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Subject: **Response to NRC Request for Additional Information Letter No. 118 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-45**

Enclosure 1 contains GEH's response to the subject RAI transmitted via Reference 1.

Should you have any questions about the information provided here, please contact me.

Sincerely,

James C. Kinsey

James C. Kinsey
Vice President, ESBWR Licensing

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NRO

Reference:

1. MFN 07-611, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 118 Related to the ESBWR Design Certification Application,* November 2, 2007.

Enclosure:

1. Response to NRC Request for Additional Information Letter No. 118 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-45

cc:	AE Cubbage	USNRC (with enclosure)
	RE Brown	GEH/Wilmington (with enclosure)
	LE Fennern	GEH/San Jose (with enclosure)
	GB Stramback	GEH/San Jose (with enclosure)
	eDRF	0000-0077-4409

Enclosure 1

MFN 08-070

Response to NRC Request for

Additional Information Letter No. 118

Related to ESBWR Design Certification Application

Auxiliary Systems

RAI Number 9.1-45

NRC RAI 9.1-45

The design basis provided in DCD Tier 2, Section 9.1.2, "Spent Fuel Storage," does not expressly address compliance with GDC 2, 4, 61, 62, and 63. Revise the DCD to address how the design basis comply with GDC 2, 4, 61, 62, and 63 and conformance to associated regulatory guides and industry standards for spent fuel storage in accordance with the SRP.

GEH Response

The spent fuel storage design complies with the requirements of GDC 2, 4, 61, 62, and 63 by meeting the applicable guidance of Standard Review Plans 9.1.1 and 9.1.2; Regulatory Guides (RGs) 1.13, 1.29, 1.115, and 1.117; and ANSI/ANS 57.1-1992. The bases for GDC compliance is presented as follows:

GDC 2

GDC 2 requires systems, structures, and components important to safety be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety function. The spent fuel storage facilities and the structure within which they are housed are designed to protect against the effects of natural phenomena without loss of safety function in accordance with the guidance of Regulatory Guides 1.13, 1.29, and 1.117 and, therefore, comply with GDC 2.

GDC 4

GDC 4 requires that systems, structures, and components important to safety shall be appropriately protected against dynamic effects. Within the context of spent fuel storage facilities, this includes the potential effects resulting from tornado missiles, low trajectory turbine missile, and heavy load drop in order to provide assurance that the spent fuel storage facility will contain radioactive materials and maintain a subcritical configuration that can be cooled under all environmental conditions. As discussed in Subsection 9.1.2.8, the spent fuel storage facilities are designed to protect the fuel from damage caused by dropping of fuel assemblies, bundles, or other objects onto stored fuel. As discussed in Subsection 3.5.1.1.1.2, the probability of turbine missile generation is less than the acceptance limit of RG 1.115. In addition, because of the favorable orientation of the turbine shafts, spent fuel storage components are located outside the low trajectory strike zone. Based on the foregoing, the design of the spent fuel storage facilities meets the guidance provided by RG 1.13, 1.115, and 1.117 with respect to protection against dynamic effects and, therefore, complies with GDC 4.

GDC 61

GDC 61 requires spent fuel storage system be designed to assure adequate safety under normal and postulated accident conditions in order to provide assurance of adequate cooling of spent fuel, appropriate confinement of radioactive materials, and adequate radiation shielding of personnel. Subsection 3.1.6.2, provides a discussion of GDC 61 compliance. As presented in SRP 9.1.2, compliance with GDC 61 is demonstrated by conformance with applicable provisions of RG 1.13. The discussion in the following Sections 9.4.2 (C.4), 3.1.6.2 (C.4), 9.1.2.4 (C.6(b) & C.10), 9.1.2.5 (C.11), and 9.1.3.2 (C.6(b) & C.12) satisfy the applicable positions of RG 1.13.

GDC 62

GDC 62 requires that criticality in spent fuel storage systems be prevented by physical systems or processes, preferably by the use of geometrically safe configurations. Subsection 3.1.6.3, discusses compliance with GDC 62. Section 9.1.2 complies with the applicable provisions of RG1.13 and ANSI/ANS 57.1, which satisfy GDC 62 compliance requirements. The physical design of the fuel racks, which is made with neutron-absorbing borated stainless steel, and the physical isolation between individual fuel racks, provide the physical system and geometrically safe configuration to ensure a criticality is prevented. Individual fuel racks are spaced less than one fuel assembly apart so that a fuel assembly cannot be inserted between racks.

