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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SEISMIC HAZARD REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION
CALLAWAY PLANT, UNIT 1
DOCKET NO. 50-483

1.0 Overview

This report provides the U.S. Nuclear Regulatory Commission (NRC) staff's updated seismic hazard curves and response spectra for the Callaway Energy Center, Unit 1 plant (Callaway) site that are based on the implementation of (1) a new seismic ground motion model for the central and eastern United States (CEUS) and (2) recent advances in site response analysis. The NRC staff's updated hazard curves (i.e., tables A-1 through A-30) are included in appendix A to this report.

2.0 Background

In response to the March 11, 2011, Great East Japan Earthquake and tsunami, which triggered an accident at the Fukushima Dai-ichi nuclear power plant, the NRC established the Near-Term Task Force (NTTF) to conduct a systematic and methodical review of NRC processes and regulations and determine whether the agency should make additional improvements to its regulatory system. In SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated July 12, 2011 (NRC, 2011), the NRC staff recommended actions to clarify and strengthen the regulatory framework for protection against natural hazards. In particular, NTTF Recommendation 2.1 (NTTF R2.1) instructed the NRC staff to issue requests for information to all power reactor licensees pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) ("50.54(f) letter" (NRC, 2012)). Enclosure 1 to the 10 CFR 50.54(f) letter requested that addressees reevaluate the seismic hazards at their sites, using present day NRC requirements and guidance to perform a probabilistic seismic hazard analysis (PSHA) and develop a site-specific ground motion response spectrum (GMRS). To comply with the 10 CFR 50.54(f) request, the Nuclear Energy Institute submitted Electric Power Research Institute (EPRI) Report 1025287, "Seismic Evaluation Guidance: Screening, Prioritization, and Implementation Details (SPID) for the Resolution of Fukushima NTTF Recommendation 2.1 Seismic," dated November 27, 2012 (EPRI, 2012). Recipients of the 10 CFR 50.54(f) letter committed to following the SPID to develop seismic hazard and screening reports (SHSRs). By December 2017, the NRC staff had finished assessing the SHSRs for all operating U.S. nuclear power plants.

Under the process for the ongoing assessment of natural hazards information (POANHI), described in SECY-16-0144, "Proposed Resolution of Remaining Tier 2 and 3 Recommendations Resulting from the Fukushima Dai-ichi Accident," dated December 26, 2016 (NRC, 2016), the NRC staff continuously seeks out and integrates new natural hazards information for operating plants in the United States. The Office of Nuclear Reactor Regulation's Office Instruction LIC-208, "Process for the Ongoing Assessment of

Natural Hazards Information," issued November 2019 (NRC, 2019), provides guidance to the staff on how to collect, integrate, and evaluate new information for consideration in its regulatory decision-making. This report presents the NRC staff's latest understanding of seismic hazards at the Callaway site following the POANHI framework.

The Callaway site is located in central Missouri near the city of Fulton within the Central Lowland physiographic province and is underlain by fill material overlying sedimentary rock.

3.0 Motivation

After evaluating the SHSR submittals, the NRC staff captured in NUREG/KM-0017, "Seismic Hazards Evaluations for U.S. Nuclear Power Plants: Near-Term Task Force Recommendation 2.1 Results," issued December 2021 (Munson et al., 2021), the information used to develop the GMRS at each of the U.S. nuclear power plants. This includes a compilation and synthesis of (1) information provided by licensees in their SHSRs, (2) information collected by the NRC staff during its reviews of the SHSRs, and (3) information subsequently collected by the NRC staff from the scientific and engineering literature pertaining to several of the nuclear power plant sites. In addition, NUREG/KM-0017 includes updated approaches and relationships, relative to those recommended by the SPID, that the NRC staff used to perform its analyses.

After the development of NUREG/KM-0017, a new Senior Seismic Hazard Analysis Committee (SSHAC) Level 3 ground motion model (GMM) for Eastern North America called NGA-East was published by Goulet et al. (2018). In addition, the NRC staff also participated in a SSHAC Level 2 study, documented in Research Information Letter (RIL 2021-15), "Documentation Report for SSHAC Level 2: Site Response," issued November 2021 (Rodriguez-Marek et al., 2021). This SSHAC Level 2 study implemented the SSHAC approach to performing SRAs. The SSHAC process, described most recently in NUREG-2213, "Updated Implementation Guidelines for SSHAC Hazard Studies," issued October 2018 (Ake et al., 2018), provides a structured and logical framework for the systematic evaluation of alternative data, models, and methods. This seismic hazard report for the Callaway site incorporates the NGA-East GMM in place of the EPRI (2013) GMM and lessons learned from the SSHAC Level 2 SRA study (RIL 2021-15) into a PSHA to develop updated seismic hazard curves and a GMRS for the site.

4.0 Methods

4.1 Reference Rock Hazard

For the reference rock PSHA, the NRC staff used the distributed seismicity zones (DSZs) from the SSHAC Level 3 Central and Eastern United States Seismic Source Characterization for Nuclear Facilities (CEUS-SSC) model in NUREG-2115, "Central and Eastern United States Seismic Source Characterization for Nuclear Facilities, issued January 2012 (NRC, 2012). Specifically, the NRC staff selected the DSZs that are located within 500 kilometers of the site. For this reevaluation, the NRC staff used the SSHAC Level 2 update to the CEUS-SSC seismicity catalog and recurrence parameters (Gatlin, 2015), which primarily impacts sites close to the 1886 Charleston earthquake sequence. For the Callaway site, the NRC staff selected the New Madrid/Reelfoot Rift and Wabash CEUS-SSC repeated large-magnitude earthquake (RLME) sources, which are the RLME sources that are within 1,000 kilometers of the site. To develop the reference rock seismic hazard curves for the site, the NRC staff used the NGA-East GMM (2018) to compute the median and logarithmic standard deviation of the spectral accelerations. Because the NGA-East GMM implements the rupture distance

parameter, the NRC staff developed virtual rupture planes for each of the distributed source zones surrounding the site. For each virtual rupture, the NRC staff used the CEUS-SSC hazard input document (NRC, 2012) to specify the size of the rupture plane and the orientation of the rupture plane in terms of the strike and dip angles, dip direction, and rupture type (e.g., reverse and strike slip). In contrast, to develop the hazard curves for NUREG/KM-0017, the NRC staff used point source approximations for the CEUS-SSC and EPRI GMM (EPRI, 2013) combination.

Figure 1 in section 8 shows the distribution of the virtual ruptures for one of the four alternative CEUS-SSC seismotectonic DSZ configurations along with the resulting 10-Hertz (Hz) mean hazard curves developed using the NGA-East GMM. In particular, figure 1 shows the distribution of the surface projection of the updip segments of the virtual rupture planes for each of the four seismotectonic DSZs within 500 kilometers of the site. As expected, the Midcontinent Craton—A Configuration (MIDC—A) source zone, which surrounds the site, is the largest contributor to the 10 Hz reference rock mean hazard curves at the 10^{-4} annual frequency of exceedance (AFE) level. Similarly, figure 2 shows the distribution of the virtual ruptures for one of the three alternative CEUS-SSC maximum-magnitude DSZ configurations along with the resulting 10 Hz mean hazard curves developed using the NGA-East GMM. The Non-Mesozoic-and-Younger Extension—Narrow Configuration (NMESE—N) source zone, which surrounds the site, is the largest contributor to the 10 Hz reference rock mean hazard curves at the 10^{-4} AFE level. Figure 3 shows that the New Madrid RLME source, which is about 300 kilometers from the site, is the largest contributor to the 1 Hz reference rock mean hazard curves at the 10^{-4} AFE level. Figure 4 shows the contribution from all the DSZs relative to the RLME sources, as well as the total mean hazard for the 1 and 10 Hz mean reference rock hazard curves, from using the NGA-East GMM. For both the 1 and 10 Hz mean reference rock hazard curves, the RLME sources provide the largest contribution at the 10^{-4} AFE level. Finally, figure 5 shows the mean 1,000-, 10,000-, and 100,000-year return period mean reference rock uniform hazard response spectra (UHRS) for the Callaway site from using the EPRI GMM (blue) and the NGA-East GMM (red). For this reevaluation, the NRC staff used the NGA-East single station standard deviation and for the comparison shown in figure 5, the NRC staff used the EPRI GMM ergodic standard deviation. As shown in figure 5, the spectral accelerations from using the NGA-East GMM are higher than those from using the EPRI GMM, up to the spectral frequency of about 25 Hz. This result is expected because, as shown in figure 4, the largest contributors to the hazard for the Callaway site are from the RLMEs. As described in section 14.2.1 of NGA-East (2018), the differences between the NGA-East GMM and EPRI GMM ground-motion predictions at the larger magnitudes generated by the RLMEs increase with increasing source-to-site distances. The Callaway site is located at a distance of about 300 km to the western edge of the New Madrid RLME source (see figure 3).

4.2 Site Response Analysis

SRAs, which are used to develop site adjustment (or amplification) factors (SAFs) depend on several factors, including the site strata (material type, stiffness, and thickness) and their response to dynamic loading. Because this information is site specific, the ability to accurately model the site response depends on the quantity and quality of site-specific geologic and geotechnical data available, and on the interpretation and use of these data to develop input models for assessing amplification (or deamplification) of ground motions. The resulting SAFs are assessed for a wide range of input ground motions as part of understanding the changes in the soil and rock response as input ground motions increase.

The NRC staff followed the site response approach described in RIL 2021-15, which uses a logic tree for systematically identifying and propagating epistemic uncertainties in the SRA. As described in RIL 2021-15, to produce a truly probabilistic estimate of the seismic hazard at the control point elevation, it is necessary to estimate both the epistemic uncertainties and the aleatory variability of the soil and or rock dynamic response, and to propagate these through the SRA and the calculation of the site hazard curves.

4.2.1 Site Exploration

As described in the NTTF R2.1 SHSR submitted by Ameren Missouri (Ameren; Neterer, 2014) and summarized in section 2.5.2 of NUREG/KM-0017, the site investigations for Callaway consist of geophysical field investigations using seismic refraction surveys carried out for Unit 1 and multiple downhole, cross hole, suspension logging and refraction surveys carried out for the now withdrawn Combined Operating License for Unit 2 (Unistar, 2009).

4.2.2 Base Case Profiles

The Callaway site consists of about 9 meters (m) of backfill overlying a thick sequence of sedimentary rock. Ameren stated in its NTTF R2.1 seismic probabilistic risk assessment (SPRA; Banker, 2020) that the foundation materials for the Category 1 plant structures are either engineered backfill or sedimentary rock. For its NTTF R2.1 SPRA, Ameren selected the site ground surface elevation (256 m above mean sea level) as the control point for its site response analysis. For the engineered backfill Ameren estimated a shear wave velocity (V_S) of 411 meters/second (m/sec) and for the underlying sedimentary rock Ameren used the V_S measured from the geophysical surveys performed for proposed Unit 2 (Unistar, 2009). These measurements carried out for the proposed Unit 2 extend to a depth of about 107 m below grade. For the uppermost layer beneath the backfill, which consists of 8.5 m of cherty clay, sandstone, and sandy chert conglomerate, the Ameren measured a V_S of 712 m/sec. Beneath the conglomerate layer are Mississippian- to Devonian-age sedimentary rock formations, which are primarily limestone, sandstone, and shale. Ameren divided these sedimentary rock formations into three layers with thicknesses of 1.3, 3.2, and 6.0 m and V_S of 1235, 1843, and 1132 m/sec, respectively. For the underlying 22 m of Ordovician-age sedimentary rock, which is primarily limestone and dolomite, Ameren measured V_S of 2233 and 1372 m/sec and for the remaining 611 m of Ordovician- and Cambrian-age sedimentary rock, Ameren assumed a constant V_S of 2536 m/sec.

The NRC staff used the V_S values and layer thicknesses from the SPRA performed by Ameren (Banker, 2020), which were updated from its earlier SHSR submittal (Neterer, 2014).

For its NTTF R2.1 SHSR, Ameren developed lower, best-estimate, and upper median V_S basecase profiles in order to capture the uncertainty in V_S across the Callaway site. For the lower basecase profile, Ameren used a scale factor of 0.80 and for the upper basecase profile, Ameren used a scale factor of 1.25. In contrast, for its NTTF R2.1 SPRA Ameren developed two basecase profiles (lower and best-estimate) for the 9 m of backfill and then used only a single best-estimate basecase profile for the upper 50 m of sedimentary rock. For the lowest 611 m of sedimentary rock in the profile, Ameren developed lower, best-estimate, and upper median V_S basecase profiles.

Consistent with the NRC staff's effort to capture a range of uncertainty in V_S (RIL 2021-15), the NRC staff developed lower and upper basecase profiles by multiplying its best-estimate basecase profile by scale factors of 0.83 and 1.21, respectively, which corresponds to an

epistemic logarithmic standard deviation of 0.15. The weights for the lower, best-estimate, and upper basecase profiles are 0.3, 0.4, and 0.3, respectively. Figure 6 shows the three lower, best-estimate, and upper basecase profiles used by the NRC staff, which extend to a depth of 661 m below the control point elevation, at which point the V_S is assumed to reach the reference rock V_S for the NGA-East GMM (3000 m/sec).

4.2.3 Site Kappa

To estimate the site kappa (κ_0), which captures the overall attenuation (i.e., intrinsic and scattering attenuation) of the geologic profile, the NRC staff used the four Q_{ef}-V_S models from Campbell (2009), where Q_{ef} is the effective quality factor of shear waves, which captures both the frequency-independent component of intrinsic attenuation and small-scale scattering. For each of the four Q_{ef}-V_S models, the NRC staff estimated a Q_{ef} for each layer in the basecase profiles, then used the estimated Q_{ef}, V_S, and layer thickness to determine a κ_0 for each layer. Summing these κ_0 values for each layer and adding the reference value of 6 milliseconds (msec) provides an estimate of the total κ_0. The NRC staff used a weight of 0.25 for each of the four Q_{ef}-V_S models. Assuming a lognormal distribution for κ_0 with a logarithmic standard deviation of 0.2 from Xu et al. (2020), the NRC staff developed a nine-point discrete distribution. This results in 45 κ_0 values and associated weights for each of the basecase profiles, which the NRC staff then resampled using the approach from Miller and Rice (1983) to reduce the distribution to five representative values and associated weights. These five κ_0 values and weights, which are listed in Table 1, range from 7 msec to 20 msec for the three basecase profiles.

4.2.4 Nonlinear Dynamic Properties

For the equivalent linear (EQL) SRA, nonlinearity is incorporated using strain-compatible site properties (i.e., shear modulus and damping ratio) for each layer. The strain-compatible properties model both the shear modulus reduction and the increased damping that are expected as the intensity of shaking increases. To model the nonlinear response within the uppermost 9-meter-thick backfill layer in the profile, the NRC staff used the EPRI sand modulus reduction and damping (MRD) curves (EPRI, 1993) as one alternative and the Peninsular Range curves (Silva et al., 1997) as the other alternative with each receiving a weight of 0.5. For the underlying layers of sedimentary rock down to a depth of 50 m below the control point, the NRC staff used the EPRI rock MRD curves (EPRI, 1993) as one alternative and assumed linear behavior as the other alternative with each alternative receiving a weight of 0.5. For the remaining 611 m of sedimentary rock, the NRC staff assumed that the rock behaves linearly under seismic loading.

Table 2 provides the layer depths, lithologies, V_S, unit weights, and dynamic properties for the NRC staff's three basecase profiles. It is important to note that the NRC staff has adjusted the critical damping ratio values in each of the layers of the profiles, which are treated as having a linear response, so that each profile as a whole has the appropriate κ_0 value. Figure 7, which shows tornado plots for the reference rock peak ground acceleration (PGA) value of 0.76 g, shows the site response logic tree nodes that contribute to the variance of the SAF. Each tornado plot in Figure 7 is associated with one of the four oscillator frequencies of 1, 5, 10, and 100 Hz. For each of the oscillator frequencies except for 100 Hz, the epistemic uncertainty in the basecase V_S contributes the most to the variance in the SAF. For 100 Hz, the uncertainty in κ_0 contributes the most to the variance in the SAF.

4.2.5 Input Motions

Input motions used for the SRA were generated as outcrop motions at the reference rock horizon, located at the bottom of the basecase profiles. The NRC staff used random vibration theory to generate the input motions after first developing an input Fourier amplitude spectrum (FAS) using seismological source theory (i.e., single-corner frequency Brune source spectrum). To develop the FAS, the NRC staff used the source and regional attenuation parameters recommended in the SPID for Eastern North American rock sites and then used random vibration theory to develop corresponding 5 percent damped acceleration response spectra. The NRC staff developed 12 input FAS assuming a magnitude ($\boldsymbol{M}$) of 6.5 and 12 different source-to-site distances, as recommended in the SPID.

4.2.6 Analysis Methodology

To develop SAFs for the Callaway site, the NRC staff used traditional EQL analysis and the recently developed kappa-corrected EQL analysis, which adjusts the high-frequency control point (i.e., top of profile) FAS from the EQL SRA to be consistent with the target κ_0 value. In particular, the NRC staff used the kappa-corrected EQL analysis methodology (Xu and Rathje, 2021) with the modification in which the EQL control point FAS remains unmodified below a specified transition frequency, and then a slope equal to the target κ_0 value is imposed at frequencies above the transition frequency (RIL 2021-15). To capture the uncertainty in this transition frequency value, the NRC staff selected three frequencies for which the FAS amplitude equals 5 percent, 11 percent, and 17 percent of its peak value, with weights of 0.2, 0.6, and 0.2, respectively.

To capture the spatial variability in site properties across the site, the NRC staff generated randomized V_S profiles around each of the basecase profiles using the Toro (1995) model, which quantifies the aleatory variability through a depth-dependent standard deviation of the natural log of the velocities. The logarithmic standard deviation values used by the NRC staff for the Callaway site were based on site-specific data and are shown in Table 2. In addition to randomizing the V_S profiles, the NRC staff also randomized the MRD curves following the logit function approach used in the SPID and described in RIL 2021-15.

