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10 CFR 52.3



March 14, 2008

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

UN#08-008

Subject: UniStar Nuclear, NRC Docket No. 52-016
Submittal of Information Associated with Soil Hazard Curves at Additional
Annual Exceedence Frequencies

- References:
- 1) Letter UN#07-008, from R. M. Krich (UniStar Nuclear) to U.S. Nuclear Regulatory Commission, "UniStar Nuclear, NRC Project No. 746, Submittal of a Partial Combined License Application for the Calvert Cliffs Nuclear Power Plant, Unit 3, Application for Withholding of Documents and Request for Exemption," dated July 13, 2007
 - 2) Letter UN#07-016, from R. M. Krich (UniStar Nuclear) to U.S. Nuclear Regulatory Commission, "UniStar Nuclear, NRC Project No. 746, Submittal of a Revision 1 to the Partial Combined License Application," dated December 14, 2007
 - 3) Letter from David B. Matthews (NRC) to R. M. Krich (UniStar Nuclear), "Docketing of the Partial Combined License Application for Calvert Cliffs Nuclear Power Plant, Unit 3," dated January 25, 2008

By letter dated July 13, 2007 (Reference 1), UniStar Nuclear submitted a partial Combined License (i.e., COL) application to the NRC for the proposed Calvert Cliffs Nuclear Power Plant (CCNPP), Unit 3. On December 14, 2007, UniStar Nuclear submitted Revision 1 to its partial COL application for CCNPP, Unit 3 (Reference 2). The NRC accepted the UniStar Nuclear partial COL application for further processing and review as specified in its letter of January 25, 2008 (Reference 3).

In a conference call between UniStar Nuclear and NRC representatives, held on February 6, 2008, the NRC requested an electronic copy of data associated with the CCNPP Unit 3 Probabilistic Seismic Hazards Analysis (PSHA). Specifically, the NRC

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representatives requested data for soil hazard curves at additional annual exceedence frequencies (i.e., at values between 10^{-4} , 10^{-5} , and 10^{-6}) be provided in electronic format. This information related to the soil hazard curves at additional annual exceedence frequencies is provided in Enclosure 1. A copy of the associated electronic data is provided on compact disk in Enclosure 2.

If you have any questions or need additional information, contact me at (410) 470-5531.

Respectfully,



J. E. Price

- Enclosures:
1. Calvert Cliffs Nuclear Power Plant Unit 3 Soil Hazard Curves at Additional Annual Exceedence Frequencies
 2. Compact Disk Containing Electronic Data for Calvert Cliffs Nuclear Power Plant Unit 3 Soil Hazard Curves at Additional Annual Exceedence Frequencies

cc: U.S. NRC Region I
U.S. NRC Resident Inspector, CCNPP, Units 1 and 2
NRC Project Manager, U.S. EPR Combined License Application
NRC Project Manager, U.S. EPR Design Certification Application (w/o enclosures)

ENCLOSURE 1

**Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies**

Calvert Cliffs Nuclear Power Plant Unit 3 Soil Hazard Curves at Additional Annual Exceedence Frequencies

Mean horizontal hard rock ground motion values at seven spectral frequencies for annual probability of exceedance levels of 10^{-4} , 10^{-5} , and 10^{-6} are presented in the FSAR Table 2.5.2-23. The corresponding mean hard rock horizontal hazard curves are plotted in the FSAR Figures 2.5.2-51 through 2.5.2-57. Mean horizontal soil ground motion values at a depth of 41' for annual probability of exceedance levels of 10^{-4} and 10^{-5} were prepared in the development of the horizontal SSE presented in the FSAR Table 2.5.2-21. Corresponding mean horizontal soil ground motion values at a depth of 41' for an additional annual probability of exceedance level of 10^{-6} were also prepared. In a conference call between UniStar Nuclear and NRC representatives, held on February 6, 2008, the NRC requested that the mean horizontal soil hazard curves at a suite of points in addition to the three points at annual probability of exceedance levels of 10^{-4} , 10^{-5} , and 10^{-6} be provided. The response to this request is as follows.

Table 1 shows the mean horizontal spectral acceleration ground motion values given for the seven spectral frequencies for both hard rock and soil at a depth of 41 ft at the three annual probability levels. Also shown in this table are the Soil/Hard Rock spectral ratios for each of the three annual probability levels.

Table 1. Hard rock , 41-ft depth soil [outcrop], and resulting spectral ratios of resulting ground motion values.

Freq. (Hz)	Hard Rock			Soil at 41 ft Depth [Outcrop]			Spectral Ratio		
	SA (g) 10^{-4}	SA (g) 10^{-5}	SA (g) 10^{-6}	SA (g) 10^{-4}	SA (g) 10^{-5}	SA (g) 10^{-6}	Ratio 10^{-4}	Ratio 10^{-5}	Ratio 10^{-6}
100	0.0766	0.271	0.845	0.0530	0.135	0.264	0.692	0.498	0.312
25	0.228	0.767	2.39	0.0749	0.163	0.280	0.329	0.213	0.117
10	0.149	0.493	1.42	0.121	0.286	0.448	0.812	0.580	0.315
5	0.102	0.309	0.846	0.127	0.320	0.610	1.245	1.036	0.721
2.5	0.0577	0.158	0.402	0.0917	0.232	0.534	1.589	1.468	1.328
1	0.0269	0.0722	0.166	0.0703	0.176	0.353	2.613	2.438	2.127
0.5	0.0164	0.0488	0.114	0.0310	0.0934	0.226	1.890	1.914	1.982

For each of the seven frequencies a quadratic equation was fit to the log (base10) of the spectral ratios (AMP) as a function of the log (base10) of the annual exceedance probability (AEP). Mathematically, this functional model is given as,

$$\text{Log}_{10} (\text{AMP}) = C_1 + C_2 * \text{Log}_{10} (\text{AEP}) + C_3 * [\text{Log}_{10}(\text{AEP})]^2 \quad (1)$$

The resulting fits to the three data points are shown in Figure 1a through Figure 1g for each of the seven frequencies. The coefficients and equation are given at the top of each plot. Note that the red dashed line is a linear log-log line between the three data points.

Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies

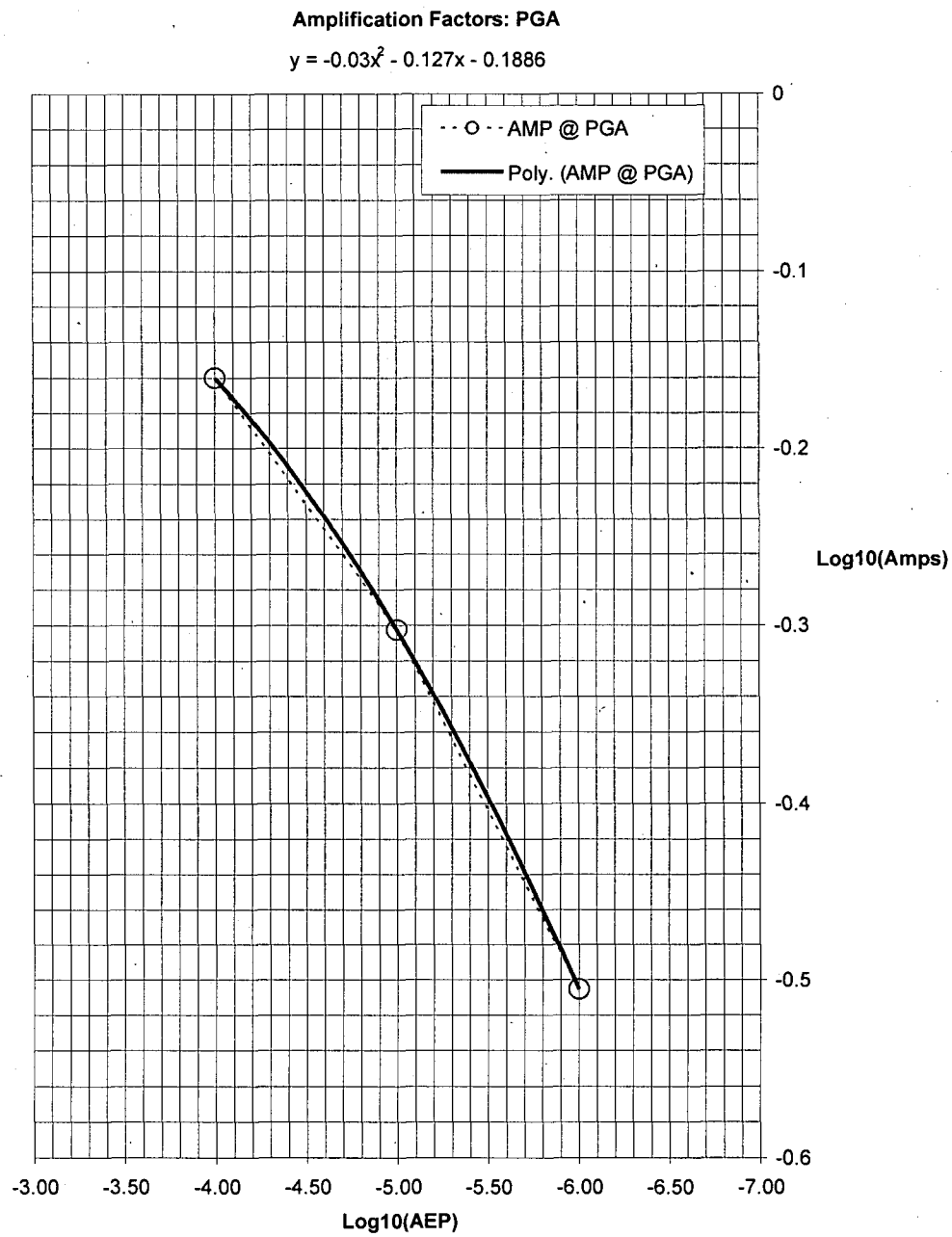


Figure 1a. Quadratic fit to the amplification values for 100 Hz.

Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies

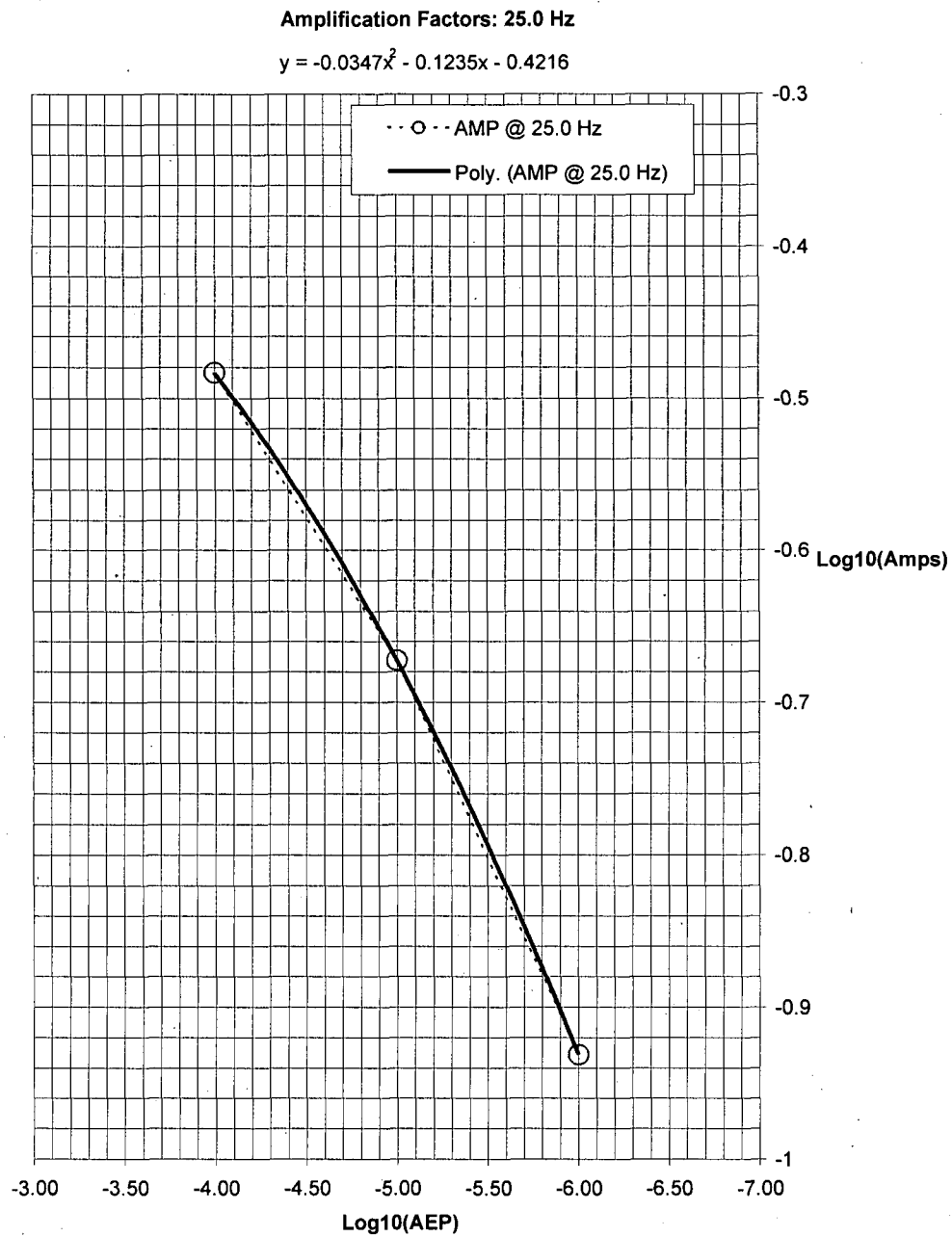


Figure 1b. Quadratic fit to the amplification values for 25 Hz.

Calvert Cliffs Nuclear Power Plant Unit 3 Soil Hazard Curves at Additional Annual Exceedence Frequencies

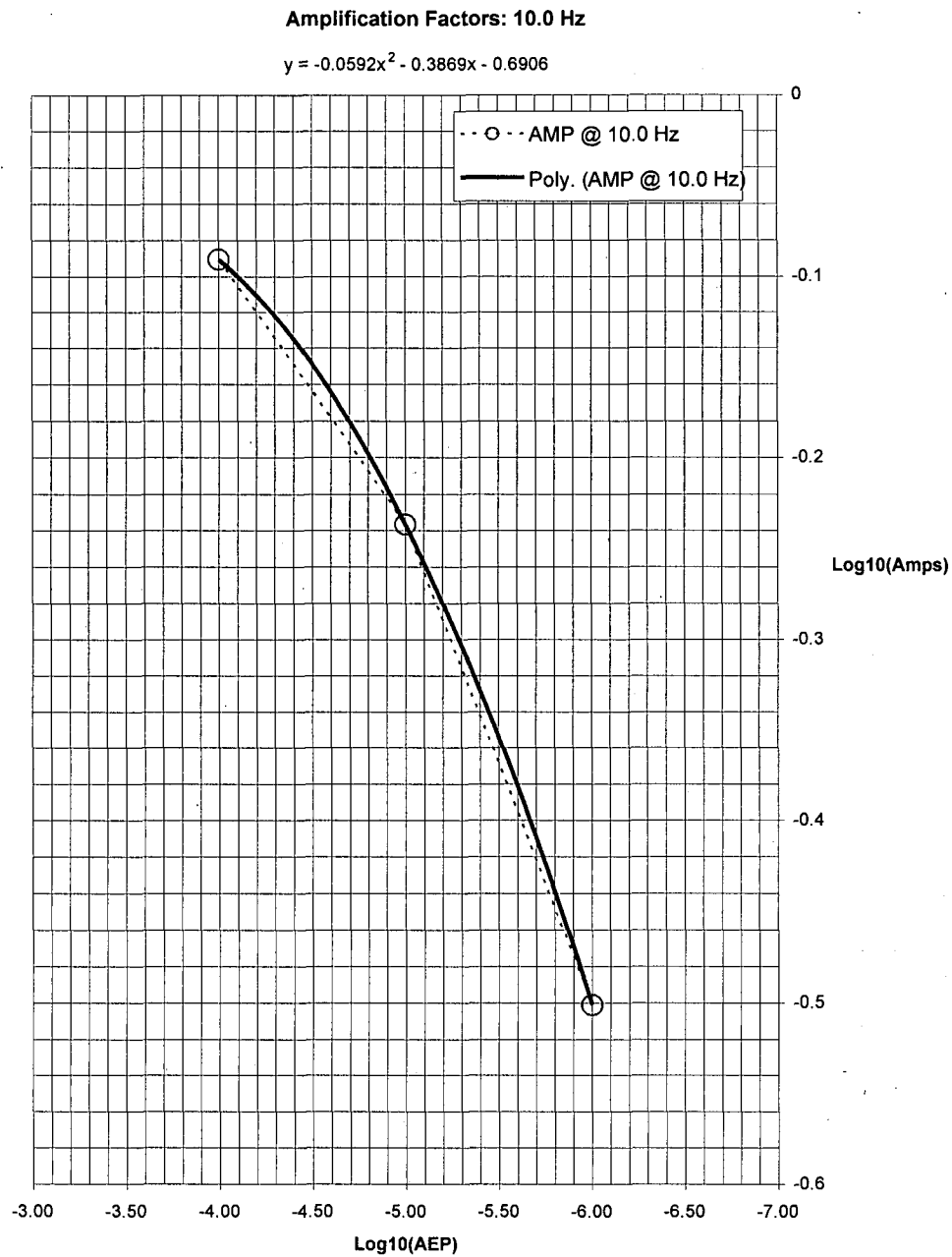


Figure 1c. Quadratic fit to the amplification values for 10 Hz.

Calvert Cliffs Nuclear Power Plant Unit 3 Soil Hazard Curves at Additional Annual Exceedence Frequencies

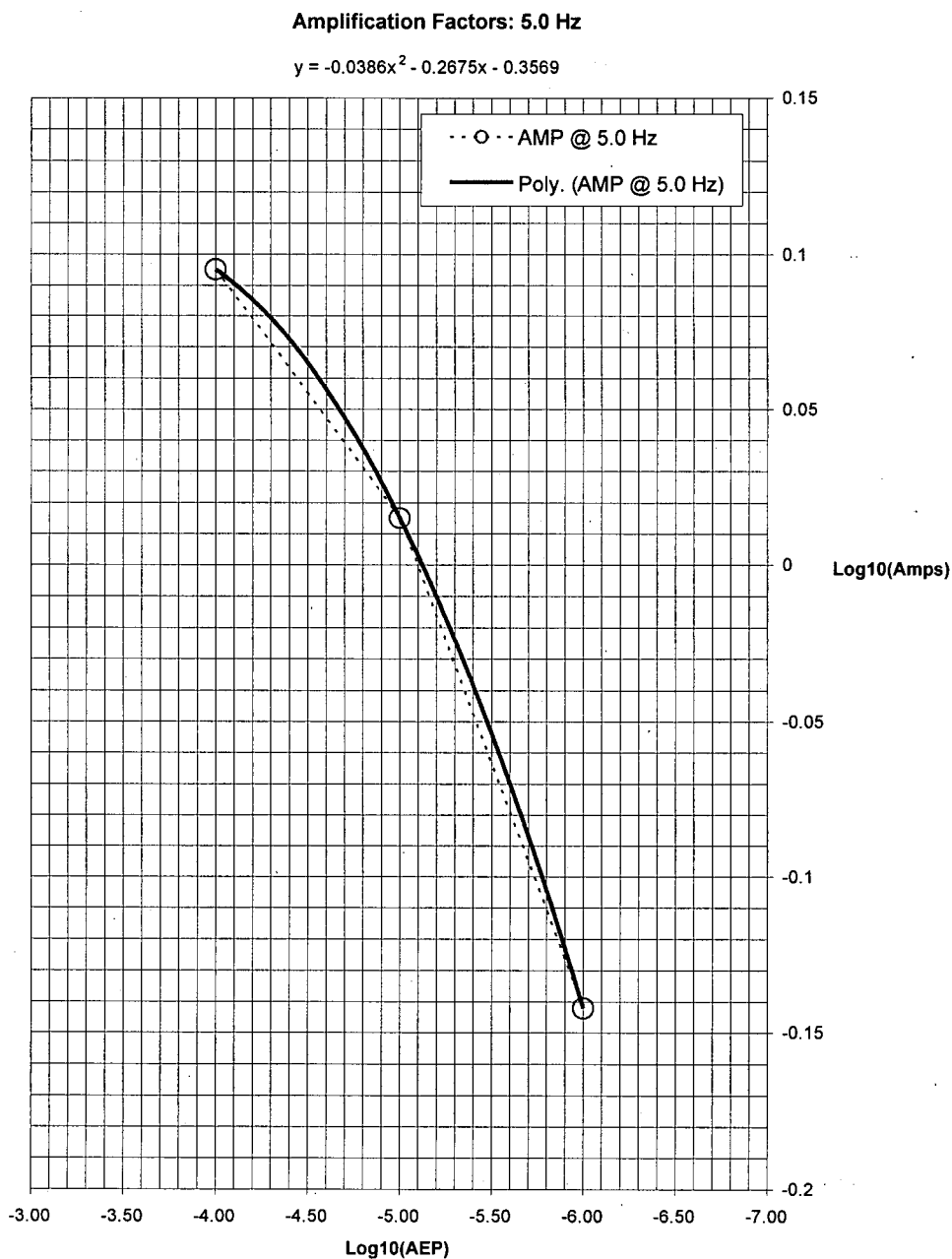


Figure 1d. Quadratic fit to the amplification values for 5 Hz.

**Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies**

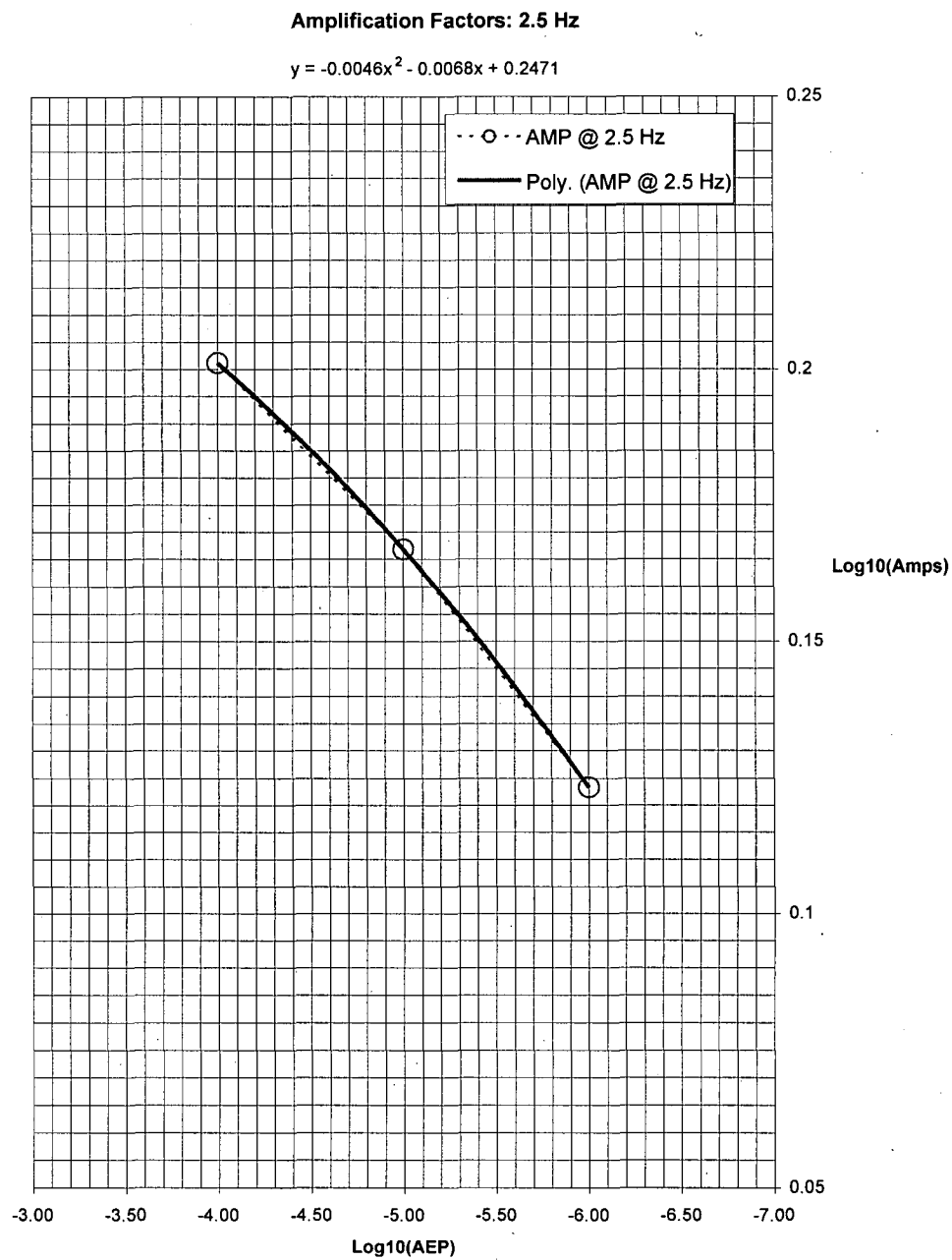


Figure 1e. Quadratic fit to the amplification values for 2.5 Hz.

Calvert Cliffs Nuclear Power Plant Unit 3 Soil Hazard Curves at Additional Annual Exceedence Frequencies

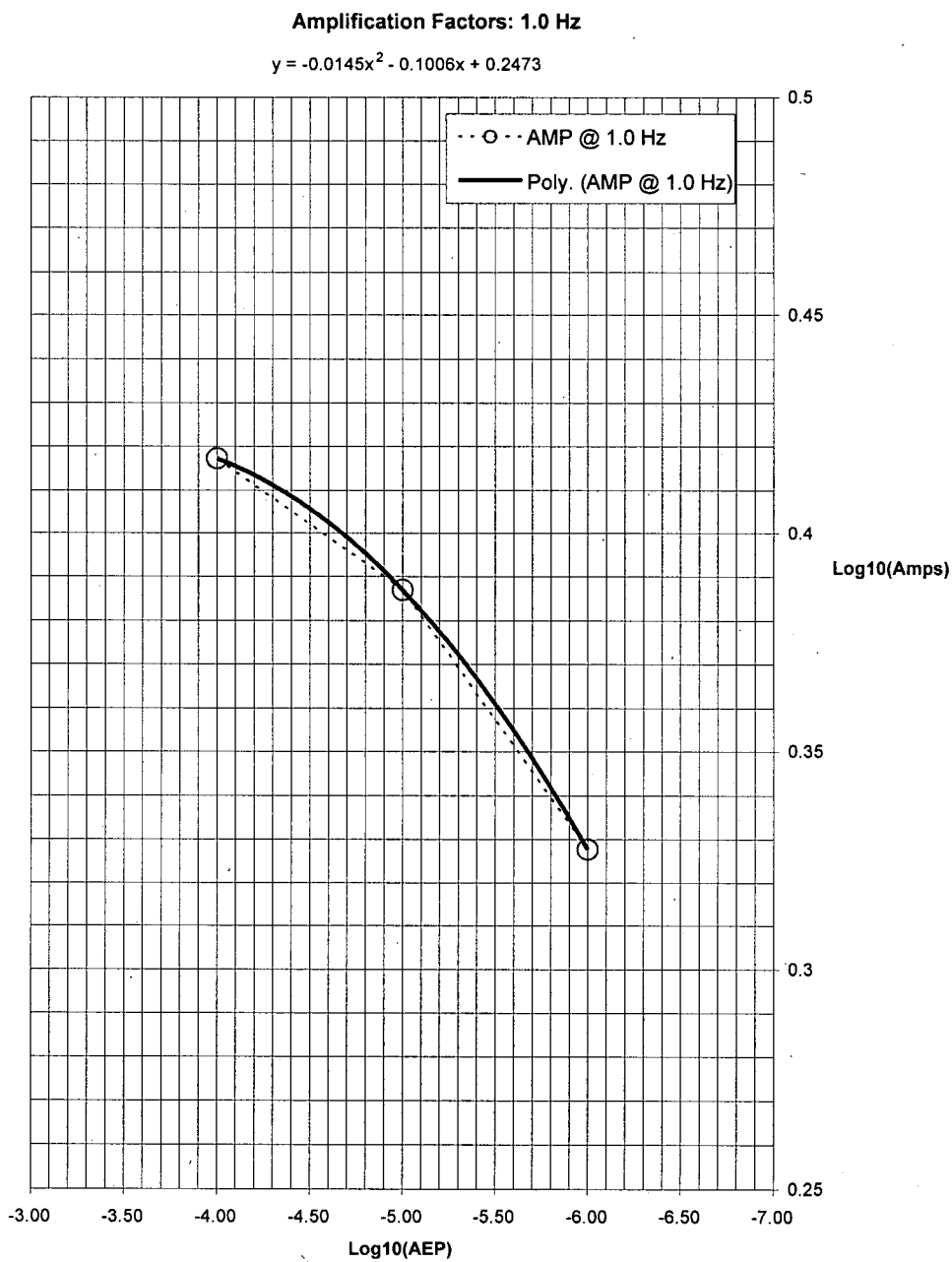


Figure 1f. Quadratic fit to the amplification values for 1 Hz.

