PMTurkeyCOLPEm Resource

From: Comar, Manny
Sent: Thursday, November 01, 2012 5:04 PM
To: TurkeyCOL Resource
Subject: FW: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 5896 - Vibratory Ground Motion
Attachments: Draft Revised Response for NRC RAI Letter No. 037 (eRAI 5896) 2.5.2-9.pdf

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From: Franzone, Steve [mailto:Steve.Franzone@fpl.com]
Sent: Friday, October 19, 2012 11:45 AM
To: Comar, Manny
Cc: Maher, William; Burski, Raymond; Franzone, Steve
Subject: RE: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 5896 - Vibratory Ground Motion

Manny,

To support a future public meeting, FPL is providing draft revised responses for eRAI 5896 (RAI questions 02.05.02-9) in the attached file:

If you have any questions, please contact me.
Thanks
Steve Franzone
NNP Licensing Manager - COLA
"Never give in--never, never, never, never, in nothing great or small, large or petty, never give in except to convictions of honour and good sense. Never yield to force; never yield to the apparently overwhelming might of the enemy. " Sir Winston Churchill, Speech, 1941, Harrow School
561.694.3209 (office)
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Hearing Identifier: TurkeyPoint_COL_Public
Email Number: 702

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Subject: FW: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 5896 - Vibratory Ground Motion
Sent Date: 11/1/2012 5:03:46 PM
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From: Comar, Manny

Created By: Manny.Comar@nrc.gov

Recipients:
"TurkeyCOL Resource" <TurkeyCOL.Resource@nrc.gov>
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NRC RAI Letter No. PTN-RAI-LTR-037

SRP Section: 02.05.02 - Vibratory Ground Motion

Question for Geosciences and Geotechnical Engineering Branch 1 (RGS1)

NRC RAI Number: 02.05.02-9 (eRAI 5896)

FSAR Subsection 2.5.2.5.1 states that P-wave velocities from eight deep wells were used to develop the deeper (>636 ft) sections of the site response model. The wells that provide the P-wave velocity information are approximately 100km to 180km away from the site. In accordance with Regulatory Guide (RG) 1.208, "A Performance-Based Approach to Define the Site-Specific Earthquake Ground
Motion", please provide:

a. additional information on the applicability of seismic velocity information obtained at such great distances to the Turkey Point site. How was the variation in geology considered in these projections?

b. individual velocity profiles for each of the eight wells used in estimating the average profile shown in FSAR Figure 2.5.4-211

c. further details on how larger uncertainties in deeper layers' thicknesses/depths are taken into account in the randomization of the site profile

FPL RESPONSE:

Background

Sonic logs 0001, 0002, 0005, 0007, 0008 and 0010 (files purchased from the Florida Geological Survey Division of Oil and Gas) were derived from wells located approximately 66 miles (approximately 106.2 kilometers), 62 miles (approximately 100.0 kilometers), 81 miles (approximately 130.4 kilometers), 110 miles (approximately 177.0 kilometers), 82 miles (approximately 132.0 kilometers), and 71 miles (approximately 114.3 kilometers) from the FPL Turkey Point site, respectively (FSAR Figure 2.5.4-210). The measurements recorded by the probe at these locations were depth, expressed in feet below the drill rig's Kelly bushing, and the interval travel time (Delta T (DT_p)) expressed in microseconds (10^{-6} seconds) per foot. The logs were initiated at an upper depth of 3,610 to 4,100 feet (El. -3,555 to -4,059 feet NAVD 88) below each drill rig's Kelly bushing and terminated at a lower depth of 11,600 to 11,920 feet (El. -11,564 to -11,879 feet NAVD 88) below Kelly bushing.

Because these six sonic logs do not possess DT_p data for depths above 3,610 (El. -3,555 feet NAVD88), a gap in the compression wave velocity data existed between the depths of 620 and 3,610 feet (El. -600 and -3,555 feet NAVD 88). To fill much of this data gap, two sonic logs, LAB-TW and PBF-12, obtained from U.S. Geological Survey (Reference 1) were manually digitized over ten- foot intervals.

Sonic logs LAB-TW and PBF-12 (Reference 1) were derived from wells located approximately 115 miles (approximately 185.1 kilometers) and 64 miles (approximately

103.0 kilometers) from the FPL Turkey Point site, respectively (FSAR Figure 2.5.4-210). The measurements recorded by the probe at these locations were depth, expressed in feet below land surface, and DT_p, expressed in microseconds (10^{-6} seconds) per foot. The logs were initiated at an upper depth of 500 to 900 feet (El. -482 to -834 feet NAVD88) below land surface and terminated at a lower depth of 1,900 to 2,350 feet (El. -1882 to -2334 feet NAVD88) below land surface.