For each terminal branch of the site response logic tree, the NRC staff developed 60 randomized profiles and then determined the SAF by dividing the computed control point response spectrum by the outcrop response spectrum for the reference condition. Next, the NRC staff computed a median and logarithmic standard deviation for the SAF, using the 60 SAFs from the randomized profiles, for each terminal branch of the logic tree. To facilitate implementing the SAF medians and logarithmic standard deviations into the PSHA seismic hazard integral, the NRC staff reduced the median SAFs from the over 200 logic tree terminal branches to seven discrete fractiles and weights using the resampling procedure outlined by Miller and Rice (1983). As recommended by Rodriguez-Marek et al. (2021), to ensure that the SRA captures enough epistemic uncertainty in the median SAF, the NRC staff implemented a minimum logarithmic standard deviation value of 0.15, which causes the seven median SAF fractiles to spread apart if necessary.

Finally, because the SAF logarithmic standard deviation for each spectral frequency does not vary significantly across the terminal branches of the logic tree, the NRC staff used a single mean value for each frequency. In addition, to avoid double-counting the aleatory variability

already captured by the GMM, the NRC staff adjusted the SAF logarithmic standard deviation to include only the portion of the standard deviation associated with the nonlinear site response.

Figure 8 shows the seven median SAF values (top) and the average logarithmic standard deviation (bottom) as a function of input reference rock spectral acceleration for the 1 and 10 Hz spectral frequencies. As shown in Figure 8, the 1 Hz median SAFs range from about 1 to 2 and remain constant with higher input spectral accelerations. In contrast the 10 Hz median SAFs start at about 3 and fall off to 1 with higher input spectral accelerations. The lower half of Figure 8 shows both the total and the nonlinear values of the SAF logarithmic standard deviation, the latter of which are implemented into the PSHA hazard integral. Figure 9 shows the seven median SAF values versus frequency at the 10^{-4} AFE spectral acceleration value for each of the 23 NGA-East GMM spectral frequencies as well as for PGA, which is plotted at 200 Hz. Overall, the Callaway site produces a moderate amplification peak of about 3 around 6 Hz.

4.3 Control Point Hazard and Ground Motion Response Spectra

The NRC staff calculated the mean control point hazard for the Callaway site using Convolution Approach 3 from NUREG/CR-6728, "Technical Basis for Revision of Regulatory Guidance on Design Ground Motions: Hazard- and Risk-Consistent Ground Motion Spectra Guidelines," issued October 2001 (McGuire et al., 2001), which convolves the predetermined mean reference condition hazard with the SAFs. For each NGA-East GMM spectral frequency, the NRC staff convolved the mean reference condition hazard curve with the seven SAFs to determine the final mean control point hazard. Using the mean control point hazard curves, the NRC staff then determined the 10^{-4} and 10^{-5} uniform hazard response spectra in order to calculate the final GMRS. Table 3 shows the 10^{-4} and 10^{-5} UHRS and the GMRS spectral acceleration values for the Callaway site. Figure 10 shows the GMRS (red curve) compared to the GMRS (blue curve) developed by Ameren for its SPRA (Banker, 2020). As shown in figure 10, the final GMRS from this study is similar in shape but higher than the Ameren SPRA GMRS up to about 25 Hz and then lower out to 100 Hz. As described above in Section 4.1, these higher spectral accelerations are due to the differences between the NGA-East GMM and EPRI GMM ground-motion predictions at the larger earthquake magnitudes generated by the New Madrid RLME, which are the primary contributor to the hazard for the Callaway site. The narrower peak for the Ameren SPRA GMRS from 5 to 10 Hz relative to the broader peak for the GMRS developed by this study is due to the single basecase median V_S profile used by Ameren for the sedimentary rock down to a depth of 50 m. As described above in Section 4.2.2, the NRC staff developed lower, best-estimate, and upper median V_S basecase profiles from the top to the bottom of the profile in order to capture the uncertainty in V_S across the Callaway site.

5.0 Data Tables

Appendix A provides the data tables for the Callaway site. Tables A-1, A-2, and A-3 give the reference rock mean hazard curves for 23 spectral frequencies ranging from 0.1 to 100 Hz and for PGA. Tables A-4 through A-27 give the SAF medians and logarithmic standard deviations for the 23 spectral frequencies and for PGA. Tables A-28, A-29, and A-30 give the control point hazard mean hazard curves for the 23 spectral frequencies and for PGA.

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7.0 Principal Contributors

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8.0 Tables 1 Through 3 and Figures 1 Through 10

Table 1 Site Kappa (κ_0) Values for Callaway

Kappa Distributions for Base Case Profiles					
Lower Case		**Base Case**		**Upper Case**	
***k₀* (sec)**	**Weight**	***k₀* (sec)**	**Weight**	***k₀* (sec)**	**Weight**
0.010	0.101	0.009	0.101	0.007	0.101
0.012	0.244	0.011	0.244	0.009	0.244
0.014	0.309	0.013	0.309	0.011	0.309
0.016	0.244	0.015	0.244	0.013	0.244
0.020	0.101	0.019	0.101	0.015	0.101

Table 2 Layer Depths, Shear Wave Velocities (V_S), Unit Weights, and Dynamic Properties for Callaway

		Vs (m/s)			*Vs*	Unit	Dynamic Properties	
Layer #	Depth (m)	LR (0.3)	BC (0.4)	UR (0.3)	Sigma (ln)	Weight (kN/m^3)	Alt. 1 (0.5)	Alt. 2 (0.5)
1	9	339	411	499	0.20	16	EPRI Sand	Peninsular
2	18	587	712	863	0.15	16	EPRI Rock	Linear
3	19	1019	1235	1497	0.15	22	EPRI Rock	Linear
4	22	1520	1843	2233	0.15	24	Linear	Linear
5	28	934	1132	1372	0.15	24	Linear	Linear
6	40	2102	2548	2830	0.15	24	Linear	Linear
7	50	1748	2118	2567	0.15	24	Linear	Linear
8	669	2092	2536	2830	0.15	28	Linear	Linear

LR = lower range; BC = basecase; UR = upper range; ln = natural log; Alt. = Alternative
EPRI Sand or Rock = EPRI (1993) and Peninsular = Silva et al., 1997
For LR, BC, UR and Alt.: Values in parentheses refer to weights for site response analysis logic tree branches.

Table 3 GMRS and UHRS for Callaway

Frequency(Hz)	UHRS1E-4(g)	GMRS(g)	UHRS1E-5(g)
0.100	0.01953	0.02150	0.04165
0.133	0.02800	0.03050	0.05891
0.200	0.04357	0.04700	0.09074
0.250	0.05580	0.06030	0.11652
0.333	0.08325	0.08930	0.17207
0.500	0.13371	0.14410	0.27798
0.667	0.16700	0.18820	0.36712
1.000	0.22699	0.25660	0.50113
1.333	0.26662	0.30140	0.58862
2.000	0.35411	0.40160	0.78481
2.500	0.44084	0.51540	1.01483
3.333	0.61480	0.71290	1.40089
4.000	0.80360	0.88680	1.72120
5.000	1.04958	1.04960	1.98466
6.667	1.23467	1.23470	2.29080
10.000	1.12132	1.16980	2.23884
13.333	0.93090	1.00880	1.94916
20.000	0.78482	0.87490	1.70236
25.000	0.66189	0.76150	1.49340
33.333	0.54188	0.62300	1.22162
40.000	0.45822	0.53470	1.05233
50.000	0.39390	0.44300	0.86380
100.000	0.36435	0.38680	0.74359
200.000	0.41452	0.42990	0.82155

Figure 1 Distribution of Virtual Ruptures (Left) for CEUS-SSC Seismotectonic Configuration 1 DSZs, and Associated Mean 10 Hz Reference Rock Hazard Curves (Right) for Callaway

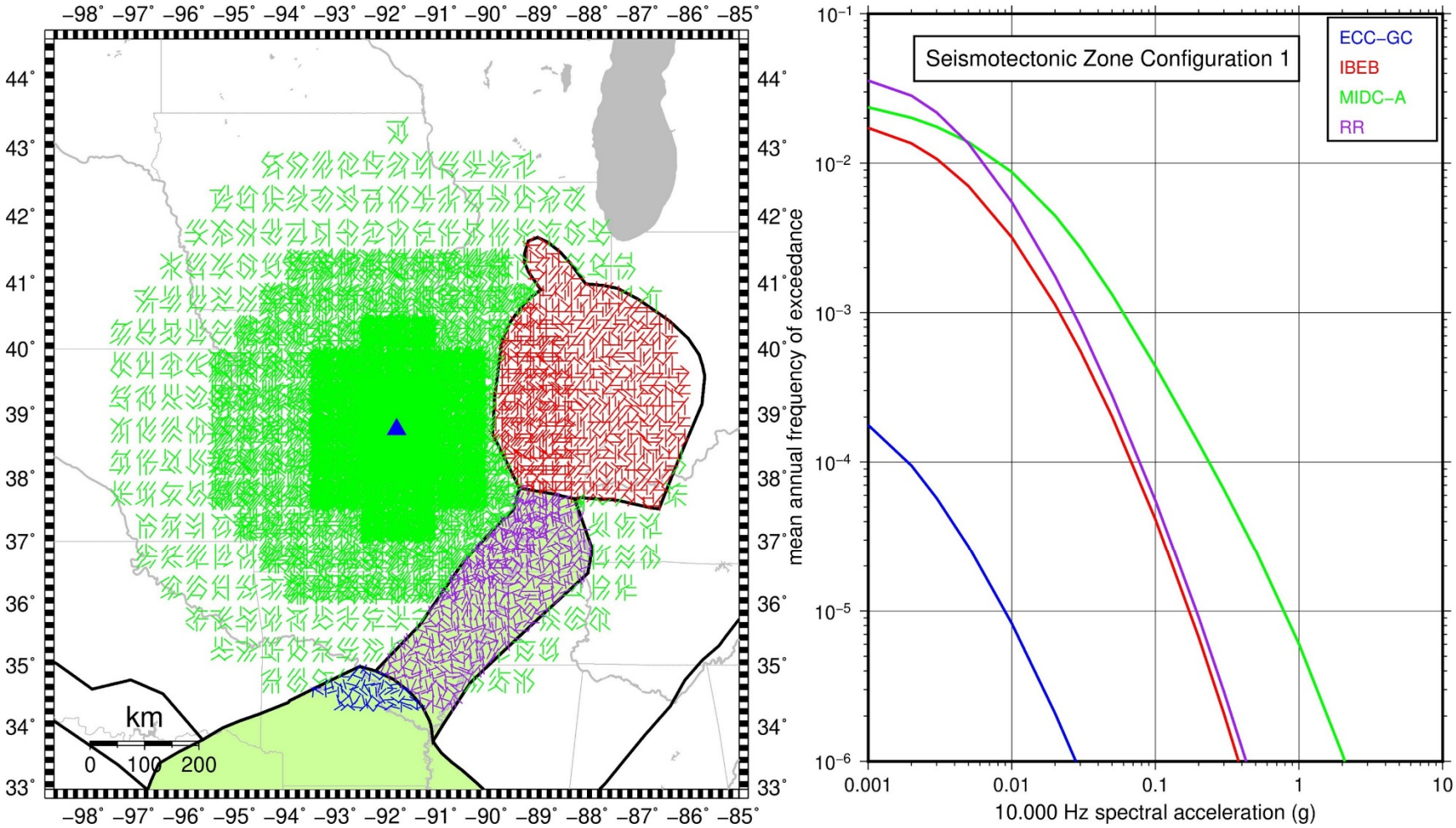


Figure 2 Distribution of Virtual Ruptures (Left) for CEUS-SSC Maximum-Magnitude Narrow-Configuration DSZs, and Associated Mean 10 Hz Reference Rock Hazard Curves (Right) for Callaway

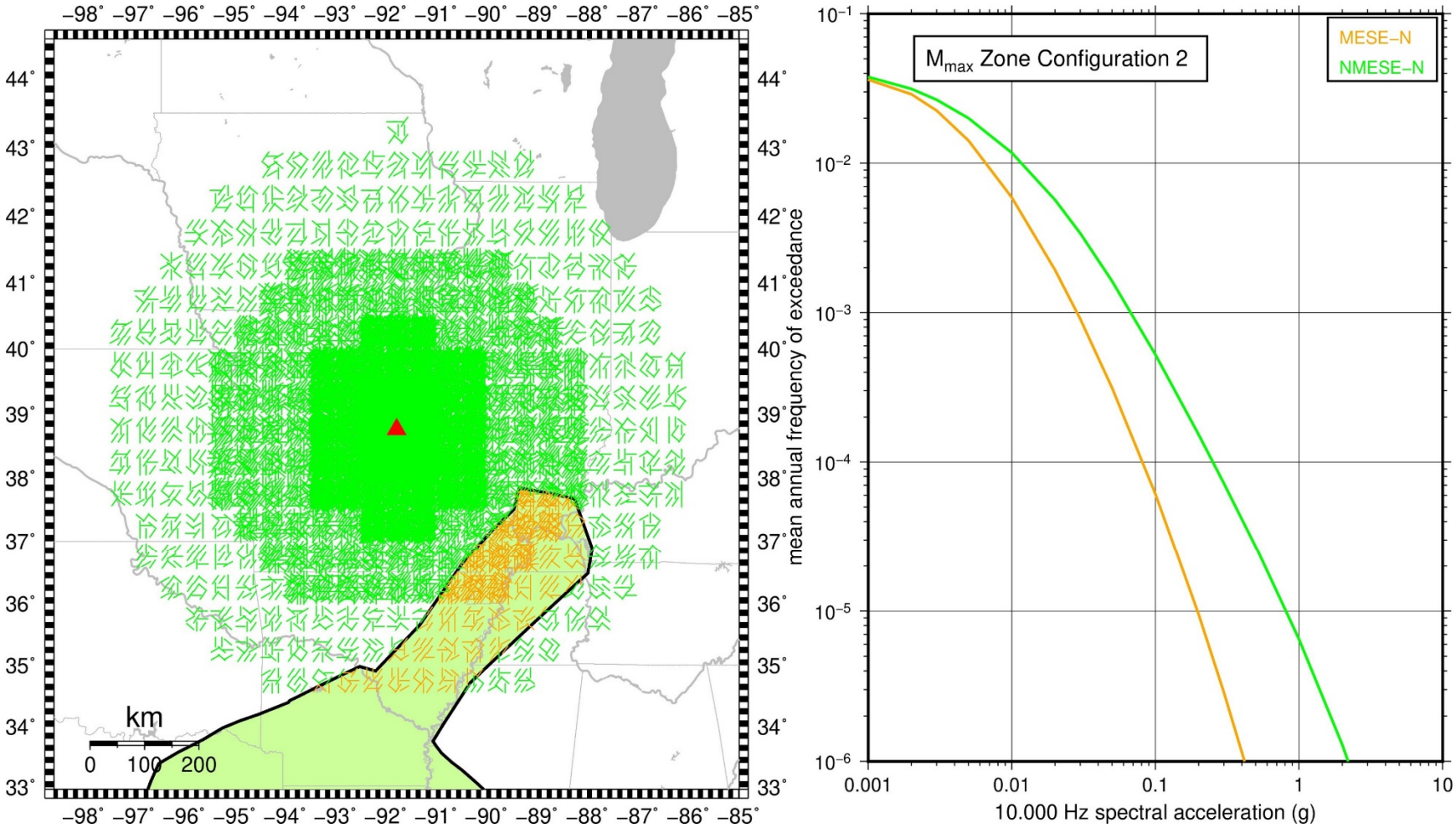


Figure 3 CEUS-SSC RLME Sources (Left), and Associated Mean 1 Hz Reference Rock Hazard Curves (Right) for Callaway

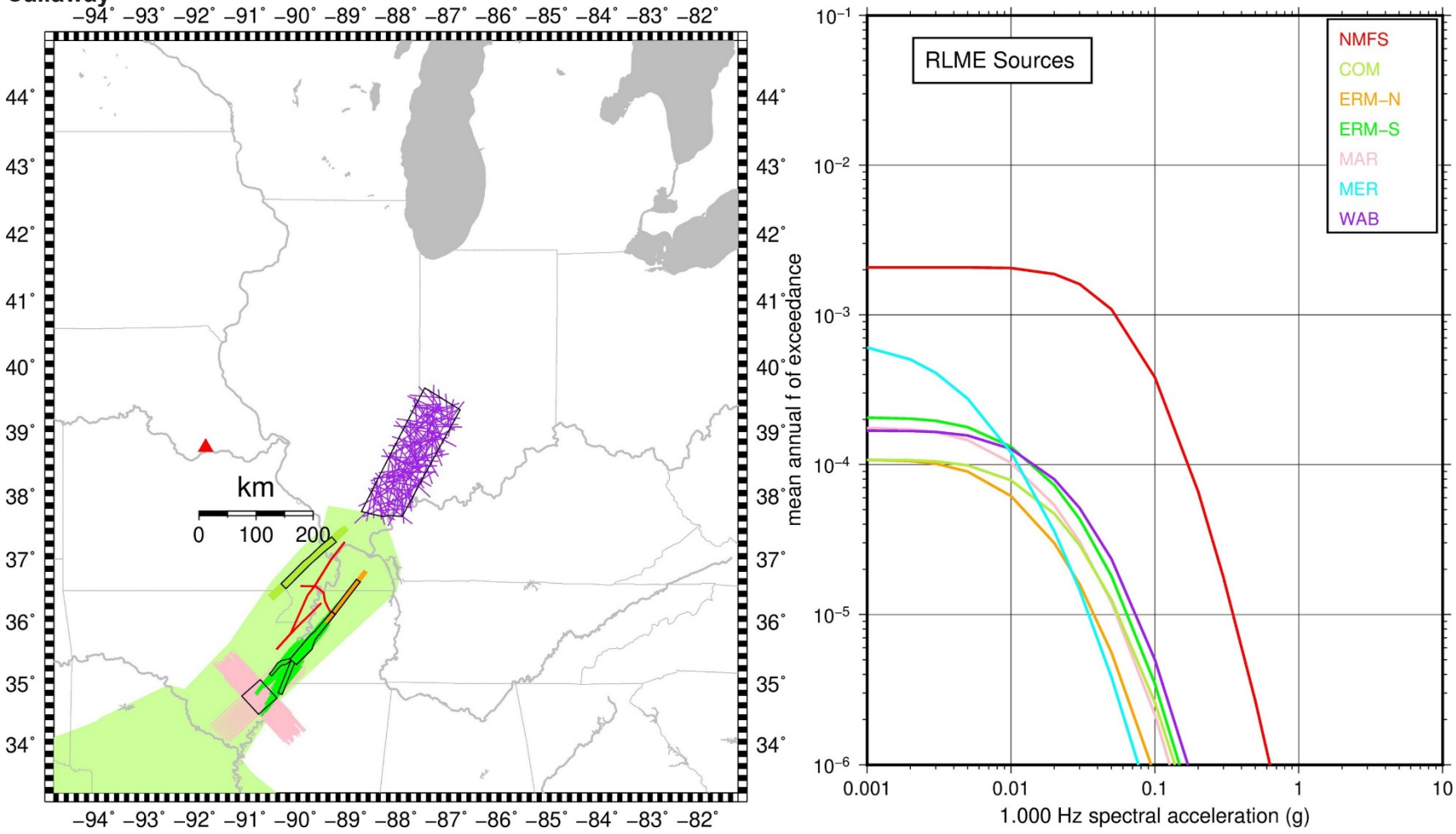


Figure 4 DSZ, RLME, and Total Mean Reference Rock Hazard Curves for 1 Hz (Right) and 10 Hz (Left) for Callaway

