GE Hitachi Nuclear Energy

Richard E. Kingston
Vice President, ESBWR Licensing

PO Box 780 M/C A-65
Wilmington, NC 28402-0780
USA

T 910 819 6192
F 910 362 6192
rick.kingston@ge.com

MFN 10-291 Revision 1 Docket No. 52-010

October 14, 2010

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Transmittal of ESBWR DCD Markups to Tier 2, Table 2.0-1 and Tier 1, Table 5.1-1**

The purpose of this letter is to submit revised markups correcting ESBWR DCD Tier 2, Table 2.0-1 and Tier 1, Table 5.1-1, "Envelope of ESBWR Standard Plant Site Parameters".

These markups are the result of GEH internal review, and subsequent discussion with the NRC, and will be incorporated into DCD, Revision 8. The markup pages are contained in Enclosure 1.

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

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

Enclosure:

1. Transmittal of ESBWR DCD Markups to Tier 2, Table 2.0-1 and Tier 1, Table 5.1-1 – DCD Markups

cc:

AE Cubbage	USNRC (with enclosures)
J G Head	GEH/Wilmington (with enclosures)
DH Hinds	GEH/Wilmington (with enclosures)
LF Dougherty	GEH/Wilmington (with enclosures)
eDRF Section	0000-0123-9999, 0000-0124-6224

Enclosure 1

MFN 10-291 Revision 1

Transmittal of ESBWR DCD Markups to Tier 2, Table 2.0-1 and Tier 1, Table 5.1-1

DCD Markups

Table 5.1-1
Envelope of ESBWR Standard Plant Site Parameters (continued)

Soil Properties: [6]	- Minimum Static Bearing Capacity [2]: Greater than or equal to the maximum static bearing demand ~~multiplied by a factor of safety appropriate for the design load combination~~. Maximum Static Bearing Demand: Reactor/Fuel Building: 699 kPa (14,600 lbf/ft^2) Control Building: 292 kPa (6,100 lbf/ft^2) Fire Water Service Complex: 165 kPa (3,450 lbf/ft^2) - Minimum Dynamic Bearing Capacity [2]: Greater than or equal to the maximum dynamic bearing demand ~~multiplied by a factor of safety appropriate for the design load combination~~. Maximum Dynamic Bearing Demand (SSE + Static): **Reactor/Fuel Building:** Soft: 1100 kPa (23,000 lbf/ft^2) Medium: 2700 kPa (56,400 lbf/ft^2) Hard: 1100 kPa (23,000 lbf/ft^2) **Control Building:** Soft: 500 kPa (10,500 lbf/ft^2) Medium: 2200 kPa (46,000 lbf/ft^2) Hard: 420 kPa (8,800 lbf/ft^2) **Firewater Service Complex (FWSC):** Soft: 460 kPa (9,600 lbf/ft^2) Medium: 690 kPa (14,400 lbf/ft^2) Hard: 1200 kPa (25,100 lbf/ft^2) - Minimum Shear Wave Velocity: [3] 300 m/s (1000 ft/s) - Liquefaction Potential: Seismic Category I Structures: None under footprint of Seismic Category I structures resulting from site-specific SSE. - Angle of Internal Friction (in-situ and backfill): ≥ 35 degrees - Backfill on sides of and underneath Seismic Category I structures Product of peak ground acceleration α (in g), Poisson's ratio ν and density γ: $\alpha(0.95\nu+0.65)\gamma$: 1220 kg/m^3 (76 lbf/ft^3) maximum Product of at-rest pressure coefficient k_0 and density: $k_0\gamma$: 750 kg/m^3 (47 lbf/ft^3) minimum Soil density: γ: 2000 kg/m^3 (125 lbf/ft^3) minimum
Seismology:	- SSE Horizontal Ground Response Spectra: [4] See Figure 5.1-1 - SSE Vertical Ground Response Spectra: [4] See Figure 5.1-2

Table 5.1-1
Envelope of ESBWR Standard Plant Site Parameters (continued)

