Charles R. Pierce
Regulatory Affairs Director

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SOUTHERN COMPANY

March 31, 2014

Docket Nos.: 50-348
50-364

NL-14-0342

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

Joseph M. Farley Nuclear Plant – Units 1 and 2
Seismic Hazard and Screening Report for CEUS Sites

References:

1. NRC Letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 10 CFR 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012.
2. NEI Letter to NRC, "Proposed Path Forward for NTTF Recommendation 2.1: Seismic Reevaluations," dated April 9, 2013. ML13101A379.
3. NRC Letter, EPRI Final Draft Report XXXXXX, Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," as an Acceptable Alternative to the March 12, 2012, Information Request for Seismic Reevaluations, dated May 7, 2013. ML13106A331.
4. EPRI Report 1025287, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic. ML12333A170.
5. NRC Letter, Endorsement of EPRI Final Draft Report 1025287, Seismic Evaluation Guidance, dated February 15, 2013. ML12319A074.

Ladies and Gentlemen:

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Reference 1 to all power reactor licensees and holders of construction permits in active or deferred status. Enclosure 1 of Reference 1 requested each addressee in the Central and Eastern United States (CEUS) to submit a Seismic Hazard Evaluation and Screening Report within 1.5 years from the date of Reference 1.

In Reference 2, the Nuclear Energy Institute (NEI) requested NRC agreement to delay submittal of the final CEUS Seismic Hazard Evaluation and Screening Reports so that an update to the Electric Power Research Institute (EPRI) ground motion attenuation model could be completed and used to develop that information. NEI proposed that descriptions of subsurface materials and properties and base case velocity profiles be submitted to the NRC by

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September 12, 2013, with the remaining seismic hazard and screening information submitted by March 31, 2014. NRC agreed with that proposed path forward in Reference 3.

Reference 4 contains industry guidance and detailed information to be included in the Seismic Hazard Evaluation and Screening Report submittals. NRC endorsed this industry guidance in Reference 5.

The attached Seismic Hazard Evaluation and Screening Report for the Joseph M. Farley Nuclear Plant (FNP) site provides the information described in Section 4 of Reference 4 in accordance with the schedule identified in Reference 2.

This letter contains no NRC regulatory commitments. If you have any questions, please contact John Giddens at 205.992.7924.

Mr. C.R. Pierce states he is Director of Regulatory Affairs of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and, to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

C. R. Pierce

C.R. Pierce
Regulatory Affairs Director

CRP/JMG/RCW

Sworn to and subscribed before me this 31 *day of* March, *2014.*

Laura L. Crights
Notary Public

My commission expires: 10/8/2017

Enclosure 1: Joseph M. Farley Nuclear Plant - Units 1 and 2
Seismic Hazard Reevaluation and Screening for Risk Evaluation

cc: Southern Nuclear Operating Company
Mr. S. E. Kuczynski, Chairman, President & CEO
Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer
Ms. C. A. Gayheart, Vice President – Farley
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U. S. Nuclear Regulatory Commission
Mr. V. M. McCree, Regional Administrator
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Mr. S. A. Williams, NRR Project Manager - Farley
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Mr. J. R. Sowa, Resident Inspector - Farley

Alabama Department of Public Health
Dr. D. E. Williamson, State Health Officer

SOUTHERN COMPANY

Enclosure 1 to SNC Letter
NL-14-0342

Joseph M. Farley Nuclear Plant
Units 1 and 2

Response to Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Fukushima Near-Term Task Force Recommendation 2.1: Seismic for
Seismic Hazard Reevaluation and Screening for Risk Evaluation

This report provides information in response to NRC's March 12, 2012, 10CFR50.54(f) letter requesting nuclear power plant licensees to perform seismic hazard reevaluation and screening for risk evaluation pursuant to the recommendations in NRC's Near-Term Task Force review of the accident at the Fukushima Dai-ichi nuclear facility.

1.0 Introduction

Following the accident at the Fukushima Daiichi nuclear power plant resulting from the March 11, 2011, Great Tohoku Earthquake and subsequent tsunami, the NRC Commission established a Near Term Task Force (NTTF) to conduct a systematic review of NRC processes and regulations and to determine if the agency should make additional improvements to its regulatory system. The NTTF developed a set of recommendations intended to clarify and strengthen the regulatory framework for protection against natural phenomena. Subsequently, the NRC issued a 50.54(f) letter that requests information to assure that these recommendations are addressed by all U.S. nuclear power plants. The 50.54(f) letter requests that licensees and holders of construction permits under 10 CFR Part 50 reevaluate the seismic hazards at their sites against present-day NRC requirements. Depending on the comparison between the reevaluated seismic hazard and the current design basis, the result is either no further risk evaluation or the performance of a seismic risk assessment. Risk assessment approaches acceptable to the staff include a seismic probabilistic risk assessment (SPRA), or a seismic margin assessment (SMA). Based upon the risk assessment results, the NRC staff will determine whether additional regulatory actions are necessary.

This report provides the information requested in items (1) through (7) of the "Requested Information" section and Attachment 1 of the 50.54(f) letter pertaining to NTTF Recommendation 2.1 for Plant Farley Units 1 and 2, located in Houston County, Alabama. In providing this information, Southern Nuclear Operating Company (SNC) followed the guidance provided in the *Seismic Evaluation Guidance: Screening, Prioritization, and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic* (EPRI 1025287, 2013a). The Augmented Approach, Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic (EPRI 3002000704, 2013c), has been developed as the process for evaluating critical plant equipment as an interim action to demonstrate additional plant safety margin, prior to performing the complete plant seismic risk evaluations.

The original geologic and seismic siting investigations for Plant Farley Units 1 and 2 were performed in accordance with Appendix A to 10 CFR Part 100 and meet General Design Criterion 2 in Appendix A to 10 CFR Part 50. The Safe Shutdown Earthquake Ground Motion (SSE) was developed in accordance with Appendix A to 10 CFR Part 100 and used for the design of seismic Category I systems, structures and components.

In response to the 50.54(f) letter and following the guidance provided in the SPID (EPRI 1025287, 2013a), a seismic hazard reevaluation was performed. For screening purposes, a Ground Motion Response Spectrum (GMRS) was developed.

Based on the results of the screening evaluation, Plant Farley Units 1 and 2 screens in under the special screening considerations for a Low Seismic Hazard Site per section 3.2.1.1 of the

SPID (EPRI 1025287, 2013a). Plant Farley screens in for a high frequency confirmation; and screens out for a spent fuel evaluation.

2.0 Seismic Hazard Reevaluation

Plant Farley Units 1 and 2 is located in southeast Alabama on the west side of the Chattahoochee River, about 6 miles north of the intersection of U.S. Highway 84 and State Highway 95. It is in the northeastern section of Houston County, Alabama, just across the river from Early County, Georgia. The site is about 100 miles southeast of Montgomery, Alabama, and about 180 miles south-southwest of Atlanta, Georgia.

The site is located in the extreme southeastern portion of the East Gulf Coastal Plain physiographic province, which covers about 65 percent of the State of Alabama. This province is underlain by Mesozoic and Cenozoic sedimentary rocks which dip southward at 10 to 25 feet per mile. These deposits consist of marine and nonmarine gravels, sands, silts, clays, marls, and their consolidated equivalents such as sandstone and limestone. In southeastern Alabama and southwestern Georgia, the gentle south-dipping Paleocene through Oligocene sequence is influenced by only minor structural features. These structures have been inactive since Miocene time, and do not affect materials underlying the site. The Lisbon formation (Eocene), which is a soft to moderately hard sedimentary rock and dense sand formation approximately 130 feet thick, is the principal material for most plant structures, but other structures are founded at essentially plant grade.

This region is one of the least seismically active regions in the United States and is characterized by few low-magnitude and low-intensity shocks. Historic records show that earthquakes have never been felt at the site with an intensity greater Modified Mercalli V and that no earthquake of epicentral intensity greater than Modified Mercalli IV has occurred within 150 miles of the plant site. Therefore, the maximum intensity postulated as having been experienced at the site, as a result of any historical earthquake, is a low to moderate V. This intensity corresponds to a surface acceleration of 0.03g on the Hershberger's (1956) curve. Therefore, conservatively 0.10g surface acceleration was selected for the safe shutdown earthquake (SSE). The modified Newmark spectral shape with a peak ground acceleration of 0.1g defined the Farley Units 1 and 2 SSE.

2.1 Regional and Local Geology

The regional and site (local) geology is described in detail in the Farley FSAR (SNC, 2014f) Section 2.5.1.

The site is underlain by approximately 7,000 feet of relatively unconsolidated Mesozoic and Cenozoic sands, gravels, clays, claystones, sandstones, and limestones. These strata overlie unmetamorphosed Paleozoic consolidated sedimentary units and dip uniformly to the south. No structural features affect the material underlying the site. Sediments in this province were deposited as the Gulf of Mexico subsided and the site environment changed from continental to marine. These coastal plain deposits strike in an east-west direction and dip to the south at about 10 to 25 feet per mile (SNC, 2014f). As a result of the regional subsidence, these deposits

generally thicken from north to south. It is assumed that the physical properties of each stratigraphic unit along strike are similar.

The site is within a transitional zone between the Atlantic and Gulf Coastal Plain provinces. However, the stratigraphy of the area is more closely allied with the Gulf Coastal Plain province. Scattered deep borings in Houston County, Alabama, and Early County, Georgia, indicate that pre-Cretaceous basement rock underlying the site consists of flat lying, consolidated, unmetamorphosed Paleozoic formations. Overlying the basement rock are relatively unconsolidated sedimentary units that range in age from Jurassic to Recent. These units dip Gulfward at about 10 to 25 feet/mile and thicken downdip. Sea level fluctuations resulted in erosion of the units after their deposition.

Materials from the following geologic units, listed from oldest to youngest, were found in geologic and foundation borings drilled at the site: Tallahatta, Lisbon, and Moodys Branch formations of Eocene age; Residuum of Oligocene and Miocene age; and floodplain deposits of Pleistocene and Recent age. Pilot holes for two water wells drilled at the site penetrated below the Tallahatta formation. One of the holes extended into the following geologic units, listed from oldest to youngest: Ripley and Providence formations of Late Cretaceous age; Clayton formation of Paleocene age; and Nanafalia, Tuscahoma, and Hatchetigbee formations of Early Eocene age.

Structural features in the vicinity of the site include the Gordon anticline and the Apalachicola embayment. Other features of questionable existence in the site vicinity include the Chattahoochee anticline, Fort Gaines fault, Cypress fault, and several small anticlines in southeastern Alabama. None of these structural units are of significance to the site. These features are discussed in detail in FSAR subsection 2.5.1.1.6.1, Description of Tectonic Structures (SNC, 2014f). A site structural geologic map showing contours of the top of the Lisbon formation is presented on Figure 2.5-8 of (SNC, 2014f). The Lisbon is the foundation for the major plant structures. The contours indicate that the Lisbon surface has been modified by post- depositional erosion. The erosion occurred before deposition of the Moodys Branch formation in the Upland and western floodplain areas, and is presently occurring near the channel of the Chattahoochee River. Structural features do not appear to influence the Lisbon surface.

2.2 Probabilistic Seismic Hazard Analysis

2.2.1 Probabilistic Seismic Hazard Analysis Results

LCI (2013a) is the source of the information presented in the following section.

In accordance with the 50.54(f) letter and following the guidance in the SPID (EPRI 1025287, 2013a), a probabilistic seismic hazard analysis (PSHA) was completed (LCI, 2013a) using the recently developed Central and Eastern United States Seismic Source Characterization (CEUS-SSC) for Nuclear Facilities (CEUS-SSC, 2012) together with the updated EPRI Ground-Motion

Model (GMM) for the CEUS (EPRI, 2013b). For the PSHA, a lower-bound moment magnitude (M_w) of 5.0 was used, as specified in the 50.54(f) letter (NRC, 2012).

For the PSHA (LCI, 2013b), the CEUS-SSC background seismic sources out to a distance of 400 miles (640 km) around Farley were included. This distance exceeds the 200 mile (320 km) recommendation contained in NRC (2007) and was chosen for completeness. Background sources included in this site analysis are the following:

1. Atlantic Highly Extended Crust (AHEX)
2. Extended Continental Crust—Atlantic Margin (ECC_AM)
3. Extended Continental Crust—Gulf Coast (ECC_GC)
4. Gulf Highly Extended Crust (GHEX)
5. Mesozoic and younger extended prior – narrow (MESE-N)
6. Mesozoic and younger extended prior – wide (MESE-W)
7. Midcontinent-Craton alternative A (MIDC_A)
8. Midcontinent-Craton alternative B (MIDC_B)
9. Midcontinent-Craton alternative C (MIDC_C)
10. Midcontinent-Craton alternative D (MIDC_D)
11. Non-Mesozoic and younger extended prior – narrow (NMESE-N)
12. Non-Mesozoic and younger extended prior – wide (NMESE-W)
13. Paleozoic Extended Crust narrow (PEZ_N)
14. Paleozoic Extended Crust wide (PEZ_W)
15. Reelfoot Rift (RR)
16. Reelfoot Rift including the Rough Creek Graben (RR-RCG)
17. Study region (STUDY_R)

Large magnitude CEUS-SSC (2012) Repeated Large Magnitude Earthquake (RLME) sources within 1,000 km of the site were also included in the analysis. These sources are:

1. Charleston
2. Commerce
3. Eastern Rift Margin Fault northern segment (ERM-N)
4. Eastern Rift Margin Fault southern segment (ERM-S)
5. Marianna
6. New Madrid Fault System (NMFS)
7. Wabash Valley

For each of the above background sources, the Gulf version of the updated CEUS EPRI GMM (EPRI, 2013b) was used to model the travel path of seismic waves. For the Charleston RLME source, a combination of the Gulf and mid-continent versions of the updated CEUS EPRI GMM is created using a weighting of 36% and 64%, respectively. For the RLME sources in the Mississippi embayment (Commerce, ERM-N, ERM-S, Marianna, NMFS, and Wabash), a combination of the Gulf and mid-continent versions of the updated CEUS EPRI GMM is created using a weighting of 20% and 80%, respectively. These percentages represent the relative fraction of the seismic wave travel path through these regions from the source to Farley.

2.2.2 Base Rock Seismic Hazard Curves

Hazard curves at Farley are calculated for base rock conditions (LCI, 2013a).

The procedure to develop probabilistic seismic hazard curves for base rock follows standard techniques documented in the technical literature (e.g., McGuire, 2004). Separate seismic hazard calculations are conducted for the 7 spectral frequencies for which ground motion equations are available (100 Hz=peak ground acceleration or PGA, 25 Hz, 10 Hz, 5 Hz, 2.5 Hz, 1 Hz, and 0.5 Hz). As discussed in Section 2.2.1, ground motion equations from the updated EPRI Ground-Motion Model (GMM) for the CEUS (EPRI, 2013b) were used for the calculation of base rock hazard. All spectral accelerations presented herein correspond to 5% of critical damping (LCI, 2013a). Figure 2.2.2-1 shows the mean base rock seismic hazard curves for the 7 spectral frequencies. The digital values for the mean and fractile hazard curves are provided in Table 2.2.2-1a through Table 2.2.2-1g.

Deaggregation of seismic hazard is calculated by determining the contribution by moment magnitude (M_w), distance (R), and number of logarithmic standard deviations from the median spectral amplitude (ε), grouping the contributions by M_w, R, and ε bin (LCI, 2013b). The contributions are calculated for individual seismic sources and are aggregated for all sources. The deaggregations are calculated by spectral frequency and mean annual frequency of exceedance (MAFE).

Deaggregation and determination of controlling M_w and R (LCI, 2013b) follows the methodology presented in Regulatory Guide 1.208 (NRC, 2007). Log-distance is used in the calculation of the controlling distance and linear- M_w is used in calculating the controlling magnitudes. When a substantial portion (> 5%) of the low frequency hazard (average of 1 and 2.5 Hz) is from distant sources (> 100 km), the controlling magnitude and distances are determined only from contributions from hazard at distances greater than 100 km. The resulting mean M_w and distance values from the controlling events are listed in Table 2.2.2-2 (LCI, 2013b).

Table 2.2.2-1a: Mean and Fractile Base Rock Seismic Hazard Curves for 100 Hz (PGA) at Farley (LCI, 2013a)

PGA(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	2.46E-02	1.15E-02	1.82E-02	2.39E-02	3.23E-02	3.79E-02
0.001	1.54E-02	6.54E-03	1.07E-02	1.49E-02	2.04E-02	2.57E-02
0.005	3.84E-03	7.55E-04	1.72E-03	3.33E-03	5.83E-03	8.85E-03
0.01	1.46E-03	2.19E-04	4.43E-04	1.04E-03	2.19E-03	4.70E-03
0.015	7.27E-04	9.65E-05	1.84E-04	4.37E-04	9.93E-04	2.80E-03
0.03	1.93E-04	2.22E-05	4.07E-05	9.79E-05	2.46E-04	8.12E-04
0.05	7.25E-05	7.03E-06	1.44E-05	3.79E-05	9.93E-05	2.84E-04
0.075	3.57E-05	2.60E-06	7.23E-06	1.95E-05	5.35E-05	1.23E-04
0.1	2.24E-05	1.25E-06	4.56E-06	1.31E-05	3.52E-05	7.45E-05
0.15	1.19E-05	4.07E-07	2.49E-06	7.34E-06	1.92E-05	3.79E-05
0.3	3.84E-06	5.83E-08	7.55E-07	2.46E-06	6.36E-06	1.20E-05
0.5	1.52E-06	1.20E-08	2.72E-07	9.79E-07	2.53E-06	4.77E-06
0.75	6.60E-07	3.33E-09	1.04E-07	4.13E-07	1.11E-06	2.10E-06
1.	3.44E-07	1.29E-09	4.77E-08	2.07E-07	5.91E-07	1.13E-06
1.5	1.24E-07	3.42E-10	1.32E-08	6.83E-08	2.13E-07	4.37E-07
3.	1.57E-08	1.53E-10	9.51E-10	6.64E-09	2.49E-08	6.54E-08
5.	2.50E-09	1.01E-10	1.79E-10	8.85E-10	3.79E-09	1.25E-08
7.5	4.67E-10	9.11E-11	1.20E-10	2.22E-10	7.34E-10	2.57E-09
10.	1.26E-10	9.11E-11	1.01E-10	1.53E-10	2.84E-10	8.35E-10

Table 2.2.2-1b: Mean and Fractile Base Rock Seismic Hazard Curves for 25 Hz at Farley (LCI, 2013a)

SA(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	3.09E-02	1.69E-02	2.46E-02	3.05E-02	3.73E-02	4.43E-02
0.001	2.08E-02	1.05E-02	1.57E-02	2.01E-02	2.57E-02	3.33E-02
0.005	6.34E-03	1.87E-03	3.42E-03	5.83E-03	8.98E-03	1.32E-02
0.01	3.13E-03	6.45E-04	1.23E-03	2.57E-03	4.83E-03	8.00E-03
0.015	1.88E-03	3.28E-04	6.17E-04	1.38E-03	2.92E-03	5.66E-03
0.03	6.73E-04	1.01E-04	1.74E-04	4.07E-04	9.11E-04	2.57E-03
0.05	2.80E-04	3.90E-05	6.93E-05	1.57E-04	3.63E-04	1.13E-03
0.075	1.33E-04	1.74E-05	3.28E-05	7.55E-05	1.82E-04	5.12E-04
0.1	7.78E-05	9.65E-06	1.90E-05	4.63E-05	1.15E-04	2.80E-04
0.15	3.80E-05	3.95E-06	9.51E-06	2.46E-05	6.09E-05	1.18E-04
0.3	1.24E-05	6.83E-07	3.19E-06	8.98E-06	2.07E-05	3.52E-05
0.5	5.47E-06	1.64E-07	1.36E-06	4.07E-06	9.24E-06	1.53E-05
0.75	2.74E-06	4.98E-08	6.54E-07	2.07E-06	4.70E-06	7.55E-06
1.	1.62E-06	2.01E-08	3.79E-07	1.23E-06	2.80E-06	4.56E-06
1.5	7.23E-07	5.83E-09	1.53E-07	5.42E-07	1.29E-06	2.01E-06
3.	1.44E-07	5.35E-10	2.35E-08	9.79E-08	2.64E-07	4.37E-07
5.	3.48E-08	1.57E-10	4.07E-09	2.07E-08	6.17E-08	1.20E-07
7.5	9.64E-09	1.53E-10	8.98E-10	4.98E-09	1.67E-08	3.73E-08
10.	3.53E-09	1.25E-10	3.14E-10	1.62E-09	6.09E-09	1.49E-08

Table 2.2.2-1c: Mean and Fractile Base Rock Seismic Hazard Curves for 10 Hz at Farley (LCI, 2013a)

SA(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	3.64E-02	2.32E-02	2.96E-02	3.63E-02	4.37E-02	4.83E-02
0.001	2.54E-02	1.49E-02	1.95E-02	2.49E-02	3.14E-02	3.63E-02
0.005	7.87E-03	3.37E-03	4.83E-03	7.55E-03	1.08E-02	1.36E-02
0.01	3.91E-03	1.16E-03	1.84E-03	3.47E-03	5.91E-03	8.23E-03
0.015	2.33E-03	5.42E-04	9.24E-04	1.90E-03	3.68E-03	5.66E-03
0.03	7.72E-04	1.32E-04	2.35E-04	5.27E-04	1.15E-03	2.42E-03
0.05	2.94E-04	4.70E-05	8.12E-05	1.84E-04	4.01E-04	1.01E-03
0.075	1.29E-04	1.92E-05	3.47E-05	7.89E-05	1.79E-04	4.37E-04
0.1	7.12E-05	9.93E-06	1.90E-05	4.43E-05	1.04E-04	2.25E-04
0.15	3.18E-05	3.79E-06	8.35E-06	2.13E-05	5.05E-05	9.37E-05
0.3	9.02E-06	5.66E-07	2.32E-06	6.54E-06	1.51E-05	2.53E-05
0.5	3.63E-06	1.18E-07	8.72E-07	2.68E-06	6.17E-06	1.01E-05
0.75	1.68E-06	3.14E-08	3.84E-07	1.21E-06	2.88E-06	4.77E-06
1.	9.37E-07	1.15E-08	2.01E-07	6.73E-07	1.64E-06	2.68E-06
1.5	3.82E-07	2.64E-09	7.23E-08	2.68E-07	6.73E-07	1.13E-06
3.	6.42E-08	2.53E-10	8.85E-09	3.95E-08	1.16E-07	2.13E-07
5.	1.36E-08	1.53E-10	1.38E-09	7.23E-09	2.35E-08	5.05E-08
7.5	3.34E-09	1.25E-10	3.19E-10	1.57E-09	5.75E-09	1.38E-08
10.	1.12E-09	1.01E-10	1.64E-10	5.27E-10	1.95E-09	4.90E-09

Table 2.2.2-1d: Mean and Fractile Base Rock Seismic Hazard Curves for 5 Hz at Farley (LCI, 2013a)

SA(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	3.88E-02	2.42E-02	3.05E-02	3.90E-02	4.77E-02	5.20E-02
0.001	2.74E-02	1.53E-02	2.01E-02	2.72E-02	3.52E-02	3.95E-02
0.005	8.02E-03	3.47E-03	5.05E-03	7.77E-03	1.10E-02	1.32E-02
0.01	3.79E-03	1.15E-03	1.90E-03	3.47E-03	5.66E-03	7.45E-03
0.015	2.13E-03	5.05E-04	8.85E-04	1.82E-03	3.28E-03	4.90E-03
0.03	5.94E-04	1.07E-04	1.92E-04	4.19E-04	8.85E-04	1.77E-03
0.05	1.92E-04	3.09E-05	5.75E-05	1.20E-04	2.68E-04	6.00E-04
0.075	7.36E-05	1.13E-05	2.10E-05	4.63E-05	1.07E-04	2.29E-04
0.1	3.75E-05	5.35E-06	1.05E-05	2.46E-05	5.66E-05	1.13E-04
0.15	1.53E-05	1.74E-06	4.19E-06	1.08E-05	2.49E-05	4.31E-05
0.3	3.81E-06	1.98E-07	9.51E-07	2.80E-06	6.45E-06	1.05E-05
0.5	1.37E-06	3.37E-08	3.09E-07	9.93E-07	2.39E-06	3.95E-06
0.75	5.73E-07	7.66E-09	1.13E-07	4.13E-07	1.02E-06	1.74E-06
1.	2.95E-07	2.68E-09	5.20E-08	2.04E-07	5.35E-07	9.11E-07
1.5	1.07E-07	6.09E-10	1.53E-08	6.83E-08	1.92E-07	3.52E-07
3.	1.46E-08	1.53E-10	1.34E-09	7.34E-09	2.53E-08	5.42E-08
5.	2.64E-09	1.13E-10	2.39E-10	1.13E-09	4.50E-09	1.08E-08
7.5	5.74E-10	9.79E-11	1.42E-10	2.84E-10	1.02E-09	2.64E-09
10.	1.77E-10	9.11E-11	1.01E-10	1.62E-10	3.73E-10	9.37E-10

Table 2.2.2-1e: Mean and Fractile Base Rock Seismic Hazard Curves for 2.5 Hz at Farley (LCI, 2013a)

SA(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	3.70E-02	2.32E-02	2.80E-02	3.63E-02	4.63E-02	5.12E-02
0.001	2.53E-02	1.40E-02	1.79E-02	2.46E-02	3.33E-02	3.79E-02
0.005	6.96E-03	3.05E-03	4.31E-03	6.73E-03	9.65E-03	1.16E-02
0.01	3.29E-03	9.93E-04	1.60E-03	2.96E-03	4.98E-03	6.64E-03
0.015	1.81E-03	4.19E-04	7.03E-04	1.51E-03	2.88E-03	4.25E-03
0.03	4.38E-04	6.83E-05	1.20E-04	2.96E-04	6.93E-04	1.36E-03
0.05	1.11E-04	1.51E-05	2.80E-05	6.83E-05	1.67E-04	3.90E-04
0.075	3.35E-05	4.43E-06	8.72E-06	2.04E-05	5.12E-05	1.16E-04
0.1	1.44E-05	1.84E-06	3.79E-06	9.11E-06	2.32E-05	4.63E-05
0.15	4.89E-06	4.90E-07	1.20E-06	3.33E-06	8.35E-06	1.51E-05
0.3	1.01E-06	3.84E-08	1.92E-07	6.64E-07	1.77E-06	3.23E-06
0.5	3.28E-07	5.05E-09	4.70E-08	1.98E-07	5.91E-07	1.10E-06
0.75	1.27E-07	1.08E-09	1.36E-08	7.03E-08	2.25E-07	4.56E-07
1.	6.25E-08	3.95E-10	5.27E-09	3.09E-08	1.10E-07	2.32E-07
1.5	2.12E-08	1.53E-10	1.27E-09	8.60E-09	3.73E-08	8.47E-08
3.	2.55E-09	1.01E-10	1.69E-10	7.77E-10	4.13E-09	1.13E-08
5.	4.12E-10	9.11E-11	1.08E-10	1.90E-10	6.93E-10	2.01E-09
7.5	8.16E-11	9.11E-11	1.01E-10	1.53E-10	2.19E-10	4.90E-10
10.	2.34E-11	9.11E-11	1.01E-10	1.53E-10	1.55E-10	2.32E-10

Table 2.2.2-1f: Mean and Fractile Base Rock Seismic Hazard Curves for 1 Hz at Farley (LCI, 2013a)

SA(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	2.34E-02	1.08E-02	1.57E-02	2.32E-02	3.09E-02	3.63E-02
0.001	1.45E-02	6.64E-03	9.51E-03	1.42E-02	1.92E-02	2.35E-02
0.005	4.08E-03	1.05E-03	1.87E-03	3.79E-03	6.26E-03	8.12E-03
0.01	1.93E-03	2.42E-04	5.35E-04	1.57E-03	3.33E-03	4.90E-03
0.015	1.05E-03	8.60E-05	2.04E-04	7.23E-04	1.92E-03	3.09E-03
0.03	2.40E-04	1.13E-05	2.84E-05	1.18E-04	4.19E-04	8.72E-04
0.05	5.55E-05	2.22E-06	5.35E-06	2.25E-05	8.72E-05	2.32E-04
0.075	1.41E-05	5.66E-07	1.32E-06	5.42E-06	1.98E-05	6.26E-05
0.1	4.98E-06	2.07E-07	4.98E-07	1.98E-06	6.93E-06	2.19E-05
0.15	1.16E-06	4.50E-08	1.29E-07	4.83E-07	1.84E-06	4.70E-06
0.3	1.46E-07	2.72E-09	1.13E-08	5.75E-08	2.46E-07	5.91E-07
0.5	4.15E-08	3.19E-10	1.79E-09	1.31E-08	6.54E-08	1.82E-07
0.75	1.51E-08	1.53E-10	4.56E-10	3.63E-09	2.25E-08	7.03E-08
1.	7.07E-09	1.23E-10	2.13E-10	1.40E-09	9.93E-09	3.47E-08
1.5	2.24E-09	1.01E-10	1.53E-10	3.79E-10	2.84E-09	1.13E-08
3.	2.44E-10	9.11E-11	1.01E-10	1.53E-10	3.19E-10	1.25E-09
5.	3.72E-11	9.11E-11	1.01E-10	1.53E-10	1.53E-10	2.76E-10
7.5	7.12E-12	9.11E-11	9.11E-11	1.53E-10	1.53E-10	1.55E-10
10.	2.01E-12	9.11E-11	9.11E-11	1.53E-10	1.53E-10	1.53E-10

Table 2.2.2-1g: Mean and Fractile Base Rock Seismic Hazard Curves for 0.5 Hz at Farley (LCI, 2013a)

SA(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	1.21E-02	6.36E-03	8.47E-03	1.16E-02	1.57E-02	1.92E-02
0.001	7.74E-03	3.52E-03	4.90E-03	7.45E-03	1.05E-02	1.31E-02
0.005	2.42E-03	2.80E-04	6.73E-04	2.04E-03	4.13E-03	5.83E-03
0.01	1.06E-03	4.70E-05	1.44E-04	6.83E-04	2.04E-03	3.33E-03
0.015	5.40E-04	1.40E-05	4.63E-05	2.72E-04	1.04E-03	1.92E-03
0.03	1.13E-04	1.44E-06	4.90E-06	3.42E-05	1.87E-04	5.05E-04
0.05	2.52E-05	2.57E-07	8.12E-07	5.75E-06	3.47E-05	1.20E-04
0.075	6.26E-06	6.09E-08	1.87E-07	1.25E-06	7.45E-06	2.92E-05
0.1	2.14E-06	2.01E-08	6.45E-08	4.19E-07	2.53E-06	9.51E-06
0.15	4.50E-07	3.84E-09	1.44E-08	8.98E-08	6.17E-07	1.90E-06
0.3	4.26E-08	2.60E-10	1.11E-09	7.23E-09	5.50E-08	2.10E-07
0.5	1.10E-08	1.25E-10	2.04E-10	1.34E-09	1.11E-08	5.91E-08
0.75	3.93E-09	1.01E-10	1.53E-10	3.79E-10	3.19E-09	2.10E-08
1.	1.85E-09	9.11E-11	1.13E-10	2.01E-10	1.31E-09	9.37E-09
1.5	5.97E-10	9.11E-11	1.01E-10	1.53E-10	3.84E-10	2.72E-09
3.	6.76E-11	9.11E-11	9.79E-11	1.53E-10	1.53E-10	3.42E-10
5.	1.08E-11	9.11E-11	9.11E-11	1.53E-10	1.53E-10	1.55E-10
7.5	2.13E-12	9.11E-11	9.11E-11	1.53E-10	1.53E-10	1.53E-10
10.	6.15E-13	9.11E-11	9.11E-11	1.53E-10	1.53E-10	1.53E-10

Table 2.2.2-2: Mean M_w and distance values for the high frequency (HF) and low frequency (LF) cases (LCI, 2013b).

	10^{-4} UHRS	10^{-5} UHRS	10^{-6} UHRS
Low Frequency M	7.4*	7.4*	7.5*
Low Frequency R (km)	520*	480*	450*
High Frequency M	6.4	6.0	6.0
High Frequency R (km)	140	33	15

*M and R calculated for R>100 km per NRC (2007), because the contribution to hazard for R>100 km is more than 5% of the total hazard.

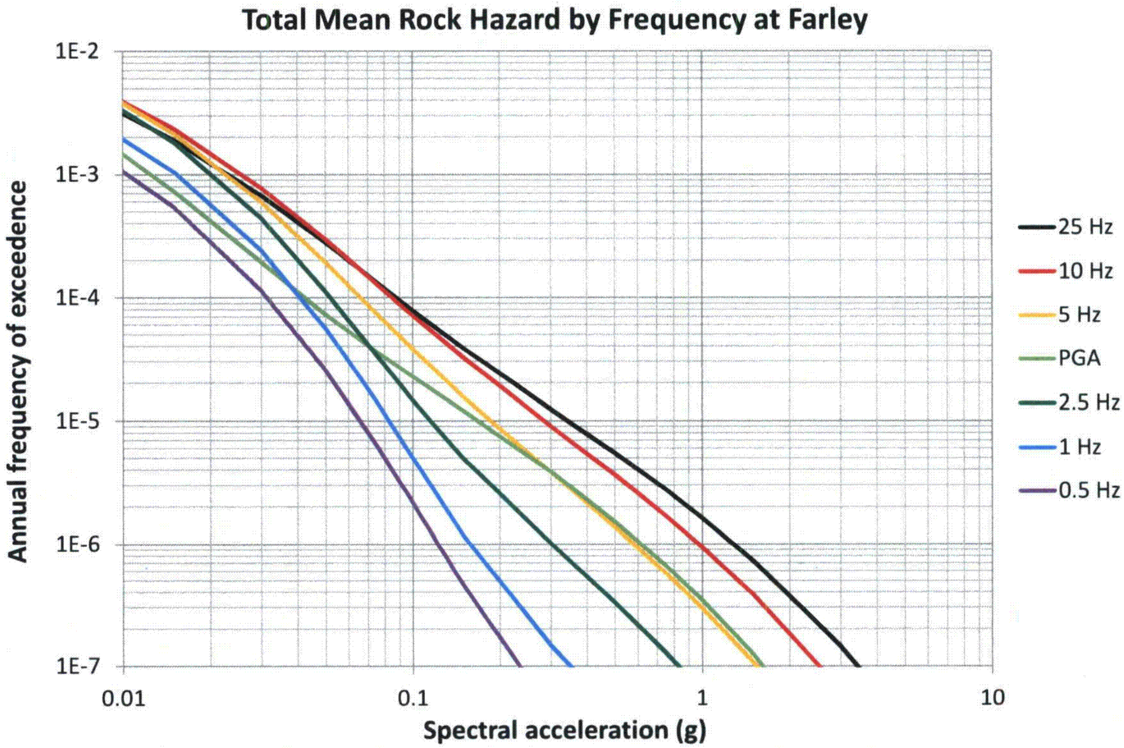

Figure 2.2.2-1: Mean base rock hazard curves for frequencies of 0.5, 1, 2.5, 5, 10, 25 and 100 (PGA) Hz at Farley at 5% spectral damping.

2.3 Site Response Evaluation

A site response analysis was performed for the Farley site following the guidance contained in Seismic Enclosure 1 of the 3/12/2012 50.54(f) Request for Information and in the SPID (EPRI, 2013a) for nuclear power plant sites that are not sited on hard rock (defined as 2.83 km/sec or 9,200 feet/sec).

2.3.1 Description of Subsurface Material

SNC Calculation SC-SNC539158-004 (SNC, 2014a) is the source of the information presented in the following section.

Available site specific subsurface data were obtained from subsurface exploration for the FSAR (SNC, 2014f) and subsequent studies carried out for the independent spent fuel storage installation (ISFSI) foundations (SNC, 2001). However, these data are limited with regard to the determination of dynamic properties and a site–specific shear wave velocity (Vs) profile. For example, the previous site explorations extended only to an elevation of -150 feet, with plant grade at El. 155 feet (note, all elevations herein are with respect to mean sea level). Data included field and laboratory test results on representative samples from soil borings. The geologic conditions below El. -150 feet were developed for the FSAR using data from regional oil test wells and pilot holes drilled at the site for onsite water wells. A search of public records disclosed no recent nearby subsurface data. Historic subsurface data from nearby deep boreholes in Houston County were obtained from the State of Alabama Oil and Gas Board in Tuscaloosa, Alabama. These data included electric logs (e.g., resistivity, spontaneous potential (SP)), gamma ray logs, sonic logs, and stratigraphic (sample) logs. Table 2.3.1-1 provides a summary of the available data from three deep boreholes in proximity to the Farley site.

