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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Numbers 9.1-33, 9.1-34, 9.1-35, and 9.1-36**

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

D068
NRO

Reference:

1. MFN 07-556, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, General Manager, *Request for Additional Information Letter No. 100 Related to the ESBWR Design Certification Application,* May 30, 2007.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application – Auxiliary Systems - RAI Numbers 9.1-33, 9.1-34, 9.1-35, and 9.1-36

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	0000-0072-8495 Rev. 1, 0000-0072-8496 Rev. 1, 0000-0072-8498 Rev. 1, 0000-0072-8499 Rev. 1

Enclosure 1

MFN 08-047

Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application Auxiliary Systems RAI Numbers 9.1-33, 9.1-34, 9.1-35, and 9.1-36

NRC RAI 9.1-33

Although fuel handling components are not required to function following an SSE, critical components of the fuel handling system are designed to Seismic Category II requirements so that they will not fail in a way that would result in unacceptable consequences, such as fuel damage or damage to safety-related equipment. GE stated that standard dynamic analyses using the appropriate response spectra are performed to demonstrate compliance to the seismic design requirements. However, GE has not provided the dynamic analyses for staff review. Provide the dynamic analyses to demonstrate how the design satisfies the requirements of general design criteria (GDC) 2 and the guidelines of RG 1.29, Rev. 2, Positions C.1 and C.2.

GEH Response

The dynamic analysis of Seismic Category I and II refueling equipment is not performed until the final structural configuration of the equipment has been determined. Determination of the final equipment configuration and the structural analysis of the equipment are done as part of the normal equipment delivery for the plant. The procurement specifications for the equipment include the requirements for analysis in accordance with the guidelines of RG 1.29. At the time of the design and delivery of the refueling equipment the dynamic analysis will be available for review to demonstrate the compliance with 10 CFR 50 General Design Criterion 2.

DCD Impact

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

NRC RAI 9.1-34

With regard to the inclined fuel transfer system (IFTS), in DCD Tier 2, Rev. 3, Section 9.1.4.12, GE states that there is sufficient redundancy and diversity in equipment and controls to prevent loss of load (carriage with fuel is released in an uncontrolled manner). There are no modes of operation that allow simultaneous opening of any set of valves that could cause draining of water from the upper pool in an uncontrolled manner.

Describe in detail how sufficient redundancy and diversity in equipment are achieved and what are the controls designed to prevent loss of the load (carriage with fuel is released in an uncontrolled manner).

GEH Response

The performance specification for the IFTS requires that equipment controlling or monitoring the movement of the carriage use dual input for carriage position. Both fixed proximity sensors at selected positions and continuous position sensors such as an encoder determine the position of the carriage. Each sensor consists of primary and backup sensors [two channels] whose position indications are compared to one another to assure that the failure of one sensor does not result in lack of knowledge of the carriage position. Control interlocks are provided, to assure at selected positions, there is agreement between the continuous sensor and the fixed sensor to either initiate or prevent carriage movement.

The same logic is provided for valve control. Dual sensors for valve position are provided. Interlocks in the control logic prevents inadvertent movement without agreement between sensors and other inputs such as carriage position.

DCD Impact

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

NRC RAI 9.1-35

With regard to the ISFT, in DCD Tier 2, Rev. 3, Section 9.1.4.12, GE states that the IFTS tubes and supporting structure can withstand an SSE without failure of the basic structure or compromising the integrity of adjacent equipment and structures. Therefore, the portion of the IFTS transfer tube assembly from where it interfaces with the upper fuel pool, the portion of the tube assembly extending through the building, the drain line connection, and the lower terminus equipment (tube, valve, support structure, and bellows) are designed as nonsafety-related and Seismic Category I. The remaining equipment is designed as nonsafety-related and Seismic Category NS.

It is not clear to the staff where the exact boundaries of the seismic design classifications are (nonsafety-related and Seismic Category I, nonsafety-related and Seismic Category II, or nonsafety-related and Seismic Category NS) for the components of the IFTS. Revise the Figure 9.1-2, "Inclined Fuel Transfer System," to show the interfaces of seismic design classifications for the IFTS components.

GEH Response

See Revised Figure 9.1-2, Table 3.2-1, and Table 9.1-4.

As shown on the revised Figure 9.1-2 the Seismic Category I equipment includes the Upper Terminus, the IFTS transfer tube, the lower bellows, lower gate valve, and valve support structure. Seismic Category II equipment includes the Upper and Lower Upenders and the winch.

