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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 65 Related to ESBWR Design Certification Application – Classification of Structures, Systems and Components – RAI Numbers 3.2-63 and 3.2-64**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter.

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

Sincerely,

/Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

D068

Reference:

1. MFN 06-353, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 65 Related to ESBWR Design Certification Application,* September 26, 2006

Enclosure:

1. MFN 07-052 – Response to Portion of NRC Request for Additional Information Letter No. 65 Related to ESBWR Design Certification Application – Classification of Structures, Systems and Components – RAI Numbers 3.2-63 and 3.2-64

cc:

AE Cubbage	USNRC
DH Hinds	GE (with enclosures)
RE Brown	GE (w/o enclosures)
eDRF	0000-0063-7835/1

Enclosure 1

MFN 07-052

Response to Portion of NRC Request for

Additional Information Letter No. 65

Related to ESBWR Design Certification Application

Classification of Structures, Systems and Components

RAI Numbers 3.2-63 and 3.2-64

NRC RAI 3.2-63

Classification of non-safety SSCs required to support safety-related components - components required following discharge of batteries.

Table 3.2-1, Classification Summary, indicates that the Medium Voltage Distribution System, R11, the Low Voltage Distribution System, R12, and the Standby alternating current (ac) Power Supply, R21, are non safety-related and non-seismic. Describe how the batteries will be recharged following their design basis discharge if the non safety-related systems R11, R12 and R21 have been destroyed in a seismic event. All paths and components required to maintain the plant shutdown and provide residual core cooling following the discharge of the batteries should be seismic category I.

GE Response

The equipment needed to recharge the safety-related batteries following their discharge is located in the Electrical Building. The Electrical Building and the components within it that are needed to recharge the safety-related batteries will be designed to withstand seismic effects using methods permitted by the International Building Code (IBC), without formally classifying these components as Seismic Category I. Section 1616.2.3 of the IBC addresses post-earthquake recovery and is therefore directly applicable to the design of RTNSS equipment. See the attached DCD markup for additional details.

GE believes this is the appropriate method for addressing the seismic design of nonsafety-related components that support the long-term operability of safety-related components. For additional information on battery recharging, see the GE response to RAI 9.5-31 that is being transmitted to NRC in GE Letter MFN 07-068.

DCD Impact

DCD Tier 2, Subsection 3.2.1 was revised as noted in the attached markup.

NRC RAI 3.2-64

Classification of non-safety SSCs required to support safety-related components - physical separation between safety and nonsafety components.

Table 3.2-1, Classification Summary, differentiates between electrical modules and cables with and without safety functions. Is it your intent to have the safety-related modules separated in different racks from the non safety-related modules? Is it your intent to have separate safety-related and non safety-related cable raceway systems? Note that electrical modules and cables, if identified for treatment by the Regulatory Treatment of Non-Safety Systems (RTNSS) process, should be treated as seismic category I.

GE Response

DCD Tier 2 Subsection 8.1.5.2.1 states that raceways are not shared by Class 1E and non-Class 1E cables, or Class 1E cables of a different division.

DCD Tier 2 Subsections 8.3.1.3 through 8.3.2 make it clear that all safety-related DCIS equipment is separated from the nonsafety-related DCIS equipment, i.e., racks will not contain safety-related and nonsafety-related equipment. Also, terms like cable, tray, and raceway, etc. are defined in this portion of the DCD. Specific examples from these sections are provided below.

DCD Tier 2 Subsection 8.3.1.3.1, Rev. 3, states that: "Electrical and control equipment, panels and racks, and cables and raceways grouped into separate divisions are identified so that their electrical divisional assignment is apparent, and so that an observer can visually differentiate between safety-related equipment and wiring of different divisions, and between safety-related and nonsafety-related equipment and wiring."

Under the heading of "Control, Relay, and Instrument Panels/Racks", DCD Tier 2 Subsection 8.3.1.4.1 provides the following additional information: "Control, relay, and instrument panels/racks are designed in accordance with ... general criteria to preclude failure of nonsafety-related circuits causing failure of any safety-related circuit, and to preclude failure of any safety-related circuit causing failure of its redundant safety-related circuit." Later in the same subsection it goes on to state "Class 1E circuits and devices are also separated from the non-Class 1E circuits and devices that are present inside a panel. These circuits and devices are separated from each other horizontally and vertically by the minimum distance required in IEEE 384 Subsection 6.6.2, or by steel barriers or enclosures."

GE does not agree that electrical modules and cables identified for treatment as RTNSS need to be classified as Seismic Category I. The attached DCD markup for Subsection 3.2.1 provides GE's position on this subject. GE believes it is sufficient to design RTNSS components to withstand seismic effects using methods permitted by the International Building Code, without formally classifying these components as Seismic Category I. For RTNSS components located in the Turbine Building, that building is already classified as Seismic Category II, which ensures the building and the RTNSS components located within it will remain intact following an SSE.

DCD Impact

DCD Tier 2, Subsection 3.2.1 was revised as noted in the attached markup. In addition, Revision 3 of DCD Tier 2, Chapter 8, included additional clarifications to further differentiate between safety-related and nonsafety-related cables, components and systems.

3.2 CLASSIFICATION OF STRUCTURES, SYSTEMS AND COMPONENTS

ESBWR structures, systems and components are categorized as safety-related (as defined in 10 CFR 50.2) or nonsafety-related. The safety-related structures, systems and components are those relied upon to remain functional during and following design basis events to ensure:

- The integrity of the reactor coolant pressure boundary (RCPB);
- The capability to shut down the reactor and maintain it in a safe condition; or
- The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the applicable guidelines exposures set forth in 10 CFR 50.34(a)(1) or 10 CFR 100.11.