GDC 63

GDC 63 requires, as related to spent fuel storage, that appropriate monitoring systems be provided in fuel storage areas to detect conditions that may result in the loss of decay heat removal capability and excessive radiation levels and to initiate appropriate safety actions. Subsection 3.1.6.4, provides a discussion of GDC 63 compliance. Subsection 9.1.3.5, provides a discussion of fuel pool temperature and level instrumentation and is further discussed in GEH response to RAI 9.1-18 S02 (MFN 07-646 dated December 7, 2007).

Subsection 9.4.2.2 addresses high radiation conditions. Radiation monitoring in the Fuel Building general area and pool area is discussed in Subsections 11.5.3.1.7 and 11.5.3.1.8, respectively. Fuel Building ventilation is further discussed in the GEH response to RAI 9.4-51 (MFN 07-648 dated December 6, 2007).

Pool level and temperature instrumentation and area radiation monitoring instrumentation is designed to meet Position C.7 of RG 1.13 and, therefore, comply with GDC 63.

Compliance with GDC 2, 4, 61, 62, and 63 is not currently addressed in Section 9.1.2. Section 9.1.2 will be revised.

DCD Impact

DCD Tier 2, Section 9.1.2.1, "Design Bases", will be revised in Revision 5, as noted in the attached markup.

9.1.2 Spent Fuel Storage

9.1.2.1 Design Bases

The spent fuel storage design complies with the requirements of GDC 2, 4, 61, 62, and 63 by meeting the applicable guidance of Standard Review Plans 9.1.1 and 9.1.2; Regulatory Guides (RGs) 1.13, 1.29, 1.115, and 1.117; and ANSI/ANS 57.1-1992 as follows:

GDC 2

The spent fuel storage facilities and the structure within which they are housed are designed to protect against the effects of natural phenomena without loss of safety function in accordance with the guidance of RGs 1.13, 1.29, and 1.117 and comply with GDC 2 requirements.

GDC 4

In accordance with the guidance of RG 1.13, the spent fuel storage facilities are designed to protect the fuel from damage caused by dropping of fuel assemblies, bundles, or other objects onto stored fuel. As noted above in the discussion of compliance with GDC 2, the Fuel Building and the spent fuel storage components which it houses are designed to protect against the effects of tornado winds, including tornado missiles. Because of the favorable orientation of the turbine shafts, spent fuel storage components are located outside the turbine missile low trajectory strike zone. The spent fuel storage system and components are adequately protected against dynamic effects in accordance with the guidance of RGs 1.13, 1.115, and 1.117 and comply with GDC 4 requirements.

GDC 61

Compliance with GDC 61 is demonstrated by conformance with applicable provisions of RG 1.13. These include design to control airborne release of radioactive material; design of drains, gates, and weirs to prevent drainage of coolant inventory below an adequate shielding depth; provision of adequate coolant flow to spent fuel racks; and a system for detecting and containing spent fuel pool liner leakage. These design features have been included in accordance with the applicable guidance of RG 1.13 and comply with GDC 61 requirements.

GDC 62

Criticality in the spent fuel storage pool is prevented by the presence of fixed neutron absorbing material to assure k_{eff} does not exceed 0.95 under all normal and abnormal conditions which include earthquake and load drop. The spent fuel storage system is designed to the applicable provisions of ANSI/ANS 57.1, which specify criteria for compliance with GDC 62. Individual fuel racks are spaced less than one fuel assembly apart so that a fuel assembly cannot be inserted between racks. The spent fuel storage system conforms to the applicable provisions of RG 1.13 and ANSI/ANS 57.1 and complies with GDC 62 requirements.

GDC 63

The fuel storage monitoring section of GDC 63 applies to Sections 9.4.2 and 11.5. Instrumentation associated with spent fuel storage conforms to the guidance of RG 1.13 and complies with GDC 63 requirements.