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TASK REPORT

ON

DEVELOPMENT OF SEISMIC ACCELERATION RESPONSE SPECTRA FOR DIESEL GENERATOR BUILDING OF SEQUOYAH NUCLEAR PLANT

PART 2: SITE-SPECIFIC OBE & SSE INPUTS

Prepared for

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Part 2

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Part 2: Site-Specific OBE & SSE Inputs

1. INTRODUCTION

This report presents the seismic analysis methodology, analysis models, analysis scope, and analysis results obtained for the Diesel Generator (DG) building of the Sequoyah Nuclear Plant. Part 2 of this report describes the analyses performed for the seismic input using the 84 percentile site-specific response spectra of the Operating Basis Earthquake (OBE) and the Safe Shutdown Earthquake (SSE) for the plant. The objective of the analysis is to develop the seismic floor acceleration response spectra (ARS) for comparison with the design basis ARS for the building.

Since the DG building is supported by a layer of soil deposit above the underlying rock at the plant site and the structure is partially embedded in the soil deposit, the seismic response analysis for the building requires the consideration of the free-field response of the soil deposit above rock as well as the soil-structure interaction (SSI) effect including the effect of embedment. Thus, in performing the seismic response analysis for the building, the free-field response of the soil deposit is analyzed, as done for Part 1, using the one-dimensional (1-D) soil column wave propagation analysis computer program SHAKE (Reference 1), and the SSI response of the structure is analyzed using the recently developed three-dimensional (3-D) finite element SSI analysis computer program SASSI (Ref. 2).

Section 2 of this part of the report presents the analysis assumptions and methods for determining the seismic response of the soil deposit and the building, which are the same as those described in Part 1.

Section 3 describes the 84 percentile site-specific seismic input motions for the seismic response analysis. Section 4 describes the same seismic analysis models used for the response analysis as used for the analysis in Part 1. Section 5 presents the analysis cases considered in the seismic analysis. Section 6 presents the analysis results obtained. Section 7 presents the comparison of the response results obtained in the current analysis with the corresponding original design basis responses. Section 8 summarizes the conclusions.

2. DESCRIPTION OF ANALYSIS METHOD

Since the DG building is supported by a layer of approximately 70 ft. thick of soil deposit above the rock foundation for the plant, the determination of the seismic response for the building requires, in addition to the determination of SSI response of the structure, the determination of free-field soil response above rock subjected to the design seismic input motion which is defined at the surface of rock of the plant. The analysis for the free-field seismic response of the soil deposit assumes that the soil profile is horizontally layered and the seismic input motion is vertically propagating plane shear and compression incidence waves, such that the analysis can be performed using the 1-D wave propagation analysis methodology for a soil column utilizing the computer program SHAKE (Ref. 1).

For the SHAKE analysis of the soil deposit, the design seismic input motion defined at the rock surface of the site is prescribed in the form of rock outcrop motion. Using this form of input, the soil-rock interaction effect is considered in determining the soil response. This interaction takes place in the sense that the energy of seismic waves reflected form the free surface of the soil deposit is permitted to dissipate into the underlying rock medium. This form of input motion is also more consistent with the definition of design response spectra since such a definition is usually based on the study of surface-recorded ground motions rather than the motions recorded at depth.

In the SHAKE analysis of free-field soil response, the low-strain soil shear moduli of the soil layers are based on the results of site geophysical survey (Ref. 3). In order to account for the variability in soil shear modulus, analyses are performed by varying the soil shear moduli as determined from the geophysical survey data by ± 50%. Furthermore, since soil materials usually exhibit nonlinear hysteresis behavior as a function of shear strain in soil under clyclic loading

conditions, the SHAKE analysis of seismic soil response also considers the strain-dependency of soil properties based on the variation curves for normalized shear modulus and damping factor as functions of shear strain developed for sand by Seed and Idriss (Ref. 4).

The SSI response of the DG building is determined using the newly-developed 3-D finite element SSI analysis computer program SASSI (Ref. 2). In the SASSI analysis, the free-field soil surface response motion as determined from the SHAKE analysis is used as the input prescribed at the ground surface. Consistent with the assumption for the SHAKE analysis, the input motion to the SASSI analysis is also assumed to be caused by vertically propagating plane seismic shear and compression waves. Since SASSI is a linear SSI analysis computer program, the equivalent linear soil properties used for the SASSI analysis are based on the strain-compatible soil shear moduli and damping values as resulted from the SHAKE iterative, equivalent linear analysis of free-field soil response. In this manner, the primary effect of strain dependency of soil properties caused by the free-field soil response is included in the SASSI SSI response analysis.

The computer program SHAKE applied to the analysis of free-field soil response reported herein is a Bechtel version (CE915-SHAKE3) which was obtained from the University of California, Berkeley, and implemented on the Bechtel UNIVAC computer system. This version of SHAKE has been tested and verified on the UNIVAC computer system and the results of verification are documented in the validation report for the program (Ref. 5). Additional validation has also been performed for the analysis reported in Ref. 6 and the results of validation are documented in the calculation files which form the basis for the report in Ref. 6.

The version of SASSI computer program applied to the SSI analysis of the DG building reported herein was obtained by Bechtel from the University of

California, Berkeley, and implemented in the CDC CRAY-XMP computer system. This version has undergone extensive testing and validation by benchmarking the SASSI solutions with a comprehensive set of available published solutions. The results of the program validation are documented in the program validation calculation files (Ref. 7). The program validation results have been reviewed in detail by the NRC consultants and the validity of the program verification is confirmed in the NRC consultant's report (Ref. 8).

3. SEISMIC GROUND MOTION INPUT

The horizontal and vertical ground acceleration time histories used as the input for the 84 percentile site-specific response spectra for the SSE are the four Sequoyah design basis OBE artificial acceleration time histories A, B, C, and D scaled up by a factor of 3.2 for the horizontal component and a factor of 2.22 for the vertical component. These factors are determined from the TVA study contained in Reference 11. The site-specific OBE input time histories are taken as one half of the corresponding time histories for the site-specific SSE.

The comparison of the 7% damping horizontal averaged response spectrum for the four scaled-up time histories with the 84 percentile site-specific horizontal response spectrum for the SSE is shown in Figure 1. The same comparison for the vertical response spectrum is shown in Figure 2. As shown, the scaled-up average time history response spectra envelop the site-specific response spectra with significant margins in the frequency range below 4 Hz for the horizontal spectrum and below 12 Hz for the vertical spectrum.

As in Part 1, the control motion for the seismic analysis is prescribed at the rock surface at El. 650' as rock outcrop motion. The motion is considered to be caused by vertically propagating plane seismic shear waves for the horizontal components and compression waves for the vertical component of input motion.

The maximum (cut-off) frequency of the input earthquake acceleration time histories considered for the SHAKE free-field soil response analysis is 33 Hz in accordance with the requirement of the NRC Standard Review Plan. The maximum frequency for the SASSI SSI response analysis for the DG building is prescribed consistent with the maximum significant frequency of the free-field soil response motion at the soil surface which is used as the input motion for the SASSI analysis.

4. ANALYSIS MODELS

The analysis models used for the analysis in Part 2 are the same as those used for the analysis in Part 1. For the SHAKE analysis of free-field soil response, the 1-D soil column model used is shown in Figure 3. As shown, the model consists of four soil layers above a rock halfspace. The properties of the top soil layer between El. 722' (grade) and El. 712' are designated as Soil #1, the properties of the second soil layer between El. 712' and El. 692' are designated as Soil #2; the properties of the third soil layer between El. 692' and El. 678' are designated as Soil #3, and the properties of the fourth soil layer between El. 678' and El. 650' (soil-rock interface) are designated as Soil #4. The mean, lower-bound (-50% of mean), and upper-bound (+50% of mean) low-strain soil properties for all four soil layers and the the properties of rock halfspace are also shown in Figure 1. These properties are derived from the TVA calculation file for the DG building as contained in Ref. 9. The ground water table is taken to be at El. 692' in accordance with Ref. 9. Since the SHAKE analysis does not have limitations on layer thickness as a function of cutoff frequency, averaging of the soil properties as used in Ref. 9 has been applied to obtain the properties for a reduced number of soil layers for the SHAKE analysis reported herein.

The strain-dependent variation curves for normalized soil shear modulus vs. shear strain and soil damping ratio vs. shear strain for Soil #1, #2, and #3 used for the SHAKE analysis are the standard sand curves as obtained from Ref. 4. These curves are shown in Figures 4 and 5. The strain-dependent curves used for Soil #4, which is a layer of weathered shale, are based on the curves derived in Ref. 9. These curves are shown in Figures 6 and 7.

For the SASSI analysis of the SSI response for the DG building, the 3-D lumped-mass stick model for the building as developed for the STARDYNE

analysis of Ref. 9, is directly used. This model is shown in Figure 6. The fixed-base structure modal properties for the 3-D lumped mass model as reconstructed from Ref. 9 for the SASSI analysis are shown in Table 1.

These modal properties compare closely with the corresponding properties as obtained from the STARDYNE analysis of Ref. 9. The fixed-base structure damping ratio used for is uniformly 4% for the OBE analysis and 7% for the SSE analysis for all modes of the fixed-base structure. These damping values are consistent with the RG 1.16 damping values for reinforced concrete structures.

The foundation model for the DG building for the SASSI SSI analysis consists of a 3-D brick finite element model for the embedded DG building basemat between El. 722' (grade and top of basemat) and El. 712' (bottom of basemat). The finite element mesh of the foundation model is shown in Figure 8. This finite elment mesh applies also for the brick finite element foundation soil model for the excavated soil volume displaced by the embedded DG building basemat. This foundation modelling technique is unique to the SASSI SSI analysis methodology which adopts the so-called "flexible volume substructuring" method (Ref. 2).

The connection between the brick finite element model for the basemat and the 3-D lumped-mass stick model for the DG building above the basemat is accomplished by connecting the base of the stick model to a set of rigid beams attached to the top of the finite element model for the basemat, simulating the connections of structural walls to the basemat. The finite element mesh for the SASSI foundation model is sized to pass the highest significant frequency of the free-field soil response motion as determined from the SHAKE free-field soil response analysis.

The structural damping for the brick finite element model of the basemat is prescribed as 4% for the OBE and 7% for the SSE, and the soil hysteresis damping for the brick finite element foundation soil model is prescribed as the strain-compatible values resulting from the SHAKE free-field soil response analysis.

5. ANALYSIS SCOPE

The seismic response analyses for the DG building for the site-specific OBE and SSE inputs have each been performed for three soil cases, namely, the mean, lower-bound, and upper-bound soil cases with the mean, lower-bound (-50% of mean), and upper-bound (+50% of mean) low-strain soil shear moduli, respectively. For each soil case of OBE or SSE input, analyses have been performed separately for each of the three directions of input, namely, the horizontal NS and EW, and the vertical directions of input. For the analysis in each direction, all four scaled-up acceleration time histories A, B, C, and D for the site-specific OBE or SSE have been used as the input. Thus, the total analysis scope consists of 48 separate SHAKE free-field soil response analyses (i.e., 2 input levels x 3 soil cases x 2 directions x 4 time histories) and 72 separate SASSI seismic SSI response analyses (i.e., 2 input levels x 3 soil cases x 3 directions x 4 time histories).

In the SHAKE analysis, the strain-compatible soil properties for each soil case subjected to the four (A, B, C, and D) scaled-up OBE or SSE horizontal time history inputs are first obtained; then the averaged strain-compatible soil properties applicable for OBE or SSE for each soil case are obtained as the average of the four sets of strain-compatible soil properties resulting from the four horizontal time history inputs. The averaged strain-compatible soil properties as obtained for each soil case are finally used as the equivalent linear soil properties for the SASSI SSI model for each corresponding soil case. The averaged strain-compatible soil shear moduli and damping values for the mean, lower-bound, and upper-bound soil cases are shown in Table 2 for the site-specific OBE input and in Table 3 for the site-specific SSE input. The averaged properties as obtained are also used for the second-step SHAKE analyses without further soil property strain-compatibility iterations for determining the free-field soil surface response motions (horizontal and vertical) for each of the four

time history inputs for OBE or SSE and for each soil case. This results in 12 horizontal and 12 vertical free-field soil surface response time histories each for the site-specific OBE and SSE conditions, which are compatible with the averaged strain-compatible soil properties for each soil case. These motions are subsequently used as the input for 72 (12 horizontal NS, 12 horizontal EW, and 12 vertical each for OBE and SSE) SASSI SSI response analyses.

6. ANALYSIS RESULTS

The results of SHAKE free-field soil response analyses consist of three sets each for OBE and SSE of strain-compatible soil properties corresponding to the mean, lower-bound, and upper-bound soil cases as shown in Tables 2 and 3, and 48 strain-compatible free-field soil surface response acceleration time histories (12 for horizontal inputs and 12 for vertical inputs each for OBE and SSE). For each of these time histories, the 1, 2, and 4% damping acceleration response spectra (ARS) for OBE and 2, 3, 4, and 7% damping ARS for SSE have been calculated; and the resulting spectra are averaged for the four input time histories A, B, C, and D. This results in 6 averaged ARS (one horizontal and one vertical for each of the 3 soil cases) each for OBE and SSE for the free-field soil response motions at the ground surface for each spectral damping value. Four envelopes of these average ARS for 3 soil cases for 1% damping for OBE and 2% damping for SSE are plotted and compared with the corresponding averaged ARS for the free-field soil response motions at the soil-rock interface (El. 650') and the averaged ARS for the input motions at the rock outcrop in Figures A-1 through A-4 in Appendix A.

The results of SASSI seismic SSI response analyses consists of 15 acceleration response time histories at selected locations and directions for the DG building for each of the 72 separate SASSI analyses, resulting in a total of 1080 response time history outputs (540 each for OBE and SSE). The 15 response time histories selected for each SASSI analysis case consist of 5 selected response time histories for each of the three floor elevations at El. 753.5' (roof), El. 739.75' (second floor), and El. 722' (top of basemat). The 5 selected response time histories for each floor elevation consist of 4 horizontal response time histories (NS and EW response time histories at 2 extreme edge locations of the floor) and one vertical response time history at the center of mass location for the floor.

For each of the 540 response time histories obtained for OBE and SSE from SASSI analyses, the 1, 2, and 4% damping floor response ARS for OBE and 2, 3, 4 and 7% damping ARS for SSE have been calculated, resulting in a total of 3780 ARS curves. The set of ARS curves for each of the OBE and SSE inputs are subsequently post-processed as described in the following:

(1) The 540 ARS curves for each spectral damping are first combined, using the square-root-of-the-sum-of-squares (SRSS) procedure, for the co-directional response resulting from three directions of input for the same soil case and the same time history input. This reduces the 540 ARS curves to 180 curves for each spectral damping.

(2) The 180 ARS curves for each spectral damping as obtained from Step 1 are then averaged for the four time history inputs (i.e., time histories A, B, C, and D). This reduces the 180 curves to 45 averaged ARS curves for each spectral damping.

(3) The 45 averaged ARS curves for each spectral damping as obtained from Step 2 are compared and enveloped for each floor elevation to obtain 27 envelopes of average ARS curves (3 directions per floor x 3 floor elevations x 3 soil cases) for each spectral damping.

(4) The 27 envelopes of average ARS curves for each spectral damping as obtained from Step 3 above are finally combined by enveloping the curves for 3 soil cases, resulting in 9 final envelopes of average ARS curves (3 directions per floor x 3 floor elevations) for each spectral damping for each of the OBE and SSE inputs.

The 9 final envelopes of ARS curves for 1, 2, and 4% damping values for OBE as obtained from enveloping results for 3 soil cases in Step 4 above are plotted and shown in Figures A-5 through A-13; and the 9 final envelopes of ARS curves for 2, 3, 4, and 7% damping for SSE as obtained are shown in Figures A-14 through A-22 of Appendix A. The spectral values of Figures A-5 through A-22, including the spectral values for the ASME code Case N411 damping (Ref. 10), are listed in Tables A-1 through A-18 in Appendix A.

7. COMPARISON OF RESULTS

The results of SASSI analyses for the site-specific OBE input in terms of the 1, 2, and N411 damping final ARS envelopes for three soil cases are compared with the corresponding original (old) design basis OBE ARS curves in Figures B-1 through B-9 of Appendix B, for each of the three directions of response and for each of the three floor elevations in the DG building. The results for the site-specific SSE input in terms of 2, 3, and N411 damping final ARS envelopes for three soil cases are compared with the design basis SSE ARS curves in Figures B-10 through B-18 of Appendix B. For the comparison of the vertical response ARS envelopes at three elevations of the DG building, the comparisons are also made with the new vertical design basis ARS which were developed subsequent to the establishment of the original design basis ARS.

As shown by the comparison in these figures, the final floor response ARS envelopes as obtained in the current analysis are generally enveloped by the original design basis ARS as well as by the new vertical design basis ARS with a significant margin in the spectral peak frequency region.

8. SUMMARY AND CONCLUSIONS

The seismic responses of the Diesel Generator (DG) building subjected to the 84 percentile site-specific OBE and SSE ground motion inputs for the Sequoyah Nuclear Plant have been analyzed using the 3-D finite element SSI analysis computer program SASSI to develop the floor acceleration response spectral envelopes, taking into account the amplified soil response above rock based on the 1-D soil column wave propagation analysis computer program SHAKE. The analyses have been performed for three soil cases each for OBE and SSE with the mean, lower-bound, and upper-bound soil properties to account for the variation of the low-strain soil shear moduli as derived from the seismic geophysical survey data. For each soil case, the strain-dependency of soil shear moduli and damping values have also been incorporated in the analysis. All four design time histories scaled up by appropriate factors so that their average spectra envelope the site specific OBE and SSE spectra, have been used as the seismic input for the analysis. The seismic input motions are considered to be rock outcrop motions defined at the surface of rock at the plant site.

The envelopes of average acceleration response spectra (ARS) for 3 spectral damping ratios (1, 2, and 4%) for OBE and 4 spectral damping ratios (1, 2, 4, and 7%) for SSE, for 3 directions of response (NS, EW, and Vertical), at three elevations of the DG building (roof, second floor, and top of basemat) have been developed for each soil case. These final ARS envelopes for OBE and SSE are plotted in Figures A-4 through A-22 of Appendix A.

The comparisons of the final envelopes of average ARS curves as obtained in the current analysis with the original (old) and new design basis ARS for several spectral damping ratios including the ASME Code Case N411 damping ratio, are shown in Figures B-1 through B-18 of Appendix B. As

shown in these comparisons, the final envelope of average ARS curves obtained in the current analysis are generally enveloped by the original design basis ARS with significant margins in the spectral peak frequency range. Thus, the design basis ARS for the DG building are still conservative with a significant margin of conservatism in the spectral peak frequency region relative to the ARS envelopes developed for the 84 percentile site-specific OBE and SSE inputs and using the current state-of-the-art analysis methodology and computer programs.

9. REFERENCES

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(2) Lysmer, J., Tabatabaie-Raissi, M., Tajirian, F., Valdani, S., and Ostadan, F., "SASSI - A System for Analysis of Soil-Structure Interaction," Report No. UCB/GT/81-02, Geotechnical Engineering, University of California, Berkeley, April 1981.

(3) Sequoyah Nuclear Plant, Final Safety Analysis Report, Sections 2.5 and 3.7.

(4) Seed, H. B. and Idriss, I. M., "Soil Moduli and Damping Factors for Dynamic Response Analysis," Report No. EERC 70-10, University of California, Berkeley, December 1970.

(5) Davie, J. R., "Verification Report for Computer Program SHAKE3, Version No. A1-1," Revision 1, Bechtel Power Corporation, February 1985.

(6) Bechtel North American Power Corporation," Task Report on Development of Horizontal Seismic Acceleration Response Spectra for Auxiliary Building ERCW Pipe Tunnel,", Report prepared for TVA Sequoyah Nuclear Plant, January 25, 1988.

(7) Bechtel Western Power Corporation, "SASSI Computer Program Validation", Bechtel Calculation No. DCPP-LTSP-SSI 2-01 through 2-20, January 1986.

(8) NRC letter from Charles M. Trammell, NRC Project Manager, to Licensee, Pacific Gas and Electric Company (PG&E), dated August 27, 1987, on "Trip Report - Audit of Calculational Programs to Evaluate Potential Soil-Structure Interaction Effects - June 9 through 11, 1987," Diablo Canyon Power Plant, Long Term Seismic Program.

(9) TVA Calculations, "Sequoyah Nuclear Plant - Diesel Generator Building 3-D Earthquake Study", RIMS No. B41 '87 0521 020, May 12, 1987; and "Geophysical Properties for Seismic Analysis of Diesel Generator Building," RIMS No. B41 '87 0715 001, June 9, 1986.

(10) ASME Code Case N411, "Alternative Damping Values for Seismic Analysis of Classes 1, 2, and 3 Piping Sections," Section III, Division 1.

(11) TVA Calculations, "Derivation of the 84th Percentile Site-Specific Response Spectra," RIMS No. B25 '88 0122 456, January 22, 1988.

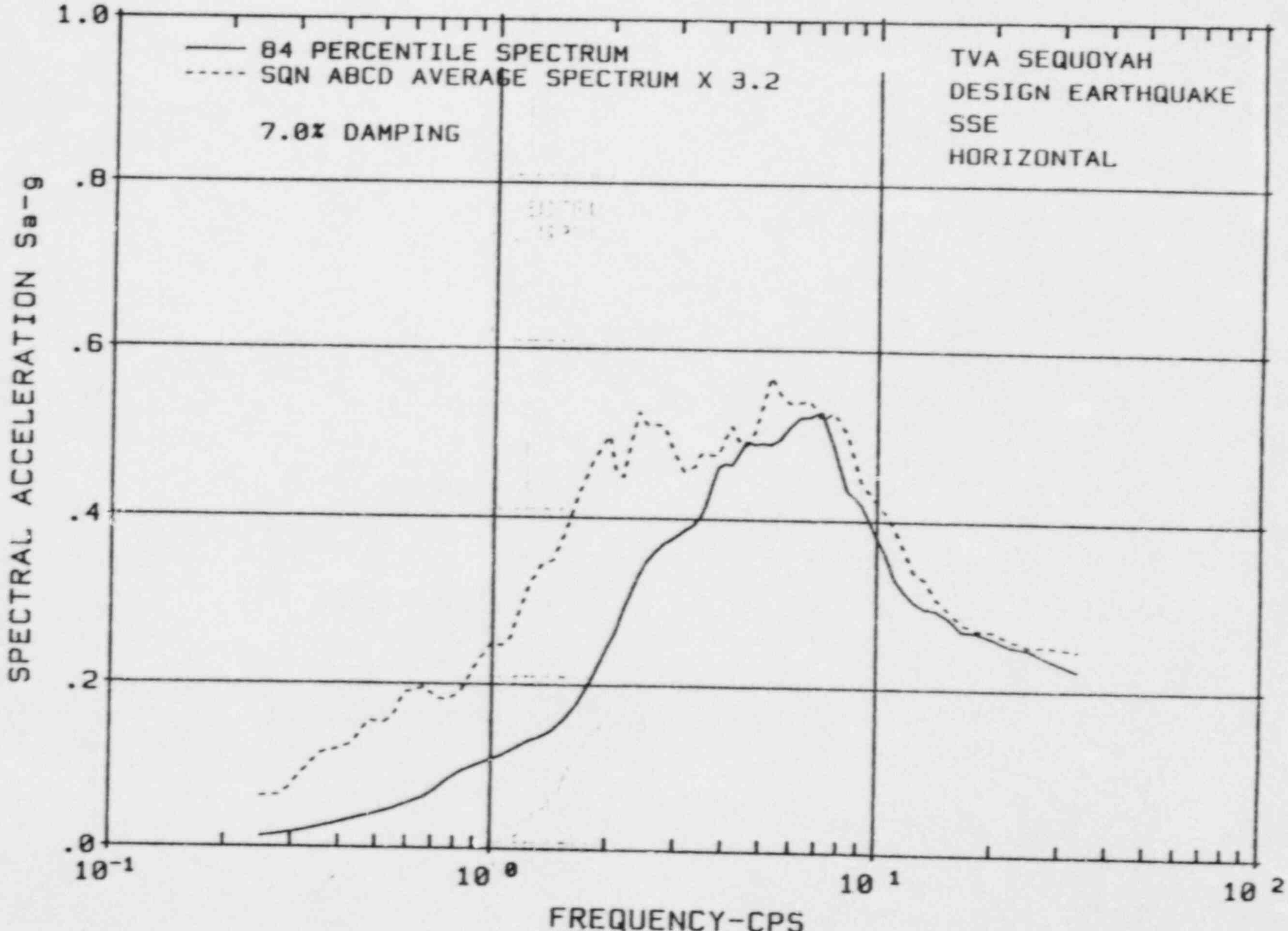

Figure 1 COMPARISON OF AVERAGE ARS

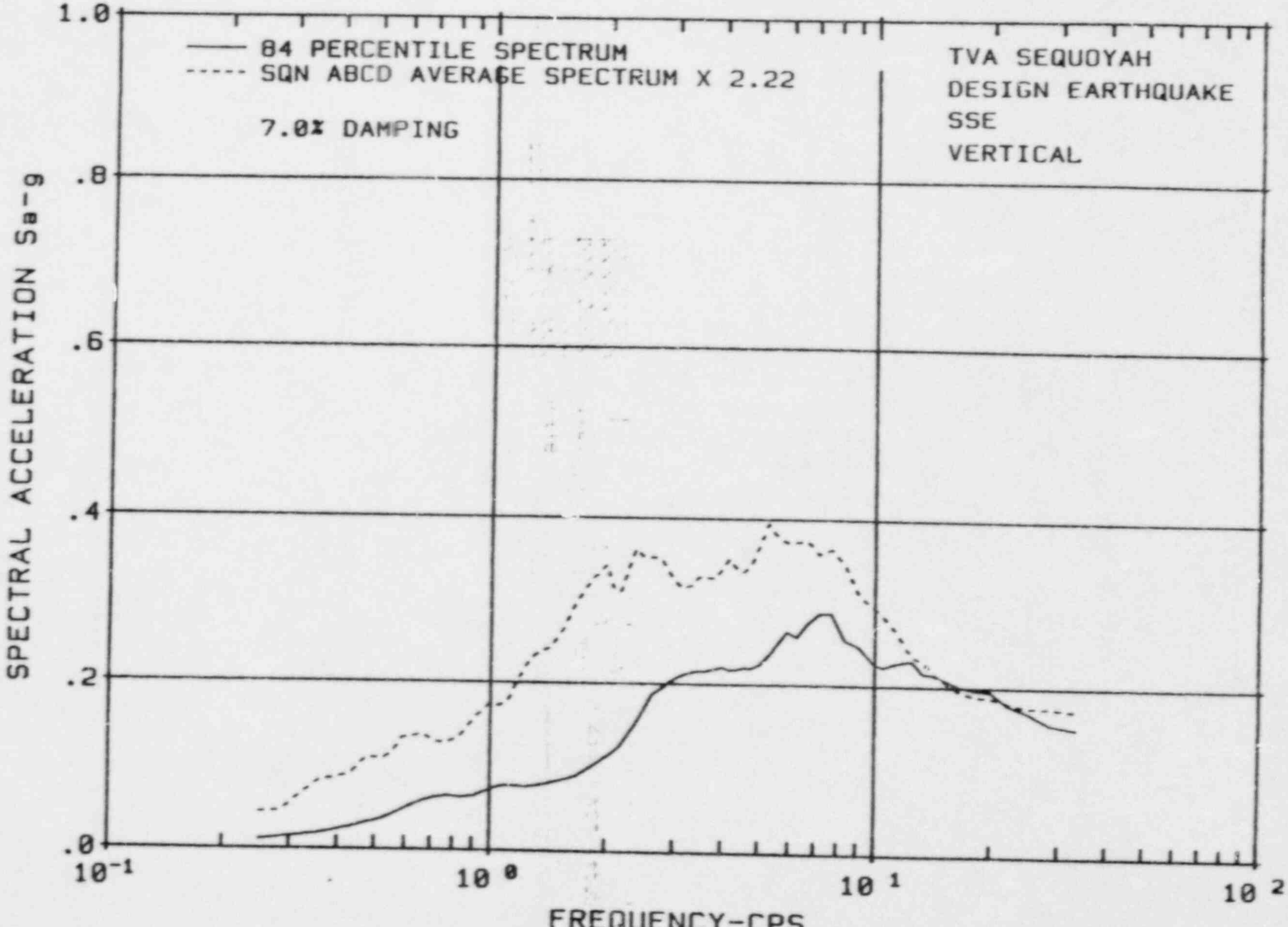

Figure 2 COMPARISON OF AVERAGE ARS

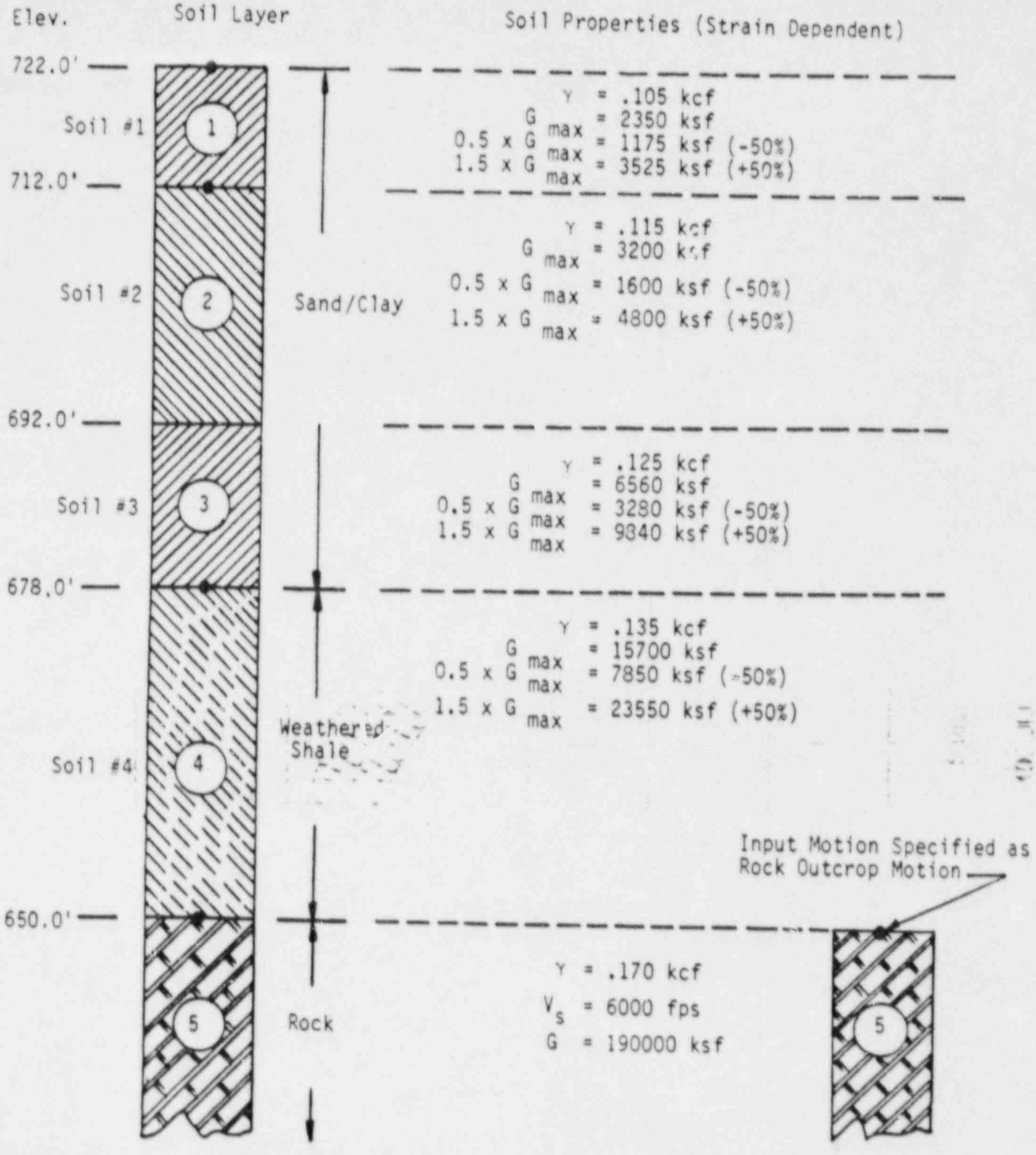

Figure 3 SHAKE Analysis Model and Properties

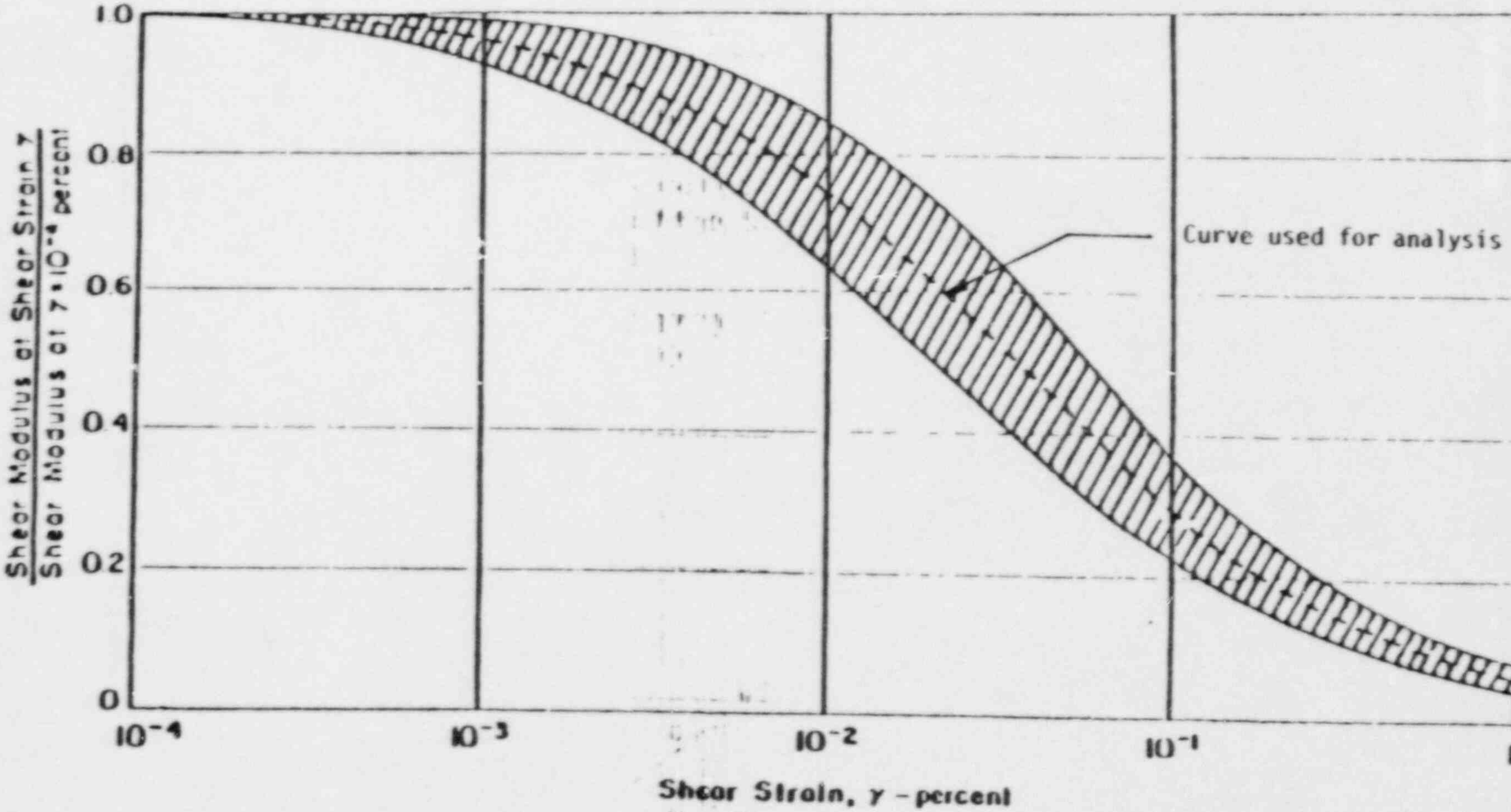

Figure 4 VARIATION OF SHEAR MODULUS WITH SHEAR STRAIN FOR SANDS

(AFTER SEED AND IDRISS 1970)

