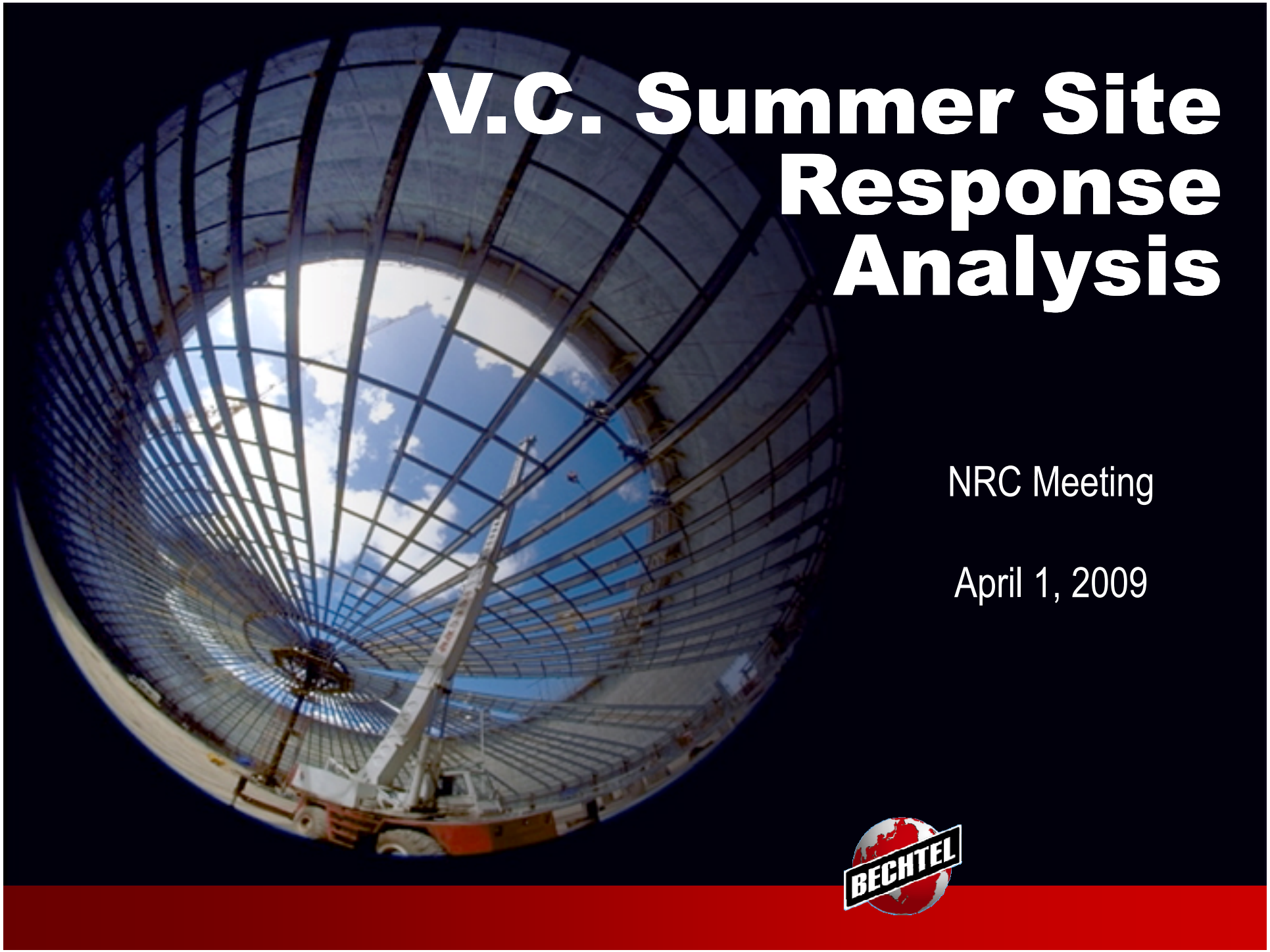


V.C. Summer Site Response Analysis

NRC Meeting

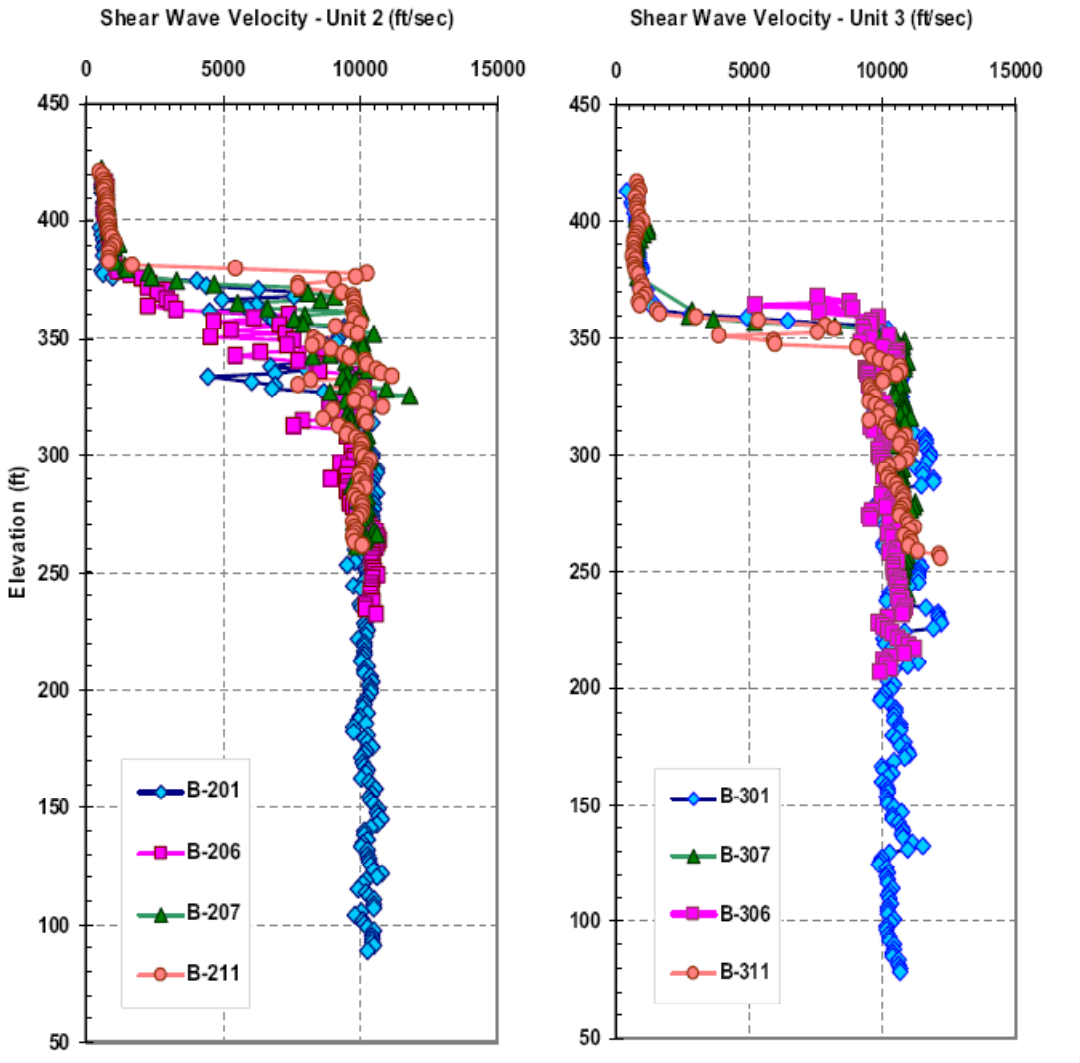
April 1, 2009

RAI 02.05.02-18

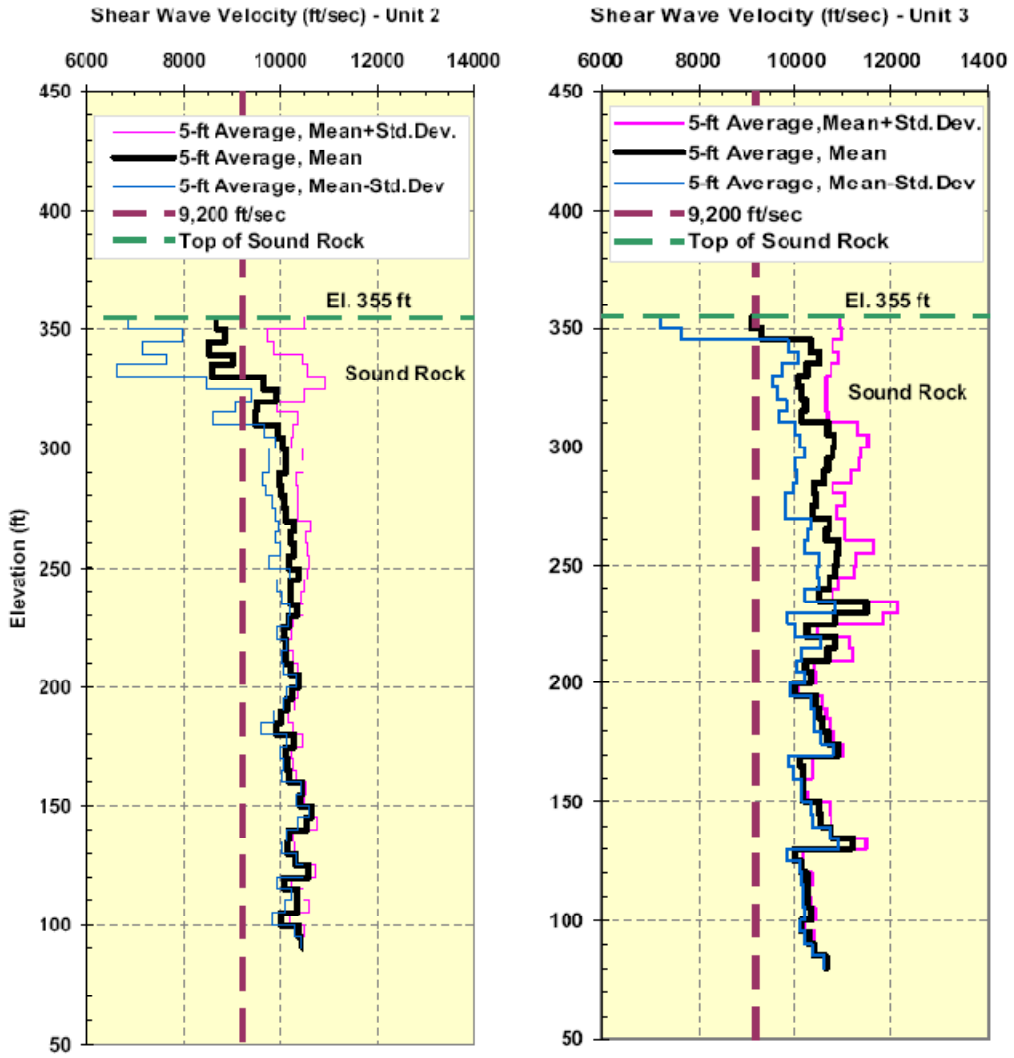
FSAR Section 2.5.2.5 states that the site is underlain by weathered and unweathered bedrock with a high shear velocity (greater than 8,500 fps) and, therefore, a site response analysis was not performed to develop the GMRS because the S-wave velocity is consistent (i.e. within the uncertainty) with the ground motion model used in the PSHA (S-wave velocity greater than 9,200 fps). While FSAR Figure 2.5.4-226, "Shear Wave Velocity of Layer V with 5-Foot Vertical Distance Averaging" shows the mean S-wave