
**Pacific Northwest
National Laboratory**

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**Final Data Report: P- and S-Wave
Velocity Logging
Borings C4993, C4996, And C4997
Part A: Interval Logs**

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February 2007



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P- AND S-WAVE VELOCITY LOGGING BORINGS C4993, C4996 AND C4997 PART A: INTERVAL LOGS

WTP SEISMIC BOREHOLE PROJECT Hanford, Washington

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WTP SEISMIC BOREHOLE PROJECT Hanford, Washington

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1.0 INTRODUCTION

Insitu borehole P- and S-wave velocity measurements were collected in three borings located within the Waste Treatment Plant (WTP) boundaries at the Hanford Site, southeastern Washington. Geophysical data acquisition was performed between August and October of 2006 by Rob Steller, Charles Carter, Antony Martin and John Diehl of **GEOVision**. Data analysis was performed by Rob Steller and John Diehl, and reviewed by Antony Martin of GEOVision, and report preparation was performed by John Diehl and reviewed by Rob Steller. The work was performed under subcontract with Battelle, Pacific Northwest Division with Marty Gardner as Battelle's Technical Representative and Alan Rohay serving as the Technical Administrator for Pacific Northwest National Laboratory (PNNL).

This report describes the field measurements, data analysis, and results of this work.

2.0 SCOPE OF WORK

This report presents the results of insitu geophysical PS suspension seismic measurements collected between August and October, 2006, in three borings, as detailed below and summarized in Table 1. The purpose of these studies was to acquire shear wave velocities and compressional wave velocities as a function of depth, to support the WTP Seismic Borehole Project. This work was performed within the boundaries of the Hanford Site.

Table 1. Boring locations

BORING DESIGNATION	X	Y	Z
BH-C4993	307755.440	5158260.488	200.499
BH-C4996	307826.310	5158555.282	204.079
BH-C4997	307977.327	5158249.420	206.406

Reference:

Waste Treatment Plant Borehole Survey, January 15-16, 2007

UTM Zone 11, Horizontal Datum NAD83, Horizontal and Vertical Units Meters, Vertical Datum NAVD88

The primary focus of borehole geophysics was to measure the seismic velocities in the “interbeds” between basalt flows. GEOVision acquired this data (this report, Part A) in freshly drilled segments, beginning nominally 50ft below the previous interbed, and continuing to about 30ft below the next interbed. This report describes the results of these interval measurements. The subsequent Part B of this report will describe overall measurements in completed, but cemented boreholes.

The OYO Model 170 Suspension Logging Recorder and Suspension Logging Probe was used to obtain in-situ horizontal shear and compressional wave velocity measurements at 1.6 foot intervals. The acquired data was analyzed and a profile of velocity versus depth was produced for both compressional and horizontally polarized shear waves.

A detailed reference for the velocity measurement techniques used in this study is:

Guidelines for Determining Design Basis Ground Motions, Report TR-102293, Electric Power Research Institute, Palo Alto, California, November 1993, Sections 7 and 8.

3.0 INSTRUMENTATION

Suspension soil velocity measurements were performed in all borings using the Model 170 suspension logging system, manufactured by OYO Corporation. This system directly determines the average velocity of a 3.3 foot high segment of the soil or rock column surrounding the boring by measuring the elapsed time between arrivals of a wave propagating upward through the segment. The receivers that detect the wave, and the source that generates the wave, are moved as a unit in the boring producing relatively constant amplitude signals at all depths.

The suspension system probe consists of a combined reversible polarity solenoid horizontal shear-wave source (S_H) and compressional-wave source (P), joined to two biaxial receivers by a flexible isolation cylinder, as shown in Figure 1. The separation of the two receivers is 3.3 feet, allowing average wave velocity in the region between the receivers to be determined by inversion of the wave travel time between the two receivers. The total length of the probe as used in these surveys is 19 feet.

The probe both receives control signals from, and sends the amplified receiver signals to, instrumentation on the surface via an armored 4 or 7 conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured to provide probe depth data, using a 3.28 foot circumference sheave fitted with a digital rotary encoder.

The entire probe is suspended in the boring by the cable, therefore, source motion is not coupled directly to the boring walls; rather, the source motion creates a horizontally propagating impulsive pressure wave in the fluid filling the boring and surrounding the source. This pressure wave is converted to P and S_H -waves in the surrounding soil and rock as it passes through the casing and grout annulus, when present, and impinges upon the wall of the boring. These waves propagate through the soil and rock surrounding the boring, in turn causing a pressure wave to be generated in the fluid surrounding the receivers as the soil waves pass their location. Separation of the P and S_H -waves at the receivers is performed using the following steps:

1. Orientation of the horizontal receivers is maintained parallel to the axis of the source, maximizing the amplitude of the recorded S_H -wave signals.

2. At each depth, S_H -wave signals are recorded with the source actuated in opposite directions, producing S_H -wave signals of opposite polarity, providing a characteristic S_H -wave signature distinct from the P-wave signal.
3. The 6.75 foot separation of source and the receivers permits the P-wave signal to pass and damp significantly before the slower S_H -wave signal arrives at the receiver. In higher velocity soils or rock, the isolation cylinder is extended to allow greater separation of the P- and S_H -wave signals.
4. In saturated soils, the received P-wave signal is typically of much higher frequency than the received S_H -wave signal, permitting additional separation of the two signals by low pass filtering.
5. Direct arrival of the original pressure pulse in the fluid is not detected at the receivers because the wavelength of the pressure pulse in fluid is significantly greater than the dimension of the fluid annulus surrounding the probe (meter versus centimeter scale), preventing significant energy transmission through the fluid medium.

In operation, a distinct, repeatable pattern of impulses is generated at each depth as follows:

1. The source is fired in one direction producing dominantly horizontal shear with some vertical compression, and the signals from the horizontal receivers situated parallel to the axis of motion of the source are recorded.
2. The source is fired again in the opposite direction and the horizontal receiver signals are recorded.
3. The source is fired again and the vertical receiver signals are recorded. The repeated source pattern facilitates the picking of the P and S_H -wave arrivals; reversal of the source changes the polarity of the S_H -wave pattern but not the P-wave pattern.

The data from each receiver during each source activation is recorded as a different channel on the recording system. The Suspension PS system has six channels (two simultaneous recording channels), each with a 1024 sample record. The recorded data is displayed on a CRT or LCD display as six channels with a common time scale. Data is stored on disk for further processing. Up to 8 sampling sequences can be summed to improve the signal to noise ratio of the signals.

A review of the displayed data on the recorder or computer screen allows the operator to set the gains, filters, delay time, pulse length (energy), sample rate, and summing number to optimize the quality of the data before recording. Verification of the calibration of the Suspension PS digital recorder is performed every twelve months using a NIST traceable frequency source and counter, as outlined in Appendix B.

4.0 MEASUREMENT PROCEDURES

Measurements followed the **GEOVision** Procedure for P-S Suspension Seismic Velocity Logging, revision 1.3, as presented in Appendix D. In each boring, the probe was positioned with the mid-point between receivers at ground surface, as verified with a tape measure, and recorded on the field logs. The probe was lowered to the bottom of the boring, and then returned to the surface, stopping at 1.6 foot intervals to collect data, as summarized in Table 2.

Table 2. Logging dates and depth ranges (BGS)

BORING NUMBER	RUN NUMBER	DEPTH RANGE (FEET)	OPEN HOLE (FEET)	DEPTH TO BOTTOM OF CASING (FEET)	SAMPLE INTERVAL (FEET)	RECEIVER	DATE LOGGED
BH-C4993	Log 1	360.9 – 549.5	562	363	1.6	26066	9/12/06
BH-C4993	Log 2	557.7 – 762.8	775	363	1.6	26066	9/18/06
BH-C4993	Log 3	736.6 - 953.1	964	363	1.6	26066	9/23/06
BH-C4993	Log 4A	930.1 - 1172.6	1185*	363	1.6	26066	9/30/06
BH-C4993	Log 4B	1149.9 – 1210.6	1222	363	1.6	26066	10/1/06
BH-C4993	Log 5	1195.9 - 1400.9	1411	363	1.6	26066	10/8/06
BH-C4993	Log 6+	357.6 – 1400.9	1411	363	3.3	330094	10/14/06
BH-C4996	Log 1	349.4 - 523.3	535	349	1.6	30086	8/3/06
BH-C4996	Log 2	426.5 - 734.9	747	349	1.6	23053	8/11/06
BH-C4996	Log 3	674.5 – 930.1	941	349	1.6	23053	8/17/06
BH-C4996	Log 4	908.8 - 1184.4	1198	349	1.6	23053	8/22/06
BH-C4996	Log 5A	1261.5 - 1338.6	1351	349	1.6	23053	8/28/06
BH-C4996	Log 5B+>	347.8 - 1263.1	1276	349	1.6 and 3.3	26066	8/28/06
BH-C4996	Log 6	1325.5 - 1450.1	1463	349	1.6	26066	9/6/06
BH-C4996	Log 7+	1364.8 - 1453.4	1465	349	3.3	26066	9/19/06
BH-C4997	Log 1	388.8 - 538.1	550	384	1.6	23053	8/27/06
BH-C4997	Log 2^	528.2 – 774.3	787	384	1.6	26066	9/6/06
BH-C4997	Log 3^	785.8 - 962.9	977	384	1.6	26066	9/13/06
BH-C4997	Log 4	949.8 - 1127.0	1137	384	1.6	26066	9/24/06
BH-C4997	Log 5	1081.0 – 1234.6	1247	384	1.6	26066	10/2/06
BH-C4997	Log 6	1220.5 - 1415.7	1428	384	1.6	26066/330094	10/9/06
BH-C4997	Log 7+	383.9 - 1417.3	1429	384	3.3	330094	10/13/06

* BH-C4993 10-1-06 Field log states that hole was drilled to 1222ft, but unable to penetrate past 1185ft.

+ These logs were done at 1m intervals over the entire borehole after final cementing.

The results of these logs are reported in Volume 2

^ There is a gap in the data between log 2 and 3. This will be discussed in the results.

> Depth range from 1190.9 to 1263.1 logged at 1.6ft interval. Remainder logged at 3.3ft intervals – see Volume 2

NOTE: OYO PS Logger S/N 19029 was used on C4996 Log #1. All other logs were recorded using S/N 15014.

At each measurement depth the measurement sequence of two opposite horizontal records and one vertical record was performed, and the gains were adjusted as required. The data from each depth was printed on paper tape, checked, and recorded on diskette before moving to the next depth.

Upon completion of the measurements, the probe zero depth indication at the depth reference point was verified prior to removal from the boring.

5.0 DATA ANALYSIS

Using the proprietary OYO software program PSLOG.EXE version 1.0, included in volume 2 of 2 (CDR) of this report, the recorded digital waveforms were analyzed to locate the most prominent first minima, first maxima, or first break on the vertical axis records, indicating the arrival of P-wave energy. The difference in travel time between receiver 1 and receiver 2 (R1-R2) arrivals was used to calculate the P-wave velocity for that 3.3 foot segment of the soil column. When observable, P-wave arrivals on the horizontal axis records were used to verify the velocities determined from the vertical axis data. The time picks were then transferred into an EXCEL template (EXCEL version 2003 SP2) to complete the velocity calculations based upon the arrival time picks made in PSLOG. The PSLOG pick files and the EXCEL analysis files are included in the boring specific directories on volume 3 of 3 (CDR) of this report.

The P-wave velocity over the 6.75 foot interval from source to receiver 1 (S-R1) was also picked using PSLOG, and calculated and plotted in EXCEL, for quality assurance of the velocity derived from the travel time between receivers. In this analysis, the depth values as recorded were increased by 4.8 feet to correspond to the mid-point of the 6.75 foot S-R1 interval. Travel times were obtained by picking the first break of the P-wave signal at receiver 1 and subtracting 3.0 milliseconds, the calculated and experimentally verified delay from source trigger pulse (beginning of record) to source impact. This delay corresponds to the duration of acceleration of the solenoid before impact.

As with the P-wave records, using PSLOG, the recorded digital waveforms were analyzed to locate the presence of clear S_H -wave pulses, as indicated by the presence of opposite polarity pulses on each pair of horizontal records. Ideally, the S_H -wave signals from the 'normal' and 'reverse' source pulses are very nearly inverted images of each other. Digital FFT - IFFT lowpass filtering was used to remove the higher frequency P-wave signal from the S_H -wave signal. Different filter cutoffs were used to separate P- and S_H -waves at different depths, ranging from 600 Hz in the slowest

zones to 4000 Hz in the regions of highest velocity. At each depth, the filter frequency was selected to be at least twice the fundamental frequency of the S_H -wave signal being filtered.

Generally, the first maxima were picked for the 'normal' signals and the first minima for the 'reverse' signals, although other points on the waveform were used if the first pulse was distorted. The absolute arrival time of the 'normal' and 'reverse' signals may vary by ± 0.2 milliseconds, due to differences in the actuation time of the solenoid source caused by constant mechanical bias in the source or by boring inclination. This variation does not affect the R1-R2 velocity determinations, as the differential time is measured between arrivals of waves created by the same source actuation. The final velocity value is the average of the values obtained from the 'normal' and 'reverse' source actuations.

As with the P-wave data, S_H -wave velocity calculated from the travel time over the 6.75 foot interval from source to receiver 1 was calculated and plotted for verification of the velocity derived from the travel time between receivers. In this analysis, the depth values were increased by 4.8 foot to correspond to the mid-point of the 6.75 foot S-R1 interval. Travel times were obtained by picking the first break of the S_H -wave signal at the near receiver and subtracting 3.0 milliseconds, the calculated and experimentally verified delay from the beginning of the record at the source trigger pulse to source impact.

These data and analysis were reviewed by Rob Steller and Tony Martin as a component of **GEOVision's** in-house QA-QC program.

Figure 2 shows an example of R1 - R2 measurements on a sample filtered suspension record. In Figure 2, the time difference over the 3.3 foot interval of 1.88 milliseconds for the horizontal signals is equivalent to an S_H -wave velocity of 1745 feet/second. Whenever possible, time differences were determined from several phase points on the S_H -waveform records to verify the data obtained from the first arrival of the S_H -wave pulse. Figure 3 displays the same record before filtering of the S_H -waveform record with a 1400 Hz FFT - IFFT digital lowpass filter, illustrating the presence of higher frequency P-wave energy at the beginning of the record, and distortion of the lower frequency S_H -wave by residual P-wave signal.

6.0 RESULTS

Suspension R1-R2 P- and S_H -wave velocities are plotted in Figures 4 through 22. The suspension velocity data presented in these figures are presented in Tables 3 - 21. The PSLOG and EXCEL analysis files for each boring are included in the boring specific directories on volume 3 of 3 (CDR) of this report, along with the raw and filtered waveforms.

P- and S_H -wave velocity data from R1-R2 analysis and quality assurance analysis of S-R1 data are plotted together in Appendix A (Figures A-1 through A-19) to aid in visual comparison. It must be noted that R1-R2 data is an average velocity over a 3.3 foot segment of the soil column; S-R1 data is an average over 6.75 feet, creating a significant smoothing relative to the R1-R2 plots. S-R1 data are presented in Appendix A (Tables A-1 through A-19), and included in the EXCEL analysis files for each boring on volume 3 of 3 (CDR) of this report.

Calibration procedures and records for the suspension measurement system are presented in Appendix B.

The **GEOVision** standard field log sheets for all borings are reproduced in Appendix C.

The **GEOVision** standard field procedures are reproduced in Appendix D.

7.0 SUMMARY

Discussion of Suspension Results

Suspension PS velocity data is ideally collected in an uncased fluid filled boring, drilled with rotary mud (rotary wash) methods. The drilling method used in all of these boreholes was ideal for collection of suspension PS velocity data. The borehole diameters, at 9 inches, is larger than optimal, but the logs in all boreholes were successful. All boreholes showed good to excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities except in transition zones. P- and S-wave arrivals in the basalt portions of these boreholes were weak, as is generally the case in hard rock borings.

Suspension PS velocity data quality is judged based upon 5 criteria:

1. Consistent data between receiver to receiver (R1 – R2) and source to receiver (S – R1) data.
2. Consistent relationship between P-wave and S_H -wave (excluding transition to saturated soils)
3. Consistency between data from adjacent depth intervals.
4. Clarity of P-wave and S_H-wave onset, as well as damping of later oscillations.
5. Consistency of profile between adjacent borings, if available.

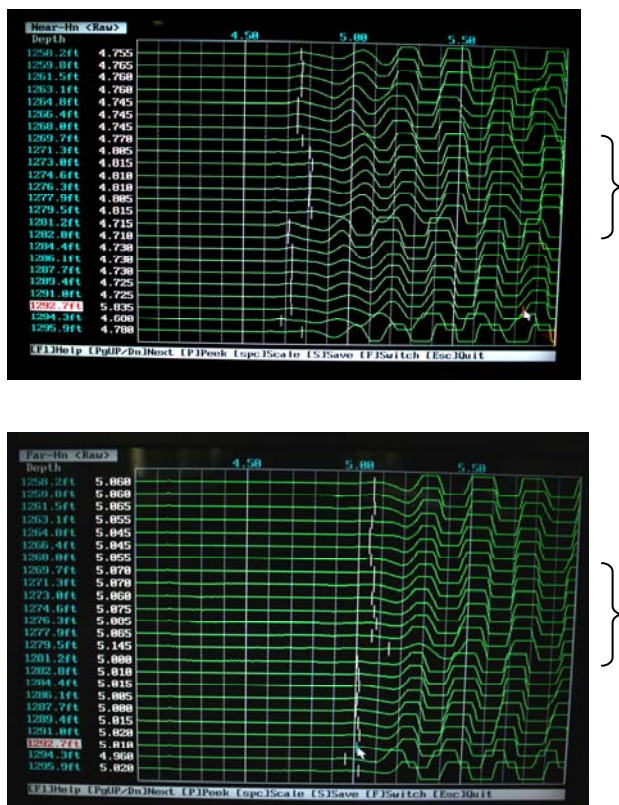
Based on these criteria, most of the data collected at the Hanford WTP site are of good to excellent quality. Even though arrivals in basalt were weak, once identified, they were quite consistent. Two boreholes did not meet this criteria and these are discussed as follows:

Boring BH-C4997 Log #2 It has come to our attention that there were some problems with C4997 Log 2. The field notes indicate a recognized problem with the far receiver (most distant from the source) but noted that the data looked OK and the operator suspected the cable head, not the receiver, so the logging proceeded. In processing this data it has become apparent that there are some unusual timing issues related to the far receiver that have not been resolved. At this time we

have taken the step of not accepting many picks and as a result the Rev5c spreadsheet is not populated completely.

BH C4997 Log #6 (Figures 22 and A- 19): The quality of data in this entire set is not as good as other logs. This can be seen in the scatter in the Poisson's ratio, and high degree of mismatch between the R1-R2 and S-R1. Data in the section from 1270 to 1295 has been discarded. It was notable in the analysis because of the unusual mismatch between R1-R2 and S-R1 data. Particularly, S-R1 appears low between 1270 and 1285 on both S-wave and P-wave data.

Usually differences between R1-R2 and S-R1 are resolved by examining the raw data and picking a different phase. Further, we expect a smoothing effect of S-R1 due to the bigger travel path. However, and you can see in the following images, the far normal horizontal record (see label, top left corner) shows little or no change in this zone, whereas the near horizontal normal record shows an abrupt increase in the travel time. The effect of this is to increase the R1-R2 velocity, but decrease the S-R1 velocity.



The obvious questions arise:

1. What caused this? We do not know yet. At this time we believe there may be an intermittent problem with this receiver. There may be a washout or some physical aspect of the borehole and the position of the receiver in the borehole that may account for this, but at this time we can't think of another explanation.
2. How do you know it hasn't happened elsewhere? Well, we suppose it could. In soils this amount of shift would not be significant. However, this emphasizes the reliability and self checking nature of this method, because we can see the opposing shifts in velocity between R1-R2 and S-R1. If it happened on a single measurement we probably could not tell. There is enough scatter ($\pm 5\%$ means ± 500 fps) that confidence in individual picks is limited. However, there is enough data density or redundancy through a section of material and we are confident that the results are robust.
3. Why all the way to 1295? Well, the S-R1 seems to shift first slow, and then fast. This seems prudent.

It will be observed that an offset delay of -0.09msec was introduced in the S-R1 analysis to get reasonable agreement over the entire borehole. This resulted from a change in receivers from an old style OYO receiver to a new style (see Table 2). While the receiver separation is always 1m, the overall length of the new style probe is slightly smaller, resulting in a change in travel path. It should be emphasized that since we use the S-R1 as a QA tool, to check that we are measuring on the correct phase of the waveform, and not to match R1-R2 velocity exactly, this minor accommodation is completely acceptable and in fact is a planned function of the S-R1 Analysis spreadsheet. The change in offset can be seen in the spreadsheet C4997 Log 6a, tab "Analysis, S-R1" in column F at 1360ft (volume 3 of 3 (CDR) Data subdirectory).

Finally, while there was full intention to have a full overlap between each interval log to obtain complete coverage of the entire borehole both before and after cementing, it is apparent that there was a gap in borehole BH-C4997 between Logs 2 and 3 (see footnote, Table 2). It is unknown at this time the reason for this gap. However, it occurs in the basalt, and there is coverage of this zone in the cemented log data (see Part B of this report, "Overall Logs", contained in Volume 2).

Quality Assurance

These boring geophysical measurements were performed using industry-standard or better methods for measurements and analyses. All work was performed under **GEOVision** quality assurance procedures, which include:

- Use of NIST-traceable calibrations, where applicable, for field and laboratory instrumentation
- Use of standard field data logs
- Use of independent verification of velocity data by comparison of receiver-to-receiver and source-to-receiver velocities
- Independent review of calculations and results by a registered professional engineer, geologist, or geophysicist.

Suspension Data Reliability

P- and S_H -wave velocity measurement using the Suspension Method gives average velocities over a 3.3 foot interval of depth. This high resolution results in the scatter of values shown in the graphs. Individual S_H -wave measurements are very reliable with estimated precision of $\pm 5\%$. Due to the difficulty in picking weak signals and high velocities, which can be seen in the greater scatter of P-wave picks, P-wave measurements have an estimated precision of $\pm 10\%$. Standardized field procedures and quality assurance checks contribute to the reliability of these data.