DCD Impact

DCD Tier 2, Figure 9.1-2, Tables 3.2-1, and Table 9.1-4 will be revised as noted in the attached markup.

NRC RAI 9.1-35

With regard to the ISFT, in DCD Tier 2, Rev. 3, Section 9.1.4.12, GE states that the IFTS tubes and supporting structure can withstand an SSE without failure of the basic structure or compromising the integrity of adjacent equipment and structures. Therefore, the portion of the IFTS transfer tube assembly from where it interfaces with the upper fuel pool, the portion of the tube assembly extending through the building, the drain line connection, and the lower terminus equipment (tube, valve, support structure, and bellows) are designed as nonsafety-related and Seismic Category I. The remaining equipment is designed as nonsafety-related and Seismic Category NS.

It is not clear to the staff where the exact boundaries of the seismic design classifications are (nonsafety-related and Seismic Category I, nonsafety-related and Seismic Category II, or nonsafety-related and Seismic Category NS) for the components of the IFTS. Revise the Figure 9.1-2, "Inclined Fuel Transfer System," to show the interfaces of seismic design classifications for the IFTS components.

GEH Response

See Revised Figure 9.1-2, Table 3.2-1, and Table 9.1-4.

As shown on the revised Figure 9.1-2 the Seismic Category I equipment includes the Upper Terminus, the IFTS transfer tube, the lower bellows, lower gate valve, and valve support structure. Seismic Category II equipment includes the Upper and Lower Upenders and the winch.

DCD Impact

DCD Tier 2, Figure 9.1-2, Tables 3.2-1, and Table 9.1-4 will be revised as noted in the attached markup.

NRC RAI 9.1-36

The new fuel inspection stand is a vertical frame mounted in a pit that supports fuel bundles contained in a mechanically driven inspection carriage. However, the seismic design classification has not been addressed for the new fuel inspection stand. Provide a detailed discussion to demonstrate that the failure of the new fuel inspection stand during an SSE will not cause damage to any safety-related structures, systems and components (SSCs).