Based on the southerly offset distances of the wells from the Farley site, the changes in elevations due to dip range from about 23 to 288 feet as summarized in Table 2.3.1-1. These elevation changes are a function of the dip projected south along the offset distance, from the Farley site to the wells. For purposes of developing the stratigraphy of the soil/rock column at the site, these changes in elevation of stratigraphic units from the boreholes to the site were considered negligible due to the low angle of regional dip. The elevations of stratigraphic units at each borehole are not adjusted to account for dip and are assumed to be the same at the site.

Borehole 1394, to a depth of about 3,200 feet, contained sonic data that were converted to Vs data. Since borehole 1394 did not contain a sample log, the sample logs from boreholes 238 and 186, along with the SP and resistivity logs, were used to correlate material types and geologic units to borehole 1394. Stratigraphy from boreholes 238 and 186 was used below the termination depth of borehole 1394.

FSAR Section 2.5.1.2.2 provides a description of the geologic materials underlying the site to a depth of about 1,150 feet below plant grade based on; 1) subsurface exploration data near surface and 2) pilot holes drilled for water wells at the site to a depth of about 1,150 feet. Stratigraphy below this depth was developed based on data from the nearby boreholes 1394,

238, and 186, and projected to the site as described above. Generally, the materials underlying the site consist of alternating layers of uncemented sands, clays, and indurated sediments, including claystone, siltstone, limestone and shale, typical of Coastal Plain sediments. These alternating layers vary within the strata such that sand, clay, limestone, and sandstone may be present within the same geologic formation. In addition, the thicknesses of these materials vary as shown in FSAR Figure 2B4-14. In this figure, the Lisbon Formation consists of siltstone, sandstone, limestone, and dense sand varying in thickness from about 10 feet to about 40 feet. This figure also illustrates that the thickness of these materials varies both laterally and vertically. This variation in thickness and material type generally appears to be present throughout the soil/rock column as indicated on the sample logs for 186 and 238. Smith (1998) provides subsurface stratigraphy in the Dothan Area of Houston County. Dothan is about 16 miles west of the Farley Nuclear Plant. Generally, the layer thickness is reported to vary from about ± 3 to ± 25 percent. A best estimate summary of strata thicknesses and material descriptions are provided in Table 2.3.1-2. A ± 10 percent variation in stratum thickness is recommended.

The groundwater level in the plant area is reported in FSAR Subsection 2B.6.1 as a "normal groundwater level" at El. 125 feet. The design groundwater level, as noted per FSAR Subsection 2B.6.1 is at El. 140 feet.

Table 2.3.1-1: Summary of Nearby Boreholes

Permit No (Borehole No), Well Name, Approx Distance	Southerly Offset Dist. (mi) / Change in El. Due to Dip (feet)	Date Logged	Logs Available	Record Interval, Depth (feet)
238, A.L. Snell #1, 4.3 miles south	~2.3 / 23 to 58	1950	Resistivity SP Sample	377 – 4012 377 - 4012 0 - 4012
1394, P.E. Mixon #1, 18.8 miles west southwest	~5.5 / 55 to 138	1966	Resistivity SP Gamma Sonic	319 – 3200 319 – 3200 2500 - 3060 319 – 3193
186, E.P. Kirkland #1, 20.5 miles southwest	~11.5 / 115 to 288	1949	Resistivity SP Sample	217 - 8099 217 - 8099 0 - 8100

Dip offset range based on dip of 10 to 25 feet per mile (SNC, 2014f)

Table 2.3.1-2: Best Estimate Plant Area Stratigraphy

Elevation (ft)		Depth (ft)			Geologic Formation (Group)	Material Description
Top	Base	Top	Base	Thickness (ft)		
185	--	0	--	--	SSE Control Point (at Surface)	
185	95	0	90	90	Overburden (Fill and Residuum)	Sand, silty sand, clayey sand, and clay
95	70	90	115	25	Lisbon (Claiborne)	General foundation level
70	-25	115	210	95	Lisbon (Claiborne)	Calcareous and sandy claystone; silty sandstone; sandstone; and uncemented sand
-25	-160	210	345	135	Tallahatta (Claiborne)	Sandy, fossiliferous limestone; sand and clay beds; sandy, calcareous, claystone; and glauconitic, fossiliferous, calcareous sand
-160	-199	345	384	39	Hatchetigbee (Wilcox)	(Bashi marl) Fossiliferous, calcareous, glauconitic, sand and sandstone
-199	-439	384	624	240	Tuscahoma (Wilcox)	Silty and sandy carbonaceous clay; calcareous, silty sandstone; and coarse-grained fossiliferous gravelly sand
-439	-554	624	739	115	Nanafalia (Wilcox)	Medium to coarse sand; gravelly sand; and sandy and fossiliferous limestone
-554	-854	739	1,039	300	Clayton Formation (Midway)	Sandy and fossiliferous limestone and coarse-grained sand and micaceous, sandy clay
-854	-939	1,039	1,124	85	Providence Formation (Selma)	Fine to coarse-grained micaceous, glauconitic, fossiliferous sand; sandy, calcareous, fossiliferous clay; and sandy, fossiliferous limestone
-939	*-2,354*	1,124	*2,539*	1,415	Ripley Formation (Selma)	Fine to medium-grained, calcareous micaceous, glauconitic sand;

Elevation (ft)		Depth (ft)			Geologic Formation (Group)	
Top	Base	Top	Base	Thickness (ft)		Material Description
						sandstone; and calcareous sandy clay
-2,354	*-2,554*	*2,539*	*2,739*	*200*	*Eutaw*	*Fine grained micaceous sandstone,*
-2,554	*-3,014*	*2,739*	*3,199*	*460*	*Tuscaloosa*	*Shale, glauconitic and fossiliferous sandstone, glauconitic sand, coarse sand and gravel*
-3,014	*-7,114*	*3,199*	*7,299*	*4,100*	*Cretaceous*	*Sand, gravel, shale, sandstone, micaceous clay*
-7,114	*-7,664*	*7,299*	*7,849*	*550*	*Paleozoic*	*Sandstone, claystone, sandy shale, sand, micaceous shale*
-7,664		*7,849*			*Ordovician-age Period*	*Calcareous sandstone, carbonaceous shale*

Notes: 1. Stratigraphy and material descriptions from FSAR 2.5.1.2.2.
2. Stratigraphy below Ripley Formation (*italic entries*) taken from boreholes 238 and 186.
3. The geologic group was used to correlate materials between the various boreholes.

2.3.2 Development of Base Case Profile and Nonlinear Material Properties

SNC Calculation SC-SNC539158-004 (SNC, 2014a) is the source of the information presented in the following section.

The base case profiles for the Farley site were based on existing subsurface information contained in the FSAR for Units 1 and 2 (SNC, 2014f), as well as additional and more recent information obtained for the investigation carried out for the ISFSI study (SNC, 2001). The following paragraphs summarize that information.

Representative samples of the subsurface materials were tested in the laboratory to determine their classification in accordance with the Unified Soil Classification System (USCS, ASTM D-2487) during the explorations for Units 1 and 2 and recent investigations for the ISFSI (SNC, 2001). In addition, representative samples of the backfill soils were tested to determine their classification, during backfill construction. Table 2.3.2-1 provides a material description for the predominate soil type of each major geologic unit.

FSAR Subsection 2B7.2.1 notes the soil dry unit weight values at the site range from 85 to 120 pounds/foot^3 (pcf) with soil moisture contents ranging from 10 to 30 percent. FSAR Figure 2B5B-7 provides estimated unit weight values for the near surface soils at various locations around the plant area. FSAR Tables 2B-10 and 2B-19 provide maximum dry unit weight values and optimum moisture content values for compacted fill (fill materials C-1, C-2, C-3, and C-5). These values range from 106 pcf at 18.1 percent to 120 pcf at 11.8 percent moisture with corresponding total unit weight values of about 125 pcf and 134 pcf, respectively. Based on these FSAR references, a best estimate total unit weight of 125 pcf is recommended for the fill and overburden soils and the Lisbon Formation.

Based on the descriptions of the materials provided in FSAR Section 2.5.1.2.2 and the sample logs from boreholes 238 and 186, as summarized above in Table 2.3.1-2, a best estimate total unit weight value of 125 pcf is recommended for the underlying materials considering a distribution of sand, clay, limestone, siltstone, and sandstone (Navfac, 1986). Based on experience, a best estimate total unit weight value of 165 pcf is recommended for the Paleozoic materials at the base of the column. Unit weight values are summarized in Table 2.3.2-1.

Shallow shear wave velocity data are available, but deep data are limited to an offsite, but nearby petroleum well. FSAR Figure 2B5B-7 provides Vs values for various strata and locations at the site, including overburden, backfill, and the Lisbon Formation. The shear- and compression-wave velocitiy (Vs and Vp, respectively) values, along with Poisson's ratio values, from this figure have been reproduced in Table 2.3.2-2. Notes on the figure indicate that velocity data were obtained using refraction, uphole, and cross-hole methods. Raw velocity data were not available for review and no new velocity data were obtained for this study. The data are from the Plant Area (PA), River and Pond Intake, and the Pond Dam and Dike areas. These data from all areas along with Vs data from the ISFSI study (SNC, 2001) are combined into one plot and the best estimate Vs profile through the overburden/fill soils (including the fill) and weathered rock/Lisbon Formation is presented in Figure 2.3.2-1. This figure also illustrates the

recommended variation in the Vs profile. The variation is established using a logarithmic standard deviation of 0.35 (σ_{ln} = 0.35) for the overburden materials (above the Lisbon Formation) and a logarithmic standard deviation of 0.5 (σ_{ln} = 0.5) for Lisbon Formation. This is based on guidance described in Appendix B of the SPID (EPRI, 2013a). A value of 0.35 is used for the overburden materials based on the consistency of the site specific data. A value of 0.5 is used for Lisbon Formation given the variability of the site specific data.

Shear wave velocity data below the exploration depth at the plant was obtained from nearby historic data. Specifically, a downhole seismic (sonic) record from borehole 1394 near the site was obtained from the State of Alabama Oil and Gas Board as discussed previously. Based on the elevation of the drilling platform, depths were converted to elevation and these elevations were correlated to site data. Sonic data were converted to Vs data. The Poisson's ratio values, used to calculate Vs from the sonic data, were estimated based on material types presented in the sample log from borehole 238. The Vs profile developed from these sonic data is presented (green trace) in Figure 2.3.2-2. The profile identified with a red dotted line, labeled "Incremental Average – from Sonic Data", is a stepped profile averaged from discrete depth intervals. The profile below the "Incremental Average" is identified with a blue line and is labeled "Extrapolated". This "Extrapolated" profile was developed by projecting the slope in the lower portion of the "Incremental Average" profile to the Ordovician contact with the assumption that a Vs value of 9,200 fps occurs at the Ordovician contact - an approximate depth of 7,850 feet (El. -7,664 feet). The profile identified with a heavy black line, labeled "Stepped Average", is a stepped profile averaged over large depth intervals. The data appear consistent with deep velocity data obtained elsewhere in the Coastal Plain in terms of consistency and increase in velocity with depth.

Figure 2.3.2-3 combines the shallow site-specific FSAR Vs data from Figure 2.3.2-1 with the deep interpreted sonic Vs data from Figure 2.3.2-2. The recommended variation (best estimate (BE) ± 1 logarithmic standard deviation (σ_{ln})) of Vs is also illustrated. As previously discussed, a logarithmic standard deviation of 0.35 is used for all overburden materials except for the Lisbon Formation where a logarithmic standard deviation of 0.5 is used. For discussion of the lower range and upper range profiles, see section 2.3.3.

The upper portion of the Vs profile, to Elevation -200 feet, is illustrated in Figure 2.3.2-4 at a smaller scale to provide clarity. The 16^{th} (BE – sigma), 50^{th} (BE), and 84^{th} (BE + sigma) soil/rock profiles are illustrated in Figure 2.3.2-3 and tabulated in Table 2.3.2-3. Also included in Table 2.3.2-3 are the 10th and 90th percentiles, which are used as the lower-range and upper-range profiles, as recommended in Appendix B of the SPID (EPRI, 2013a). Note that all Vs profiles should be capped at 9,200 fps.

For the randomization process (Appendix B-4.1 of the SPID (EPRI, 2013a)) it is suggested that the empirical σ_{lnVs} is about 0.25 from the ground surface to a depth of about 15m (50 feet) where it reduces to 0.15, however, it is suggested herein that 0.25 be used to a depth of 90 feet and then reduced to 0.15 below that level for the remainder of the column. Further, a bound or cap of ±2 σ_{lnVs} should be imposed on the profile to prevent unrealistic cases. Even with this

restriction, each randomization should be checked against the available site data to ensure unrealistic Vs profiles are not included.

2.3.2.1 Shear Modulus and Damping Curves

SNC Calculations SC-SNC539158-004 (SNC, 2014a) and SC-SNC539158-006 (SNC, 2014b) are the source of the information presented in the following section.

2.3.2.1.1 Fill and Overburden

Shear modulus degradation and material damping relationships for fill soils are presented in FSAR Tables 2B-5, 2B-6, 2B-20, and 2B-21. The values of shear modulus degradation (G/G_{max}) vs shear strain are plotted in Figure 2.3.2-5. Damping ratio values vs. shear strain are plotted in Figure 2.3.2-6. Note that FSAR data are represented with prefixes of C-1, C-2, C-3 and C-5 and represent test results on fill materials. These data were obtained using resonant column (RC) and cyclic triaxial test methods.

Published relationships (EPRI, 1993) of shear modulus degradation and material damping for granular and cohesive soils are plotted in Figure 2.3.2-5 and Figure 2.3.2-6 for comparison with site specific data. Granular soils are represented with the depth intervals of 0-20 feet, 20-50 feet, 50-120 feet, and 120-250 feet. Cohesive soils are represented with plasticity index (PI) values of 15 and 30. Note that the site specific damping values plot above (more damping) the published curves. Current understanding of the test methods used at the time suggests that these values are artificially high due to unaccounted for system damping. Therefore, based on the comparison of these data and to account for uncertainty, the shear modulus degradation and material damping of the fill and overburden soils should be evaluated using two sets of published curves – EPRI (1993) "20-50 feet" and "50-120 feet", both equally weighted. Note in Figure 2.3.2-5 and Figure 2.3.2-6, the curves labeled 0-20 feet through 120-250 feet are from EPRI (1993); the others are from site-specific testing on backfill samples from the Farley site. The recommended shear modulus degradation and damping relationships for the fill and overburden are tabulated in Table 2.3.2-4.

2.3.2.1.2 Lisbon to Ripley

Shear modulus degradation and material damping relationships for native (in situ) materials are presented in FSAR Figure 2B5B-7 (SNC, 2014f). These data are reproduced here in Table 2.3.2-5. FSAR Section 2B.7.2.2 (SNC, 2014f) describes the samples represented by the test results as "fresh rock specimens", soft clayey siltstone, and hard sandstone. Similar to the fill soils, these data were obtained from cyclic triaxial and resonant column tests. Figure 2.3.2-7 illustrates these data in terms of G/G_{max} vs shearing strain and damping ratio in percent vs shear strain. Additional modulus reduction and damping ratio relationships from Idriss and Boulanger (2010) and Stokoe et al. (2003) are illustrated on Figure 2.3.2-7. Data from Idriss and Boulanger (2010) were scaled from Figure B-15 of that reference, while data from Stokoe (2003) were obtained using RCTS test methods on rock materials.

In reviewing Figure 2.3.2-7, the site specific data behave similarly to the Idriss and Boulanger (2010) results for both shear modulus degradation and damping versus shear strain. For

damping relationships, most of the site specific data range between 3 and 6 percent damping. Again, given the current understanding of the test methods used at the time, these values are believed to be artificially high due to unaccounted for system damping. Therefore, for materials in the Lisbon to Ripley Formations, it is recommended to use the shear modulus degradation and damping relationship taken from Idriss and Boulanger (2010), as tabulated in Table 2.3.2-6.

2.3.2.1.3 Variation in Material Properties

The variation of shear modulus degradation and material damping with shear strain is evaluated to develop a standard deviation for these properties. Site specific data presented in Figure 2.3.2-5 and Figure 2.3.2-6 were grouped according to shear strain. The mean and standard deviation of these groups were determined. Based on these results, the following guidelines are recommended for the variation of shear modulus reduction and damping with shear strain:

- G/G_{max}
  - for shear strains $\leq$ 0.0001, coefficient of variation (COV) = 0
  - for shear strains > 0.0001 and $\leq$ 0.001, COV linear log relationship between 0 and 0.15
  - for shear strains > 0.001, COV = 0.15
- Damping
  - for all shear strains, COV = 0.2

The uncertainties in G/G_{max} and damping are expected to be consistent throughout the soil/rock column. Thus, the variations outlined above should be applied to subsurface materials from the overburden through the Ripley Formation. Below the Ripley Formation, where shear modulus is assumed to remain constant with strain (no degradation), only the variation in damping is applied.

2.3.2.2 Kappa

SNC Calculation SC-SNC539158-006 (SNC, 2014b) is the source of the information presented in the following section.

Based on the guidance in the Section B-5.1.3.1 of the SPID (EPRI, 2013a) the Farley site is considered a deep soil site thus a median kappa value of 0.04 sec is considered for the soil column. As specified in Section B-5.1.3.2 of the SPID (EPRI, 2013a) a natural log standard deviation of 0.4 was used to estimate the upper and lower range values of kappa. Table 2.3.2-7 summarizes the kappa values used for the site response analysis. This range encompasses the values (e.g., 0.060, 0.054, and 0.052 sec) listed in the SPID (EPRI, 2013a) for deep soil sites. An additional estimate of the total site kappa may be made using the empirical relationship provided by Campbell (2009). Using this relationship and a profile thickness of 7849 ft, a total site kappa of 0.151 sec is calculated and is significantly larger (indicating more damping) than the values selected for consideration.

In the site response analyses, the material above the depth of 2539 ft is modeled as nonlinear with strain dependent shear-modulus reduction and material damping curves as discussed above in Section 2.3.2.1. Below the depth of 2539 ft, the material is considered to be linear for all analyses with damping ratio calibrated to provide the prescribed total site kappa at the surface of the site.

Table 2.3.2-1: Summary of Total Unit Weight and Poisson's Ratio Values

Depth (feet)		Thickness (feet)	Geologic unit	Total Unit Weight (pcf)	Poisson's Ratio
Top	Base				
0	--	--	SSE Control Point (at Surface)	--	--
0	90	90	Overburden (Fill and Insitu)	125	0.37
90	210	120	Lisbon	125	0.25
210	345	135	Tallahatta	125	0.25
345	384	39	Hatchetigbee	125	0.25
384	624	240	Tuscahoma	125	0.30
624	739	115	Nanafalia	125	0.25
739	1,039	300	Clayton	125	0.30
1,039	1,124	85	Providence	125	0.30
1,124	2,539	1415	Ripley	125	0.25
2,539	2,739	200	Eutaw	125	0.25
2,739	3,199	460	Tuscaloosa	125	0.25
3,199	7,299	4100	Cretaceous	125	0.25
7,299	--	--	Paleozoic and older	165	0.25

Table 2.3.2-2: Summary of Site Velocity Data[3]

Area	Formation	Elevation (feet)		V_p (ft/sec)	V_s (ft/sec)	Poisson's Ratio (ν)
		From	To			
Plant Area	Overburden	175	150	1300	680	0.36
Plant Area	Overburden	150	130	2100	970	0.36
Plant Area	Wx Rock [1]	130	95	5000	2520	0.36
Plant Area	Lisbon	95	65	10000	5360	0.33
Plant Area	Lisbon	> 65	0 [2]	6400	2000	0.4
Plant Area	Backfill	155	125	2100	950	0.37
Pond Intake	Overburden	180	175	1200	550-500	0.37
Pond Intake	Overburden	175	130	2500	650-850	0.43
Pond Intake	Overburden	130	100	5000	no data	no data
Pond Intake	Lisbon	> 100	50 [2]	8000	no data	no data
River Intake	Overburden	110	100	1200-1300	550-800	0.37
River Intake	Overburden	100	80	2500	900	0.43
River Intake	Lisbon	> 80	55 [2]	6200	1400-1800	0.47-0.48
River Intake	Lisbon	> 55	0 [2]	7200	2200-2500	0.45
Dam	Overburden	140	120	2200-2800	850-950	0.41
Dam	Overburden	120	100	5000 [4]	850-950	0.48
Dam	Lisbon	> 100	50 [2]	6200-6600	2200	0.43
Dike	Overburden	Surface	130	2800-3500	800-1000	0.45
Dike	Overburden	130	100	5000 [4]	900	0.48
Dike	Lisbon	> 100	50 [2]	6200 [4]	1350	0.48

Notes:
1) Wx - weathered rock
2) assumed elevation
3) data were reproduced from FSAR Figure 2B5B-7
4) V_p likely represents V_p of water (~5,000 fps)

Table 2.3.2-3: Soil/Rock Column V_s Profile Profiles

Elevation (feet)	10th Percentile (ft/sec)	16th Percentile (ft/sec)	50th Percentile (ft/sec)	84th Percentile (ft/sec)	90th Percentile (ft/sec)
185	518	572	812	1152	1273
95	1591	1831	3018	4976	5724
65	1038	1147	1628	2310	2553
50	1180	1304	1850	2625	2901
0	2321	2565	3640	5165	5709
-66	2033	2247	3189	4525	5001
-132	2560	2829	4015	5698	6297
-826	2581	2853	4048	5744	6349
-1716	2487	2749	3901	5536	6118
-2316	2899	3204	4546	6451	7130
-3316	3188	3523	5000	7095	7842
-4716	3507	3876	5500	7805	8626
-5916	3826	4228	6000	8514	9410
-7116	4017	4440	6300	8940	9880
-7664	5866	6483	9200	13055	14428

Table 2.3.2-4: Best Estimate Shear Modulus and Damping Relationships for Fill and Overburden Soils

Shear Strain (γ)	Modulus Reduction (G/G_{max})	Damping (%)	Modulus Reduction (G/G_{max})	Damping (%)
	EPRI 20-50 feet		EPRI 50-120 feet	
0.0001	1	1.3	1	1.15
0.0003	1	1.3	1	1.15
0.0010	0.992	1.43	0.995	1.22
0.0032	0.94	2.04	0.951	1.63
0.0100	0.815	3.67	0.867	2.86
0.0316	0.589	7.14	0.665	5.51
0.1000	0.355	12.55	0.427	10.41
0.3162	0.161	19.39	0.21	17.04
1.0000	0.065	24.9	0.089	22.86

Table 2.3.2-5: Site Specific Shear Modulus and Damping for Lisbon to Ripley Formations.

Location / Material	Sample El (feet)	Torsional Strain (rad)	Shearing Strain (in/in)	Shearing Strain (%)	G (psi)	G (ksf)	G/G_{max}	Damping Ratio (dec.)	Damping Ratio (%)
Rv Intake / Sandy Siltstone	17	3.50E-06	3.50E-06	3.50E-04	48300	6955.2	1.000	0.054	5.4
		7.90E-05	7.90E-05	7.90E-03	47400	6825.6	0.981	0.055	5.5
		2.00E-04	2.00E-04	2.00E-02	46300	6667.2	0.959	0.058	5.8
Pond Spillway / Sandstone	81	3.30E-07	3.30E-07	3.30E-05	617000	88848.0	1.000	0.031	3.1
		5.70E-06	5.70E-06	5.70E-04	606000	87264.0	0.982	0.038	3.8
		2.00E-05	2.00E-05	2.00E-03	596000	85824.0	0.966	0.039	3.9
	81	3.10E-07	3.10E-07	3.10E-05	655000	94320.0	1.000	0.038	3.8
		3.40E-06	3.40E-06	3.40E-04	644000	92736.0	0.983	0.036	3.6
		2.10E-05	2.10E-05	2.10E-03	638000	91872.0	0.974	0.038	3.8
Pond Intake / Sandstone	52	1.60E-06	1.60E-06	1.60E-04	124400	17913.6	1.000	0.014	1.4
		7.90E-06	7.90E-06	7.90E-04	123400	17769.6	0.992	0.017	1.7
		8.30E-05	8.30E-05	8.30E-03	118000	16992.0	0.949	0.016	1.6
		2.20E-04	2.20E-04	2.20E-02	117900	16977.6	0.948	0.024	2.4
Plant / Clayey Siltstone	38	6.60E-06	6.60E-06	6.60E-04	16500	2376.0	1.000	0.058	5.8
		2.80E-05	2.80E-05	2.80E-03	16500	2376.0	1.000	0.059	5.9
		5.30E-05	5.30E-05	5.30E-03	16400	2361.6	0.994	0.060	6.0
		4.10E-04	4.10E-04	4.10E-02	16000	2304.0	0.970	0.065	6.5
Dam / Clayey Siltstone	22	3.40E-06	3.40E-06	3.40E-04	36700	5284.8	1.000	0.041	4.1
		6.90E-05	6.90E-05	6.90E-03	36700	5284.8	1.000	0.055	5.5
		2.40E-04	2.40E-04	2.40E-02	36500	5256.0	0.995	0.055	5.5

NOTES: 1. Data in columns 1,2,3,6,9 taken from FSAR Figure 2B5B-7
2. Torsional strain in radians taken as equal to shearing strain
3. G_{max} taken as value of G at lowest strain value

Table 2.3.2-6: Best Estimate Shear Modulus and Damping Relationships for Lisbon to Ripley Formations.

Shear Strain (γ)	Modulus Reduction (G/G_{max})
0.0001	1.000
0.0003	1.000
0.001	1.000
0.003	0.992
0.01	0.96
0.03	0.931
0.1	0.892
1.0	0.777

Shear Strain (γ)	Damping (%)
0.0001	0.375
0.001	0.9
0.01	1.5
0.1	3.0
1.0	5.0

Table 2.3.2-7: Site Column Kappa Values Used for Site Response Analyses

Velocity Profiles	10th Percentile (sec)	50th Percentile (sec)	90th Percentile (sec)
Lower Range, Median, and Upper Range	0.024	0.040	0.067