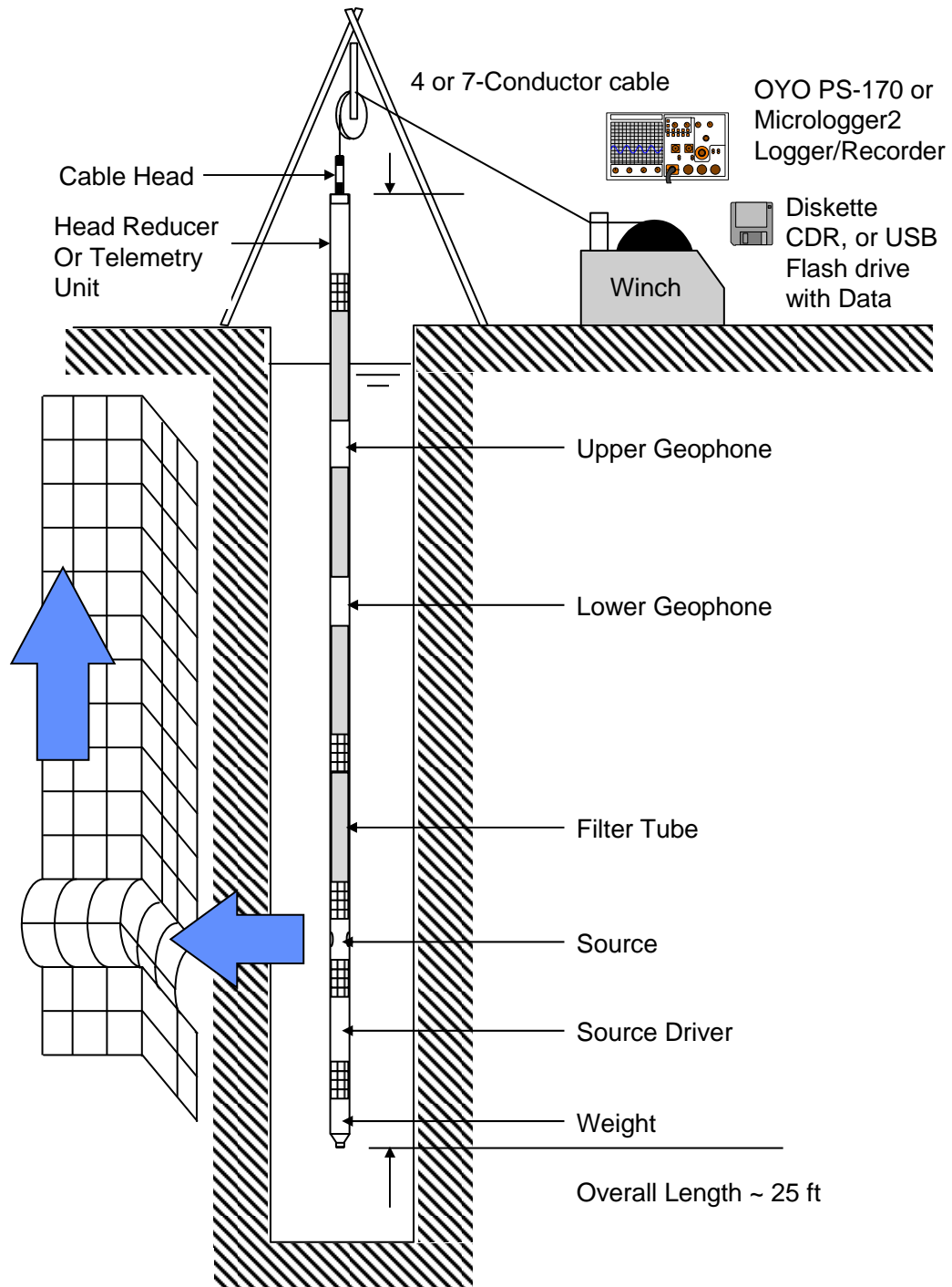


Figure 1: Concept illustration of P-S logging system

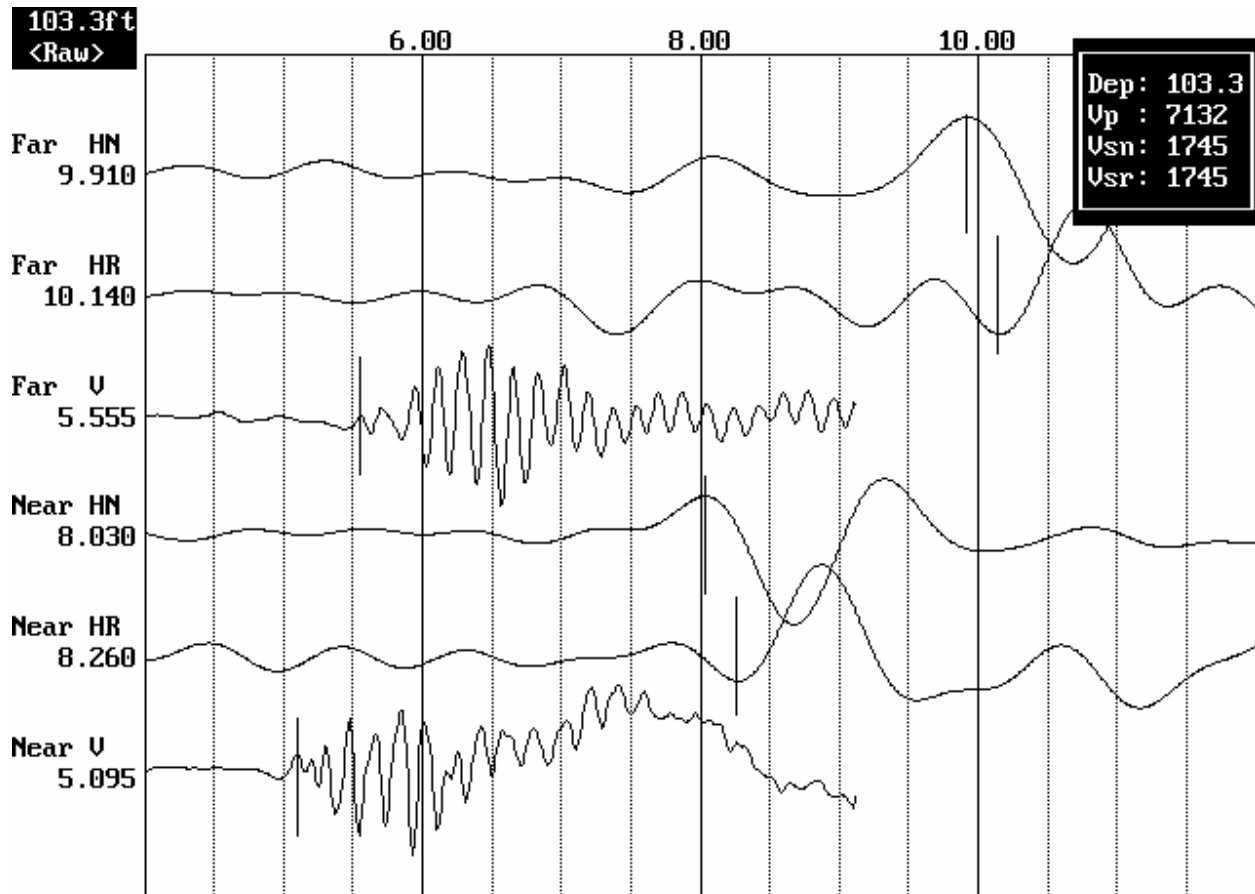


Figure 2: Example of filtered (1400 Hz lowpass) record

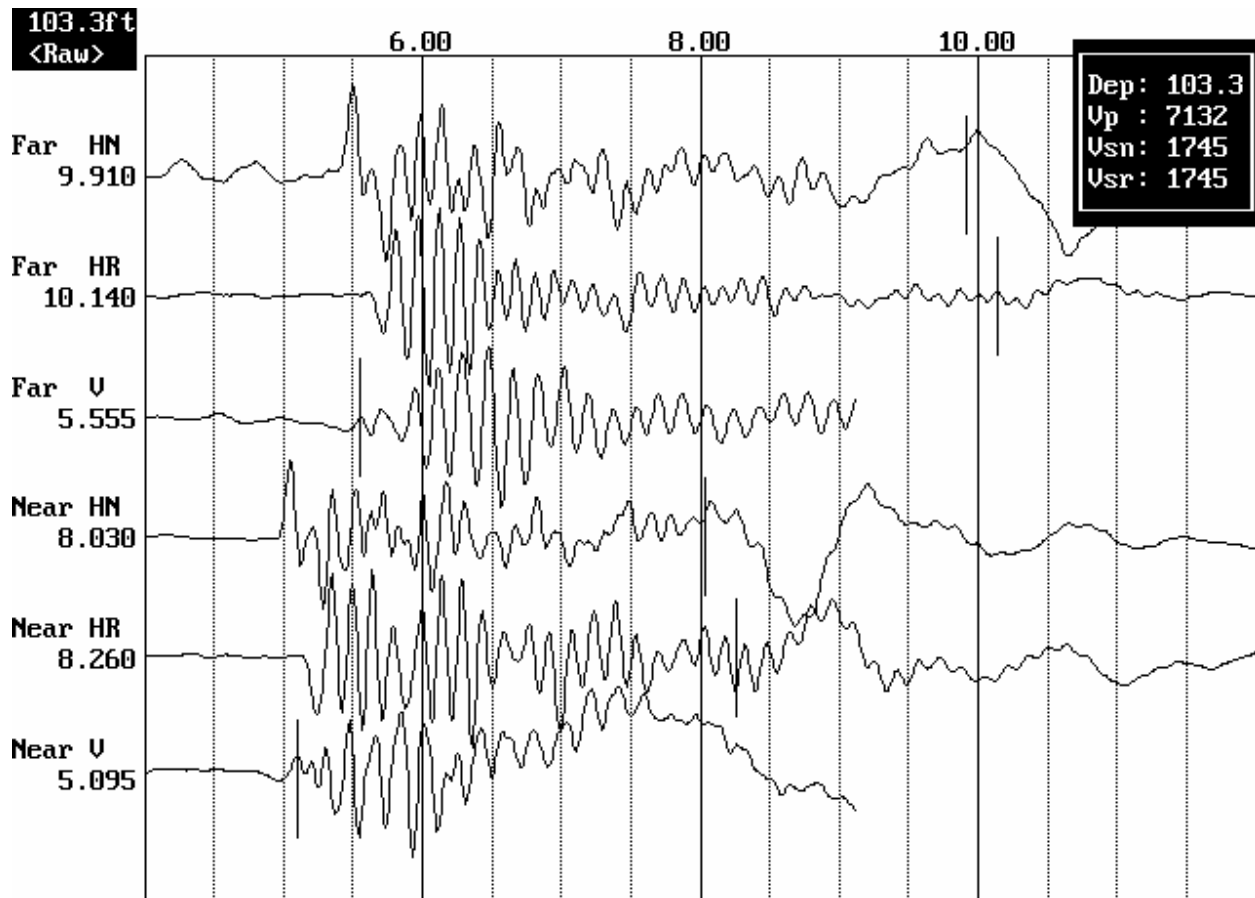


Figure 3. Example of unfiltered record

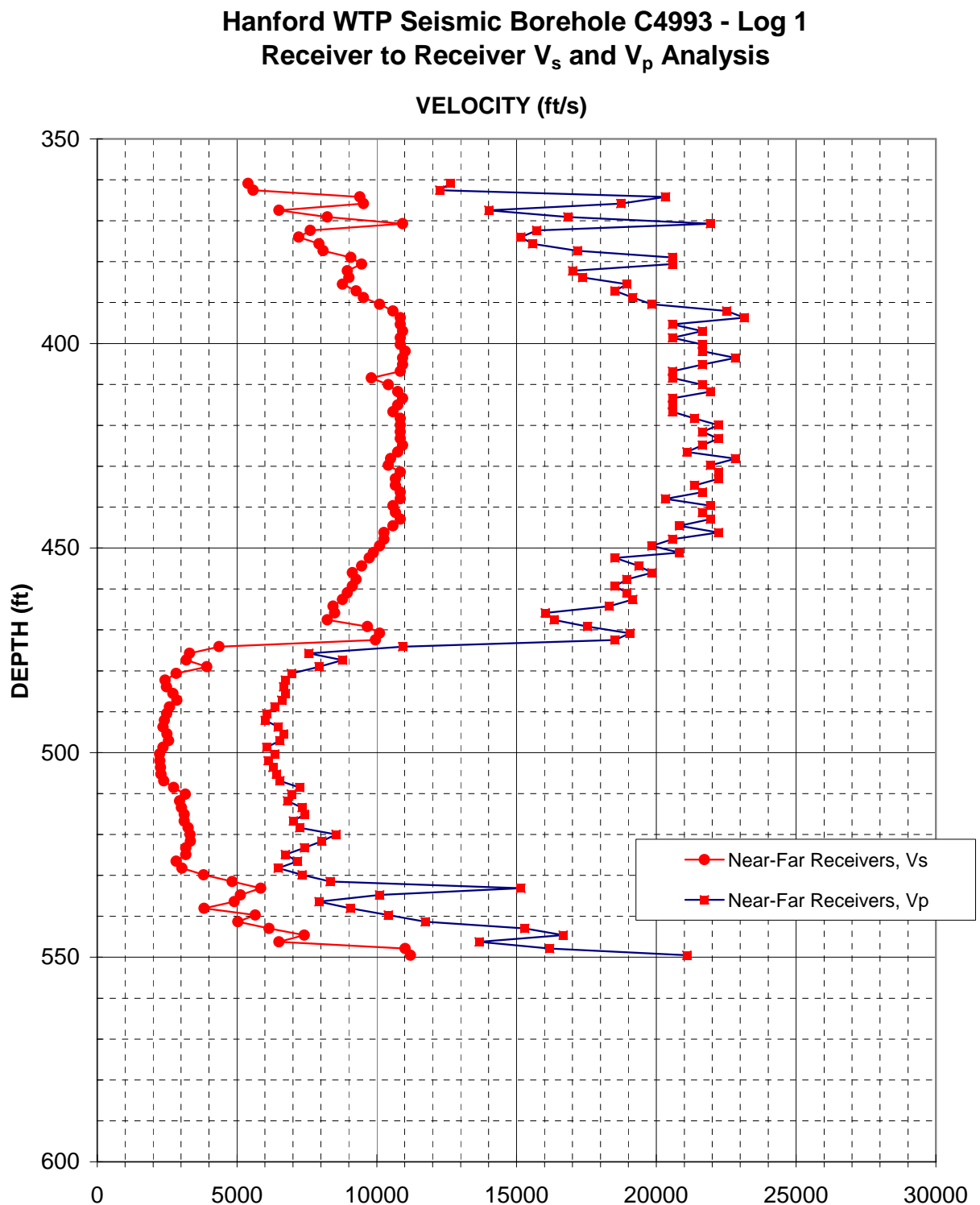


Figure 4: Boring BH-C4993 Log 1, Suspension R1-R2 P- and S_H -wave velocities

Table 3. Boring BH-C4993 Log 1, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN #1**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
360.9	5400	12630	0.39	110.0	1650	3850	0.39
362.5	5580	12250	0.37	110.5	1700	3740	0.37
364.2	9390	20330	0.36	111.0	2860	6200	0.36
365.8	9520	18730	0.33	111.5	2900	5710	0.33
367.5	6500	14010	0.36	112.0	1980	4270	0.36
369.1	8230	16840	0.34	112.5	2510	5130	0.34
370.7	10930	21930	0.33	113.0	3330	6680	0.33
372.4	7620	15720	0.35	113.5	2320	4790	0.35
374.0	7210	15150	0.35	114.0	2200	4620	0.35
375.7	7940	15580	0.32	114.5	2420	4750	0.32
377.3	8080	17180	0.36	115.0	2460	5240	0.36
378.9	9070	20580	0.38	115.5	2760	6270	0.38
380.6	9460	20580	0.37	116.0	2880	6270	0.37
382.2	8950	17010	0.31	116.5	2730	5180	0.31
383.9	9010	17360	0.32	117.0	2750	5290	0.32
385.5	8770	18940	0.36	117.5	2670	5770	0.36
387.1	9260	18520	0.33	118.0	2820	5640	0.33
388.8	9520	19160	0.34	118.5	2900	5840	0.34
390.4	10100	19840	0.33	119.0	3080	6050	0.33
392.1	10580	22520	0.36	119.5	3230	6860	0.36
393.7	10840	23150	0.36	120.0	3300	7060	0.36
395.3	10840	20580	0.31	120.5	3300	6270	0.31
397.0	10930	21650	0.33	121.0	3330	6600	0.33
398.6	10840	20580	0.31	121.5	3300	6270	0.31
400.3	10840	21650	0.33	122.0	3300	6600	0.33
401.9	11020	21650	0.33	122.5	3360	6600	0.33
403.5	10930	22830	0.35	123.0	3330	6960	0.35
405.2	10930	21650	0.33	123.5	3330	6600	0.33
406.8	10840	20580	0.31	124.0	3300	6270	0.31
408.5	9800	20580	0.35	124.5	2990	6270	0.35
410.1	10420	21650	0.35	125.0	3180	6600	0.35
411.8	10750	21930	0.34	125.5	3280	6680	0.34
413.4	10930	20580	0.30	126.0	3330	6270	0.30
415.0	10750	20580	0.31	126.5	3280	6270	0.31

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN #1**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
416.7	10580	20580	0.32
418.3	10840	21370	0.33
420.0	10840	22220	0.34
421.6	10840	21650	0.33
423.2	10840	22220	0.34
424.9	10930	21650	0.33
426.5	10750	21100	0.32
428.2	10500	22830	0.37
429.8	10420	21930	0.35
431.4	10840	22220	0.34
433.1	10670	22220	0.35
434.7	10670	21370	0.33
436.4	10840	21650	0.33
438.0	10840	20330	0.30
439.6	10580	21930	0.35
441.3	10670	21650	0.34
442.9	10840	21930	0.34
444.6	10580	20830	0.33
446.2	10260	22220	0.36
447.8	10260	20580	0.33
449.5	10100	19840	0.33
451.1	9880	20830	0.36
452.4	9730	18520	0.31
454.4	9460	19380	0.34
456.0	9130	19840	0.37
457.7	9260	18940	0.34
459.3	9130	18520	0.34
461.0	8950	18940	0.36
462.6	8770	19160	0.37
464.2	8440	18320	0.37
465.9	8490	16030	0.30
467.5	8230	16340	0.33
469.2	9660	17540	0.28
470.8	10100	19050	0.30
472.4	9950	18520	0.30
474.1	4360	10930	0.41
475.7	3300	7580	0.38
477.4	3190	8770	0.42

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
127.0	3230	6270	0.32
127.5	3300	6510	0.33
128.0	3300	6770	0.34
128.5	3300	6600	0.33
129.0	3300	6770	0.34
129.5	3330	6600	0.33
130.0	3280	6430	0.32
130.5	3200	6960	0.37
131.0	3180	6680	0.35
131.5	3300	6770	0.34
132.0	3250	6770	0.35
132.5	3250	6510	0.33
133.0	3300	6600	0.33
133.5	3300	6200	0.30
134.0	3230	6680	0.35
134.5	3250	6600	0.34
135.0	3300	6680	0.34
135.5	3230	6350	0.33
136.0	3130	6770	0.36
136.5	3130	6270	0.33
137.0	3080	6050	0.33
137.5	3010	6350	0.36
137.9	2970	5640	0.31
138.5	2880	5910	0.34
139.0	2780	6050	0.37
139.5	2820	5770	0.34
140.0	2780	5640	0.34
140.5	2730	5770	0.36
141.0	2670	5840	0.37
141.5	2570	5580	0.37
142.0	2590	4880	0.30
142.5	2510	4980	0.33
143.0	2940	5350	0.28
143.5	3080	5810	0.30
144.0	3030	5640	0.30
144.5	1330	3330	0.41
145.0	1010	2310	0.38
145.5	970	2670	0.42

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN #1**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
479.0	3920	7940	0.34
480.6	2820	6940	0.40
482.3	2430	6730	0.42
483.9	2480	6670	0.42
485.6	2710	6730	0.40
487.2	2850	6600	0.39
488.9	2580	6350	0.40
490.5	2490	6060	0.40
492.1	2410	6010	0.40
493.8	2360	6470	0.42
495.4	2500	6670	0.42
497.1	2550	6540	0.41
498.7	2360	6060	0.41
500.3	2230	6350	0.43
502.0	2240	6120	0.42
503.6	2270	6290	0.43
505.3	2280	6410	0.43
506.9	2380	6540	0.42
508.5	2730	7250	0.42
510.2	3160	6940	0.37
511.8	2950	6800	0.38
513.5	3020	7330	0.40
515.1	3120	7410	0.39
516.7	3120	7020	0.38
518.4	3250	7250	0.37
520.0	3320	8550	0.41
521.7	3330	8030	0.40
523.3	3170	7410	0.39
524.9	3170	6730	0.36
526.6	2820	7170	0.41
528.2	3030	6470	0.36
529.9	3810	7330	0.31
531.5	4830	8330	0.25
533.1	5850	15150	0.41
534.8	5130	10100	0.33
536.4	4900	7940	0.19
538.1	3820	9060	0.39
539.7	5650	10420	0.29

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
146.0	1200	2420	0.34
146.5	860	2120	0.40
147.0	740	2050	0.42
147.5	760	2030	0.42
148.0	830	2050	0.40
148.5	870	2010	0.39
149.0	790	1940	0.40
149.5	760	1850	0.40
150.0	730	1830	0.40
150.5	720	1970	0.42
151.0	760	2030	0.42
151.5	780	1990	0.41
152.0	720	1850	0.41
152.5	680	1940	0.43
153.0	680	1860	0.42
153.5	690	1920	0.43
154.0	700	1950	0.43
154.5	730	1990	0.42
155.0	830	2210	0.42
155.5	960	2120	0.37
156.0	900	2070	0.38
156.5	920	2230	0.40
157.0	950	2260	0.39
157.5	950	2140	0.38
158.0	990	2210	0.37
158.5	1010	2610	0.41
159.0	1020	2450	0.40
159.5	970	2260	0.39
160.0	970	2050	0.36
160.5	860	2180	0.41
161.0	920	1970	0.36
161.5	1160	2230	0.31
162.0	1470	2540	0.25
162.5	1780	4620	0.41
163.0	1560	3080	0.33
163.5	1490	2420	0.19
164.0	1160	2760	0.39
164.5	1720	3180	0.29

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN #1**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
541.3	5030	11740	0.39
543.0	6140	15290	0.40
544.6	7410	16670	0.38
546.3	6500	13660	0.35
547.9	11020	16180	0.07
549.5	11200	21100	0.30

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
165.0	1530	3580	0.39
165.5	1870	4660	0.40
166.0	2260	5080	0.38
166.5	1980	4160	0.35
167.0	3360	4930	0.07
167.5	3420	6430	0.30

Notes: "-" means no data available at that particular interval of depth.

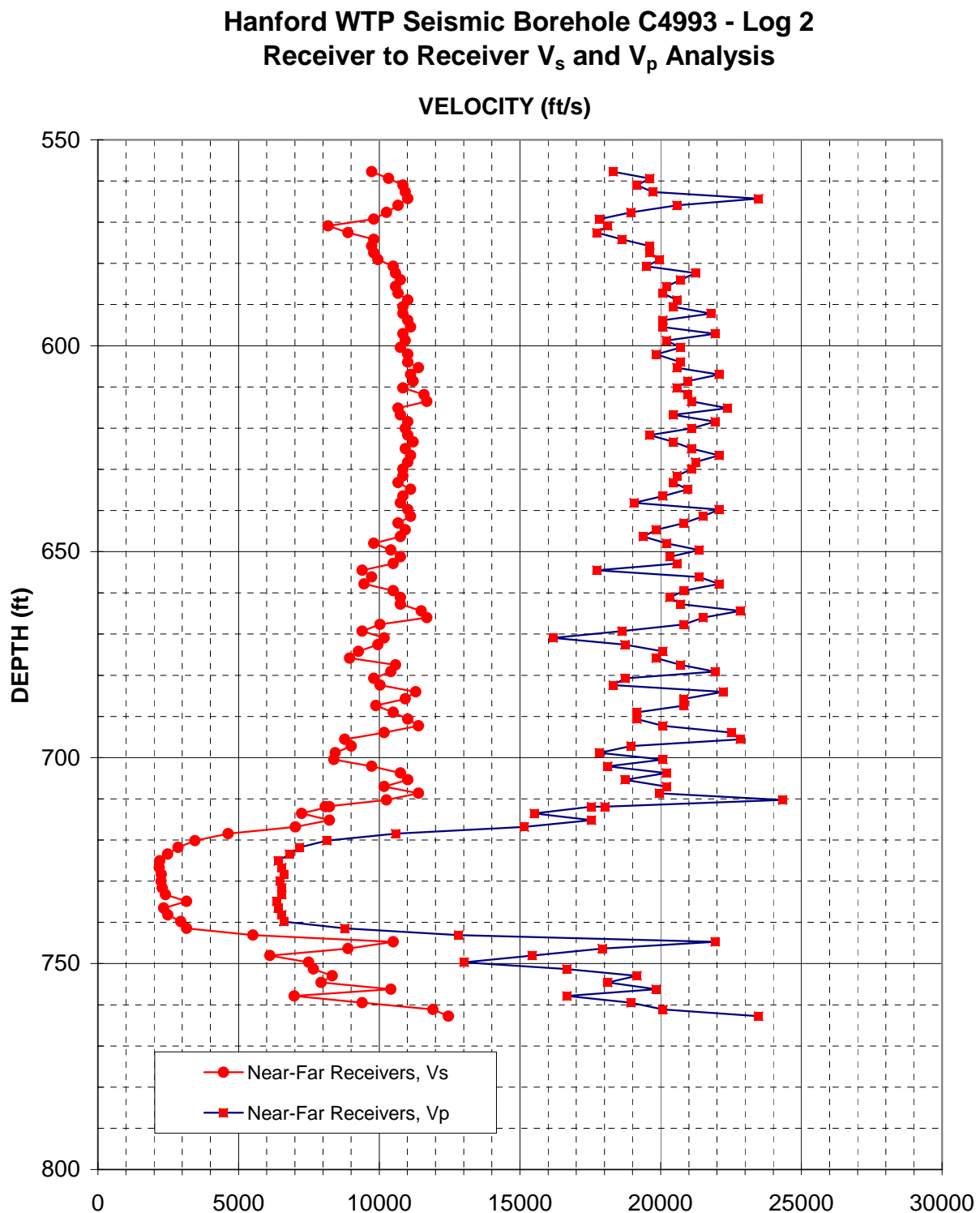


Figure 5: Boring BH-C4993 Log 2, Suspension R1-R2 P- and S_H -wave velocities

Table 4. Boring BH-C4993 Log 2, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN #2**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
557.7	9730	18320	0.30
559.4	10340	19610	0.31
561.0	10840	19160	0.26
562.7	10930	19720	0.28
564.3	11020	23470	0.36
565.9	10670	20580	0.32
567.6	10260	18940	0.29
569.2	9800	17830	0.28
570.9	8180	18120	0.37
572.5	8890	17730	0.33
574.2	9800	18620	0.31
575.8	9730	19610	0.34
577.4	9800	19610	0.33
579.1	9950	19960	0.33
580.7	10500	19490	0.30
582.4	10580	21230	0.33
584.0	10750	20700	0.32
585.6	10580	20200	0.31
587.3	10670	20080	0.30
588.9	11020	20580	0.30
590.6	10840	20450	0.30
592.2	10840	21790	0.34
593.8	11020	20080	0.28
595.5	11110	20080	0.28
597.1	10840	21930	0.34
598.8	10930	20200	0.29
600.4	10750	20700	0.32
602.0	11020	19840	0.28
604.0	11020	20700	0.30
605.3	11400	20580	0.28
607.0	11110	22080	0.33
608.6	11200	20960	0.30
610.2	10840	20580	0.31
611.9	11590	20960	0.28
613.5	11700	21100	0.28

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
170.0	2970	5580	0.30
170.5	3150	5980	0.31
171.0	3300	5840	0.26
171.5	3330	6010	0.28
172.0	3360	7150	0.36
172.5	3250	6270	0.32
173.0	3130	5770	0.29
173.5	2990	5430	0.28
174.0	2490	5520	0.37
174.5	2710	5400	0.33
175.0	2990	5680	0.31
175.5	2970	5980	0.34
176.0	2990	5980	0.33
176.5	3030	6080	0.33
177.0	3200	5940	0.30
177.5	3230	6470	0.33
178.0	3280	6310	0.32
178.5	3230	6160	0.31
179.0	3250	6120	0.30
179.5	3360	6270	0.30
180.0	3300	6230	0.30
180.5	3300	6640	0.34
181.0	3360	6120	0.28
181.5	3390	6120	0.28
182.0	3300	6680	0.34
182.5	3330	6160	0.29
183.0	3280	6310	0.32
183.5	3360	6050	0.28
184.1	3360	6310	0.30
184.5	3470	6270	0.28
185.0	3390	6730	0.33
185.5	3420	6390	0.30
186.0	3300	6270	0.31
186.5	3530	6390	0.28
187.0	3560	6430	0.28

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN #2**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
615.2	10670	22370	0.35
616.8	10750	20450	0.31
618.4	11020	21930	0.33
620.1	10930	21100	0.32
621.7	11020	19610	0.27
623.4	11200	20450	0.29
625.0	10930	21100	0.32
626.6	11110	22080	0.33
628.3	11020	21230	0.32
629.9	10840	21100	0.32
631.6	10840	20580	0.31
633.2	10670	20450	0.31
634.8	11110	20960	0.30
636.5	10840	20080	0.29
638.1	10750	19050	0.27
639.8	11020	22080	0.33
641.4	11110	21510	0.32
643.0	10670	20830	0.32
644.7	10930	19840	0.28
646.3	10750	19380	0.28
648.0	9800	20200	0.35
649.6	10420	21370	0.34
651.3	10750	20330	0.31
652.9	10500	20580	0.32
654.5	9390	17730	0.31
656.2	9730	21370	0.37
657.8	9460	22080	0.39
659.5	10500	20830	0.33
661.1	10750	20330	0.31
662.7	10750	20700	0.32
664.4	11490	22830	0.33
666.0	11700	21510	0.29
667.7	10030	20830	0.35
669.3	9390	18620	0.33
670.9	10180	16180	0.17
672.6	9950	18730	0.30
674.2	9260	20080	0.36
675.9	8950	19840	0.37
677.5	10580	20700	0.32

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
187.5	3250	6820	0.35
188.0	3280	6230	0.31
188.5	3360	6680	0.33
189.0	3330	6430	0.32
189.5	3360	5980	0.27
190.0	3420	6230	0.29
190.5	3330	6430	0.32
191.0	3390	6730	0.33
191.5	3360	6470	0.32
192.0	3300	6430	0.32
192.5	3300	6270	0.31
193.0	3250	6230	0.31
193.5	3390	6390	0.30
194.0	3300	6120	0.29
194.5	3280	5810	0.27
195.0	3360	6730	0.33
195.5	3390	6550	0.32
196.0	3250	6350	0.32
196.5	3330	6050	0.28
197.0	3280	5910	0.28
197.5	2990	6160	0.35
198.0	3180	6510	0.34
198.5	3280	6200	0.31
199.0	3200	6270	0.32
199.5	2860	5400	0.31
200.0	2970	6510	0.37
200.5	2880	6730	0.39
201.0	3200	6350	0.33
201.5	3280	6200	0.31
202.0	3280	6310	0.32
202.5	3500	6960	0.33
203.0	3560	6550	0.29
203.5	3060	6350	0.35
204.0	2860	5680	0.33
204.5	3100	4930	0.17
205.0	3030	5710	0.30
205.5	2820	6120	0.36
206.0	2730	6050	0.37
206.5	3230	6310	0.32

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN #2**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
679.1	10420	21930	0.35
680.8	9800	18730	0.31
682.4	10030	18320	0.29
684.1	11300	22220	0.33
685.7	10930	20830	0.31
687.3	9880	20830	0.36
689.0	10500	19160	0.29
690.6	11020	19160	0.25
692.3	11400	20080	0.26
693.9	10180	22520	0.37
695.5	8770	22830	0.41
697.2	9010	18940	0.35
698.8	8440	17830	0.36
700.5	8390	20080	0.39
702.1	9730	18120	0.30
703.7	10750	20200	0.30
705.4	11020	18730	0.24
707.0	10180	20200	0.33
708.7	11400	19960	0.26
710.3	10260	24330	0.39
711.9	8080	18020	0.37
711.9	8230	17540	0.36
713.6	7250	15500	0.36
715.2	8230	17540	0.36
716.9	7020	15150	0.36
718.5	4630	10580	0.38
720.1	3450	8130	0.39
721.8	2850	7170	0.41
723.4	2480	6800	0.42
725.1	2200	6410	0.43
726.7	2190	6540	0.44
728.4	2260	6600	0.43
730.0	2250	6470	0.43
731.6	2290	6540	0.43
733.3	2410	6540	0.42
734.9	3160	6350	0.34
736.6	2340	6410	0.42
738.2	2490	6540	0.42
739.8	2950	6600	0.38

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
207.0	3180	6680	0.35
207.5	2990	5710	0.31
208.0	3060	5580	0.29
208.5	3440	6770	0.33
209.0	3330	6350	0.31
209.5	3010	6350	0.36
210.0	3200	5840	0.29
210.5	3360	5840	0.25
211.0	3470	6120	0.26
211.5	3100	6860	0.37
212.0	2670	6960	0.41
212.5	2750	5770	0.35
213.0	2570	5430	0.36
213.5	2560	6120	0.39
214.0	2970	5520	0.30
214.5	3280	6160	0.30
215.0	3360	5710	0.24
215.5	3100	6160	0.33
216.0	3470	6080	0.26
216.5	3130	7420	0.39
217.0	2460	5490	0.37
217.0	2510	5350	0.36
217.5	2210	4730	0.36
218.0	2510	5350	0.36
218.5	2140	4620	0.36
219.0	1410	3230	0.38
219.5	1050	2480	0.39
220.0	870	2180	0.41
220.5	760	2070	0.42
221.0	670	1950	0.43
221.5	670	1990	0.44
222.0	690	2010	0.43
222.5	690	1970	0.43
223.0	700	1990	0.43
223.5	730	1990	0.42
224.0	960	1940	0.34
224.5	710	1950	0.42
225.0	760	1990	0.42
225.5	900	2010	0.38

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN #2**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
741.5	3160	8770	0.43	226.0	960	2670	0.43
743.1	5510	12820	0.39	226.5	1680	3910	0.39
744.8	10500	21930	0.35	227.0	3200	6680	0.35
746.4	8890	17920	0.34	227.5	2710	5460	0.34
748.0	6120	15430	0.41	228.0	1860	4700	0.41
749.7	7490	13020	0.25	228.5	2280	3970	0.25
751.3	7660	16670	0.37	229.0	2340	5080	0.37
753.0	8330	19160	0.38	229.5	2540	5840	0.38
754.6	7940	18120	0.38	230.0	2420	5520	0.38
756.2	10420	19840	0.31	230.5	3180	6050	0.31
757.9	6980	16670	0.39	231.0	2130	5080	0.39
759.5	9390	18940	0.34	231.5	2860	5770	0.34
761.2	11900	20080	0.23	232.0	3630	6120	0.23
762.8	12460	23470	0.30	232.5	3800	7150	0.30

Notes: "-" means no data available at that particular interval of depth.