The wells noted in the preceding two paragraphs are the closest wells to the Turkey Point Units 6 & 7 site with available subsurface seismic velocity data. This response is structured to respond to parts a, b, and c of the RAI.

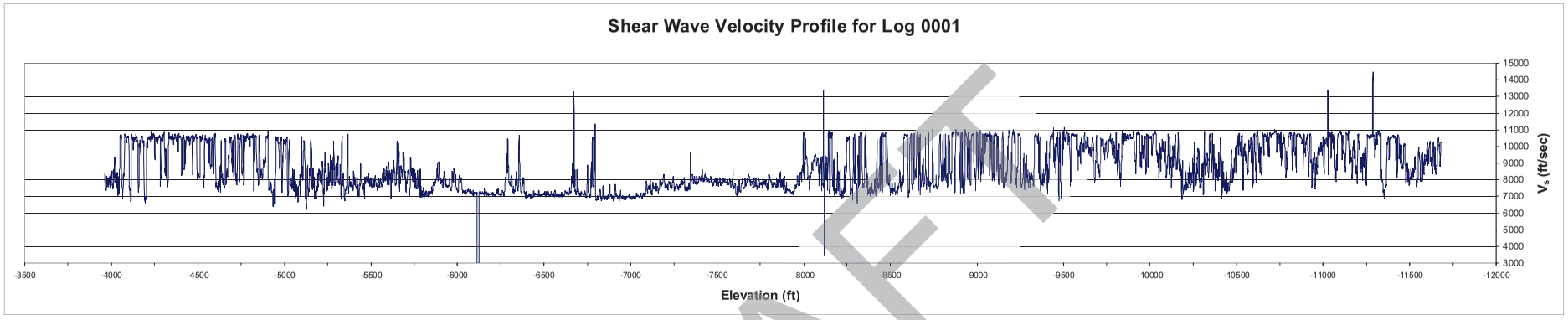
a) The well locations with the sonic logs used for this analysis are shown on FSAR Figure 2.5.4-210. FSAR Figure 2.5.1-232 shows a north-south regional geologic cross section (Section E-F) through the Upper Mesozoic and Lower Cenozoic rocks in southern Florida. Point 39 on the cross section (and on the Inset Map on FSAR Figure 2.5.1-232) is the closest location on the regional geologic cross section to the majority of the sonic log locations on FSAR Figure 2.5.4-210. The distance from Point 39 to the Turkey Point site is about 80 miles (128.7 kilometers). Based on the review of publications (FSAR Subsection 2.5.1 References 374, 377, 378, and 397), regional geologic cross sections (FSAR Figures 2.5.1-232, 233, 235, and 236) and the sonic logs (0001, 0002, 0005, 0007, 0008, 0010, LAB-TW and PBF-12), there appears to be relatively little variation, on a regional scale, in the stratigraphy of the upper 6,000 ft between the Point 39 area and the Turkey Point site. Based upon this review the stratigraphic units generally show less variation with increasing depth. Therefore, it is reasonable to assume that the lack of stratigraphic variation on the scale shown in FSAR Figure 2.5.1-232 continues below 6,000 feet. The stratigraphic information and shear wave velocity data, which is calculated from Poisson's ratio and interval travel time derived from the sonic logs, were migrated down the gentle regional dip from the locations of the wells shown on FSAR Figure 2.5.4-210 to the Turkey Point Units 6 & 7 site. Geologic variations, where they exist, are most likely due to facies changes within the gross stratigraphic units. This regional geology-based approach is a reasonable means for developing a stratigraphic and shear wave velocity column for the stratigraphic units below the deepest site borings. This approach provides a technical basis for the development of the deep portion of the site response model. Variations in both unit thickness and material properties, that might be the result of facies changes within stratigraphic units, are accounted for by the randomization process described in part c of this RAI response.

b) The compression and shear wave velocity profiles for each of the 8 wells are shown in Figures 1 through 8.

c) The uncertainties in the dynamic properties of the deeper layers were taken into account by the following two steps.