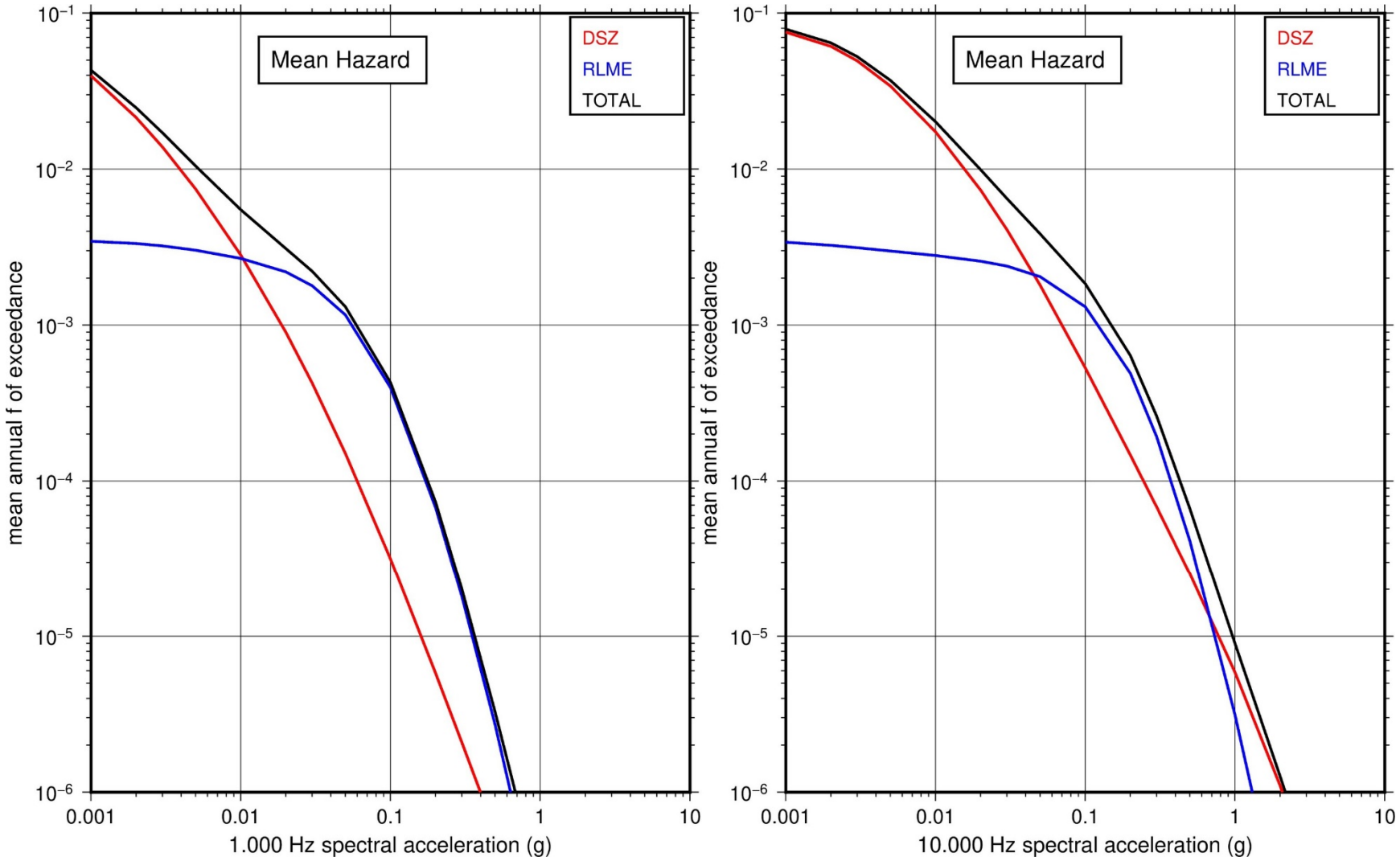


Figure 5 1,000-, 10,000-, and 100,000-Year Return Period Mean Reference Rock UHRS for CEUS-SSC and EPRI GMM (Blue Curves) and CEUS-SSC and NGA-East GMM (Red Curves)

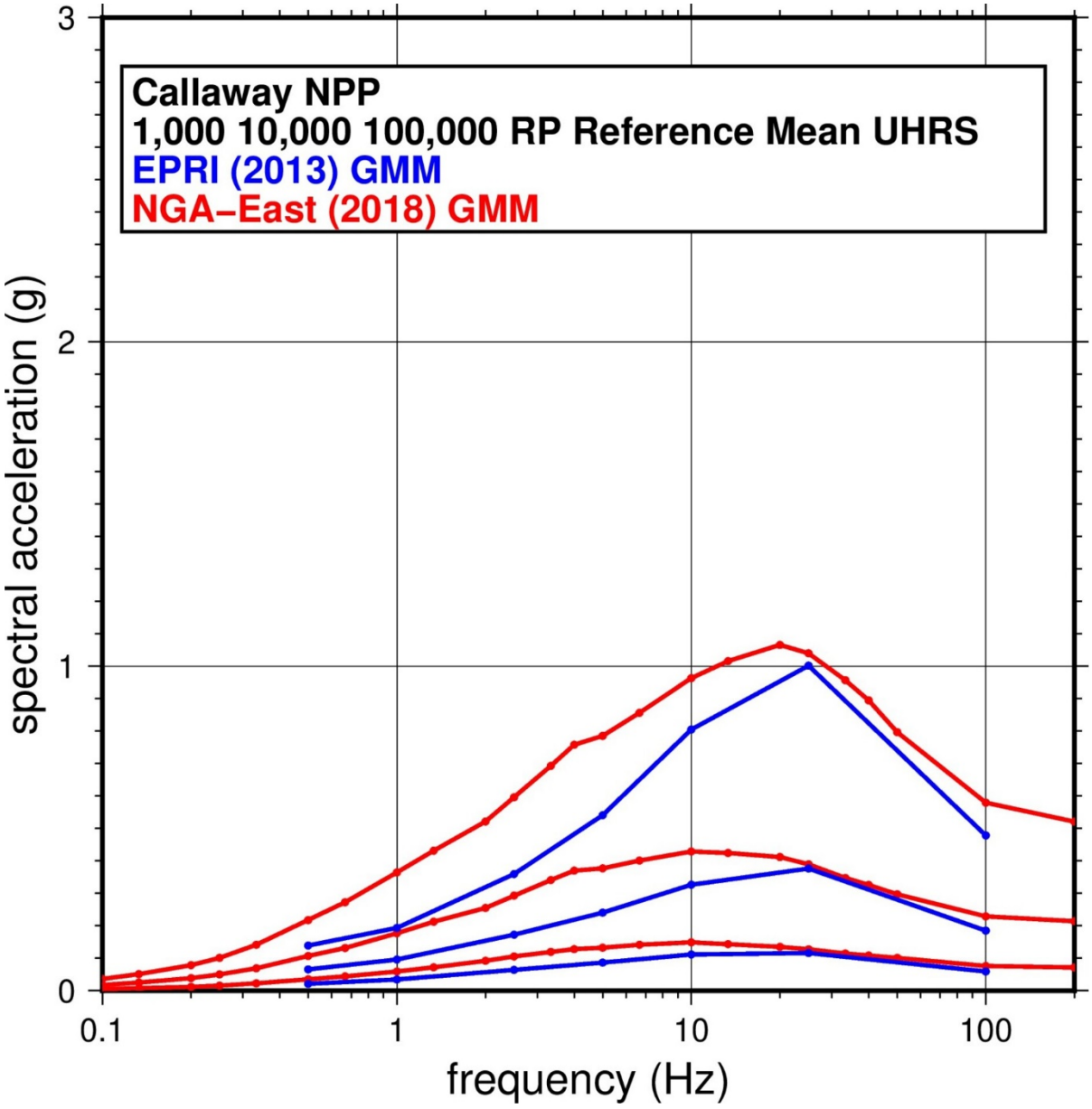


Figure 6 **Shear wave velocity (V_S) basecase profiles for Callaway; thick horizontal black line indicates the reference rock horizon; best estimate basecase profile shown as solid blue line; lower and upper range basecase profiles shown as dotted red and purple lines, respectively**

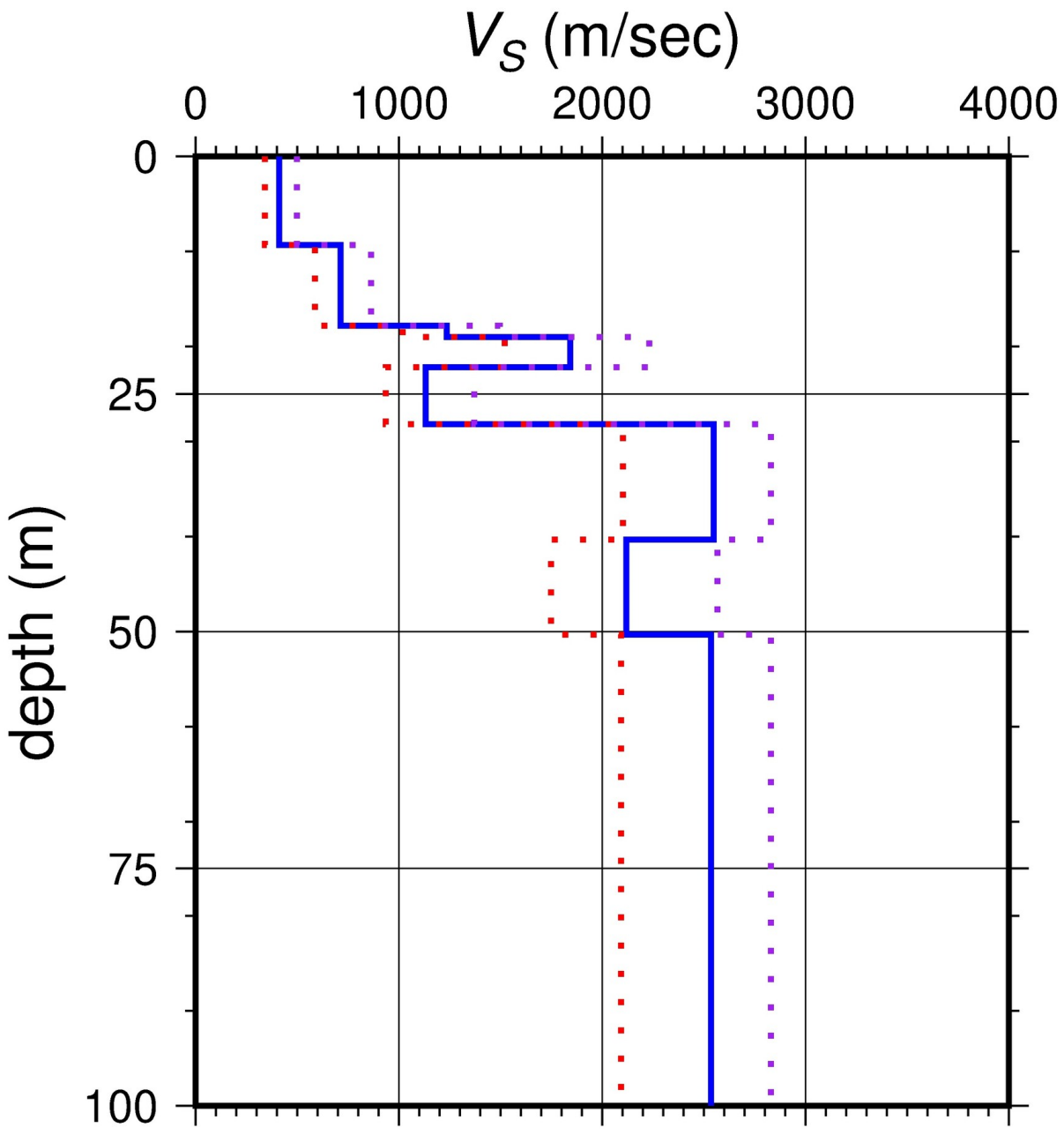


Figure 7 Tornado plots for site response logic tree nodes V_S profile, κ_0, MRD curves, and the analysis method for 1, 5, 10, and 100 Hz spectral frequencies for an input motion with a PGA of 0.76 g

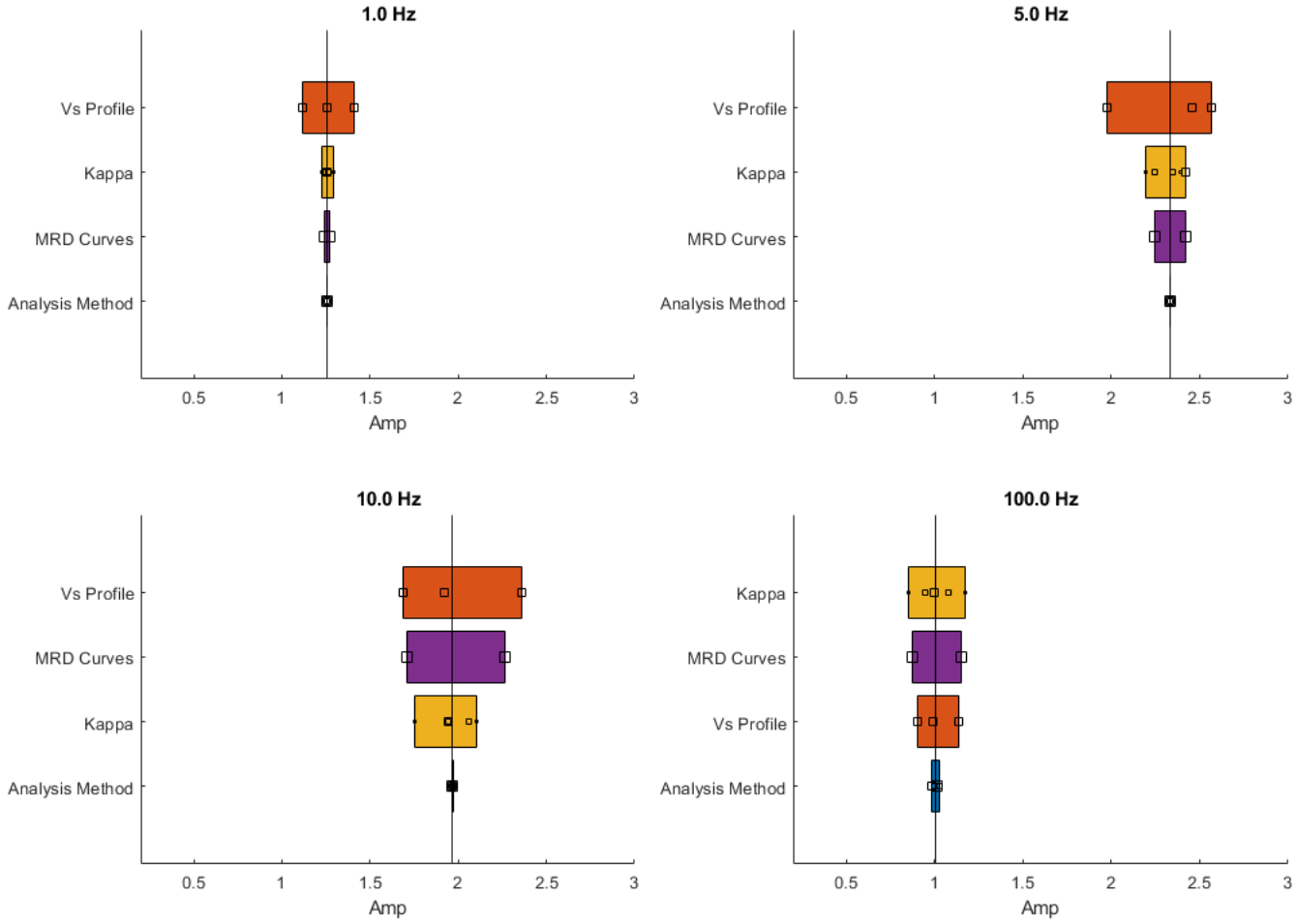


Figure 8 Seven median SAFs (above) and mean log standard deviations of SAF (below) as functions of input acceleration for 1 Hz (left) and 10 Hz (right)