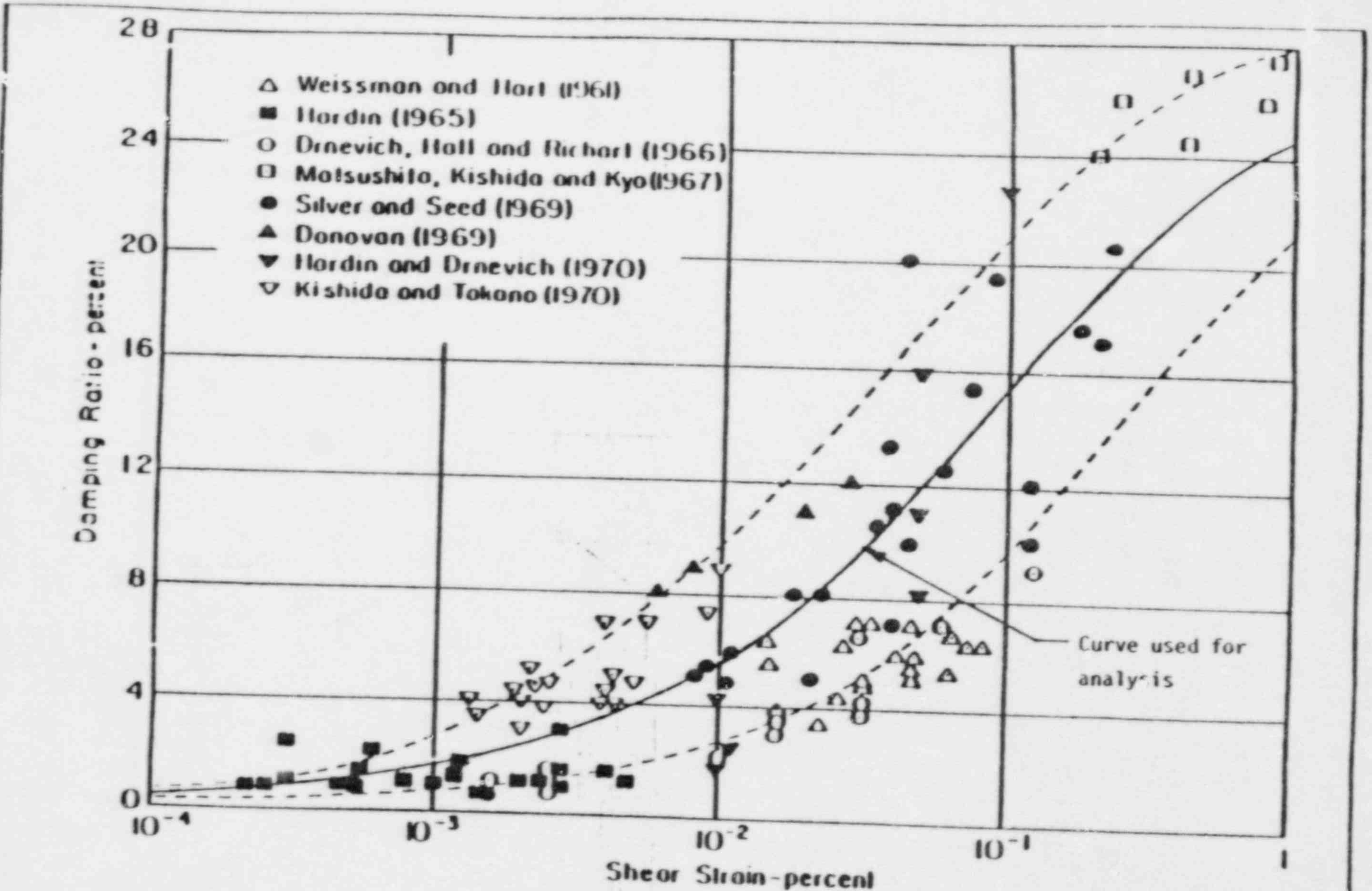

Figure 5 DAMPING RATIOS FOR SANDS
(AFTER SEED AND IDRISS, 1970)

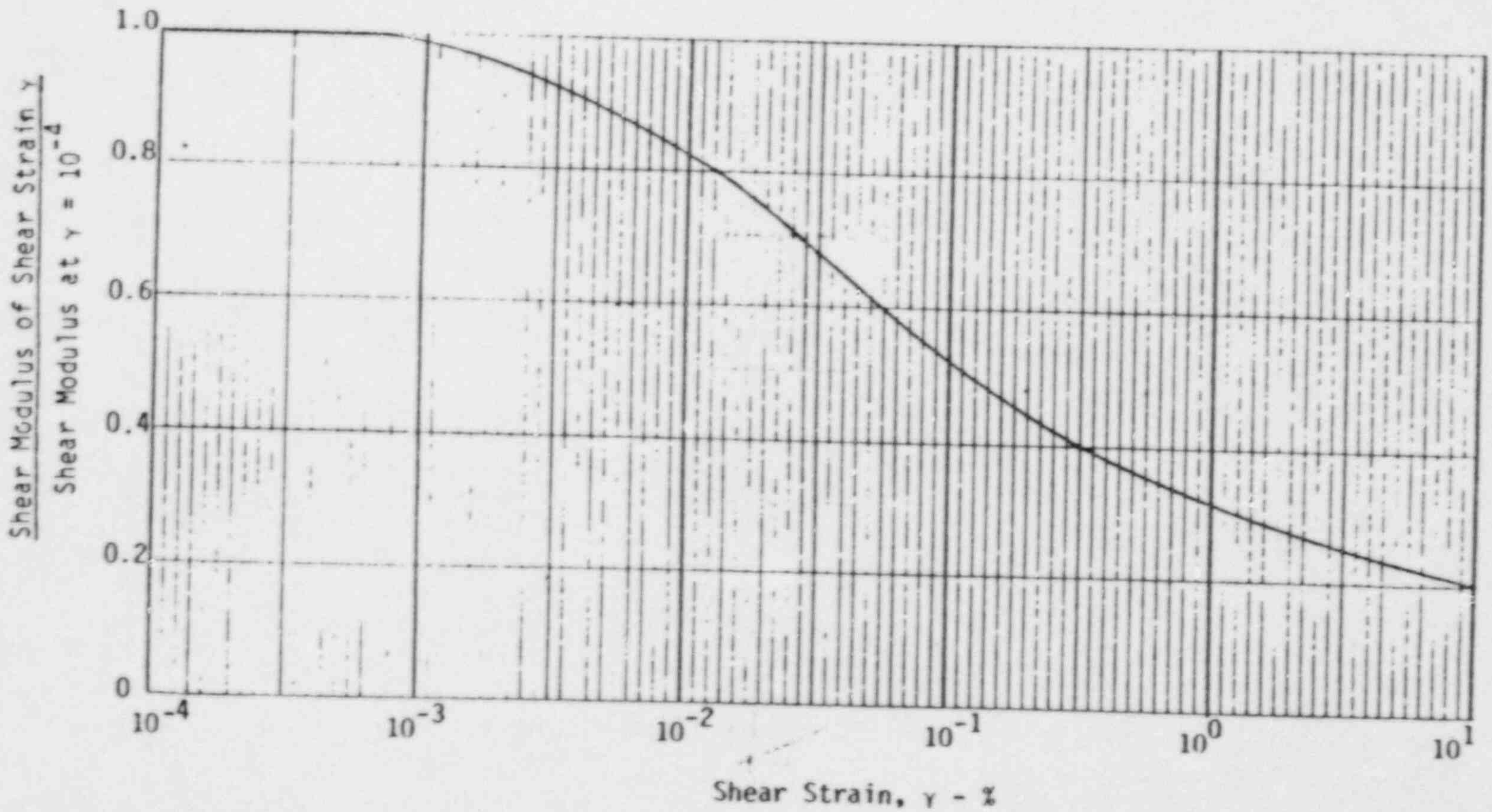

Figure 6 Variation of Shear Modulus with Shear Strain for Weathered Shale (Ref. 9)

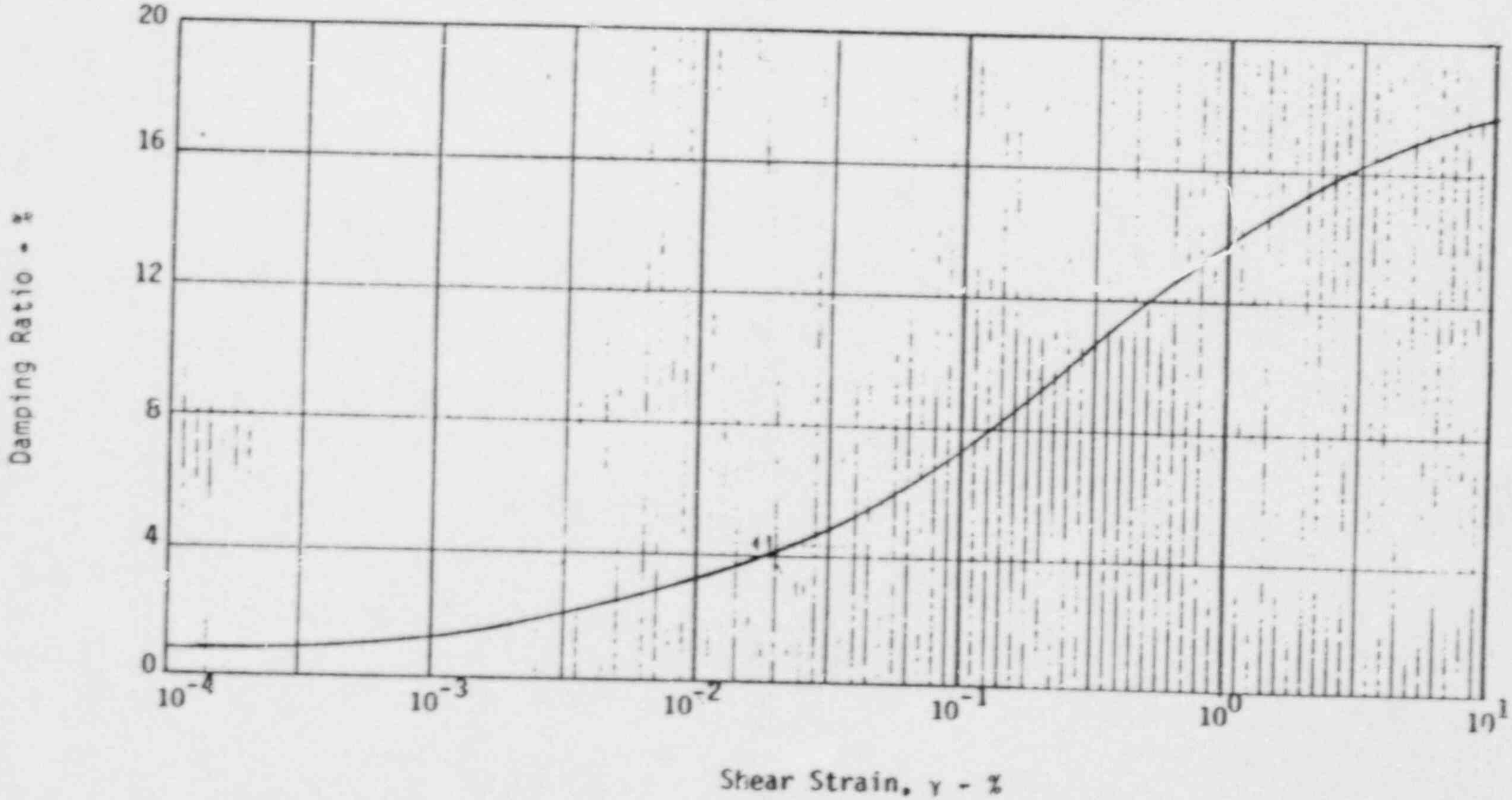

Figure 7 Variation of Damping Ratio with Shear Strain for Weathered Shale (Ref. 9)

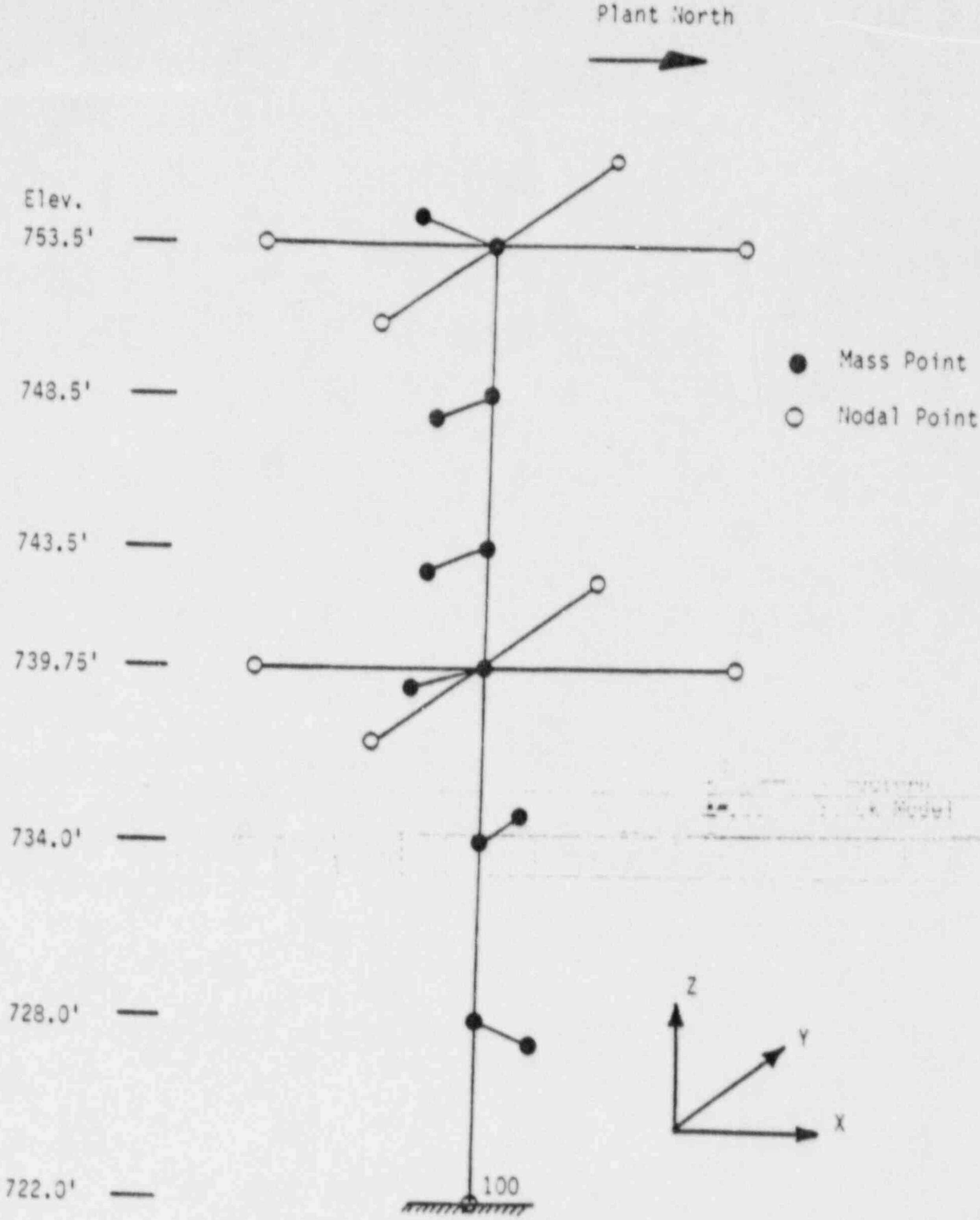

Figure 8 3-D Lumped-Mass Stick Model of DG Building

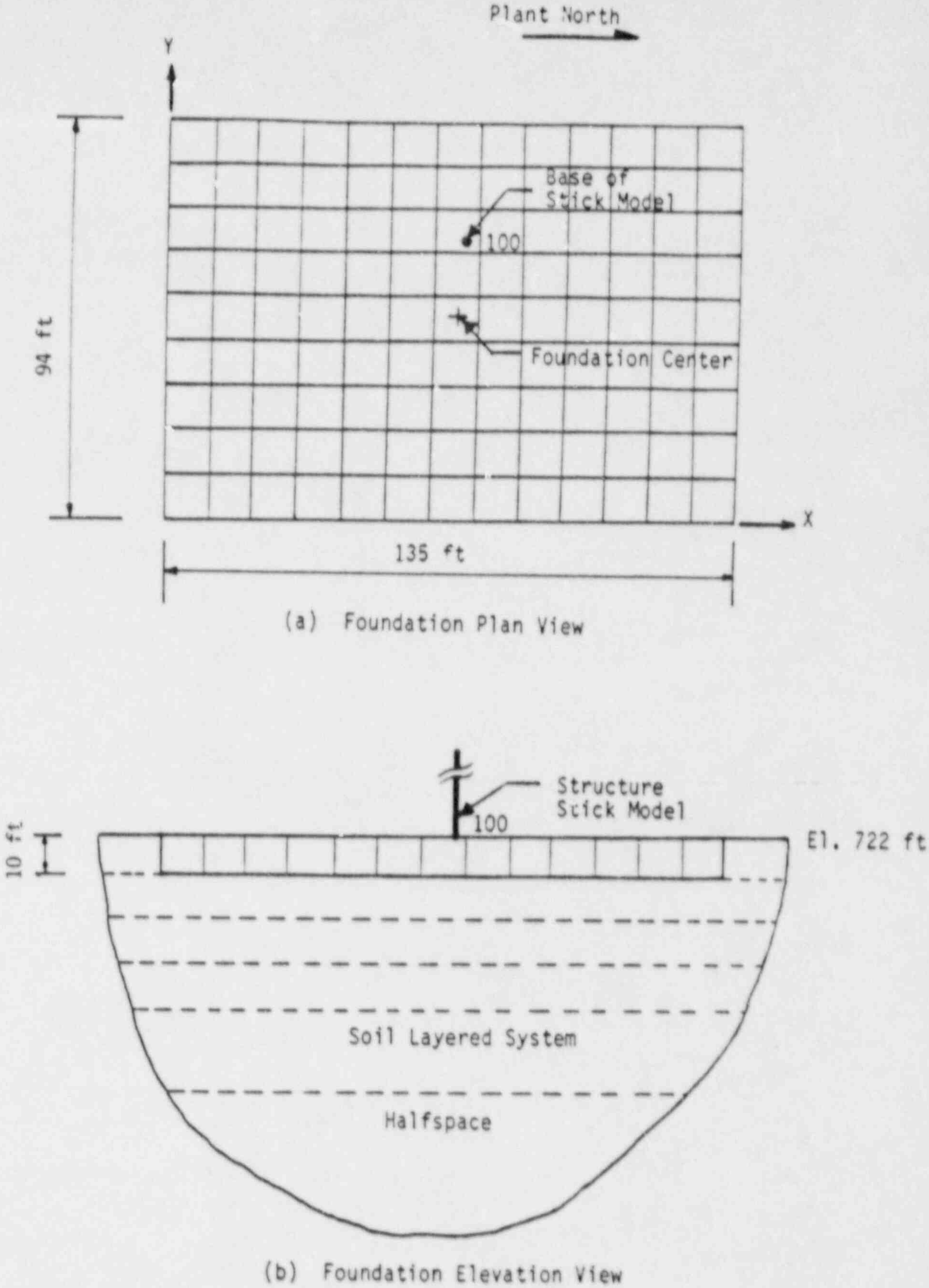

Figure 9 SASSI Foundation Model

Table 1

Modal Properties of Fixed-Base Structure

Mode No.	Frequency (cps)	Modal Mass (Kips-Sec^2/Ft) X (N-S)	Y (E-W)	Z (Vertical)
1	11.18	.027	.605	.000
2	22.66	264.884	.021	.000
3	23.71	.017	292.792	.000
4	42.63	.037	.022	.000
5	51.93	40.085	.000	.000
6	52.63	.000	.000	287.303
	Summations	305.050	293.440	287.303
	Total Mass	324.717	324.717	324.717

Table 2

Strain-Compatible Soil Properties From
SHAKE Analysis for 84 Percentile Site-Specific OBE

Layer No.	Layer Thickness (ft)	Lower Bound Soil (0.5xGmax)		Mean Soil (1.0xGmax)		Upper Bound Soil (1.5xGmax)	
		G (ksf)	β(%)	G (ksf)	β(%)	G (ksf)	β(%)
1	10	833	6.3	1931	4.3	3116	3.2
2	20	709	11.9	2000	7.9	3519	5.9
3	14	1722	10.0	4632	6.4	7633	5.1
4	28	6306	3.4	13847	2.6	21558	2.1

Table 3

Strain-Compatible Soil Properties From
SHAKE Analysis for 84 Percentile Site-Specific SSE

Layer No.	Layer Thickness (ft)	Lower Bound Soil (0.5xGmax)		Mean Soil (1.0xGmax)		Upper Bound Soil (1.5xGmax)	
		G (ksf)	β(%)	G (ksf)	β(%)	G (ksf)	β(%)
1	10	667	9.0	1708	6.0	2811	4.7
2	20	396	17.3	1430	11.8	2707	9.1
3	14	1109	14.6	3460	9.9	6223	7.8
4	28	5729	4.2	12796	3.4	20165	2.9

Appendix A

'inal Envelopes of Average ARS Plots for Enveloping the Results of Three Soil Cases

