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Separate spectral shapes were developed for high frequency (HF) and low frequency (LF). In order to reflect accurately the UHRS values calculated by the PSHA as shown in Table 2.5.2-14³², the HF spectral shape was anchored to the UHRS values from Table 2.5.2-14 at 100 Hz, 25 Hz, 10 Hz, 5 Hz, and 2.5 Hz. In ³². For the 10^{-4} AFE hazard level, the HF spectral shape, derived from NUREG/CR-6728, is scaled to the UHRS amplitudes at 5, 10, 25, and 100 Hz (PGA). The NUREG/CR-6728 spectral shape defines the HF spectrum between these frequencies, the spectrum was interpolated using shapes 0.5 and 5 Hz anchored to the next higher and lower frequency and using weights on the two shapes equal to the inverse logarithmic difference between the intermediate frequency and the next higher or lower frequency. Below 2.5 Hz, the HF shape was extrapolated from 2.5 Hz. (The HF spectrum was anchored to the UHRS amplitude at 2.5 Hz, in addition to 5 Hz, because anchoring (scaled) to the UHRS amplitude at 5 Hz. For the 10^{-5} and extrapolating 10^{-6} HF response spectrum, the HF spectral shape scaled to lower frequencies gave a 2.5 Hz amplitude that exceeded the UHRS.) For the LF spectral shape, a similar procedure was used except that the LF spectral shape was anchored 5 Hz exceeds the 2.5 Hz UHRS value, therefore, the HF spectral shape, derived from NUREG/CR-6728, is scaled to the UHRS values at 2.5 Hz, 1 Hz, and 0.5 Hz. Above 2.5 Hz, the LF shape was extrapolated from 2.5 Hz amplitudes at 2.5, 5, 10, 25, and 100 Hz (PGA). The NUREG/CR-6728 spectral shape defines the HF spectrum between 0.5 and 2.5 Hz anchored (scaled) to the UHRS amplitude at 2.5 Hz.

For each AFE hazard level, the LF spectral shape, derived from the NUREG/CR-6728, is scaled to the UHRS amplitudes at 0.5, 1, and 2.5 Hz. The NUREG/CR-6728 spectral shape defines the LF spectrum above 2.5 Hz when anchored (scaled) to the UHRS amplitude at 2.5 Hz. To create these spectral shapes, the single-corner and double-corner models recommended in NUREG/CR-6728 were weighted equally for each AFE hazard level, and for both HF and LF. For frequencies below 0.5 Hz, the spectral shape was extrapolated from the value at 0.5 Hz assuming a constant spectral velocity (i.e., spectral accelerations were assumed to scale linearly with frequency) down to 0.167 Hz (6 sec period). From 0.167 Hz to 0.1 Hz, spectral accelerations were assumed to scale as (the square of the frequency)². This follows the recommendation of FEMA 450 (Reference 2.5.2-21) for long periods. Some smoothing of the 10^{-4} and 10^{-5} MAFE LF spectrum is applied between 0.6 Hz and 2 Hz to avoid bumps in this frequency range that are apparent if no smoothing is applied.

Figures 2.5.2-31 through 2.5.2-33 show present the horizontal HF and LF spectra calculated in this way for 10^{-4} , 10^{-5} , and 10^{-6} annual frequencies of exceedance, respectively. As mentioned previously, these spectra accurately reflect the rock UHRS amplitudes in Table 2.5.2-14³² that were calculated for the seven spectral frequencies at which PSHA calculations were done. For each AFE hazard level, the envelope spectrum (smooth mean rock UHRS) is also calculated. Figure 2.5.2-76 shows the smooth mean rock 10^{-4} , 10^{-5} , and 10^{-6} AFE UHRS for the PSEG Site.

2.5.2.5 Seismic Wave Transmission Characteristics of the Site

The subsurface conditions necessary to predict and model the seismic wave transmission characteristics for the PSEG Site were determined from both site-specific and regional data. This data included both stratigraphic and representative shear-wave measurements, degradation properties of the soils, and the uncertainties associated with these parameters. A detailed presentation of these parameters, as well as a discussion of the data and methodology for developing them, are provided in Subsections 2.5.4.2 through 2.5.4.7.

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The profile is divided into the shallow profile (surface to about 400 feet [ft.]) and the deep profile (about 400 ft. to “basement”). The shallow profile represents depth to which extensive characterization has been performed. The lateral and vertical control on the subsurface strata (layering) ~~was~~ **is** defined primarily on lithology and material properties. The GMRS is developed for the top of the Competent Layer (Layer 1) (Figure 2.5.4.7-8a), following the guidance of RG 1.208, which has a mean elevation of -67 feet. Soils above this elevation are considered only for the purposes of calculating confining stresses.

2.5.2.5.1 Aleatory and Epistemic Uncertainty

The uncertainties in most of the site-characterization parameters are developed in Subsection 2.5.4.7 and are summarized here. Other necessary parameters not described in Subsection 2.5.4.7 are developed in this subsection.

Uncertainty in shear-wave velocities ~~was~~ **is** specified by means of its Coefficient of Variation (COV). This COV takes a value of 0.25 for the top 160 ft. of the shallow profile, 0.30 for the deeper portion of the shallow profile, and 0.35 for the deep profile.

Uncertainty in the stratigraphy ~~was~~ **is** also ~~specified~~ **described** in Subsections 2.5.4.1, 2.5.4.7.2, and 2.5.4.7.4, including uncertainty in the depth to basement rock. These uncertainties ~~were~~ **are** specified as standard deviations or ranges for the elevation of the top of each layer.

Uncertainties in the degradation properties for soils in the shallow profile ~~were specified~~ **are discussed** in Subsection 2.5.4.7.5. These values are roughly comparable to those recommended by Costantino (Reference 2.5.2-28) and by EPRI (Reference 2.5.2-38). For the deep profile and bedrock, which have strain-independent properties, the uncertainty in damping ~~was~~ **is** characterized by a COV of 0.35 based on the recommendations in EPRI (Reference 2.5.2-38).

2.5.2.5.2 Description of Site Response Analysis

The site response analysis ~~was~~ **is** conducted in three steps that are common to analyses of this type. First, the site geology and geotechnical properties in Subsections 2.5.4.1, 2.5.4.2, and 2.5.4.7, and the assessments of uncertainty described in Subsection 2.5.2.5.1 ~~were~~ **are** reviewed and used to generate multiple synthetic profiles of site characteristics. Second, sets of rock spectra ~~were~~ **are** selected to represent rock ground motions corresponding to mean annual exceedance frequencies of 10^{-4} , 10^{-5} , and 10^{-6} . Finally, site response ~~was~~ **is** calculated using an equivalent-linear technique, using the multiple synthetic profile and the sets of rock spectra representing input motions. These three steps are described in detail in the following subsections.

2.5.2.5.2.1 Generation of Synthetic Profiles

To account for the epistemic and aleatory uncertainties in the site's dynamic properties, 60 synthetic profiles ~~were~~ **are** generated using the stochastic model developed by Toro (Reference 2.5.2-84), with some modifications to account for the conditions at the PSEG Site. These synthetic profiles represent the site column from the top of the bedrock to the top of the Competent Layer, where the GMRS is defined. Bedrock is defined as having a shear-wave

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velocity of 9,200 ft/sec, in order to achieve consistency with the new-EPRI attenuation equations used for the rock hazard calculations (Reference 2.5.2-39). This stochastic model uses as inputs the following quantities, all of them coming **provided** from Subsections 2.5.2.5.1 or 2.5.4.2, 2.5.4.4, and 2.5.4.7: (1) the median shear-wave velocity profile, ~~which is given~~ **provided** in Table 2.5.2-17; (2) the standard deviation of $\ln(V_s)$ (the natural logarithm of the shear-wave velocity) as a function of depth below the top of the ~~competent layer, which is also given~~ **Competent Layer, provided** in Table 2.5.2-17 and is taken as identical to the COV values given in Subsection 2.5.2.5.1; (3) the correlation coefficient between $\ln(V_s)$ in adjacent layers, ~~which is taken from generic results in Toro (Reference 2.5.2-84); and~~ (4) the uncertainties in the depths to the top of the various layers, ~~which are given~~ **provided** in Table 2.5.2-18 (note that the standard deviations for the shallow profile take into account that the elevation of the top of Competent Layer is itself uncertain).

The correlation coefficient between $\ln(V_s)$ in adjacent layers is estimated using the inter-layer correlation model from Toro (Reference 2.5.2-84) for USGS category A+B, which corresponds to V_{s30} values of 360 m/s (~1,180 ft./s) or greater. This correlation model predicts fairly high correlation coefficients, except for the very top of the profile. For instance, the correlation coefficient is approximately 75% **percent** at a depth of 50 ft. and higher values at greater depths.

Figures 2.5.2-34 and 2.5.2-35 ~~display~~ **present** the V_s values of the 60 synthetic profiles, for the entire profile and shallow portion ~~profile~~, respectively. Figures 2.5.2-36 and 2.5.2-37 compare the ~~median logarithmic means~~ of these 60 V_s profiles to the $V_s \pm$ Variability values ~~given~~ **provided** in Table 2.5.2-17, indicating excellent agreement. The difference near the bottom of the profile occurs because the values in Table 2.5.2-17 do not take into account the depth to bedrock and its uncertainty.

For the randomization of the degradation properties, the standard deviations given in Subsection 2.5.4.7.5 are read at a strain of $3.16E-2$, converted to logarithmic standard deviations and used as input to the randomization calculations. **To account for a possible range in the Overconsolidation Ratio (OCR) of Layers 1 through 9B in Table 2.5.2-17 (varying from 2 to 6), idealized G/Gmax and damping curves are developed whose median and standard deviations bound the respective curves for the range of OCRs as shown in Figures 2.5.2-77 through 2.5.2-80.** The randomization software extends these uncertainty values to other strains, tapering them near the ends to achieve physically reasonable curves for the synthetic G/Gmax and damping curves. The correlation coefficient between $\ln(G/G_{max})$ and $\ln(\text{damping})$ in the fill is specified as -0.75. This implies that in synthetic profiles where the fill has higher than average G/Gmax, the fill tends to have lower than average damping. The degradation and damping properties are treated as fully correlated among layers with the same soil type, but independent between different soil types. **In this analysis, damping values are truncated at 15 percent as is standard practice.**

~~Figure~~ **Figures 2.5.2-38 shows 77 through 2.5.2-80 illustrate** the modulus-degradation and damping curves for layers **1, 2-5, 6-8, and 9A/9B, respectively used** in the 60 synthetic profiles. ~~Similarly, Figure 2.5.2-39 shows the curves for layers 6-8.~~

Each set of 60 synthetic profiles, consisting of V_s and unit weight vs. depth, depth to bedrock, stiffness, and damping curves, is used to calculate and quantify site response and its uncertainty, as described below.