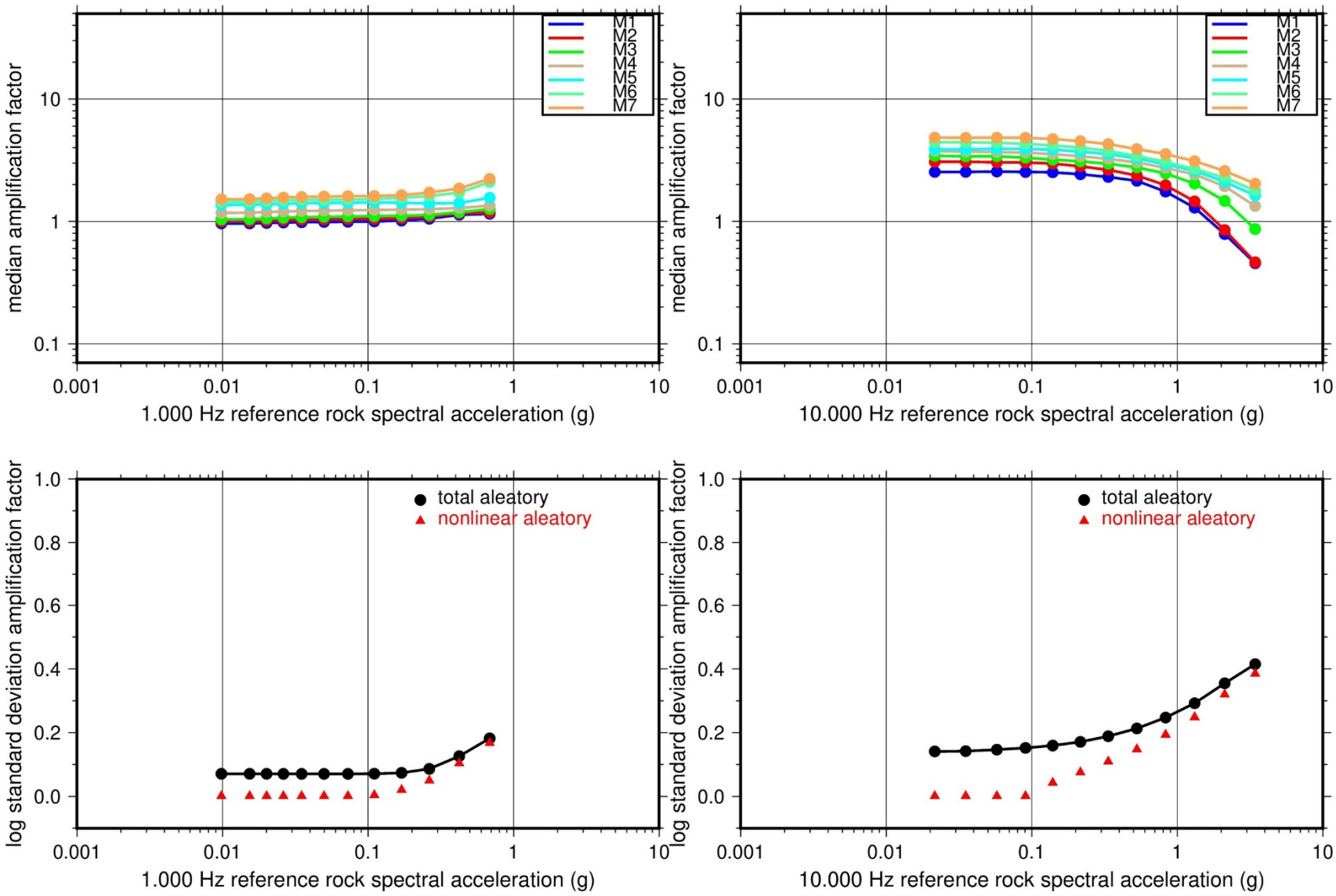


Figure 9 **Seven median SAFs as functions of spectral frequency for spectral accelerations at the 10^{-4} AFE level**

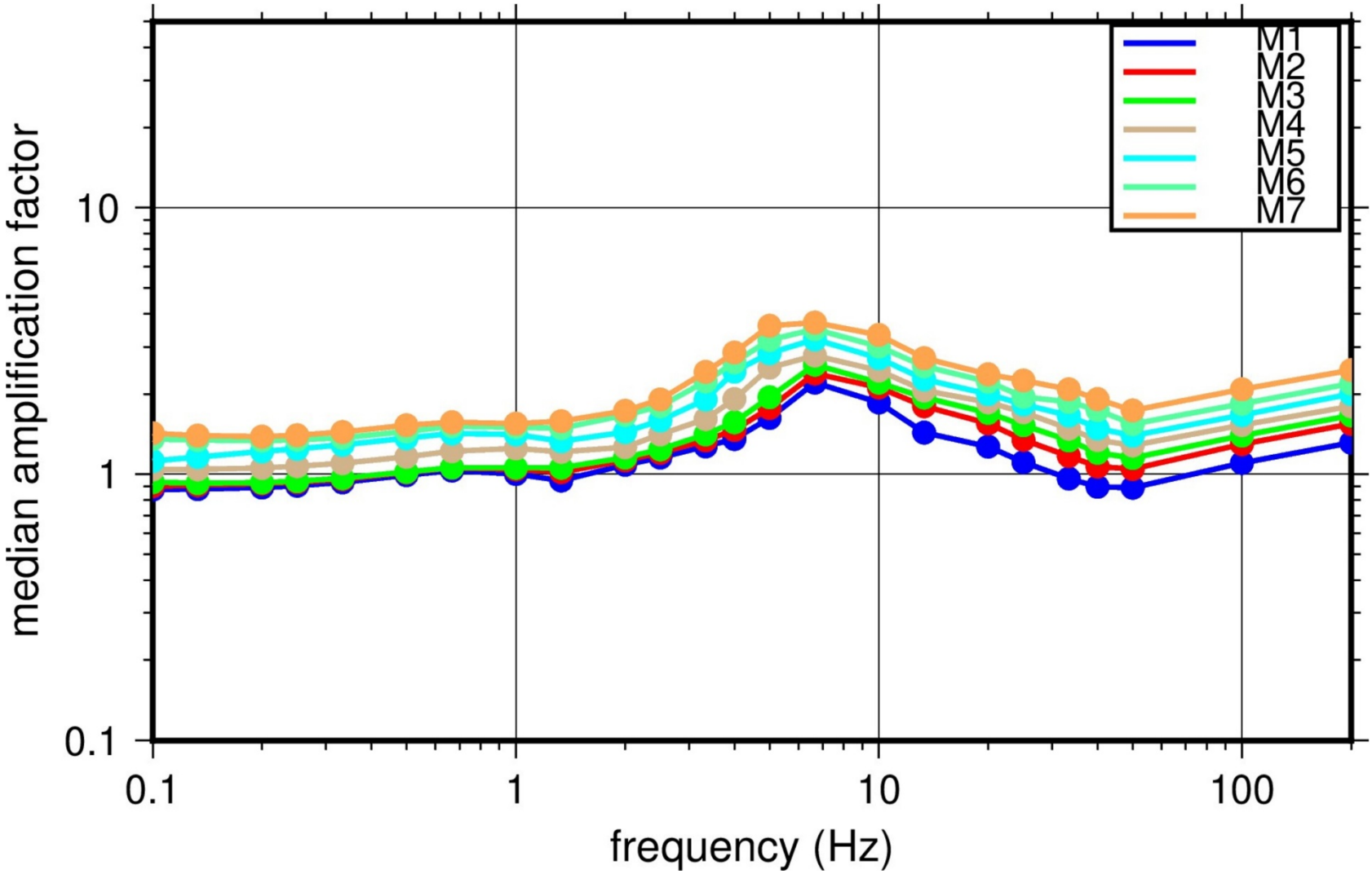
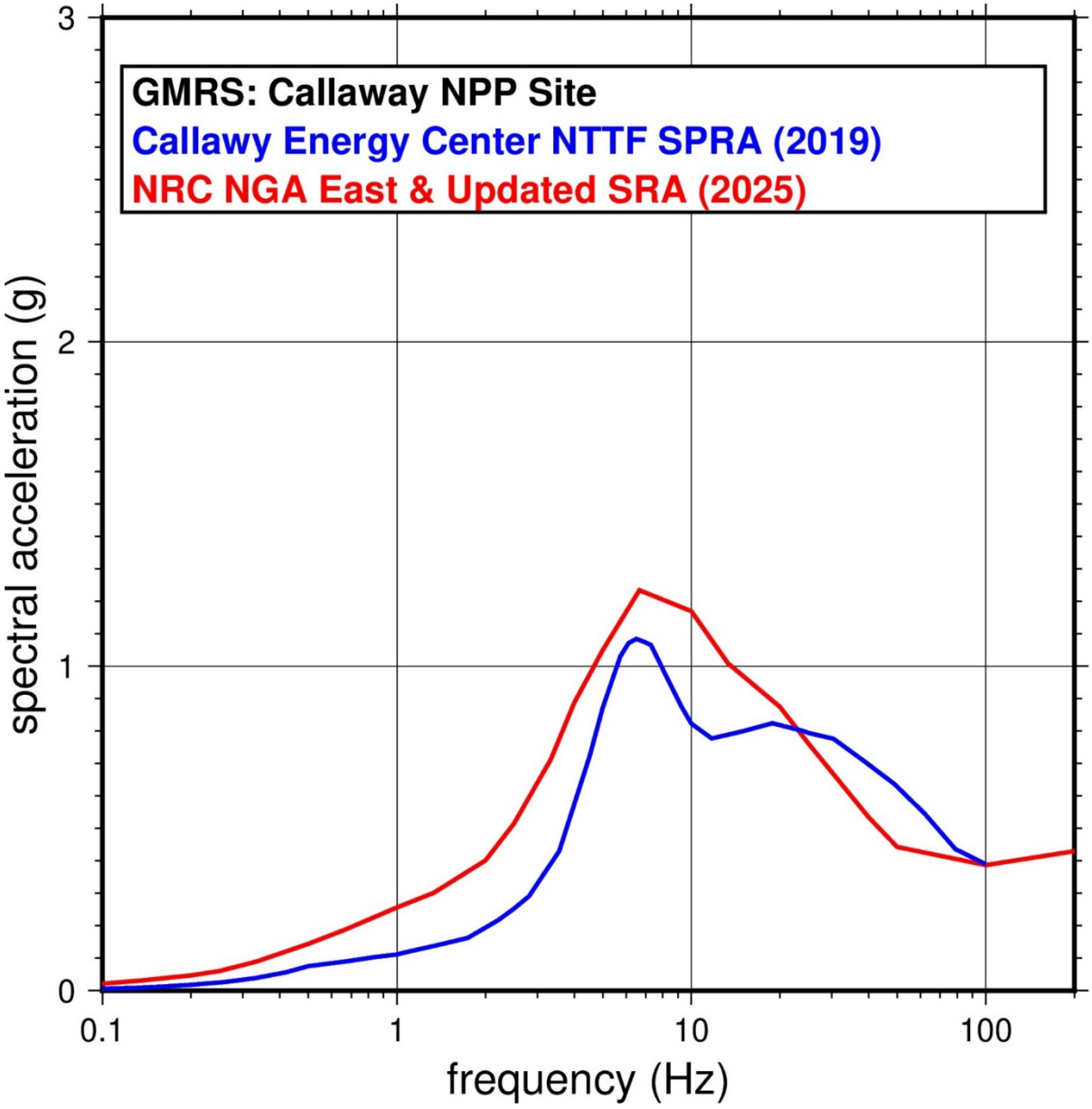


Figure 10 GMRS for the Callaway Site



Appendix A

Data Tables

Table A-1 Reference Rock Total Mean Hazard Curves for F=0.100 to 1.000 Hz								
SA(g)	**F0.100Hz**	**F0.133Hz**	**F0.200Hz**	**F0.250Hz**	**F0.333Hz**	**F0.500Hz**	**F0.667Hz**	**F1.000Hz**
0.00100	2.82659E-03	3.50857E-03	4.97376E-03	6.47027E-03	9.00742E-03	1.71765E-02	2.52746E-02	4.31259E-02
0.00126	2.52212E-03	3.14063E-03	4.36811E-03	5.57303E-03	7.61115E-03	1.41538E-02	2.06994E-02	3.58364E-02
0.00158	2.25577E-03	2.81775E-03	3.84656E-03	4.81510E-03	6.45386E-03	1.17099E-02	1.70228E-02	2.98937E-02
0.00200	2.00822E-03	2.51668E-03	3.36943E-03	4.13505E-03	5.43513E-03	9.61202E-03	1.38859E-02	2.47493E-02
0.00251	1.75892E-03	2.23387E-03	2.99517E-03	3.63664E-03	4.69114E-03	7.99107E-03	1.13564E-02	2.01033E-02
0.00316	1.51997E-03	1.96908E-03	2.65302E-03	3.19514E-03	4.05438E-03	6.64692E-03	9.27543E-03	1.62470E-02
0.00398	1.26169E-03	1.70390E-03	2.33397E-03	2.81424E-03	3.54398E-03	5.58594E-03	7.61136E-03	1.30278E-02
0.00501	1.04644E-03	1.47373E-03	2.05318E-03	2.47899E-03	3.09878E-03	4.69713E-03	6.24995E-03	1.04525E-02
0.00631	7.50075E-04	1.15965E-03	1.73281E-03	2.13235E-03	2.70279E-03	4.03158E-03	5.23741E-03	8.43098E-03
0.00794	5.38360E-04	9.13384E-04	1.46343E-03	1.83529E-03	2.35869E-03	3.46245E-03	4.39202E-03	6.80628E-03
0.01000	3.85905E-04	7.18746E-04	1.23511E-03	1.57870E-03	2.05730E-03	2.97191E-03	3.68056E-03	5.49010E-03
0.01260	2.18817E-04	4.56719E-04	9.05330E-04	1.23073E-03	1.70081E-03	2.53046E-03	3.12191E-03	4.53315E-03
0.01580	1.25544E-04	2.92963E-04	6.67897E-04	9.64429E-04	1.41165E-03	2.16179E-03	2.65712E-03	3.75792E-03
0.02000	7.03851E-05	1.84483E-04	4.86542E-04	7.48128E-04	1.16262E-03	1.83478E-03	2.24643E-03	3.09107E-03
0.02510	3.41879E-05	9.81769E-05	2.98450E-04	4.98794E-04	8.63580E-04	1.48166E-03	1.85080E-03	2.56208E-03
0.03160	1.60776E-05	5.03277E-05	1.75532E-04	3.18509E-04	6.17247E-04	1.16423E-03	1.49358E-03	2.09682E-03
0.03980	6.99283E-06	2.33490E-05	9.13566E-05	1.78616E-04	3.91795E-04	8.40891E-04	1.13244E-03	1.65691E-03
0.05010	3.04536E-06	1.08424E-05	4.75586E-05	1.00150E-04	2.48522E-04	6.06767E-04	8.57880E-04	1.30848E-03
0.06310	1.21742E-06	4.51718E-06	2.12249E-05	4.69369E-05	1.28551E-04	3.58034E-04	5.45288E-04	9.01498E-04
0.07940	4.88465E-07	1.88855E-06	9.50303E-06	2.20645E-05	6.66703E-05	2.11710E-04	3.47225E-04	6.22028E-04
0.10000	1.95292E-07	7.86895E-07	4.24151E-06	1.03419E-05	3.44888E-05	1.24931E-04	2.20716E-04	4.28576E-04
0.12600	7.15257E-08	3.01122E-07	1.70499E-06	4.27286E-06	1.50745E-05	5.96696E-05	1.12620E-04	2.37728E-04
0.15800	2.67484E-08	1.17552E-07	6.98461E-07	1.79808E-06	6.70304E-06	2.89400E-05	5.82722E-05	1.33489E-04
0.20000	9.60228E-09	4.41300E-08	2.75707E-07	7.29909E-07	2.88181E-06	1.36200E-05	2.93367E-05	7.31799E-05
0.25100	3.30816E-09	1.60393E-08	1.06116E-07	2.88146E-07	1.18568E-06	5.92038E-06	1.33469E-05	3.53799E-05
0.31600	1.10670E-09	5.66624E-09	3.98180E-08	1.11126E-07	4.77372E-07	2.51247E-06	5.91873E-06	1.66292E-05
0.39800	3.51393E-10	1.90163E-09	1.43038E-08	4.12733E-08	1.85820E-07	1.02005E-06	2.49190E-06	7.33393E-06
0.50100	1.11836E-10	6.39558E-10	5.14806E-09	1.53579E-08	7.24666E-08	4.14883E-07	1.05091E-06	3.23920E-06
0.63100	3.39037E-11	2.02408E-10	1.73110E-09	5.36917E-09	2.69221E-08	1.61573E-07	4.22846E-07	1.34724E-06
0.79400	1.03272E-11	6.43533E-11	5.84644E-10	1.88499E-09	1.00415E-08	6.31614E-08	1.70757E-07	5.62312E-07

Table A-1 Reference Rock Total Mean Hazard Curves for F=0.100 to 1.000 Hz								
SA(g)	**F0.100Hz**	**F0.133Hz**	**F0.200Hz**	**F0.250Hz**	**F0.333Hz**	**F0.500Hz**	**F0.667Hz**	**F1.000Hz**
1.00000	3.13119E-12	2.03694E-11	1.96620E-10	6.59083E-10	3.73095E-09	2.46006E-08	6.87133E-08	2.33901E-07
1.26000	9.23471E-13	6.30994E-12	6.39859E-11	2.22028E-10	1.33030E-09	9.30959E-09	2.70710E-08	9.48319E-08
1.58000	2.79349E-13	2.00281E-12	2.13140E-11	7.65042E-11	4.84592E-10	3.59482E-09	1.08734E-08	3.91758E-08
2.00000	8.04046E-14	6.06085E-13	6.78259E-12	2.52188E-11	1.69266E-10	1.33427E-09	4.20493E-09	1.55998E-08
2.51000	2.25928E-14	1.83935E-13	2.22163E-12	8.57303E-12	6.04240E-11	5.05438E-10	1.65937E-09	6.34651E-09
3.16000	6.08918E-15	5.38168E-14	7.07973E-13	2.84712E-12	2.11253E-11	1.87815E-10	6.42640E-10	2.53740E-09
3.98000	1.50726E-15	1.46666E-14	2.16059E-13	9.16878E-13	7.20803E-12	6.82938E-11	2.43485E-10	9.95772E-10
5.01000	3.73794E-16	4.00399E-15	6.60489E-14	2.95785E-13	2.46391E-12	2.48789E-11	9.24139E-11	3.91460E-10
6.31000	7.79379E-17	9.28430E-16	1.76288E-14	8.50437E-14	7.70254E-13	8.44465E-12	3.27169E-11	1.44816E-10
7.94000	1.63526E-17	2.16542E-16	4.73014E-15	2.45738E-14	2.41914E-13	2.87878E-12	1.16308E-11	5.37866E-11
10.00000	3.41024E-18	5.02198E-17	1.26270E-15	7.06648E-15	7.56363E-14	9.77273E-13	4.11810E-12	1.99002E-11