velocity to be greater than 8,500 fps, the profile exhibits a large standard deviation particularly below Unit 2 in the 310 to 355 ft elevation range. FSAR Section 2.5.4.7.3 presents the results of site response calculations but does not discuss the impact of the site response on the GMRS.

Please provide additional justification for not performing a site response calculation as part of the development of the GMRS, in light of the significant S-wave velocity variability beneath the site and the observed S-wave velocity values that are significantly less than 8,500 fps.

2.5.4.7.2 Vs – Measured (Suspension P-S Logging)



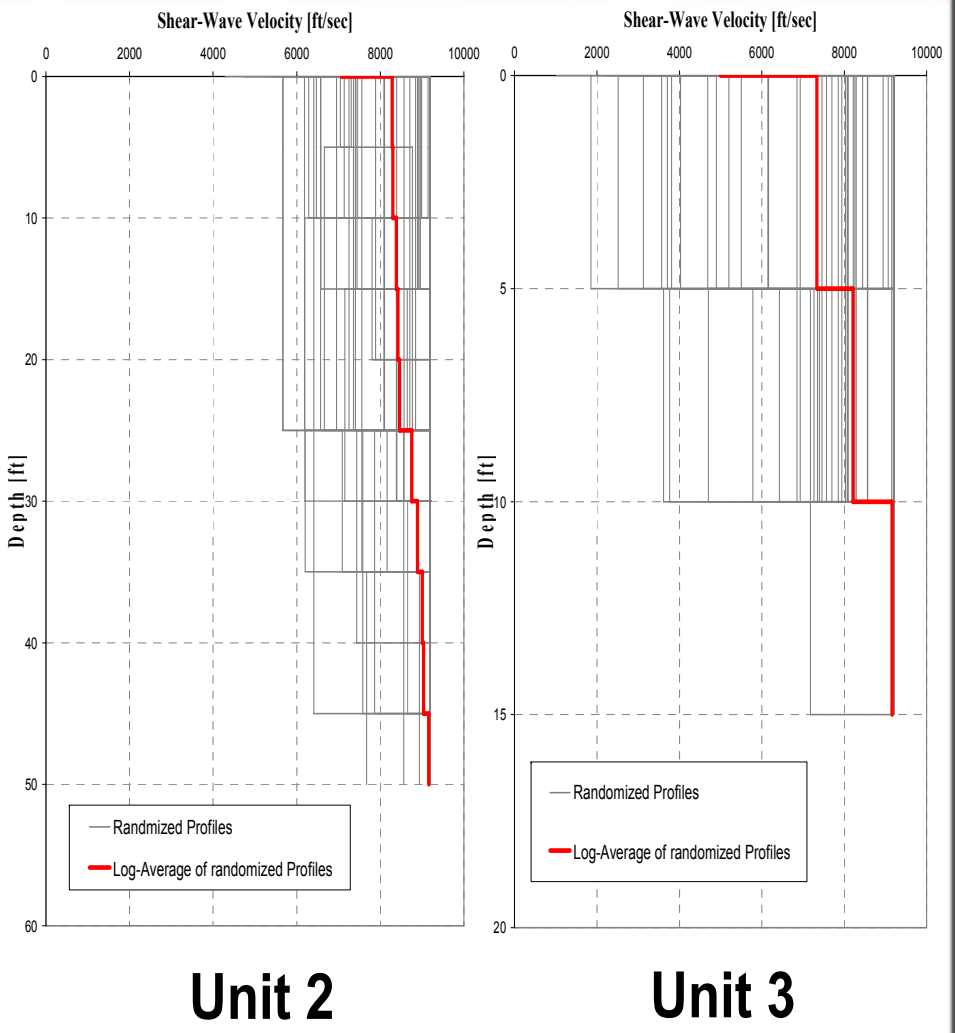
2.5.4.7.2 Vs - Averaging at 5 Ft Intervals