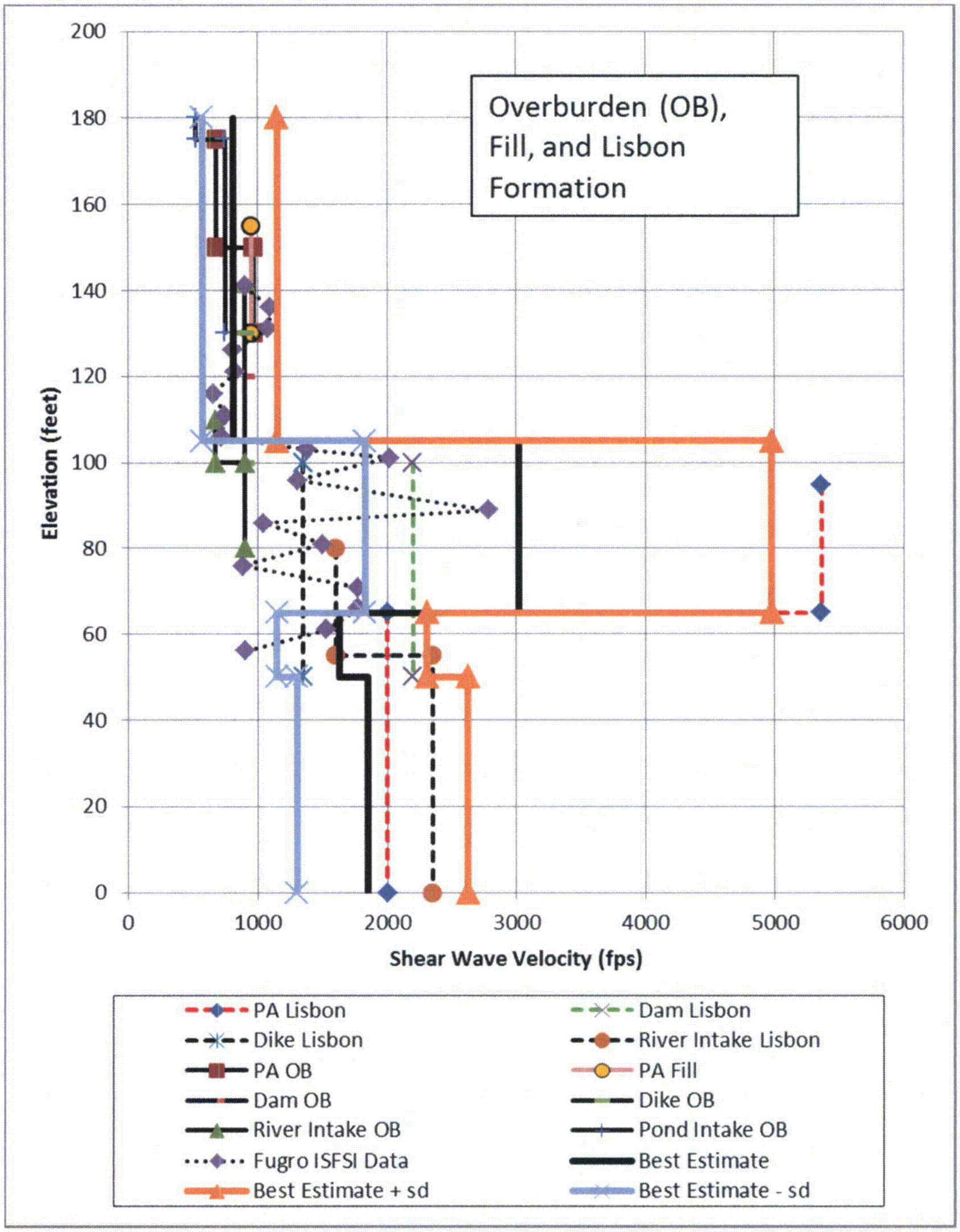

Figure 2.3.2-1: Site Vs Data for Overburden and Lisbon Formation

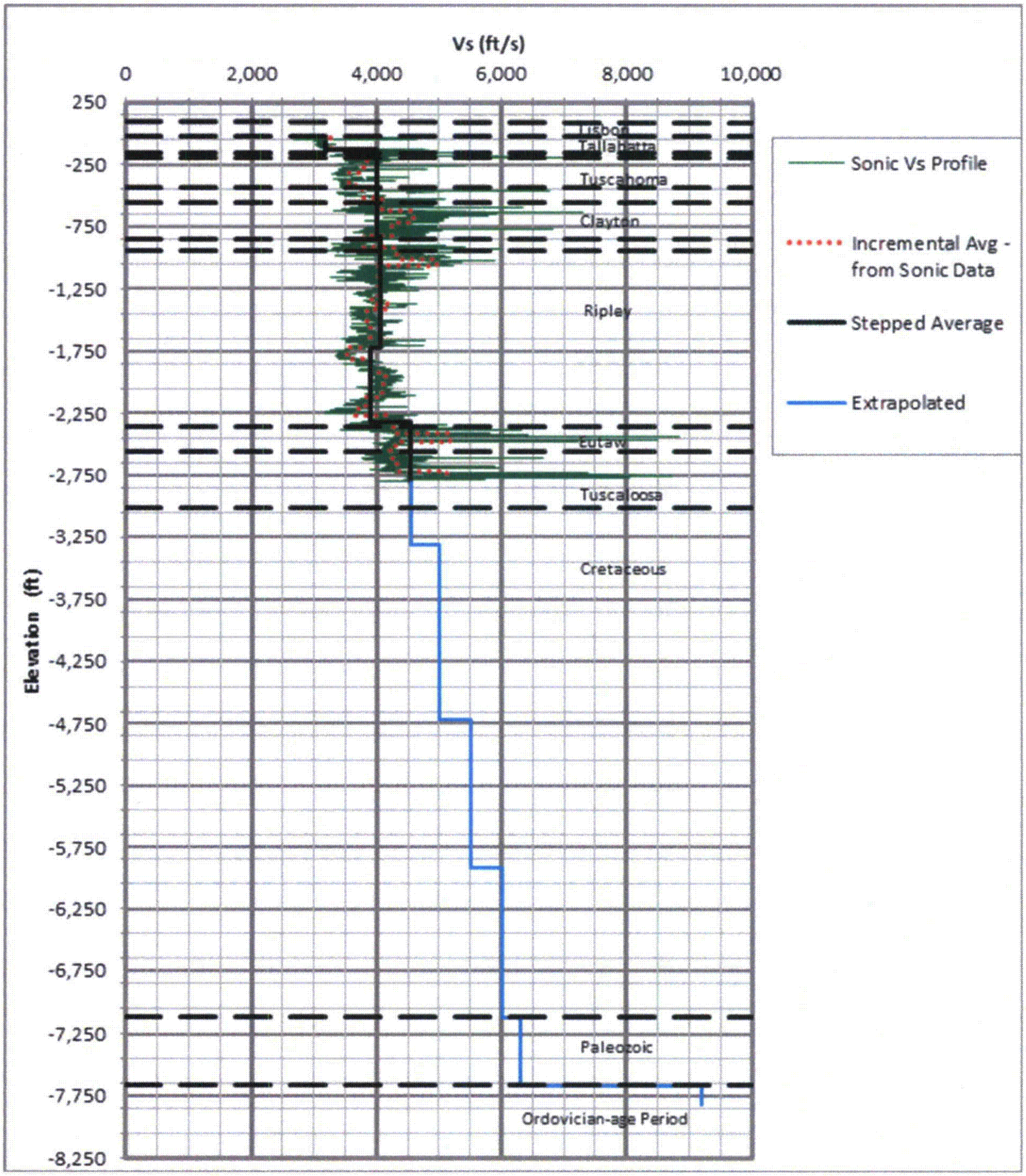

Figure 2.3.2-2: Deep Vs Profile from Sonic Data

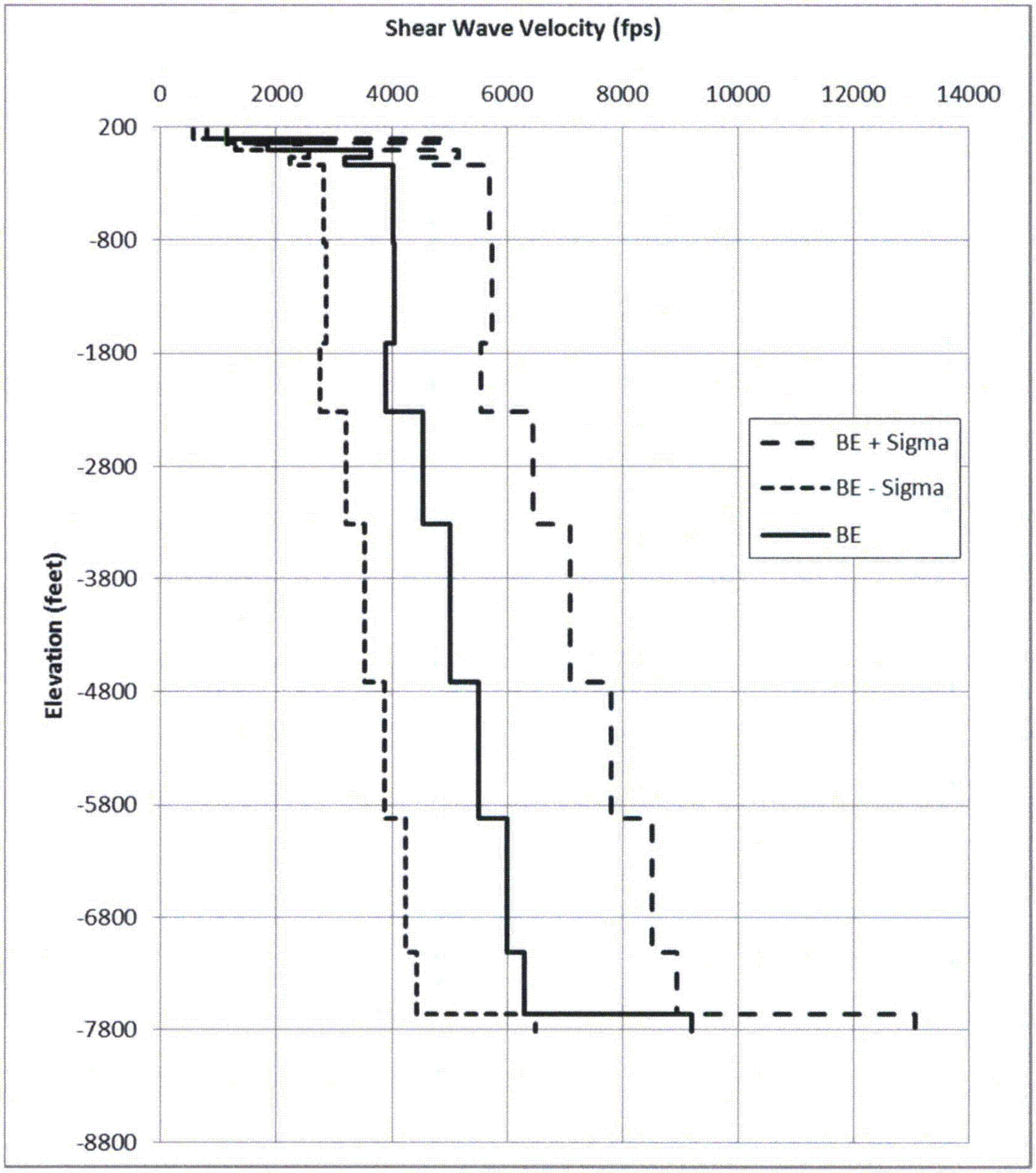

Figure 2.3.2-3: Best Estimate Vs Profile for Farley Plant Site

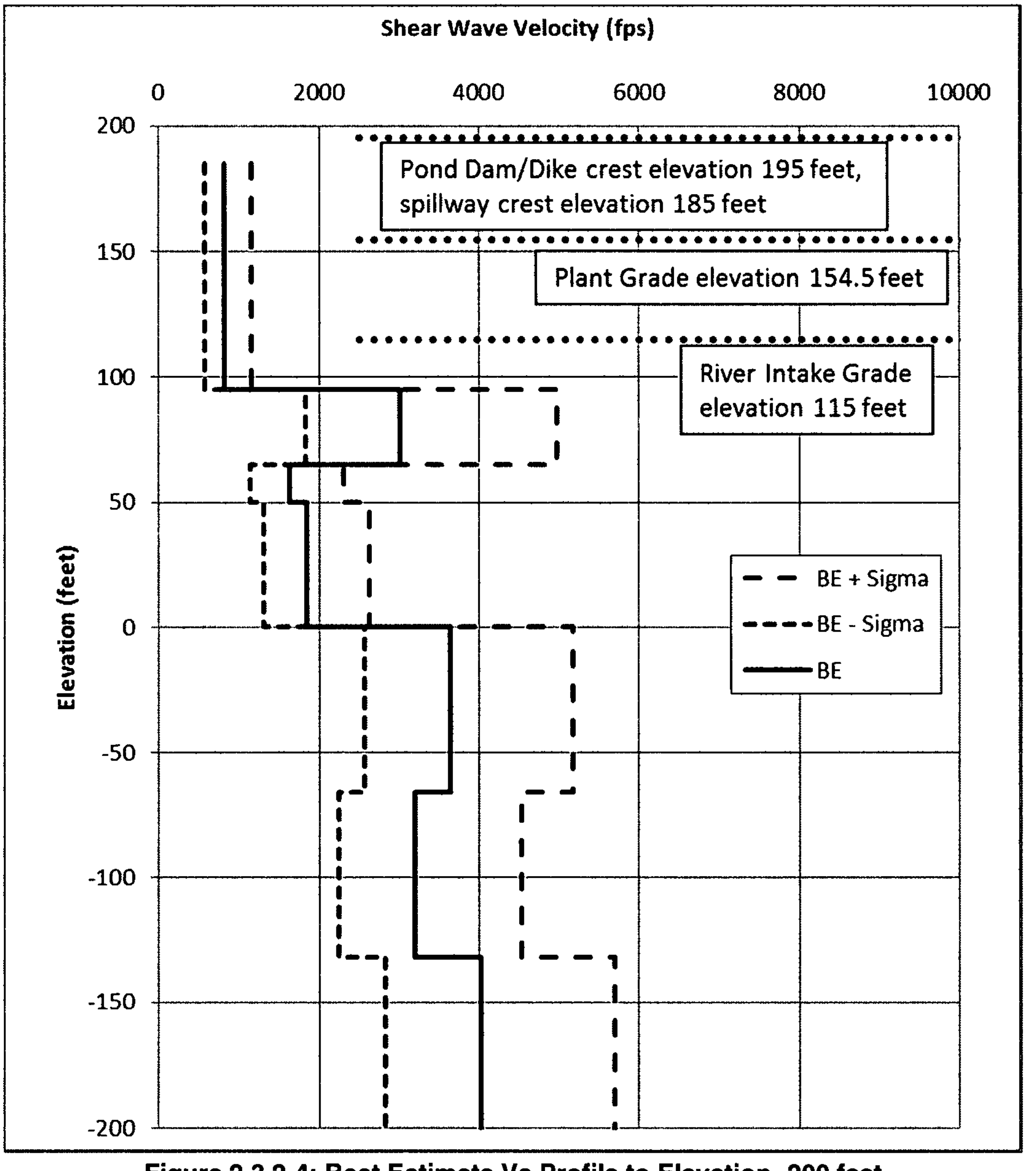

Figure 2.3.2-4: Best Estimate Vs Profile to Elevation -200 feet

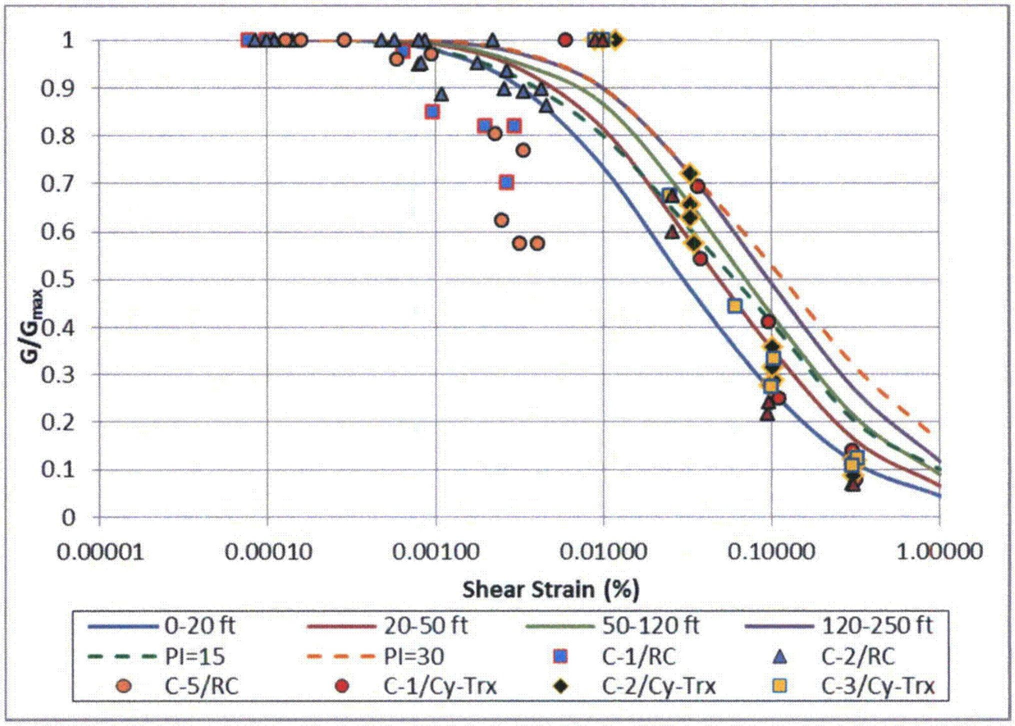

Figure 2.3.2-5: Shear Modulus Degradation Relationships – Fill and Overburden

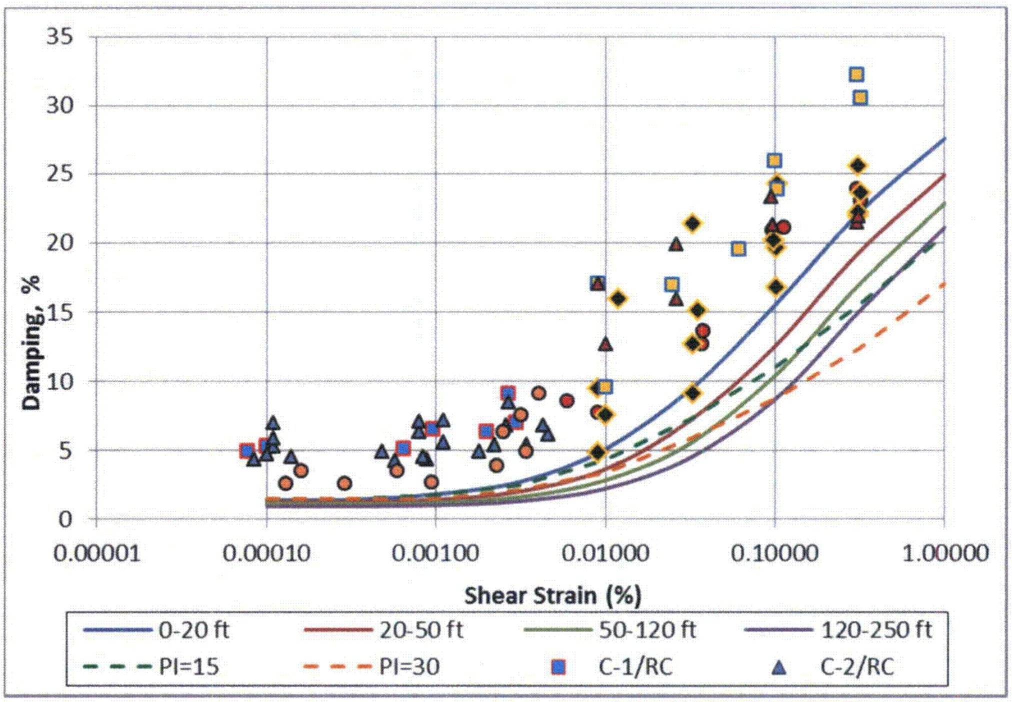

Figure 2.3.2-6: Damping Relationships – Fill and Overburden

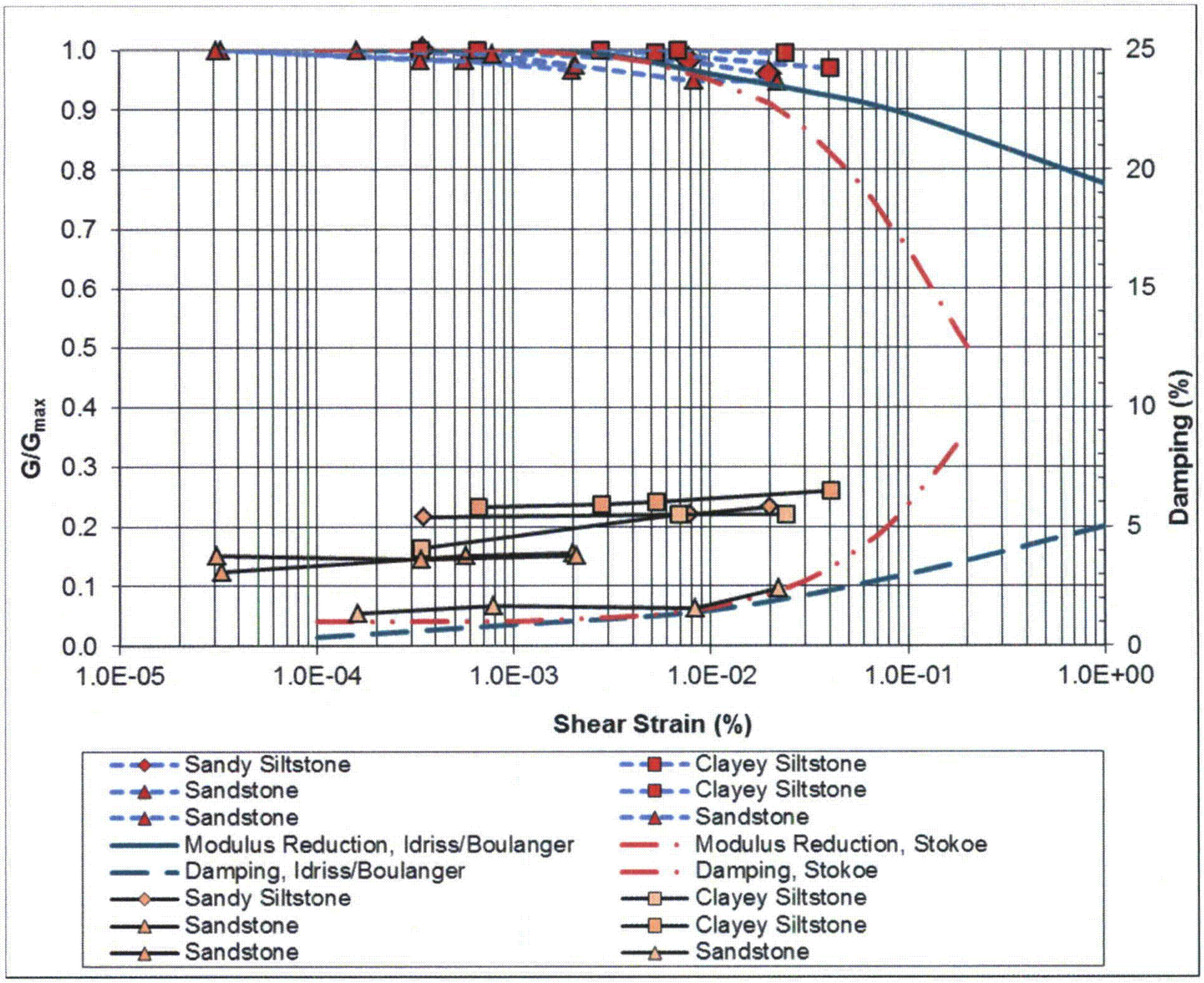

Figure 2.3.2-7: Shear Modulus Reduction and Damping Relationships (Lisbon to Ripley)

2.3.3 Randomization of Base Case Profiles

SNC Calculation SC-SNC539158-006 (SNC, 2014b) is the source of the information presented in the following section.

To account for the aleatory variability in material properties that is expected to occur across a site at the scale of a typical nuclear facility, variability in the assumed shear wave velocity (Vs) profiles has been incorporated in the site response calculations. For the Farley site, simulated shear wave velocity profiles were developed from the base case profile, as presented in Section 2.3.2. The lower range and upper range profiles were defined by the 10th and 90th percentile Vs profiles as recommended by the SPID (EPRI, 2013a), presented in Table 2.3.2-3. The simulation procedure generates a set of site-specific simulated soil profiles to represent the dynamic properties of the site while considering the uncertainty associated with each of these properties, and correlations between different parameters.

Consistent with the discussion in Appendix B of the SPID (EPRI, 2013a), the Vs randomization procedure made use of Vs correlation developed by Toro (1996). The USGS C model parameters were used for this median profile, while USGS B and D were used for the upper-range and lower-range Vs profiles, respectively.

Sixty simulated Vs profiles were generated for each base case profile. These simulated Vs profiles were generated using a natural log standard deviation of 0.25 over the upper 90 feet and a natural log standard deviation of 0.15 below that depth. In the correlation model, a limit of +/- 2 standard deviations about the median value in each layer was assumed for the limits on random velocity fluctuations. All random velocities were limited to be less than or equal to 9200 ft/sec. The thicknesses of the layers were varied considering 10% variation in thickness, and models using a bounded beta distribution. The bounds of the distribution were assumed to be separated by 4 times the standard deviation.

Given the limited geotechnical information available, the following alternatives were considered: three base case Vs models, two sets of curves are used to model the strain-dependent behavior of the soil layers, and three different total kappa values for a total of 18 different site columns (see Table 2.3.5-1 for considered alternative site columns). As an example, the simulated Vs profiles for the lower-range, median, and upper-range Vs models is shown in Figures 2.3.3-1, 2.3.3-2, and 2.3.3-3.

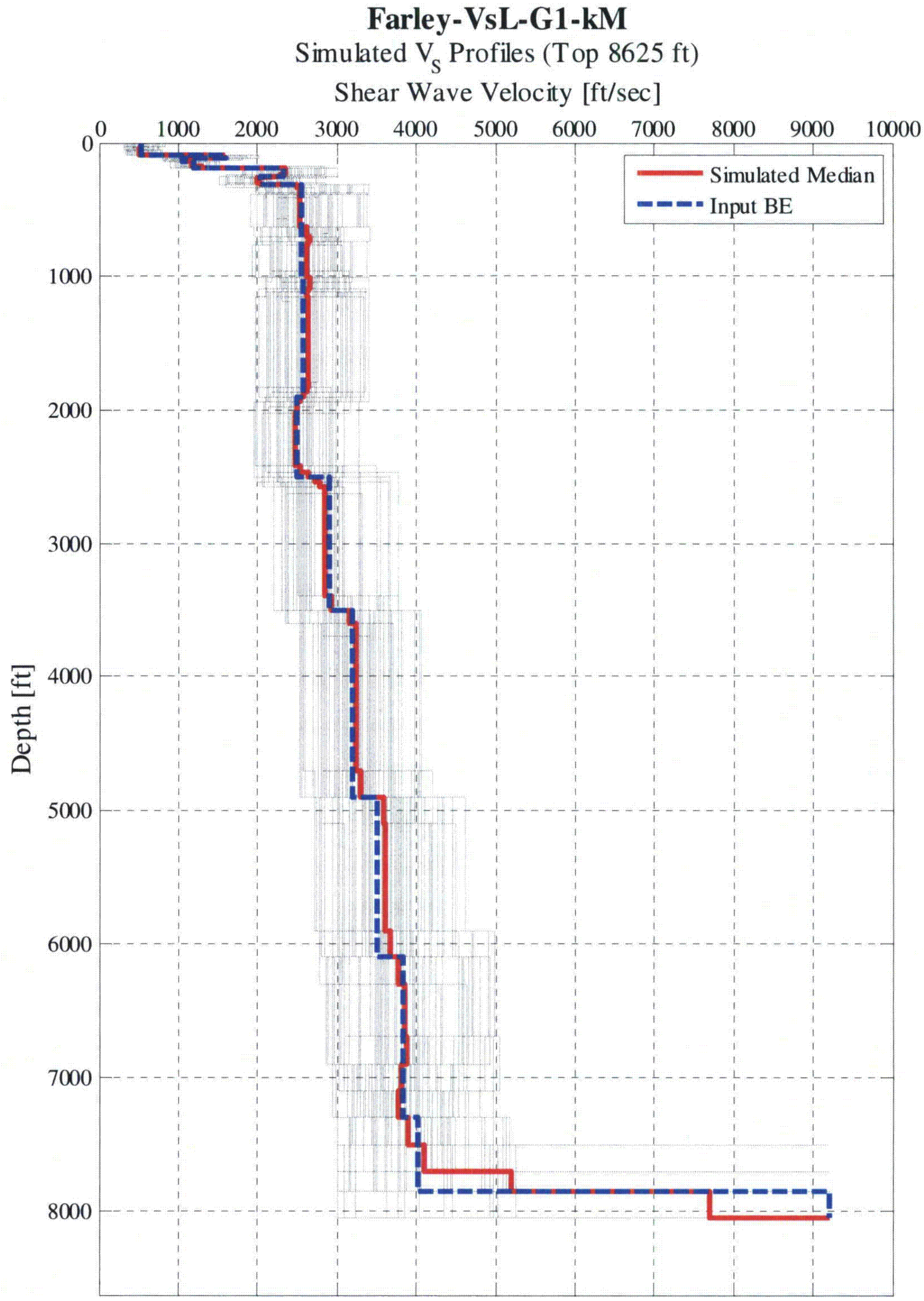

Figure 2.3.3-1: Simulated shear wave velocity profiles for the lower-range velocity model.

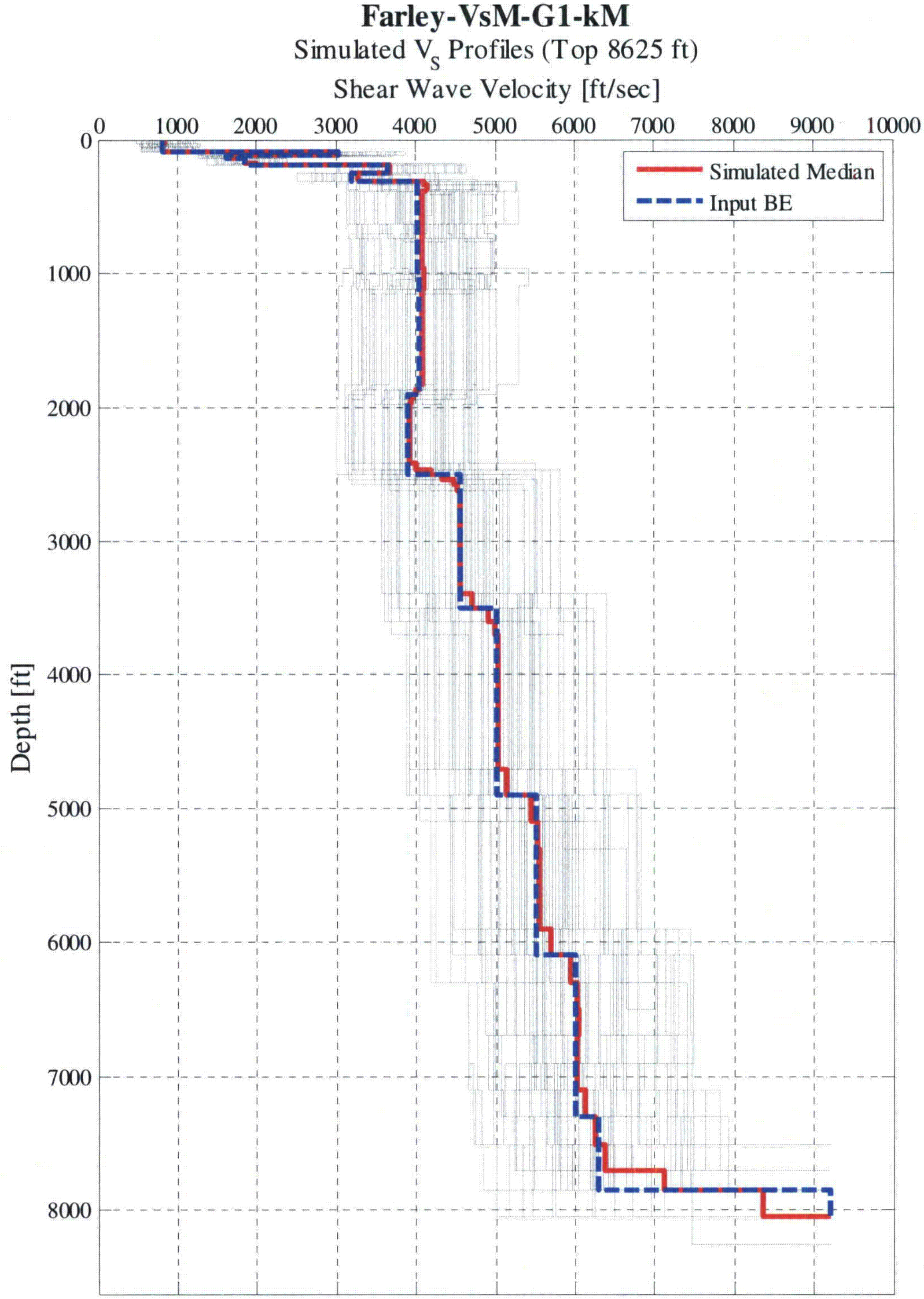

Figure 2.3.3-2: Simulated shear wave velocity profiles for the median velocity model.

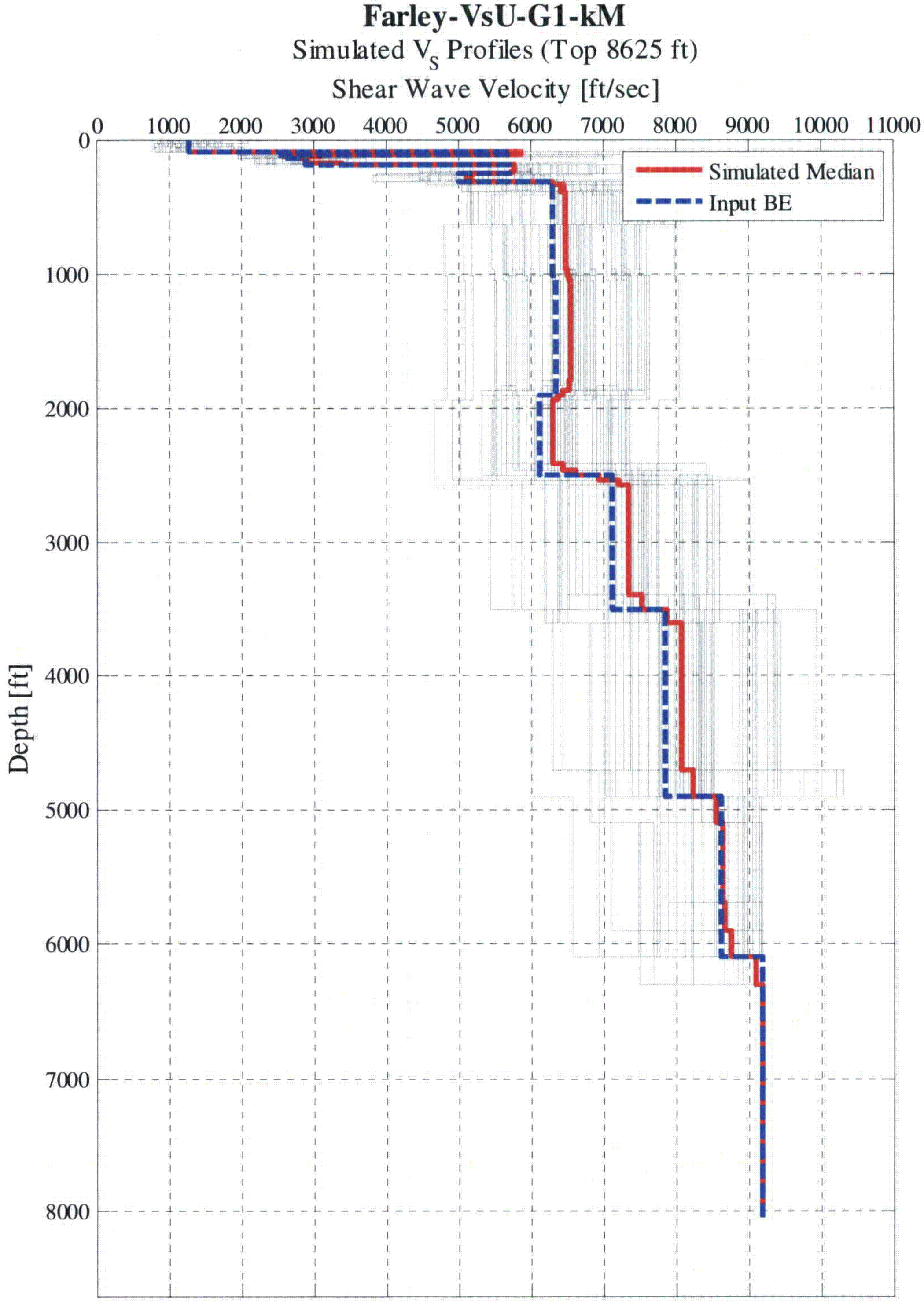

Figure 2.3.3-3: Simulated shear wave velocity profiles for the upper-range velocity model.

2.3.4 Input Spectra

SNC Calculation SC-SNC539158-001 (SNC, 2014d) and LCI (2013b) are the sources of the information presented in the following section.

Input base rock acceleration response spectra for the site amplification analysis are developed for a suite of high frequency (HF) and low frequency (LF) cases. These cases correspond to the UHRS ground motion values for MAFE levels of 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7}, and 10^{-8}. Separate spectral shapes are developed for HF and LF. The HF spectral shape has been anchored to the corresponding UHRS values at 100 Hz, 25 Hz, 10 Hz, 5 Hz, and 2.5 Hz in order to reflect accurately the UHRS values. In between these frequencies, the spectrum is logarithmically interpolated using the average of the CEUS single and double corner spectral shape model given in NUREG/CR-6728 (McGuire et al., 2001) using the deaggregation information for the Farley site (LCI, 2013b). For the MAFE level of 10^{-3} the deaggregation results for the 10^{-4} level are adopted and for MAFE levels of 10^{-7} and 10^{-8} the results for the 10^{-6} level are used. For frequencies between 2.5 Hz and 0.5 Hz, the spectral amplitudes are scaled using the spectral shape anchored to the 2.5 Hz amplitude value. For frequencies between 0.5 Hz (2 sec) and 0.1 Hz (10 sec), the spectrum has been extrapolated from the 0.5 Hz spectral value to a 0.1 Hz value with a 1/T shape, where T is period.

For the LF response spectrum the spectral shape – again based on the NUREG/CR-6728 spectral shapes as given this time by the LF deaggregation information for the Farley site -- is anchored to the UHRS values at 2.5 Hz, 1 Hz, and 0.5 Hz in order to reflect accurately the UHRS values. In between these frequencies, the spectrum is logarithmically interpolated using shapes anchored to the next higher and lower frequencies. Above 2.5 Hz, the spectral amplitudes are scaled using the spectral shape anchored to the 2.5 Hz amplitude. For frequencies between 0.5 Hz (2 sec) and 0.1 Hz (10 sec), the spectrum has been extrapolated from the 0.5 Hz spectral value to a 0.1 Hz value with a 1/T shape, where T is period.

For the LF response spectrum at MAFE of 10^{-3}, the above procedure as for the MAFEs of 10^{-7} and 10^{-8}, above, results in the high-frequency end of the LF response spectrum exceeding the 10^{-3} HF response spectrum – including the PSHA values – at high-frequencies. Therefore, the LF spectral shape is anchored to the UHRS values at all seven ground motion frequencies (100 (PGA), 25, 10, 5, 2.5, 1, and 0.5 Hz). Again, frequencies between 0.5 Hz (2 sec) and 0.1 Hz (10 sec), the spectrum has been extrapolated from the 0.5 Hz spectral value to a 0.1 Hz value with a 1/T shape, where T is period.

The HF and LF input spectra are plotted in Figure 2.3.4-1 for the MAFE levels of 10^{-4}, 10^{-5}, and 10^{-6}. The digital values corresponding to these HF and LF spectra are listed in Table 2.3.4-1 for an interpolated set of 40 spectral frequencies that include the reference seven spectral frequencies of 100 (PGA), 25, 10, 5, 2.5, 1, and 0.5 Hz.

Table 2.3.4-1: Input HF and LF spectra for MAFE levels of 10^{-4}, 10^{-5}, and 10^{-6} at a suite of 40 spectra frequencies.

Freq. (Hz)	10^{-4} HF (g)	10^{-4} LF (g)	10^{-5} HF (g)	10^{-5} LF (g)	10^{-6} HF (g)	10^{-6} LF (g)
100	4.23E-02	4.23E-02	1.67E-01	1.01E-01	6.12E-01	2.61E-01
90	4.57E-02	4.56E-02	1.80E-01	1.09E-01	6.62E-01	2.83E-01
80	5.16E-02	5.15E-02	2.04E-01	1.25E-01	7.50E-01	3.22E-01
70	6.07E-02	6.05E-02	2.40E-01	1.48E-01	8.84E-01	3.82E-01
60	7.20E-02	7.16E-02	2.85E-01	1.77E-01	1.05E+00	4.57E-01
50	8.22E-02	8.17E-02	3.25E-01	2.04E-01	1.20E+00	5.28E-01
40	8.83E-02	8.76E-02	3.49E-01	2.22E-01	1.30E+00	5.75E-01
35	8.93E-02	8.87E-02	3.53E-01	2.27E-01	1.31E+00	5.88E-01
30	8.90E-02	8.86E-02	3.51E-01	2.30E-01	1.31E+00	5.94E-01
25	8.73E-02	8.73E-02	3.43E-01	2.29E-01	1.28E+00	5.93E-01
20	8.98E-02	8.82E-02	3.41E-01	2.26E-01	1.25E+00	5.85E-01
15	9.00E-02	8.79E-02	3.25E-01	2.18E-01	1.16E+00	5.65E-01
12.5	8.84E-02	8.69E-02	3.08E-01	2.12E-01	1.08E+00	5.47E-01
10	8.48E-02	8.48E-02	2.83E-01	2.02E-01	9.69E-01	5.21E-01
9	8.23E-02	8.22E-02	2.68E-01	1.96E-01	9.03E-01	5.08E-01
8	7.93E-02	7.91E-02	2.50E-01	1.90E-01	8.31E-01	4.92E-01
7	7.56E-02	7.55E-02	2.31E-01	1.83E-01	7.53E-01	4.73E-01
6	7.12E-02	7.12E-02	2.10E-01	1.74E-01	6.69E-01	4.49E-01
5	6.59E-02	6.59E-02	1.86E-01	1.62E-01	5.79E-01	4.20E-01
4	6.25E-02	6.22E-02	1.62E-01	1.48E-01	4.77E-01	3.84E-01
3.5	6.00E-02	5.97E-02	1.48E-01	1.39E-01	4.22E-01	3.61E-01
3	5.66E-02	5.64E-02	1.33E-01	1.28E-01	3.64E-01	3.34E-01
2.5	5.19E-02	5.19E-02	1.15E-01	1.15E-01	3.01E-01	3.01E-01
2	4.22E-02	5.41E-02	9.12E-02	1.16E-01	2.38E-01	2.72E-01
1.5	3.07E-02	5.13E-02	6.43E-02	1.07E-01	1.68E-01	2.27E-01
1.25	2.45E-02	4.70E-02	5.04E-02	9.65E-02	1.32E-01	1.95E-01
1	1.82E-02	4.07E-02	3.68E-02	8.25E-02	9.57E-02	1.58E-01
0.9	1.58E-02	4.03E-02	3.15E-02	8.23E-02	8.20E-02	1.57E-01
0.8	1.34E-02	3.92E-02	2.65E-02	8.06E-02	6.88E-02	1.52E-01
0.7	1.12E-02	3.73E-02	2.17E-02	7.72E-02	5.61E-02	1.45E-01
0.6	8.98E-03	3.47E-02	1.71E-02	7.22E-02	4.42E-02	1.35E-01
0.5	6.92E-03	3.13E-02	1.29E-02	6.54E-02	3.31E-02	1.22E-01
0.4	5.53E-03	2.50E-02	1.03E-02	5.23E-02	2.65E-02	9.76E-02
0.35	4.84E-03	2.19E-02	9.02E-03	4.58E-02	2.32E-02	8.54E-02
0.3	4.15E-03	1.88E-02	7.73E-03	3.92E-02	1.99E-02	7.32E-02
0.25	3.46E-03	1.57E-02	6.44E-03	3.27E-02	1.65E-02	6.10E-02
0.2	2.77E-03	1.25E-02	5.15E-03	2.62E-02	1.32E-02	4.88E-02
0.15	2.07E-03	9.39E-03	3.86E-03	1.96E-02	9.93E-03	3.66E-02
0.125	1.73E-03	7.83E-03	3.22E-03	1.64E-02	8.27E-03	3.05E-02
0.1	1.38E-03	6.26E-03	2.58E-03	1.31E-02	6.62E-03	2.44E-02

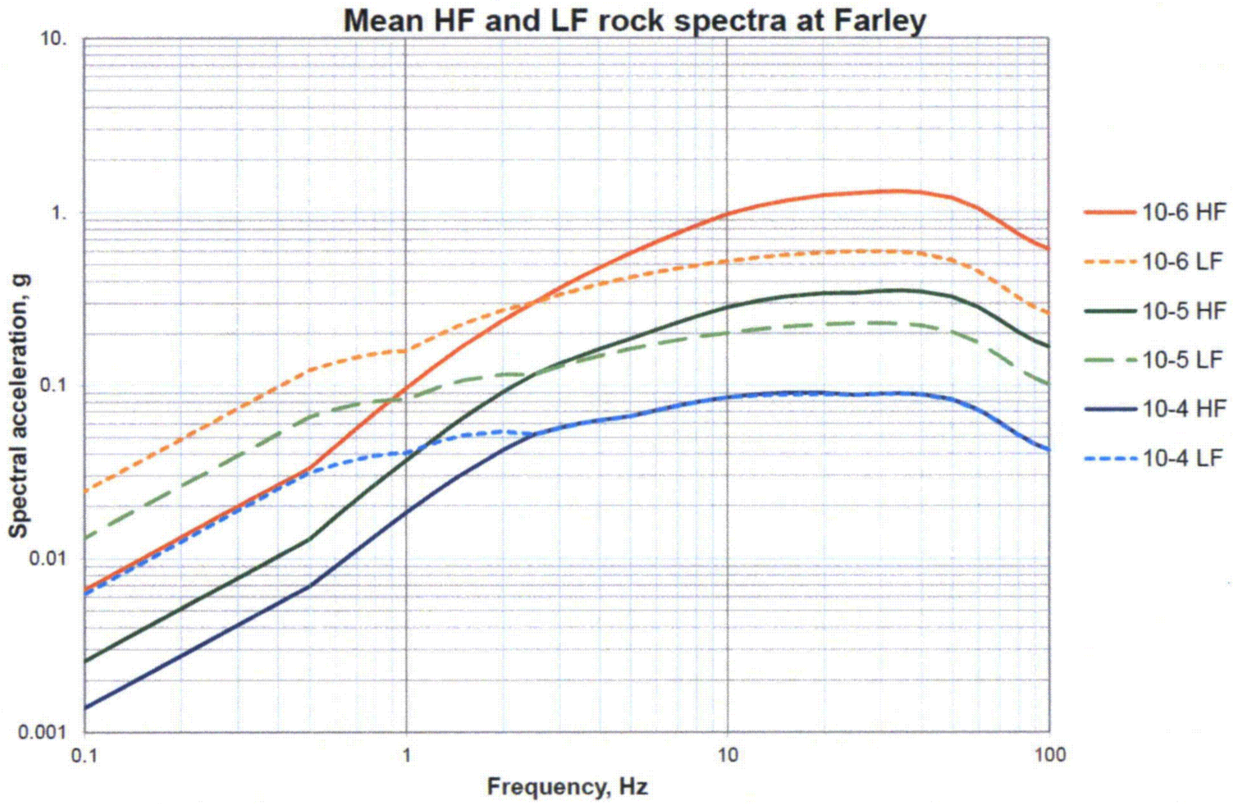

Figure 2.3.4-1: Input HF and LF spectra for MAFE levels of 10-4, 10-5, and 10-6 for a spectral damping of 5%.