1. The calculated logarithmic standard deviation for each of the converted shear-wave velocity (V_s) values was increased to account for uncertainty in Poisson's ratio and to account for the number of profiles used to construct the deep portion of the base case profile.
2. The layer thicknesses of each synthetic profile were obtained using a randomization approach where the rate of layer boundary changes at a given depth (which is closely related to the probability of having a layer boundary at that depth) is the sum of a smooth continuous function and a non-smooth function that takes non-zero values where the base case profiles have discontinuities in V_s. The value of the latter function is proportional to the relative change in V_s and inversely proportional to the logarithmic standard deviation of V_s. Because the size of the steps in the base case V_s profile is relatively small compared to the logarithmic standard deviation of V_s, these discontinuities tend to occur at different depths in different synthetic profiles, as can be verified in FSAR Figure 2.5.2-239. This implies that the layer thicknesses are strongly randomized in the lower portion of the profile

Figure 1. Shear Wave (V_s) and Compression Wave (V_p) Velocity Profiles for Sonic Log 0001



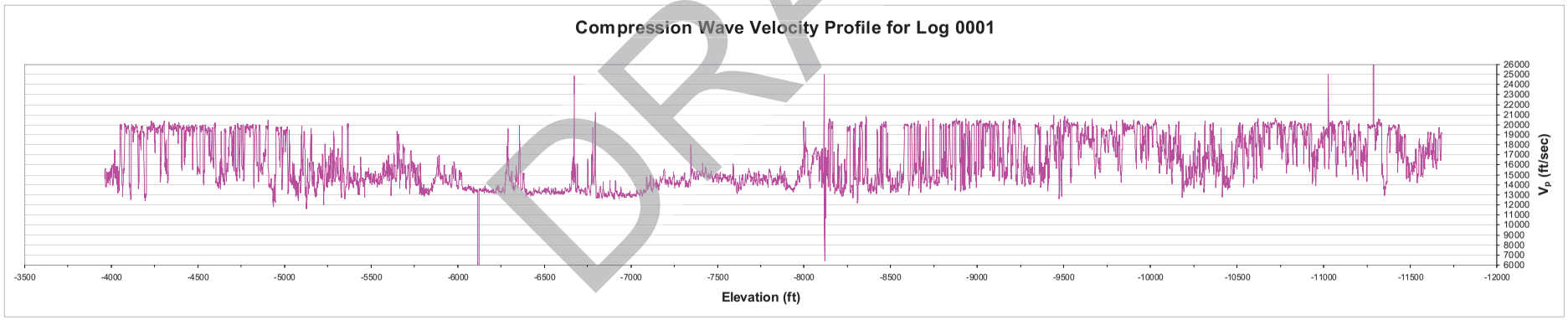
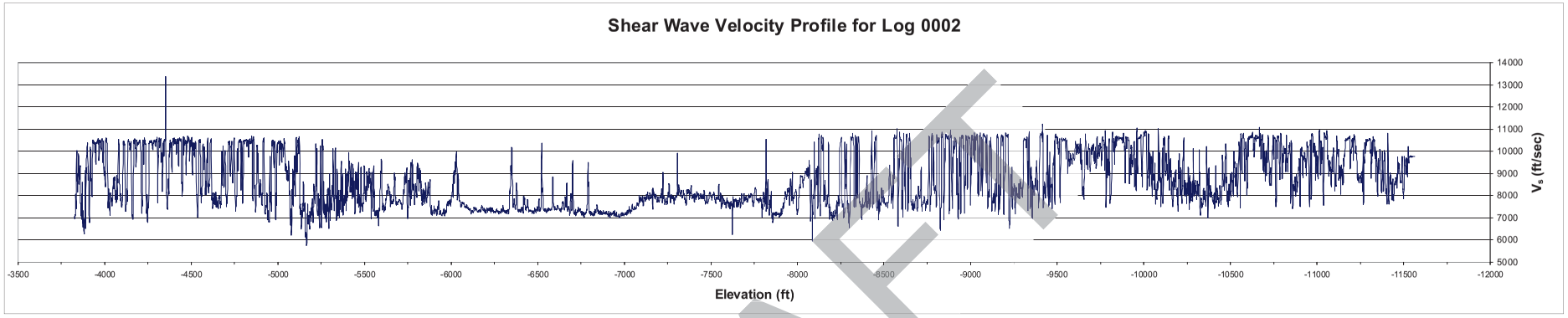


Figure 2. Shear Wave (V_s) and Compression Wave (V_p) Velocity Profiles for Sonic Log 0002