Table A-2 Reference Rock Total Mean Hazard Curves for F=1.333 to 10.000 Hz								
SA(g)	**F1.333Hz**	**F2.000Hz**	**F2.500Hz**	**F3.333Hz**	**F4.000Hz**	**F5.000Hz**	**F6.667Hz**	**F10.000Hz**
0.00100	5.65229E-02	7.03554E-02	7.43416E-02	7.78472E-02	7.86438E-02	7.96830E-02	7.99771E-02	7.89886E-02
0.00126	4.82392E-02	6.27432E-02	6.74136E-02	7.18109E-02	7.29208E-02	7.44547E-02	7.49556E-02	7.38150E-02
0.00158	4.13052E-02	5.60879E-02	6.12555E-02	6.63538E-02	6.77204E-02	6.96675E-02	7.03439E-02	6.90773E-02
0.00200	3.51405E-02	4.99053E-02	5.54387E-02	6.11102E-02	6.26977E-02	6.50082E-02	6.58419E-02	6.44657E-02
0.00251	2.88725E-02	4.22855E-02	4.76696E-02	5.34354E-02	5.51639E-02	5.77621E-02	5.87843E-02	5.75220E-02
0.00316	2.35379E-02	3.54416E-02	4.05141E-02	4.61564E-02	4.79473E-02	5.07073E-02	5.18708E-02	5.07642E-02
0.00398	1.88495E-02	2.88330E-02	3.33090E-02	3.84624E-02	4.01990E-02	4.29340E-02	4.41890E-02	4.33618E-02
0.00501	1.51017E-02	2.34616E-02	2.73885E-02	3.20517E-02	3.37028E-02	3.63508E-02	3.76430E-02	3.70381E-02
0.00631	1.19713E-02	1.84661E-02	2.16216E-02	2.54629E-02	2.69022E-02	2.92330E-02	3.04928E-02	3.02231E-02
0.00794	9.49851E-03	1.45482E-02	1.70851E-02	2.02472E-02	2.14931E-02	2.35294E-02	2.47216E-02	2.46822E-02
0.01000	7.52975E-03	1.14509E-02	1.34881E-02	1.60855E-02	1.71566E-02	1.89226E-02	2.00264E-02	2.01412E-02
0.01260	6.06698E-03	8.96043E-03	1.04894E-02	1.24574E-02	1.33064E-02	1.46959E-02	1.56477E-02	1.58981E-02
0.01580	4.91036E-03	7.04740E-03	8.20001E-03	9.69896E-03	1.03749E-02	1.14733E-02	1.22893E-02	1.26106E-02
0.02000	3.93943E-03	5.48772E-03	6.34504E-03	7.47316E-03	8.00588E-03	8.86572E-03	9.55517E-03	9.90711E-03
0.02510	3.23393E-03	4.38713E-03	5.03236E-03	5.87204E-03	6.28131E-03	6.92006E-03	7.47334E-03	7.80490E-03
0.03160	2.63421E-03	3.49684E-03	3.98764E-03	4.61559E-03	4.93118E-03	5.40129E-03	5.84184E-03	6.13818E-03
0.03980	2.10810E-03	2.78731E-03	3.18365E-03	3.67286E-03	3.92266E-03	4.26380E-03	4.60953E-03	4.85173E-03
0.05010	1.68633E-03	2.22149E-03	2.54202E-03	2.92363E-03	3.12170E-03	3.36739E-03	3.63896E-03	3.83675E-03
0.06310	1.20644E-03	1.64047E-03	1.92826E-03	2.26618E-03	2.44418E-03	2.62348E-03	2.84619E-03	3.00319E-03
0.07940	8.64275E-04	1.21288E-03	1.46430E-03	1.75837E-03	1.91558E-03	2.04595E-03	2.22832E-03	2.35303E-03
0.10000	6.18348E-04	8.95685E-04	1.11079E-03	1.36300E-03	1.49988E-03	1.59402E-03	1.74292E-03	1.84187E-03
0.12600	3.58120E-04	5.44782E-04	7.06718E-04	9.10883E-04	1.02865E-03	1.08874E-03	1.20493E-03	1.29277E-03
0.15800	2.09773E-04	3.34791E-04	4.53877E-04	6.13849E-04	7.11014E-04	7.49539E-04	8.39412E-04	9.14060E-04
0.20000	1.20175E-04	2.01620E-04	2.86177E-04	4.06944E-04	4.83973E-04	5.08069E-04	5.76052E-04	6.37044E-04
0.25100	6.01009E-05	1.05015E-04	1.54649E-04	2.30837E-04	2.83236E-04	2.97103E-04	3.41330E-04	3.85484E-04
0.31600	2.91841E-05	5.29987E-05	8.07545E-05	1.26100E-04	1.59434E-04	1.67573E-04	1.95499E-04	2.26199E-04
0.39800	1.32187E-05	2.47252E-05	3.85502E-05	6.21078E-05	8.04612E-05	8.55519E-05	1.02056E-04	1.22197E-04
0.50100	5.99554E-06	1.15497E-05	1.84243E-05	3.06189E-05	4.06385E-05	4.37159E-05	5.33272E-05	6.60825E-05
0.63100	2.55557E-06	5.05655E-06	8.18427E-06	1.38200E-05	1.85956E-05	2.05007E-05	2.59639E-05	3.39485E-05
0.79400	1.09302E-06	2.22111E-06	3.64736E-06	6.25760E-06	8.53570E-06	9.64297E-06	1.26777E-05	1.74868E-05

Table A-2 Reference Rock Total Mean Hazard Curves for F=1.333 to 10.000 Hz								
SA(g)	**F1.333Hz**	**F2.000Hz**	**F2.500Hz**	**F3.333Hz**	**F4.000Hz**	**F5.000Hz**	**F6.667Hz**	**F10.000Hz**
1.00000	4.65942E-07	9.72511E-07	1.62036E-06	2.82468E-06	3.90618E-06	4.52250E-06	6.17304E-06	8.98419E-06
1.26000	1.93996E-07	4.18031E-07	7.08579E-07	1.25525E-06	1.76037E-06	2.10875E-06	3.02477E-06	4.66960E-06
1.58000	8.22536E-08	1.82867E-07	3.15227E-07	5.67292E-07	8.06568E-07	9.98966E-07	1.50424E-06	2.46026E-06
2.00000	3.36531E-08	7.72921E-08	1.35592E-07	2.48051E-07	3.57756E-07	4.58761E-07	7.26655E-07	1.26215E-06
2.51000	1.40522E-08	3.32503E-08	5.95121E-08	1.10984E-07	1.62646E-07	2.14591E-07	3.56071E-07	6.51821E-07
3.16000	5.76519E-09	1.40373E-08	2.56256E-08	4.86981E-08	7.24952E-08	9.82548E-08	1.70633E-07	3.29346E-07
3.98000	2.31731E-09	5.77412E-09	1.07301E-08	2.07328E-08	3.13000E-08	4.32827E-08	7.82541E-08	1.59110E-07
5.01000	9.33006E-10	2.37889E-09	4.49980E-09	8.83967E-09	1.35326E-08	1.90906E-08	3.59254E-08	7.69319E-08
6.31000	3.53266E-10	9.17478E-10	1.76375E-09	3.51180E-09	5.42911E-09	7.73619E-09	1.49562E-08	3.34441E-08
7.94000	1.34278E-10	3.55199E-10	6.93914E-10	1.40032E-09	2.18606E-09	3.14632E-09	6.24828E-09	1.45874E-08
10.00000	5.08481E-11	1.37007E-10	2.72018E-10	5.56378E-10	8.77120E-10	1.27514E-09	2.60151E-09	6.34213E-09

Table A-3 Reference Rock Total Mean Hazard Curves for F=13.333 to 100.000 Hz and PGA								
SA(g)	**F13.333Hz**	**F20.000Hz**	**F25.000Hz**	**F33.333Hz**	**F40.000Hz**	**F50.000Hz**	**F100.000Hz**	**PGA**
0.00100	7.78528E-02	7.60526E-02	7.46249E-02	7.27259E-02	7.13771E-02	6.92250E-02	6.45574E-02	6.38379E-02
0.00126	7.24728E-02	7.03002E-02	6.85669E-02	6.62513E-02	6.46357E-02	6.21323E-02	5.67641E-02	5.59890E-02
0.00158	6.75649E-02	6.50891E-02	6.31116E-02	6.04702E-02	5.86518E-02	5.58916E-02	5.00451E-02	4.92390E-02
0.00200	6.28061E-02	6.00717E-02	5.78904E-02	5.49843E-02	5.30072E-02	5.00570E-02	4.38908E-02	4.30722E-02
0.00251	5.59097E-02	5.31531E-02	5.09257E-02	4.79399E-02	4.59389E-02	4.30050E-02	3.69289E-02	3.61336E-02
0.00316	4.92518E-02	4.65647E-02	4.43649E-02	4.13990E-02	3.94377E-02	3.66034E-02	3.07851E-02	3.00266E-02
0.00398	4.20751E-02	3.96395E-02	3.75967E-02	3.48089E-02	3.29871E-02	3.03817E-02	2.50571E-02	2.43462E-02
0.00501	3.59447E-02	3.37462E-02	3.18641E-02	2.92719E-02	2.75961E-02	2.52225E-02	2.04007E-02	1.97460E-02
0.00631	2.94421E-02	2.76664E-02	2.60717E-02	2.38226E-02	2.23772E-02	2.03396E-02	1.62060E-02	1.56113E-02
0.00794	2.41351E-02	2.27000E-02	2.13494E-02	1.94038E-02	1.81606E-02	1.64161E-02	1.28857E-02	1.23540E-02
0.01000	1.97695E-02	1.86107E-02	1.74688E-02	1.57920E-02	1.47265E-02	1.32384E-02	1.02365E-02	9.76742E-03
0.01260	1.57029E-02	1.48614E-02	1.39571E-02	1.25878E-02	1.17204E-02	1.05140E-02	8.07996E-03	7.68050E-03
0.01580	1.25326E-02	1.19230E-02	1.12034E-02	1.00811E-02	9.37225E-03	8.39025E-03	6.40914E-03	6.06969E-03
0.02000	9.90908E-03	9.47840E-03	8.91119E-03	7.99944E-03	7.42520E-03	6.63298E-03	5.03509E-03	4.75000E-03
0.02510	7.83936E-03	7.53494E-03	7.09145E-03	6.35848E-03	5.89935E-03	5.27042E-03	3.98844E-03	3.75263E-03
0.03160	6.18313E-03	5.96348E-03	5.61622E-03	5.02736E-03	4.66101E-03	4.16375E-03	3.13473E-03	2.93978E-03
0.03980	4.87828E-03	4.69757E-03	4.42093E-03	3.94429E-03	3.65105E-03	3.25922E-03	2.42408E-03	2.26145E-03
0.05010	3.85036E-03	3.70150E-03	3.48091E-03	3.09504E-03	2.86023E-03	2.55133E-03	1.87421E-03	1.73925E-03
0.06310	2.98027E-03	2.82600E-03	2.63937E-03	2.31116E-03	2.11885E-03	1.87710E-03	1.32251E-03	1.21114E-03
0.07940	2.30916E-03	2.15991E-03	2.00350E-03	1.72783E-03	1.57152E-03	1.38274E-03	9.34514E-04	8.44603E-04
0.10000	1.78740E-03	1.64909E-03	1.51919E-03	1.29027E-03	1.16422E-03	1.01737E-03	6.59455E-04	5.88170E-04
0.12600	1.23319E-03	1.12315E-03	1.02017E-03	8.40743E-04	7.50367E-04	6.44069E-04	3.94326E-04	3.45482E-04
0.15800	8.57406E-04	7.71065E-04	6.90760E-04	5.52725E-04	4.88060E-04	4.11632E-04	2.38321E-04	2.05185E-04
0.20000	5.87191E-04	5.21140E-04	4.60191E-04	3.57093E-04	3.11822E-04	2.58228E-04	1.41051E-04	1.19250E-04
0.25100	3.56844E-04	3.18464E-04	2.78275E-04	2.12262E-04	1.83990E-04	1.49738E-04	7.90254E-05	6.54786E-05
0.31600	2.11567E-04	1.90617E-04	1.65457E-04	1.24890E-04	1.07646E-04	8.62494E-05	4.41161E-05	3.58100E-05
0.39800	1.17880E-04	1.08669E-04	9.49994E-05	7.26599E-05	6.26677E-05	4.97788E-05	2.49815E-05	1.98560E-05
0.50100	6.57549E-05	6.20381E-05	5.46273E-05	4.23379E-05	3.65388E-05	2.87740E-05	1.41676E-05	1.10274E-05
0.63100	3.55664E-05	3.55354E-05	3.19706E-05	2.53085E-05	2.18296E-05	1.70203E-05	8.15570E-06	6.24014E-06
0.79400	1.92849E-05	2.04000E-05	1.87509E-05	1.51600E-05	1.30687E-05	1.00889E-05	4.70527E-06	3.53919E-06

Table A-3 Reference Rock Total Mean Hazard Curves for F=13.333 to 100.000 Hz and PGA								
SA(g)	**F13.333Hz**	**F20.000Hz**	**F25.000Hz**	**F33.333Hz**	**F40.000Hz**	**F50.000Hz**	**F100.000Hz**	**PGA**
1.00000	1.04318E-05	1.16859E-05	1.09747E-05	9.06280E-06	7.80818E-06	5.96816E-06	2.70882E-06	2.00289E-06
1.26000	5.67306E-06	6.66171E-06	6.32654E-06	5.23643E-06	4.47880E-06	3.37605E-06	1.47293E-06	1.07101E-06
1.58000	3.12440E-06	3.84217E-06	3.68899E-06	3.06023E-06	2.59888E-06	1.93248E-06	8.11109E-07	5.80196E-07
2.00000	1.67859E-06	2.16586E-06	2.10334E-06	1.74894E-06	1.47429E-06	1.08080E-06	4.35716E-07	3.06399E-07
2.51000	8.93778E-07	1.18708E-06	1.15650E-06	9.54034E-07	7.95391E-07	5.73841E-07	2.20140E-07	1.51610E-07
3.16000	4.65360E-07	6.35600E-07	6.20821E-07	5.07459E-07	4.18049E-07	2.96556E-07	1.07998E-07	7.27944E-08
3.98000	2.30917E-07	3.22834E-07	3.15408E-07	2.54475E-07	2.06599E-07	1.43779E-07	4.94063E-08	3.25487E-08
5.01000	1.14670E-07	1.64084E-07	1.60349E-07	1.27697E-07	1.02171E-07	6.97595E-08	2.26227E-08	1.45681E-08
6.31000	5.10814E-08	7.46007E-08	7.28202E-08	5.70982E-08	4.49614E-08	3.01025E-08	9.25120E-09	5.84207E-09
7.94000	2.28285E-08	3.40241E-08	3.31747E-08	2.56132E-08	1.98507E-08	1.30335E-08	3.79667E-09	2.35135E-09
10.00000	1.01702E-08	1.54705E-08	1.50673E-08	1.14538E-08	8.73635E-09	5.62478E-09	1.55275E-09	9.43038E-10

Table A-4 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=0.100 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.000390	0.8561	0.8770	0.8843	1.0175	1.1875	1.2557	1.3080	0.014055	0.000000
0.000605	0.8562	0.8774	0.8854	1.0179	1.1879	1.2567	1.3102	0.014104	0.000000
0.000769	0.8563	0.8802	0.8914	1.0206	1.1898	1.2628	1.3217	0.014418	0.000000
0.001020	0.8558	0.8829	0.8969	1.0228	1.1918	1.2689	1.3299	0.014677	0.000000
0.001393	0.8550	0.8853	0.9013	1.0242	1.1936	1.2735	1.3363	0.014830	0.000000
0.001942	0.8542	0.8869	0.9039	1.0247	1.1955	1.2754	1.3395	0.014857	0.000000
0.002624	0.8535	0.8891	0.9046	1.0254	1.1982	1.2756	1.3401	0.014794	0.000000
0.003530	0.8528	0.8901	0.9063	1.0250	1.2009	1.2759	1.3401	0.014635	0.000000
0.004766	0.8531	0.8910	0.9070	1.0258	1.1993	1.2778	1.3450	0.014454	0.000000
0.006987	0.8544	0.8904	0.9058	1.0325	1.1925	1.2850	1.3435	0.014629	0.000000
0.011085	0.8672	0.8997	0.9083	1.0276	1.1687	1.3192	1.3578	0.015885	0.002971
0.017944	0.8759	0.9028	0.9347	1.0436	1.1171	1.3585	1.4293	0.021572	0.014894

Table A-5 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=0.133 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.000696	0.8623	0.8827	0.8900	1.0244	1.1973	1.2627	1.3146	0.017057	0.000000
0.001077	0.8625	0.8831	0.8911	1.0249	1.1978	1.2638	1.3167	0.017088	0.000000
0.001353	0.8629	0.8862	0.8973	1.0281	1.2004	1.2703	1.3282	0.017296	0.000000
0.001765	0.8629	0.8893	0.9029	1.0306	1.2030	1.2765	1.3365	0.017450	0.000000
0.002384	0.8623	0.8918	0.9073	1.0323	1.2052	1.2811	1.3427	0.017513	0.000000
0.003324	0.8617	0.8935	0.9098	1.0329	1.2072	1.2831	1.3459	0.017483	0.000000
0.004537	0.8612	0.8957	0.9105	1.0337	1.2100	1.2834	1.3465	0.017377	0.000000
0.006228	0.8607	0.8966	0.9121	1.0332	1.2126	1.2837	1.3466	0.017189	0.000000
0.008611	0.8610	0.8975	0.9128	1.0340	1.2113	1.2855	1.3510	0.016997	0.000000
0.012816	0.8626	0.8971	0.9119	1.0398	1.2044	1.2943	1.3483	0.017179	0.001972
0.020416	0.8750	0.9064	0.9144	1.0352	1.1818	1.3260	1.3669	0.018499	0.007140
0.033049	0.8839	0.9102	0.9406	1.0528	1.1319	1.3674	1.4381	0.024699	0.017855

Table A-6 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=0.200 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.001481	0.8781	0.8967	0.9034	1.0380	1.2193	1.2807	1.3320	0.024971	0.000000
0.002290	0.8784	0.8973	0.9046	1.0390	1.2200	1.2819	1.3342	0.024979	0.000000
0.002853	0.8798	0.9011	0.9111	1.0447	1.2238	1.2890	1.3465	0.025054	0.000000
0.003642	0.8808	0.9049	0.9171	1.0483	1.2277	1.2960	1.3555	0.025086	0.000000
0.004833	0.8813	0.9080	0.9218	1.0503	1.2310	1.3012	1.3621	0.025051	0.000000
0.006749	0.8812	0.9099	0.9244	1.0518	1.2335	1.3035	1.3654	0.024969	0.000000
0.009386	0.8812	0.9122	0.9252	1.0528	1.2364	1.3042	1.3664	0.024833	0.000000
0.013315	0.8811	0.9133	0.9268	1.0528	1.2390	1.3048	1.3668	0.024644	0.000000
0.019080	0.8817	0.9143	0.9275	1.0536	1.2382	1.3067	1.3711	0.024490	0.000000
0.028886	0.8839	0.9145	0.9275	1.0572	1.2324	1.3174	1.3665	0.024774	0.000000
0.046193	0.8963	0.9240	0.9311	1.0540	1.2098	1.3478	1.3940	0.026454	0.009211
0.074776	0.9075	0.9312	0.9583	1.0745	1.1642	1.3927	1.4717	0.034957	0.024638