2.3.5 Methodology

SNC Calculation SC-SNC539158-005 (SNC, 2014c) is the source of the information presented in the following section.

To perform the site response analyses for the Farley site, a random vibration theory (RVT) approach has been employed. This process utilizes a simple, efficient approach for computing site-specific amplification functions and is consistent with existing NRC guidance and the SPID (EPRI, 2013a). The guidance contained in Appendix B of the SPID (EPRI, 2013a) on incorporating epistemic uncertainty in shear wave velocities, kappa, non-linear dynamic properties and source spectra for plants with limited at-site information was followed for the Farley site, and resulted in the consideration of 18 different site columns. These columns and associated weight factors are presented in Table 2.3.5-1.

For each combination of the base profiles and its corresponding 60 randomized profiles, described in Section 2.3.3, and input motions, described in Section 2.3.4, the site amplification is computed as the ratio between 5% damped geologic outcrop pseudo-acceleration response spectrum at the control point and bedrock. The analysis is carried out at 301 frequency points ranging from 0.1 to 100 Hz and equally spaced in logarithmic space. The median (computed as the logarithmic mean) and the logarithmic standard deviation (log-SD) of the site amplification at each frequency are then computed. The weighted average amplification and total standard

deviation are computed using the equations provided in the SPID (EPRI, 2013a) along with the weight factors in Table 2.3.5-1.

The probabilistic seismic hazard curves are defined at the following 38 frequencies (in units of Hz):

100 90 80 70 60 50 45 40 35 30 25 20 15 12.5 10 9 8 7 6 5 4 3 2.5 2 1.5 1.25 1
0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.167 0.125 0.1

At each of these frequencies, the weighted average amplification and total standard are computed using linear interpolation in log-log space from the 301 site amplification values.

Table 2.3.5-1: Alternative Base Site Columns and Weights

Shear Wave Velocity		Strain-Dependent Property Curves		Kappa		Base Soil Column Weight	Base Soil Column Name
Profile	**Weight (wVs)**	**Profile**	**Weight (wG)**	**Profile**	**Weight (wk)**	**(WVs · wG · wk)**	
Lower (VsL)	0.3	Set 1 (G1)*	0.5	Lower (kL)	0.3	0.045	VsL_G1_kL
				Median (kM)	0.4	0.060	VsL_G1_kM
				Upper (kU)	0.3	0.045	VsL_G1_kU
		Set 2 (G2)**	0.5	Lower (kL)	0.3	0.045	VsL_G2_kL
				Median (kM)	0.4	0.060	VsL_G2_kM
				Upper (kU)	0.3	0.045	VsL_G2_kU
Median (VsM)	0.4	Set 1 (G1)	0.5	Lower (kL)	0.3	0.060	VsM_G1_kL
				Median (kM)	0.4	0.080	VsM_G1_kM
				Upper (kU)	0.3	0.060	VsM_G1_kU
		Set 2 (G2)	0.5	Lower (kL)	0.3	0.060	VsM_G2_kL
				Median (kM)	0.4	0.080	VsM_G2_kM
				Upper (kU)	0.3	0.060	VsM_G2_kU
Upper (VsU)	0.3	Set 1 (G1)	0.5	Lower (kL)	0.3	0.045	VsU_G1_kL
				Median (kM)	0.4	0.060	VsU_G1_kM
				Upper (kU)	0.3	0.045	VsU_G1_kU
		Set 2 (G2)	0.5	Lower (kL)	0.3	0.045	VsU_G2_kL
				Median (kM)	0.4	0.060	VsU_G2_kM
				Upper (kU)	0.3	0.045	VsU_G2_kU
					Total:	**1.000**	

*G1 designates the EPRI 20-50 ft strain-dependent property curves

*G2 designates the EPRI 50-120 ft strain-dependent property curves

2.3.6 Amplification Functions

SNC Calculation SC-SNC539158-005 (SNC, 2014c) is the source of the information presented in the following section.

The results of the site response analysis consist of amplification functions which describe the amplification (or de-amplification) of base rock motions as a function of frequency and input

base rock amplitude. The amplification functions are represented in terms of a median (computed as the logarithmic mean) amplification value and an associated logarithmic standard deviation (sigma) for each response spectral frequency and input base rock amplitude. As an example, the median and logarithmic standard deviation for the VsM_G1_kM site column are shown in Figure 2.3.6-1 and Figure 2.3.6-2. The data associated for these figures are tabulated in Table 2.3.6-1 for the high-frequency (HF) and low-frequency (LF) input motions at mean-annual frequencies of exceedance (MAFE) of 10^{-4} and 10^{-5}. Similarly, the figures and data are provided for the VsM-G2_kM site column in Figure 2.3.6-3, Figure 2.3.6-4, and Table 2.3.6-2.

The weighted average amplification and total standard deviation are obtained by combining the results of each base profile using its associated weight factor using the method recommended by the SPID (EPRI, 2013a). The weighted average and total standard deviation are shown in Figure 2.3.6-5 and Figure 2.3.6-6. The associated data for the high-frequency (HF) and low-frequency (LF) input motions at mean-annual frequencies of exceedance (MAFE) of 10^{-4} and 10^{-5} are provided in Table 2.3.6-3. Note these tables in this section are provided in lieu of the submittal template Appendix Tables A.2-b1 and A.2-b2.

Additionally, the weighted average amplification and total standard deviation, for the 1E-3 through 1E-7 MAFE, are reported at the seven frequencies of interest in Table A-2 in the Appendix.

At some frequencies, the calculated site amplification for high base rock amplitudes is less than the minimum value of 0.5 recommended by the SPID (EPRI, 2013a). The 0.5 limit is not imposed here in the calculation of the surface hazard because the intended purpose of this calculation is a best assessment of mean and fractile levels of the seismic response for plant risk assessment with no added conservatism.

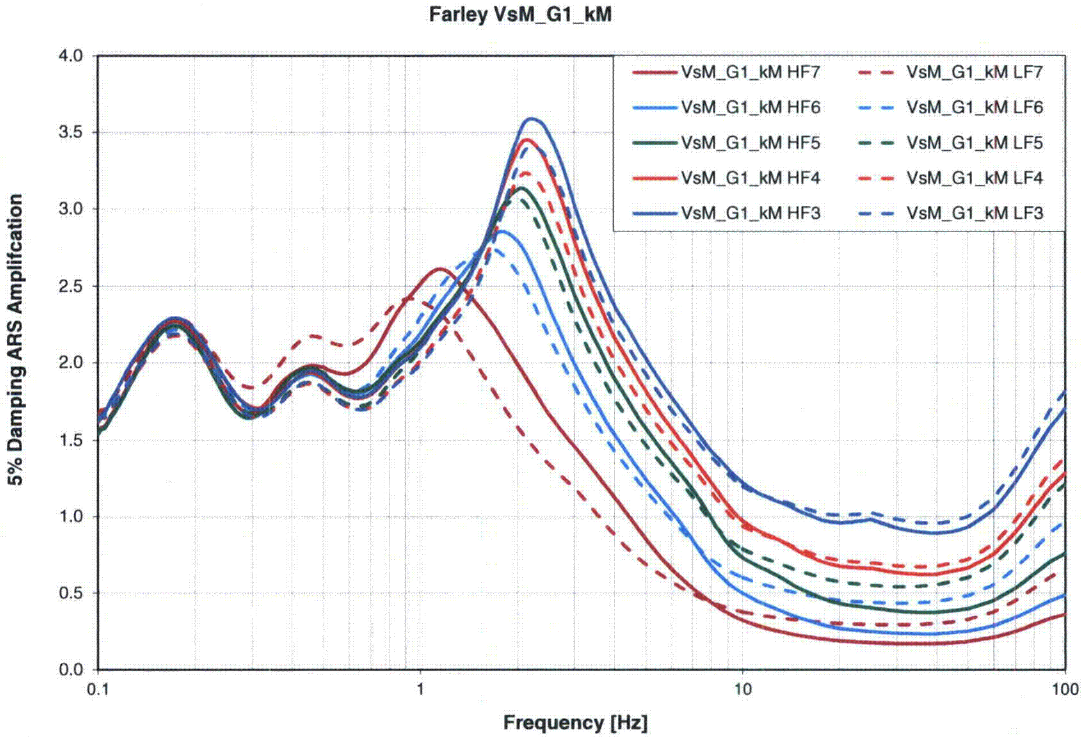

Figure 2.3.6-1: The logarithmic mean site amplification for the VsM_G1_kM site column for the considered input motions.

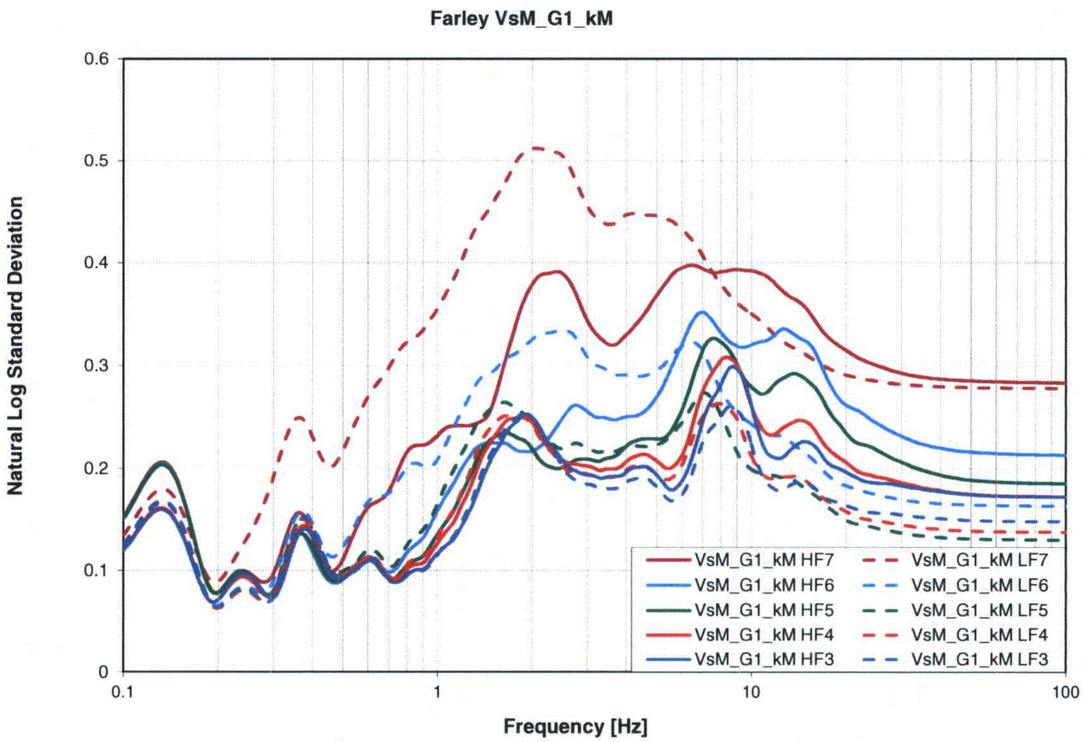

Figure 2.3.6-2: The logarithmic standard deviation of the site amplification for the VsM_G1_kM site column for the considered input motions.

Table 2.3.6-1: The logarithmic mean and standard deviation of the site amplification (for 5% damped PSA) computed for the VsM_G1_kM profile and the HF4, LF4, HF5, and LF5 input motions.

Freq. (Hz)	HF4		LF4		HF5		LF5	
	Median	Log SD	Median	Log-SD	Median	Log-SD	Median	Log-SD
0.100	1.626	0.121	1.618	0.125	1.537	0.151	1.624	0.125
0.125	1.962	0.158	1.855	0.163	1.842	0.199	1.862	0.163
0.167	2.278	0.107	2.167	0.113	2.232	0.134	2.176	0.114
0.200	2.200	0.071	2.100	0.063	2.131	0.078	2.109	0.064
0.300	1.711	0.076	1.653	0.075	1.647	0.078	1.665	0.078
0.400	1.874	0.135	1.808	0.141	1.913	0.123	1.821	0.140
0.500	1.901	0.093	1.822	0.096	1.932	0.091	1.832	0.099
0.600	1.780	0.112	1.710	0.112	1.820	0.110	1.729	0.120
0.700	1.792	0.093	1.711	0.095	1.835	0.092	1.739	0.105
0.800	1.911	0.101	1.817	0.105	1.949	0.105	1.859	0.124
0.900	2.012	0.107	1.915	0.113	2.048	0.114	1.973	0.140
1.000	2.102	0.126	2.010	0.132	2.135	0.134	2.092	0.165
1.250	2.377	0.176	2.275	0.191	2.402	0.188	2.396	0.226
1.500	2.659	0.229	2.546	0.242	2.660	0.229	2.674	0.259
2.000	3.376	0.245	3.177	0.243	3.123	0.219	3.058	0.244
2.500	3.268	0.208	3.055	0.202	2.869	0.201	2.734	0.219
3.000	2.801	0.202	2.605	0.194	2.454	0.209	2.296	0.220
4.000	2.164	0.207	2.013	0.199	1.896	0.222	1.764	0.221
5.000	1.819	0.207	1.704	0.195	1.579	0.229	1.470	0.223
6.000	1.578	0.212	1.480	0.203	1.356	0.256	1.277	0.244
7.000	1.390	0.275	1.315	0.251	1.174	0.315	1.128	0.273
8.000	1.218	0.305	1.158	0.263	0.985	0.323	0.968	0.252
9.000	1.072	0.300	1.024	0.248	0.827	0.301	0.856	0.216
10.000	0.970	0.261	0.938	0.212	0.734	0.279	0.789	0.199
12.500	0.861	0.238	0.856	0.192	0.627	0.287	0.706	0.191
15.000	0.773	0.245	0.789	0.187	0.531	0.286	0.645	0.179
20.000	0.677	0.206	0.716	0.158	0.430	0.235	0.574	0.149
25.000	0.663	0.192	0.700	0.148	0.403	0.218	0.552	0.141
30.000	0.635	0.186	0.679	0.144	0.381	0.206	0.542	0.136
35.000	0.624	0.181	0.673	0.142	0.373	0.198	0.545	0.133
40.000	0.626	0.178	0.678	0.140	0.373	0.194	0.556	0.132
45.000	0.646	0.176	0.700	0.139	0.384	0.190	0.579	0.131
50.000	0.666	0.175	0.723	0.138	0.396	0.189	0.602	0.131
60.000	0.758	0.174	0.823	0.138	0.450	0.187	0.693	0.130
70.000	0.897	0.173	0.972	0.137	0.533	0.186	0.827	0.130
80.000	1.052	0.173	1.140	0.137	0.625	0.186	0.977	0.130
90.000	1.186	0.173	1.285	0.137	0.706	0.185	1.118	0.130
100.000	1.282	0.172	1.387	0.137	0.762	0.185	1.209	0.129

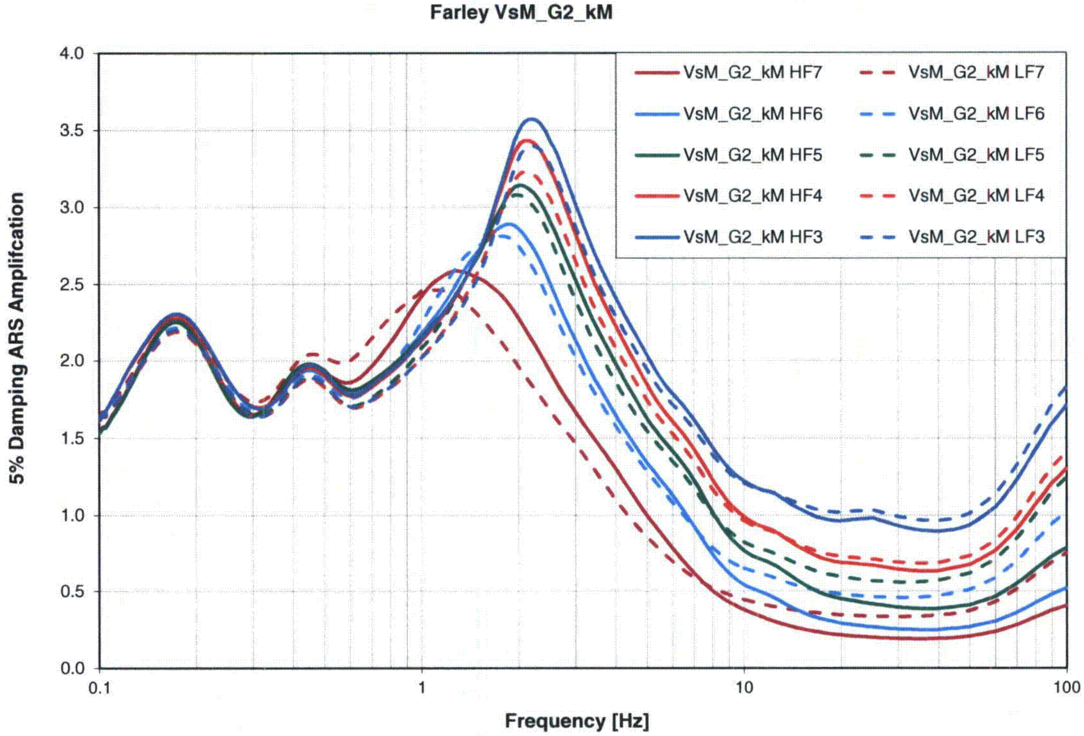

Figure 2.3.6-3: The logarithmic mean site amplification for the VsM_G2_kM site column for the considered input motions.

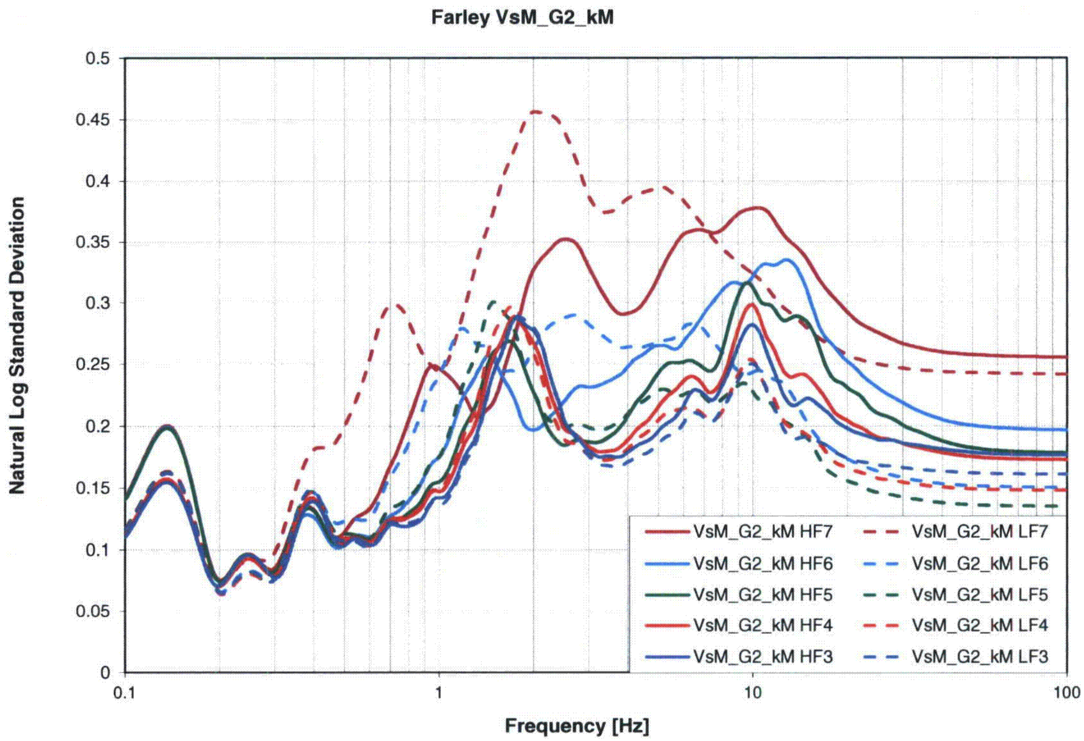

Figure 2.3.6-4: The logarithmic standard deviation of the site amplification for the VsM_G2_kM site column for the considered input motions.

Table 2.3.6-2: The logarithmic mean and standard deviation of the site amplification (for 5% damped PSA) computed for the VsM_G2_kM profile and the HF4, LF4, HF5, and LF5 input motions.

Freq. (Hz)	HF4		LF4		HF5		LF5	
	Median	Log SD	Median	Log SD	Median	Log SD	Median	Log SD
0.100	1.622	0.112	1.612	0.116	1.528	0.140	1.616	0.117
0.125	1.957	0.152	1.848	0.155	1.832	0.190	1.853	0.156
0.167	2.289	0.114	2.175	0.121	2.241	0.142	2.182	0.121
0.200	2.207	0.070	2.105	0.065	2.136	0.074	2.112	0.065
0.300	1.703	0.080	1.642	0.076	1.642	0.083	1.652	0.078
0.400	1.881	0.141	1.812	0.145	1.920	0.131	1.821	0.146
0.500	1.902	0.105	1.821	0.109	1.933	0.105	1.825	0.112
0.600	1.770	0.106	1.695	0.103	1.810	0.108	1.707	0.109
0.700	1.827	0.124	1.739	0.125	1.864	0.122	1.758	0.133
0.800	1.922	0.126	1.822	0.128	1.952	0.129	1.849	0.142
0.900	2.021	0.138	1.915	0.140	2.049	0.144	1.954	0.161
1.000	2.128	0.147	2.023	0.148	2.149	0.155	2.079	0.175
1.250	2.389	0.193	2.276	0.202	2.401	0.206	2.374	0.245
1.500	2.696	0.257	2.581	0.275	2.681	0.260	2.690	0.300
2.000	3.395	0.267	3.203	0.259	3.139	0.227	3.076	0.227
2.500	3.249	0.199	3.060	0.190	2.912	0.185	2.814	0.199
3.000	2.834	0.184	2.655	0.177	2.533	0.187	2.402	0.199
4.000	2.228	0.189	2.085	0.182	1.981	0.208	1.860	0.209
5.000	1.848	0.215	1.746	0.205	1.630	0.242	1.548	0.228
6.000	1.609	0.235	1.527	0.214	1.415	0.252	1.348	0.225
7.000	1.427	0.231	1.347	0.208	1.225	0.246	1.172	0.223
8.000	1.227	0.237	1.164	0.211	1.016	0.261	1.008	0.221
9.000	1.078	0.279	1.041	0.241	0.863	0.305	0.896	0.232
10.000	0.989	0.298	0.964	0.253	0.769	0.313	0.825	0.228
12.500	0.892	0.245	0.885	0.205	0.668	0.286	0.746	0.204
15.000	0.786	0.239	0.805	0.192	0.556	0.283	0.671	0.190
20.000	0.689	0.204	0.730	0.166	0.450	0.231	0.594	0.156
25.000	0.671	0.191	0.711	0.158	0.417	0.210	0.568	0.146
30.000	0.644	0.186	0.691	0.155	0.395	0.201	0.558	0.142
35.000	0.632	0.182	0.684	0.152	0.385	0.194	0.561	0.139
40.000	0.634	0.179	0.689	0.151	0.385	0.188	0.571	0.138
45.000	0.654	0.177	0.711	0.150	0.397	0.185	0.594	0.136
50.000	0.675	0.175	0.734	0.149	0.409	0.183	0.618	0.136
60.000	0.768	0.174	0.836	0.149	0.464	0.181	0.711	0.135
70.000	0.908	0.174	0.987	0.148	0.550	0.180	0.849	0.135
80.000	1.065	0.173	1.157	0.148	0.645	0.179	1.003	0.135
90.000	1.201	0.173	1.305	0.148	0.729	0.179	1.148	0.135
100.000	1.298	0.173	1.409	0.148	0.787	0.179	1.241	0.135

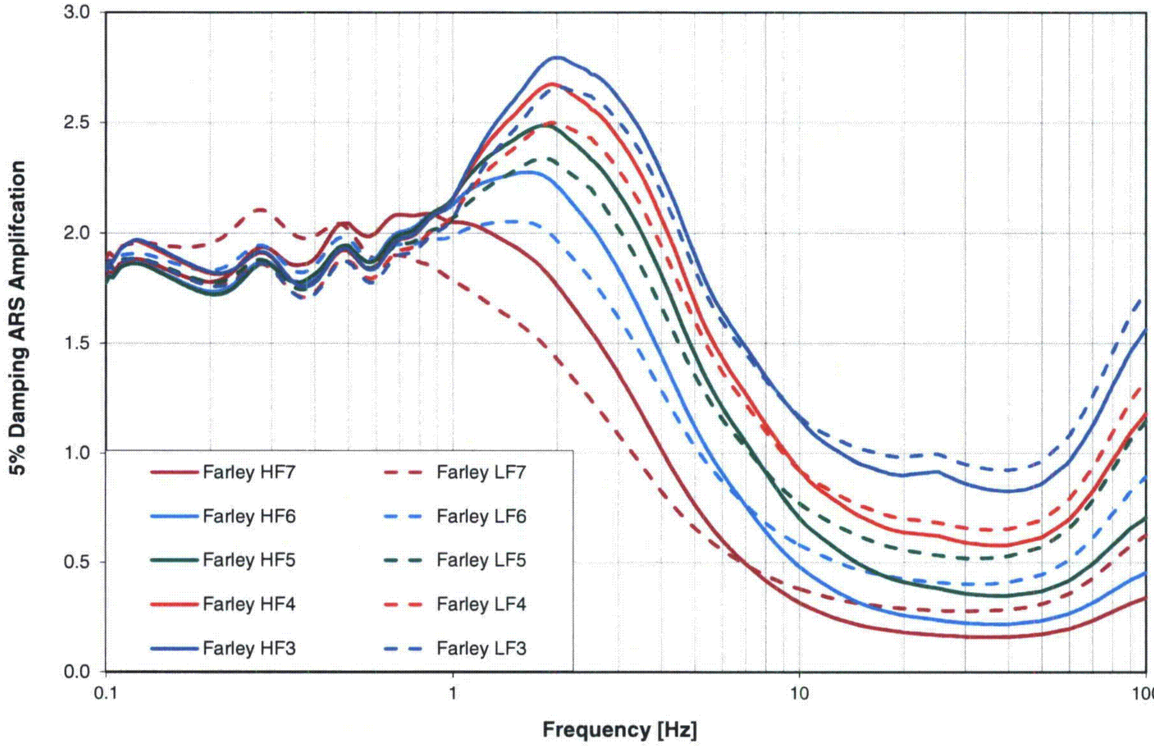

Figure 2.3.6-5: Weighted Average Median Amplification Factors at Ground Surface.

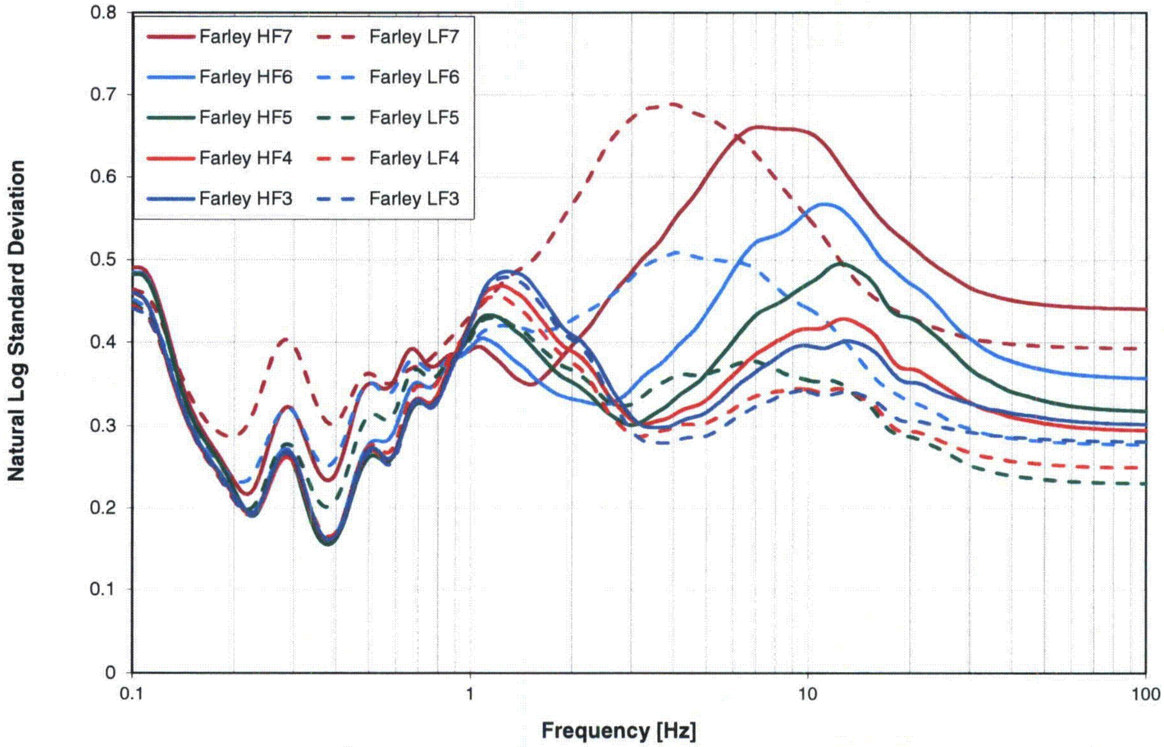

Figure 2.3.6-6: Total Logarithmic Standard Deviations for Amplification Functions at Ground Surface.

Table 2.3.6-3: The weighted average median and total logarithmic standard deviation of the site amplification (for 5% damped PSA) the HF4, LF4, HF5, and LF5 input motions.

Freq. (Hz)	HF4		LF4		HF5		LF5	
	Median	Log-SD	Median	Log-SD	Median	Log-SD	Median	Log-SD
0.100	1.837	0.459	1.828	0.444	1.771	0.482	1.836	0.447
0.125	1.959	0.383	1.873	0.381	1.857	0.414	1.880	0.383
0.167	1.863	0.260	1.799	0.257	1.765	0.277	1.810	0.260
0.200	1.815	0.213	1.760	0.209	1.721	0.222	1.775	0.212
0.300	1.888	0.254	1.834	0.256	1.849	0.253	1.854	0.272
0.400	1.777	0.167	1.731	0.171	1.812	0.162	1.773	0.210
0.500	1.918	0.267	1.869	0.275	1.942	0.261	1.912	0.312
0.600	1.844	0.270	1.801	0.280	1.877	0.267	1.849	0.319
0.700	1.967	0.334	1.917	0.348	1.990	0.328	1.946	0.367
0.800	2.013	0.339	1.956	0.354	2.033	0.339	1.974	0.362
0.900	2.087	0.387	2.021	0.393	2.101	0.381	2.019	0.386
1.000	2.152	0.426	2.086	0.422	2.155	0.410	2.069	0.405
1.250	2.397	0.468	2.276	0.454	2.336	0.426	2.201	0.427
1.500	2.532	0.444	2.380	0.428	2.421	0.398	2.278	0.406
2.000	2.668	0.389	2.493	0.376	2.466	0.353	2.313	0.367
2.500	2.563	0.344	2.428	0.324	2.334	0.319	2.200	0.333
3.000	2.430	0.307	2.286	0.289	2.182	0.301	2.024	0.326
4.000	2.067	0.313	1.940	0.298	1.808	0.331	1.663	0.359
5.000	1.686	0.332	1.601	0.304	1.448	0.363	1.352	0.362
6.000	1.431	0.361	1.368	0.320	1.207	0.401	1.153	0.373
7.000	1.268	0.386	1.222	0.336	1.049	0.432	1.025	0.377
8.000	1.129	0.400	1.097	0.342	0.911	0.446	0.916	0.368
9.000	1.016	0.412	0.997	0.345	0.795	0.459	0.832	0.360
10.000	0.922	0.416	0.920	0.344	0.703	0.471	0.770	0.355
12.500	0.790	0.428	0.822	0.345	0.573	0.495	0.677	0.351
15.000	0.710	0.416	0.760	0.330	0.489	0.479	0.617	0.326
20.000	0.637	0.369	0.700	0.293	0.409	0.430	0.556	0.287
25.000	0.621	0.348	0.683	0.280	0.381	0.400	0.532	0.269
30.000	0.591	0.329	0.658	0.267	0.358	0.369	0.518	0.252
35.000	0.579	0.318	0.650	0.261	0.348	0.353	0.520	0.244
40.000	0.579	0.311	0.653	0.257	0.348	0.342	0.528	0.239
45.000	0.597	0.307	0.674	0.255	0.358	0.336	0.549	0.236
50.000	0.615	0.303	0.695	0.253	0.368	0.331	0.571	0.234
60.000	0.698	0.299	0.790	0.251	0.417	0.325	0.656	0.232
70.000	0.825	0.297	0.933	0.250	0.493	0.322	0.783	0.231
80.000	0.967	0.296	1.093	0.249	0.578	0.320	0.925	0.230
90.000	1.090	0.295	1.232	0.249	0.654	0.319	1.058	0.230
100.000	1.178	0.295	1.330	0.249	0.705	0.318	1.144	0.230

2.3.7 Control Point Seismic Hazard Curves

SNC Calculation SC-SNC539158-002 (SNC, 2014e) is the source of the information presented in the following section.

The procedure to develop probabilistic site-specific control point hazard curves used in the present analysis follows the methodology described in McGuire et al. (2001) and Section B-6.0 of the SPID (EPRI, 2013a). This procedure (referred to as Method 3) computes a site-specific control point hazard curve for a broad range of spectral accelerations given the site-specific bedrock hazard curve and site-specific estimates of soil or soft-rock response (i.e., median amplification factors) and associated uncertainties (i.e., sigma in natural log units) presented in the previous section.

As part of the implementation of Method 3, base rock hazard curves for 31 spectral frequencies in addition to the original seven frequencies of 100 Hz (PGA), 25 Hz, 10 Hz, 5 Hz, 2.5 Hz, 1 Hz, and 0.5 Hz are initially developed and used in the application of Method 3 to capture the resulting expected site resonance characteristics from the site response analysis. Given the base rock hazard curves from the seven reference spectral frequencies, UHRS are developed for this suite of 38 spectral frequencies over the range of 0.1 to 100 Hz. UHRS are computed for annual frequencies of exceedances of 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7}, and 10^{-8}. For the interpolation of ground motions at the additional 31 spectral frequencies, the average of the CEUS base rock single-corner and double-corner spectral shape models (McGuire et al., 2001) is used with an M_w of 6.5 at a distance of 50 km. This average spectral shape for each UHRS is constrained to be equal to the ground motion value for each of the seven reference spectral frequencies. For frequencies less than 0.5 Hz, a constant slope of 1/T is adopted, where T is the spectral period. This methodology for the interpolation of additional spectral frequencies for the base rock hazard curves was applied to both the mean and fractile sets of base rock hazard curves.

