Enclosure 4 Contains Westinghouse Proprietary Class 2 Information requested to be withheld from public disclosure under 10 CFR 2.390(a)(4)

FPL.

L-2013-071
10 CFR 52.3

March 7, 2013

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

Re: Florida Power & Light Company
Proposed Turkey Point Units 6 and 7
Docket Nos. 52-040 and 52-041
Response to NRC Request for Additional Information Letter No. 61 (eRAI 6432)
Related to SRP Section 03.07.01 - Seismic Design Parameters

References:

1. NRC Letter to FPL dated May 17, 2012, Request for Additional Information Letter No. 61 Related to SRP Section 03.07.01 Seismic Design Parameters for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application

2. FPL Letter L-2012-264 to NRC dated June 29, 2012, Schedule for Response to NRC Request for Additional Information Letter No. 61 (eRAI 6432) Related to SRP Section 03.07.01 - Seismic Design Parameters

3. FPL Letter L-2012-302 to NRC dated August 2, 2012, Revised Schedule for Response to NRC Request for Additional Information Letter No. 61 (eRAI 6432) Related to SRP Section 03.07.01 - Seismic Design Parameters

4. FPL Letter L-2013-015 to NRC dated January 10, 2013, Revised Schedule for Response to NRC Request for Additional Information Letter No. 61 (eRAI 6432) Related to SRP Section 03.07.01 - Seismic Design Parameters

5. FPL Letter L-2013-074 to NRC dated February 20, 2013, Revised Schedule for Response to NRC Request for Additional Information Letter No. 61 (eRAI 6432) Related to SRP Section 03.07.01 - Seismic Design Parameters

Florida Power & Light Company (FPL) provides, as Enclosure 2 to this letter, its response to the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) 03.07.01-15 provided in the Reference 1. The Enclosure identifies changes that will be made in a future revision of the Turkey Point Units 6 and 7 Combined License Application (if applicable). References 2, 3, 4 and 5 provided the schedule for responding to RAI 03.07.01-15.

Enclosure 4 Contains Westinghouse Proprietary Class 2 Information requested to be withheld from public disclosure under 10 CFR 2.390(b)(4)

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Enclosure 4, AP-1000 Turkey Point Site Specific Seismic Evaluation Report, TPG-1000-S2R-802, Revision 5 dated January 2013, contains Westinghouse Proprietary Class 2 information. The Westinghouse proprietary information for which withholding is being requested is further identified in the affidavit signed by Westinghouse Electric Company, LLC. The Westinghouse affidavit accompanying this letter (Enclosure 1), sets forth the basis on which the information may be withheld from public disclosure by the Commission and address with specificity the considerations listed in 10 CFR 2.390(b)(4). Correspondence with respect to the proprietary aspects of this application for withholding or the accompanying affidavit should reference CAW-13-3601 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066. Based on Enclosure 2 to this letter, FPL requests that Enclosure 4 be withheld from public disclosure under 10 CFR 2.390(a)(4).

If you have any questions, or need additional information, please contact me at 561-691-7490.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on March 7, 2013.

Sincerely,

William Maher
Senior Licensing Director – New Nuclear Projects

WDM/ETC

Enclosure 1: Westinghouse Application for Withholding Proprietary Information from Public Disclosure CAW-13-3601 (7 Pages)

Enclosure 2: FPL Response to NRC RAI No. 03.07.01-15 (eRAI 6432) (80 Pages)

Enclosure 3: AP1000 Turkey Point Site Specific Seismic Evaluation Report, TPG-1000-S2R-807, Revision 2, January 2013, Contains Westinghouse Non-Proprietary Class 3 Information (154 Pages)

Enclosure 4: AP1000 Turkey Point Site Specific Seismic Evaluation Report, TPG-1000-S2R-802, Revision 5, January 2013 -Contains Westinghouse Proprietary Class 2 Information (155 Pages)

cc: (W/O Enclosures)
PTN 6 & 7 Project Manager, AP1000 Projects Branch 1, USNRC DNRL/NRO
Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant 3 & 4

Enclosure 1

Westinghouse Application for Withholding

Proprietary Information from Public Disclosure

CAW-13-3601

(7 Total Pages)

Westinghouse Application for Withholding Proprietary Information from Public Disclosure CAW-13-3601, accompanying Affidavit, Proprietary Information Notice, and Copyright Notice pursuant to 10 CFR 2.390(a)(4)

Enclosure 4 of this letter, AP1000 Turkey Point Site Specific Seismic Evaluation Report, TPG-1000-S2R-802, Revision 5, contains Westinghouse Proprietary Class 2 information.

As Enclosure 4 of this letter contains proprietary information to Westinghouse Electric Company LLC, it is supported by an affidavit signed by Westinghouse, the owner of the information. The Westinghouse affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and address with specificity the considerations listed in 10 CFR 2.390(b)(4).

Accordingly, it is respectfully requested that the information which is proprietary be withheld from public disclosure in accordance 10 CFR 2.390.

Correspondence with respect to the proprietary aspects of this application for withholding or the accompanying affidavit should reference CAW-13-3601 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

COPYRIGHT NOTICE

The reports transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies of the information contained in these reports which are necessary for its internal use in connection with generic and plant-specific reviews and approvals as well as the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, order, or regulation subject to the requirements of 10 CFR 2.390 regarding restrictions on public disclosure to the extent such information has been identified as proprietary by Westinghouse, copyright protection notwithstanding. With respect to the non-proprietary versions of these reports, the NRC is permitted to make the number of copies beyond those necessary for its internal use which are necessary in order to have one copy available for public viewing in the appropriate docket files in the public document room in Washington, DC and in local public document rooms as may be required by NRC regulations if the number of copies submitted is insufficient for this purpose. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

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COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared **Robert B. Sisk**, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

Robert B. Sisk
Program Manager Korea/UAE

Sworn to and subscribed
before me this 5th day
of February 2013.

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Linda J. Bugle, Notary Public
City of Pittsburgh, Allegheny County
My Commission Expires June 18, 2013
Member, Pennsylvania Association of Notaries

Notary Public

(1) I am Program Manager Korea/UAE, Westinghouse Electric Company, LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse "Application for Withholding" accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitute Westinghouse policy and provide the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component

may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390; it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld from within the "Transmittal of Turkey Point Site Specific Evaluation Report, TPG-1000-S2R-802, Rev. 5 (Proprietary) (APC_TPG_000045), for submittal to the Commission, being transmitted by Florida Power and Light Company letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with Transmittal of Turkey Point Site Specific Evaluation Report, TPG-1000-S2R-802, Rev. 5, and may be used only for that purpose.

The information requested to be withheld reveals details of the AP1000 design; timing and content of procurement; sequence and method of construction; and timing and content of inspection and testing. This information was developed and continues to be developed by Westinghouse. The information is part of that which enables Westinghouse to manufacture and deliver products to utilities based on proprietary designs.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar commercial power reactors without commensurate expenses.

The information requested to be withheld is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Enclosure 2

FPL Response to NRC RAI No. 03.07.01-15

(eRAI 6432)

(80 Total Pages)

NRC RAI Letter No. PTN-RAI-LTR-061 Dated May 17, 2012

SRP Section: 03.07.01 – Seismic Design Parameters

Questions from Structural Engineering Branch 1

NRC RAI Number: 03.07.01-15 (eRAI 6432)

In Revision 3 of the applicant's FSAR, (aka. TPG-1000-S2R-802, "Turkey Point Site-Specific Seismic Evaluation Report") Figures 2.1-3 through 8 show the response spectra at the foundation level. These spectra have zpa values that are less than the 0.1g at the foundation depth that is required by Appendix S to 10 CFR Part 50. (Note that this issue was previously identified in a question on Figure 2.5.2-252 regarding the input motion at Elevation -35). The response spectra shown in those figures form the basis of the input motions that are used to compute the in-structure response spectra (ISRS) from the SSI analyses. Meeting the Appendix S requirements would appear to require adjusting the input motions upward which would result in margins, as compared to the DCD ISRS at the six key locations, to reduce significantly from those indicated in the tables mentioned above. Additionally, it is noted in the AP1000 DCD that the CSDRS is at finished grade. Since the input motion at the foundation level is less than the minimum required by Appendix S, the surface spectra shown in Appendix 3JJ, which neglect any adjustment required to satisfy Appendix S, appear to be understated. Thus, the applicant is requested to provide a discussion as to how the results provided in Appendix 3JJ and Figures 2.1-3 through 8 meet the Appendix S to 10 CFR Part 50 requirements for minimum seismic input at the foundation level.

FPL RESPONSE:

In Revision 5 of TPG-1000-S2R-802, "Turkey Point Site-Specific Seismic Evaluation Report", Section 2.1 presents a summary of the Turkey Point Units 6 & 7 free-field site response analyses, which updates the information from the Revision 3 report and presents detailed descriptions of how the Appendix S to 10 CFR Part 50 requirements for minimum seismic input at the foundation level are met.

The updated free-field site response analyses results, acceleration response spectra, soil-structure interaction (SSI) input time histories, and strain compatible soil properties were drawn from changes to FSAR Subsection 3.7.1 and Appendix 3JJ. These changes are shown in the Associated COLA Revisions section of this response.

To satisfy the requirements of Appendix S to 10 CFR Part 50, specifically that the Safe Shutdown Earthquake (SSE) motion must be an adequate acceleration response spectra (ARS) with a minimum peak ground acceleration (PGA) of 0.1g, the Turkey Point Units 6 & 7 site-specific design response spectra (DRS) at the foundation level (El. -16 ft) consists of the envelope of the Turkey Point site-specific foundation input response spectra (FIRS) and the RG 1.60 spectra scaled to 0.1g. The resulting outcrop horizontal and vertical envelope FIRS is considered the SSE motion for the Units 6 & 7 site meeting the minimum 0.1g PGA. The horizontal and vertical Turkey Point site-specific FIRS and RG 1.60 spectra envelopes scaled to 0.1g are presented in Figure 2.1-2.

Two horizontal (H1 and H2) and one vertical (UP) acceleration time histories are spectrally matched to the SSE motion. The SSI analysis of the Nuclear Island (NI) uses a set of SSE acceleration time histories that are input as "within," i.e., in-column motion at the elevation of the Turkey Point foundation (El. -16 ft) located 41.5-foot depth. To obtain these "within" time histories, each of the strain compatible BE, LB and UB soil profiles is analyzed by inputting the time histories consistent with the 41.5-foot depth, minimum 0.1g SSE spectra as an "outcrop" motion at this foundation depth. Horizontal and vertical ARS at the design grade elevation were developed following the Interim Staff Guidance DC/COL-ISG-017 to check that the response due to the site-specific FIRS envelope the surface ARS using the best estimate (BE), lower bound (LB) and upper bound (UB) soil properties.

The horizontal and vertical BE, LB and UB "within" ARS at the Turkey Point foundation El. -16 ft are shown in TPG-1000-S2R-802 Rev. 5, Figures 2.1-3 through 2.1-5 for the NI (near) site conditions, and Figures 2.1-6 through 2.1-8 for the FAR site conditions. Figures 2.1-9 through 2.1-14 also present the comparison of the computed surface motions to the respective DRS for each directional component (H1, H2, V), each soil case (BE, LB and UB) and each site condition (NI and FAR) using the site-specific FIRS.

As indicated, the SSE time histories were input into the three (BE, LB and UB) soil columns as outcropping motions at El. -16 ft, and then output as in-column motions at El. -16 ft for use in the SSI analysis. These in-column time histories at El.-16 ft are presented in Figures 3.5-1 through 3.5-3 of the Revision 5 report for the NI site conditions and in Figures 3.5-4 through 3.5-6 for the FAR site conditions.

Time history seismic analyses for the Turkey Point 3D Design-Basis model and the Units 6 & 7 BE, LB and UB cases were performed in two horizontal and one vertical direction. The revised Turkey Point input time histories at the top of lean concrete fill (El. -16 ft) based on the minimum 0.1g PGA outcrop SSE spectra were used in SASSI with the SASSI Direct method of analysis. In-structure floor response spectra (FRS) for 5 percent damping were obtained at the six key NI locations.

Figures 6.2-1 through 6.2-18 present the broadened horizontal and vertical Turkey Point Units 6 & 7 Factored 3D Design-Basis FRS, which includes the BE, LB and UB FRS and Turkey Point FRS envelope compared to the 3D AP1000 certified seismic design response spectra (CSDRS) and hard rock high frequency (HRHF) floor response spectra (FRS) envelopes at the six (6) key NI locations. The HRHF FRS envelope is presented to demonstrate that additional margin exists at the key nodes in the high frequency range (20-50 Hz). As shown, the Turkey Point site specific FRS are enveloped by the AP1000 CSDRS and HRHF FRS envelopes at each of the six key NI locations.

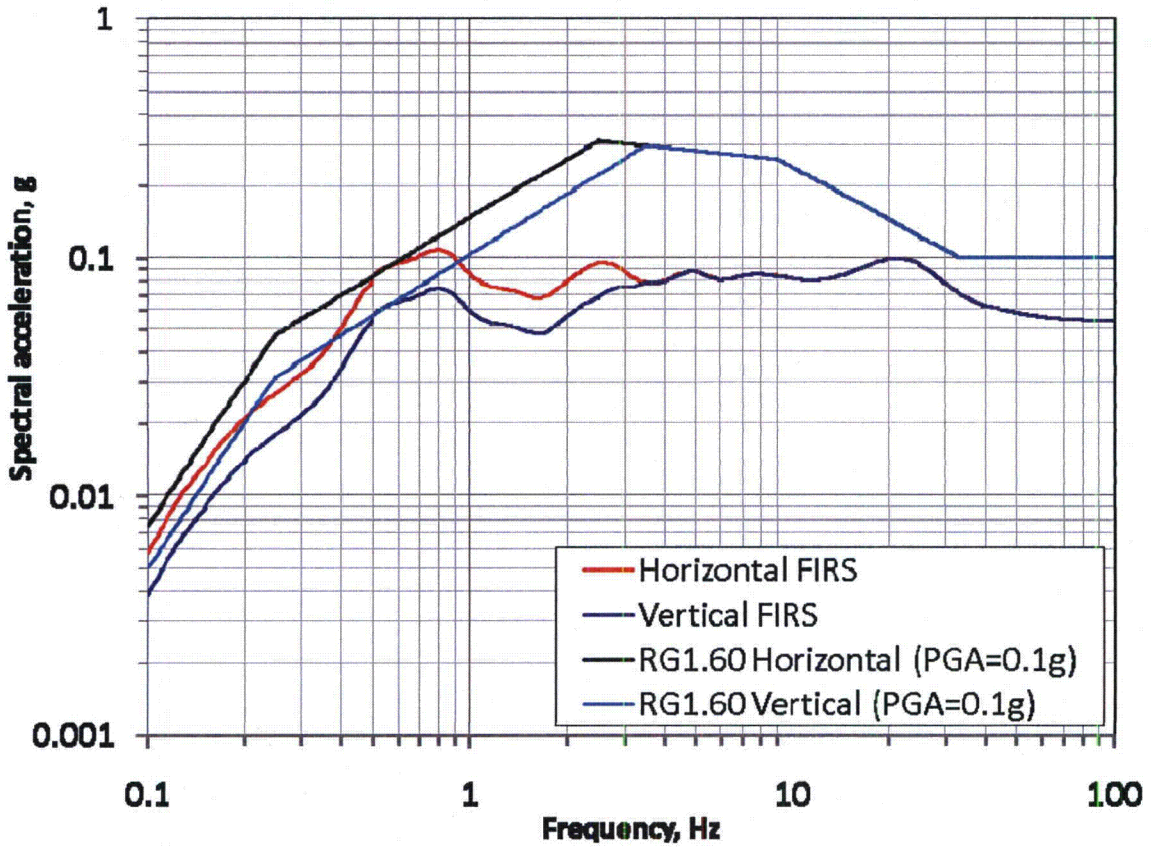


Figure 2.1-2

TPNP FIRS and RG 1.60 PGA=0.1g Foundation Level Outcrop SSE

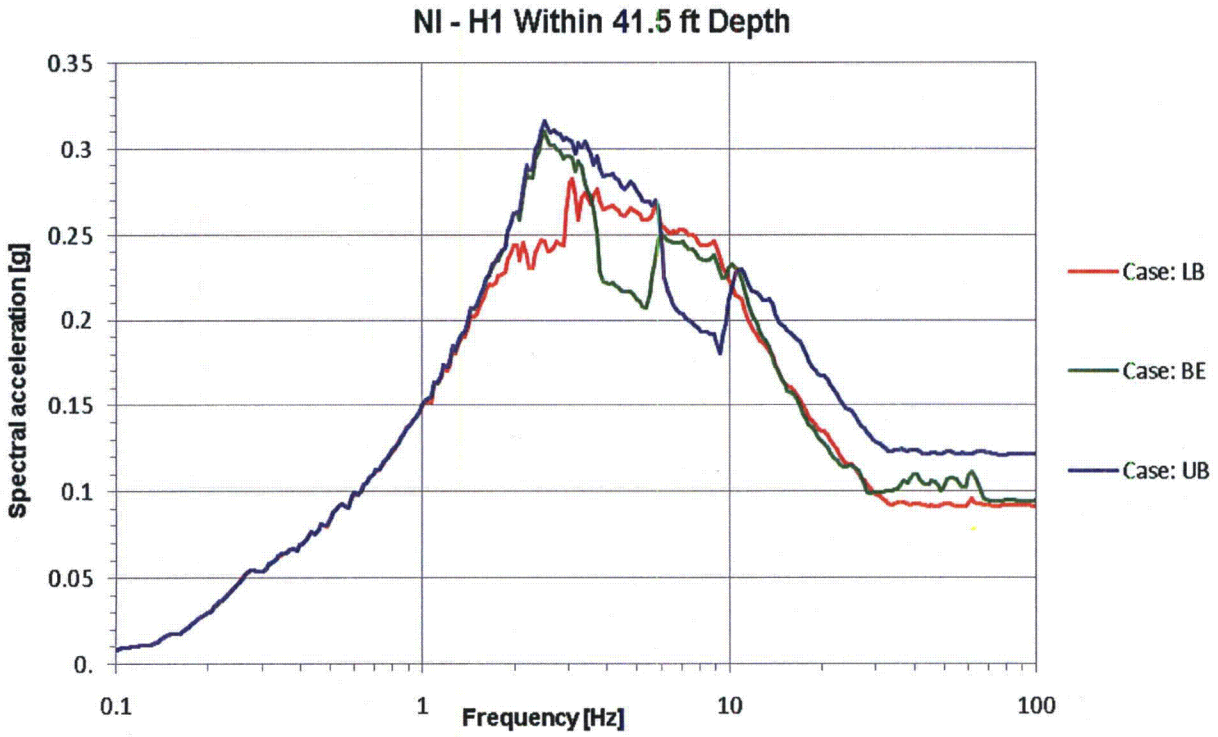


Figure 2.1-3

NI H1 Horizontal Within ARS at TPNP Foundation El. -16'

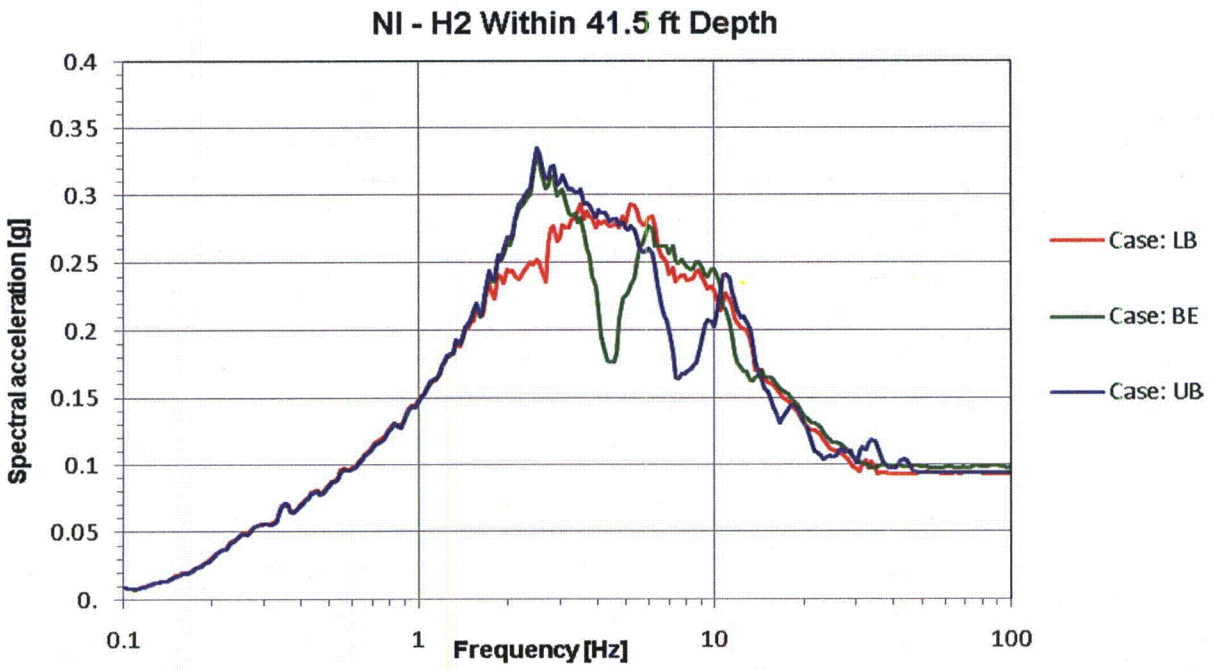


Figure 2.1-4

NI H2 Horizontal Within ARS at TPNP Foundation El. -16'

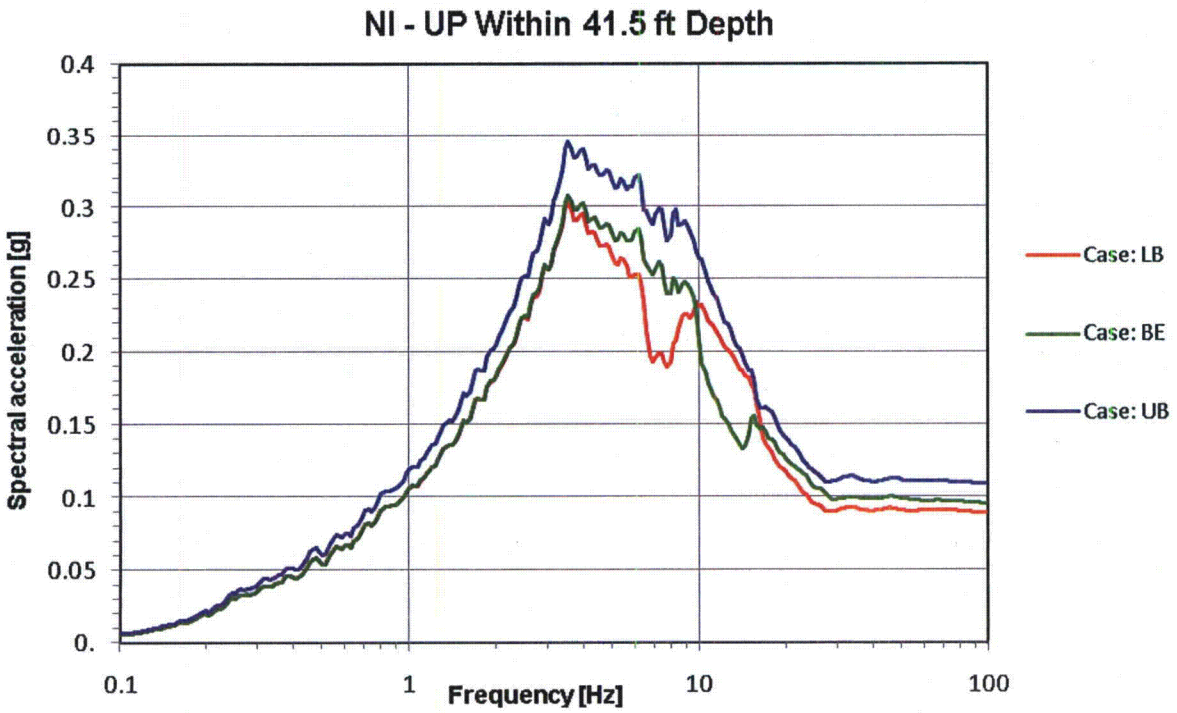


Figure 2.1-5

NI UP Vertical Within ARS at TPNP Foundation El. -16'

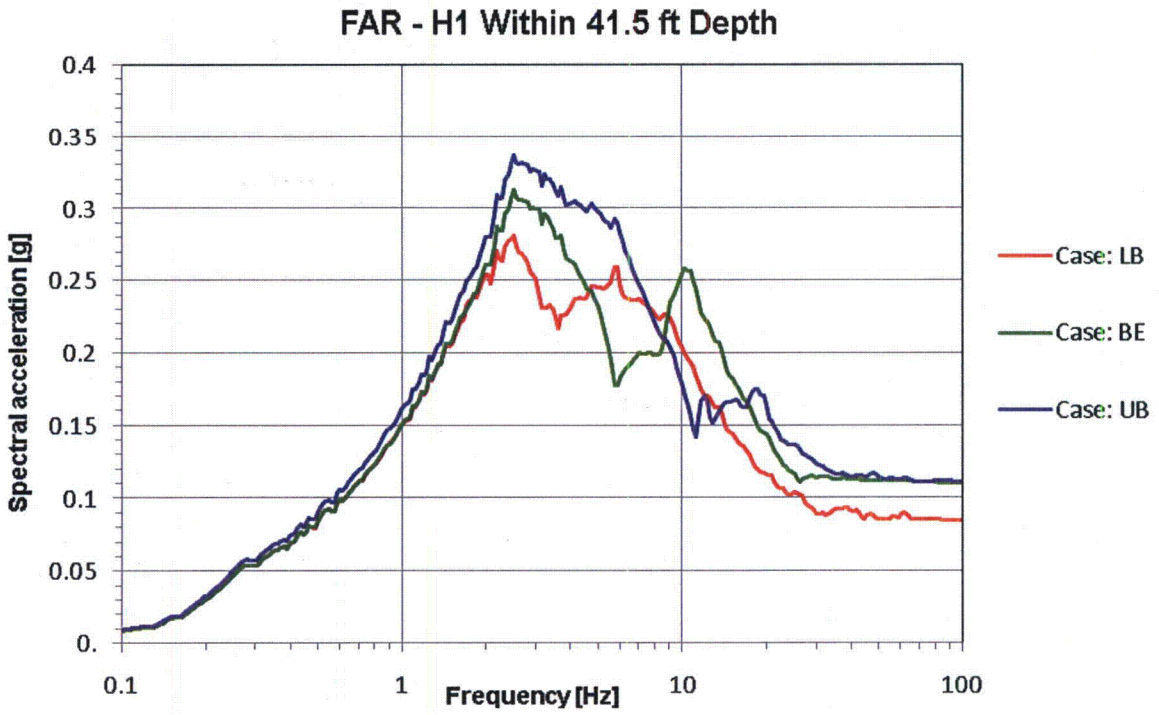


Figure 2.1-6

FAR H1 Horizontal Within ARS at TPNP Foundation El. -16'

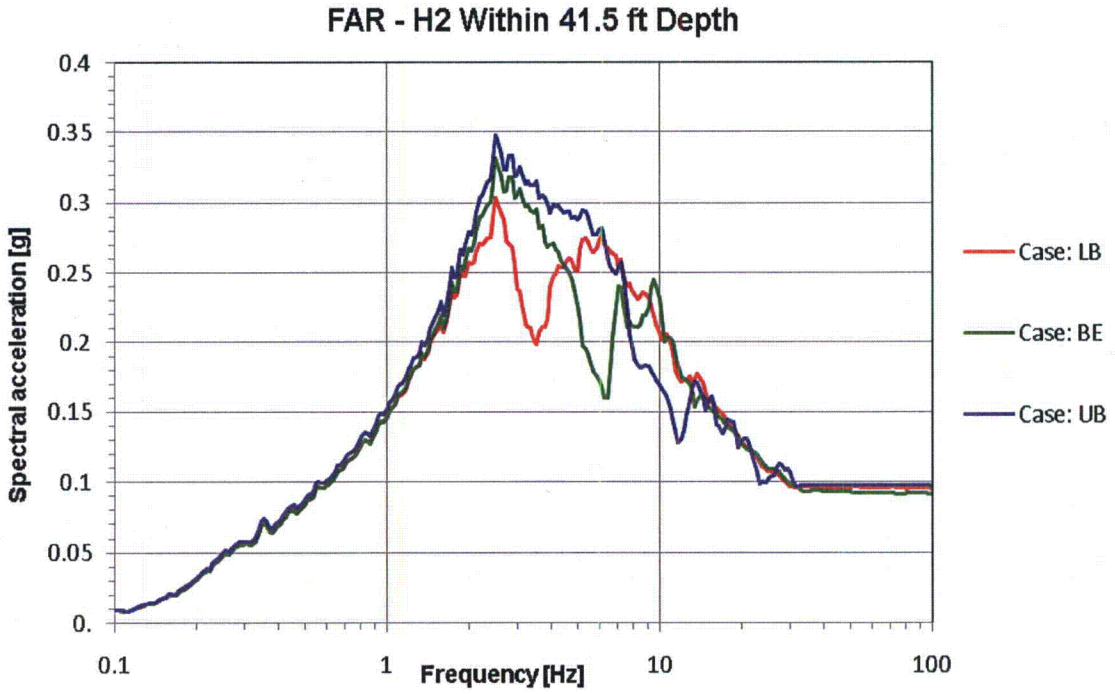


Figure 2.1-7

FAR H2 Horizontal Within ARS at TPNP Foundation El. -16'

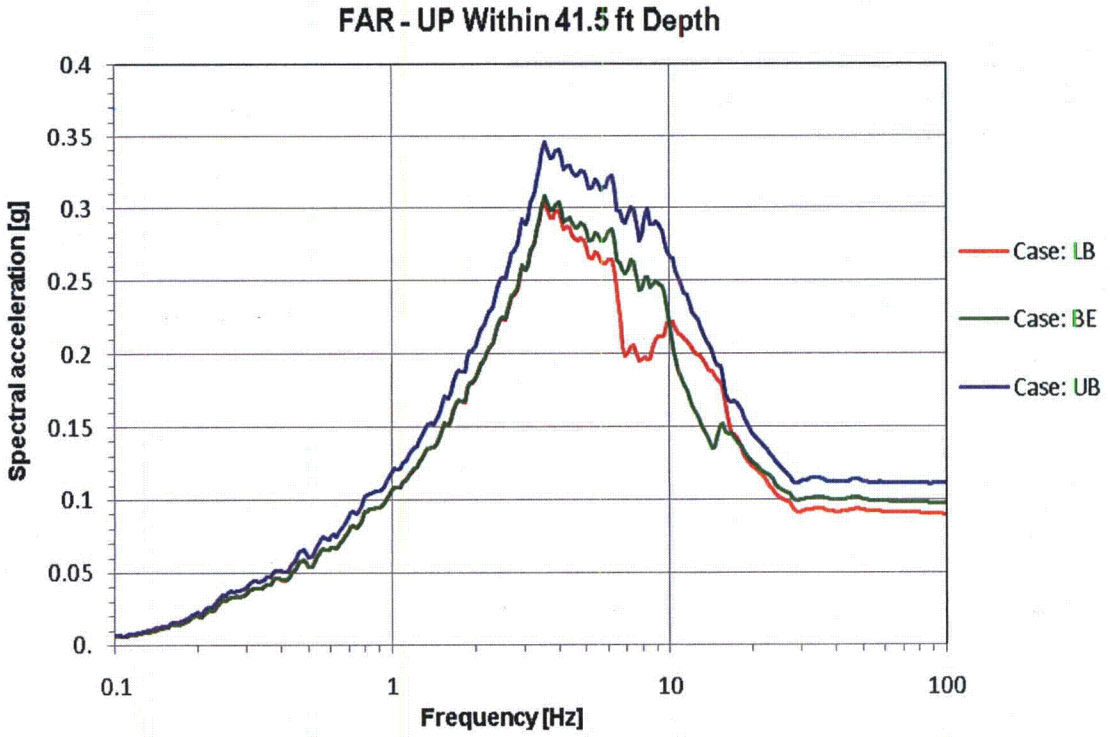


Figure 2.1-8

FAR UP Vertical Within ARS at TPNP Foundation El. -16'