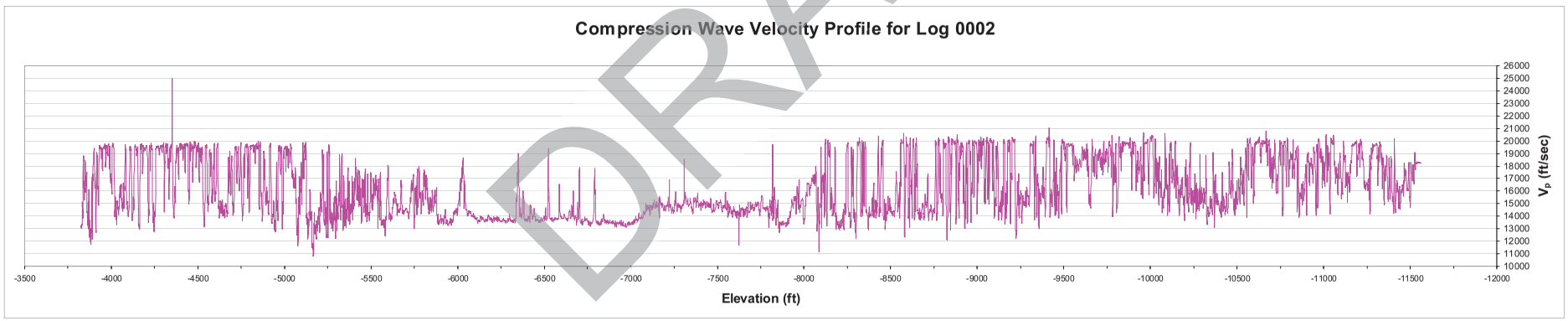
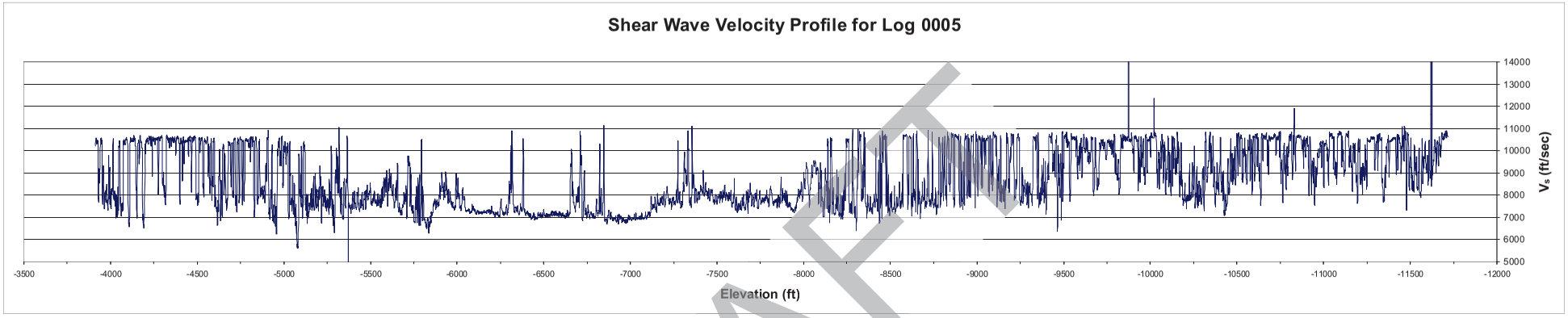


Figure 3. Shear Wave (V_s) and Compression Wave (V_p) Velocity Profiles for Sonic Log 0005