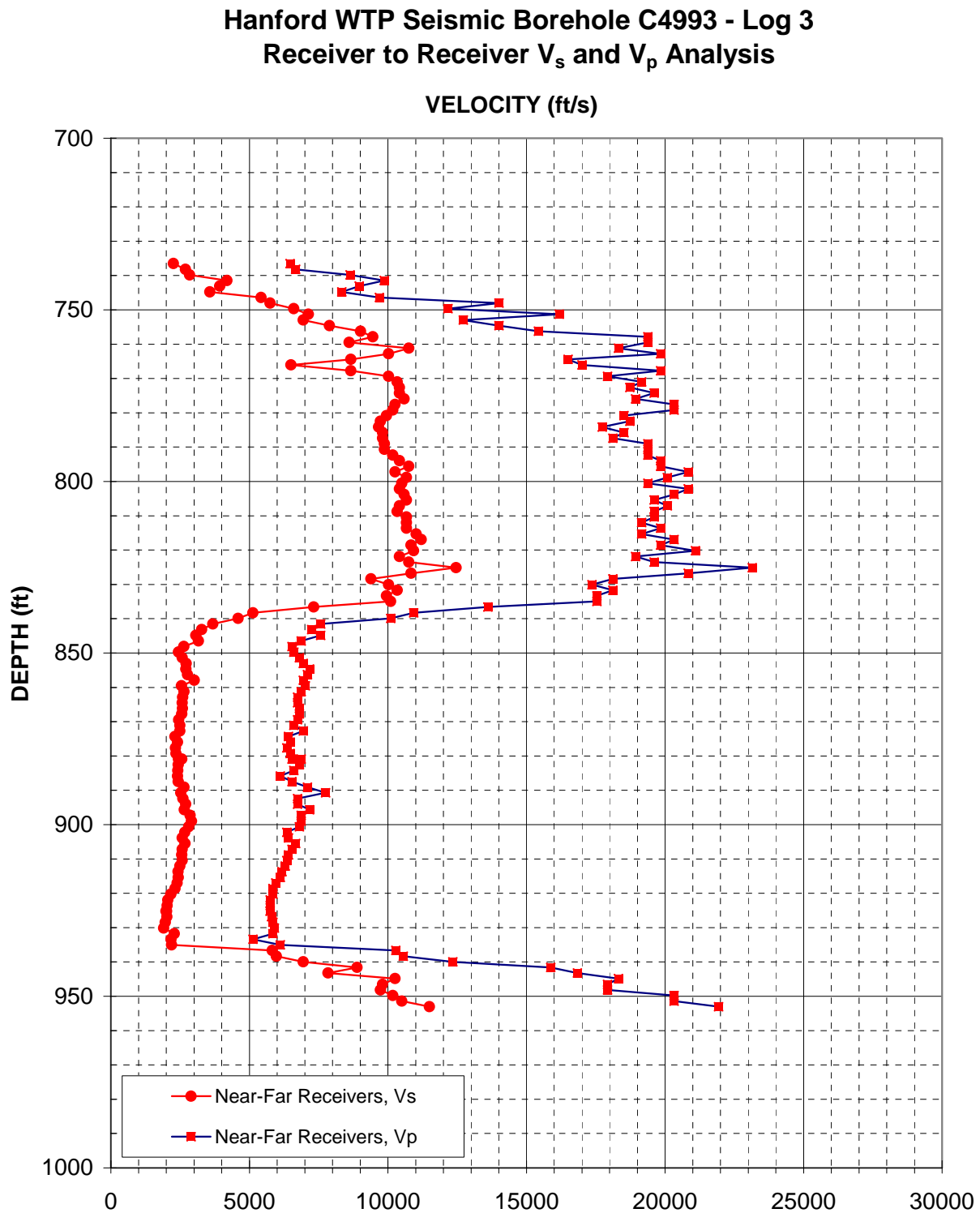


Figure 6. Boring BH-C4993 Log 3, Suspension R1-R2 P- and S_H -wave velocities

Table 5. Boring BH-C4993 Log 3, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 LOG#3**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
736.6	2260	6470	0.43	224.5	690	1970	0.43
738.2	2690	6670	0.40	225.0	820	2030	0.40
739.8	2850	8640	0.44	225.5	870	2630	0.44
741.5	4190	9860	0.39	226.0	1280	3010	0.39
743.1	3930	8960	0.38	226.5	1200	2730	0.38
744.8	3570	8330	0.39	227.0	1090	2540	0.39
746.4	5420	9690	0.27	227.5	1650	2950	0.27
748.0	5750	14010	0.40	228.0	1750	4270	0.40
749.7	6600	12170	0.29	228.5	2010	3710	0.29
751.3	7130	16180	0.38	229.0	2170	4930	0.38
753.0	6940	12720	0.29	229.5	2120	3880	0.29
754.6	7890	14010	0.27	230.0	2400	4270	0.27
756.2	9010	15430	0.24	230.5	2750	4700	0.24
757.9	9460	19380	0.34	231.0	2880	5910	0.34
759.5	8600	19380	0.38	231.5	2620	5910	0.38
761.2	10750	18320	0.24	232.0	3280	5580	0.24
762.8	10030	19840	0.33	232.5	3060	6050	0.33
764.4	8660	16500	0.31	233.0	2640	5030	0.31
766.1	6500	17010	0.41	233.5	1980	5180	0.41
767.7	8660	19840	0.38	234.0	2640	6050	0.38
769.4	10030	17920	0.27	234.5	3060	5460	0.27
771.0	10340	19160	0.29	235.0	3150	5840	0.29
772.6	10420	18730	0.28	235.5	3180	5710	0.28
774.3	10420	19610	0.30	236.0	3180	5980	0.30
775.9	10580	18940	0.27	236.5	3230	5770	0.27
777.6	10260	20330	0.33	237.0	3130	6200	0.33
779.2	10180	20330	0.33	237.5	3100	6200	0.33
780.8	9950	18520	0.30	238.0	3030	5640	0.30
782.5	9730	18730	0.31	238.5	2970	5710	0.31
784.1	9660	17730	0.29	239.0	2940	5400	0.29
785.8	9800	18520	0.31	239.5	2990	5640	0.31
787.4	9800	18120	0.29	240.0	2990	5520	0.29
789.0	9880	19380	0.32	240.5	3010	5910	0.32

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 LOG#3**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
790.7	9880	19380	0.32
792.3	10180	19380	0.31
794.0	10420	19840	0.31
795.6	10750	19840	0.29
797.2	10260	20830	0.34
798.9	10670	20080	0.30
800.5	10500	19380	0.29
802.2	10420	20830	0.33
803.8	10580	20330	0.31
805.5	10670	19610	0.29
807.1	10420	20080	0.32
808.7	10340	19610	0.31
810.4	10670	19610	0.29
812.0	10670	19160	0.28
813.7	10670	19840	0.30
815.3	11020	19160	0.25
816.9	11200	20330	0.28
818.6	10840	19840	0.29
820.2	10930	21100	0.32
821.9	10420	18940	0.28
823.5	10750	19610	0.28
825.1	12460	23150	0.30
826.8	10840	20830	0.31
828.4	9390	18120	0.32
830.1	10030	17360	0.25
831.7	10340	18120	0.26
833.3	9950	17540	0.26
835.0	10100	17540	0.25
836.6	7330	13610	0.30
838.3	5130	10930	0.36
839.9	4600	10100	0.37
841.5	3680	7580	0.35
843.2	3280	7250	0.37
844.8	3070	7580	0.40
846.5	3160	6870	0.37
848.1	2640	6540	0.40
849.7	2440	6600	0.42
851.4	2570	6800	0.42

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
241.0	3010	5910	0.32
241.5	3100	5910	0.31
242.0	3180	6050	0.31
242.5	3280	6050	0.29
243.0	3130	6350	0.34
243.5	3250	6120	0.30
244.0	3200	5910	0.29
244.5	3180	6350	0.33
245.0	3230	6200	0.31
245.5	3250	5980	0.29
246.0	3180	6120	0.32
246.5	3150	5980	0.31
247.0	3250	5980	0.29
247.5	3250	5840	0.28
248.0	3250	6050	0.30
248.5	3360	5840	0.25
249.0	3420	6200	0.28
249.5	3300	6050	0.29
250.0	3330	6430	0.32
250.5	3180	5770	0.28
251.0	3280	5980	0.28
251.5	3800	7060	0.30
252.0	3300	6350	0.31
252.5	2860	5520	0.32
253.0	3060	5290	0.25
253.5	3150	5520	0.26
254.0	3030	5350	0.26
254.5	3080	5350	0.25
255.0	2230	4150	0.30
255.5	1560	3330	0.36
256.0	1400	3080	0.37
256.5	1120	2310	0.35
257.0	1000	2210	0.37
257.5	940	2310	0.40
258.0	960	2090	0.37
258.5	800	1990	0.40
259.0	740	2010	0.42
259.5	780	2070	0.42

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 LOG#3**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
853.0	2720	6940	0.41
854.7	2710	7170	0.42
856.3	2770	7090	0.41
857.9	3020	6940	0.38
859.6	2550	7020	0.42
861.2	2650	6870	0.41
862.9	2590	6730	0.41
864.5	2570	6730	0.41
866.1	2580	6800	0.42
867.8	2560	6800	0.42
869.4	2450	6730	0.42
871.1	2500	6600	0.42
872.7	2500	6940	0.43
874.3	2310	6410	0.43
876.0	2410	6470	0.42
877.6	2330	6350	0.42
879.3	2350	6470	0.42
880.9	2440	6540	0.42
880.9	2560	6870	0.42
882.6	2430	6800	0.43
884.2	2420	6600	0.42
885.8	2410	6120	0.41
887.5	2430	6540	0.42
889.1	2650	7090	0.42
890.8	2530	7750	0.44
892.4	2600	6730	0.41
894.0	2700	6730	0.40
895.7	2660	7170	0.42
897.3	2860	6870	0.40
899.0	2910	6870	0.39
900.6	2810	6800	0.40
902.2	2670	6350	0.39
903.9	2570	6410	0.40
905.5	2680	6670	0.40
907.2	2570	6540	0.41
908.8	2560	6410	0.40
910.4	2570	6350	0.40
912.1	2500	6290	0.41

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
260.0	830	2120	0.41
260.5	830	2180	0.42
261.0	840	2160	0.41
261.5	920	2120	0.38
262.0	780	2140	0.42
262.5	810	2090	0.41
263.0	790	2050	0.41
263.5	780	2050	0.41
264.0	790	2070	0.42
264.5	780	2070	0.42
265.0	750	2050	0.42
265.5	760	2010	0.42
266.0	760	2120	0.43
266.5	710	1950	0.43
267.0	730	1970	0.42
267.5	710	1940	0.42
268.0	720	1970	0.42
268.5	740	1990	0.42
268.5	780	2090	0.42
269.0	740	2070	0.43
269.5	740	2010	0.42
270.0	730	1860	0.41
270.5	740	1990	0.42
271.0	810	2160	0.42
271.5	770	2360	0.44
272.0	790	2050	0.41
272.5	820	2050	0.40
273.0	810	2180	0.42
273.5	870	2090	0.40
274.0	890	2090	0.39
274.5	860	2070	0.40
275.0	810	1940	0.39
275.5	780	1950	0.40
276.0	820	2030	0.40
276.5	780	1990	0.41
277.0	780	1950	0.40
277.5	780	1940	0.40
278.0	760	1920	0.41

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 LOG#3**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
913.7	2420	6170	0.41
915.4	2430	6120	0.41
917.0	2390	5950	0.40
918.6	2310	5850	0.41
920.3	2160	5850	0.42
921.9	2060	5750	0.43
923.6	2030	5750	0.43
925.2	2010	5750	0.43
925.2	1990	5750	0.43
926.8	2030	5800	0.43
928.5	1970	5850	0.44
930.1	1910	5900	0.44
931.8	2290	5850	0.41
933.4	2180	5130	0.39
935.0	2190	6120	0.43
936.7	5820	10290	0.26
938.3	5980	10550	0.26
940.0	6940	12350	0.27
941.6	8890	15870	0.27
943.2	7840	16840	0.36
944.9	10260	18320	0.27
946.5	9800	17920	0.29
948.2	9730	17920	0.29
949.8	10180	20330	0.33
951.4	10500	20330	0.32
953.1	11490	21930	0.31

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
278.5	740	1880	0.41
279.0	740	1860	0.41
279.5	730	1810	0.40
280.0	710	1780	0.41
280.5	660	1780	0.42
281.0	630	1750	0.43
281.5	620	1750	0.43
282.0	610	1750	0.43
282.0	610	1750	0.43
282.5	620	1770	0.43
283.0	600	1780	0.44
283.5	580	1800	0.44
284.0	700	1780	0.41
284.5	660	1560	0.39
285.0	670	1860	0.43
285.5	1770	3140	0.26
286.0	1820	3220	0.26
286.5	2120	3760	0.27
287.0	2710	4840	0.27
287.5	2390	5130	0.36
288.0	3130	5580	0.27
288.5	2990	5460	0.29
289.0	2970	5460	0.29
289.5	3100	6200	0.33
290.0	3200	6200	0.32
290.5	3500	6680	0.31

Notes: "-" means no data available at that particular interval of depth.

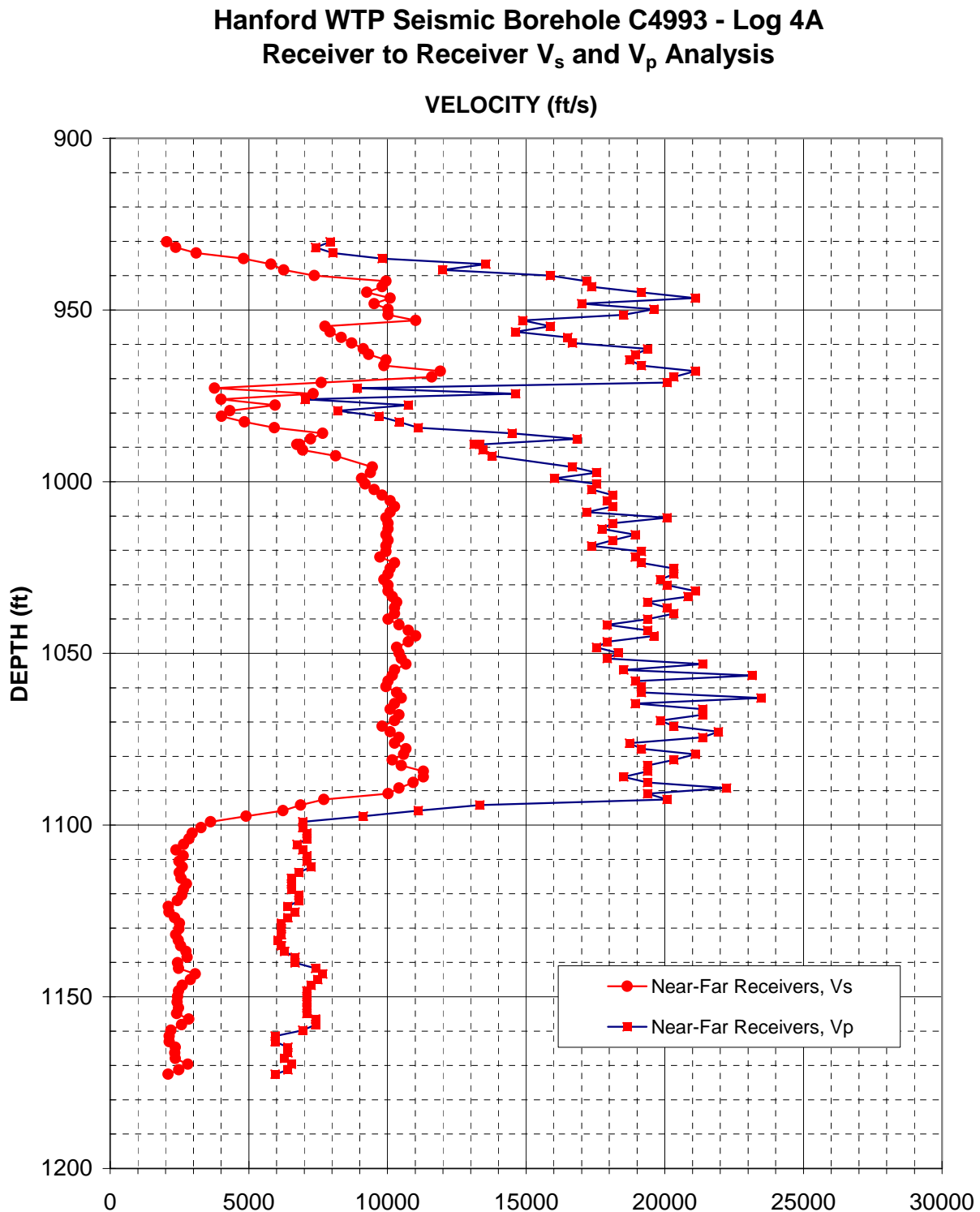


Figure 7: Boring BH-C4993 Log 4A, Suspension R1-R2 P- and S_H -wave velocities

Table 6: Boring BH-C4993 Log 4A, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN#4 LOGGED BY J DIEHL**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
930.1	2040	7940	0.46
931.8	2360	7410	0.44
933.4	3100	8030	0.41
935.0	4810	9800	0.34
936.7	5800	13550	0.39
938.3	6260	11990	0.31
940.0	7370	15870	0.36
941.6	9950	17180	0.25
943.2	9800	17360	0.27
944.9	9260	19160	0.35
946.5	10100	21100	0.35
948.2	9520	17010	0.27
949.8	10030	19610	0.32
951.4	10030	18520	0.29
953.1	11020	14880	-0.11
954.7	7750	15870	0.34
956.4	7940	14620	0.29
958.0	8330	16500	0.33
959.7	8710	16670	0.31
961.3	9130	19380	0.36
962.9	9320	18940	0.34
964.6	9950	18730	0.30
966.2	9880	19160	0.32
967.9	11900	21100	0.27
969.5	11590	20330	0.26
971.1	7620	20080	0.42
972.8	3770	8910	0.39
974.4	7330	14620	0.33
976.1	4000	7030	0.26
977.7	5950	10750	0.28
979.3	4310	8210	0.31
981.0	4020	9690	0.40
982.6	4850	10420	0.36
984.3	5930	11110	0.30
985.9	7660	14490	0.31
987.5	7230	16840	0.39

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
283.5	620	2420	0.46
284.0	720	2260	0.44
284.5	950	2450	0.41
285.0	1470	2990	0.34
285.5	1770	4130	0.39
286.0	1910	3650	0.31
286.5	2250	4840	0.36
287.0	3030	5240	0.25
287.5	2990	5290	0.27
288.0	2820	5840	0.35
288.5	3080	6430	0.35
289.0	2900	5180	0.27
289.5	3060	5980	0.32
290.0	3060	5640	0.29
290.5	3360	4540	-0.11
291.0	2360	4840	0.34
291.5	2420	4460	0.29
292.0	2540	5030	0.33
292.5	2660	5080	0.31
293.0	2780	5910	0.36
293.5	2840	5770	0.34
294.0	3030	5710	0.30
294.5	3010	5840	0.32
295.0	3630	6430	0.27
295.5	3530	6200	0.26
296.0	2320	6120	0.42
296.5	1150	2720	0.39
297.0	2230	4460	0.33
297.5	1220	2140	0.26
298.0	1810	3280	0.28
298.5	1320	2500	0.31
299.0	1220	2950	0.40
299.5	1480	3180	0.36
300.0	1810	3390	0.30
300.5	2340	4420	0.31
301.0	2200	5130	0.39

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN#4 LOGGED BY J DIEHL**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
989.2	6730	13330	0.33
989.2	6840	13120	0.31
990.8	6940	13440	0.32
992.5	8130	13770	0.23
995.7	9460	16670	0.26
997.4	9390	17540	0.30
999.0	9070	16030	0.26
1000.7	9200	17540	0.31
1002.3	9520	17360	0.28
1003.9	9800	18120	0.29
1005.6	10100	17920	0.27
1007.2	10260	18120	0.26
1008.9	10100	17180	0.24
1010.5	9950	20080	0.34
1012.1	10030	18120	0.28
1013.8	10030	17730	0.27
1015.4	9950	18940	0.31
1017.1	10030	18120	0.28
1018.7	9950	17360	0.26
1020.3	9950	19160	0.32
1022.0	9730	18940	0.32
1023.6	10260	19160	0.30
1025.3	10100	20330	0.34
1026.9	10030	20330	0.34
1028.5	9880	19840	0.34
1030.2	10030	20080	0.33
1031.8	10030	21100	0.35
1033.5	10180	20830	0.34
1035.1	10340	19380	0.30
1036.8	10260	20080	0.32
1038.4	10260	20330	0.33
1040.0	10030	19380	0.32
1041.7	10420	17920	0.24
1043.3	10750	19380	0.28
1045.0	11020	19610	0.27
1046.6	10750	17920	0.22
1048.2	10340	17540	0.23
1049.9	10420	18320	0.26
1051.5	10500	17920	0.24

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
301.5	2050	4060	0.33
301.5	2080	4000	0.31
302.0	2120	4100	0.32
302.5	2480	4200	0.23
303.5	2880	5080	0.26
304.0	2860	5350	0.30
304.5	2760	4880	0.26
305.0	2800	5350	0.31
305.5	2900	5290	0.28
306.0	2990	5520	0.29
306.5	3080	5460	0.27
307.0	3130	5520	0.26
307.5	3080	5240	0.24
308.0	3030	6120	0.34
308.5	3060	5520	0.28
309.0	3060	5400	0.27
309.5	3030	5770	0.31
310.0	3060	5520	0.28
310.5	3030	5290	0.26
311.0	3030	5840	0.32
311.5	2970	5770	0.32
312.0	3130	5840	0.30
312.5	3080	6200	0.34
313.0	3060	6200	0.34
313.5	3010	6050	0.34
314.0	3060	6120	0.33
314.5	3060	6430	0.35
315.0	3100	6350	0.34
315.5	3150	5910	0.30
316.0	3130	6120	0.32
316.5	3130	6200	0.33
317.0	3060	5910	0.32
317.5	3180	5460	0.24
318.0	3280	5910	0.28
318.5	3360	5980	0.27
319.0	3280	5460	0.22
319.5	3150	5350	0.23
320.0	3180	5580	0.26
320.5	3200	5460	0.24

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN#4 LOGGED BY J DIEHL**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1053.2	10670	21370	0.33
1054.8	10260	18520	0.28
1056.4	10180	23150	0.38
1058.1	10030	18940	0.31
1059.7	9950	19160	0.32
1061.4	10340	19160	0.29
1063.0	10500	23470	0.37
1064.6	10260	18940	0.29
1066.3	10100	21370	0.36
1067.9	10420	21370	0.34
1069.6	10260	19840	0.32
1071.2	9800	20330	0.35
1072.8	10100	21930	0.37
1074.5	10420	21370	0.34
1076.1	10260	18730	0.29
1077.8	10670	19160	0.28
1079.4	10580	21100	0.33
1081.0	10180	20330	0.33
1082.7	10500	19380	0.29
1084.3	11300	19380	0.24
1086.0	11300	18520	0.20
1087.6	10930	19380	0.27
1089.2	10420	22220	0.36
1090.9	10030	19380	0.32
1092.5	7710	20080	0.41
1094.2	6870	13330	0.32
1095.8	6230	11110	0.27
1097.4	4900	9130	0.30
1099.1	3620	6940	0.31
1100.7	3280	6940	0.36
1102.4	2960	7090	0.39
1104.0	2850	7090	0.40
1105.6	2660	6730	0.41
1107.3	2370	6940	0.43
1108.9	2640	7090	0.42
1110.6	2490	7090	0.43
1112.2	2600	7250	0.43
1113.9	2500	6800	0.42
1115.5	2560	6540	0.41

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
321.0	3250	6510	0.33
321.5	3130	5640	0.28
322.0	3100	7060	0.38
322.5	3060	5770	0.31
323.0	3030	5840	0.32
323.5	3150	5840	0.29
324.0	3200	7150	0.37
324.5	3130	5770	0.29
325.0	3080	6510	0.36
325.5	3180	6510	0.34
326.0	3130	6050	0.32
326.5	2990	6200	0.35
327.0	3080	6680	0.37
327.5	3180	6510	0.34
328.0	3130	5710	0.29
328.5	3250	5840	0.28
329.0	3230	6430	0.33
329.5	3100	6200	0.33
330.0	3200	5910	0.29
330.5	3440	5910	0.24
331.0	3440	5640	0.20
331.5	3330	5910	0.27
332.0	3180	6770	0.36
332.5	3060	5910	0.32
333.0	2350	6120	0.41
333.5	2090	4060	0.32
334.0	1900	3390	0.27
334.5	1490	2780	0.30
335.0	1100	2120	0.31
335.5	1000	2120	0.36
336.0	900	2160	0.39
336.5	870	2160	0.40
337.0	810	2050	0.41
337.5	720	2120	0.43
338.0	800	2160	0.42
338.5	760	2160	0.43
339.0	790	2210	0.43
339.5	760	2070	0.42
340.0	780	1990	0.41

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN#4 LOGGED BY J DIEHL**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1117.1	2750	6540	0.39
1118.8	2650	6540	0.40
1120.4	2580	6800	0.42
1122.1	2420	6800	0.43
1123.7	2100	6410	0.44
1125.3	2120	6670	0.44
1127.0	2320	6410	0.42
1128.6	2510	6170	0.40
1130.3	2490	6170	0.40
1131.9	2360	6170	0.41
1133.5	2460	6060	0.40
1135.2	2540	6170	0.40
1136.8	2730	6290	0.38
1138.5	2780	6670	0.39
1140.1	2430	6670	0.42
1141.7	2470	7410	0.44
1143.4	3070	7660	0.40
1145.0	2900	7490	0.41
1146.7	2600	7250	0.43
1148.3	2470	7090	0.43
1149.9	2430	7090	0.43
1151.6	2420	7090	0.43
1153.2	2470	7090	0.43
1154.9	2400	7090	0.44
1156.5	2840	7410	0.41
1158.1	2570	7410	0.43
1159.8	2190	6940	0.44
1161.4	2130	5950	0.43
1163.1	2130	5950	0.43
1164.7	2350	6410	0.42
1166.3	2330	6410	0.42
1168.0	2350	6290	0.42
1169.6	2800	6540	0.39
1171.3	2480	6410	0.41
1172.6	2090	5950	0.43