Preliminary Rock Column Analysis Results

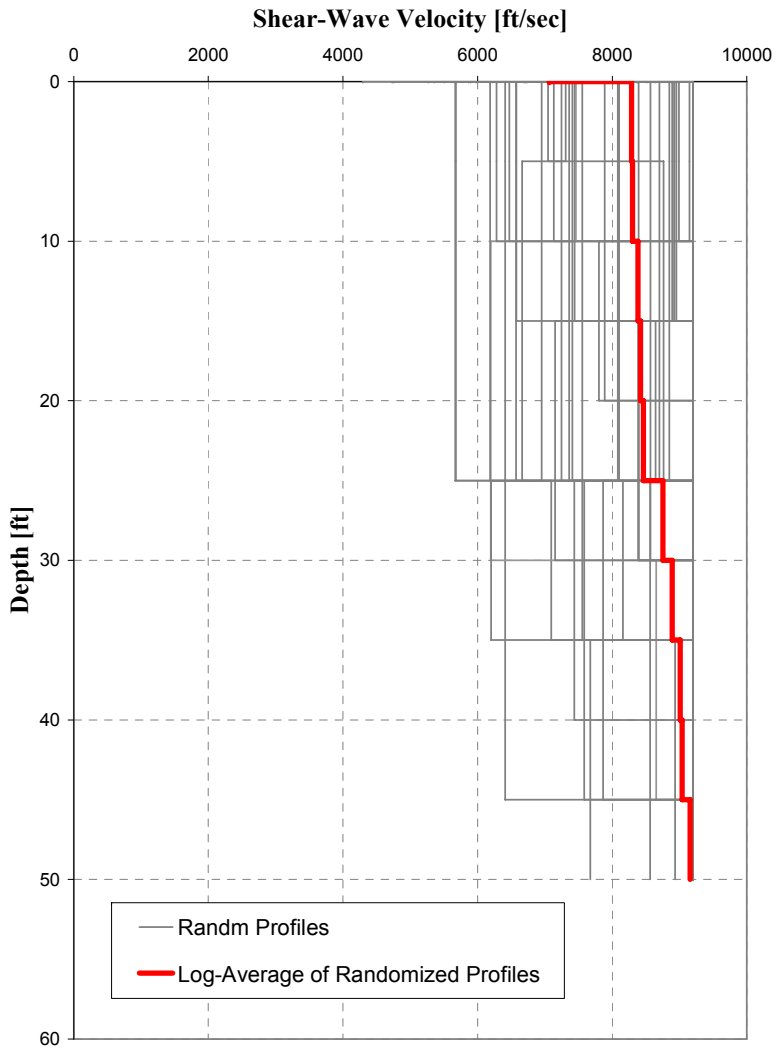
VC Summer - Randomized Profiles Analyses

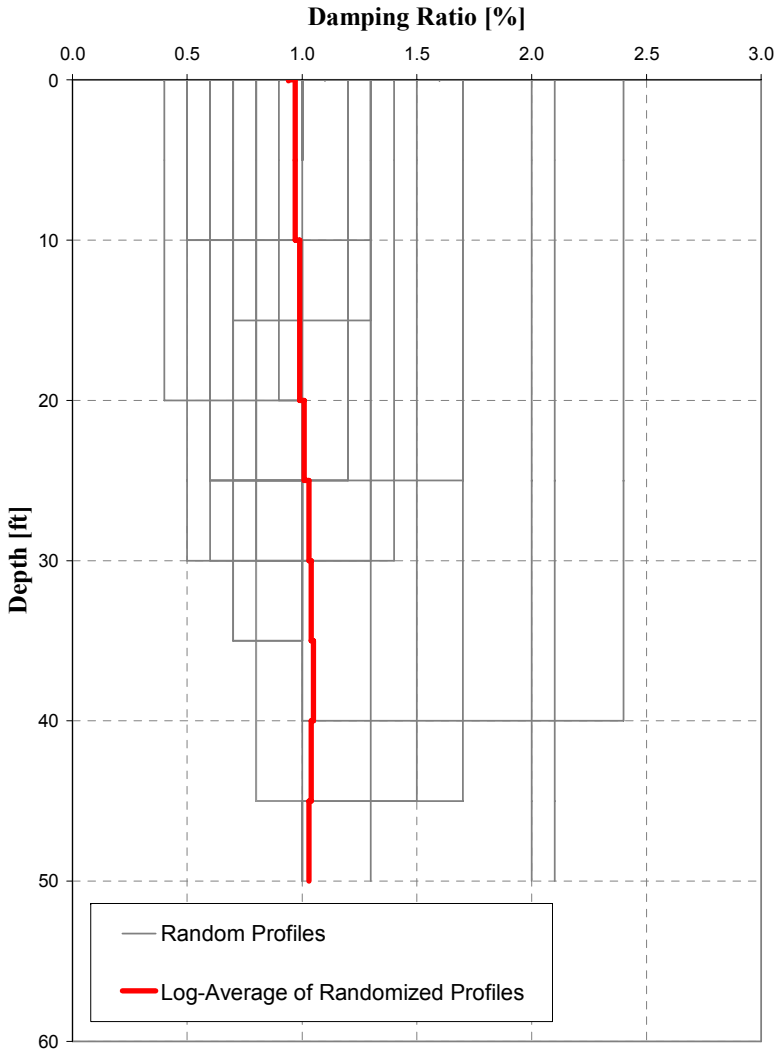
- Two soil profiles, corresponding to Units 2 and 3 are used in the P-SHAKE analyses.
- For each soil profile, 60 randomized profiles were generated and used for analyses.
- Two different levels of hazard were considered with annual exceedance probability of 10^{-4} and 10^{-5}.
- High frequency and low frequency spectrums were considered separately, leading to a total of 480 P-SHAKE runs for 2 units, 60 randomized profiles, 2 hazard levels.