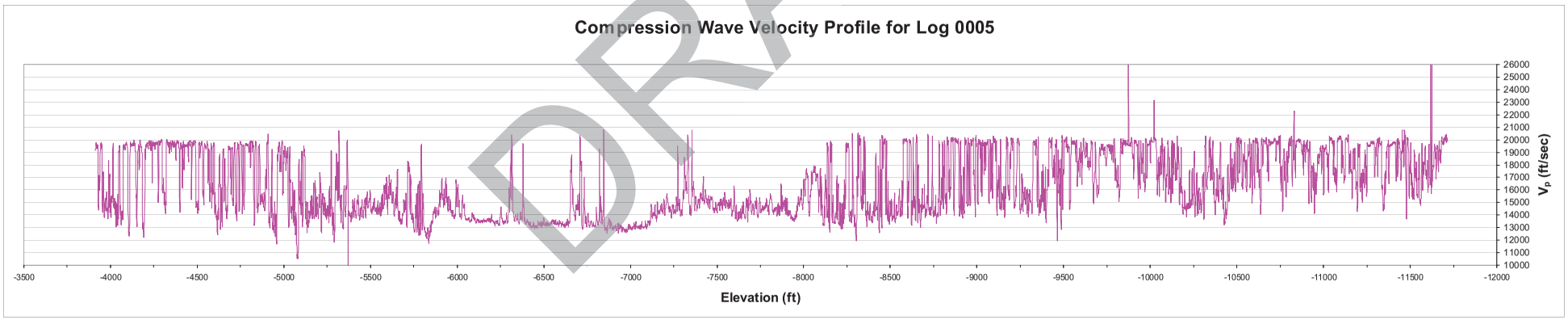
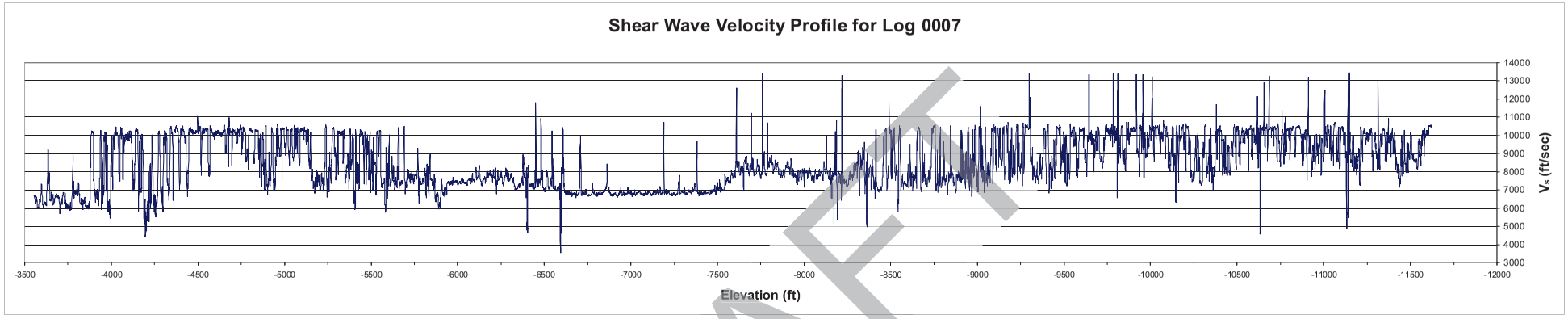


Figure 4. Shear Wave (V_s) and Compression Wave (V_p) Velocity Profiles for Sonic Log 0007



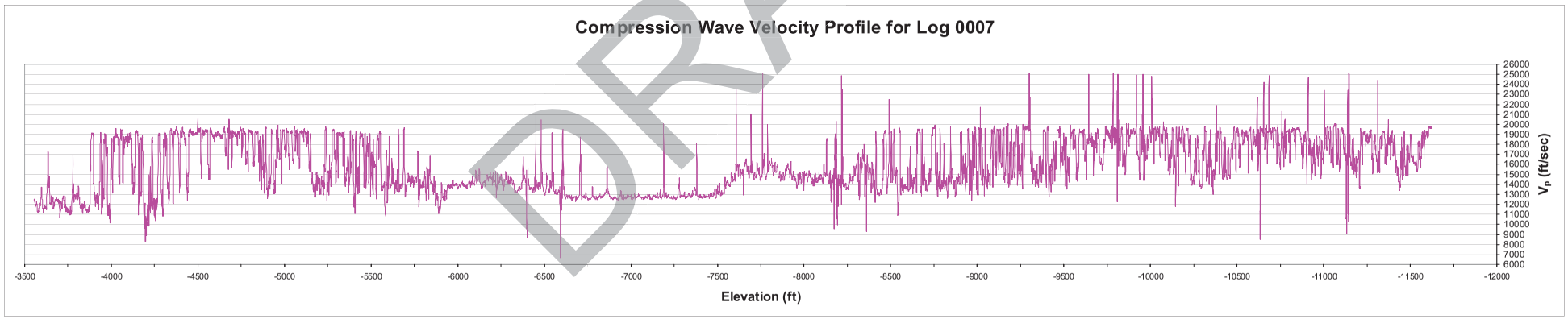
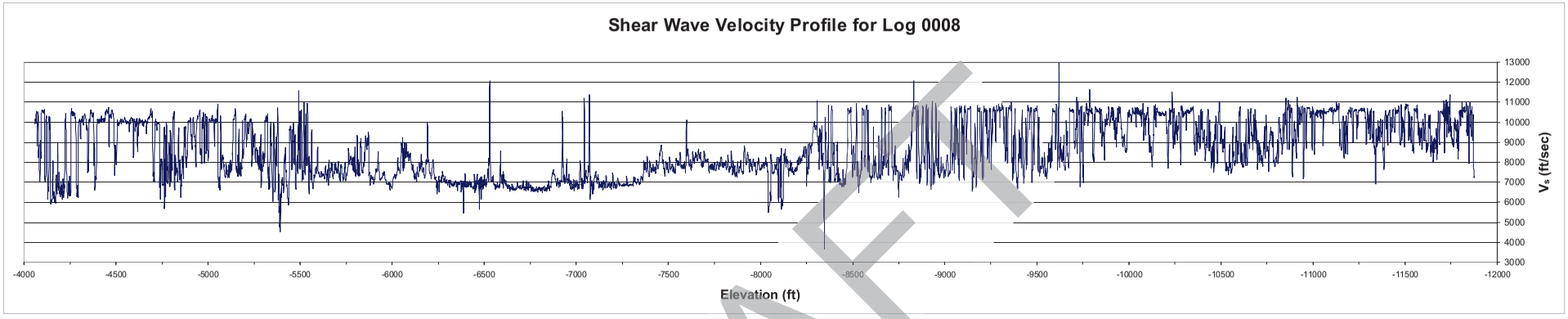


