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MFN 06-394
Supplement 2

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Subject: **Response to NRC Request for Additional Information Letter
No. 154 Related to ESBWR Design Certification Application –
Conduct of Operations - RAI Number 13.3-5 S02**

Enclosures 1 and 2 contain GEH's response to the subject NRC RAI transmitted via the Reference 1 letter. GEH's previous responses were provided in the Reference 2 and 3 letters.

Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box. The marked-up pages may contain unverified changes in addition to the verified changes resulting from this RAI response. Other changes shown in the markup(s) may not be fully developed and approved for inclusion in DCD Revision 5.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

James C. Kinsey
Vice President, ESBWR Licensing

DO68
NRC

References:

1. MFN 08-308, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request For Additional Information Letter No. 154 Related To ESBWR Design Certification Application*, dated March 21, 2008
2. MFN 06-394, Letter from David Hinds to U.S. Nuclear Regulatory Commission, *Response to NRC Request for Additional Information Letter No. 47 Related to ESBWR Design Certification Application – Conduct of Operations – RAI Numbers 13.3-1 through 13.3-6*, dated October 20, 2006
3. MFN 06-394, Supplement 1, Letter from James C. Kinsey to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 47 Related to ESBWR Design Certification Application – Conduct of Operations – RAI Number 13.3-5 S01*, dated September 18, 2007

Enclosures:

1. MFN 06-394, Supplement 2 - Response to NRC Request for Additional Information Letter No. 154 Related to ESBWR Design Certification Application – Conduct of Operations - RAI Number 13.3-5 S02
2. MFN 06-394, Supplement 2 - Response to NRC Request for Additional Information Letter No. 154 Related to ESBWR Design Certification Application – Conduct of Operations - RAI Number 13.3-5 S02 – DCD Markup

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Enclosure 1

**MFN 06-394
Supplement 2**

**Response to NRC Request for
Additional Information Letter No. 154
Related to ESBWR Design Certification Application
Conduct of Operation
RAI Number 13.3-5 S02**

For historical purposes, the original text of RAIs 13.3-5 and 13.3-5 S01 and the GEH response is included. The attachments (if any) are not included from the original responses to avoid confusion.

NRC RAI 13.3-5

Guidance for TSC ventilation is found in NUREG-0696, Section 2.6. Please provide more detail as to the level of radiological protection provided by the TSC ventilation system.

GE Response

The HVAC subsystem for the Technical Support Center (TSC) is described in Subsection 9.4.7.1 and 9.4.7.2 and depicted in Figure 9.4-12. Each of the 100% capacity redundant HVAC trains is provided with a 100% capacity filter train consisting of HEPA and charcoal filtration to provide radiological protection to the occupants of the TSC. The TSC HVAC Air Intake Radiation Monitoring Subsystem (RMS) is described in Subsection 11.5.3.2.13 and its' range of channel measurement and display are given in Tables 11.5-1 and 11.5-2. The TSC HVAC subsystem automatically transfers from its normal operation mode to its radiological mode upon detection of radioactivity at the outside air intakes to limit the introduction of airborne radiation into the TSC. As stated in Section 13.3, the radiation exposure to any person working in the TSC will not exceed 0.05 Sv (5 rem TDE) for the duration of the accident. This defines the level of radiological protection that the detailed system and components will be designed to meet.

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

NRC RAI 13.3-5 S01

In response to RAI 13.3-1, the applicant indicated that technical support center (TSC) Communication Room 5189, is outside the TSC, but communication personnel are part of the TSC staff size. How are TSC communication personnel included in the level of radiological protection described in response to RAI 13.3-5.

GEH Response

The Communications Room 5189 located in the Electrical Building, is across the hallway corridor adjacent to the Technical Support Center, see Figure 1.2-26, Electrical Building Plan at Elevation 4650. The nonsafety-related Electrical Building HVAC System (EBVS) provides service to the Electrical Building and consists of the Electric and Electronic Rooms (EER) HVAC Subsystems (EERVS), the Technical Support Center (TSC) HVAC Subsystem (TSCVS), and the Diesel Generators (DG) HVAC Subsystem (DGVS).

As discussed in subsection 9.4.7 Electrical Building HVAC System, the ESBWR design complies with the requirements of NUREG-0696, which requires the TSC to supply the same level of radiological protection as that supplied to the Main Control Room (MCR) under GDC 19. However, the TSC is not specifically committed to providing safety-related environment in full compliance with GDC 19 that defines the Control Room habitability acceptance criteria. The TSCVS detects and limits the introduction of airborne hazardous materials (radioactivity or smoke) into the TSC. The TSCVS filter units are defense-in-depth components and provide the function of filtration for the TSC during conditions of abnormal airborne radioactivity when power is available. The TSCVS automatically transfer from its normal operation mode to its radiological mode upon detection of radioactivity at the outside air intakes.

