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Subject: Response to Portion of NRC Request for Additional Information Letter No. 172 Related to ESBWR Design Certification Application - Control Room Habitability - RAI Number 6.4-7 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,

James C. Kinsey
Vice President, ESBWR Licensing

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NRC

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 08-309, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 172 Related to ESBWR Design Certification Application*, March 26, 2008

Enclosure:

1. MFN 08-392 - Response to Portion of NRC Request for Additional Information Letter No. 172 Related to ESBWR Design Certification Application - Control Room Habitability - RAI Number 6.4-7 S01

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Enclosure 1

MFN 08-392

**Response to Portion of NRC Request for
Additional Information Letter No. 172
Related to ESBWR Design Certification Application**

Control Room Habitability

RAI Number 6.4-7 S01

For historical purposes, the original text of RAI 6.4-7 and the GEH response is included.

NRC RAI 6.4-7:

DCD, Tier 2, Revision 3, Section 6.4.3, states that the heat sink "consists of the thermal mass of concrete that makes up the ceilings and walls of these rooms" in the control room habitability area (CRHA).

This RAI requests additional information on the role of the heat sink after 72 hours into the design basis accident.

- A. Thoroughly discuss in the DCD how the temperature in the control room is to be maintained for the entire 30 day design basis accident period. Include the initial temperature assumptions and CRHA heat loads that are assumed in the heat sink calculation. Identify the equipment and their power sources necessary to maintain the temperature (heat sink, recirculation air handling units (AHUs), chillers, cooling water pumps, etc) for the full 30 day period.*
- B. After 72 hours into the design basis accident, will the operation of the chillers, cooling water pumps, and recirculation AHUs be needed so that the heat sink is not needed? Are these items powered from the same portable non-safety diesel generator units used to power the EFU's after 72 hours? Are connections established to allow rapid hook up of the portable diesel generators?*
- C. Identify in the DCD the non-safety-related components included in the regulatory treatment of non-safety systems (RTNSS) program that are needed to maintain CRHA temperature.*
- D. Change number 125 to Section 8 for Rev. 3 of the DCD states "The transportable AC generator referenced has been deleted from the ESBWR design." Are the portable generators part of the ESBWR design? Are these the same portable non-safety diesel generator units used to power the EFU's after 72 hours as described in Section 6.4.4, Emergency Mode? If these portable diesel generators have been removed from the ESBWR design, what have they been replaced with?*

GEH Response:

DCD Tier 2, Subsection 6.4.3, states that the heat sink "consists of the thermal mass of concrete that makes up the ceilings and walls of these rooms" in the control room habitability area (CRHA), which is part of the ESBWR passive design characteristics and does not require additional equipment to maintain the CRHA temperature during the first 72 hours after a design basis accident (DBA).

- A. During the first 72-hour period following a DBA the passive heat sink is credited for limiting the temperature rise inside each room of the CRHA as stated in DCD Tier 2, Subsection 6.4.3. For more details about the post-accident responses in the 72-hour post-accident period, see the responses to RAI 6.4-16 and RAI 9.4-33. After the 72-hour period, B2 Regulatory Treatment of Non-Safety Systems (RTNSS)*

diesel generators can supply power to the CRHAVS that provides cooling of the CRHA. In the event that the B2 RTNSS diesel generators are not available, the B1 RTNSS portable AC generator will provide power to the CRHA emergency lighting and safety-related emergency filter units (EFUs), which will ensure CRHA habitability. There is no other equipment that is necessary to maintain the CRHA temperature before or after 72 hours.

The B1 RTNSS power supply and safety-related EFUs ensure that the control room remains habitable in the post 72-hour accident period. Throughout the entire 30 day DBA period, the CRHA complies with 10 CFR 50 Appendix A, General Design Criteria (GDC) 19 with respect to control room habitability with the use of B2 or B1 RTNSS components. B2 and B1 RTNSS functions and criteria are described in DCD Tier 2, Subsection 19A.1.