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2.5.2.5.2.2 Selection of Rock Input Motions

Rock input motions ~~were~~**are** selected for input to the site response calculations using the seismic hazard and deaggregation results. Six separate input motions are considered, corresponding to HF and LF motions at 10^{-4} , 10^{-5} , and 10^{-6} . The development of spectra for these motions is presented in Subsection 2.5.2.4.4 and ~~shown~~**illustrated** in Figures 2.5.2-34**59** through 2.5.2-33**61**.

2.5.2.5.2.2.1 Site Response Calculations

The site response calculations for ~~the PSEG~~**Site** ~~were~~**are** performed using the Random Vibration Theory (RVT) approach. In many respects, the inputs and assumptions are the same for an RVT analysis and for a time-history based analysis (e.g., an analysis with the program SHAKE (Reference 2.5.2-47)). Both the RVT and ~~time-history~~ (SHAKE) procedures use a horizontally layered half-space representation of the site and use an equivalent-linear representation of dynamic response to vertically propagating shear waves. Starting from the same inputs (in the form of response spectra), both procedures ~~will lead to~~**result in** similar estimates of site response (Reference 2.5.2-73). The main advantage of the RVT approach is that it does not require the spectral matching of multiple time histories to a given rock response spectrum. Instead, the RVT approach uses a probabilistic representation of the ensemble of all input motions corresponding to that given response spectrum and then calculates the response spectrum of the ensemble of dynamic responses.

Site-response calculations ~~were~~**are** performed for the six bedrock motions as described in the previous subsection.

In addition to the rock response spectra, the RVT site-response calculations require the following inputs: (1) the strong-motion duration (T) associated with each rock spectrum; and (2) the equivalent-strain ratio to use in the equivalent-linear calculations (this input is required for both the time-history and RVT approaches) and depends on magnitude). The duration is calculated from the de-aggregation results in Subsection 2.5.2.4.4 (Table 2.5.2-46**34**), using standard seismological relations between magnitude, seismic moment, corner frequency (f_c), and duration (Reference 2.5.2-73), and ~~using~~ stress-drop and crustal Vs values typical of the eastern United States. The effective strain ratio is calculated using the expression $(M_w - 1)/10$ (Reference 2.5.2-47), **where M is moment magnitude**. Values smaller than 0.5 or greater than 0.65 ~~were~~**are** brought into the 0.5-0.65 range, which is the range recommended by Kramer (Reference 2.5.2-54). The calculated values of duration and effective strain ratio are given in Table 2.5.2-19.

For each rock-motion input, separate site response calculations ~~were~~**are** performed for the corresponding 60 synthetic profiles, and these results ~~were~~**are** used to calculate the logarithmic mean and standard deviation of the amplification factor. Figures 2.5.2-40 and 2.5.2-41 ~~show~~**present** the amplification factors computed for the 60 synthetic profiles, for the 10^{-5} HF and LF motions, and the resulting logarithmic mean and standard deviation. Figures 2.5.2-42 and 2.5.2-43 ~~show~~**present** the logarithmic mean and standard deviation of the amplification factor for ~~the~~**all** three exceedance frequencies considered. Tables 2.5.2-20 and 2.5.2-21 present these results in Tabular form.

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Figures 2.5.2-44 and 2.5.2-45 ~~show~~**provide** the peak strains as a function of depth for the 60 synthetic profiles, for the 10^{-5} HF and LF rock motions. Results are shown only for the shallow portion of the profile because the properties of the deep profile are independent of strain.

2.5.2.6 Ground Motion and Site Response Analysis

2.5.2.6.1 Ground Motion Response Spectrum (GMRS)

With the site-specific amplification described in Subsection 2.5.2.5, the seismic hazard model described in Subsection 2.5.2.4 ~~was~~**is rerunanalyzed** incorporating the site amplifications into the hazard calculations. For ground motions below the 10^{-4} amplitudes, site amplification ~~was~~**is** assumed to be the same as for the 10^{-4} amplitudes (Tables 2.5.2-20 and 2.5.2-21). For ground motions greater than the 10^{-6} amplitudes, site amplification ~~was~~**is** assumed to be the same as for the 10^{-6} amplitudes (Tables 2.5.2-20 and 2.5.2-21). The logarithmic standard deviations in Tables 2.5.2-20 and 2.5.2-21 ~~were~~**are** used to represent uncertainties in site response. ~~The~~**A minimum moment magnitude (M) of 5.0 is used in the calculations (no CAV filter was applied to these calculations), using V_{s30} for surface conditions for the PSEG Site - 730 m/s (2395 ft/sec) and using amplitudes at the surface after site effects have been taken into account.**

The amplification factors for the HF input spectra ~~were~~**are** used for hazard calculations at 5, 10, 25 and 100 Hz (**peak ground acceleration; PGA**), and the amplification factors for the LF input spectra ~~were~~**are** used for hazard ~~calculation~~**calculations** at 0.5, 1, and 2.5 Hz. ~~The reason is~~**Figures 2.5.2-59 through 2.5.2-61 illustrate** that the HF rock spectra dominate the high frequencies and the LF rock spectra dominate the low frequencies. ~~This is apparent from Figures 2.5.2-31 through 2.5.2-33.~~

Figures 2.5.2-46 through 2.5.2-52 ~~show~~**present** seismic hazard curves for the ~~7~~**seven** spectral frequencies at which ground motion equations are available for the GMRS elevation ~~and~~. ~~These figures cover a frequency range from the PGA (100 hz) in Figure 2.5.2-46 to 0.5 hz (Figure 2.5.2-52). The mean hazard curves roll over to an annual frequency of exceedance that is less than 10^{-4} , because the CAV calculation indicates that many small magnitude earthquakes will not be damaging. Seismic hazard curves data for the GMRS elevation are documented~~**provided** in Table 2.5.2-22. Table 2.5.2-23 ~~shows~~**provides** mean **and median** amplitudes for annual frequencies of 10^{-4} , 10^{-5} , and 10^{-6} . The mean and median soil UHRS for 10^{-4} , 10^{-5} , and 10^{-6} are ~~plotted~~**presented** in Figure 2.5.2-53.

2.5.2.6.1.1 Horizontal GMRS Spectrum

The horizontal Ground Motion Response Spectra (GMRS) ~~was~~**is** developed from the horizontal soil UHRS using the approach described in ASCE/SEI Standard 43-05 (Reference 2.5.2-4) and RG 1.208.

The ASCE/SEI Standard 43-05 (Reference 2.5.2-4) approach defines the GMRS using the site-specific UHRS, which is defined for Seismic Design Category SDC-5 at a mean 10^{-4} annual frequency of exceedance. The procedure for computing the GMRS is as follows:-

For each spectral frequency at which the UHRS is defined, a slope factor A_R is determined from:

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$$A_R = SA(10^{-5})/SA(10^{-4}) \quad \text{(Equation 2.5.2-2)}$$

where $SA(10^{-4})$ is the spectral acceleration SA at a mean UHRS exceedance frequency of $10^{-4}/\text{yr}$ (and similarly for $SA(10^{-5})$). A Design Factor "DF" is defined based on A_R , which reflects the slope of the mean hazard curve between 10^{-4} and 10^{-5} mean annual frequencies of exceedance. The DF at each spectral frequency is given by:

$$DF = 0.6(A_R)^{0.80} \quad \text{(Equation 2.5.2-3)}$$

and

$$GMRS = \max[SA(10^{-4}) \times \max(1, DF), 0.45 \times SA(10^{-5})] \quad \text{---(Equation 2.5.2-4)}$$

The derivation of DF is described in detail in the Commentary to ASCE/SEI Standard 43-05 Reference 2.5.2-4 and in RG 1.208. For the PSEG Site, the 10^{-4} soil UHRS is not defined, as described in Subsection 2.5.2.6.1. Therefore, factors A_R and DF in Equations (2.5.2-2) and (2.5.2-3) are not defined. For this case, Equation (2.5.2-3) indicates that the GMRS is calculated as 0.45 times the 10^{-5} UHRS. Table 2.5.2-24 shows the calculation of **tabulates** the horizontal GMRS from the 10^{-5} UHRS. The horizontal GMRS is plotted in Figure 2.5.2-54.

2.5.2.6.1.2 Vertical GMRS Spectrum

The vertical GMRS ~~was~~ **is** developed using vertical-to-horizontal (V/H) ratios. NRC RG 1.60 and NUREG/CR-6728 ~~indicate~~ **provide** proposed V/H ratios for design spectra for nuclear facilities, and these V/H ratios are plotted in Figure 2.5.2-55. The V/H ratios in **the portion of** Figure 2.5.2-55 ~~from~~ **labeled "NUREG/CR-6728 CEUS rock"** are ~~labeled "CEUS rock (<0.2g)"~~ **and from Table 4-5 in NUREG/CR-6728. The values are those** recommended for rock sites in the CEUS when the horizontal PGA ~~ranges from 0.2g to 0.2g~~ **5g**, which is the case for the horizontal GMRS at the PSEG Site. These V/H ratios are shown for background information only. For soil conditions, two ground motion prediction equations ~~were~~ **are** used based on empirical data from California, ~~Abrahamson the Western United States (WUS), Campbell and Bozorgnia (Reference 2.5.2-112) and Silva (Reference 2.5.2-1) Gülerce and Campbell (Reference 2.5.2-23),~~ **Abrahamson (Reference 2.5.2-113)** because these studies ~~predict spectral amplitudes for both horizontal and vertical motion~~ **enable prediction of V/H ratios** as a function of M_w and R. To obtain V/H ratios, ground motions ~~were~~ **are** predicted for both horizontal and vertical spectra, and the ratio plotted. Two earthquakes ~~were~~ **are** used for this calculation, corresponding to the M_w and R values ~~shown~~ **presented** in Table 2.5.2-16 ~~34~~ for HF 10^{-4} and 10^{-5} spectra: $M_w=5.6$ ~~9~~ and $R=9.6$ and ~~22~~ **27** km (43 ~~16.7~~ **mi.**), and $M=6.0$ and $R=12$ km (7.5 mi.). The GMRS is ~~less than~~ **between** the 10^{-4} and 10^{-5} UHRS, and the soil 10^{-4} UHRS is not defined, **as shown in Figure 2.5.2-81** but these M_w and R values are indicative of the magnitudes and distances that ~~would be expected to cause the GMRS ground motion.~~

Two ~~sets of~~ **V/H ratios are shown** ~~presented on Figure 2.5.2-55 for each distance (R=9.6 and 22 km; 6 and 13.7 mi., respectively) in Figure 2.5.2-55. The of the two WUS ground motion prediction equations. The first (set is labeled "WUS soil") shows V/H unshifted" and is taken directly as the average V/H from~~ **from each respective ground motion prediction equation for the two ground motion prediction equations. The corresponding HF controlling earthquake. The second set of V/H ratios (, labeled "WUS soil (shifted)")** recognizes that CEUS earthquake ground motions tend to have more high-frequency content than their ~~western~~ **WUS**

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counterparts. To approximate what might be a V/H ratio for soil conditions in the CEUS, the WUS soil V/H ratios are shifted by scaling the frequency by a factor of 3, which shifts the peak V/H ratio to higher frequencies. The locations of the peak for the “WUS soil (shifted)” V/H ratios are consistent with the peak in the “NUREG/CR-6728 CEUS rock ($\leq 0.2g$)” V/H ratio.

