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**Subject: Response to Portion of NRC Request for Additional  
Information Letter No. 202 Related to ESBWR Design  
Certification Application ESBWR RAI Number 14.3-394**

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 (RAI) sent by NRC letter 202 dated May 21, 2008 (Reference 1).

Enclosure 1 contains the GEH response to RAI Number 14.3-394. Changes to the ESBWR DCD resulting from this response will be included in Revision 6 of the DCD.

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

Sincerely,

Richard E. Kingston  
Vice President, ESBWR Licensing

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MLO

Reference:

1. MFN 08-486, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 202 Related To ESBWR Design Certification Application*, dated May 21, 2008.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 202 Related to ESBWR Design Certification Application - RAI Number 14.3-394

cc: AE Cabbage      USNRC (with enclosure)  
RE Brown      GEH/Wilmington (with enclosure)  
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eDRF      0000-0089-2282 (RAI) 14.3-394

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**Enclosure 1**

**Response to Portion of NRC Request for  
Additional Information Letter No. 202  
Related to ESBWR Design Certification Application**

**DCD Tier 1**

**RAI Number 14.3-394**

*NRC Summary:*

*Interface requirements for offsite power*

*Full Text:*

*Section 4, "Interface Material" of DCD, Tier 1, Rev. 4 of ESBWR design states that an applicant for a combined license (COL) that references the ESBWR certified design must provide design feature or characteristics that comply with the interface requirements for the plant design and inspections, tests, analyses, and acceptance criteria (ITAAC) for the site specific portion of the facility design, in accordance with 10 CFR 52.79(c). However, no interface requirements were identified for the offsite power system in the certified design. RG 1.206, CIII.7.2, Site-Specific ITAAC, recommends that applicants should develop ITAAC for the site-specific systems that are designed to meet the significant interface requirements of the standard certified design, that is, the site-specific systems that are needed for operation of the plant (e.g., offsite power).*

*As indicated in Section 8.1.5.2.4 of DCD, the ESBWR standard design complies with the requirements of GDC 17 with respect to two independent and separate offsite power sources. Therefore, an ITAAC is needed so that the NRC staff can verify that the required circuits from the transmission network satisfy the requirements of GDC 17 with regards to its capacity and capability regardless of its low risk significance in ESBWR design.*

*Revise Section 4 of DCD, Tier 1 to include interface requirements for the offsite power system. It is expected that site-specific ITAAC for offsite power will be provided by the COL applicants to satisfy the interface requirements.*

## **GEH RESPONSE**

ITAAC are provided in Tier 1, Section 2.13, "Electrical Systems," for safety-related / risk significant aspects of the electrical system for the ESBWR standard plant design. ITAAC 1 in Table 2.13.1-2 verifies the functional arrangement of the onsite AC power system according to Subsection 2.13.1, Table 2.13.1-1, and Figure 2.13.1-1. Figure 2.13.1-1 depicts the connections of the ESBWR standard plant design to the offsite power system. Thus, no plant-specific ITAAC would be necessary for these design features covered by Tier 1, Section 2.13.

As discussed in DCD Tier 2, Section 3.1.2.8, "Criterion 17 – Electric Power Systems," the design of the offsite power systems is outside the scope of the ESBWR standard plant design. However, this section notes that DCD Tier 2,

Section 8.2, "Offsite Power Systems," discusses which specific portions of GDC-17 apply to the offsite power system and how these are implemented to the design.

The ESBWR is a passive plant and does not rely on actively generated power for design basis event mitigation and therefore both onsite AC power and offsite power are provided by nonsafety-related systems. In NRC SRM 94-084, the Commission agreed with the staff recommendation that any regulatory oversight for the offsite power systems of passive advanced light water reactors would be determined using the RTNSS process. As part of the GEH ESBWR DCD development, Chapter 19 (PRA and Severe Accidents) determined that the offsite power system for the ESBWR does not meet the criteria to be considered as RTNSS.

Thus, with regards to GDC 17, the ESBWR reference plant design does not require offsite or diesel-generated AC power for 72 hours after an abnormal event. Safety-related DC power supports passive core cooling and containment safety-related functions. Accordingly, GDC-17 is not applicable to the offsite power system that interfaces with the ESBWR standard plant as related to the need to be available within a few seconds following a loss-of-coolant accident. Nor is offsite power necessary after anticipated operational occurrences to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded, as would be required by GDC-17 for non-passive plants.<sup>1</sup> Accordingly, there is no need for an interface requirement for demonstrating the capacity and capability of the offsite power systems.

However, as described in DCD Tier 2, the ESBWR offsite power system complies with the provisions in GDC-17 for the existence of two separate and independent offsite circuits. Also, as described in DCD Tier 2, these circuits are capable of providing power to the plant during plant operation and during plant shutdown conditions. In addition, DCD Tier 2, Section 8.2.4, specifies the COL Information that will be provided by the COL applicant in regards to the transmission system and the offsite power sources, including the following COL Information, as delineated in Tier 2, Section 8.2, Revision 5:

- The COL applicant will describe the transmission system.

