5-33

MFN 09-024, Att. A, Page 2 states that the fixed position alarms, displays and controls that are not continuously displayed are quickly and easily retrievable, typically accessible by one operator action (one touch accessible). Please explain what criteria GEH will use to determine whether a minimum inventory (MI) item is continuously displayed, one touch accessible, or more than one touch accessible.

GEH Response

The design requirement for the Minimum Inventory of fixed alarms, displays, and controls for the ESBWR is that they be accessible by one operator action ("one touch accessible"). Other design requirements may result in Minimum Inventory items being continuously visible. An example of this is the Manual Scram Switches, which are located on the Main Control Room Console (DCD Chapter 7, Section 7.2.1.5.5). Controls and displays that are continuously displayed meet the "one touch accessible" design requirement. The "one touch accessible" design requirement for the Minimum Inventory is acceptable because of the passive nature of the ESBWR safety systems and the resultant required operator response times. DCD Chapter 15 Design Basis Events require operator response times ranging from 30 minutes to, more typically, no operator response required or an operator response is not credited for 72 hours. Minimum inventory fixed alarms will immediately alert the operator of an alarm condition. Response to alarm conditions is through the Q-DCIS or N-DCIS systems. The nature of the Q-DCIS and N-DCIS systems VDU interfaces allow one step access to appropriate minimum inventory parameters and allow the operator to assess the plant status, determine an appropriate course of action, and implement that action.

The DCD Chapter 18 Section 18.5.2.1 will be updated to reflect this clarification per the enclosed markup.

DCD Impact

DCD Tier 2, Section 18.5 will be revised as noted in the attached markup.

Where appropriate, analysts combined alarms, displays, and controls at high levels while still meeting HSI needs identified during task analysis.

Minimum inventory analysts considered:

- HSIs needed to support decision making;
- HSIs needed to support plant manipulations; and
- HSIs needed to support monitoring task success criteria.

Analysts considered what HSIs were needed to successfully complete each task and assigned one or more of the following types of minimum inventory HSIs:

- Alarms - Alert the operator regarding abnormal or degrading conditions that require operator response.
- Displays – Provide information necessary during task performance.
- Controls – Provide the means to change the state of plant equipment.

The design requirement for the minimum inventory HSIs is that they be accessible by one operator action (one touch accessible). Minimum inventory HSIs that are continuously displayed meet the one touch accessible design requirement. The one touch accessible design requirement for the minimum inventory HSIs is acceptable because of the passive nature of the ESBWR safety systems and the resultant required operator response times. DCD Chapter 15 Design Basis Events require operator response times ranging from 30 minutes to, more typically, no operator response required or an operator response is not credited for 72 hours.

The result of this analysis is the ESBWR MCR and RSS minimum inventory of HSIs documented in Tables 18.1-1a and 18.1-1b.~~The TA process is conducted in accordance with References 18.5-1 and 18.5-2.~~

~~18.5.1~~ 18.5.2 Detailed Design (including the design , detailed, and economic phases of task analysis) Task Analysis Implementation Plan

The TA implementation plan, Reference 18.5-2, establishes a task analysis process that conforms to ESBWR plans and applicable regulatory requirements. The system-level and plant-level functions are systematically analyzed. The relationships and interaction between human and machine tasks are examined through several iterations of analysis. TA considers all functions identified by the FRA and allocated to human, machine, or shared ownership.

~~18.5.1.1~~ 18.5.2.1 Scope of TA

The TA Implementation Plan establishes the following scope elements.

a. Objectives, performance requirements, and constraints are defined.

b. Methods and criteria for conducting the TA are in accordance with accepted human factors principles and practices.

c. System and function requirements define task sequencing and coordination restraints.

d. TA results establish systems HSI requirements.

e. TA scope defines responsiveness to HRA/PRA and deterministic evaluations.