Based on these comparisons, it is recommended that the applicable recommended V/H ratios for the PSEG Site should be 1.015 at spectral frequencies between 100–40 Hz and 1040100 Hz, 0.75 for frequencies from 5–0.1 Hz to 0.15 Hz. Between the frequencies of 5 and 40 Hz the V/H ratio is assumed to vary linearly from 0.75 at 5 Hz up to 1.15 at 40 Hz, and V/H should be interpolated (on a log-linear scale) between 1.015 at 1040 Hz and 0.75 at 5 Hz. This recommendation is shown. The recommended V/H ratios are depicted on Figure 2.5.2-55 as a dashed red solid black line. This recommendation bounds. These recommended V/H ratios bound all of the V/H ratios described above, plotted except the RG 1.60 ratio, which is considered obsolete because it is based on a small number of ground motions recorded prior to 1973.

Vertical spectra were are scaled from the horizontal spectra using the recommended V/H ratios. The vertical GMRS was is calculated by multiplying the horizontal GMRS at each frequency by the V/H ratio shown depicted by the solid black line in Figure 2.5.2-55. Figure 2.5.2-54 shows illustrates the horizontal GMRS and the vertical GMRS calculated using this way method. The V/H ratios and vertical GMRS are documented values are provided in Table 2.5.2-24.

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~~Table 2.5.2-1
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Tables 2.5.2-1 through 2.5.2-16 Not Used

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**Table 2.5.2-17
Base-Case Soil Profile
Mean Shear Wave Velocity**

Formation	Soil Curve Number	Soil Curve Description	Thickness (ft.)	Vs (ft/sec)	Unit Weight (pcf) ^(a)	Sigma (ln Vs)	Depth to Top of Layer (ft.) ^(c)
Layer 1 (Tvt, Tht and Knv) - Competent Layer for GMRS ^(b)	1	Layer 1	84.5	2250	121	0.25	0
Layer 2 (Kml)	2	Layers 2-5	18.5	3920	131	0.25	84
Layer 3 (Kml)	2	Layers 2-5	21.5	2490	131	0.25	103
Layer 4 (Kml)	2	Layers 2-5	34.5	3020	131	0.25	124
Layer 5 (Kml, Kwn, Kmt)	2	Layers 2-5	62.0	2490	128	0.25	155
Layer 6 (Ket, Kwb)	3	Layers 6-8	84.0	1710	125	0.30	222
Layer 7 (Kmv)	3	Layers 6-8	26.0	2290	130	0.30	306
Layer 8 (Kmg)	3	Layers 6-8	25.0	1780	130	0.30	331
Layer 9A (Kmg)	4	Layers 9a-9b	31.0	2490	130	0.30	356
Layer 9B (Kp)	4	Layers 9a-9b	51.0	2490	130	0.30	387
Layer Potomac	5	Deep Profile	365.0	2200	135	0.35	438
Layer Potomac	5	Deep Profile	430.0	2630	135	0.35	803
Layer Potomac	5	Deep Profile	450.0	3060	135	0.35	1233

a) pcf = pounds per cubic foot

b) Layer definitions are shown on Figure 2.5.4.7-8a

c) Depths are referenced to top of Competent Layer

**Table 2.5.2-17
Base-Case Soil Profile
Mean Shear Wave Velocity**

Formation	Latitude (lat)	Soil Curve Number	Longitude (long)	Soil Curve Description	Emb Thickness (ft.)	SMBVs (ft/sec)	RMBUnit Weight (pcf) ^(a)	Magnitude Type Sigma (ln Vs)	Source Depth to Top of Layer (ft.)
5/10/15 Layer 1 (Tvt, Tht and Knv) - Competent Layer for GMRS ^(b)	42.53	01	71.47	Layer 1	3.10	84.5	0.1225	3.11121	NES
5/10/19 Layer 2 (Kml)	40.98	02	73.83	Layers 2-5	4.07	18.5	0.1392	4.08131	SYK0.5
5/10/21 Layer 3 (Kml)	40.99	02	73.83	Layers 2-5	3.20	21.5	0.1249	3.21131	SYK0.3
0/01/23 Layer 4 (Kml)	42.55	02	71.48	Layers 2-5	3.60	4.5	0.1302	3.61131	NES
0/05/05 Layer 5 (Kml, Kwn, Kmt)	36.03	02	71.67	Layers 2-5	3.70	62.0	0.1249	3.71128	NEIC

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1/03/15	Layer 6 (Ket, Kwb)	37.746	77.909	Layers 6-8	3.8084.0	0.1171 0	3.81125	mbLg0.30	SEUS 22
1/04/12	Layer 7 (Kmv)	41.1503	73.650	Layers 6-8	3.2026.0	0.1229 0	3.21130	Mn0.30	NES 5
1/06/03	Layer 8 (Kmg)	41.0503	71.440	Layers 6-8	3.3025.0	0.1178 0	3.31130	Mn0.30	NES 4
1/06/17	Layer 9A (Kmg)	42.593	74.637	Layers 9a-9b	4.0031.0	0.3249 0	4.10130	MC0.3 0	LCSN 6
1/08/15	Layer 9B (Kp)	40.783	77.667	Layers 9a-9b	3.0051.0	0.3249 0	3.10130	MC0.3 0	LCSN 7
1/09/02	Upper Potomac	42.4915	74.209	Deep Profile	3.1065.0	0.3220 0	3.20135	MC0.3 5	LCSN 8
1/09/03	Middle Potomac	42.9405	71.510	Deep Profile	3.30430.0	0.1263 0	3.31135.0	Mn0.35	NES 3
1/10/28	Lower Potomac	41.0605	73.630	Deep Profile	3.10450.0	0.1306 0	3.11135.0	Mn0.35	NES 3

1992/01/09	40.360	74.340	3.00	0.1	3.01	mbLg	SYK08
1992/03/10	41.040	72.130	4.10	0.1	4.11	Mn	NESN
1994/01/16	40.369	76.092	4.60	0.3	4.70	MC	LCSN
1994/03/12	42.789	77.688	3.50	0.3	3.60	MC	LCSN
1994/10/02	42.360	72.250	3.40	0.1	3.41	Mn	NESN
1996/03/22	41.690	71.240	3.10	0.3	3.20	Mc	NESN
1997/11/14	40.164	76.276	3.00	0.3	3.10	MC	LCSN
1998/10/21	37.422	78.439	3.80	0.1	3.81	mbLg	SEUSSN
2000/01/27	43.000	71.180	3.00	0.1	3.01	Mn	NESN
2000/06/16	42.100	72.820	3.00	0.1	3.01	Mn	NESN
2001/02/03	42.340	77.390	3.20	0.3	3.30	MC	LCSN
2001/09/22	38.026	78.396	3.20	0.1	3.21	mbLg	SEUSSN
2002/07/11	40.390	71.330	3.00	0.3	3.10	MC	LCSN
2003/05/05	37.655	78.055	3.90	0.1	3.91	mbLg	SEUSSN
2003/08/26	40.570	75.110	3.48	0.1	3.49	mbLg	SYK08
2003/12/09	37.774	78.100	4.50	0.1	4.51	mbLg	SEUSSN
2007/07/24	42.604	74.119	3.10	0.3	3.20	MC	LCSN
2008/12/27	40.114	76.403	3.40	0.3	3.50	MC	LCSN
2009/02/03	40.870	74.522	3.00	0.3	3.10	MC	LCSN

a) LCSN — Lamont-Doherty Cooperative Seismographic Network
 NESN — New England Seismic Network
 SEUSSN — Southeastern U. S. Seismic Network
 SYK08 — Sykes, et al., 2008
 NEIC — National Earthquake Information Center

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**Table 2.5.2-18
Parameters for Layer-Depth Randomization**

Formation (top of)	Distribution Type	Depth 1 (ft.)^(a)	Depth 2 (ft.)^(a)
Layer 2 (Kml)	Normal	84.5	4.27
Layer 3 (Kml)	Normal	103	4.27
Layer 4 (Kml)	Normal	124.5	4.27
Layer 5 (Kml, Kwn, Kmt)	Normal	159	4.27
Layer 6 (Ket, Kwb)	Normal	221	4.27
Layer 7 (Kmv)	Normal	305	6.40
Layer 8 (Kmg)	Normal	331	6.40
Layer 9A (Kmg)	Normal	356	6.40
Layer 9B (Kp)	Normal	387	20.40
Upper Potomac	Uniform	433	443
Middle Potomac	Uniform	603	1003
Lower Potomac	Uniform	1033	1433
Bedrock	Uniform	1483	1883

- a) For normal distributions, Depth1 is the mean depth below competent layer and Depth2 is the standard deviation of depth; for uniform distributions, Depth1 is the minimum depth to the top of the layer below top of competent layer and Depth2 is the maximum depth to the top of the layer below top of competent layer.
- ~~a) For normal distributions, Depth1 is the mean depth and Depth2 is the standard deviation of depth; for uniform distributions, Depth1 is the minimum depth and Depth2 is the maximum. Depths are to tops of layers as measured from the top of the competent layer.~~

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Table 2.5.2-19

Calculation of Durations and Effective Strain Ratios for Input Rock Motions

Event	M	Distance (R) (R) km (mi)	Mo (dyn-cm)^(a)	fc (Hz)	T (seconds)	Effective Strain Ratio
1E-4 HF	5.9	27 (16.7)	7.94E+24	0.42	3.71	0.5
1E-4 LF	7.3	540 (335.5)	1.00E+27	0.08	38.82	0.63
1E-5 HF	6.0	12 (7.5)	1.21E+25	0.38	3.25	0.5
1E-5 LF	7.6	570 (354)	2.82E+27	0.06	45.20	0.65
1E-6 HF	6.3	9 (5.6)	3.16E+25	0.27	4.19	0.53
1E-6 LF	7.7	420 (261)	3.98E+27	0.05	39.74	0.65