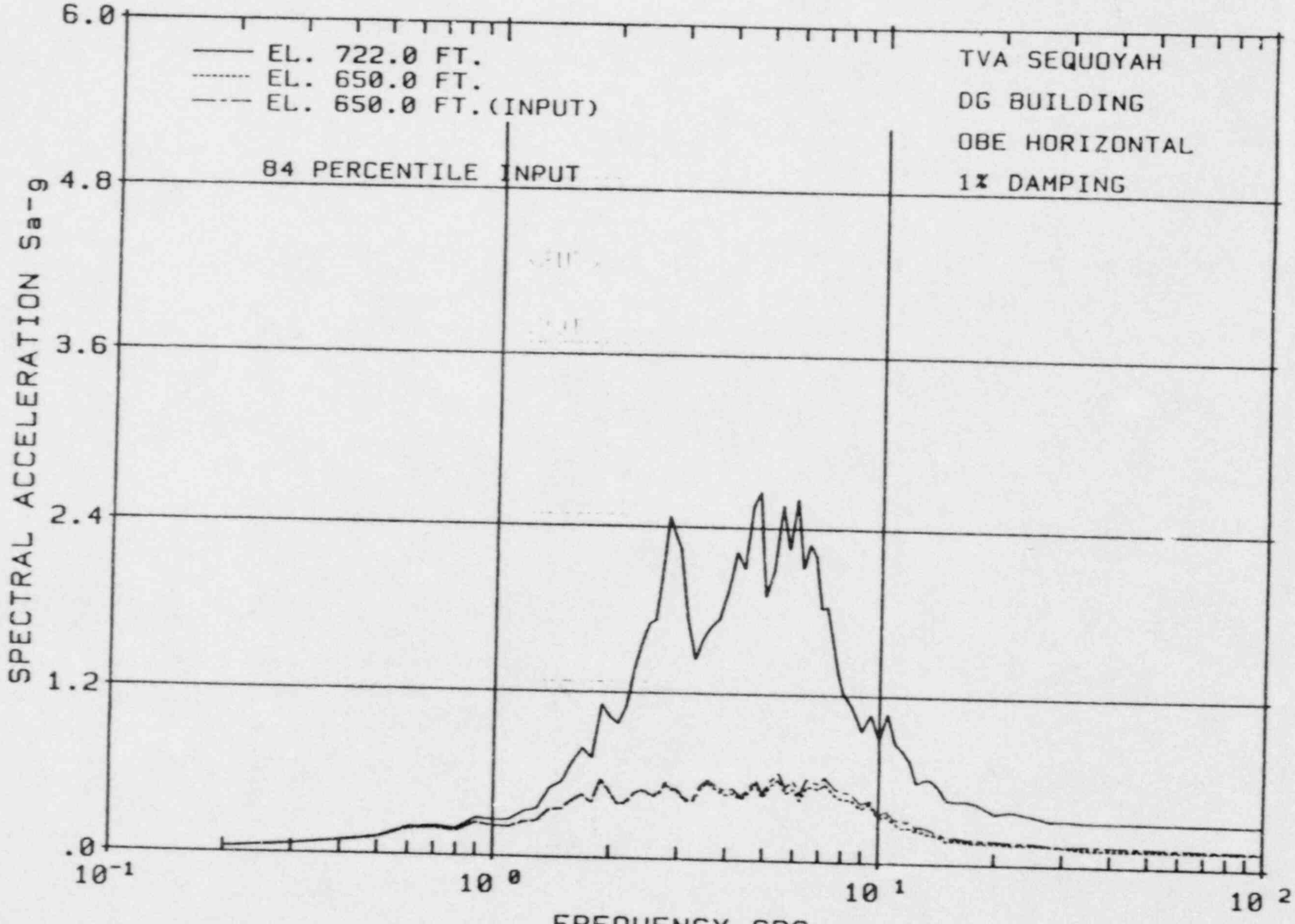

Figure A-1 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

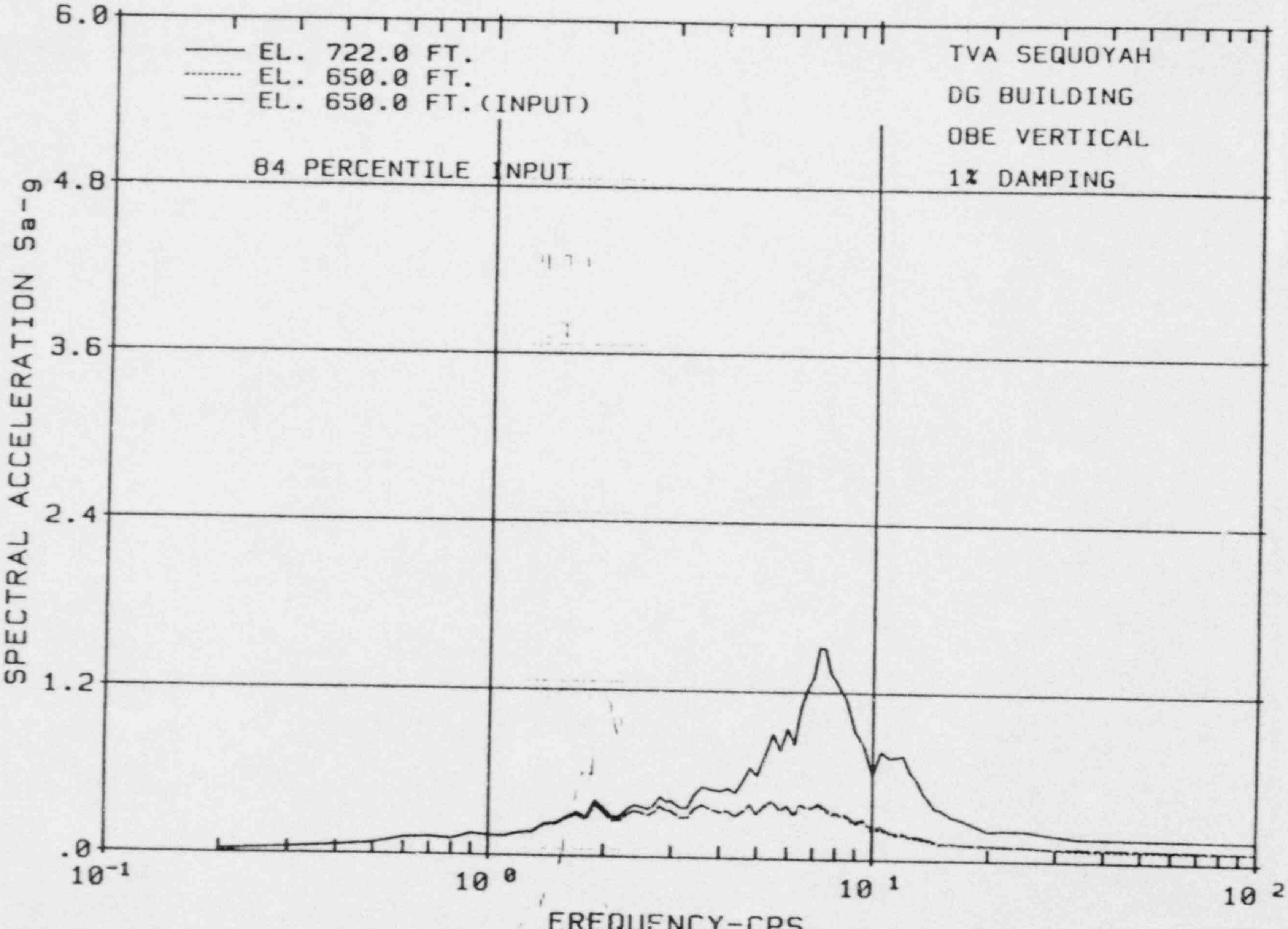

Figure A-2 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

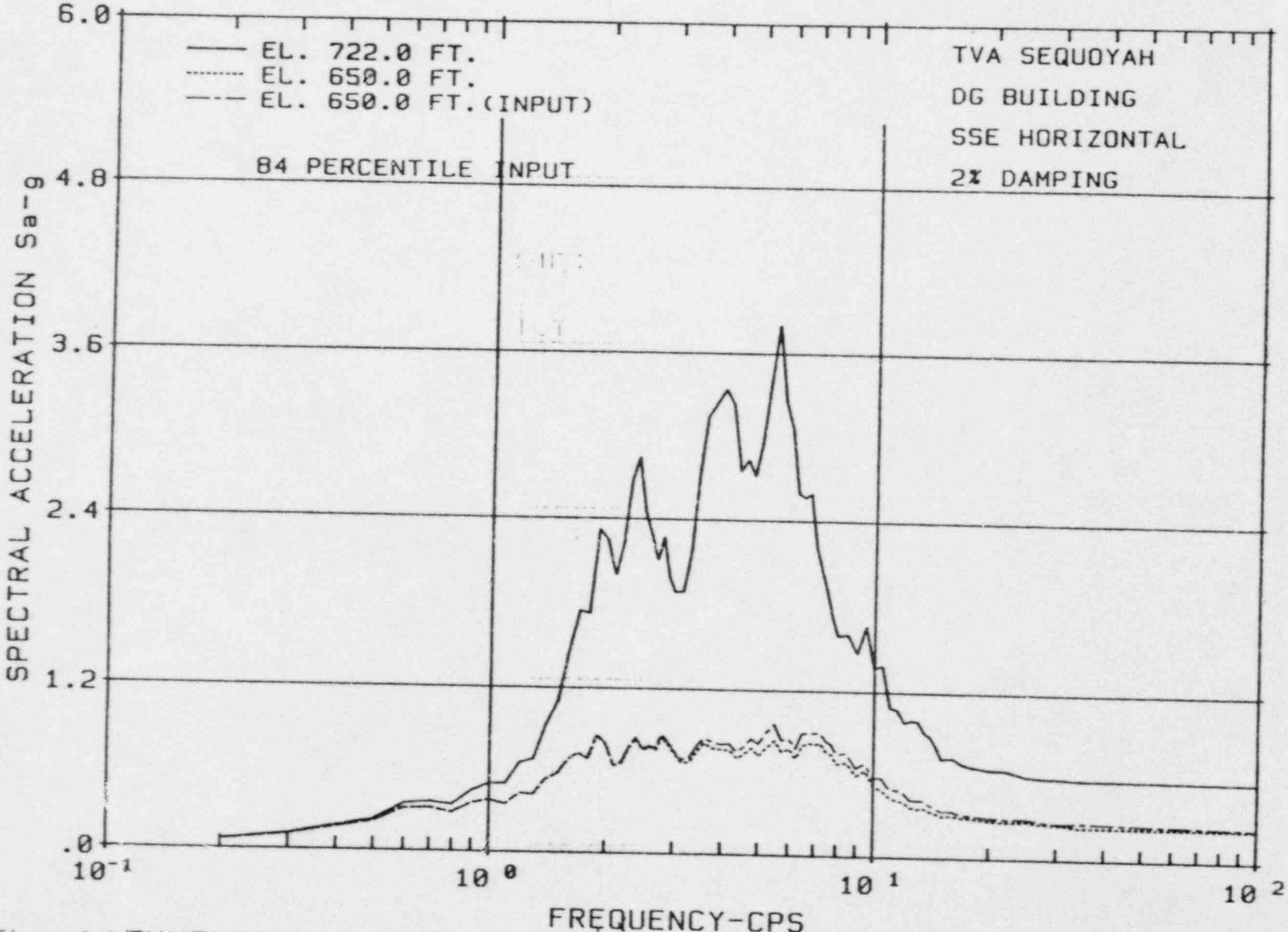

Figure A-3 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

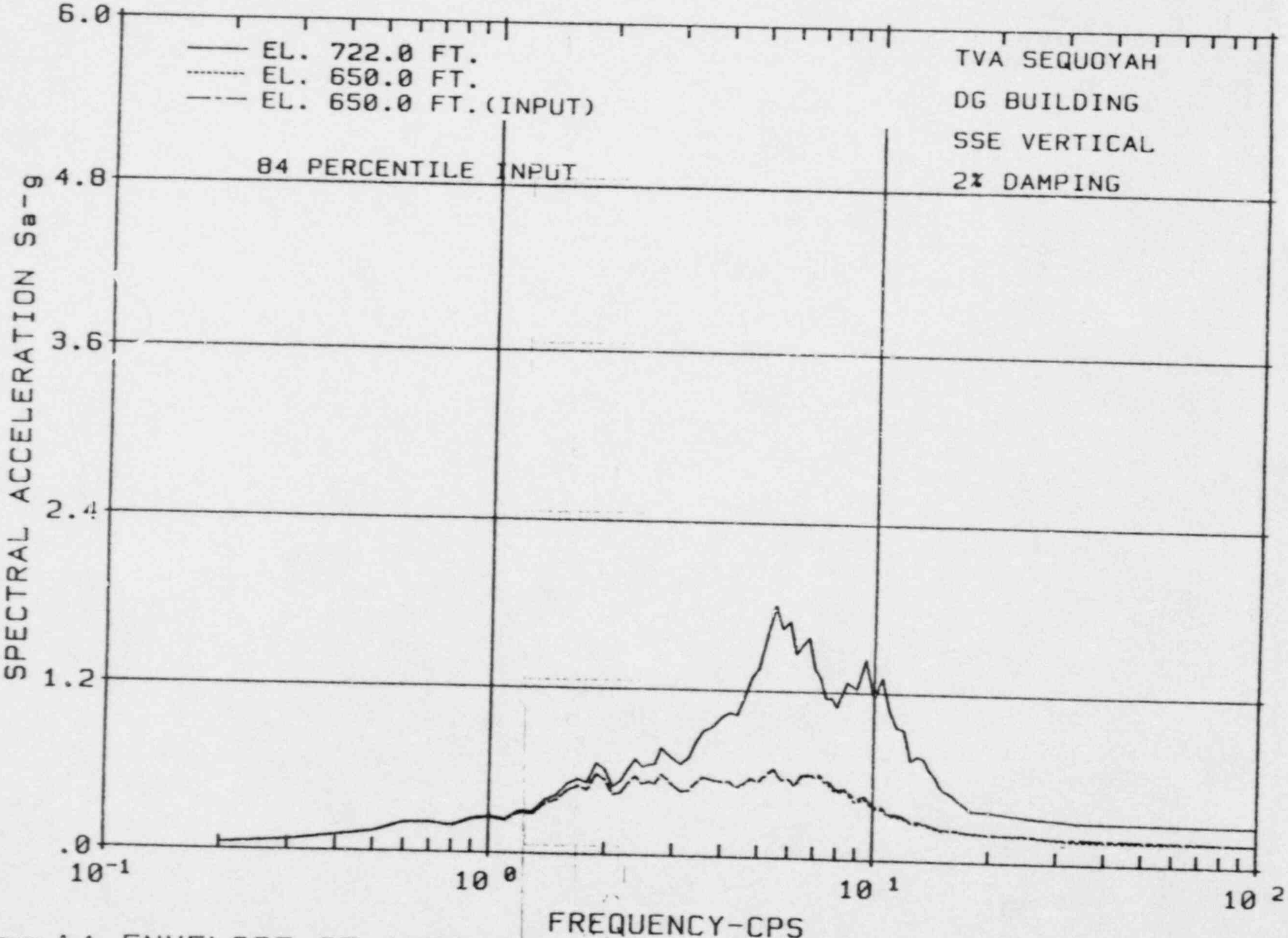

Figure A-4 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

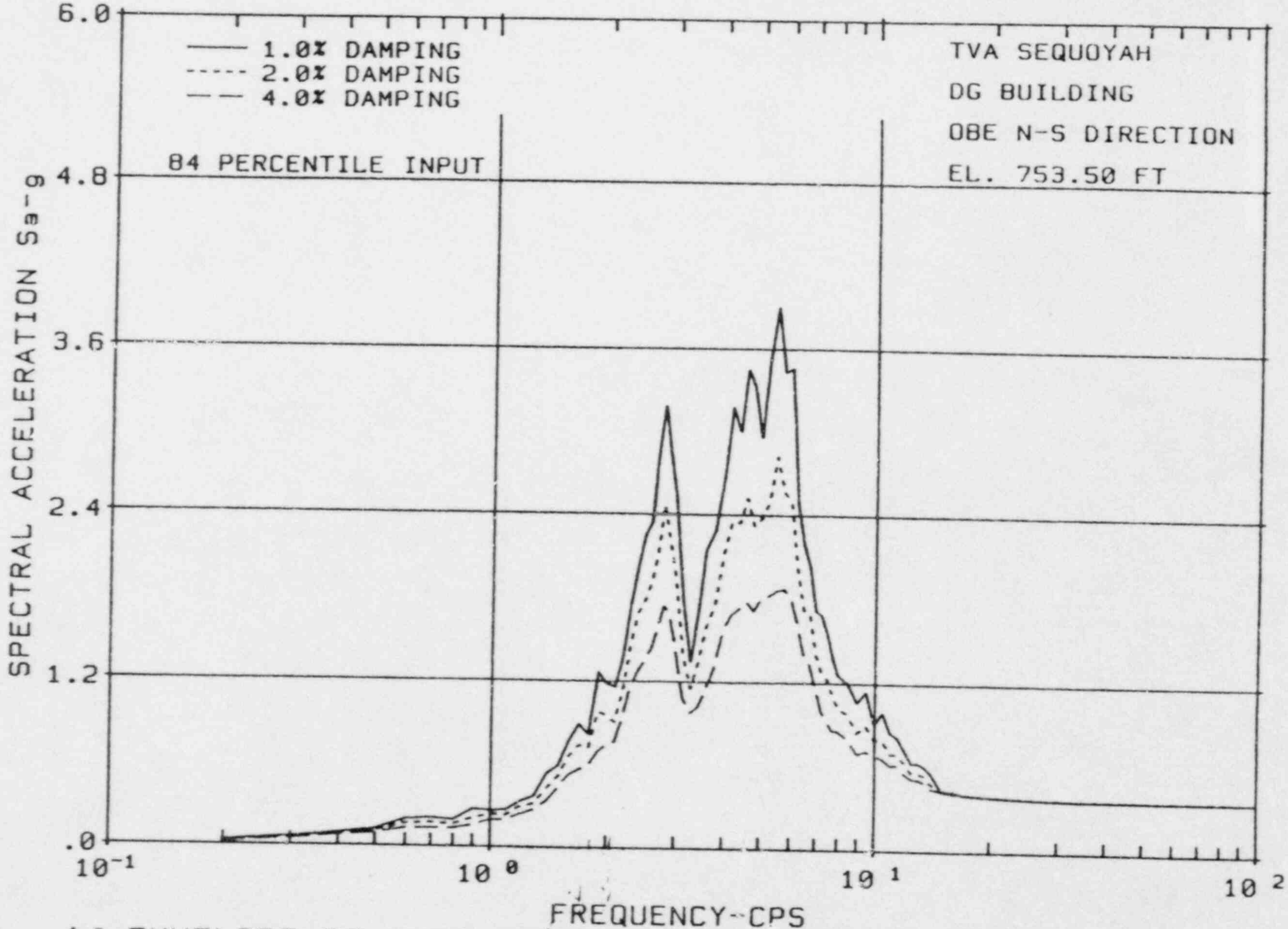

Figure A-5 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

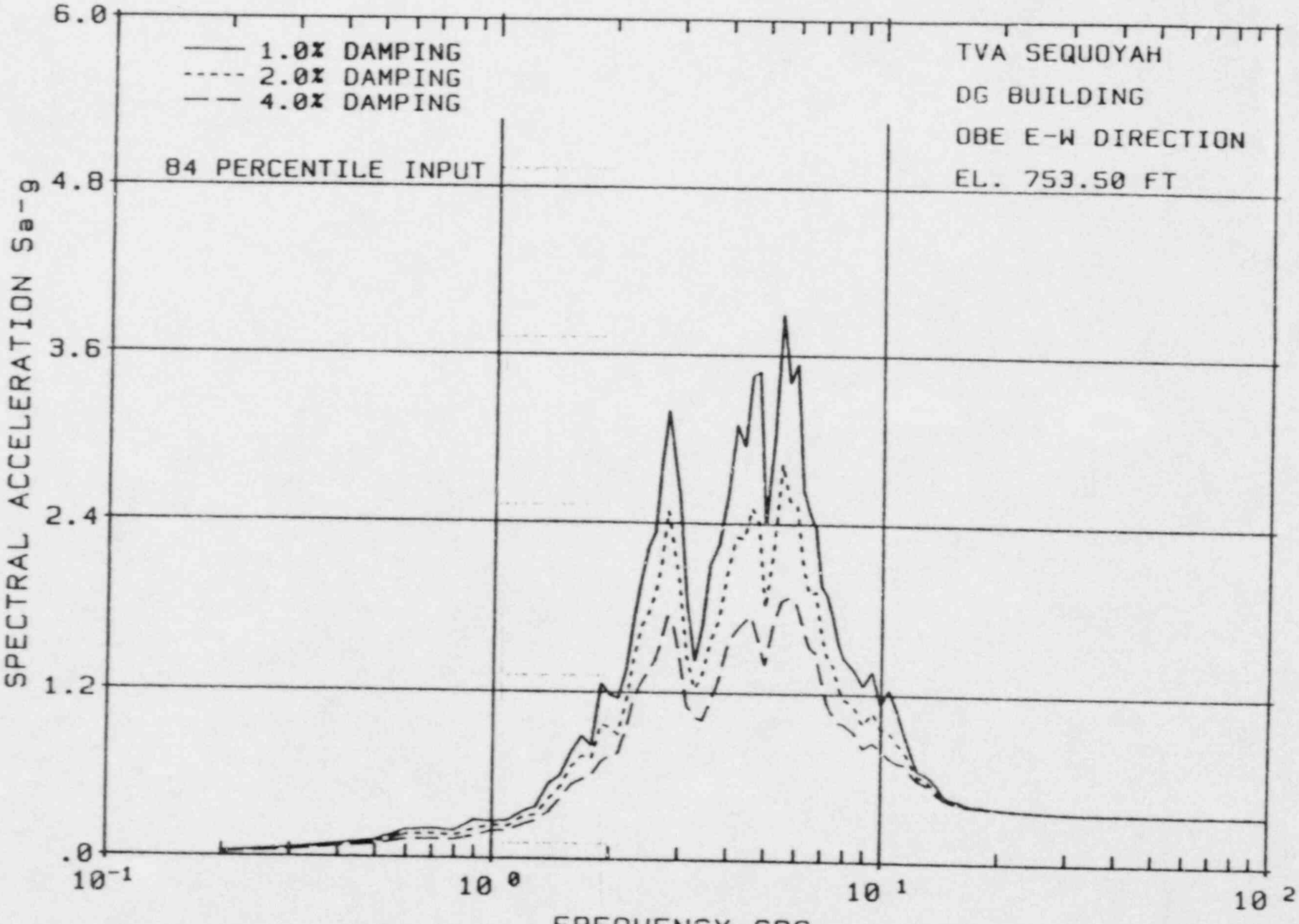

Figure A-6 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

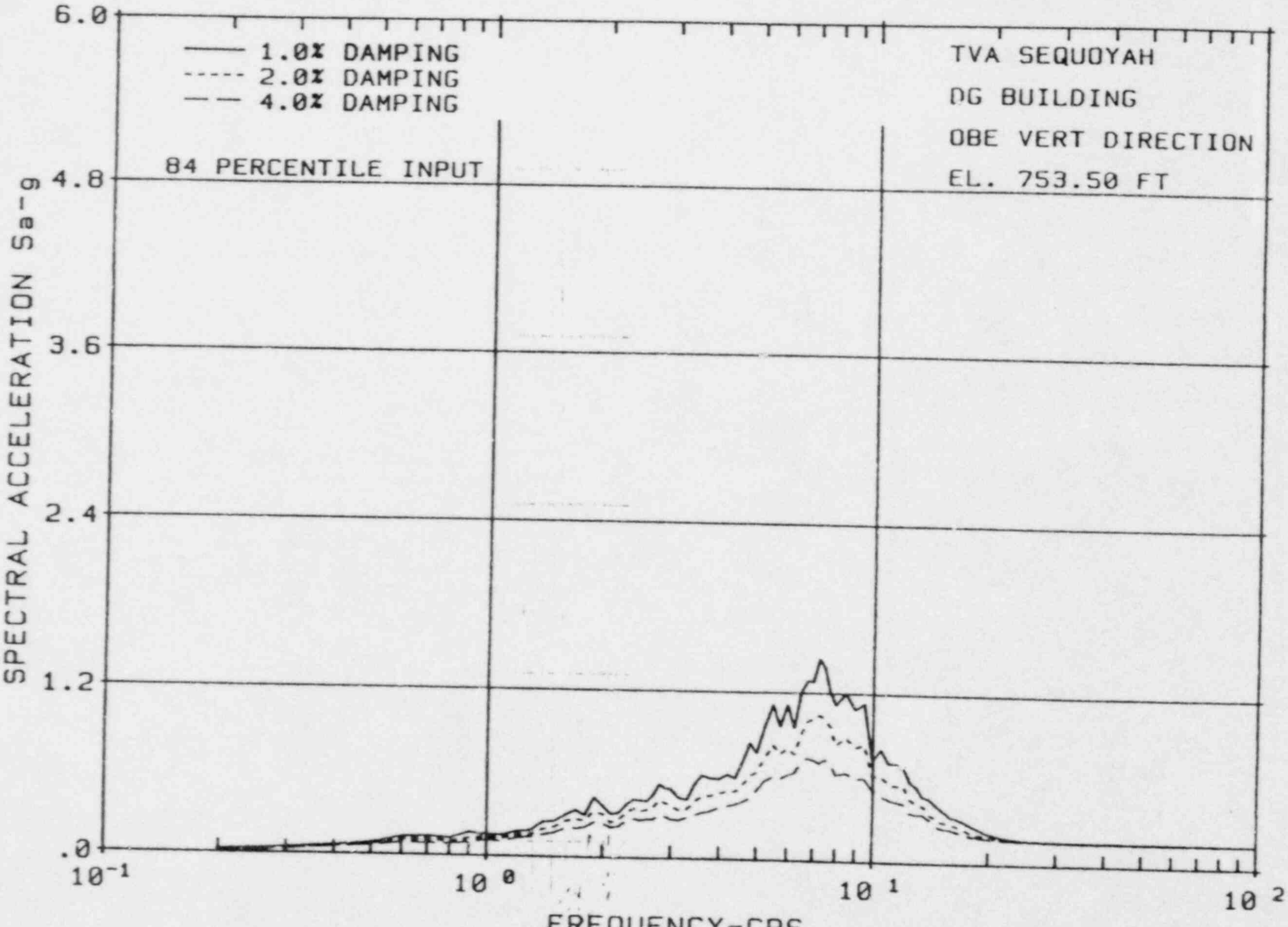

Figure A-7 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

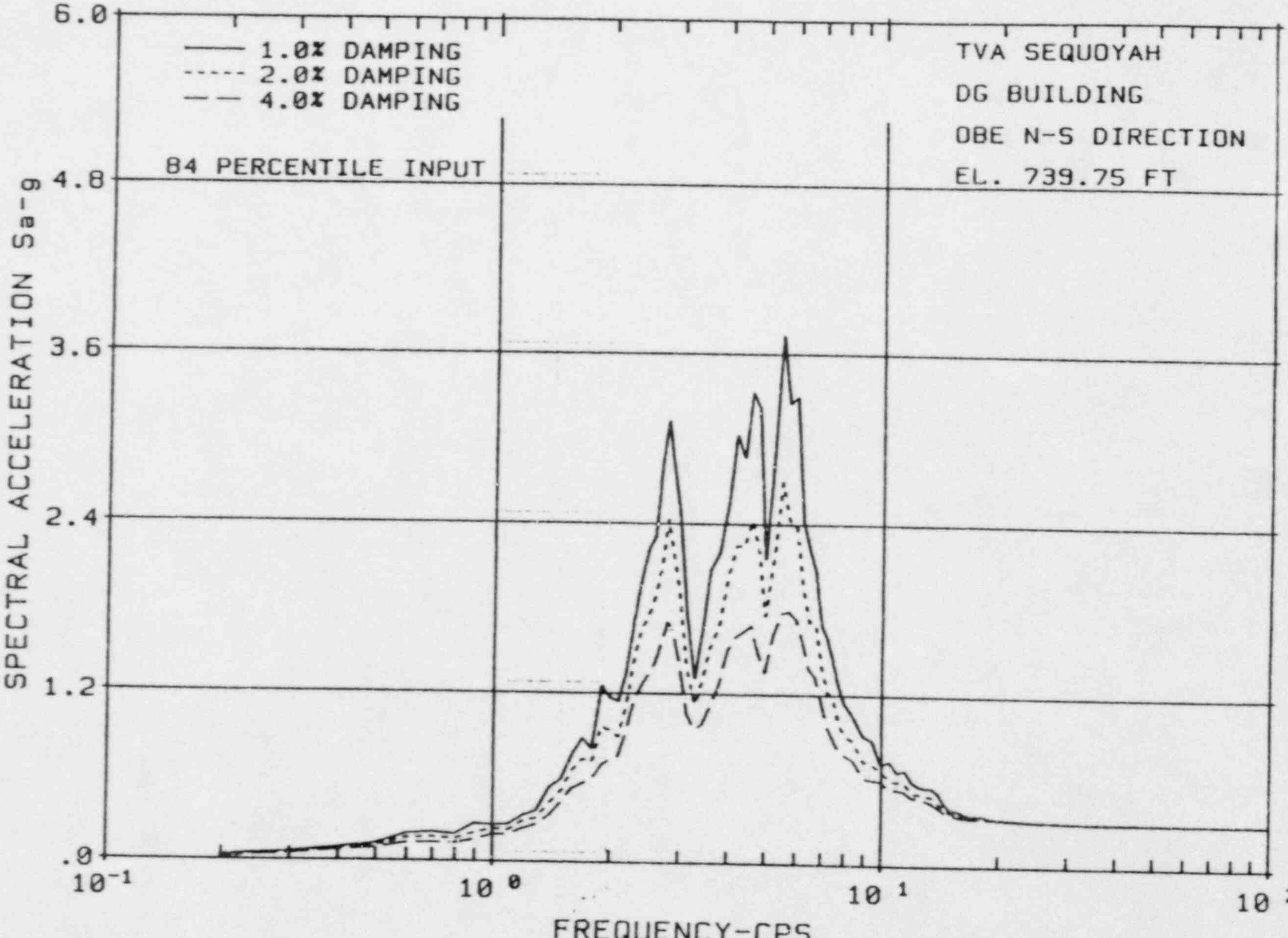

Figure A-8 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

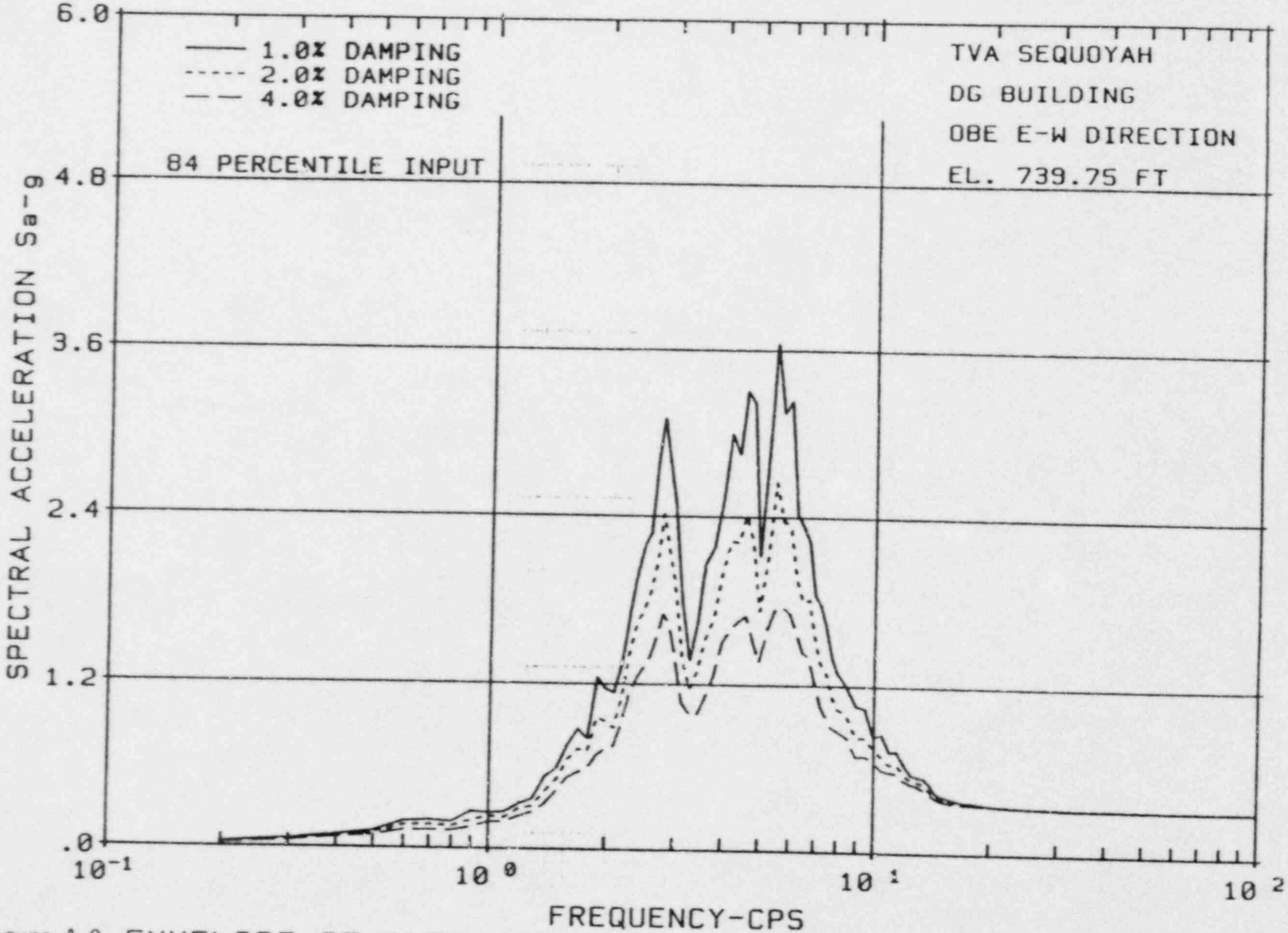

Figure A-9 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

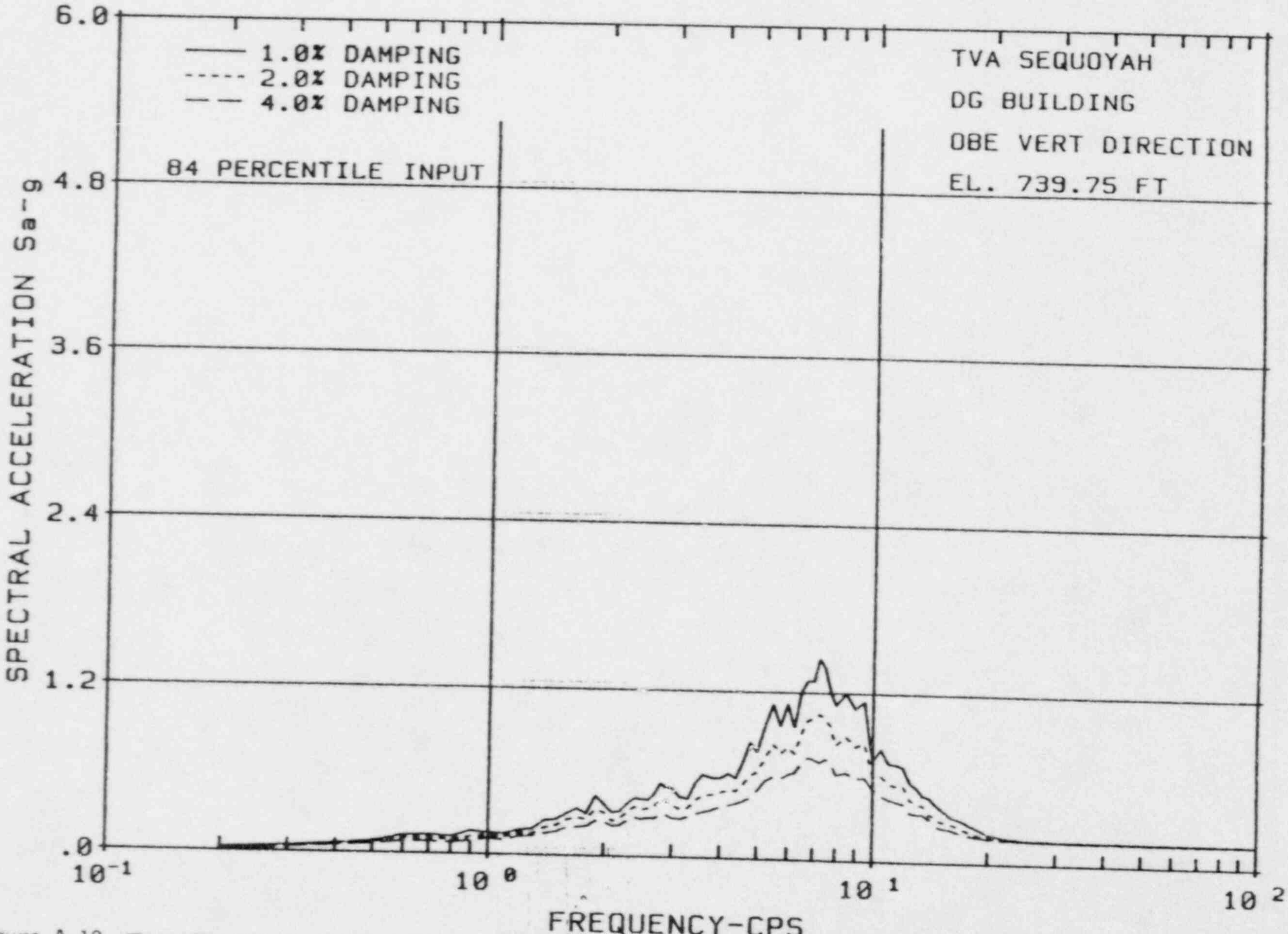

Figure A-10 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

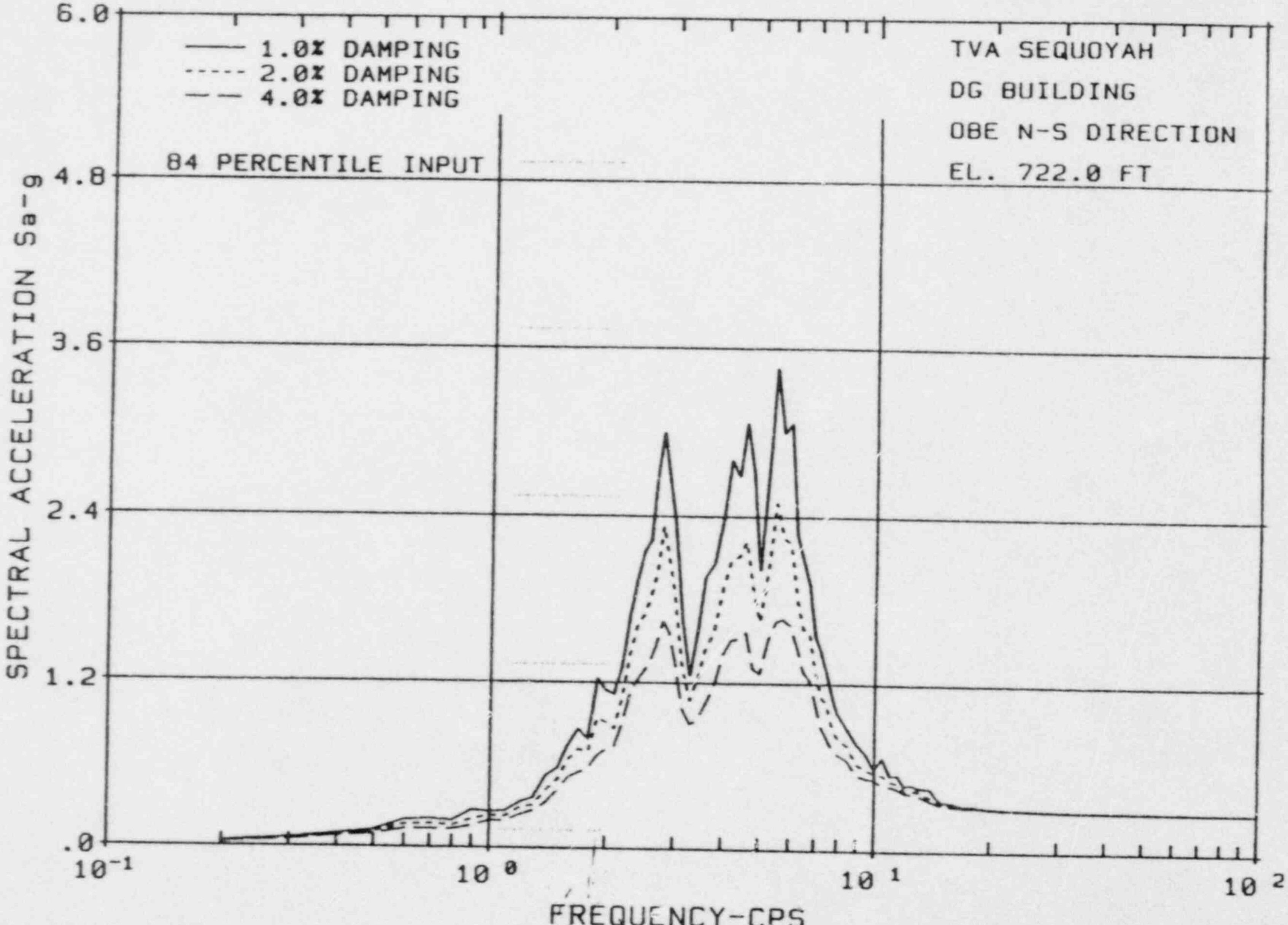

Figure A-11 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

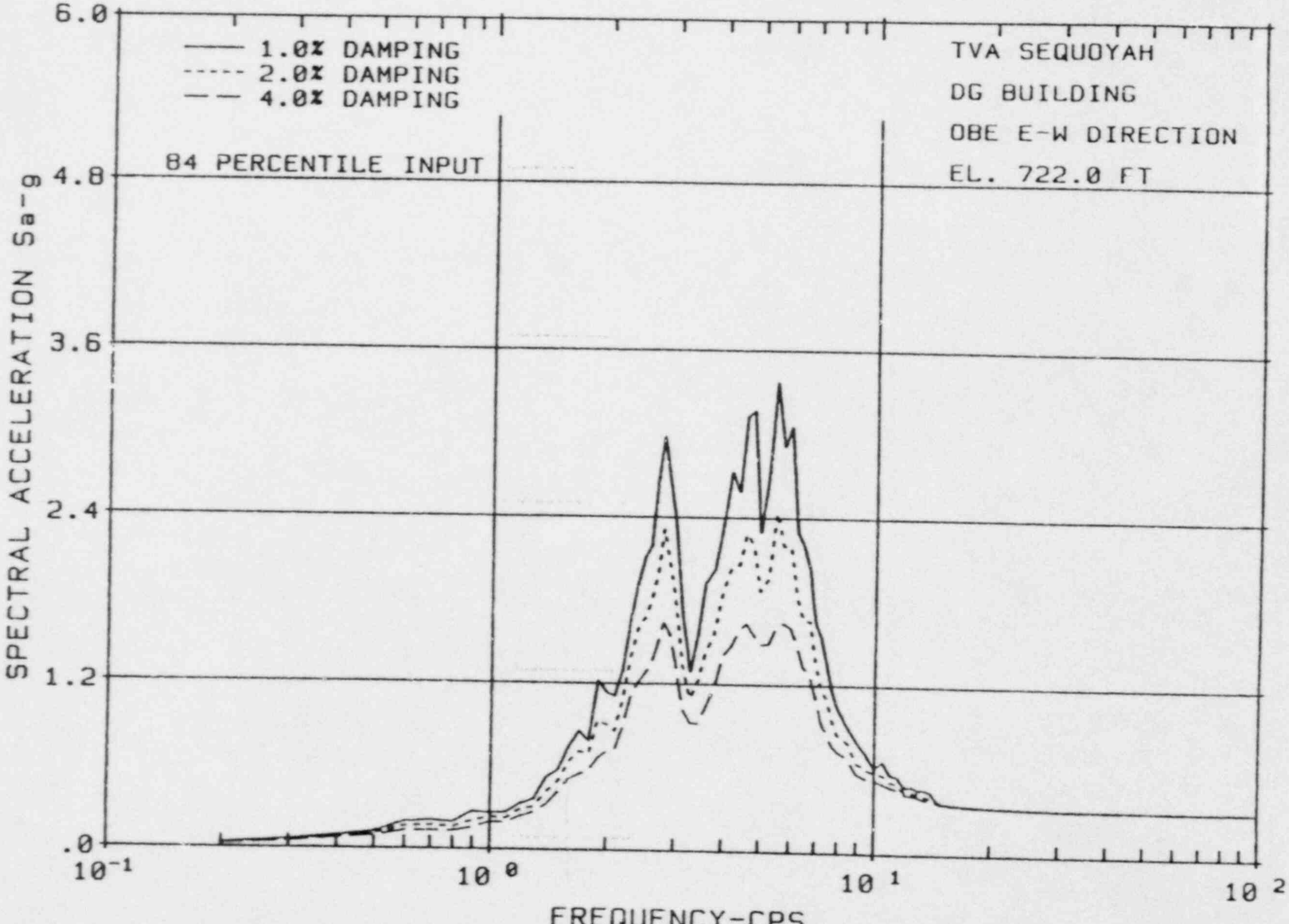

Figure A-12 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

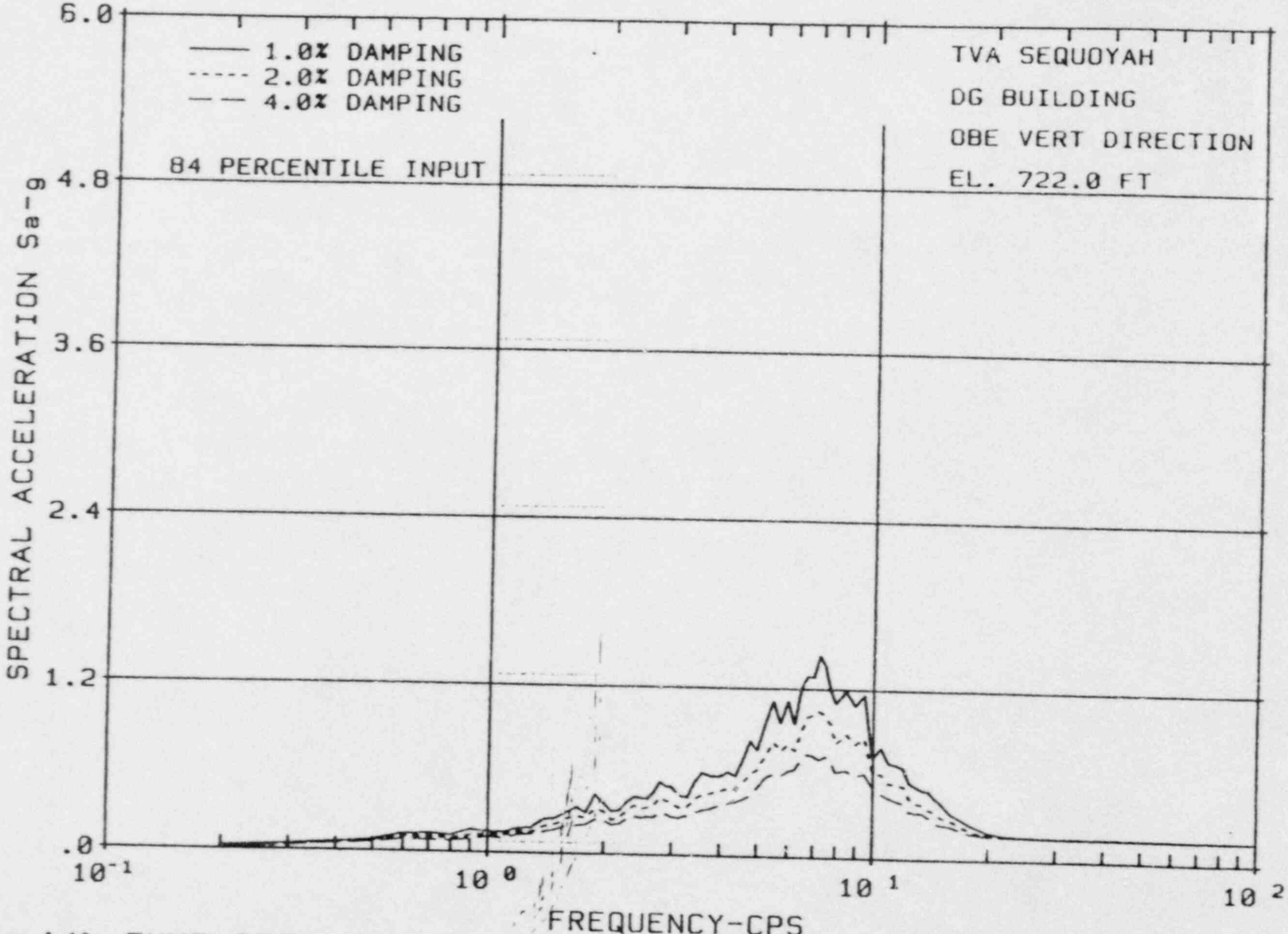

Figure A-13 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

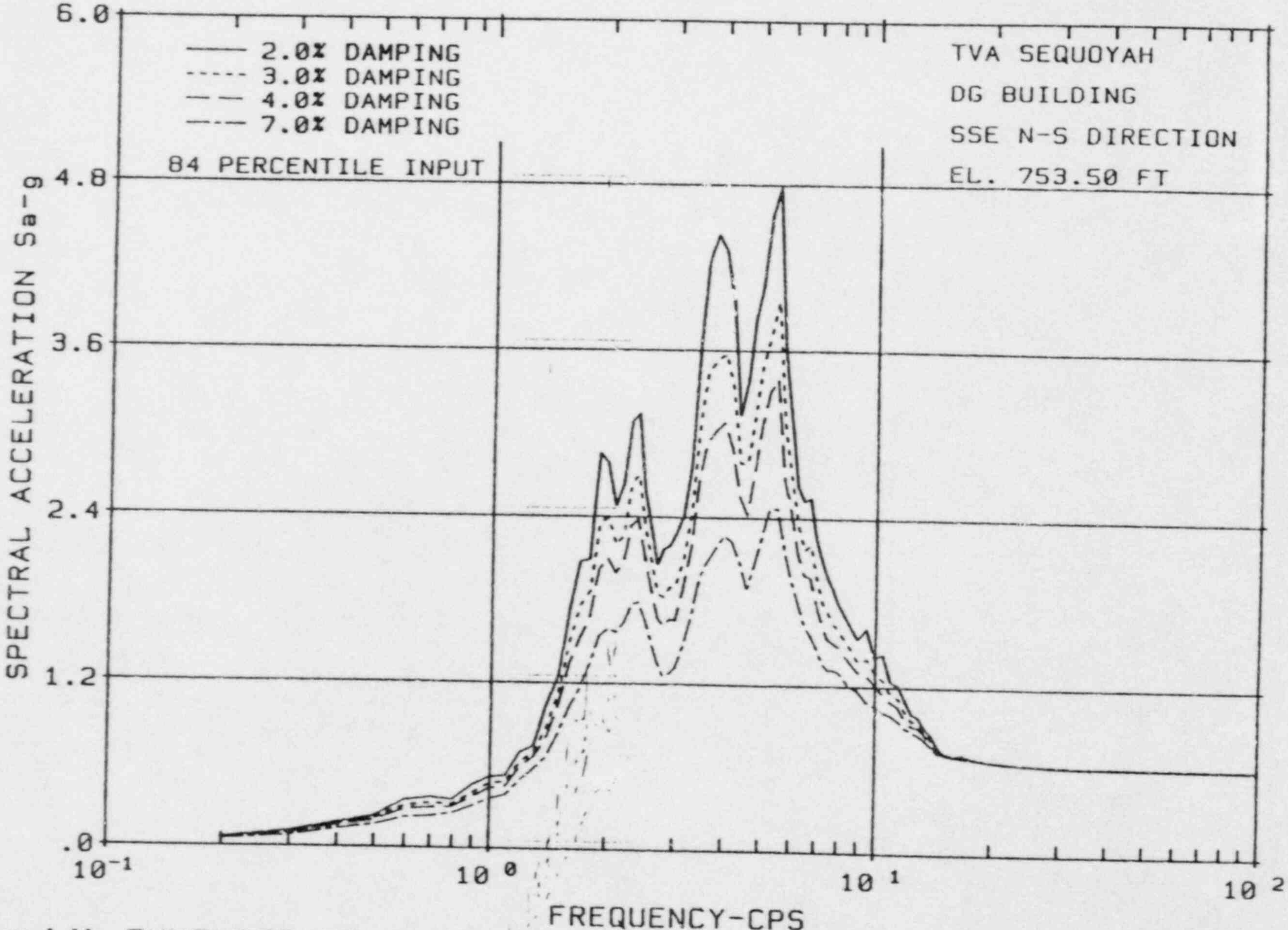

Figure A-14 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

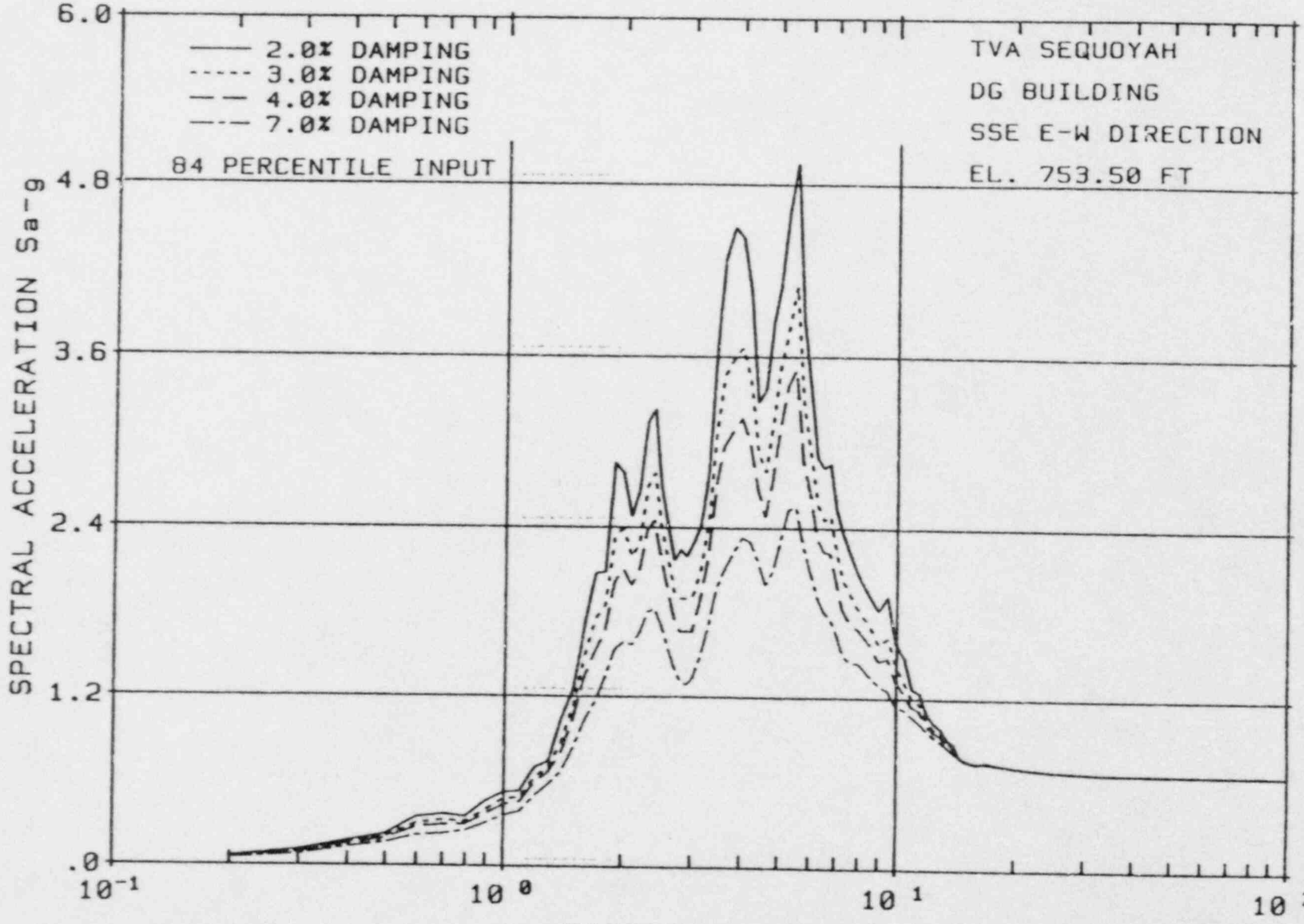

Figure A-15 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

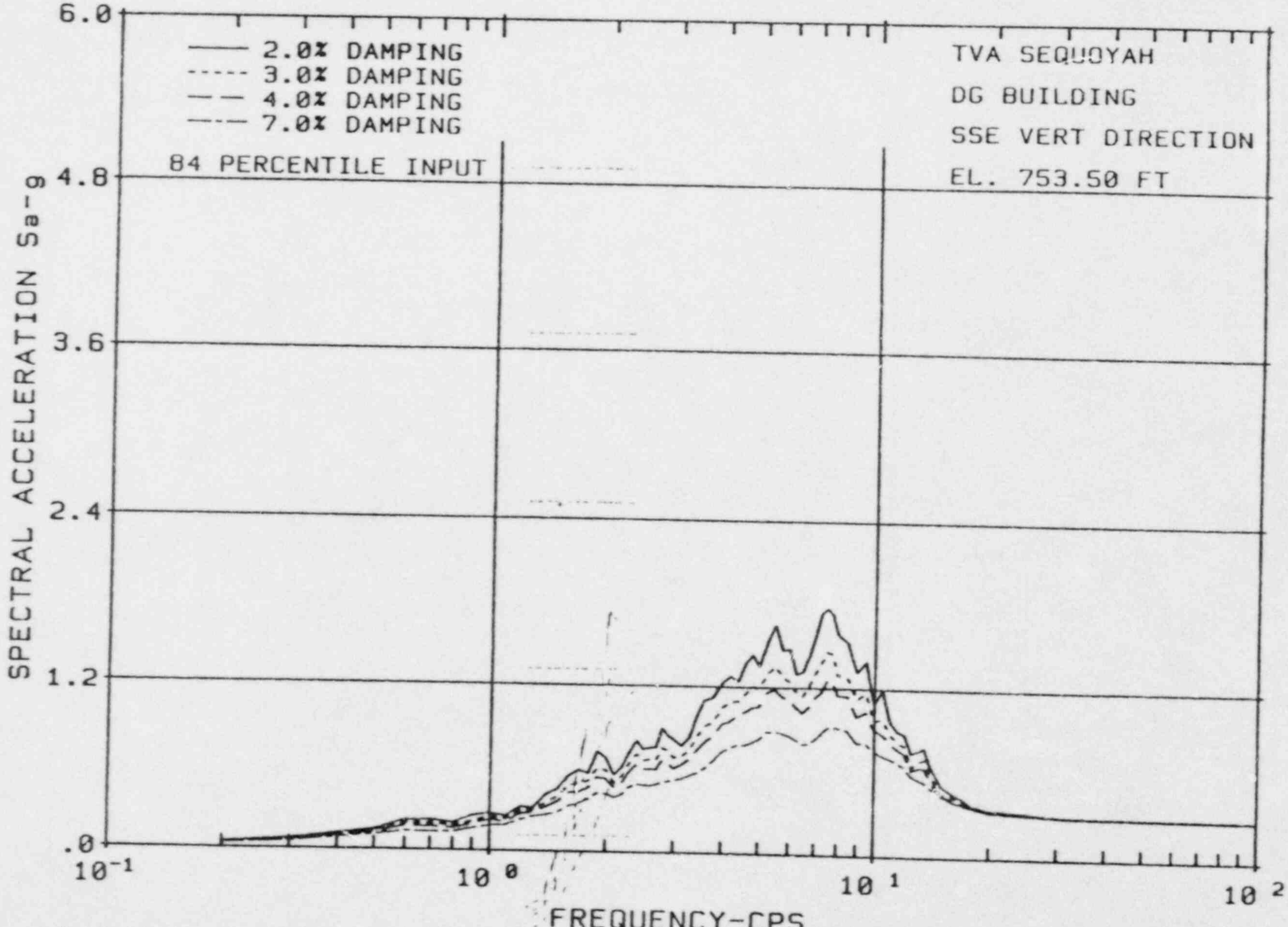

Figure A-16 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

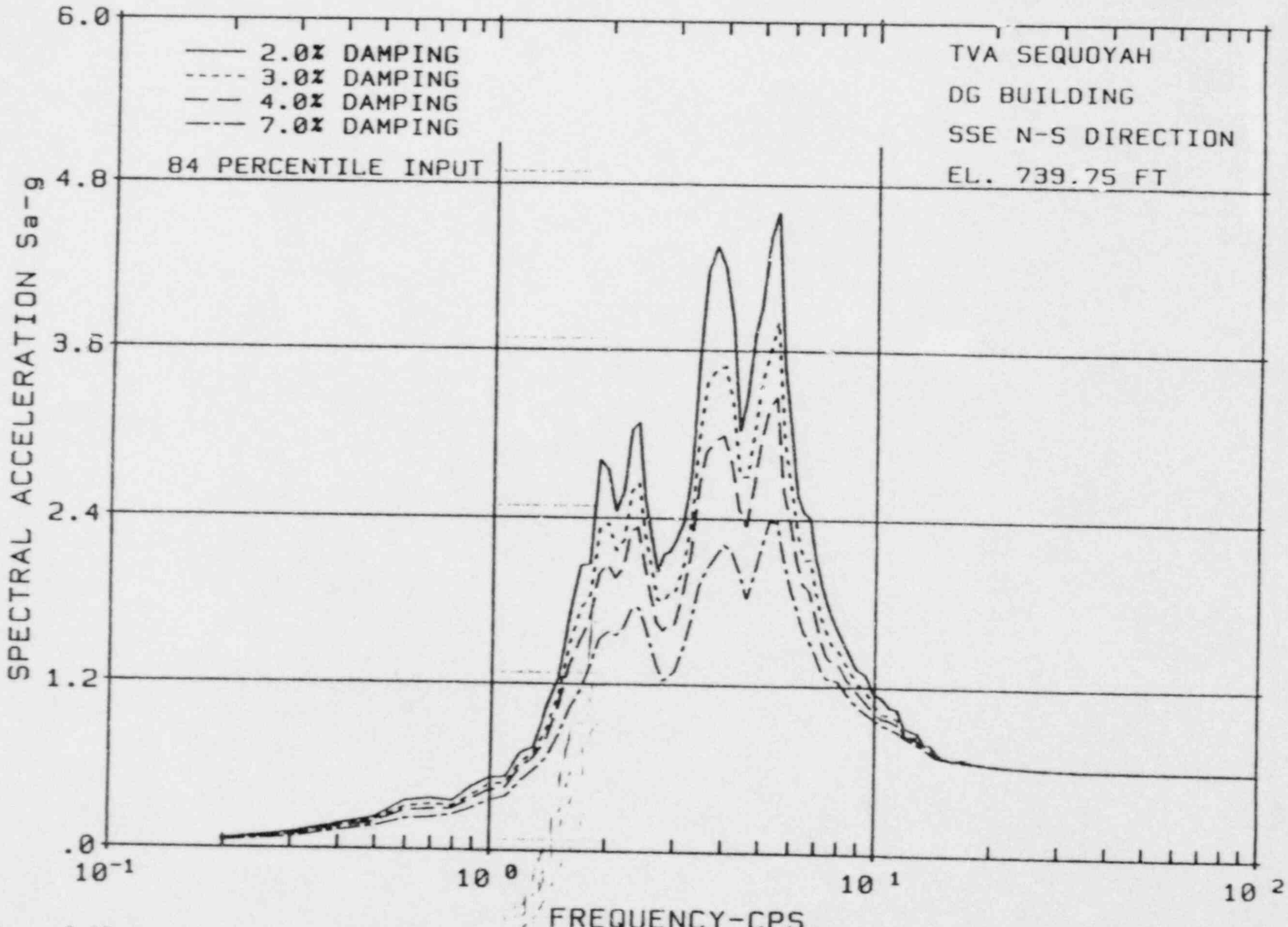

Figure A-17 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