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
340.5	840	1990	0.39
341.0	810	1990	0.40
341.5	790	2070	0.42
342.0	740	2070	0.43
342.5	640	1950	0.44
343.0	650	2030	0.44
343.5	710	1950	0.42
344.0	760	1880	0.40
344.5	760	1880	0.40
345.0	720	1880	0.41
345.5	750	1850	0.40
346.0	780	1880	0.40
346.5	830	1920	0.38
347.0	850	2030	0.39
347.5	740	2030	0.42
348.0	750	2260	0.44
348.5	940	2340	0.40
349.0	880	2280	0.41
349.5	790	2210	0.43
350.0	750	2160	0.43
350.5	740	2160	0.43
351.0	740	2160	0.43
351.5	750	2160	0.43
352.0	730	2160	0.44
352.5	860	2260	0.41
353.0	780	2260	0.43
353.5	670	2120	0.44
354.0	650	1810	0.43
354.5	650	1810	0.43
355.0	720	1950	0.42
355.5	710	1950	0.42
356.0	720	1920	0.42
356.5	850	1990	0.39
357.0	760	1950	0.41
357.4	640	1810	0.43

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4993 - Log 4B Receiver to Receiver V_s and V_p Analysis

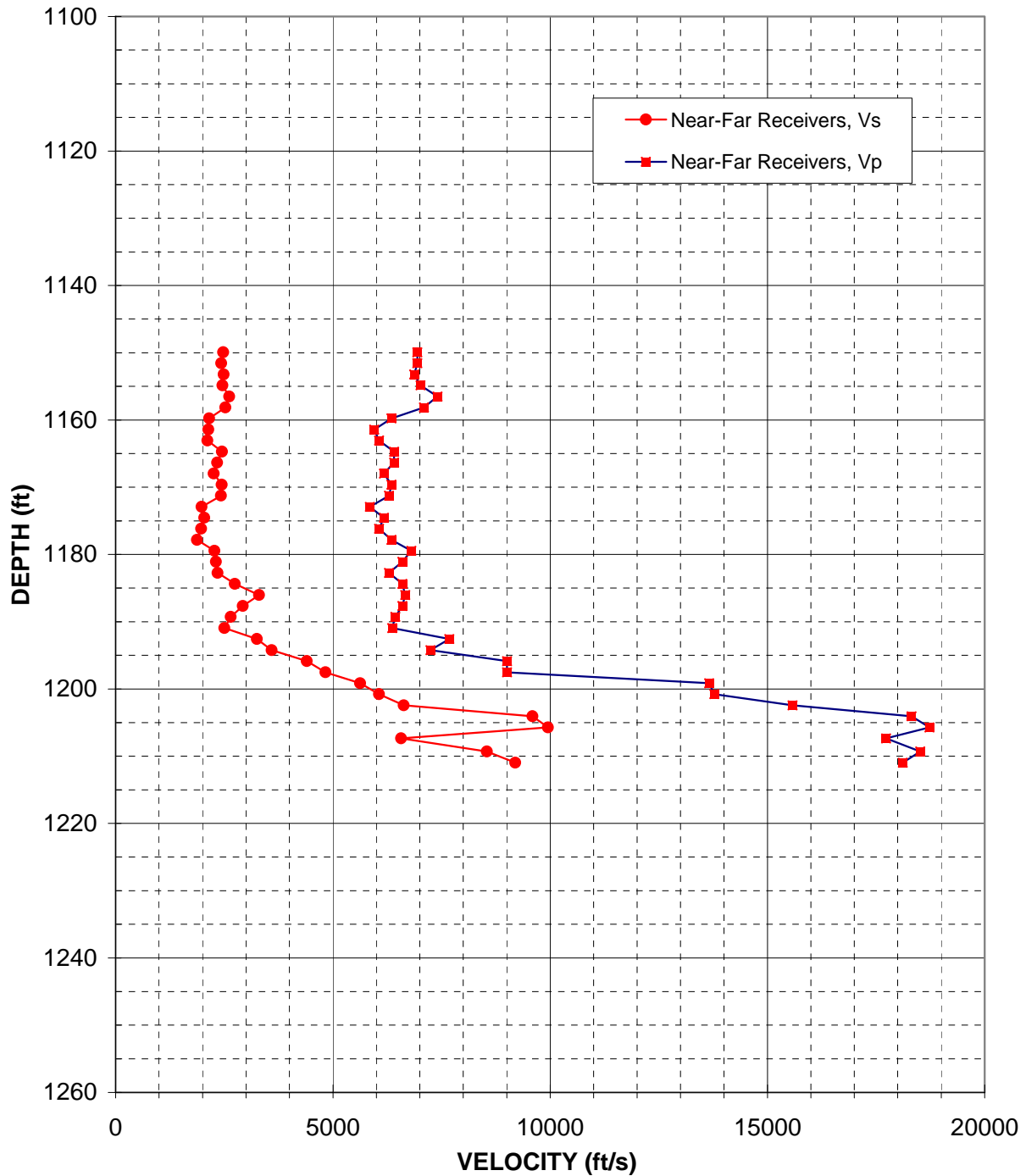


Figure 8: Boring BH-C4993 Log 4B, Suspension R1-R2 P- and S_H -wave velocities

Table 7: Boring BH-C4993 Log 4B, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN #4B**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1149.9	2480	6940	0.43	350.5	760	2120	0.43
1151.6	2430	6940	0.43	351.0	740	2120	0.43
1153.2	2490	6870	0.42	351.5	760	2090	0.42
1154.9	2460	7020	0.43	352.0	750	2140	0.43
1156.5	2610	7410	0.43	352.5	800	2260	0.43
1158.1	2530	7090	0.43	353.0	770	2160	0.43
1159.8	2150	6350	0.44	353.5	660	1940	0.44
1161.4	2140	5950	0.43	354.0	650	1810	0.43
1163.1	2120	6060	0.43	354.5	650	1850	0.43
1164.7	2450	6410	0.41	355.0	750	1950	0.41
1166.3	2340	6410	0.42	355.5	710	1950	0.42
1168.0	2260	6170	0.42	356.0	690	1880	0.42
1169.6	2440	6350	0.41	356.5	740	1940	0.41
1171.3	2420	6290	0.41	357.0	740	1920	0.41
1172.9	1980	5850	0.44	357.5	600	1780	0.44
1174.5	2040	6170	0.44	358.0	620	1880	0.44
1176.2	1970	6060	0.44	358.5	600	1850	0.44
1177.8	1870	6350	0.45	359.0	570	1940	0.45
1179.5	2280	6800	0.44	359.5	690	2070	0.44
1181.1	2310	6600	0.43	360.0	700	2010	0.43
1182.7	2350	6290	0.42	360.5	720	1920	0.42
1184.4	2740	6600	0.40	361.0	840	2010	0.40
1186.0	3300	6670	0.34	361.5	1010	2030	0.34
1187.7	2930	6600	0.38	362.0	890	2010	0.38
1189.3	2650	6440	0.40	362.5	810	1960	0.40
1190.9	2510	6360	0.41	363.0	760	1940	0.41
1192.6	3250	7680	0.39	363.5	990	2340	0.39
1194.2	3590	7250	0.34	364.0	1100	2210	0.34
1195.9	4400	9010	0.34	364.5	1340	2750	0.34
1197.5	4830	9010	0.30	365.0	1470	2750	0.30
1199.2	5630	13660	0.40	365.5	1710	4160	0.40
1200.8	6060	13770	0.38	366.0	1850	4200	0.38
1202.4	6630	15580	0.39	366.5	2020	4750	0.39
1204.1	9590	18320	0.31	367.0	2920	5580	0.31
1205.7	9950	18730	0.30	367.5	3030	5710	0.30

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 RUN #4B**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1207.4	6570	17730	0.42	368.0	2000	5400	0.42
1209.3	8550	18520	0.36	368.6	2610	5640	0.36
1211.0	9200	18120	0.33	369.1	2800	5520	0.33

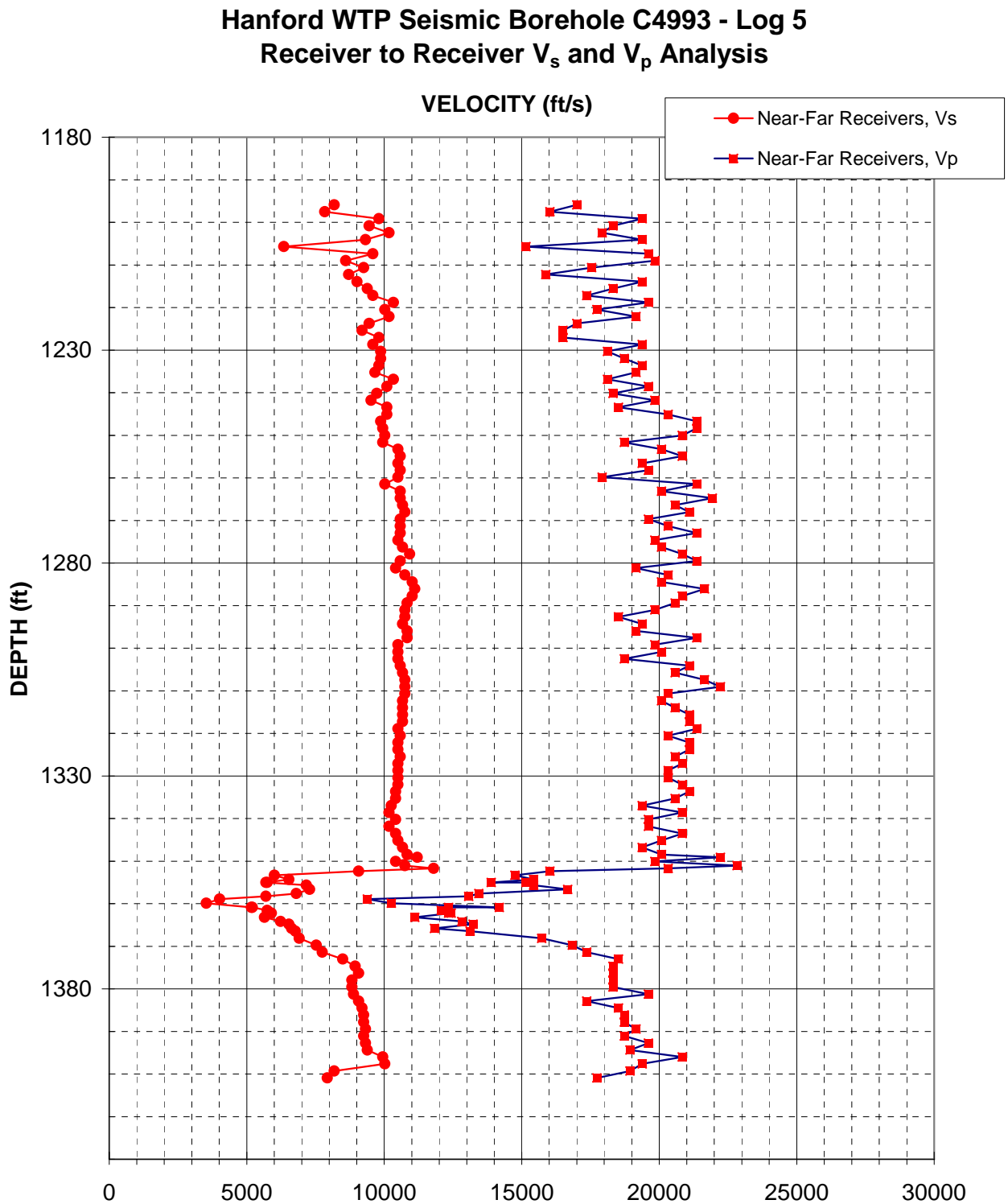


Figure 9: Boring BH-C4993 Log 5, Suspension R1-R2 P- and S_H -wave velocities

Table 8: Boring BH-C4993 Log 5, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4993 LOG #5**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1195.9	8180	17010	0.35	364.5	2490	5180	0.35
1197.5	7840	16030	0.34	365.0	2390	4880	0.34
1199.2	9800	19380	0.33	365.5	2990	5910	0.33
1200.8	9460	18320	0.32	366.0	2880	5580	0.32
1202.4	10180	17920	0.26	366.5	3100	5460	0.26
1204.1	9320	19380	0.35	367.0	2840	5910	0.35
1205.7	6350	15150	0.39	367.5	1940	4620	0.39
1207.4	9590	19610	0.34	368.0	2920	5980	0.34
1209.0	8600	19840	0.38	368.5	2620	6050	0.38
1210.6	9260	17540	0.31	369.0	2820	5350	0.31
1212.3	8710	15870	0.28	369.5	2660	4840	0.28
1213.9	9010	19380	0.36	370.0	2750	5910	0.36
1215.6	9390	18320	0.32	370.5	2860	5580	0.32
1217.2	9590	17360	0.28	371.0	2920	5290	0.28
1218.8	10340	19610	0.31	371.5	3150	5980	0.31
1220.5	10030	17730	0.27	372.0	3060	5400	0.27
1222.1	10180	19160	0.30	372.5	3100	5840	0.30
1223.8	9460	17010	0.28	373.0	2880	5180	0.28
1225.4	9200	16500	0.27	373.5	2800	5030	0.27
1227.0	9800	16500	0.23	374.0	2990	5030	0.23
1228.7	9590	19380	0.34	374.5	2920	5910	0.34
1230.3	9880	18120	0.29	375.0	3010	5520	0.29
1232.0	9880	18730	0.31	375.5	3010	5710	0.31
1233.6	9800	19380	0.33	376.0	2990	5910	0.33
1235.2	9660	19160	0.33	376.5	2940	5840	0.33
1236.9	10340	18120	0.26	377.0	3150	5520	0.26
1238.5	10100	19610	0.32	377.5	3080	5980	0.32
1240.2	9730	18320	0.30	378.0	2970	5580	0.30
1241.8	9520	19840	0.35	378.5	2900	6050	0.35
1243.4	10100	18520	0.29	379.0	3080	5640	0.29
1245.1	10100	20330	0.34	379.5	3080	6200	0.34
1246.7	9880	21370	0.36	380.0	3010	6510	0.36
1248.4	9950	21370	0.36	380.5	3030	6510	0.36
1250.0	10030	20830	0.35	381.0	3060	6350	0.35
1251.6	9950	18730	0.30	381.5	3030	5710	0.30

1253.3	10500	20080	0.31	382.0	3200	6120	0.31
1254.9	10580	20830	0.33	382.5	3230	6350	0.33
1256.6	10500	19380	0.29	383.0	3200	5910	0.29
1258.2	10580	19610	0.29	383.5	3230	5980	0.29
1259.8	10500	17920	0.24	384.0	3200	5460	0.24
1261.5	10030	21370	0.36	384.5	3060	6510	0.36
1263.1	10580	20080	0.31	385.0	3230	6120	0.31
1264.8	10580	21930	0.35	385.5	3230	6680	0.35
1266.4	10670	20580	0.32	386.0	3250	6270	0.32
1268.0	10750	21100	0.32	386.5	3280	6430	0.32
1269.7	10580	19610	0.29	387.0	3230	5980	0.29
1271.3	10580	20330	0.31	387.5	3230	6200	0.31
1273.0	10580	21370	0.34	388.0	3230	6510	0.34
1274.6	10500	19840	0.31	388.5	3200	6050	0.31
1276.3	10670	20080	0.30	389.0	3250	6120	0.30
1277.9	10930	20830	0.31	389.5	3330	6350	0.31
1279.5	10580	21370	0.34	390.0	3230	6510	0.34
1281.2	10420	19160	0.29	390.5	3180	5840	0.29
1282.8	10750	20330	0.31	391.0	3280	6200	0.31
1284.5	11020	20080	0.28	391.5	3360	6120	0.28
1286.1	11110	21650	0.32	392.0	3390	6600	0.32
1287.7	11020	20830	0.31	392.5	3360	6350	0.31
1289.4	10840	20580	0.31	393.0	3300	6270	0.31
1291.0	10750	19840	0.29	393.5	3280	6050	0.29
1292.7	10750	18520	0.25	394.0	3280	5640	0.25
1294.3	10670	19380	0.28	394.5	3250	5910	0.28
1295.9	10840	19160	0.26	395.0	3300	5840	0.26
1297.6	10840	21370	0.33	395.5	3300	6510	0.33
1299.2	10500	19840	0.31	396.0	3200	6050	0.31
1300.9	10500	20080	0.31	396.5	3200	6120	0.31
1302.5	10500	18730	0.27	397.0	3200	5710	0.27
1304.1	10580	21100	0.33	397.5	3230	6430	0.33
1305.8	10670	20580	0.32	398.0	3250	6270	0.32
1307.4	10750	21650	0.34	398.5	3280	6600	0.34
1309.1	10750	22220	0.35	399.0	3280	6770	0.35
1310.7	10750	20330	0.31	399.5	3280	6200	0.31
1312.3	10670	20080	0.30	400.0	3250	6120	0.30
1314.0	10670	20580	0.32	400.5	3250	6270	0.32
1315.6	10670	21100	0.33	401.0	3250	6430	0.33
1317.3	10670	21100	0.33	401.5	3250	6430	0.33
1318.9	10500	21370	0.34	402.0	3200	6510	0.34
1320.5	10580	20330	0.31	402.5	3230	6200	0.31
1322.2	10500	21100	0.34	403.0	3200	6430	0.34
1323.8	10500	21100	0.34	403.5	3200	6430	0.34
1325.5	10580	20580	0.32	404.0	3230	6270	0.32
1327.1	10500	20830	0.33	404.5	3200	6350	0.33
1328.7	10500	20330	0.32	405.0	3200	6200	0.32

1330.4	10500	20330	0.32	405.5	3200	6200	0.32
1332.0	10500	20830	0.33	406.0	3200	6350	0.33
1333.7	10420	21100	0.34	406.5	3180	6430	0.34
1335.3	10420	20580	0.33	407.0	3180	6270	0.33
1336.9	10260	19380	0.31	407.5	3130	5910	0.31
1338.6	10180	20830	0.34	408.0	3100	6350	0.34
1340.2	10420	19610	0.30	408.5	3180	5980	0.30
1341.9	10180	19610	0.32	409.0	3100	5980	0.32
1343.5	10420	20830	0.33	409.5	3180	6350	0.33
1345.1	10500	20080	0.31	410.0	3200	6120	0.31
1346.8	10670	19380	0.28	410.5	3250	5910	0.28
1348.4	10840	20080	0.29	411.0	3300	6120	0.29
1349.1	11200	22220	0.33	411.2	3420	6770	0.33
1350.1	10420	19840	0.31	411.5	3180	6050	0.31
1351.1	10750	22830	0.36	411.8	3280	6960	0.36
1351.7	11800	20330	0.25	412.0	3600	6200	0.25
1352.4	9070	16030	0.26	412.2	2760	4880	0.26
1353.4	6010	14750	0.40	412.5	1830	4500	0.40
1354.3	6540	15430	0.39	412.8	1990	4700	0.39
1355.0	5700	13890	0.40	413.0	1740	4230	0.40
1355.0	5750	15150	0.42	413.0	1750	4620	0.42
1355.6	7170	15430	0.36	413.2	2180	4700	0.36
1356.6	7290	16670	0.38	413.5	2220	5080	0.38
1357.6	6800	13440	0.33	413.8	2070	4100	0.33
1358.3	5700	13070	0.38	414.0	1740	3980	0.38
1358.9	4020	9390	0.39	414.2	1220	2860	0.39
1359.9	3530	10260	0.43	414.5	1080	3130	0.43
1360.9	5170	14180	0.42	414.8	1580	4320	0.42
1360.9	5210	12350	0.39	414.8	1590	3760	0.39
1361.6	5750	12080	0.35	415.0	1750	3680	0.35
1362.2	5850	12350	0.36	415.2	1780	3760	0.36
1362.2	5900	12440	0.35	415.2	1800	3790	0.35
1363.2	5650	11110	0.33	415.5	1720	3390	0.33
1364.2	6230	12820	0.35	415.8	1900	3910	0.35
1364.8	6540	13230	0.34	416.0	1990	4030	0.34
1365.8	6630	11820	0.27	416.3	2020	3600	0.27
1366.5	6770	13120	0.32	416.5	2060	4000	0.32
1368.1	6910	15720	0.38	417.0	2110	4790	0.38
1369.8	7530	16840	0.37	417.5	2300	5130	0.37
1371.4	7750	17360	0.38	418.0	2360	5290	0.38
1373.0	8490	18520	0.37	418.5	2590	5640	0.37
1374.7	8950	18320	0.34	419.0	2730	5580	0.34
1376.3	9070	18320	0.34	419.5	2760	5580	0.34
1378.0	8830	18320	0.35	420.0	2690	5580	0.35
1379.6	8830	18320	0.35	420.5	2690	5580	0.35
1381.2	8890	19610	0.37	421.0	2710	5980	0.37
1382.9	9070	17360	0.31	421.5	2760	5290	0.31

1384.5	9200	18520	0.34	422.0	2800	5640	0.34
1386.2	9260	18730	0.34	422.5	2820	5710	0.34
1387.8	9260	18730	0.34	423.0	2820	5710	0.34
1389.4	9320	19160	0.34	423.5	2840	5840	0.34
1391.1	9260	18730	0.34	424.0	2820	5710	0.34
1392.7	9320	19610	0.35	424.5	2840	5980	0.35
1394.4	9390	18940	0.34	425.0	2860	5770	0.34
1396.0	9950	20830	0.35	425.5	3030	6350	0.35
1397.6	10030	19380	0.32	426.0	3060	5910	0.32
1399.3	8180	18940	0.39	426.5	2490	5770	0.39
1400.9	7940	17730	0.37	427.0	2420	5400	0.37

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4996 - Log 1 Receiver to Receiver V_s and V_p Analysis

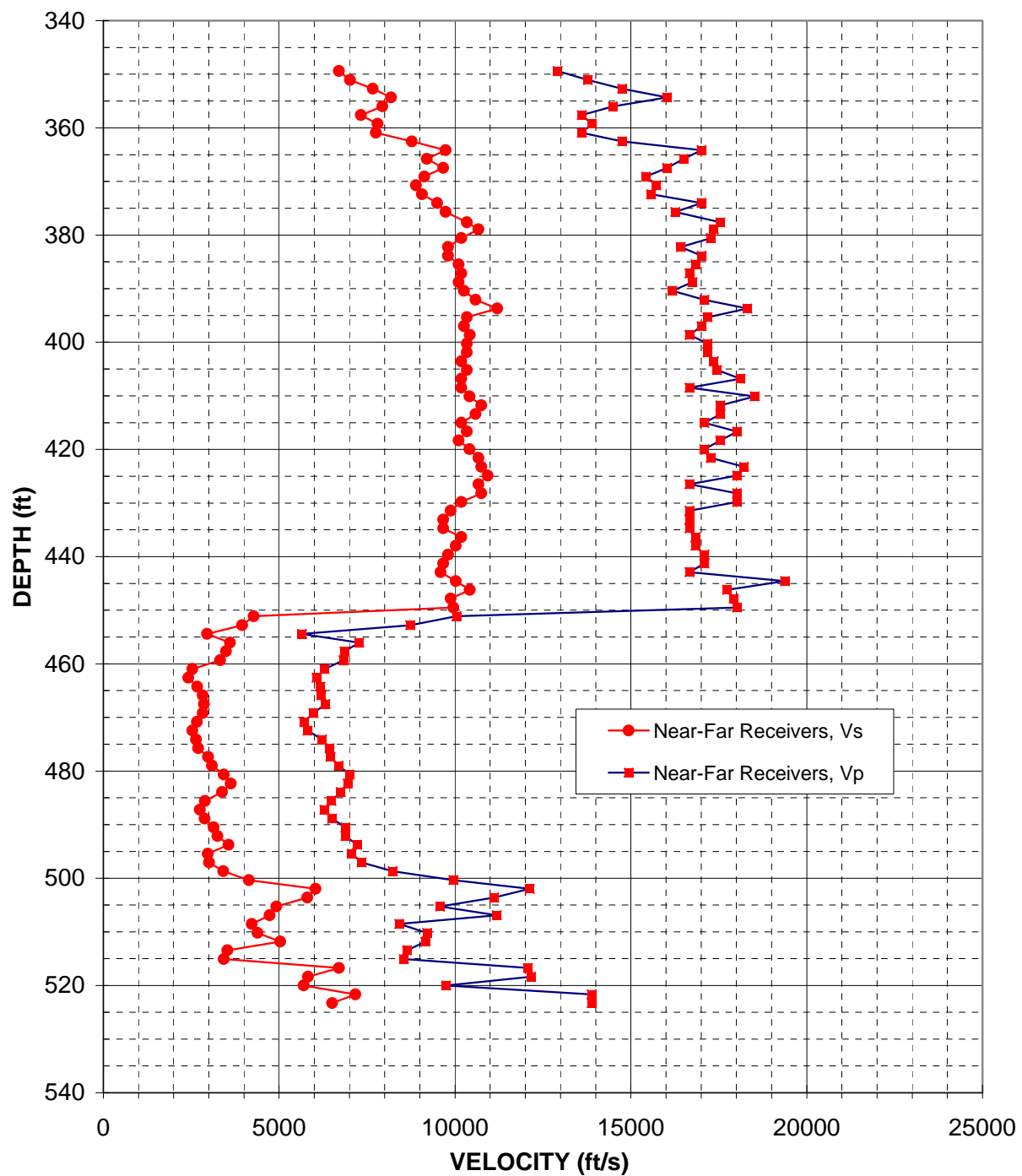


Figure 10: Boring BH-C4996 Log 1, Suspension R1-R2 P- and S_H -wave velocities

Table 9. Boring BH-C4996 Log 1, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 LOG #1**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
349.4	6700	12920	0.32	106.5	2040	3940	0.32
351.1	7020	13770	0.32	107.0	2140	4200	0.32
352.7	7660	14750	0.32	107.5	2340	4500	0.32
354.3	8180	16030	0.32	108.0	2490	4880	0.32
356.0	7940	14490	0.29	108.5	2420	4420	0.29
357.6	7330	13610	0.30	109.0	2230	4150	0.30
359.3	7800	13890	0.27	109.5	2380	4230	0.27
360.9	7750	13610	0.26	110.0	2360	4150	0.26
362.5	8770	14750	0.23	110.5	2670	4500	0.23
364.2	9730	17010	0.26	111.0	2970	5180	0.26
365.8	9200	16500	0.27	111.5	2800	5030	0.27
367.5	9660	16030	0.21	112.0	2940	4880	0.21
369.1	9130	15430	0.23	112.5	2780	4700	0.23
370.7	8890	15720	0.27	113.0	2710	4790	0.27
372.4	9060	15580	0.24	113.5	2760	4750	0.24
374.0	9500	17010	0.27	114.0	2890	5180	0.27
375.7	9730	16260	0.22	114.5	2970	4960	0.22
377.6	10340	17540	0.23	115.1	3150	5350	0.23
378.9	10670	17360	0.20	115.5	3250	5290	0.20
380.6	10180	17270	0.23	116.0	3100	5260	0.23
382.2	9800	16420	0.22	116.5	2990	5000	0.22
383.9	9800	17010	0.25	117.0	2990	5180	0.25
385.5	10100	16840	0.22	117.5	3080	5130	0.22
387.1	10180	16670	0.20	118.0	3100	5080	0.20
388.8	10100	16750	0.21	118.5	3080	5110	0.21
390.4	10260	16180	0.16	119.0	3130	4930	0.16
392.1	10580	17090	0.19	119.5	3230	5210	0.19
393.7	11200	18320	0.20	120.0	3420	5580	0.20
395.3	10340	17180	0.22	120.5	3150	5240	0.22
397.0	10260	17010	0.21	121.0	3130	5180	0.21
398.6	10420	16670	0.18	121.5	3180	5080	0.18
400.3	10340	17180	0.22	122.0	3150	5240	0.22
401.9	10340	17180	0.22	122.5	3150	5240	0.22
403.5	10180	17360	0.24	123.0	3100	5290	0.24
405.2	10340	17450	0.23	123.5	3150	5320	0.23