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<sup>1</sup> As discussed in the preamble to 10 CFR Part 50, Appendix A, the General Design Criteria were established for the types of plants that were "similar in design and location to plants for which construction permits have been issued by the Commission." The preamble notes that "there may be water-cooled nuclear power units for which fulfillment of some of the General Design Criteria may not be necessary or appropriate." In the ESBWR design, some elements of the GDC are not directly applicable. For example, when GDC 17 was established by the 1971 rulemaking (36 Fed. Reg. 3255 (Feb. 20, 1971)), light-water reactors required a significant source of AC power within a few seconds following AOOs or accidents. Accordingly, the capability and capacity of the offsite power system needed to be evaluated in light of the significant transient placed on the grid (i.e. loss of a major baseload supply). That is not the case for the ESBWR design.

- The COL applicant will describe the switchyard.
- The COL applicant will specify the normal preferred power voltage.
- The COL applicant will specify the alternate preferred power voltage.
- The COL applicant is responsible for switchyard protective relaying and will ensure such relaying is coordinated, reviewed, and accepted by the applicable grid reliability organization.
- The COL applicant will address switchyard DC power.
- The COL applicant will address switchyard AC power.
- The COL applicant will address switchyard transformer protection.
- The COL applicant will address the stability and reliability of the offsite transmission system.
- The COL applicant is responsible for the interface protocol requirements.

In accordance with NRC regulatory guidance (as referenced in the RAI), Section C.III.7.2 of RG 1.206, site-specific ITAAC should be included in a COL for site-specific systems that are needed “for operation of the plant (e.g., offsite power, circulating water system).” The guidance goes on to state that Tier 1 should include an interface requirement to “describe the significant design provisions for interfaces between the certified design and SSCs of the facility that are wholly or partially outside the scope of the certified design” and that the “interface requirements also define the significant attributes and performance characteristics that the portion of the facility that is outside the scope of the design certification must have in order to support the in-scope (standard) portion of the design.” In addition, the NRC guidance explains that “the AP1000 DCD does not contain any interface requirements for site-specific elements of the facility outside the scope of the certified design because the AP1000 has passive safety functions and does not rely upon systems outside the scope of the certified design to perform any safety-related or safety-significant functions.” As previously stated, the ESBWR is also a passive plant, thus the same approach was implemented for DCD Tier 1.

As stated in GEH response to RAI 16.0-1, the ESBWR offsite power system does not meet the criterion of 10 CFR 50.36, thus this system will not be included in plant technical specifications. No Technical Specification required surveillances or associated Limiting Condition for Operation will exist for the ESBWR plant offsite power supplies.

As stated in the DCD Tier 2, Subsection 8.2.3, 2<sup>nd</sup> bullet, “The normal preferred circuit and the alternate preferred circuit are electrically independent and are physically separated from each other.”

Because the ESBWR design did not request an exemption to GDC 17, an interface item for the offsite power system features as related to GDC-17 will be added to Tier 1. This new section will reflect that – similar to the AP1000 – the offsite power connection is neither safety-related nor safety significant because the ESWBR is a passive plant.

Plant-specific ITAAC will be required that verifies the ESBWR plants comply with GDC 17 with regard to offsite power being supplied by two physically separated electrically independent circuits.

### **DCD Impact**

DCD Tier # 1, Section 4 will be revised as noted in the attached markup.

## 4. INTERFACE MATERIAL

An applicant for a combined license (COL) that references the ESBWR certified design must provide design features or characteristics that comply with the interface requirements for the plant design and inspections, tests, analyses, and acceptance criteria (ITAAC) for the site-specific portion of the facility design, in accordance with 10 CFR 52.79 (c).

Tier 1 interfaces were identified for the conceptual design portion of the Plant Service Water System for the certified design.

### 4.1 PLANT SERVICE WATER SYSTEM

#### Design Description

The Plant Service Water System (PSWS) is the heat sink for the Reactor Component Cooling Water System. PSWS does not perform any safety-related function. There is no interface with any safety-related component.

The PSWS cooling towers and basins are not within the scope of the certified design. A specific design for this portion of the PSWS shall be selected for any facility, which has adopted the certified design. The plant-specific portion of the PSWS shall meet the interface requirements defined below.

#### Interface Requirements

The interface requirements are necessary for supporting the post-72-hour cooling function of the PSWS. The PSWS is required to remove  $2.02 \times 10^7$  MJ ( $1.92 \times 10^{10}$  BTU) over a period of 7 days without active makeup. Consequently, verification of compliance with the interface requirements shall be achieved by inspections, tests, and analyses that are similar to those provided for the certified design. The combined license applicant referencing the certified design shall develop these inspections, tests, and analyses, together with their associated acceptance criteria.

### 4.2 OFFSITE POWER

#### Design Description

The offsite power system supplies power to the plant from the switchyard connected to the transmission grid offsite power sources and is the preferred source of AC power when the plant is operating and during plant shutdown when offsite power is available. The ESBWR standard design provides for two independent circuits: the normal preferred power source and the alternate preferred power source. The alternate preferred power source serves as backup to the normal preferred power source.

In the ESBWR, which is a passive plant, the offsite power system provides no safety-related function and there is no direct interface with any safety-related component. The offsite power system provides power to the safety-related system via the Isolation Power Centers under conditions when offsite power is available. The offsite power system is not required for the first 72-hours following an abnormal event or accident to protect fuel parameters. There are no technical specifications, required surveillances, or associated Limiting Conditions for Operation for the off-site power supplies.

**Interface Requirements**

A combined license applicant referencing the ESBWR certified design shall develop an ITAAC to verify by inspection that two physically independent circuits will supply electric power from the transmission network to the onsite electric distribution system.