

Enclosure 1

MFN 16-041

GEH's Response to RAI 13.03-1

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NRC Request for Information RAI 13.03-01:

10 CFR 50.47(b)(8) (1997) requires that “adequate emergency facilities and equipment to support the emergency response are provided and maintained.” Also, Paragraph IV.E.8 of Appendix E to 10 CFR Part 50 (1997) requires “[a] licensee onsite technical support center and a licensee near-site emergency operations facility from which effective direction can be given and effective control can be exercised during an emergency.” Section 2.6, “Habitability,” of NUREG-0696 states in part that the Technical Support Center (TSC) shall have the same radiological habitability as the control room under accident conditions, and the TSC ventilation system shall function in a manner comparable to the control room ventilation system. For the control room, General Design Criteria (GDC) 19 specifies an exposure acceptance criteria of 5 rem total effective dose equivalent (TEDE) (0.05 Sievert (Sv)) for the duration of design basis accidents (DBAs). The DBAs are discussed in Chapter 15 of the ABWR DCD. In addition, Section 8.2, “Technical Support Center (TSC),” of NUREG-0737 (Suppl. 1) addresses various TSC requirements, including radiological protection in Subsection 8.2.1.f.

GEH Design Control Document (DCD), Tier 2, Revision 6, February 2016, Chapter 13, “Conduct of Operations,” Section: 13.3, “Emergency Planning,” addresses the TSC and states in Table 13.3-1 (fourth column) that, for the TSC, “[t]he necessary facilities and equipment are called for in Section 2 of NUREG-0696.” The TSC and OSC (Lunch Room) are both located in the Service Building. DCD Tier 2 Section 9.4.8, “Service Building HVAC System,” describes the ventilation system for the TSC. DCD Tier 2 Section 9.4.8, does not appear to describe TSC radiological habitability capability under accident conditions that is the same as the radiological habitability capability of the main control room.

Please address this apparent conflict within the DCD with respect to the TSC habitability and ventilation system guidance provided by Section 2.6 of NUREG-0696 and Section 8.2 of NUREG-0737 (Suppl. 1) by providing the following information:

- a. Describe how the TSC ventilation system (to the extent not addressed in DCD Tier 2 Section 9.4.8), will function in a manner comparable to the control room ventilation system. For example, Section 2.6 of NUREG-0696 states that a TSC ventilation system that includes high-efficiency particulate air (HEPA) and charcoal filters are needed as minimum design features.
- b. Describe how the TSC radiological habitability is the same as the control room under accident conditions, including the ABWR TSC radiological consequence analyses for the postulated DBAs.
- c. Revise the ABWR DCD, as appropriate, to be consistent with the TSC habitability criteria in NUREG-0696 and NUREG-0737 (Suppl. 1).
- d. Add an additional ITAAC in DCD Tier 1 Table 2.17.1, “Emergency Response Facilities,” to address TSC habitability, or explain why this is not necessary in this instance.

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Summary:

As explained in the ABWR Design Control Document (DCD), Section 13.3, the standard design does not address the programmatic aspects of emergency planning, but includes certain related

design features that relate to emergency planning, such as features for the Technical Support Center (TSC). The ABWR renewal requirements for the TSC, including habitability, remain the same as in the original ABWR design certification. However, as explained further below, GEH agrees that the DCD clarity on this issue could be improved by adding an ITAAC in DCD Tier 1, Table 2.17.1 to ensure that the final as-built TSC habitability meets the commitment to NUREG-0696 in the ABWR DCD Tier 2, Section 13.3.

Response to Specific Items:

- a. Describe how the TSC ventilation system (to the extent not addressed in DCD Tier 2 Section 9.4.8), will function in a manner comparable to the control room ventilation system. For example, Section 2.6 of NUREG-0696 states that a TSC ventilation system that includes high-efficiency particulate air (HEPA) and charcoal filters are needed as minimum design features.

The Service Building Clean Air HVAC services the TSC for personnel occupancy and includes design features for radiological habitability. Features of the system are described in several sections of the DCD.