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 LOG #1**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
406.8	10180	18120	0.27
408.5	10180	16670	0.20
410.1	10420	18520	0.27
411.8	10750	17540	0.20
413.4	10580	17540	0.21
415.0	10180	17090	0.23
416.7	10340	18020	0.25
418.3	10100	17540	0.25
420.0	10420	17090	0.20
421.6	10670	17270	0.19
423.2	10750	18210	0.23
424.9	10930	18020	0.21
426.5	10670	16670	0.15
428.2	10750	18020	0.22
429.8	10180	18020	0.27
431.4	9880	16670	0.23
433.1	9660	16670	0.25
434.7	9660	16670	0.25
436.4	10180	16840	0.21
438.0	10030	16840	0.23
439.6	9800	17090	0.25
441.3	9660	17090	0.27
442.9	9590	16670	0.25
444.6	10030	19380	0.32
446.2	10420	17730	0.24
447.8	9880	17920	0.28
449.5	9950	18020	0.28
451.1	4270	10040	0.39
452.8	3940	8730	0.37
454.4	2950	5650	0.31
456.0	3600	7280	0.34
457.7	3490	6860	0.33
459.3	3330	6830	0.34
461.0	2530	6290	0.40
462.6	2420	6060	0.41
464.2	2670	6170	0.38
465.9	2820	6200	0.37
467.5	2860	6310	0.37

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
124.0	3100	5520	0.27
124.5	3100	5080	0.20
125.0	3180	5640	0.27
125.5	3280	5350	0.20
126.0	3230	5350	0.21
126.5	3100	5210	0.23
127.0	3150	5490	0.25
127.5	3080	5350	0.25
128.0	3180	5210	0.20
128.5	3250	5260	0.19
129.0	3280	5550	0.23
129.5	3330	5490	0.21
130.0	3250	5080	0.15
130.5	3280	5490	0.22
131.0	3100	5490	0.27
131.5	3010	5080	0.23
132.0	2940	5080	0.25
132.5	2940	5080	0.25
133.0	3100	5130	0.21
133.5	3060	5130	0.23
134.0	2990	5210	0.25
134.5	2940	5210	0.27
135.0	2920	5080	0.25
135.5	3060	5910	0.32
136.0	3180	5400	0.24
136.5	3010	5460	0.28
137.0	3030	5490	0.28
137.5	1300	3060	0.39
138.0	1200	2660	0.37
138.5	900	1720	0.31
139.0	1100	2220	0.34
139.5	1060	2090	0.33
140.0	1010	2080	0.34
140.5	770	1920	0.40
141.0	740	1850	0.41
141.5	810	1880	0.38
142.0	860	1890	0.37
142.5	870	1920	0.37

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 LOG #1**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
469.2	2830	5970	0.36
470.8	2670	5710	0.36
472.4	2530	5810	0.38
474.1	2640	6220	0.39
475.7	2700	6440	0.39
477.4	2980	6460	0.37
479.0	3090	6690	0.36
480.6	3430	7000	0.34
482.3	3620	6940	0.31
483.9	3380	6750	0.33
485.6	2890	6490	0.38
487.2	2740	6290	0.38
488.9	2880	6510	0.38
490.5	3140	6890	0.37
492.1	3240	6890	0.36
493.8	3570	7220	0.34
495.4	2970	7060	0.39
497.1	3010	7340	0.40
498.7	3410	8230	0.40
500.3	4140	9950	0.40
502.0	6030	12120	0.34
503.6	5800	11110	0.31
505.3	4920	9580	0.32
506.9	4730	11190	0.39
508.5	4220	8420	0.33
510.2	4390	9210	0.35
511.8	5030	9160	0.28
513.5	3530	8640	0.40
515.1	3430	8550	0.40
516.7	6700	12080	0.28
518.4	5820	12170	0.35
520.0	5700	9750	0.24
521.7	7170	13890	0.32
523.3	6500	13890	0.36

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
143.0	860	1820	0.36
143.5	810	1740	0.36
144.0	770	1770	0.38
144.5	800	1900	0.39
145.0	820	1960	0.39
145.5	910	1970	0.37
146.0	940	2040	0.36
146.5	1040	2130	0.34
147.0	1100	2120	0.31
147.5	1030	2060	0.33
148.0	880	1980	0.38
148.5	840	1920	0.38
149.0	880	1980	0.38
149.5	960	2100	0.37
150.0	990	2100	0.36
150.5	1090	2200	0.34
151.0	910	2150	0.39
151.5	920	2240	0.40
152.0	1040	2510	0.40
152.5	1260	3030	0.40
153.0	1840	3690	0.34
153.5	1770	3390	0.31
154.0	1500	2920	0.32
154.5	1440	3410	0.39
155.0	1290	2570	0.33
155.5	1340	2810	0.35
156.0	1530	2790	0.28
156.5	1080	2630	0.40
157.0	1040	2610	0.40
157.5	2040	3680	0.28
158.0	1770	3710	0.35
158.5	1740	2970	0.24
159.0	2180	4230	0.32
159.5	1980	4230	0.36

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4996 - Log 2 Receiver to Receiver V_s and V_p Analysis

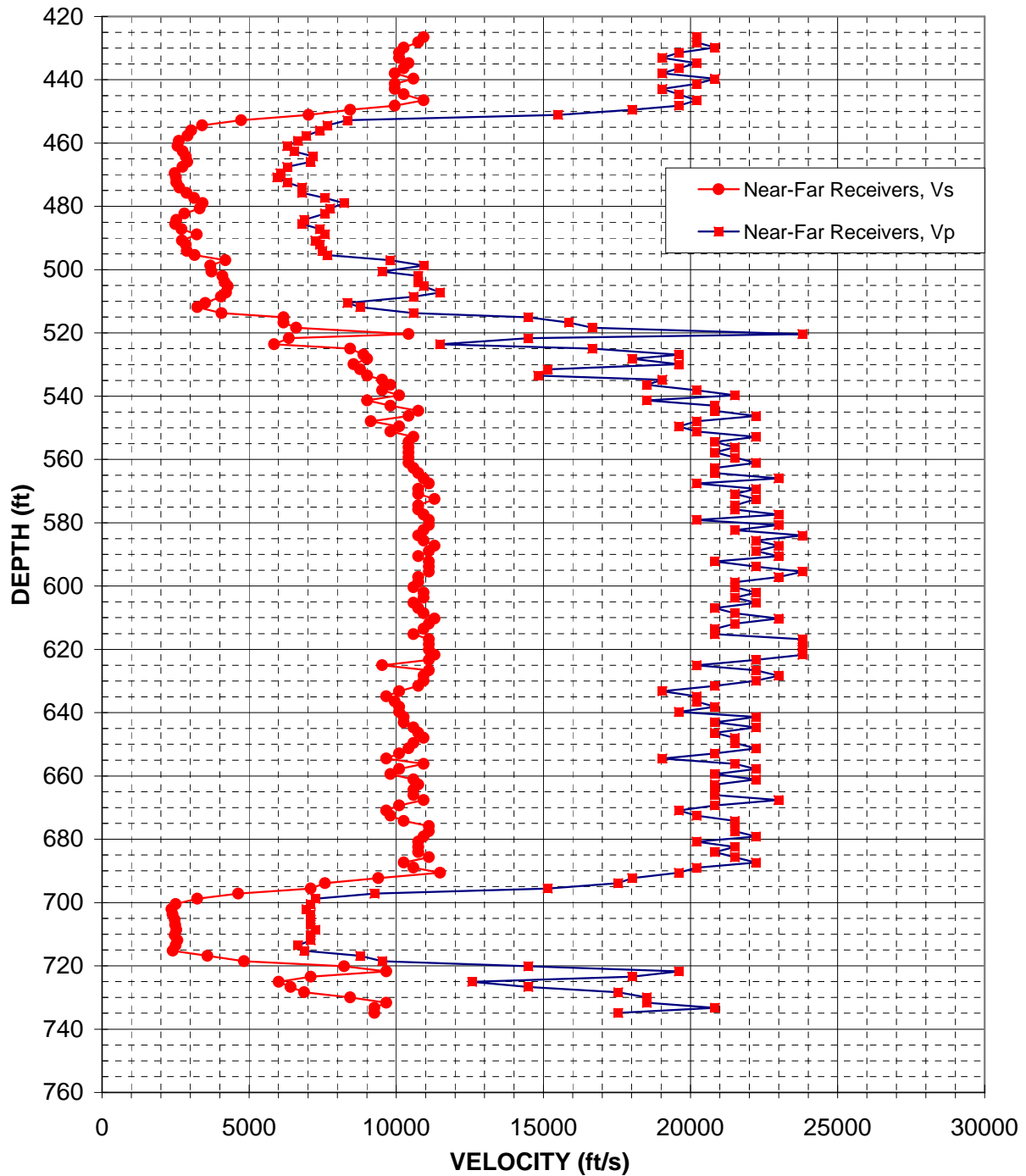


Figure 11: Boring BH-C4996 Log 2, Suspension R1-R2 P- and S_H -wave velocities

Table 10. Boring BH-C4996 Log 2, Suspension R1-R2 depths and P- and S_H-wave velocities

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 LOG 2							
American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
426.5	10930	20200	0.29	130.0	3330	6160	0.29
428.2	10750	20200	0.30	130.5	3280	6160	0.30
429.8	10260	20830	0.34	131.0	3130	6350	0.34
431.4	10100	19610	0.32	131.5	3080	5980	0.32
433.1	10100	19050	0.30	132.0	3080	5810	0.30
434.7	10420	20200	0.32	132.5	3180	6160	0.32
436.4	10260	19610	0.31	133.0	3130	5980	0.31
438.0	9950	19050	0.31	133.5	3030	5810	0.31
439.6	10580	20830	0.33	134.0	3230	6350	0.33
441.3	9950	20200	0.34	134.5	3030	6160	0.34
442.9	9950	19050	0.31	135.0	3030	5810	0.31
444.6	10260	19610	0.31	135.5	3130	5980	0.31
446.5	10930	20200	0.29	136.1	3330	6160	0.29
448.2	9950	19610	0.33	136.6	3030	5980	0.33
449.5	8440	18020	0.36	137.0	2570	5490	0.36
451.1	7020	15500	0.37	137.5	2140	4730	0.37
452.8	4730	8330	0.26	138.0	1440	2540	0.26
454.4	3400	7660	0.38	138.5	1040	2340	0.38
456.0	3030	7410	0.40	139.0	920	2260	0.40
457.7	2910	6940	0.39	139.5	890	2120	0.39
459.3	2610	6670	0.41	140.0	800	2030	0.41
461.0	2570	6290	0.40	140.5	780	1920	0.40
462.6	2740	6540	0.39	141.0	840	1990	0.39
464.2	2850	7170	0.41	141.5	870	2180	0.41
465.9	2900	7090	0.40	142.0	880	2160	0.40
467.5	2730	6290	0.38	142.5	830	1920	0.38
469.5	2470	6060	0.40	143.1	750	1850	0.40
470.8	2520	5950	0.39	143.5	770	1810	0.39
472.4	2530	6290	0.40	144.0	770	1920	0.40
474.1	2620	6800	0.41	144.5	800	2070	0.41
475.7	2870	6800	0.39	145.0	880	2070	0.39
477.4	3130	7580	0.40	145.5	950	2310	0.40
479.0	3420	8230	0.40	146.0	1040	2510	0.40
480.6	3320	7750	0.39	146.5	1010	2360	0.39
482.3	2800	7580	0.42	147.0	850	2310	0.42
484.3	2530	6870	0.42	147.6	770	2090	0.42
485.6	2490	6800	0.42	148.0	760	2070	0.42

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 LOG 2							
American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
487.2	2700	7410	0.42	148.5	820	2260	0.42
488.9	3220	7580	0.39	149.0	980	2310	0.39
490.8	2720	7250	0.42	149.6	830	2210	0.42
492.1	2850	7410	0.41	150.0	870	2260	0.41
494.1	2890	7490	0.41	150.6	880	2280	0.41
495.4	3140	7660	0.40	151.0	960	2340	0.40
497.1	4190	9800	0.39	151.5	1280	2990	0.39
498.7	3680	10930	0.44	152.0	1120	3330	0.44
500.7	3720	9520	0.41	152.6	1140	2900	0.41
502.0	4090	10750	0.42	153.0	1250	3280	0.42
503.9	4170	10750	0.41	153.6	1270	3280	0.41
505.3	4270	10930	0.41	154.0	1300	3330	0.41
507.2	4220	11490	0.42	154.6	1290	3500	0.42
508.5	4040	10580	0.41	155.0	1230	3230	0.41
510.5	3510	8330	0.39	155.6	1070	2540	0.39
511.8	3240	8770	0.42	156.0	990	2670	0.42
513.8	4070	10580	0.41	156.6	1240	3230	0.41
515.1	6170	14490	0.39	157.0	1880	4420	0.39
516.7	6170	15870	0.41	157.5	1880	4840	0.41
518.4	6600	16670	0.41	158.0	2010	5080	0.41
520.3	10420	23810	0.38	158.6	3180	7260	0.38
521.7	6350	14490	0.38	159.0	1940	4420	0.38
523.6	5850	11490	0.33	159.6	1780	3500	0.33
524.9	8440	16670	0.33	160.0	2570	5080	0.33
526.9	8890	19610	0.37	160.6	2710	5980	0.37
528.2	9010	18020	0.33	161.0	2750	5490	0.33
529.9	8550	19610	0.38	161.5	2610	5980	0.38
531.5	8770	15150	0.25	162.0	2670	4620	0.25
533.5	9010	14810	0.21	162.6	2750	4520	0.21
534.8	9520	19050	0.33	163.0	2900	5810	0.33
536.4	9800	18520	0.31	163.5	2990	5640	0.31
538.1	9520	20200	0.36	164.0	2900	6160	0.36
539.7	10100	21510	0.36	164.5	3080	6550	0.36
541.3	9010	18520	0.34	165.0	2750	5640	0.34
543.0	9800	20830	0.36	165.5	2990	6350	0.36
544.6	10750	20830	0.32	166.0	3280	6350	0.32
546.3	10420	22220	0.36	166.5	3180	6770	0.36
547.9	9130	20200	0.37	167.0	2780	6160	0.37
549.5	10100	19610	0.32	167.5	3080	5980	0.32
551.2	9800	20200	0.35	168.0	2990	6160	0.35

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 LOG 2							
American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
552.8	10580	22220	0.35	168.5	3230	6770	0.35
554.5	10420	20830	0.33	169.0	3180	6350	0.33
556.1	10420	21510	0.35	169.5	3180	6550	0.35
557.7	10420	20830	0.33	170.0	3180	6350	0.33
559.4	10420	21510	0.35	170.5	3180	6550	0.35
561.0	10420	22220	0.36	171.0	3180	6770	0.36
562.7	10580	20830	0.33	171.5	3230	6350	0.33
564.3	10750	20830	0.32	172.0	3280	6350	0.32
565.9	10930	22990	0.35	172.5	3330	7010	0.35
567.6	11110	20200	0.28	173.0	3390	6160	0.28
569.2	10750	22220	0.35	173.5	3280	6770	0.35
570.9	10750	21510	0.33	174.0	3280	6550	0.33
572.5	11300	22220	0.33	174.5	3440	6770	0.33
574.5	10750	21510	0.33	175.1	3280	6550	0.33
575.8	10750	21510	0.33	175.5	3280	6550	0.33
577.4	10930	22990	0.35	176.0	3330	7010	0.35
579.1	11110	20200	0.28	176.5	3390	6160	0.28
580.7	11110	22990	0.35	177.0	3390	7010	0.35
582.4	10930	21510	0.33	177.5	3330	6550	0.33
584.0	10750	23810	0.37	178.0	3280	7260	0.37
585.6	10930	22220	0.34	178.5	3330	6770	0.34
587.3	11300	22990	0.34	179.0	3440	7010	0.34
588.9	11110	22220	0.33	179.5	3390	6770	0.33
590.6	10750	22990	0.36	180.0	3280	7010	0.36
592.2	11110	20830	0.30	180.5	3390	6350	0.30
593.8	11110	22220	0.33	181.0	3390	6770	0.33
595.5	11110	23810	0.36	181.5	3390	7260	0.36
597.1	10750	22990	0.36	182.0	3280	7010	0.36
598.8	10750	21510	0.33	182.5	3280	6550	0.33
600.4	10580	21510	0.34	183.0	3230	6550	0.34
602.0	10930	22220	0.34	183.5	3330	6770	0.34
603.7	10930	21510	0.33	184.0	3330	6550	0.33
605.3	10580	22220	0.35	184.5	3230	6770	0.35
607.0	10750	20830	0.32	185.0	3280	6350	0.32
608.6	10930	21510	0.33	185.5	3330	6550	0.33
610.2	11300	22990	0.34	186.0	3440	7010	0.34
611.9	11110	21510	0.32	186.5	3390	6550	0.32
613.5	10930	20830	0.31	187.0	3330	6350	0.31
615.2	10580	20830	0.33	187.5	3230	6350	0.33
616.8	11110	23810	0.36	188.0	3390	7260	0.36

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 LOG 2							
American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
618.4	11110	23810	0.36	188.5	3390	7260	0.36
620.1	11110	23810	0.36	189.0	3390	7260	0.36
621.7	11300	23810	0.35	189.5	3440	7260	0.35
623.4	11110	22220	0.33	190.0	3390	6770	0.33
625.0	9520	20200	0.36	190.5	2900	6160	0.36
626.6	11110	22220	0.33	191.0	3390	6770	0.33
628.3	10930	22990	0.35	191.5	3330	7010	0.35
629.9	10930	22220	0.34	192.0	3330	6770	0.34
631.6	10750	20830	0.32	192.5	3280	6350	0.32
633.2	10100	19050	0.30	193.0	3080	5810	0.30
634.8	9660	20200	0.35	193.5	2940	6160	0.35
636.5	9950	20200	0.34	194.0	3030	6160	0.34
638.1	10100	20830	0.35	194.5	3080	6350	0.35
639.8	10100	19610	0.32	195.0	3080	5980	0.32
641.4	10260	22220	0.36	195.5	3130	6770	0.36
643.0	10260	20830	0.34	196.0	3130	6350	0.34
644.7	10580	22220	0.35	196.5	3230	6770	0.35
646.3	10750	20830	0.32	197.0	3280	6350	0.32
648.0	10930	21510	0.33	197.5	3330	6550	0.33
649.6	10580	21510	0.34	198.0	3230	6550	0.34
651.3	10420	22220	0.36	198.5	3180	6770	0.36
652.9	10100	20830	0.35	199.0	3080	6350	0.35
654.5	9660	19050	0.33	199.5	2940	5810	0.33
656.2	10930	21510	0.33	200.0	3330	6550	0.33
657.8	10100	22220	0.37	200.5	3080	6770	0.37
659.5	9800	20830	0.36	201.0	2990	6350	0.36
661.1	10580	22220	0.35	201.5	3230	6770	0.35
662.7	10750	20830	0.32	202.0	3280	6350	0.32
664.4	10580	20830	0.33	202.5	3230	6350	0.33
666.0	10580	20830	0.33	203.0	3230	6350	0.33
667.7	10930	22990	0.35	203.5	3330	7010	0.35
669.3	10100	20830	0.35	204.0	3080	6350	0.35
670.9	9660	19610	0.34	204.5	2940	5980	0.34
672.6	9800	20200	0.35	205.0	2990	6160	0.35
674.2	10260	21510	0.35	205.5	3130	6550	0.35
675.9	11110	21510	0.32	206.0	3390	6550	0.32
677.5	11110	21510	0.32	206.5	3390	6550	0.32
679.1	10930	22220	0.34	207.0	3330	6770	0.34
680.8	10750	20200	0.30	207.5	3280	6160	0.30
682.4	10750	21510	0.33	208.0	3280	6550	0.33

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 LOG 2							
American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
684.1	10750	20830	0.32	208.5	3280	6350	0.32
685.7	11110	21510	0.32	209.0	3390	6550	0.32
687.3	10260	22220	0.36	209.5	3130	6770	0.36
689.0	10580	20200	0.31	210.0	3230	6160	0.31
690.6	11490	19610	0.24	210.5	3500	5980	0.24
692.3	9390	18020	0.31	211.0	2860	5490	0.31
693.9	7580	17540	0.39	211.5	2310	5350	0.39
695.5	7090	15150	0.36	212.0	2160	4620	0.36
697.2	4630	9260	0.33	212.5	1410	2820	0.33
698.8	3240	7250	0.38	213.0	990	2210	0.38
700.5	2510	7090	0.43	213.5	760	2160	0.43
702.1	2360	6940	0.43	214.0	720	2120	0.43
703.7	2400	7090	0.44	214.5	730	2160	0.44
705.4	2470	7090	0.43	215.0	750	2160	0.43
707.0	2490	7090	0.43	215.5	760	2160	0.43
708.7	2530	7250	0.43	216.0	770	2210	0.43
710.3	2470	7090	0.43	216.5	750	2160	0.43
711.9	2560	7090	0.42	217.0	780	2160	0.42
713.6	2510	6670	0.42	217.5	760	2030	0.42
715.2	2410	6870	0.43	218.0	730	2090	0.43
716.9	3580	8770	0.40	218.5	1090	2670	0.40
718.5	4830	9520	0.33	219.0	1470	2900	0.33
720.1	8230	14490	0.26	219.5	2510	4420	0.26
721.8	9660	19610	0.34	220.0	2940	5980	0.34
723.4	7090	18020	0.41	220.5	2160	5490	0.41
725.1	6010	12580	0.35	221.0	1830	3830	0.35
726.7	6410	14490	0.38	221.5	1950	4420	0.38
728.4	6870	17540	0.41	222.0	2090	5350	0.41
730.0	8440	18520	0.37	222.5	2570	5640	0.37
731.6	9660	18520	0.31	223.0	2940	5640	0.31
733.3	9260	20830	0.38	223.5	2820	6350	0.38
734.9	9260	17540	0.31	224.0	2820	5350	0.31
Notes:				"-" means no data available at that particular interval of depth.			

Hanford WTP Borehole C4996 - Log 3 Receiver to Receiver V_s and V_p Analysis

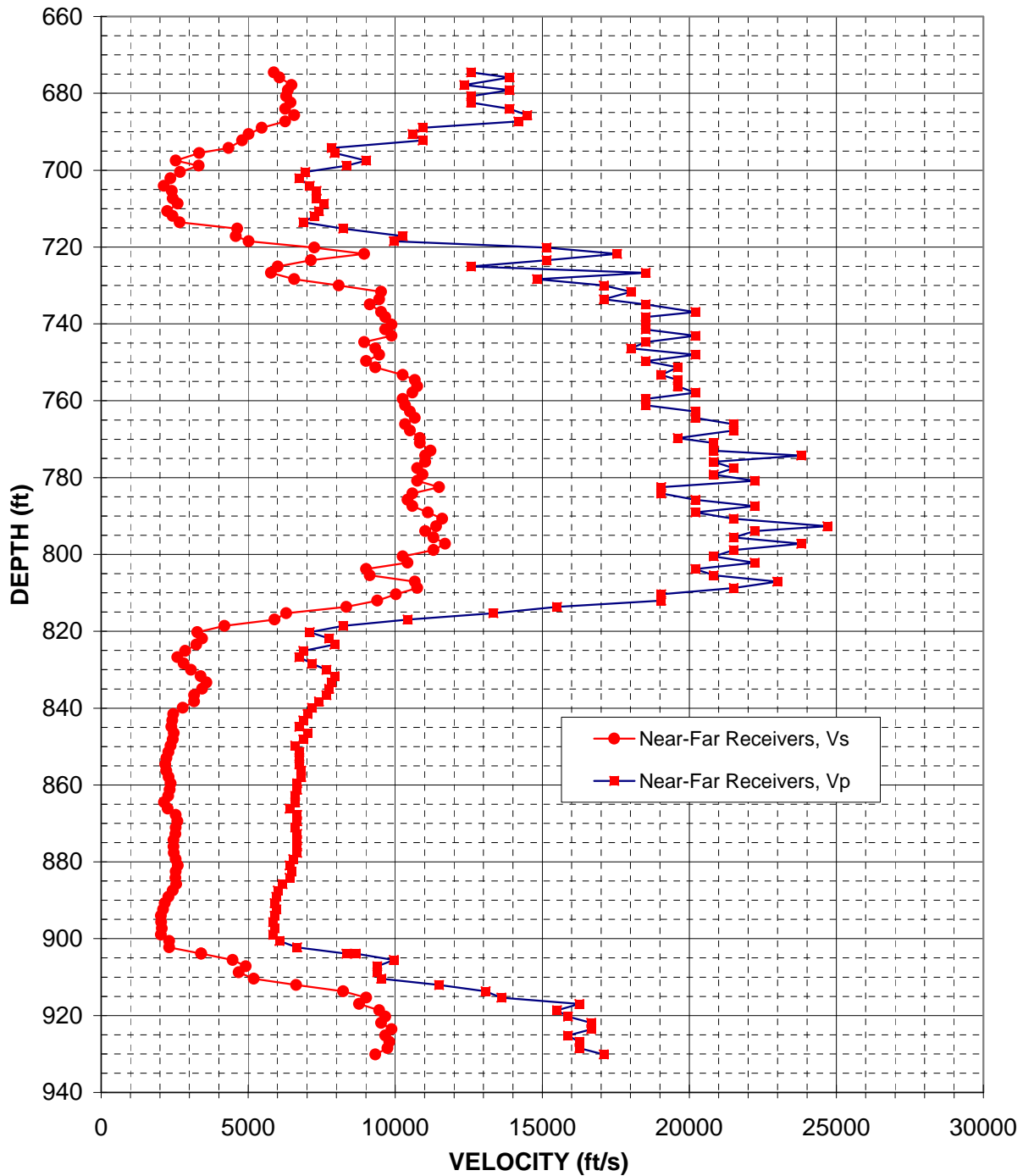


Figure 12: Boring BH-C4996 Log 3, Suspension R1-R2 P- and S_H -wave velocities

Table 11. Boring BH-C4996 Log 3, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN#3**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
674.5	5870	12580	0.36	205.6	1790	3830	0.36
675.9	6060	13890	0.38	206.0	1850	4230	0.38
677.8	6470	12350	0.31	206.6	1970	3760	0.31
679.1	6350	13890	0.37	207.0	1940	4230	0.37
680.8	6290	12580	0.33	207.5	1920	3830	0.33
682.4	6440	12580	0.32	208.0	1960	3830	0.32
684.1	6260	13890	0.37	208.5	1910	4230	0.37
685.7	6570	14490	0.37	209.0	2000	4420	0.37
687.3	6260	14180	0.38	209.5	1910	4320	0.38
689.0	5460	10930	0.33	210.0	1670	3330	0.33
690.6	5010	10580	0.36	210.5	1530	3230	0.36
692.3	4800	10930	0.38	211.0	1460	3330	0.38
694.2	4330	7840	0.28	211.6	1320	2390	0.28
695.5	3330	7940	0.39	212.0	1020	2420	0.39
697.5	2530	9010	0.46	212.6	770	2750	0.46
698.8	3320	8330	0.41	213.0	1010	2540	0.41
700.5	2690	6940	0.41	213.5	820	2120	0.41
702.1	2360	6730	0.43	214.0	720	2050	0.43
704.1	2140	7090	0.45	214.6	650	2160	0.45
705.4	2410	7330	0.44	215.0	730	2230	0.44
707.4	2440	7330	0.44	215.6	740	2230	0.44
708.7	2600	7580	0.43	216.0	790	2310	0.43
710.6	2250	7410	0.45	216.6	690	2260	0.45
711.9	2430	7250	0.44	217.0	740	2210	0.44
713.6	2670	6870	0.41	217.5	810	2090	0.41
715.2	4630	8230	0.27	218.0	1410	2510	0.27
717.2	4580	10260	0.38	218.6	1400	3130	0.38
718.5	5010	9950	0.33	219.0	1530	3030	0.33
720.1	7250	15150	0.35	219.5	2210	4620	0.35
721.8	8950	17540	0.32	220.0	2730	5350	0.32
723.4	7130	15150	0.36	220.5	2170	4620	0.36
725.1	6010	12580	0.35	221.0	1830	3830	0.35
726.7	5770	18520	0.45	221.5	1760	5640	0.45
728.4	6570	14810	0.38	222.0	2000	4520	0.38
730.0	8080	17090	0.36	222.5	2460	5210	0.36