Calvert Cliffs Nuclear Power Plant Unit 3 **Soil Hazard Curves at Additional Annual Exceedence Frequencies**

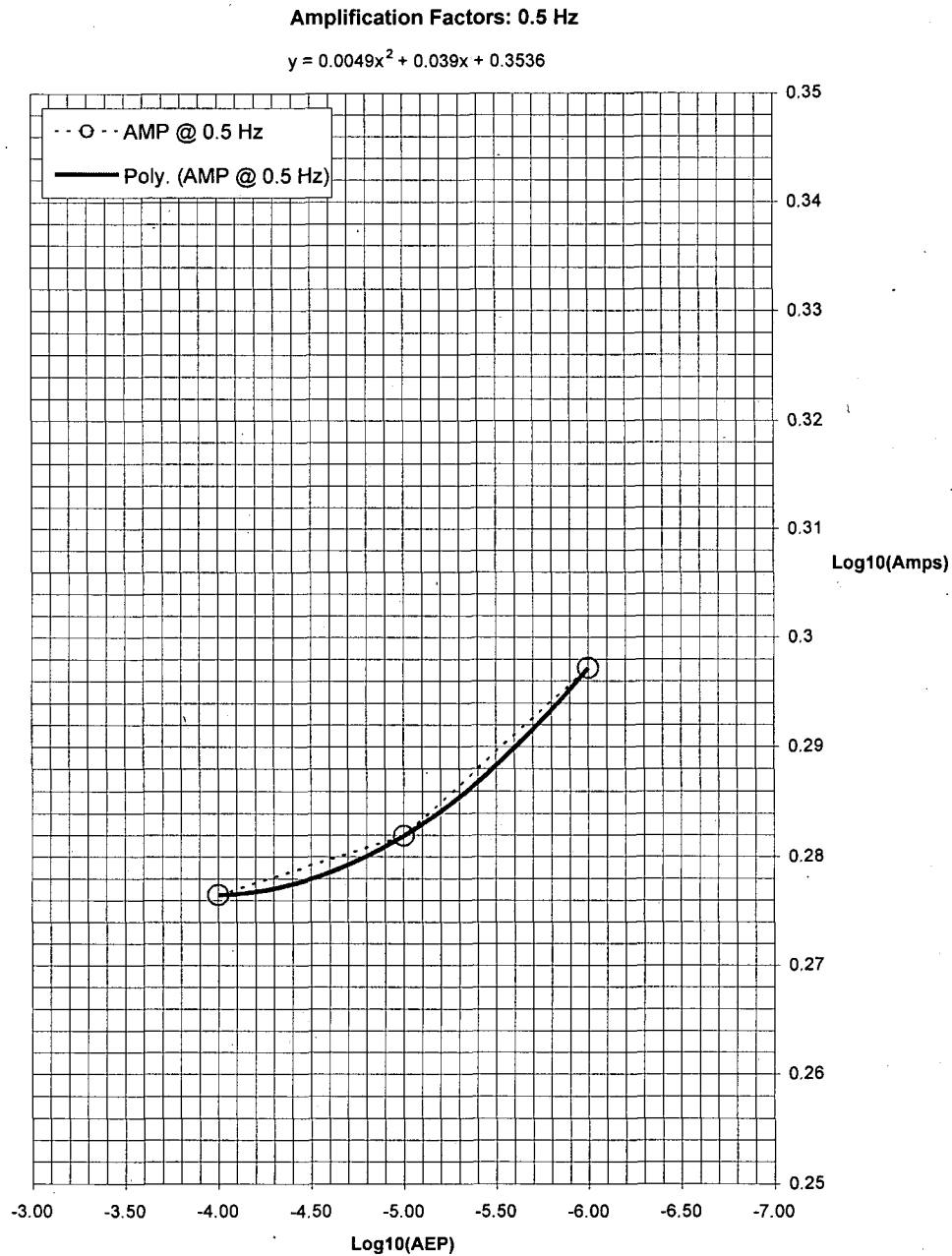


Figure 1g. Quadratic fit to the amplification values for 0.5 Hz.

Next, the hard rock hazard curves were scaled based on the functional amplification factor model for each frequency. The three hard rock ground motion values (see Table 1) corresponding to annual probability levels of 10^{-4} , 10^{-5} , and 10^{-6} were added to the suite of 25 points that defined the hard rock hazard curves prior to developing the 41-ft soil horizon hazard curves. For each of the seven frequencies, the 41-ft soil horizon seismic hazard curve was computed by scaling the hard rock ground motion values by the functional amplification model at each of the 28 annual probability level points that define the hard rock seismic hazard curves (see Table 2a through Table 2g). A

Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies

constraint was placed on the resulting 41-ft soil horizon hazard curves such that the resulting hazard curve does not decrease in ground motion for decreasing annual probability of exceedance levels. In cases where this constraint is applicable, the resulting 41-ft soil horizon hazard curve is vertical (i.e., the ground motion value is constant for decreasing annual probability levels).

The hard rock seismic hazard curves, amplification factors, and corresponding 41-ft soil horizon seismic hazard curves are listed in Table 2a through Table 2g for the seven frequencies. The three additional data points corresponding to probability levels of 10^{-4} , 10^{-5} , and 10^{-6} are indicated in bold. The hard rock (solid red line) and resulting 41-ft soil horizon seismic hazard curves are plotted in Figure 2a through Figure 2g. As indicated on each figure, the dashed blue line is based on the extrapolation of the amplification function beyond the range 10^{-4} to 10^{-6} and the green solid line with green circles is based on the interpolation of the amplification function over the range 10^{-4} to 10^{-6} .

Table 2a. Hard rock and 41 ft soil horizon seismic hazard curves for 100 Hz (PGA).

Rock Hazard Curve			Soil Hazard Curve	
Hard Rock PGA (g)	Mean AEP @ PGA	AMPS @ PGA	Soil PGA (g)	Mean AEP @ PGA
1.000E-03	1.910E-02	0.8731	8.731E-04	1.910E-02
1.500E-03	1.585E-02	0.8766	1.315E-03	1.585E-02
2.000E-03	1.354E-02	0.8789	1.758E-03	1.354E-02
3.000E-03	1.036E-02	0.8816	2.645E-03	1.036E-02
5.000E-03	6.760E-03	0.8825	4.413E-03	6.760E-03
7.000E-03	4.788E-03	0.8802	6.161E-03	4.788E-03
1.000E-02	3.126E-03	0.8735	8.735E-03	3.126E-03
1.500E-02	1.781E-03	0.8586	1.288E-02	1.781E-03
2.000E-02	1.138E-03	0.8419	1.684E-02	1.138E-03
3.000E-02	5.711E-04	0.8086	2.426E-02	5.711E-04
5.000E-02	2.234E-04	0.7502	3.751E-02	2.234E-04
7.000E-02	1.184E-04	0.7039	4.927E-02	1.184E-04
0.0766	1.000E-04	0.6909	5.292E-02	1.000E-04
1.000E-01	6.080E-05	0.6510	6.510E-02	6.080E-05
1.500E-01	2.900E-05	0.5888	8.832E-02	2.900E-05
2.000E-01	1.729E-05	0.5443	1.089E-01	1.729E-05
0.271	1.000E-05	0.4970	1.347E-01	1.000E-05
3.000E-01	8.288E-06	0.4809	1.443E-01	8.288E-06
5.000E-01	3.117E-06	0.3991	1.996E-01	3.117E-06
7.000E-01	1.542E-06	0.3437	2.406E-01	1.542E-06
0.845	1.000E-06	0.3115	2.632E-01	1.000E-06
1.000E+00	6.798E-07	0.2841	2.841E-01	6.798E-07
1.500E+00	2.378E-07	0.2170	3.254E-01	2.378E-07
2.000E+00	1.028E-07	0.1714	3.427E-01	1.028E-07
3.000E+00	2.689E-08	0.1131	3.427E-01	2.689E-08
5.000E+00	3.618E-09	0.0557	3.427E-01	3.618E-09
7.000E+00	7.742E-10	0.0301	3.427E-01	7.742E-10
1.000E+01	1.226E-10	0.0133	3.427E-01	1.226E-10

Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies

Table 2b. Hard rock and 41 ft soil horizon seismic hazard curves for 25 Hz.

Rock Hazard Curve			Soil Hazard Curve	
Hard Rock SA(g) @25.0 Hz	Mean AEP @ 25.0 Hz	AMPS @ 25.0 Hz	Soil SA(g) @ 25.0 Hz	Mean AEP @ 25.0 Hz
1.000E-03	2.275E-02	0.4871	4.871E-04	2.275E-02
1.500E-03	1.999E-02	0.4876	7.314E-04	1.999E-02
2.000E-03	1.799E-02	0.4878	9.756E-04	1.799E-02
3.000E-03	1.512E-02	0.4878	1.463E-03	1.512E-02
5.000E-03	1.155E-02	0.4869	2.434E-03	1.155E-02
7.000E-03	9.333E-03	0.4854	3.398E-03	9.333E-03
1.000E-02	7.183E-03	0.4827	4.827E-03	7.183E-03
1.500E-02	5.075E-03	0.4776	7.164E-03	5.075E-03
2.000E-02	3.830E-03	0.4723	9.445E-03	3.830E-03
3.000E-02	2.443E-03	0.4616	1.385E-02	2.443E-03
5.000E-02	1.263E-03	0.4414	2.207E-02	1.263E-03
7.000E-02	7.719E-04	0.4233	2.963E-02	7.719E-04
1.000E-01	4.360E-04	0.3995	3.995E-02	4.360E-04
1.500E-01	2.159E-04	0.3671	5.507E-02	2.159E-04
2.000E-01	1.277E-04	0.3413	6.827E-02	1.277E-04
0.228	1.000E-04	0.3290	7.501E-02	1.000E-04
3.000E-01	5.965E-05	0.3026	9.078E-02	5.965E-05
5.000E-01	2.259E-05	0.2530	1.265E-01	2.259E-05
7.000E-01	1.191E-05	0.2214	1.550E-01	1.191E-05
0.767	1.000E-05	0.2130	1.634E-01	1.000E-05
1.000E+00	6.002E-06	0.1893	1.893E-01	6.002E-06
1.500E+00	2.690E-06	0.1548	2.321E-01	2.690E-06
2.000E+00	1.482E-06	0.1316	2.632E-01	1.482E-06
2.39	1.000E-06	0.1175	2.809E-01	1.000E-06
3.000E+00	6.047E-07	0.1011	3.032E-01	6.047E-07
5.000E+00	1.719E-07	0.0670	3.349E-01	1.719E-07
7.000E+00	6.779E-08	0.0479	3.354E-01	6.779E-08
1.000E+01	2.262E-08	0.0312	3.354E-01	2.262E-08

Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies

Table 2c. Hard rock and 41 ft soil horizon seismic hazard curves for 10 Hz.