The resulting 38 base rock hazard curve sets (i.e., mean and five fractile levels of 5th, 16th, 50th, 84th, and 95th) were used in the Method 3 approach (McGuire et al., 2001) to estimate the control point seismic hazard curves for 38 spectral frequencies along with the median site amplification factors and associated sigma values from the high frequency (HF) and low frequency (LF) input spectra. For frequencies equal to 5 Hz and higher the results from only the HF cases were used and for frequencies equal to 2.5 Hz and lower only the results from the LF cases were used. For frequencies between 2.5 Hz and 5 Hz the results from both the HF and LF cases were combined using weights that are computed based on the log interpolation of the difference in the given frequency value from the two end member values of 2.5 Hz and 5 Hz. The mean control point hazard curves for the seven reference spectral frequencies for the Farley site are shown in Figure 2.3.7-1. Tabulated values of the control point hazard curves and site response amplification functions are provided in the attached Appendix Table A-1 and A-2, respectively.

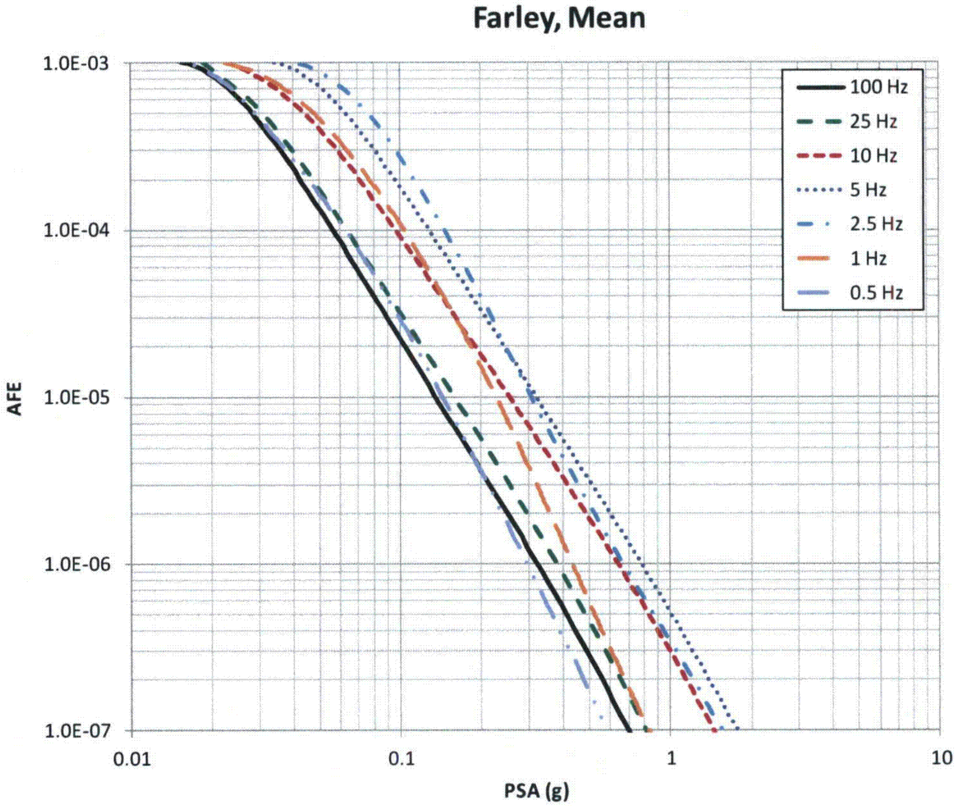

Figure 2.3.7-1: Control point mean hazard curves for spectral frequencies of 0.5, 1, 2.5, 5, 10, 25 and 100 Hz at the Farley site. The hazard curve relates the pseudo-spectral acceleration (PSA) to the annual frequency of exceedance (AFE).

2.4 Control Point Response Spectra

SNC Calculation SC-SNC539158-002 (SNC, 2014e) is the source of the information presented in the following section.

The control point hazard curves described above and provided in the Tables A-1a through A-1g of Appendix A for the seven reference frequencies have been used to develop uniform hazard response spectra (UHRS) and the ground motion response spectrum (GMRS). The UHRS were obtained through linear interpolation in log-log space to estimate the spectral acceleration at each of the 38 spectral frequencies for the 1E-4 and 1E-5 per year hazard levels.

The 1E-4 and 1E-5 UHRS, along with a design factor (DF) are used to compute the GMRS at the control point using the criteria in Regulatory Guide 1.208 (NRC, 2007). The UHRS and GMRS spectral accelerations are shown in Figure 2.4-1, as well as tabulated in Table 2.4-1.

Table 2.4-1: UHRS for 10^{-4} and 10^{-5} and GMRS at control point for Farley.

Frequency (Hz)	Mean UHRS (g) (AFE=10^{-4})	Mean UHRS (g) (AFE=10^{-5})	GMRS (g)
100.000	0.0563	0.1356	0.0682
90.000	0.0563	0.1357	0.0683
80.000	0.0564	0.1360	0.0684
70.000	0.0566	0.1365	0.0687
60.000	0.0569	0.1372	0.0690
50.000	0.0575	0.1388	0.0698
45.000	0.0582	0.1409	0.0708
40.000	0.0584	0.1417	0.0712
35.000	0.0593	0.1447	0.0726
30.000	0.0607	0.1495	0.0749
25.000	0.0633	0.1588	0.0793
20.000	0.0679	0.1723	0.0858
15.000	0.0788	0.2043	0.1013
12.500	0.0867	0.2295	0.1133
10.000	0.0962	0.2543	0.1256
9.000	0.1025	0.2694	0.1332
8.000	0.1086	0.2851	0.1410
7.000	0.1149	0.2998	0.1485
6.000	0.1199	0.3070	0.1526
5.000	0.1281	0.3193	0.1596
4.000	0.1426	0.3339	0.1690
3.000	0.1474	0.3207	0.1647
2.500	0.1464	0.3070	0.1588
2.000	0.1642	0.3440	0.1780
1.500	0.1551	0.3305	0.1704
1.250	0.1379	0.2981	0.1533
1.000	0.1038	0.2277	0.1167
0.900	0.0971	0.2164	0.1106
0.800	0.0885	0.2001	0.1020
0.700	0.0821	0.1887	0.0958
0.600	0.0681	0.1570	0.0797
0.500	0.0625	0.1437	0.0730
0.400	0.0445	0.0993	0.0507
0.300	0.0366	0.0818	0.0418
0.200	0.0230	0.0503	0.0258
0.167	0.0200	0.0443	0.0227
0.125	0.0168	0.0388	0.0197
0.100	0.0138	0.0326	0.0165

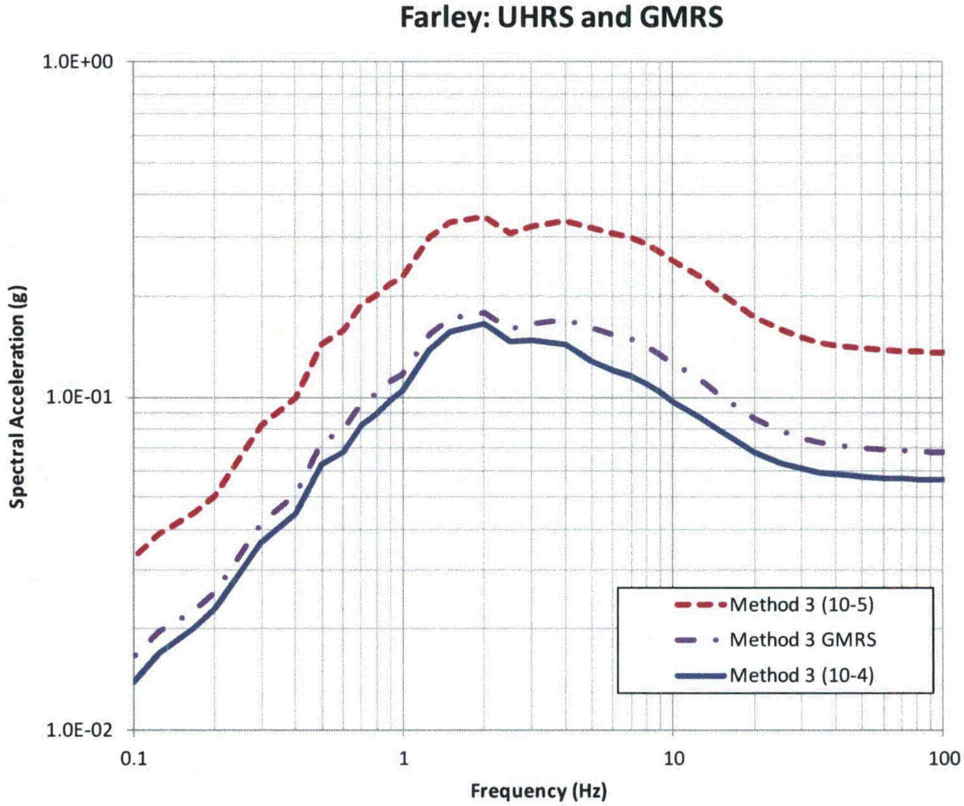

Figure 2.4-1: UHRS for 1E-4 and 1E-5 and GMRS at control point for Farley.

3.0 Plant Design Basis and Beyond Design Basis Evaluation Ground Motion

The design basis ground motion for Plant Farley Units 1 and 2 is identified in the FSAR (SNC, 2014f). In particular the Plant Farley SSE is defined in sections 1.2.1.6 Seismology, 2.5.2.10 Safe Shutdown Earthquake, and 3.7.1 Seismic Input.

3.1 SSE Description of Spectral Shape

The SSE was developed in accordance with 10 CFR Part 100, Appendix A through an evaluation of the maximum earthquake potential for the region surrounding the site. This region is one of the least seismically active regions in the United States and is characterized by few low-magnitude and low-intensity shocks. Historic records show that earthquakes have never been felt at the site with an intensity greater Modified Mercalli V and that no earthquake of epicentral intensity greater than Modified Mercalli IV has occurred within 150 miles of the plant site. Therefore, the maximum intensity postulated as having been experienced at the site, as a result of any historical earthquake, is a low to moderate V. This intensity corresponds to a surface acceleration of 0.03g on the Hershberger's (1956) curve. Therefore, conservatively 0.10g surface acceleration was selected for the safe shutdown earthquake (SSE). The modified Newmark spectral shape with a peak ground acceleration of 0.1g defines the Farley Units 1 and 2 SSE. The 5% damped horizontal SSE is provided in Table 3.3-1 and shown in Figure 3.3-1.

Table 3.3-1: SSE for Plant Farley Units 1 and 2.

Frequency (Hz)	SSE (g)
0.10	0.005
0.217	0.023
0.5	0.053
1.0	0.105
2.0	0.21
2.5	0.21
4.0	0.21
6.67	0.21
8.0	0.17
9.0	0.15
10.0	0.13
12.5	0.10
33.0	0.10
100.0	0.10

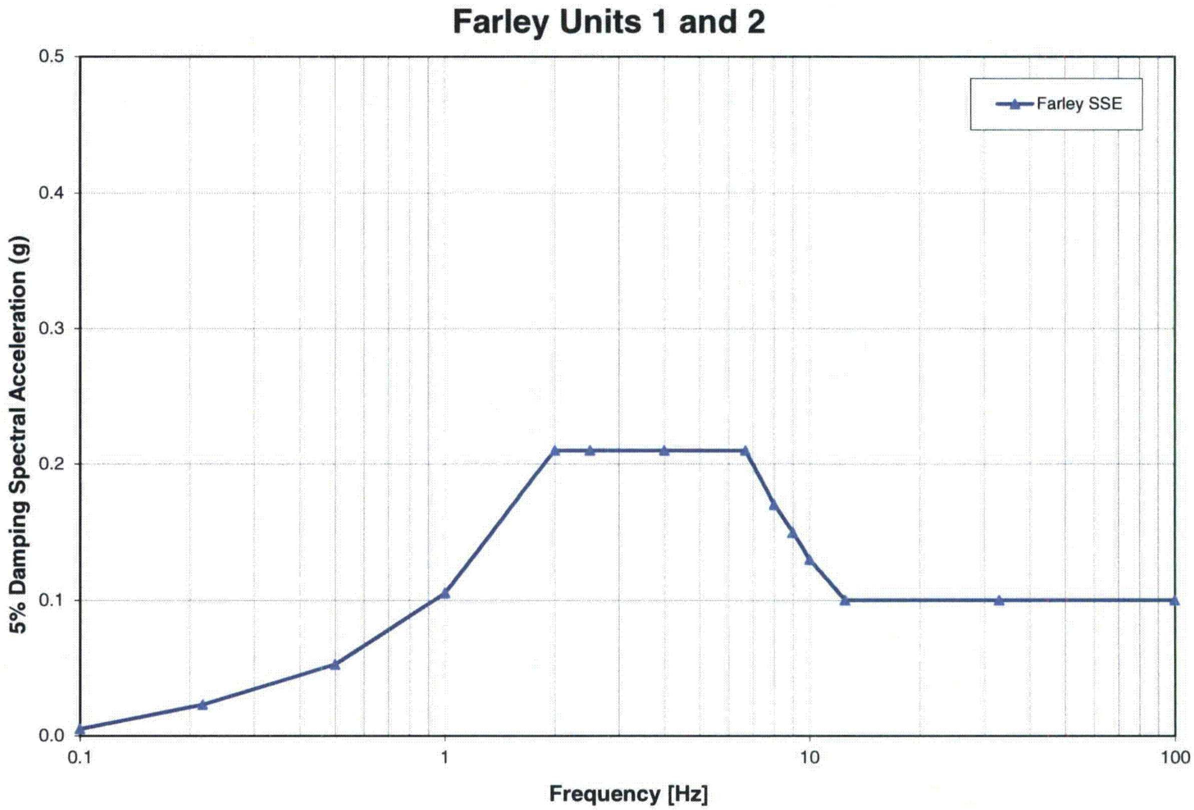

Figure 3.3-1: Horizontal SSE for Plant Farley Units 1 and 2

3.2 Control Point Elevation

The SSE control point elevation is defined at Elevation 155 feet which is general plant grade. There are safety related structures founded at plant grade. The SPID (EPRI, 2013a) section 2.4.2 Figure 2-2 is representative of the Farley site conditions. Also FSAR (SNC, 2014f) Figure 3.7-62 “Seismic Instrumentation” shows a free field acceleration sensor in the free field which is surface mounted. This fact supports the location of the control point for the SSE and therefore the GMRS is at general plant grade.

4.0 Screening Evaluation

In accordance with SPID (EPRI, 2013a) Section 3, a screening evaluation has been performed as described below.

4.1 Risk Evaluation Screening (1 to 10 Hz)

In the 1 to 10 Hz part of the response spectrum, Plant Farley Units 1 and 2 screens in under the special screening considerations for a Low Seismic Hazard Site per section 3.2.1.1 of the SPID (EPRI, 2013a).

4.2 High Frequency Screening (> 10 Hz)

For a portion of the range above 10 Hz, the GMRS exceeds the SSE; therefore, Plant Farley Units 1 and 2 screens in for a high frequency confirmation.

4.3 Spent Fuel Pool Evaluation Screening (1 to 10 Hz)

In the 1 to 10 Hz part of the response spectrum, Plant Farley Units 1 and 2 screens in under the special screening considerations for a Low Seismic Hazard Site per section 3.2.1.1 of the SPID (EPRI, 2013a). Therefore, a spent fuel pool evaluation will not be performed.

5.0 Interim Actions

Based on the screening evaluation, the expedited seismic evaluation described in EPRI Report No. 3002000704 (EPRI, 2013c) is limited to Expedited Seismic Equipment List items that have their fundamental natural frequencies below the highest frequency where the GMRS exceeds the SSE (EPRI 2013c, section 2.2.1.1) as proposed in letter to NRC dated April 9, 2013 (ML13101A379) and agreed to by NRC in a letter dated May 7, 2013 (ML13106A331).

Consistent with NRC letter dated February 20, 2014, [ML14030A046] the seismic hazard reevaluations presented herein are distinct from the current design and licensing bases of Plant Farley Units 1 and 2. Therefore, the results do not call into question the operability or functionality of SSCs and are not reportable pursuant to10 CFR 50.72, "Immediate notification requirements for operating nuclear power reactors," and10 CFR 50.73, "Licensee event report system.

The NRC letter also requests that licensees provide an interim evaluation or actions to demonstrate that the plant can cope with the reevaluated hazard while the expedited approach and risk evaluations are conducted. In response to that request, NEI letter dated March 12, 2014 (NEI, 2014), provides seismic core damage risk estimates using the updated seismic hazards for the operating nuclear plants in the Central and Eastern United States. These risk estimates continue to support the following conclusions of the NRC GI-199 Safety/Risk Assessment:

> Overall seismic core damage risk estimates are consistent with the Commission's Safety Goal Policy Statement because they are within the subsidiary objective of 10^{-4}/year for core damage frequency. The GI-199 Safety/Risk Assessment, based in part on information from the U.S. Nuclear Regulatory Commission's (NRC's) Individual Plant Examination of External Events (IPEEE) program, indicates that no concern exists regarding adequate protection and that the current seismic design of operating reactors provides a safety margin to withstand potential earthquakes exceeding the original design basis.

Plant Farley Units 1 and 2 is included in the March 12, 2014 risk estimates (NEI, 2014). Using the methodology described in the NEI letter, all plants were shown to be below 10^{-4}/year; thus, the above conclusions apply.

The recent 2.3 Seismic Walkdowns provide additional assurance that Plant Farley Units 1 and 2 is maintaining the seismic capacity of the plant.

2.3 Seismic Walkdowns

In the 2012 to 2014 time frame the 2.3 Seismic Walkdowns were performed at Farley for a broad range of safety related equipment. Final reports have been submitted to the NRC.

Plant Farley had no significant degraded, non-conforming or unanalyzed conditions that warranted modification to the plant. Plant Farley had no-as found conditions that would prevent SSCs from performing their required safety functions.

The 2.3 Seismic Walkdown Equipment List for Unit 1 included 28 components that had seismic issues previously identified during the IPEEE program. The 2.3 Seismic Walkdown teams verified that the recommended resolutions to the IPEEE issues associated with the 28 items had been implemented. The 2.3 Seismic Walkdown Equipment List for Unit 2 included 18 components that had seismic issues previously identified during the IPEEE program. Implementation of these modifications was verified during the 2.3 Seismic walkdowns.

Farley Design Basis In-structure Response Spectra (ISRS)

For informational purposes it should be noted that the 5% damped response spectrum for the Farley synthesized time history as shown in Figure 3.7-5 of the Farley FSAR (SNC, 2014f) exceed the Farley SSE. In particular for the frequency range of 1 to about 1.5 Hz the exceedance is about 38% to 20% respectively. Therefore, the time history response spectrum exceeds the GMRS in that same frequency range. This time history was used to develop in-structure response spectra (ISRS) for the seismic design and/or seismic qualification of all safety related systems and components mounted in the safety related structures: e.g. piping, batteries and battery racks, electrical equipment, etc.

6.0 Conclusions

In accordance with the 50.54(f) (NRC, 2012) request for information, a seismic hazard and screening evaluation was performed for Plant Farley Units 1 and 2. A GMRS was developed solely for purpose of screening for additional evaluations in accordance with the SPID (EPRI, 2013a).

Based on the results of the screening evaluation, Plant Farley Units 1 and 2 screens in under the special screening considerations for a Low Seismic Hazard Site per section 3.2.1.1 of the SPID (EPRI, 2013a).

Plants Farley Units 1 and 2 screens in for a high frequency confirmation.

Plant Farley Units 1 and 2 screens out of *a* Spent Fuel Pool evaluation.

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Appendix A

Table A-1a. 100 Hz (PGA) Seismic Hazard Curves at Farley.

Mean		*5th Fractile*		*16th Fractile*		*50th Fractile*		*84th Fractile*		*95th Fractile*	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.0125	1.080E-03	0.0041	1.067E-03	0.0066	1.090E-03	0.0102	1.093E-03	0.0149	1.073E-03	0.0267	1.034E-03
0.0132	1.069E-03	0.0043	1.060E-03	0.0070	1.080E-03	0.0108	1.083E-03	0.0158	1.060E-03	0.0282	1.011E-03
0.0140	1.055E-03	0.0045	1.051E-03	0.0074	1.068E-03	0.0114	1.069E-03	0.0167	1.043E-03	0.0297	9.824E-04
0.0148	1.037E-03	0.0047	1.039E-03	0.0078	1.051E-03	0.0121	1.052E-03	0.0177	1.021E-03	0.0313	9.484E-04
0.0156	1.014E-03	0.0049	1.025E-03	0.0082	1.031E-03	0.0128	1.029E-03	0.0187	9.942E-04	0.0331	9.088E-04
0.0165	9.850E-04	0.0052	1.007E-03	0.0087	1.005E-03	0.0135	1.001E-03	0.0198	9.615E-04	0.0349	8.640E-04
0.0175	9.505E-04	0.0054	9.860E-04	0.0092	9.743E-04	0.0143	9.673E-04	0.0209	9.230E-04	0.0368	8.145E-04
0.0185	9.102E-04	0.0057	9.612E-04	0.0097	9.384E-04	0.0151	9.278E-04	0.0221	8.791E-04	0.0388	7.610E-04
0.0196	8.646E-04	0.0060	9.328E-04	0.0103	8.976E-04	0.0160	8.828E-04	0.0234	8.302E-04	0.0409	7.046E-04
0.0208	8.142E-04	0.0063	9.010E-04	0.0109	8.523E-04	0.0169	8.327E-04	0.0248	7.773E-04	0.0432	6.465E-04
0.0220	7.600E-04	0.0066	8.659E-04	0.0115	8.033E-04	0.0179	7.784E-04	0.0262	7.213E-04	0.0456	5.879E-04
0.0232	7.032E-04	0.0070	8.280E-04	0.0122	7.515E-04	0.0189	7.211E-04	0.0277	6.635E-04	0.0481	5.300E-04
0.0246	6.450E-04	0.0073	7.877E-04	0.0128	6.978E-04	0.0200	6.619E-04	0.0293	6.052E-04	0.0507	4.737E-04
0.0260	5.867E-04	0.0077	7.458E-04	0.0136	6.434E-04	0.0211	6.021E-04	0.0310	5.476E-04	0.0535	4.202E-04
0.0275	5.296E-04	0.0081	7.027E-04	0.0144	5.892E-04	0.0224	5.429E-04	0.0328	4.918E-04	0.0564	3.701E-04
0.0292	4.746E-04	0.0085	6.592E-04	0.0152	5.362E-04	0.0237	4.856E-04	0.0346	4.387E-04	0.0595	3.238E-04
0.0309	4.227E-04	0.0089	6.159E-04	0.0160	4.852E-04	0.0250	4.310E-04	0.0366	3.890E-04	0.0628	2.818E-04
0.0327	3.743E-04	0.0094	5.734E-04	0.0170	4.366E-04	0.0265	3.800E-04	0.0388	3.431E-04	0.0662	2.440E-04
0.0346	3.300E-04	0.0098	5.320E-04	0.0179	3.911E-04	0.0280	3.331E-04	0.0410	3.013E-04	0.0699	2.105E-04
0.0366	2.897E-04	0.0103	4.922E-04	0.0190	3.487E-04	0.0296	2.904E-04	0.0434	2.636E-04	0.0737	1.811E-04
0.0387	2.535E-04	0.0109	4.543E-04	0.0200	3.097E-04	0.0313	2.523E-04	0.0459	2.299E-04	0.0777	1.555E-04
0.0410	2.212E-04	0.0114	4.185E-04	0.0212	2.740E-04	0.0332	2.184E-04	0.0485	2.000E-04	0.0820	1.333E-04
0.0433	1.927E-04	0.0120	3.848E-04	0.0224	2.416E-04	0.0351	1.887E-04	0.0513	1.737E-04	0.0865	1.142E-04
0.0459	1.675E-04	0.0126	3.534E-04	0.0237	2.123E-04	0.0371	1.628E-04	0.0543	1.506E-04	0.0912	9.788E-05
0.0485	1.454E-04	0.0132	3.241E-04	0.0250	1.860E-04	0.0392	1.404E-04	0.0574	1.305E-04	0.0963	8.394E-05
0.0514	1.260E-04	0.0139	2.970E-04	0.0265	1.625E-04	0.0415	1.210E-04	0.0607	1.130E-04	0.1015	7.207E-05
0.0544	1.091E-04	0.0146	2.718E-04	0.0280	1.416E-04	0.0439	1.044E-04	0.0642	9.787E-05	0.1071	6.196E-05
0.0575	9.440E-05	0.0153	2.485E-04	0.0296	1.231E-04	0.0464	9.018E-05	0.0679	8.476E-05	0.1130	5.336E-05
0.0609	8.158E-05	0.0161	2.270E-04	0.0313	1.068E-04	0.0491	7.796E-05	0.0718	7.345E-05	0.1192	4.602E-05
0.0644	7.045E-05	0.0169	2.071E-04	0.0330	9.254E-05	0.0520	6.746E-05	0.0759	6.371E-05	0.1257	3.977E-05
0.0682	6.080E-05	0.0178	1.886E-04	0.0349	8.002E-05	0.0550	5.843E-05	0.0803	5.531E-05	0.1326	3.441E-05
0.0722	5.244E-05	0.0186	1.715E-04	0.0369	6.910E-05	0.0582	5.065E-05	0.0850	4.807E-05	0.1399	2.982E-05
0.0764	4.521E-05	0.0196	1.557E-04	0.0390	5.959E-05	0.0615	4.393E-05	0.0899	4.182E-05	0.1476	2.587E-05
0.0808	3.897E-05	0.0206	1.410E-04	0.0413	5.134E-05	0.0651	3.811E-05	0.0950	3.642E-05	0.1557	2.247E-05
0.0855	3.358E-05	0.0216	1.274E-04	0.0436	4.418E-05	0.0688	3.306E-05	0.1005	3.175E-05	0.1642	1.953E-05
0.0905	2.894E-05	0.0227	1.148E-04	0.0461	3.798E-05	0.0728	2.868E-05	0.1063	2.770E-05	0.1732	1.698E-05
0.0958	2.493E-05	0.0238	1.031E-04	0.0487	3.261E-05	0.0770	2.487E-05	0.1124	2.418E-05	0.1828	1.476E-05

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.1014	2.148E-05	0.0251	9.239E-05	0.0515	2.797E-05	0.0815	2.156E-05	0.1189	2.111E-05	0.1928	1.283E-05
0.1073	1.851E-05	0.0263	8.251E-05	0.0545	2.397E-05	0.0862	1.869E-05	0.1258	1.843E-05	0.2034	1.115E-05
0.1136	1.594E-05	0.0276	7.347E-05	0.0576	2.051E-05	0.0912	1.620E-05	0.1330	1.609E-05	0.2145	9.687E-06
0.1202	1.374E-05	0.0290	6.521E-05	0.0609	1.754E-05	0.0964	1.404E-05	0.1407	1.404E-05	0.2263	8.407E-06
0.1272	1.184E-05	0.0305	5.772E-05	0.0643	1.499E-05	0.1020	1.216E-05	0.1488	1.225E-05	0.2387	7.289E-06
0.1346	1.020E-05	0.0320	5.093E-05	0.0680	1.281E-05	0.1079	1.054E-05	0.1574	1.068E-05	0.2518	6.314E-06
0.1424	8.787E-06	0.0337	4.482E-05	0.0719	1.095E-05	0.1141	9.133E-06	0.1665	9.299E-06	0.2656	5.463E-06
0.1507	7.571E-06	0.0354	3.934E-05	0.0760	9.359E-06	0.1207	7.917E-06	0.1761	8.090E-06	0.2802	4.721E-06
0.1595	6.524E-06	0.0371	3.445E-05	0.0804	8.008E-06	0.1277	6.865E-06	0.1862	7.029E-06	0.2956	4.077E-06
0.1688	5.621E-06	0.0390	3.009E-05	0.0849	6.861E-06	0.1351	5.955E-06	0.1970	6.100E-06	0.3118	3.516E-06
0.1787	4.843E-06	0.0410	2.622E-05	0.0898	5.886E-06	0.1429	5.167E-06	0.2083	5.286E-06	0.3290	3.031E-06
0.1891	4.172E-06	0.0430	2.280E-05	0.0949	5.058E-06	0.1512	4.485E-06	0.2203	4.574E-06	0.3470	2.611E-06
0.2001	3.594E-06	0.0452	1.978E-05	0.1004	4.353E-06	0.1599	3.895E-06	0.2330	3.952E-06	0.3661	2.248E-06
0.2118	3.094E-06	0.0475	1.712E-05	0.1061	3.751E-06	0.1692	3.383E-06	0.2465	3.410E-06	0.3861	1.935E-06
0.2241	2.663E-06	0.0499	1.478E-05	0.1121	3.237E-06	0.1789	2.938E-06	0.2607	2.938E-06	0.4073	1.665E-06
0.2372	2.290E-06	0.0524	1.272E-05	0.1186	2.797E-06	0.1893	2.551E-06	0.2757	2.528E-06	0.4297	1.433E-06
0.2510	1.968E-06	0.0551	1.092E-05	0.1253	2.418E-06	0.2002	2.214E-06	0.2916	2.172E-06	0.4533	1.233E-06
0.2656	1.689E-06	0.0578	9.352E-06	0.1325	2.091E-06	0.2118	1.920E-06	0.3084	1.864E-06	0.4782	1.062E-06
0.2811	1.449E-06	0.0608	7.982E-06	0.1401	1.809E-06	0.2240	1.664E-06	0.3262	1.597E-06	0.5044	9.141E-07
0.2975	1.241E-06	0.0638	6.790E-06	0.1481	1.564E-06	0.2370	1.439E-06	0.3450	1.367E-06	0.5321	7.871E-07
0.3149	1.061E-06	0.0670	5.757E-06	0.1565	1.352E-06	0.2507	1.243E-06	0.3649	1.169E-06	0.5613	6.778E-07
0.3332	9.062E-07	0.0704	4.866E-06	0.1655	1.167E-06	0.2652	1.071E-06	0.3859	9.986E-07	0.5921	5.837E-07
0.3526	7.727E-07	0.0740	4.099E-06	0.1749	1.006E-06	0.2805	9.209E-07	0.4082	8.519E-07	0.6246	5.026E-07
0.3732	6.578E-07	0.0777	3.442E-06	0.1849	8.661E-07	0.2967	7.897E-07	0.4317	7.259E-07	0.6589	4.327E-07
0.3950	5.591E-07	0.0816	2.882E-06	0.1955	7.440E-07	0.3139	6.753E-07	0.4566	6.177E-07	0.6950	3.724E-07
0.4180	4.745E-07	0.0857	2.406E-06	0.2066	6.376E-07	0.3320	5.758E-07	0.4829	5.250E-07	0.7332	3.204E-07
0.4423	4.020E-07	0.0901	2.003E-06	0.2184	5.452E-07	0.3512	4.895E-07	0.5108	4.456E-07	0.7734	2.755E-07
0.4681	3.402E-07	0.0946	1.663E-06	0.2309	4.649E-07	0.3715	4.150E-07	0.5402	3.778E-07	0.8159	2.367E-07
0.4954	2.874E-07	0.0994	1.378E-06	0.2441	3.953E-07	0.3930	3.508E-07	0.5714	3.198E-07	0.8607	2.032E-07
0.5243	2.425E-07	0.1044	1.138E-06	0.2580	3.351E-07	0.4157	2.957E-07	0.6043	2.703E-07	0.9079	1.742E-07
0.5549	2.043E-07	0.1097	9.388E-07	0.2728	2.832E-07	0.4398	2.487E-07	0.6392	2.281E-07	0.9577	1.492E-07
0.5872	1.720E-07	0.1152	7.724E-07	0.2884	2.386E-07	0.4652	2.085E-07	0.6760	1.922E-07	1.0103	1.275E-07
0.6214	1.445E-07	0.1210	6.341E-07	0.3048	2.004E-07	0.4921	1.745E-07	0.7150	1.617E-07	1.0657	1.088E-07
0.6577	1.212E-07	0.1271	5.195E-07	0.3222	1.678E-07	0.5205	1.456E-07	0.7562	1.358E-07	1.1242	9.266E-08
0.6960	1.016E-07	0.1335	4.247E-07	0.3407	1.400E-07	0.5506	1.212E-07	0.7998	1.138E-07	1.1859	7.870E-08
0.7366	8.489E-08	0.1403	3.464E-07	0.3601	1.163E-07	0.5824	1.007E-07	0.8459	9.510E-08	1.2510	6.664E-08
0.7795	7.080E-08	0.1473	2.819E-07	0.3807	9.635E-08	0.6161	8.340E-08	0.8947	7.931E-08	1.3197	5.625E-08
0.8250	5.889E-08	0.1548	2.289E-07	0.4024	7.948E-08	0.6517	6.887E-08	0.9463	6.595E-08	1.3921	4.731E-08
0.8730	4.884E-08	0.1626	1.854E-07	0.4254	6.529E-08	0.6894	5.670E-08	1.0008	5.466E-08	1.4685	3.962E-08

Mean		*5th Fractile*		*16th Fractile*		*50th Fractile*		*84th Fractile*		*95th Fractile*	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.9239	4.036E-08	0.1708	1.497E-07	0.4497	5.339E-08	0.7293	4.651E-08	1.0585	4.513E-08	1.5491	3.304E-08
0.9778	3.322E-08	0.1794	1.206E-07	0.4754	4.344E-08	0.7714	3.800E-08	1.1196	3.711E-08	1.6342	2.742E-08
1.0348	2.722E-08	0.1884	9.682E-08	0.5026	3.516E-08	0.8160	3.091E-08	1.1841	3.038E-08	1.7238	2.263E-08
1.0951	2.219E-08	0.1979	7.747E-08	0.5313	2.830E-08	0.8632	2.502E-08	1.2524	2.474E-08	1.8185	1.857E-08
1.1590	1.798E-08	0.2079	6.174E-08	0.5616	2.264E-08	0.9131	2.015E-08	1.3246	2.003E-08	1.9183	1.515E-08
1.2265	1.449E-08	0.2184	4.900E-08	0.5937	1.799E-08	0.9659	1.613E-08	1.4010	1.612E-08	2.0236	1.228E-08
1.2980	1.160E-08	0.2294	3.870E-08	0.6276	1.420E-08	1.0217	1.283E-08	1.4818	1.289E-08	2.1346	9.886E-09
1.3737	9.214E-09	0.2410	3.040E-08	0.6635	1.112E-08	1.0808	1.014E-08	1.5672	1.023E-08	2.2518	7.902E-09
1.4538	7.265E-09	0.2532	2.375E-08	0.7014	8.648E-09	1.1432	7.956E-09	1.6575	8.059E-09	2.3754	6.268E-09
1.5385	5.682E-09	0.2659	1.843E-08	0.7415	6.669E-09	1.2093	6.193E-09	1.7531	6.297E-09	2.5057	4.933E-09
1.6282	4.405E-09	0.2794	1.420E-08	0.7838	5.099E-09	1.2792	4.783E-09	1.8542	4.878E-09	2.6433	3.851E-09
1.7231	3.385E-09	0.2934	1.086E-08	0.8286	3.864E-09	1.3532	3.662E-09	1.9611	3.745E-09	2.7883	2.981E-09
1.8235	2.576E-09	0.3082	8.232E-09	0.8759	2.902E-09	1.4314	2.778E-09	2.0742	2.849E-09	2.9414	2.287E-09
1.9298	1.941E-09	0.3238	6.186E-09	0.9260	2.159E-09	1.5141	2.088E-09	2.1937	2.146E-09	3.1028	1.739E-09
2.0423	1.448E-09	0.3401	4.605E-09	0.9789	1.590E-09	1.6017	1.554E-09	2.3202	1.600E-09	3.2731	1.310E-09
2.1614	1.068E-09	0.3573	3.393E-09	1.0348	1.160E-09	1.6943	1.145E-09	2.4540	1.181E-09	3.4528	9.769E-10
2.2874	7.796E-10	0.3753	2.474E-09	1.0939	8.370E-10	1.7922	8.351E-10	2.5955	8.623E-10	3.6423	7.216E-10
2.4207	5.626E-10	0.3942	1.783E-09	1.1564	5.978E-10	1.8958	6.024E-10	2.7451	6.226E-10	3.8422	5.276E-10
2.5619	4.013E-10	0.4141	1.271E-09	1.2224	4.224E-10	2.0054	4.297E-10	2.9034	4.445E-10	4.0531	3.818E-10
2.7112	2.829E-10	0.4350	8.947E-10	1.2923	2.951E-10	2.1213	3.030E-10	3.0708	3.137E-10	4.2755	2.733E-10
2.8692	1.970E-10	0.4570	6.219E-10	1.3661	2.039E-10	2.2440	2.112E-10	3.2479	2.188E-10	4.5102	1.936E-10
3.0365	1.355E-10	0.4800	4.268E-10	1.4441	1.393E-10	2.3737	1.454E-10	3.4351	1.508E-10	4.7577	1.356E-10
3.2135	9.204E-11	0.5042	2.889E-10	1.5266	9.404E-11	2.5109	9.892E-11	3.6332	1.026E-10	5.0189	9.395E-11
3.4008	6.172E-11	0.5297	1.930E-10	1.6139	6.274E-11	2.6561	6.646E-11	3.8427	6.900E-11	5.2943	6.435E-11

Table A-1b. 0.5 Hz Seismic Hazard Curves at Farley.