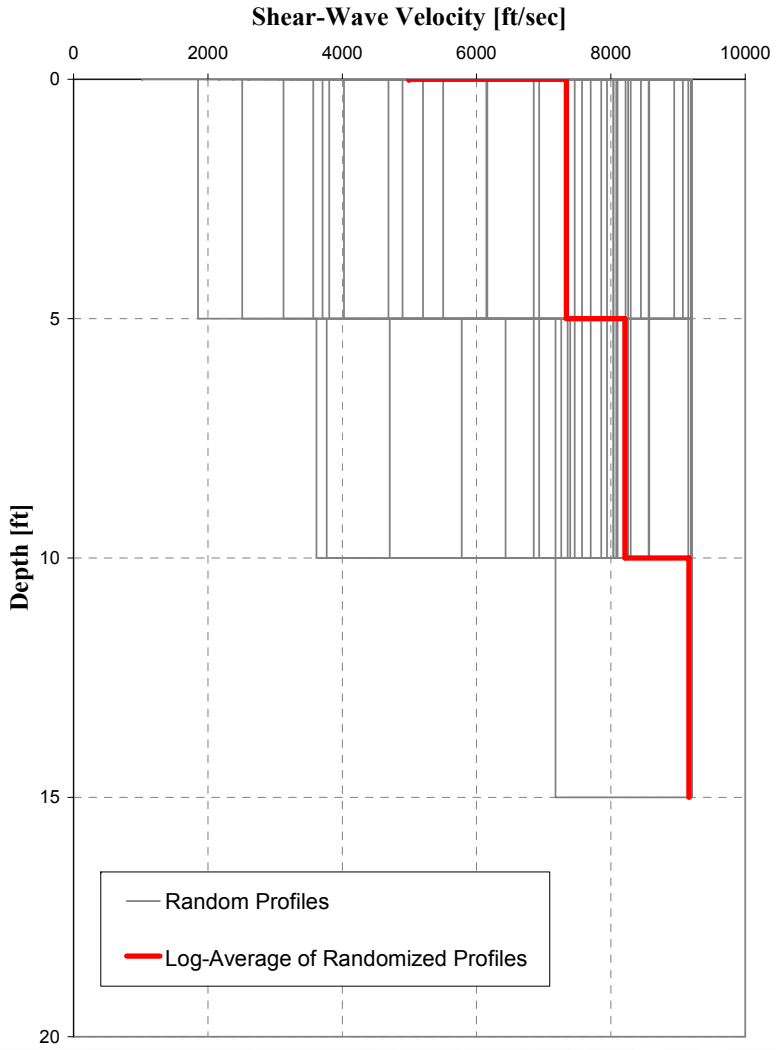
Unit 2 Unit 3

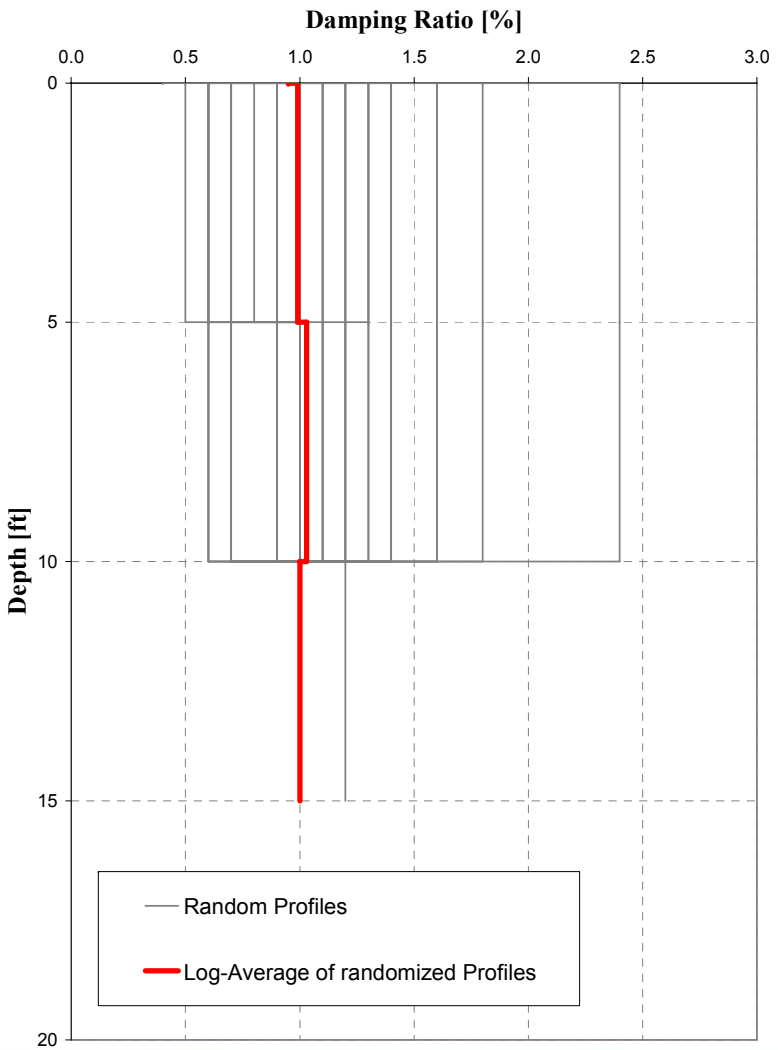
Unit 2 - Random Profiles - Initial Velocity and Damping



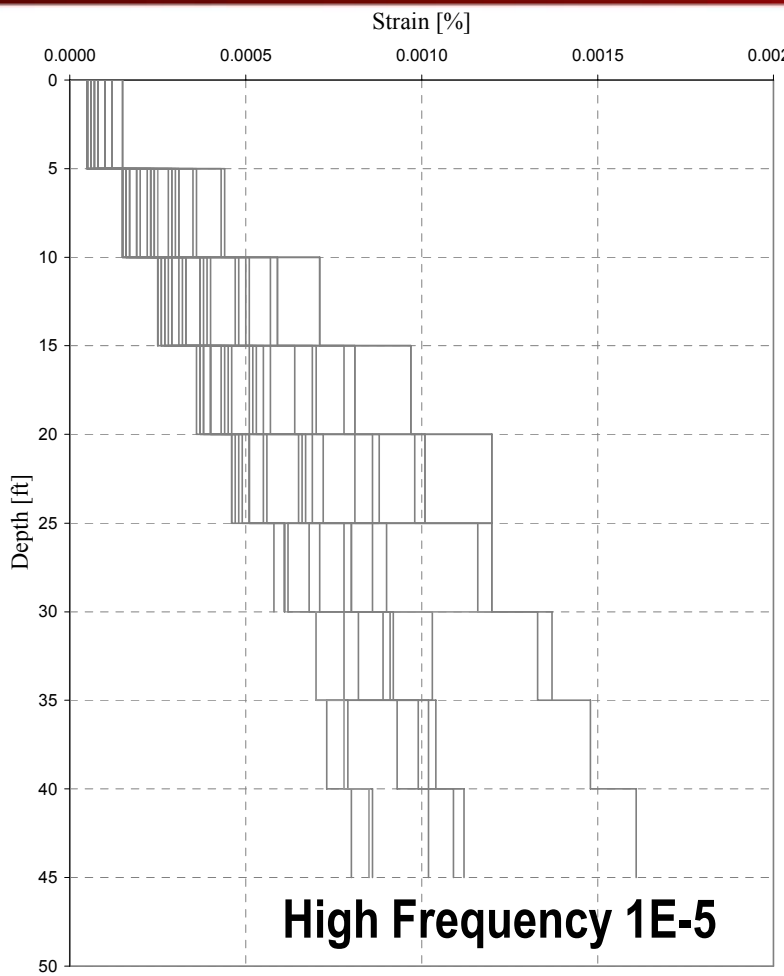


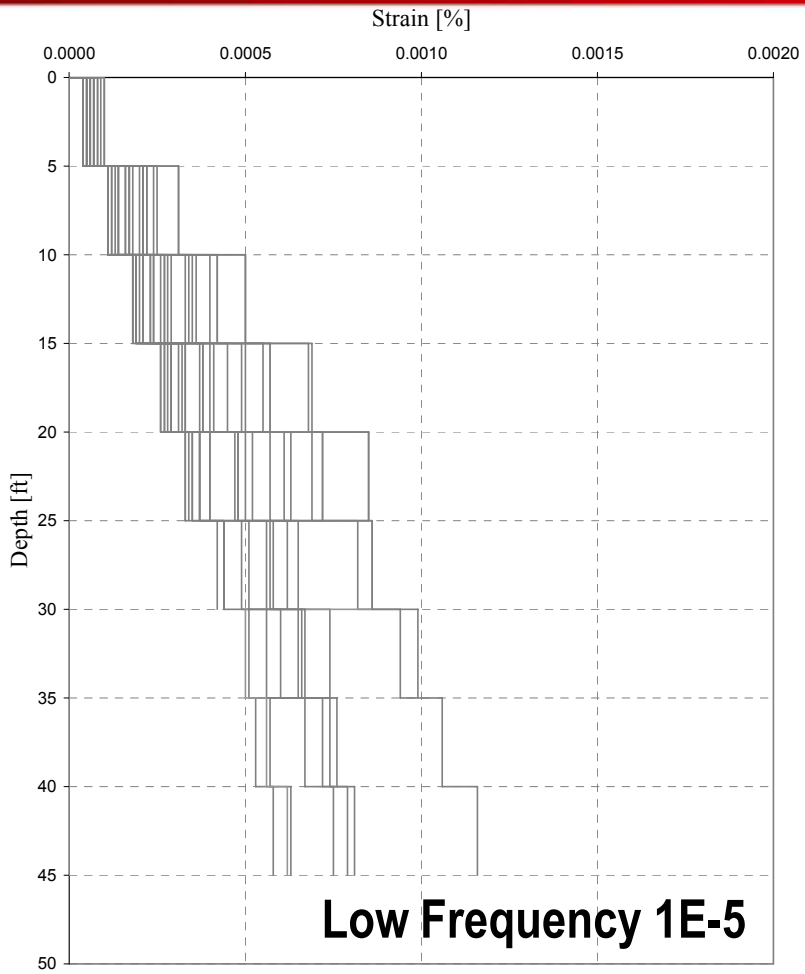
Unit 3 - Random Profiles - Initial Velocity and Damping