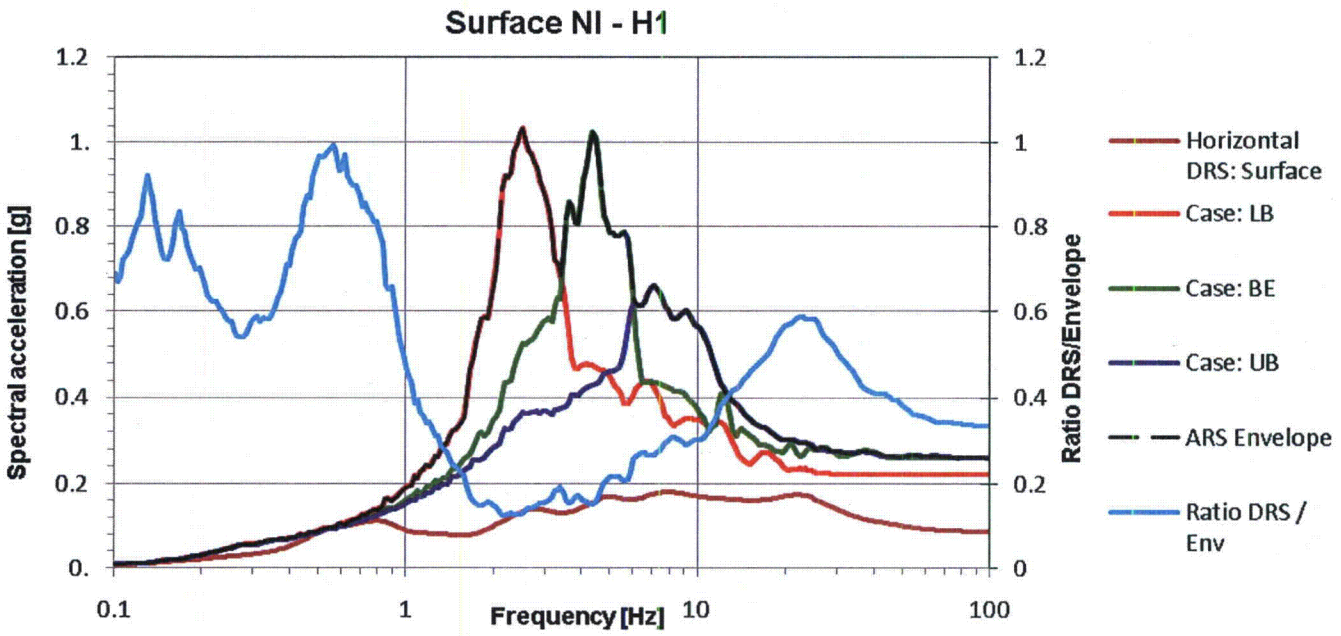


Figure 2.1-9

Comparison of Spectra of Computed H1 Component Surface Motions for NI SSI Profiles with Horizontal DRS

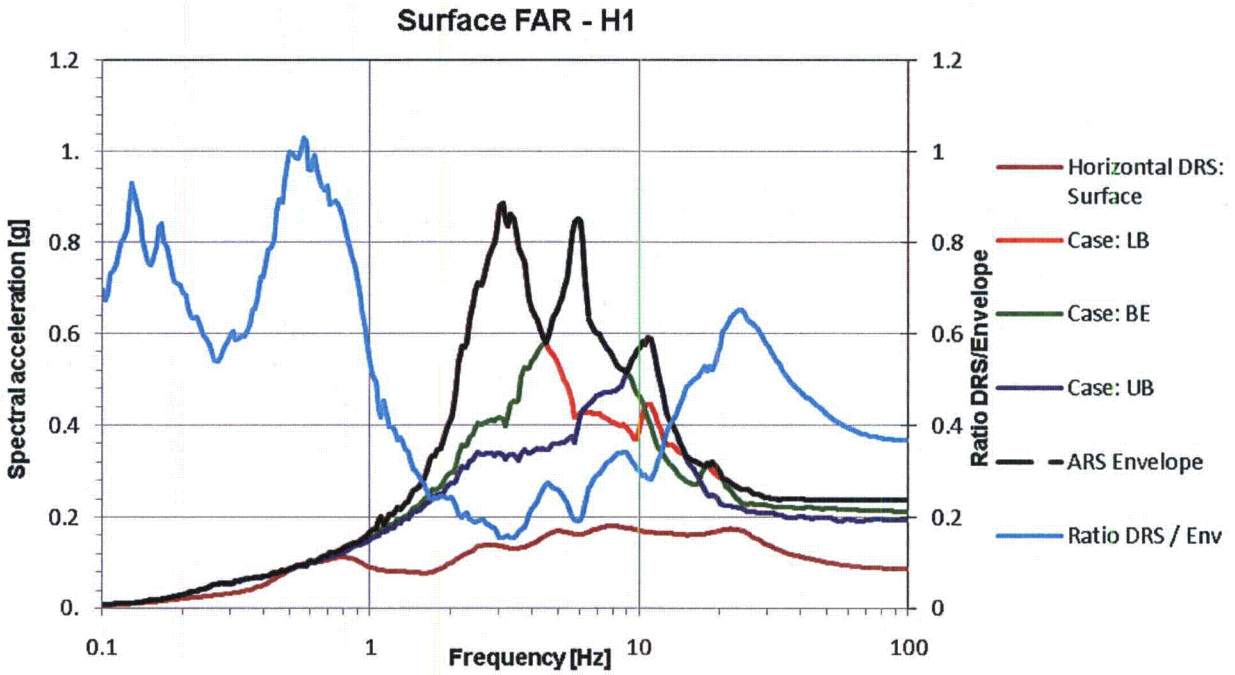


Figure 2.1-10

Comparison of Spectra of Computed H1 Component Surface Motions for FAR SSI Profiles with Horizontal DRS

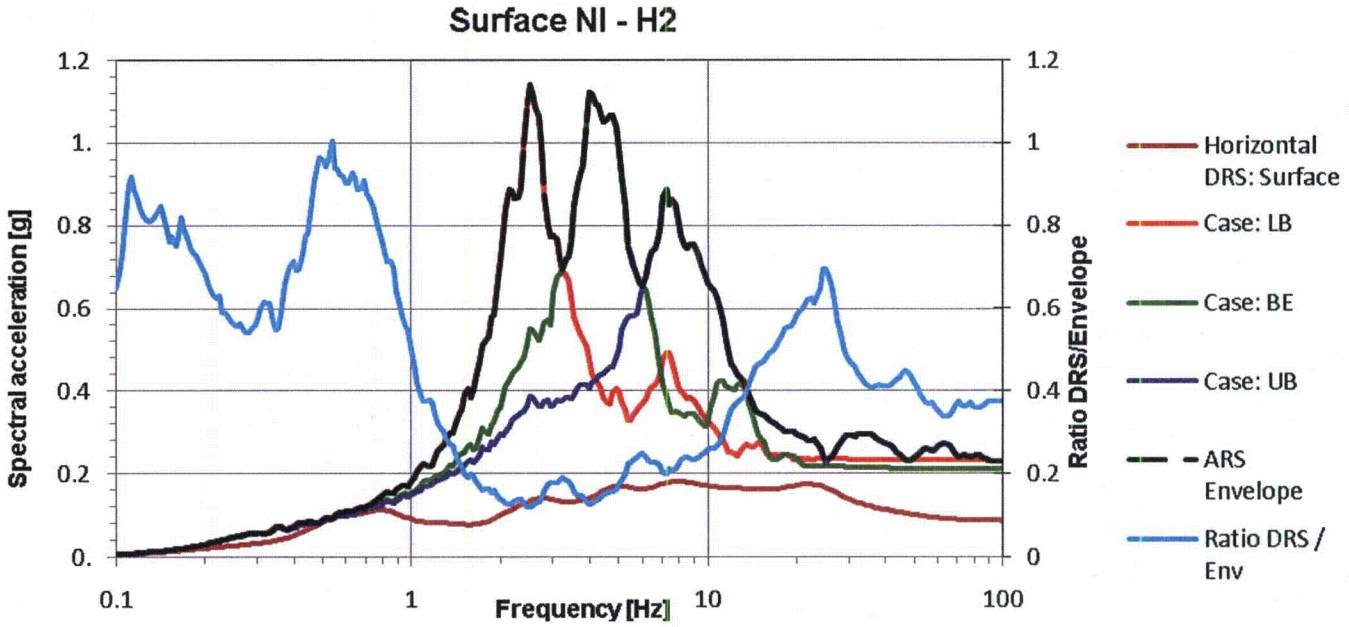


Figure 2.1-11

Comparison of Spectra of Computed H2 Component Surface Motions for NI SSI Profiles with Horizontal DRS

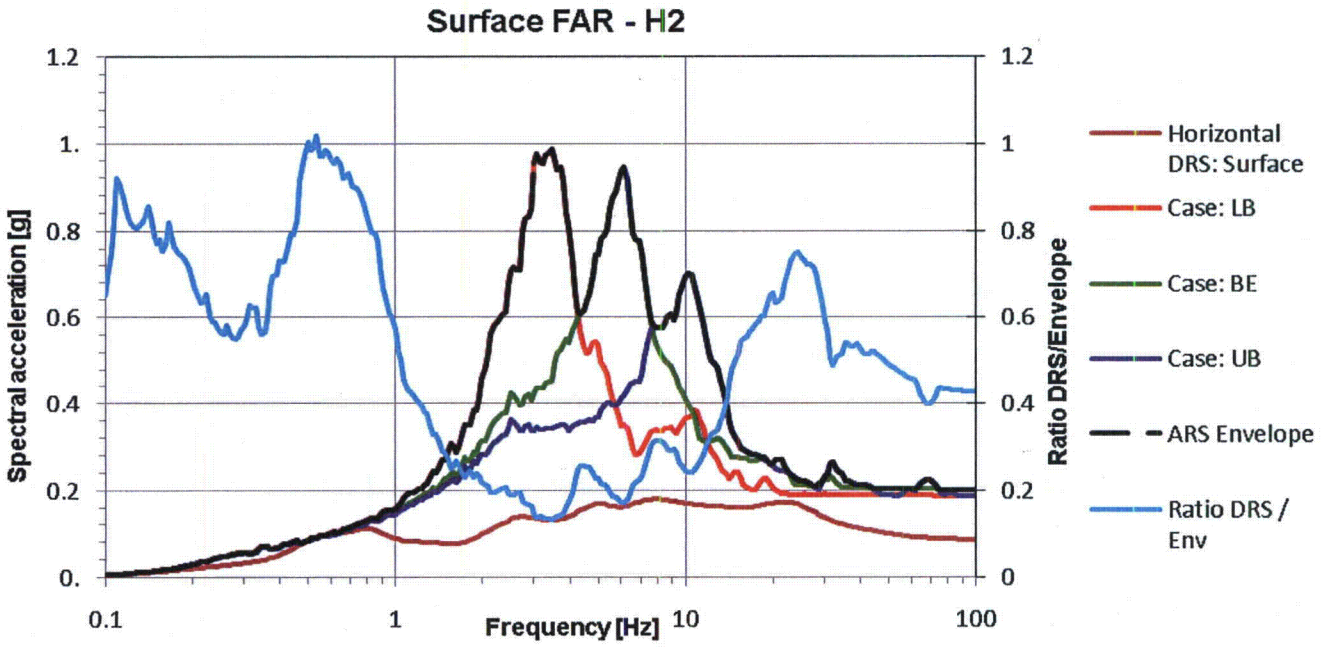


Figure 2.1-12

Comparison of Spectra of Computed H2 Component Surface Motions for FAR SSI Profiles with Horizontal DRS

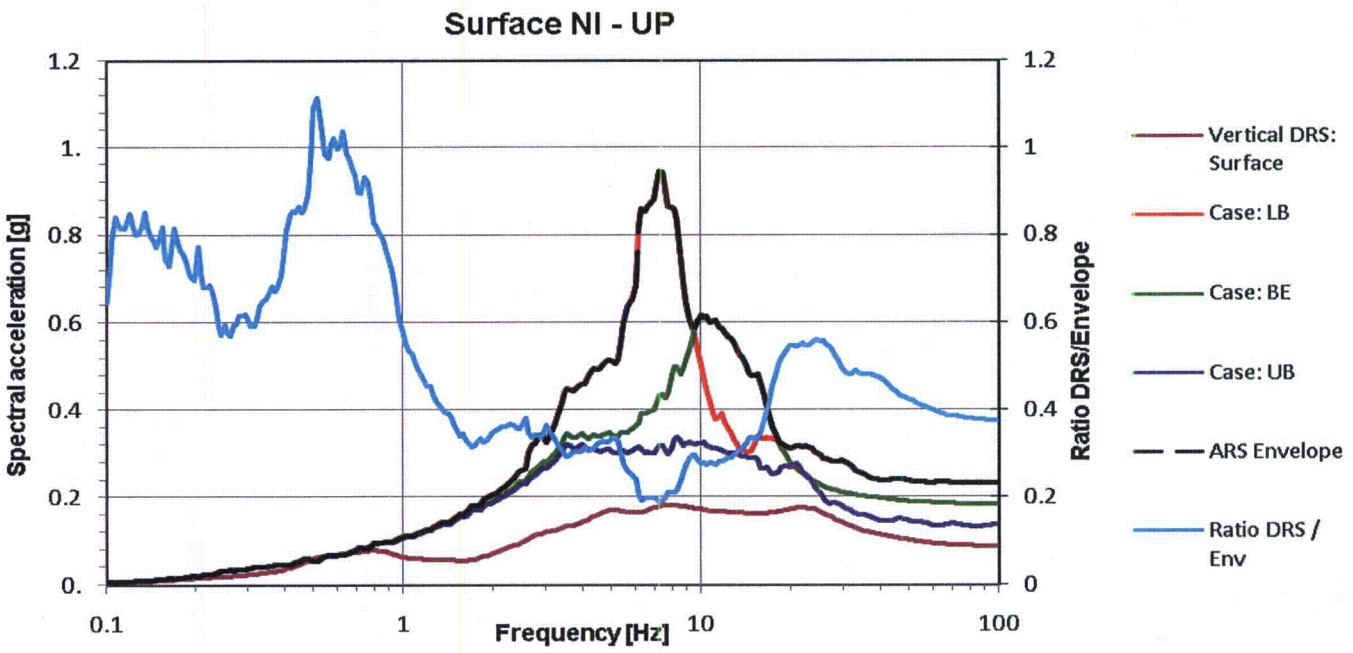


Figure 2.1-13

Comparison of Spectra of Computed V Component Surface Motions for NI SSI Profiles with Vertical DRS

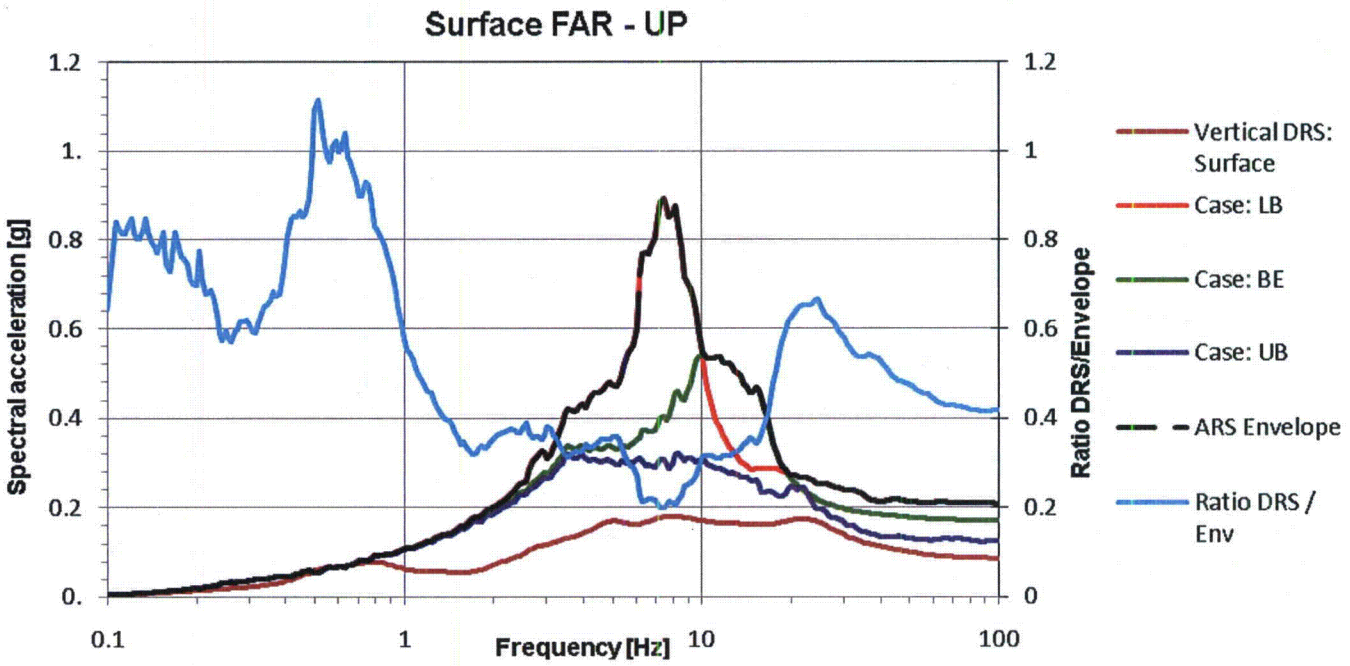


Figure 2.1-14

Comparison of Spectra of Computed V Component Surface Motions for FAR SSI Profiles with Vertical DRS

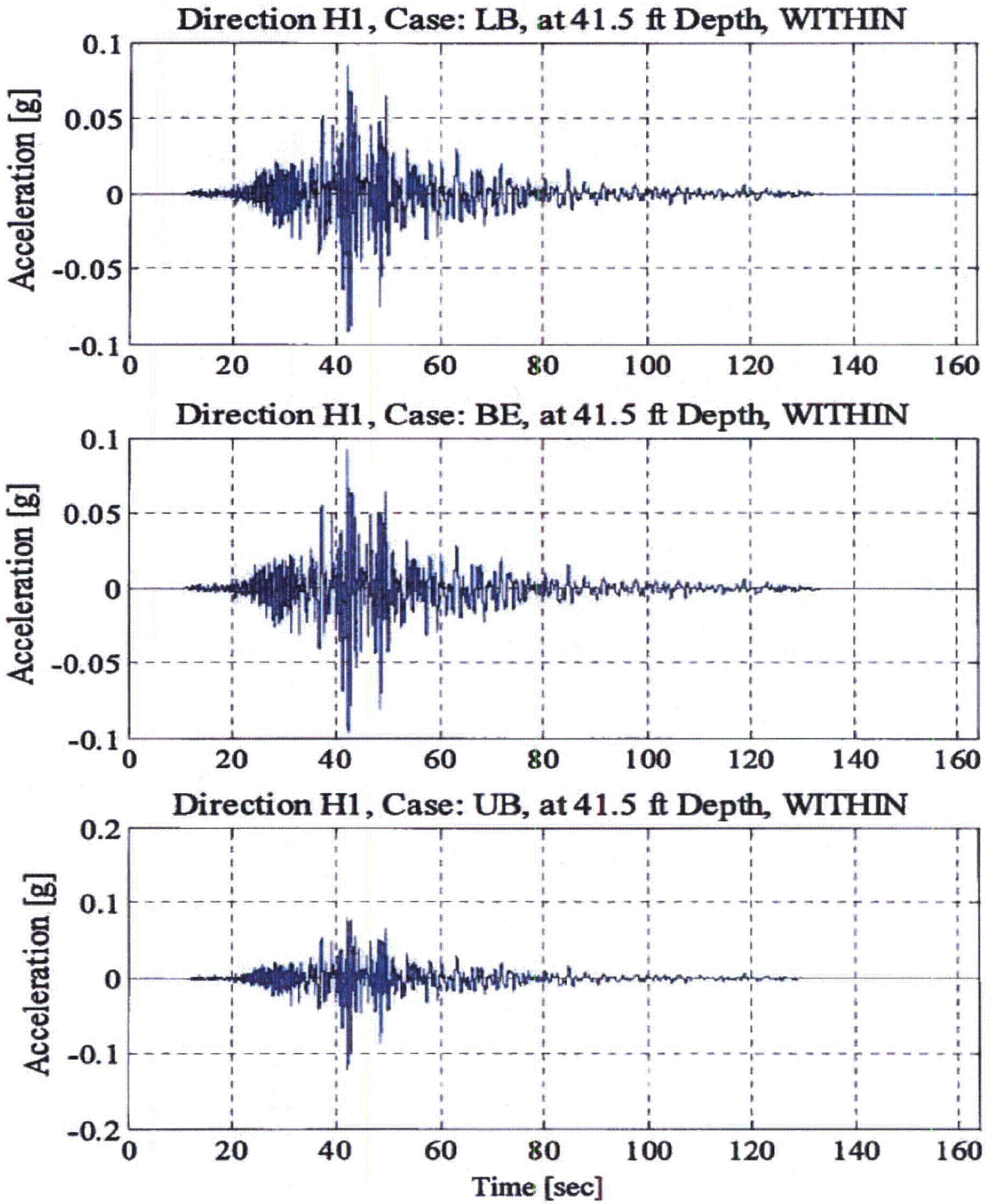


Figure 3.5-1

TPNP NI BE, LB and UB Seismic Input in H1 (X-Direction) – El. -16'

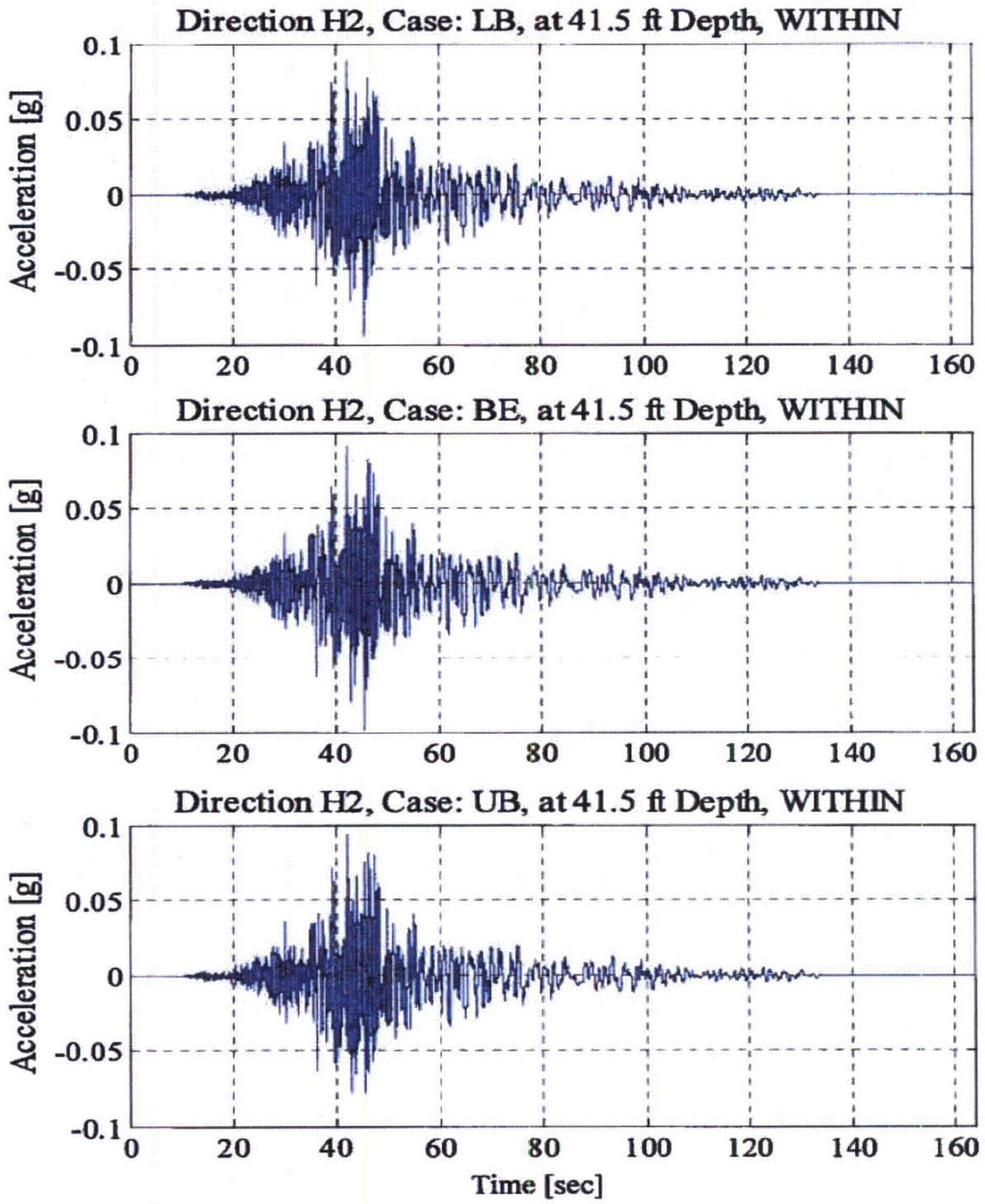


Figure 3.5-2

TPNP NI BE, LB and UB Seismic Input in H2 (Y-Direction) – El. -16'

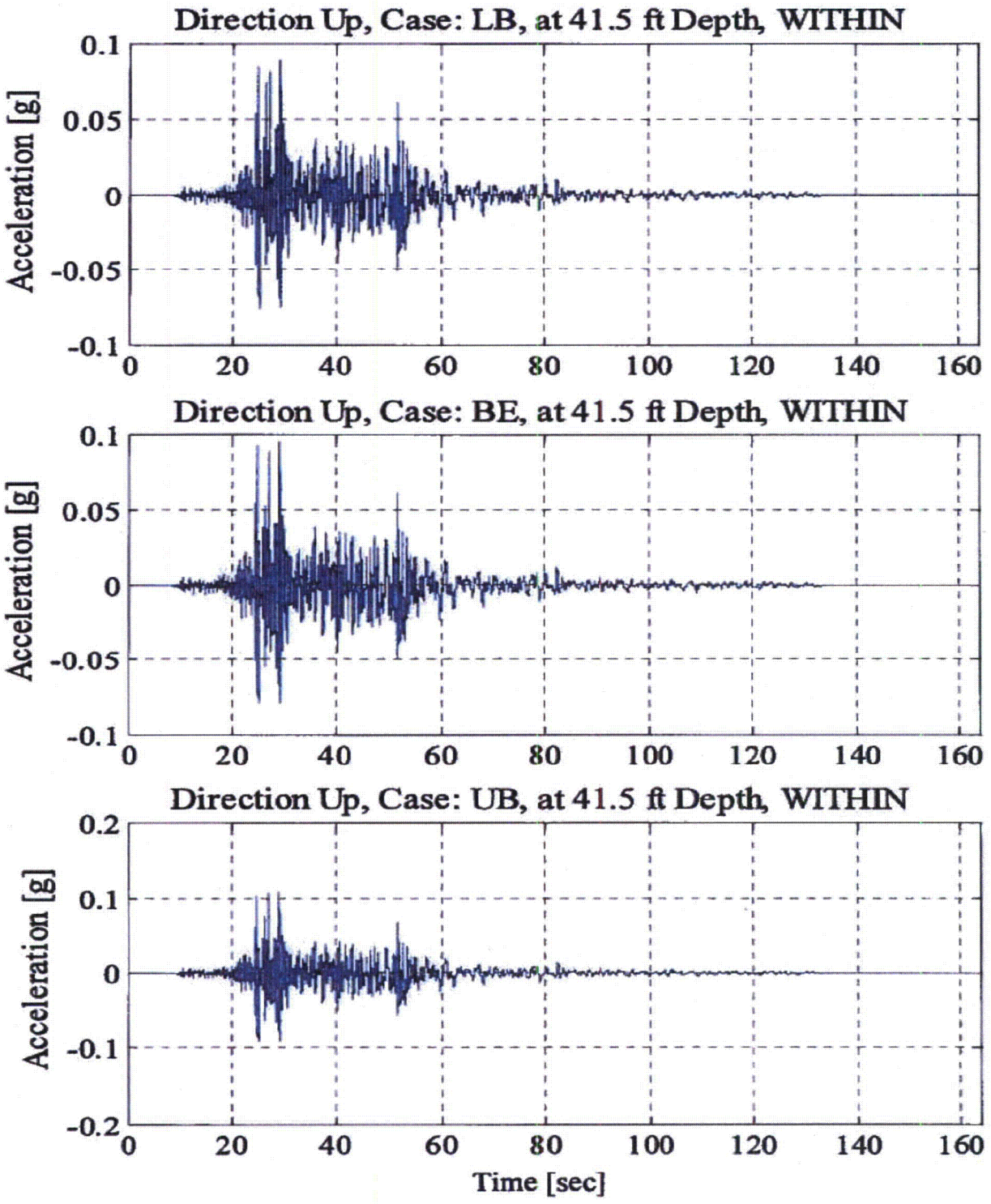


Figure 3.5-3

TPNP NI BE, LB and UB Seismic Input in UP (Z-Direction) – El. -16'

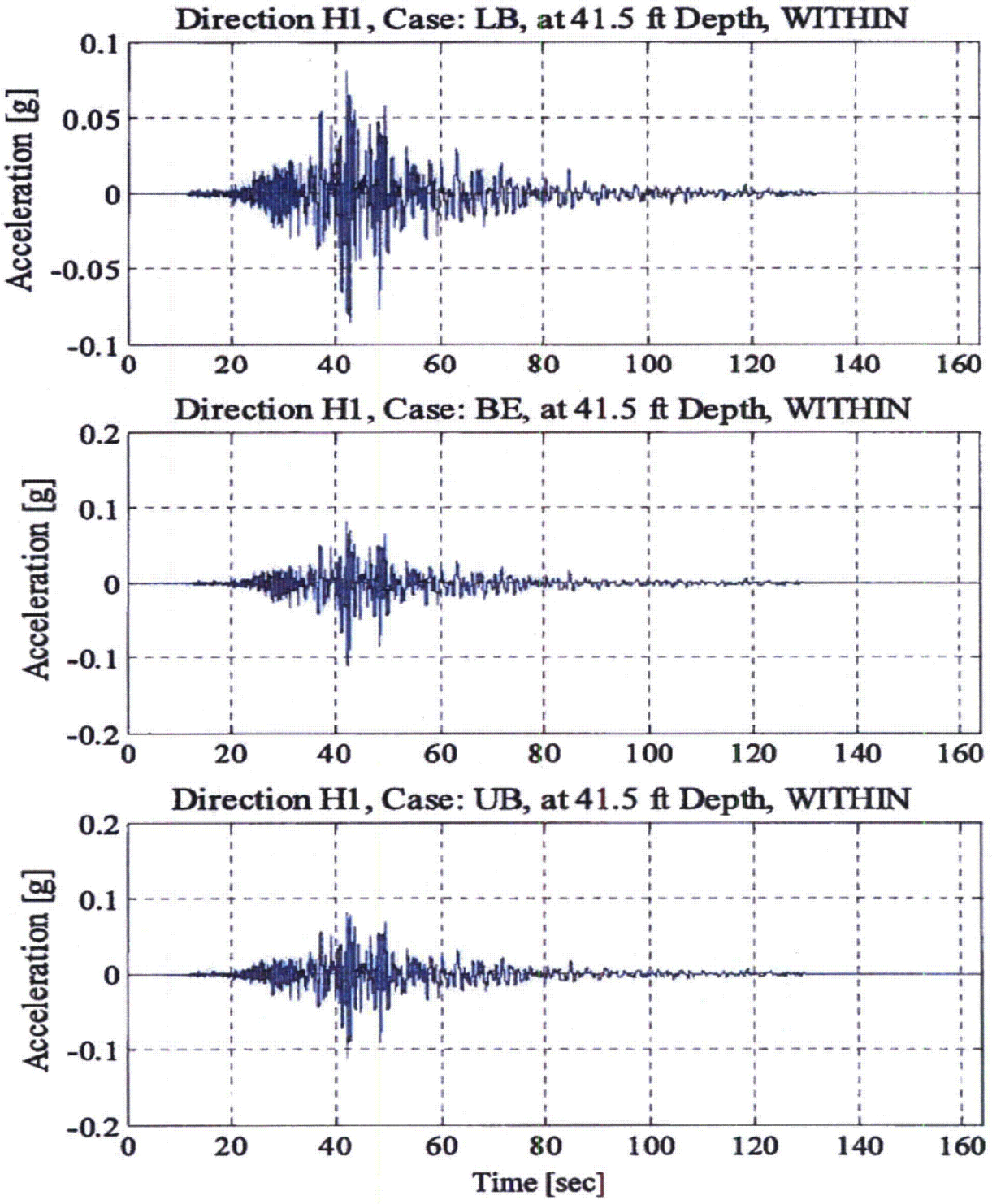


Figure 3.5-4

TPNP FAR BE, LB and UB Seismic Input in H1 (X-Direction) – El. -16'