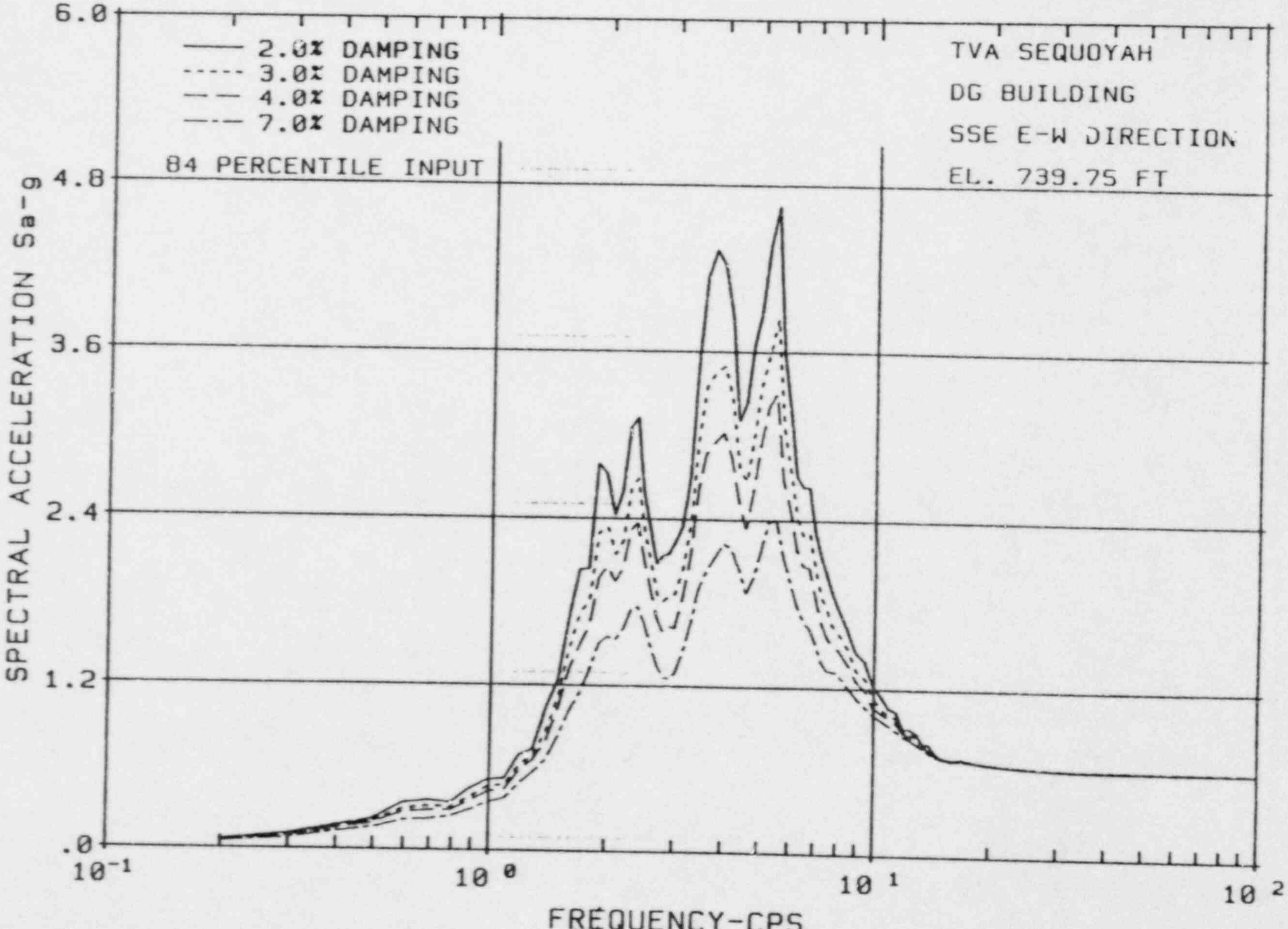

Figure A-18 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

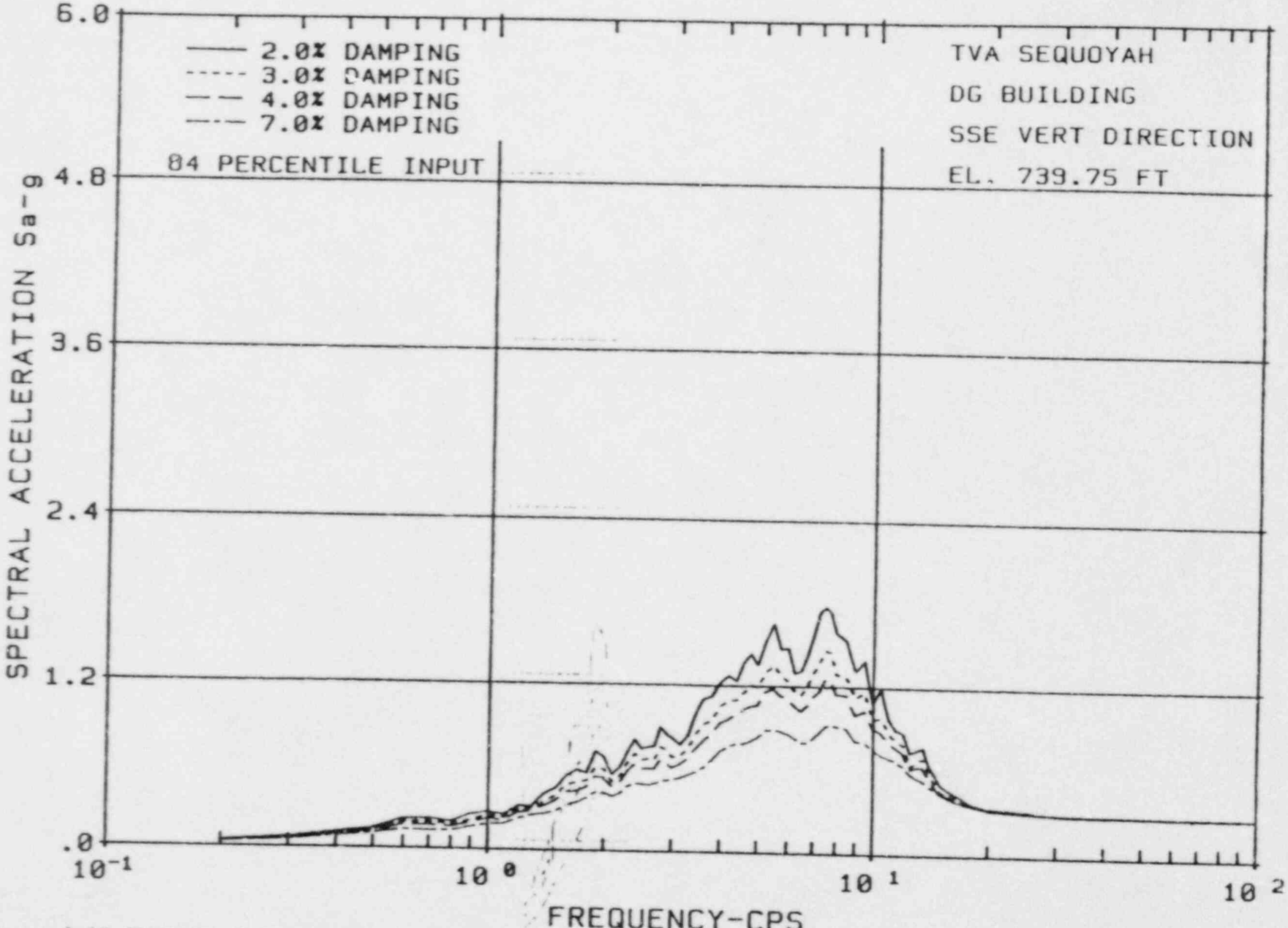

Figure A-19 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

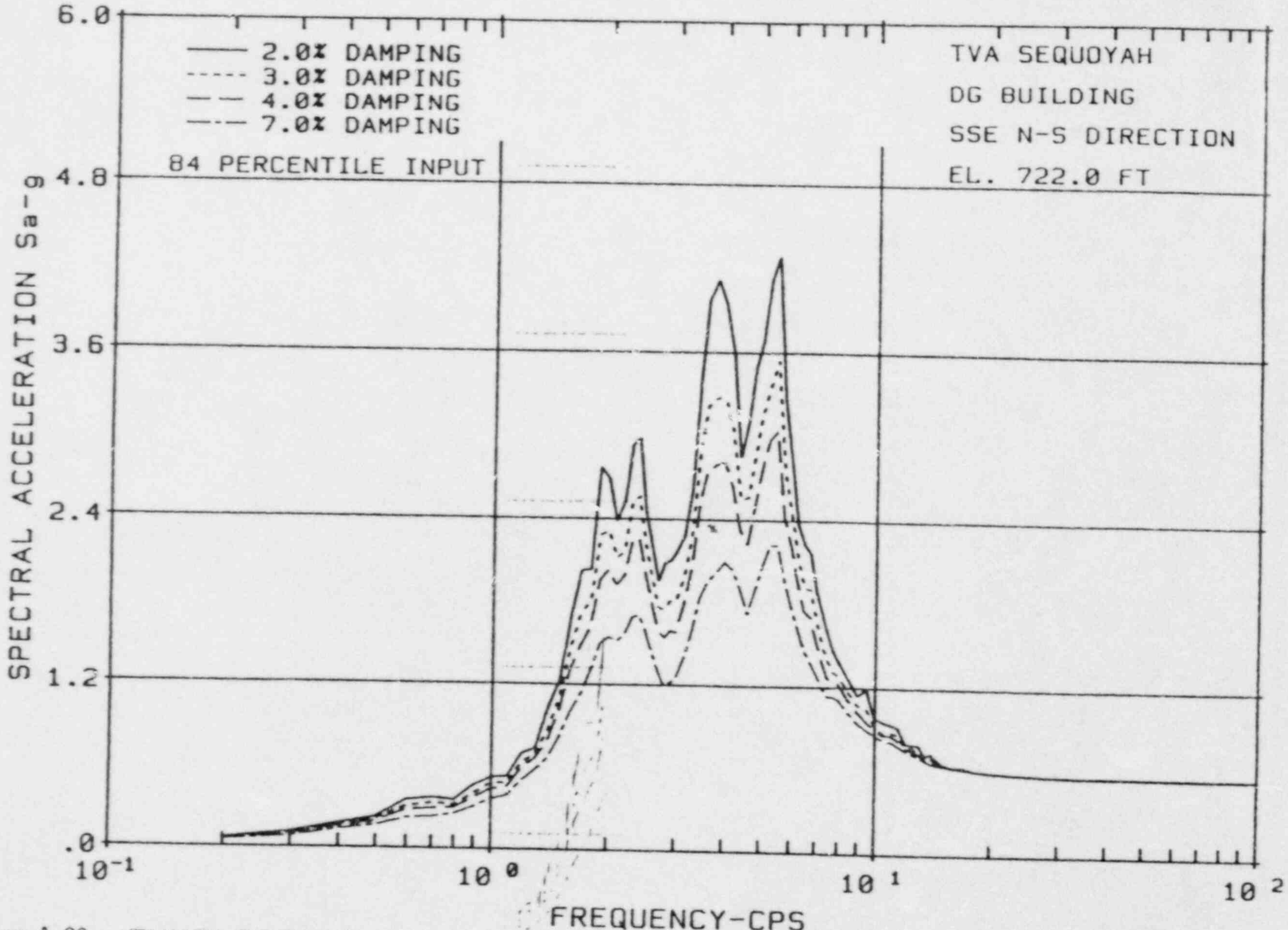

Figure A-20 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

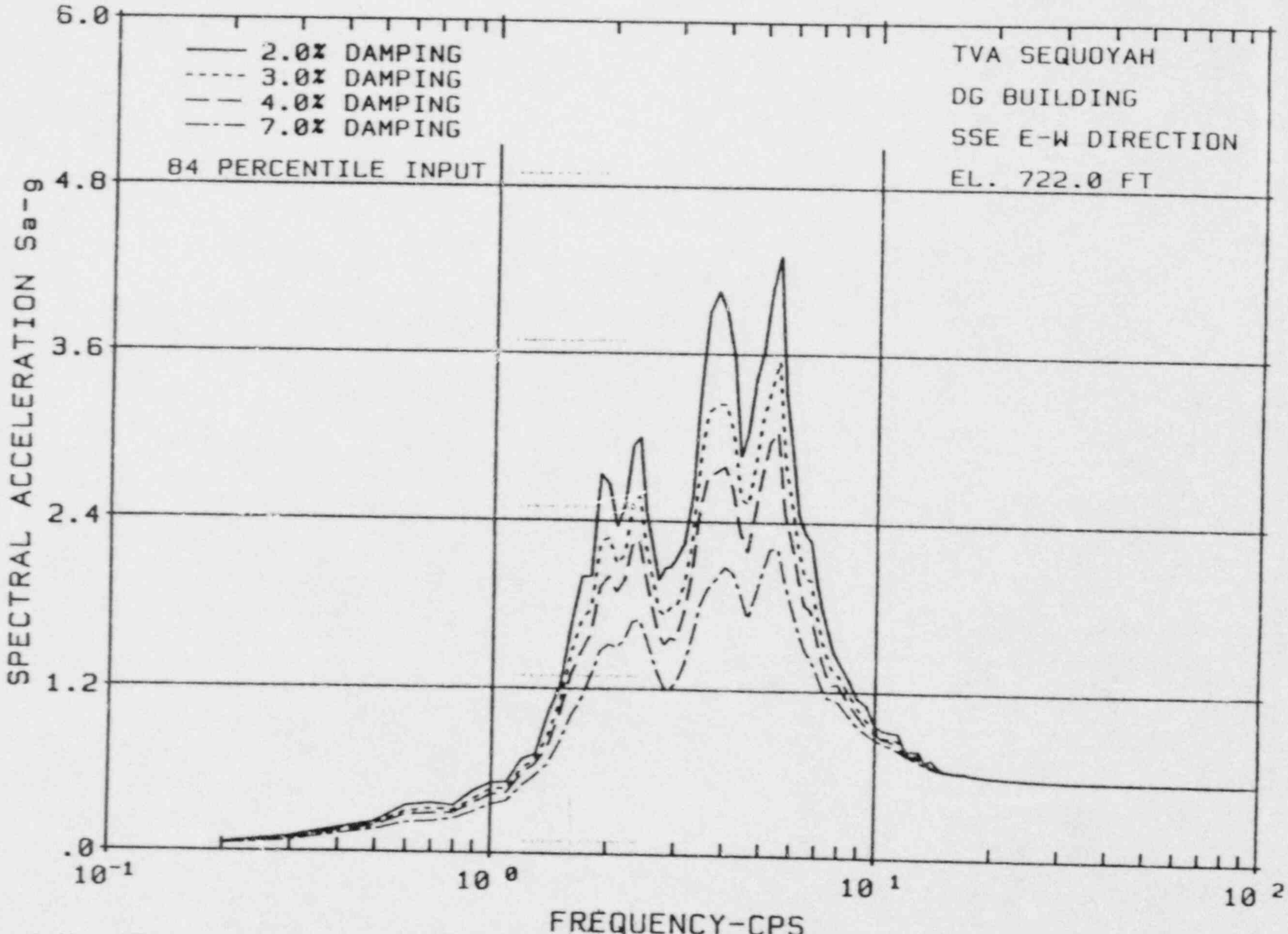

Figure A-21 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

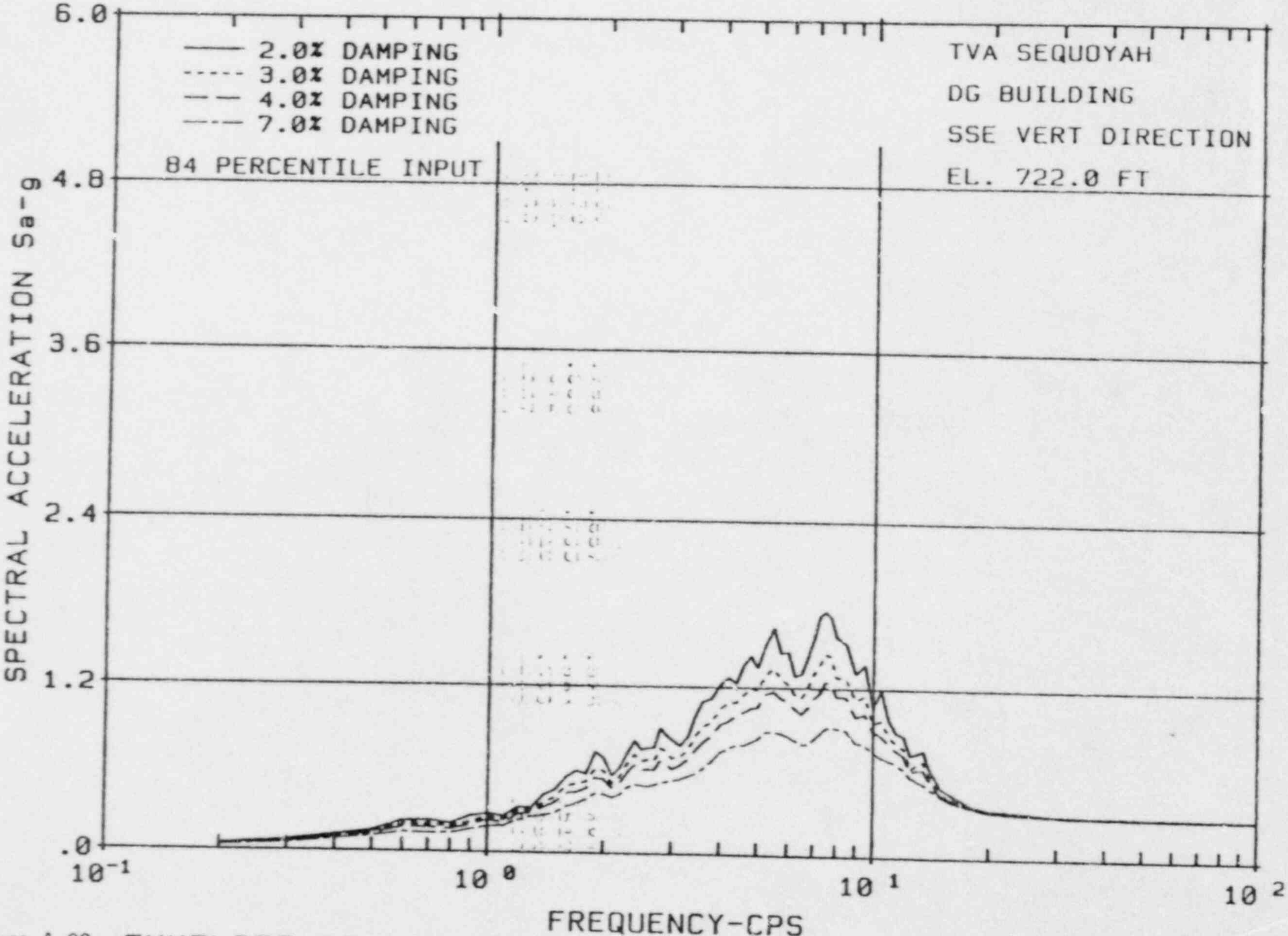

Figure A-22 ENVELOPE OF AVERAGED ARS STRAIN-DEP. OUTCROP INPUT

Table A-1

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
ROOF AT EL. 753.5 FT. N-S COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
.20	.035	.032	.027	.026
.30	.062	.054	.046	.043
.40	.094	.087	.076	.072
.50	.121	.108	.094	.088
.60	.195	.163	.130	.119
.70	.206	.170	.133	.122
.80	.192	.159	.132	.123
.90	.269	.205	.157	.146
1.00	.261	.233	.195	.181
1.10	.268	.228	.197	.187
1.20	.330	.291	.241	.226
1.30	.367	.312	.272	.259
1.40	.528	.422	.332	.308
1.50	.590	.507	.427	.398
1.60	.768	.657	.525	.481
1.70	.886	.735	.563	.517
1.80	.816	.718	.593	.554
1.90	1.267	.975	.695	.640
2.00	1.182	.945	.743	.680
2.10	1.159	.902	.764	.723
2.20	1.377	1.[illegible]34	.939	.874
2.30	1.750	1.467	1.161	1.052
2.40	2.033	1.685	1.275	1.136
2.50	2.250	1.776	1.354	1.208
2.60	2.347	1.914	1.440	1.285
2.70	2.856	2.122	1.582	1.408
2.80	3.178	2.472	1.741	1.532
2.90	2.843	2.206	1.663	1.481
3.00	2.538	1.967	1.467	1.335
3.15	1.781	1.401	1.082	1.023
3.30	1.347	1.152	.973	.907
3.45	1.709	1.347	1.017	.917
3.60	2.144	1.580	1.137	1.026
3.80	2.286	1.751	1.313	1.210
4.00	2.665	2.117	1.577	1.428
4.20	3.169	2.349	1.682	1.487
4.40	2.997	2.343	1.727	1.568
4.60	3.451	2.521	1.775	1.575
4.80	3.321	2.321	1.711	1.563
5.00	2.956	2.369	1.794	1.621
5.25	3.545	2.498	1.819	1.614