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.0104	1.077E-03	0.0022	1.072E-03	0.0036	1.073E-03	0.0079	1.079E-03	0.0152	1.088E-03	0.0210	1.090E-03
0.0108	1.076E-03	0.0023	1.071E-03	0.0038	1.072E-03	0.0081	1.078E-03	0.0158	1.086E-03	0.0219	1.089E-03
0.0112	1.074E-03	0.0024	1.069E-03	0.0039	1.070E-03	0.0084	1.076E-03	0.0164	1.085E-03	0.0227	1.087E-03
0.0117	1.072E-03	0.0025	1.067E-03	0.0041	1.068E-03	0.0087	1.074E-03	0.0170	1.083E-03	0.0236	1.084E-03
0.0121	1.069E-03	0.0026	1.065E-03	0.0042	1.066E-03	0.0091	1.072E-03	0.0176	1.080E-03	0.0246	1.081E-03
0.0126	1.065E-03	0.0027	1.061E-03	0.0044	1.062E-03	0.0094	1.068E-03	0.0182	1.076E-03	0.0255	1.076E-03
0.0131	1.060E-03	0.0028	1.056E-03	0.0046	1.057E-03	0.0097	1.064E-03	0.0189	1.071E-03	0.0266	1.070E-03
0.0137	1.053E-03	0.0029	1.049E-03	0.0048	1.051E-03	0.0101	1.058E-03	0.0196	1.065E-03	0.0276	1.063E-03
0.0142	1.045E-03	0.0031	1.041E-03	0.0049	1.044E-03	0.0105	1.051E-03	0.0203	1.057E-03	0.0287	1.053E-03
0.0148	1.034E-03	0.0032	1.031E-03	0.0051	1.034E-03	0.0108	1.042E-03	0.0210	1.047E-03	0.0298	1.041E-03
0.0154	1.021E-03	0.0033	1.018E-03	0.0053	1.022E-03	0.0112	1.031E-03	0.0218	1.035E-03	0.0310	1.027E-03
0.0160	1.005E-03	0.0035	1.002E-03	0.0055	1.008E-03	0.0117	1.018E-03	0.0225	1.021E-03	0.0322	1.009E-03
0.0166	9.866E-04	0.0036	9.843E-04	0.0058	9.910E-04	0.0121	1.003E-03	0.0234	1.005E-03	0.0335	9.891E-04
0.0173	9.649E-04	0.0038	9.633E-04	0.0060	9.714E-04	0.0125	9.851E-04	0.0242	9.857E-04	0.0348	9.657E-04
0.0180	9.402E-04	0.0039	9.392E-04	0.0062	9.490E-04	0.0130	9.646E-04	0.0251	9.638E-04	0.0362	9.391E-04
0.0187	9.126E-04	0.0041	9.123E-04	0.0065	9.238E-04	0.0135	9.414E-04	0.0260	9.391E-04	0.0376	9.094E-04
0.0195	8.821E-04	0.0042	8.826E-04	0.0067	8.958E-04	0.0139	9.156E-04	0.0269	9.117E-04	0.0391	8.767E-04
0.0203	8.491E-04	0.0044	8.504E-04	0.0070	8.653E-04	0.0145	8.872E-04	0.0279	8.817E-04	0.0407	8.413E-04
0.0211	8.138E-04	0.0046	8.160E-04	0.0073	8.326E-04	0.0150	8.564E-04	0.0289	8.492E-04	0.0423	8.035E-04
0.0220	7.766E-04	0.0048	7.799E-04	0.0076	7.979E-04	0.0155	8.235E-04	0.0300	8.145E-04	0.0440	7.638E-04
0.0228	7.381E-04	0.0050	7.425E-04	0.0078	7.617E-04	0.0161	7.888E-04	0.0311	7.780E-04	0.0457	7.226E-04
0.0238	6.987E-04	0.0052	7.042E-04	0.0082	7.244E-04	0.0167	7.525E-04	0.0322	7.399E-04	0.0475	6.806E-04
0.0247	6.589E-04	0.0054	6.655E-04	0.0085	6.864E-04	0.0173	7.152E-04	0.0334	7.008E-04	0.0494	6.381E-04
0.0257	6.192E-04	0.0056	6.270E-04	0.0088	6.482E-04	0.0179	6.772E-04	0.0346	6.610E-04	0.0513	5.957E-04
0.0268	5.800E-04	0.0058	5.889E-04	0.0092	6.102E-04	0.0186	6.389E-04	0.0358	6.210E-04	0.0534	5.540E-04
0.0278	5.417E-04	0.0061	5.517E-04	0.0095	5.728E-04	0.0193	6.007E-04	0.0371	5.812E-04	0.0555	5.133E-04
0.0290	5.046E-04	0.0063	5.157E-04	0.0099	5.363E-04	0.0200	5.630E-04	0.0385	5.420E-04	0.0577	4.740E-04
0.0301	4.690E-04	0.0066	4.811E-04	0.0103	5.010E-04	0.0207	5.262E-04	0.0399	5.038E-04	0.0599	4.364E-04
0.0313	4.351E-04	0.0069	4.481E-04	0.0107	4.671E-04	0.0215	4.904E-04	0.0413	4.667E-04	0.0623	4.008E-04
0.0326	4.030E-04	0.0071	4.169E-04	0.0111	4.348E-04	0.0222	4.560E-04	0.0428	4.312E-04	0.0648	3.672E-04
0.0339	3.728E-04	0.0074	3.873E-04	0.0115	4.041E-04	0.0231	4.232E-04	0.0443	3.973E-04	0.0673	3.358E-04
0.0353	3.444E-04	0.0077	3.596E-04	0.0120	3.752E-04	0.0239	3.919E-04	0.0460	3.652E-04	0.0700	3.067E-04
0.0367	3.179E-04	0.0080	3.336E-04	0.0125	3.480E-04	0.0248	3.624E-04	0.0476	3.350E-04	0.0728	2.796E-04
0.0382	2.932E-04	0.0084	3.093E-04	0.0130	3.225E-04	0.0257	3.347E-04	0.0493	3.068E-04	0.0756	2.547E-04
0.0397	2.703E-04	0.0087	2.867E-04	0.0135	2.987E-04	0.0266	3.087E-04	0.0511	2.805E-04	0.0786	2.318E-04
0.0413	2.490E-04	0.0091	2.656E-04	0.0140	2.766E-04	0.0276	2.845E-04	0.0530	2.561E-04	0.0817	2.107E-04
0.0430	2.292E-04	0.0094	2.460E-04	0.0146	2.559E-04	0.0286	2.619E-04	0.0549	2.335E-04	0.0850	1.914E-04
0.0447	2.109E-04	0.0098	2.277E-04	0.0151	2.366E-04	0.0296	2.410E-04	0.0569	2.126E-04	0.0883	1.738E-04

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.0465	1.939E-04	0.0102	2.107E-04	0.0157	2.187E-04	0.0307	2.215E-04	0.0590	1.935E-04	0.0918	1.576E-04
0.0484	1.781E-04	0.0107	1.949E-04	0.0163	2.020E-04	0.0318	2.035E-04	0.0611	1.758E-04	0.0954	1.428E-04
0.0504	1.634E-04	0.0111	1.801E-04	0.0170	1.865E-04	0.0330	1.868E-04	0.0633	1.597E-04	0.0992	1.293E-04
0.0524	1.499E-04	0.0116	1.663E-04	0.0177	1.720E-04	0.0342	1.713E-04	0.0656	1.449E-04	0.1031	1.169E-04
0.0545	1.372E-04	0.0120	1.535E-04	0.0183	1.585E-04	0.0355	1.570E-04	0.0680	1.313E-04	0.1072	1.055E-04
0.0567	1.255E-04	0.0125	1.415E-04	0.0191	1.460E-04	0.0368	1.438E-04	0.0704	1.190E-04	0.1115	9.514E-05
0.0590	1.146E-04	0.0130	1.302E-04	0.0198	1.342E-04	0.0381	1.315E-04	0.0730	1.076E-04	0.1159	8.565E-05
0.0614	1.045E-04	0.0136	1.197E-04	0.0206	1.232E-04	0.0395	1.201E-04	0.0756	9.730E-05	0.1204	7.698E-05
0.0638	9.517E-05	0.0141	1.098E-04	0.0214	1.129E-04	0.0409	1.096E-04	0.0784	8.787E-05	0.1252	6.908E-05
0.0664	8.649E-05	0.0147	1.006E-04	0.0223	1.033E-04	0.0424	9.989E-05	0.0812	7.928E-05	0.1301	6.187E-05
0.0691	7.846E-05	0.0153	9.192E-05	0.0231	9.439E-05	0.0440	9.090E-05	0.0842	7.144E-05	0.1353	5.533E-05
0.0719	7.105E-05	0.0159	8.384E-05	0.0240	8.604E-05	0.0456	8.259E-05	0.0872	6.432E-05	0.1406	4.938E-05
0.0748	6.422E-05	0.0166	7.631E-05	0.0250	7.827E-05	0.0473	7.492E-05	0.0904	5.784E-05	0.1462	4.400E-05
0.0778	5.794E-05	0.0173	6.930E-05	0.0260	7.104E-05	0.0490	6.786E-05	0.0937	5.196E-05	0.1520	3.914E-05
0.0809	5.219E-05	0.0180	6.280E-05	0.0270	6.434E-05	0.0508	6.137E-05	0.0971	4.663E-05	0.1580	3.477E-05
0.0842	4.694E-05	0.0187	5.678E-05	0.0280	5.815E-05	0.0526	5.541E-05	0.1006	4.180E-05	0.1642	3.084E-05
0.0876	4.214E-05	0.0195	5.124E-05	0.0292	5.245E-05	0.0546	4.995E-05	0.1042	3.743E-05	0.1707	2.731E-05
0.0911	3.779E-05	0.0203	4.614E-05	0.0303	4.720E-05	0.0566	4.497E-05	0.1080	3.349E-05	0.1775	2.416E-05
0.0948	3.384E-05	0.0211	4.148E-05	0.0315	4.241E-05	0.0586	4.042E-05	0.1119	2.994E-05	0.1845	2.135E-05
0.0986	3.026E-05	0.0220	3.723E-05	0.0327	3.803E-05	0.0608	3.629E-05	0.1160	2.675E-05	0.1918	1.885E-05
0.1026	2.704E-05	0.0229	3.336E-05	0.0340	3.404E-05	0.0630	3.255E-05	0.1202	2.387E-05	0.1994	1.663E-05
0.1068	2.413E-05	0.0238	2.985E-05	0.0354	3.043E-05	0.0653	2.916E-05	0.1245	2.130E-05	0.2072	1.466E-05
0.1111	2.152E-05	0.0248	2.669E-05	0.0367	2.717E-05	0.0677	2.610E-05	0.1290	1.899E-05	0.2154	1.292E-05
0.1155	1.917E-05	0.0258	2.383E-05	0.0382	2.422E-05	0.0701	2.334E-05	0.1337	1.692E-05	0.2239	1.138E-05
0.1202	1.707E-05	0.0268	2.126E-05	0.0397	2.157E-05	0.0727	2.086E-05	0.1386	1.507E-05	0.2328	1.002E-05
0.1250	1.518E-05	0.0279	1.895E-05	0.0413	1.919E-05	0.0754	1.863E-05	0.1436	1.342E-05	0.2420	8.822E-06
0.1301	1.349E-05	0.0291	1.687E-05	0.0429	1.706E-05	0.0781	1.663E-05	0.1488	1.195E-05	0.2516	7.764E-06
0.1353	1.198E-05	0.0303	1.502E-05	0.0446	1.515E-05	0.0810	1.484E-05	0.1542	1.064E-05	0.2615	6.832E-06
0.1408	1.064E-05	0.0315	1.335E-05	0.0463	1.344E-05	0.0839	1.324E-05	0.1598	9.465E-06	0.2718	6.012E-06
0.1465	9.432E-06	0.0328	1.186E-05	0.0481	1.192E-05	0.0870	1.181E-05	0.1655	8.422E-06	0.2826	5.289E-06
0.1524	8.358E-06	0.0342	1.053E-05	0.0500	1.056E-05	0.0902	1.053E-05	0.1715	7.493E-06	0.2938	4.653E-06
0.1585	7.400E-06	0.0356	9.338E-06	0.0520	9.345E-06	0.0935	9.380E-06	0.1778	6.667E-06	0.3054	4.093E-06
0.1649	6.546E-06	0.0370	8.273E-06	0.0541	8.266E-06	0.0969	8.355E-06	0.1842	5.932E-06	0.3174	3.601E-06
0.1716	5.787E-06	0.0385	7.323E-06	0.0562	7.305E-06	0.1004	7.439E-06	0.1909	5.278E-06	0.3300	3.168E-06
0.1785	5.111E-06	0.0401	6.475E-06	0.0584	6.452E-06	0.1041	6.621E-06	0.1978	4.696E-06	0.3430	2.787E-06
0.1857	4.511E-06	0.0418	5.720E-06	0.0607	5.694E-06	0.1079	5.890E-06	0.2050	4.178E-06	0.3566	2.452E-06
0.1932	3.979E-06	0.0435	5.048E-06	0.0631	5.023E-06	0.1119	5.238E-06	0.2124	3.718E-06	0.3707	2.158E-06
0.2010	3.506E-06	0.0453	4.450E-06	0.0656	4.428E-06	0.1159	4.655E-06	0.2201	3.308E-06	0.3853	1.899E-06
0.2091	3.088E-06	0.0471	3.919E-06	0.0681	3.901E-06	0.1202	4.135E-06	0.2281	2.944E-06	0.4006	1.672E-06

Mean		5th Fractile		16th Fractile		50th Fractile		84th Fractile		95th Fractile	
PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE
0.2175	2.718E-06	0.0490	3.449E-06	0.0708	3.436E-06	0.1246	3.672E-06	0.2363	2.620E-06	0.4164	1.472E-06
0.2263	2.391E-06	0.0510	3.032E-06	0.0736	3.026E-06	0.1291	3.258E-06	0.2449	2.332E-06	0.4329	1.297E-06
0.2354	2.103E-06	0.0531	2.664E-06	0.0765	2.664E-06	0.1338	2.890E-06	0.2538	2.075E-06	0.4500	1.143E-06
0.2449	1.848E-06	0.0553	2.339E-06	0.0795	2.345E-06	0.1387	2.563E-06	0.2630	1.847E-06	0.4678	1.007E-06
0.2548	1.624E-06	0.0576	2.053E-06	0.0826	2.063E-06	0.1438	2.271E-06	0.2725	1.644E-06	0.4863	8.886E-07
0.2651	1.426E-06	0.0599	1.800E-06	0.0859	1.816E-06	0.1491	2.012E-06	0.2824	1.463E-06	0.5055	7.843E-07
0.2758	1.252E-06	0.0624	1.579E-06	0.0893	1.598E-06	0.1545	1.782E-06	0.2926	1.302E-06	0.5255	6.926E-07
0.2869	1.099E-06	0.0650	1.383E-06	0.0928	1.406E-06	0.1602	1.578E-06	0.3032	1.159E-06	0.5462	6.121E-07
0.2984	9.648E-07	0.0676	1.212E-06	0.0964	1.238E-06	0.1660	1.397E-06	0.3142	1.031E-06	0.5678	5.412E-07
0.3105	8.465E-07	0.0704	1.062E-06	0.1002	1.089E-06	0.1721	1.236E-06	0.3256	9.173E-07	0.5903	4.789E-07
0.3230	7.425E-07	0.0733	9.301E-07	0.1042	9.582E-07	0.1784	1.094E-06	0.3374	8.160E-07	0.6136	4.240E-07
0.3360	6.512E-07	0.0763	8.146E-07	0.1083	8.429E-07	0.1849	9.673E-07	0.3496	7.258E-07	0.6379	3.757E-07
0.3496	5.709E-07	0.0794	7.133E-07	0.1125	7.413E-07	0.1916	8.555E-07	0.3623	6.454E-07	0.6631	3.330E-07
0.3637	5.004E-07	0.0827	6.246E-07	0.1170	6.518E-07	0.1986	7.565E-07	0.3754	5.737E-07	0.6893	2.953E-07
0.3784	4.384E-07	0.0860	5.469E-07	0.1216	5.729E-07	0.2059	6.688E-07	0.3891	5.099E-07	0.7165	2.620E-07
0.3936	3.840E-07	0.0896	4.787E-07	0.1264	5.033E-07	0.2134	5.911E-07	0.4032	4.530E-07	0.7449	2.325E-07
0.4095	3.362E-07	0.0932	4.190E-07	0.1313	4.420E-07	0.2212	5.223E-07	0.4178	4.024E-07	0.7743	2.064E-07
0.4260	2.943E-07	0.0971	3.666E-07	0.1365	3.880E-07	0.2293	4.615E-07	0.4329	3.572E-07	0.8049	1.833E-07
0.4432	2.575E-07	0.1010	3.207E-07	0.1419	3.404E-07	0.2377	4.075E-07	0.4486	3.170E-07	0.8367	1.627E-07
0.4611	2.252E-07	0.1052	2.804E-07	0.1474	2.984E-07	0.2464	3.598E-07	0.4649	2.811E-07	0.8698	1.444E-07
0.4797	1.968E-07	0.1095	2.450E-07	0.1532	2.614E-07	0.2554	3.175E-07	0.4817	2.492E-07	0.9042	1.282E-07
0.4990	1.719E-07	0.1140	2.139E-07	0.1593	2.289E-07	0.2647	2.801E-07	0.4992	2.208E-07	0.9399	1.137E-07
0.5844	1.000E-07	0.1425	1.000E-07	0.2022	1.000E-07	0.3552	1.000E-07	0.6293	1.000E-07	0.9799	1.000E-07

Table A-1c. 1 Hz Seismic Hazard Curves at Farley.

Mean		*5th Fractile*		*16th Fractile*		*50th Fractile*		*84th Fractile*		*95th Fractile*	
PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE
0.0153	1.077E-03	0.0051	1.068E-03	0.0071	1.069E-03	0.0127	1.076E-03	0.0202	1.084E-03	0.0278	1.088E-03
0.0160	1.073E-03	0.0053	1.064E-03	0.0073	1.066E-03	0.0132	1.072E-03	0.0210	1.080E-03	0.0290	1.084E-03
0.0167	1.069E-03	0.0055	1.060E-03	0.0076	1.062E-03	0.0137	1.068E-03	0.0218	1.075E-03	0.0302	1.080E-03
0.0173	1.063E-03	0.0057	1.056E-03	0.0079	1.057E-03	0.0142	1.063E-03	0.0227	1.070E-03	0.0314	1.074E-03
0.0181	1.057E-03	0.0060	1.050E-03	0.0082	1.051E-03	0.0147	1.057E-03	0.0236	1.063E-03	0.0327	1.067E-03
0.0188	1.049E-03	0.0062	1.044E-03	0.0086	1.045E-03	0.0153	1.050E-03	0.0246	1.056E-03	0.0341	1.059E-03
0.0196	1.041E-03	0.0064	1.037E-03	0.0089	1.037E-03	0.0159	1.042E-03	0.0256	1.047E-03	0.0355	1.050E-03
0.0204	1.031E-03	0.0067	1.028E-03	0.0092	1.029E-03	0.0165	1.033E-03	0.0266	1.037E-03	0.0370	1.039E-03
0.0213	1.020E-03	0.0069	1.019E-03	0.0096	1.019E-03	0.0172	1.023E-03	0.0277	1.026E-03	0.0385	1.027E-03
0.0222	1.007E-03	0.0072	1.008E-03	0.0100	1.008E-03	0.0178	1.011E-03	0.0288	1.013E-03	0.0401	1.013E-03
0.0231	9.922E-04	0.0075	9.962E-04	0.0104	9.959E-04	0.0185	9.981E-04	0.0299	9.984E-04	0.0418	9.977E-04
0.0241	9.761E-04	0.0078	9.829E-04	0.0108	9.822E-04	0.0192	9.838E-04	0.0311	9.824E-04	0.0435	9.805E-04
0.0251	9.584E-04	0.0081	9.682E-04	0.0112	9.671E-04	0.0200	9.679E-04	0.0324	9.647E-04	0.0453	9.614E-04
0.0261	9.388E-04	0.0084	9.520E-04	0.0116	9.505E-04	0.0207	9.506E-04	0.0337	9.453E-04	0.0472	9.405E-04
0.0272	9.176E-04	0.0087	9.344E-04	0.0121	9.324E-04	0.0216	9.317E-04	0.0350	9.243E-04	0.0492	9.179E-04
0.0283	8.946E-04	0.0090	9.154E-04	0.0125	9.129E-04	0.0224	9.113E-04	0.0365	9.016E-04	0.0512	8.934E-04
0.0295	8.701E-04	0.0094	8.949E-04	0.0130	8.919E-04	0.0233	8.894E-04	0.0379	8.772E-04	0.0533	8.671E-04
0.0307	8.439E-04	0.0097	8.731E-04	0.0135	8.694E-04	0.0242	8.660E-04	0.0394	8.513E-04	0.0556	8.393E-04
0.0320	8.163E-04	0.0101	8.499E-04	0.0141	8.456E-04	0.0251	8.412E-04	0.0410	8.239E-04	0.0579	8.099E-04
0.0334	7.874E-04	0.0105	8.254E-04	0.0146	8.206E-04	0.0261	8.152E-04	0.0427	7.952E-04	0.0603	7.792E-04
0.0348	7.573E-04	0.0109	7.998E-04	0.0152	7.943E-04	0.0271	7.879E-04	0.0444	7.652E-04	0.0628	7.473E-04
0.0362	7.263E-04	0.0113	7.731E-04	0.0158	7.670E-04	0.0281	7.596E-04	0.0462	7.343E-04	0.0654	7.144E-04
0.0377	6.944E-04	0.0118	7.455E-04	0.0164	7.388E-04	0.0292	7.304E-04	0.0480	7.025E-04	0.0681	6.807E-04
0.0393	6.620E-04	0.0122	7.172E-04	0.0170	7.099E-04	0.0303	7.005E-04	0.0500	6.700E-04	0.0709	6.464E-04
0.0409	6.292E-04	0.0127	6.881E-04	0.0177	6.803E-04	0.0315	6.699E-04	0.0520	6.371E-04	0.0739	6.118E-04
0.0426	5.963E-04	0.0132	6.587E-04	0.0184	6.503E-04	0.0327	6.390E-04	0.0541	6.039E-04	0.0769	5.771E-04
0.0444	5.634E-04	0.0137	6.289E-04	0.0191	6.200E-04	0.0340	6.078E-04	0.0562	5.707E-04	0.0801	5.426E-04
0.0463	5.308E-04	0.0142	5.990E-04	0.0198	5.897E-04	0.0353	5.766E-04	0.0585	5.377E-04	0.0834	5.084E-04
0.0482	4.986E-04	0.0148	5.691E-04	0.0206	5.594E-04	0.0367	5.455E-04	0.0608	5.051E-04	0.0869	4.748E-04
0.0502	4.670E-04	0.0153	5.394E-04	0.0214	5.293E-04	0.0381	5.147E-04	0.0633	4.729E-04	0.0905	4.420E-04
0.0523	4.363E-04	0.0159	5.100E-04	0.0222	4.997E-04	0.0396	4.843E-04	0.0658	4.416E-04	0.0943	4.100E-04
0.0545	4.065E-04	0.0166	4.811E-04	0.0231	4.705E-04	0.0411	4.546E-04	0.0685	4.110E-04	0.0982	3.792E-04
0.0567	3.777E-04	0.0172	4.528E-04	0.0240	4.421E-04	0.0427	4.255E-04	0.0712	3.815E-04	0.1022	3.496E-04
0.0591	3.501E-04	0.0179	4.252E-04	0.0249	4.144E-04	0.0444	3.974E-04	0.0741	3.531E-04	0.1065	3.213E-04
0.0616	3.238E-04	0.0185	3.985E-04	0.0259	3.876E-04	0.0461	3.702E-04	0.0771	3.260E-04	0.1109	2.944E-04
0.0641	2.987E-04	0.0193	3.726E-04	0.0269	3.618E-04	0.0479	3.441E-04	0.0802	3.001E-04	0.1155	2.690E-04
0.0668	2.750E-04	0.0200	3.478E-04	0.0280	3.370E-04	0.0497	3.190E-04	0.0834	2.755E-04	0.1203	2.450E-04
0.0696	2.526E-04	0.0208	3.240E-04	0.0291	3.133E-04	0.0516	2.952E-04	0.0867	2.523E-04	0.1253	2.226E-04

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.0725	2.316E-04	0.0216	3.013E-04	0.0302	2.907E-04	0.0536	2.725E-04	0.0902	2.305E-04	0.1305	2.017E-04
0.0755	2.119E-04	0.0224	2.797E-04	0.0314	2.693E-04	0.0557	2.511E-04	0.0938	2.101E-04	0.1359	1.822E-04
0.0787	1.935E-04	0.0233	2.592E-04	0.0326	2.490E-04	0.0579	2.309E-04	0.0976	1.911E-04	0.1415	1.643E-04
0.0820	1.764E-04	0.0242	2.399E-04	0.0339	2.299E-04	0.0601	2.119E-04	0.1015	1.733E-04	0.1474	1.477E-04
0.0854	1.605E-04	0.0251	2.216E-04	0.0352	2.120E-04	0.0624	1.942E-04	0.1056	1.569E-04	0.1535	1.324E-04
0.0889	1.458E-04	0.0261	2.045E-04	0.0365	1.951E-04	0.0649	1.776E-04	0.1099	1.418E-04	0.1599	1.185E-04
0.0927	1.322E-04	0.0271	1.884E-04	0.0380	1.794E-04	0.0674	1.621E-04	0.1143	1.278E-04	0.1665	1.058E-04
0.0965	1.197E-04	0.0281	1.734E-04	0.0394	1.647E-04	0.0700	1.478E-04	0.1189	1.150E-04	0.1735	9.419E-05
0.1005	1.082E-04	0.0292	1.594E-04	0.0410	1.510E-04	0.0727	1.345E-04	0.1236	1.032E-04	0.1807	8.370E-05
0.1047	9.765E-05	0.0303	1.464E-04	0.0426	1.383E-04	0.0755	1.222E-04	0.1286	9.250E-05	0.1882	7.421E-05
0.1091	8.797E-05	0.0315	1.342E-04	0.0442	1.264E-04	0.0784	1.109E-04	0.1338	8.274E-05	0.1960	6.566E-05
0.1137	7.912E-05	0.0327	1.230E-04	0.0460	1.155E-04	0.0815	1.005E-04	0.1391	7.386E-05	0.2041	5.797E-05
0.1184	7.104E-05	0.0340	1.125E-04	0.0478	1.054E-04	0.0846	9.092E-05	0.1447	6.581E-05	0.2126	5.108E-05
0.1233	6.368E-05	0.0353	1.029E-04	0.0496	9.608E-05	0.0879	8.215E-05	0.1505	5.853E-05	0.2214	4.492E-05
0.1285	5.698E-05	0.0367	9.395E-05	0.0515	8.748E-05	0.0913	7.412E-05	0.1566	5.196E-05	0.2306	3.942E-05
0.1338	5.090E-05	0.0381	8.572E-05	0.0535	7.956E-05	0.0948	6.678E-05	0.1629	4.605E-05	0.2401	3.453E-05
0.1394	4.539E-05	0.0396	7.814E-05	0.0556	7.228E-05	0.0985	6.009E-05	0.1694	4.073E-05	0.2501	3.019E-05
0.1452	4.041E-05	0.0411	7.115E-05	0.0578	6.560E-05	0.1023	5.400E-05	0.1762	3.597E-05	0.2605	2.635E-05
0.1513	3.590E-05	0.0427	6.473E-05	0.0601	5.946E-05	0.1063	4.846E-05	0.1833	3.171E-05	0.2713	2.296E-05
0.1576	3.185E-05	0.0443	5.883E-05	0.0624	5.385E-05	0.1104	4.343E-05	0.1907	2.791E-05	0.2826	1.997E-05
0.1642	2.820E-05	0.0460	5.342E-05	0.0648	4.871E-05	0.1147	3.887E-05	0.1984	2.453E-05	0.2943	1.735E-05
0.1710	2.492E-05	0.0478	4.846E-05	0.0673	4.401E-05	0.1191	3.474E-05	0.2063	2.152E-05	0.3065	1.505E-05
0.1782	2.199E-05	0.0497	4.392E-05	0.0700	3.973E-05	0.1237	3.101E-05	0.2146	1.886E-05	0.3192	1.304E-05
0.1856	1.936E-05	0.0516	3.977E-05	0.0727	3.582E-05	0.1285	2.764E-05	0.2232	1.650E-05	0.3325	1.128E-05
0.1933	1.702E-05	0.0536	3.597E-05	0.0755	3.226E-05	0.1335	2.461E-05	0.2322	1.442E-05	0.3463	9.754E-06
0.2014	1.494E-05	0.0556	3.251E-05	0.0785	2.903E-05	0.1387	2.188E-05	0.2415	1.258E-05	0.3606	8.426E-06
0.2098	1.309E-05	0.0578	2.936E-05	0.0815	2.609E-05	0.1440	1.943E-05	0.2512	1.097E-05	0.3756	7.273E-06
0.2185	1.145E-05	0.0600	2.649E-05	0.0847	2.342E-05	0.1496	1.723E-05	0.2613	9.555E-06	0.3912	6.275E-06
0.2277	1.000E-05	0.0623	2.388E-05	0.0880	2.101E-05	0.1554	1.526E-05	0.2718	8.315E-06	0.4074	5.412E-06
0.2372	8.721E-06	0.0647	2.150E-05	0.0914	1.883E-05	0.1614	1.350E-05	0.2828	7.230E-06	0.4243	4.668E-06
0.2470	7.593E-06	0.0672	1.935E-05	0.0950	1.685E-05	0.1677	1.192E-05	0.2941	6.283E-06	0.4419	4.026E-06
0.2574	6.601E-06	0.0698	1.740E-05	0.0987	1.507E-05	0.1742	1.052E-05	0.3059	5.457E-06	0.4603	3.473E-06
0.2681	5.731E-06	0.0725	1.563E-05	0.1025	1.346E-05	0.1809	9.273E-06	0.3182	4.737E-06	0.4794	2.998E-06
0.2793	4.970E-06	0.0753	1.403E-05	0.1065	1.201E-05	0.1879	8.164E-06	0.3310	4.111E-06	0.4993	2.589E-06
0.2909	4.304E-06	0.0782	1.259E-05	0.1106	1.071E-05	0.1952	7.179E-06	0.3443	3.567E-06	0.5200	2.238E-06
0.3030	3.723E-06	0.0812	1.128E-05	0.1150	9.537E-06	0.2028	6.306E-06	0.3582	3.095E-06	0.5416	1.937E-06
0.3157	3.217E-06	0.0844	1.010E-05	0.1194	8.486E-06	0.2106	5.534E-06	0.3726	2.685E-06	0.5641	1.678E-06
0.3289	2.777E-06	0.0876	9.040E-06	0.1241	7.543E-06	0.2188	4.852E-06	0.3875	2.330E-06	0.5875	1.456E-06
0.3426	2.396E-06	0.0910	8.083E-06	0.1289	6.699E-06	0.2272	4.249E-06	0.4031	2.023E-06	0.6118	1.265E-06

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.3569	2.065E-06	0.0945	7.223E-06	0.1339	5.943E-06	0.2360	3.718E-06	0.4193	1.756E-06	0.6372	1.102E-06
0.3717	1.779E-06	0.0982	6.448E-06	0.1391	5.267E-06	0.2452	3.251E-06	0.4361	1.526E-06	0.6637	9.608E-07
0.3872	1.532E-06	0.1020	5.753E-06	0.1446	4.663E-06	0.2547	2.840E-06	0.4537	1.326E-06	0.6912	8.396E-07
0.4034	1.319E-06	0.1059	5.128E-06	0.1502	4.125E-06	0.2645	2.479E-06	0.4719	1.153E-06	0.7199	7.352E-07
0.4202	1.135E-06	0.1100	4.568E-06	0.1560	3.645E-06	0.2748	2.162E-06	0.4909	1.004E-06	0.7498	6.451E-07
0.4378	9.770E-07	0.1142	4.065E-06	0.1621	3.218E-06	0.2854	1.885E-06	0.5106	8.743E-07	0.7809	5.673E-07
0.4560	8.411E-07	0.1186	3.615E-06	0.1684	2.838E-06	0.2965	1.642E-06	0.5311	7.622E-07	0.8133	4.998E-07
0.4750	7.243E-07	0.1232	3.212E-06	0.1750	2.501E-06	0.3080	1.429E-06	0.5524	6.651E-07	0.8471	4.413E-07
0.4948	6.241E-07	0.1280	2.852E-06	0.1818	2.201E-06	0.3199	1.243E-06	0.5746	5.809E-07	0.8822	3.903E-07
0.5155	5.380E-07	0.1329	2.530E-06	0.1889	1.936E-06	0.3323	1.081E-06	0.5977	5.078E-07	0.9188	3.459E-07
0.5370	4.642E-07	0.1381	2.242E-06	0.1962	1.700E-06	0.3452	9.399E-07	0.6217	4.444E-07	0.9570	3.070E-07
0.5594	4.008E-07	0.1434	1.985E-06	0.2039	1.492E-06	0.3585	8.167E-07	0.6467	3.894E-07	0.9967	2.729E-07
0.5827	3.465E-07	0.1489	1.756E-06	0.2118	1.309E-06	0.3724	7.094E-07	0.6727	3.415E-07	1.0380	2.429E-07
0.6070	2.998E-07	0.1547	1.551E-06	0.2201	1.146E-06	0.3868	6.159E-07	0.6997	2.997E-07	1.0811	2.164E-07
0.6323	2.597E-07	0.1606	1.369E-06	0.2286	1.003E-06	0.4018	5.347E-07	0.7279	2.634E-07	1.1260	1.930E-07
0.6587	2.252E-07	0.1668	1.208E-06	0.2375	8.772E-07	0.4174	4.640E-07	0.7571	2.316E-07	1.1727	1.723E-07
0.6862	1.956E-07	0.1733	1.064E-06	0.2468	7.662E-07	0.4335	4.026E-07	0.7875	2.039E-07	1.2214	1.538E-07
0.7148	1.700E-07	0.1800	9.361E-07	0.2564	6.686E-07	0.4503	3.492E-07	0.8192	1.796E-07	1.2721	1.374E-07
0.7446	1.479E-07	0.1869	8.228E-07	0.2664	5.829E-07	0.4678	3.029E-07	0.8521	1.583E-07	1.3248	1.227E-07
0.7757	1.289E-07	0.1941	7.223E-07	0.2767	5.077E-07	0.4859	2.626E-07	0.8863	1.396E-07	1.3798	1.096E-07
0.8080	1.123E-07	0.2016	6.333E-07	0.2875	4.417E-07	0.5047	2.277E-07	0.9220	1.231E-07	1.4371	9.784E-08
0.8417	9.801E-08	0.2094	5.545E-07	0.2987	3.839E-07	0.5242	1.974E-07	0.9590	1.086E-07	1.4967	8.729E-08
0.8768	8.556E-08	0.3397	1.000E-07	0.4297	1.000E-07	0.6281	1.000E-07	0.9975	9.583E-08	1.5588	7.781E-08

Table A-1d. 2.5 Hz Seismic Hazard Curves at Farley.