Figure 5. Shear Wave (V_s) and Compression Wave (V_p) Velocity Profiles for Sonic Log 0008



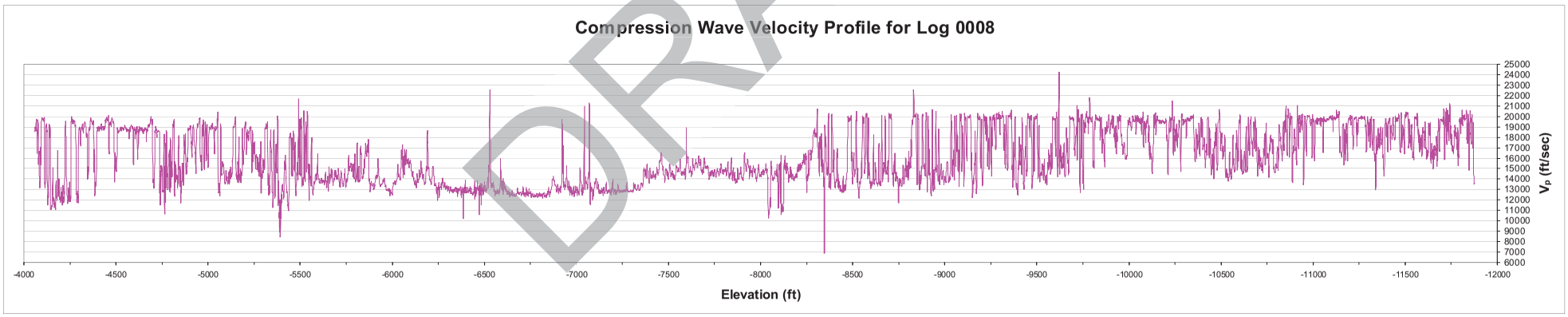


Figure 6. Shear Wave (V_s) and Compression Wave (V_p) Velocity Profiles for Sonic Log 0010