a) Mo = seismic moment; dyn-cm = Dyne-centimeters

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Table 2.5.2-20

Amplification Factors for High- Frequency (HF) Motions

Frequency (Hz)	Logarithmic Mean Amplification Factors			Logarithmic Standard Deviations		
	1.00E-04	1.00E-05	1.00E-06	1.00E-04	1.00E-05	1.00E-06
100	1.07	0.77	0.48	0.21	0.23	0.30
90	0.97	0.70	0.43	0.21	0.23	0.30
80	0.85	0.60	0.37	0.22	0.24	0.30
70	0.72	0.51	0.30	0.23	0.24	0.31
60	0.62	0.42	0.25	0.25	0.26	0.31
50	0.57	0.38	0.21	0.28	0.28	0.32
45	0.57	0.37	0.20	0.29	0.30	0.33
40	0.59	0.37	0.19	0.30	0.32	0.34
35	0.63	0.38	0.19	0.31	0.34	0.36
30	0.67	0.41	0.19	0.31	0.36	0.39
25	0.76	0.46	0.21	0.30	0.36	0.43
20	0.89	0.57	0.25	0.30	0.36	0.46
15	1.06	0.73	0.33	0.27	0.33	0.48
12.5	1.14	0.84	0.42	0.23	0.29	0.47
10	1.27	0.97	0.52	0.22	0.27	0.43
9	1.38	1.07	0.59	0.22	0.27	0.43
8	1.51	1.19	0.69	0.21	0.26	0.43
7	1.63	1.31	0.80	0.22	0.26	0.40
6	1.74	1.43	0.92	0.19	0.22	0.37
5	1.80	1.53	1.03	0.28	0.25	0.32
4	1.64	1.50	1.10	0.32	0.31	0.33
3	1.42	1.37	1.17	0.22	0.25	0.34
2.5	1.47	1.39	1.22	0.26	0.27	0.35
2	1.69	1.57	1.35	0.23	0.26	0.33
1.5	1.93	1.83	1.57	0.23	0.25	0.31
1.25	2.05	1.96	1.70	0.24	0.25	0.34
1	2.18	2.17	1.98	0.26	0.23	0.24
0.9	2.06	2.10	2.03	0.26	0.25	0.23
0.8	1.97	2.02	2.02	0.23	0.23	0.23
0.7	2.00	2.05	2.08	0.24	0.23	0.21
0.6	2.16	2.22	2.29	0.23	0.23	0.21
0.5	2.44	2.49	2.57	0.23	0.23	0.22
0.4	2.75	2.82	2.89	0.30	0.30	0.30
0.3	2.34	2.41	2.48	0.38	0.39	0.39
0.2	1.60	1.64	1.69	0.32	0.33	0.35
0.15	1.36	1.39	1.41	0.18	0.19	0.21
0.125	1.31	1.33	1.34	0.14	0.15	0.16
0.1	1.29	1.31	1.30	0.11	0.12	0.13

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**Table 2.5.2-21
Amplification Factors for Low- Frequency (LF) Motions**

Frequency (Hz)	Logarithmic Mean Amplification Factors			Logarithmic Standard Deviations		
	1.00E-04	1E-55	1.00E-06	1.00E-04	1.00E-05	1.00E-06
100	1.13	0.93	0.63	0.18	0.21	0.28
90	1.05	0.86	0.58	0.18	0.21	0.28
80	0.93	0.76	0.51	0.19	0.21	0.28
70	0.80	0.64	0.43	0.20	0.21	0.28
60	0.69	0.54	0.36	0.21	0.22	0.28
50	0.64	0.48	0.31	0.23	0.23	0.29
45	0.63	0.47	0.30	0.25	0.25	0.29
40	0.64	0.46	0.29	0.26	0.26	0.30
35	0.67	0.47	0.29	0.27	0.27	0.30
30	0.71	0.49	0.29	0.28	0.29	0.32
25	0.77	0.53	0.30	0.28	0.31	0.34
20	0.89	0.60	0.33	0.28	0.33	0.37
15	1.04	0.72	0.37	0.27	0.33	0.42
12.5	1.12	0.82	0.43	0.24	0.32	0.44
10	1.26	0.94	0.51	0.23	0.30	0.45
9	1.36	1.03	0.56	0.22	0.30	0.46
8	1.47	1.14	0.63	0.22	0.29	0.47
7	1.59	1.25	0.73	0.22	0.28	0.45
6	1.69	1.36	0.83	0.20	0.25	0.43
5	1.74	1.43	0.91	0.28	0.27	0.39
4	1.62	1.43	0.99	0.32	0.31	0.38
3	1.42	1.34	1.07	0.21	0.26	0.36
2.5	1.47	1.38	1.16	0.25	0.28	0.38
2	1.66	1.51	1.26	0.22	0.26	0.37
1.5	1.93	1.79	1.48	0.22	0.26	0.35
1.25	2.03	1.91	1.60	0.23	0.25	0.39
1	2.10	2.02	1.77	0.23	0.18	0.26
0.9	2.06	2.08	1.94	0.24	0.22	0.25
0.8	2.00	2.04	2.00	0.22	0.21	0.26
0.7	2.03	2.07	2.07	0.23	0.21	0.24
0.6	2.20	2.26	2.28	0.24	0.23	0.23
0.5	2.51	2.54	2.63	0.27	0.26	0.24
0.4	2.73	2.77	2.85	0.30	0.30	0.29
0.3	2.30	2.33	2.42	0.37	0.38	0.37
0.2	1.55	1.57	1.62	0.31	0.31	0.34
0.15	1.30	1.31	1.34	0.17	0.18	0.19
0.125	1.23	1.23	1.25	0.13	0.13	0.14
0.1	1.17	1.18	1.19	0.09	0.09	0.10

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Table 2.5.2-22 (Sheet 1 of 7)

Mean and Fractile Soil Seismic Hazard Curves at GMRS Elevation

100 Hz (PGA) Hazard Curves						
Amplitude ^(a)	MEAN	0.05^(b)	0.16	0.5^(c)	0.84	0.95
0.0005	6.08E-02	2.10E-02	2.83E-02	4.76E-02	1.04E-01	1.41E-01
0.0007	4.73E-02	1.70E-02	2.14E-02	3.41E-02	8.22E-02	1.16E-01
0.001	3.56E-02	1.29E-02	1.62E-02	2.44E-02	6.12E-02	8.97E-02
0.0015	2.54E-02	9.12E-03	1.13E-02	1.71E-02	4.45E-02	6.52E-02
0.002	1.98E-02	6.92E-03	8.56E-03	1.28E-02	3.43E-02	5.09E-02
0.003	1.36E-02	4.90E-03	6.04E-03	8.85E-03	2.29E-02	3.59E-02
0.005	8.29E-03	2.82E-03	3.72E-03	5.33E-03	1.37E-02	2.16E-02
0.007	5.86E-03	1.86E-03	2.63E-03	4.00E-03	8.85E-03	1.49E-02
0.01	3.98E-03	1.23E-03	1.74E-03	2.82E-03	5.97E-03	1.00E-02
0.015	2.50E-03	7.08E-04	1.07E-03	1.86E-03	3.80E-03	5.78E-03
0.02	1.76E-03	4.68E-04	7.08E-04	1.32E-03	2.65E-03	4.04E-03
0.03	1.04E-03	2.69E-04	4.07E-04	7.59E-04	1.52E-03	2.33E-03
0.05	5.06E-04	1.35E-04	1.91E-04	3.80E-04	7.59E-04	1.23E-03
0.07	3.09E-04	7.76E-05	1.10E-04	2.34E-04	4.68E-04	7.59E-04
0.1	1.82E-04	4.17E-05	6.31E-05	1.35E-04	2.88E-04	4.68E-04
0.15	9.89E-05	2.16E-05	3.16E-05	7.76E-05	1.66E-04	2.51E-04
0.2	6.35E-05	1.29E-05	1.95E-05	5.13E-05	1.02E-04	1.55E-04
0.3	3.33E-05	6.46E-06	1.08E-05	2.75E-05	5.89E-05	8.32E-05
0.5	1.38E-05	2.14E-06	3.98E-06	1.05E-05	2.57E-05	3.89E-05
0.7	7.23E-06	9.33E-07	1.86E-06	5.25E-06	1.38E-05	2.24E-05
1	3.41E-06	3.20E-07	7.08E-07	2.29E-06	6.46E-06	1.05E-05
1.5	1.29E-06	7.24E-08	2.04E-07	7.08E-07	2.29E-06	4.27E-06
2	5.93E-07	2.09E-08	6.53E-08	3.09E-07	1.00E-06	2.29E-06
3	1.71E-07	2.37E-09	1.05E-08	7.24E-08	2.88E-07	7.33E-07
5	2.69E-08	3.59E-10	4.68E-10	8.51E-09	4.79E-08	1.30E-07
7	6.55E-09	5.19E-11	4.73E-11	1.68E-09	1.12E-08	3.27E-08
10	1.24E-09	4.20E-12	6.31E-12	2.34E-10	2.00E-09	6.03E-09

Spectral acceleration in g

(b) Percentile

a) —

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0.5 fractile = median

- a) Spectral acceleration in g
- b) Percentile
- c) 0.5 fractile = median

Table 2.5.2-22 (Sheet 2 of 7)

Mean and Fractile RockSoil Seismic Hazard Curves at GMRS Elevation

25 Hz Hazard Curves						
Amplitude (a)	MEAN N	0.05^(b) (b)	0.16^(c) (c)	0.5^(c) (c)	0.84^(d) (d)	0.95^(e) (e)
0.0005	7.69E-02	7.41E-02	3.02E-02	7.55E-02	3.16E-01	3.89E-01
0.0007	6.18E-02	5.62E-02	2.44E-02	5.75E-02	9.10E-02	3.27E-01
0.0010	4.84E-02	4.57E-02	1.84E-02	4.38E-02	7.00E-02	3.06E-01
0.0015	3.62E-02	3.13E-02	1.49E-02	2.91E-02	5.38E-02	7.49E-02
0.0020	2.92E-02	9.12E-03	1.20E-02	2.21E-02	4.19E-02	5.86E-02
0.0030	2.14E-02	7.41E-03	9.13E-03	1.45E-02	3.01E-02	4.57E-02