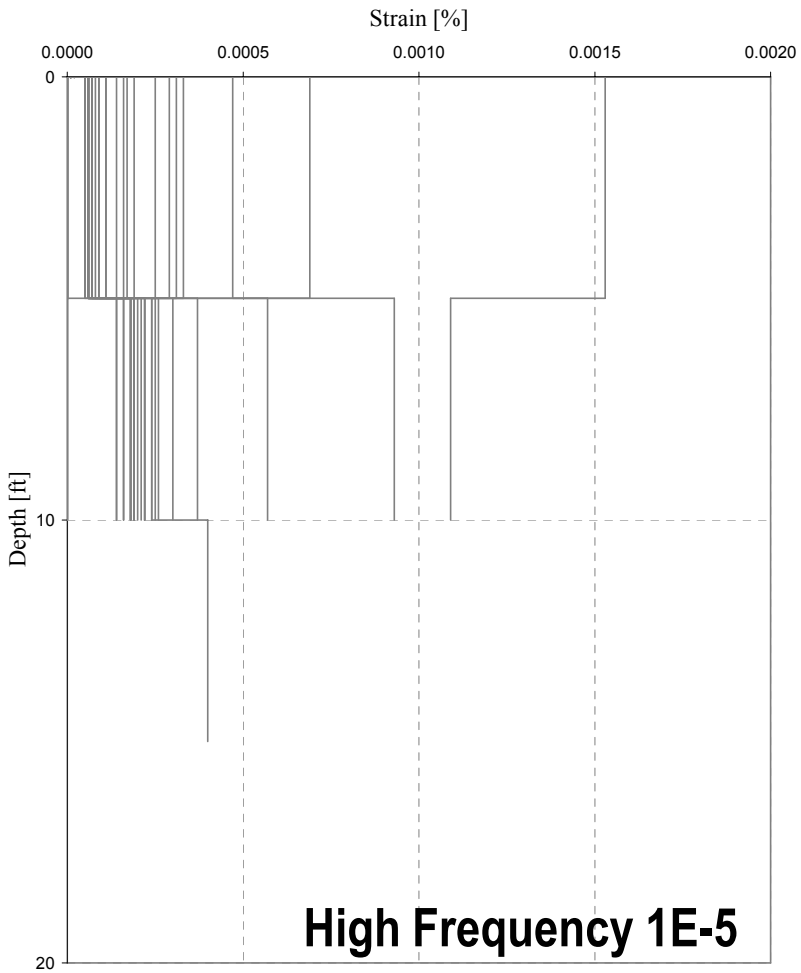
Unit 2 - Randomized Profiles - Strain Results

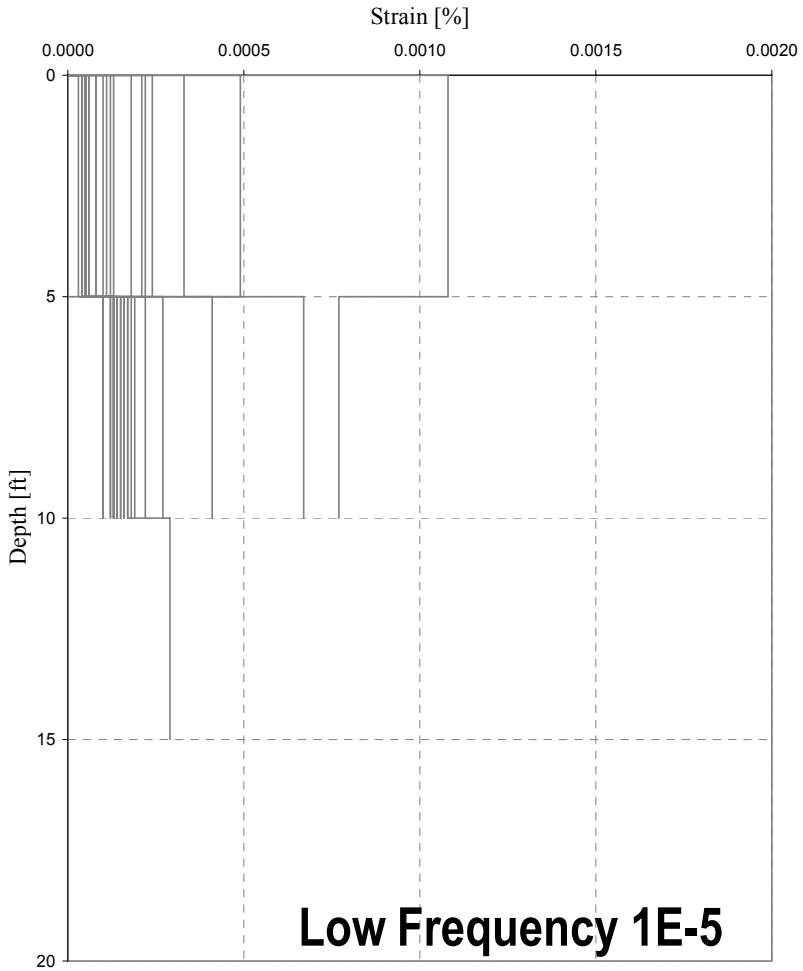




- Very low strain amplitudes

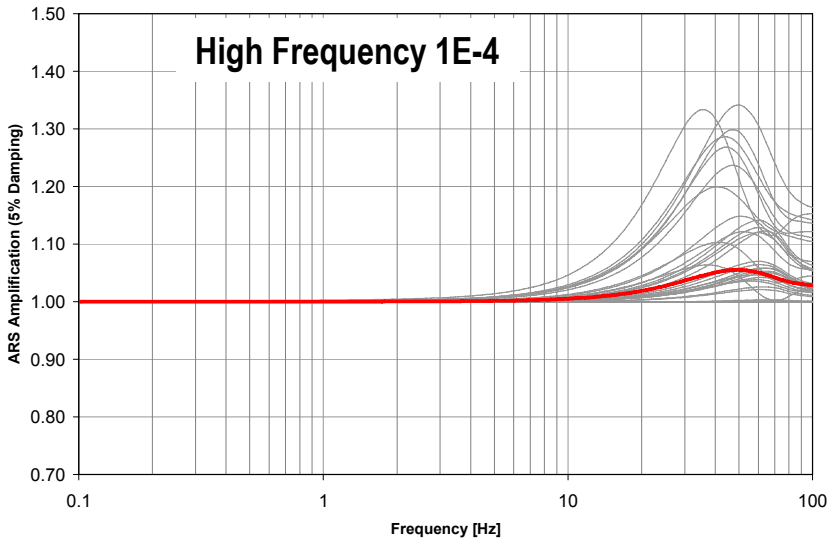
Unit 3 - Randomized Profiles - Strain Results