Table A-1 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
ROOF AT EL. 753.5 FT. N-S COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
5.50	3.903	2.821	1.858	1.613
5.75	3.432	2.568	1.871	1.663
6.00	3.462	2.493	1.806	1.622
6.25	2.486	2.017	1.628	1.482
6.50	2.195	1.721	1.412	1.293
6.75	2.039	1.695	1.337	1.220
7.00	1.716	1.416	1.161	1.078
7.25	1.684	1.274	.995	.934
7.50	1.561	1.234	.926	.855
7.75	1.395	1.111	.861	.807
8.00	1.264	1.021	.857	.798
8.50	1.201	.973	.806	.748
9.00	1.061	.847	.700	.664
9.50	1.140	.897	.717	.666
10.00	.910	.800	.694	.655
10.50	.991	.798	.666	.638
11.00	.853	.701	.620	.603
11.50	.817	.698	.622	.607
12.00	.728	.635	.561	.556
12.50	.638	.565	.528	.525
13.00	.638	.565	.520	.519
13.50	.612	.547	.501	.503
14.00	.572	.497	.458	.459
14.50	.503	.457	.450	.452
15.00	.441	.439	.437	.438
16.00	.437	.424	.424	.424
17.00	.416	.416	.416	.416
18.00	.410	.410	.410	.410
20.00	.401	.401	.402	.401
22.00	.395	.395	.396	.395
25.00	.389	.389	.390	.389
28.00	.385	.385	.386	.385
31.00	.383	.383	.383	.383
34.00	.380	.380	.381	.380
100.00	.375	.375	.375	.375

Table A-2

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
ROOF AT EL. 753.5 FT. E-W COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
.20	.035	.032	.027	.026
.30	.062	.054	.046	.043
.40	.094	.087	.076	.072
.50	.121	.108	.094	.088
.60	.195	.164	.130	.120
.70	.206	.170	.133	.122
.80	.192	.159	.132	.123
.90	.269	.206	.157	.146
1.00	.261	.233	.196	.182
1.10	.269	.228	.197	.187
1.20	.331	.292	.242	.227
1.30	.368	.313	.273	.259
1.40	.528	.423	.333	.309
1.50	.591	.508	.429	.399
1.60	.769	.657	.526	.482
1.70	.885	.735	.563	.519
1.80	.817	.719	.594	.555
1.90	1.267	.974	.693	.637
2.00	1.183	.945	.744	.681
2.10	1.159	.898	.759	.720
2.20	1.368	1.127	.933	.869
2.30	1.740	1.461	1.156	1.049
2.40	2.021	1.679	1.271	1.137
2.50	2.236	1.769	1.351	1.208
2.60	2.340	1.908	1.437	1.284
2.70	2.845	2.125	1.583	1.408
2.80	3.198	2.488	1.758	1.545
2.90	2.890	2.240	1.687	1.500
3.00	2.601	2.016	1.491	1.352
3.15	1.857	1.458	1.112	1.049
3.30	1.440	1.227	1.029	.952
3.45	1.694	1.335	1.005	.916
3.60	2.122	1.565	1.121	1.012
3.80	2.262	1.733	1.296	1.192
4.00	2.624	2.088	1.561	1.412
4.20	3.102	2.312	1.656	1.473
4.40	2.949	2.299	1.719	1.567
4.60	3.455	2.514	1.764	1.563
4.80	3.485	2.407	1.594	1.421
5.00	2.403	1.824	1.414	1.287
5.25	2.992	2.233	1.705	1.535

Table A-2 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
ROOF AT EL. 753.5 FT. E-W COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
5.50	3.897	2.825	1.869	1.624
5.75	3.411	2.566	1.898	1.688
6.00	3.544	2.543	1.857	1.667
6.25	2.638	2.125	1.696	1.542
6.50	2.485	1.918	1.540	1.409
6.75	2.374	1.938	1.506	1.361
7.00	1.983	1.637	1.308	1.215
7.25	1.909	1.459	1.133	1.048
7.50	1.760	1.411	1.055	.969
7.75	1.575	1.256	.998	.930
8.00	1.465	1.171	.988	.921
8.50	1.383	1.122	.935	.864
9.00	1.264	.982	.816	.778
9.50	1.371	1.079	.857	.800
10.00	1.136	.962	.807	.762
10.50	1.240	.942	.743	.710
11.00	1.102	.854	.709	.685
11.50	.935	.799	.695	.678
12.00	.780	.696	.631	.622
12.50	.648	.609	.578	.574
13.00	.631	.597	.561	.559
13.50	.598	.552	.526	.527
14.00	.552	.514	.487	.489
14.50	.487	.461	.457	.458
15.00	.459	.444	.438	.439
16.00	.439	.424	.413	.415
17.00	.410	.405	.402	.403
18.00	.406	.396	.397	.397
20.00	.389	.388	.388	.388
22.00	.380	.379	.379	.379
25.00	.371	.371	.370	.371
28.00	.366	.366	.365	.366
31.00	.362	.362	.362	.362
34.00	.360	.360	.359	.360
100.00	.353	.353	.353	.353

Table A-3

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
ROOF AT EL. 753.5 FT. VERTICAL COMPONENT

Frequency (cps)	Damping			
	1%	2%	4%	P411
.20	.024	.022	.019	.018
.30	.042	.036	.030	.029
.40	.061	.056	.049	.046
.50	.080	.072	.062	.059
.60	.125	.105	.084	.078
.70	.132	.108	.083	.076
.80	.119	.097	.079	.071
.90	.162	.123	.094	.087
1.00	.150	.132	.110	.102
1.10	.146	.122	.103	.098
1.20	.175	.153	.129	.122
1.30	.182	.151	.137	.132
1.40	.245	.194	.153	.143
1.50	.253	.212	.170	.155
1.60	.297	.254	.199	.180
1.70	.333	.271	.202	.183
1.80	.297	.258	.210	.195
1.90	.427	.330	.247	.225
2.00	.367	.308	.242	.223
2.10	.309	.248	.211	.199
2.20	.317	.268	.219	.204
2.30	.377	.318	.257	.235
2.40	.415	.353	.277	.251
2.50	.409	.333	.266	.244
2.60	.405	.345	.275	.251
2.70	.452	.359	.275	.254
2.80	.528	.420	.307	.276
2.90	.501	.396	.298	.270
3.00	.493	.378	.277	.256
3.15	.432	.343	.271	.251
3.30	.421	.354	.290	.268
3.45	.532	.411	.310	.281
3.60	.598	.444	.327	.294
3.80	.577	.455	.340	.311
4.00	.575	.473	.367	.339
4.20	.608	.490	.379	.349
4.40	.581	.498	.394	.367
4.60	.702	.538	.412	.378
4.80	.838	.603	.440	.401
5.00	.770	.629	.493	.452
5.25	.959	.733	.568	.517

Table A-3 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
ROOF AT EL. 753.5 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
5.50	1.113	.831	.595	.531
5.75	.960	.763	.581	.527
6.00	1.115	.810	.611	.557
6.25	.952	.765	.626	.583
6.50	1.204	.900	.695	.632
6.75	1.288	.999	.733	.654
7.00	1.286	1.017	.723	.646
7.25	1.450	1.045	.703	.625
7.50	1.384	[illegible]	.726	.643
7.75	1.213	.964	.707	.629
8.00	1.119	.831	.618	.568
8.50	1.201	.893	.633	.556
9.00	1.087	.819	.591	.528
9.50	1.133	.842	.598	.537
10.00	.731	.616	.516	.480
10.50	.810	.618	.472	.441
11.00	.711	.560	.447	.421
11.50	.705	.550	.432	.418
12.00	.688	.554	.419	.405
12.50	.579	.456	.354	.348
13.00	.540	.421	.344	.343
13.50	.472	.409	.345	.348
14.00	.461	.348	.314	.317
14.50	.422	.325	.279	.281
15.00	.389	.296	.249	.251
16.00	.328	.280	.239	.252
17.00	.307	.253	.214	.232
18.00	.271	.223	.196	.208
20.00	.214	.190	.179	.190
22.00	.186	.174	.173	.174
25.00	.171	.169	.169	.169
28.00	.167	.167	.167	.167
31.00	.165	.165	.165	.165
34.00	.164	.164	.164	.164
100.00	.161	.161	.161	.161

Table A-4

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
SECOND FLOOR AT EL. 739.75 FT. N-S COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
.20	.035	.032	.027	.026
.30	.062	.054	.046	.043
.40	.094	.086	.076	.072
.50	.121	.107	.093	.088
.60	.194	.163	.130	.119
.70	.206	.170	.133	.122
.80	.192	.159	.131	.122
.90	.268	.205	.156	.146
1.00	.261	.232	.194	.181
1.10	.267	.227	.195	.185
1.20	.329	.290	.240	.225
1.30	.365	.311	.270	.258
1.40	.525	.419	.330	.306
1.50	.586	.503	.423	.394
1.60	.761	.651	.520	.476
1.70	.878	.729	.558	.512
1.80	.808	.711	.587	.548
1.90	1.254	.965	.688	.634
2.00	1.169	.934	.734	.673
2.10	1.145	.892	.755	.714
2.20	1.360	1.120	.928	.864
2.30	1.727	1.448	1.146	1.039
2.40	2.006	1.662	1.257	1.119
2.50	2.216	1.749	1.333	1.190
2.60	2.310	1.884	1.417	1.264
2.70	2.810	2.086	1.557	1.386
2.80	3.122	2.429	1.711	1.505
2.90	2.788	2.166	1.632	1.454
3.00	2.486	1.926	1.440	1.310
3.15	1.743	1.372	1.060	1.004
3.30	1.313	1.124	.949	.887
3.45	1.661	1.306	.987	.890
3.60	2.074	1.525	1.105	.996
3.80	2.193	1.687	1.266	1.170
4.00	2.548	2.029	1.514	1.372
4.20	3.024	2.244	1.610	1.425
4.40	2.870	2.248	1.649	1.496
4.60	3.327	2.431	1.689	1.497
4.80	3.217	2.222	1.501	1.338
5.00	2.153	1.760	1.359	1.234
5.25	2.896	2.163	1.630	1.468

Table A-4 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
SECOND FLOOR AT EL. 739.75 FT. N-S COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
5.50	3.733	2.700	1.780	1.547
5.75	3.246	2.432	1.792	1.592
6.00	3.295	2.382	1.740	1.565
6.25	2.428	1.957	1.581	1.436
6.50	2.225	1.717	1.388	1.273
6.75	2.072	1.705	1.333	1.211
7.00	1.700	1.413	1.157	1.073
7.25	1.601	1.225	.985	.923
7.50	1.452	1.179	.904	.837
7.75	1.274	1.017	.817	.773
8.00	1.150	.930	.788	.737
8.50	1.045	.876	.742	.691
9.00	.919	.736	.620	.593
9.50	.887	.715	.605	.580
10.00	.718	.668	.598	.572
10.50	.740	.606	.543	.534
11.00	.661	.595	.543	.531
11.50	.678	.590	.532	.524
12.00	.599	.520	.492	.488
12.50	.567	.513	.484	.482
13.00	.556	.506	.472	.471
13.50	.553	.491	.454	.456
14.00	.524	.457	.427	.429
14.50	.457	.421	.395	.397
15.00	.410	.391	.377	.380
16.00	.392	.374	.357	.362
17.00	.364	.351	.349	.350
18.00	.367	.354	.348	.350
20.00	.340	.341	.340	.341
22.00	.334	.333	.334	.333
25.00	.328	.327	.327	.327
28.00	.324	.324	.324	.324
31.00	.321	.321	.321	.321
34.00	.319	.319	.319	.319
100.00	.314	.314	.314	.314

Table A-5

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
SECOND FLOOR AT EL. 739.75 FT. E-W COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
.20	.035	.032	.027	.026
.30	.062	.054	.046	.043
.40	.093	.086	.076	.072
.50	.121	.108	.093	.088
.60	.195	.163	.130	.119
.70	.206	.170	.132	.122
.80	.192	.159	.131	.122
.90	.268	.205	.156	.146
1.00	.261	.232	.194	.181
1.10	.267	.227	.195	.185
1.20	.329	.290	.240	.226
1.30	.365	.311	.270	.258
1.40	.524	.419	.329	.308
1.50	.585	.502	.423	.394
1.60	.760	.650	.519	.476
1.70	.876	.726	.556	.512
1.80	.806	.709	.586	.547
1.90	1.250	.960	.683	.629
2.00	1.165	.930	.731	.671
2.10	1.140	.884	.747	.708
2.20	1.345	1.108	.917	.854
2.30	1.708	1.434	1.134	1.028
2.40	1.983	1.646	1.246	1.112
2.50	2.190	1.731	1.322	1.180
2.60	2.286	1.866	1.403	1.253
2.70	2.775	2.070	1.545	1.374
2.80	3.108	2.418	1.709	1.503
2.90	2.796	2.171	1.635	1.454
3.00	2.512	1.946	1.444	1.311
3.15	1.788	1.404	1.072	1.013
3.30	1.378	1.171	.985	.912
3.45	1.654	1.301	.979	.878
3.60	2.065	1.521	1.093	.989
3.80	2.191	1.682	1.258	1.159
4.00	2.535	2.020	1.513	1.370
4.20	2.992	2.233	1.601	1.425
4.40	2.844	2.221	1.660	1.511
4.60	3.308	2.413	1.699	1.505
4.80	3.225	2.227	1.528	1.356
5.00	2.130	1.734	1.369	1.250
5.25	2.835	2.113	1.611	1.451

Table A-5 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
SECOND FLOOR AT EL. 739.75 FT. E-W COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
5.50	3.655	2.650	1.755	1.525
5.75	3.151	2.374	1.766	1.570
6.00	3.240	2.340	1.721	1.546
6.25	2.426	1.962	1.575	1.431
6.50	2.338	1.800	1.441	1.319
6.75	2.233	1.820	1.409	1.274
7.00	1.854	1.531	1.223	1.131
7.25	1.778	1.361	1.057	.977
7.50	1.615	1.295	.976	.897
7.75	1.420	1.133	.905	.846
8.00	1.304	1.040	.882	.824
8.50	1.196	.990	.835	.774
9.00	1.059	.832	.693	.667
9.50	1.040	.829	.696	.657
10.00	.845	.753	.660	.626
10.50	.858	.691	.600	.582
11.00	.731	.640	.584	.570
11.50	.735	.646	.579	.569
12.00	.644	.574	.529	.524
12.50	.571	.530	.505	.502
13.00	.554	.520	.492	.490
13.50	.546	.501	.465	.466
14.00	.506	.461	.437	.439
14.50	.441	.416	.406	.406
15.00	.418	.398	.387	.389
16.00	.399	.381	.369	.373
17.00	.376	.365	.362	.363
18.00	.374	.362	.359	.360
20.00	.353	.353	.352	.353
22.00	.346	.346	.345	.346
25.00	.339	.339	.338	.339
28.00	.335	.335	.334	.335
31.00	.332	.332	.331	.332
34.00	.330	.330	.329	.330
100.00	.324	.324	.324	.324

Table A-6

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
SECOND FLOOR AT EL. 739.75 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
.20	.024	.022	.019	.018
.30	.042	.036	.030	.029
.40	.061	.056	.049	.046
.50	.080	.072	.062	.059
.60	.125	.105	.084	.077
.70	.132	.108	.083	.076
.80	.119	.097	.079	.074
.90	.162	.123	.094	.087
1.00	.149	.132	.110	.102
1.10	.146	.122	.103	.098
1.20	.175	.153	.129	.122
1.30	.182	.151	.137	.132
1.40	.245	.194	.153	.143
1.50	.253	.212	.170	.155
1.60	.297	.254	.199	.180
1.70	.333	.271	.202	.183
1.80	.297	.258	.210	.194
1.90	.427	.330	.247	.225
2.00	.367	.308	.242	.223
2.10	.309	.248	.211	.199
2.20	.317	.268	.219	.204
2.30	.377	.318	.256	.235
2.40	.415	.353	.276	.251
2.50	.409	.333	.266	.244
2.60	.404	.345	.275	.251
2.70	.451	.358	.274	.253
2.80	.527	.420	.306	.275
2.90	.498	.395	.298	.268
3.00	.492	.377	.276	.256
3.15	.431	.342	.271	.250
3.30	.420	.353	.289	.267
3.45	.532	.410	.309	.280
3.60	.597	.443	.326	.293
3.80	.575	.454	.340	.311
4.00	.574	.472	.367	.338
4.20	.607	.489	.378	.348
4.40	.579	.487	.393	.366
4.60	.700	.537	.412	.377
4.80	.835	.601	.439	.400
5.00	.768	.627	.492	.452
5.25	.958	.732	.567	.516

Table A-6 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
SECOND FLOOR AT EL. 739.75 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
5.50	1.112	.830	.593	.530
5.75	.959	.762	.580	.526
6.00	1.115	.811	.612	.557
6.25	.952	.765	.626	.583
6.50	1.206	.901	.695	.633
6.75	1.290	1.000	.734	.655
7.00	1.287	1.018	.724	.646
7.25	1.449	1.045	.700	.625
7.50	1.382	1.018	.725	.642
7.75	1.210	.962	.706	.627
8.00	1.113	.828	.616	.567
8.50	1.200	.893	.632	.556
9.00	1.088	.820	.591	.528
9.50	1.142	.848	.600	.538
10.00	.725	.617	.517	.481
10.50	.804	.615	.471	.440
11.00	.702	.556	.444	.419
11.50	.696	.544	.428	.412
12.00	.677	.546	.414	.400
12.50	.567	.449	.351	.343
13.00	.532	.416	.341	.339
13.50	.476	.405	.341	.343
14.00	.464	.344	.311	.314
14.50	.421	.325	.276	.278
15.00	.387	.294	.247	.249
16.00	.324	.278	.236	.249
17.00	.301	.249	.211	.228
18.00	.265	.217	.195	.204
20.00	.208	.185	.178	.185
22.00	.184	.172	.172	.172
25.00	.169	.169	.169	.169
28.00	.167	.167	.167	.167
31.00	.165	.165	.165	.165
34.00	.164	.164	.164	.164
100.00	.161	.161	.161	.161

Table A-7

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
BASE SLAB AT EL. 722.0 FT. N-S COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
.20	.035	.032	.027	[illegible]
.30	.062	.054	.046	.043
.40	.093	.086	.076	.071
.50	.121	.107	.093	.088
.60	.194	.163	.130	.119
.70	.206	.169	.132	.121
.80	.191	.158	.130	.122
.90	.267	.204	.155	.145
1.00	.259	.230	.193	.179
1.10	.265	.225	.193	.183
1.20	.327	.288	.238	.223
1.30	.361	.308	.268	.254
1.40	.520	.415	.325	.302
1.50	.578	.494	.417	.388
1.60	.750	.641	.512	.469
1.70	.864	.717	.548	.503
1.80	.794	.698	.576	.538
1.90	1.230	.946	.673	.620
2.00	1.144	.913	.717	.658
2.10	1.119	.870	.735	.696
2.20	1.324	1.090	.903	.841
2.30	1.680	1.408	1.114	1.010
2.40	1.946	1.613	1.220	1.087
2.50	2.144	1.691	1.289	1.150
2.60	2.227	1.819	1.367	1.218
2.70	2.699	2.008	1.499	1.336
2.80	2.996	2.331	1.646	1.448
2.90	2.671	2.079	1.568	1.397
3.00	2.380	1.842	1.381	1.258
3.15	1.667	1.316	1.017	.965
3.30	1.258	1.077	.907	.852
3.45	1.576	1.238	.937	.844
3.60	1.963	1.440	1.043	.944
3.80	2.062	1.574	1.173	1.086
4.00	2.372	1.886	1.409	1.273
4.20	2.803	2.089	1.514	1.339
4.40	2.689	2.114	1.525	1.391
4.60	3.066	2.225	1.574	1.400
4.80	2.727	1.883	1.310	1.200
5.00	2.018	1.651	1.274	1.157
5.25	2.706	2.019	1.522	1.371

Table A-7 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
BASE SLAB AT EL. 722.0 FT. N-S COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
5.50	3.461	2.504	1.651	1.432
5.75	2.998	2.252	1.666	1.482
6.00	3.064	2.211	1.619	1.457
6.25	2.266	1.817	1.472	1.338
6.50	2.083	1.596	1.293	1.187
6.75	1.915	1.575	1.232	1.120
7.00	1.555	1.298	1.069	.993
7.25	1.442	1.112	.900	.843
7.50	1.292	1.055	.819	.761
7.75	1.121	.903	.736	.702
8.00	.999	.820	.699	.665
8.50	.887	.763	.656	.613
9.00	.777	.629	.547	.529
9.50	.707	.591	.528	.513
10.00	.599	.567	.516	.496
10.50	.677	.552	.476	.471
11.00	.549	.508	.470	.461
11.50	.553	.495	.455	.448
12.00	.476	.440	.425	.424
12.50	.484	.443	.419	.416
13.00	.465	.438	.409	.408
13.50	.458	.410	.390	.391
14.00	.457	.397	.368	.369
14.50	.401	.368	.352	.355
15.00	.361	.350	.339	.342
16.00	.354	.340	.328	.332
17.00	.332	.324	.324	.324
18.00	.333	.326	.321	.324
20.00	.313	.313	.314	.313
22.00	.308	.308	.308	.308
25.00	.303	.303	.303	.303
28.00	.299	.299	.299	.299
31.00	.298	.297	.297	.297
34.00	.296	.296	.296	.296
100.00	.292	.292	.292	.292

Table A-8

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
BASE SLAB AT EL. 722.0 FT. E-W COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
.20	.035	.032	.027	.026
.30	.062	.054	.046	.043
.40	.093	.086	.075	.071
.50	.121	.107	.093	.088
.60	.194	.163	.130	.119
.70	.205	.169	.132	.121
.80	.191	.158	.130	.121
.90	.267	.204	.155	.145
1.00	.259	.230	.193	.179
1.10	.264	.224	.193	.183
1.20	.326	.288	.238	.223
1.30	.361	.307	.267	.254
1.40	.518	.414	.324	.301
1.50	.576	.492	.415	.386
1.60	.746	.637	.509	.466
1.70	.859	.713	.544	.500
1.80	.789	.694	.573	.536
1.90	1.223	.940	.668	.615
2.00	1.137	.906	.713	.655
2.10	1.109	.861	.727	.688
2.20	1.308	1.077	.891	.830
2.30	1.657	1.390	1.100	.997
2.40	1.920	1.593	1.205	1.075
2.50	2.114	1.669	1.273	1.136
2.60	2.197	1.797	1.349	1.205
2.70	2.666	1.989	1.487	1.324
2.80	2.981	2.319	1.640	1.442
2.90	2.674	2.079	1.565	1.393
3.00	2.393	1.853	1.381	1.255
3.15	1.696	1.334	1.021	.966
3.30	1.294	1.099	.924	.859
3.45	1.556	1.222	.919	.821
3.60	1.929	1.425	1.024	.922
3.80	2.031	1.568	1.174	1.081
4.00	2.350	1.874	1.411	1.280
4.20	2.731	2.045	1.477	1.339
4.40	2.591	2.065	1.587	1.447
4.60	3.124	2.292	1.641	1.451
4.80	3.170	2.206	1.559	1.397
5.00	2.299	1.878	1.492	1.366
5.25	2.721	1.969	1.495	1.346

Table A-8 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
BASE SLAB AT EL. 722.0 FT. E-W COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
5.50	3.373	2.446	1.615	1.403
5.75	2.916	2.203	1.646	1.465
6.00	3.059	2.204	1.611	1.449
6.25	2.302	1.836	1.478	1.344
6.50	2.204	1.666	1.329	1.216
6.75	2.042	1.665	1.293	1.169
7.00	1.653	1.374	1.117	1.035
7.25	1.541	1.185	.943	.879
7.50	1.361	1.105	.853	.790
7.75	1.160	.952	.775	.733
8.00	1.045	.855	.732	.693
8.50	.914	.803	.688	.645
9.00	.809	.652	.572	.550
9.50	.718	.610	.541	.525
10.00	.621	.583	.529	.508
10.50	.671	.571	.505	.489
11.00	.572	.520	.482	.473
11.50	.557	.508	.468	.462
12.00	.487	.451	.434	.431
12.50	.488	.451	.427	.425
13.00	.467	.443	.418	.417
13.50	.467	.423	.398	.399
14.00	.449	.408	.392	.393
14.50	.397	.383	.380	.381
15.00	.369	.369	.369	.369
16.00	.360	.360	.360	.360
17.00	.355	.354	.354	.354
18.00	.351	.350	.350	.350
20.00	.345	.345	.344	.345
22.00	.341	.341	.341	.341
25.00	.336	.337	.336	.337
28.00	.334	.334	.334	.334
31.00	.332	.331	.332	.331
34.00	.330	.330	.330	.330
100.00	.326	.326	.326	.326

Table A-9

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
BASE SLAB AT EL. 722.0 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
.20	.024	.022	.019	.018
.30	.042	.036	.030	.029
.40	.061	.056	.049	.046
.50	.080	.072	.062	.059
.60	.125	.105	.084	.077
.70	.132	.108	.083	.076
.80	.119	.097	.079	.074
.90	.162	.123	.094	.087
1.00	.149	.132	.110	.102
1.10	.146	.122	.103	.098
1.20	.175	.153	.129	.122
1.30	.182	.151	.137	.131
1.40	.244	.194	.153	.143
1.50	.253	.211	.170	.155
1.60	.297	.253	.199	.179
1.70	.333	.271	.201	.183
1.80	.296	.258	.210	.194
1.90	.426	.329	.246	.225
2.00	.367	.307	.242	.223
2.10	.308	.247	.211	.198
2.20	.316	.267	.217	.204
2.30	.376	.317	.256	.234
2.40	.413	.352	.275	.250
2.50	.407	.332	.265	.242
2.60	.402	.344	.274	.250
2.70	.449	.356	.273	.252
2.80	.524	.417	.304	.274
2.90	.495	.393	.296	.267
3.00	.489	.375	.275	.254
3.15	.429	.341	.268	.249
3.30	.418	.352	.288	.266
3.45	.529	.408	.307	.279
3.60	.594	.441	.325	.292
3.80	.572	.452	.339	.309
4.00	.570	.469	.364	.336
4.20	.603	.486	.376	.347
4.40	.575	.484	.391	.364
4.60	.695	.533	.409	.375
4.80	.828	.596	.436	.396
5.00	.764	.623	.490	.450
5.25	.953	.727	.564	.514

Table A-9 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC OBE
BASE SLAB AT EL. 722.0 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 1%	2%	4%	N411
5.50	1.110	.827	.591	.528
5.75	.957	.760	.579	.524
6.00	1.112	.810	.612	.558
6.25	.953	.765	.626	.583
6.50	1.208	.904	.696	.633
6.75	1.295	1.004	.736	.655
7.00	1.291	1.020	.725	.647
7.25	1.449	1.044	.700	.625
7.50	1.376	1.014	.722	.639
7.75	1.202	.956	.701	.624
8.00	1.101	.819	.612	.564
8.50	1.189	.890	.626	.552
9.00	1.085	.819	.590	.526
9.50	1.164	.861	.605	.541
10.00	.721	.618	.518	.482
10.50	.794	.607	.468	.438
11.00	.686	.543	.438	.413
11.50	.673	.530	.417	.402
12.00	.651	.526	.402	.388
12.50	.543	.430	.340	.334
13.00	.517	.401	.332	.330
13.50	.495	.391	.332	.334
14.00	.489	.359	.302	.304
14.50	.441	.338	.267	.270
15.00	.410	.309	.249	.259
16.00	.329	.282	.239	.253
17.00	.290	.244	.209	.225
18.00	.250	.209	.188	.196
20.00	.198	.177	.174	.177
22.00	.176	.171	.171	.171
25.00	.168	.168	.168	.168
28.00	.165	.165	.165	.165
31.00	.163	.164	.164	.164
34.00	.162	.162	.163	.162
100.00	.159	.159	.159	.159

Table A-10

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
ROOF AT EL. 753.5 FT. N-S COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
.20	.064	.059	.055	.049	.053
.30	.110	.099	.092	.078	.087
.40	.174	.162	.153	.129	.144
.50	.221	.202	.189	.160	.178
.60	.342	.299	.272	.215	.249
.70	.363	.320	.286	.225	.261
.80	.346	.310	.291	.249	.275
.90	.456	.396	.362	.300	.337
1.00	.518	.472	.432	.357	.400
1.10	.529	.481	.447	.386	.421
1.20	.702	.629	.588	.498	.554
1.30	.746	.702	.667	.581	.633
1.40	1.045	.880	.803	.671	.746
1.50	1.255	1.134	1.041	.844	.963
1.60	1.733	1.515	1.347	1.034	1.220
1.70	2.083	1.764	1.530	1.164	1.361
1.80	2.099	1.863	1.671	1.344	1.537
1.90	2.859	2.354	2.021	1.548	1.821
2.00	2.784	2.394	2.108	1.598	1.894
2.10	2.483	2.198	1.999	1.576	1.835
2.20	2.644	2.279	2.083	1.642	1.912
2.30	3.086	2.643	2.339	1.773	2.105
2.40	3.141	2.706	2.382	1.789	2.138
2.50	2.593	2.326	2.119	1.665	1.943
2.60	2.322	2.080	1.887	1.498	1.729
2.70	2.067	1.853	1.686	1.358	1.555
2.80	2.179	1.827	1.615	1.258	1.456
2.90	2.199	1.899	1.671	1.282	1.493
3.00	2.273	1.909	1.663	1.325	1.505
3.15	2.414	2.108	1.893	1.493	1.737
3.30	2.787	2.447	2.196	1.707	2.002
3.45	3.649	3.079	2.684	1.961	2.385
3.60	4.242	3.442	2.933	2.080	2.567
3.80	4.437	3.530	3.020	2.184	2.671
4.00	4.308	3.581	3.081	2.277	2.733
4.20	3.955	3.346	2.902	2.229	2.633
4.40	3.139	2.793	2.556	2.081	2.372
4.60	3.382	2.793	2.425	1.896	2.198
4.80	3.836	3.132	2.721	2.069	2.438
5.00	4.060	3.491	3.048	2.256	2.686
5.25	4.584	3.713	3.303	2.467	2.979

Table A-10 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
ROOF AT EL. 753.5 FT. N-S COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
5.50	4.778	3.957	3.402	2.472	3.000
5.75	3.622	3.060	2.696	2.183	2.491
6.00	3.122	2.693	2.452	1.959	2.256
6.25	2.632	2.357	2.158	1.801	1.998
6.50	2.527	2.177	1.998	1.641	1.849
6.75	2.550	2.220	1.977	1.571	1.804
7.00	2.261	1.982	1.803	1.481	1.669
7.25	2.115	1.807	1.644	1.374	1.530
7.50	1.987	1.731	1.546	1.323	1.432
7.75	1.900	1.657	1.517	1.322	1.426
8.00	1.801	1.606	1.490	1.306	1.411
8.50	1.670	1.505	1.397	1.213	1.310
9.00	1.550	1.386	1.310	1.170	1.254
9.50	1.620	1.405	1.287	1.091	1.198
10.00	1.421	1.306	1.219	1.062	1.158
10.50	1.441	1.250	1.144	1.023	1.097
11.00	1.243	1.145	1.094	1.000	1.065
11.50	1.218	1.121	1.064	.962	1.039
12.00	1.110	1.024	.973	.912	.956
12.50	1.015	.963	.927	.885	.920
13.00	.991	.945	.916	.863	.914
13.50	.914	.885	.870	.828	.872
14.00	.871	.834	.814	.785	.817
14.50	.799	.767	.751	.743	.756
15.00	.743	.738	.733	.725	.736
16.00	.716	.716	.716	.712	.716
17.00	.727	.718	.712	.700	.719
18.00	.697	.697	.696	.693	.697
20.00	.677	.677	.677	.677	.677
22.00	.666	.666	.666	.666	.666
25.00	.656	.656	.656	.656	.656
28.00	.648	.649	.649	.649	.648
31.00	.644	.644	.644	.644	.644
34.00	.640	.640	.640	.640	.640
100.00	.630	.630	.630	.630	.630