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.0200	1.105E-03	0.0100	1.086E-03	0.0126	1.098E-03	0.0179	1.107E-03	0.0251	1.113E-03	0.0340	1.117E-03
0.0210	1.105E-03	0.0103	1.086E-03	0.0132	1.098E-03	0.0187	1.106E-03	0.0263	1.113E-03	0.0356	1.117E-03
0.0220	1.104E-03	0.0107	1.086E-03	0.0137	1.098E-03	0.0195	1.106E-03	0.0275	1.112E-03	0.0373	1.116E-03
0.0230	1.103E-03	0.0112	1.085E-03	0.0143	1.097E-03	0.0204	1.105E-03	0.0288	1.111E-03	0.0390	1.115E-03
0.0241	1.102E-03	0.0116	1.084E-03	0.0149	1.096E-03	0.0213	1.104E-03	0.0301	1.110E-03	0.0408	1.114E-03
0.0252	1.101E-03	0.0120	1.083E-03	0.0156	1.095E-03	0.0223	1.103E-03	0.0315	1.108E-03	0.0427	1.112E-03
0.0264	1.098E-03	0.0125	1.082E-03	0.0162	1.093E-03	0.0233	1.101E-03	0.0330	1.106E-03	0.0447	1.109E-03
0.0277	1.095E-03	0.0130	1.081E-03	0.0169	1.091E-03	0.0244	1.098E-03	0.0345	1.103E-03	0.0468	1.105E-03
0.0290	1.092E-03	0.0135	1.078E-03	0.0177	1.088E-03	0.0255	1.094E-03	0.0361	1.098E-03	0.0490	1.101E-03
0.0303	1.086E-03	0.0140	1.076E-03	0.0184	1.084E-03	0.0266	1.090E-03	0.0378	1.093E-03	0.0513	1.094E-03
0.0318	1.080E-03	0.0145	1.073E-03	0.0192	1.079E-03	0.0278	1.084E-03	0.0396	1.086E-03	0.0537	1.086E-03
0.0333	1.072E-03	0.0151	1.069E-03	0.0201	1.073E-03	0.0291	1.076E-03	0.0414	1.077E-03	0.0562	1.076E-03
0.0348	1.061E-03	0.0157	1.064E-03	0.0209	1.066E-03	0.0304	1.067E-03	0.0433	1.066E-03	0.0588	1.064E-03
0.0365	1.049E-03	0.0163	1.058E-03	0.0218	1.057E-03	0.0318	1.056E-03	0.0453	1.052E-03	0.0616	1.049E-03
0.0382	1.034E-03	0.0169	1.050E-03	0.0228	1.046E-03	0.0332	1.043E-03	0.0475	1.036E-03	0.0644	1.030E-03
0.0400	1.016E-03	0.0176	1.042E-03	0.0237	1.033E-03	0.0347	1.027E-03	0.0497	1.016E-03	0.0674	1.009E-03
0.0419	9.948E-04	0.0182	1.032E-03	0.0248	1.018E-03	0.0363	1.008E-03	0.0520	9.937E-04	0.0706	9.835E-04
0.0439	9.706E-04	0.0189	1.020E-03	0.0258	1.000E-03	0.0379	9.865E-04	0.0544	9.677E-04	0.0739	9.548E-04
0.0459	9.432E-04	0.0197	1.006E-03	0.0270	9.799E-04	0.0397	9.620E-04	0.0569	9.384E-04	0.0773	9.225E-04
0.0481	9.127E-04	0.0204	9.910E-04	0.0281	9.572E-04	0.0414	9.344E-04	0.0596	9.057E-04	0.0809	8.868E-04
0.0504	8.790E-04	0.0212	9.736E-04	0.0293	9.318E-04	0.0433	9.038E-04	0.0624	8.699E-04	0.0847	8.478E-04
0.0527	8.424E-04	0.0220	9.542E-04	0.0306	9.039E-04	0.0453	8.704E-04	0.0653	8.311E-04	0.0887	8.059E-04
0.0552	8.033E-04	0.0229	9.327E-04	0.0319	8.736E-04	0.0473	8.344E-04	0.0683	7.897E-04	0.0928	7.615E-04
0.0578	7.620E-04	0.0238	9.093E-04	0.0333	8.409E-04	0.0495	7.960E-04	0.0715	7.462E-04	0.0971	7.152E-04
0.0606	7.189E-04	0.0247	8.838E-04	0.0347	8.061E-04	0.0517	7.556E-04	0.0748	7.011E-04	0.1017	6.675E-04
0.0634	6.747E-04	0.0256	8.565E-04	0.0362	7.696E-04	0.0541	7.137E-04	0.0783	6.549E-04	0.1064	6.192E-04
0.0664	6.298E-04	0.0266	8.274E-04	0.0378	7.316E-04	0.0565	6.706E-04	0.0819	6.082E-04	0.1114	5.708E-04
0.0695	5.847E-04	0.0276	7.967E-04	0.0394	6.926E-04	0.0591	6.269E-04	0.0857	5.616E-04	0.1166	5.230E-04
0.0728	5.401E-04	0.0287	7.647E-04	0.0411	6.528E-04	0.0617	5.831E-04	0.0897	5.157E-04	0.1220	4.763E-04
0.0763	4.963E-04	0.0298	7.316E-04	0.0429	6.127E-04	0.0645	5.397E-04	0.0939	4.709E-04	0.1277	4.313E-04
0.0798	4.539E-04	0.0310	6.976E-04	0.0447	5.727E-04	0.0674	4.970E-04	0.0983	4.277E-04	0.1337	3.884E-04
0.0836	4.132E-04	0.0322	6.629E-04	0.0467	5.331E-04	0.0705	4.555E-04	0.1029	3.866E-04	0.1399	3.480E-04
0.0876	3.744E-04	0.0334	6.280E-04	0.0487	4.943E-04	0.0737	4.156E-04	0.1077	3.477E-04	0.1464	3.103E-04
0.0917	3.380E-04	0.0347	5.929E-04	0.0508	4.566E-04	0.0770	3.775E-04	0.1127	3.114E-04	0.1533	2.754E-04
0.0960	3.039E-04	0.0360	5.581E-04	0.0530	4.202E-04	0.0805	3.415E-04	0.1179	2.777E-04	0.1604	2.434E-04
0.1005	2.722E-04	0.0374	5.237E-04	0.0552	3.854E-04	0.0841	3.077E-04	0.1234	2.467E-04	0.1679	2.144E-04
0.1053	2.431E-04	0.0389	4.900E-04	0.0576	3.523E-04	0.0880	2.763E-04	0.1291	2.184E-04	0.1757	1.882E-04
0.1102	2.164E-04	0.0404	4.572E-04	0.0601	3.211E-04	0.0919	2.473E-04	0.1352	1.928E-04	0.1839	1.647E-04

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.1154	1.921E-04	0.0419	4.254E-04	0.0627	2.918E-04	0.0961	2.206E-04	0.1415	1.697E-04	0.1925	1.438E-04
0.1209	1.701E-04	0.0435	3.948E-04	0.0654	2.644E-04	0.1004	1.962E-04	0.1480	1.491E-04	0.2015	1.253E-04
0.1266	1.502E-04	0.0452	3.656E-04	0.0682	2.390E-04	0.1050	1.740E-04	0.1549	1.306E-04	0.2109	1.089E-04
0.1325	1.324E-04	0.0469	3.377E-04	0.0712	2.156E-04	0.1097	1.540E-04	0.1621	1.143E-04	0.2208	9.459E-05
0.1388	1.164E-04	0.0488	3.113E-04	0.0742	1.940E-04	0.1147	1.360E-04	0.1697	9.981E-05	0.2311	8.203E-05
0.1453	1.021E-04	0.0506	2.864E-04	0.0774	1.742E-04	0.1199	1.198E-04	0.1776	8.707E-05	0.2418	7.105E-05
0.1522	8.943E-05	0.0526	2.630E-04	0.0808	1.561E-04	0.1253	1.054E-04	0.1859	7.587E-05	0.2531	6.150E-05
0.1594	7.816E-05	0.0546	2.411E-04	0.0843	1.396E-04	0.1310	9.248E-05	0.1945	6.605E-05	0.2649	5.319E-05
0.1669	6.819E-05	0.0567	2.207E-04	0.0879	1.246E-04	0.1369	8.104E-05	0.2036	5.746E-05	0.2773	4.599E-05
0.1747	5.938E-05	0.0589	2.016E-04	0.0917	1.111E-04	0.1431	7.090E-05	0.2131	4.995E-05	0.2902	3.975E-05
0.1830	5.163E-05	0.0612	1.840E-04	0.0956	9.880E-05	0.1496	6.194E-05	0.2230	4.340E-05	0.3038	3.435E-05
0.1916	4.481E-05	0.0635	1.676E-04	0.0998	8.775E-05	0.1564	5.403E-05	0.2334	3.770E-05	0.3180	2.969E-05
0.2007	3.884E-05	0.0660	1.524E-04	0.1041	7.781E-05	0.1635	4.708E-05	0.2442	3.273E-05	0.3328	2.567E-05
0.2101	3.362E-05	0.0685	1.385E-04	0.1085	6.889E-05	0.1708	4.097E-05	0.2556	2.842E-05	0.3483	2.221E-05
0.2200	2.907E-05	0.0712	1.256E-04	0.1132	6.090E-05	0.1786	3.562E-05	0.2675	2.467E-05	0.3646	1.923E-05
0.2304	2.511E-05	0.0739	1.138E-04	0.1181	5.375E-05	0.1867	3.094E-05	0.2799	2.142E-05	0.3816	1.667E-05
0.2413	2.167E-05	0.0768	1.029E-04	0.1232	4.738E-05	0.1951	2.685E-05	0.2930	1.860E-05	0.3994	1.446E-05
0.2526	1.869E-05	0.0797	9.295E-05	0.1285	4.170E-05	0.2039	2.330E-05	0.3066	1.615E-05	0.4181	1.256E-05
0.2645	1.612E-05	0.0828	8.384E-05	0.1341	3.665E-05	0.2132	2.020E-05	0.3209	1.404E-05	0.4376	1.093E-05
0.2770	1.390E-05	0.0860	7.551E-05	0.1398	3.217E-05	0.2228	1.752E-05	0.3358	1.221E-05	0.4580	9.526E-06
0.2901	1.199E-05	0.0893	6.792E-05	0.1459	2.821E-05	0.2329	1.519E-05	0.3515	1.063E-05	0.4794	8.317E-06
0.3038	1.034E-05	0.0927	6.099E-05	0.1522	2.471E-05	0.2434	1.317E-05	0.3678	9.269E-06	0.5017	7.273E-06
0.3181	8.930E-06	0.0963	5.470E-05	0.1587	2.162E-05	0.2545	1.142E-05	0.3849	8.091E-06	0.5251	6.372E-06
0.3331	7.718E-06	0.1000	4.898E-05	0.1656	1.890E-05	0.2660	9.912E-06	0.4029	7.072E-06	0.5496	5.591E-06
0.3488	6.679E-06	0.1039	4.380E-05	0.1727	1.651E-05	0.2780	8.607E-06	0.4216	6.190E-06	0.5753	4.915E-06
0.3652	5.788E-06	0.1079	3.912E-05	0.1801	1.441E-05	0.2906	7.481E-06	0.4413	5.427E-06	0.6021	4.327E-06
0.3824	5.023E-06	0.1120	3.489E-05	0.1879	1.256E-05	0.3037	6.508E-06	0.4618	4.766E-06	0.6302	3.815E-06
0.4005	4.367E-06	0.1164	3.107E-05	0.1960	1.095E-05	0.3175	5.667E-06	0.4833	4.191E-06	0.6597	3.368E-06
0.4194	3.803E-06	0.1208	2.764E-05	0.2045	9.542E-06	0.3319	4.941E-06	0.5058	3.691E-06	0.6904	2.978E-06
0.4391	3.318E-06	0.1255	2.455E-05	0.2133	8.309E-06	0.3469	4.314E-06	0.5294	3.255E-06	0.7227	2.635E-06
0.4598	2.899E-06	0.1303	2.179E-05	0.2225	7.233E-06	0.3626	3.771E-06	0.5540	2.874E-06	0.7564	2.334E-06
0.4815	2.537E-06	0.1354	1.931E-05	0.2321	6.293E-06	0.3790	3.300E-06	0.5798	2.540E-06	0.7917	2.070E-06
0.5042	2.223E-06	0.1406	1.710E-05	0.2421	5.474E-06	0.3961	2.892E-06	0.6068	2.247E-06	0.8286	1.837E-06
0.5280	1.950E-06	0.1460	1.512E-05	0.2525	4.760E-06	0.4141	2.538E-06	0.6350	1.989E-06	0.8673	1.631E-06
0.5529	1.713E-06	0.1516	1.336E-05	0.2634	4.138E-06	0.4328	2.230E-06	0.6646	1.761E-06	0.9078	1.450E-06
0.5790	1.506E-06	0.1575	1.179E-05	0.2747	3.597E-06	0.4524	1.961E-06	0.6955	1.561E-06	0.9501	1.289E-06
0.6063	1.325E-06	0.1635	1.040E-05	0.2866	3.126E-06	0.4729	1.726E-06	0.7279	1.383E-06	0.9945	1.147E-06
0.6349	1.166E-06	0.1698	9.163E-06	0.2989	2.716E-06	0.4943	1.521E-06	0.7618	1.226E-06	1.0409	1.021E-06
0.6648	1.027E-06	0.1764	8.066E-06	0.3118	2.360E-06	0.5166	1.341E-06	0.7973	1.087E-06	1.0895	9.092E-07

Mean		*5th Fractile*		*16th Fractile*		*50th Fractile*		*84th Fractile*		*95th Fractile*	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.6961	9.051E-07	0.1832	7.095E-06	0.3253	2.051E-06	0.5400	1.183E-06	0.8344	9.640E-07	1.1403	8.101E-07
0.7290	7.976E-07	0.1902	6.236E-06	0.3393	1.782E-06	0.5645	1.044E-06	0.8732	8.549E-07	1.1935	7.221E-07
0.7633	7.031E-07	0.1976	5.476E-06	0.3539	1.549E-06	0.5900	9.216E-07	0.9139	7.581E-07	1.2492	6.439E-07
0.7993	6.198E-07	0.2052	4.805E-06	0.3692	1.347E-06	0.6167	8.137E-07	0.9565	6.723E-07	1.3075	5.744E-07
0.8370	5.465E-07	0.2131	4.213E-06	0.3851	1.172E-06	0.6446	7.185E-07	1.0010	5.962E-07	1.3686	5.126E-07
0.8765	4.820E-07	0.2213	3.691E-06	0.4017	1.020E-06	0.6738	6.345E-07	1.0476	5.288E-07	1.4324	4.576E-07
0.9178	4.251E-07	0.2299	3.231E-06	0.4190	8.883E-07	0.7043	5.602E-07	1.0964	4.690E-07	1.4993	4.086E-07
0.9611	3.750E-07	0.2387	2.826E-06	0.4371	7.740E-07	0.7362	4.945E-07	1.1474	4.159E-07	1.5692	3.650E-07
1.0064	3.308E-07	0.2479	2.469E-06	0.4560	6.748E-07	0.7695	4.364E-07	1.2008	3.689E-07	1.6425	3.260E-07
1.0538	2.919E-07	0.2575	2.156E-06	0.4756	5.886E-07	0.8043	3.851E-07	1.2567	3.272E-07	1.7191	2.913E-07
1.1035	2.576E-07	0.2674	1.881E-06	0.4961	5.138E-07	0.8407	3.397E-07	1.3152	2.902E-07	1.7994	2.602E-07
1.1556	2.274E-07	0.2777	1.640E-06	0.5175	4.487E-07	0.8788	2.995E-07	1.3765	2.575E-07	1.8833	2.325E-07
1.2100	2.007E-07	0.2884	1.428E-06	0.5398	3.920E-07	0.9185	2.641E-07	1.4406	2.284E-07	1.9712	2.077E-07
1.2671	1.772E-07	0.2995	1.243E-06	0.5631	3.425E-07	0.9601	2.327E-07	1.5076	2.025E-07	2.0632	1.855E-07
1.3268	1.564E-07	0.3111	1.081E-06	0.5874	2.994E-07	1.0036	2.050E-07	1.5778	1.796E-07	2.1595	1.656E-07
1.3894	1.381E-07	0.3231	9.388E-07	0.6127	2.618E-07	1.0490	1.805E-07	1.6513	1.593E-07	2.2603	1.478E-07
1.4549	1.219E-07	0.3355	8.149E-07	0.6391	2.288E-07	1.0964	1.589E-07	1.7282	1.412E-07	2.3658	1.319E-07
1.5235	1.076E-07	0.3484	7.068E-07	0.6667	2.000E-07	1.1461	1.398E-07	1.8086	1.251E-07	2.4762	1.176E-07
1.5954	9.500E-08	0.3619	6.125E-07	0.6954	1.748E-07	1.1979	1.230E-07	1.8928	1.109E-07	2.5917	1.048E-07
1.6706	8.383E-08	0.3758	5.304E-07	0.7254	1.527E-07	1.2522	1.081E-07	1.9809	9.818E-08	2.7127	9.327E-08
1.7493	7.394E-08	0.3903	4.589E-07	0.7567	1.333E-07	1.3088	9.503E-08	2.0732	8.689E-08	2.8393	8.296E-08
1.8318	6.519E-08	0.4054	3.968E-07	0.7893	1.163E-07	1.3681	8.347E-08	2.1697	7.685E-08	2.9718	7.371E-08
1.9182	5.744E-08	0.5793	1.000E-07	0.8269	1.000E-07	1.4300	7.327E-08	2.2707	6.792E-08	3.1105	6.541E-08

Table A-1e. 5 Hz Seismic Hazard Curves at Farley.

Mean		*5th Fractile*		*16th Fractile*		*50th Fractile*		*84th Fractile*		*95th Fractile*	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.0226	1.097E-03	0.0107	1.082E-03	0.0141	1.096E-03	0.0199	1.102E-03	0.0281	1.099E-03	0.0393	1.096E-03
0.0238	1.094E-03	0.0112	1.080E-03	0.0148	1.094E-03	0.0209	1.099E-03	0.0296	1.095E-03	0.0413	1.091E-03
0.0250	1.089E-03	0.0117	1.077E-03	0.0155	1.090E-03	0.0220	1.095E-03	0.0311	1.090E-03	0.0433	1.084E-03
0.0263	1.083E-03	0.0122	1.073E-03	0.0163	1.085E-03	0.0231	1.089E-03	0.0327	1.082E-03	0.0455	1.075E-03
0.0277	1.075E-03	0.0127	1.068E-03	0.0171	1.078E-03	0.0243	1.081E-03	0.0343	1.073E-03	0.0478	1.063E-03
0.0291	1.065E-03	0.0132	1.062E-03	0.0179	1.069E-03	0.0255	1.071E-03	0.0361	1.061E-03	0.0502	1.049E-03
0.0306	1.051E-03	0.0138	1.054E-03	0.0188	1.058E-03	0.0268	1.058E-03	0.0379	1.046E-03	0.0528	1.031E-03
0.0322	1.035E-03	0.0144	1.044E-03	0.0197	1.043E-03	0.0282	1.042E-03	0.0399	1.027E-03	0.0554	1.009E-03
0.0339	1.014E-03	0.0150	1.032E-03	0.0207	1.026E-03	0.0296	1.023E-03	0.0419	1.004E-03	0.0582	9.840E-04
0.0356	9.898E-04	0.0157	1.018E-03	0.0217	1.005E-03	0.0311	9.988E-04	0.0441	9.771E-04	0.0612	9.545E-04
0.0375	9.611E-04	0.0163	1.001E-03	0.0228	9.808E-04	0.0327	9.710E-04	0.0463	9.460E-04	0.0642	9.210E-04
0.0394	9.282E-04	0.0170	9.813E-04	0.0239	9.526E-04	0.0344	9.389E-04	0.0487	9.109E-04	0.0675	8.836E-04
0.0415	8.912E-04	0.0178	9.591E-04	0.0251	9.206E-04	0.0361	9.026E-04	0.0512	8.717E-04	0.0709	8.426E-04
0.0436	8.504E-04	0.0185	9.341E-04	0.0264	8.850E-04	0.0380	8.625E-04	0.0538	8.291E-04	0.0744	7.986E-04
0.0459	8.063E-04	0.0193	9.064E-04	0.0277	8.462E-04	0.0399	8.190E-04	0.0566	7.834E-04	0.0782	7.520E-04
0.0482	7.596E-04	0.0202	8.760E-04	0.0291	8.044E-04	0.0419	7.726E-04	0.0595	7.354E-04	0.0821	7.035E-04
0.0507	7.110E-04	0.0210	8.433E-04	0.0305	7.604E-04	0.0441	7.240E-04	0.0625	6.858E-04	0.0863	6.540E-04
0.0534	6.612E-04	0.0219	8.084E-04	0.0320	7.146E-04	0.0463	6.740E-04	0.0657	6.354E-04	0.0906	6.041E-04
0.0561	6.110E-04	0.0229	7.717E-04	0.0336	6.677E-04	0.0487	6.234E-04	0.0691	5.850E-04	0.0952	5.545E-04
0.0590	5.614E-04	0.0239	7.336E-04	0.0353	6.205E-04	0.0512	5.730E-04	0.0726	5.354E-04	0.1000	5.061E-04
0.0621	5.129E-04	0.0249	6.945E-04	0.0370	5.735E-04	0.0538	5.235E-04	0.0764	4.873E-04	0.1050	4.594E-04
0.0653	4.662E-04	0.0260	6.548E-04	0.0388	5.274E-04	0.0565	4.757E-04	0.0803	4.412E-04	0.1103	4.148E-04
0.0687	4.218E-04	0.0271	6.149E-04	0.0408	4.828E-04	0.0594	4.300E-04	0.0844	3.975E-04	0.1159	3.728E-04
0.0723	3.800E-04	0.0283	5.753E-04	0.0428	4.399E-04	0.0624	3.869E-04	0.0887	3.567E-04	0.1217	3.337E-04
0.0760	3.412E-04	0.0295	5.364E-04	0.0449	3.993E-04	0.0656	3.467E-04	0.0932	3.189E-04	0.1279	2.977E-04
0.0799	3.054E-04	0.0308	4.984E-04	0.0471	3.611E-04	0.0689	3.096E-04	0.0980	2.842E-04	0.1343	2.646E-04
0.0841	2.726E-04	0.0321	4.617E-04	0.0495	3.254E-04	0.0724	2.757E-04	0.1030	2.527E-04	0.1411	2.347E-04
0.0884	2.428E-04	0.0335	4.264E-04	0.0519	2.925E-04	0.0761	2.448E-04	0.1083	2.241E-04	0.1482	2.077E-04
0.0930	2.159E-04	0.0349	3.929E-04	0.0545	2.622E-04	0.0800	2.170E-04	0.1139	1.985E-04	0.1557	1.835E-04
0.0978	1.917E-04	0.0364	3.611E-04	0.0572	2.345E-04	0.0841	1.921E-04	0.1197	1.756E-04	0.1635	1.619E-04
0.1029	1.700E-04	0.0380	3.312E-04	0.0600	2.094E-04	0.0884	1.698E-04	0.1258	1.552E-04	0.1718	1.427E-04
0.1082	1.506E-04	0.0396	3.032E-04	0.0630	1.866E-04	0.0929	1.499E-04	0.1323	1.371E-04	0.1804	1.257E-04
0.1139	1.333E-04	0.0413	2.771E-04	0.0661	1.660E-04	0.0976	1.323E-04	0.1390	1.211E-04	0.1895	1.107E-04
0.1198	1.179E-04	0.0431	2.528E-04	0.0694	1.475E-04	0.1026	1.168E-04	0.1462	1.070E-04	0.1991	9.753E-05
0.1260	1.042E-04	0.0449	2.303E-04	0.0729	1.309E-04	0.1078	1.030E-04	0.1536	9.453E-05	0.2091	8.589E-05
0.1325	9.201E-05	0.0469	2.096E-04	0.0765	1.160E-04	0.1133	9.086E-05	0.1615	8.355E-05	0.2196	7.565E-05
0.1394	8.123E-05	0.0489	1.904E-04	0.0803	1.028E-04	0.1191	8.016E-05	0.1698	7.387E-05	0.2307	6.664E-05
0.1466	7.168E-05	0.0510	1.728E-04	0.0843	9.090E-05	0.1251	7.072E-05	0.1785	6.535E-05	0.2423	5.871E-05

Mean		***5^{th} Fractile***		***16^{th} Fractile***		***50^{th} Fractile***		***84^{th} Fractile***		***95^{th} Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.1542	6.322E-05	0.0532	1.567E-04	0.0884	8.033E-05	0.1315	6.240E-05	0.1876	5.784E-05	0.2546	5.174E-05
0.1622	5.573E-05	0.0555	1.418E-04	0.0928	7.093E-05	0.1382	5.507E-05	0.1972	5.123E-05	0.2674	4.560E-05
0.1706	4.911E-05	0.0579	1.283E-04	0.0974	6.257E-05	0.1452	4.861E-05	0.2073	4.539E-05	0.2809	4.020E-05
0.1794	4.326E-05	0.0604	1.159E-04	0.1022	5.515E-05	0.1526	4.292E-05	0.2179	4.023E-05	0.2950	3.544E-05
0.1887	3.810E-05	0.0630	1.046E-04	0.1073	4.857E-05	0.1604	3.791E-05	0.2291	3.567E-05	0.3099	3.124E-05
0.1985	3.354E-05	0.0657	9.427E-05	0.1126	4.274E-05	0.1686	3.348E-05	0.2408	3.163E-05	0.3255	2.754E-05
0.2087	2.952E-05	0.0685	8.488E-05	0.1182	3.759E-05	0.1772	2.958E-05	0.2532	2.805E-05	0.3419	2.427E-05
0.2196	2.597E-05	0.0715	7.634E-05	0.1241	3.303E-05	0.1862	2.614E-05	0.2661	2.488E-05	0.3592	2.140E-05
0.2309	2.285E-05	0.0746	6.859E-05	0.1302	2.902E-05	0.1957	2.310E-05	0.2798	2.206E-05	0.3773	1.886E-05
0.2429	2.009E-05	0.0778	6.157E-05	0.1367	2.548E-05	0.2057	2.042E-05	0.2941	1.956E-05	0.3963	1.661E-05
0.2555	1.767E-05	0.0811	5.521E-05	0.1435	2.237E-05	0.2161	1.805E-05	0.3092	1.734E-05	0.4163	1.464E-05
0.2687	1.553E-05	0.0846	4.945E-05	0.1506	1.963E-05	0.2272	1.596E-05	0.3250	1.537E-05	0.4372	1.289E-05
0.2826	1.366E-05	0.0883	4.426E-05	0.1581	1.722E-05	0.2387	1.411E-05	0.3416	1.361E-05	0.4593	1.136E-05
0.2973	1.201E-05	0.0921	3.958E-05	0.1659	1.512E-05	0.2509	1.248E-05	0.3591	1.205E-05	0.4824	1.000E-05
0.3127	1.055E-05	0.0960	3.536E-05	0.1741	1.327E-05	0.2637	1.104E-05	0.3775	1.067E-05	0.5068	8.806E-06
0.3289	9.276E-06	0.1002	3.156E-05	0.1828	1.165E-05	0.2771	9.762E-06	0.3969	9.441E-06	0.5323	7.752E-06
0.3459	8.153E-06	0.1045	2.815E-05	0.1918	1.023E-05	0.2912	8.634E-06	0.4172	8.350E-06	0.5591	6.824E-06
0.3639	7.167E-06	0.1090	2.509E-05	0.2013	8.985E-06	0.3061	7.638E-06	0.4385	7.382E-06	0.5873	6.005E-06
0.3827	6.299E-06	0.1137	2.234E-05	0.2113	7.896E-06	0.3217	6.756E-06	0.4610	6.523E-06	0.6169	5.284E-06
0.4025	5.537E-06	0.1186	1.988E-05	0.2218	6.942E-06	0.3380	5.976E-06	0.4846	5.761E-06	0.6480	4.648E-06
0.4234	4.867E-06	0.1237	1.767E-05	0.2328	6.106E-06	0.3553	5.286E-06	0.5094	5.086E-06	0.6807	4.088E-06
0.4453	4.278E-06	0.1290	1.570E-05	0.2443	5.372E-06	0.3734	4.675E-06	0.5355	4.488E-06	0.7150	3.595E-06
0.4684	3.760E-06	0.1346	1.394E-05	0.2564	4.728E-06	0.3924	4.135E-06	0.5629	3.958E-06	0.7510	3.161E-06
0.4927	3.304E-06	0.1404	1.236E-05	0.2692	4.161E-06	0.4124	3.656E-06	0.5918	3.488E-06	0.7889	2.778E-06
0.5182	2.903E-06	0.1464	1.095E-05	0.2825	3.663E-06	0.4334	3.232E-06	0.6221	3.072E-06	0.8286	2.441E-06
0.5451	2.550E-06	0.1527	9.697E-06	0.2965	3.225E-06	0.4555	2.856E-06	0.6539	2.705E-06	0.8704	2.145E-06
0.5733	2.239E-06	0.1593	8.577E-06	0.3112	2.839E-06	0.4787	2.522E-06	0.6874	2.379E-06	0.9143	1.884E-06
0.6030	1.965E-06	0.1662	7.580E-06	0.3266	2.498E-06	0.5031	2.227E-06	0.7226	2.091E-06	0.9604	1.654E-06
0.6342	1.723E-06	0.1733	6.692E-06	0.3428	2.198E-06	0.5287	1.965E-06	0.7596	1.837E-06	1.0088	1.453E-06
0.6671	1.510E-06	0.1808	5.902E-06	0.3598	1.933E-06	0.5556	1.732E-06	0.7985	1.612E-06	1.0596	1.276E-06
0.7017	1.322E-06	0.1886	5.200E-06	0.3777	1.699E-06	0.5839	1.526E-06	0.8394	1.414E-06	1.1130	1.120E-06
0.7380	1.157E-06	0.1967	4.577E-06	0.3964	1.493E-06	0.6137	1.343E-06	0.8824	1.239E-06	1.1691	9.835E-07
0.7763	1.012E-06	0.2052	4.025E-06	0.4161	1.311E-06	0.6450	1.180E-06	0.9276	1.085E-06	1.2281	8.635E-07
0.8165	8.835E-07	0.2140	3.535E-06	0.4367	1.150E-06	0.6778	1.036E-06	0.9751	9.489E-07	1.2900	7.582E-07
0.8588	7.709E-07	0.2233	3.101E-06	0.4583	1.008E-06	0.7123	9.087E-07	1.0250	8.296E-07	1.3550	6.658E-07
0.9033	6.721E-07	0.2329	2.718E-06	0.4811	8.829E-07	0.7486	7.958E-07	1.0775	7.248E-07	1.4233	5.847E-07
0.9501	5.854E-07	0.2429	2.379E-06	0.5049	7.726E-07	0.7868	6.961E-07	1.1327	6.329E-07	1.4951	5.135E-07
0.9993	5.094E-07	0.2534	2.081E-06	0.5300	6.754E-07	0.8269	6.079E-07	1.1907	5.522E-07	1.5704	4.510E-07
1.0511	4.429E-07	0.2643	1.817E-06	0.5562	5.898E-07	0.8690	5.302E-07	1.2517	4.816E-07	1.6496	3.961E-07

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
1.1055	3.848E-07	0.2757	1.585E-06	0.5838	5.144E-07	0.9133	4.618E-07	1.3158	4.198E-07	1.7327	3.478E-07
1.1628	3.341E-07	0.2875	1.381E-06	0.6128	4.481E-07	0.9598	4.016E-07	1.3832	3.657E-07	1.8201	3.055E-07
1.2231	2.898E-07	0.2999	1.201E-06	0.6432	3.899E-07	1.0087	3.488E-07	1.4540	3.184E-07	1.9118	2.682E-07
1.2864	2.513E-07	0.3129	1.044E-06	0.6750	3.388E-07	1.0601	3.026E-07	1.5285	2.771E-07	2.0082	2.354E-07
1.3531	2.178E-07	0.3263	9.056E-07	0.7085	2.940E-07	1.1141	2.621E-07	1.6068	2.410E-07	2.1094	2.066E-07
1.4232	1.886E-07	0.3404	7.845E-07	0.7436	2.547E-07	1.1709	2.268E-07	1.6891	2.095E-07	2.2157	1.812E-07
1.4969	1.633E-07	0.3551	6.786E-07	0.7805	2.203E-07	1.2305	1.960E-07	1.7756	1.821E-07	2.3274	1.588E-07
1.5745	1.413E-07	0.3703	5.861E-07	0.8192	1.903E-07	1.2932	1.692E-07	1.8665	1.581E-07	2.4447	1.391E-07
1.6561	1.222E-07	0.3863	5.054E-07	0.8598	1.641E-07	1.3591	1.459E-07	1.9621	1.372E-07	2.5680	1.217E-07
1.7419	1.056E-07	0.4029	4.350E-07	0.9025	1.413E-07	1.4283	1.257E-07	2.0626	1.190E-07	2.6974	1.065E-07
1.8321	9.120E-08	0.4203	3.738E-07	0.9472	1.214E-07	1.5011	1.082E-07	2.1682	1.031E-07	2.8334	9.298E-08
1.9270	7.872E-08	0.4384	3.207E-07	0.9942	1.041E-07	1.5776	9.307E-08	2.2792	8.923E-08	2.9762	8.111E-08
2.0269	6.790E-08	0.4573	2.746E-07	1.0435	8.918E-08	1.6580	7.995E-08	2.3959	7.715E-08	3.1262	7.066E-08
2.1319	5.851E-08	0.4770	2.347E-07	1.0952	7.624E-08	1.7424	6.861E-08	2.5186	6.664E-08	3.2838	6.146E-08
2.2424	5.036E-08	0.4975	2.002E-07	1.1495	6.505E-08	1.8312	5.882E-08	2.6476	5.748E-08	3.4493	5.337E-08
2.3585	4.330E-08	0.5190	1.704E-07	1.2065	5.540E-08	1.9245	5.036E-08	2.7832	4.950E-08	3.6232	4.626E-08
2.4807	3.717E-08	0.5413	1.448E-07	1.2664	4.708E-08	2.0225	4.306E-08	2.9257	4.257E-08	3.8058	4.002E-08
2.6093	3.187E-08	0.5647	1.228E-07	1.3292	3.994E-08	2.1256	3.677E-08	3.0756	3.654E-08	3.9976	3.454E-08
2.7445	2.727E-08	0.5890	1.039E-07	1.3951	3.381E-08	2.2339	3.135E-08	3.2331	3.130E-08	4.1991	2.975E-08
2.8867	2.329E-08	0.6144	8.770E-08	1.4642	2.856E-08	2.3477	2.669E-08	3.3987	2.676E-08	4.4108	2.556E-08
3.0362	1.985E-08	0.6408	7.386E-08	1.5368	2.408E-08	2.4673	2.267E-08	3.5727	2.283E-08	4.6331	2.191E-08
3.1935	1.687E-08	0.6684	6.206E-08	1.6130	2.025E-08	2.5930	1.923E-08	3.7557	1.942E-08	4.8667	1.872E-08
3.3590	1.431E-08	0.6972	5.201E-08	1.6930	1.699E-08	2.7251	1.627E-08	3.9480	1.649E-08	5.1120	1.596E-08

Table A-1f. 10 Hz Seismic Hazard Curves at Farley.