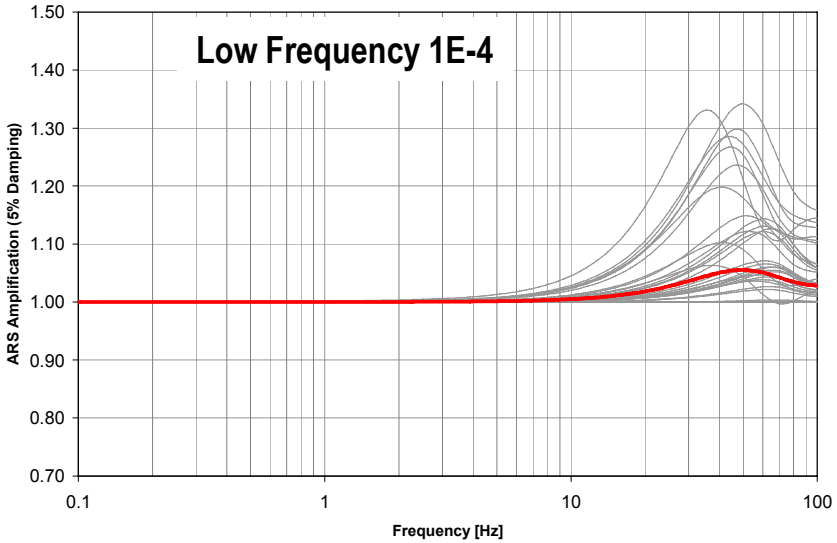


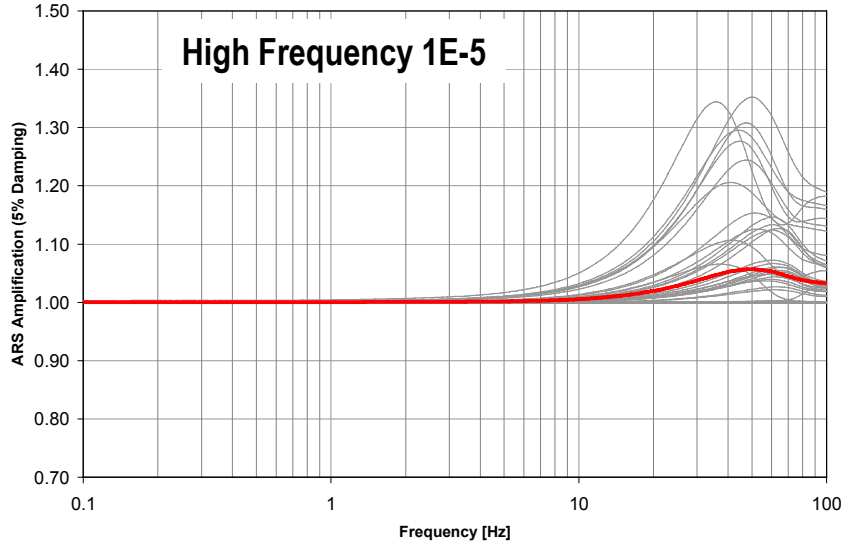


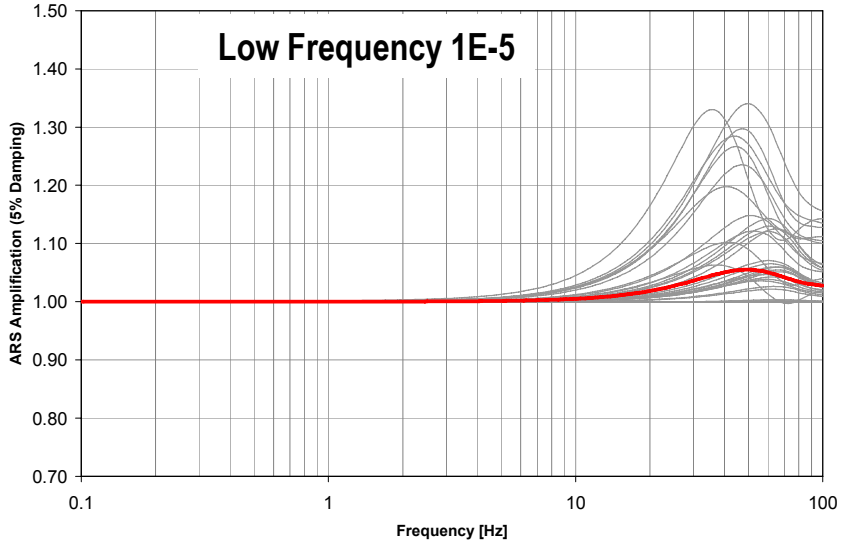
- Very low strain amplitudes

Unit 2 – ARS Amplifications

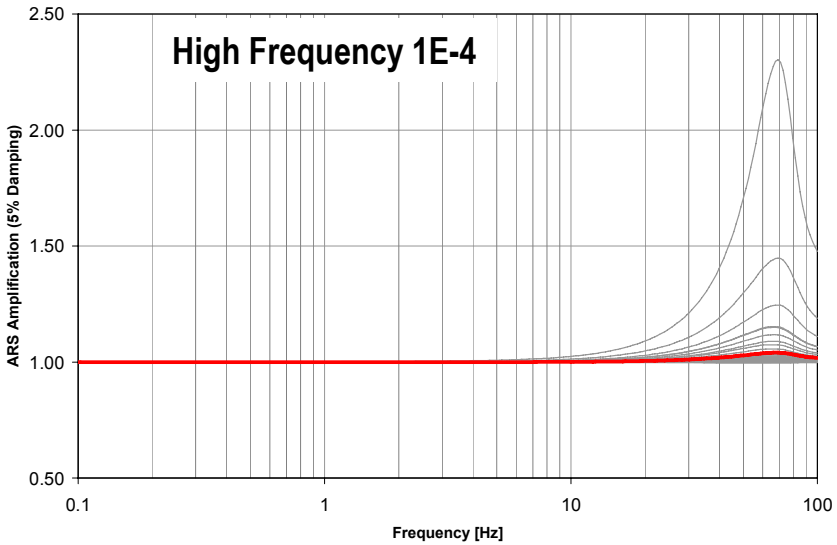


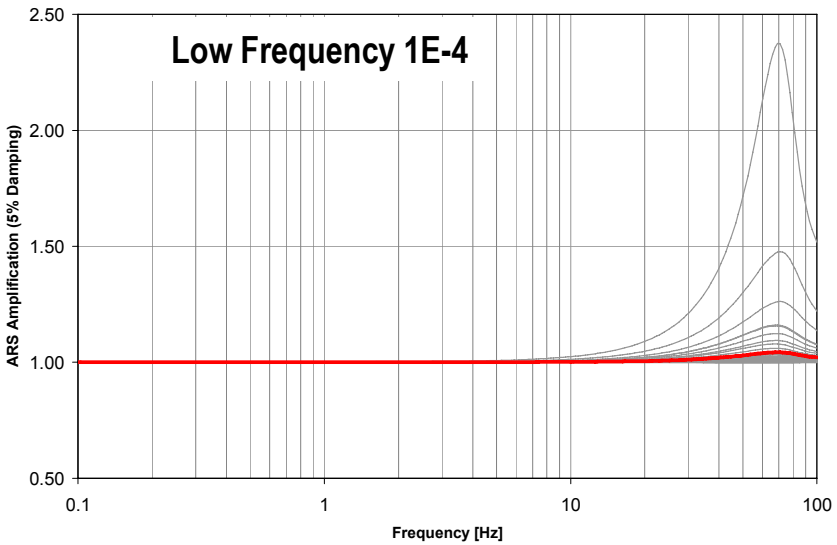