The Communications Room 5189 is outside the TSC and is serviced by the EERVS. The EERVS provides conditioned air to maintain acceptable temperatures for equipment and personnel, but does not provide the same level of radiological protection as the TSCVS. However, personnel that occupy the Communication Room 5189, will do so for only a brief period of time when the TSC is activated. Otherwise personnel in the Communications Room 5189 will normally occupy the TSC. If at any time the director of the TSC facility considers it to be uninhabitable due to loss of communications or other reason, the functions of the TSC will be transferred to the Emergency Offsite Facility (EOF).

DCD Impact

There is no change required to the DCD.

NRC RAI 13.3-5 S02

(Regulatory Basis: 10 CFR 52.47, 10 CFR 52.48, 10 CFR 50.47(b)(8) and (b)(11), and Subsection IV.E.8 to 10 CFR Part 50, Appendix E)

a) ESBWR conformance with NUREG-0696:

In DCD Subsection 9.4.7, and in its response to RAI 9.4 25 and RAI 13.3-5 (Supplement 1), the applicant stated that the ESBWR design conforms to NUREG-0696. In contrast, the applicant further stated that the TSC is not specifically committed to providing a safety-related environment in full compliance with the Control Room habitability acceptance criteria defined in GDC 19.

Section 2.6, "Habitability," of NUREG-0696 states the following with respect to TSC habitability (emphasis added):

Since the TSC is to provide direct management and technical support to the control room during an accident, it shall have the same radiological habitability as the control room under accident conditions. TSC personnel shall be protected from radiological hazards, including direct radiation and airborne radioactivity from inplant sources under accident conditions, to the same degree as control room personnel. Applicable criteria are specified in General Design Criterion 19; Standard Review Plan 6.4; and NUREG-0737, "Clarification of TMI Action Plan Requirements," Item II.B.2 [per 50.34 (f)(2)(vii)].

The applicant specifically takes exception to this clear guidance in stating that "the TSC is not specifically committed to providing a safety-related environment in full compliance with GDC 19." The staff sees this as contradictory to the applicant's statement in DCD Subsection 9.4.7 that "the ESBWR complies with the requirements of NUREG-0696, which requires the TSC to supply the same level of radiological protection as that supplied to the MCR under GDC 19." In short, the applicant has basically said that the TSC complies with NUREG-0696, and then follows with the clarification that it actually does not.

Please clarify this apparent contradiction, which relates to protection of TSC personnel (including communication personnel that are part of the TSC staff) from radiological hazards, including the extent to which the ESBWR design comports with the applicable guidance in NUREG-0696.

b) Communications Room outside the TSC:

Responses to RAI 13.3-1 and RAI 13.3-5, Supplement 1, state that Communications Room 5189 is outside the TSC, and that communication personnel are part of the TSC staff size. Further, the Electric and Electronic Rooms HVAC Subsystems services Communications Room 5189, and does not provide the same level of radiological protection as the TSC ventilation system, which services the TSC. The applicant justifies the lesser radiological protection for communication personnel by stating that the occupation of the Communication[s] Room 5189 by personnel will only be for a "brief period of time when the TSC is activated," and that otherwise, they will normally occupy the TSC.

It is not clear whether the TSC communication personnel will perform their emergency duties from within the TSC or from Communications Room 5189.

Please clarify. If they perform their duties from Communications Room 5189, describe how this comports with the applicable habitability criteria in NUREG-0696.

c) TSC functions transferred to EOF:

The response to RAI 13.3-5, Supplement 1, states that "[i]f at any time the director of the TSC facility considers it to be uninhabitable due to loss of communications or other reasons, the functions of the TSC will be transferred to the Emergency Offsite [sic] Facility (EOF)."

This statement is problematic, in that the EOF is not a plant-specific, design-related aspect of the ESBWR. Any such transfer of TSC functions to the EOF would be programmatic in nature, and would depend on the individual characteristics of any specific site. Consistent with Section 13.3, "Emergency Planning," of the Standard Review Plan (SRP) (NUREG-0800), the staff's review of design-related aspects of emergency planning in a design certification application should be limited to site-independent emergency planning features that are technically relevant to the design, and usable for a multiple number of units or sites.

Further, as reflected in the staff's earlier review of the AP1000 reactor design (see NUREG-1793, September 2004), the designation of the EOF as an alternate TSC is problematic. TSC design features cannot be ignored based on unknown compensatory measures, and if the EOF is an alternate TSC, its location would need to be evaluated against the applicable guidance criteria in NUREG-0696. Finally, Section 2.6 of NUREG-0696 states that "[i]f the

TSC becomes uninhabitable, the TSC plant management function shall be transferred to the control room."