For the heat sink calculation, the initial temperature for the CRHA is at the maximum normal operating condition found in DCD Tier 2, Table 9.4-1. The CRHA heat loads can be found in DCD Tier 2, Table 3H-12 for the first 72 hours after a DBA. After 72 hours when B2 RTNSS power is unavailable, the expected heat loads in the CRHA are composed of the operators, minimal emergency lighting, and the EFU fan motor, which amounts to a conservative estimate of 1700 watts.

- B. After 72 hours, operation of the chillers, cooling water pumps, and associated power sources obviates the need for the passive heat sink when the B2 RTNSS generators are available. Additionally, B1 RTNSS non-safety portable generators will be used to power the EFUs after 72 hours, which will maintain the CRHA habitability when B2 RTNSS equipment is unavailable. The portable AC generators included in the design will have the capability of rapid connections to supply the EFU fan motor.
- C. The B1 RTNSS AC power supply is used after 72 hours to power the safety-related EFU to maintain the CRHA habitability. The B1 RTNSS power supply is readily available throughout the entire DBA. When B2 RTNSS power supplies are available, it obviates the need for the B1 RTNSS power supply. DCD Tier 2, Subsection 9.4.1.1 states, "For longer-term operation, from after 72 hrs out to 7 days, a small portable AC power generator that is kept on the plant site can power the EFU fan system". Additionally, the AC power supply RTNSS criterion is described in DCD Tier 2, Table 19A-2, which is titled "RTNSS Systems."
- D. The portable generators that were deleted from DCD Tier 2, Revision 3, Chapter 8, are not currently part of the ESBWR design, and do not need to be replaced. These are different from the portable generators that are used to power the EFUs after 72 hours and performed a different function. Further description of the deleted generators can be found in DCD Tier 2, Revision 2, Subsection 8.3.1.1.2.

DCD Impact:

DCD Tier 2, Subsection 6.4.3 and Subsection 9.4.1.1 will be revised as shown in the attached markups.

NRC RAI 6.4-7 S01:

The GEH response to RAI 9.4-7 indicates that after 72 hours the CRHA temperature is maintained by the B2-RTNSS diesel generators supplying power to chillers and the recirculation AHU in the CR. It goes on to state that if the B2-RTNSS power supply is not available, the B1 RTNSS portable generators would power the EFU and emergency lighting and that this would assure control room habitability. Do the B1- RTNSS portable diesel generators also supply power to the chillers and recirculation EFU in the CRHA to maintain temperature? Is the CRHA still dependent on passive cooling post 72 hours if the B2 diesel generators are not available? If passive cooling is being relied upon post 72 hours, please supply sufficient information to show that the temperature in the CRHA is adequately controlled. In GEH's response to 9.4-33, it appears that the temperature is approaching 93 degrees at 72 hours. Please consider the questions asked in the supplement to 9.4-33 in responding to this RAI.

GEH Response:

As discussed in the response to RAI 9.4-31 (MFN 08-343, dated April 11, 2008), two ancillary diesel generators have been added to the design of the ESBWR to provide the function of the small portable AC generator previously referenced in DCD Tier 2, Revision 3, Subsection 9.4.1, as described in the response RAI 14.3-219 (MFN 08-086, Supplement 8 dated March 5, 2008). In addition to supplying power to the emergency filter unit (EFU) fans, the ancillary diesel generators provide power to the Main Control Room auxiliary air conditioning unit, and the recirculation air handling units (AHUs). These active cooling systems are credited for controlling the control room habitability temperature after 72 hours from the start of the event.

The two ancillary diesel generators automatically start on a loss of all AC power. This provides assurance that AC power to the EFU fans, Main Control Room auxiliary air conditioning unit, and the recirculation AHUs is restored before the safety-related batteries become exhausted. This is a nonsafety-related function that satisfies the criteria for Regulatory Treatment of Non-Safety Systems (RTNSS).

DCD Impact:

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