Rock Hazard Curve			Soil Hazard Curve	
Hard Rock SA(g) @10.0 Hz	Mean AEP @ 10.0 Hz	AMPS @ 10.0 Hz	Soil SA(g) @ 10.0 Hz	Mean AEP @ 10.0 Hz
1.000E-03	2.460E-02	0.6007	6.007E-04	2.460E-02
1.500E-03	2.149E-02	0.6166	9.249E-04	2.149E-02
2.000E-03	1.921E-02	0.6296	1.259E-03	1.921E-02
3.000E-03	1.593E-02	0.6511	1.953E-03	1.593E-02
5.000E-03	1.179E-02	0.6845	3.422E-03	1.179E-02
7.000E-03	9.202E-03	0.7108	4.976E-03	9.202E-03
1.000E-02	6.724E-03	0.7422	7.422E-03	6.724E-03
1.500E-02	4.381E-03	0.7809	1.171E-02	4.381E-03
2.000E-02	3.078E-03	0.8086	1.617E-02	3.078E-03
3.000E-02	1.744E-03	0.8437	2.531E-02	1.744E-03
5.000E-02	7.646E-04	0.8713	4.357E-02	7.646E-04
7.000E-02	4.205E-04	0.8727	6.109E-02	4.205E-04
1.000E-01	2.159E-04	0.8554	8.554E-02	2.159E-04
0.149	1.000E-04	0.8125	1.211E-01	1.000E-04
1.500E-01	9.916E-05	0.8119	1.218E-01	9.916E-05
2.000E-01	5.697E-05	0.7675	1.535E-01	5.697E-05
3.000E-01	2.618E-05	0.6907	2.072E-01	2.618E-05
0.493	1.000E-05	0.5806	2.863E-01	1.000E-05
5.000E-01	9.737E-06	0.5775	2.887E-01	9.737E-06
7.000E-01	4.933E-06	0.4959	3.471E-01	4.933E-06
1.000E+00	2.287E-06	0.4057	4.057E-01	2.287E-06
1.42	1.000E-06	0.3159	4.486E-01	1.000E-06
1.500E+00	8.753E-07	0.3025	4.537E-01	8.753E-07
2.000E+00	4.130E-07	0.2326	4.652E-01	4.130E-07
3.000E+00	1.277E-07	0.1456	4.652E-01	1.277E-07
5.000E+00	2.342E-08	0.0653	4.652E-01	2.342E-08
7.000E+00	6.630E-09	0.0327	4.652E-01	6.630E-09
1.000E+01	1.523E-09	0.0131	4.652E-01	1.523E-09

Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies

Table 2d. Hard rock and 41 ft soil horizon seismic hazard curves for 5 Hz.

Rock Hazard Curve			Soil Hazard Curve	
Hard Rock SA(g) @5.0 Hz	Mean AEP @ 5.0 Hz	AMPS @ 5.0 Hz	Soil SA(g) @ 5.0 Hz	Mean AEP @ 5.0 Hz
1.000E-03	2.405E-02	0.9440	9.440E-04	2.405E-02
1.500E-03	2.050E-02	0.9654	1.448E-03	2.050E-02
2.000E-03	1.793E-02	0.9830	1.966E-03	1.793E-02
3.000E-03	1.430E-02	1.0120	3.036E-03	1.430E-02
5.000E-03	9.919E-03	1.0571	5.285E-03	9.919E-03
7.000E-03	7.330E-03	1.0921	7.645E-03	7.330E-03
1.000E-02	5.006E-03	1.1329	1.133E-02	5.006E-03
1.500E-02	2.993E-03	1.1813	1.772E-02	2.993E-03
2.000E-02	1.972E-03	1.2141	2.428E-02	1.972E-03
3.000E-02	1.024E-03	1.2526	3.758E-02	1.024E-03
5.000E-02	4.081E-04	1.2774	6.387E-02	4.081E-04
7.000E-02	2.133E-04	1.2732	8.913E-02	2.133E-04
1.000E-01	1.045E-04	1.2482	1.248E-01	1.045E-04
0.102	1.000E-04	1.2459	1.271E-01	1.000E-04
1.500E-01	4.554E-05	1.1937	1.791E-01	4.554E-05
2.000E-01	2.509E-05	1.1397	2.279E-01	2.509E-05
3.000E-01	1.070E-05	1.0448	3.135E-01	1.070E-05
0.309	1.000E-05	1.0366	3.203E-01	1.000E-05
5.000E-01	3.504E-06	0.8987	4.494E-01	3.504E-06
7.000E-01	1.602E-06	0.7887	5.521E-01	1.602E-06
0.846	1.000E-06	0.7219	6.108E-01	1.000E-06
1.000E+00	6.578E-07	0.6632	6.632E-01	6.578E-07
1.500E+00	2.177E-07	0.5152	7.728E-01	2.177E-07
2.000E+00	9.267E-08	0.4122	8.245E-01	9.267E-08
3.000E+00	2.492E-08	0.2789	8.367E-01	2.492E-08
5.000E+00	3.893E-09	0.1455	8.367E-01	3.893E-09
7.000E+00	1.002E-09	0.0840	8.367E-01	1.002E-09
1.000E+01	2.097E-10	0.0413	8.367E-01	2.097E-10

Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies

Table 2e. Hard rock and 41 ft soil horizon seismic hazard curves for 2.5 Hz.

Rock Hazard Curve			Soil Hazard Curve	
Hard Rock SA(g) @2.5 Hz	Mean AEP @ 2.5 Hz	AMPS @ 2.5 Hz	Soil SA(g) @ 2.5 Hz	Mean AEP @ 2.5 Hz
1.000E-03	1.879E-02	1.7585	1.758E-03	1.879E-02
1.500E-03	1.502E-02	1.7547	2.632E-03	1.502E-02
2.000E-03	1.244E-02	1.7513	3.503E-03	1.244E-02
3.000E-03	9.059E-03	1.7450	5.235E-03	9.059E-03
5.000E-03	5.521E-03	1.7338	8.669E-03	5.521E-03
7.000E-03	3.737E-03	1.7239	1.207E-02	3.737E-03
1.000E-02	2.332E-03	1.7105	1.711E-02	2.332E-03
1.500E-02	1.268E-03	1.6912	2.537E-02	1.268E-03
2.000E-02	7.862E-04	1.6745	3.349E-02	7.862E-04
3.000E-02	3.770E-04	1.6461	4.938E-02	3.770E-04
5.000E-02	1.359E-04	1.6018	8.009E-02	1.359E-04
0.0577	1.000E-04	1.5874	9.160E-02	1.000E-04
7.000E-02	6.581E-05	1.5671	1.097E-01	6.581E-05
1.000E-01	2.938E-05	1.5256	1.526E-01	2.938E-05
1.500E-01	1.134E-05	1.4731	2.210E-01	1.134E-05
0.158	1.000E-05	1.4659	2.316E-01	1.000E-05
2.000E-01	5.684E-06	1.4329	2.866E-01	5.684E-06
3.000E-01	2.104E-06	1.3723	4.117E-01	2.104E-06
0.402	1.000E-06	1.3253	5.328E-01	1.000E-06
5.000E-01	5.769E-07	1.2897	6.448E-01	5.769E-07
7.000E-01	2.356E-07	1.2306	8.614E-01	2.356E-07
1.000E+00	8.620E-08	1.1630	1.163E+00	8.620E-08
1.500E+00	2.507E-08	1.0790	1.619E+00	2.507E-08
2.000E+00	9.715E-09	1.0145	2.029E+00	9.715E-09
3.000E+00	2.270E-09	0.9166	2.750E+00	2.270E-09
5.000E+00	2.918E-10	0.7829	3.915E+00	2.918E-10
7.000E+00	6.525E-11	0.6905	4.833E+00	6.525E-11
1.000E+01	1.165E-11	0.5909	5.909E+00	1.165E-11

Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies

Table 2f. Hard rock and 41 ft soil horizon seismic hazard curves for 1 Hz.

Rock Hazard Curve			Soil Hazard Curve	
Hard Rock SA(g) @1.0 Hz	Mean AEP @ 1.0 Hz	AMPS @ 1.0 Hz	Soil SA(g) @ 1.0 Hz	Mean AEP @ 1.0 Hz
5.000E-04	1.432E-02	2.4183	1.209E-03	1.432E-02
7.000E-04	1.129E-02	2.4446	1.711E-03	1.129E-02
1.000E-03	8.483E-03	2.4744	2.474E-03	8.483E-03
1.500E-03	5.891E-03	2.5091	3.764E-03	5.891E-03
2.000E-03	4.440E-03	2.5335	5.067E-03	4.440E-03
3.000E-03	2.882E-03	2.5662	7.698E-03	2.882E-03
5.000E-03	1.570E-03	2.6024	1.301E-02	1.570E-03
7.000E-03	1.004E-03	2.6217	1.835E-02	1.004E-03
1.000E-02	5.943E-04	2.6359	2.636E-02	5.943E-04
1.500E-02	3.051E-04	2.6409	3.961E-02	3.051E-04
2.000E-02	1.810E-04	2.6345	5.269E-02	1.810E-04
0.0269	1.000E-04	2.6164	7.038E-02	1.000E-04
3.000E-02	8.028E-05	2.6067	7.820E-02	8.028E-05
5.000E-02	2.522E-05	2.5310	1.266E-01	2.522E-05
7.000E-02	1.086E-05	2.4512	1.716E-01	1.086E-05
0.0722	1.000E-05	2.4423	1.763E-01	1.000E-05
1.000E-01	4.180E-06	2.3383	2.338E-01	4.180E-06
1.500E-01	1.335E-06	2.1771	3.266E-01	1.335E-06
0.166	1.000E-06	2.1326	3.540E-01	1.000E-06
2.000E-01	5.779E-07	2.0445	4.089E-01	5.779E-07
3.000E-01	1.760E-07	1.8419	5.526E-01	1.760E-07
5.000E-01	3.944E-08	1.5749	7.875E-01	3.944E-08
7.000E-01	1.443E-08	1.3953	9.767E-01	1.443E-08
1.000E+00	4.729E-09	1.2018	1.202E+00	4.729E-09
1.500E+00	1.211E-09	0.9805	1.471E+00	1.211E-09
2.000E+00	4.282E-10	0.8263	1.653E+00	4.282E-10
3.000E+00	8.793E-11	0.6204	1.861E+00	8.793E-11
5.000E+00	9.689E-12	0.3948	1.974E+00	9.689E-12

Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies

Table 2g. Hard rock and 41 ft soil horizon seismic hazard curves for 0.5 Hz.