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0.0050.01005	1.43E-02 026.52E-03 031.43E-02	4.90E-03 037.33E-04 044.90E-03	6.46E-03 032.14E-06 046E-03	9.39E-03 035.25E-09 039E-03	1.98E-02 021.05E-09 08E-02	3.01E-02 021.48E-03 01E-02
0.0070.015007	1.08E-02 024.78E-03 031.08E-02	3.98E-03 034.52E-04 043.98E-03	4.90E-03 031.41E-04 090E-03	7.05E-03 033.72E-07 05E-03	1.46E-02 027.41E-03 031.46E-02	2.29E-02 021.12E-02 029E-02
0.010.0204	7.99E-03 033.74E-07 099E-03	2.82E-03 033.31E-04 042.82E-03	3.47E-03 039.33E-04 043.47E-03	5.30E-03 032.92E-05 030E-03	1.06E-02 025.62E-03 031.06E-02	1.72E-02 028.81E-03 031.72E-02
0.0150.03015	5.62E-03 032.56E-05 062E-03	1.86E-03 031.97E-04 041.86E-03	2.46E-03 035.37E-04 042.46E-03	3.73E-03 032.00E-03 073E-03	7.24E-03 033.98E-07 024E-03	1.16E-02 026.24E-03 031.16E-02
0.020.0502	4.34E-03 031.48E-04 034E-03	1.32E-03 0381.32E-05 0503	1.86E-03 032.51E-04 041.86E-03	3.02E-03 031.07E-03 02E-03	5.76E-03 032.29E-05 076E-03	8.97E-03 033.85E-08 097E-03
0.030.0703	2.96E-03 039.88E-04 042.96E-03	8.13E-04 044.62E-05 058.13E-04	1.45E-03 041.23E-03	2.14E-03 037.08E-04 042.14E-03	4.02E-03 031.62E-04 02E-03	6.00E-03 032.63E-06 00E-03
0.050.105	1.74E-03 036.23E-04 041.74E-03	4.22E-04 042.09E-05 054.22E-04	7.76E-04 056.61E-04	1.23E-03 034.37E-04 041.23E-03	2.46E-03 031.00E-02 046E-03	3.55E-03 031.68E-03 055E-03
0.070.1507	1.18E-03 033.55E-04 041.18E-03	2.69E-04 047.67E-06 062.69E-04	4.17E-04 054.37E-04	8.13E-04 042.43E-08 013E-04	1.68E-03 035.37E-04 041.68E-03	2.48E-03 039.33E-04 042.48E-03
0.10.24	7.54E-04 042.33E-07 054E-04	3.35E-04 061.66E-04	2.57E-04 052.51E-04	5.37E-04 041.66E-05 037E-04	1.07E-03 033.80E-04 041.07E-03	1.74E-03 035.96E-04 041.74E-03
0.150.315	4.39E-04 041.26E-04 039E-04	9.33E-05 078.91E-05	1.29E-04 051.40E-04	3.09E-04 048.61E-05 053.09E-04	6.17E-04 042.04E-06 017E-04	1.07E-03 033.20E-04 041.07E-03
0.20.52	2.93E-04 045.56E-05 052.93E-04	1.45E-05 075.89E-05	5.25E-05 068.91E-05	2.04E-04 043.51E-05 052.04E-04	4.07E-04 041.02E-04 07E-04	7.08E-04 041.55E-07 008E-04
0.30.73	1.62E-04 043.17E-05 051.62E-04	3.76E-05 083.16E-05	2.29E-05 064.79E-05	1.18E-04 041.82E-05 051.18E-04	2.34E-04 045.89E-05 052.34E-04	4.07E-04 041.02E-04 007E-04
0.510.5	7.40E-05 051.70E-07 040E-05	7.67E-05 091.29E-05	8.71E-05 072.24E-05	5.50E-05 058.22E-06 065.50E-05	1.18E-04 043.39E-05 051.18E-04	1.97E-04 046.10E-05 051.97E-04

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				05	04	04
0.71-50.7	4.31E-05 8.03E-06 4.31E-05	1.19E-06 9.92E-06	2.88E-07 1.29E-05	3.16E-05 3.47E-06 3.16E-05	7.24E-05 1.59E-07 2.4E-05	1.22E-04 3.39E-05 1.22E-04
124	2.37E-05 4.54E-06 2.37E-05	2.99E-06 103.47E-06	1.18E-07 6.03E-06	1.62E-06 1.70E-05	4.47E-05 8.51E-06 4.47E-05	6.31E-05 2.02E-06 3.1E-05
1.531.5	1.15E-05 1.89E-06 1.15E-05	2.95E-06 111.41E-06	2.40E-08 2.82E-06	4.84E-07 8.22E-06	2.24E-05 3.47E-06 2.24E-05	3.39E-05 9.12E-06 3.39E-05
52	6.61E-06 5.43E-07 6.61E-06	1.23E-07 126.38E-07	2.29E-09 1.41E-06	8.04E-08 4.42E-06	1.20E-05 8.71E-07 1.20E-05	2.09E-05 2.72E-07 2.09E-05
73	2.85E-06 2.13E-07 2.85E-06	1.26E-07 131.91E-07	3.80E-10 4.37E-07	2.09E-08 1.62E-06	2.88E-07 4.90E-06	9.77E-06 1.04E-09 7.7E-06
105	7.04E-08 8.61E-07	8.81E-08 153.06E-08	4.79E-08 18.32E-08	5.07E-09 3.80E-07	7.24E-08 1.41E-06	3.02E-06 3.31E-07 3.02E-06
7	3.53E-07	6.24E-09	2.24E-08	1.26E-07	5.75E-07	1.32E-06
10	1.23E-07	5.56E-10	4.57E-09	3.63E-08	1.91E-07	5.01E-07

a) Spectral acceleration in g
b) Percentile
c) 0.5 fractile = median
Spectral acceleration in g
(b) Percentile

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0.5 fractile = median

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Mean and Fractile Soil Seismic Hazard Curves at GMRS Elevation

10 Hz Hazard Curves						
Amplitude (a)	MEAN EAN	0.05^(b) 5^(b)	0.16 0.16	0.5^(c) 0.5^(c)	0.84 0.84	0.95 0.95
0.00050-00100 05	9.89E- 022.49E 9.89E-02	9.44E- 033.91E 02	5.62E- 021.48E 5.62E-02	9.32E- 022.40E 9.32E-02	3.39E- 021.45E 01	4.17E- 021.84E 01
0.00070-00150 007	7.94E- 022.12E 7.94E-02	7.16E- 033.18E 02	4.27E- 021.20E 4.27E-02	7.12E- 022.09E 7.12E-02	2.95E- 021.19E 01	3.63E- 021.52E 01
0.0010-002001	6.15E- 021.85E 6.15E-02	5.82E- 032.41E 02	3.24E- 029.77E -	5.08E- 021.82E 5.08E-02	9.14E- 022.57E 9.14E-02	3.16E- 021.17E 01
0.00150-00300 15	4.50E- 021.49E 4.50E-02	4.12E- 031.82E 02	2.29E- 026.92E -	3.63E- 021.48E 3.63E-02	6.58E- 022.24E 6.58E-02	9.03E- 022.75E 9.03E-02
0.0020-005002	3.56E- 021.08E 3.56E-02	2.37E- 031.48E 02	1.85E- 024.57E -	2.76E- 029.77E -	5.09E- 021.70E 5.09E-02	7.07E- 022.09E 7.07E-02
0.0030-007003	2.52E- 028.35E -	1.51E- 032.52E 02	1.30E- 023.24E -	1.82E- 027.41E -	3.70E- 021.29E 3.70E-02	5.21E- 021.76E 5.21E-02
0.0050-01005	1.60E- 026.17E -	8.41E- 046.46E 03	7.98E- 032.29E 7.98E-03	1.10E- 025.43E -	2.34E- 029.77E -	3.45E- 021.33E 3.45E-02
0.0070-015007	1.17E- 024.19E -	4.68E- 044.57E 03	5.63E- 031.32E 5.63E-03	8.21E- 033.59E 8.21E-03	1.65E- 026.92E -	2.54E- 029.44E -
0.010-0201	8.20E- 033.09E 8.20E-03	3.09E- 043.02E 03	8.71E- 043.98E 03	5.73E- 032.63E 5.73E-03	1.14E- 024.90E -	1.76E- 027.16E -
0.0150-03015	5.39E- 031.93E	1.78E- 042.00E	4.68E- 042.63E	4.01E- 031.74E	7.20E- 033.24E	1.16E- 024.57E

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	5.39E-03	03	03	4.01E-03	7.20E-03	- 031.16E-02
0.020.0502	3.95E-03 9.97E-04 - 043.95E-03	7.24E-05 1.41E-03	2.04E-04 2.00E-03	3.03E-03 8.13E-04 - 043.03E-03	5.25E-03 031.62E-03 5.25E-03	7.90E-03 032.46E-03 7.90E-03
0.030.0703	2.48E-03 6.24E-04 - 042.48E-03	3.51E-05 8.13E-04	1.10E-04 1.23E-03	2.00E-03 5.37E-04 - 042.00E-03	3.33E-03 031.00E-03 3.33E-03	4.86E-03 031.57E-03 4.86E-03
0.050.105	1.31E-03 3.71E-04 - 041.31E-03	1.53E-05 4.07E-04	5.89E-05 6.17E-04	1.07E-03 3.20E-04 - 041.07E-03	1.75E-03 6.17E-04 - 041.75E-03	2.59E-03 9.02E-04 - 042.59E-03
0.070.1507	8.27E-04 2.01E-04 8.27E-04	5.25E-05 6.51E-04	2.95E-05 3.80E-04	6.61E-04 1.72E-04 6.61E-04	1.08E-03 3.31E-04 - 041.08E-03	1.66E-03 5.01E-04 - 041.66E-03
0.10.21	4.94E-04 1.28E-04 4.94E-04	2.07E-05 6.45E-04	1.70E-05 2.19E-04	4.07E-04 1.10E-04 4.07E-04	7.08E-04 2.19E-04 7.08E-04	1.01E-03 3.20E-04 - 041.01E-03
0.150.315	2.69E-04 6.64E-05 - 052.69E-04	5.56E-07 7.76E-05	7.94E-06 6.10E-04	2.19E-04 5.50E-05 - 052.19E-04	4.07E-04 1.26E-04 4.07E-04	5.77E-04 1.66E-04 5.77E-04
0.20.52	1.74E-04 2.75E-05 - 051.74E-04	7.76E-08 4.79E-05	2.63E-06 6.76E-05	1.45E-04 2.16E-05 - 051.45E-04	2.88E-04 5.13E-05 - 052.88E-04	3.81E-04 7.50E-05 - 053.81E-04
0.30.73	9.23E-05 1.46E-05 9.23E-05	1.88E-08 2.32E-05	1.23E-06 3.39E-05	7.76E-05 1.05E-05 7.76E-05	1.55E-04 2.75E-05 - 051.55E-04	2.04E-04 4.32E-05 - 052.04E-04
0.510.5	7.01E-06 4.02E-05 - 064.02E-05	4.12E-09 8.51E-06	4.68E-07 1.38E-05	4.42E-05 3.39E-05 - 063.39E-05	7.24E-05 5.29E-05 7.24E-05	9.55E-05 2.24E-05 9.55E-05
0.71.50.7	2.76E-06 2.24E-05 - 062.24E-05	5.37E-10 4.57E-06	1.35E-07 7.41E-06	1.46E-05 1.82E-05 - 061.82E-05	5.25E-05 6.89E-05 - 063.89E-05	9.77E-05 5.50E-05 - 065.50E-05
124	1.32E-06 6.15E-06	1.26E-10 2.21E-06	5.13E-08 3.47E-06	6.17E-05 9.12E-06	2.63E-05 6.09E-06	4.90E-05 6.16E-06

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	05	06	06	06	05	05
31.5	4.17E-07 5.02E-06	1.16E-11 8.71E-07	9.12E-09 1.32E-06	1.60E-07 3.47E-06	8.13E-07 9.12E-06	1.68E-06 1.38E-05
52	7.81E-08 2.62E-06	3.94E-13 3.80E-07	7.08E-10 6.38E-07	2.40E-08 1.86E-06	1.35E-07 4.90E-06	3.31E-07 7.41E-06
73	2.23E-08 9.49E-07	3.63E-11 1.02E-07	1.10E-10 2.04E-07	4.90E-09 6.17E-07	3.63E-08 1.74E-06	9.55E-08 2.82E-06
105	5.16E-09 2.18E-07	1.46E-15 1.20E-08	1.29E-11 3.16E-08	7.85E-10 1.35E-07	7.94E-09 3.80E-07	2.24E-08 6.61E-07

a) Percentile

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**Table 2.5.2-13 (Sheet 4 of 7)
Mean and Fractile Rock Seismic Hazard Curves**