Table A-7 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=0.250 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.002139	0.8915	0.9088	0.9148	1.0489	1.2353	1.2979	1.3485	0.032213	0.000000
0.003308	0.8919	0.9094	0.9160	1.0502	1.2366	1.2991	1.3497	0.032209	0.000000
0.004120	0.8939	0.9136	0.9227	1.0570	1.2425	1.3054	1.3620	0.032212	0.000000
0.005226	0.8956	0.9179	0.9288	1.0626	1.2470	1.3126	1.3725	0.032186	0.000000
0.006882	0.8970	0.9218	0.9340	1.0640	1.2513	1.3186	1.3798	0.032117	0.000000
0.009622	0.8974	0.9239	0.9367	1.0660	1.2542	1.3214	1.3834	0.032028	0.000000
0.013517	0.8977	0.9262	0.9377	1.0678	1.2571	1.3224	1.3848	0.031902	0.000000
0.019493	0.8979	0.9275	0.9393	1.0684	1.2597	1.3233	1.3856	0.031747	0.000000
0.028424	0.8991	0.9289	0.9405	1.0689	1.2583	1.3278	1.3887	0.031653	0.000000
0.043315	0.9016	0.9295	0.9410	1.0718	1.2533	1.3349	1.3930	0.032057	0.001666
0.069342	0.9141	0.9391	0.9457	1.0699	1.2313	1.3682	1.4182	0.034125	0.011817
0.112250	0.9283	0.9499	0.9750	1.0925	1.1887	1.4169	1.5031	0.045246	0.031974

Table A-8 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=0.333 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.003240	0.9152	0.9308	0.9356	1.0703	1.2644	1.3254	1.3877	0.046590	0.000000
0.005017	0.9159	0.9317	0.9370	1.0717	1.2657	1.3275	1.3888	0.046569	0.000000
0.006274	0.9195	0.9373	0.9446	1.0794	1.2728	1.3394	1.3951	0.046473	0.000000
0.007935	0.9222	0.9423	0.9511	1.0863	1.2797	1.3480	1.4025	0.046380	0.000000
0.010397	0.9243	0.9465	0.9564	1.0915	1.2849	1.3537	1.4117	0.046285	0.000000
0.014566	0.9256	0.9493	0.9596	1.0933	1.2884	1.3575	1.4161	0.046207	0.000000
0.020691	0.9270	0.9523	0.9613	1.0942	1.2915	1.3604	1.4181	0.046119	0.000000
0.030362	0.9280	0.9541	0.9634	1.0950	1.2939	1.3634	1.4192	0.046038	0.000000
0.045105	0.9289	0.9553	0.9643	1.0978	1.2937	1.3658	1.4231	0.046062	0.000000
0.069155	0.9320	0.9566	0.9657	1.1004	1.2893	1.3693	1.4393	0.046695	0.006071
0.110790	0.9456	0.9668	0.9731	1.0984	1.2697	1.4050	1.4655	0.049586	0.017754
0.179350	0.9667	0.9854	1.0083	1.1270	1.2309	1.4660	1.5627	0.066872	0.048252

Table A-9 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=0.500 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.005273	0.9640	0.9788	0.9815	1.1230	1.3276	1.3894	1.4654	0.078784	0.000000
0.008184	0.9649	0.9801	0.9831	1.1247	1.3293	1.3915	1.4672	0.078734	0.000000
0.010361	0.9704	0.9874	0.9919	1.1342	1.3393	1.4042	1.4773	0.078477	0.000000
0.013172	0.9757	0.9944	1.0000	1.1428	1.3481	1.4164	1.4868	0.078275	0.000000
0.017280	0.9797	1.0001	1.0064	1.1495	1.3551	1.4260	1.4946	0.078133	0.000000
0.024317	0.9823	1.0039	1.0104	1.1526	1.3597	1.4318	1.4996	0.078064	0.000000
0.034951	0.9846	1.0074	1.0127	1.1560	1.3635	1.4358	1.5034	0.078029	0.000000
0.052198	0.9863	1.0099	1.0153	1.1585	1.3668	1.4385	1.5080	0.078052	0.000000
0.079010	0.9886	1.0106	1.0176	1.1609	1.3680	1.4405	1.5146	0.078261	0.000000
0.121850	0.9940	1.0153	1.0208	1.1640	1.3638	1.4517	1.5310	0.079386	0.011723
0.195340	1.0113	1.0280	1.0349	1.1643	1.3478	1.4950	1.5645	0.084821	0.032092
0.316200	1.0537	1.0690	1.0912	1.2118	1.3208	1.5910	1.7013	0.122070	0.093469

Table A-10 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=0.667 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.007013	0.9964	1.0126	1.0159	1.1736	1.3756	1.4453	1.4999	0.093544	0.000000
0.010911	0.9975	1.0144	1.0175	1.1756	1.3776	1.4477	1.5020	0.093475	0.000000
0.013981	1.0038	1.0237	1.0267	1.1864	1.3890	1.4615	1.5139	0.093102	0.000000
0.017930	1.0097	1.0319	1.0353	1.1963	1.3993	1.4741	1.5252	0.092796	0.000000
0.023653	1.0147	1.0386	1.0426	1.2043	1.4077	1.4844	1.5352	0.092574	0.000000
0.033432	1.0184	1.0415	1.0476	1.2082	1.4130	1.4905	1.5412	0.092466	0.000000
0.048367	1.0217	1.0455	1.0505	1.2126	1.4175	1.4954	1.5463	0.092415	0.000000
0.072852	1.0247	1.0487	1.0539	1.2163	1.4213	1.5005	1.5516	0.092455	0.000000
0.111230	1.0285	1.0521	1.0572	1.2194	1.4226	1.5080	1.5590	0.092776	0.000000
0.172060	1.0366	1.0593	1.0637	1.2205	1.4194	1.5247	1.5811	0.094557	0.014174
0.275910	1.0614	1.0771	1.0865	1.2306	1.4041	1.5838	1.6303	0.105020	0.047844
0.446630	1.0808	1.0996	1.1319	1.2869	1.4136	1.8264	1.9391	0.156290	0.125246

Table A-11 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=1.000 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.009838	0.9618	0.9922	1.0046	1.1997	1.3515	1.4214	1.4659	0.060524	0.000000
0.015366	0.9628	0.9941	1.0064	1.2022	1.3535	1.4237	1.4689	0.060540	0.001366
0.020104	0.9686	1.0043	1.0160	1.2154	1.3637	1.4367	1.4870	0.060567	0.002266
0.026218	0.9741	1.0137	1.0254	1.2261	1.3738	1.4495	1.5039	0.060590	0.002815
0.035015	0.9792	1.0219	1.0338	1.2309	1.3833	1.4610	1.5178	0.060647	0.003851
0.049887	0.9832	1.0274	1.0396	1.2366	1.3906	1.4689	1.5255	0.060794	0.005717
0.072771	0.9880	1.0334	1.0437	1.2419	1.3985	1.4761	1.5297	0.061031	0.007846
0.110510	0.9946	1.0368	1.0503	1.2464	1.4088	1.4844	1.5303	0.061497	0.010893
0.170030	1.0008	1.0418	1.0561	1.2499	1.4121	1.4949	1.5448	0.062838	0.016893
0.263830	1.0210	1.0561	1.0723	1.2502	1.4009	1.5458	1.5812	0.069645	0.034456
0.423240	1.0680	1.0991	1.1223	1.2774	1.3833	1.6501	1.6894	0.103640	0.084131
0.685130	1.1011	1.1311	1.2009	1.3511	1.4757	1.7772	1.9738	0.160070	0.148186

Table A-12 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=1.333 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.012067	0.8860	0.9529	0.9904	1.1664	1.2776	1.3722	1.4599	0.037238	0.000000
0.018910	0.8869	0.9553	0.9923	1.1681	1.2800	1.3750	1.4630	0.037531	0.000000
0.025173	0.8921	0.9671	1.0034	1.1776	1.2962	1.3862	1.4805	0.038737	0.000000
0.033309	0.8972	0.9781	1.0142	1.1866	1.3105	1.3981	1.4968	0.039814	0.000000
0.044978	0.9022	0.9872	1.0237	1.1947	1.3213	1.4107	1.5096	0.040890	0.000000
0.064514	0.9070	0.9934	1.0305	1.2017	1.3240	1.4251	1.5186	0.042089	0.000000
0.094649	0.9141	1.0014	1.0357	1.2090	1.3262	1.4398	1.5312	0.043668	0.000000
0.144320	0.9276	1.0062	1.0451	1.2162	1.3256	1.4605	1.5507	0.046267	0.014284
0.222780	0.9497	1.0197	1.0580	1.2129	1.3308	1.4908	1.5852	0.052150	0.027983
0.346290	1.0011	1.0512	1.0874	1.2151	1.3277	1.5736	1.6319	0.075076	0.060826
0.555660	1.0700	1.1135	1.1583	1.2605	1.3499	1.6781	1.7676	0.127060	0.119196
0.899480	1.1101	1.1538	1.2456	1.3575	1.5441	1.6586	1.9387	0.209760	0.205092

Table A-13 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=2.000 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.015262	1.0010	1.0442	1.0641	1.1818	1.3664	1.5259	1.5866	0.088594	0.000000
0.024044	1.0027	1.0467	1.0665	1.1847	1.3692	1.5294	1.5903	0.088899	0.000000
0.032921	1.0119	1.0593	1.0790	1.1990	1.3830	1.5478	1.6099	0.089688	0.000000
0.044610	1.0208	1.0710	1.0910	1.2123	1.3959	1.5653	1.6285	0.090596	0.000000
0.061344	1.0291	1.0812	1.1017	1.2239	1.4074	1.5810	1.6446	0.091937	0.000000
0.088954	1.0369	1.0891	1.1106	1.2329	1.4173	1.5938	1.6573	0.094061	0.000000
0.131610	1.0462	1.0990	1.1205	1.2397	1.4278	1.6107	1.6672	0.097507	0.021573
0.201590	1.0661	1.1127	1.1383	1.2522	1.4359	1.6409	1.6982	0.103940	0.041968
0.312160	1.0996	1.1396	1.1674	1.2705	1.4430	1.6929	1.7549	0.118450	0.070627
0.486300	1.1186	1.1684	1.2091	1.3100	1.4717	1.8354	1.9167	0.151840	0.118377
0.780610	1.1290	1.1839	1.2758	1.4288	1.6226	1.9299	2.1911	0.203680	0.180120
1.263600	1.1493	1.2228	1.4036	1.5260	1.7788	1.8496	1.9927	0.296780	0.281134

Table A-14 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=2.500 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.016960	1.0509	1.0975	1.1148	1.3053	1.4821	1.5703	1.6542	0.091750	0.000000
0.026809	1.0533	1.1006	1.1178	1.3086	1.4869	1.5740	1.6579	0.092481	0.000000
0.037361	1.0641	1.1148	1.1319	1.3251	1.5046	1.5932	1.6796	0.094500	0.000000
0.051385	1.0750	1.1283	1.1458	1.3404	1.5236	1.6106	1.6998	0.096811	0.000000
0.071463	1.0873	1.1414	1.1598	1.3537	1.5432	1.6282	1.7200	0.100060	0.000000
0.104330	1.1016	1.1539	1.1741	1.3648	1.5524	1.6538	1.7483	0.104980	0.010743
0.155130	1.1197	1.1698	1.1928	1.3780	1.5626	1.6866	1.7866	0.112500	0.041843
0.238150	1.1500	1.1928	1.2230	1.3970	1.5765	1.7391	1.8434	0.125690	0.069947
0.369320	1.1582	1.2146	1.2551	1.4233	1.6111	1.8651	1.9844	0.148950	0.106211
0.576060	1.1698	1.2326	1.3012	1.4995	1.7058	2.0208	2.2058	0.179160	0.145578
0.924930	1.1877	1.2618	1.4162	1.6593	1.8848	1.9988	2.2181	0.236860	0.212597
1.497200	1.2095	1.3082	1.5037	1.6680	1.7998	1.9575	2.0696	0.332080	0.315233

Table A-15 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=3.333 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.018964	1.1874	1.2449	1.2697	1.4407	1.6693	1.8167	1.9173	0.143170	0.000000
0.030121	1.1900	1.2484	1.2733	1.4458	1.6753	1.8240	1.9250	0.144760	0.000000
0.043060	1.2030	1.2651	1.2904	1.4668	1.6987	1.8530	1.9576	0.148610	0.000000
0.060496	1.2156	1.2802	1.3066	1.4887	1.7218	1.8859	1.9909	0.153320	0.000000
0.085502	1.2277	1.2931	1.3223	1.5122	1.7455	1.9341	2.0266	0.160290	0.000000
0.126010	1.2392	1.3030	1.3374	1.5325	1.7739	2.0027	2.1034	0.170730	0.045677
0.188700	1.2516	1.3137	1.3576	1.5572	1.8139	2.0941	2.2171	0.185200	0.085069
0.290590	1.2736	1.3277	1.3914	1.5916	1.8754	2.1867	2.3724	0.203720	0.120164
0.451540	1.2683	1.3618	1.4437	1.6469	1.9640	2.3081	2.5096	0.218760	0.144200
0.705610	1.2906	1.3980	1.5363	1.7827	2.0784	2.2913	2.5116	0.238760	0.173043
1.133400	1.3284	1.4621	1.6511	1.8625	2.0142	2.1844	2.4148	0.289970	0.238789
1.834600	1.1071	1.3209	1.5663	1.7112	1.8691	2.0310	2.0526	0.386080	0.349278

Table A-16 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=4.000 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.020053	1.2628	1.3337	1.3700	1.6568	2.0466	2.2784	2.4143	0.210160	0.000000
0.031962	1.2660	1.3381	1.3746	1.6640	2.0602	2.2882	2.4254	0.211950	0.000000
0.046521	1.2817	1.3580	1.3954	1.6915	2.0990	2.3253	2.4685	0.215920	0.000000
0.066342	1.2968	1.3756	1.4152	1.7213	2.1447	2.3616	2.5147	0.221110	0.000000
0.094827	1.3121	1.3910	1.4352	1.7555	2.2018	2.4021	2.5653	0.228730	0.000000
0.140680	1.3280	1.4033	1.4565	1.7937	2.2481	2.4675	2.6473	0.239220	0.065273
0.211690	1.3467	1.4177	1.4900	1.8351	2.3142	2.5716	2.7616	0.248660	0.094160
0.326740	1.3490	1.4516	1.5439	1.8929	2.4029	2.6295	2.8584	0.254880	0.109536
0.508480	1.3723	1.5010	1.6286	1.9764	2.4894	2.6265	2.8692	0.257110	0.114630
0.795670	1.4081	1.5649	1.7690	2.0856	2.3175	2.5712	2.8217	0.269640	0.140499
1.278400	1.4657	1.6421	1.7833	1.9487	2.1537	2.4433	2.5447	0.328150	0.233916
2.069400	0.9819	1.1280	1.5046	1.7551	1.9477	2.0435	2.1109	0.416520	0.347165

Table A-17 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=5.000 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.021114	1.4829	1.5752	1.6476	2.1605	2.8083	3.1738	3.5421	0.299270	0.000000
0.033808	1.4878	1.5811	1.6547	2.1708	2.8174	3.1781	3.5457	0.298630	0.000000
0.050419	1.5096	1.6076	1.6842	2.2079	2.8481	3.2050	3.5811	0.297390	0.000000
0.073358	1.5304	1.6331	1.7121	2.2487	2.8773	3.2273	3.6091	0.296540	0.000000
0.106450	1.5529	1.6596	1.7424	2.2954	2.9048	3.2391	3.6261	0.295170	0.000000
0.159330	1.5793	1.6806	1.7831	2.3558	2.9262	3.2481	3.6584	0.293050	0.000000
0.241300	1.6145	1.7043	1.8446	2.4340	2.9254	3.2473	3.6800	0.289950	0.000000
0.373650	1.6247	1.7702	1.9408	2.5079	2.8524	3.1905	3.6136	0.284530	0.000000
0.582760	1.6674	1.8687	2.0681	2.5587	2.6740	3.1057	3.4253	0.285930	0.000000
0.913690	1.7078	1.9576	2.1683	2.3328	2.5073	2.9132	3.0911	0.303530	0.069780
1.468600	1.4181	1.6369	1.9641	2.1074	2.3273	2.5028	2.5742	0.360270	0.206236
2.377300	0.8638	0.9463	1.3225	1.9020	2.0406	2.1541	2.1736	0.455630	0.346897

Table A-18 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=6.667 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.021916	2.1239	2.2643	2.4721	3.1415	3.5088	3.7103	3.9743	0.290350	0.000000
0.035331	2.1344	2.2756	2.4847	3.1413	3.4855	3.7098	3.9673	0.288850	0.000000
0.054590	2.1687	2.3135	2.5283	3.1610	3.4604	3.7045	3.9621	0.285640	0.000000
0.081787	2.1938	2.3411	2.5613	3.1633	3.4075	3.6326	3.9280	0.281670	0.000000
0.121310	2.2064	2.3577	2.5845	3.1510	3.3357	3.5934	3.8752	0.278500	0.000000
0.183910	2.2254	2.3790	2.6219	3.1254	3.2820	3.5644	3.7851	0.276100	0.000000
0.281190	2.2107	2.3952	2.6516	2.9624	3.2510	3.5666	3.7187	0.273210	0.000000
0.437670	2.2060	2.3860	2.5559	2.7472	3.1982	3.4873	3.7045	0.275140	0.000000
0.685100	2.0060	2.2009	2.4386	2.6481	3.0061	3.2016	3.4746	0.283530	0.044265
1.077400	1.7462	1.8902	2.1903	2.5306	2.6531	2.8757	2.9622	0.310880	0.134969
1.732900	1.2027	1.3435	1.6881	2.1376	2.4683	2.5572	2.6921	0.375790	0.250576
2.805200	0.7391	0.8449	1.1314	1.6194	1.9113	2.3053	2.5416	0.448920	0.350855