Table A-11

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
ROOF AT EL. 753.5 FT. E-W COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
.20	.064	.059	.055	.049	.053
.30	.110	.099	.092	.078	.087
.40	.174	.162	.153	.130	.144
.50	.221	.202	.189	.160	.178
.60	.342	.299	.272	.214	.249
.70	.363	.320	.287	.225	.261
.80	.346	.311	.291	.249	.275
.90	.456	.396	.362	.300	.338
1.00	.519	.472	.432	.357	.400
1.10	.530	.482	.448	.385	.421
1.20	.701	.629	.586	.496	.552
1.30	.745	.701	.666	.580	.633
1.40	1.044	.880	.804	.671	.747
1.50	1.252	1.134	1.042	.845	.964
1.60	1.725	1.506	1.345	1.031	1.218
1.70	2.076	1.758	1.525	1.163	1.358
1.80	2.086	1.855	1.666	1.341	1.533
1.90	2.848	2.344	2.015	1.542	1.814
2.00	2.777	2.392	2.106	1.592	1.892
2.10	2.480	2.192	1.994	1.576	1.835
2.20	2.667	2.305	2.104	1.663	1.934
2.30	3.138	2.687	2.379	1.807	2.143
2.40	3.226	2.776	2.449	1.830	2.195
2.50	2.682	2.400	2.185	1.714	2.003
2.60	2.420	2.168	1.963	1.547	1.796
2.70	2.173	1.938	1.764	1.412	1.625
2.80	2.246	1.902	1.667	1.317	1.502
2.90	2.202	1.901	1.673	1.292	1.495
3.00	2.279	1.914	1.666	1.335	1.511
3.15	2.413	2.112	1.899	1.503	1.744
3.30	2.799	2.462	2.214	1.723	2.020
3.45	3.676	3.100	2.703	1.976	2.400
3.60	4.273	3.468	2.961	2.100	2.590
3.80	4.500	3.588	3.072	2.225	2.718
4.00	4.422	3.667	3.162	2.334	2.802
4.20	4.069	3.439	3.001	2.307	2.731
4.40	3.280	2.922	2.670	2.167	2.473
4.60	3.376	2.790	2.484	2.004	2.283
4.80	3.834	3.138	2.737	2.094	2.450
5.00	4.097	3.530	3.084	2.292	2.724
5.25	4.620	3.796	3.395	2.530	3.062

Table A-11 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
ROOF AT EL. 753.5 FT. E-W COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
5.50	4.955	4.091	3.515	2.549	3.105
5.75	3.860	3.258	2.863	2.276	2.602
6.00	3.385	2.915	2.635	2.082	2.421
6.25	2.893	2.565	2.339	1.916	2.160
6.50	2.819	2.459	2.236	1.812	2.066
6.75	2.848	2.493	2.223	1.769	2.039
7.00	2.543	2.239	2.028	1.660	1.880
7.25	2.390	2.038	1.841	1.520	1.698
7.50	2.272	1.977	1.764	1.470	1.618
7.75	2.165	1.887	1.716	1.457	1.600
8.00	2.069	1.827	1.688	1.451	1.579
8.50	1.939	1.733	1.596	1.365	1.487
9.00	1.828	1.583	1.471	1.297	1.398
9.50	1.921	1.635	1.489	1.258	1.388
10.00	1.593	1.429	1.327	1.149	1.251
10.50	1.494	1.315	1.236	1.122	1.186
11.00	1.272	1.194	1.145	1.075	1.125
11.50	1.244	1.167	1.119	1.030	1.100
12.00	1.099	1.038	1.017	.979	1.011
12.50	1.032	.992	.973	.938	.968
13.00	.997	.967	.946	.906	.944
13.50	.926	.907	.895	.869	.896
14.00	.894	.868	.854	.833	.856
14.50	.802	.804	.804	.804	.804
15.00	.776	.775	.777	.782	.775
16.00	.752	.756	.758	.761	.756
17.00	.767	.763	.760	.755	.763
18.00	.751	.750	.749	.747	.751
20.00	.730	.729	.729	.729	.730
22.00	.717	.717	.717	.716	.717
25.00	.704	.704	.704	.704	.704
28.00	.695	.696	.696	.696	.695
31.00	.690	.690	.689	.690	.690
34.00	.685	.685	.685	.685	.685
100.00	.674	.674	.674	.674	.674

Table A-12

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
ROOF AT EL. 753.5 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
.20	.044	.041	.037	.033	.035
.30	.074	.067	.061	.052	.058
.40	.113	.105	.099	.083	.093
.50	.144	.134	.126	.106	.119
.60	.212	.187	.171	.134	.156
.70	.217	.189	.169	.130	.153
.80	.195	.175	.160	.131	.149
.90	.250	.209	.191	.159	.179
1.00	.268	.245	.224	.181	.207
1.10	.249	.227	.210	.186	.202
1.20	.314	.286	.267	.223	.250
1.30	.313	.296	.283	.250	.272
1.40	.403	.347	.318	.261	.296
1.50	.444	.391	.356	.279	.326
1.60	.536	.470	.421	.323	.382
1.70	.579	.487	.427	.345	.390
1.80	.558	.502	.455	.374	.421
1.90	.720	.598	.533	.417	.487
2.00	.673	.583	.524	.413	.481
2.10	.549	.494	.461	.390	.434
2.20	.605	.538	.490	.410	.456
2.30	.715	.637	.577	.463	.530
2.40	.804	.702	.627	.487	.569
2.50	.743	.657	.595	.479	.547
2.60	.753	.666	.598	.476	.544
2.70	.760	.660	.595	.485	.548
2.80	.898	.754	.663	.502	.596
2.90	.848	.731	.647	.509	.590
3.00	.818	.682	.604	.514	.567
3.15	.773	.690	.633	.530	.590
3.30	.838	.746	.677	.552	.622
3.45	.992	.847	.745	.573	.673
3.60	1.100	.915	.799	.605	.714
3.80	1.126	.930	.854	.661	.775
4.00	1.231	1.052	.936	.731	.848
4.20	1.283	1.093	.959	.761	.872
4.40	1.244	1.099	.999	.786	.913
4.60	1.380	1.154	1.025	.784	.928
4.80	1.445	1.209	1.055	.805	.948
5.00	1.365	1.194	1.065	.831	.974
5.25	1.540	1.308	1.167	.885	1.054

Table A-12 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
ROOF AT EL. 753.5 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
5.50	1.661	1.365	1.186	.888	1.058
5.75	1.480	1.285	1.136	.876	1.026
6.00	1.488	1.244	1.119	.857	1.015
6.25	1.306	1.166	1.061	.827	.973
6.50	1.328	1.145	1.026	.800	.937
6.75	1.445	1.223	1.069	.799	.955
7.00	1.585	1.316	1.135	.836	1.003
7.25	1.748	1.393	1.173	.877	1.039
7.50	1.787	1.475	1.261	.919	1.108
7.75	1.746	1.458	1.261	.931	1.115
8.00	1.602	1.300	1.154	.920	1.060
8.50	1.543	1.283	1.147	.905	1.050
9.00	1.329	1.126	1.005	.816	.918
9.50	1.406	1.173	1.038	.814	.942
10.00	1.099	.975	.914	.755	.856
10.50	1.194	.994	.886	.721	.819
11.00	.978	.886	.823	.699	.787
11.50	.906	.827	.778	.677	.759
12.00	.887	.801	.744	.649	.726
12.50	.747	.645	.622	.583	.615
13.00	.765	.688	.641	.557	.637
13.50	.786	.701	.641	.536	.646
14.00	.656	.599	.564	.501	.570
14.50	.586	.527	.498	.473	.507
15.00	.513	.461	.453	.446	.455
16.00	.463	.437	.421	.406	.433
17.00	.427	.407	.392	.382	.409
18.00	.379	.373	.369	.364	.374
20.00	.349	.344	.340	.332	.349
22.00	.342	.334	.330	.325	.342
25.00	.332	.327	.323	.316	.332
28.00	.314	.314	.314	.313	.314
31.00	.308	.308	.308	.308	.308
34.00	.304	.304	.304	.304	.304
100.00	.294	.294	.294	.294	.294

Table A-13

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
SECOND FLOOR AT EL. 739.75 FT. N-S COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
.20	.064	.059	.055	.049	.053
.30	.110	.099	.092	.078	.087
.40	.173	.162	.153	.129	.144
.50	.221	.202	.188	.160	.178
.60	.342	.299	.271	.214	.248
.70	.361	.319	.285	.225	.261
.80	.345	.309	.290	.248	.274
.90	.455	.394	.360	.298	.336
1.00	.516	.470	.430	.356	.399
1.10	.526	.478	.444	.384	.419
1.20	.698	.626	.585	.495	.551
1.30	.742	.698	.663	.577	.630
1.40	1.037	.873	.797	.665	.740
1.50	1.244	1.123	1.031	.835	.954
1.60	1.717	1.501	1.335	1.024	1.209
1.70	2.063	1.746	1.514	1.151	1.346
1.80	2.077	1.842	1.653	1.329	1.520
1.90	2.826	2.327	1.999	1.530	1.801
2.00	2.751	2.364	2.081	1.580	1.872
2.10	2.451	2.171	1.975	1.556	1.813
2.20	2.605	2.245	2.052	1.617	1.884
2.30	3.035	2.600	2.302	1.743	2.071
2.40	3.084	2.656	2.340	1.759	2.100
2.50	2.542	2.282	2.079	1.634	1.906
2.60	2.275	2.038	1.849	1.470	1.695
2.70	2.023	1.816	1.653	1.333	1.525
2.80	2.147	1.801	1.592	1.232	1.435
2.90	2.168	1.872	1.647	1.261	1.472
3.00	2.237	1.878	1.637	1.301	1.478
3.15	2.373	2.071	1.861	1.466	1.707
3.30	2.736	2.403	2.156	1.676	1.966
3.45	3.581	3.023	2.636	1.924	2.342
3.60	4.163	3.376	2.879	2.042	2.520
3.80	4.351	3.461	2.958	2.135	2.614
4.00	4.193	3.487	2.998	2.220	2.660
4.20	3.836	3.246	2.816	2.168	2.558
4.40	3.036	2.708	2.480	2.020	2.303
4.60	3.283	2.711	2.354	1.835	2.130
4.80	3.719	3.036	2.641	2.006	2.363
5.00	3.924	3.376	2.947	2.185	2.601
5.25	4.414	3.587	3.190	2.383	2.878

Table A-13 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
SECOND FLOOR AT EL. 739.75 FT. N-S COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
5.50	4.602	3.810	3.276	2.385	2.890
5.75	3.513	2.968	2.611	2.111	2.409
6.00	3.049	2.631	2.386	1.901	2.194
6.25	2.574	2.302	2.103	1.742	1.946
6.50	2.453	2.116	1.937	1.593	1.794
6.75	2.418	2.120	1.895	1.520	1.743
7.00	2.135	1.887	1.720	1.427	1.602
7.25	1.959	1.697	1.543	1.315	1.445
7.50	1.814	1.591	1.427	1.258	1.337
7.75	1.702	1.497	1.384	1.252	1.329
8.00	1.616	1.473	1.390	1.241	1.332
8.50	1.469	1.347	1.256	1.142	1.204
9.00	1.331	1.233	1.172	1.065	1.129
9.50	1.292	1.176	1.100	1.014	1.055
10.00	1.160	1.077	1.030	.971	1.003
10.50	1.123	1.009	.980	.933	.964
11.00	1.060	1.001	.968	.910	.951
11.50	1.046	.976	.943	.884	.930
12.00	.919	.876	.866	.845	.863
12.50	.895	.853	.844	.817	.841
13.00	.879	.847	.828	.792	.827
13.50	.796	.788	.778	.762	.779
14.00	.796	.762	.745	.732	.747
14.50	.745	.722	.713	.703	.714
15.00	.704	.700	.699	.694	.699
16.00	.680	.684	.684	.681	.684
17.00	.691	.684	.679	.670	.684
18.00	.668	.667	.667	.664	.667
20.00	.650	.650	.650	.650	.650
22.00	.640	.640	.640	.640	.640
25.00	.630	.630	.630	.630	.630
28.00	.624	.623	.623	.624	.624
31.00	.619	.619	.619	.619	.619
34.00	.615	.616	.616	.615	.615
100.00	.607	.607	.607	.607	.607

Table A-14

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
SECOND FLOOR AT EL. 739.75 FT. E-W COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
.20	.064	.059	.055	.049	.053
.30	.110	.099	.092	.078	.087
.40	.173	.162	.152	.129	.144
.50	.221	.202	.189	.160	.178
.60	.341	.299	.271	.214	.248
.70	.361	.319	.286	.224	.260
.80	.345	.309	.289	.247	.273
.90	.454	.394	.359	.298	.335
1.00	.516	.469	.429	.354	.398
1.10	.525	.477	.443	.382	.417
1.20	.696	.623	.581	.492	.547
1.30	.737	.694	.659	.574	.627
1.40	1.031	.870	.793	.662	.737
1.50	1.235	1.117	1.026	.831	.949
1.60	1.699	1.484	1.324	1.015	1.200
1.70	2.042	1.729	1.499	1.143	1.334
1.80	2.051	1.822	1.637	1.318	1.506
1.90	2.796	2.301	1.978	1.515	1.782
2.00	2.720	2.344	2.063	1.564	1.856
2.10	2.430	2.150	1.957	1.545	1.797
2.20	2.603	2.248	2.054	1.622	1.886
2.30	3.052	2.615	2.314	1.756	2.085
2.40	3.122	2.688	2.371	1.776	2.127
2.50	2.589	2.317	2.111	1.658	1.936
2.60	2.331	2.088	1.892	1.493	1.732
2.70	2.088	1.866	1.698	1.362	1.566
2.80	2.147	1.821	1.598	1.267	1.448
2.90	2.158	1.863	1.640	1.260	1.465
3.00	2.229	1.871	1.628	1.300	1.473
3.15	2.353	2.058	1.848	1.458	1.696
3.30	2.719	2.392	2.150	1.672	1.961
3.45	3.563	3.005	2.620	1.914	2.328
3.60	4.135	3.355	2.867	2.034	2.509
3.80	4.331	3.453	2.950	2.138	2.611
4.00	4.219	3.500	3.018	2.235	2.679
4.20	3.873	3.276	2.853	2.199	2.597
4.40	3.109	2.773	2.529	2.057	2.344
4.60	3.241	2.677	2.342	1.886	2.153
4.80	3.667	2.998	2.616	1.999	2.339
5.00	3.884	3.354	2.930	2.179	2.587
5.25	4.367	3.589	3.207	2.388	2.890

Table A-14 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
SECOND FLOOR AT EL. 739.75 FT. E-W COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
5.50	4.655	3.846	3.304	2.403	2.917
5.75	3.617	3.058	2.686	2.144	2.446
6.00	3.180	2.745	2.473	1.960	2.275
6.25	2.716	2.413	2.196	1.794	2.033
6.50	2.639	2.292	2.079	1.689	1.920
6.75	2.636	2.313	2.065	1.638	1.887
7.00	2.338	2.061	1.867	1.535	1.733
7.25	2.164	1.866	1.689	1.401	1.564
7.50	2.033	1.775	1.586	1.334	1.458
7.75	1.907	1.662	1.520	1.327	1.427
8.00	1.808	1.620	1.502	1.317	1.422
8.50	1.651	1.505	1.394	1.219	1.304
9.00	1.471	1.332	1.258	1.134	1.207
9.50	1.408	1.274	1.194	1.073	1.142
10.00	1.231	1.131	1.071	1.014	1.045
10.50	1.152	1.058	1.030	.979	1.014
11.00	1.068	1.020	.996	.941	.981
11.50	1.045	.999	.965	.905	.952
12.00	.925	.903	.895	.869	.892
12.50	.923	.884	.869	.842	.866
13.00	.892	.865	.846	.811	.844
13.50	.817	.807	.799	.781	.800
14.00	.815	.781	.766	.752	.768
14.50	.753	.737	.733	.725	.734
15.00	.721	.718	.718	.712	.718
16.00	.697	.701	.701	.698	.701
17.00	.711	.705	.701	.696	.705
18.00	.692	.692	.691	.688	.692
20.00	.672	.672	.672	.672	.672
22.00	.661	.661	.661	.661	.661
25.00	.650	.650	.650	.651	.650
28.00	.643	.643	.643	.643	.643
31.00	.638	.638	.638	.638	.638
34.00	.634	.634	.635	.635	.634
100.00	.624	.624	.624	.624	.624

Table A-15

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
SECOND FLOOR AT EL. 739.75 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
.20	.044	.041	.037	.033	.035
.30	.074	.067	.061	.052	.058
.40	.113	.105	.099	.083	.093
.50	.144	.134	.126	.106	.119
.60	.212	.187	.171	.134	.156
.70	.217	.189	.169	.130	.153
.80	.195	.175	.160	.131	.149
.90	.250	.209	.191	.159	.179
1.00	.268	.245	.224	.181	.207
1.10	.249	.227	.210	.186	.202
1.20	.314	.286	.267	.223	.250
1.30	.313	.296	.282	.250	.272
1.40	.402	.347	.318	.261	.296
1.50	.444	.391	.355	.279	.326
1.60	.535	.470	.421	.323	.381
1.70	.579	.487	.427	.344	.389
1.80	.557	.501	.454	.374	.420
1.90	.719	.598	.533	.416	.486
2.00	.672	.582	.523	.413	.480
2.10	.548	.494	.461	.389	.434
2.20	.604	.537	.490	.410	.456
2.30	.715	.637	.575	.462	.530
2.40	.803	.702	.627	.486	.569
2.50	.742	.657	.595	.479	.546
2.60	.752	.665	.597	.475	.543
2.70	.759	.659	.594	.484	.547
2.80	.896	.753	.663	.501	.595
2.90	.847	.729	.647	.509	.589
3.00	.817	.681	.603	.514	.567
3.15	.772	.689	.632	.529	.590
3.30	.837	.745	.676	.550	.621
3.45	.990	.846	.744	.572	.672
3.60	1.098	.913	.797	.604	.713
3.80	1.124	.948	.852	.660	.774
4.00	1.229	1.051	.933	.729	.846
4.20	1.280	1.092	.957	.759	.871
4.40	1.241	1.097	.997	.784	.912
4.60	1.378	1.152	1.024	.783	.926
4.80	1.443	1.208	1.054	.804	.946
5.00	1.363	1.193	1.062	.830	.973
5.25	1.537	1.306	1.164	.882	1.052

Table A-15 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
SECOND FLOOR AT EL. 739.75 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
5.50	1.657	1.362	1.184	.886	1.056
5.75	1.476	1.282	1.133	.874	1.023
6.00	1.484	1.239	1.116	.855	1.011
6.25	1.302	1.161	1.058	.825	.970
6.50	1.324	1.141	1.023	.798	.934
6.75	1.441	1.219	1.066	.796	.953
7.00	1.581	1.313	1.132	.834	1.001
7.25	1.744	1.391	1.171	.874	1.036
7.50	1.782	1.470	1.258	.917	1.106
7.75	1.742	1.454	1.258	.928	1.110
8.00	1.597	1.297	1.151	.917	1.057
8.50	1.540	1.280	1.144	.902	1.048
9.00	1.325	1.123	1.002	.813	.915
9.50	1.399	1.167	1.031	.809	.936
10.00	1.094	.969	.907	.751	.851
10.50	1.193	.985	.879	.716	.812
11.00	.975	.877	.816	.693	.780
11.50	.898	.820	.772	.673	.752
12.00	.879	.794	.739	.634	.720
12.50	.742	.640	.618	.580	.612
13.00	.759	.684	.637	.553	.633
13.50	.779	.697	.637	.532	.642
14.00	.650	.594	.561	.497	.566
14.50	.580	.522	.495	.470	.504
15.00	.507	.457	.450	.443	.451
16.00	.458	.433	.417	.404	.430
17.00	.421	.403	.388	.379	.405
18.00	.375	.369	.367	.362	.370
20.00	.347	.341	.338	.331	.347
22.00	.339	.332	.328	.324	.339
25.00	.329	.324	.321	.315	.329
28.00	.313	.313	.312	.311	.313
31.00	.306	.306	.306	.306	.306
34.00	.303	.302	.302	.303	.303
100.00	.293	.293	.293	.293	.293

Table A-16

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
BASE SLAB AT EL. 722.0 FT. N-S COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
.20	.064	.059	.055	.049	.053
.30	.110	.099	.092	.078	.087
.40	.173	.161	.152	.129	.144
.50	.220	.202	.188	.159	.178
.60	.341	.298	.271	.214	.248
.70	.360	.318	.284	.223	.259
.80	.343	.308	.288	.246	.273
.90	.452	.391	.358	.296	.333
1.00	.512	.467	.427	.353	.396
1.10	.521	.473	.440	.381	.415
1.20	.692	.621	.581	.491	.546
1.30	.734	.691	.656	.571	.624
1.40	1.025	.863	.787	.657	.731
1.50	1.228	1.108	1.016	.823	.940
1.60	1.692	1.480	1.316	1.008	1.191
1.70	2.031	1.718	1.489	1.132	1.323
1.80	2.041	1.810	1.624	1.305	1.494
1.90	2.773	2.283	1.961	1.502	1.768
2.00	2.692	2.313	2.036	1.549	1.832
2.10	2.391	2.120	1.929	1.520	1.771
2.20	2.530	2.180	1.994	1.572	1.831
2.30	2.938	2.521	2.233	1.692	2.010
2.40	2.983	2.569	2.268	1.705	2.035
2.50	2.459	2.207	2.011	1.582	1.844
2.60	2.199	1.973	1.790	1.425	1.641
2.70	1.961	1.759	1.603	1.295	1.480
2.80	2.091	1.754	1.549	1.194	1.396
2.90	2.108	1.819	1.601	1.221	1.430
3.00	2.168	1.820	1.586	1.255	1.425
3.15	2.285	1.994	1.789	1.406	1.639
3.30	2.624	2.308	2.070	1.608	1.887
3.45	3.423	2.891	2.522	1.839	2.241
3.60	3.965	3.217	2.749	1.951	2.407
3.80	4.115	3.278	2.797	2.023	2.470
4.00	3.939	3.273	2.817	2.097	2.508
4.20	3.599	3.046	2.646	2.045	2.406
4.40	2.857	2.552	2.329	1.899	2.161
4.60	3.106	2.566	2.230	1.726	2.017
4.80	3.499	2.859	2.492	1.894	2.231
5.00	3.680	3.162	2.759	2.054	2.444
5.25	4.119	3.360	2.980	2.225	2.688

Table A-16 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
BASE SLAB AT EL. 722.0 FT. N-S COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
5.50	4.289	3.547	3.045	2.222	2.688
5.75	3.270	2.758	2.430	1.964	2.241
6.00	2.830	2.448	2.217	1.769	2.042
6.25	2.370	2.133	1.954	1.612	1.811
6.50	2.233	1.923	1.753	1.462	1.632
6.75	2.168	1.907	1.709	1.376	1.574
7.00	1.900	1.686	1.540	1.290	1.441
7.25	1.741	1.511	1.391	1.195	1.303
7.50	1.591	1.398	1.268	1.137	1.194
7.75	1.469	1.313	1.241	1.134	1.199
8.00	1.395	1.288	1.232	1.117	1.184
8.50	1.265	1.174	1.119	1.023	1.080
9.00	1.148	1.077	1.033	.947	.999
9.50	1.192	1.053	.964	.901	.924
10.00	.987	.931	.905	.858	.884
10.50	.960	.875	.866	.828	.855
11.00	.941	.885	.861	.816	.848
11.50	.920	.866	.831	.785	.817
12.00	.804	.779	.773	.752	.770
12.50	.796	.766	.753	.728	.750
13.00	.793	.756	.735	.708	.733
13.50	.717	.702	.693	.681	.694
14.00	.729	.698	.682	.659	.685
14.50	.690	.671	.660	.649	.664
15.00	.652	.649	.645	.641	.647
16.00	.630	.632	.631	.629	.631
17.00	.632	.628	.625	.618	.628
18.00	.609	.609	.609	.608	.609
20.00	.595	.595	.595	.595	.595
22.00	.587	.587	.587	.587	.587
25.00	.579	.579	.579	.579	.579
28.00	.573	.573	.573	.573	.573
31.00	.569	.569	.569	.570	.569
34.00	.566	.566	.566	.567	.566
100.00	.559	.559	.559	.559	.559

Table A-17

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
BASE SLAB AT EL. 722.0 FT. E-W COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
.20	.064	.059	.055	.049	.053
.30	.110	.099	.092	.078	.087
.40	.173	.162	.152	.129	.144
.50	.220	.201	.188	.160	.178
.60	.340	.297	.271	.214	.248
.70	.360	.317	.283	.223	.258
.80	.342	.307	.287	.245	.271
.90	.451	.390	.357	.295	.333
1.00	.511	.465	.426	.352	.395
1.10	.519	.471	.438	.379	.413
1.20	.688	.618	.577	.488	.543
1.30	.729	.687	.651	.567	.619
1.40	1.018	.858	.781	.653	.726
1.50	1.217	1.098	1.008	.816	.933
1.60	1.673	1.463	1.302	.998	1.179
1.70	2.008	1.699	1.472	1.121	1.309
1.80	2.016	1.788	1.606	1.292	1.478
1.90	2.739	2.254	1.938	1.485	1.747
2.00	2.660	2.288	2.013	1.532	1.813
2.10	2.367	2.098	1.909	1.507	1.753
2.20	2.521	2.175	1.988	1.559	1.826
2.30	2.940	2.523	2.232	1.696	2.012
2.40	2.997	2.578	2.278	1.710	2.044
2.50	2.481	2.220	2.022	1.590	1.856
2.60	2.228	1.997	1.810	1.433	1.658
2.70	1.993	1.785	1.624	1.308	1.500
2.80	2.076	1.742	1.537	1.210	1.386
2.90	2.089	1.803	1.586	1.213	1.419
3.00	2.150	1.804	1.570	1.248	1.412
3.15	2.258	1.972	1.768	1.391	1.620
3.30	2.593	2.284	2.051	1.592	1.870
3.45	3.384	2.856	2.491	1.818	2.215
3.60	3.912	3.176	2.718	1.929	2.381
3.80	4.055	3.239	2.759	2.003	2.438
4.00	3.906	3.242	2.799	2.086	2.493
4.20	3.590	3.037	2.641	2.043	2.403
4.40	2.876	2.570	2.341	1.900	2.168
4.60	3.055	2.526	2.199	1.730	1.990
4.80	3.436	2.813	2.457	1.880	2.200
5.00	3.624	3.129	2.732	2.039	2.421
5.25	4.073	3.344	2.975	2.217	2.681

Table A-17 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
BASE SLAB AT EL. 722.0 FT. E-W COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
5.50	4.311	3.556	3.052	2.221	2.690
5.75	3.337	2.822	2.475	1.977	2.255
6.00	2.921	2.526	2.273	1.803	2.094
6.25	2.461	2.209	2.025	1.635	1.869
6.50	2.334	2.012	1.828	1.505	1.687
6.75	2.276	2.002	1.793	1.433	1.639
7.00	1.988	1.751	1.601	1.336	1.496
7.25	1.735	1.570	1.436	1.224	1.340
7.50	1.646	1.441	1.314	1.155	1.228
7.75	1.497	1.342	1.251	1.146	1.211
8.00	1.429	1.322	1.256	1.127	1.206
8.50	1.298	1.201	1.135	1.036	1.093
9.00	1.156	1.088	1.043	.955	1.008
9.50	1.110	1.004	.959	.907	.931
10.00	.970	.940	.915	.866	.895
10.50	.932	.883	.873	.834	.861
11.00	.921	.878	.859	.819	.848
11.50	.913	.861	.829	.789	.818
12.00	.796	.783	.776	.757	.774
12.50	.788	.767	.755	.733	.752
13.00	.786	.753	.735	.710	.734
13.50	.709	.696	.693	.685	.693
14.00	.726	.695	.681	.663	.683
14.50	.681	.668	.659	.651	.662
15.00	.652	.649	.645	.642	.647
16.00	.633	.634	.633	.630	.634
17.00	.634	.630	.627	.620	.630
18.00	.614	.614	.614	.613	.614
20.00	.599	.599	.600	.600	.599
22.00	.591	.591	.591	.591	.591
25.00	.582	.582	.583	.583	.582
28.00	.577	.577	.577	.577	.577
31.00	.573	.573	.573	.573	.573
34.00	.570	.570	.570	.570	.570
100.00	.561	.561	.561	.561	.561

Table A-18

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
BASE SLAB AT EL. 722.0 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
.20	.044	.041	.037	.033	.035
.30	.074	.067	.061	.052	.058
.40	.113	.105	.099	.083	.093
.50	.144	.134	.126	.106	.119
.60	.212	.187	.170	.134	.156
.70	.217	.189	.169	.130	.153
.80	.195	.175	.160	.131	.149
.90	.250	.209	.191	.158	.179
1.00	.268	.245	.224	.181	.207
1.10	.249	.227	.210	.186	.201
1.20	.314	.286	.266	.223	.250
1.30	.312	.296	.282	.250	.272
1.40	.402	.347	.318	.260	.296
1.50	.443	.390	.355	.279	.326
1.60	.535	.469	.420	.323	.381
1.70	.578	.487	.427	.344	.389
1.80	.557	.501	.454	.373	.420
1.90	.718	.597	.532	.415	.486
2.00	.671	.581	.522	.412	.479
2.10	.547	.493	.460	.389	.433
2.20	.603	.536	.488	.408	.454
2.30	.713	.635	.573	.462	.528
2.40	.800	.699	.625	.485	.567
2.50	.740	.655	.593	.477	.544
2.60	.750	.663	.596	.473	.542
2.70	.755	.657	.592	.483	.546
2.80	.894	.751	.661	.500	.593
2.90	.845	.727	.644	.507	.587
3.00	.814	.678	.600	.512	.564
3.15	.769	.686	.629	.527	.587
3.30	.833	.742	.674	.548	.619
3.45	.985	.842	.741	.569	.669
3.60	1.093	.908	.794	.601	.710
3.80	1.119	.944	.848	.657	.770
4.00	1.223	1.046	.929	.725	.842
4.20	1.274	1.085	.952	.754	.866
4.40	1.235	1.092	.993	.779	.906
4.60	1.373	1.147	1.019	.779	.922
4.80	1.437	1.202	1.049	.800	.942
5.00	1.356	1.185	1.057	.826	.968
5.25	1.528	1.298	1.156	.876	1.045

Table A-18 (continued)

TVA SEQUOYAH DIESEL GENERATOR BUILDING
ENVELOPE OF AVERAGED ARS FOR SITE-SPECIFIC SSE
BASE SLAB AT EL. 722.0 FT. VERTICAL COMPONENT

Frequency (cps)	Damping 2%	3%	4%	7%	N411
5.50	1.645	1.353	1.176	.880	1.049
5.75	1.463	1.272	1.124	.868	1.016
6.00	1.471	1.229	1.106	.848	1.003
6.25	1.291	1.152	1.049	.818	.960
6.50	1.311	1.130	1.013	.791	.925
6.75	1.434	1.213	1.060	.792	.947
7.00	1.574	1.308	1.128	.829	.997
7.25	1.739	1.386	1.166	.868	1.029
7.50	1.768	1.459	1.250	.908	1.098
7.75	1.727	1.441	1.248	.920	1.103
8.00	1.586	1.288	1.144	.911	1.050
8.50	1.533	1.271	1.137	.897	1.042
9.00	1.316	1.116	.996	.808	.908
9.50	1.379	1.150	1.016	.797	.923
10.00	1.077	.953	.893	.741	.837
10.50	1.190	.972	.862	.705	.797
11.00	.974	.862	.799	.682	.765
11.50	.883	.802	.757	.661	.738
12.00	.862	.777	.723	.622	.706
12.50	.725	.627	.606	.569	.600
13.00	.741	.668	.624	.543	.620
13.50	.759	.681	.623	.522	.629
14.00	.633	.581	.548	.488	.555
14.50	.563	.510	.485	.462	.492
15.00	.491	.444	.441	.435	.442
16.00	.444	.420	.406	.396	.417
17.00	.407	.390	.378	.374	.391
18.00	.367	.363	.361	.356	.364
20.00	.339	.336	.332	.327	.339
22.00	.333	.327	.324	.319	.333
25.00	.323	.318	.315	.311	.323
28.00	.309	.308	.308	.307	.309
31.00	.303	.303	.302	.302	.303
34.00	.299	.299	.299	.299	.299
100.00	.289	.289	.289	.289	.289

Appendix B

Comparisons of ARS Envelopes of the Current Analysis
with the Original Design Basis ARS