Rock Hazard Curve			Soil Hazard Curve	
Hard Rock SA(g) @0.5 Hz	Mean AEP @0.5 Hz	AMPS @ 0.5 Hz	Soil SA(g) @ 0.5 Hz	Mean AEP @0.5 Hz
5.000E-04	6.682E-03	1.9586	9.793E-04	6.682E-03
7.000E-04	4.989E-03	1.9489	1.364E-03	4.989E-03
1.000E-03	3.612E-03	1.9390	1.939E-03	3.612E-03
1.500E-03	2.458E-03	1.9284	2.893E-03	2.458E-03
2.000E-03	1.842E-03	1.9213	3.843E-03	1.842E-03
3.000E-03	1.190E-03	1.9118	5.736E-03	1.190E-03
5.000E-03	6.399E-04	1.9012	9.506E-03	6.399E-04
7.000E-03	4.034E-04	1.8953	1.327E-02	4.034E-04
1.000E-02	2.348E-04	1.8906	1.891E-02	2.348E-04
1.500E-02	1.183E-04	1.8880	2.832E-02	1.183E-04
0.0164	1.000E-04	1.8880	3.096E-02	1.000E-04
2.000E-02	6.944E-05	1.8887	3.777E-02	6.944E-05
3.000E-02	3.047E-05	1.8941	5.682E-02	3.047E-05
0.0488	1.000E-05	1.9103	9.322E-02	1.000E-05
5.000E-02	9.440E-06	1.9114	9.557E-02	9.440E-06
7.000E-02	4.003E-06	1.9313	1.352E-01	4.003E-06
1.000E-01	1.491E-06	1.9621	1.962E-01	1.491E-06
0.114	1.000E-06	1.9770	2.254E-01	1.000E-06
1.500E-01	4.264E-07	2.0137	3.021E-01	4.264E-07
2.000E-01	1.628E-07	2.0637	4.127E-01	1.628E-07
3.000E-01	3.936E-08	2.1552	6.466E-01	3.936E-08
5.000E-01	6.597E-09	2.3040	1.152E+00	6.597E-09
7.000E-01	2.106E-09	2.4216	1.695E+00	2.106E-09
1.000E+00	6.313E-10	2.5676	2.568E+00	6.313E-10
1.500E+00	1.534E-10	2.7721	4.158E+00	1.534E-10
2.000E+00	5.325E-11	2.9520	5.904E+00	5.325E-11
3.000E+00	1.082E-11	3.2745	9.824E+00	1.082E-11
5.000E+00	1.188E-12	3.8490	1.924E+01	1.188E-12

Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies

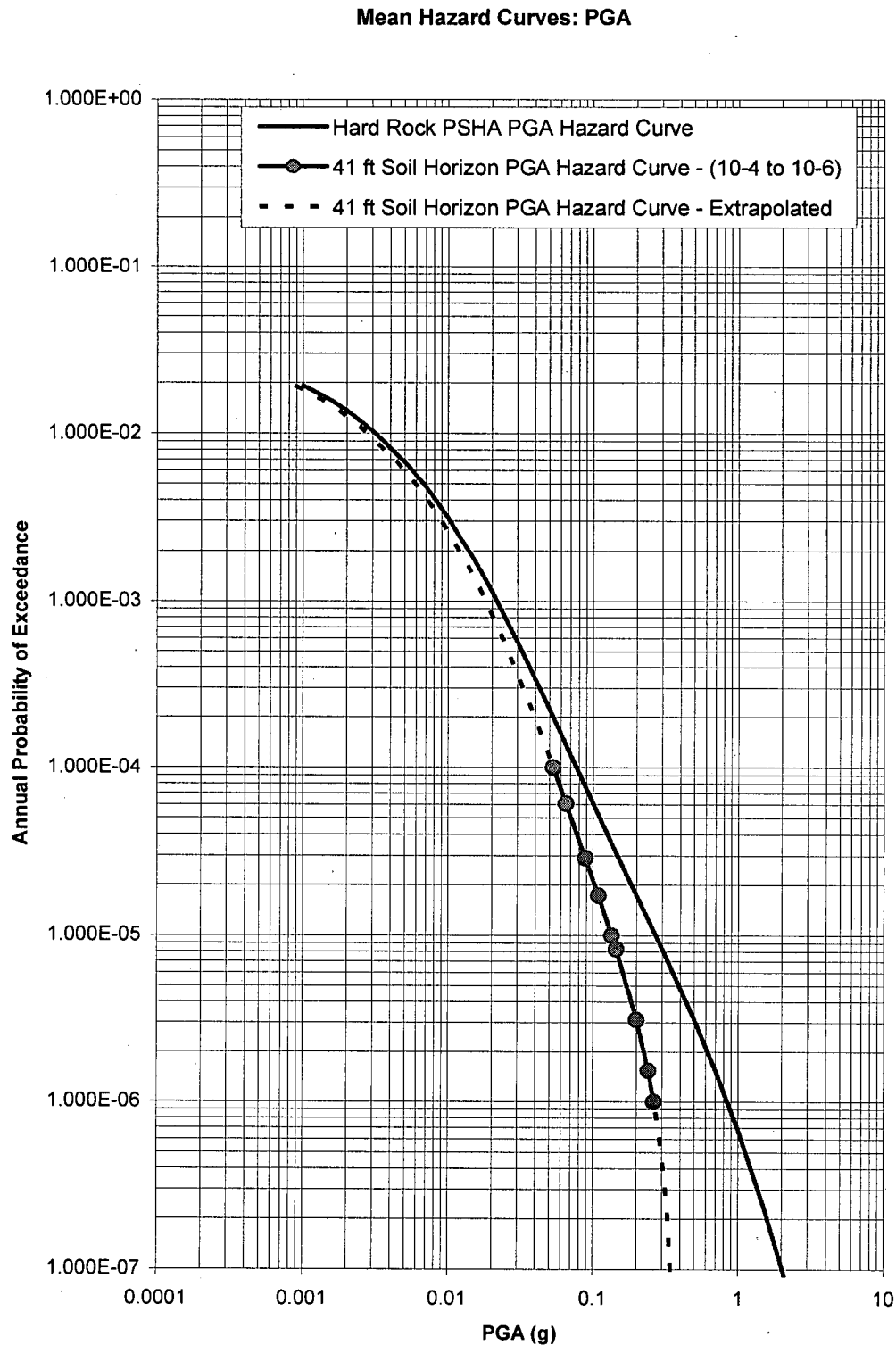


Figure 2a. Hard rock (solid red line) and 41 ft soil horizon (dashed blue and solid green line) seismic hazard curves for 100 Hz.

**Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies**

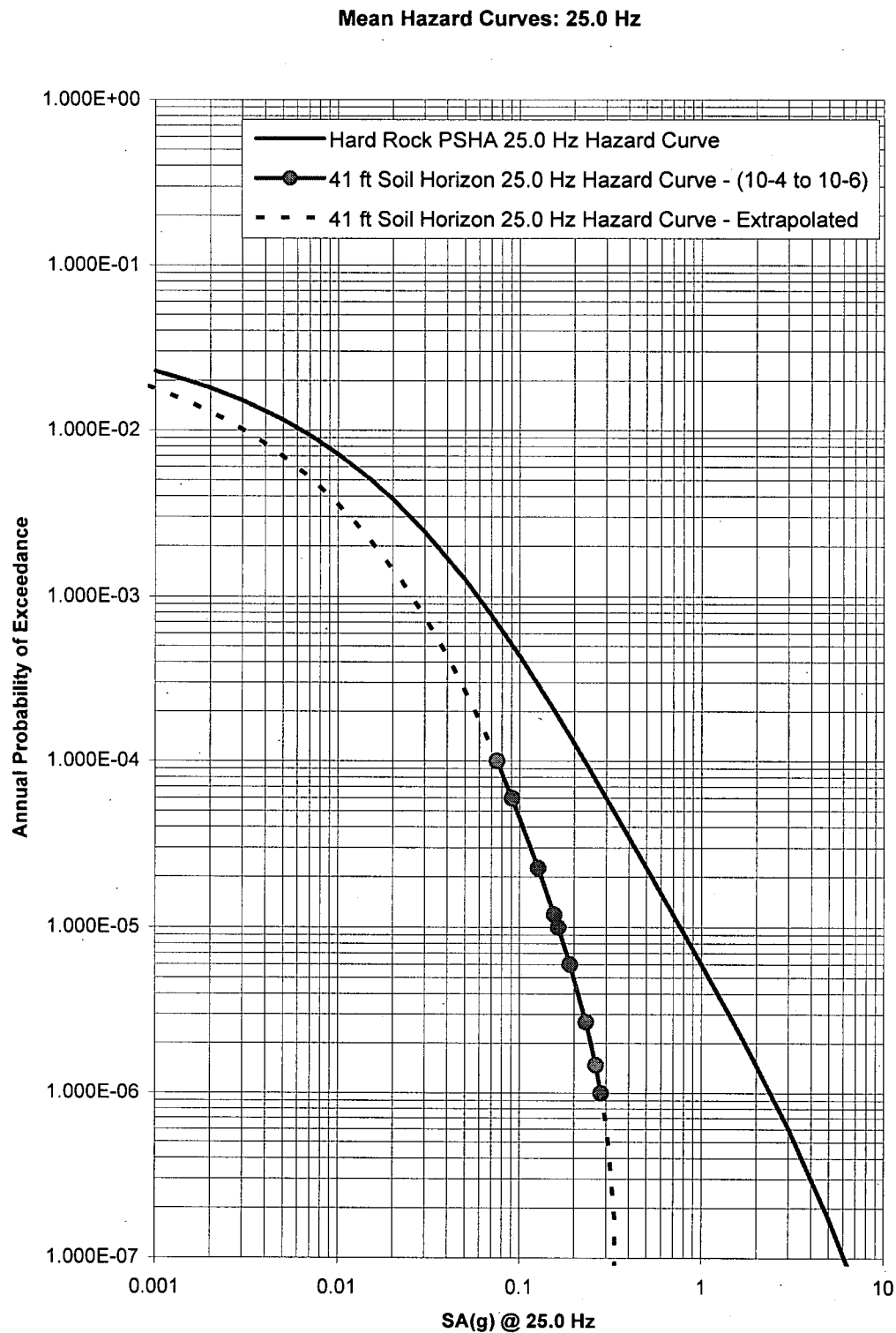


Figure 2b. Hard rock (solid red line) and 41 ft soil horizon (dashed blue and solid green line) seismic hazard curves for 25 Hz.

**Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies**

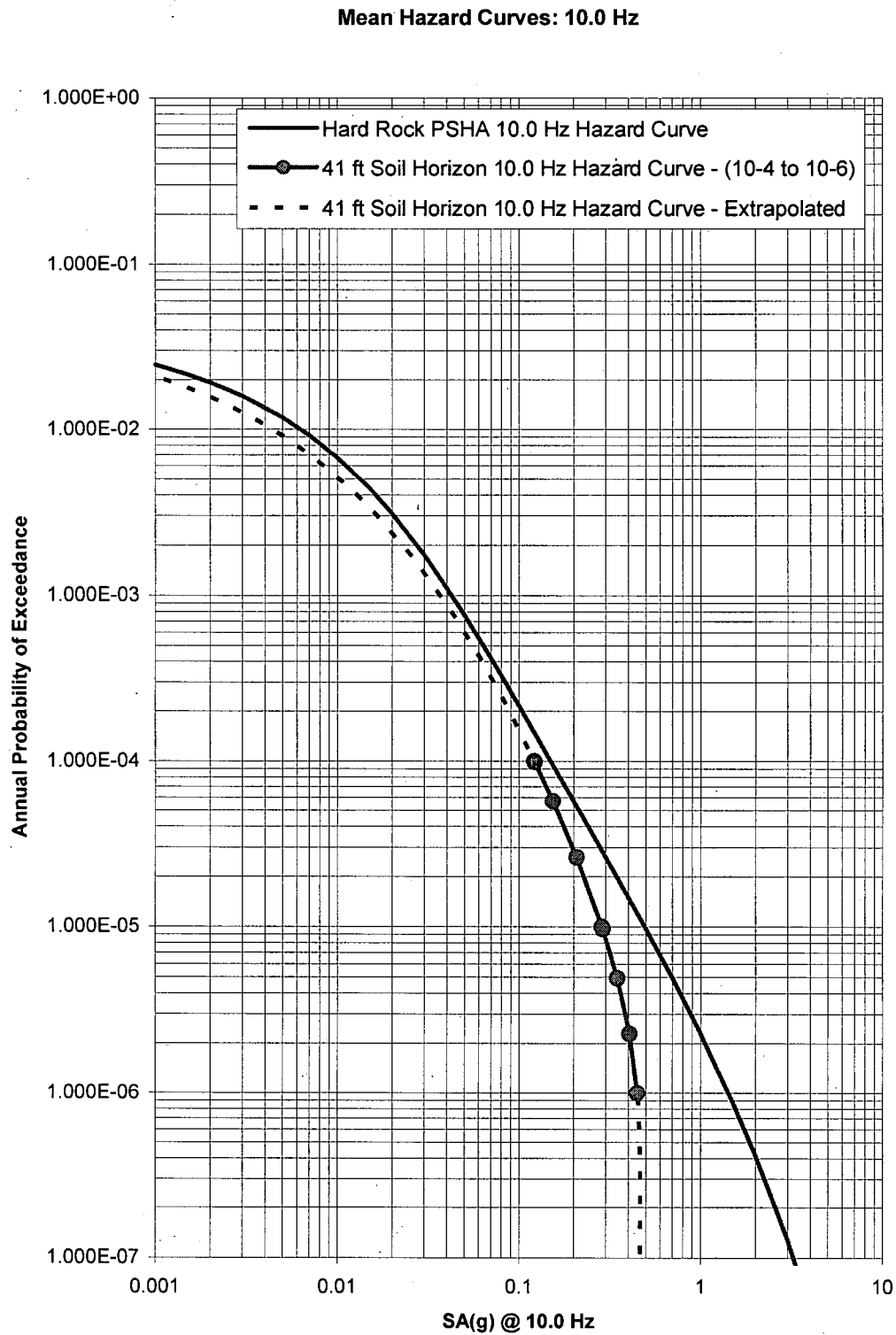


Figure 2c. Hard rock (solid red line) and 41 ft soil horizon (dashed blue and solid green line) seismic hazard curves for 10 Hz.

**Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies**

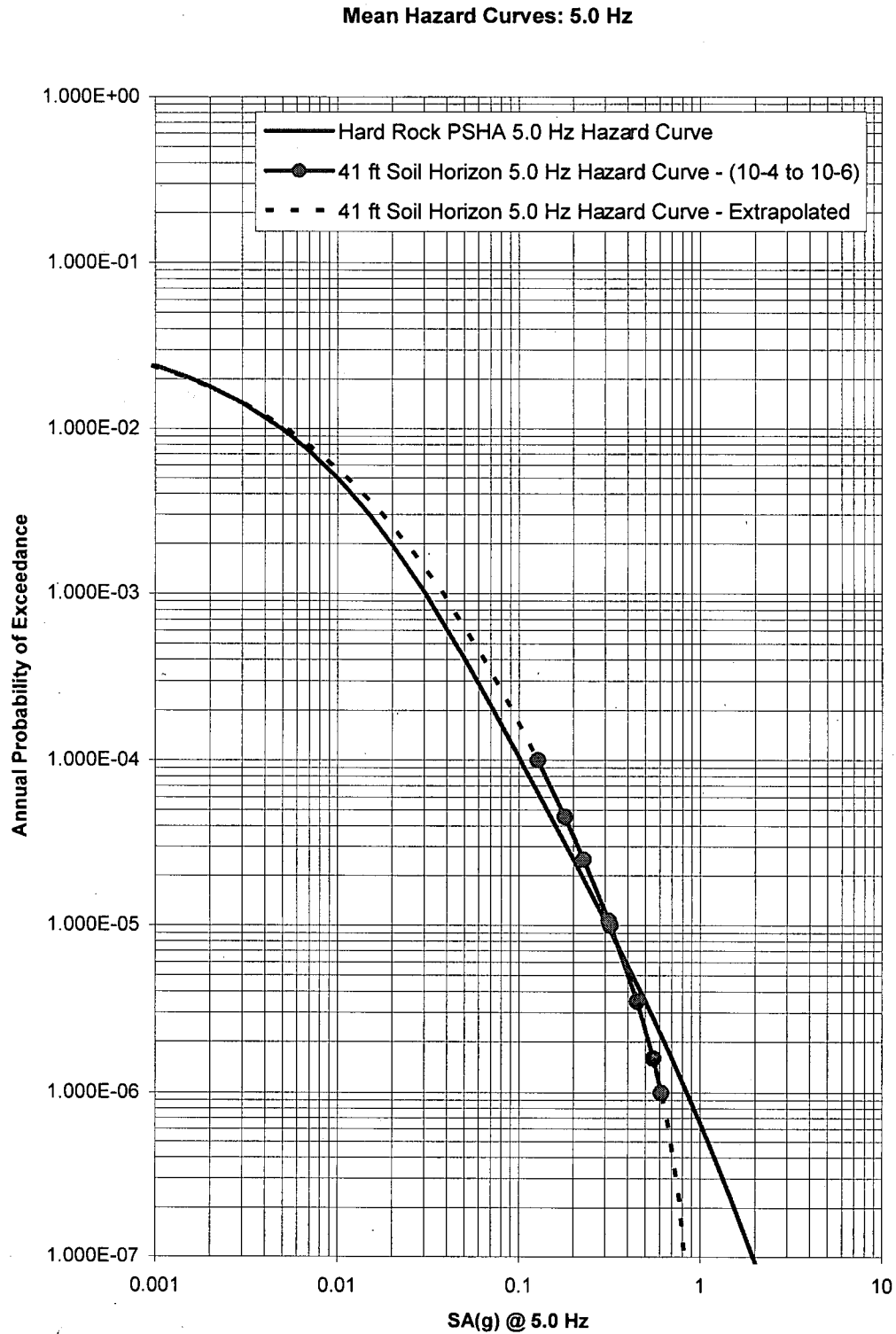


Figure 2d. Hard rock (solid red line) and 41 ft soil horizon (dashed blue and solid green line) seismic hazard curves for 5 Hz.

**Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies**

Mean Hazard Curves: 2.5 Hz

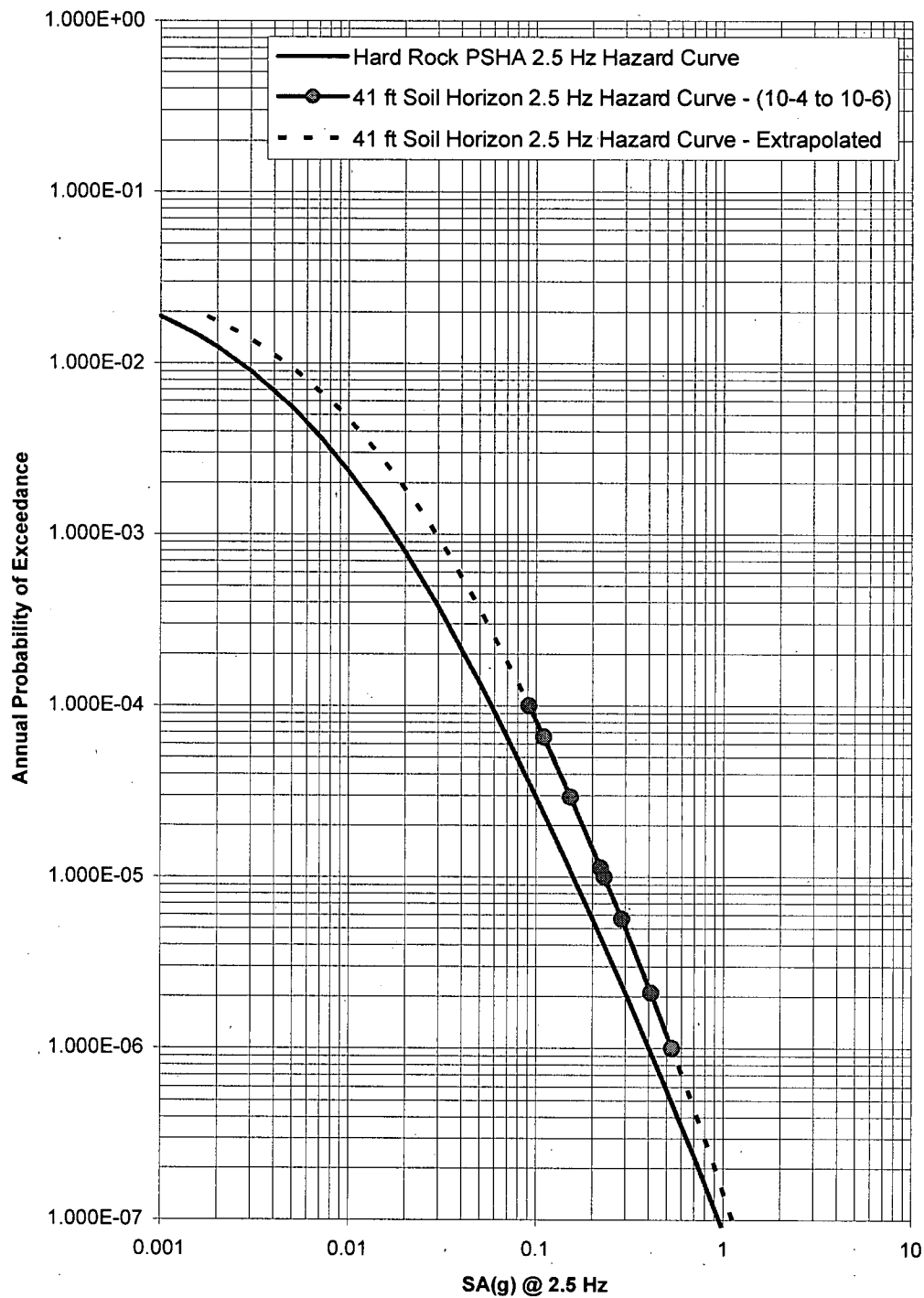


Figure 2e. Hard rock (solid red line) and 41 ft soil horizon (dashed blue and solid green line) seismic hazard curves for 2.5 Hz.

**Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies**

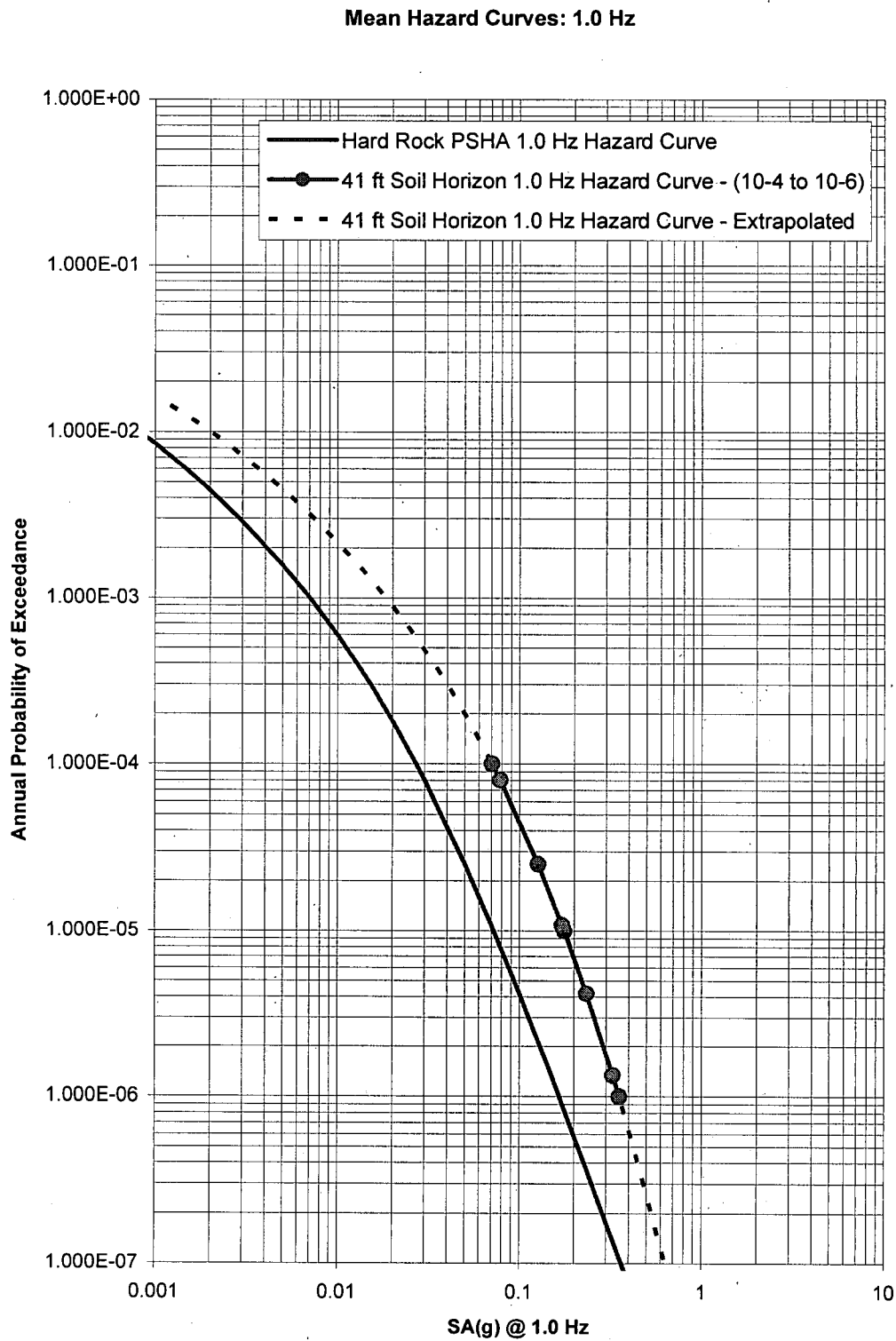


Figure 2f. Hard rock (solid red line) and 41 ft soil horizon (dashed blue and solid green line) seismic hazard curves for 1 Hz.

**Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies**

Mean Hazard Curves: 0.5 Hz

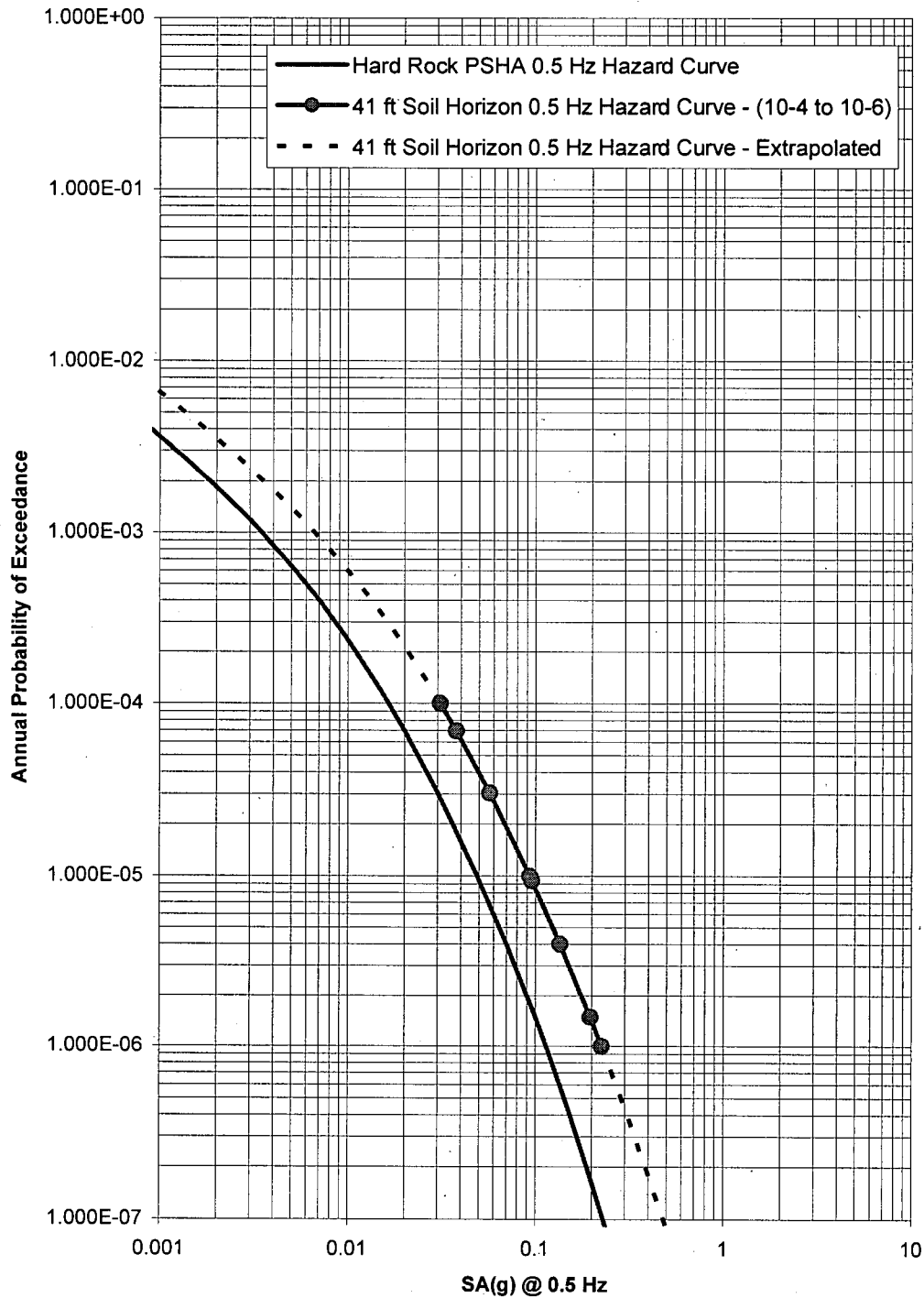


Figure 2g. Hard rock (solid red line) and 41 ft soil horizon (dashed blue and solid green line) seismic hazard curves for 0.5 Hz.

ENCLOSURE 2

**Compact Disk Containing Electronic Data
for Calvert Cliffs Nuclear Power Plant Unit 3
Soil Hazard Curves at Additional Annual Exceedence Frequencies**