Table A-19 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=10.000 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.021591	2.0480	2.4220	2.4818	2.7026	3.1010	3.4367	3.5905	0.154080	0.000000
0.035192	2.0503	2.4180	2.4794	2.6999	3.0915	3.4386	3.5928	0.155380	0.000000
0.057653	2.0575	2.4103	2.4754	2.6987	3.0708	3.4448	3.6040	0.160970	0.000000
0.090694	2.0482	2.3902	2.4614	2.6826	3.0401	3.4189	3.6100	0.166400	0.000000
0.139540	2.0217	2.3562	2.4387	2.6524	2.9987	3.3651	3.6018	0.171960	0.038213
0.216130	1.9776	2.2427	2.3890	2.5701	2.9452	3.2231	3.5026	0.178440	0.061080
0.335820	1.9022	2.1722	2.2765	2.5250	2.8285	3.0763	3.4289	0.187740	0.084476
0.527800	1.8228	2.0700	2.1474	2.3853	2.6479	2.9613	3.2493	0.201970	0.112614
0.832030	1.6527	1.8456	1.9575	2.1935	2.3888	2.8522	3.1006	0.224860	0.149840
1.315900	1.4025	1.4894	1.7100	1.9985	2.1467	2.6981	2.9058	0.259550	0.198132
2.119000	0.9281	1.0440	1.3507	1.6774	1.8795	2.3524	2.6061	0.308370	0.258809
3.430200	0.5386	0.6935	0.9139	1.3185	1.5296	1.9300	2.2113	0.371640	0.331672

Table A-20 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=13.333 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.020246	1.5711	2.0186	2.1743	2.3315	2.5922	2.7371	3.0980	0.141930	0.000000
0.033281	1.5622	2.0092	2.1664	2.3238	2.5903	2.7321	3.0527	0.142280	0.000000
0.057142	1.5493	1.9967	2.1572	2.3036	2.5576	2.7620	2.9748	0.147590	0.000000
0.093608	1.5174	1.9656	2.1432	2.2869	2.5140	2.7449	2.8892	0.151140	0.000000
0.148540	1.5088	1.9367	2.0934	2.2514	2.4755	2.7061	2.8653	0.153800	0.026381
0.234290	1.4919	1.8942	2.0447	2.1639	2.4358	2.6347	2.8383	0.156330	0.038479
0.369100	1.4480	1.8276	1.9777	2.1002	2.3126	2.5676	2.7834	0.160130	0.051799
0.585410	1.3976	1.7330	1.8590	1.9724	2.1782	2.4813	2.6030	0.168690	0.074147
0.929030	1.3428	1.5571	1.7063	1.8979	2.0200	2.2886	2.4058	0.184070	0.104515
1.476900	1.0755	1.2327	1.4932	1.7402	1.8722	2.0779	2.2424	0.212580	0.149103
2.380800	0.7332	0.8736	1.1665	1.4970	1.6857	1.9016	2.0720	0.262700	0.214599
3.854000	0.4210	0.5759	0.7865	1.1693	1.4049	1.6238	1.8567	0.331940	0.295340

Table A-21 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=20.000 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.017198	1.4371	1.8248	1.9607	2.1597	2.2936	2.5206	2.8293	0.134250	0.000000
0.028572	1.4355	1.8188	1.9287	2.1307	2.2733	2.5074	2.8188	0.134020	0.000000
0.052416	1.3981	1.7757	1.9286	2.1072	2.2362	2.4722	2.7413	0.141180	0.000000
0.091524	1.3731	1.7238	1.8857	2.0589	2.1720	2.4199	2.6828	0.146480	0.000000
0.152800	1.3665	1.6507	1.8306	2.0096	2.1407	2.3597	2.5772	0.149500	0.027216
0.248440	1.3348	1.6048	1.7687	1.9427	2.0903	2.3042	2.4775	0.150010	0.029891
0.400750	1.2748	1.5594	1.7072	1.8708	2.0086	2.2331	2.3782	0.150610	0.032769
0.646150	1.1835	1.4084	1.5600	1.7276	1.8395	2.1025	2.2525	0.155880	0.051856
1.038000	1.0173	1.1620	1.3665	1.5839	1.7413	1.9472	2.1242	0.171810	0.088933
1.665300	0.7745	0.8976	1.1695	1.4080	1.5569	1.7838	2.0236	0.203150	0.140215
2.689800	0.5258	0.6597	0.8727	1.1500	1.3686	1.5882	1.8694	0.251250	0.203757
4.354200	0.3214	0.4727	0.6138	0.8703	1.1096	1.4100	1.6459	0.307650	0.270257

Table A-22 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=25.000 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.015309	1.3954	1.7124	1.9633	2.0973	2.2260	2.3803	2.7833	0.144980	0.000000
0.025505	1.3811	1.7164	1.9437	2.0548	2.2362	2.3588	2.7659	0.144330	0.000000
0.048104	1.3365	1.6767	1.8114	1.9757	2.1220	2.3110	2.6473	0.152770	0.000000
0.086996	1.2680	1.6014	1.7822	1.9329	2.0238	2.2156	2.5459	0.160550	0.000000
0.149780	1.2245	1.5405	1.6727	1.8792	1.9576	2.1037	2.4294	0.163810	0.028077
0.248220	1.1828	1.4414	1.5922	1.7801	1.9106	2.0164	2.3320	0.161890	0.012766
0.406510	1.1031	1.3366	1.5204	1.7019	1.8183	1.9448	2.2417	0.158850	0.000000
0.662730	1.0084	1.2315	1.3667	1.5391	1.6793	1.8560	2.1110	0.158710	0.000000
1.073400	0.8638	1.0014	1.1796	1.3843	1.5687	1.7543	1.9455	0.169110	0.050525
1.732700	0.6545	0.7700	1.0133	1.1958	1.4221	1.6055	1.8355	0.196110	0.111417
2.802400	0.4507	0.5791	0.7384	0.9957	1.2030	1.4376	1.6637	0.239710	0.177244
4.536400	0.2897	0.4143	0.5366	0.7628	0.9632	1.2214	1.4620	0.294780	0.246678

Table A-23 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=33.333 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.013154	1.4476	1.7027	1.9218	2.0322	2.2004	2.4691	2.7426	0.141460	0.000000
0.021865	1.4230	1.7027	1.9210	2.0212	2.1851	2.4576	2.7224	0.139540	0.000000
0.041667	1.3319	1.6411	1.7284	1.9083	2.0434	2.2941	2.5697	0.141000	0.000000
0.078125	1.2313	1.5168	1.6482	1.8231	1.9190	2.1265	2.3966	0.145550	0.000000
0.139870	1.1294	1.3439	1.5318	1.6773	1.8386	2.0465	2.2553	0.149030	0.024363
0.237930	1.0333	1.2571	1.4401	1.5572	1.7399	1.9259	2.1628	0.147950	0.016518
0.398130	0.9394	1.1413	1.3049	1.4554	1.6362	1.8493	2.0548	0.146420	0.000000
0.659680	0.8355	1.0030	1.1400	1.3179	1.5238	1.7329	1.9212	0.150160	0.030523
1.081700	0.7002	0.8148	0.9807	1.1921	1.3916	1.6133	1.8302	0.163280	0.071021
1.761800	0.5504	0.6482	0.8062	1.0066	1.2106	1.4762	1.7095	0.189300	0.119240
2.855000	0.4009	0.4971	0.6242	0.8111	1.0053	1.2591	1.5277	0.229470	0.176182
4.621600	0.2714	0.3658	0.4673	0.6250	0.8070	1.0520	1.2961	0.279810	0.238070

Table A-24 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=40.000 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.012119	1.4664	1.7288	1.8943	2.1024	2.2312	2.4674	2.7705	0.135130	0.000000
0.020050	1.4413	1.6993	1.9023	2.0622	2.2116	2.4178	2.7696	0.132250	0.000000
0.037684	1.3263	1.6228	1.7539	1.8922	2.0669	2.2571	2.5945	0.126100	0.000000
0.071393	1.2086	1.4636	1.5950	1.7665	1.9131	2.0410	2.3061	0.123900	0.000000
0.130500	1.0812	1.2855	1.4348	1.5606	1.6752	1.8880	2.1164	0.124320	0.006786
0.225600	0.9712	1.1680	1.3097	1.4218	1.5684	1.7925	1.9990	0.124170	0.002963
0.382860	0.8677	1.0284	1.1606	1.3098	1.4514	1.7199	1.8799	0.125960	0.021366
0.641470	0.7660	0.9066	1.0135	1.1636	1.3201	1.6362	1.8070	0.133020	0.047801
1.060800	0.6558	0.7543	0.8777	1.0582	1.1847	1.4810	1.7104	0.147800	0.080221
1.738900	0.5262	0.6103	0.7265	0.8913	1.0467	1.2751	1.5831	0.173840	0.121700
2.821700	0.3933	0.4801	0.5812	0.7283	0.8745	1.1157	1.4180	0.214470	0.174894
4.567700	0.2709	0.3576	0.4448	0.5778	0.7190	0.9747	1.2272	0.266360	0.235666

Table A-25 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=50.000 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.011237	1.5507	1.7581	1.9317	2.0826	2.3393	2.5393	2.8024	0.135790	0.000000
0.018464	1.5185	1.7517	1.9118	2.1084	2.3140	2.5086	2.7831	0.132680	0.000000
0.033540	1.3581	1.6547	1.8191	2.0150	2.1740	2.2785	2.6319	0.122680	0.000000
0.063036	1.2108	1.4696	1.6070	1.7631	1.8927	2.0517	2.3547	0.113950	0.000000
0.116930	1.0724	1.2857	1.3980	1.5608	1.7181	1.7751	2.0106	0.107500	0.000000
0.205470	0.9665	1.1466	1.2499	1.3944	1.4939	1.6296	1.8136	0.102570	0.000000
0.354360	0.8552	1.0003	1.1048	1.2336	1.3500	1.5024	1.6997	0.100980	0.000000
0.601820	0.7462	0.8823	0.9585	1.0746	1.2173	1.4038	1.6029	0.106730	0.000000
1.006000	0.6465	0.7446	0.8167	0.9607	1.0712	1.2882	1.4976	0.123470	0.057748
1.662500	0.5315	0.6089	0.6922	0.8182	0.9337	1.1184	1.3736	0.152490	0.106505
2.702600	0.4025	0.4890	0.5675	0.6888	0.7995	0.9803	1.2329	0.194340	0.160804
4.374800	0.2804	0.3625	0.4375	0.5559	0.6672	0.8512	1.0621	0.247250	0.221862

Table A-26 Site Adjustment Factor Medians and Logarithmic Standard Deviation for F=100.000 Hz									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.010157	1.6639	1.8398	2.0108	2.1220	2.4326	2.6934	2.9226	0.139130	0.000000
0.016487	1.6537	1.8420	2.0293	2.1243	2.4277	2.6976	2.9393	0.136480	0.000000
0.027389	1.5665	1.8419	2.0139	2.2377	2.4287	2.6144	2.9098	0.128070	0.000000
0.046471	1.4510	1.7368	1.9364	2.1029	2.2784	2.4267	2.8172	0.119310	0.000000
0.080508	1.3199	1.6020	1.7310	1.9278	2.0229	2.2199	2.6064	0.110610	0.000000
0.138650	1.2057	1.4428	1.5677	1.7152	1.8468	2.0250	2.3357	0.102720	0.000000
0.239320	1.0921	1.2841	1.3824	1.5146	1.6519	1.8197	2.0611	0.096222	0.000000
0.411280	0.9819	1.1288	1.2052	1.3320	1.4573	1.6188	1.7973	0.095197	0.000000
0.698630	0.8646	0.9724	1.0382	1.1690	1.2841	1.4299	1.5663	0.105290	0.000000
1.172500	0.7191	0.7940	0.8747	1.0179	1.1222	1.2688	1.4338	0.131350	0.075528
1.912900	0.5566	0.6294	0.7261	0.8675	0.9699	1.1253	1.3138	0.176000	0.139383
3.096600	0.3929	0.4704	0.5702	0.7260	0.8419	0.9815	1.1747	0.231970	0.205577

Table A-27 Site Adjustment Factor Medians and Logarithmic Standard Deviation for PGA									
SA (g)	**SAF-M1**	**SAF-M2**	**SAF-M3**	**SAF-M4**	**SAF-M5**	**SAF-M6**	**SAF-M7**	**LNSTDEV**	**NL-LNSTDEV**
0.010020	1.6783	1.8514	2.0157	2.1381	2.4434	2.7132	2.9384	0.139580	0.000000
0.016224	1.6761	1.8602	2.0323	2.1379	2.4532	2.7197	2.9547	0.136980	0.000000
0.026327	1.6255	1.8894	2.0803	2.2634	2.5175	2.7005	2.9815	0.128850	0.000000
0.042833	1.5469	1.8356	2.0520	2.2338	2.4096	2.5848	2.9803	0.120580	0.000000
0.069979	1.4584	1.7928	1.9523	2.1572	2.2970	2.4875	2.8539	0.112550	0.000000
0.114440	1.3969	1.6930	1.8394	2.0365	2.1733	2.3738	2.6920	0.105120	0.000000
0.187600	1.3371	1.5844	1.7038	1.8399	2.0442	2.2314	2.5311	0.098521	0.000000
0.307920	1.2516	1.4448	1.5504	1.6896	1.8847	2.0765	2.2674	0.096334	0.000000
0.504880	1.1497	1.2996	1.3751	1.5770	1.7016	1.8832	2.0026	0.104540	0.000000
0.826150	1.0117	1.0866	1.1991	1.4023	1.5233	1.6746	1.8181	0.129040	0.071893
1.340700	0.7908	0.8706	1.0036	1.2130	1.3462	1.5104	1.6861	0.173650	0.136644
2.170300	0.5599	0.6463	0.7862	1.0173	1.1636	1.3339	1.5197	0.230130	0.203659

Table A-28 Control Point Total Mean Hazard Curves for F=0.100 to 1.000 Hz								
SA(g)	**F0.100Hz**	**F0.133Hz**	**F0.200Hz**	**F0.250Hz**	**F0.333Hz**	**F0.500Hz**	**F0.667Hz**	**F1.000Hz**
0.00100	2.86044E-03	3.54946E-03	5.04108E-03	6.57000E-03	9.16261E-03	1.75125E-02	2.73112E-02	4.39360E-02
0.00130	2.62146E-03	3.26036E-03	4.56731E-03	5.87100E-03	8.29081E-03	1.57777E-02	2.45398E-02	3.97431E-02
0.00160	2.34347E-03	2.92376E-03	4.02068E-03	5.07235E-03	7.10591E-03	1.31117E-02	2.02786E-02	3.32854E-02
0.00200	2.08441E-03	2.61320E-03	3.53772E-03	4.38310E-03	5.80985E-03	1.08210E-02	1.66236E-02	2.76080E-02
0.00250	1.83603E-03	2.32450E-03	3.12421E-03	3.81550E-03	5.13740E-03	8.94810E-03	1.35964E-02	2.28330E-02
0.00320	1.58934E-03	2.05066E-03	2.76387E-03	3.34564E-03	4.41816E-03	7.42787E-03	1.11096E-02	1.88114E-02
0.00400	1.34619E-03	1.79073E-03	2.43993E-03	2.94389E-03	3.83642E-03	6.20496E-03	9.08854E-03	1.53631E-02
0.00500	1.09976E-03	1.53024E-03	2.13390E-03	2.58234E-03	3.34362E-03	5.21842E-03	7.45377E-03	1.24146E-02
0.00630	8.48270E-04	1.25965E-03	1.83567E-03	2.24556E-03	2.92044E-03	4.42651E-03	6.15428E-03	9.98680E-03
0.00790	6.21873E-04	1.00424E-03	1.55760E-03	1.93757E-03	2.54913E-03	3.78104E-03	5.13326E-03	8.04703E-03
0.01000	4.34739E-04	7.69330E-04	1.28823E-03	1.64226E-03	2.20559E-03	3.24201E-03	4.30426E-03	6.50317E-03
0.01260	2.82217E-04	5.48505E-04	1.01317E-03	1.34294E-03	1.88143E-03	2.78007E-03	3.64470E-03	5.28837E-03
0.01580	1.68146E-04	3.62522E-04	7.59289E-04	1.12185E-03	1.57712E-03	2.43904E-03	3.08850E-03	4.34482E-03
0.02000	9.43181E-05	2.26817E-04	5.45332E-04	8.11776E-04	1.28521E-03	2.11292E-03	2.62200E-03	3.66928E-03