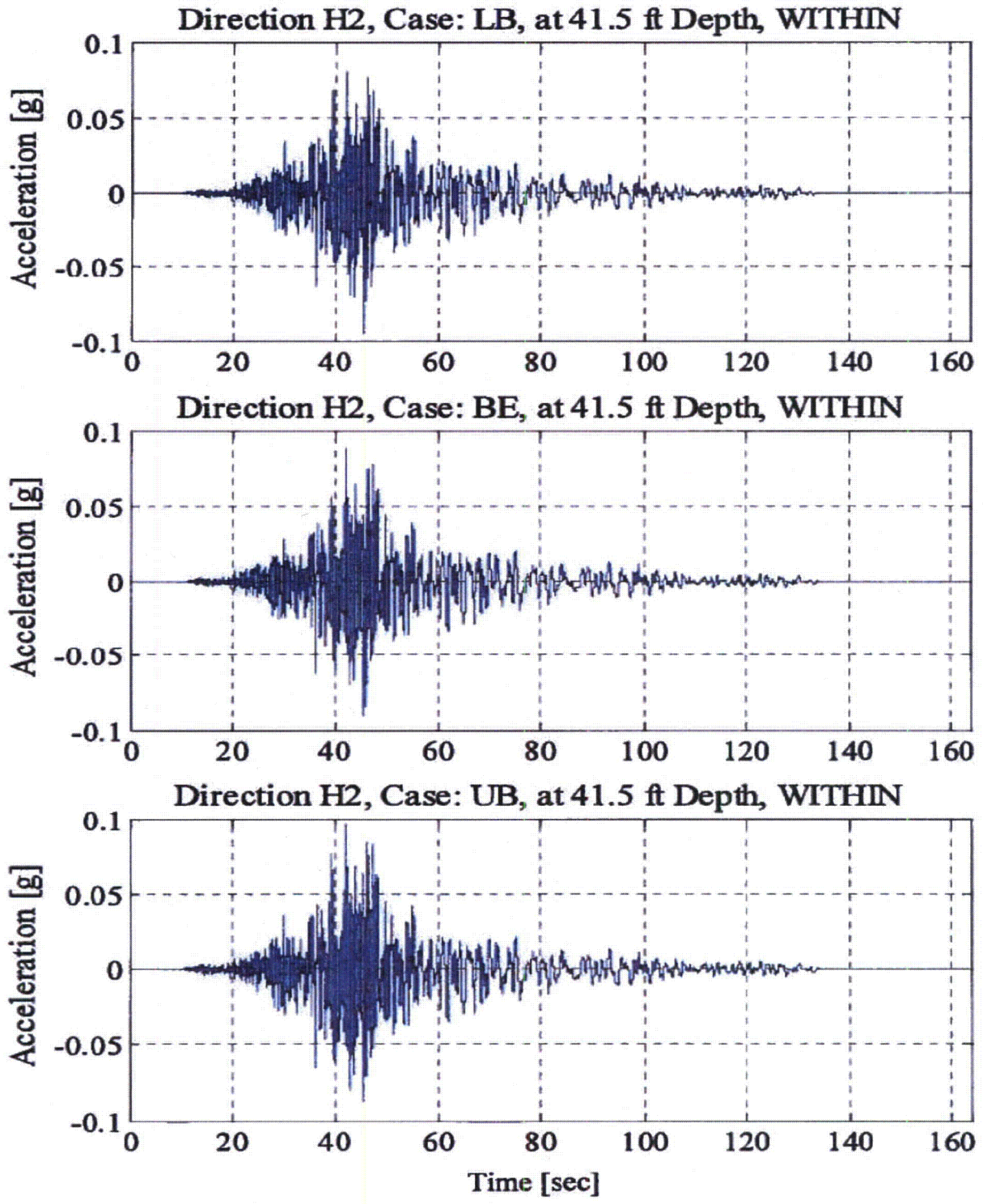


Figure 3.5-5

TPNP FAR BE, LB and UB Seismic Input in H2 (Y-Direction) – El. -16'

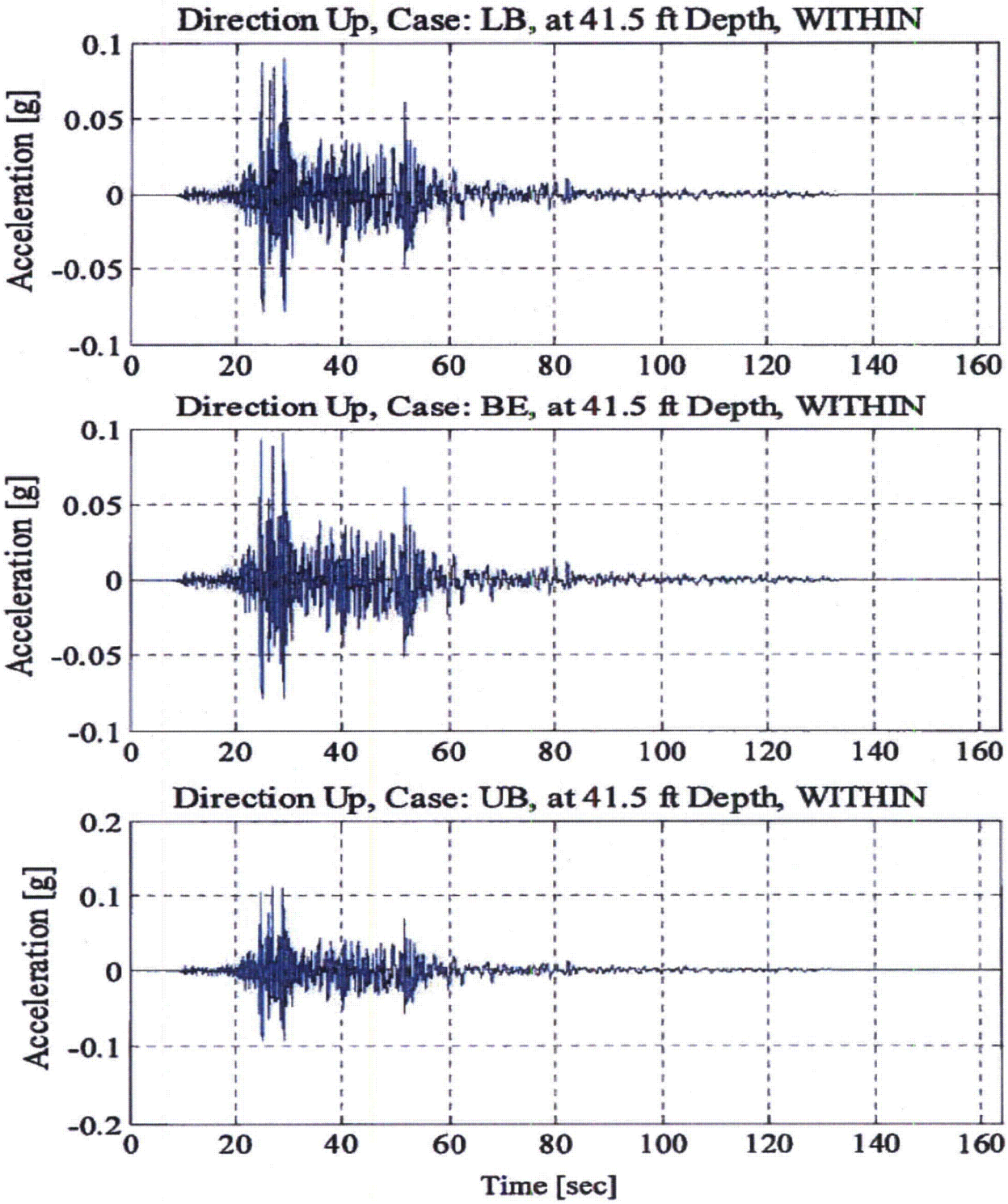


Figure 3.5-6

TPNP FAR BE, LB and UB Seismic Input in UP (Z-Direction) – El. -16'