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN#3**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
731.6	9520	18020	0.31
733.6	9460	17090	0.28
734.9	9130	18520	0.34
736.9	9520	20200	0.36
738.2	9660	18520	0.31
740.2	9880	18520	0.30
741.5	9660	18520	0.31
743.1	9880	20200	0.34
744.8	8950	18520	0.35
746.4	9320	18020	0.32
748.0	9460	20200	0.36
749.7	9010	18520	0.34
751.3	9320	19610	0.35
753.3	10260	19050	0.30
754.6	10670	19610	0.29
756.2	10750	19610	0.28
757.9	10580	20200	0.31
759.5	10260	18520	0.28
761.2	10340	18520	0.27
762.8	10500	20200	0.32
764.4	10670	20200	0.31
766.1	10340	21510	0.35
767.7	10500	21510	0.34
769.7	10840	19610	0.28
771.0	10840	20830	0.31
773.0	11200	20830	0.30
774.3	11020	23810	0.36
775.9	11020	20830	0.31
777.6	10750	21510	0.33
779.2	10930	20830	0.31
780.8	10750	22220	0.35
782.5	11490	19050	0.21
784.1	10580	19050	0.28
785.8	10420	20200	0.32
787.4	10580	22220	0.35
789.0	11110	20200	0.28
790.7	11590	21510	0.30
792.7	11400	24690	0.36

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
223.0	2900	5490	0.31
223.6	2880	5210	0.28
224.0	2780	5640	0.34
224.6	2900	6160	0.36
225.0	2940	5640	0.31
225.6	3010	5640	0.30
226.0	2940	5640	0.31
226.5	3010	6160	0.34
227.0	2730	5640	0.35
227.5	2840	5490	0.32
228.0	2880	6160	0.36
228.5	2750	5640	0.34
229.0	2840	5980	0.35
229.6	3130	5810	0.30
230.0	3250	5980	0.29
230.5	3280	5980	0.28
231.0	3230	6160	0.31
231.5	3130	5640	0.28
232.0	3150	5640	0.27
232.5	3200	6160	0.32
233.0	3250	6160	0.31
233.5	3150	6550	0.35
234.0	3200	6550	0.34
234.6	3300	5980	0.28
235.0	3300	6350	0.31
235.6	3420	6350	0.30
236.0	3360	7260	0.36
236.5	3360	6350	0.31
237.0	3280	6550	0.33
237.5	3330	6350	0.31
238.0	3280	6770	0.35
238.5	3500	5810	0.21
239.0	3230	5810	0.28
239.5	3180	6160	0.32
240.0	3230	6770	0.35
240.5	3390	6160	0.28
241.0	3530	6550	0.30
241.6	3470	7530	0.36

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN#3**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
794.0	11020	22220	0.34
795.6	11300	21510	0.31
797.2	11700	23810	0.34
798.9	11300	21510	0.31
800.5	10260	20830	0.34
802.2	10420	22220	0.36
803.8	9010	20200	0.38
805.5	9130	20830	0.38
807.1	10670	22990	0.36
808.7	10750	21510	0.33
810.4	10030	19050	0.31
812.0	9390	19050	0.34
813.7	8330	15500	0.30
815.3	6290	13330	0.36
816.9	5900	10420	0.26
818.6	4190	8230	0.32
820.2	3270	7090	0.37
821.9	3440	7750	0.38
823.5	3240	7940	0.40
825.1	2860	6870	0.40
826.8	2590	6730	0.41
828.4	2810	7170	0.41
830.1	3060	7660	0.41
831.7	3380	7940	0.39
833.3	3580	7840	0.37
835.0	3440	7750	0.38
836.6	3160	7660	0.40
838.3	3160	7410	0.39
839.9	2780	7170	0.41
841.5	2450	7020	0.43
843.2	2420	6870	0.43
844.8	2390	6730	0.43
846.5	2470	7020	0.43
848.1	2440	6870	0.43
849.7	2360	6600	0.43
851.4	2290	6730	0.43
853.0	2220	6730	0.44
854.7	2190	6730	0.44

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
242.0	3360	6770	0.34
242.5	3440	6550	0.31
243.0	3560	7260	0.34
243.5	3440	6550	0.31
244.0	3130	6350	0.34
244.5	3180	6770	0.36
245.0	2750	6160	0.38
245.5	2780	6350	0.38
246.0	3250	7010	0.36
246.5	3280	6550	0.33
247.0	3060	5810	0.31
247.5	2860	5810	0.34
248.0	2540	4730	0.30
248.5	1920	4060	0.36
249.0	1800	3180	0.26
249.5	1280	2510	0.32
250.0	1000	2160	0.37
250.5	1050	2360	0.38
251.0	990	2420	0.40
251.5	870	2090	0.40
252.0	790	2050	0.41
252.5	860	2180	0.41
253.0	930	2340	0.41
253.5	1030	2420	0.39
254.0	1090	2390	0.37
254.5	1050	2360	0.38
255.0	960	2340	0.40
255.5	960	2260	0.39
256.0	850	2180	0.41
256.5	750	2140	0.43
257.0	740	2090	0.43
257.5	730	2050	0.43
258.0	750	2140	0.43
258.5	740	2090	0.43
259.0	720	2010	0.43
259.5	700	2050	0.43
260.0	680	2050	0.44
260.5	670	2050	0.44

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN#3**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
856.3	2210	6800	0.44
857.9	2300	6800	0.44
859.6	2360	6670	0.43
861.2	2330	6670	0.43
862.9	2280	6600	0.43
864.5	2140	6600	0.44
866.1	2270	6410	0.43
867.8	2530	6670	0.42
869.4	2590	6670	0.41
871.1	2530	6600	0.41
872.7	2530	6670	0.42
874.3	2460	6670	0.42
876.0	2460	6670	0.42
877.6	2470	6670	0.42
879.3	2530	6540	0.41
880.9	2610	6410	0.40
882.6	2530	6470	0.41
884.2	2530	6410	0.41
885.8	2550	6170	0.40
887.5	2440	6010	0.40
889.1	2290	5950	0.41
890.8	2160	5900	0.42
892.4	2110	5950	0.43
894.0	2030	5900	0.43
895.7	2040	5850	0.43
897.3	2060	5900	0.43
899.0	2030	5850	0.43
900.6	2310	6060	0.41
902.2	2310	6670	0.43
903.9	3400	8330	0.40
903.9	3400	8660	0.41
905.5	4470	9950	0.37
907.2	4920	9390	0.31
908.8	4680	9390	0.33
910.4	5190	9520	0.29
912.1	6630	11490	0.25
913.7	8230	13070	0.17
915.4	9010	13610	0.11

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
261.0	680	2070	0.44
261.5	700	2070	0.44
262.0	720	2030	0.43
262.5	710	2030	0.43
263.0	700	2010	0.43
263.5	650	2010	0.44
264.0	690	1950	0.43
264.5	770	2030	0.42
265.0	790	2030	0.41
265.5	770	2010	0.41
266.0	770	2030	0.42
266.5	750	2030	0.42
267.0	750	2030	0.42
267.5	750	2030	0.42
268.0	770	1990	0.41
268.5	800	1950	0.40
269.0	770	1970	0.41
269.5	770	1950	0.41
270.0	780	1880	0.40
270.5	740	1830	0.40
271.0	700	1810	0.41
271.5	660	1800	0.42
272.0	640	1810	0.43
272.5	620	1800	0.43
273.0	620	1780	0.43
273.5	630	1800	0.43
274.0	620	1780	0.43
274.5	710	1850	0.41
275.0	710	2030	0.43
275.5	1040	2540	0.40
275.5	1040	2640	0.41
276.0	1360	3030	0.37
276.5	1500	2860	0.31
277.0	1430	2860	0.33
277.5	1580	2900	0.29
278.0	2020	3500	0.25
278.5	2510	3980	0.17
279.0	2750	4150	0.11

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN#3**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
917.0	8770	16260	0.29
918.6	9460	15500	0.20
920.3	9660	15870	0.21
921.9	9520	16670	0.26
923.6	9880	16670	0.23
925.2	9660	15870	0.21
926.8	9800	16260	0.21
928.5	9730	16260	0.22
930.1	9320	17090	0.29

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
279.5	2670	4960	0.29
280.0	2880	4730	0.20
280.5	2940	4840	0.21
281.0	2900	5080	0.26
281.5	3010	5080	0.23
282.0	2940	4840	0.21
282.5	2990	4960	0.21
283.0	2970	4960	0.22
283.5	2840	5210	0.29

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4996 - Log 4 Receiver to Receiver V_s and V_p Analysis

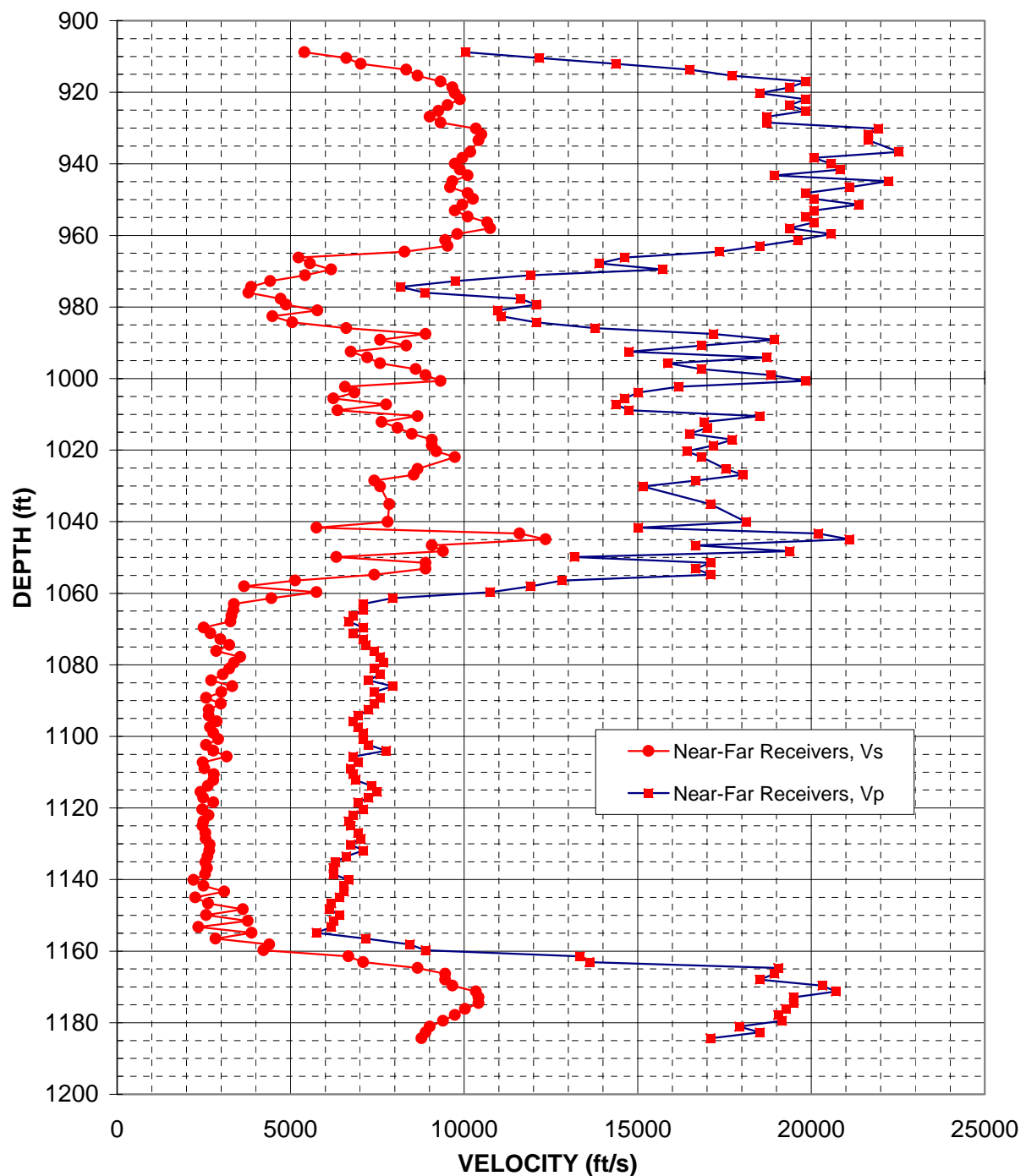


Figure 13: Boring BH-C4996 Log 4, Suspension R1-R2 P- and S_H -wave velocities

Table 12. Boring BH-C4996 Log 4, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN #4**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
908.8	5400	10040	0.30	277.0	1650	3060	0.30
910.4	6600	12170	0.29	277.5	2010	3710	0.29
912.1	7020	14370	0.34	278.0	2140	4380	0.34
913.7	8330	16500	0.33	278.5	2540	5030	0.33
915.4	8660	17730	0.34	279.0	2640	5400	0.34
917.0	9320	19840	0.36	279.5	2840	6050	0.36
918.6	9660	19380	0.33	280.0	2940	5910	0.33
920.3	9730	18520	0.31	280.5	2970	5640	0.31
921.9	9880	19840	0.34	281.0	3010	6050	0.34
923.6	9520	19380	0.34	281.5	2900	5910	0.34
925.2	9260	19840	0.36	282.0	2820	6050	0.36
926.8	9010	18730	0.35	282.5	2750	5710	0.35
928.5	9320	18730	0.34	283.0	2840	5710	0.34
930.1	10340	21930	0.36	283.5	3150	6680	0.36
931.8	10500	21650	0.35	284.0	3200	6600	0.35
933.4	10420	21650	0.35	284.5	3180	6600	0.35
936.7	10180	22520	0.37	285.5	3100	6860	0.37
938.3	9950	20080	0.34	286.0	3030	6120	0.34
940.0	9730	20580	0.36	286.5	2970	6270	0.36
941.6	9880	20830	0.36	287.0	3010	6350	0.36
943.2	10100	18940	0.30	287.5	3080	5770	0.30
944.9	9660	22220	0.38	288.0	2940	6770	0.38
946.5	9590	21100	0.37	288.5	2920	6430	0.37
948.2	10100	19840	0.33	289.0	3080	6050	0.33
949.8	10260	20080	0.32	289.5	3130	6120	0.32
951.4	9950	21370	0.36	290.0	3030	6510	0.36
953.1	9730	20080	0.35	290.5	2970	6120	0.35
954.7	10100	19840	0.33	291.0	3080	6050	0.33
956.4	10670	20080	0.30	291.5	3250	6120	0.30
958.0	10750	19380	0.28	292.0	3280	5910	0.28
959.7	9800	20580	0.35	292.5	2990	6270	0.35
961.3	9460	19610	0.35	293.0	2880	5980	0.35
962.9	9520	18520	0.32	293.5	2900	5640	0.32
964.6	8280	17360	0.35	294.0	2520	5290	0.35
966.2	5230	14620	0.43	294.5	1590	4460	0.43

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN #4**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
967.9	5560	13890	0.40
969.5	6170	15720	0.41
971.1	5420	11900	0.37
972.8	4420	9750	0.37
974.4	3860	8170	0.36
976.1	3790	8870	0.39
977.7	4710	11610	0.40
979.3	4870	12080	0.40
981.0	5770	10960	0.31
982.6	4470	11070	0.40
984.3	5050	12080	0.39
985.9	6600	13770	0.35
987.5	8890	17180	0.32
989.2	7580	18940	0.40
990.8	8330	16840	0.34
992.5	6730	14750	0.37
994.1	7210	18730	0.41
995.7	7580	15870	0.35
997.4	8600	16840	0.32
999.0	8890	18830	0.36
1000.7	9320	19840	0.36
1002.3	6570	16180	0.40
1003.9	6840	15020	0.37
1005.6	6230	14620	0.39
1007.2	7750	14370	0.29
1008.9	6350	14750	0.39
1010.5	8660	18520	0.36
1012.1	7620	16920	0.37
1013.8	8080	17010	0.35
1015.4	8490	16500	0.32
1017.1	9070	17730	0.32
1018.7	9070	17180	0.31
1020.3	9200	16420	0.27
1022.0	9730	16840	0.25
1025.3	8660	17540	0.34
1026.9	8550	18020	0.35
1028.5	7410	16670	0.38
1030.2	7580	15150	0.33

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
295.0	1690	4230	0.40
295.5	1880	4790	0.41
296.0	1650	3630	0.37
296.5	1350	2970	0.37
297.0	1180	2490	0.36
297.5	1150	2700	0.39
298.0	1440	3540	0.40
298.5	1480	3680	0.40
299.0	1760	3340	0.31
299.5	1360	3380	0.40
300.0	1540	3680	0.39
300.5	2010	4200	0.35
301.0	2710	5240	0.32
301.5	2310	5770	0.40
302.0	2540	5130	0.34
302.5	2050	4500	0.37
303.0	2200	5710	0.41
303.5	2310	4840	0.35
304.0	2620	5130	0.32
304.5	2710	5740	0.36
305.0	2840	6050	0.36
305.5	2000	4930	0.40
306.0	2080	4580	0.37
306.5	1900	4460	0.39
307.0	2360	4380	0.29
307.5	1940	4500	0.39
308.0	2640	5640	0.36
308.5	2320	5160	0.37
309.0	2460	5180	0.35
309.5	2590	5030	0.32
310.0	2760	5400	0.32
310.5	2760	5240	0.31
311.0	2800	5000	0.27
311.5	2970	5130	0.25
312.5	2640	5350	0.34
313.0	2610	5490	0.35
313.5	2260	5080	0.38
314.0	2310	4620	0.33

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN #4**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1035.1	7840	17090	0.37
1040.0	7800	18120	0.39
1041.7	5750	15020	0.41
1043.3	11590	20200	0.25
1045.0	12350	21100	0.24
1046.6	9070	16670	0.29
1048.2	9390	19380	0.35
1049.9	6320	13180	0.35
1051.5	8890	17090	0.31
1053.2	8890	16670	0.30
1054.8	7410	17090	0.38
1056.4	5130	12820	0.40
1058.1	3660	11900	0.45
1059.7	5750	10750	0.30
1061.4	4440	7940	0.27
1063.0	3370	7090	0.35
1064.6	3350	7090	0.36
1066.3	3300	6800	0.35
1067.9	3270	6670	0.34
1069.6	2500	7090	0.43
1071.2	2690	6800	0.41
1072.8	2980	7090	0.39
1074.5	3240	7170	0.37
1076.1	2860	7410	0.41
1077.8	3550	7580	0.36
1079.4	3370	7660	0.38
1081.0	3240	7410	0.38
1082.7	3040	7580	0.40
1084.3	2710	7250	0.42
1086.0	3320	7940	0.39
1087.6	3000	7410	0.40
1089.2	2560	7580	0.44
1090.9	2990	7410	0.40
1092.5	2650	7250	0.42
1094.2	2650	6940	0.42
1095.8	2870	6800	0.39
1097.4	2680	6940	0.41
1099.1	2780	7090	0.41

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
315.5	2390	5210	0.37
317.0	2380	5520	0.39
317.5	1750	4580	0.41
318.0	3530	6160	0.25
318.5	3760	6430	0.24
319.0	2760	5080	0.29
319.5	2860	5910	0.35
320.0	1930	4020	0.35
320.5	2710	5210	0.31
321.0	2710	5080	0.30
321.5	2260	5210	0.38
322.0	1560	3910	0.40
322.5	1120	3630	0.45
323.0	1750	3280	0.30
323.5	1350	2420	0.27
324.0	1030	2160	0.35
324.5	1020	2160	0.36
325.0	1010	2070	0.35
325.5	1000	2030	0.34
326.0	760	2160	0.43
326.5	820	2070	0.41
327.0	910	2160	0.39
327.5	990	2180	0.37
328.0	870	2260	0.41
328.5	1080	2310	0.36
329.0	1030	2340	0.38
329.5	990	2260	0.38
330.0	930	2310	0.40
330.5	830	2210	0.42
331.0	1010	2420	0.39
331.5	920	2260	0.40
332.0	780	2310	0.44
332.5	910	2260	0.40
333.0	810	2210	0.42
333.5	810	2120	0.42
334.0	880	2070	0.39
334.5	820	2120	0.41
335.0	850	2160	0.41

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN #4**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1100.7	2910	7090	0.40
1102.4	2560	7250	0.43
1104.0	2780	7750	0.43
1105.6	3160	6800	0.36
1107.3	2470	6940	0.43
1108.9	2520	6730	0.42
1110.6	2790	6800	0.40
1112.2	2770	6870	0.40
1113.9	2610	7330	0.43
1115.5	2410	7490	0.44
1117.1	2480	7250	0.43
1118.4	2780	6940	0.40
1120.4	2450	7090	0.43
1122.1	2640	6800	0.41
1123.7	2490	6670	0.42
1125.0	2460	6730	0.42
1127.0	2540	6940	0.42
1128.6	2550	7020	0.42
1130.3	2670	6730	0.41
1131.9	2660	7090	0.42
1133.5	2600	6600	0.41
1135.2	2540	6290	0.40
1136.8	2590	6230	0.40
1138.5	2530	6230	0.40
1140.1	2200	6670	0.44
1141.7	2490	6540	0.42
1143.4	3090	6540	0.36
1145.0	2250	6410	0.43
1146.7	2620	6170	0.39
1148.3	3620	6120	0.23
1149.9	2560	6410	0.40
1151.6	3770	6230	0.21
1153.2	2340	6170	0.42
1154.9	3880	5750	0.08
1156.5	2840	7170	0.41
1158.1	4390	8440	0.31
1159.8	4220	8890	0.35
1161.4	6670	13330	0.33

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
335.5	890	2160	0.40
336.0	780	2210	0.43
336.5	850	2360	0.43
337.0	960	2070	0.36
337.5	750	2120	0.43
338.0	770	2050	0.42
338.5	850	2070	0.40
339.0	840	2090	0.40
339.5	800	2230	0.43
340.0	730	2280	0.44
340.5	760	2210	0.43
340.9	850	2120	0.40
341.5	750	2160	0.43
342.0	800	2070	0.41
342.5	760	2030	0.42
342.9	750	2050	0.42
343.5	780	2120	0.42
344.0	780	2140	0.42
344.5	810	2050	0.41
345.0	810	2160	0.42
345.5	790	2010	0.41
346.0	780	1920	0.40
346.5	790	1900	0.40
347.0	770	1900	0.40
347.5	670	2030	0.44
348.0	760	1990	0.42
348.5	940	1990	0.36
349.0	690	1950	0.43
349.5	800	1880	0.39
350.0	1100	1860	0.23
350.5	780	1950	0.40
351.0	1150	1900	0.21
351.5	710	1880	0.42
352.0	1180	1750	0.08
352.5	860	2180	0.41
353.0	1340	2570	0.31
353.5	1290	2710	0.35
354.0	2030	4060	0.33

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN #4**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1163.1	7090	13610	0.31
1164.7	8660	19050	0.37
1166.3	9460	18940	0.33
1168.0	9460	18520	0.32
1169.6	9660	20330	0.35
1171.3	10340	20700	0.33
1172.9	10420	19490	0.30
1174.5	10420	19490	0.30
1176.2	10030	19270	0.31
1177.8	9730	19050	0.32
1179.5	9390	19160	0.34
1181.1	9010	17920	0.33
1182.7	8890	18520	0.35
1184.4	8770	17090	0.32

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
354.5	2160	4150	0.31
355.0	2640	5810	0.37
355.5	2880	5770	0.33
356.0	2880	5640	0.32
356.5	2940	6200	0.35
357.0	3150	6310	0.33
357.5	3180	5940	0.30
358.0	3180	5940	0.30
358.5	3060	5870	0.31
359.0	2970	5810	0.32
359.5	2860	5840	0.34
360.0	2750	5460	0.33
360.5	2710	5640	0.35
361.0	2670	5210	0.32

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Borehole C4996 - Log 5A Receiver to Receiver V_s and V_p Analysis

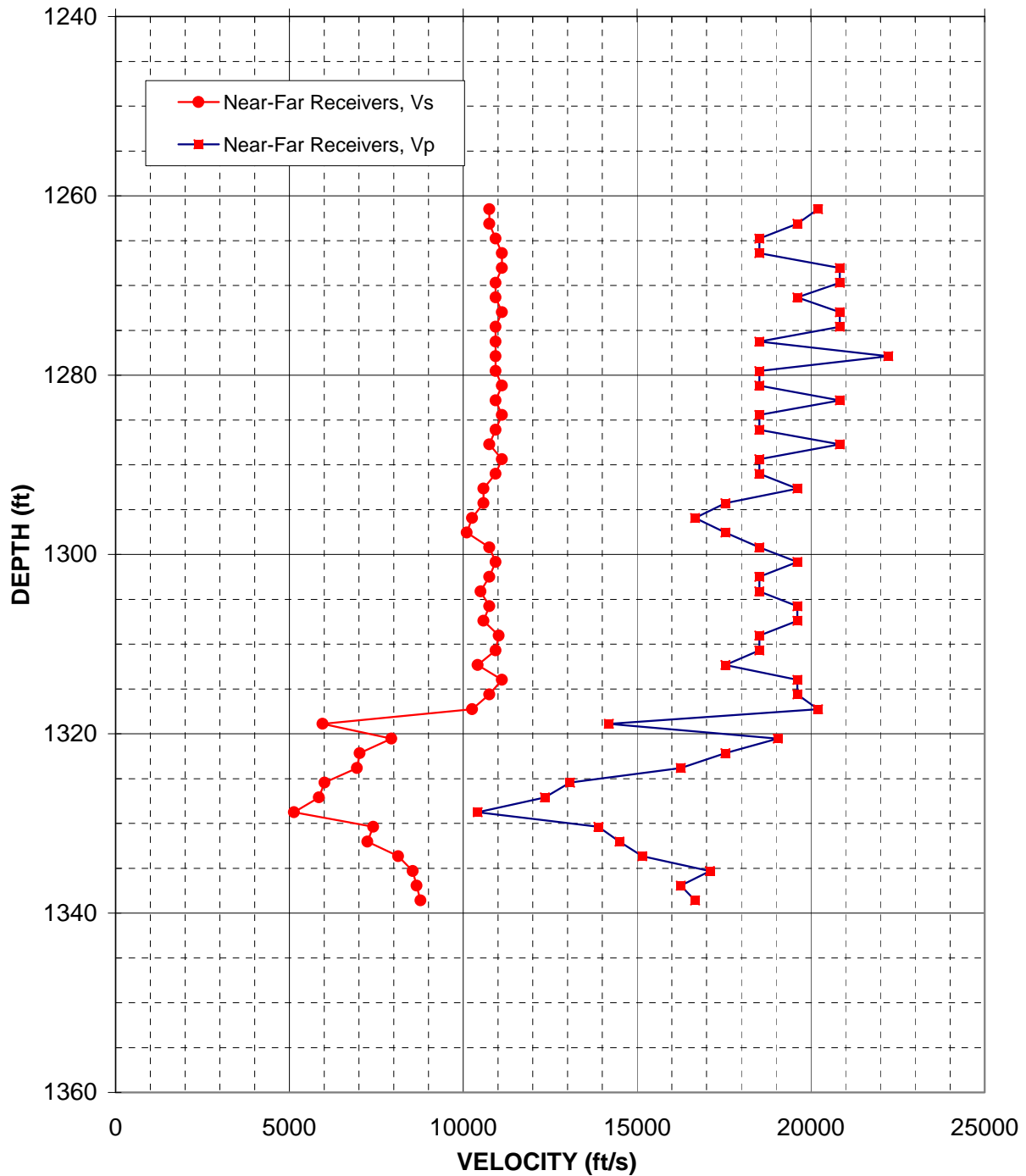


Figure 14: Boring BH-C4996 Log 5A, Suspension R1-R2 P- and S_H -wave velocities

Table 13. Boring BH-C4996 Log 5A, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN #8A**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1261.5	10750	20200	0.30	384.5	3280	6160	0.30
1263.1	10750	19610	0.28	385.0	3280	5980	0.28
1264.8	10930	18520	0.23	385.5	3330	5640	0.23
1266.4	11110	18520	0.22	386.0	3390	5640	0.22
1268.0	11110	20830	0.30	386.5	3390	6350	0.30
1269.7	10930	20830	0.31	387.0	3330	6350	0.31
1271.3	10930	19610	0.27	387.5	3330	5980	0.27
1273.0	11110	20830	0.30	388.0	3390	6350	0.30
1274.6	10930	20830	0.31	388.5	3330	6350	0.31
1276.3	10930	18520	0.23	389.0	3330	5640	0.23
1277.9	10930	22220	0.34	389.5	3330	6770	0.34
1279.5	10930	18520	0.23	390.0	3330	5640	0.23
1281.2	11110	18520	0.22	390.5	3390	5640	0.22
1282.8	10930	20830	0.31	391.0	3330	6350	0.31
1284.5	11110	18520	0.22	391.5	3390	5640	0.22
1286.1	10930	18520	0.23	392.0	3330	5640	0.23
1287.7	10750	20830	0.32	392.5	3280	6350	0.32
1289.4	11110	18520	0.22	393.0	3390	5640	0.22
1291.0	10930	18520	0.23	393.5	3330	5640	0.23
1292.7	10580	19610	0.29	394.0	3230	5980	0.29
1294.3	10580	17540	0.21	394.5	3230	5350	0.21
1295.9	10260	16670	0.20	395.0	3130	5080	0.20
1297.6	10100	17540	0.25	395.5	3080	5350	0.25
1299.2	10750	18520	0.25	396.0	3280	5640	0.25
1300.9	10930	19610	0.27	396.5	3330	5980	0.27
1302.5	10750	18520	0.25	397.0	3280	5640	0.25
1304.1	10500	18520	0.26	397.5	3200	5640	0.26
1305.8	10750	19610	0.28	398.0	3280	5980	0.28
1307.4	10580	19610	0.29	398.5	3230	5980	0.29
1309.1	11020	18520	0.23	399.0	3360	5640	0.23
1310.7	10930	18520	0.23	399.5	3330	5640	0.23
1312.3	10420	17540	0.23	400.0	3180	5350	0.23
1314.0	11110	19610	0.26	400.5	3390	5980	0.26
1315.6	10750	19610	0.28	401.0	3280	5980	0.28
1317.3	10260	20200	0.33	401.5	3130	6160	0.33