5 Hz Hazard Curves						
Amplitude^{a)}	7.28E-08	1.57E-09	6.92E-09	3.89E-08	1.26E-07	2.34E-07
10	MEAN^{b)}	0.05^{c)}	0.16^{c)}	0.5^{c)}	0.84^{c)}	0.95^{c)}
	02E-08	7.50E-11	9.33E-10	9.12E-09	3.89E-08	7.24E-08
0.001	2.50E-02	9.44E-03	1.48E-02	2.40E-02	3.39E-02	4.17E-02

a) Spectral acceleration in g

b) Percentile

c) 0.5 fractile = median

0.0015 Spectral acceleration in g

Percentile

0.5 fractile = median

Table 2.5.2-22 (Sheet 4 of 7)

Mean and Fractile Soil Seismic Hazard Curves at GMRS Elevation

5 Hz Hazard Curves						
Amplitude^(a)	2.07E-02	6.92E-03	1.12E-02	1.95E-02	2.95E-02	3.76E-02
MEAN^(b)	0.05^(c)	0.16^(c)	0.5^(c)	0.84^(c)	0.95^(c)	
0.0005	1.77E-02	5.62E-03	8.51E-03	1.70E-02	2.57E-02	3.39E-02
0.0020	1.12E-01	5.91E-02	7.38E-02	9.97E-02	1.66E-01	2.04E-01
0.005	1.38E-01	3.85E-02	6.46E-02	1.29E-01	2.09E-01	2.75E-01
0.007	1.38E-01	3.85E-02	6.46E-02	1.29E-01	2.09E-01	2.75E-01
0.01	9.36E-02	2.07E-02	3.98E-02	8.51E-02	1.48E-01	2.02E-01
0.015	6.91E-02	1.23E-02	2.63E-02	6.03E-02	1.12E-01	1.53E-01
0.02	4.96E-02	8.09E-03	1.82E-02	3.94E-02	7.6E-02	1.11E-01

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	02	02	02	02	027.62E-02	01
0.0020-01002	4.80E-033.87E-02	6.84E-041.48E-02	1.62E-032.00E-02	4.12E-033.03E-02	7.94E-036.25E-02	1.08E8.58E-02
0.0030-015003	3.04E-032.67E-02	3.55E-049.78E-03	8.71E-041.31E-02	2.63E-032.02E-02	4.90E-034.22E-02	7.16E-036.24E-02
0.0050-02005	2.10E-031.61E-02	2.19E-045.62E-03	5.04E-047.48E-03	1.74E-031.23E-02	3.47E-032.55E-02	5.25E-033.84E-02
0.0070-03007	1.21E-031.13E-02	1.10E-043.72E-03	2.34E-044.92E-03	1.00E8.04E-038.01E-03	2.00E-031.80E-02	3.02E-032.77E-02
0.010-0504	5.73E-047.55E-03	3.89E-052.46E-03	1.10E-043.24E-03	4.68E-045.50E-03	1.00E-031.20E-02	1.51E-031.87E-02
0.0150-07015	3.41E-044.64E-03	1.82E-051.46E-03	5.50E-052.00E-03	2.69E-043.32E-03	5.75E-047.06E-03	8.71E-041.12E-02
0.020-102	1.93E-043.21E-03	7.16E-061.00E-03	2.57E-051.41E-03	1.55E-042.32E-03	3.31E-044.79E-03	5.19E-047.60E-03
0.030-1503	9.86E-051.85E-03	2.07E-065.37E-04	1.20E-058.13E-04	8.04E-051.42E-03	1.78E-042.62E-03	2.60E-044.28E-03
0.050-205	6.04E-058.87E-04	7.85E-072.51E-04	6.46E-063.80E-04	5.13E-056.84E-04	1.10E-041.21E-03	1.60E-041.91E-03
0.070-307	2.88E-055.31E-04	1.78E-071.55E-04	2.82E-062.19E-04	2.24E-054.07E-04	5.13E-057.14E-04	8.04E-051.13E-03
0.10-54	1.04E-053.01E-04	2.48E-088.32E-05	8.71E-071.26E-04	7.16E-062.34E-04	1.95E-054.37E-04	3.16E-056.29E-04
0.150-745	4.98E-061.56E-04	6.03E-094.17E-05	36.31E-07056.31E-05	2.82E-061.18E-04	9.12E-062.51E-04	1.64E-053.56E-04
0.240-2	2.12E-069.65E-05	1.15E-092.40E-05	1.02E-073.63E-05	1.04E-067.24E-05	3.98E-061.55E-04	7.67E-062.19E-04
0.34-50.3	7.20E-074.83E-05	1.40E-101.12E-05	2.24E-081.70E-05	2.88E-073.63E-05	1.32E-067.76E-05	2.72E-061.10E-04
0.520-5	3.11E-071.92E-05	2.66E-113.98E-06	6.46E-096.03E-06	1.14E-071.48E-05	6.17E-073.16E-05	1.23E-064.79E-05
0.730-7	8.50E-081.00E-06	2.14E-121.86E-06	1.00E-092.82E-06	2.40E-087.94E-06	1.66E-071.70E-05	3.43E-072.57E-05

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	05	06	06	06	05	05
	1.34E-08 4.74E-06	5.69E-14 7.59E-07	6.31E-11 1.23E-06	2.54E-09 3.72E-06	2.57E-08 8.51E-06	5.69E-08 1.29E-05
151						
	3.43E-09 1.86E-06	3.59E-15 2.51E-07	6.92E-12 4.37E-07	5.19E-10 1.41E-06	5.62E-09 3.47E-06	1.38E-08 5.25E-06
1.571.5						
	7.09E-10 9.05E-07	9.55E-17 1.02E-07	5.75E-13 1.78E-07	6.76E-11 6.61E-07	9.33E-10 1.74E-06	2.63E-09 2.63E-06
102						

a. Percentile

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**Table 2.5.2-13 (Sheet 5 of 7)
Mean and Fractile Rock Seismic Hazard Curves**

2.5 Hz Hazard Curves						
Amplitude	2.95E-07	1.82E-08	4.17E-08	2.04E-07	5.75E-07	9.33E-07
5	MEAN	0.05	0.16	0.50	0.84	0.95
	5.97E-08	5.07E-12	4.27E-09	3.16E-08	1.18E-07	2.19E-07
0.0017	2.07E-02	6.92E-03	1.05E-02	1.95E-02	2.95E-02	3.89E-02
	1.84E-08	7.50E-14	4.52E-10	7.67E-09	3.63E-08	7.24E-08
0.0015	1.61E-02	4.73E-03	7.94E-03	1.53E-02	2.40E-02	3.06E-02
	4.70E-09	9.66E-19	2.75E-14	1.51E-09	9.12E-09	2.09E-08
0.002	1.32E-02	3.59E-03	6.46E-03	1.20E-02	1.95E-02	2.75E-02

a) Spectral acceleration in g

b) Percentile

c) 0.5 fractile = median

0.003 Spectral acceleration in g
Percentile

0.5 fractile = median

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Table 2.5.2-22 (Sheet 5 of 7)

Mean and Fractile Soil Seismic Hazard Curves at GMRS Elevation

2.5 Hz Hazard Curves						
Amplitude^(a)	9.47E-03 MEAN	2.37E-03 0.05^(b)	4.27E-03 0.16	8.22E-03 0.5^(c)	1.48E-02 0.84	2.09E-02 0.95
0.0005	5.77E-03 1.03E-01	1.19E-03 1.59E-02	2.29E-03 6.44E-02	4.90E-03 4.19E-02	9.77E-03 1.56E-01	1.38E-02 1.98E-01
0.0007	3.96E-03 8.06E-02	6.61E-04 1.13E-02	1.41E-03 4.58E-02	3.24E-03 3.07E-02	6.46E-03 1.28E-01	9.77E-03 1.70E-01
0.001	2.53E-03 6.06E-02	3.67E-04 7.17E-03	7.59E-04 3.24E-02	2.00E-03 2.10E-02	4.27E-03 9.86E-02	6.68E-03 1.36E-01
0.0015	1.45E-03 4.26E-02	1.66E-04 4.27E-03	3.55E-04 2.01E-02	1.07E-03 1.38E-02	2.63E-03 7.20E-02	3.98E-03 9.89E-02
0.002	9.44E-04 3.26E-02	9.23E-05 2.92E-03	2.04E-04 1.42E-02	7.08E-04 9.78E-03	1.62E-03 5.60E-02	2.63E-03 8.01E-02
0.003	4.98E-04 2.18E-02	3.63E-05 1.62E-03	8.91E-05 8.68E-03	3.55E-04 6.46E-03	8.13E-04 3.81E-02	1.41E-03 5.50E-02
0.005	2.11E-04 1.25E-02	1.08E-05 7.85E-04	2.95E-05 4.61E-03	1.45E-04 3.47E-03	3.55E-04 2.18E-02	5.96E-04 3.30E-02
0.007	1.16E-04 8.34E-03	4.27E-06 6.68E-04	1.29E-05 3.03E-03	8.32E-05 2.14E-03	2.04E-04 1.40E-02	3.43E-04 2.28E-02
0.01	6.00E-05 5.25E-03	1.46E-06 2.51E-04	5.62E-06 1.87E-03	4.47E-05 1.32E-03	1.02E-04 8.61E-03	1.78E-04 1.49E-02

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0.0150-0.015	2.74E-05 2.97E-03	3.94E-07 1.18E-04	2.14E-06 1.07E-03	1.82E-05 7.59E-04	5.13E-05 4.76E-03	8.61E-05 8.52E-03
0.020-0.02	1.52E-05 1.93E-03	1.30E-07 7.24E-05	1.00E-06 6.61E-04	15.01E-05 45.01E-04	2.95E-05 2.82E-03	4.96E-05 5.72E-03
0.030-0.03	6.36E-06 1.02E-03	2.75E-08 3.16E-05	3.55E-07 43.55E-04	3.72E-06 2.69E-04	1.29E-05 1.39E-03	2.24E-05 2.76E-03
0.050-0.05	1.92E-06 4.35E-04	3.02E-09 1.05E-05	6.31E-08 1.45E-04	8.71E-07 1.10E-04	3.47E-06 5.59E-04	7.41E-06 1.05E-03
0.070-0.07	8.14E-07 2.42E-04	6.17E-10 4.57E-06	1.59E-08 7.76E-05	3.09E-07 5.89E-05	1.62E-06 3.36E-04	3.24E-06 5.59E-04
0.100-0.10	3.04E-07 1.27E-04	8.91E-11 1.86E-06	2.82E-09 4.17E-05	8.04E-08 2.75E-05	6.17E-07 1.79E-04	1.23E-06 2.90E-04
0.150-0.15	8.92E-08 5.98E-05	8.51E-12 5.75E-07	3.55E-10 1.95E-05	2.02E-08 1.29E-05	1.78E-07 9.56E-05	3.67E-07 1.38E-04
0.200-0.20	3.46E-08 3.45E-05	1.32E-12 2.19E-07	5.89E-11 1.12E-05	6.46E-09 6.92E-06	6.31E-08 5.89E-05	1.35E-07 8.10E-05
0.300-0.30	7.92E-09 1.56E-05	6.31E-14 4.79E-08	4.90E-12 4.90E-06	9.66E-10 2.82E-06	1.12E-08 2.75E-05	3.06E-07 3.64E-05
0.500-0.50	9.75E-10 5.47E-06	7.85E-16 2.27E-10	1.35E-13 1.41E-06	5.69E-11 8.71E-07	1.23E-09 9.77E-06	3.59E-08 1.38E-05
0.700-0.70	2.09E-10 2.61E-06	2.09E-16 1.80E-12	9.12E-15 5.75E-07	7.16E-12 3.31E-07	2.51E-10 4.90E-06	7.59E-09 6.92E-06
100-100	3.53E-11 1.13E-06	8.61E-17 7.00E-14	8.91E-17 2.04E-07	7.59E-13 8.91E-08	3.16E-11 2.14E-06	1.26E-10 3.24E-06

a)Percentile

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**Table 2.5.2-13 (Sheet 6 of 7)
Mean and Fractile Rock Seismic Hazard Curves**