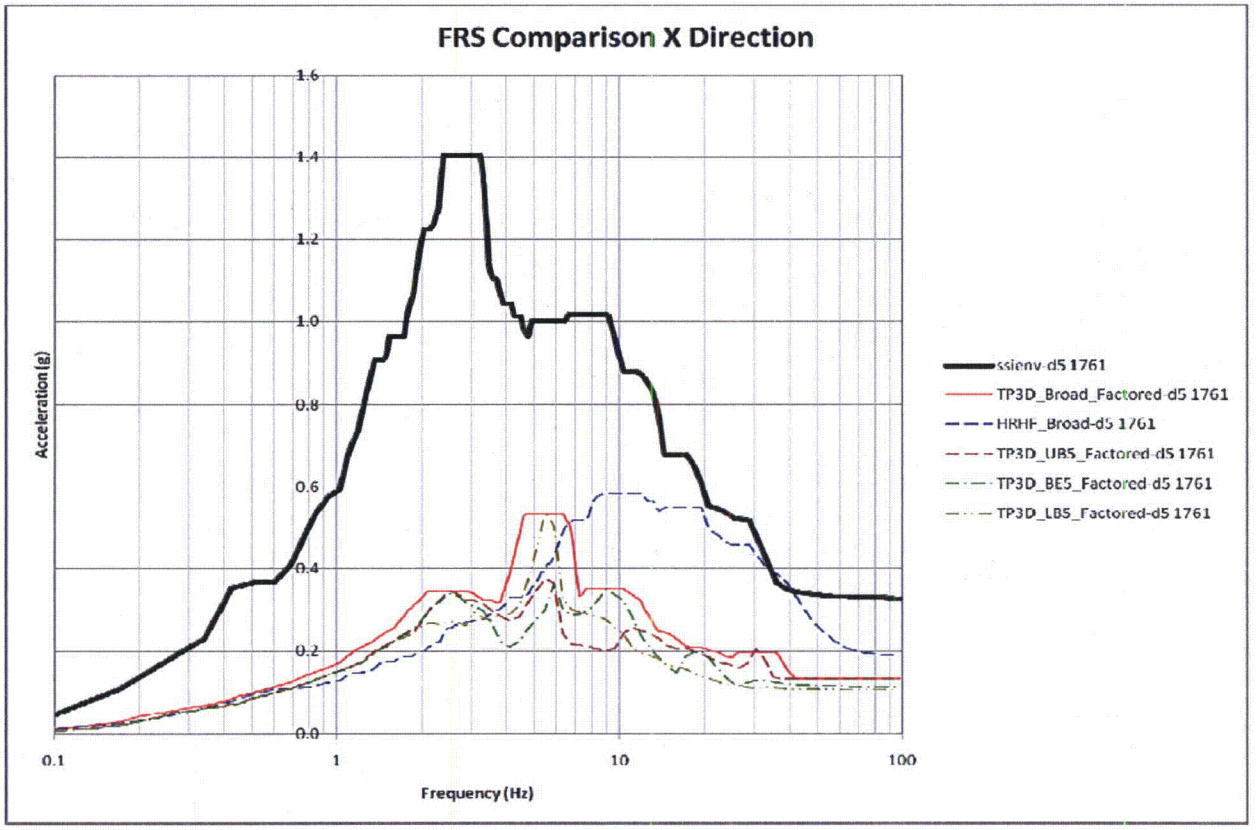


Figure 6.2-1

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in X-Direction – Node 1761

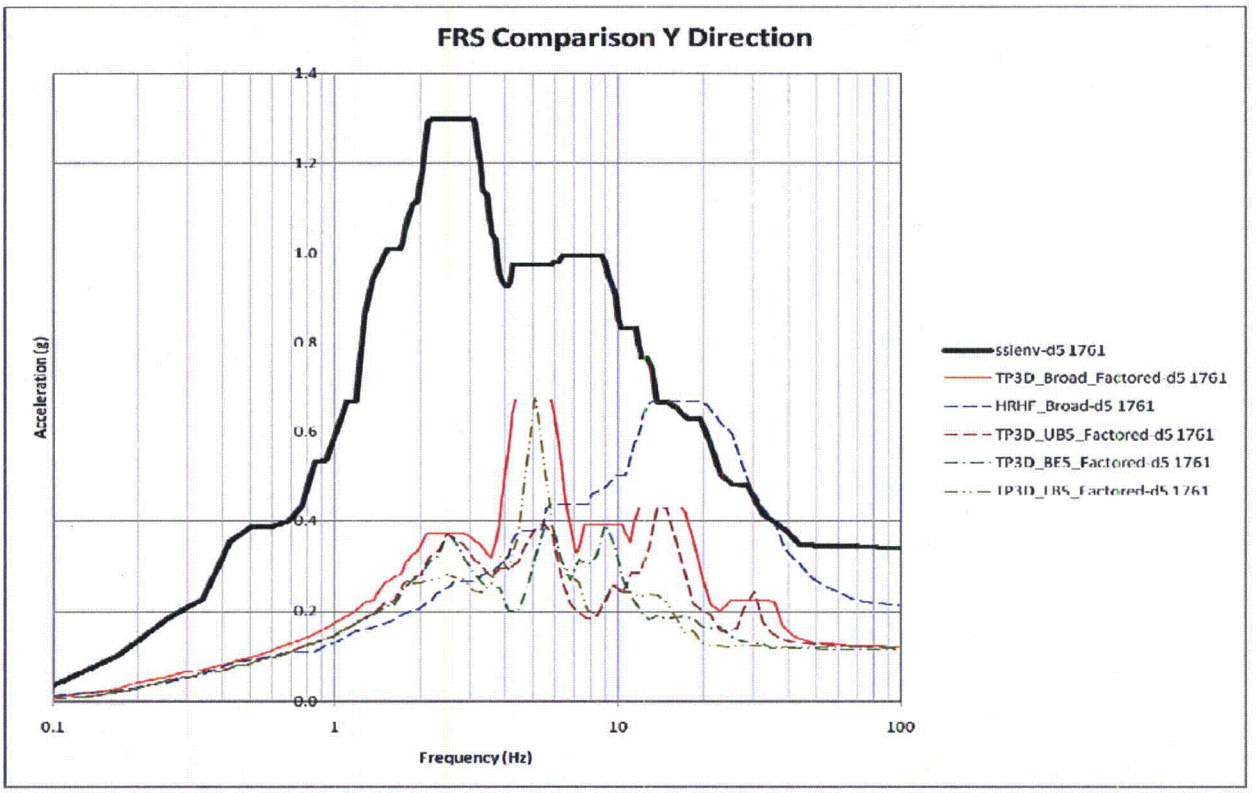


Figure 6.2-2

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Y-Direction – Node 1761

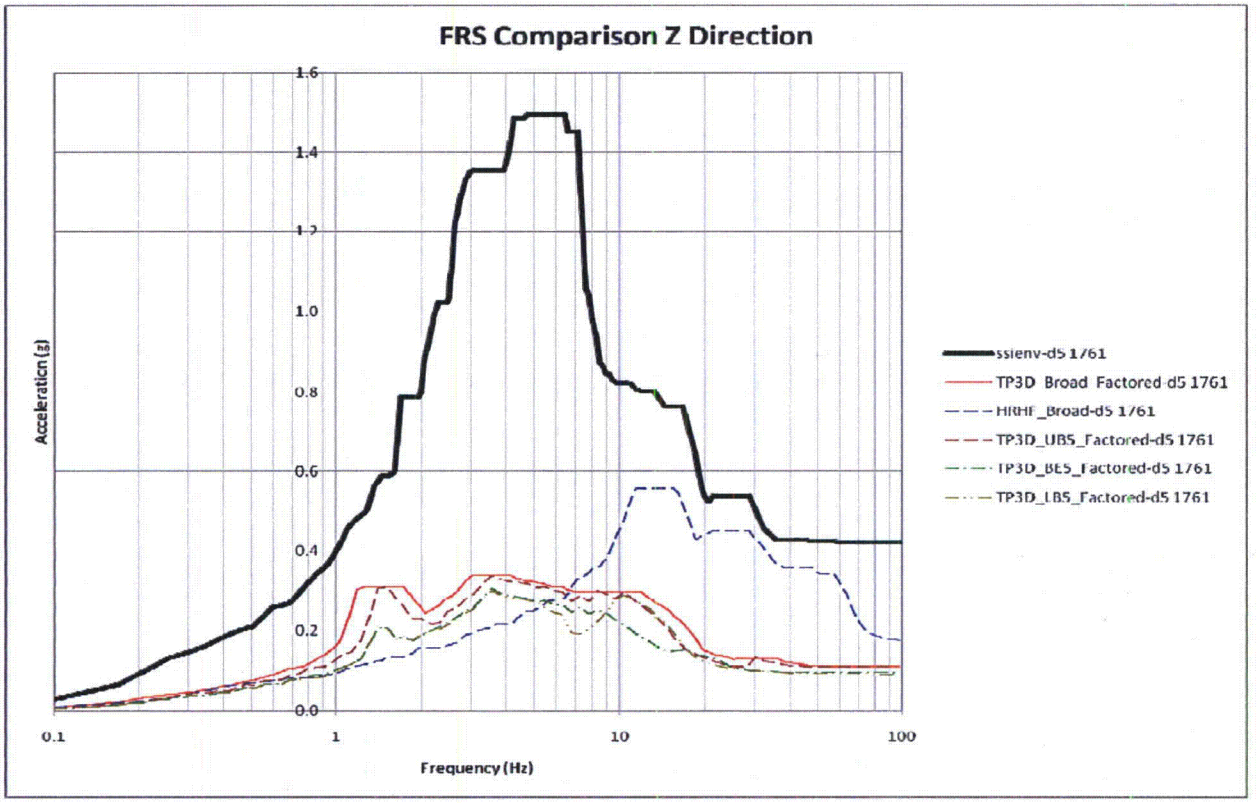


Figure 6.2-3

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Z-Direction – Node 1761

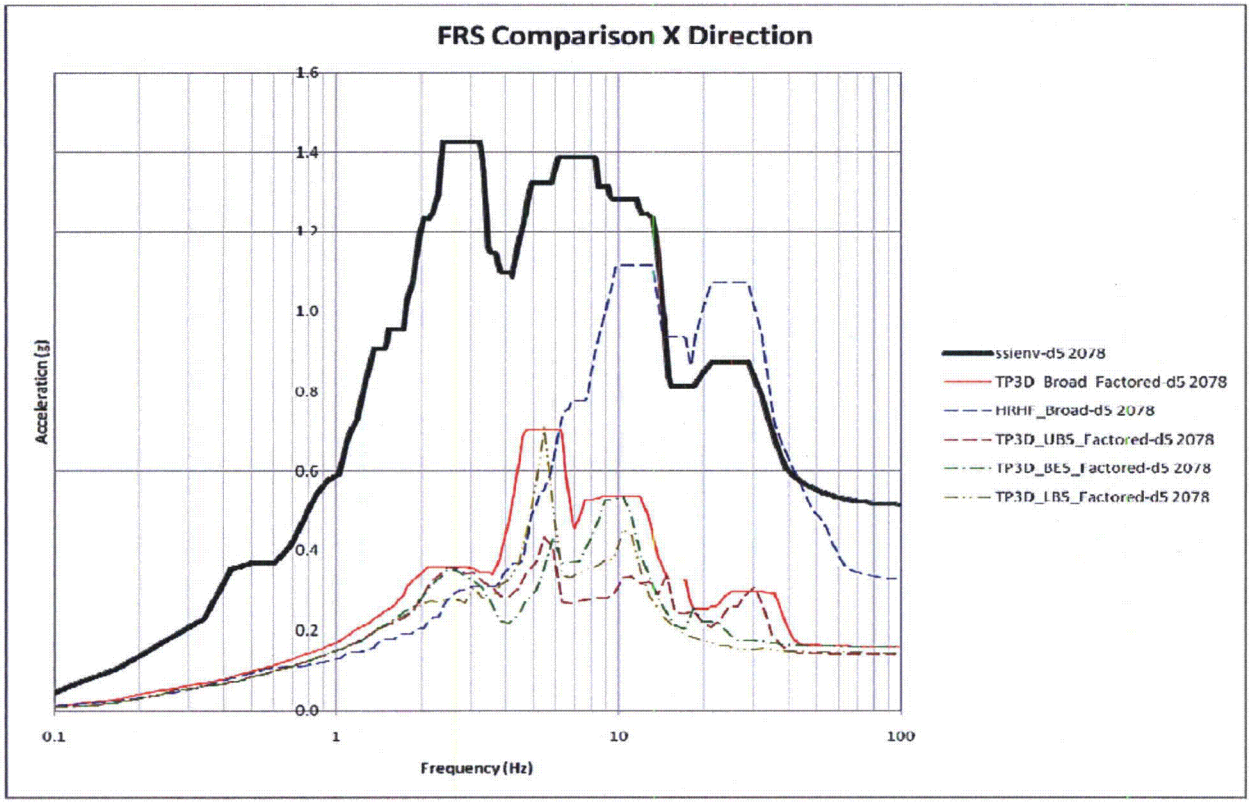


Figure 6.2-4

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in X-Direction – Node 2078

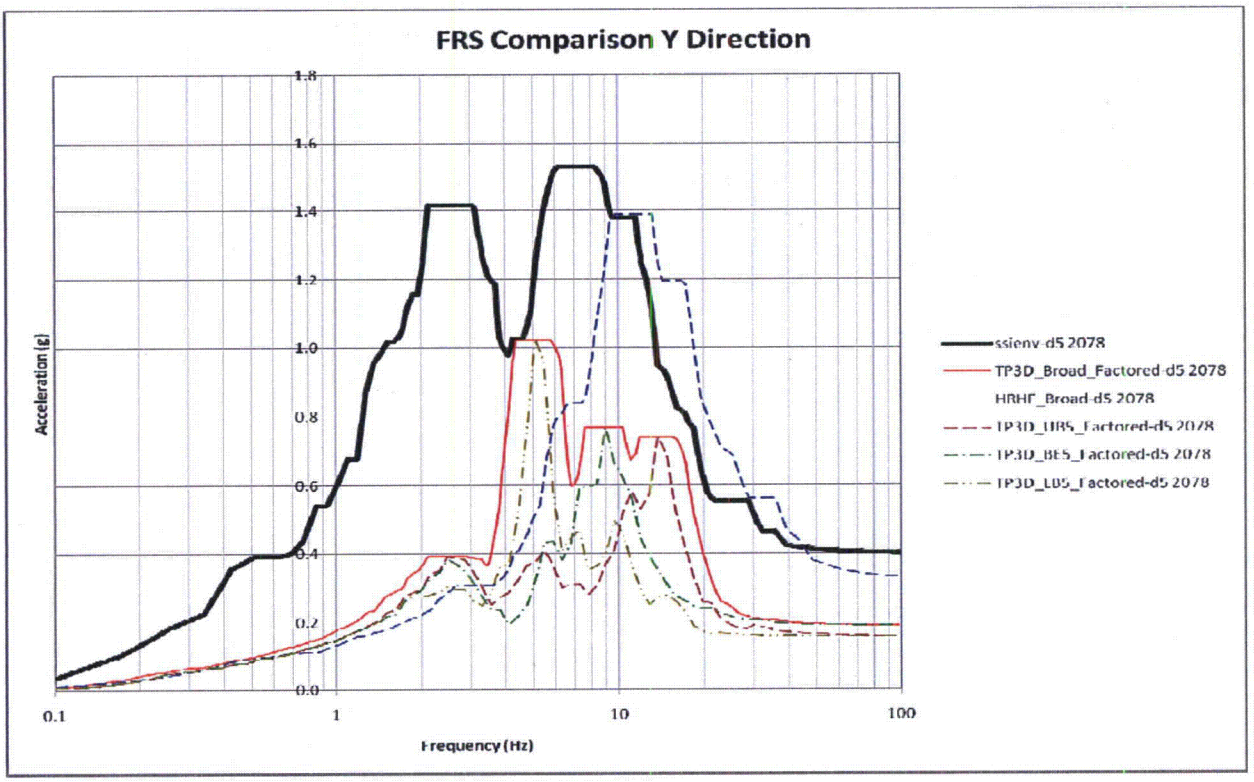


Figure 6.2-5

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Y-Direction – Node 2078

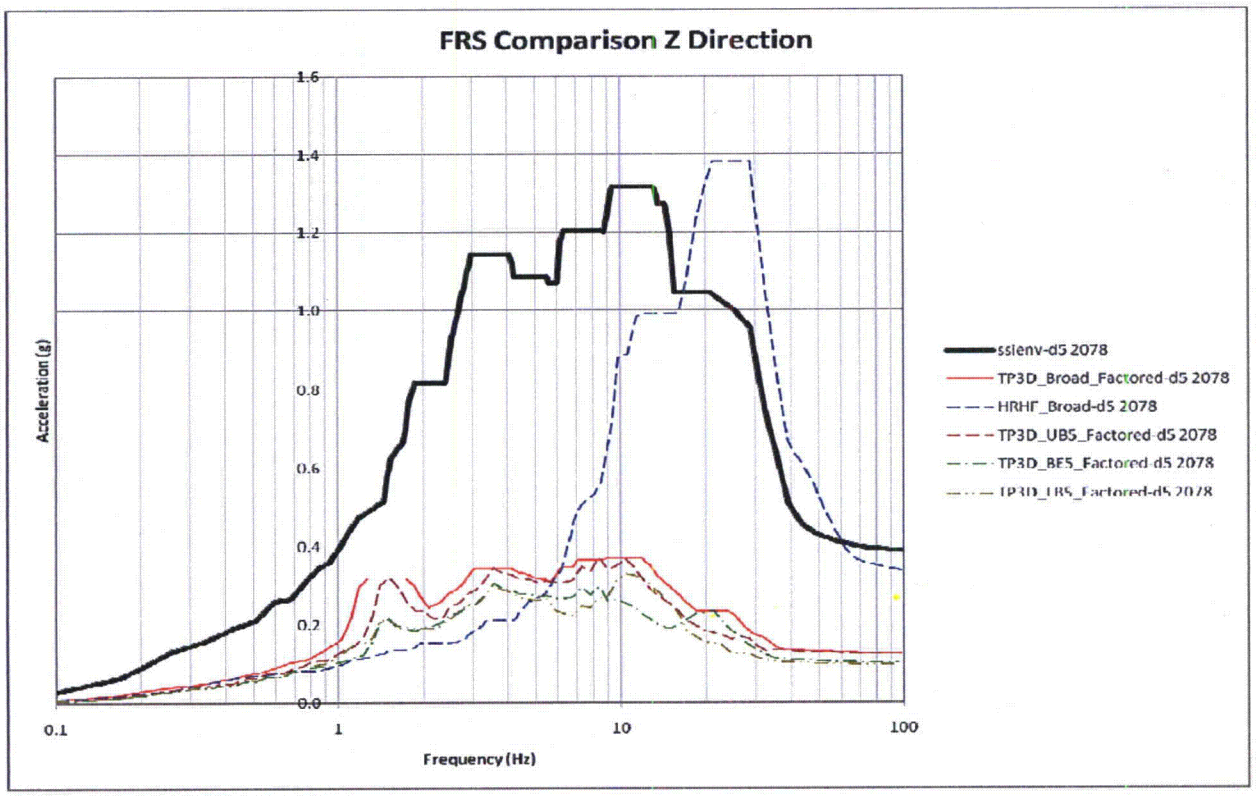


Figure 6.2-6

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Z-Direction – Node 2078

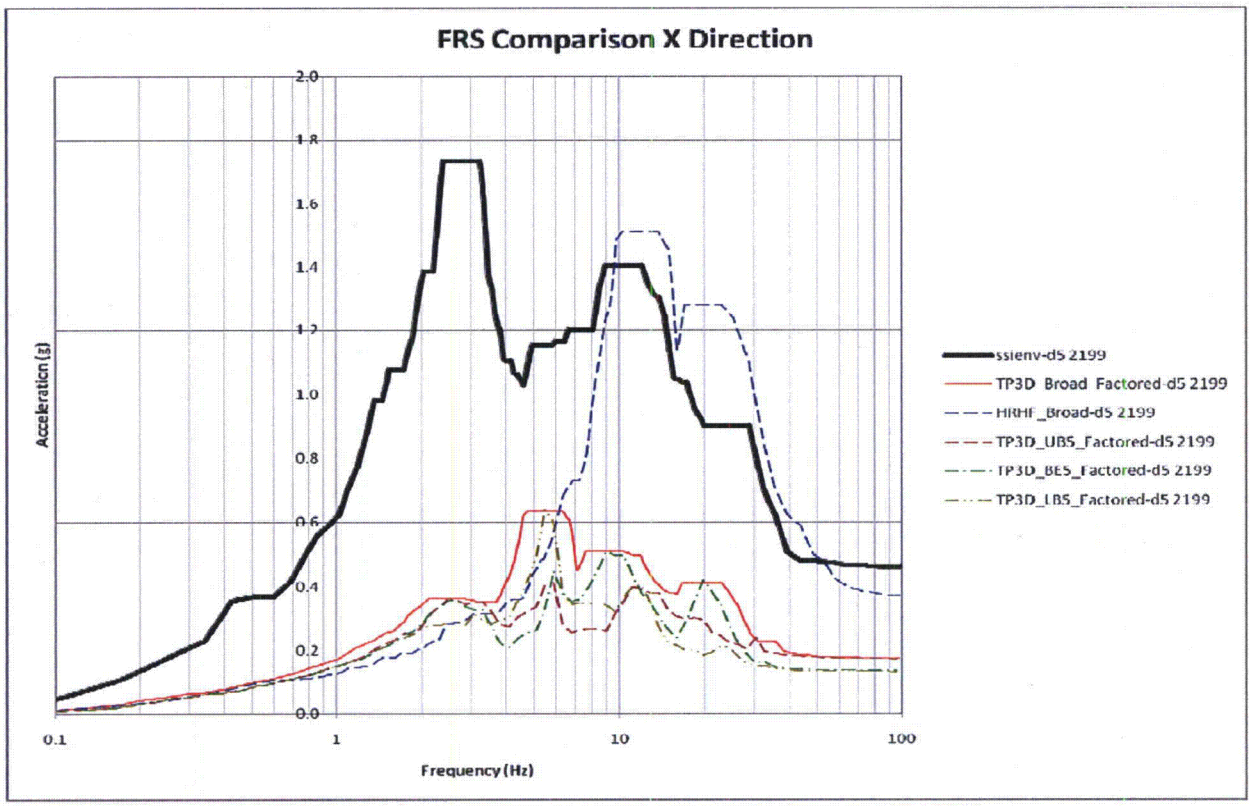


Figure 6.2-7

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in X-Direction – Node 2199

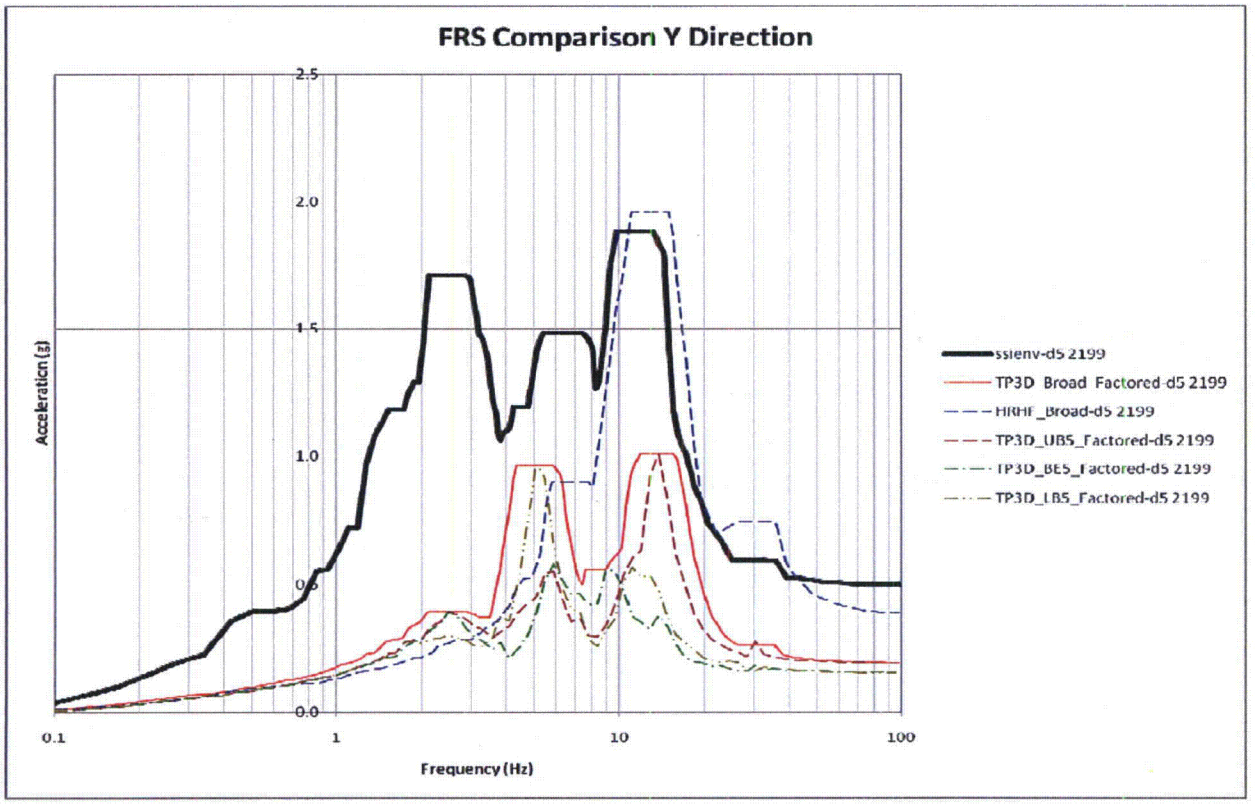


Figure 6.2-8

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Y-Direction – Node 2199

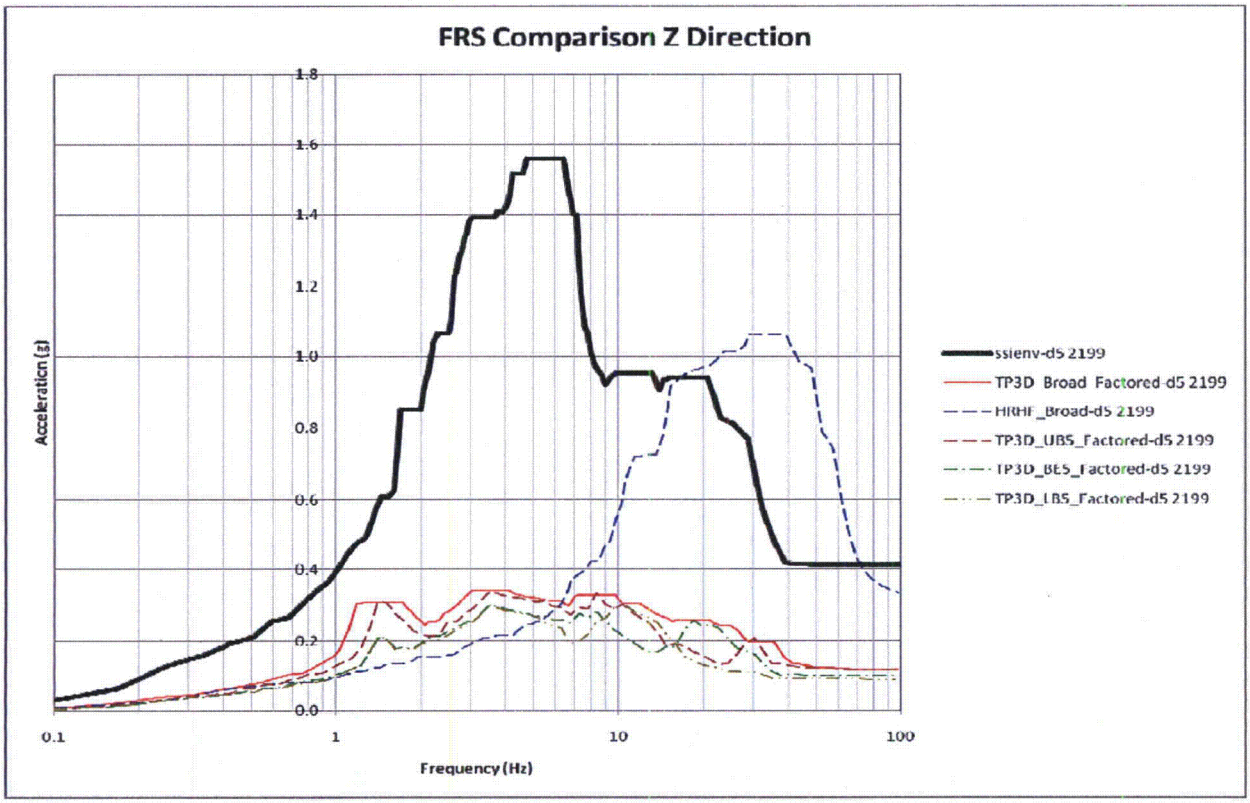


Figure 6.2-9

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Z-Direction – Node 2199

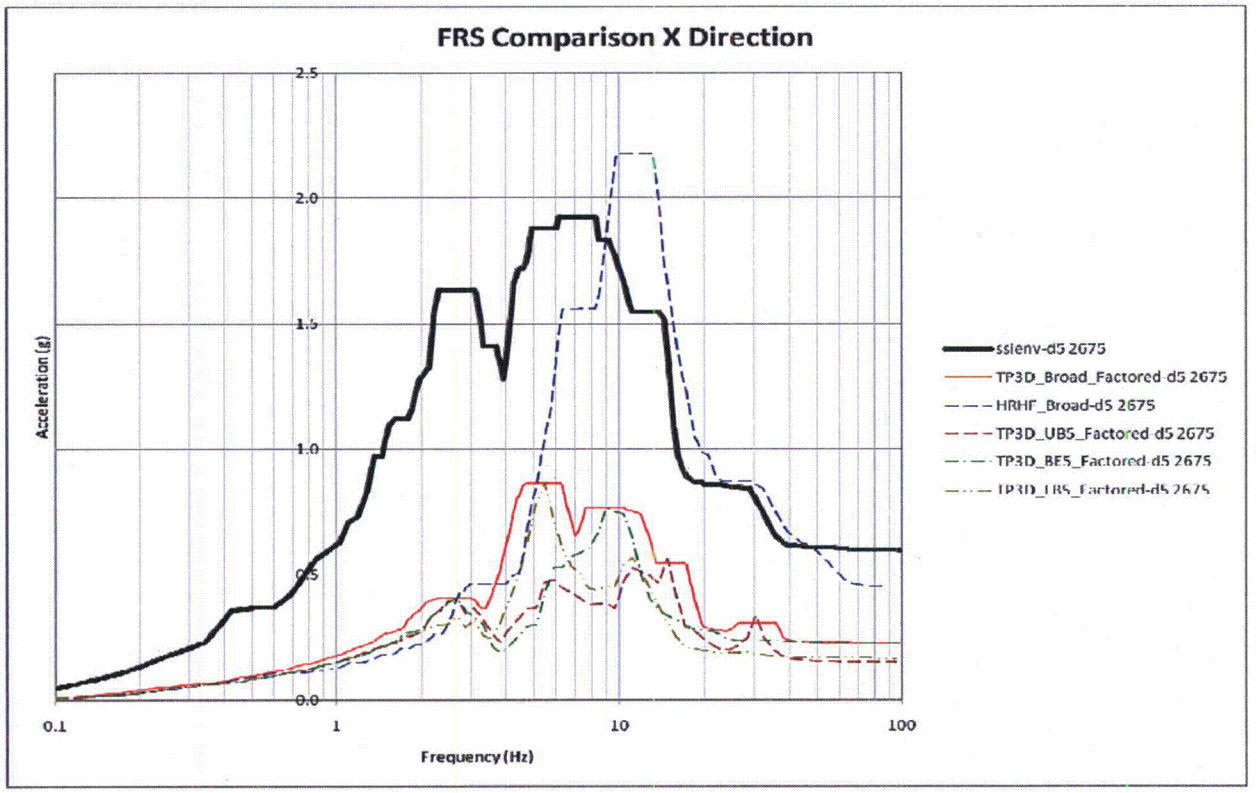


Figure 6.2-10

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in X-Direction – Node 2675

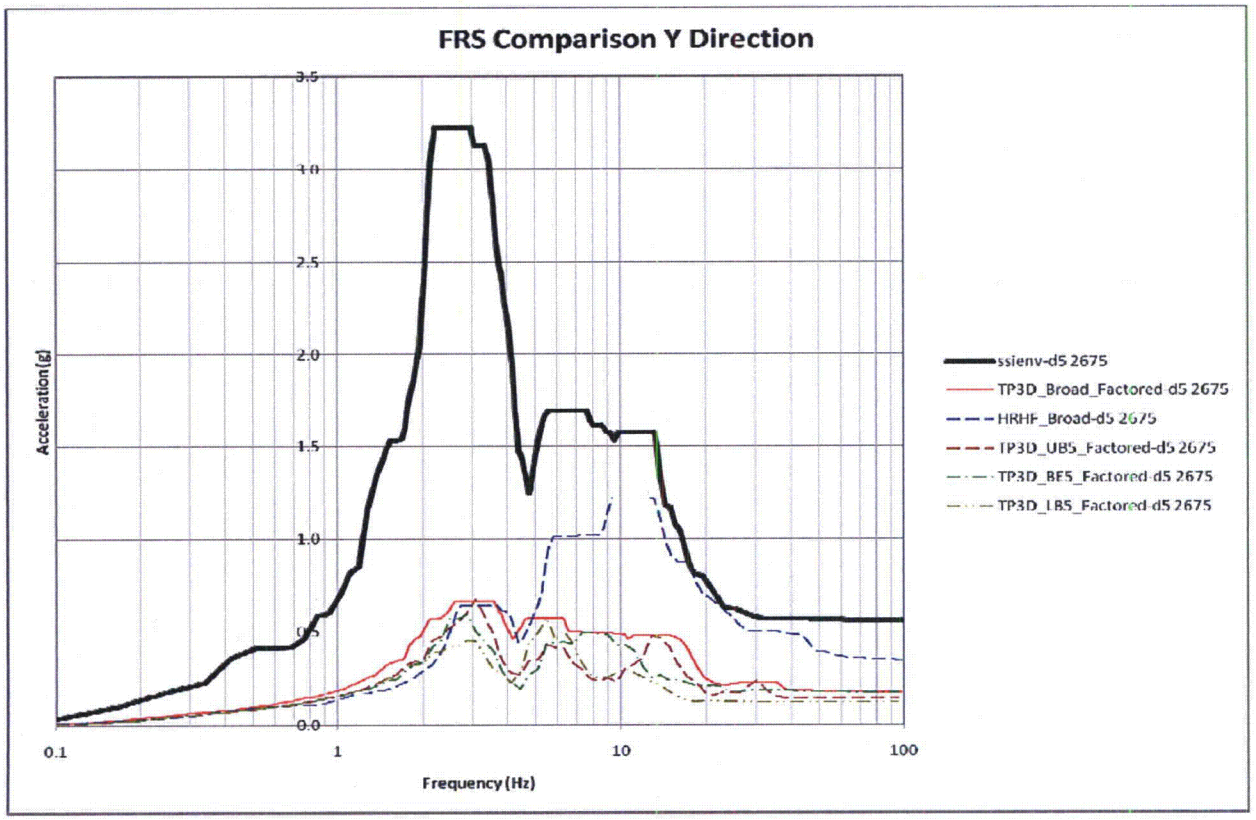


Figure 6.2-11

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Y-Direction – Node 2675

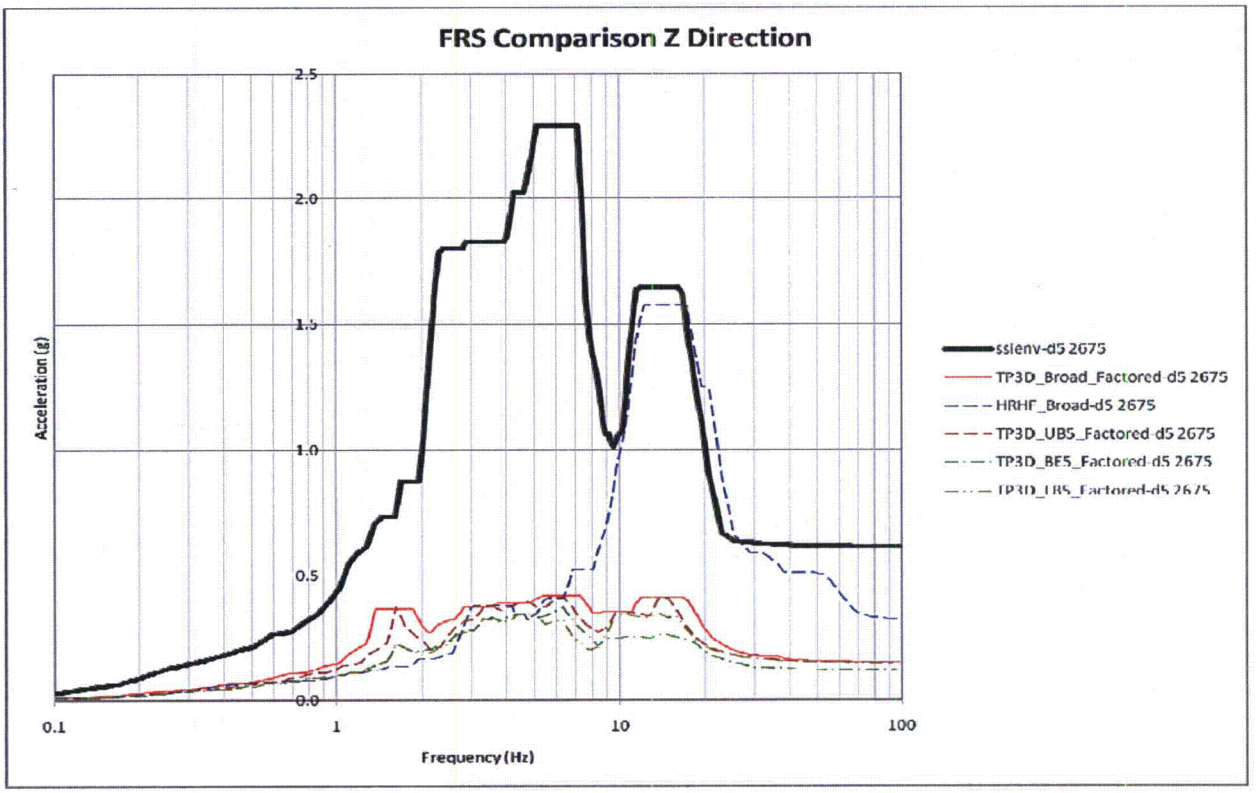


Figure 6.2-12

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Z-Direction – Node 2675

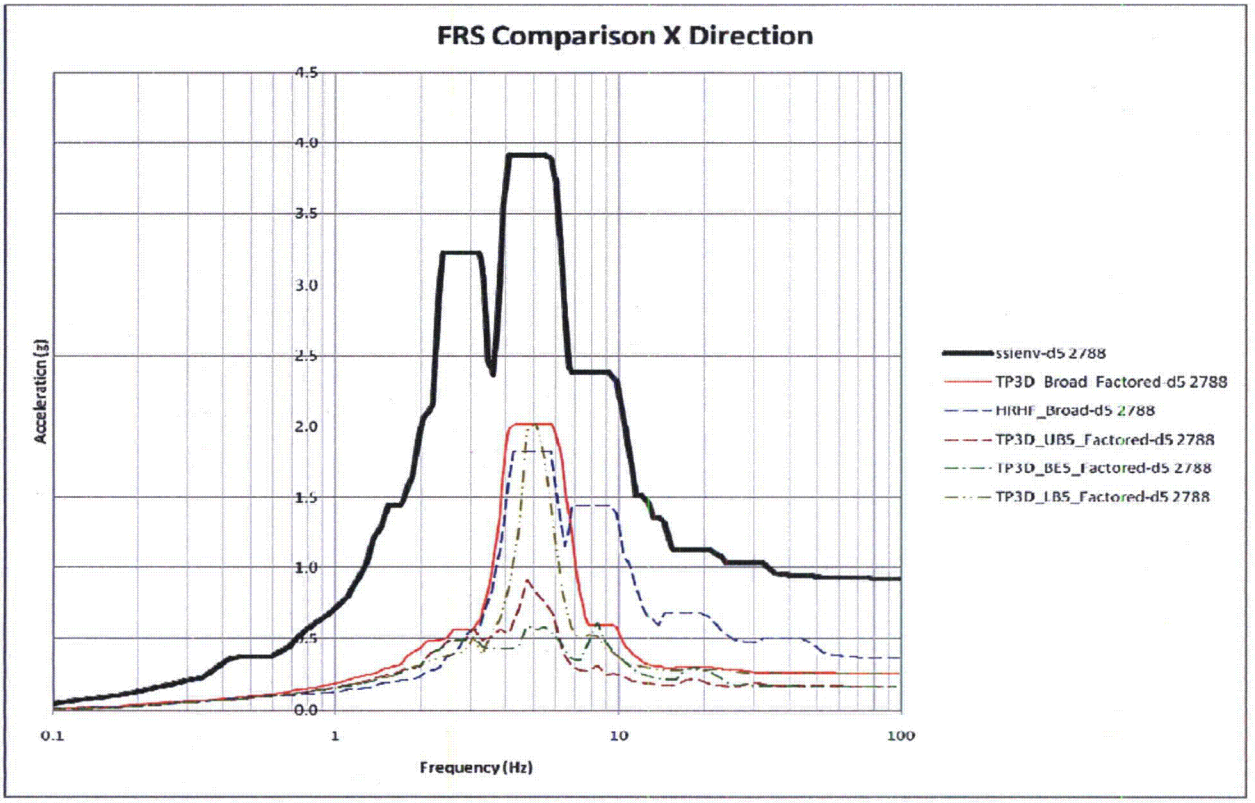


Figure 6.2-13

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in X-Direction – Node 2788

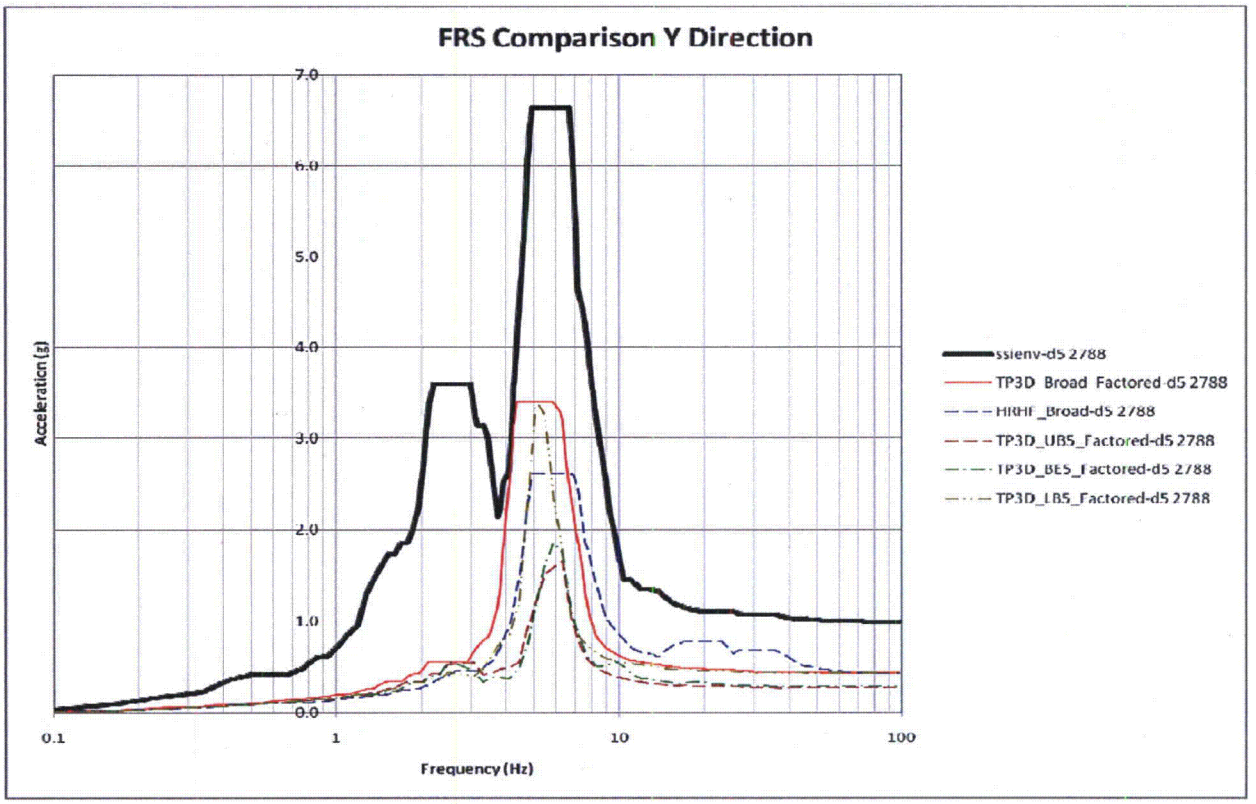


Figure 6.2-14

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Y-Direction – Node 2788

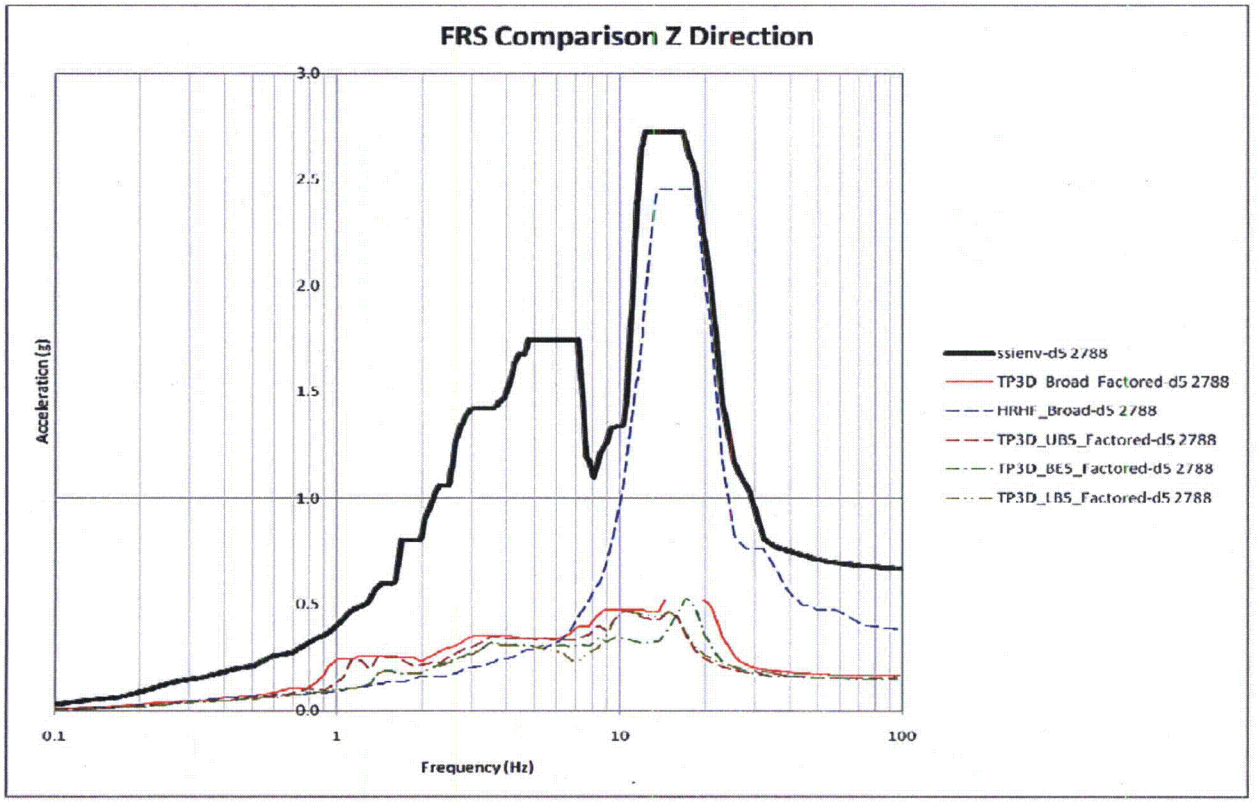


Figure 6.2-15

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Z-Direction – Node 2788

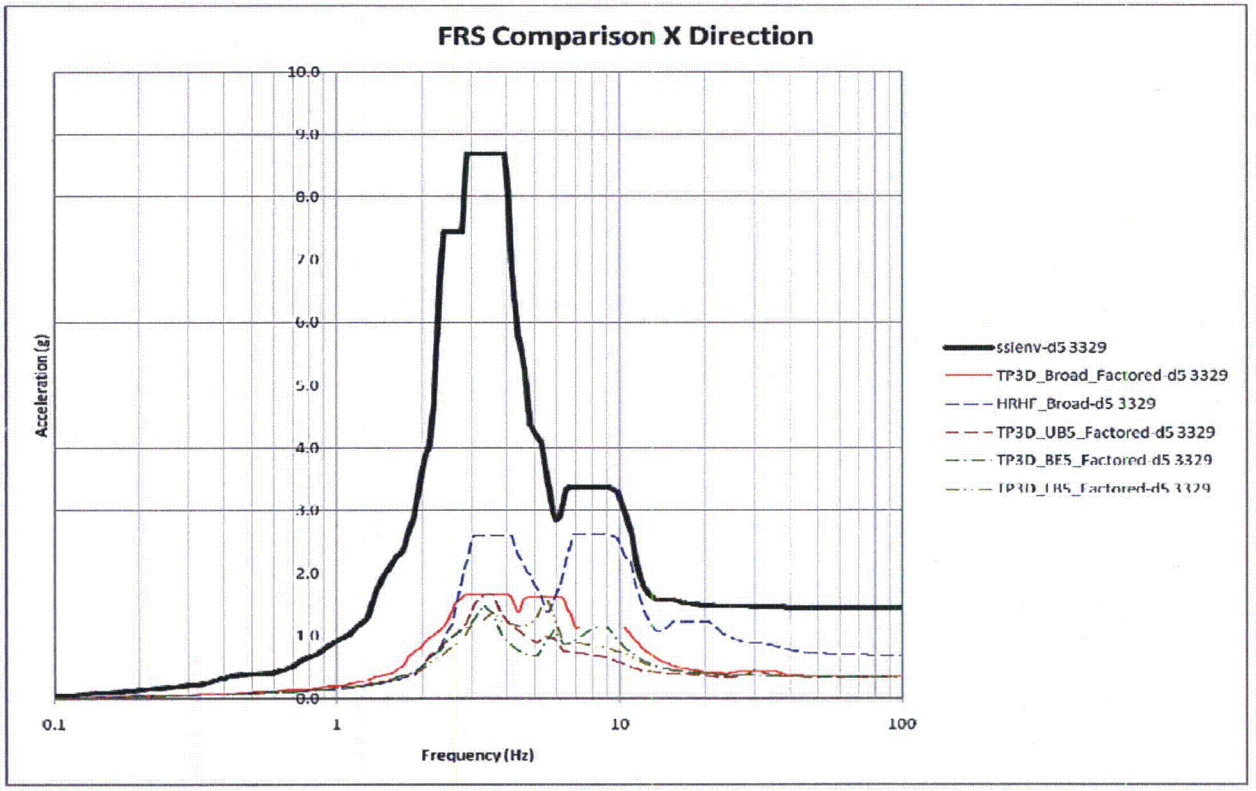


Figure 6.2-16

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in X-Direction – Node 3329

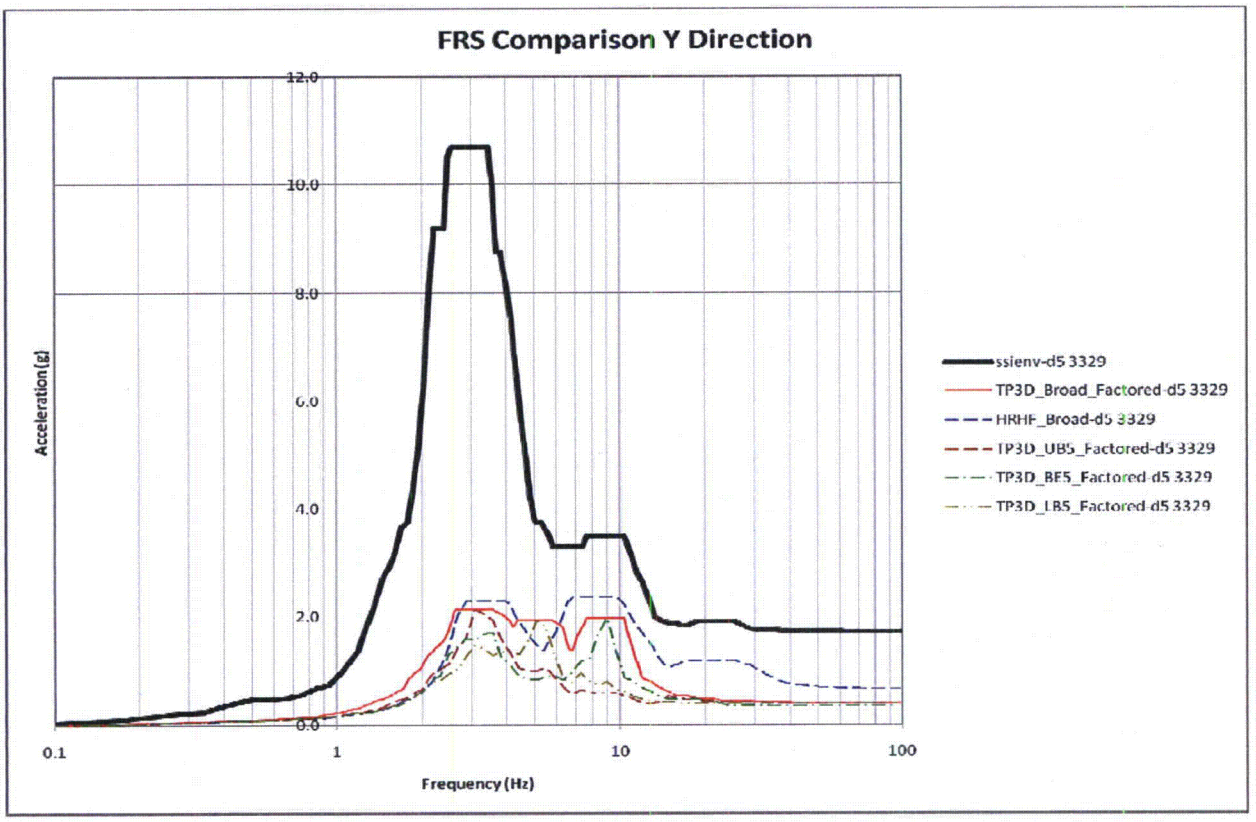


Figure 6.2-17

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Y-Direction – Node 3329

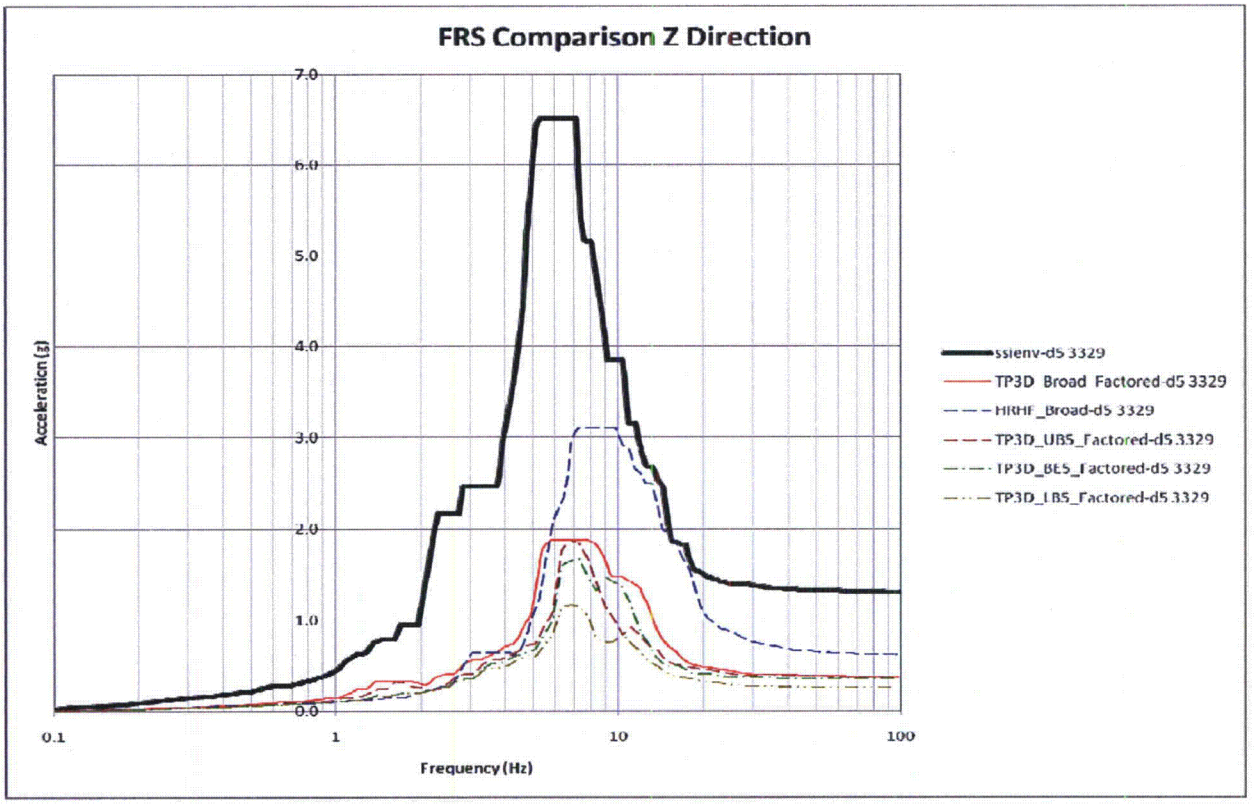


Figure 6.2-18

TPNP 3D BE, LB, UB FRS and AP1000 FRS Envelope in Z-Direction – Node 3329

This response is PLANT SPECIFIC.

References:

1. Westinghouse Report No. TPG-1000-S2R-802, Rev.5, Turkey Point Site Specific Seismic Evaluation Report, dated January 2013.
2. Westinghouse Report No. TPG-1000-S2R-807, Rev.2, Turkey Point Site Specific Seismic Evaluation Report, dated January 2013

ASSOCIATED COLA REVISIONS:

FSAR Subsection 3.7.1.1 will be revised in a future COLA revision as follows:

3.7.1.1.1 Soil Profiles and Input Motions for Soil-Structure Interaction Analysis

The site-specific Ground Motion Response Spectra (GMRS) are described in Section 2.5.2. The development of the Foundation Input Response Spectra (FIRS) is described in Subsection 3.7.1.1.1.1. **The development of Safe Shutdown Earthquake (SSE) motion is provided in Subsection 3.7.1.1.1.2.** Strain-compatible soil properties are presented in Subsection ~~3.7.1.1.1.2~~ **3.7.1.1.1.3**. The development of acceleration time histories for soil-structure interaction (SSI) analysis is summarized in Subsection ~~3.7.1.1.1.3~~ **3.7.1.1.1.4**. A detailed discussion of each of these steps is provided in Appendix 3JJ.

The developed input is used for SSI analysis, which is provided in Appendix 3KK.

3.7.1.1.1.1 Development of FIRS

The Uniform Hazard Response Spectra (UHRS), described in Section 2.5.2.4, are defined for hard rock characterized with a shear wave velocity of Vs = 9200 feet/second (2.8 kilometers/second), which is located at about 10,000 feet (3000 meters) below the ground surface. Section 2.5.2.5 describes the development of the site amplification factors at the GMRS horizon. Section 2.5.2.6 discusses the development of the horizontal and vertical GMRS. The same procedures are followed in this section to develop FIRS at the bottom of the nuclear island foundation horizon.

The full soil columns used for computation of soil amplification factors represent the two soil conditions found at the location of Units 6 & 7. The soil column far from the nuclear island consists of in situ soil layers except for the upper 30.5 feet (9.3 meters) of structural fill. This is the fill required for the general plant area to raise the site grade elevation from the existing grade to the finished grade, and is designated as "FAR" in this Section. A second soil column, representing the site conditions near the nuclear island, where, in addition to the general fill, lean concrete, and structural fill replace the in situ soils down to a depth of 60.5 feet (18.4 meters) below finished grade. This is designated "NI" in the following discussion.