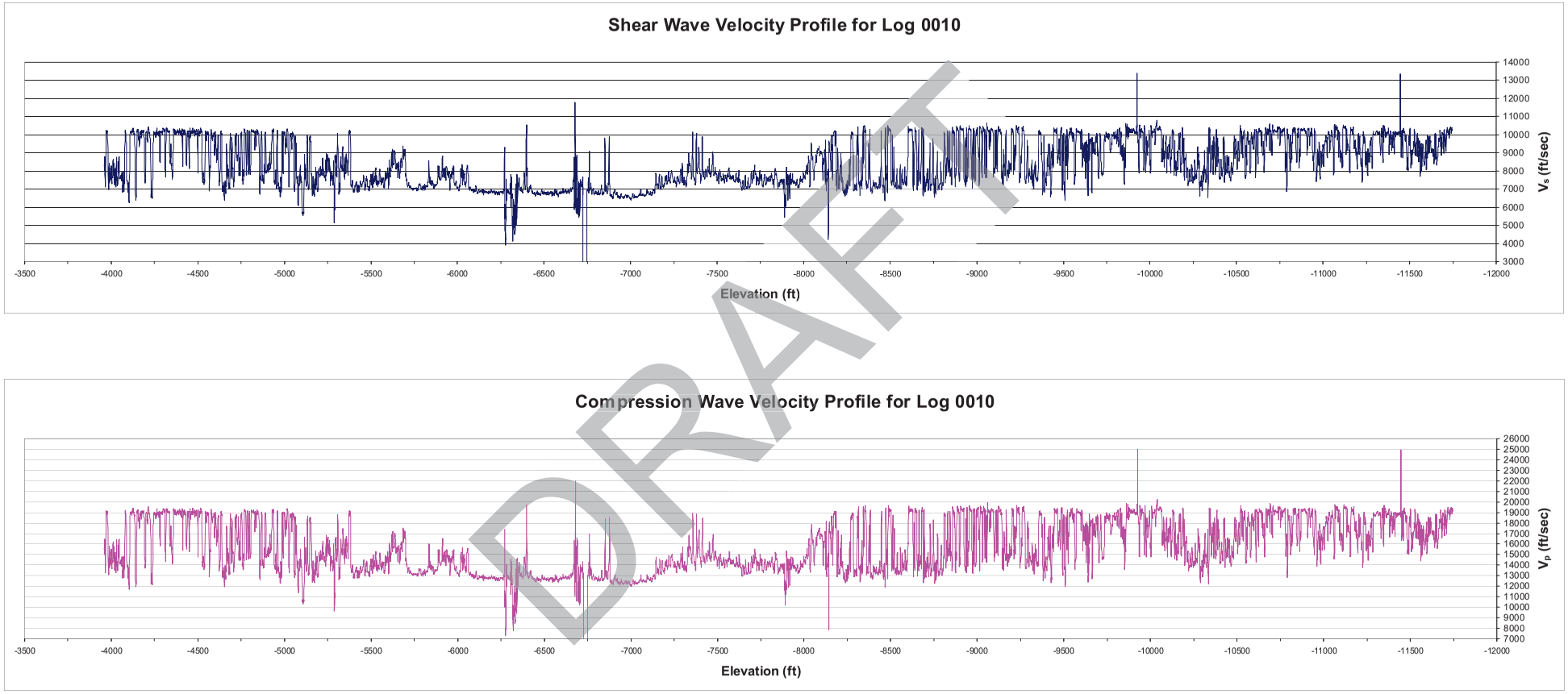
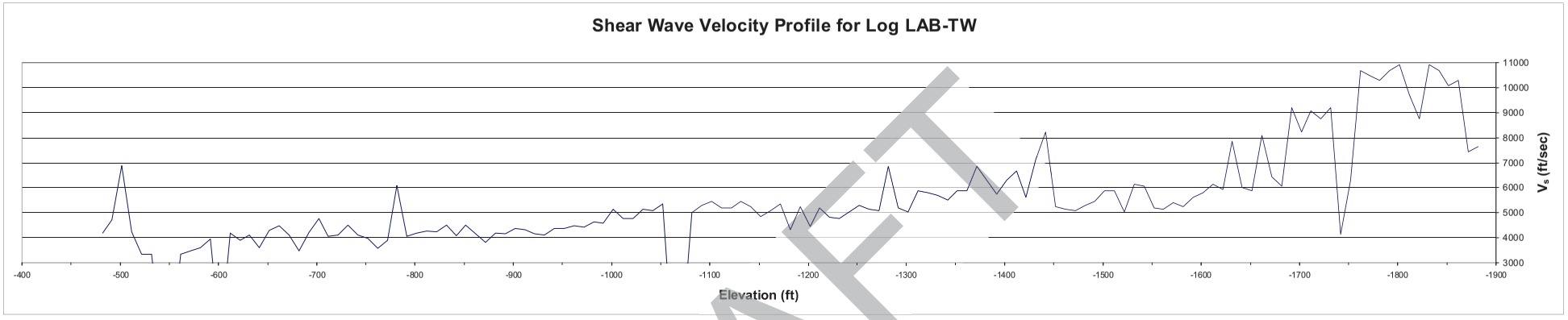


Figure 7. Shear Wave (V_s) and Compression Wave (V_p) Velocity Profiles for Sonic Log LAB-TW