1 Hz Hazard Curves																									
Amplitude		1.5	3.99E-07		1.15E-15		4.79E-08		1.59E-08		8.13E-07		1.15E-06												
2		MEAN		1.7	0.05		1.46E		0.16		1.25E		0.57		7.24E		0.84		3.80E		0.95		5.37E		
				8E-07				-18				-08				11				-07				-07	
0.00053		1.68E-		025.15E-		034.04E-		038.91E-		021.88E-		021.10E-		021.66E-											
				08		29		11		14		07		07											
0.00075		1.32E-		028.85E-		034.20E-		032.07E-		025.07E-		021.82E-		023.16E-											
				09		29		15		29		08		08											
0.0017		9.93E-		032.44E-		034.20E-		034.32E-		034.28E-		024.90E-		029.77E-											
				09		29		17		29		09		09											
0.001510		6.96E-		035.53E-		034.20E-		033.55E-		034.20E-		021.07E-		022.46E-											
				10		29		19		29		09		09											
	0.002	5.28E-03		1.04E-03		2.00E-03		4.42E-03		8.51E-03		1.29E-02													

- a) 0.003 Spectral acceleration in g
b) Percentile
c) 0.5 fractile = median

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Table 2.5.2-22 (Sheet 6 of 7)

Mean and Fractile Soil Seismic Hazard Curves at GMRS Elevation

1 Hz Hazard Curves						
Amplitude^(a)	3.44E-03 MEAN	5.56E-04 0.05^(b)	1.15E-03 0.16	2.82E-03 0.5^(c)	5.62E-03 0.84	8.51E-03 0.95
0.00050-0.0005	1.88E-03 5.94E-02	2.34E-04 1.59E-02	5.01E-04 3.04E-02	1.41E-03 4.27E-02	3.24E-03 1.05E-01	5.07E-03 1.29E-01
0.00070-0.0007	1.20E-03 4.44E-02	1.18E-04 1.13E-02	2.69E-04 2.01E-02	8.13E-04 3.12E-02	2.14E-03 8.21E-02	3.47E-03 1.07E-01
0.00100-0.001	7.10E-04 3.19E-02	5.69E-05 7.17E-03	1.35E-04 1.32E-02	4.37E-04 2.16E-02	1.32E-03 5.70E-02	2.29E-03 7.91E-02
0.00150-0.0015	3.70E-04 2.14E-02	2.02E-05 4.27E-03	5.89E-05 8.10E-03	2.04E-04 1.41E-02	6.61E-04 3.94E-02	1.27E-03 5.71E-02
0.00200-0.002	2.24E-04 1.59E-02	9.12E-06 2.92E-03	2.95E-05 5.32E-03	1.18E-04 1.03E-02	4.07E-04 2.93E-02	7.85E-04 4.43E-02
0.00300-0.003	1.04E-04 1.02E-02	2.63E-06 1.62E-03	9.77E-06 2.84E-03	4.32E-05 6.22E-03	1.91E-04 1.87E-02	3.80E-04 2.93E-02
0.00500-0.005	3.66E-05 5.47E-03	5.01E-07 7.85E-04	2.14E-06 1.32E-03	1.38E-05 3.09E-03	5.89E-05 1.02E-02	1.30E-04 1.78E-02
0.00700-0.007	1.75E-05 3.49E-03	1.45E-07 4.68E-04	7.59E-07 7.09E-04	6.03E-06 1.80E-03	2.95E-05 6.12E-03	6.53E-05 1.19E-02
0.01000-0.01	7.68E-06 2.08E-03	3.63E-08 2.51E-04	2.34E-07 4.08E-04	2.63E-06 9.62E-04	1.48E-05 3.57E-03	3.16E-05 7.64E-03
0.01500-0.015	2.91E-06	5.82E-09	5.50E-08	7.59E-07	6.03E-06	1.29E-05

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	06 1.10E- 03	09 1.18E- 04	08 2.04E- 04	07 4.76E- 04	06 1.66E- 03	05 4.33E- 03
0.02 0.02	1.43E- 06 6.84E- 04	1.46E- 09 7.24E- 05	1.95E- 08 1.18E- 04	3.31E- 07 2.82E- 04	2.82E- 06 9.18E- 04	6.46E- 06 2.69E- 03
0.03 0.03	5.09E- 07 3.35E- 04	1.40E- 10 3.16E- 05	3.24E- 09 5.31E- 05	9.55E- 08 1.37E- 04	9.33E- 07 3.79E- 04	2.07E- 06 1.22E- 03
0.05 0.05	1.27E- 1.27E- 07 04	5.62E- 12 1.05E- 05	2.51E- 10 1.82E- 05	1.59E- 08 5.14E- 05	1.91E- 07 1.44E- 04	5.37E- 07 3.88E- 04
0.07 0.07	4.75E- 08 6.41E- 05	5.75E- 13 4.57E- 06	3.63E- 11 9.12E- 06	3.98E- 09 2.76E- 05	6.31E- 08 7.94E- 05	1.97E- 07 1.70E- 04
0.10 0.1	1.54E- 08 2.96E- 05	4.03E- 14 1.86E- 06	3.98E- 12 4.27E- 06	7.59E- 10 1.38E- 05	2.24E- 08 4.20E- 05	67.31E- 08 057.31 E-05
0.15 0.15	3.80E- 09 1.18E- 05	1.37E- 15 5.75E- 07	21.51E- 13 061.51 E-06	1.02E- 10 6.03E- 06	3.98E- 09 1.95E- 05	1.64E- 08 2.93E- 05
0.20 0.2	1.29E- 09 6.09E- 06	7.76E- 23 2.19E- 07	2.75E- 14 6.61E- 07	2.09E- 11 3.24E- 06	1.07E- 09 1.12E- 05	5.07E- 09 1.63E- 05
0.30 0.3	2.47E- 10 2.40E- 06	8.91E- 29 4.79E- 08	3.80E- 16 1.91E- 07	2.00E- 12 1.32E- 06	2.04E- 10 4.90E- 06	8.41E- 10 7.45E- 06
0.50 0.5	2.44E- 11 7.30E- 07	7.76E- 29 2.27E- 10	8.91E- 29 2.02E- 08	7.76E- 14 3.55E- 07	1.38E- 11 1.62E- 06	9.55E- 11 2.46E- 06

a) Percentile

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**Table 2.5.2-13 (Sheet 7 of 7)
Mean and Fractile Rock Seismic Hazard Curves**

0.5 Hz Hazard Curves						
Amplitude						
0.7	3.21E-07	1.80E-12	1.78E-10	1.26E-07	7.59E-07	1.15E-06
1	MEAN 1.27E-07	0.05 7.00E-14	0.16 1.48E-11	0.53 8.9E-08	0.84 2.88E-07	0.95 5.01E-07
0.0005	8.70E-03	2.21E-03	3.47E-03	7.41E-03	1.38E-02	1.95E-02
0.0007	4.01E-08	1.15E-15	1.97E-13	1.05E-08	2.61E-08	1.78E-07
0.001	6.55E-03	1.51E-03	2.63E-03	5.25E-03	1.05E-02	1.48E-02
0.0013	1.65E-08	1.46E-18	9.44E-15	3.24E-09	3.39E-08	2.76E-08
0.0015	4.76E-03	1.00E-03	1.86E-03	3.72E-03	7.41E-03	1.12E-02
0.0016	4.26E-09	4.04E-29	1.45E-16	4.07E-10	8.51E-09	2.16E-08
0.002	3.23E-03	5.56E-04	1.07E-03	2.46E-03	5.25E-03	7.94E-03
0.0027	6.28E-10	4.20E-29	2.88E-19	2.85E-11	1.15E-09	3.47E-09
0.003	2.40E-03	3.43E-04	7.08E-04	1.74E-03	3.98E-03	6.24E-03
0.0031	1.55E-10	4.20E-29	5.28E-29	4.27E-12	2.51E-10	8.71E-10
0.0031	1.52E-11	1.60E-29	3.31E-29	1.00E-13	2.82E-11	4.42E-10
0.005	3.12E-11	4.20E-29	5.28E-29	5.75E-13	4.47E-11	1.66E-10
0.005	8.01E-04	5.31E-05	1.10E-04	4.07E-04	1.62E-03	2.72E-03

- a) 0.007 Spectral acceleration in g
b) Percentile
c) 0.5 fractile = median

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Table 2.5.2-22 (Sheet 7 of 7)