The site response analysis is conducted on a set of 60 randomized profiles, for each of the two soil profiles, to account for the variability in the dynamic soil properties. The randomization procedure is described in detail in Section 2.5.2.5.2. Using the randomized soil profiles, the soil column analyses are performed with the de-aggregated low frequency (LF) and high frequency (HF) spectra of the hard rock motion at 10^{-4} and 10^{-5} annual-frequency-of-exceedance, presented in Section 2.5.2.4, following the same methodology described in Section 2.5.2.5. Log-mean amplification functions and soil response spectra are developed for "outcrop" motions for both FAR and NI soil conditions at the FIRS horizon, located at the bottom of the nuclear island foundation at elevation –16 feet (–4.9 meters) corresponding to a depth of 41.5 feet (12.7 meters) below finished ground surface.

FIRS are computed at the elevation of –16 feet from the envelope of NI and FAR soil columns representing near and far field soil columns. **To satisfy the requirements of Appendix S to 10 CFR Part 50, for the purpose of SSI analysis, the horizontal and vertical SSE motions are calculated as the envelope of FIRS and the RG 1.60 motions scaled to 0.1 g PGA.** The input for SSI analysis in terms of acceleration time histories were computed as in-column motion **corresponding to the SSE** as described in Section ~~3JJ.5~~**3JJ.6** in Appendix 3JJ. In application of the SSI input acceleration time histories, the control point was defined at elevation of –14 feet at the bottom of the NI basemat.

The change of 2 feet accounts for the thickness of the mud mat(s) and the water proofing membrane. This is considered acceptable since, in computation of the FIRS for NI soil column, 19 feet of lean concrete is already included in the soil column analysis and an additional 2 feet of concrete has negligible effects on the FIRS and associated SSI input motion.

Following the same procedure as used in Section 2.5.2.6 to obtain the GMRS, the procedure presented in RG 1.208 is implemented to develop the horizontal design response spectrum (DRS) for each of the FAR and NI soil columns. The horizontal FIRS is defined as the envelope of the FAR and NI DRS. The vertical FIRS is obtained by scaling the horizontal FIRS by the same V/H as presented in Section 2.5.2.6. The details of the site response analysis and development of FIRS are documented in Appendix 3JJ.

In addition to the FIRS, from the same set of soil amplification analyses, design spectra at the ground surface for both NI and FAR soil profiles are developed and enveloped. The surface DRS are used to check the adequacy of the SSI input motion as described in Subsection ~~3.7.1.1.1.3~~**3.7.1.1.1.4** and Appendix 3JJ.

The resulting horizontal and vertical FIRS are plotted in Figure 3.7-201 and reported in Table 3.7-201. As developed and described in Appendix 3KK, comparisons of the FIRS developed indicate they are enveloped completely by the AP1000 Certified Seismic Design Response Spectra (CSDRS) for all frequencies, as shown in Figure 3.7-202. The analysis results show that the Nuclear Island Floor Response Spectra (FRS) of AP1000 at the Turkey Point site at six key locations are enveloped by the AP1000 Certified Design Response Spectra (CSDRS).

3.7.1.1.1.2 Safe Shutdown Earthquake Motion

To satisfy the requirements of Appendix S to 10 CFR Part 50, namely that the SSE motion, for the purpose of soil-structure interaction analysis, must be an adequate acceleration response spectra (ARS) with a minimum PGA of 0.1 g (also referred to as the minimum required response spectra), the site-specific FIRS and the minimum required response spectra are enveloped. The resulting 5 percent damping ARS (horizontal and vertical) are considered the SSE motions for the site. More details on

the comparison of the FIRS with the minimum required response spectra and the calculation of the horizontal and vertical SSE ARS are provided in Appendix 3JJ.

3.7.1.1.1.~~2~~3 Strain-Compatible Soil Property Profiles

~~From the results of soil amplification analysis of FAR and NI soil profiles, two sets of strain-compatible soil profiles are developed.~~**Two sets of soil profile properties corresponding to the FAR and NI site conditions are developed which are strain compatible with the developed SSE motion.** Each set consists of the best estimate (BE), the lower bound (LB) and the upper bound (UB) strain-compatible shear-wave velocity, P-wave velocity and damping profiles. The development of strain-compatible soil profiles~~, consistent with the developed FIRS,~~ is discussed in detail in Appendix 3JJ.

3.7.1.1.1.~~3~~4 Acceleration Time Histories for SSI Input

Acceleration time histories for use in SSI analysis of the nuclear island (which includes modeling of the embedment of the nuclear island) are presented in this section. The seed acceleration time histories were selected from the database of candidate time histories given in NUREG/CR-6728 based on the low frequency de-aggregation results (i.e., magnitudes > 7 and distances > 500 km). For the analysis, the three component (i.e., two horizontal and one vertical component) strong ground motion recordings from the 1999 Chi-Chi earthquake (magnitude=7.6) recorded at the TAP024 station (closest distance=100.2 km) were selected and matched to the 5 percent damping **SSE ARS** ~~FIRS~~ developed earlier (see Subsection 3.7.1.1.1.~~1~~2 ~~for FIRS~~). These time histories were modified to be spectrum-compatible to the **SSE ARS** ~~FIRS target spectra~~ following the spectral matching criteria given in NUREG/CR-6728. The acceleration response spectra of the generated time histories matching **SSE ARS** ~~FIRS~~ are shown in Appendix 3JJ.

For SSI input motion of nuclear island with embedment, these acceleration time histories are propagated through the strain-compatible soil profiles, presented in Subsection 3.7.1.1.1.~~2~~3, where they are used as input "outcrop" motions in the soil column at the FIRS horizon and the "within" acceleration time histories at the same horizon are computed. No further iterations on soil properties are performed. This analysis results in a set of 3 "within" motions for each soil profile in the two horizontal directions (H1 and H2) and vertical direction (UP), respectively. Six (6) sets are developed corresponding to the LB, BE and UB profiles for NI and FAR soil conditions. The analysis also incorporates the requirement for checking the adequacy of the SSI input motion (References 201 and 202). Checks are made with respect to the corresponding surface design response spectra (DRS) and modifications are made where necessary. The analysis steps are discussed in detail in Appendix 3JJ.

The "within" acceleration time histories are recommended for use in the SSI analysis of the nuclear island SSI model that includes embedment. The time histories are to be applied at the FIRS horizon as "within" motion and shall be used in combination with the respective SSI soil profiles discussed in Subsection 3.7.1.1.1.~~2~~3.

FSAR Appendix 3JJ, Section 3JJ.0 will be revised in a future COLA revision as follows:

3JJ.0 INTRODUCTION

Subsection 3.7.1.1.1 summarizes the development of the Foundation Input Response Spectra (FIRS), **the Safe Shutdown Earthquake (SSE) motion,** the strain-compatible soil profiles, and the development of acceleration time histories for use as input motions in soil-structure interaction (SSI) analysis. Appendix 3JJ discusses these steps in detail.

In Subsection 3JJ.1, the site response analysis leading to the development of amplification factors at the FIRS horizon is discussed. Subsection 3JJ.2 presents the developed FIRS while Subsection 3JJ.3 presents **the calculation of the SSE motion and Subsection 3JJ.4 provides** the calculated strain-compatible soil profiles. The matching of acceleration time histories to the ~~FIRS~~**5 percent damping SSE acceleration response spectra (ARS)** is discussed in Subsection ~~3JJ.4~~**3JJ.5** and the final acceleration time histories suitable for use in SSI analysis are presented in Subsection ~~3JJ.5~~**3JJ.6**.

The fourth paragraph of FSAR Subsection 3JJ.1 will be revised in a future COLA revision as follows:

Using the randomized profiles, the soil column analysis is performed with the de-aggregated low frequency (LF) and high frequency (HF) spectra of hard rock motion at 10^{-4} and 10^{-5} annual-frequency-of-exceedance, presented in Subsection 2.5.2.4, following the same methodology described in Subsection 2.5.2.5. The 5 percent damping ~~acceleration response spectra (~~ARS~~)~~ are calculated as "outcrop" motion at the selected horizons at 301 frequencies between 0.1 and 100 Hz. Amplification factors are calculated as the ratio of the calculated ARS at the selected horizon to the input UHRS at the bottom of the soil column.

The second and last paragraphs of FSAR Subsection 3JJ.2 will be revised in a future COLA revision as follows:

With the site-specific amplification calculations described in the previous subsection, the site horizontal design response spectrum (DRS) for both FAR and NI soil columns were determined as follows. Figures 3JJ-209 and 3JJ-210 show the 10^{-4} and 10^{-5} horizontal HF and LF ~~acceleration response spectra (~~ARS~~)~~ resulting from the site response analysis, plotted on a linear spectral acceleration scale for the FAR and NI soil columns, respectively. The "LF SA(g)" and "HF SA(g)" columns in Tables 3JJ-201 and 3JJ-202 list these ARS at a 38-frequency subset of the 301 frequencies analyzed for the annual frequencies of exceedance of 10^{-4} and 10^{-5}, respectively. For each soil column the HF and LF 10^{-4} and 10^{-5} horizontal site spectra are enveloped to give a "raw" soil ~~uniform hazard response spectrum(~~UHRS~~)~~ and smoothed to remove small frequency-to-frequency variations, using a smoothing function that averages over spectral accelerations at adjacent frequencies. Figures 3JJ-211 and 3JJ-212 show the smoothed, UHRS calculated

in this way, plotted on a linear spectral acceleration scale for the FAR and NI soil columns, respectively. Tables 3JJ-201 and 3JJ-202 tabulate the "raw" and smoothed UHRS for both FAR and NI soil columns for the annual frequencies of exceedance of 10^{-4} and 10^{-5}, respectively.

In addition to the FIRS, from the same set of soil amplification analysis, DRS at the ground surface for both NI and FAR soil profiles are developed and enveloped. The surface DRS are calculated using the ground surface amplification factors presented in Subsection 3JJ.1 following the same procedure for development of FIRS. Surface DRS are used to check the adequacy of the SSI input motion as described in Subsection ~~3JJ.5~~**3JJ.6**.

A new Subsection 3JJ.3 will be included in a future COLA revision. Subsequent sections will be renumbered accordingly.

3JJ.3 **SAFE SHUTDOWN EARTHQUAKE MOTION**

To satisfy the requirements of Appendix S to 10 CFR Part 50, namely that the SSE motion, for the purpose of soil-structure interaction analysis, must be an adequate ARS with a minimum PGA of 0.1 g (also referred to as the minimum required response spectra), the site-specific FIRS and the minimum required response spectra are enveloped.

Subsection 3JJ.2 provides the site-specific DRS at foundation level or FIRS. The 5 percent damping horizontal and vertical ARS defined in the RG 1.60 scaled to a PGA of 0.1 g are considered as the minimum required response spectra satisfying the requirements of Appendix S to 10 CFR Part 50. The 5 percent damped ARS for the minimum required response spectra and the horizontal and vertical FIRS are plotted in Figure 3JJ-238. The envelope of the FIRS and RG motions, horizontal and vertical, constitute the SSE for the FPL site.

FSAR Subsection 3JJ.3 will be revised in a future COLA revision as follows:

~~3JJ.3~~**3JJ.4** STRAIN-COMPATIBLE SOIL PROPERTY PROFILES

Two sets of strain-compatible profiles are developed for the NI and FAR site conditions, respectively. Each set consists of best estimate (BE), lower bound (LB) and upper bound (UB) strain-compatible shear-wave velocity, P-wave velocity and damping profiles. The soil properties are developed consistent with the developed ~~FIRS~~**5 percent damping SSE ARS as described below**. The upper bound and the lower bound shear wave velocity profiles maintain the minimum coefficient of variation of 0.50 in terms of the best estimate soil shear modulus.

A set of LB, BE and UB profiles is developed for each of the NI and FAR soil columns that are strain-compatible with the SSE motion, described in Subsection 3JJ.3. The approach used is iterative and consists of propagating modified rock

motions (input at bedrock) convolved through each set of 60 simulated profiles (NI and FAR) and computing the response at the foundation elevation horizon. The analysis is repeated, modifying the input rock motion each time, until the 5 percent damping mean ARS at the foundation horizon closely matches the 5 percent damping SSE ARS. Figure 3JJ-239 presents a comparison of the horizontal SSE motion and the mean ARS of the propagated motion through the NI soil column profiles. Figure 3JJ-240 presents a similar comparison in the case of the FAR soil column. Note that a close match is achieved, especially at the lower frequency range of the ARS which holds the most effect on the level of strain in the soil column and therefore its iterated properties.

FSAR Subsection 3JJ.4 will be revised in a future COLA revision as follows:

~~3JJ.4~~**3JJ.5** SPECTRAL MATCHING OF ACCELERATION TIME HISTORIES

Spectrum-compatible acceleration time histories are presented in this section. The first step in the development of spectrum-compatible time histories was the selection of appropriate seed acceleration time histories. These selected input seed time histories were taken from the database of candidate time histories given in NUREG/CR-6728 based on the low frequency de-aggregation results (i.e., magnitudes > 7 and distances > 500 km). For the analysis, the three component (i.e., two horizontal and one vertical component) strong ground motion recordings from the 1999 Chi-Chi earthquake (magnitude=7.6) recorded at the TAP024 station (closest distance=100.2 km) were selected and matched to the 5 percent damping ~~FIRS~~**SSE ARS** developed earlier (see Subsection 3JJ.~~2~~**3**).

The spectral matching procedure is a time domain procedure and emphasis was placed on maintaining the phase characteristics of the initial time history in the final modified spectrum-compatible time history. In addition, emphasis was placed on maintaining the characteristic of the normalized Arias intensities (the integral of the square of the acceleration-time history, a ground motion parameter that captures the potential destructiveness of an earthquake) of the initial and final modified spectrum-compatible time histories. These time histories were modified to be spectrum-compatible to the **SSE ARS**~~FIRS target spectra~~ following the spectral matching criteria given in NUREG-0800 Rev. 3 (3.7.1). In most cases, an additional constant scale factor was applied after the spectral matching procedure to comply with the spectral matching criteria given in NUREG-0800 Rev. 3 (3.7.1). Scale factors of **1.01, 1.015, and 1.015**~~1.02, 1.022, and 1.01~~ were applied for the two horizontal directions (H1, H2), and vertical direction (UP) components, respectively.

The modified spectrum-compatible acceleration, velocity, and displacement time histories prior to the application of the noted constant scale factors are plotted in Figure 3JJ-222a for the H1 component. Figure 3JJ-222c shows target horizontal **SSE**~~FIRS~~ spectrum, 1.3* **SSE**~~FIRS~~ target spectrum, 0.9* **SSE**~~FIRS~~ target spectrum and the modified time history response spectrum including the ~~1.02~~**1.01** constant scale factor. The normalized Arias

intensities for the first horizontal (H1) component initial and modified spectrum-compatible time histories are plotted in Figure 3JJ-222b. The results for the second horizontal (H2) component and the UP component are shown in Figures 3JJ-223a, 3JJ-223b, and 3JJ-223c and Figures 3JJ-224a, 3JJ-224b, and 3JJ-224c, respectively. The zero-lag cross correlation values were computed for the combinations between the three spectrum-compatible acceleration time histories and are listed in Table 3JJ-208. These values are all less than the required value of 0.16.

FSAR Subsection 3JJ.5 will be revised in a future COLA revision as follows:

~~3JJ.5~~ **3JJ.6** SSI ACCELERATION TIME HISTORIES

Acceleration time histories, suitable for use in SSI analysis of the nuclear island, are presented in this section. ~~Section 3JJ.4~~**Subsection 3JJ.5** provides a set of two horizontal motions and one vertical motion, spectrally matched to ~~FIRS~~**5 percent damping SSE ARS**. The acceleration time histories are propagated through the developed strain-compatible profiles, presented in Subsection ~~3JJ.3~~**3JJ.4**, where they are used as input "outcrop" motions in the soil column at the FIRS horizon and the "within" acceleration time histories at the same horizon are computed. No further iterations on soil properties are performed.

These analyses result in a set of 3 "within" motions for each soil profile in the H1 and H2 directions and the UP direction, respectively. Note that while for horizontal motions, strain-compatible shear-wave velocity profiles are used to describe the shear modulus of the soil column, in the case of vertical motions, P-wave velocity profiles are used instead. Six (6) sets of 3 orthogonal motions are developed corresponding to the LB, BE and UB profiles for NI and FAR site conditions.

From the same set of soil amplification analyses, the 5 percent damping ARS at the ground surface level are calculated. Checks are made with respect to the corresponding surface design response spectra (DRS) **discussed in Subsection 3JJ.2**, per applicable requirements (References 201and 202) to ensure that the envelope of LB, BE and UB surface ARS, in each direction and site condition, envelops the corresponding surface DRS. Figures 3JJ-225, 3JJ-226, and 3JJ-227 present this comparison for NI site condition in the 3 orthogonal directions. Figures 3JJ-228, 3JJ-229, and 3JJ-230 present the same plots for FAR site condition. In these figures, the surface-DRS-to-envelope-ARS ratios (DRS/ENV) are also plotted.

Note that for horizontal motions, the DRS/ENV exceed unity on the order of 1 percent for the NI case, and on the order of 7 percent in the FAR case. Therefore, the horizontal motions are increased by an adjustment factor to ensure the surface ARS plots envelop the surface DRS in the horizontal directions for both NI and FAR site conditions. In the case of vertical motions and for both site conditions, an increase

of about 12 percent is needed. The adjustment factors applied to each of the within motions are presented in Table 3JJ-209.

~~Note that for horizontal motions, the DRS/ENV exceed unity in most cases, but by not greater than 19 percent in all horizontal motions. Therefore, the horizontal motions can be amplified by a factor not greater than 19 percent to ensure the surface ARS envelop the surface DRS in the horizontal directions for both NI and FAR site conditions.~~

~~In the case of vertical motions, the DRS/ENV exceed unity and reach a maximum of about 1.5 but in a narrow range of frequencies, between 1 and 8 Hz, for both NI and FAR site conditions. To avoid the amplification of the "within" motions by a large constant factor, close to 1.5, it was decided to re-generate an "outcrop" vertical acceleration time history matched to an adjusted target. The adjusted target spectrum is obtained by multiplying a smoothed version of the vertical DRS/ENV by the original target vertical FIRS. Figure 3JJ-231 presents the original and adjusted targets, as well as the amplification factor applied to the original vertical FIRS. The amplification factor is shown to envelop the DRS/ENV for both NI and FAR site conditions. A new vertical acceleration time history is matched to the adjusted vertical motion target ARS following the same procedure described in Subsection 3JJ.4. The new vertical motion is used as input and the site response analysis is repeated to obtain the corresponding "within" motions at FIRS horizon.~~

The resulting adjusted acceleration time histories are presented in Figures 3JJ- 232, 3JJ-233, and 3JJ-234 for NI site condition and in Figures 3JJ-235, 3JJ-236, and 3JJ-237 for FAR site condition. The "within" acceleration time histories are recommended for use in the SSI analysis of the nuclear island SSI model that includes embedment. The time histories are to be applied at the FIRS horizon as "within" motion and shall be used in combination with the respective SSI soil profiles discussed in Subsection ~~3JJ.3~~**3JJ.4**.

FSAR Subsection 3JJ.6 will be revised in a future COLA revision as follows:

~~3JJ.6~~ **3JJ.7** REFERENCES

Table 3JJ-208 will be revised in a future COLA revision as follows:

Table 3JJ-208
Absolute Value of the Zero-Lag Cross Correlations Between Components for the Spectrum Compatible Time Histories Developed for the SSI Analysis

Components	Cross Correlation
H1 –H2	~~0.013~~**0.078**
H1 -UP	~~0.105~~**0.036**
H2 - UP	~~0.015~~**0.051**

A new Table 3JJ-209 will be added in a future COLA revision as follows:

Table 3JJ-209
SSI Motion Adjustment Factors

Site Condition	Run Label	Adjustment Factor
Near Nuclear Island (NI)	NI-H1-LB	1.00
	NI-H2-LB	1.01
	NI-UP-LB	1.00
	NI-H1-BE	1.00
	NI-H2-BE	1.00
	NI-UP-BE	1.00
	NI-H1-UB	1.00
	NI-H2-UB	1.00
	NI-UP-UB	1.12
Far From Nuclear Island (FAR)	FAR-H1-LB	1.00
	FAR-H2-LB	1.00
	FAR-UP-LB	1.00
	FAR-H1-BE	1.00
	FAR-H2-BE	1.00
	FAR-UP-BE	1.00
	FAR-H1-UB	1.07
	FAR-H2-UB	1.04
	FAR-UP-UB	1.12

Figures 3JJ-216 through 3JJ-221 will be replaced in a future COLA revision as follows. Note that for these figures the titles will not change.

Figure 3JJ-216
Recommended SSI Shear-Wave Velocity Profiles –
NI Site Conditions (Upper 1000 feet – below 1000 feet depth is not shown)

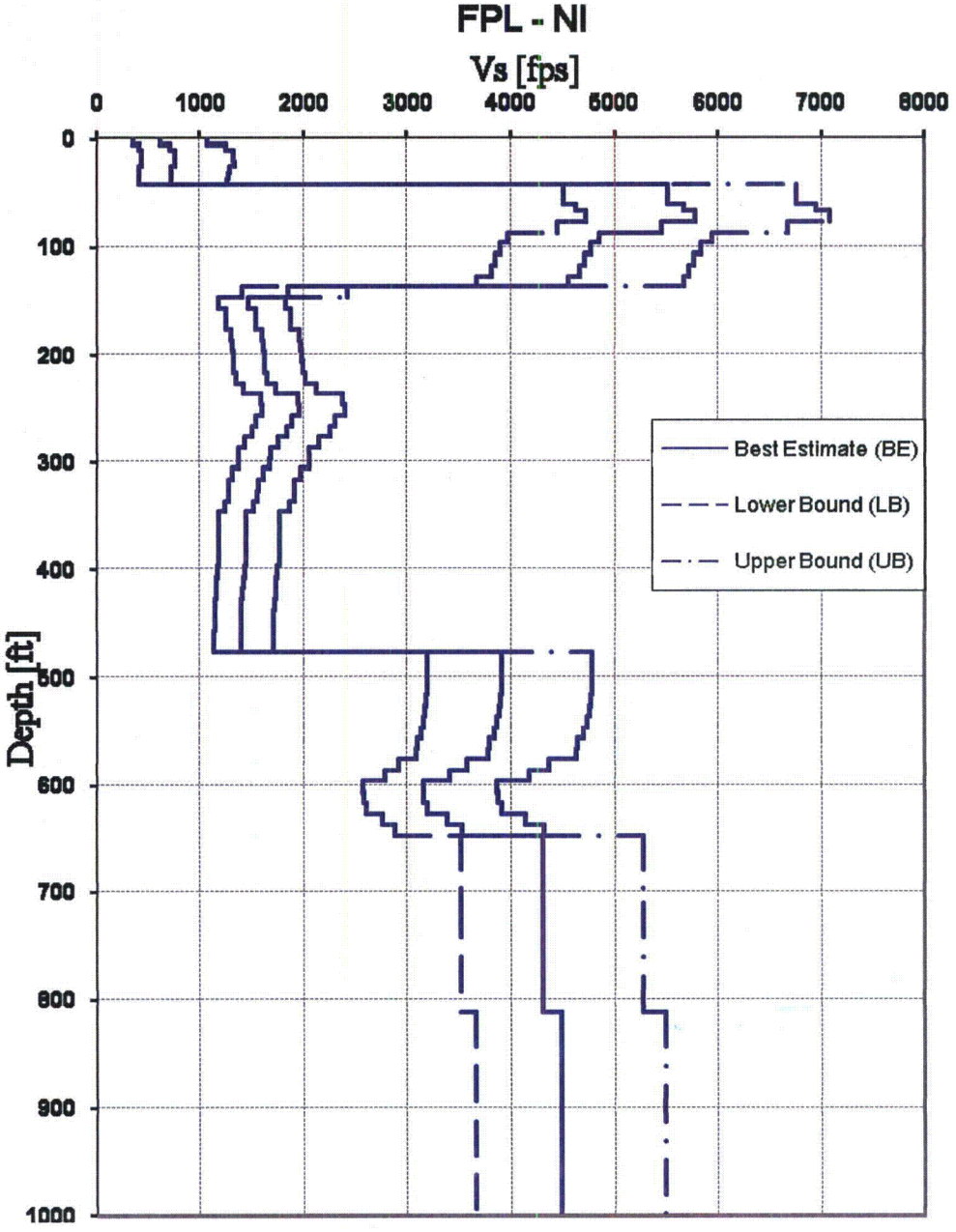


Figure 3JJ-217
Recommended SSI Damping Profiles –
NI Site Conditions (Upper 1000 feet – below 1000 feet depth is not shown)

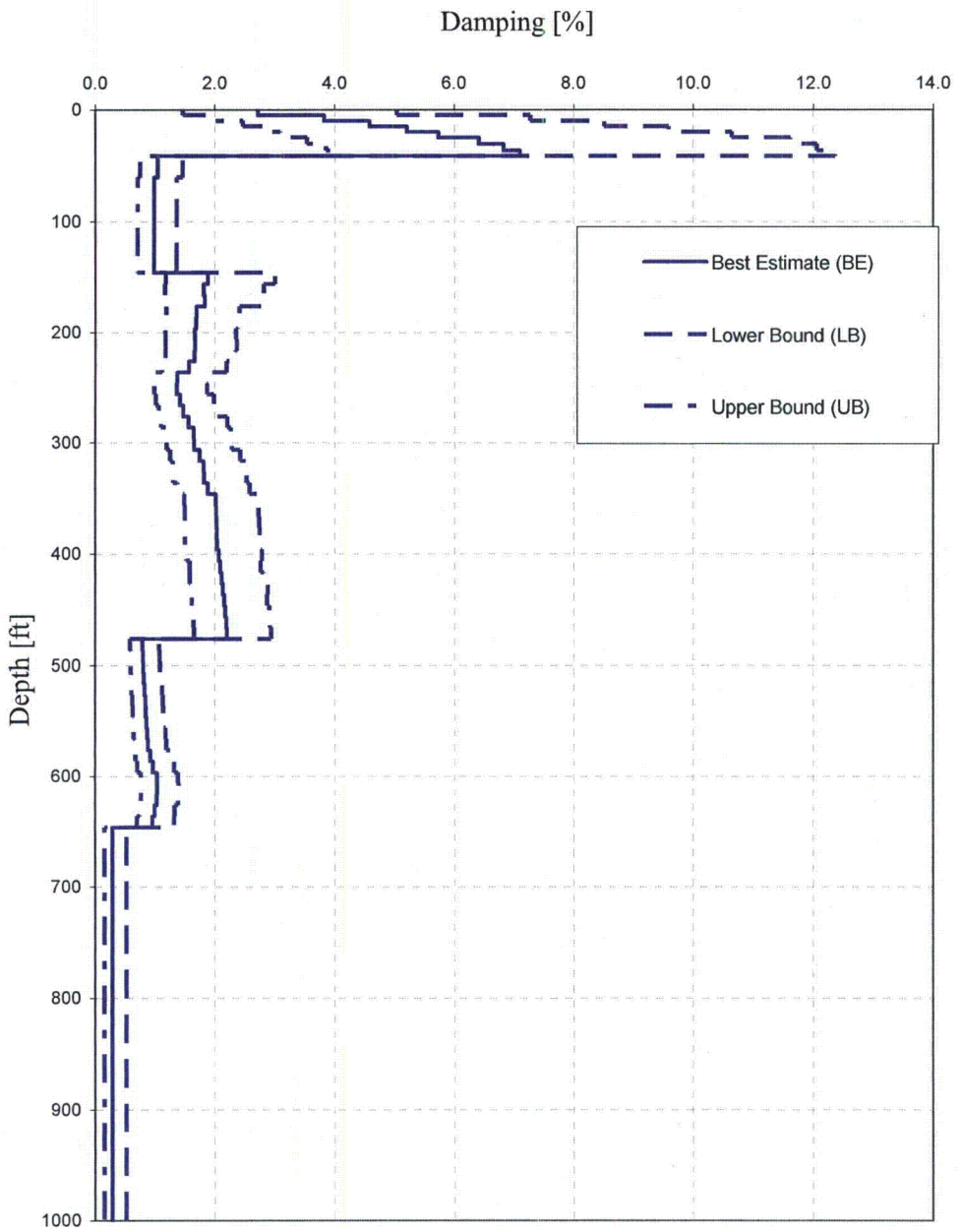

Damping [%]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Depth [ft]
0
100
200
300
400
500
600
700
800
900
1000
Best Estimate (BE)
Lower Bound (LB)
Upper Bound (UB)

Figure 3JJ-218
Recommended P-Wave Velocity Profiles – NI Site Conditions (Upper 1000 feet – below 1000 feet depth is not shown)

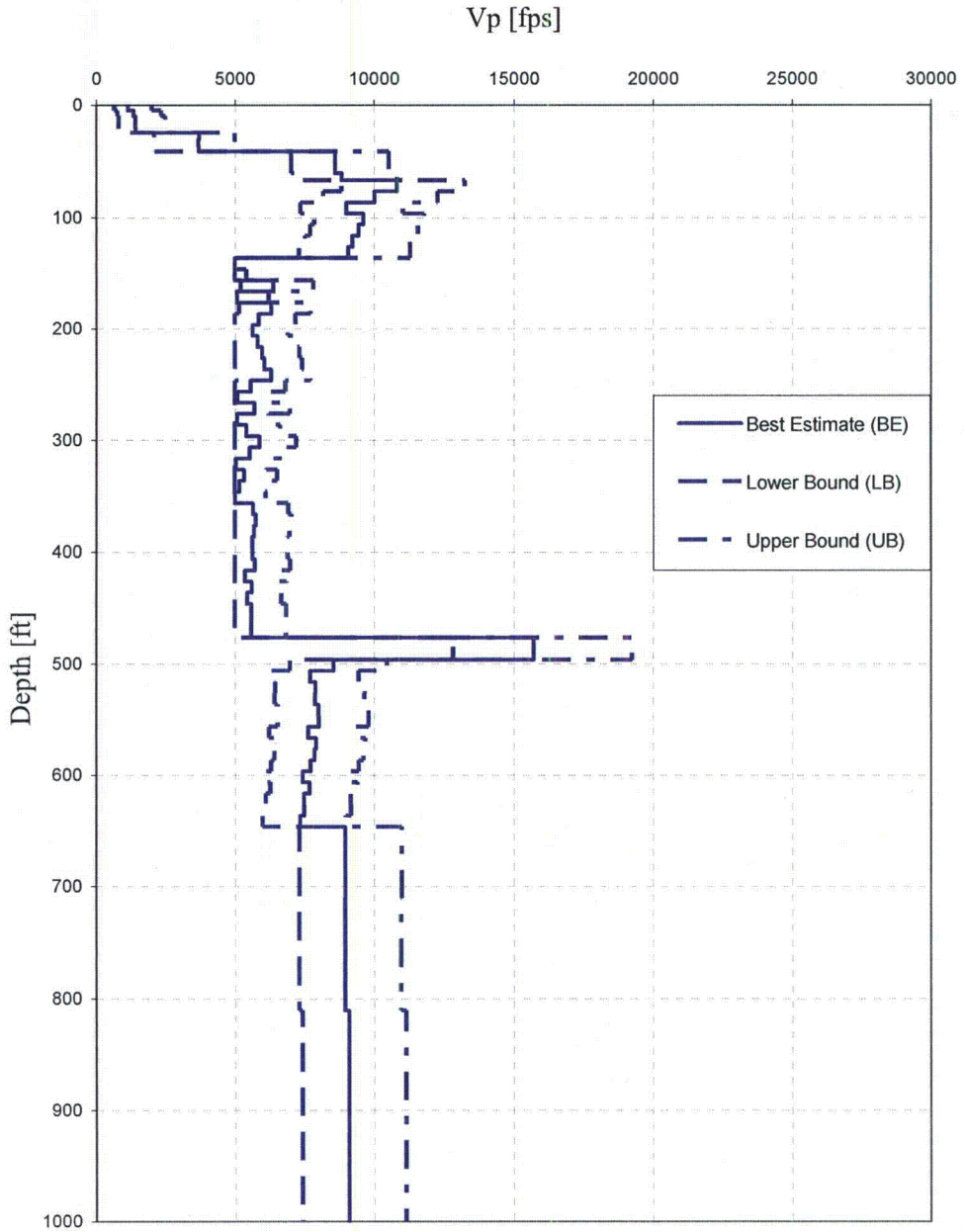


Figure 3JJ-219
Recommended SSI Shear-Wave Velocity Profiles –
FAR Site Conditions (Upper 1000 feet – below 1000 feet depth is not shown)