Meteorological Dispersion (X/Q): (continued)	Technical Support Center X/Q:*		
	Reactor Building		
	0-2 hours:	1.00E-03 s/m^3	1.00E-03 s/m^3
	2-8 hours:	6.00E-04 s/m^3	6.00E-04 s/m^3
	8-24 hours:	3.00E-04 s/m^3	3.00E-04 s/m^3
	1-4 days:	2.00E-04 s/m^3	2.00E-04 s/m^3
	4-30 days:	1.00E-04 s/m^3	1.00E-04 s/m^3
	Turbine Building		
	0-2 hours:	2.00E-03 s/m^3	2.00E-03 s/m^3
	2-8 hours:	1.50E-03 s/m^3	1.50E-03 s/m^3
	8-24 hours:	8.00E-04 s/m^3	8.00E-04 s/m^3
	1-4 days:	6.00E-04 s/m^3	6.00E-04 s/m^3
	4-30 days:	5.00E-04 s/m^3	5.00E-04 s/m^3
	Passive Containment Cooling System / Reactor Building Roof		
	0-2 hours:	2.00E-03 s/m^3	2.00E-03 s/m^3
	2-8 hours:	1.10E-03 s/m^3	1.10E-03 s/m^3
	8-24 hours:	5.00E-04 s/m^3	5.00E-04 s/m^3
	1-4 days:	4.00E-04 s/m^3	4.00E-04 s/m^3
	4-30 days:	3.00E-04 s/m^3	3.00E-04 s/m^3

Notes:

(1) The site parameters defined in this table are applicable to Seismic Category I, II, and Radwaste Building structures, unless noted otherwise.

(2) At the foundation level of Seismic Category I structures. ~~The static bearing pressure is the average pressure.~~ The dynamic bearing pressure is the toe pressure. The maximum static bearing demand is ~~multiplied by a factor of safety appropriate for the design load combination and is~~ compared with the site-specific allowable static bearing pressure, which is obtained by dividing the ultimate soil bearing capacity by a factor of safety appropriate for the design load combination. The maximum dynamic bearing demand is ~~multiplied by a factor of safety appropriate for the design load combination and is~~ compared with the site-specific allowable dynamic bearing pressure, which is obtained by dividing the ultimate soil bearing capacity by a factor of safety appropriate for the design load combination. When a site-specific shear wave velocity is between soft soil and medium soil the larger of the soft or medium maximum dynamic bearing demand will be used. When a site-specific shear wave velocity is between medium soil and hard soil the larger of the medium or hard maximum dynamic bearing demand will be used. Alternatively, for soils with a site-specific shear wave velocity a linearly interpolated dynamic bearing demand between soft and medium soil or between medium and hard soil can be used. The shear wave velocities of soft, medium and hard soils are 300 m/sec (1000 ft/sec), 800 m/sec (2600 ft/sec) and greater than or equal to 1700 m/sec (5600 ft/sec), respectively.

(3) This is the minimum shear wave velocity of the supporting foundation material and material surrounding the embedded walls associated with seismic strains for lower bound

Table 2.0-1

Envelope of ESBWR Standard Plant Site Parameters [1] (continued)