Mean and Fractile Soil Seismic Hazard Curves at GMRS Elevation

0.5 Hz Hazard Curves						
Amplitude^(a)	5.00E-04	2.16E-05	5.13E-05	2.04E-04	9.33E-04	1.74E-03
	MEAN	0.0505^(b)	0.16	0.5^(c)	0.84	0.95
0.0010005	2.90E-04 3.34E-02	7.16E-06 6.96E-03	2.09E-05 1.28E-02	9.55E-05 2.31E-02	5.01E-04 6.08E-02	1.04E-03 8.54E-02
0.00150007	1.48E-04 2.43E-02	2.00E-06 4.59E-03	5.62E-06 7.86E-03	3.39E-05 1.72E-02	2.04E-04 4.53E-02	5.37E-04 6.67E-02
0.002001	8.81E-05 1.71E-02	7.08E-07 2.82E-03	2.29E-06 4.79E-03	1.70E-05 1.23E-02	1.10E-04 3.16E-02	2.99E-04 4.92E-02
0.0030015	4.02E-05 1.12E-02	1.50E-07 1.57E-03	6.61E-07 2.54E-03	6.03E-06 7.75E-03	4.79E-05 2.11E-02	1.22E-04 3.41E-02
0.005002	1.34E-05 8.24E-03	1.53E-08 1.00E-03	1.02E-07 1.55E-03	1.62E-06 5.26E-03	1.59E-05 1.57E-02	3.63E-05 2.59E-02
0.007003	5.99E-06 5.17E-03	2.46E-09 4.68E-04	2.75E-08 7.68E-04	5.75E-07 2.71E-03	6.03E-06 9.97E-03	1.64E-05 1.76E-02
0.01005	2.37E-06 2.73E-03	3.31E-10 1.66E-04	6.03E-09 2.89E-04	1.84E-07 1.12E-03	2.46E-06 5.27E-03	7.41E-06 1.04E-02
0.015007	7.57E-07 1.74E-03	3.06E-11 8.32E-05	8.71E-10 1.55E-04	4.32E-08 5.86E-04	8.13E-07 3.17E-03	2.63E-06 6.89E-03
0.0201	3.21E-07 1.04E-03	4.90E-12 2.89E-05	1.91E-11 7.25E-05	1.38E-09 2.87E-04	3.55E-08 1.71E-03	1.27E-07 4.39E-03
0.03015	9.15E-08 5.56E-04	2.69E-13 1.59E-05	1.295E-11 1.105E-05	3.02E-10 1.33E-04	1.02E-09 7.20E-04	3.80E-08 2.44E-03
0.0502	1.79E-08	3.72E-14	6.61E-12	3.31E-11	1.70E-10	7.76E-09

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	083.47E-04	158.51E-06	131.59E-05	107.44E-05	083.64E-04	081.51E-03
0.0.703	5.86E-09 1.74E-04	8.51E-18 3.02E-06	5.89E-14 6.03E-06	5.50E-11 3.41E-05	4.90E-09 1.48E-04	2.32E-08 6.21E-04
40.05	1.70E-09 7.08E-05	9.55E-29 7.08E-07	3.02E-15 1.74E-06	6.92E-12 1.20E-05	1.41E-09 5.47E-05	6.24E-09 1.68E-04
1.50.07	3.81E-10 3.70E-05	8.04E-29 2.19E-07	2.29E-24 6.61E-07	5.75E-13 5.62E-06	2.51E-10 2.82E-05	1.51E-09 7.02E-05
20.1	1.23E-10 1.70E-05	7.76E-29 5.69E-08	8.91E-29 2.19E-07	8.91E-14 4.46E-06	5.13E-11 1.39E-05	4.84E-10 2.86E-05
30.15	2.22E-11 6.24E-06	4.62E-29 5.43E-09	8.32E-29 4.79E-08	4.57E-15 5.59E-07	4.90E-12 6.03E-06	7.24E-11 1.05E-05
50.2	2.09E-12 2.86E-06	4.47E-29 5.55E-11	7.76E-29 1.05E-08	1.82E-16 3.55E-07	1.78E-13 3.47E-06	4.73E-12 5.77E-06
0.3	9.03E-07	1.27E-12	1.10E-10	1.18E-07	1.32E-06	2.83E-06
0.5	2.11E-07	8.22E-15	3.98E-12	1.95E-08	4.07E-07	9.34E-07
0.7	8.32E-08	5.56E-16	1.84E-13	3.47E-09	1.91E-07	4.22E-07
1	3.09E-08	4.04E-29	4.42E-15	3.67E-10	7.76E-08	1.78E-07
1.5	9.53E-09	4.04E-29	8.61E-17	4.17E-11	2.40E-08	5.50E-08
2	3.88E-09	4.04E-29	4.73E-18	8.51E-12	9.77E-09	2.40E-08
3	9.81E-10	4.20E-29	5.28E-29	1.00E-12	2.29E-09	6.03E-09
5	1.41E-10	4.20E-29	5.28E-29	4.17E-14	2.51E-10	9.33E-10
7	3.43E-11	4.20E-29	4.47E-29	4.12E-15	4.79E-11	2.19E-10
10	6.76E-12	4.20E-29	4.47E-29	2.19E-16	7.41E-12	4.17E-11

d) Spectral acceleration in g

e) Percentile

f) 0.5 fractile = median

Spectral acceleration in g

(b) Percentile

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0.5 fractile = median

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Table 2.5.2-23

Mean and Median UHRS Values for Rock Soil Seismic Hazard at Hope Creek (SA in g)

Frequency, Hz	Mean 10^{-4}	Mean 10^{-5}	Mean 10^{-6}
100 (PGA)	0.1239158	0.4869465	1.3450.958
25	0.3461313	1.3320.836	3.8951.59
10	0.2328360	0.84121.07	2.20717
5.0	0.1487366	0.50991.12	1.3252.48
2.5	0.07582174	0.2432543	0.64571.42
1.0	0.03063122	0.08916341	0.2301853
0.5	0.01864110	0.05649341	0.1359823
Frequency, Hz	Median 10^{-4}	Median 10^{-5}	Median 10^{-6}
100 (PGA)	0.1059133	0.3592415	0.8710837
25	0.2735254	0.9159756	2.3521.42
10	0.2111317	0.7134991	1.70296
5.0	0.1310316	0.43051.02	1.0112.29
2.5	0.06257146	0.2009479	0.47631.21
1.0	0.021350767	0.05699251	0.1371665
0.5	0.009786046 5	0.02461144	0.05850378

Mean and Median UHRS Values for Soil Seismic Hazard (SA in g)

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Frequency, Hz	Mean 10^{-4}	Mean 10^{-5}	Mean 10^{-6}
100 (PGA)	0.158	0.465	0.958
25	0.313	0.836	1.59
10	0.360	1.07	2.17
5.0	0.366	1.12	2.48
2.5	0.174	0.543	1.42
1.0	0.122	0.341	0.853
0.5	0.110	0.341	0.823
Frequency, Hz	Median 10^{-4}	Median 10^{-5}	Median 10^{-6}
100 (PGA)	0.133	0.415	0.837
25	0.254	0.756	1.42
10	0.317	0.991	1.96
5.0	0.316	1.02	2.29
2.5	0.146	0.479	1.21
1.0	0.0767	0.251	0.665
0.5	0.0465	0.144	0.378

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**Table 2.5.2-24
Calculation of Horizontal and Vertical GMRS**

Frequency (Hz)	Horizontal GMRS (g)	V/H Ratio	Vertical GMRS (g)
0.1	9.14E-03	0.75	6.86E-03
0.125	1.49E-02	0.75	1.12E-02
0.15	2.28E-02	0.75	1.71E-02
0.2	4.04E-02	0.75	3.03E-02
0.3	8.98E-02	0.75	6.74E-02
0.4	1.42E-01	0.75	1.07E-01
0.5	1.60E-01	0.75	1.20E-01
0.6	1.54E-01	0.75	1.16E-01
0.7	1.50E-01	0.75	1.12E-01
0.8	1.53E-01	0.75	1.15E-01
0.9	1.60E-01	0.75	1.20E-01
1	1.72E-01	0.75	1.29E-01
1.25	1.97E-01	0.75	1.48E-01
1.5	2.20E-01	0.75	1.65E-01
2	2.45E-01	0.75	1.84E-01
2.5	2.59E-01	0.75	1.94E-01
3	2.84E-01	0.75	2.13E-01
4	4.17E-01	0.75	3.13E-01
5	5.26E-01	0.75	3.95E-01
6	5.67E-01	0.79	4.45E-01
7	5.72E-01	0.81	4.66E-01
8	5.59E-01	0.84	4.70E-01
9	5.39E-01	0.86	4.65E-01
10	5.23E-01	0.88	4.62E-01
12.5	5.17E-01	0.93	4.79E-01
15	5.11E-01	0.96	4.91E-01
20	4.63E-01	1.02	4.71E-01
25	4.13E-01	1.06	4.37E-01
30	3.66E-01	1.09	4.01E-01
35	3.32E-01	1.12	3.73E-01
40	3.02E-01	1.15	3.47E-01
45	2.81E-01	1.15	3.23E-01
50	2.67E-01	1.15	3.07E-01
60	2.45E-01	1.15	2.81E-01
70	2.33E-01	1.15	2.68E-01
80	2.28E-01	1.15	2.62E-01
90	2.26E-01	1.15	2.60E-01
100	2.25E-01	1.15	2.59E-01

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**Table 2.5.2-24
Calculation of Horizontal and Vertical GMRS**

Frequency	1E-5 UHRS, g	GMRS, g	V/H ratio	Vertical GMRS, g
100	4.00E-01	1.80E-01	4	1.80E-01
90	4.03E-01	1.81E-01	4	1.81E-01
80	4.07E-01	1.83E-01	4	1.83E-01
70	4.16E-01	1.87E-01	4	1.87E-01
60	4.34E-01	1.96E-01	4	1.96E-01
50	4.72E-01	2.13E-01	4	2.13E-01
45	4.99E-01	2.25E-01	4	2.25E-01
40	5.40E-01	2.42E-01	4	2.42E-01
35	5.99E-01	2.69E-01	4	2.69E-01
30	6.71E-01	3.03E-01	4	3.03E-01
25	7.75E-01	3.48E-01	4	3.48E-01
20	8.79E-01	3.89E-01	4	3.89E-01
15	9.42E-01	4.20E-01	4	4.20E-01
12.5	9.36E-01	4.20E-01	4	4.20E-01
10	8.99E-01	4.10E-01	4	4.10E-01
9	9.22E-01	4.13E-01	0.96	3.97E-01
8	9.29E-01	4.17E-01	0.92	3.84E-01
7	9.23E-01	4.14E-01	0.87	3.61E-01
6	8.77E-01	3.96E-01	0.82	3.23E-01
5	8.17E-01	3.60E-01	0.75	2.70E-01
4	6.29E-01	2.84E-01	0.75	2.13E-01
3	3.96E-01	1.78E-01	0.75	1.33E-01
2.5	3.20E-01	1.45E-01	0.75	1.09E-01
2	2.91E-01	1.31E-01	0.75	9.79E-02
1.5	2.46E-01	1.09E-01	0.75	8.19E-02
1.25	2.07E-01	9.27E-02	0.75	6.95E-02
1	1.59E-01	7.34E-02	0.75	5.51E-02
0.9	1.44E-01	6.47E-02	0.75	4.85E-02
0.8	1.24E-01	5.63E-02	0.75	4.23E-02
0.7	1.09E-01	4.92E-02	0.75	3.69E-02
0.6	9.88E-02	4.44E-02	0.75	3.33E-02
0.5	9.05E-02	4.07E-02	0.75	3.05E-02
0.4	7.97E-02	3.58E-02	0.75	2.69E-02
0.3	5.15E-02	2.31E-02	0.75	1.73E-02
0.2	2.26E-02	1.05E-02	0.75	7.85E-03
0.15	1.24E-02	5.60E-03	0.75	4.20E-03
0.125	8.04E-03	3.63E-03	0.75	2.72E-03
0.1	4.90E-03	2.21E-03	0.75	1.65E-03

Note: Light-gray cells indicate high frequency controlling earthquakes and dark-gray cells indicate low frequency controlling earthquakes.