The NRC found the ABWR TSC radiological habitability design features, which are based on the guidance in NUREG-0696 (1981¹), to be acceptable at the time the design was originally certified. Table 13.3-1, "ABWR Design Considerations for Emergency Planning Requirements," establishes the design considerations for the ABWR TSC radiological habitability through a reference to Section 2 of NUREG-0696 for the "necessary facilities and equipment" for the TSC. For TSC habitability, NUREG-0696, Section 2.6, specifies the applicable criteria as General Design Criteria (GDC) 19, Standard Review Plan (SRP) Section 6.4, and NUREG-0737, Item II.B.2. Although Section 2.6 refers to these criteria, it also recognizes that the "TSC ventilation system need not be seismic Category I qualified, redundant, instrumented in the control room, or automatically activated to fulfill its role." It states that a "TSC ventilation system that includes high-efficiency particulate air (HEPA) and charcoal filters is needed, as a minimum." In this manner, it reflects that the "TSC ventilation system shall function in a manner comparable to the control room ventilation system." The ABWR DCD Tier 2, Section 9.4.8, describes the design features for the non-safety-related Service Building Clean Air HVAC that services the TSC that are comparable to the safety-related control room habitability HVAC system, which is described in Section 9.4.1, including HEPA and charcoal filters as minimum design features.

The Service Building Clean Area HVAC System consists of an air conditioning unit with two supply fans, two exhaust fans, and an emergency filtration unit with two circulating fans. In an emergency, it supplies filtered air for the clean areas of the Service Building. The emergency filtration unit includes two HEPA filters and a 5.1 cm charcoal filter bed.

In addition, to address site-specific conditions through COL Information Item 9.4.10.1, the COL applicant is to provide the details of the Service Building HVAC system, including a detailed P&ID, system flow rates and an equipment list, compliance with RG 1.140, toxic gas protection requirements, and description of radiation monitors at the supply air inlet, for the Service Building HVAC system, including the TSC and OSC, for NRC review (DCD Section 9.4.8.2).

¹ See, e.g., SRP 13.3 (Revision 3, March 2007), which references (Reference 40) NUREG-0696, "Functional Criteria for Emergency Response Facilities," February 1981. This version of NUREG-0696 was the latest version at the time the ABWR design was certified and GEH is not aware of a subsequent revision.

Regarding shielding criteria in NUREG-0737, Item II.B.2 (referenced in NUREG-0696, Section 2.6, as applicable to TSC habitability), Tier 1, Section 3.2, addresses shielding requirements. NUREG-0737, Item II.B.2 is also discussed in DCD Tier 2, Sections 1A.2.6 and 19A.2.19 and Appendix 1AA.

Tier 1, Section 2.15.5, (Subsection titled Clean Area HVAC System) Revision 4 (certified design) and the current Revision 6, describes the certified design material for the Service Building Clean Area HVAC system, including ITAAC (Table 2.15.5m) for the following Design Commitments:

1. The basic configuration of the S/B HVAC System is as described in Section 2.15.5.
2. On receipt of a signal from the TSC or MCR, the normal air intake damper closes, the minimum outside air intake damper opens, and the ventilation air for the Clean Area is routed through the emergency filtration unit.
3. In the high radiation mode, a positive pressure is maintained in the Clean Area relative to the outside atmosphere.
4. The emergency filtration unit for the Clean Area ventilation air has at least 95% removal efficiency for all forms of iodine (elemental, organic, particulate, and hydrogen iodide).

ITAAC 4 specifies an emergency filtration unit removal efficiency of at least 95%. The standard efficiency of 95% is expected to be adequate for TSC personnel occupancy post-accident,² but it would necessarily be checked at the time that the COL applicant implements COL Information Item 9.4.10.1 with the plant and site conditions. If plant and site conditions indicate a higher efficiency is necessary, it would still meet the ITAAC acceptance criteria of at least 95% and the ITAAC would not need to be revised at that time for a higher efficiency. If plant and site conditions indicate that a lower efficiency would be sufficient, the standard 95% efficiency would still be used unless the applicant or licensee requested a plant-specific exemption. On this basis, no changes are proposed for DCD Tier 1, Section 2.15.5.

Tier 1, Section 2.17.1, includes ITAAC for the Emergency Response Facilities, including the TSC. Tier 1, Section 2.3.2, provides the design description and associated ITAAC for the Area Radiation Monitoring System (ARMS). Tier 2, Section 12.3, describes the function of the ARMS and Table 12.3-5 lists the area radiation monitor for the Service Building TSC. Figure 12.3-64 shows the location of the monitors for the Control Building and the Service Building (which shows a monitor located in the TSC).

²See SRP 6.4 (1981) for examples of system Iodine Protection Factor capabilities with 95% efficiencies.

b. Describe how the TSC radiological habitability is the same as the control room under accident conditions, including the ABWR TSC radiological consequence analyses for the postulated DBAs.

The NRC reviewed the facilities and equipment against the applicable criteria of NUREG-0696, as documented in the ABWR FSER (NUREG-1503), Section 13.3, and found the design features, descriptions, and ITAAC to be acceptable.