Soil Properties: [16]	- *Minimum Static Bearing Capacity* [7]*: Greater than or equal to the maximum static bearing demand ~~multiplied by a factor of safety appropriate for the design load combination~~.* - *Maximum Static Bearing Demand:* *Reactor/Fuel Building: 699 kPa (14,600 lbf/ft²)* *Control Building: 292 kPa (6,100 lbf/ft²)* *Firewater Service Complex: 165 kPa (3,450 lbf/ft²)* - *Minimum Dynamic Bearing Capacity* [7]*: Greater than or equal to the maximum dynamic bearing demand ~~multiplied by a factor of safety appropriate for the design load combination~~.* *~~Maximum Dynamic Bearing Demand (SSE + Static):~~* *Reactor/Fuel Building:* *Soft: 1100 kPa (23,000 lbf/ft²)* *Medium: 2700 kPa (56,400 lbf/ft²)* *Hard 1100 kPa (23,000 lbf/ft²)* *Control Building:* *Soft: 500 kPa (10,500 lbf/ft²)* *Medium: 2200 kPa (46,000 lbf/ft²)* *Hard: 420 kPa (8,800 lbf/ft²)* *Firewater Service Complex (FWSC):* *Soft: 460 kPa (9,600 lbf/ft²)* *Medium: 690 kPa (14,400 lbf/ft²)* *Hard: 1200 kPa (25,100 lbf/ft²)* - *Minimum Shear Wave Velocity:* [8] *300 m/s (1000 ft/s)* - *Liquefaction Potential:* *Seismic Category I Structures: None under footprint of Seismic Category I structures resulting from site-specific SSE.* *Other than Seismic Category I Structures: See Note (14)* - *Angle of Internal Friction (in-situ and backfill): ≥ 35 degrees* - *Backfill on sides of and underneath Seismic Category I structures* *Product of peak ground acceleration α (in g), Poisson's ratio ν and density γ:* *$\alpha(0.95\nu+0.65)\gamma$: 1220 kg/m³ (76 lbf/ft³) maximum* *Product of at-rest pressure coefficient k_0 and density:* *$k_0\gamma$: 750 kg/m³ (47 lbf/ft³) minimum* *Soil density:* *γ: 2000 kg/m³ (125 lbf/ft³) minimum*

Notes for Table 2.0-1:

(1) The site parameters defined in this table are applicable to Seismic Category I, II, and Radwaste Building structures, unless noted otherwise.

(2) Probable maximum flood level, as defined in Table 1.2-6 of Volume III of Reference 2.0-4.

(3) Maximum speed selected is based on Attachment 1 of Reference 2.0-5, which summarizes the NRC Interim Position on Regulatory Guide 1.76. Concrete structures designed to resist Spectrum I missiles of SRP 3.5.1.4, Rev. 2, also resist missiles postulated in Regulatory Guide 1.76, Revision 1. Tornado missiles do not apply to Seismic Category NS and Seismic Category II buildings. For the Radwaste building, the tornado missiles defined in Regulatory Guide 1.143, Table 2, Class RW-IIa apply. The hurricane missile spectrum for Seismic Category NS and Seismic Category II structures that house RTNSS equipment is consistent with the tornado missile spectrum identified in this table. See Tables 19A-3 and 19A-4 for additional details.

(4) Based on probable maximum precipitation (PMP) for one hour over 2.6 km^2 (one square mile) with a ratio of 5 minutes to one hour PMP of 0.32 as found in Reference 2.0-3. See also Table 3G.1-2.

(5) See Reference 2.0-9 for the definition of normal winter precipitation and extreme winter precipitation events. The maximum ground snow load for extreme winter precipitation event includes the contribution from the normal winter precipitation event. See also Table 3G.1-2.

(6) Zero percent exceedance values are based on conservative estimates of historical high and low values for potential sites. Consistent with Reference 2.0-4, they represent historical limits excluding peaks of less than two hours. One and two percent annual exceedance values were selected in order to bound the values presented in Reference 2.0-4 and available Early Site Permit applications.

(7) At the foundation level of Seismic Category I structures. ~~The static bearing pressure is the average pressure.~~ The dynamic bearing pressure is the toe pressure. The maximum static bearing demand is ~~multiplied by a factor of safety appropriate for the design load combination and is~~ compared with the site-specific allowable static bearing pressure, which is obtained by dividing the ultimate soil bearing capacity by a factor of safety appropriate for the design load combination. The maximum dynamic bearing demand is ~~multiplied by a factor of safety appropriate for the design load combination and is~~ compared with the site-specific allowable dynamic bearing pressure, which is obtained by dividing the ultimate soil bearing capacity by a factor of safety appropriate for the design load combination. When a site-specific shear wave velocity is between soft soil and medium soil the larger of the soft or medium maximum dynamic bearing demand will be used. When a site-specific shear wave velocity is between medium soil and hard soil the larger of the medium or hard maximum dynamic bearing demand will be used. Alternatively, for soils with a site-specific shear wave velocity a linearly interpolated dynamic bearing demand between soft and medium soil or between medium and hard soil can be used. The shear wave velocities of soft, medium and hard soils are 300 m/sec (1000