Table A-28 Control Point Total Mean Hazard Curves for F=0.100 to 1.000 Hz								
SA(g)	**F0.100Hz**	**F0.133Hz**	**F0.200Hz**	**F0.250Hz**	**F0.333Hz**	**F0.500Hz**	**F0.667Hz**	**F1.000Hz**
0.02510	5.04843E-05	1.33822E-04	3.67265E-04	6.30458E-04	1.01362E-03	1.77206E-03	2.20539E-03	3.03180E-03
0.03160	2.52365E-05	7.24871E-05	2.26390E-04	4.05932E-04	7.54721E-04	1.43574E-03	1.81856E-03	2.49793E-03
0.03980	1.17354E-05	3.63230E-05	1.28315E-04	2.38152E-04	5.24559E-04	1.11185E-03	1.45268E-03	2.03123E-03
0.05010	5.21757E-06	1.73460E-05	6.80281E-05	1.34820E-04	3.40667E-04	8.18969E-04	1.11876E-03	1.61528E-03
0.06310	2.28546E-06	7.91616E-06	3.36921E-05	7.11197E-05	2.04361E-04	5.65444E-04	8.15743E-04	1.23354E-03
0.07940	9.84707E-07	3.44599E-06	1.58128E-05	3.50919E-05	1.14682E-04	3.55287E-04	5.45542E-04	8.84973E-04
0.10000	4.15609E-07	1.47026E-06	7.16243E-06	1.65775E-05	5.87987E-05	2.09591E-04	3.47077E-04	6.12363E-04
0.12600	1.70567E-07	6.23879E-07	3.18014E-06	7.72133E-06	2.91615E-05	1.18965E-04	2.12282E-04	4.08216E-04
0.15800	6.97663E-08	2.61725E-07	1.37035E-06	3.41469E-06	1.36206E-05	6.13846E-05	1.17026E-04	2.51828E-04
0.20000	2.72339E-08	1.05713E-07	5.81519E-07	1.46563E-06	5.79972E-06	2.93685E-05	5.99313E-05	1.37899E-04
0.25100	1.05000E-08	4.21174E-08	2.44698E-07	6.38163E-07	2.62359E-06	1.39654E-05	3.12551E-05	7.74729E-05
0.31600	4.04755E-09	1.68051E-08	1.02571E-07	2.76513E-07	1.19132E-06	6.57374E-06	1.59997E-05	4.00559E-05
0.39800	1.51285E-09	6.35605E-09	4.09466E-08	1.14473E-07	5.22139E-07	3.16535E-06	7.76378E-06	2.00214E-05
0.50100	5.51564E-10	2.37441E-09	1.60963E-08	4.65272E-08	2.23357E-07	1.44563E-06	3.77944E-06	1.00083E-05
0.63100	1.96637E-10	8.71513E-10	6.17804E-09	1.84369E-08	9.30374E-08	6.40845E-07	1.75137E-06	4.81140E-06
0.79400	6.83870E-11	3.15077E-10	2.32737E-09	7.17501E-09	3.83539E-08	2.88768E-07	8.53533E-07	2.29000E-06
1.00000	2.31770E-11	1.12240E-10	8.67680E-10	2.76445E-09	1.57203E-08	1.30046E-07	4.21551E-07	1.10818E-06
1.26000	7.73221E-12	3.89954E-11	3.17020E-10	1.04885E-09	6.40023E-09	5.81638E-08	2.03637E-07	5.41033E-07
1.58000	2.60868E-12	1.36301E-11	1.17301E-10	4.03029E-10	2.63787E-09	2.65089E-08	1.01897E-07	2.65133E-07
2.00000	8.43156E-13	4.53214E-12	4.14079E-11	1.48173E-10	1.04323E-09	1.17391E-08	4.95653E-08	1.26965E-07
2.51000	2.84058E-13	1.56117E-12	1.50808E-11	5.62186E-11	4.25406E-10	5.36503E-09	2.49904E-08	6.25861E-08
3.16000	9.29247E-14	5.23144E-13	5.35408E-12	2.08473E-11	1.70170E-10	2.43129E-09	1.25676E-08	3.05903E-08
3.98000	3.01373E-14	1.76646E-13	1.91609E-12	7.77281E-12	6.79867E-11	1.10306E-09	6.34573E-09	1.49956E-08
5.01000	9.67592E-15	5.86738E-14	6.78079E-13	2.88116E-12	2.71839E-11	5.02785E-10	3.22502E-09	7.38501E-09
6.31000	2.97745E-15	1.89835E-14	2.37133E-13	1.05692E-12	1.07642E-11	2.29217E-10	1.64513E-09	3.64010E-09
7.94000	8.97262E-16	6.04687E-15	8.22462E-14	3.86427E-13	4.25694E-12	1.04827E-10	8.46226E-10	1.80061E-09
10.00000	2.60570E-16	1.85008E-15	2.76995E-14	1.38096E-13	1.65949E-12	4.77247E-11	4.35487E-10	8.87624E-10

Table A-29 Control Point Total Mean Hazard Curves for F=1.333 to 10.000 Hz								
SA(g)	**F1.333Hz**	**F2.000Hz**	**F2.500Hz**	**F3.333Hz**	**F4.000Hz**	**F5.000Hz**	**F6.667Hz**	**F10.000Hz**
0.00100	5.74436E-02	7.37438E-02	7.78056E-02	8.08653E-02	8.15053E-02	8.22972E-02	8.24879E-02	8.15754E-02
0.00130	5.26430E-02	6.91179E-02	7.51116E-02	7.85181E-02	8.11913E-02	8.22972E-02	8.24879E-02	8.15754E-02
0.00160	4.51842E-02	6.18374E-02	6.87134E-02	7.49417E-02	7.89802E-02	8.12998E-02	8.24879E-02	8.15754E-02
0.00200	3.80649E-02	5.51140E-02	6.23653E-02	6.92365E-02	7.44698E-02	7.93088E-02	8.24879E-02	8.15754E-02
0.00250	3.21679E-02	4.83822E-02	5.60341E-02	6.33226E-02	6.90304E-02	7.62536E-02	8.05352E-02	7.95636E-02
0.00320	2.65123E-02	4.13067E-02	4.90251E-02	5.68771E-02	6.33382E-02	7.13230E-02	7.75460E-02	7.61512E-02
0.00400	2.15022E-02	3.44242E-02	4.17092E-02	4.97950E-02	5.68500E-02	6.57708E-02	7.30263E-02	7.08423E-02
0.00500	1.72785E-02	2.81924E-02	3.47535E-02	4.27253E-02	4.96621E-02	5.97642E-02	6.78816E-02	6.54165E-02
0.00630	1.37844E-02	2.27376E-02	2.84365E-02	3.60825E-02	4.24415E-02	5.32523E-02	6.20943E-02	5.94436E-02
0.00790	1.09608E-02	1.80621E-02	2.28224E-02	3.01453E-02	3.67942E-02	4.60001E-02	5.55233E-02	5.26968E-02
0.01000	8.71050E-03	1.42534E-02	1.80547E-02	2.42532E-02	3.02489E-02	3.89592E-02	4.84846E-02	4.57448E-02
0.01260	6.95627E-03	1.12452E-02	1.42273E-02	1.92465E-02	2.44656E-02	3.23842E-02	4.14197E-02	3.89546E-02
0.01580	5.58430E-03	8.99757E-03	1.11415E-02	1.51768E-02	1.96280E-02	2.73213E-02	3.46090E-02	3.24814E-02
0.02000	4.51261E-03	6.95045E-03	8.68398E-03	1.18316E-02	1.53593E-02	2.11684E-02	2.84007E-02	2.66709E-02
0.02510	3.78807E-03	5.46785E-03	6.77034E-03	9.19012E-03	1.21286E-02	1.74198E-02	2.29992E-02	2.16654E-02
0.03160	3.08046E-03	4.40205E-03	5.31725E-03	7.14411E-03	9.42504E-03	1.37996E-02	1.83814E-02	1.73933E-02
0.03980	2.49964E-03	3.50774E-03	4.21523E-03	5.58965E-03	7.34169E-03	1.07976E-02	1.45193E-02	1.38078E-02
0.05010	1.99551E-03	2.79625E-03	3.36886E-03	4.52318E-03	5.74547E-03	8.22272E-03	1.13703E-02	1.08959E-02
0.06310	1.54329E-03	2.18894E-03	2.75664E-03	3.58862E-03	4.53369E-03	6.69630E-03	8.72866E-03	8.58159E-03
0.07940	1.13952E-03	1.65423E-03	2.14534E-03	2.83644E-03	3.58653E-03	5.23897E-03	6.94460E-03	6.75684E-03
0.10000	8.33873E-04	1.22933E-03	1.64013E-03	2.21406E-03	2.83589E-03	4.10922E-03	5.35435E-03	5.32917E-03
0.12600	5.66513E-04	9.19632E-04	1.21822E-03	1.71865E-03	2.23078E-03	3.22319E-03	4.37880E-03	4.20434E-03
0.15800	3.51949E-04	6.26546E-04	8.56192E-04	1.30007E-03	1.74701E-03	2.52168E-03	3.62902E-03	3.30780E-03
0.20000	2.04556E-04	3.89745E-04	5.78284E-04	9.28651E-04	1.30347E-03	1.93691E-03	2.70742E-03	2.59344E-03
0.25100	1.17488E-04	2.36742E-04	3.74324E-04	6.52298E-04	9.42108E-04	1.44556E-03	2.19183E-03	1.99629E-03
0.31600	6.35373E-05	1.35889E-04	2.30735E-04	4.33806E-04	6.63873E-04	1.06173E-03	1.60638E-03	1.49627E-03
0.39800	3.21665E-05	7.30035E-05	1.31291E-04	2.75292E-04	4.50924E-04	7.34283E-04	1.13793E-03	1.06212E-03
0.50100	1.63591E-05	3.74967E-05	7.11272E-05	1.64769E-04	2.94840E-04	4.79734E-04	7.82496E-04	7.20792E-04
0.63100	8.08675E-06	1.88567E-05	3.80320E-05	9.38508E-05	1.79567E-04	3.00561E-04	5.19234E-04	4.56448E-04
0.79400	3.91448E-06	9.66709E-06	2.01140E-05	5.18208E-05	1.03223E-04	1.76088E-04	3.19581E-04	2.64506E-04

Table A-29 Control Point Total Mean Hazard Curves for F=1.333 to 10.000 Hz								
SA(g)	**F1.333Hz**	**F2.000Hz**	**F2.500Hz**	**F3.333Hz**	**F4.000Hz**	**F5.000Hz**	**F6.667Hz**	**F10.000Hz**
1.00000	1.90362E-06	5.00477E-06	1.04399E-05	2.75222E-05	5.61601E-05	1.14236E-04	1.81736E-04	1.41143E-04
1.26000	9.42556E-07	2.51946E-06	5.31115E-06	1.39773E-05	2.87384E-05	6.04977E-05	9.44065E-05	7.04026E-05
1.58000	4.72029E-07	1.27890E-06	2.67433E-06	6.83796E-06	1.36148E-05	2.44715E-05	4.19750E-05	3.35688E-05
2.00000	2.32534E-07	6.25143E-07	1.27370E-06	3.10253E-06	5.82052E-06	9.70238E-06	1.75545E-05	1.48855E-05
2.51000	1.18245E-07	3.11928E-07	6.18950E-07	1.41432E-06	2.49245E-06	3.89394E-06	6.84690E-06	6.68208E-06
3.16000	5.99712E-08	1.56383E-07	2.99471E-07	6.33471E-07	1.05317E-06	1.48480E-06	2.64440E-06	2.93189E-06
3.98000	3.06211E-08	7.94708E-08	1.46797E-07	2.86363E-07	4.41526E-07	5.91235E-07	1.07948E-06	1.26061E-06
5.01000	1.57679E-08	4.09711E-08	7.30104E-08	1.32380E-07	1.87886E-07	2.51438E-07	4.50494E-07	5.28105E-07
6.31000	8.13979E-09	2.12761E-08	3.65905E-08	6.21891E-08	8.17620E-08	1.12244E-07	1.88771E-07	2.15274E-07
7.94000	4.22381E-09	1.11402E-08	1.84963E-08	2.96355E-08	3.64596E-08	5.19100E-08	8.01034E-08	8.61911E-08
10.00000	2.19015E-09	5.84186E-09	9.35833E-09	1.41796E-08	1.64381E-08	2.44440E-08	3.44948E-08	3.37223E-08

Table A-30 Control Point Total Mean Hazard Curves for F=13.333 to 100.000 Hz and PGA								
SA(g)	**F13.333Hz**	**F20.000Hz**	**F25.000Hz**	**F33.333Hz**	**F40.000Hz**	**F50.000Hz**	**F100.000Hz**	**PGA**
0.00100	8.05429E-02	7.89288E-02	7.76539E-02	7.59631E-02	7.47478E-02	7.27714E-02	6.84541E-02	6.77623E-02
0.00130	8.05429E-02	7.89288E-02	7.76539E-02	7.59631E-02	7.47478E-02	7.27714E-02	6.84541E-02	6.77623E-02
0.00160	8.05429E-02	7.86132E-02	7.73215E-02	7.57044E-02	7.47478E-02	7.27714E-02	6.84541E-02	6.77623E-02
0.00200	8.02477E-02	7.75307E-02	7.61824E-02	7.31092E-02	7.17965E-02	6.98418E-02	6.54236E-02	6.47102E-02
0.00250	7.69726E-02	7.29474E-02	7.05373E-02	6.80317E-02	6.64992E-02	6.42780E-02	5.93258E-02	5.85723E-02
0.00320	7.20491E-02	6.74373E-02	6.48025E-02	6.19953E-02	6.02478E-02	5.77899E-02	5.22858E-02	5.14951E-02
0.00400	6.70275E-02	6.20470E-02	5.92605E-02	5.54547E-02	5.40946E-02	5.28918E-02	4.56457E-02	4.48396E-02
0.00500	6.15173E-02	5.60918E-02	5.30866E-02	4.96539E-02	4.76920E-02	4.52339E-02	3.91128E-02	3.83165E-02
0.00630	5.51563E-02	4.95066E-02	4.64021E-02	4.21589E-02	4.11395E-02	3.86331E-02	3.27988E-02	3.20326E-02
0.00790	4.83601E-02	4.28399E-02	3.98380E-02	3.58050E-02	3.48543E-02	3.24838E-02	2.70344E-02	2.63118E-02
0.01000	4.16302E-02	3.64704E-02	3.36856E-02	2.99663E-02	2.90993E-02	2.69342E-02	2.19985E-02	2.13490E-02
0.01260	3.51258E-02	3.05463E-02	2.77191E-02	2.47097E-02	2.39542E-02	2.18319E-02	1.77023E-02	1.77611E-02
0.01580	2.91641E-02	2.51580E-02	2.23673E-02	2.01355E-02	1.95047E-02	1.76752E-02	1.46933E-02	1.41303E-02
0.02000	2.37271E-02	1.98206E-02	1.80359E-02	1.63363E-02	1.52545E-02	1.42240E-02	1.16721E-02	1.11723E-02
0.02510	1.92835E-02	1.60357E-02	1.45591E-02	1.31407E-02	1.22413E-02	1.13901E-02	9.25155E-03	8.81703E-03

Table A-30 Control Point Total Mean Hazard Curves for F=13.333 to 100.000 Hz and PGA								
SA(g)	**F13.333Hz**	**F20.000Hz**	**F25.000Hz**	**F33.333Hz**	**F40.000Hz**	**F50.000Hz**	**F100.000Hz**	**PGA**
0.03160	1.54365E-02	1.28631E-02	1.16582E-02	1.04969E-02	9.76283E-03	9.07437E-03	7.31918E-03	6.94827E-03
0.03980	1.21164E-02	1.02409E-02	9.30584E-03	8.36084E-03	7.76549E-03	7.04293E-03	5.72963E-03	5.46836E-03
0.05010	9.60328E-03	8.16396E-03	7.40022E-03	6.50301E-03	6.15131E-03	5.50202E-03	4.51848E-03	4.29966E-03
0.06310	7.59045E-03	6.25643E-03	5.86642E-03	4.98373E-03	4.61958E-03	4.34922E-03	3.40683E-03	3.36660E-03
0.07940	5.99036E-03	4.91722E-03	4.62259E-03	3.91678E-03	3.48594E-03	3.11006E-03	2.65331E-03	2.59952E-03
0.10000	4.71952E-03	3.85541E-03	3.42457E-03	2.91522E-03	2.63750E-03	2.25569E-03	1.94377E-03	1.99013E-03
0.12600	3.60468E-03	2.98307E-03	2.60985E-03	2.06671E-03	1.75996E-03	1.55396E-03	1.42765E-03	1.38434E-03
0.15800	2.80107E-03	2.27798E-03	1.95382E-03	1.48823E-03	1.28071E-03	1.06340E-03	8.88604E-04	9.74260E-04
0.20000	2.15212E-03	1.71102E-03	1.37577E-03	1.00232E-03	7.28536E-04	6.21899E-04	5.49487E-04	6.25926E-04
0.25100	1.56051E-03	1.20872E-03	9.17213E-04	6.56400E-04	4.69149E-04	3.77680E-04	3.02877E-04	3.99387E-04
0.31600	1.09052E-03	8.04870E-04	5.91926E-04	3.89518E-04	2.95094E-04	1.92781E-04	1.46793E-04	2.03384E-04
0.39800	7.37737E-04	5.21217E-04	3.65539E-04	2.14440E-04	1.46834E-04	9.69646E-05	7.88109E-05	1.16523E-04
0.50100	4.77818E-04	3.16084E-04	2.06858E-04	1.23158E-04	7.84016E-05	4.95537E-05	3.60779E-05	4.90525E-05
0.63100	2.82422E-04	1.79425E-04	1.13572E-04	6.67383E-05	4.14500E-05	2.64573E-05	1.87347E-05	2.69908E-05
0.79400	1.56175E-04	9.69309E-05	6.15950E-05	3.54936E-05	2.22699E-05	1.27105E-05	7.78180E-06	1.10541E-05
1.00000	8.18187E-05	4.93833E-05	3.11768E-05	1.77173E-05	1.16694E-05	6.59188E-06	3.73569E-06	5.61270E-06
1.26000	4.12297E-05	2.49602E-05	1.65137E-05	9.15395E-06	5.79723E-06	3.04225E-06	1.64350E-06	2.46895E-06
1.58000	2.02156E-05	1.26250E-05	8.46719E-06	4.66441E-06	2.83564E-06	1.40342E-06	7.36887E-07	1.13258E-06
2.00000	9.17311E-06	6.04394E-06	3.92311E-06	2.19176E-06	1.26964E-06	6.04631E-07	3.10918E-07	4.90353E-07
2.51000	4.21101E-06	2.86625E-06	1.86014E-06	1.01354E-06	5.63470E-07	2.60198E-07	1.32627E-07	2.14477E-07
3.16000	1.88581E-06	1.31349E-06	8.44195E-07	4.38382E-07	2.41248E-07	1.06089E-07	5.39485E-08	9.12408E-08
3.98000	8.34191E-07	5.84401E-07	3.62289E-07	1.77973E-07	9.94203E-08	4.11295E-08	2.11997E-08	3.77337E-08
5.01000	3.62236E-07	2.51733E-07	1.48200E-07	6.85969E-08	3.93556E-08	1.51599E-08	8.07911E-09	1.52112E-08
6.31000	1.52697E-07	1.05343E-07	5.81493E-08	2.49351E-08	1.47731E-08	5.21207E-09	2.93178E-09	5.94938E-09
7.94000	6.35087E-08	4.30232E-08	2.19400E-08	8.49669E-09	5.19798E-09	1.63249E-09	9.96496E-10	2.25222E-09
10.00000	2.57894E-08	1.68077E-08	7.75865E-09	2.61648E-09	1.64182E-09	4.39990E-10	3.04473E-10	8.06170E-10