The structures, systems, and components (SSCs) that provide for TSC radiological habitability are not safety-related or seismic Category 1 and the systems do not perform safety functions, as compared to the SSCs that provide for control room habitability. The level of design information regarding the non-safety-related functions for TSC habitability is consistent with NRC regulations in 10 CFR 52.47(a) for the content of a design certification.

Because the detailed design of the non-safety-related Service Building and its HVAC systems is not yet complete, the TSC radiological consequence analyses for postulated DBAs are not included in the standard design. As noted above, through COL Information Item 9.4.10.1, the COL applicant is to provide the details of the Service Building HVAC system, including a detailed P&ID, system flow rates and an equipment list. This information, along with the site-specific conditions, will provide an opportunity to perform analyses of the TSC radiological consequences.

To clarify that the TSC radiological consequence analyses are to be performed, Section 9.4.8.2 and COL Information Item 9.16 (Section 9.4.10.1) are modified. The acceptance criteria are provided and are consistent with NUREG-0696, which references GDC-19 and SRP 6.4 for limits of 5 rem whole body and 30 rem thyroid. A 30-day post-accident period is specified, consistent with Table 15.6-14, "Loss of Coolant Accident Meteorology and Control Room Dose Results." This acceptance criteria are discussed below as it is applied in the proposed new ITAAC for TSC habitability. The results of the COLA applicant's implementation of Section 9.4.10.1 will be addressed in the COLA, as appropriate and the new ITAAC will be verified during construction.

c. Revise the ABWR DCD, as appropriate, to be consistent with the TSC habitability criteria in NUREG-0696 and NUREG-0737 (Suppl. 1).

As described above, the TSC habitability criteria are already established as being consistent with NUREG-0696 (see ABWR DCD, Tier 2, Table 13.3-1). Although the DCD does not refer to NUREG-0737, Supplement 1, as establishing criteria for TSC habitability, the Section 8.2.1, Item f, criteria is essentially the same as that established by SRP 6.4, through reference in NUREG-0696, Section 2.6. Therefore, no revisions to DCD Section 13.3 are necessary in this regard because the DCD TSC habitability criteria are already consistent with NUREG-0696 (Section 2.6, "Habitability") and NUREG-0737, Supplement 1 (Section 8.2.1, Item f).

Other sections are revised as described herein.

d. Add an additional ITAAC in DCD Tier 1 Table 2.17.1, "Emergency Response Facilities," to address TSC habitability, or explain why this is not necessary in this instance.

The NRC guidance in SRP 14.3.10 for Emergency Planning ITAAC was considered in developing a proposed new ITAAC for TSC habitability. Also, consistent with the GEH response to Item 24 (MFN 16-035, June 3, 2016), other NRC and industry guidance has been considered. Similar

ITAAC in design certification applications or other Part 52 applications or licenses were reviewed for further insights. There are differences in how the ITAAC for verifying TSC habitability are written, but there is a general approach that the as-built TSC habitability system would be inspected and its capabilities tested (SRP 14.3.10).

- The proposed Design Commitment is that the TSC has comparable habitability to the control room habitability under accident conditions.
- For the Inspections, Tests, and Analyses, the as-built TSC habitability system will be inspected against the final design features described in Tier 2 (e.g., Section 9.4.8). The capabilities of the system will be tested, as described in DCD Section 14.2.12.1.34, “Heating, Ventilation, and Air Conditioning Systems Preoperational Test” (also see DCD Tier 1, Section 2.15.5 for the HVAC system ITAAC).
- For the Acceptance Criteria, the new ITAAC that is proposed for Tier 1 will verify that the TSC habitability is comparable to the control room habitability under accident conditions. DCD Tier 2, Table 13.3-1, establishes the criteria for the ABWR TSC radiological habitability through a commitment to Section 2 of NUREG-0696 for the “necessary facilities and equipment” for the TSC. For habitability, NUREG-0696, Section 2.6, provides the applicable criteria as General Design Criteria (GDC) 19, Standard Review Plan (SRP) Section 6.4 (1981), and NUREG-0737, Item II.B.2. The acceptance criteria in the proposed ITAAC are based on NUREG-0696 and SRP 6.4 (1981) for 5 rem whole body and 30 rem thyroid. With the additional information being added to Sections 9.4.8.2 and 9.4.10.1, the acceptance criteria are stated specifically in Tier 2. Also, the 30-day post-accident period, consistent with Table 15.6-14, is specified.

With these considerations, the proposed new ITAAC will verify that the as-built TSC habitability is as designed and as described in the ABWR DCD and the COL.

DCD Impacts

The ABWR DCD Tier 1, Section 2.17 and Table 2.17-1, and Tier 2, Sections 9.4.8 and 9.4.10, Revision 6, are revised as shown in the markups provided in Enclosure 2.