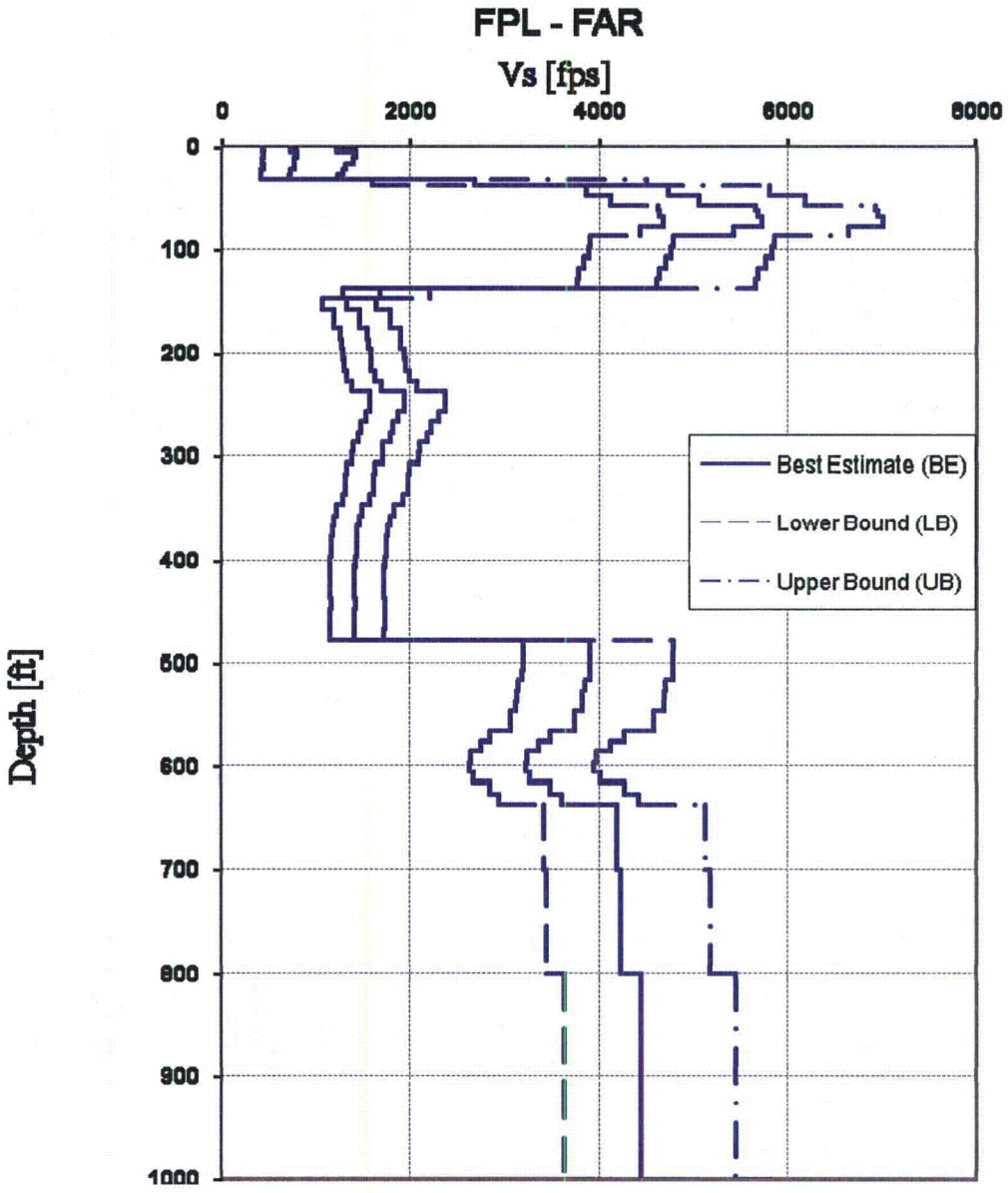


Figure 3JJ-220
Recommended SSI Damping Profiles – FAR Site Conditions (Upper 1000 feet – below 1000 feet depth is not shown)

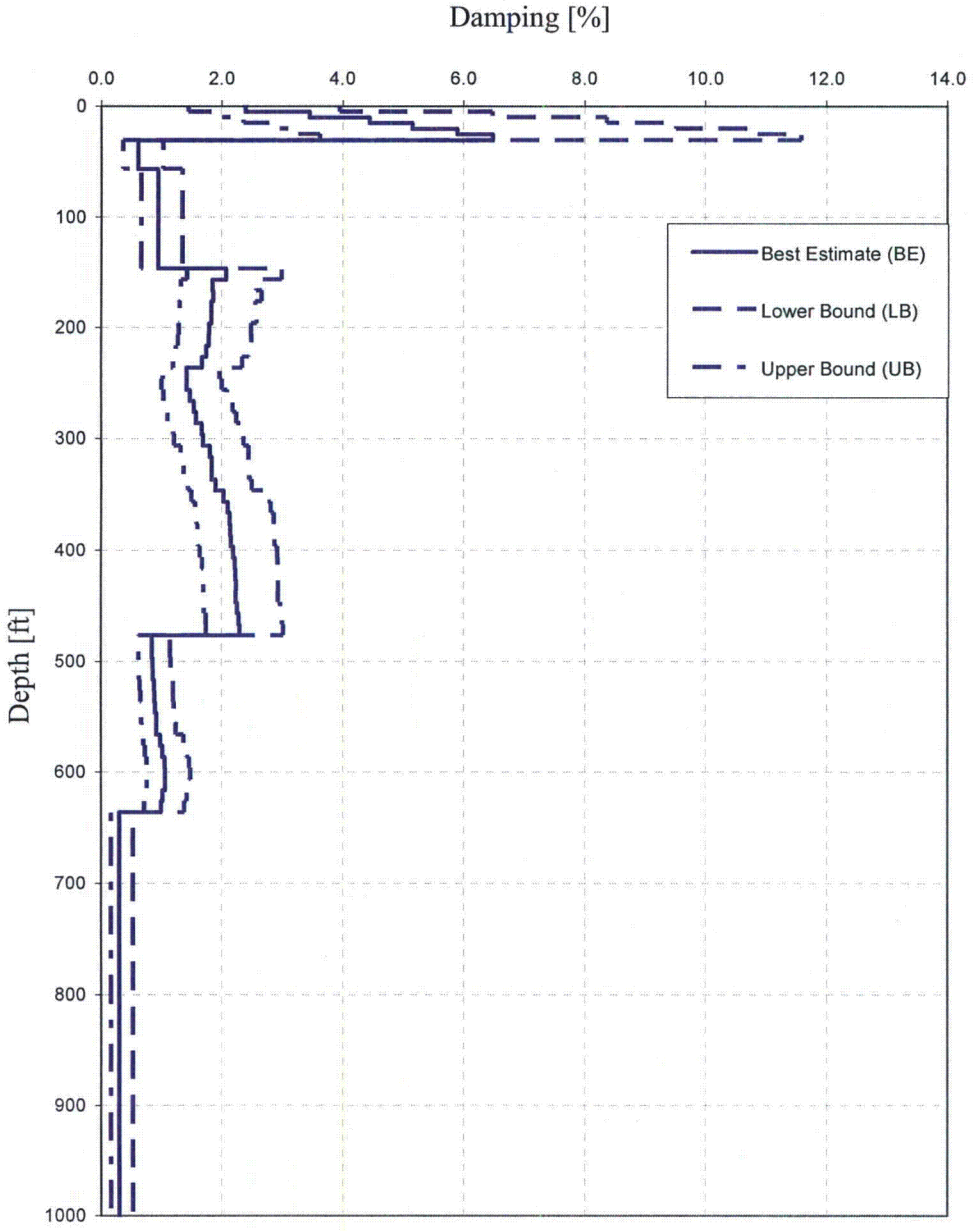
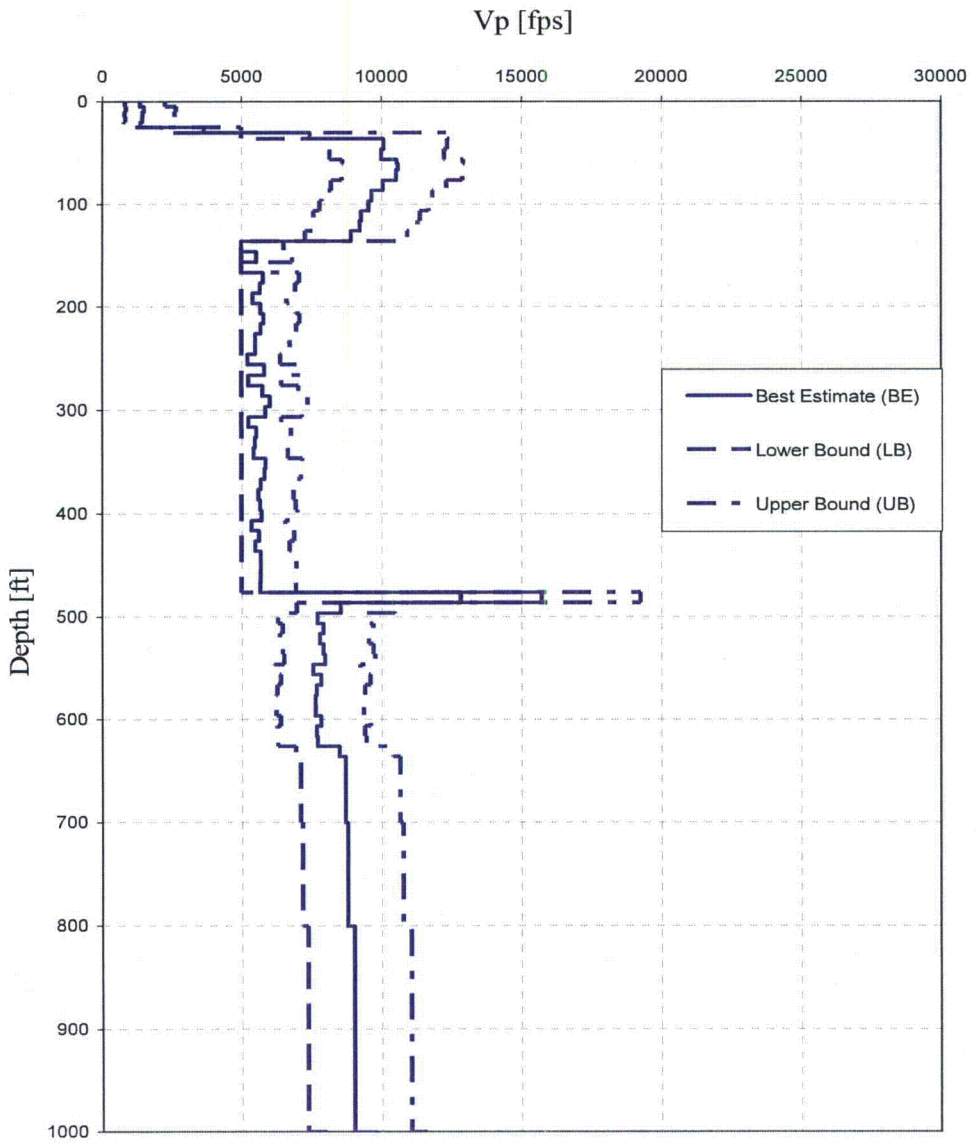


Figure 3JJ-221
Recommended P-Wave Velocity Profiles – FAR Site Conditions (Upper 1000 feet – below 1000 feet depth is not shown)



Figures 3JJ-222a through 3JJ-224c will be replaced in a future COLA revision as follows. Note that for these figures the titles will change.

Figure 3JJ-222a
Final Spectrum-Compatible Acceleration, Velocity, and Displacement Time-histories for Horizontal 1 Case Before Constant Scale Factor of 1.01 is Applied

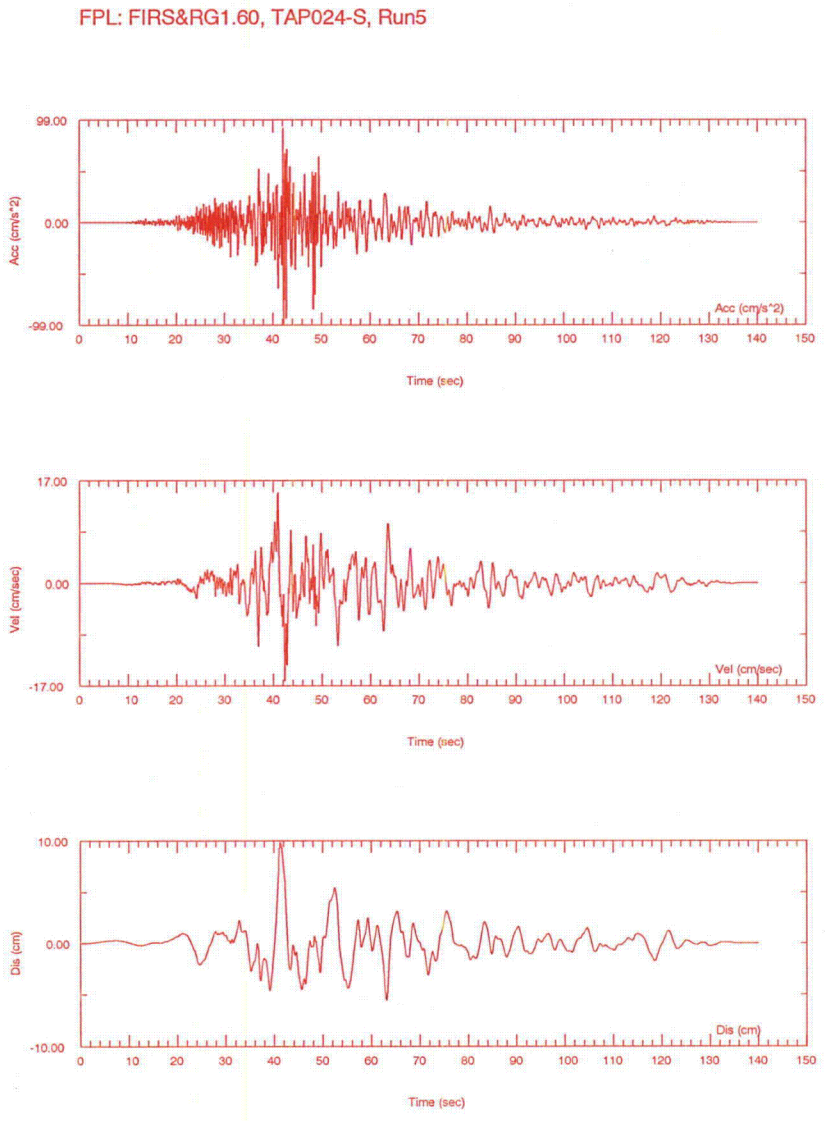


Figure 3JJ-222b
Comparison of Initial Seed Acceleration Normalized Arias Intensities Plot and Final Spectrum-Compatible Acceleration Normalized Arias Intensities Plot for Horizontal 1 Case Before Constant Scale Factor of 1.01 is Applied

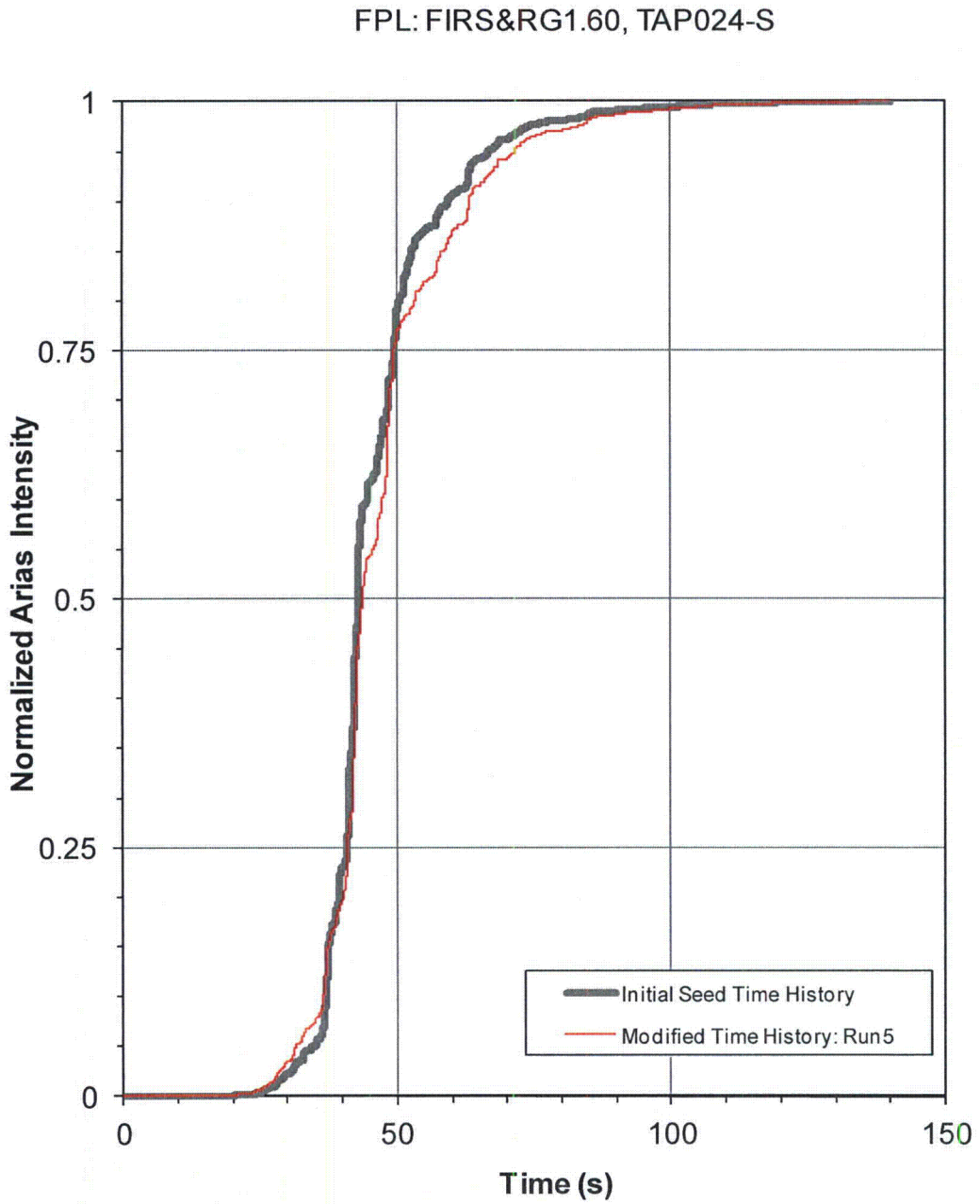


Figure 3JJ-222c
Comparison Between the Final Scaled Spectrum-Compatible Response Spectrum, Horizontal SSE ARS, and Upper and Lower Target Spectrum Bounds for Horizontal 1 Case With the Constant Scale Factor of 1.01 Applied

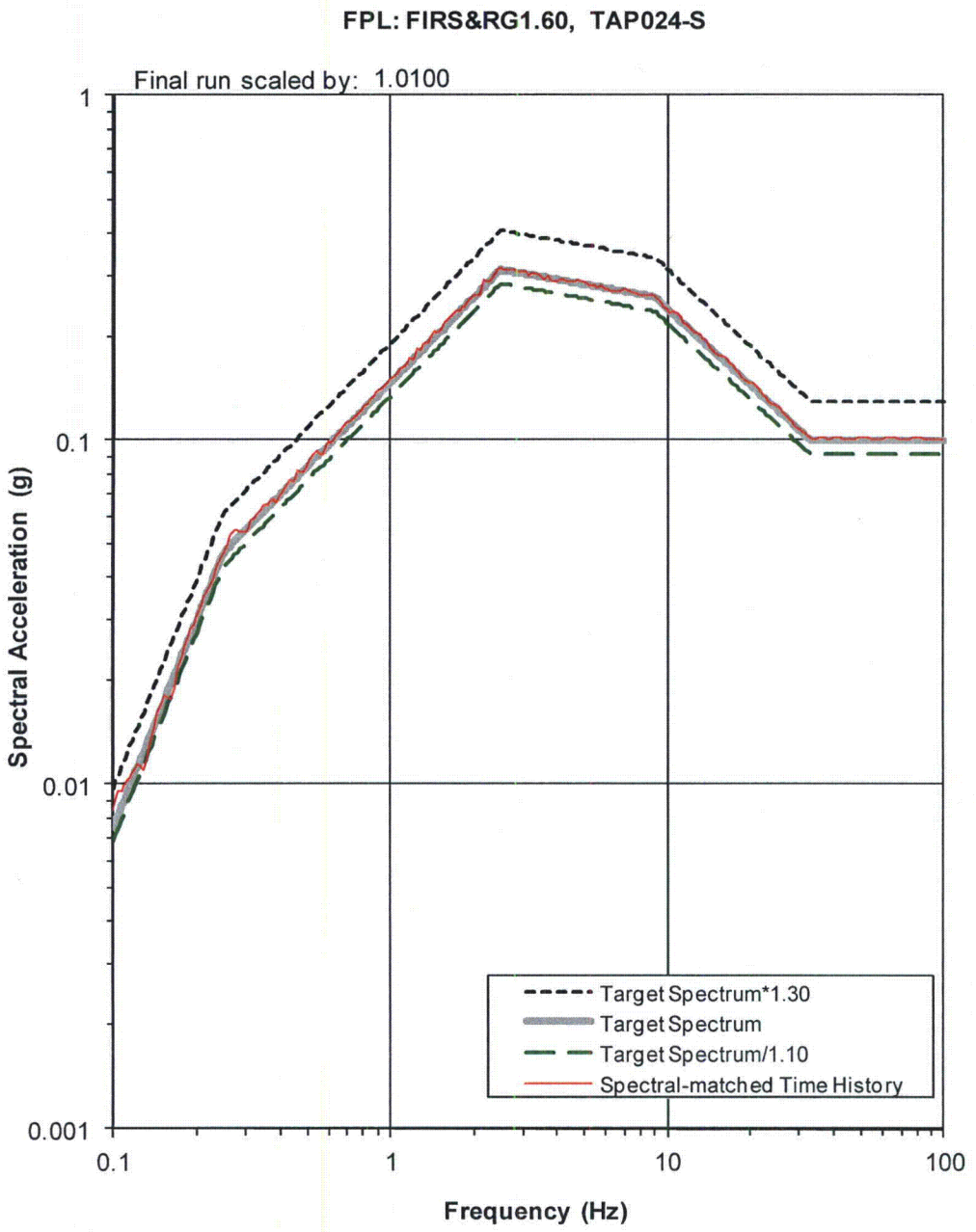


Figure 3JJ-223a
Final Spectrum-Compatible Acceleration, Velocity, and Displacement Time-histories for Horizontal 2 Case Before Constant Scale Factor of 1.015 is Applied

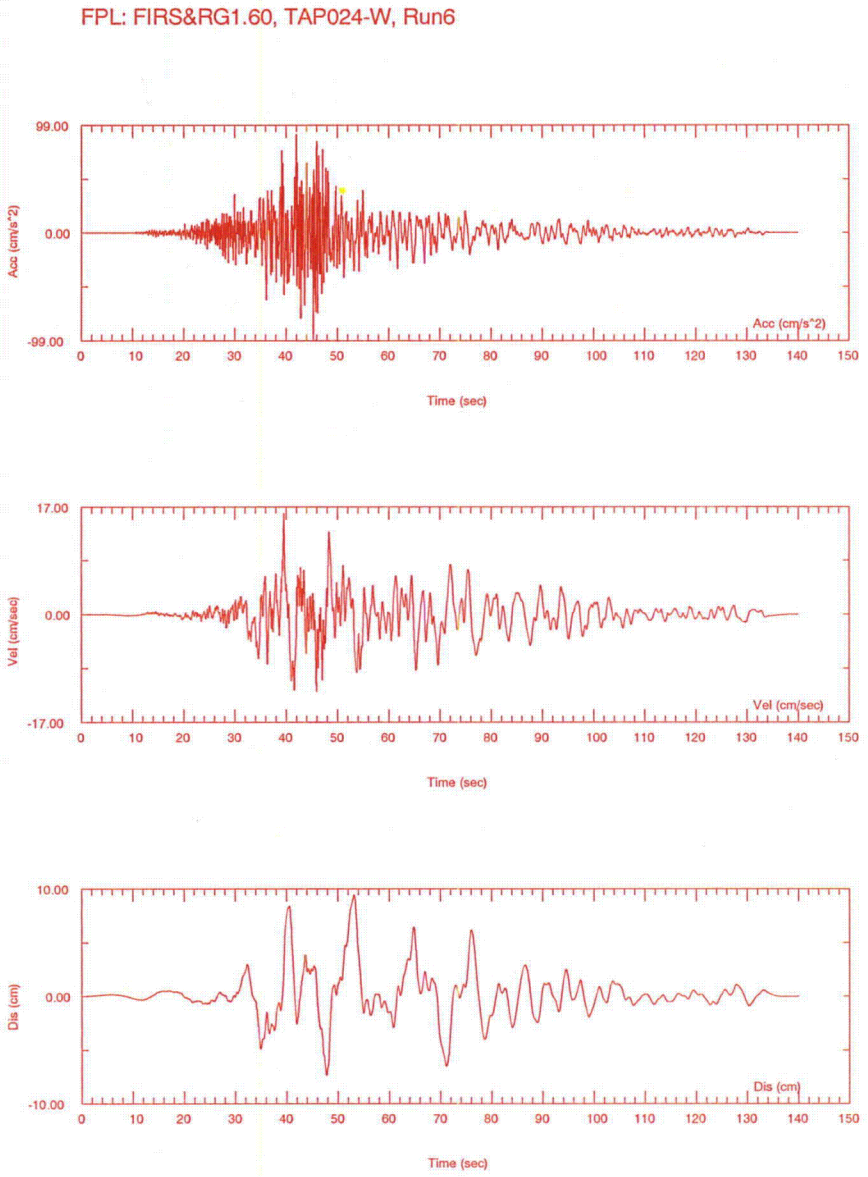


Figure 3JJ-223b
Comparison of Initial Seed Acceleration Normalized Arias Intensities Plot and Final Spectrum-Compatible Acceleration Normalized Arias Intensities Plot for Horizontal 2 Case Before Constant Scale Factor of 1.015 is Applied

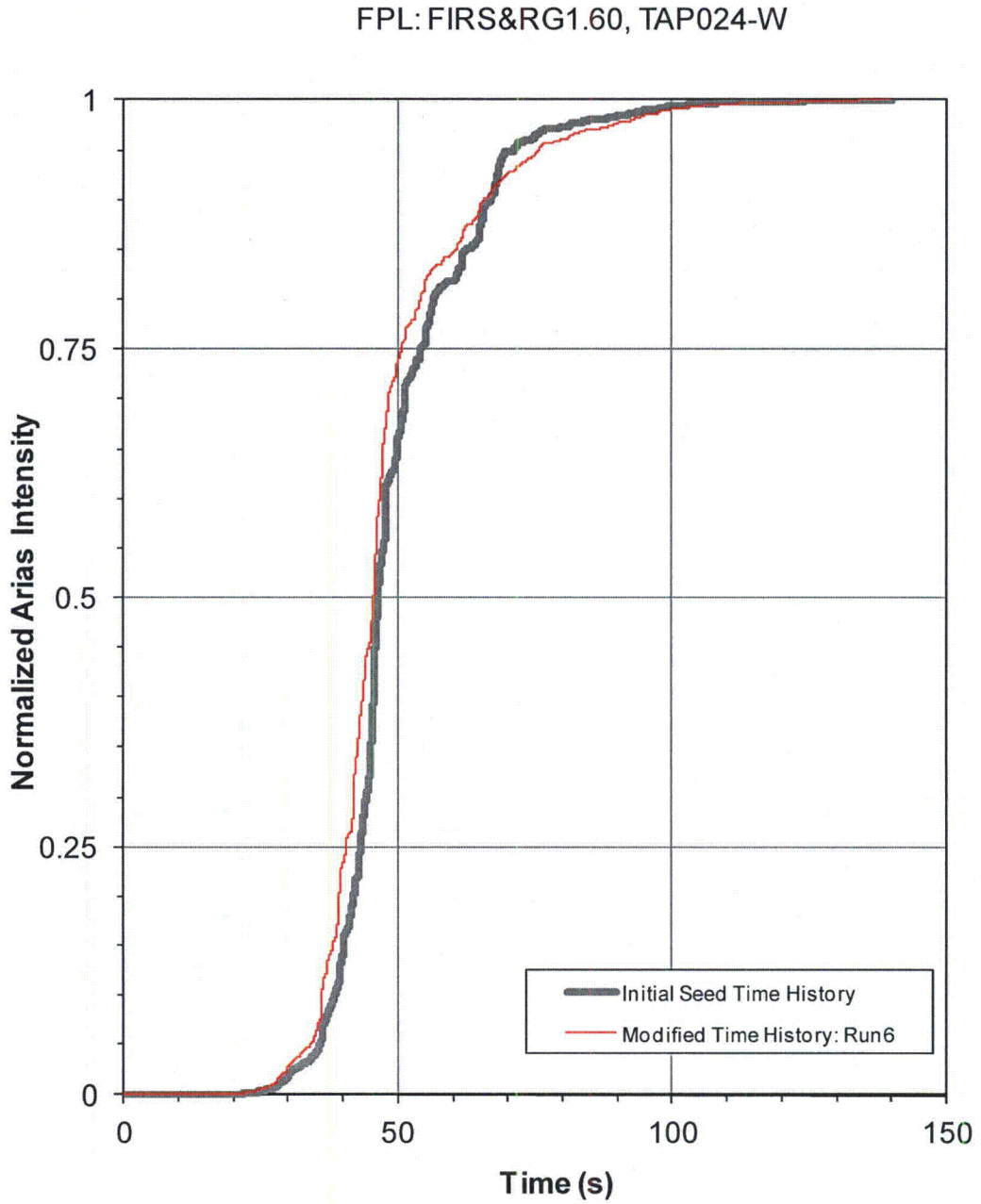


Figure 3JJ-223c
Comparison Between the Final Scaled Spectrum-Compatible Response Spectrum, Horizontal SSE ARS, and Upper and Lower Target Spectrum Bounds for Horizontal 2 Case With the Constant Scale Factor of 1.015 Applied

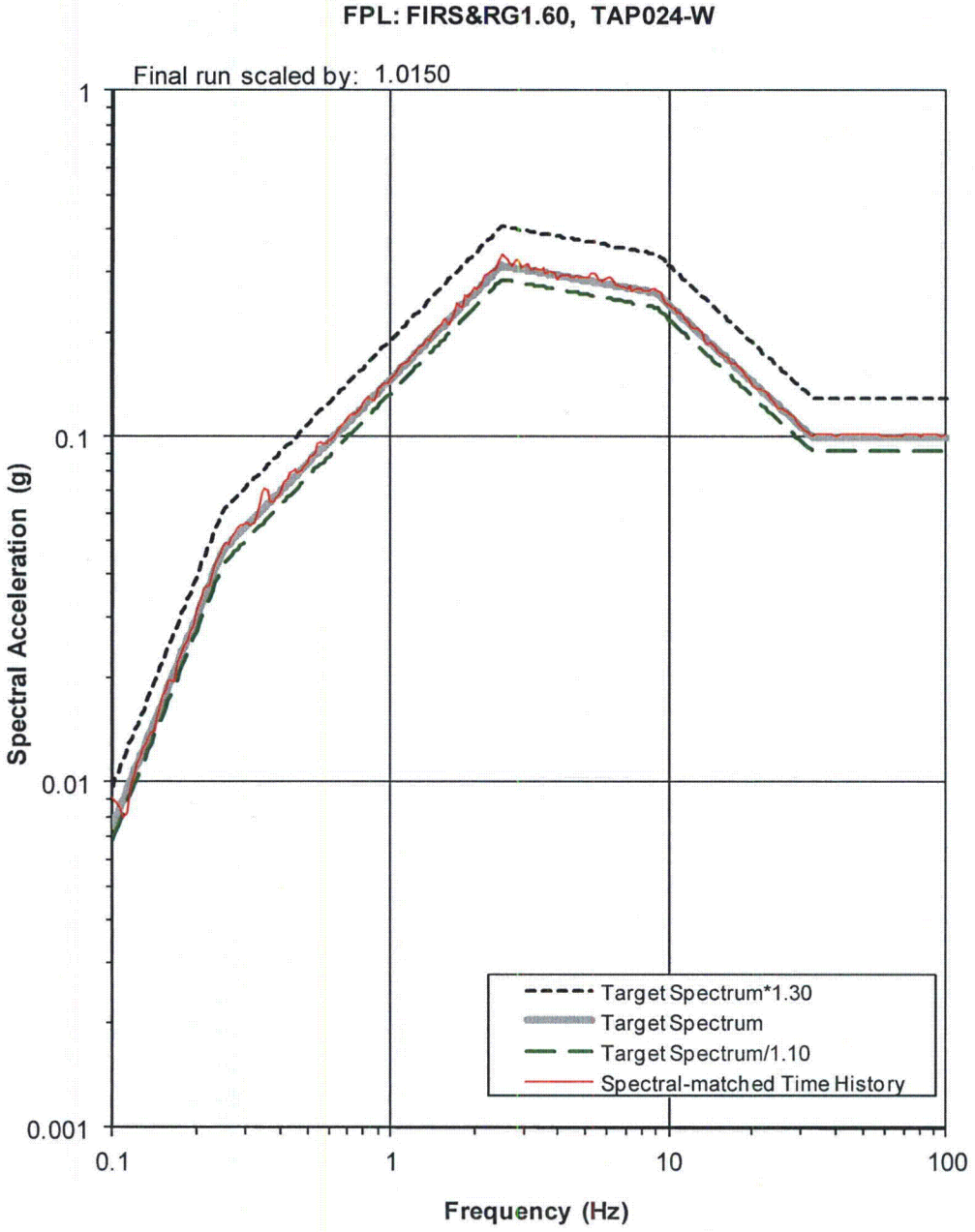


Figure 3JJ-224a
Final Spectrum-Compatible Acceleration, Velocity, and Displacement Time-histories for Vertical Case Before Constant Scale Factor of 1.015 is Applied