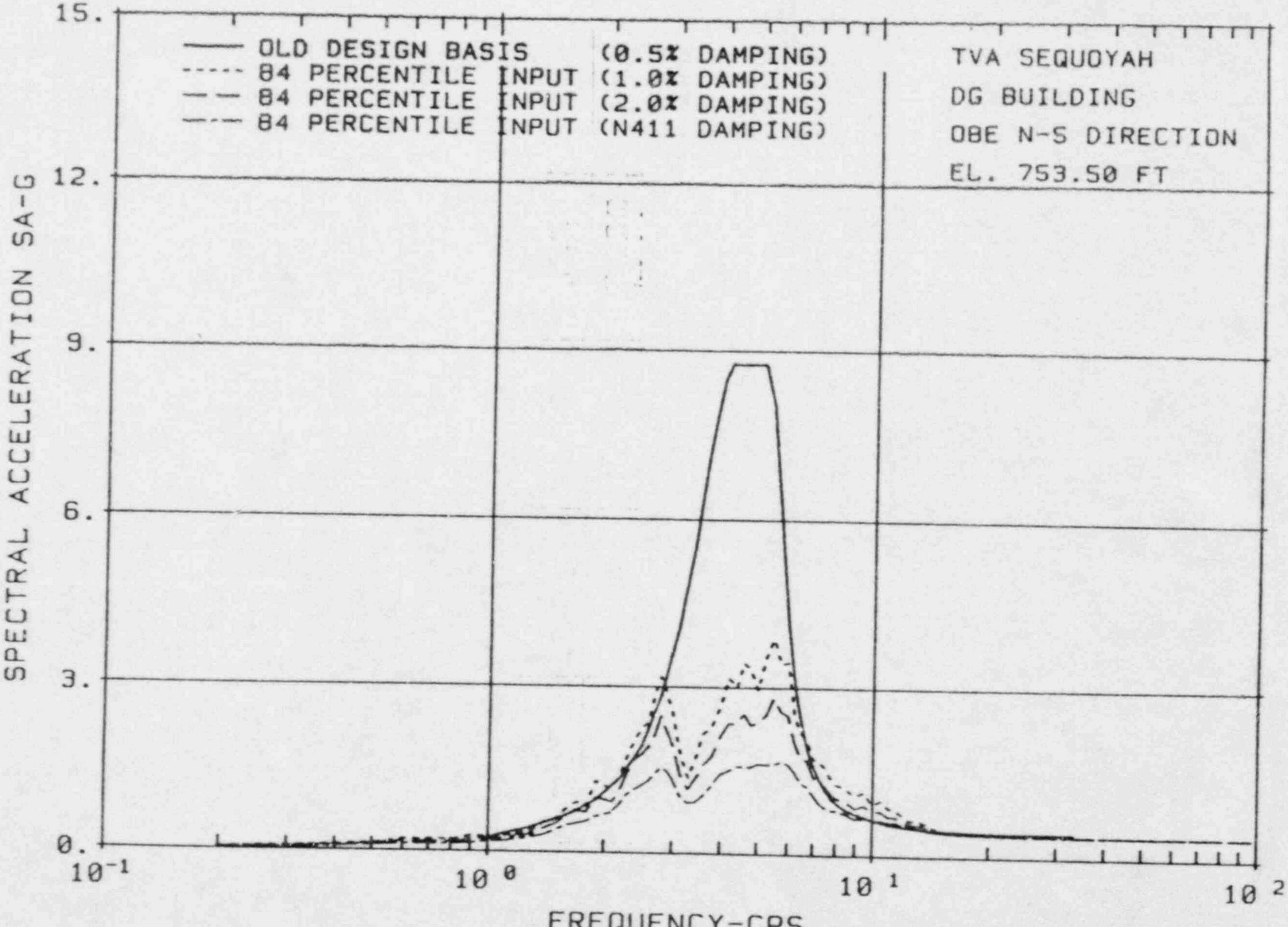

Figure B-1 COMPARISON OF ENVELOPE OF AVERAGED ARS

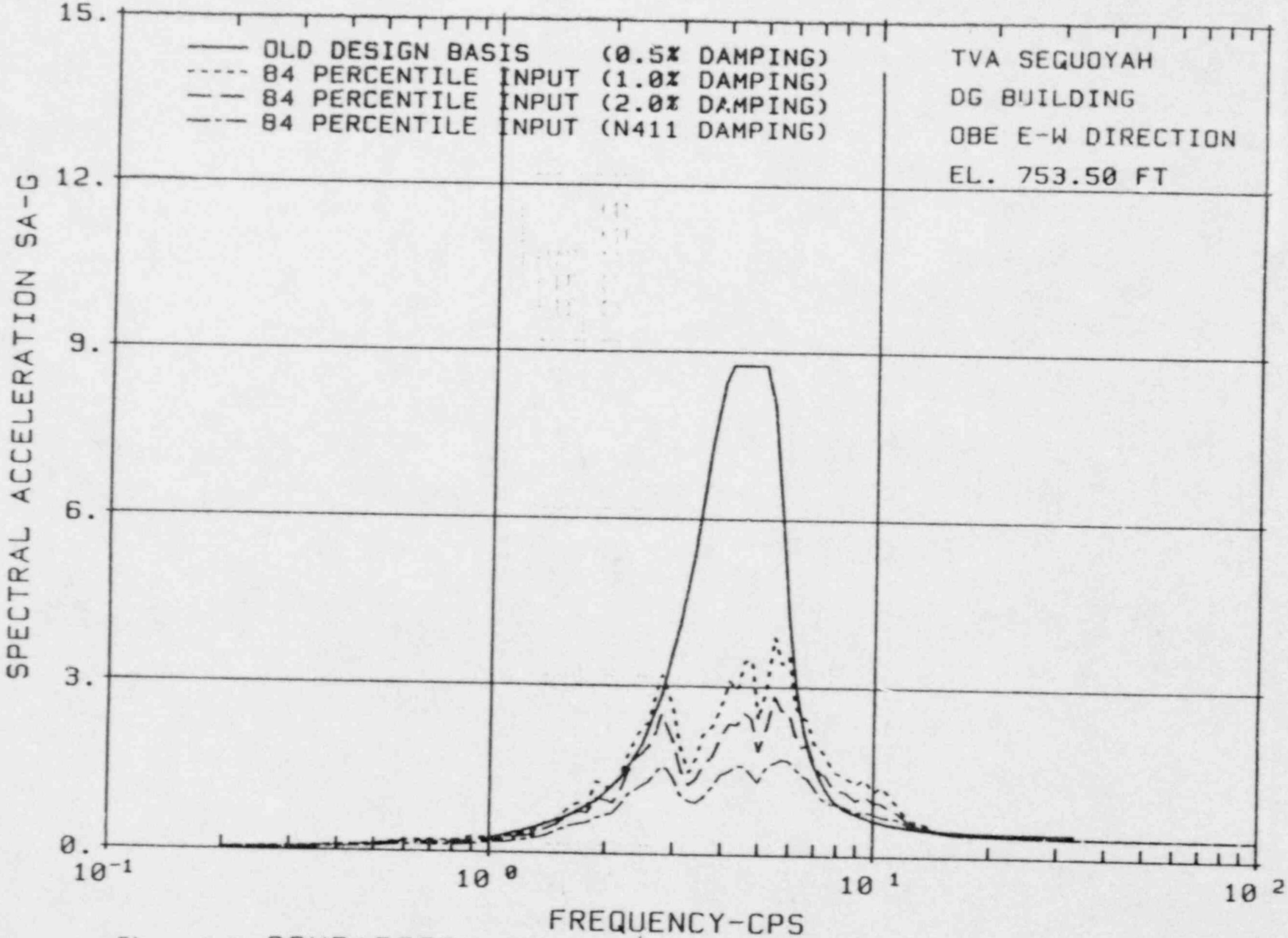

Figure B-2 COMPARISON OF ENVELOPE OF AVERAGED ARS

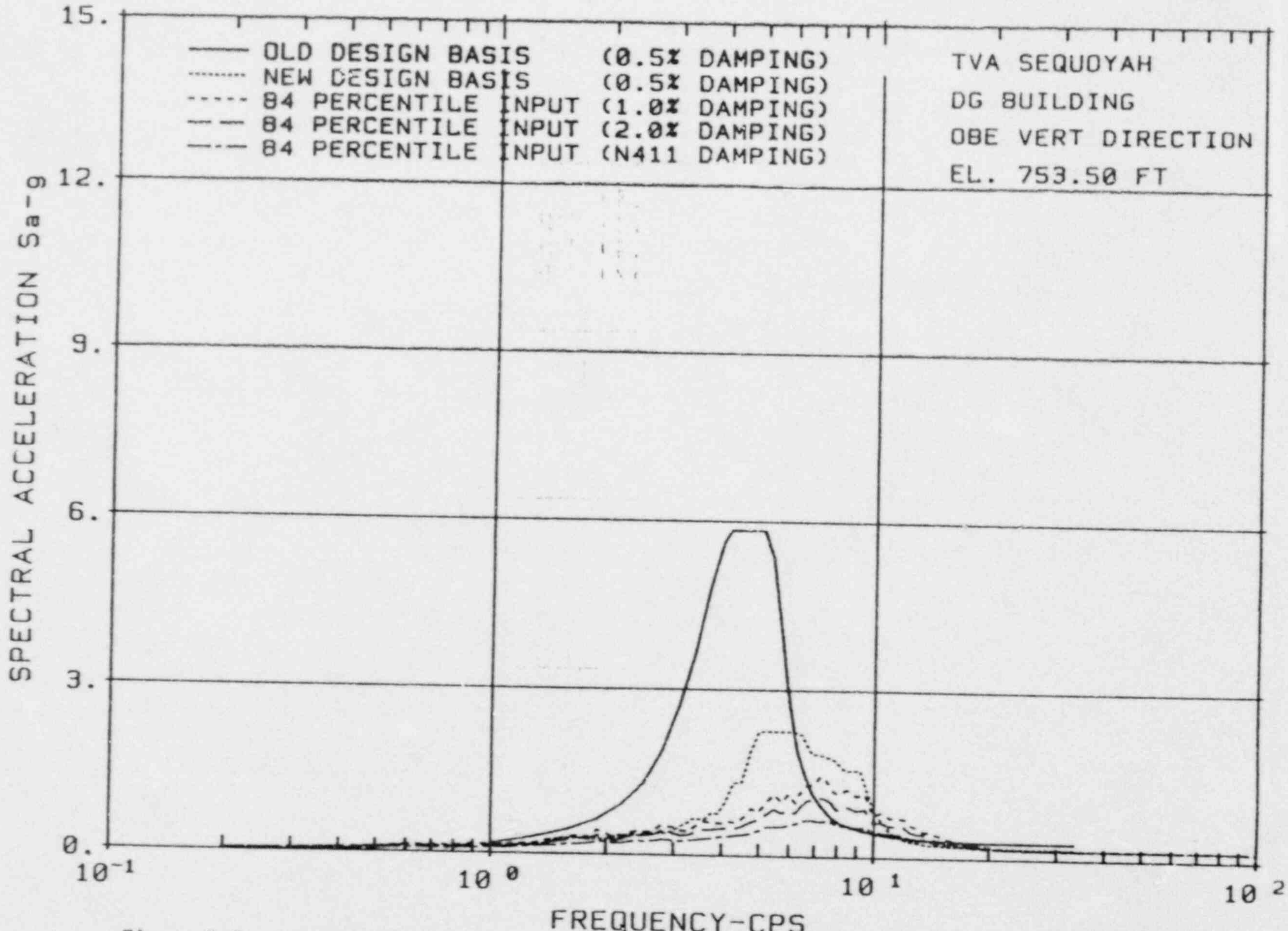

Figure B-3 COMPARISON OF ENVELOPE OF AVERAGED ARS

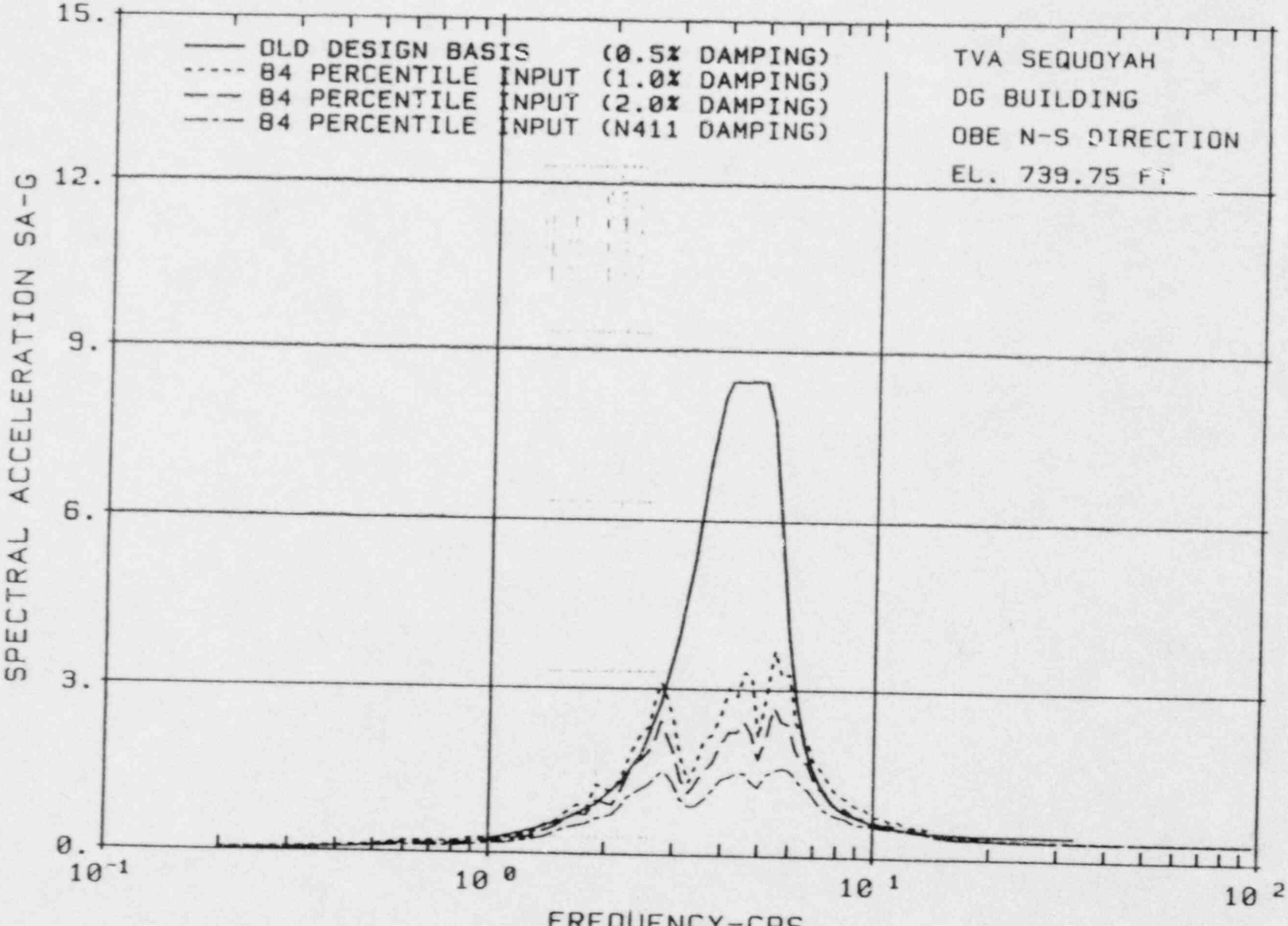

Figure B-4 COMPARISON OF ENVELOPE OF AVERAGED ARS

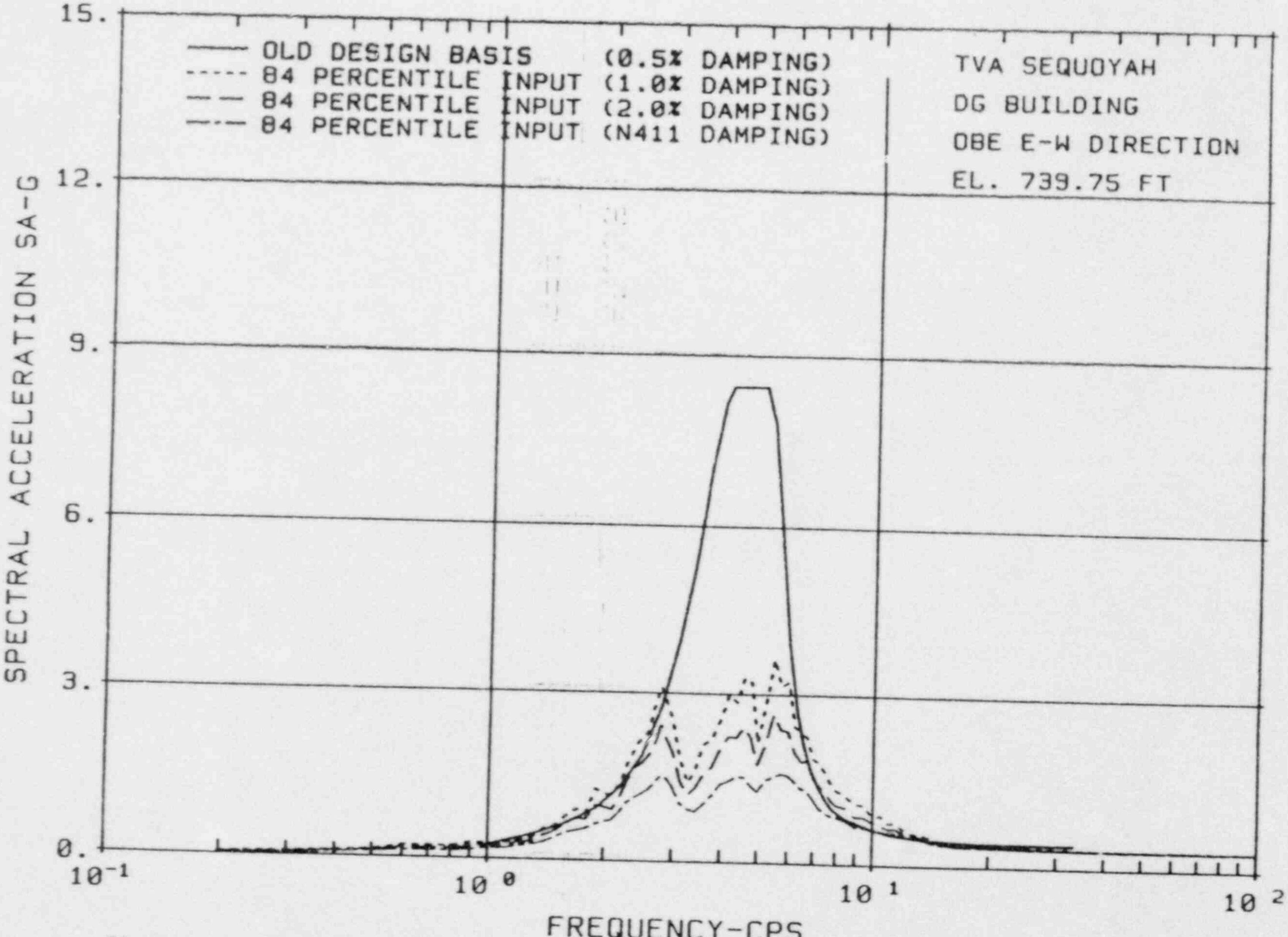

Figure B-5 COMPARISON OF ENVELOPE OF AVERAGED ARS

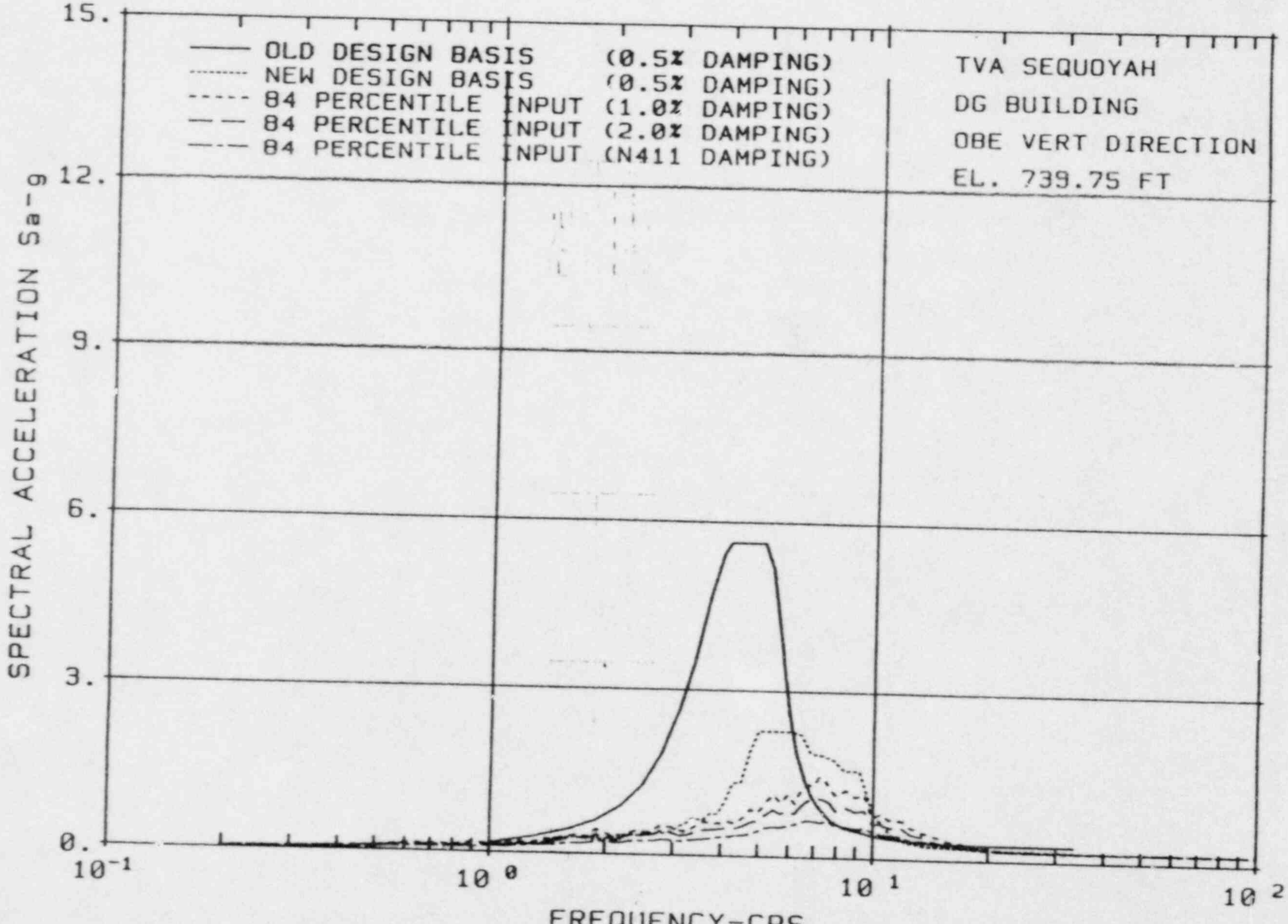

Figure B-6 COMPARISON OF ENVELOPE OF AVERAGED ARS

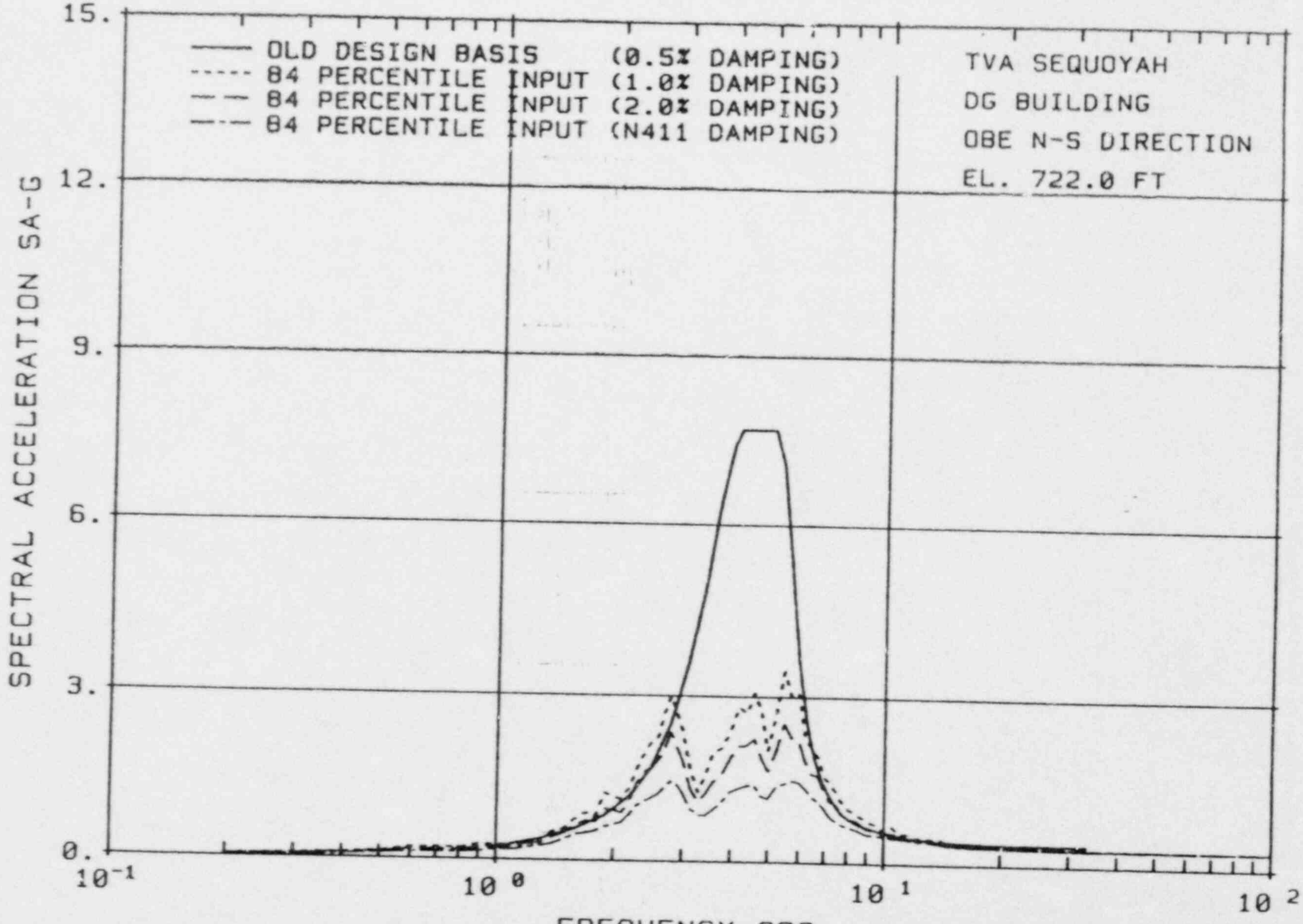

Figure B-7 COMPARISON OF ENVELOPE OF AVERAGED ARS

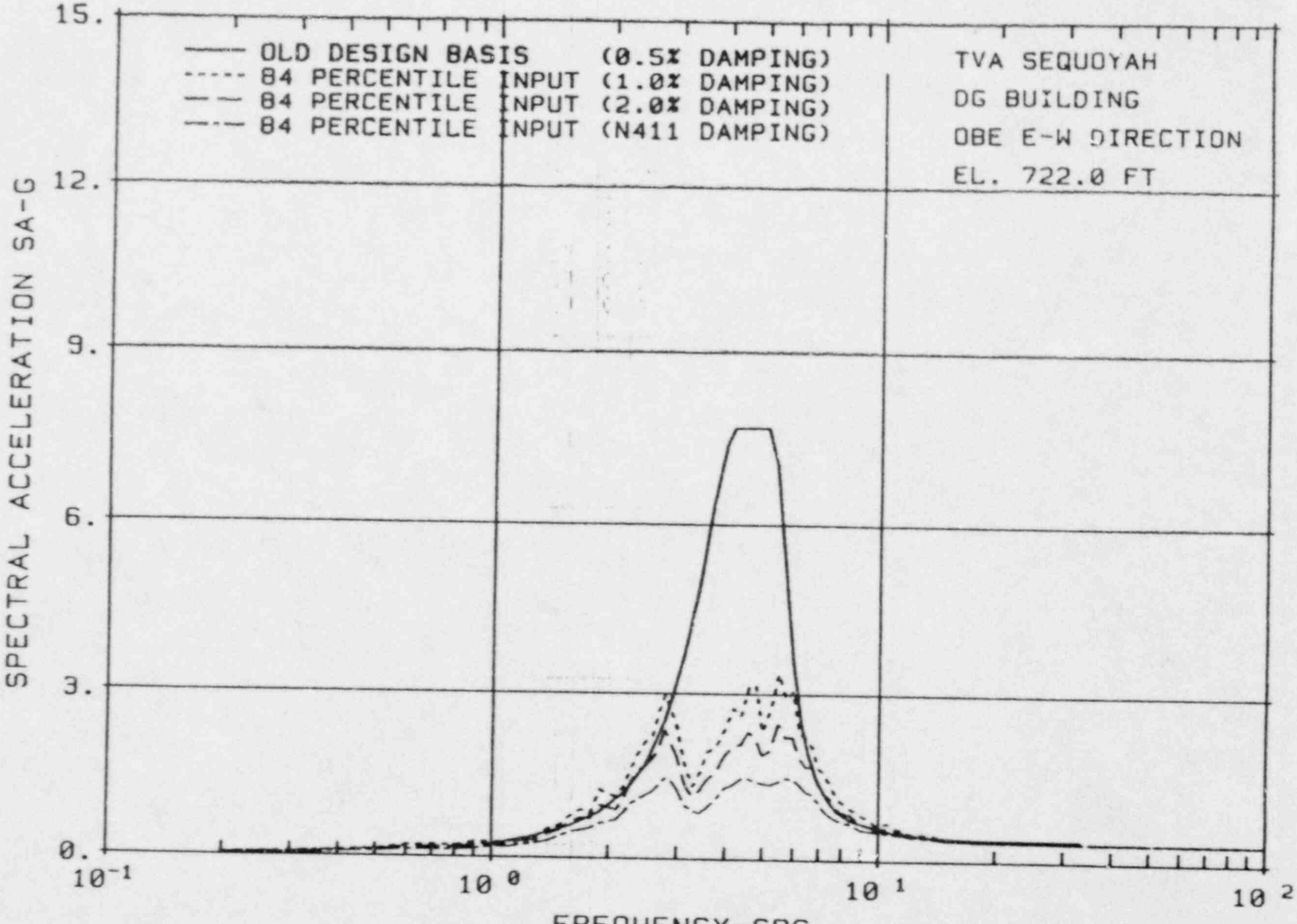

Figure B-8 COMPARISON OF ENVELOPE OF AVERAGED ARS

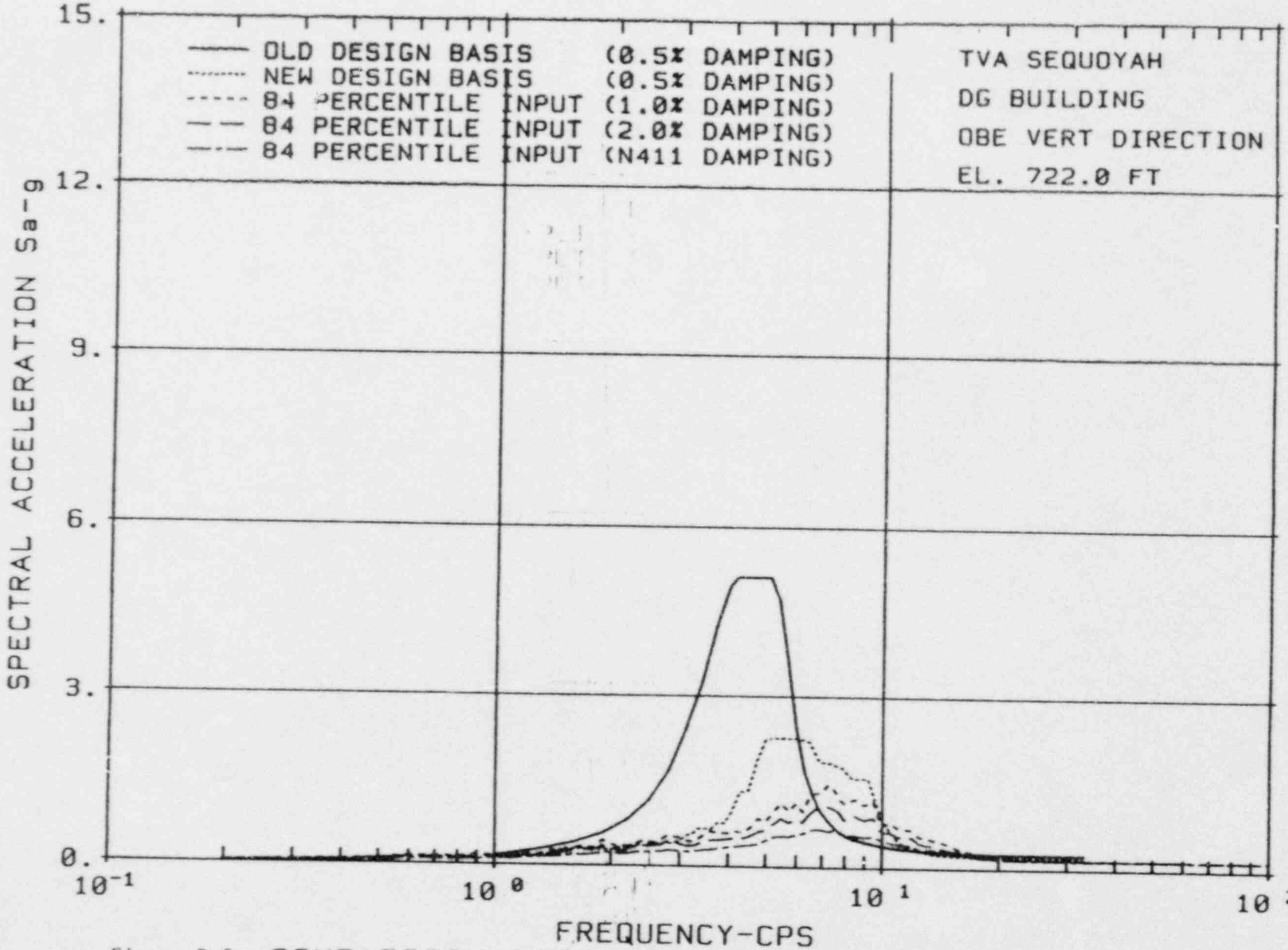

Figure B-9 COMPARISON OF ENVELOPE OF AVERAGED ARS

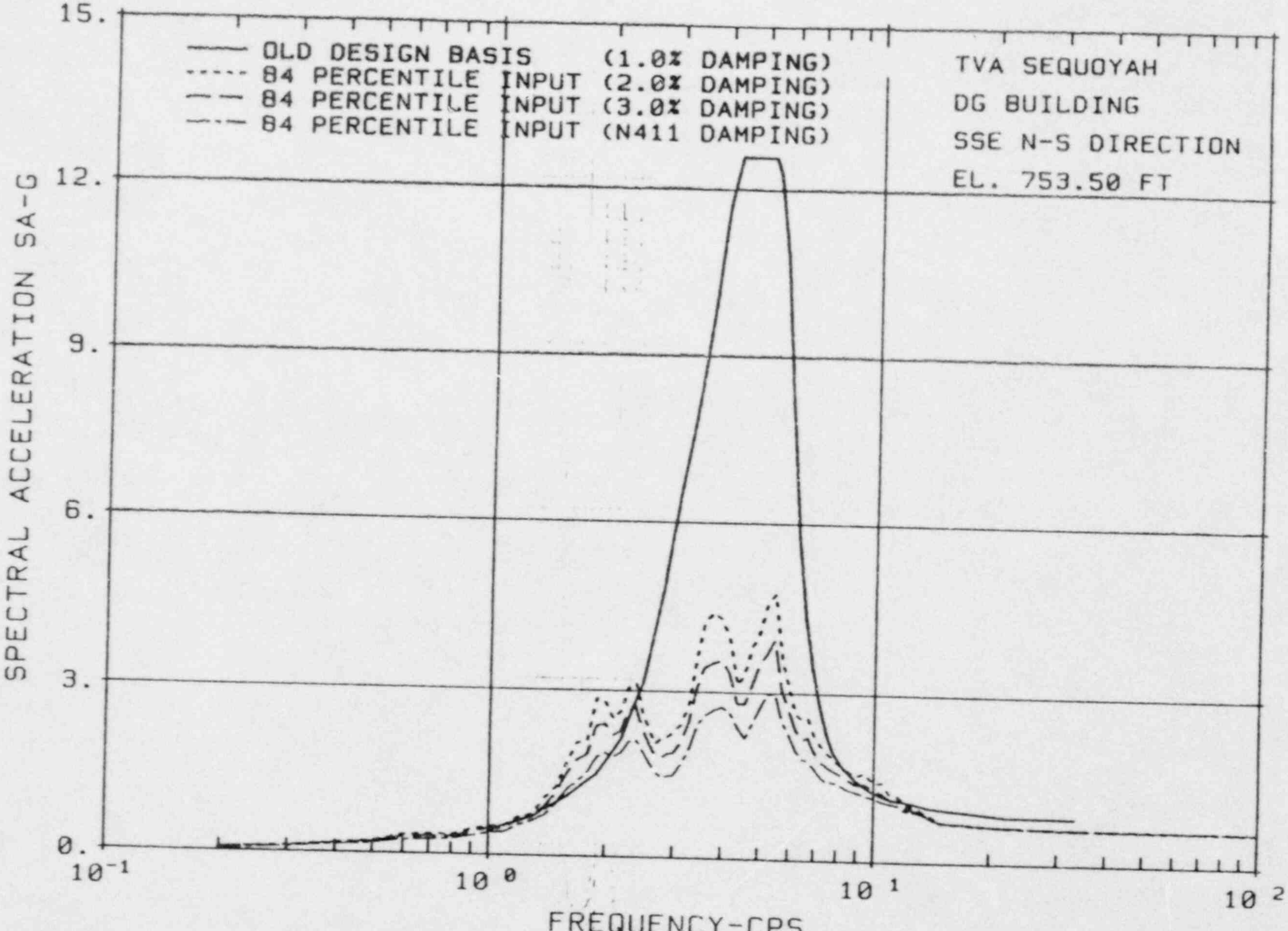

Figure B-10 COMPARISON OF ENVELOPE OF AVERAGED ARS

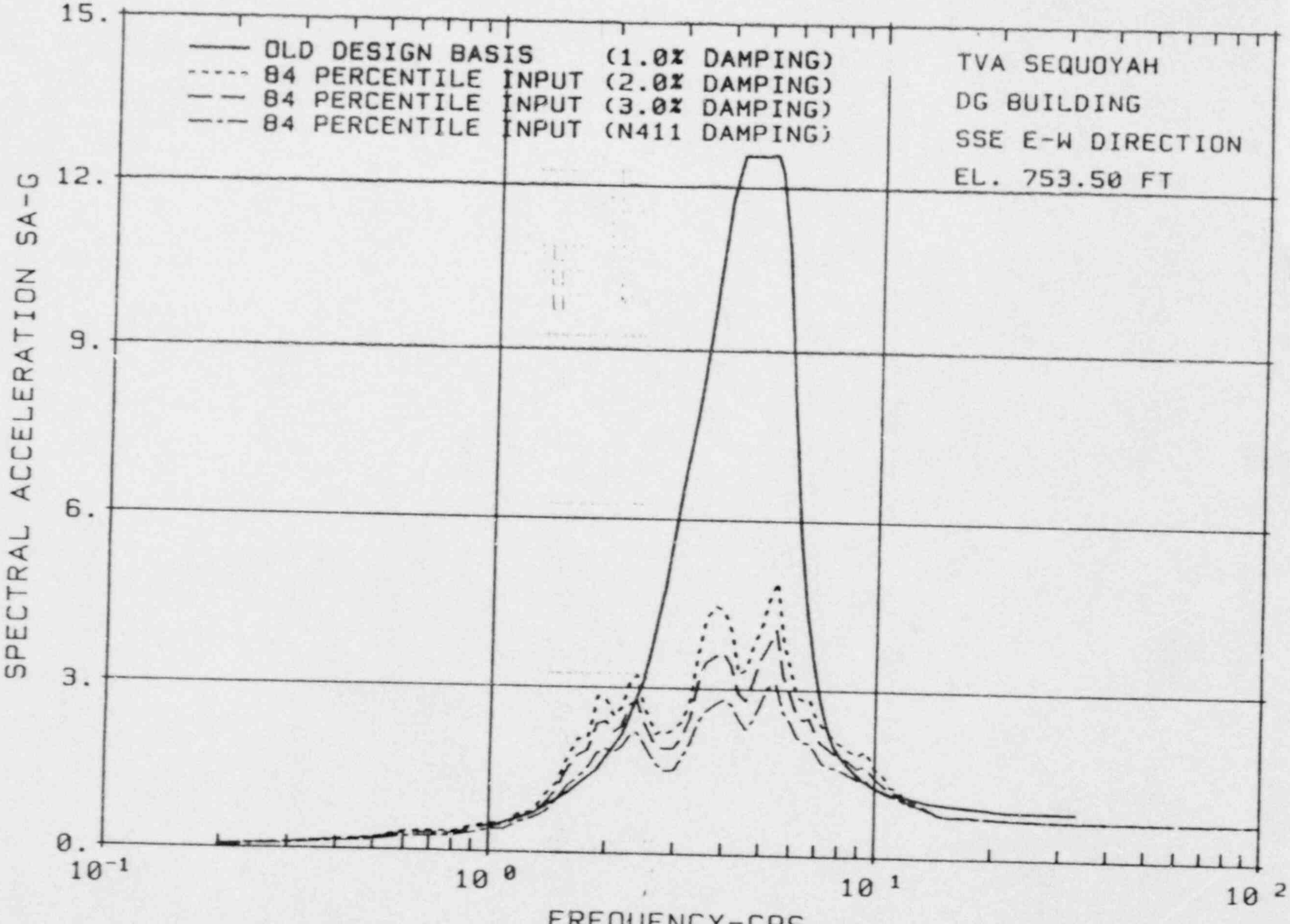

Figure B-11 COMPARISON OF ENVELOPE OF AVERAGED ARS

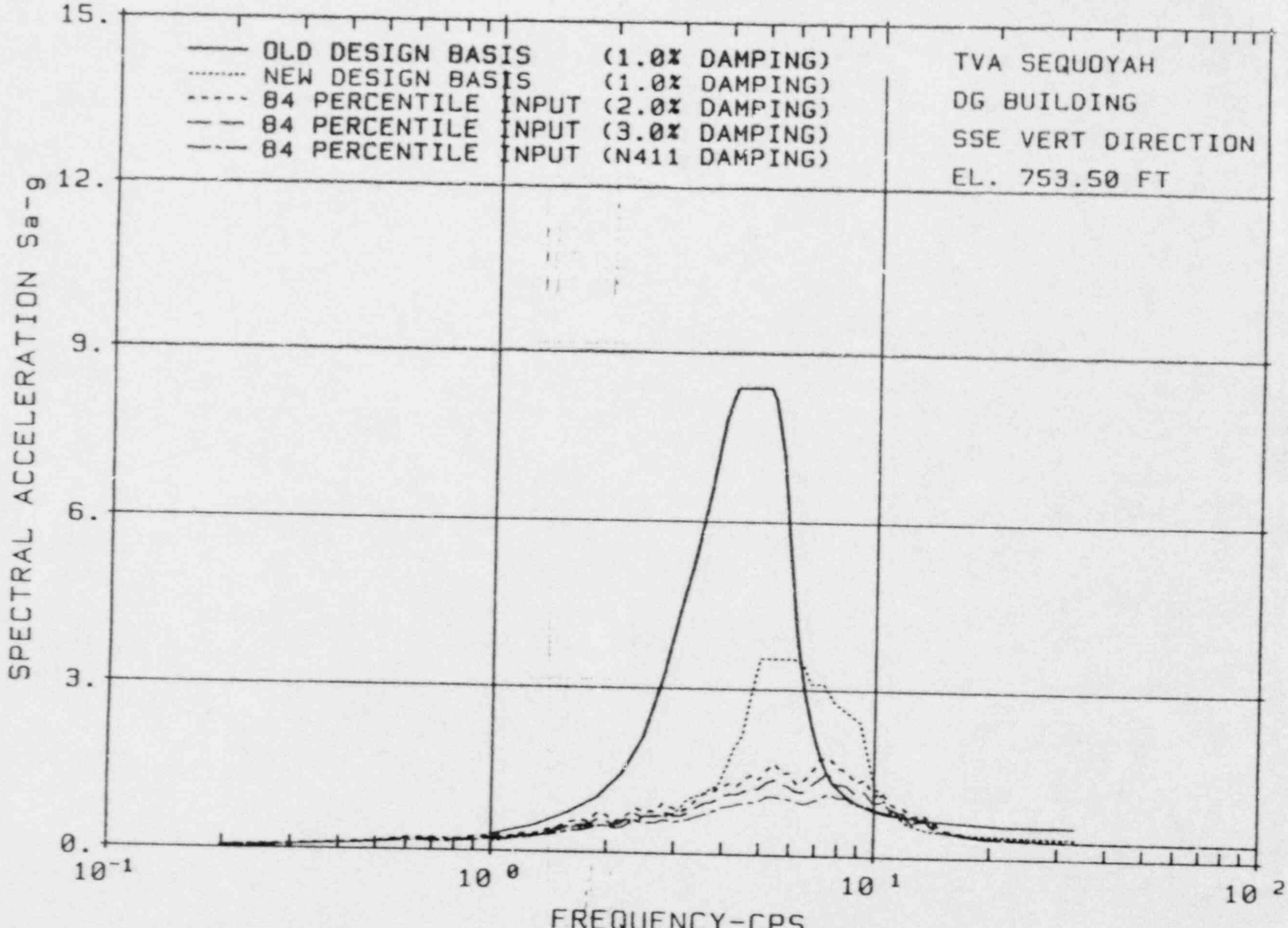

Figure B-12 COMPARISON OF ENVELOPE OF AVERAGED ARS

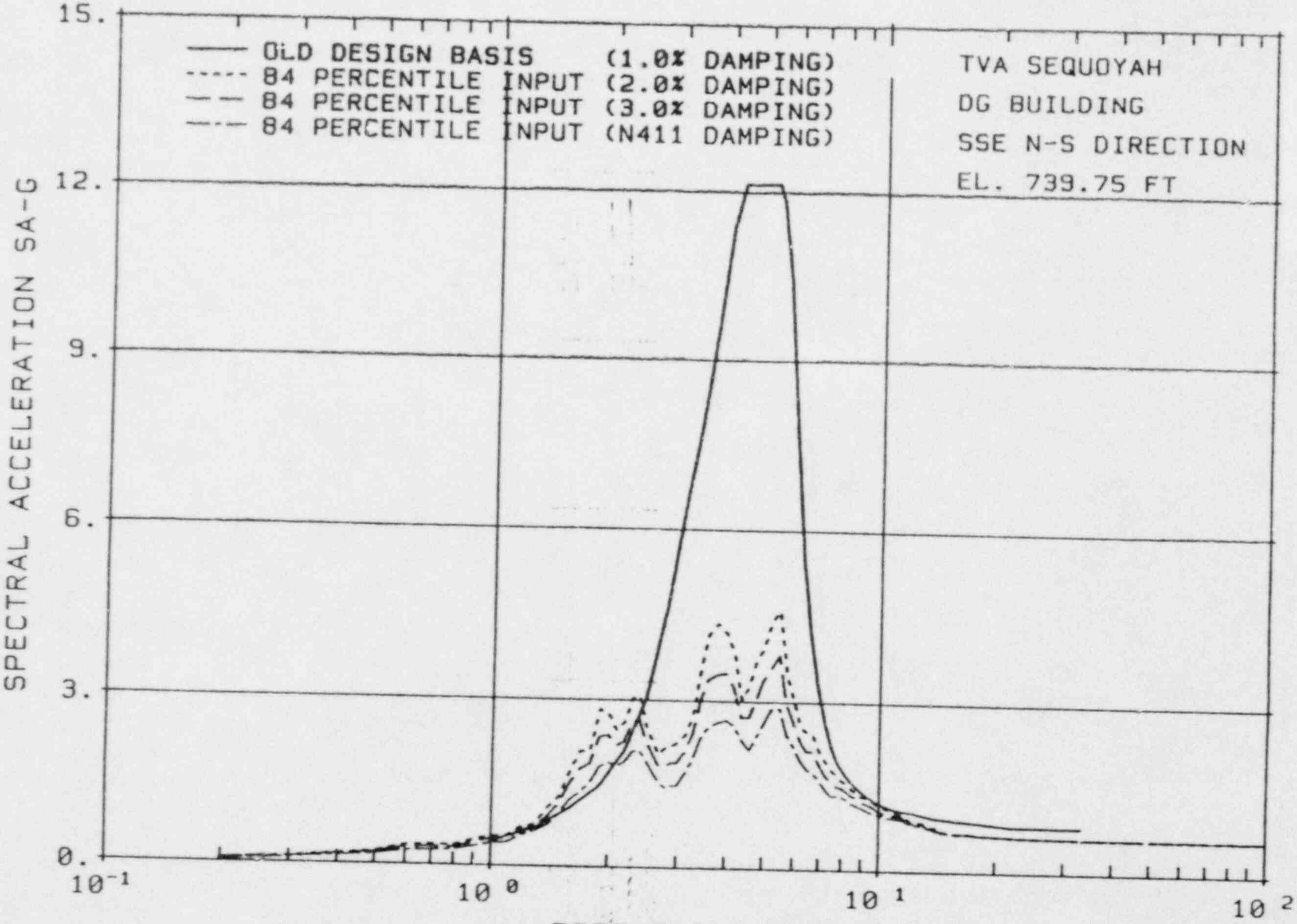

Figure B-13 COMPARISON OF ENVELOPE OF AVERAGED ARS

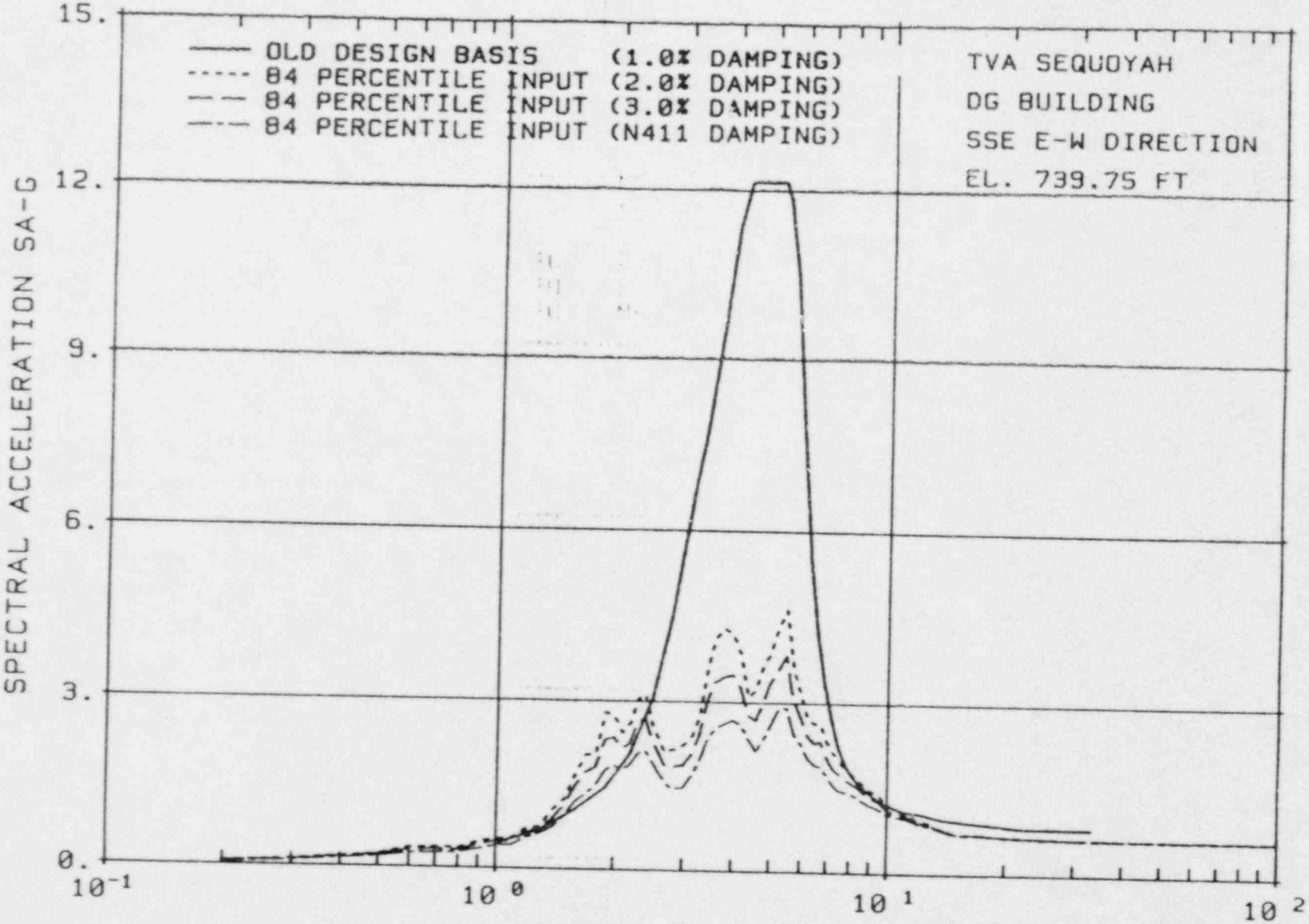

Figure B-14 COMPARISON OF ENVELOPE OF AVERAGED ARS

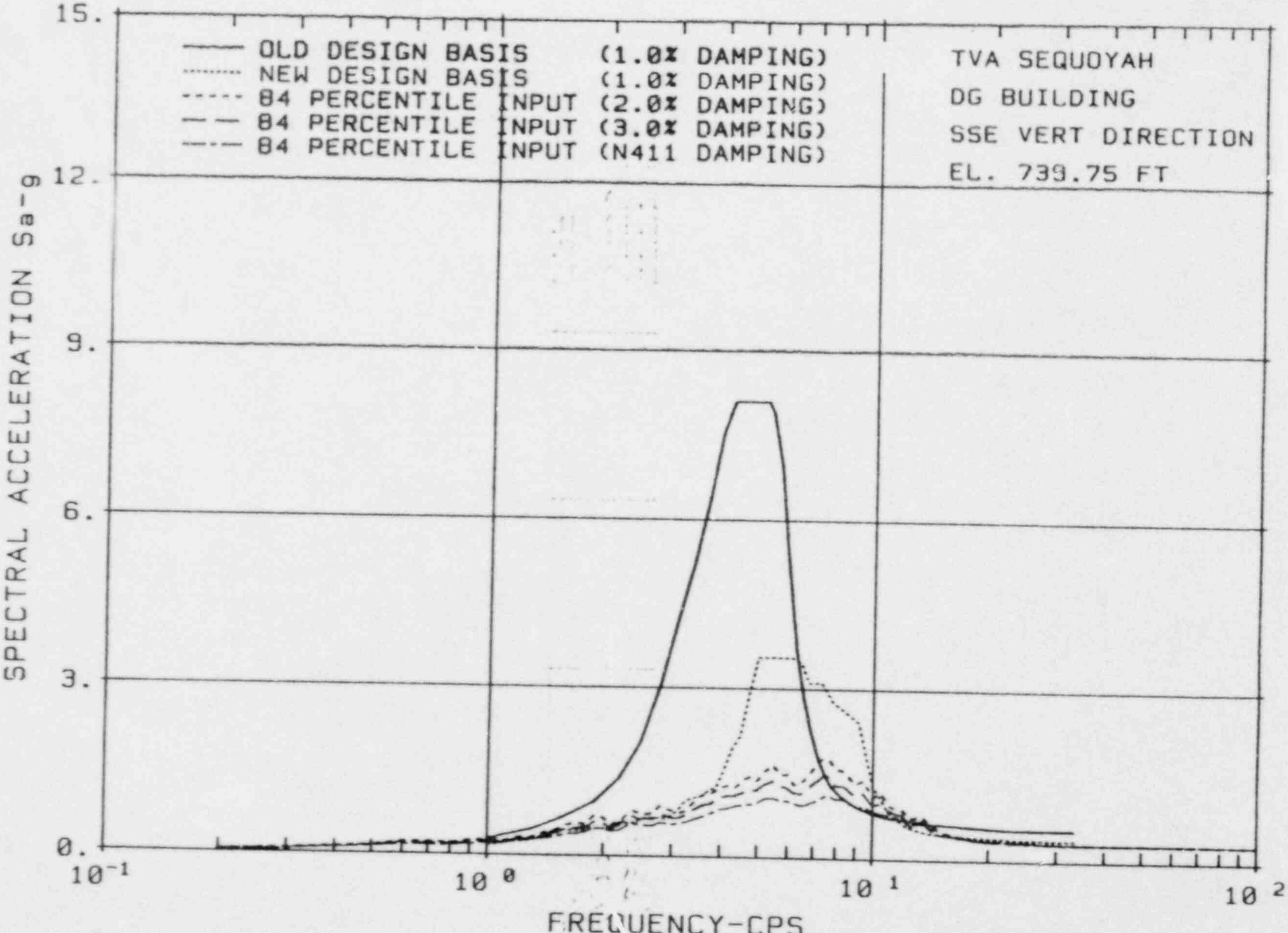

Figure B-15 COMPARISON OF ENVELOPE OF AVERAGED ARS

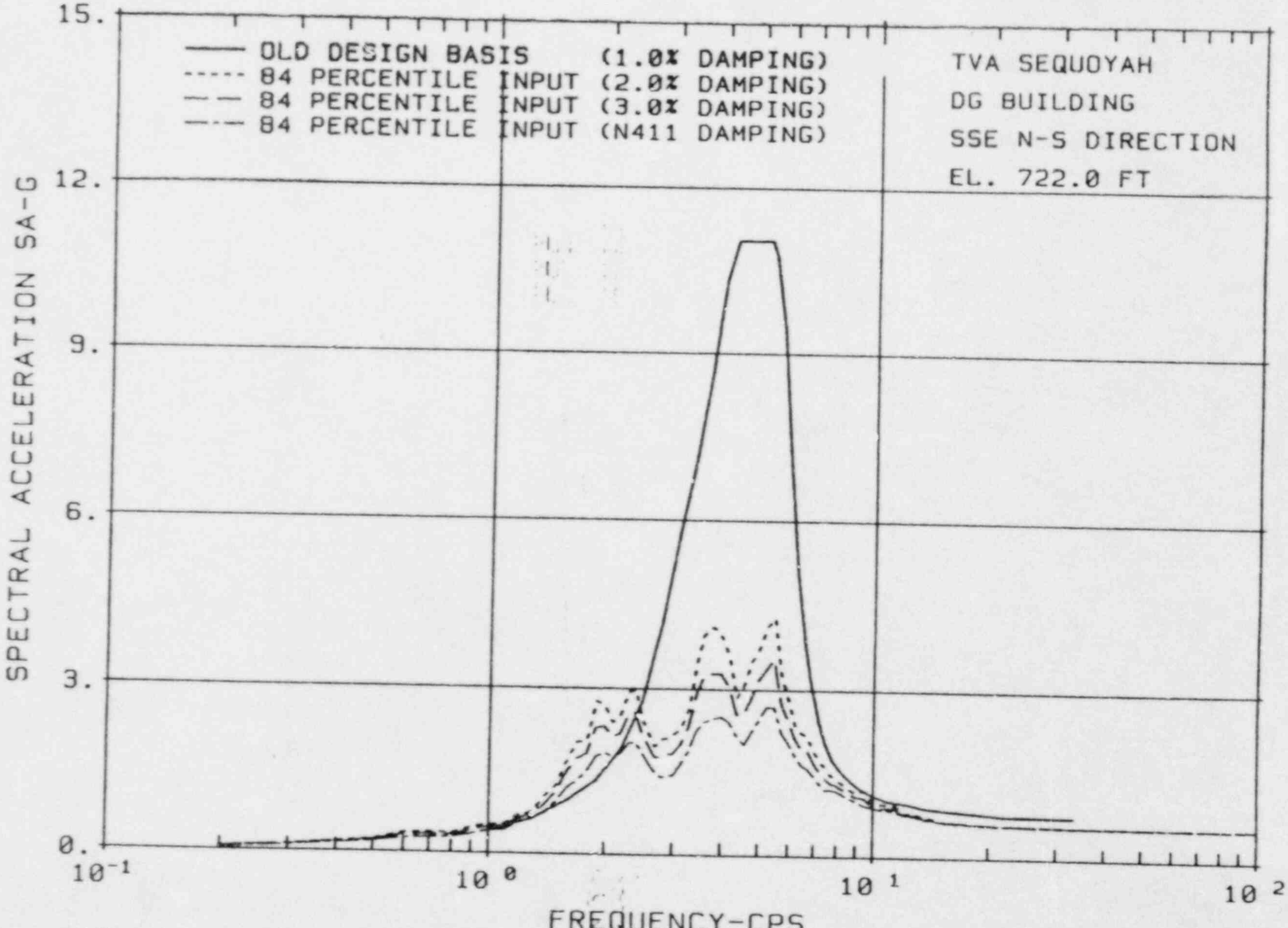

Figure B-16 COMPARISON OF ENVELOPE OF AVERAGED ARS

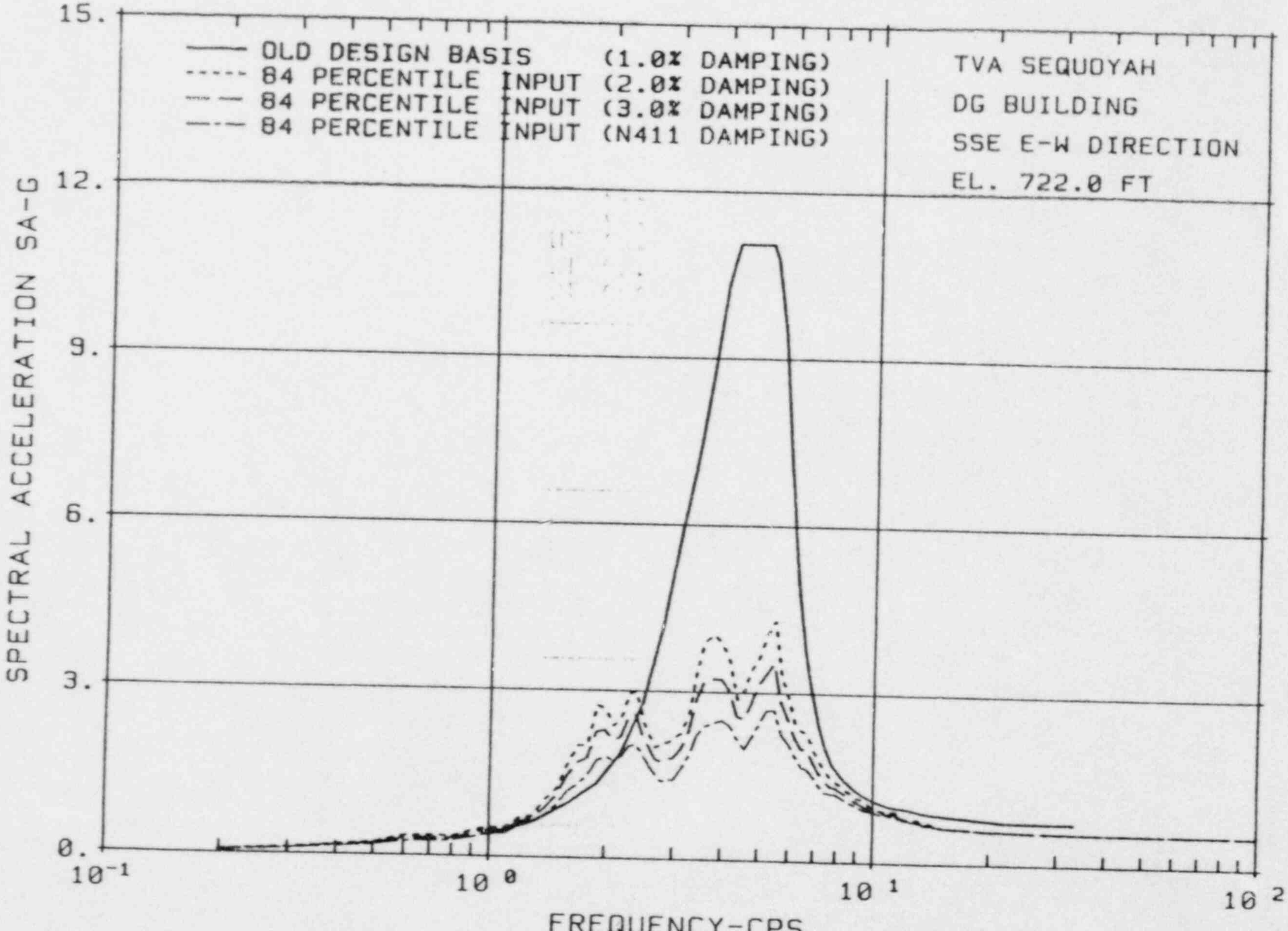

Figure B-17 COMPARISON OF ENVELOPE OF AVERAGED ARS

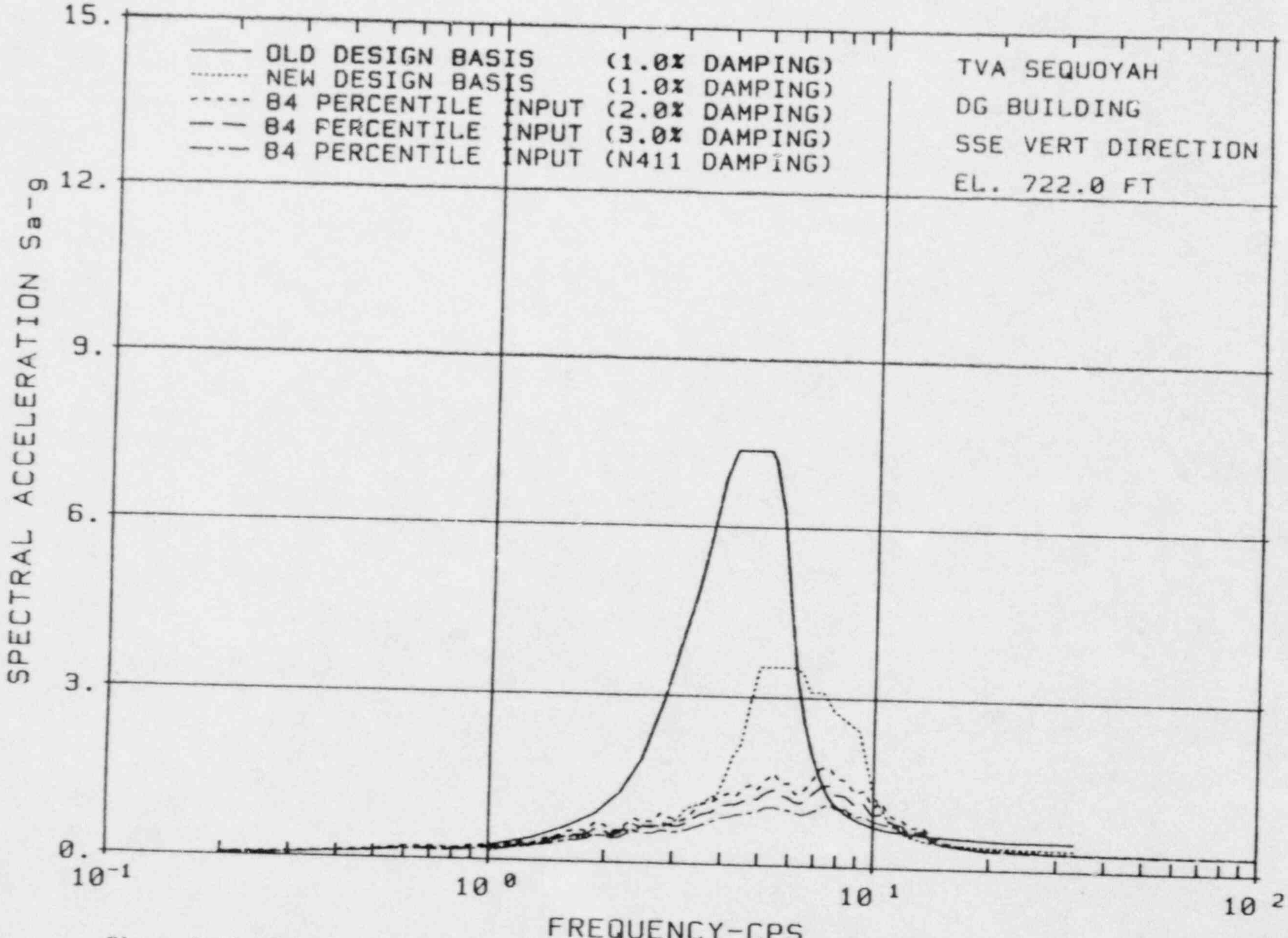

Figure B-18 COMPARISON OF ENVELOPE OF AVERAGED ARS

ATTACHMENT 2

DIESEL GENERATOR BUILDING

PIPING SYSTEMS REQUALIFICATION

1. Scope

To determine the effects of SQN CAQRSQF870242 on piping systems supported into Diesel Generator Building.

2. Technical Approach

In response to SQN CAQRSQF870242, updated floor response spectra were generated using time histories compatible with 84 percent site-specific spectra as input. The updated floor response spectra at Regulatory Guide 1.61 damping values are enveloped by the original design basis floor response spectra at FSAR damping values by a factor of at least two in the peak region. In the frequency region of interest for piping systems, the original design basis floor response spectra are exceeded by a small percentage between 7 Hz and 16 Hz. The original design basis floor response spectra were used in conjunction with a two-directional earthquake input, while the updated floor response spectra were used in conjunction with a three-directional earthquake input. The piping systems were requalified in both alternate analysis and rigorous analysis as follows:

A. Alternate Analysis

The original alternate analysis method generally used peak floor response spectrum values as input which is at least five times the ZPA value.

However, the piping systems qualified by alternate analysis method are generally rigid, i.e., with fundamental frequency around 33 Hz or higher. Thus, the ZPA value could have been used instead of the peak acceleration. Since the ZPA values of the updated floor response spectra and the original design basis floor response spectra are comparable, the original design basis alternate analysis has a built-in safety factor of at least five for a two-directional analysis. The difference between a two-directional analysis and a three-directional analysis is about a factor of square root of three divided by the square root of 2 or 1.22. Thus, the original design basis still has a safety factor of at least 5.0/1.22 or 4.1 against realistic seismic loads.

B. Rigorous Analysis

TPIPE program was used for rigorously analyzed piping. Frequencies and modal participation factors of all rigorously analyzed piping systems were examined. Systems with modal frequencies in the region

of 7 Hz to 17 Hz and with dominant participation factors in the same frequency region were identified. The ratios of the updated spectrum values to the original design basis spectrum values at those identified frequencies were conservatively applied to the system responses of all modes. The resulting piping stresses and support reactions were reevaluated and were found to meet either the design basis criteria or the CEB-CI-21.89 criteria.

3. Conclusion

SQN CAQRSQF870242 was investigated and found to have no impact on SQN unit 2 restart.

ATTACHMENT 3

DIESEL GENERATOR BUILDING

EQUIPMENT QUALIFICATION

1. Scope

To determine the effect of SQN CAQRSQF870242 on equipment contained in the Diesel Generator Building.

2. Technical Approach

Equipment in the Sequoyah Diesel Generator Building was typically purchased on combined Sequoyah-Watts Bar contracts, i.e., diesel generator system from Morrison-Knudsen Power Systems Division. The seismic qualification of such equipment was reviewed and approved for installation at both facilities. Therefore, an envelope of the spectra for both plants was used for equipment qualification, and clearly dominates the 84 percent site-specific response spectra. The frequencies (1-3 Hz) where the recalculated 84th percentile response spectra envelope the original design basis spectra are insignificant in nature and do not represent an adverse impact on the equipment qualification.

3. Conclusion

SQN CAQRSQF870242 was investigated and was found to have no impact on SQN unit 2 restart.