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN #8A**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1318.9	5950	14180	0.39
1320.5	7940	19050	0.39
1322.2	7020	17540	0.40
1323.8	6940	16260	0.39
1325.5	6010	13070	0.37
1327.1	5850	12350	0.36
1328.7	5130	10420	0.34
1330.4	7410	13890	0.30
1332.0	7250	14490	0.33
1333.7	8130	15150	0.30
1335.3	8550	17090	0.33
1336.9	8660	16260	0.30
1338.6	8770	16670	0.31

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
402.0	1810	4320	0.39
402.5	2420	5810	0.39
403.0	2140	5350	0.40
403.5	2120	4960	0.39
404.0	1830	3980	0.37
404.5	1780	3760	0.36
405.0	1560	3180	0.34
405.5	2260	4230	0.30
406.0	2210	4420	0.33
406.5	2480	4620	0.30
407.0	2610	5210	0.33
407.5	2640	4960	0.30
408.0	2670	5080	0.31

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Borehole C4996 - Log 5B Receiver to Receiver V_s and V_p Analysis

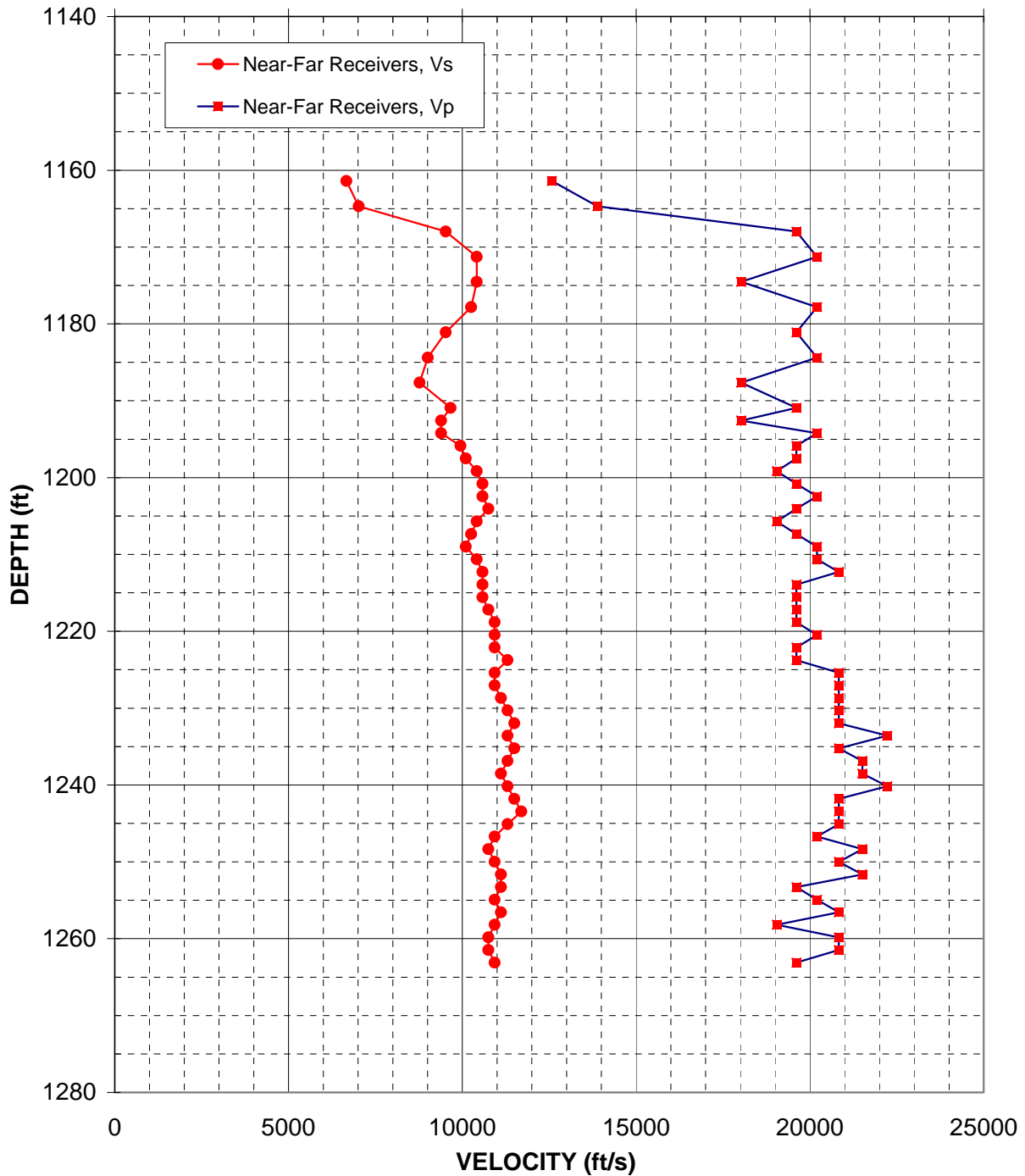


Figure 15: Boring BH-C4996 Log 5B, Suspension R1-R2 P- and S_H -wave velocities

Table 14: Boring BH-C4996 Log 5B, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1161.4	6670	12580	0.30	354.0	2030	3830	0.30
1164.7	7020	13890	0.33	355.0	2140	4230	0.33
1168.0	9520	19610	0.35	356.0	2900	5980	0.35
1171.3	10420	20200	0.32	357.0	3180	6160	0.32
1174.5	10420	18020	0.25	358.0	3180	5490	0.25
1177.8	10260	20200	0.33	359.0	3130	6160	0.33
1181.1	9520	19610	0.35	360.0	2900	5980	0.35
1184.4	9010	20200	0.38	361.0	2750	6160	0.38
1187.7	8770	18020	0.34	362.0	2670	5490	0.34
1190.9	9660	19610	0.34	363.0	2940	5980	0.34
1192.6	9390	18020	0.31	363.5	2860	5490	0.31
1194.2	9390	20200	0.36	364.0	2860	6160	0.36
1195.9	9950	19610	0.33	364.5	3030	5980	0.33
1197.5	10100	19610	0.32	365.0	3080	5980	0.32
1199.2	10420	19050	0.29	365.5	3180	5810	0.29
1200.8	10580	19610	0.29	366.0	3230	5980	0.29
1202.4	10580	20200	0.31	366.5	3230	6160	0.31
1204.1	10750	19610	0.28	367.0	3280	5980	0.28
1205.7	10420	19050	0.29	367.5	3180	5810	0.29
1207.4	10260	19610	0.31	368.0	3130	5980	0.31
1209.0	10100	20200	0.33	368.5	3080	6160	0.33
1210.6	10420	20200	0.32	369.0	3180	6160	0.32
1212.3	10580	20830	0.33	369.5	3230	6350	0.33
1213.9	10580	19610	0.29	370.0	3230	5980	0.29
1215.6	10580	19610	0.29	370.5	3230	5980	0.29
1217.2	10750	19610	0.28	371.0	3280	5980	0.28
1218.8	10930	19610	0.27	371.5	3330	5980	0.27
1220.5	10930	20200	0.29	372.0	3330	6160	0.29
1222.1	10930	19610	0.27	372.5	3330	5980	0.27
1223.8	11300	19610	0.25	373.0	3440	5980	0.25
1225.4	10930	20830	0.31	373.5	3330	6350	0.31
1227.0	10930	20830	0.31	374.0	3330	6350	0.31
1228.7	11110	20830	0.30	374.5	3390	6350	0.30
1230.3	11300	20830	0.29	375.0	3440	6350	0.29
1232.0	11490	20830	0.28	375.5	3500	6350	0.28

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1233.6	11300	22220	0.33
1235.2	11490	20830	0.28
1236.9	11300	21510	0.31
1238.5	11110	21510	0.32
1240.2	11300	22220	0.33
1241.8	11490	20830	0.28
1243.4	11700	20830	0.27
1245.1	11300	20830	0.29
1246.7	10930	20200	0.29
1248.4	10750	21510	0.33
1250.0	10930	20830	0.31
1251.6	11110	21510	0.32
1253.3	11110	19610	0.26
1254.9	10930	20200	0.29
1256.6	11110	20830	0.30
1258.2	10930	19050	0.25
1259.8	10750	20830	0.32
1261.5	10750	20830	0.32
1263.1	10930	19610	0.27

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
376.0	3440	6770	0.33
376.5	3500	6350	0.28
377.0	3440	6550	0.31
377.5	3390	6550	0.32
378.0	3440	6770	0.33
378.5	3500	6350	0.28
379.0	3560	6350	0.27
379.5	3440	6350	0.29
380.0	3330	6160	0.29
380.5	3280	6550	0.33
381.0	3330	6350	0.31
381.5	3390	6550	0.32
382.0	3390	5980	0.26
382.5	3330	6160	0.29
383.0	3390	6350	0.30
383.5	3330	5810	0.25
384.0	3280	6350	0.32
384.5	3280	6350	0.32
385.0	3330	5980	0.27

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4996 - Log 6 Receiver to Receiver V_s and V_p Analysis

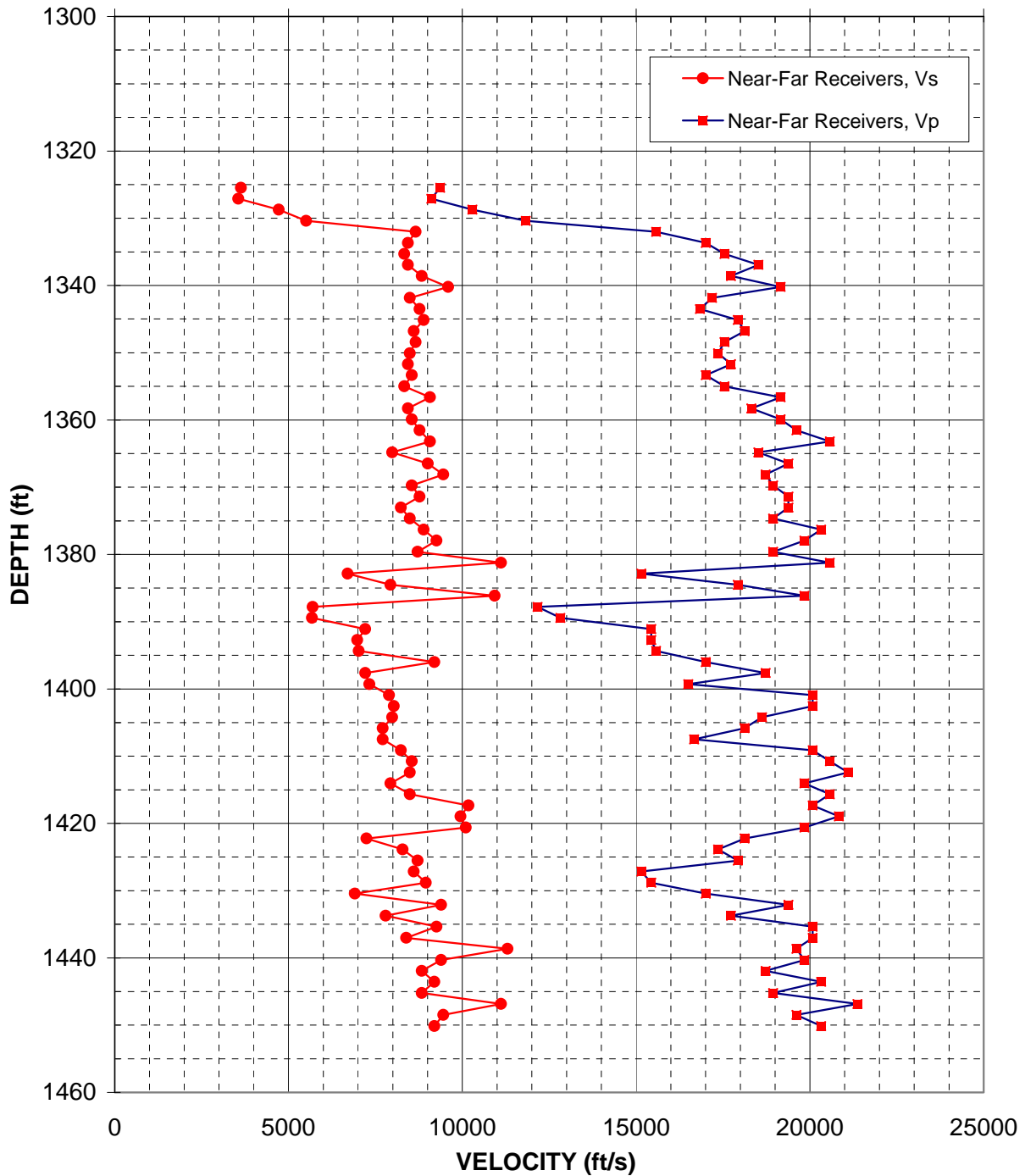


Figure 16: Boring BH-C4996 Log 6, Suspension R1-R2 P- and S_H -wave velocities

Table 15: Boring BH-C4996 Log 6, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN #6**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1325.5	3630	9360	0.41	404.0	1110	2850	0.41
1327.1	3560	9110	0.41	404.5	1080	2780	0.41
1328.7	4720	10290	0.37	405.0	1440	3140	0.37
1330.4	5510	11820	0.36	405.5	1680	3600	0.36
1332.0	8660	15580	0.28	406.0	2640	4750	0.28
1333.7	8440	17010	0.34	406.5	2570	5180	0.34
1335.3	8330	17540	0.35	407.0	2540	5350	0.35
1336.9	8440	18520	0.37	407.5	2570	5640	0.37
1338.6	8830	17730	0.34	408.0	2690	5400	0.34
1340.2	9590	19160	0.33	408.5	2920	5840	0.33
1341.9	8490	17180	0.34	409.0	2590	5240	0.34
1343.5	8770	16840	0.31	409.5	2670	5130	0.31
1345.1	8890	17920	0.34	410.0	2710	5460	0.34
1346.8	8600	18120	0.35	410.5	2620	5520	0.35
1348.4	8660	17540	0.34	411.0	2640	5350	0.34
1350.1	8490	17360	0.34	411.5	2590	5290	0.34
1351.7	8440	17730	0.35	412.0	2570	5400	0.35
1353.4	8550	17010	0.33	412.5	2610	5180	0.33
1355.0	8330	17540	0.35	413.0	2540	5350	0.35
1356.6	9070	19160	0.36	413.5	2760	5840	0.36
1358.3	8440	18320	0.37	414.0	2570	5580	0.37
1359.9	8550	19160	0.38	414.5	2610	5840	0.38
1361.6	8770	19610	0.37	415.0	2670	5980	0.37
1363.2	9070	20580	0.38	415.5	2760	6270	0.38
1364.8	7980	18520	0.39	416.0	2430	5640	0.39
1366.5	9010	19380	0.36	416.5	2750	5910	0.36
1368.1	9460	18730	0.33	417.0	2880	5710	0.33
1369.8	8550	18940	0.37	417.5	2610	5770	0.37
1371.4	8770	19380	0.37	418.0	2670	5910	0.37
1373.0	8230	19380	0.39	418.5	2510	5910	0.39
1374.7	8490	18940	0.37	419.0	2590	5770	0.37
1376.3	8890	20330	0.38	419.5	2710	6200	0.38
1378.0	9260	19840	0.36	420.0	2820	6050	0.36
1379.6	8710	18940	0.37	420.5	2660	5770	0.37
1381.2	11110	20580	0.29	421.0	3390	6270	0.29

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN #6**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1382.9	6700	15150	0.38
1384.5	7940	17920	0.38
1386.2	10930	19840	0.28
1387.8	5700	12170	0.36
1389.4	5670	12820	0.38
1391.1	7210	15430	0.36
1392.7	6980	15430	0.37
1394.4	7020	15580	0.37
1396.0	9200	17010	0.29
1397.6	7210	18730	0.41
1399.3	7330	16500	0.38
1400.9	7890	20080	0.41
1402.6	8030	20080	0.40
1404.2	7980	18620	0.39
1405.8	7710	18120	0.39
1407.5	7710	16670	0.36
1409.1	8230	20080	0.40
1410.8	8550	20580	0.40
1412.4	8490	21100	0.40
1414.0	7940	19840	0.40
1415.7	8490	20580	0.40
1417.3	10180	20080	0.33
1419.0	9950	20830	0.35
1420.6	10100	19840	0.33
1422.2	7250	18120	0.40
1423.9	8280	17360	0.35
1425.5	8710	17920	0.35
1427.2	8600	15150	0.26
1428.8	8950	15430	0.25
1430.5	6910	17010	0.40
1432.1	9390	19380	0.35
1433.7	7800	17730	0.38
1435.4	9260	20080	0.36
1437.0	8390	20080	0.39
1438.7	11300	19610	0.25
1440.3	9390	19840	0.36
1441.9	8830	18730	0.36
1443.6	9200	20330	0.37

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
421.5	2040	4620	0.38
422.0	2420	5460	0.38
422.5	3330	6050	0.28
423.0	1740	3710	0.36
423.5	1730	3910	0.38
424.0	2200	4700	0.36
424.5	2130	4700	0.37
425.0	2140	4750	0.37
425.5	2800	5180	0.29
426.0	2200	5710	0.41
426.5	2230	5030	0.38
427.0	2400	6120	0.41
427.5	2450	6120	0.40
428.0	2430	5680	0.39
428.5	2350	5520	0.39
429.0	2350	5080	0.36
429.5	2510	6120	0.40
430.0	2610	6270	0.40
430.5	2590	6430	0.40
431.0	2420	6050	0.40
431.5	2590	6270	0.40
432.0	3100	6120	0.33
432.5	3030	6350	0.35
433.0	3080	6050	0.33
433.5	2210	5520	0.40
434.0	2520	5290	0.35
434.5	2660	5460	0.35
435.0	2620	4620	0.26
435.5	2730	4700	0.25
436.0	2110	5180	0.40
436.5	2860	5910	0.35
437.0	2380	5400	0.38
437.5	2820	6120	0.36
438.0	2560	6120	0.39
438.5	3440	5980	0.25
439.0	2860	6050	0.36
439.5	2690	5710	0.36
440.0	2800	6200	0.37

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4996 RUN #6**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1445.2	8830	18940	0.36
1446.9	11110	21370	0.31
1448.5	9460	19610	0.35
1450.1	9200	20330	0.37

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
440.5	2690	5770	0.36
441.0	3390	6510	0.31
441.5	2880	5980	0.35
442.0	2800	6200	0.37

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4997 - Log 1 Receiver to Receiver V_s and V_p Analysis

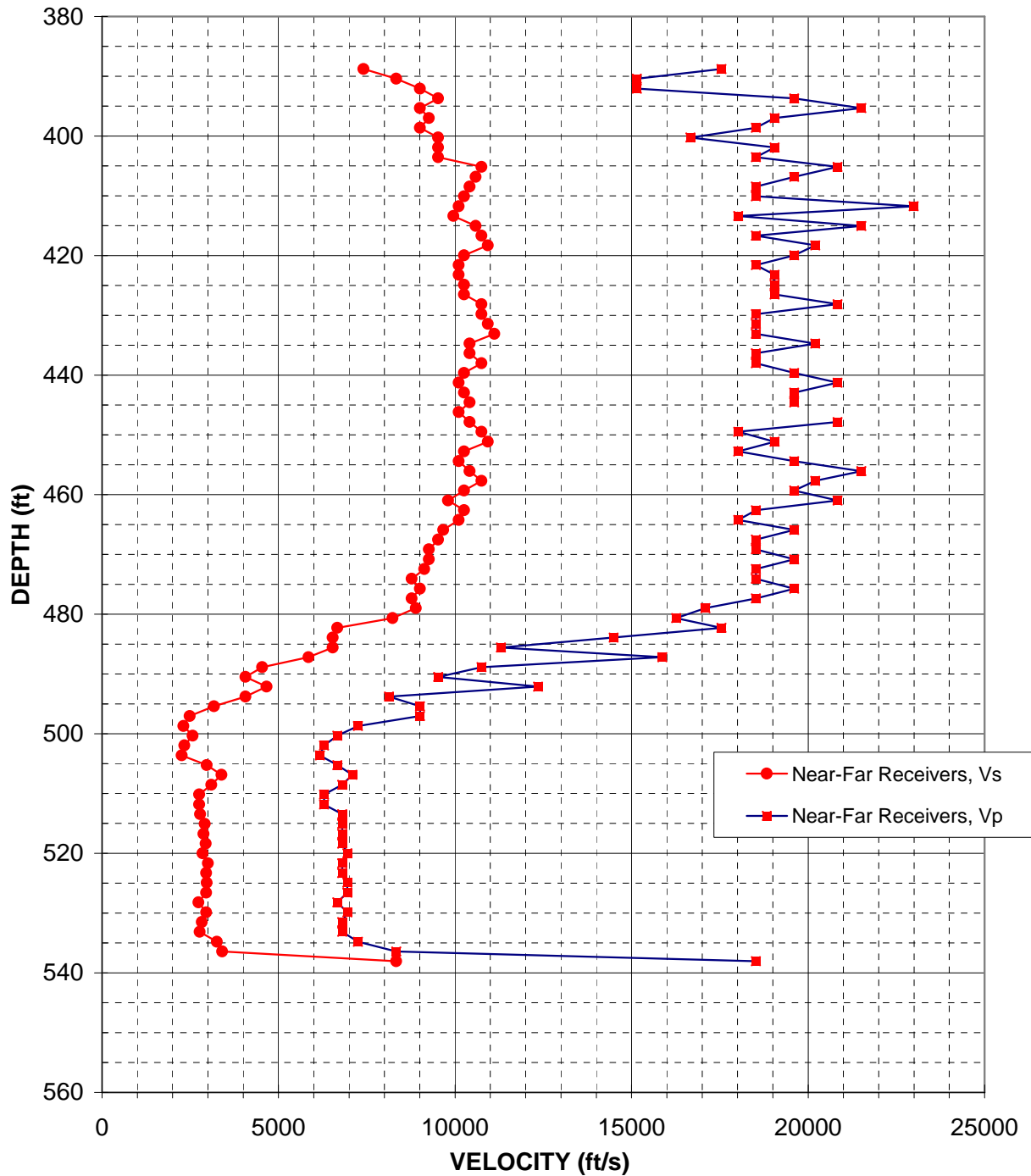


Figure 17: Boring BH-C4997 Log 1, Suspension R1-R2 P- and S_H -wave velocities

Table 16: Boring BH-C4997 Log 1, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN #1**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
388.8	7410	17540	0.39	118.5	2260	5350	0.39
390.4	8330	15150	0.28	119.0	2540	4620	0.28
392.1	9010	15150	0.23	119.5	2750	4620	0.23
393.7	9520	19610	0.35	120.0	2900	5980	0.35
395.3	9010	21510	0.39	120.5	2750	6550	0.39
397.0	9260	19050	0.35	121.0	2820	5810	0.35
398.6	9010	18520	0.34	121.5	2750	5640	0.34
400.3	9520	16670	0.26	122.0	2900	5080	0.26
401.9	9520	19050	0.33	122.5	2900	5810	0.33
403.5	9520	18520	0.32	123.0	2900	5640	0.32
405.2	10750	20830	0.32	123.5	3280	6350	0.32
406.8	10580	19610	0.29	124.0	3230	5980	0.29
408.5	10420	18520	0.27	124.5	3180	5640	0.27
410.1	10260	18520	0.28	125.0	3130	5640	0.28
411.8	10100	22990	0.38	125.5	3080	7010	0.38
413.4	9950	18020	0.28	126.0	3030	5490	0.28
415.0	10580	21510	0.34	126.5	3230	6550	0.34
416.7	10750	18520	0.25	127.0	3280	5640	0.25
418.3	10930	20200	0.29	127.5	3330	6160	0.29
420.0	10260	19610	0.31	128.0	3130	5980	0.31
421.6	10100	18520	0.29	128.5	3080	5640	0.29
423.2	10100	19050	0.30	129.0	3080	5810	0.30
424.9	10260	19050	0.30	129.5	3130	5810	0.30
426.5	10260	19050	0.30	130.0	3130	5810	0.30
428.2	10750	20830	0.32	130.5	3280	6350	0.32
429.8	10750	18520	0.25	131.0	3280	5640	0.25
431.4	10930	18520	0.23	131.5	3330	5640	0.23
433.1	11110	18520	0.22	132.0	3390	5640	0.22
434.7	10420	20200	0.32	132.5	3180	6160	0.32
436.4	10420	18520	0.27	133.0	3180	5640	0.27
438.0	10750	18520	0.25	133.5	3280	5640	0.25
439.6	10260	19610	0.31	134.0	3130	5980	0.31
441.3	10100	20830	0.35	134.5	3080	6350	0.35
442.9	10260	19610	0.31	135.0	3130	5980	0.31
444.6	10420	19610	0.30	135.5	3180	5980	0.30

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN #1**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
446.2	10100	-	-
447.8	10420	20830	0.33
449.5	10750	18020	0.22
451.1	10930	19050	0.25
452.8	10260	18020	0.26
454.4	10100	19610	0.32
456.0	10420	21510	0.35
457.7	10750	20200	0.30
459.3	10260	19610	0.31
461.0	9800	20830	0.36
462.6	10260	18520	0.28
464.2	10100	18020	0.27
465.9	9660	19610	0.34
467.5	9520	18520	0.32
469.2	9260	18520	0.33
470.8	9260	19610	0.36
472.4	9130	18520	0.34
474.1	8770	18520	0.36
475.7	9010	19610	0.37
477.4	8770	18520	0.36
479.0	8890	17090	0.31
480.6	8230	16260	0.33
482.3	6670	17540	0.42
483.9	6540	14490	0.37
485.6	6540	11300	0.25
487.2	5850	15870	0.42
488.9	4540	10750	0.39
490.5	4070	9520	0.39
492.1	4660	12350	0.42
493.8	4070	8130	0.33
495.4	3170	9010	0.43
497.1	2490	9010	0.46
498.7	2310	7250	0.44
500.3	2560	6670	0.41
502.0	2330	6290	0.42
503.6	2260	6170	0.42
505.3	2960	6670	0.38
506.9	3380	7090	0.35

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
136.0	3080	-	-
136.5	3180	6350	0.33
137.0	3280	5490	0.22
137.5	3330	5810	0.25
138.0	3130	5490	0.26
138.5	3080	5980	0.32
139.0	3180	6550	0.35
139.5	3280	6160	0.30
140.0	3130	5980	0.31
140.5	2990	6350	0.36
141.0	3130	5640	0.28
141.5	3080	5490	0.27
142.0	2940	5980	0.34
142.5	2900	5640	0.32
143.0	2820	5640	0.33
143.5	2820	5980	0.36
144.0	2780	5640	0.34
144.5	2670	5640	0.36
145.0	2750	5980	0.37
145.5	2670	5640	0.36
146.0	2710	5210	0.31
146.5	2510	4960	0.33
147.0	2030	5350	0.42
147.5	1990	4420	0.37
148.0	1990	3440	0.25
148.5	1780	4840	0.42
149.0	1380	3280	0.39
149.5	1240	2900	0.39
150.0	1420	3760	0.42
150.5	1240	2480	0.33
151.0	970	2750	0.43
151.5	760	2750	0.46
152.0	700	2210	0.44
152.5	780	2030	0.41
153.0	710	1920	0.42
153.5	690	1880	0.42
154.0	900	2030	0.38
154.5	1030	2160	0.35

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN #1**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
508.5	3090	6800	0.37
510.2	2750	6290	0.38
511.8	2750	6290	0.38
513.5	2780	6800	0.40
515.1	2910	6800	0.39
516.7	2870	6800	0.39
518.4	2940	6800	0.39
520.0	2850	6940	0.40
521.7	3000	6800	0.38
523.3	2950	6800	0.38
524.9	2960	6940	0.39
526.6	2950	6940	0.39
528.2	2730	6670	0.40
529.9	2950	6940	0.39
531.5	2820	6800	0.40
533.1	2770	6800	0.40
534.8	3250	7250	0.37
536.4	3400	8330	0.40
538.1	8330	18520	0.37

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
155.0	940	2070	0.37
155.5	840	1920	0.38
156.0	840	1920	0.38
156.5	850	2070	0.40
157.0	890	2070	0.39
157.5	880	2070	0.39
158.0	900	2070	0.39
158.5	870	2120	0.40
159.0	920	2070	0.38
159.5	900	2070	0.38
160.0	900	2120	0.39
160.5	900	2120	0.39
161.0	830	2030	0.40
161.5	900	2120	0.39
162.0	860	2070	0.40
162.5	840	2070	0.40
163.0	990	2210	0.37
163.5	1040	2540	0.40
164.0	2540	5640	0.37

Notes: "-" means no data available at that particular interval of depth.