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.0227	1.000E-03	0.0096	1.000E-03	0.0130	1.000E-03	0.0192	1.000E-03	0.0277	1.000E-03	0.0411	1.000E-03
0.0269	8.927E-04	0.0113	9.108E-04	0.0151	9.155E-04	0.0224	9.063E-04	0.0339	8.602E-04	0.0529	7.866E-04
0.0284	8.570E-04	0.0119	8.839E-04	0.0159	8.828E-04	0.0237	8.714E-04	0.0357	8.222E-04	0.0557	7.453E-04
0.0300	8.185E-04	0.0124	8.550E-04	0.0168	8.473E-04	0.0250	8.334E-04	0.0377	7.817E-04	0.0586	7.024E-04
0.0317	7.774E-04	0.0130	8.242E-04	0.0177	8.093E-04	0.0264	7.929E-04	0.0398	7.392E-04	0.0617	6.584E-04
0.0334	7.343E-04	0.0136	7.917E-04	0.0187	7.692E-04	0.0278	7.501E-04	0.0419	6.951E-04	0.0650	6.137E-04
0.0353	6.898E-04	0.0143	7.577E-04	0.0197	7.273E-04	0.0294	7.056E-04	0.0442	6.500E-04	0.0684	5.691E-04
0.0373	6.443E-04	0.0149	7.226E-04	0.0208	6.843E-04	0.0310	6.599E-04	0.0467	6.045E-04	0.0720	5.248E-04
0.0394	5.985E-04	0.0157	6.866E-04	0.0220	6.405E-04	0.0327	6.137E-04	0.0492	5.591E-04	0.0758	4.815E-04
0.0415	5.529E-04	0.0164	6.501E-04	0.0232	5.964E-04	0.0346	5.675E-04	0.0519	5.144E-04	0.0798	4.396E-04
0.0439	5.081E-04	0.0172	6.133E-04	0.0245	5.527E-04	0.0365	5.220E-04	0.0548	4.709E-04	0.0841	3.993E-04
0.0463	4.646E-04	0.0180	5.766E-04	0.0258	5.097E-04	0.0385	4.775E-04	0.0578	4.289E-04	0.0885	3.611E-04
0.0489	4.228E-04	0.0188	5.403E-04	0.0272	4.679E-04	0.0407	4.347E-04	0.0610	3.888E-04	0.0932	3.251E-04
0.0516	3.830E-04	0.0197	5.046E-04	0.0287	4.277E-04	0.0429	3.938E-04	0.0643	3.511E-04	0.0981	2.916E-04
0.0545	3.456E-04	0.0206	4.699E-04	0.0303	3.892E-04	0.0453	3.551E-04	0.0679	3.157E-04	0.1033	2.605E-04
0.0575	3.106E-04	0.0216	4.362E-04	0.0320	3.528E-04	0.0478	3.190E-04	0.0716	2.829E-04	0.1087	2.320E-04
0.0607	2.782E-04	0.0226	4.038E-04	0.0337	3.187E-04	0.0505	2.855E-04	0.0755	2.527E-04	0.1145	2.061E-04
0.0641	2.485E-04	0.0237	3.728E-04	0.0356	2.868E-04	0.0533	2.547E-04	0.0797	2.251E-04	0.1205	1.826E-04
0.0677	2.213E-04	0.0248	3.433E-04	0.0376	2.573E-04	0.0563	2.266E-04	0.0841	2.001E-04	0.1269	1.615E-04
0.0714	1.967E-04	0.0260	3.154E-04	0.0396	2.302E-04	0.0594	2.010E-04	0.0887	1.775E-04	0.1336	1.425E-04
0.0754	1.744E-04	0.0272	2.891E-04	0.0418	2.053E-04	0.0627	1.780E-04	0.0936	1.572E-04	0.1406	1.257E-04
0.0796	1.544E-04	0.0285	2.645E-04	0.0441	1.827E-04	0.0662	1.573E-04	0.0987	1.391E-04	0.1481	1.107E-04
0.0841	1.365E-04	0.0298	2.415E-04	0.0465	1.623E-04	0.0699	1.389E-04	0.1041	1.229E-04	0.1559	9.741E-05
0.0887	1.206E-04	0.0313	2.201E-04	0.0491	1.438E-04	0.0738	1.225E-04	0.1098	1.086E-04	0.1641	8.570E-05
0.0937	1.064E-04	0.0327	2.002E-04	0.0518	1.272E-04	0.0779	1.079E-04	0.1159	9.589E-05	0.1728	7.540E-05
0.0989	9.379E-05	0.0343	1.818E-04	0.0547	1.123E-04	0.0822	9.506E-05	0.1222	8.468E-05	0.1819	6.633E-05
0.1044	8.264E-05	0.0359	1.648E-04	0.0577	9.905E-05	0.0868	8.369E-05	0.1289	7.478E-05	0.1915	5.836E-05
0.1102	7.278E-05	0.0376	1.492E-04	0.0608	8.722E-05	0.0917	7.367E-05	0.1360	6.606E-05	0.2016	5.136E-05
0.1164	6.407E-05	0.0394	1.349E-04	0.0642	7.671E-05	0.0968	6.485E-05	0.1435	5.837E-05	0.2123	4.521E-05
0.1229	5.639E-05	0.0412	1.217E-04	0.0677	6.740E-05	0.1022	5.710E-05	0.1514	5.160E-05	0.2235	3.982E-05
0.1297	4.962E-05	0.0432	1.097E-04	0.0714	5.916E-05	0.1078	5.028E-05	0.1597	4.564E-05	0.2353	3.507E-05
0.1369	4.365E-05	0.0452	9.872E-05	0.0754	5.189E-05	0.1138	4.428E-05	0.1685	4.037E-05	0.2477	3.090E-05
0.1446	3.840E-05	0.0473	8.872E-05	0.0795	4.547E-05	0.1202	3.901E-05	0.1777	3.573E-05	0.2608	2.724E-05
0.1526	3.377E-05	0.0496	7.963E-05	0.0839	3.983E-05	0.1269	3.438E-05	0.1875	3.163E-05	0.2746	2.401E-05
0.1611	2.970E-05	0.0519	7.137E-05	0.0885	3.486E-05	0.1339	3.030E-05	0.1978	2.801E-05	0.2891	2.116E-05
0.1701	2.611E-05	0.0543	6.389E-05	0.0934	3.050E-05	0.1414	2.672E-05	0.2087	2.480E-05	0.3044	1.865E-05
0.1796	2.296E-05	0.0569	5.713E-05	0.0985	2.668E-05	0.1493	2.356E-05	0.2201	2.196E-05	0.3204	1.644E-05
0.1896	2.018E-05	0.0596	5.102E-05	0.1040	2.333E-05	0.1576	2.078E-05	0.2322	1.944E-05	0.3374	1.449E-05

0.2001	1.774E-05	0.0624	4.551E-05	0.1097	2.040E-05	0.1664	1.833E-05	0.2450	1.721E-05	0.3552	1.276E-05
0.2113	1.559E-05	0.0654	4.055E-05	0.1157	1.783E-05	0.1756	1.618E-05	0.2584	1.523E-05	0.3739	1.124E-05
0.2230	1.369E-05	0.0684	3.609E-05	0.1221	1.559E-05	0.1854	1.427E-05	0.2726	1.347E-05	0.3937	9.895E-06
0.2355	1.202E-05	0.0717	3.209E-05	0.1288	1.363E-05	0.1957	1.259E-05	0.2876	1.190E-05	0.4145	8.707E-06
0.2486	1.056E-05	0.0751	2.850E-05	0.1359	1.192E-05	0.2066	1.110E-05	0.3034	1.052E-05	0.4364	7.657E-06
0.2624	9.264E-06	0.0786	2.529E-05	0.1434	1.042E-05	0.2181	9.790E-06	0.3201	9.284E-06	0.4594	6.730E-06
0.2771	8.127E-06	0.0823	2.242E-05	0.1513	9.118E-06	0.2303	8.631E-06	0.3376	8.190E-06	0.4837	5.911E-06
0.2925	7.127E-06	0.0862	1.985E-05	0.1596	7.980E-06	0.2431	7.606E-06	0.3562	7.219E-06	0.5092	5.189E-06
0.3088	6.247E-06	0.0903	1.756E-05	0.1684	6.986E-06	0.2566	6.700E-06	0.3758	6.357E-06	0.5361	4.551E-06
0.3260	5.473E-06	0.0945	1.552E-05	0.1777	6.117E-06	0.2709	5.900E-06	0.3964	5.593E-06	0.5644	3.989E-06
0.3442	4.792E-06	0.0990	1.370E-05	0.1874	5.358E-06	0.2860	5.192E-06	0.4182	4.916E-06	0.5942	3.494E-06
0.3633	4.194E-06	0.1036	1.209E-05	0.1977	4.695E-06	0.3019	4.567E-06	0.4411	4.317E-06	0.6256	3.058E-06
0.3836	3.669E-06	0.1085	1.065E-05	0.2086	4.114E-06	0.3187	4.014E-06	0.4654	3.787E-06	0.6587	2.675E-06
0.4049	3.207E-06	0.1137	9.377E-06	0.2201	3.605E-06	0.3365	3.526E-06	0.4909	3.319E-06	0.6935	2.337E-06
0.4275	2.801E-06	0.1190	8.246E-06	0.2322	3.159E-06	0.3552	3.095E-06	0.5179	2.906E-06	0.7301	2.041E-06
0.4513	2.446E-06	0.1246	7.244E-06	0.2450	2.768E-06	0.3750	2.715E-06	0.5464	2.541E-06	0.7686	1.780E-06
0.4765	2.133E-06	0.1305	6.357E-06	0.2585	2.425E-06	0.3959	2.379E-06	0.5764	2.220E-06	0.8092	1.552E-06
0.5030	1.859E-06	0.1367	5.572E-06	0.2727	2.124E-06	0.4179	2.083E-06	0.6080	1.937E-06	0.8520	1.352E-06
0.5310	1.619E-06	0.1431	4.879E-06	0.2877	1.859E-06	0.4412	1.823E-06	0.6414	1.688E-06	0.8970	1.177E-06
0.5606	1.409E-06	0.1499	4.268E-06	0.3036	1.627E-06	0.4658	1.593E-06	0.6767	1.470E-06	0.9444	1.024E-06
0.5918	1.225E-06	0.1569	3.728E-06	0.3203	1.422E-06	0.4917	1.390E-06	0.7139	1.278E-06	0.9942	8.896E-07
0.6248	1.064E-06	0.1643	3.253E-06	0.3379	1.242E-06	0.5191	1.212E-06	0.7531	1.110E-06	1.0467	7.726E-07
0.6596	9.225E-07	0.1721	2.835E-06	0.3565	1.084E-06	0.5480	1.056E-06	0.7944	9.631E-07	1.1020	6.705E-07
0.6964	7.993E-07	0.1802	2.468E-06	0.3761	9.454E-07	0.5785	9.181E-07	0.8381	8.345E-07	1.1602	5.815E-07
0.7352	6.916E-07	0.1887	2.146E-06	0.3968	8.234E-07	0.6107	7.973E-07	0.8841	7.223E-07	1.2215	5.040E-07
0.7761	5.977E-07	0.1976	1.864E-06	0.4187	7.163E-07	0.6447	6.914E-07	0.9327	6.244E-07	1.2860	4.365E-07
0.8193	5.158E-07	0.2070	1.616E-06	0.4417	6.223E-07	0.6806	5.986E-07	0.9839	5.391E-07	1.3539	3.778E-07
0.8650	4.445E-07	0.2167	1.400E-06	0.4661	5.399E-07	0.7185	5.175E-07	1.0380	4.649E-07	1.4254	3.267E-07
0.9132	3.825E-07	0.2270	1.211E-06	0.4917	4.677E-07	0.7585	4.465E-07	1.0950	4.004E-07	1.5007	2.824E-07
0.9641	3.287E-07	0.2377	1.046E-06	0.5188	4.045E-07	0.8008	3.846E-07	1.1551	3.444E-07	1.5800	2.439E-07
1.0178	2.820E-07	0.2489	9.023E-07	0.5473	3.493E-07	0.8454	3.307E-07	1.2186	2.958E-07	1.6634	2.106E-07
1.0745	2.416E-07	0.2606	7.772E-07	0.5774	3.011E-07	0.8925	2.838E-07	1.2855	2.538E-07	1.7513	1.816E-07
1.1343	2.066E-07	0.2729	6.685E-07	0.6092	2.591E-07	0.9421	2.431E-07	1.3562	2.175E-07	1.8438	1.565E-07
1.1975	1.764E-07	0.2858	5.741E-07	0.6428	2.225E-07	0.9946	2.078E-07	1.4307	1.861E-07	1.9412	1.348E-07
1.2642	1.504E-07	0.2993	4.923E-07	0.6781	1.908E-07	1.0500	1.772E-07	1.5093	1.591E-07	2.0437	1.160E-07
1.3347	1.280E-07	0.3134	4.214E-07	0.7155	1.632E-07	1.1085	1.509E-07	1.5922	1.358E-07	2.1516	9.971E-08
1.4090	1.088E-07	0.3282	3.602E-07	0.7549	1.393E-07	1.1702	1.282E-07	1.6796	1.157E-07	2.2653	8.563E-08
1.4875	9.225E-08	0.3437	3.073E-07	0.7964	1.186E-07	1.2353	1.087E-07	1.7719	9.847E-08	2.3849	7.345E-08
1.5704	7.811E-08	0.3599	2.618E-07	0.8402	1.008E-07	1.3041	9.192E-08	1.8692	8.368E-08	2.5109	6.293E-08
1.6579	6.603E-08	0.3769	2.226E-07	0.8865	8.549E-08	1.3767	7.759E-08	1.9719	7.101E-08	2.6435	5.385E-08
1.7502	5.571E-08	0.3947	1.889E-07	0.9353	7.230E-08	1.4534	6.535E-08	2.0802	6.015E-08	2.7831	4.601E-08
1.8477	4.693E-08	0.4133	1.600E-07	0.9868	6.100E-08	1.5343	5.492E-08	2.1945	5.087E-08	2.9301	3.925E-08

1.9507	3.945E-08	0.4328	1.352E-07	1.0411	5.133E-08	1.6198	4.605E-08	2.3151	4.295E-08	3.0849	3.343E-08
2.0593	3.310E-08	0.4532	1.141E-07	1.0984	4.308E-08	1.7100	3.853E-08	2.4422	3.619E-08	3.2478	2.843E-08
2.1741	2.772E-08	0.4746	9.606E-08	1.1588	3.606E-08	1.8052	3.216E-08	2.5764	3.044E-08	3.4193	2.412E-08
2.2952	2.316E-08	0.4970	8.070E-08	1.2226	3.010E-08	1.9057	2.678E-08	2.7179	2.555E-08	3.5999	2.043E-08
2.4230	1.932E-08	0.5204	6.765E-08	1.2899	2.505E-08	2.0118	2.225E-08	2.8672	2.139E-08	3.7900	1.726E-08
2.5580	1.607E-08	0.5450	5.659E-08	1.3609	2.078E-08	2.1238	1.844E-08	3.0248	1.788E-08	3.9902	1.455E-08
2.7005	1.334E-08	0.5707	4.722E-08	1.4358	1.719E-08	2.2421	1.524E-08	3.1909	1.490E-08	4.2009	1.224E-08
2.8510	1.104E-08	0.5976	3.931E-08	1.5149	1.418E-08	2.3670	1.257E-08	3.3662	1.239E-08	4.4228	1.027E-08
3.0098	9.119E-09	0.6258	3.265E-08	1.5982	1.165E-08	2.4988	1.033E-08	3.5511	1.027E-08	4.6564	8.588E-09
3.1775	7.510E-09	0.6554	2.705E-08	1.6862	9.547E-09	2.6379	8.474E-09	3.7462	8.493E-09	4.9023	7.163E-09
3.3545	6.167E-09	0.6863	2.235E-08	1.7790	7.795E-09	2.7848	6.929E-09	3.9520	7.002E-09	5.1613	5.958E-09
3.5414	5.049E-09	0.7187	1.841E-08	1.8770	6.342E-09	2.9399	5.649E-09	4.1691	5.754E-09	5.4339	4.939E-09
3.7387	4.121E-09	0.7526	1.513E-08	1.9803	5.142E-09	3.1036	4.591E-09	4.3981	4.714E-09	5.7208	4.082E-09
3.9470	3.352E-09	0.7881	1.240E-08	2.0893	4.154E-09	3.2764	3.720E-09	4.6397	3.849E-09	6.0230	3.362E-09
4.1669	2.717E-09	0.8253	1.013E-08	2.2043	3.343E-09	3.4588	3.004E-09	4.8946	3.131E-09	6.3411	2.760E-09
4.3990	2.195E-09	0.8642	8.251E-09	2.3256	2.681E-09	3.6514	2.417E-09	5.1635	2.538E-09	6.6760	2.258E-09
4.6441	1.767E-09	0.9050	6.699E-09	2.4536	2.141E-09	3.8547	1.938E-09	5.4471	2.050E-09	7.0286	1.840E-09
4.9028	1.417E-09	0.9477	5.422E-09	2.5886	1.704E-09	4.0694	1.549E-09	5.7464	1.649E-09	7.3998	1.494E-09
5.1759	1.131E-09	0.9924	4.373E-09	2.7311	1.350E-09	4.2960	1.233E-09	6.0620	1.321E-09	7.7906	1.208E-09
5.4643	8.998E-10	1.0393	3.516E-09	2.8815	1.065E-09	4.5352	9.772E-10	6.3950	1.054E-09	8.2021	9.733E-10

Table A-1g. 25 Hz Seismic Hazard Curves at Farley.

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
0.0186	1.000E-03	0.0061	1.000E-03	0.0093	1.000E-03	0.0149	1.000E-03	0.0222	1.000E-03	0.0378	1.000E-03
0.0243	7.223E-04	0.0079	7.940E-04	0.0120	7.831E-04	0.0191	7.600E-04	0.0301	6.664E-04	0.0562	4.508E-04
0.0258	6.678E-04	0.0083	7.544E-04	0.0127	7.346E-04	0.0203	7.067E-04	0.0319	6.120E-04	0.0593	4.015E-04
0.0274	6.127E-04	0.0088	7.137E-04	0.0135	6.846E-04	0.0215	6.519E-04	0.0338	5.580E-04	0.0626	3.553E-04
0.0290	5.578E-04	0.0092	6.723E-04	0.0143	6.341E-04	0.0228	5.967E-04	0.0358	5.051E-04	0.0661	3.124E-04
0.0307	5.041E-04	0.0097	6.309E-04	0.0152	5.839E-04	0.0242	5.419E-04	0.0379	4.542E-04	0.0698	2.733E-04
0.0326	4.526E-04	0.0103	5.898E-04	0.0161	5.346E-04	0.0256	4.886E-04	0.0401	4.060E-04	0.0737	2.380E-04
0.0346	4.038E-04	0.0108	5.496E-04	0.0171	4.870E-04	0.0272	4.375E-04	0.0425	3.610E-04	0.0778	2.065E-04
0.0366	3.584E-04	0.0114	5.105E-04	0.0181	4.415E-04	0.0289	3.894E-04	0.0451	3.194E-04	0.0821	1.786E-04
0.0388	3.165E-04	0.0120	4.730E-04	0.0192	3.984E-04	0.0306	3.446E-04	0.0478	2.814E-04	0.0867	1.541E-04
0.0412	2.784E-04	0.0126	4.373E-04	0.0204	3.580E-04	0.0325	3.034E-04	0.0506	2.471E-04	0.0915	1.327E-04
0.0436	2.440E-04	0.0133	4.034E-04	0.0216	3.203E-04	0.0344	2.661E-04	0.0536	2.164E-04	0.0966	1.142E-04
0.0463	2.132E-04	0.0140	3.715E-04	0.0229	2.856E-04	0.0365	2.325E-04	0.0568	1.890E-04	0.1019	9.828E-05
0.0490	1.858E-04	0.0147	3.415E-04	0.0243	2.537E-04	0.0387	2.025E-04	0.0602	1.648E-04	0.1076	8.457E-05
0.0520	1.617E-04	0.0155	3.135E-04	0.0258	2.245E-04	0.0411	1.761E-04	0.0638	1.435E-04	0.1136	7.282E-05
0.0551	1.404E-04	0.0163	2.873E-04	0.0273	1.980E-04	0.0436	1.528E-04	0.0676	1.249E-04	0.1199	6.275E-05
0.0584	1.218E-04	0.0172	2.630E-04	0.0290	1.741E-04	0.0462	1.325E-04	0.0716	1.086E-04	0.1266	5.413E-05
0.0619	1.056E-04	0.0181	2.403E-04	0.0307	1.526E-04	0.0490	1.148E-04	0.0758	9.440E-05	0.1336	4.675E-05
0.0657	9.140E-05	0.0191	2.192E-04	0.0326	1.334E-04	0.0520	9.943E-05	0.0803	8.206E-05	0.1411	4.043E-05
0.0696	7.908E-05	0.0201	1.996E-04	0.0346	1.163E-04	0.0552	8.613E-05	0.0851	7.134E-05	0.1489	3.499E-05
0.0738	6.839E-05	0.0211	1.814E-04	0.0367	1.012E-04	0.0585	7.463E-05	0.0902	6.204E-05	0.1572	3.032E-05
0.0782	5.912E-05	0.0223	1.645E-04	0.0389	8.778E-05	0.0621	6.469E-05	0.0956	5.398E-05	0.1660	2.629E-05
0.0829	5.109E-05	0.0234	1.488E-04	0.0413	7.603E-05	0.0658	5.610E-05	0.1012	4.699E-05	0.1752	2.281E-05
0.0879	4.414E-05	0.0247	1.342E-04	0.0438	6.573E-05	0.0698	4.867E-05	0.1073	4.092E-05	0.1849	1.980E-05
0.0932	3.813E-05	0.0260	1.208E-04	0.0464	5.675E-05	0.0741	4.225E-05	0.1137	3.566E-05	0.1952	1.718E-05
0.0988	3.294E-05	0.0274	1.084E-04	0.0492	4.892E-05	0.0786	3.670E-05	0.1204	3.108E-05	0.2061	1.491E-05
0.1047	2.846E-05	0.0288	9.695E-05	0.0522	4.213E-05	0.0833	3.189E-05	0.1276	2.709E-05	0.2176	1.294E-05
0.1110	2.458E-05	0.0304	8.647E-05	0.0554	3.624E-05	0.0884	2.773E-05	0.1352	2.362E-05	0.2297	1.122E-05
0.1177	2.124E-05	0.0320	7.689E-05	0.0588	3.115E-05	0.0938	2.411E-05	0.1432	2.059E-05	0.2424	9.723E-06
0.1247	1.834E-05	0.0337	6.817E-05	0.0623	2.675E-05	0.0995	2.097E-05	0.1517	1.794E-05	0.2559	8.419E-06
0.1322	1.584E-05	0.0355	6.027E-05	0.0661	2.296E-05	0.1055	1.825E-05	0.1608	1.563E-05	0.2702	7.283E-06
0.1402	1.368E-05	0.0373	5.313E-05	0.0701	1.970E-05	0.1119	1.587E-05	0.1703	1.360E-05	0.2852	6.294E-06
0.1486	1.181E-05	0.0393	4.671E-05	0.0744	1.690E-05	0.1187	1.381E-05	0.1805	1.183E-05	0.3011	5.433E-06
0.1575	1.020E-05	0.0414	4.097E-05	0.0789	1.449E-05	0.1259	1.201E-05	0.1912	1.028E-05	0.3178	4.685E-06
0.1670	8.798E-06	0.0436	3.584E-05	0.0837	1.243E-05	0.1335	1.044E-05	0.2026	8.924E-06	0.3355	4.035E-06
0.1770	7.587E-06	0.0459	3.128E-05	0.0887	1.067E-05	0.1416	9.077E-06	0.2147	7.736E-06	0.3542	3.472E-06
0.1877	6.539E-06	0.0484	2.724E-05	0.0941	9.159E-06	0.1502	7.885E-06	0.2274	6.697E-06	0.3739	2.984E-06
0.1990	5.632E-06	0.0509	2.367E-05	0.0998	7.868E-06	0.1593	6.846E-06	0.2410	5.788E-06	0.3947	2.561E-06

Mean		5th Fractile		16th Fractile		50th Fractile		84th Fractile		95th Fractile	
PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE	PSA (g)	AFE
0.2109	4.847E-06	0.0536	2.053E-05	0.1059	6.763E-06	0.1690	5.939E-06	0.2553	4.996E-06	0.4167	2.197E-06
0.2236	4.168E-06	0.0565	1.776E-05	0.1123	5.818E-06	0.1793	5.149E-06	0.2705	4.304E-06	0.4398	1.882E-06
0.2370	3.581E-06	0.0595	1.534E-05	0.1191	5.009E-06	0.1901	4.459E-06	0.2866	3.703E-06	0.4643	1.612E-06
0.2513	3.073E-06	0.0626	1.322E-05	0.1264	4.315E-06	0.2017	3.858E-06	0.3037	3.180E-06	0.4902	1.379E-06
0.2664	2.635E-06	0.0660	1.137E-05	0.1340	3.719E-06	0.2139	3.335E-06	0.3217	2.727E-06	0.5174	1.179E-06
0.2824	2.256E-06	0.0695	9.752E-06	0.1422	3.206E-06	0.2269	2.878E-06	0.3409	2.334E-06	0.5462	1.008E-06
0.2993	1.930E-06	0.0731	8.349E-06	0.1508	2.764E-06	0.2407	2.481E-06	0.3612	1.994E-06	0.5766	8.608E-07
0.3173	1.648E-06	0.0770	7.131E-06	0.1599	2.383E-06	0.2553	2.136E-06	0.3827	1.701E-06	0.6087	7.350E-07
0.3364	1.405E-06	0.0811	6.077E-06	0.1696	2.053E-06	0.2708	1.835E-06	0.4054	1.449E-06	0.6426	6.275E-07
0.3566	1.197E-06	0.0854	5.167E-06	0.1799	1.768E-06	0.2872	1.574E-06	0.4296	1.232E-06	0.6783	5.355E-07
0.3780	1.017E-06	0.0899	4.383E-06	0.1908	1.521E-06	0.3047	1.348E-06	0.4551	1.046E-06	0.7161	4.570E-07
0.4008	8.632E-07	0.0947	3.710E-06	0.2024	1.306E-06	0.3231	1.152E-06	0.4822	8.865E-07	0.7559	3.899E-07
0.4248	7.312E-07	0.0997	3.133E-06	0.2147	1.120E-06	0.3428	9.821E-07	0.5109	7.502E-07	0.7980	3.326E-07
0.4504	6.182E-07	0.1050	2.640E-06	0.2277	9.590E-07	0.3636	8.354E-07	0.5413	6.338E-07	0.8424	2.836E-07
0.4774	5.216E-07	0.1106	2.220E-06	0.2415	8.191E-07	0.3856	7.088E-07	0.5735	5.346E-07	0.8892	2.419E-07
0.5061	4.393E-07	0.1165	1.863E-06	0.2562	6.980E-07	0.4090	5.998E-07	0.6077	4.502E-07	0.9387	2.062E-07
0.5365	3.692E-07	0.1227	1.560E-06	0.2717	5.931E-07	0.4339	5.063E-07	0.6438	3.785E-07	0.9909	1.757E-07
0.5688	3.097E-07	0.1292	1.304E-06	0.2882	5.026E-07	0.4602	4.261E-07	0.6822	3.178E-07	1.0461	1.496E-07
0.6030	2.592E-07	0.1360	1.087E-06	0.3057	4.246E-07	0.4881	3.575E-07	0.7228	2.663E-07	1.1043	1.273E-07
0.6392	2.165E-07	0.1432	9.049E-07	0.3243	3.576E-07	0.5177	2.991E-07	0.7658	2.228E-07	1.1657	1.082E-07
0.6776	1.805E-07	0.1509	7.515E-07	0.3439	3.001E-07	0.5492	2.495E-07	0.8114	1.861E-07	1.2306	9.187E-08
0.7183	1.502E-07	0.1589	6.227E-07	0.3648	2.510E-07	0.5825	2.075E-07	0.8596	1.552E-07	1.2991	7.788E-08
0.7615	1.247E-07	0.1673	5.149E-07	0.3869	2.092E-07	0.6179	1.720E-07	0.9108	1.291E-07	1.3714	6.590E-08
0.8072	1.033E-07	0.1762	4.246E-07	0.4104	1.737E-07	0.6554	1.422E-07	0.9650	1.073E-07	1.4477	5.564E-08
0.8557	8.536E-08	0.1855	3.494E-07	0.4353	1.437E-07	0.6951	1.171E-07	1.0224	8.891E-08	1.5282	4.686E-08
0.9072	7.038E-08	0.1954	2.867E-07	0.4617	1.183E-07	0.7373	9.617E-08	1.0833	7.352E-08	1.6132	3.935E-08
0.9617	5.788E-08	0.2057	2.346E-07	0.4897	9.706E-08	0.7821	7.870E-08	1.1478	6.064E-08	1.7030	3.294E-08
1.0195	4.746E-08	0.2166	1.913E-07	0.5194	7.927E-08	0.8295	6.417E-08	1.2161	4.987E-08	1.7978	2.747E-08
1.0807	3.880E-08	0.2281	1.556E-07	0.5509	6.444E-08	0.8799	5.214E-08	1.2884	4.089E-08	1.8978	2.282E-08
1.1457	3.161E-08	0.2403	1.261E-07	0.5844	5.214E-08	0.9333	4.220E-08	1.3651	3.340E-08	2.0034	1.887E-08
1.2145	2.566E-08	0.2530	1.018E-07	0.6198	4.197E-08	0.9899	3.401E-08	1.4464	2.718E-08	2.1149	1.553E-08
1.2875	2.074E-08	0.2664	8.187E-08	0.6574	3.361E-08	1.0500	2.730E-08	1.5324	2.203E-08	2.2325	1.272E-08
1.3649	1.669E-08	0.2806	6.558E-08	0.6973	2.676E-08	1.1138	2.181E-08	1.6236	1.776E-08	2.3568	1.036E-08
1.4469	1.337E-08	0.2955	5.230E-08	0.7396	2.118E-08	1.1813	1.733E-08	1.7203	1.425E-08	2.4879	8.390E-09
1.5338	1.065E-08	0.3111	4.152E-08	0.7845	1.666E-08	1.2530	1.370E-08	1.8226	1.137E-08	2.6263	6.753E-09
1.6260	8.433E-09	0.3277	3.280E-08	0.8321	1.302E-08	1.3291	1.077E-08	1.9311	9.017E-09	2.7725	5.401E-09
1.7237	6.637E-09	0.3450	2.578E-08	0.8825	1.011E-08	1.4098	8.416E-09	2.0460	7.105E-09	2.9267	4.291E-09
1.8273	5.189E-09	0.3634	2.015E-08	0.9361	7.788E-09	1.4953	6.533E-09	2.1678	5.560E-09	3.0896	3.385E-09
1.9371	4.029E-09	0.3826	1.565E-08	0.9929	5.956E-09	1.5861	5.037E-09	2.2968	4.320E-09	3.2615	2.652E-09

Mean		***5th Fractile***		***16th Fractile***		***50th Fractile***		***84th Fractile***		***95th Fractile***	
PSA (g)	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**	**PSA (g)**	**AFE**
2.0535	3.104E-09	0.4029	1.209E-08	1.0531	4.520E-09	1.6824	3.856E-09	2.4335	3.331E-09	3.4430	2.062E-09
2.1769	2.373E-09	0.4243	9.279E-09	1.1170	3.402E-09	1.7845	2.929E-09	2.5783	2.548E-09	3.6345	1.591E-09
2.3077	1.800E-09	0.4469	7.073E-09	1.1848	2.540E-09	1.8928	2.207E-09	2.7318	1.933E-09	3.8368	1.218E-09
2.4463	1.353E-09	0.4706	5.354E-09	1.2567	1.879E-09	2.0076	1.649E-09	2.8944	1.454E-09	4.0502	9.245E-10
2.5933	1.008E-09	0.4955	4.023E-09	1.3329	1.378E-09	2.1295	1.222E-09	3.0666	1.084E-09	4.2756	6.961E-10
2.7492	7.442E-10	0.5218	3.000E-09	1.4138	1.002E-09	2.2587	8.969E-10	3.2491	8.004E-10	4.5135	5.197E-10
2.9144	5.442E-10	0.5495	2.219E-09	1.4995	7.211E-10	2.3958	6.523E-10	3.4425	5.856E-10	4.7646	3.846E-10
3.0895	3.941E-10	0.5787	1.628E-09	1.5905	5.141E-10	2.5412	4.699E-10	3.6474	4.243E-10	5.0298	2.821E-10
3.2751	2.825E-10	0.6094	1.185E-09	1.6870	3.629E-10	2.6955	3.351E-10	3.8644	3.043E-10	5.3096	2.051E-10
3.4719	2.005E-10	0.6418	8.544E-10	1.7893	2.536E-10	2.8591	2.365E-10	4.0944	2.161E-10	5.6051	1.477E-10
3.6806	1.407E-10	0.6758	6.106E-10	1.8979	1.754E-10	3.0326	1.652E-10	4.3381	1.519E-10	5.9169	1.054E-10
3.9017	9.776E-11	0.7117	4.324E-10	2.0130	1.201E-10	3.2167	1.142E-10	4.5963	1.056E-10	6.2462	7.451E-11
4.1362	6.717E-11	0.7495	3.032E-10	2.1352	8.131E-11	3.4119	7.808E-11	4.8698	7.263E-11	6.5937	5.217E-11
4.3848	4.564E-11	0.7892	2.106E-10	2.2647	5.447E-11	3.6190	5.279E-11	5.1596	4.942E-11	6.9606	3.617E-11
4.6482	3.066E-11	0.8311	1.448E-10	2.4021	3.609E-11	3.8386	3.529E-11	5.4667	3.325E-11	7.3479	2.483E-11
4.9276	2.036E-11	0.8752	9.858E-11	2.5478	2.365E-11	4.0716	2.332E-11	5.7920	2.213E-11	7.7567	1.688E-11
5.2237	1.337E-11	0.9217	6.641E-11	2.7024	1.532E-11	4.3187	1.523E-11	6.1367	1.456E-11	8.1883	1.136E-11
5.5375	8.676E-12	0.9706	4.427E-11	2.8664	9.815E-12	4.5808	9.834E-12	6.5019	9.468E-12	8.6440	7.566E-12
5.8703	5.564E-12	1.0221	2.919E-11	3.0403	6.215E-12	4.8589	6.273E-12	6.8889	6.087E-12	9.1249	4.989E-12
6.2230	3.526E-12	1.0763	1.904E-11	3.2247	3.890E-12	5.1538	3.954E-12	7.2989	3.868E-12	9.6326	3.256E-12
6.5970	2.208E-12	1.1335	1.229E-11	3.4203	2.406E-12	5.4666	2.462E-12	7.7333	2.430E-12	10.1686	2.103E-12
6.9934	1.366E-12	1.1936	7.841E-12	3.6278	1.471E-12	5.7983	1.515E-12	8.1935	1.508E-12	10.7344	1.345E-12
7.4137	8.350E-13	1.2570	4.948E-12	3.8479	8.888E-13	6.1503	9.206E-13	8.6811	9.252E-13	11.3317	8.507E-13

Table A-2. Weighted average median and logarithmic standard deviation of amplification factors for Farley Units 1 and 2.

Motion Name	0.5 Hz Input PSA (g)	0.5 Hz Median	0.5 Hz Log SD	1.0 Hz Input PSA (g)	1.0 Hz Median	1.0 Hz Log SD	2.5 Hz Input PSA (g)	2.5 Hz Median	2.5 Hz Log SD	5.0 Hz Input PSA (g)	5.0 Hz Median	5.0 Hz Log SD
HF3	0.0027	1.926	0.271	0.0070	2.154	0.421	0.0200	2.721	0.360	0.0226	1.900	0.317
LF3	0.0103	1.864	0.267	0.0153	2.071	0.423	0.0201	2.620	0.346	0.0226	1.832	0.287
HF4	0.0069	1.918	0.267	0.0182	2.152	0.426	0.0518	2.563	0.344	0.0659	1.686	0.332
LF4	0.0313	1.869	0.275	0.0407	2.086	0.422	0.0520	2.428	0.324	0.0659	1.601	0.304
HF5	0.0129	1.942	0.261	0.0368	2.155	0.410	0.1149	2.334	0.319	0.1860	1.448	0.363
LF5	0.0653	1.912	0.312	0.0825	2.069	0.405	0.1153	2.200	0.333	0.1620	1.352	0.362
HF6	0.0331	1.930	0.277	0.0957	2.127	0.393	0.3010	2.032	0.326	0.5789	1.118	0.435
LF6	0.1219	1.966	0.352	0.1580	1.998	0.395	0.3011	1.791	0.450	0.4200	1.029	0.501
HF7	0.0910	2.043	0.351	0.2628	2.048	0.391	0.8262	1.556	0.446	1.5355	0.763	0.600
LF7	0.2333	2.013	0.363	0.3498	1.793	0.431	0.8260	1.241	0.634	1.1542	0.656	0.673

Motion Name	10.0 Hz Input PSA (g)	10.0 Hz Median	10.0 Hz Log SD	25.0 Hz Input PSA (g)	25.0 Hz Median	25.0 Hz Log SD	100.0 Hz (PGA) Input PSA (g)	100.0 Hz (PGA) Median	100.0 Hz (PGA) Log SD
HF3	0.0255	1.156	0.396	0.0230	0.915	0.339	0.0125	1.564	0.302
LF3	0.0255	1.165	0.342	0.0230	0.995	0.299	0.0125	1.740	0.281
HF4	0.0848	0.922	0.416	0.0874	0.621	0.348	0.0423	1.178	0.295
LF4	0.0848	0.920	0.344	0.0873	0.683	0.280	0.0423	1.330	0.249
HF5	0.2830	0.703	0.471	0.3431	0.381	0.400	0.1670	0.705	0.318
LF5	0.2020	0.770	0.355	0.2290	0.532	0.269	0.1010	1.144	0.230
HF6	0.9690	0.479	0.559	1.2801	0.237	0.437	0.6120	0.453	0.358
LF6	0.5210	0.580	0.441	0.5929	0.408	0.311	0.2610	0.892	0.277
HF7	2.5253	0.316	0.654	3.4200	0.168	0.487	1.6122	0.338	0.440
LF7	1.4314	0.378	0.550	1.6283	0.281	0.414	0.7155	0.624	0.393