



**HITACHI**

**GE Hitachi Nuclear Energy**

Richard E. Kingston  
Vice President, ESBWR Licensing

PO Box 780 M/C A-55  
Wilmington, NC 28402-0780  
USA

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

MFN 08-288 Supplement 2

Docket No. 52-010

September 9, 2008

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. 203 Related to ESBWR Design Certification Application - Control Room Habitability Area - RAI Number 6.4-8 S01**

Enclosure 1 contains the GE Hitachi Nuclear Energy (GEH) response to the subject NRC RAI originally transmitted via the Reference 1 letter and supplemented by an NRC request for clarification in Reference 2.

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

Sincerely,

Richard E. Kingston  
Vice President, ESBWR Licensing

A102  
D068  
NEO

References:

1. MFN 07-414, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 103 Related to ESBWR Design Certification Application*, July 23, 2007
2. MFN 08-496, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 203 Related to ESBWR Design Certification Application*, May 27, 2008

Enclosure:

1. MFN 08-288 Supplement 2 - Response to Portion of NRC Request for Additional Information Letter No. 203 Related to ESBWR Design Certification Application - Control Room Habitability Area - RAI Number 6.4-8 S01

cc: AE Cabbage USNRC (with enclosure)  
DH Hinds GEH/Wilmington (with enclosure)  
RE Brown GEH/Wilmington (with enclosure)  
eDRF 0000-0090-5143

**Enclosure 1**

**MFN 08-288 Supplement 2**

**Response to Portion of NRC Request for  
Additional Information Letter No. 203  
Related to ESBWR Design Certification Application**

**Control Room Habitability Area**

**RAI Number 6.4-8 S01**

**For historical purposes, the original text of RAI 6.4-8, and the GEH response, is included.**

**NRC RAI 6.4-8:**

*What surveillance requirements will ensure that the initial temperature assumptions on the heat sink are below acceptable limits? How often will these surveillances be performed? How are the effects of the following items accounted for in the surveillances:*

- (1) external temperatures such as 95 degree Fahrenheit day and
- (2) heat loads in adjoining rooms and passageways?

*The temperature of the CRHA is not necessarily the temperature of the heat sink because of the temperatures on the outside surface of the heat sink (concrete wall, ceilings, and floors) may be higher than the temperature in the control room.*

**GEH Response:**

DCD Tier 2, Chapter 16, Technical Specification Surveillance Requirement 3.7.2.1 verifies the average Control Room Habitability Area (CRHA) air temperature is  $\leq 25.6^{\circ}\text{C}$  ( $78.0^{\circ}\text{F}$ ). This surveillance requirement is performed on a 24-hour frequency.

In response to RAI 16.0-5 S02, GEH will respond to the question regarding heat sink temperatures compared to average air temperatures associated with the CRHA and the frequency of the required surveillances.

The CRHA heatup analysis assumes external thermal conditions are at worst-case design summer conditions.

The CRHA heatup analysis conducted for summer conditions considers outside air supply to the CRHA at 200 l/s with a dry bulb maximum temperature of  $117^{\circ}\text{F}$  as discussed in the GEH response to RAI 9.4-33 (MFN 08-064, dated February 26, 2008). The typical daily temperature range of  $28^{\circ}\text{F}$  is considered with the outside air temperature profile assumed sinusoidal with a period of one day.

In response to RAI 16.0-5 S02, GEH will provide the Surveillance Requirements, including frequency, to ensure that the effects of external temperatures, (maximum design dry bulb temperature of  $117^{\circ}\text{F}$  applied as a daily temperature profile) are accounted for in the surveillances performed.

The CRHA heatup analysis assumes certain initial heat loads and temperatures in adjacent rooms and passageways. Therefore, additional surveillance requirements will be added to verify the temperature of the adjacent rooms, particularly the Q-DCIS rooms and access corridors to the CRHA envelope. In response to RAI 16.0-5 S02, GEH will provide the Surveillance Requirements, including frequency, to ensure areas adjacent to the CRHA do not adversely impact the CRHA temperature qualification.

**DCD Impact:**

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

**NRC RAI 6.4-8 S01:**

*The staff needs additional information that would provide assurance that the analyzed conditions of the CRHA are being maintained with respect to passive cooling features. Maintaining habitability and equipment functionality is a safety-related requirement. Cooling during this period is required to meet the habitability and equipment functionality requirements. The GEH design depends on passive cooling by the transfer of heat loads to concrete walls, floors, and ceilings. The assurance that this passive cooling is adequate is provided by a CRHA cooling analysis (not yet available to the staff).*

*Please update the DCD to document any assumption used in this analysis and the conclusions of this analysis. Provide ITAAC in DCD Tier 1 for physical parameters such as wall thickness, room volume, etc. to demonstrate that the facility has been constructed in accordance with the requirements of the analysis and design. Please provide TS surveillance requirements for wall temperatures, room temperatures, heat loads, environmental impacts, etc., to assure that the conditions used in the analysis remain valid. Surveillances on temperature should be performed under the worst daily conditions.*

**GEH Response:**

The Control Room Habitability Area (CRHA) heat-up and passive cooling analysis assures that passive cooling is adequate in the ESBWR Control Building, including the CRHA. The CRHA heat-up and passive cooling analysis has been made available to the NRC Staff for audit.

DCD Tier 2, Revision 5, Appendix 3H, Equipment Qualification Design Environmental Conditions, documents assumptions used in the CRHA heat-up and passive cooling analysis and the conclusions of this analysis.

DCD Tier 1, Revision 5, Subsection 2.16.2.2 item (4) (Table 2.16.2-4 Item 4) provides an Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) item for the CRHA heat sink to perform an analysis using as-built heat sink dimensions, as-built heat sink thermal properties, as-built heat sink exposed surface area, as-built thermal properties of materials covering parts of the heat sink, and the as-built heat loads to confirm the results of the control room heat-up and passive cooling analysis.

DCD Tier 2, Revision 5, Chapter 16, Technical Specification 3.7.2 provides Surveillance Requirements (SRs) for CRHA heat sink temperatures. SR 3.7.2.1 verifies the average temperature of each CRHA heat sink is within established design limits. When the temperature of each CRHA heat sink is maintained within the specified limit, the CRHA heat sinks are sufficient to limit the increase of CRHA temperature to less than 8.3°C (15°F). When the average temperature of any CRHA heat sink is greater than the limit specified, verification will be performed every eight hours to ensure that the average temperature of any CRHA heat sink has not exceeded an interim limit. This will limit the temperature excursion of the heat sink and ensure worst case daily conditions are monitored when air temperatures in the CRHA or adjacent spaces are not being

maintained within limits. These SRs are performed every 24 hours to ensure the conditions used in the heat-up and passive cooling analysis remain valid.

RAI 9.4-32, RAI 9.4-33S01, RAI 9.4-34, RAI 16.0-5S02 and RAI 16.2-118 address related issues.

**DCD Impact:**

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