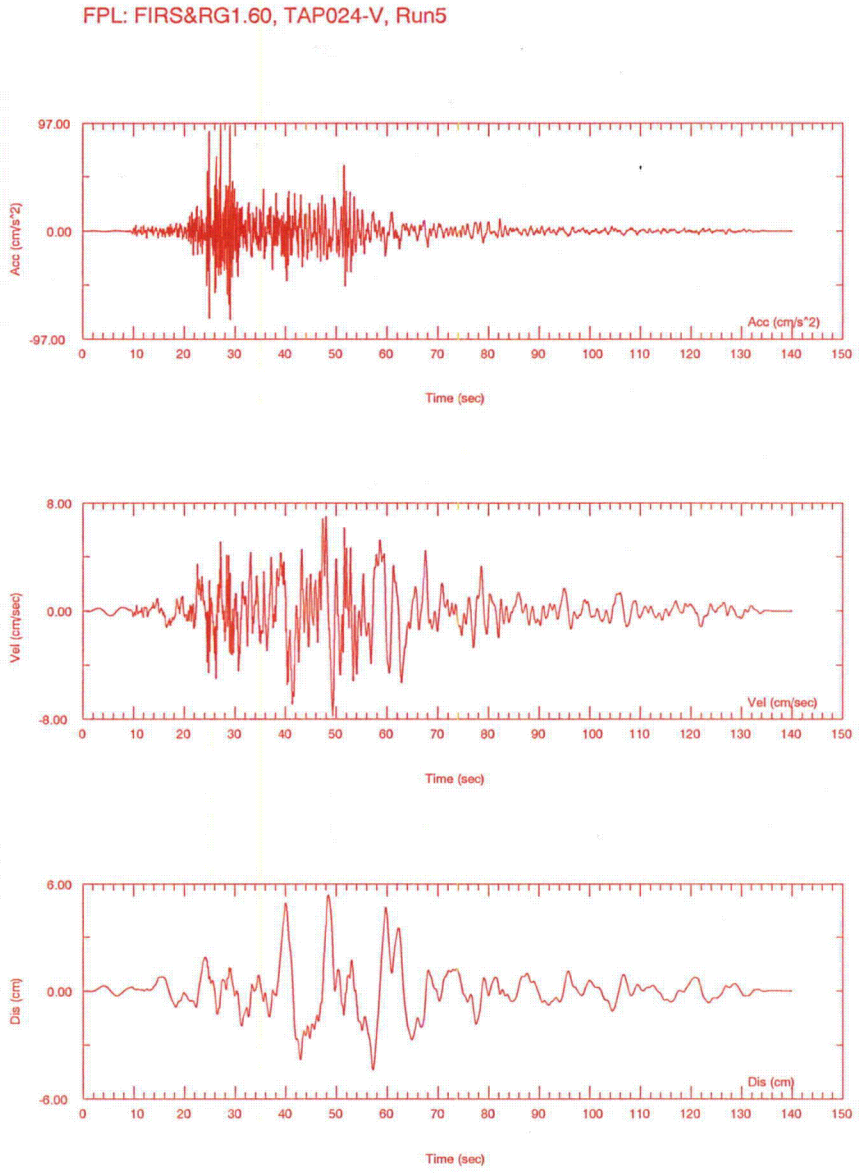


Figure 3JJ-224b
Comparison of Initial Seed Acceleration Normalized Arias Intensities Plot and Final Spectrum-Compatible Acceleration Normalized Arias Intensities Plot for Vertical Case Before Constant Scale Factor of 1.015 is Applied

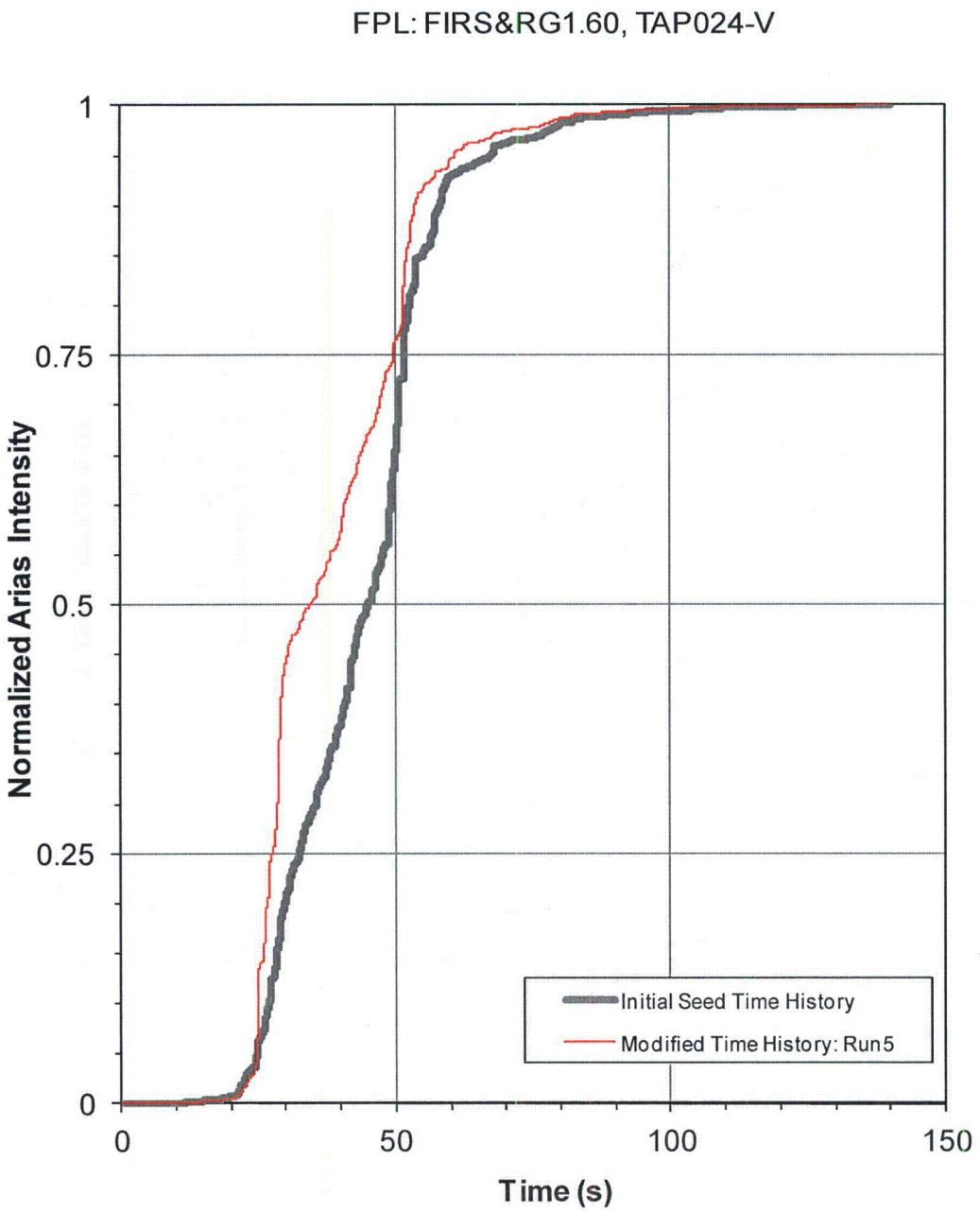
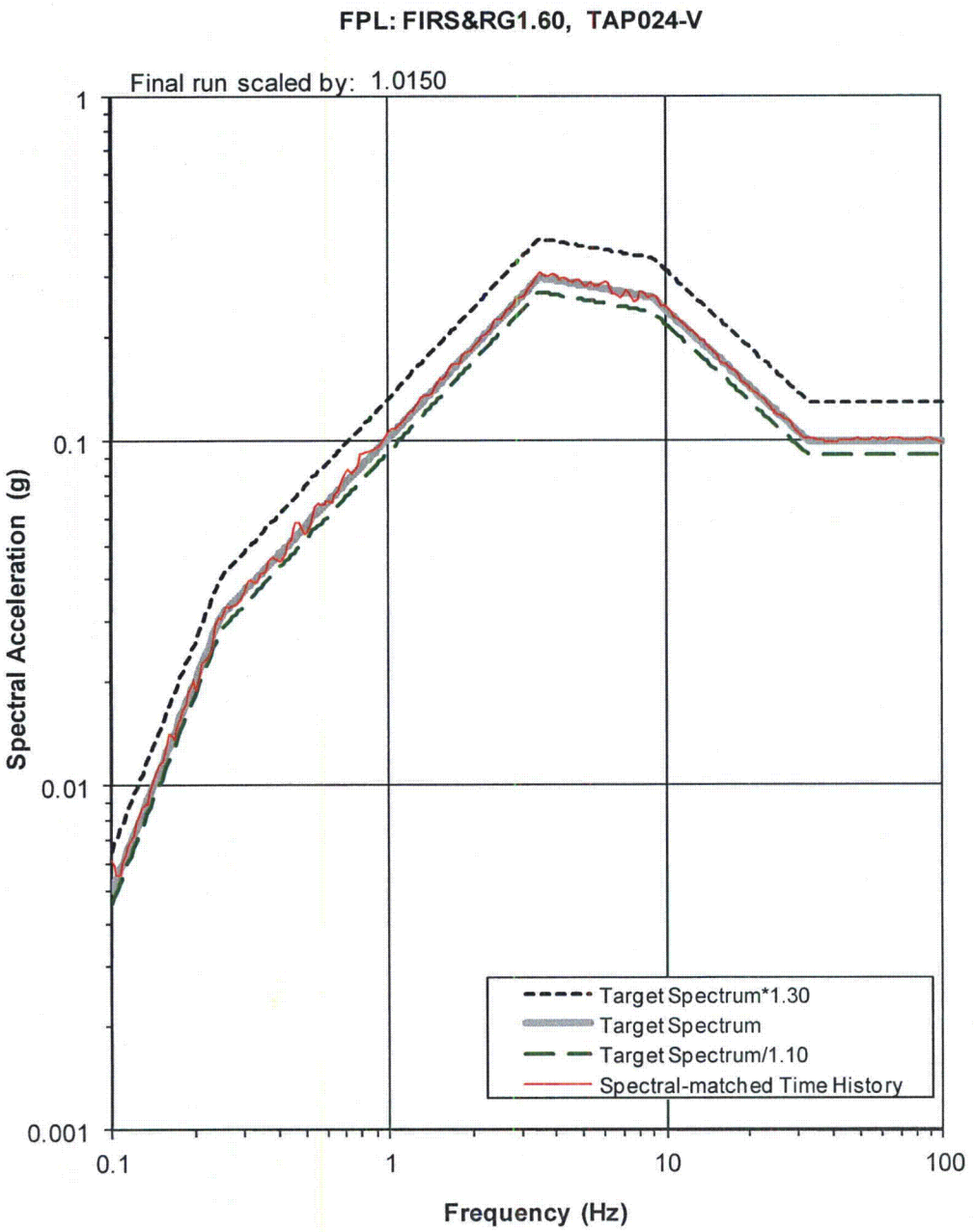


Figure 3JJ-224c
Comparison Between the Final Scaled Spectrum-Compatible Response Spectrum, Vertical SSE ARS, and Upper and Lower Target Spectrum Bounds for Vertical Case With the Constant Scale Factor of 1.015 Applied



Figures 3JJ-225 through 3JJ-230 will be replaced in a future COLA revision as follows. Note that for these figures the titles will not change.

Figure 3JJ-225
5% Damping ARS at Ground Surface –
Direction H1 – NI Site Condition

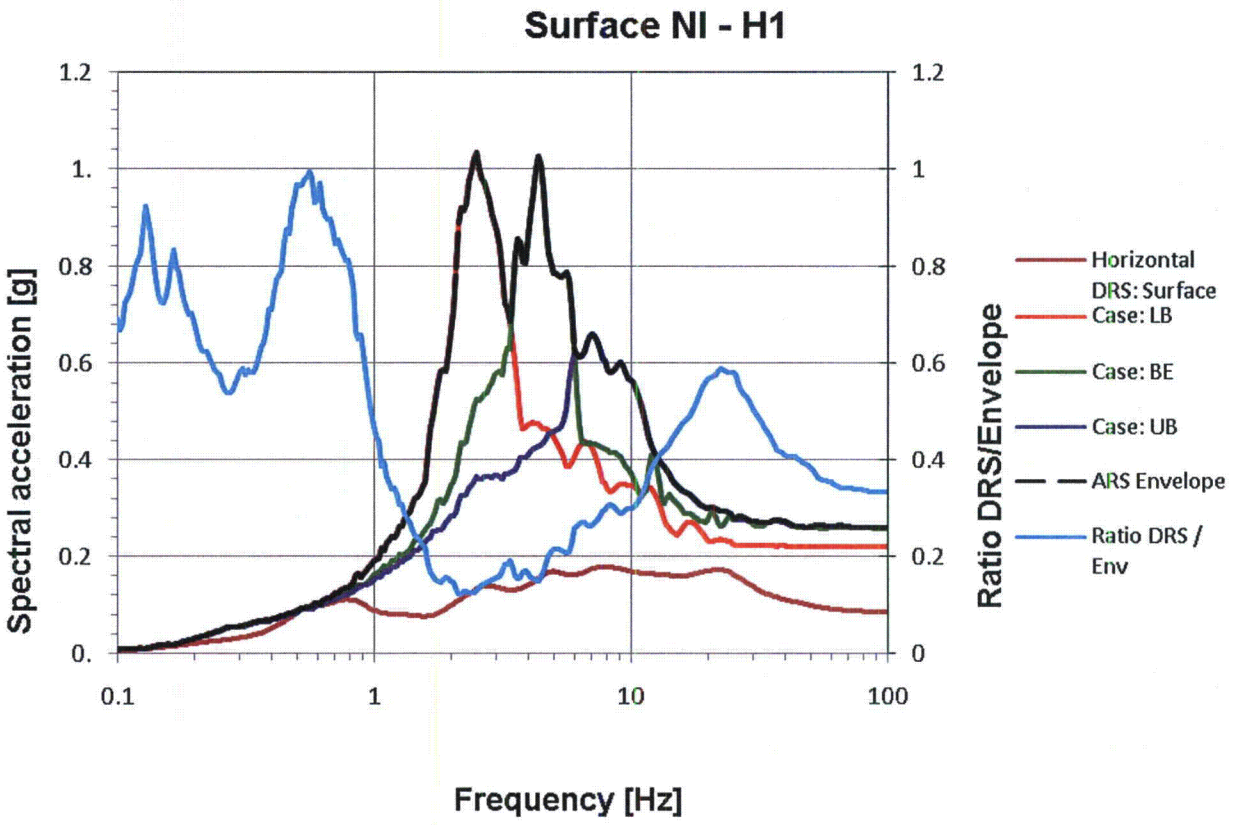


Figure 3JJ-226
5% Damping ARS at Ground Surface – Direction H2 – NI Site Condition

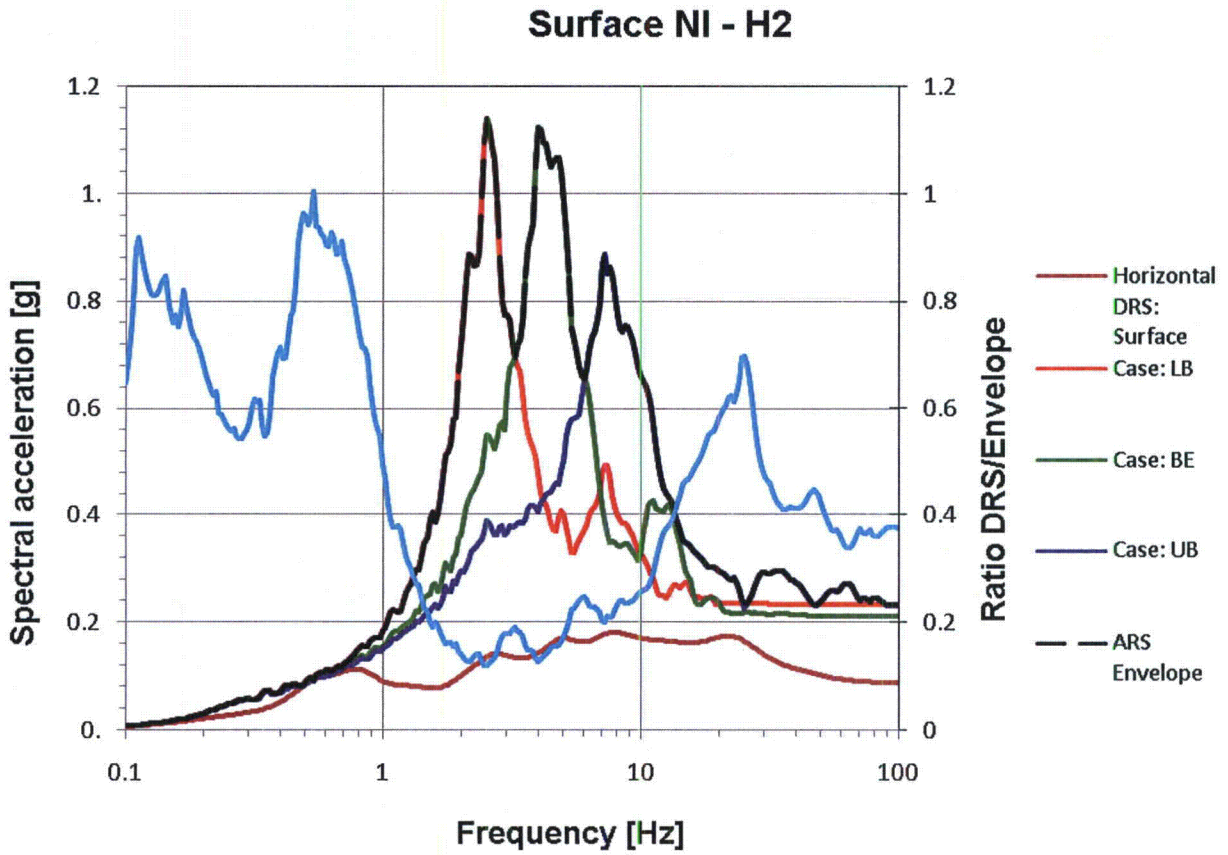


Figure 3JJ-227
5% Damping ARS at Ground Surface – Direction UP –
NI Site Condition

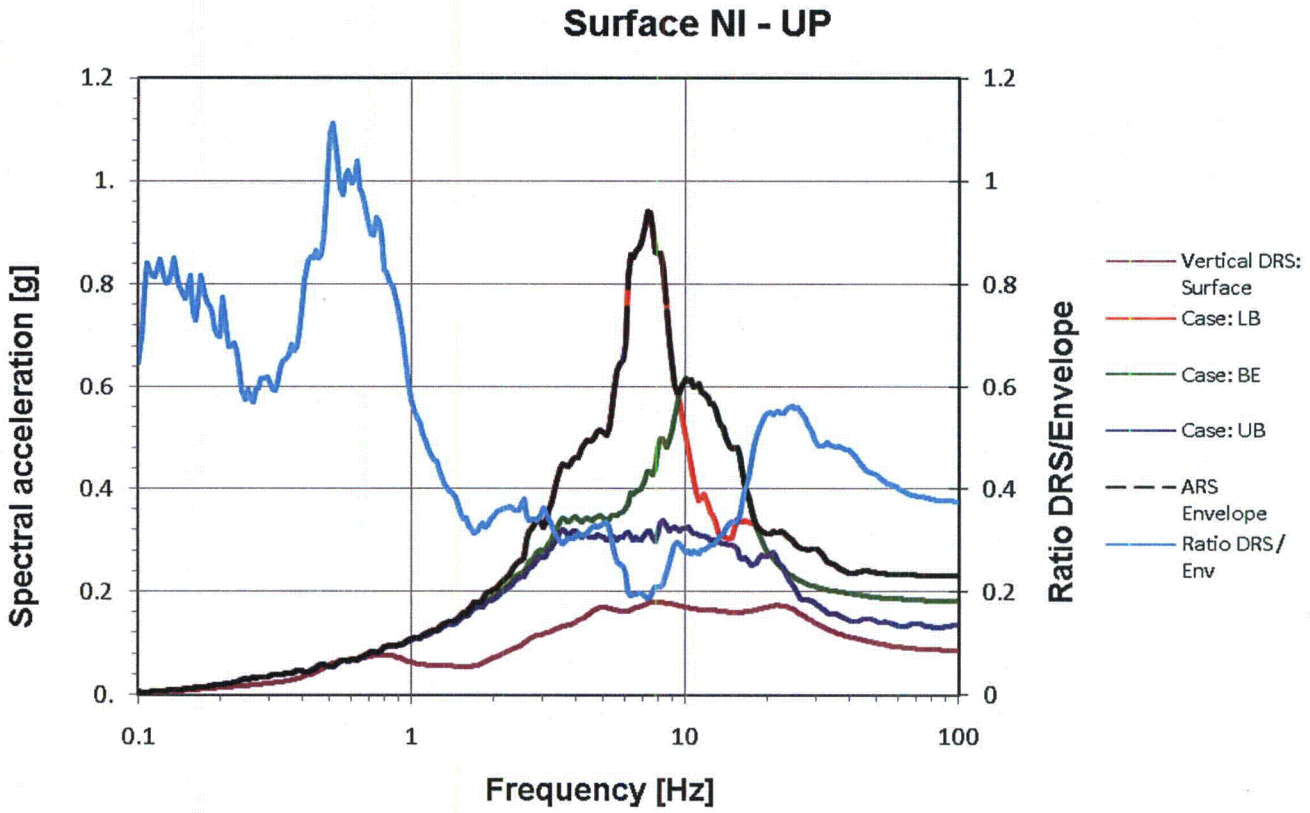


Figure 3JJ-228
5% Damping ARS at Ground Surface –
Direction H1 – FAR Site Condition

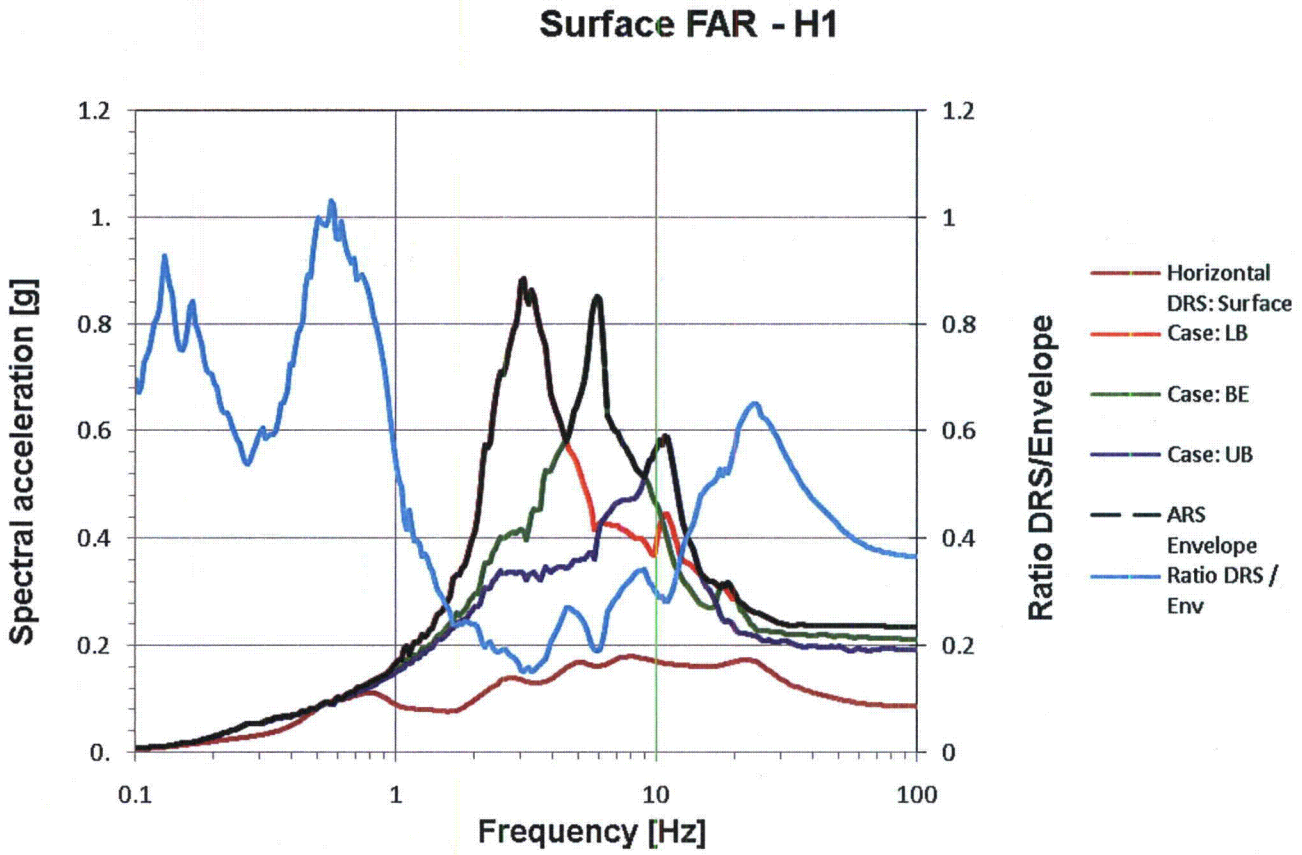


Figure 3JJ-229
5% Damping ARS at Ground Surface – Direction H2 –
FAR Site Condition

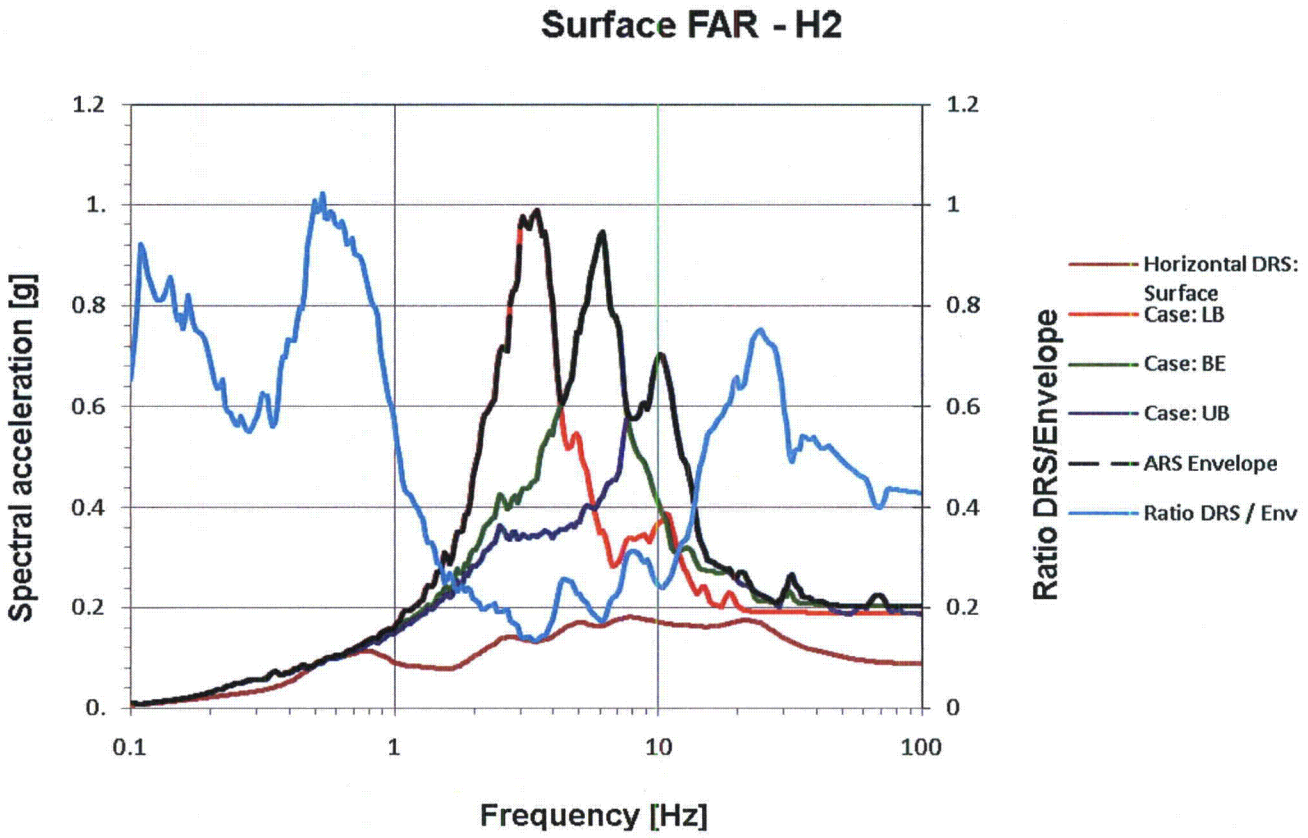


Figure 3JJ-230
5% Damping ARS at Ground Surface – Direction UP –
FAR Site Condition

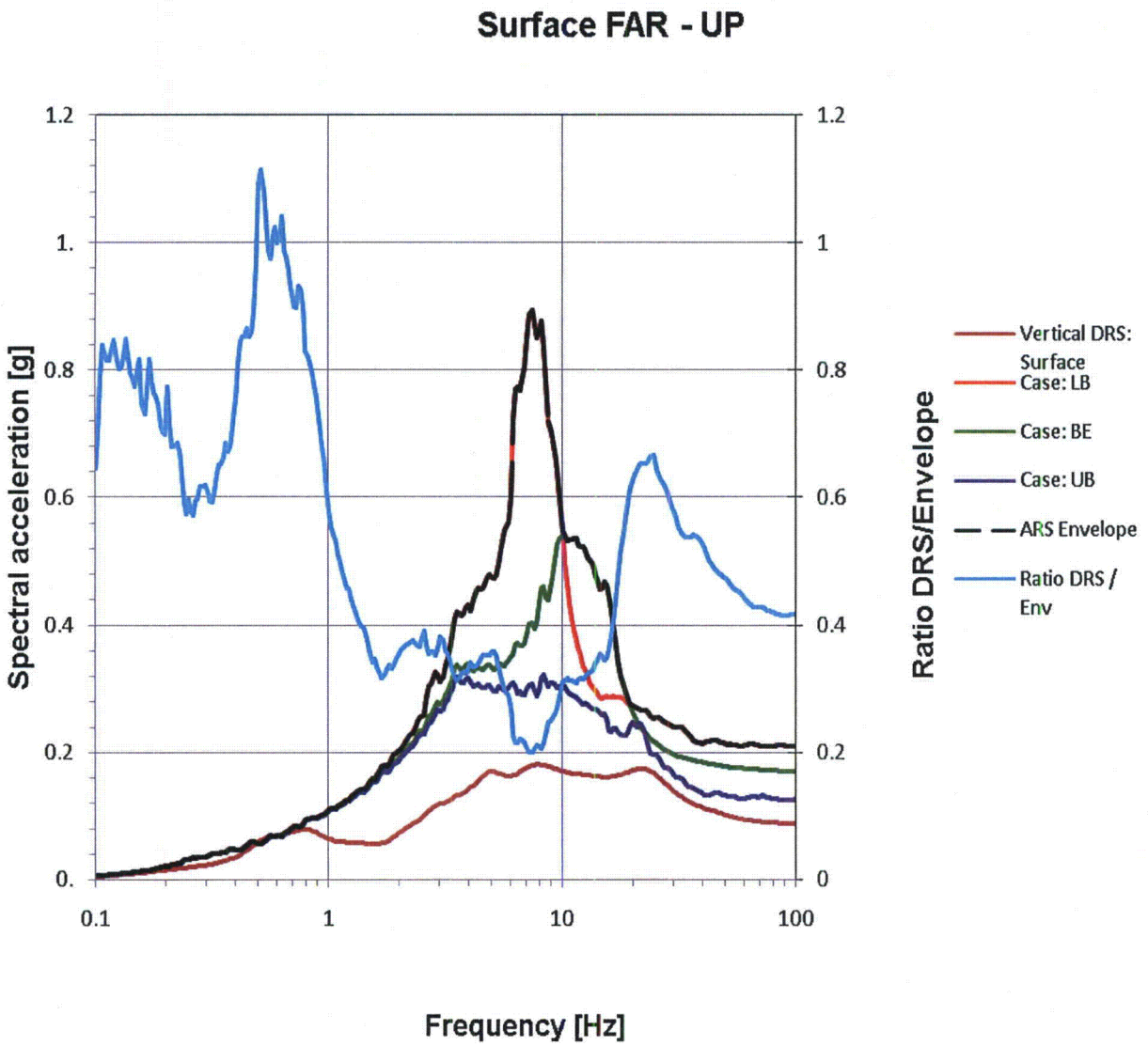


Figure 3JJ-231
~~Adjusted Vertical Target ARS at FIRS Horizon (5% Damping) Time [sec]~~ NOT USED

Figures 3JJ-232 through 3JJ-237 will be replaced in a future COLA revision as follows. Note that for these figures the titles will not change.