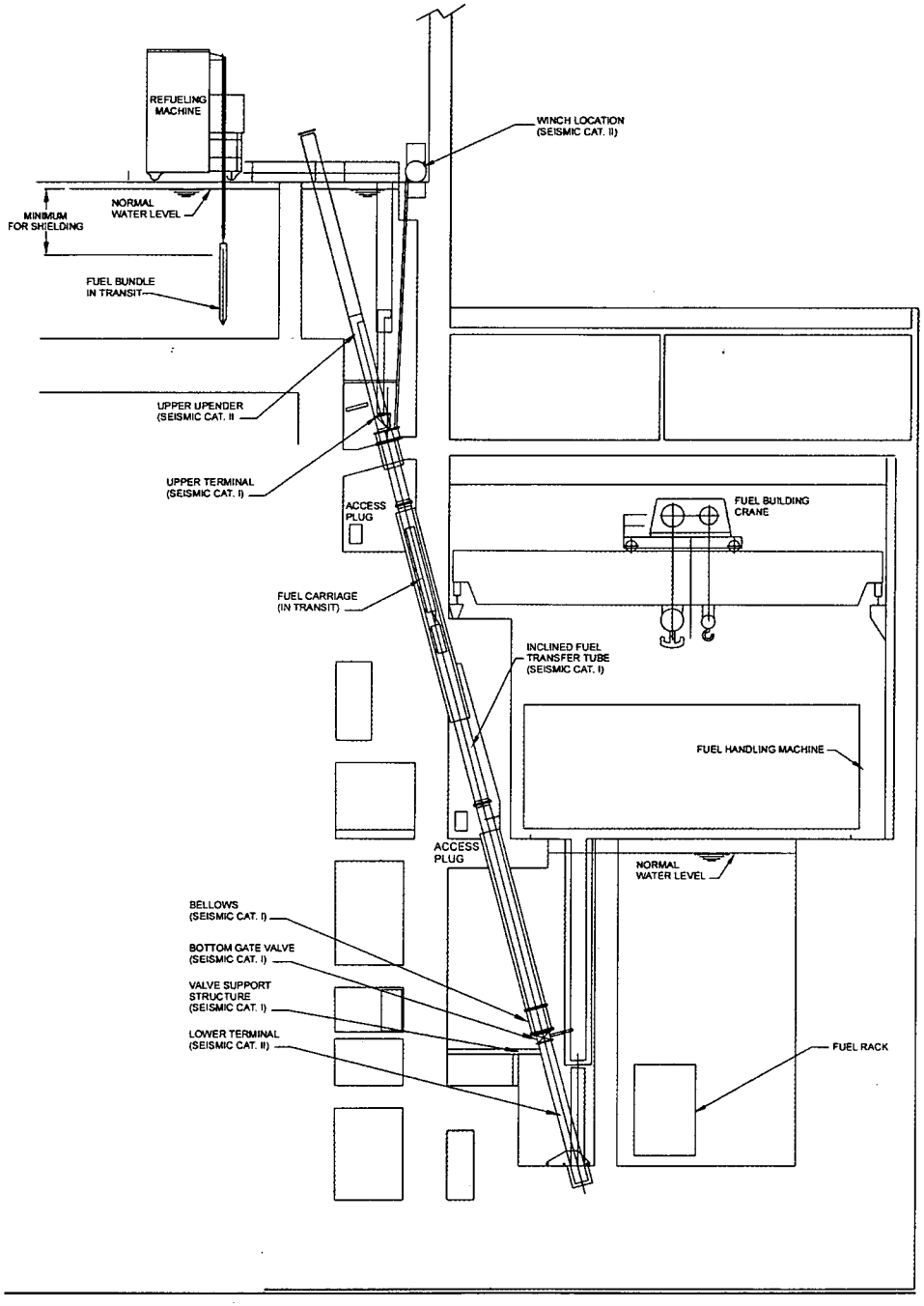
GEH Response

See revised Table 3.2-1 and Table 9.1-4

Table 9.1-4 has been revised to identify that the new fuel inspection stand shall be Seismic Category II. The bulk of the structure is in a deep pit, the floor of which is below the refueling floor. Only the carriage moving the fuel bundle up and down and a portion of the column that the carriage rides extends above the refueling floor. The base of the structure is attached to the floor of that pit. The new fuel inspection stand is dynamically analyzed. The new fuel inspection stand cannot damage adjacent equipment, as no other equipment is present in the pit.

DCD Impact

DCD Tier 2, Table 3.2-1 and Table 9.1-4 have been revised as noted in the attached markup.



~~Figure 9.1-2 Inclined Fuel Transfer System~~ Figure 9.1-2 Inclined Fuel Transfer System

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
F42 Fuel Transfer System (FTS)						
1. Transfer tube assembly from interface with upper fuel pool, through building to lower spent fuel pool terminus equipment, including drain connection	N	RB, FB	D	E	I	
2. Remaining equipment	N	RB, FB	D/—	E	II/NS	See Figure 9.1-2 for clarification of seismic classification boundaries.
G DECAY HEAT REMOVAL NETWORK						
G21 Fuel and Auxiliary Pools Cooling System (FAPCS)						
1. Piping and valves including supports between containment isolation valves (including valves) for – Suppression pool return line – GDCS pool suction line – GDCS pool return line – Drywell spray discharge line	2	CV, RB	B	B	I	
2. Piping between inboard manual valve and second outboard containment isolation valve on suppression pool suction line, as well as the LPCI piping between the RWCU/SDC interface and the second isolation valve.	2	CV, RB	B	B	I	
3. Independent line (including piping, valves, and supports) for safety-related makeup to IC/PCC and spent fuel pools from piping connections at grade level in reactor yard area and to the fire protection system.	3	OO, RB, FB	C	B	I	

Table 9.1-4

Classification of Equipment

Principal Component	Safety Class	Location	QA Requirement	Seismic Category	Notes
Fuel Servicing Equipment					
1. Fuel Preparation machine	N	FB	E	II	
2. New Fuel Inspection Stand	N	FB	E	II	
3. All Other Equipment	N	FB/RB	E	NS	
Miscellaneous Servicing Equipment	N	FB/RB	E	NS	
RPV Servicing Equipment	N	RB	E	NS/I	
RPV Internal Servicing Equipment	N	RB	E	NS	
Refueling Equipment					
1. Fuel Handling machine	N	FB	E	II	
2. Refueling Machine	N	RB	E	II	
3. Deleted					

Table 9.1-4
Classification of Equipment (continued)

Principal Component	Safety Class	Location	QA Requirement	Seismic Category	Notes
Fuel Storage Facility Fuel Storage Racks (new and spent)	N	FB/RB	E	I	
Under RPV Servicing Equipment	N	CV	E	NS	
CRD Maintenance Facility	N	RB	E	NS	
Fuel Cask Cleaning Facility	N	FB	E	NS	
Fuel Transfer System	N	RB/FB	E	I/II/NS (see Figure 9.1-2)	