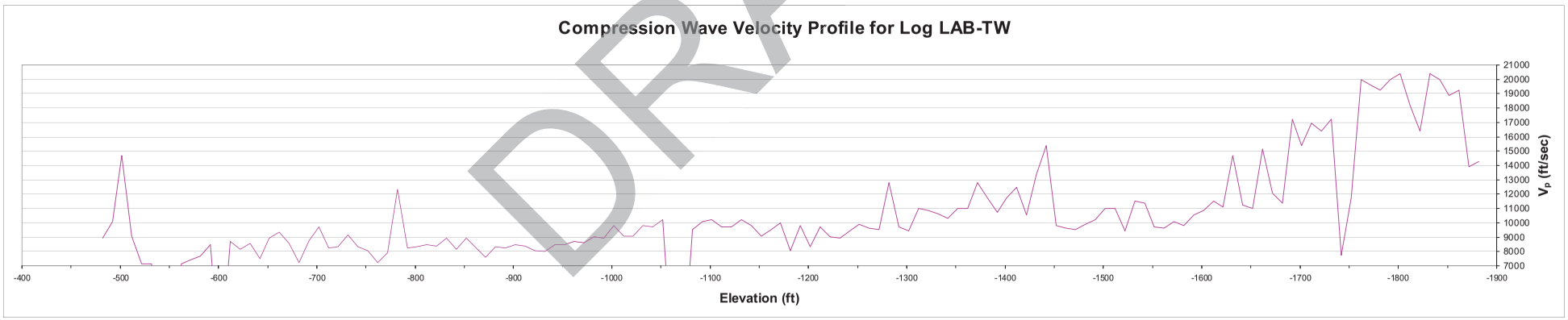
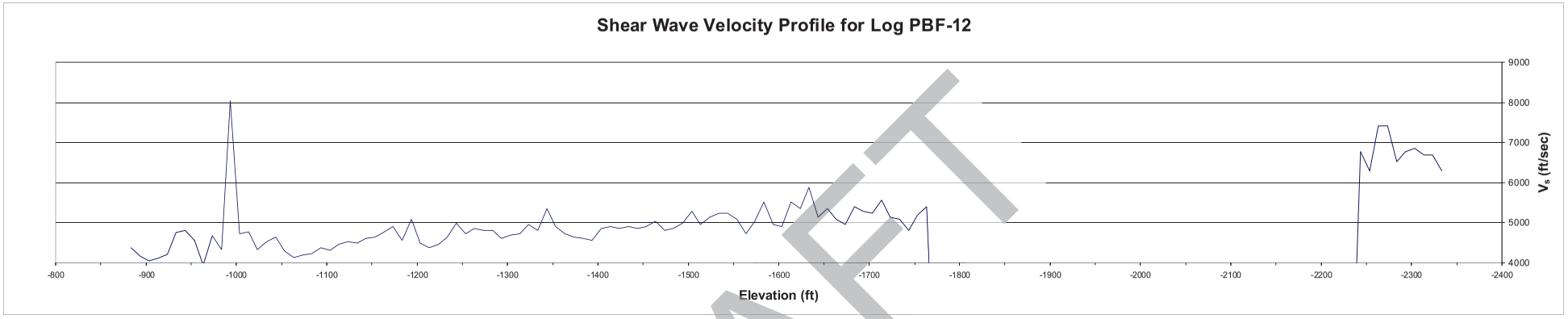
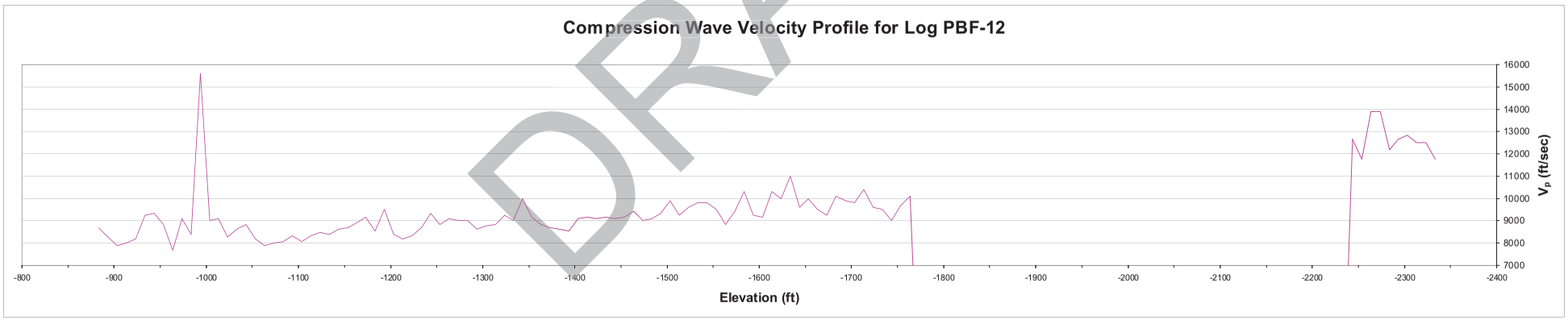


Figure 8. Shear Wave (V_s) and Compression Wave (V_p) Velocity Profiles for Sonic Log PBF-12





This response is PLANT SPECIFIC

References:

1. Reese, R.S. and Richardson, E., Synthesis of the Hydrogeologic Framework of the Floridan Aquifer System and Delineation of a Major Avon Park Permeable Zone in Central and Southern Florida, Scientific Investigations Report 2007-5207, U.S. Geological Survey, 2008.

ASSOCIATED COLA REVISIONS:

None

ASSOCIATED ENCLOSURES:

None