Please clarify how transferring the TSC functions to the EOF is relevant to the ESBWR standard design; including how this would be addressed for an existing reactor site that calls for the TSC plant management function to be transferred to the control room if the TSC becomes uninhabitable - rather than to the EOF or retract the statement that the TSC functions will be transferred to the EOF if the TSC facility becomes uninhabitable.

GEH Responses

1. A response to this comment has been addressed in letter MFN 08-143, Response to Portion of NRC Request for Additional Information Letter No. 111, Related to ESBWR Design Certification Application – Heating, Ventilation, and Air Conditioning – RAI Number 9.4-25 S01.

However, based on further review of the response in RAI 9.4-25 S01, GEH has determined that the statement regarding GDC 19 compliance was contradictory. The portion of the statement, "... however, the TSC is not specifically committed to providing a safety-related environment in full compliance with GDC 19 that defines the Control Room habitability acceptance criteria" will be deleted.

2. The Communications Room 5189 located in the Electrical Building across the hallway corridor adjacent to the Technical Support Center (Figure 1.2-26), at Elevation 4650, will be re-designated as Communications Equipment Room 5189. This room is not where personnel would go to perform communication tasks. Communication devices would be located in the offices of the TSC. In addition the Electrical Equipment Building HVAC (EBHVS) Electrical Building Equipment and Thermal Load Calculation shows no personnel in that Room 5189 to account for as a heat load. Therefore the applicable habitability criteria in NUREG-0696 do not apply to Room 5189. See also RAI 13.3-1, where GEH states that the overall floor space set aside for the TSC excludes Room 5189.
3. In the original RAI 13.3-5 S01 response, third paragraph, last sentence, we retract the statement, "If at any time the director of the TSC facility considers it to be uninhabitable due to loss of communications or other reason, the functions of the TSC will be transferred to the Emergency Offsite Facility (EOF)." Instead that sentence should read, "If at any time the director of the TSC facility considers it to be uninhabitable due to loss of communications or other reason, the TSC plant management function will be transferred to the Main Control Room."

DCD Impact

DCD Tier 2, Subsection 9.4.7, 6th paragraph, last sentence, will be revised in Revision 5 to delete the statement, "... however, the TSC is not specifically committed to providing a safety-related environment in full compliance with GDC 19 that defines the Control Room habitability acceptance criteria." as reflected in the attached markup.

Enclosure 2

**MFN 06-394
Supplement 2**

**Response to NRC Request for
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RAI Number 13.3-5 S02 – DCD Markup**

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- Alarms for high or low conditions, including airflow rates, temperatures, filter pressure drop, building differential pressure, ~~and~~ smoke detection, and high battery room hydrogen concentration.

This instrumentation conforms to GDC 13. Refer to Subsection 3.1.2 for a general discussion of GDC 13.

9.4.6.6 COL Information

None

9.4.6.7 References

The applicable HVAC codes and standards are shown in Table 9.4-17.

9.4.7 Electrical Building HVAC System

The Electrical Building HVAC System (EBVS) consists of the following subsystems:

- Electric and Electronic Rooms (EER) HVAC Subsystem (EERVS)
- Technical Support Center (TSC) HVAC Subsystem (TSCVS)
- Diesel Generators (DG) HVAC Subsystem (DGVS)

Regarding the ESBWR nonsafety-related EBVS, this subsection addresses the applicable requirements of the General Design Criteria (GDC) 2, 4, 5, 19 and 60 discussed in Standard Review Plans (SRP) 9.4.1 and 9.4.3. The ESBWR:

- Meets GDC 2 via compliance with the guidance of Regulatory Guide 1.29, Position C.2 for nonsafety-related portions. The EBVS does not perform any safety-related function. The EBVS components are designated as Seismic Category NS. The Electrical Building is nonsafety-related and Seismic Category NS.
- Meets GDC 4. While the TSC ventilation system is not specified in SRP 9.4.1, the ESBWR design is committed to providing a TSC that maintains environmental conditions in the TSC compatible with the design limits of ~~safety-related~~ equipment located therein.
- Meets GDC 5 for shared safety-related systems and components. The ESBWR does not share any safety-related structure, system or component with any other unit.
- ~~Meets GDC 19. The ESBWR design complies with the requirements of NUREG-0696, which requires the TSC to supply the same level of radiological protection as that supplied to the MCR under GDC 19.; however, the TSC is not specifically committed to providing a safety-related environment in full compliance with GDC 19 that defines the Control Room habitability acceptance criteria.~~
- Meets GDC 60 because the EER, TSC and Diesel Building HVAC Systems have no source of radioactive materials in either particulate or gaseous form. The exhaust systems have no provision for filtration or adsorption because these areas are clean.