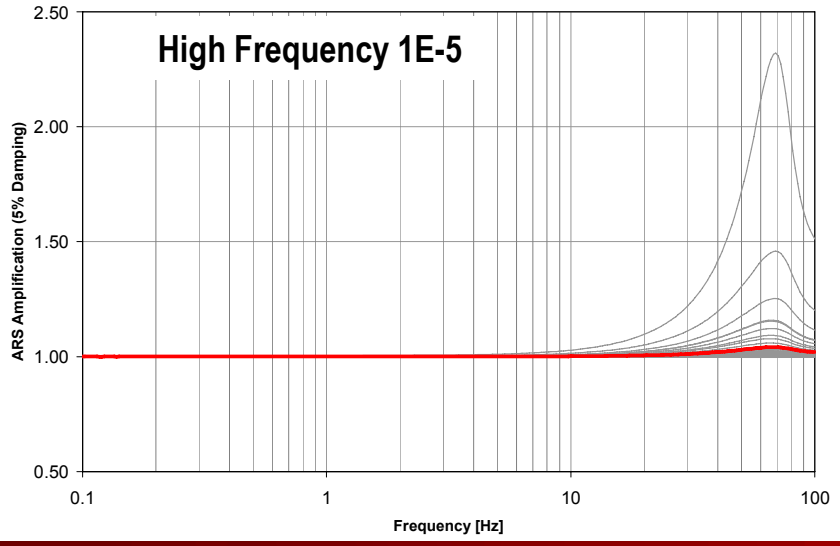


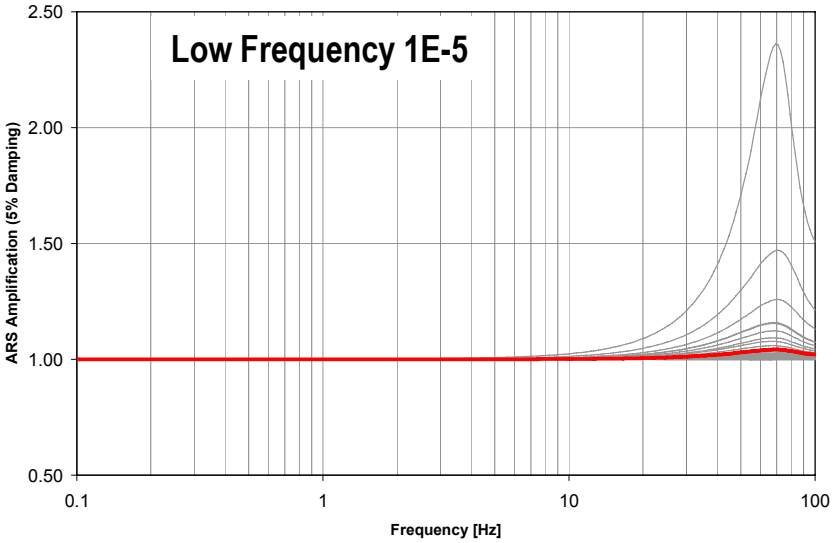


Unit 3 – ARS Amplifications

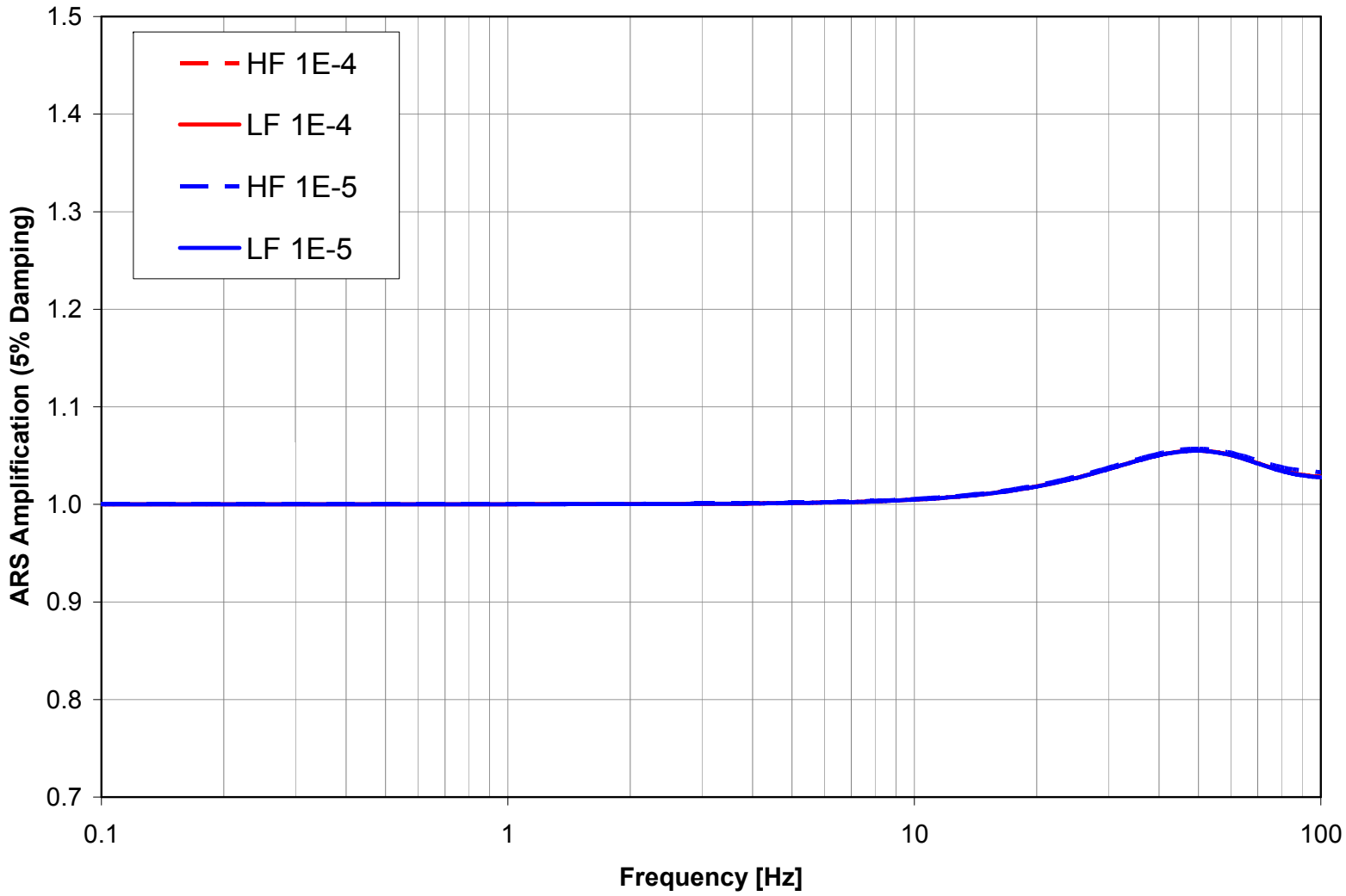




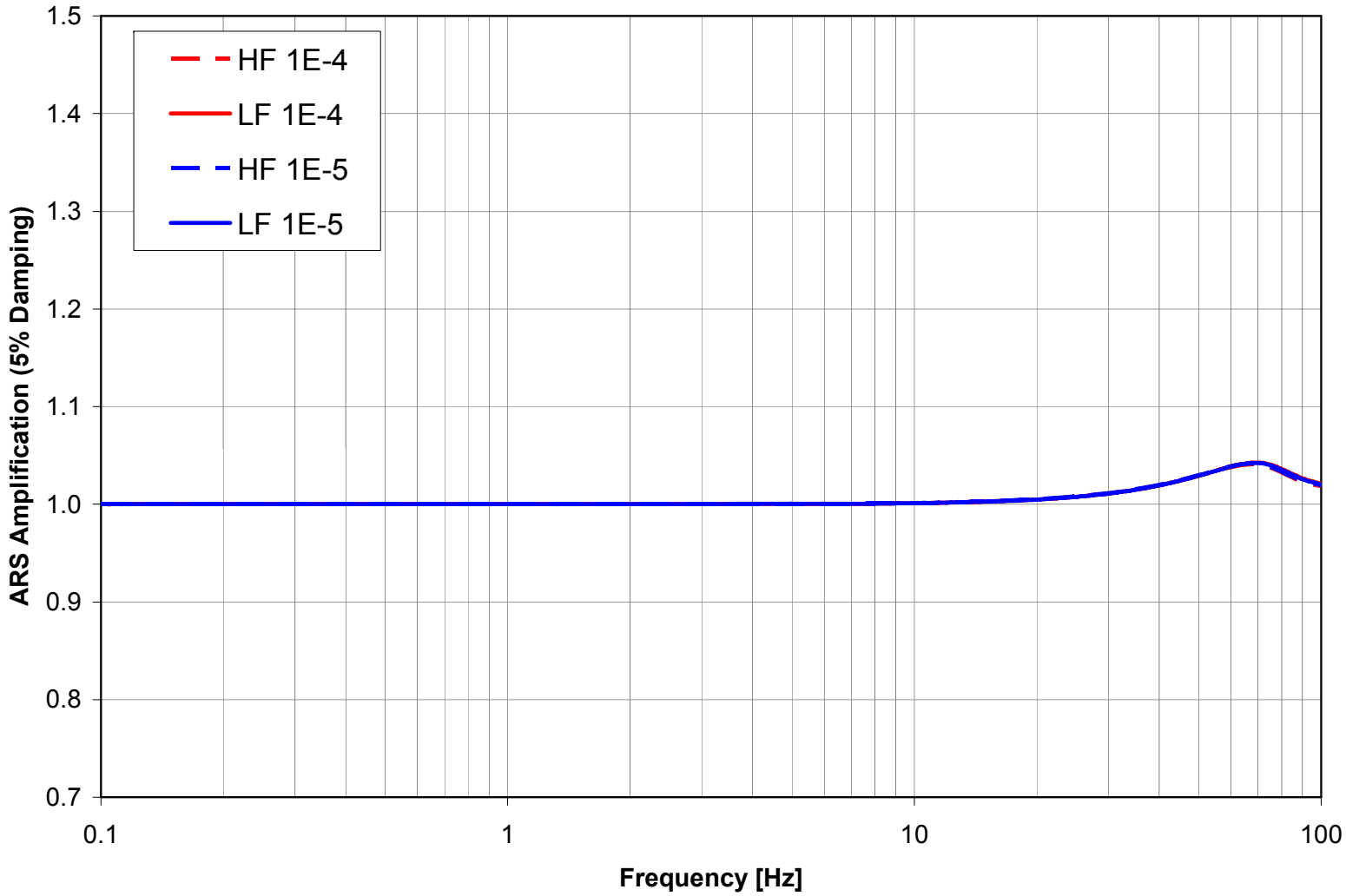




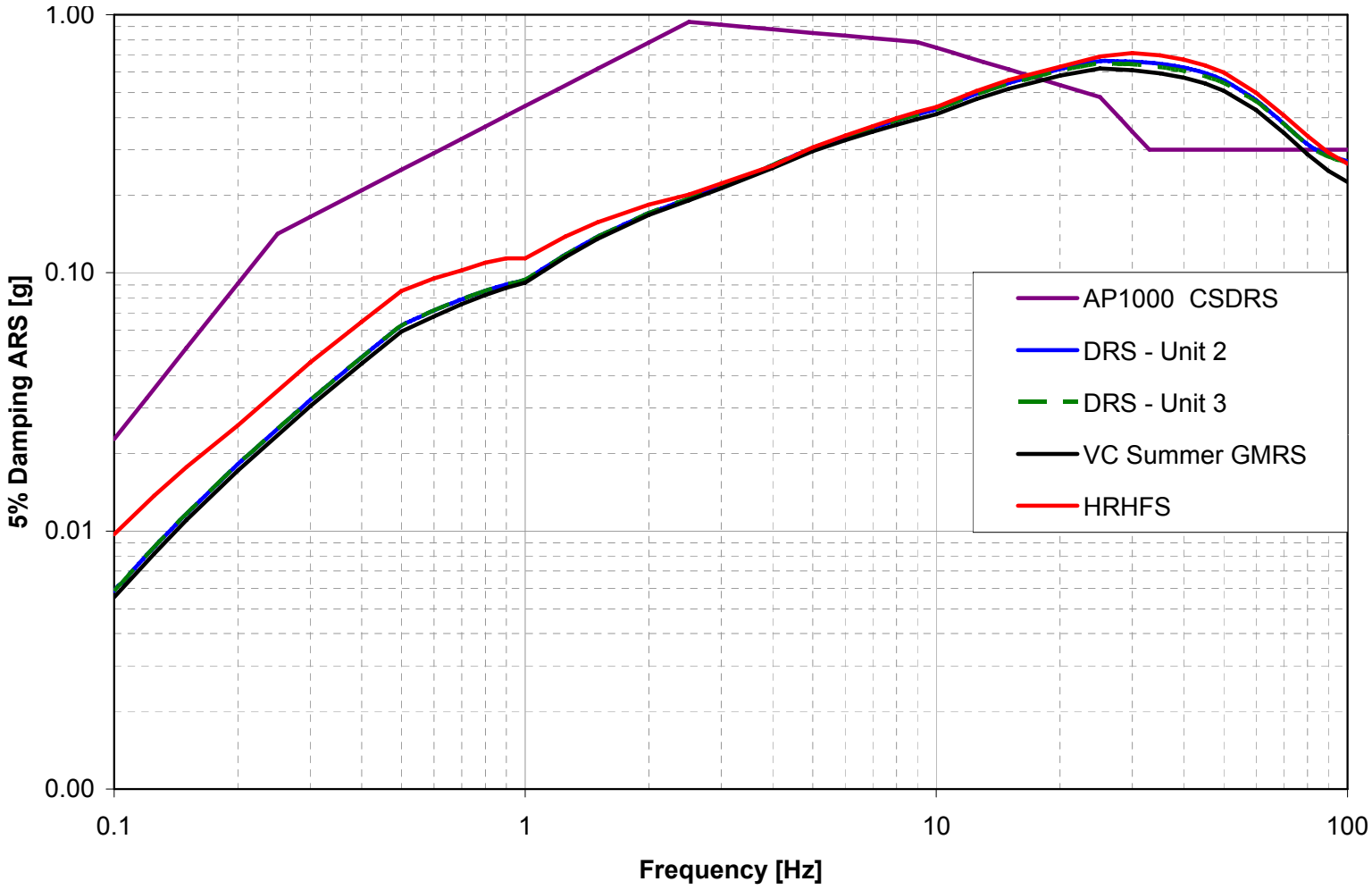
Unit 2 – ARS Amplifications Summary - Medians



Unit 3 – ARS Amplifications Summary - Medians



Design Response Spectra



Conclusion

Due to limited thickness of the weathered rock and its high velocity, the amplification is very small and its impact on GMRS is negligible