Figure 3JJ-232
SSI Input "Within" Acceleration Time History –
Direction H1 – NI Site Condition Time [sec]

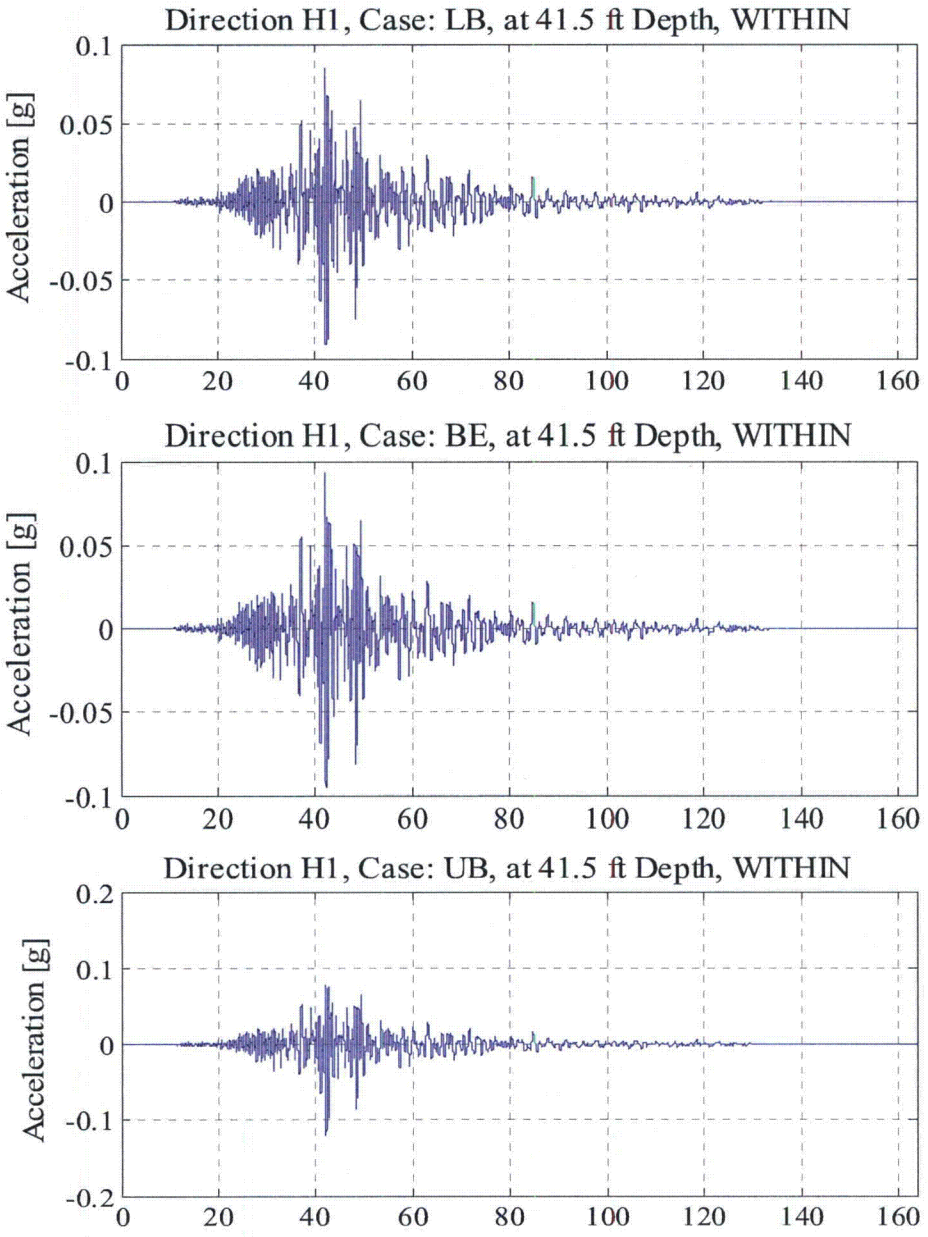


Figure 3JJ-233
SSI Input "Within" Acceleration Time History –
Direction H2 – NI Site Condition [sec]

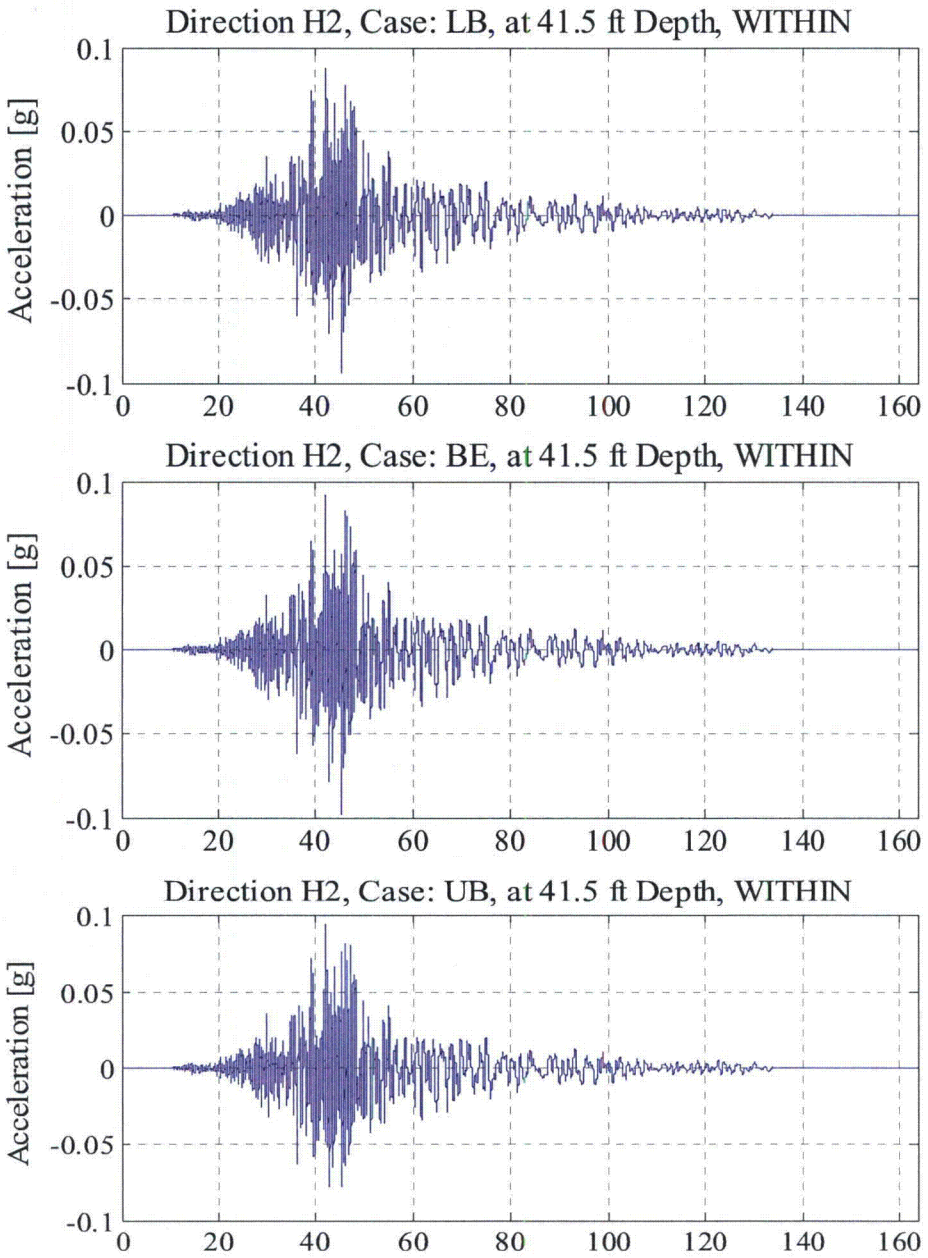


Figure 3JJ-234
SSI Input "Within" Acceleration Time History –
Direction UP – Site Condition Time [sec]

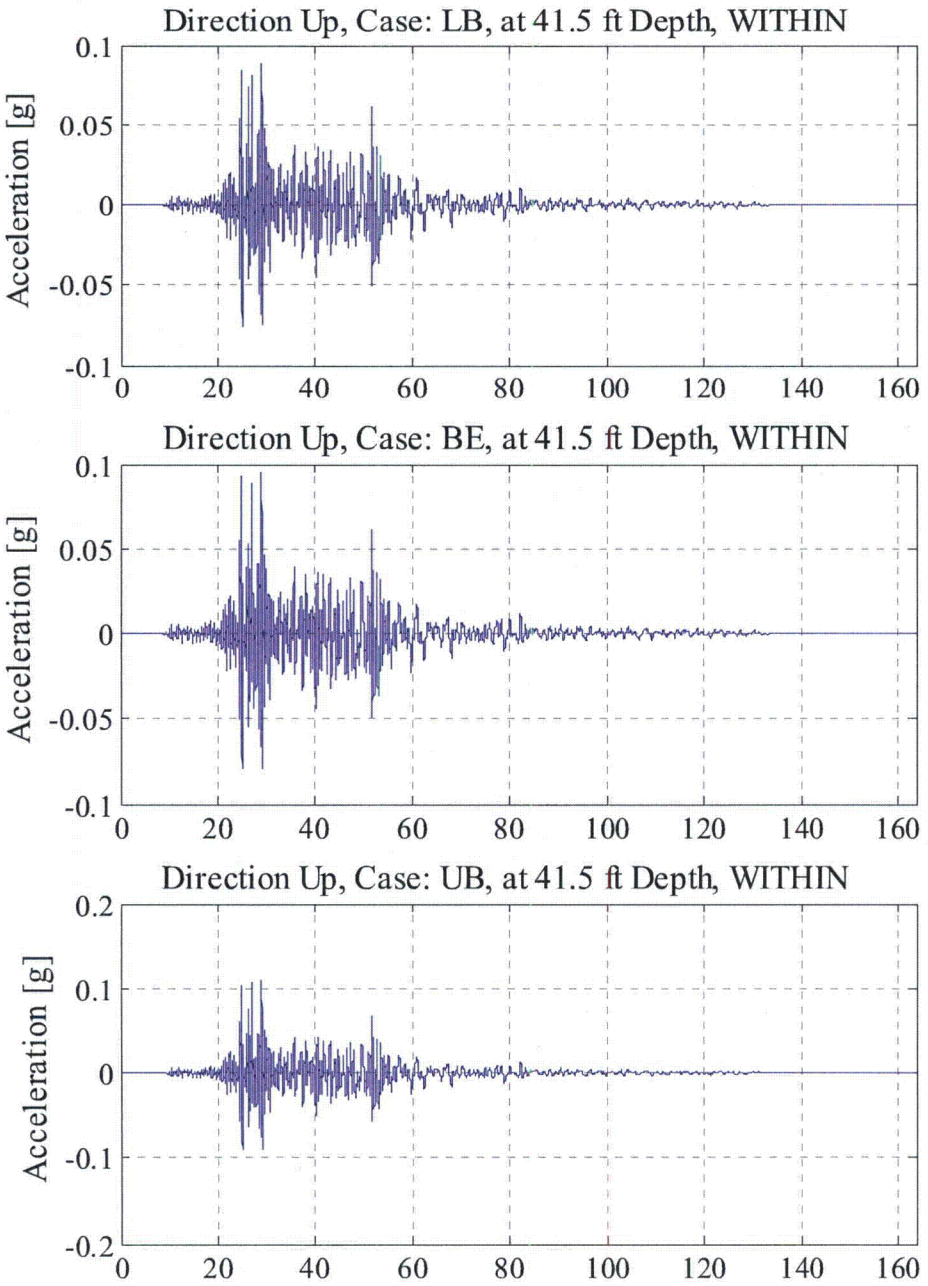


Figure 3JJ-235
SSI Input "Within" Acceleration Time History –
Direction H1 – FAR Site Condition Time [sec]

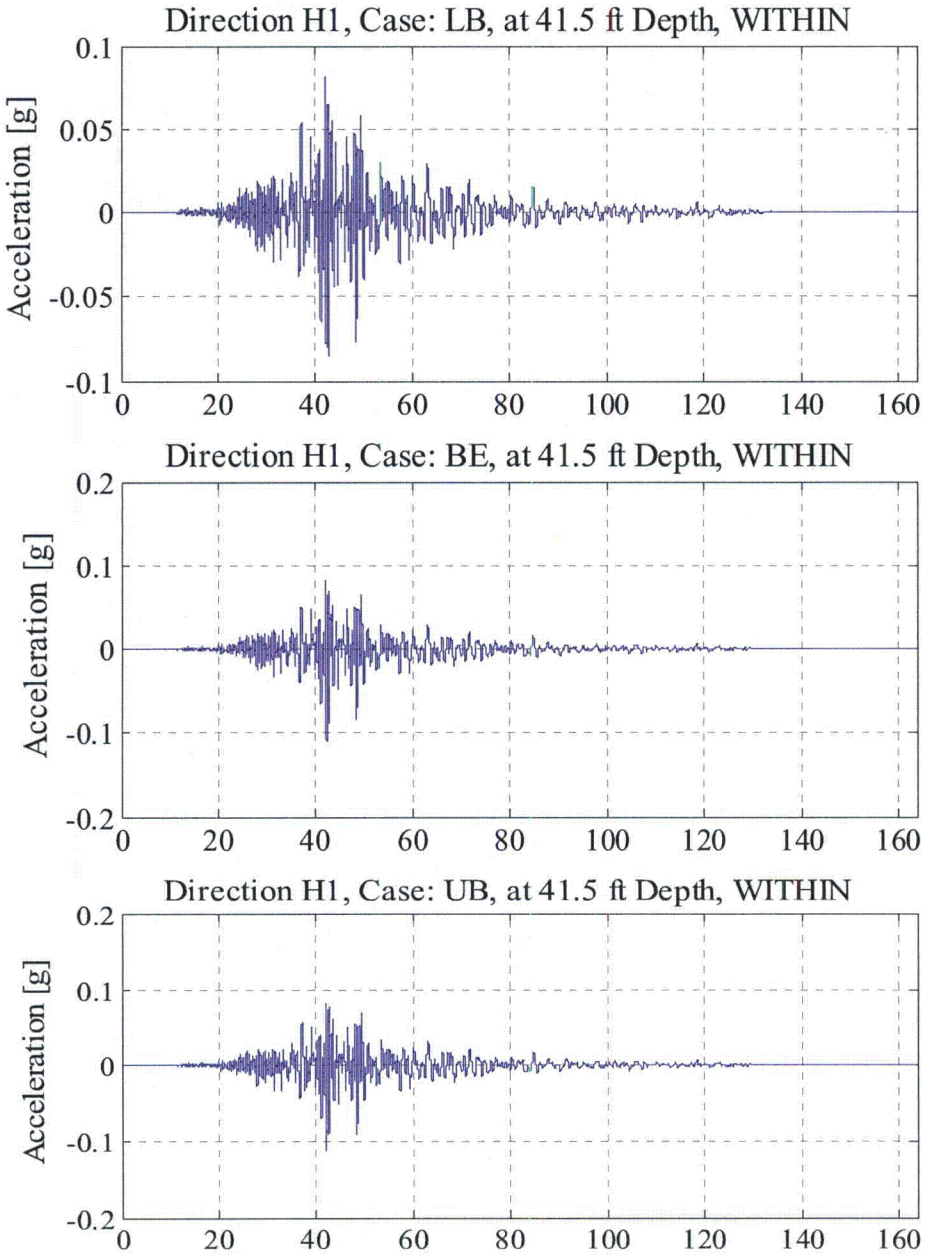


Figure 3JJ-236
SSI Input "Within" Acceleration Time History –
Direction H2 – FAR Site Condition Time [sec]

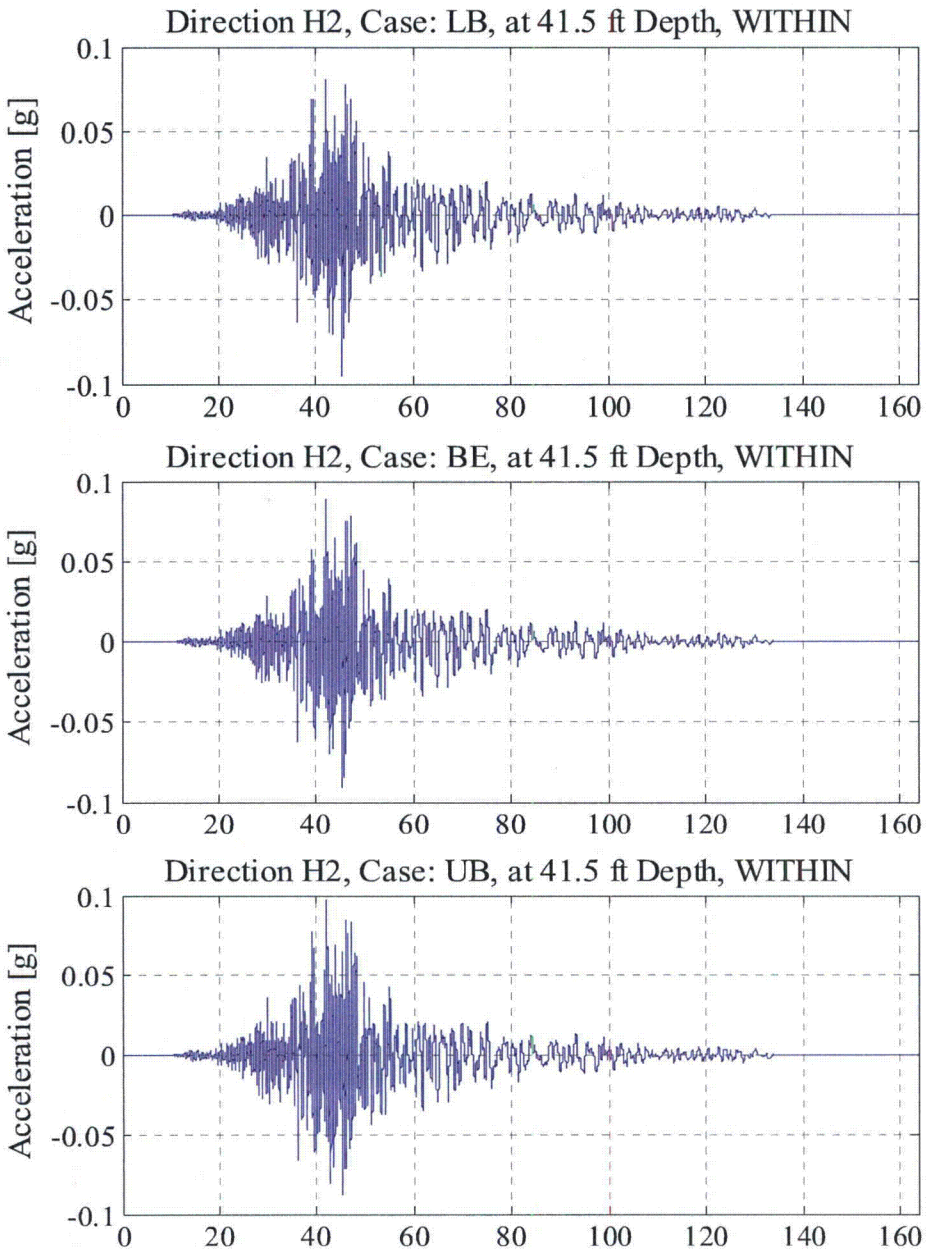
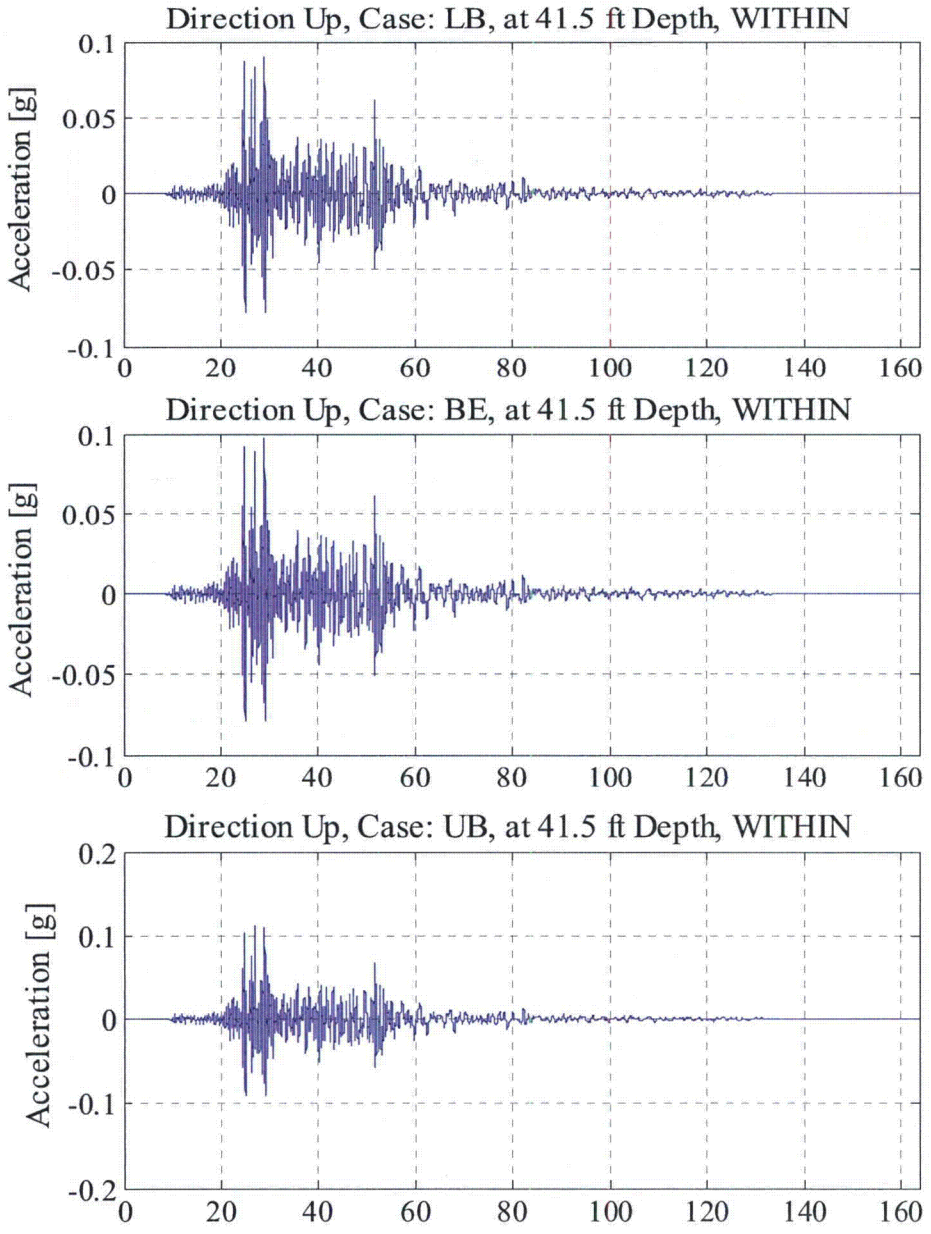


Figure 3JJ-237
SSI Input "Within" Acceleration Time History –
Direction UP – FAR Site Condition



New Figures 3JJ-238 through 3JJ-240 will be added in a future COLA revision as follows.

Figure 3JJ-238
5% Damped ARS for FIRS and RG 1.60 Scaled to a PGA of 0.1 g
(Elevation -16 foot Horizon at Bottom of Nuclear Island Foundation)

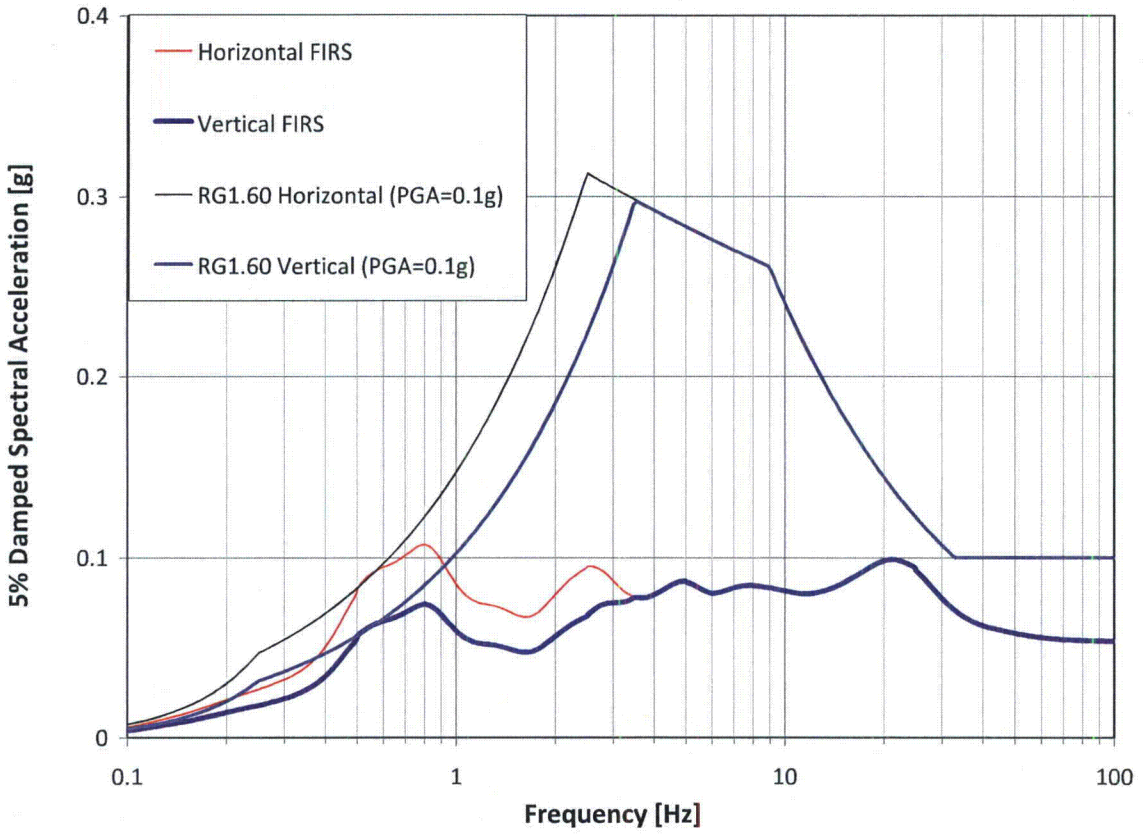


Figure 3JJ-239
Propagated Motion at Foundation Level – NI Soil Column
(Elevation -16 foot Horizon at Bottom of Nuclear Island Foundation)

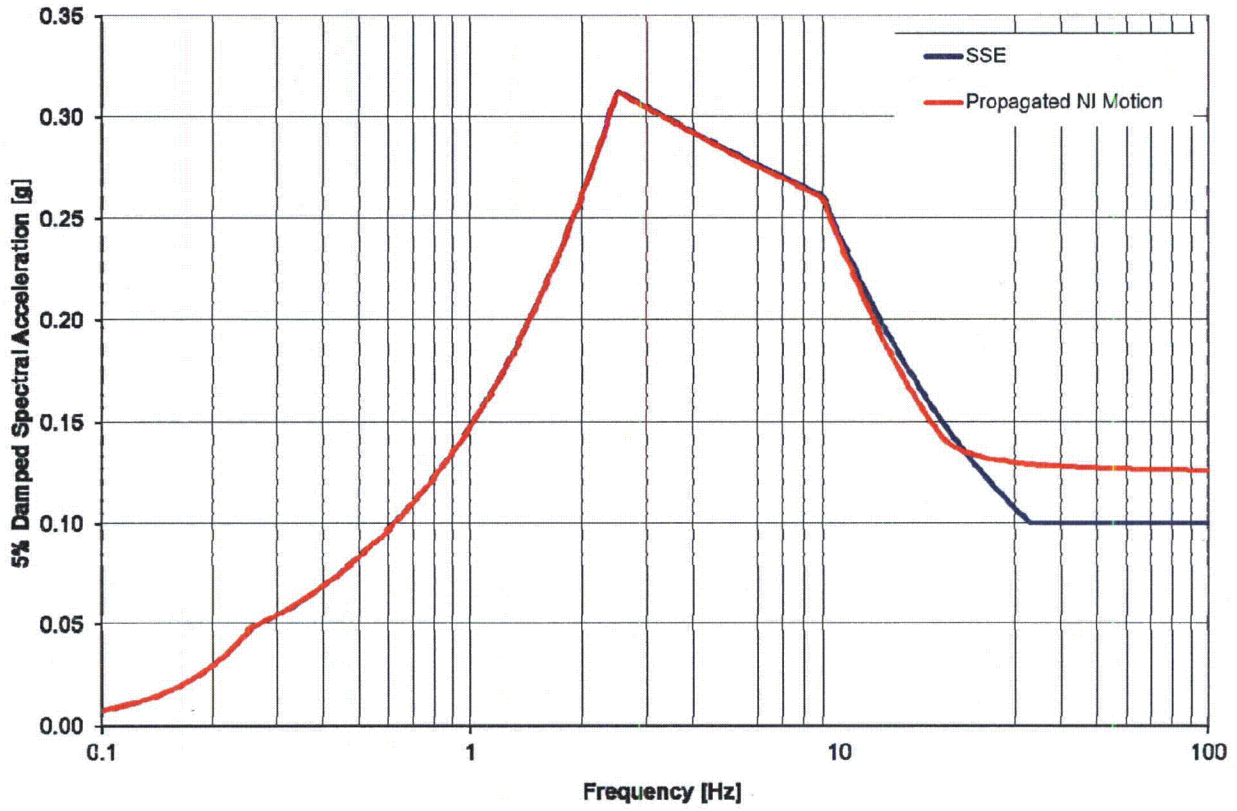
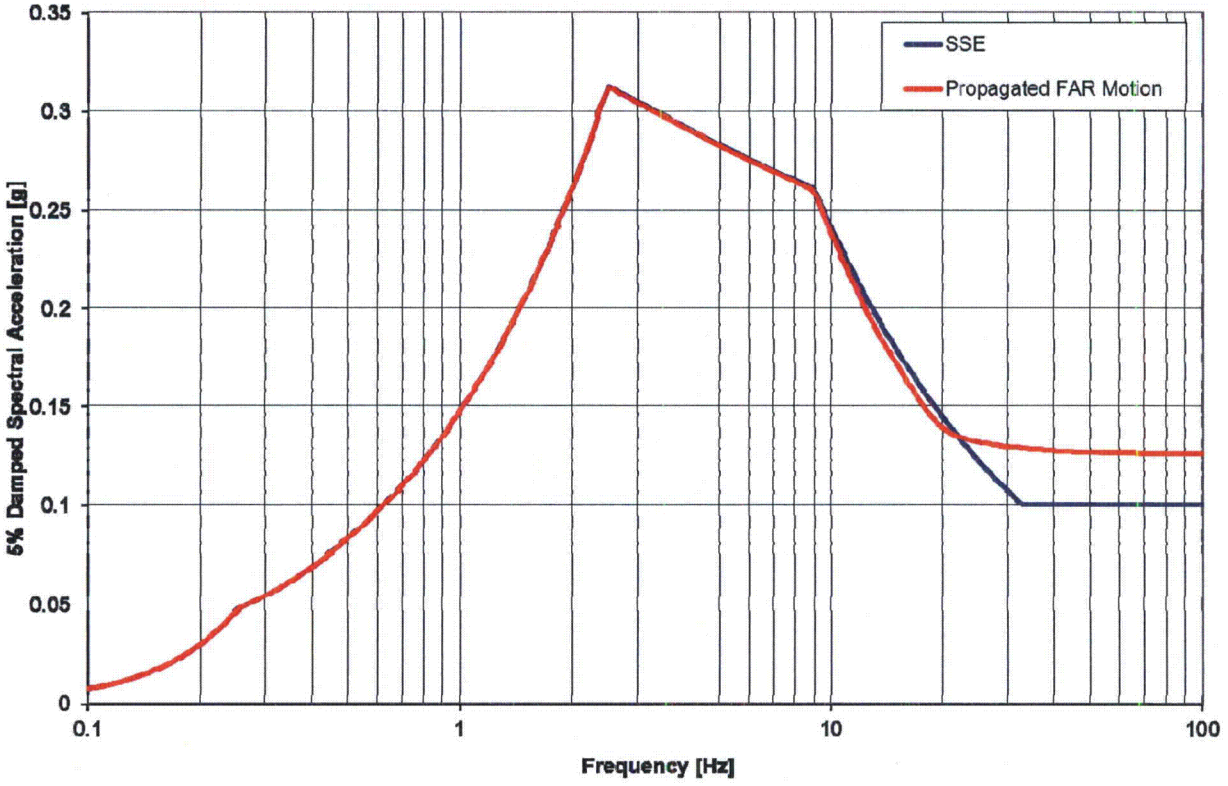


Figure 3JJ-240
Propagated Motion at Foundation Level – FAR Soil Column
(Elevation -16 foot Horizon at Bottom of Nuclear Island Foundation)



TPG-1000-S2R-802 (Westinghouse Proprietary) and TPG-1000-S2R-807 (Westinghouse Non-proprietary), Turkey Point Site-Specific Seismic Evaluation Report will be provided as Appendix 3KK in a future COLA revision. These reports are provided as Enclosures 3 and 4, respectively.

ASSOCIATED ENCLOSURES:

1. L-2013-071 Enclosure 3: Westinghouse Non-Proprietary Report No. TPG-1000-S2R-807, Rev.2, Turkey Point Site Specific Seismic Evaluation Report, dated January 2013
2. L-2012-071 Enclosure 4: Westinghouse Proprietary Report No. TPG-1000-S2R-802, Rev.5, Turkey Point Site Specific Seismic Evaluation Report, dated January 2013.