Safety-related structures, systems and components conform to the quality assurance requirements of Appendix B to 10 CFR 50. Nonsafety-related structures, systems and components have quality assurance requirements applied commensurate with the importance of the item's function. The quality assurance program is described in Chapter 17.

The ESBWR complies with 10 CFR 50, Appendix A, General Design Criterion (GDC) 2, as the safety-related structures, systems and components are designed to withstand the effects of earthquakes without loss of capability to perform their safety-related functions. Specific requirements for seismic design and quality group classifications are identified for these ESBWR items commensurate with their safety classification. Table 3.2-1 identifies these classifications for ESBWR structures, systems and components.

3.2.1 Seismic Classification

The ESBWR meets the acceptance criteria of SRP 3.2.1 (Reference 3.2-1). Structures that must remain integral with systems and components (including their foundations and supports) that must remain functional or retain their pressure integrity in the event of a safe shutdown earthquake (SSE) are designated Seismic Category I. These include safety-related items and fuel storage racks.

The Seismic Category I structures, systems, and components are designed to withstand the appropriate seismic loads (as discussed in Section 3.7) in combination with other appropriate loads without loss of function or pressure integrity. The seismic classifications indicated in Table 3.2-1 are consistent with the guidelines of Regulatory Guide 1.29 (Reference 3.2-2).

Structures, systems and components that perform no safety-related function, but whose structural failure or interaction could degrade the functioning of a Seismic Category I item to an unacceptable level of safety or could result in incapacitating injury to occupants of the Main Control Room, are designated Seismic Category II. These items are designed to structurally withstand the effects of an SSE.

Structures, systems, and components that are not categorized as Seismic Category I or II are designated Seismic Category NS.

NS (non-seismic) structures and equipment are designed for seismic requirements in accordance with the International Building Code (IBC) Reference 3.2-6. The building structures are classified as Category IV (Power Generating Stations) with an Occupancy Importance Factor of 1.5. Either of the methods permitted by the IBC, simplified analysis or dynamic analysis, is

acceptable for determination of seismic loads on NS structures and equipment including those designated as RTNSS. Refer to Appendix 19A Table 19A-1 for a list of RTNSS SSCs.

3.2.2 System Quality Group Classification

The ESBWR meets the acceptance criteria of SRP 3.2.2 (Reference 3.2-3). NRC Regulatory Guide 1.26 (Reference 3.2-4) describes a quality group classification method for fluid systems and relates it to industry codes. Items are classified by Quality Group A, B, C or D, as indicated in Table 3.2-3. Table 3.2-3 tabulates the design and fabrication requirements for each quality group, as defined in Regulatory Guide 1.26.

Table 3.2-1 shows the quality group classifications for ESBWR components. Although not within the scope of the regulatory guide, the containment boundaries that are within the scope of ASME Code, Section III, are assigned quality group classifications in accordance with Table 3.2-2.

Due to the use of many passive safety-related systems in ESBWR, the definitions of the Quality Groups provided in Regulatory Guide 1.26 can be somewhat misleading when trying to apply them directly to the ESBWR design. The following definitions in this section, which are based on Section 6 of ANS Standard 58.14, are consistent with the definitions in Regulatory Guide 1.26 but have been modified to more accurately describe their application to the ESBWR design.

3.2.2.1 Quality Group A

Quality Group A (QGA) applies to pressure-retaining portions and supports of mechanical items that form part of the RCPB and whose failure could cause a loss of reactor coolant in excess of the reactor coolant normal makeup capability. These items are designed to meet the ASME Boiler and Pressure Vessel Code, Section III. Remaining portions of the RCPB are classified in accordance with Subsection 3.2.2.2.

3.2.2.2 Quality Group B

Quality Group B (QGB) applies to pressure-retaining portions and supports of containment and other mechanical items, requirements for which are within the scope of ASME Boiler and Pressure Vessel Code, Section III. These items are not assigned to QGA and are relied upon to accomplish one or more of the following safety-related functions:

- Maintain pressure integrity of RCPB items that are not QGA.
- During or following design basis accidents whose consequences could result in potential offsite exposures comparable to the guidelines of 10 CFR 50.34(a)(1). These items include those that:
  - Maintain pressure integrity of the containment, containment isolation, or extension of containment.
  - Maintain pressure integrity of items that are (1) exterior to the containment; (2) communicate with the RCPB or containment interior; and (3) are not isolated normally, cannot be automatically isolated, or are not isolated following design basis accident or anticipated operation occurrence (transient).

3.2.3.4 NonSafety-Related

Structures, systems and components that do not fall into Safety Classes 1, 2 or 3 are classified as "nonsafety-related," which is abbreviated as "N" in Table 3.2-1.

The design requirements for nonsafety-related equipment are specified by the designer with appropriate consideration of the intended service of the equipment and expected plant and environmental conditions under which it will operate.

Where appropriate, Seismic Category I requirements are specified for nonsafety-related equipment in Table 3.2-1. Generally, design requirements for nonsafety-related equipment are based on applicable industry codes and standards as summarized in Table 3.2-3. Where these are not available, accepted industry or engineering practice is followed.

3.2.4 COL Information

None.

3.2.5 References

3.2-1 USNRC, "Seismic Classification," NUREG-0800, SRP 3.2.1.

3.2-2 USNRC, "Seismic Design Classification," Regulatory Guide 1.29.

3.2-3 USNRC, "System Quality Group Classification." NUREG-0800, SRP 3.2.2.

3.2-4 USNRC, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," Regulatory Guide 1.26.

3.2-5 American Nuclear Society, "Safety and Pressure Integrity Classification Criteria for Light Water Reactors," ANS 58.14.

3.2-6 International Building Code – 2003 by International Code Council, Inc. (300-214-4321).