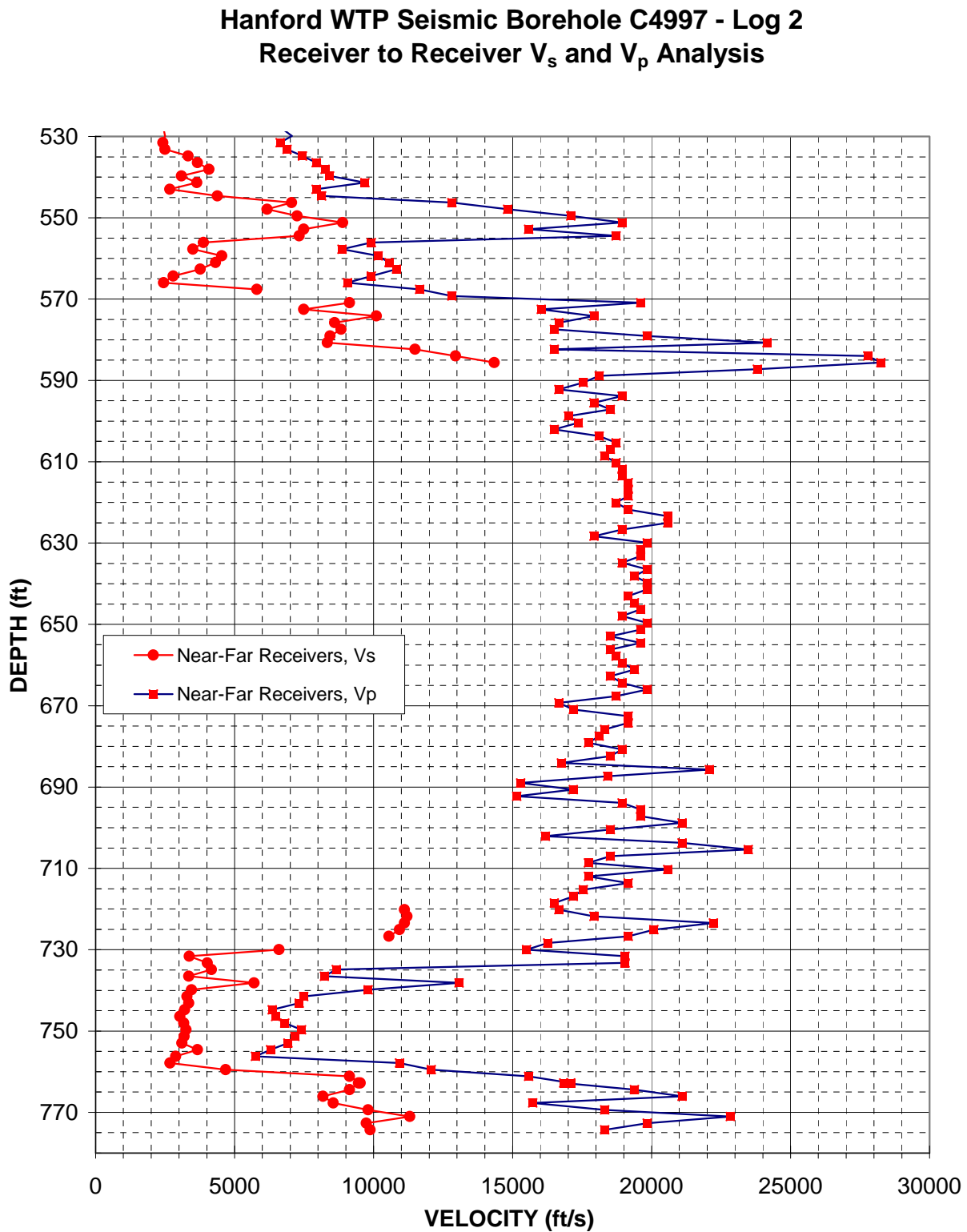


Figure 18: Boring BH-C4997 Log 2, Suspension R1-R2 P- and S_H -wave velocities

Table 17: Boring BH-C4997 Log 2, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 LOG #2**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
528.2	2450	6730	0.42	161.0	750	2050	0.42
529.9	2490	7060	0.43	161.5	760	2150	0.43
531.5	2420	6640	0.42	162.0	740	2020	0.42
533.1	2500	6890	0.42	162.5	760	2100	0.42
534.8	3330	7440	0.38	163.0	1010	2270	0.38
536.4	3660	7940	0.36	163.5	1120	2420	0.36
538.1	4080	8250	0.34	164.0	1240	2510	0.34
539.7	3090	8420	0.42	164.5	940	2570	0.42
541.3	3640	9690	0.42	165.0	1110	2950	0.42
543.0	2670	7940	0.44	165.5	810	2420	0.44
544.6	4390	8130	0.29	166.0	1340	2480	0.29
546.3	7050	12820	0.28	166.5	2150	3910	0.28
547.9	6170	14810	0.39	167.0	1880	4520	0.39
549.5	7250	17090	0.39	167.5	2210	5210	0.39
551.2	8890	18940	0.36	168.0	2710	5770	0.36
552.8	7490	15580	0.35	168.5	2280	4750	0.35
554.5	7330	18730	0.41	169.0	2230	5710	0.41
556.1	3880	9920	0.41	169.5	1180	3020	0.41
557.7	3500	8870	0.41	170.0	1070	2700	0.41
559.4	4540	10160	0.38	170.5	1380	3100	0.38
561.0	4310	10550	0.40	171.0	1320	3220	0.40
562.7	3770	10820	0.43	171.5	1150	3300	0.43
564.3	2800	9920	0.46	172.0	850	3020	0.46
565.9	2450	9060	0.46	172.5	750	2760	0.46
567.6	5800	11660	0.34	173.0	1770	3550	0.34
569.2	-	12820	-	173.5	-	3910	-
570.9	9130	19610	0.36	174.0	2780	5980	0.36
572.5	7490	16030	0.36	174.5	2280	4880	0.36
574.2	10100	17920	0.27	175.0	3080	5460	0.27
575.8	8600	16670	0.32	175.5	2620	5080	0.32
577.4	8830	16500	0.30	176.0	2690	5030	0.30
579.1	8440	19840	0.39	176.5	2570	6050	0.39
580.7	8330	24150	0.43	177.0	2540	7360	0.43
582.4	11490	16500	0.03	177.5	3500	5030	0.03
584.0	12940	27780	0.36	178.0	3950	8470	0.36

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 LOG #2**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
585.6	14340	28250	0.33
587.3	-	23810	-
588.9	-	18120	-
590.6	-	17540	-
592.2	-	16670	-
593.8	-	18940	-
595.5	-	17920	-
597.1	-	18520	-
598.8	-	17010	-
600.4	-	17360	-
602.0	-	16500	-
603.7	-	18120	-
605.3	-	18730	-
607.0	-	18520	-
608.6	-	18320	-
610.2	-	18730	-
611.9	-	18940	-
613.5	-	18940	-
615.2	-	19160	-
616.8	-	19160	-
618.4	-	19160	-
620.1	-	18730	-
621.7	-	19160	-
623.4	-	20580	-
625.0	-	20580	-
626.6	-	18940	-
628.3	-	17920	-
629.9	-	19840	-
631.6	-	19610	-
633.2	-	19610	-
634.8	-	18940	-
636.5	-	19840	-
638.1	-	19380	-
639.8	-	19840	-
641.4	-	19840	-
643.0	-	19160	-
644.7	-	19380	-
646.3	-	19610	-

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
178.5	4370	8610	0.33
179.0	-	7260	-
179.5	-	5520	-
180.0	-	5350	-
180.5	-	5080	-
181.0	-	5770	-
181.5	-	5460	-
182.0	-	5640	-
182.5	-	5180	-
183.0	-	5290	-
183.5	-	5030	-
184.0	-	5520	-
184.5	-	5710	-
185.0	-	5640	-
185.5	-	5580	-
186.0	-	5710	-
186.5	-	5770	-
187.0	-	5770	-
187.5	-	5840	-
188.0	-	5840	-
188.5	-	5840	-
189.0	-	5710	-
189.5	-	5840	-
190.0	-	6270	-
190.5	-	6270	-
191.0	-	5770	-
191.5	-	5460	-
192.0	-	6050	-
192.5	-	5980	-
193.0	-	5980	-
193.5	-	5770	-
194.0	-	6050	-
194.5	-	5910	-
195.0	-	6050	-
195.5	-	6050	-
196.0	-	5840	-
196.5	-	5910	-
197.0	-	5980	-

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 LOG #2**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
648.0	-	18940	-
649.6	-	19840	-
651.3	-	19610	-
652.9	-	18520	-
654.5	-	19610	-
656.2	-	18520	-
657.8	-	18730	-
659.5	-	18940	-
661.1	-	19380	-
662.7	-	18520	-
664.4	-	18940	-
666.0	-	19840	-
667.7	-	18730	-
669.3	-	16670	-
670.9	-	17180	-
672.6	-	19160	-
674.2	-	19160	-
675.9	-	18320	-
677.5	-	18120	-
679.1	-	17730	-
680.8	-	18940	-
682.4	-	18520	-
684.1	-	16750	-
685.7	-	22080	-
687.3	-	18420	-
689.0	-	15290	-
690.6	-	17180	-
692.3	-	15150	-
693.9	-	18940	-
695.5	-	19610	-
697.2	-	19610	-
698.8	-	21100	-
700.5	-	18520	-
702.1	-	16180	-
703.7	-	21100	-
705.4	-	23470	-
707.0	-	18520	-
708.7	-	17730	-

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
197.5	-	5770	-
198.0	-	6050	-
198.5	-	5980	-
199.0	-	5640	-
199.5	-	5980	-
200.0	-	5640	-
200.5	-	5710	-
201.0	-	5770	-
201.5	-	5910	-
202.0	-	5640	-
202.5	-	5770	-
203.0	-	6050	-
203.5	-	5710	-
204.0	-	5080	-
204.5	-	5240	-
205.0	-	5840	-
205.5	-	5840	-
206.0	-	5580	-
206.5	-	5520	-
207.0	-	5400	-
207.5	-	5770	-
208.0	-	5640	-
208.5	-	5110	-
209.0	-	6730	-
209.5	-	5610	-
210.0	-	4660	-
210.5	-	5240	-
211.0	-	4620	-
211.5	-	5770	-
212.0	-	5980	-
212.5	-	5980	-
213.0	-	6430	-
213.5	-	5640	-
214.0	-	4930	-
214.5	-	6430	-
215.0	-	7150	-
215.5	-	5640	-
216.0	-	5400	-

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 LOG #2**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
710.3	-	20580	-
711.9	-	17730	-
713.6	-	19160	-
715.2	-	17540	-
716.9	-	17180	-
718.5	-	16500	-
720.1	11110	16670	0.10
721.8	11200	17920	0.18
723.4	11110	22220	0.33
725.1	10930	20080	0.29
726.7	10550	19160	0.28
728.4	-	16260	-
730.0	6600	15500	0.39
731.6	3370	19050	0.48
733.3	4020	19050	0.48
734.9	4170	8660	0.35
736.6	3350	8230	0.40
738.2	5700	13070	0.38
739.8	3450	9800	0.43
741.5	3280	7490	0.38
743.1	3350	7330	0.37
744.8	3210	6350	0.33
746.4	3030	6470	0.36
748.0	3170	6800	0.36
749.7	3250	7410	0.38
751.3	3190	7170	0.38
753.0	3110	6920	0.37
754.6	3660	6290	0.24
756.2	2890	5750	0.33
757.9	2680	10930	0.47
759.5	4680	12080	0.41
761.2	9130	15580	0.24
762.8	9520	17090	0.27
762.8	9460	16840	0.27
764.4	9130	19380	0.36
766.1	8180	21100	0.41
767.7	8550	15720	0.29
769.4	9800	18320	0.30

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
216.5	-	6270	-
217.0	-	5400	-
217.5	-	5840	-
218.0	-	5350	-
218.5	-	5240	-
219.0	-	5030	-
219.5	3390	5080	0.10
220.0	3420	5460	0.18
220.5	3390	6770	0.33
221.0	3330	6120	0.29
221.5	3220	5840	0.28
222.0	-	4960	-
222.5	2010	4730	0.39
223.0	1030	5810	0.48
223.5	1220	5810	0.48
224.0	1270	2640	0.35
224.5	1020	2510	0.40
225.0	1740	3980	0.38
225.5	1050	2990	0.43
226.0	1000	2280	0.38
226.5	1020	2230	0.37
227.0	980	1940	0.33
227.5	920	1970	0.36
228.0	970	2070	0.36
228.5	990	2260	0.38
229.0	970	2180	0.38
229.5	950	2110	0.37
230.0	1120	1920	0.24
230.5	880	1750	0.33
231.0	820	3330	0.47
231.5	1430	3680	0.41
232.0	2780	4750	0.24
232.5	2900	5210	0.27
232.5	2880	5130	0.27
233.0	2780	5910	0.36
233.5	2490	6430	0.41
234.0	2610	4790	0.29
234.5	2990	5580	0.30

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 LOG #2**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
771.0	11300	22830	0.34
772.6	9730	19840	0.34
774.3	9880	18320	0.29

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
235.0	3440	6960	0.34
235.5	2970	6050	0.34
236.0	3010	5580	0.29

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4997 - Log 3 Receiver to Receiver V_s and V_p Analysis

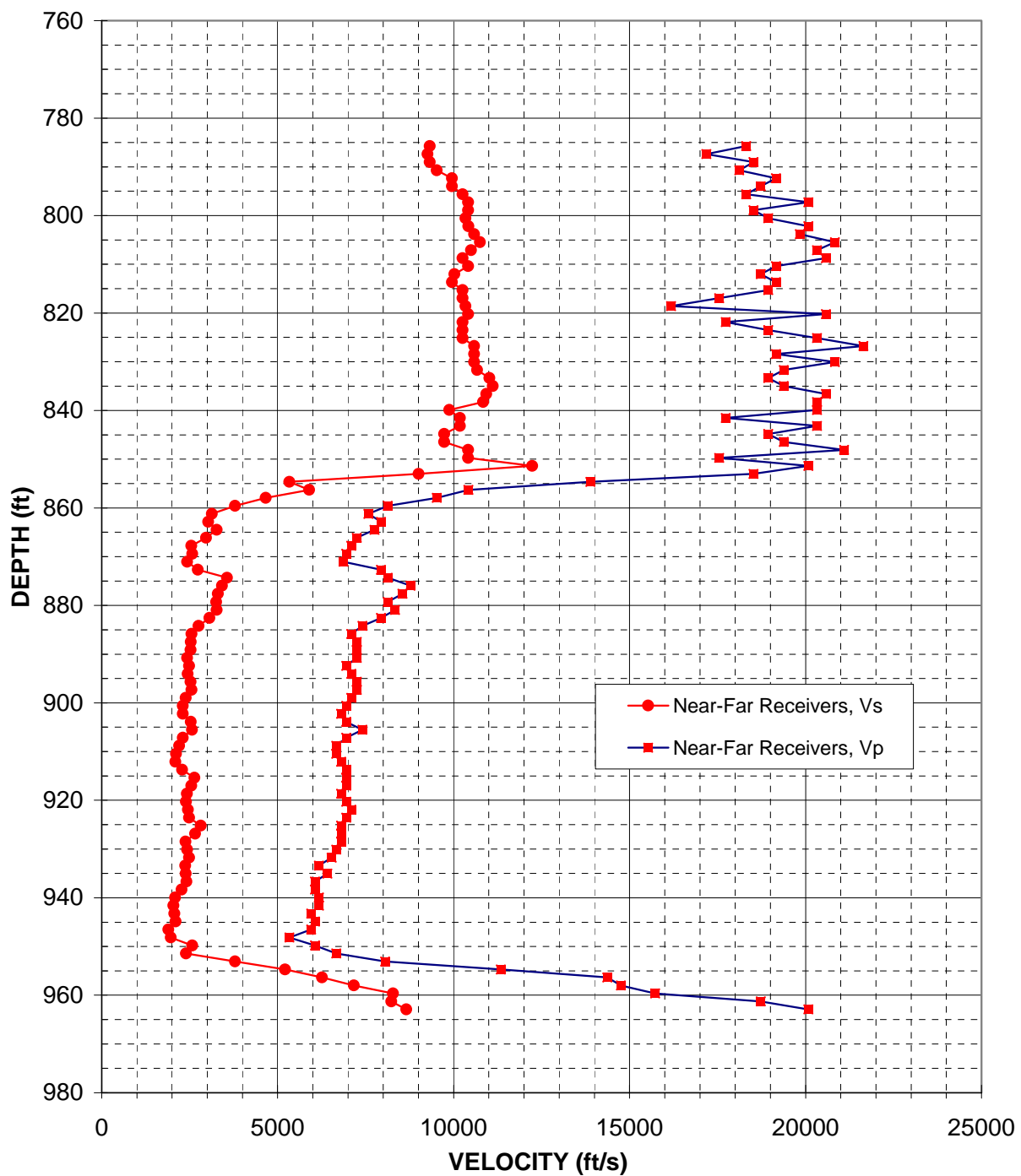


Figure 19: Boring BH-C4997 Log 3, Suspension R1-R2 P- and S_H -wave velocities

Table 18: Boring BH-C4997 Log 3, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN 3**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
785.8	9320	18320	0.33	239.5	2840	5580	0.33
787.4	9260	17180	0.30	240.0	2820	5240	0.30
789.0	9320	18520	0.33	240.5	2840	5640	0.33
790.7	9520	18120	0.31	241.0	2900	5520	0.31
792.3	9950	19160	0.32	241.5	3030	5840	0.32
794.0	9950	18730	0.30	242.0	3030	5710	0.30
795.6	10260	18320	0.27	242.5	3130	5580	0.27
797.2	10420	20080	0.32	243.0	3180	6120	0.32
798.9	10420	18520	0.27	243.5	3180	5640	0.27
800.5	10340	18940	0.29	244.0	3150	5770	0.29
802.2	10420	20080	0.32	244.5	3180	6120	0.32
803.8	10580	19840	0.30	245.0	3230	6050	0.30
805.5	10750	20830	0.32	245.5	3280	6350	0.32
807.1	10500	20330	0.32	246.0	3200	6200	0.32
808.7	10260	20580	0.33	246.5	3130	6270	0.33
810.4	10420	19160	0.29	247.0	3180	5840	0.29
812.0	10030	18730	0.30	247.5	3060	5710	0.30
813.7	9950	19160	0.32	248.0	3030	5840	0.32
815.3	10260	18940	0.29	248.5	3130	5770	0.29
816.9	10260	17540	0.24	249.0	3130	5350	0.24
818.6	10340	16180	0.16	249.5	3150	4930	0.16
820.2	10420	20580	0.33	250.0	3180	6270	0.33
821.9	10260	17730	0.25	250.5	3130	5400	0.25
823.5	10260	18940	0.29	251.0	3130	5770	0.29
825.1	10260	20330	0.33	251.5	3130	6200	0.33
826.8	10580	21650	0.34	252.0	3230	6600	0.34
828.4	10580	19160	0.28	252.5	3230	5840	0.28
830.1	10580	20830	0.33	253.0	3230	6350	0.33
831.7	10670	19380	0.28	253.5	3250	5910	0.28
833.3	11020	18940	0.24	254.0	3360	5770	0.24
835.0	11110	19380	0.26	254.5	3390	5910	0.26
836.6	10930	20580	0.30	255.0	3330	6270	0.30
838.3	10840	20330	0.30	255.5	3300	6200	0.30
839.9	9880	20330	0.35	256.0	3010	6200	0.35
841.5	10180	17730	0.25	256.5	3100	5400	0.25

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN 3**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
843.2	10180	20330	0.33
844.8	9730	18940	0.32
846.5	9730	19380	0.33
848.1	10420	21100	0.34
849.7	10420	17540	0.23
851.4	12230	20080	0.20
853.0	9010	18520	0.34
854.7	5330	13890	0.41
856.3	5900	10420	0.26
857.9	4660	9520	0.34
859.6	3790	8130	0.36
861.2	3130	7580	0.40
862.9	3030	7940	0.41
864.5	3270	7750	0.39
866.1	2960	7250	0.40
867.8	2540	7090	0.43
869.4	2570	6940	0.42
871.1	2430	6870	0.43
872.7	2730	7940	0.43
874.3	3570	8130	0.38
876.0	3420	8770	0.41
877.6	3300	8550	0.41
879.3	3250	8130	0.40
880.9	3270	8330	0.41
882.6	3060	7940	0.41
884.2	2750	7410	0.42
885.8	2550	7090	0.43
887.5	2530	7250	0.43
889.1	2530	7250	0.43
890.8	2430	7250	0.44
892.4	2490	6940	0.43
894.0	2440	7090	0.43
895.7	2530	7250	0.43
897.3	2550	7250	0.43
899.0	2390	7090	0.44
900.6	2310	6940	0.44
902.2	2310	6800	0.44
903.9	2530	6940	0.42

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
257.0	3100	6200	0.33
257.5	2970	5770	0.32
258.0	2970	5910	0.33
258.5	3180	6430	0.34
259.0	3180	5350	0.23
259.5	3730	6120	0.20
260.0	2750	5640	0.34
260.5	1630	4230	0.41
261.0	1800	3180	0.26
261.5	1420	2900	0.34
262.0	1150	2480	0.36
262.5	950	2310	0.40
263.0	920	2420	0.41
263.5	1000	2360	0.39
264.0	900	2210	0.40
264.5	780	2160	0.43
265.0	780	2120	0.42
265.5	740	2090	0.43
266.0	830	2420	0.43
266.5	1090	2480	0.38
267.0	1040	2670	0.41
267.5	1010	2610	0.41
268.0	990	2480	0.40
268.5	1000	2540	0.41
269.0	930	2420	0.41
269.5	840	2260	0.42
270.0	780	2160	0.43
270.5	770	2210	0.43
271.0	770	2210	0.43
271.5	740	2210	0.44
272.0	760	2120	0.43
272.5	740	2160	0.43
273.0	770	2210	0.43
273.5	780	2210	0.43
274.0	730	2160	0.44
274.5	700	2120	0.44
275.0	700	2070	0.44
275.5	770	2120	0.42

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN 3**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
905.5	2560	7410	0.43
907.2	2310	6940	0.44
908.8	2200	6670	0.44
910.4	2120	6670	0.44
912.1	2100	6800	0.45
913.7	2280	6940	0.44
915.4	2640	6940	0.42
917.0	2540	6940	0.42
918.6	2420	6800	0.43
920.3	2400	6940	0.43
921.9	2450	7090	0.43
923.6	2490	6940	0.43
925.2	2810	6800	0.40
926.8	2660	6800	0.41
928.5	2380	6800	0.43
930.1	2430	6670	0.42
931.8	2490	6540	0.42
933.4	2370	6170	0.41
935.0	2390	6410	0.42
936.7	2410	6060	0.41
938.3	2280	6060	0.42
940.0	2080	6170	0.44
941.6	2040	6170	0.44
943.2	2060	5950	0.43
944.9	2100	6060	0.43
946.5	1890	5950	0.44
948.2	1960	5330	0.42
949.8	2570	6060	0.39
951.4	2400	6670	0.43
953.1	3790	8050	0.36
954.7	5210	11340	0.37
956.4	6260	14370	0.38
958.0	7170	14750	0.35
959.7	8280	15720	0.31
961.3	8230	18730	0.38
962.9	8660	20080	0.39

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
276.0	780	2260	0.43
276.5	700	2120	0.44
277.0	670	2030	0.44
277.5	650	2030	0.44
278.0	640	2070	0.45
278.5	700	2120	0.44
279.0	800	2120	0.42
279.5	780	2120	0.42
280.0	740	2070	0.43
280.5	730	2120	0.43
281.0	750	2160	0.43
281.5	760	2120	0.43
282.0	860	2070	0.40
282.5	810	2070	0.41
283.0	730	2070	0.43
283.5	740	2030	0.42
284.0	760	1990	0.42
284.5	720	1880	0.41
285.0	730	1950	0.42
285.5	730	1850	0.41
286.0	690	1850	0.42
286.5	640	1880	0.44
287.0	620	1880	0.44
287.5	630	1810	0.43
288.0	640	1850	0.43
288.5	580	1810	0.44
289.0	600	1630	0.42
289.5	780	1850	0.39
290.0	730	2030	0.43
290.5	1150	2450	0.36
291.0	1590	3460	0.37
291.5	1910	4380	0.38
292.0	2180	4500	0.35
292.5	2520	4790	0.31
293.0	2510	5710	0.38
293.5	2640	6120	0.39

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4997 - Log 4 Receiver to Receiver V_s and V_p Analysis

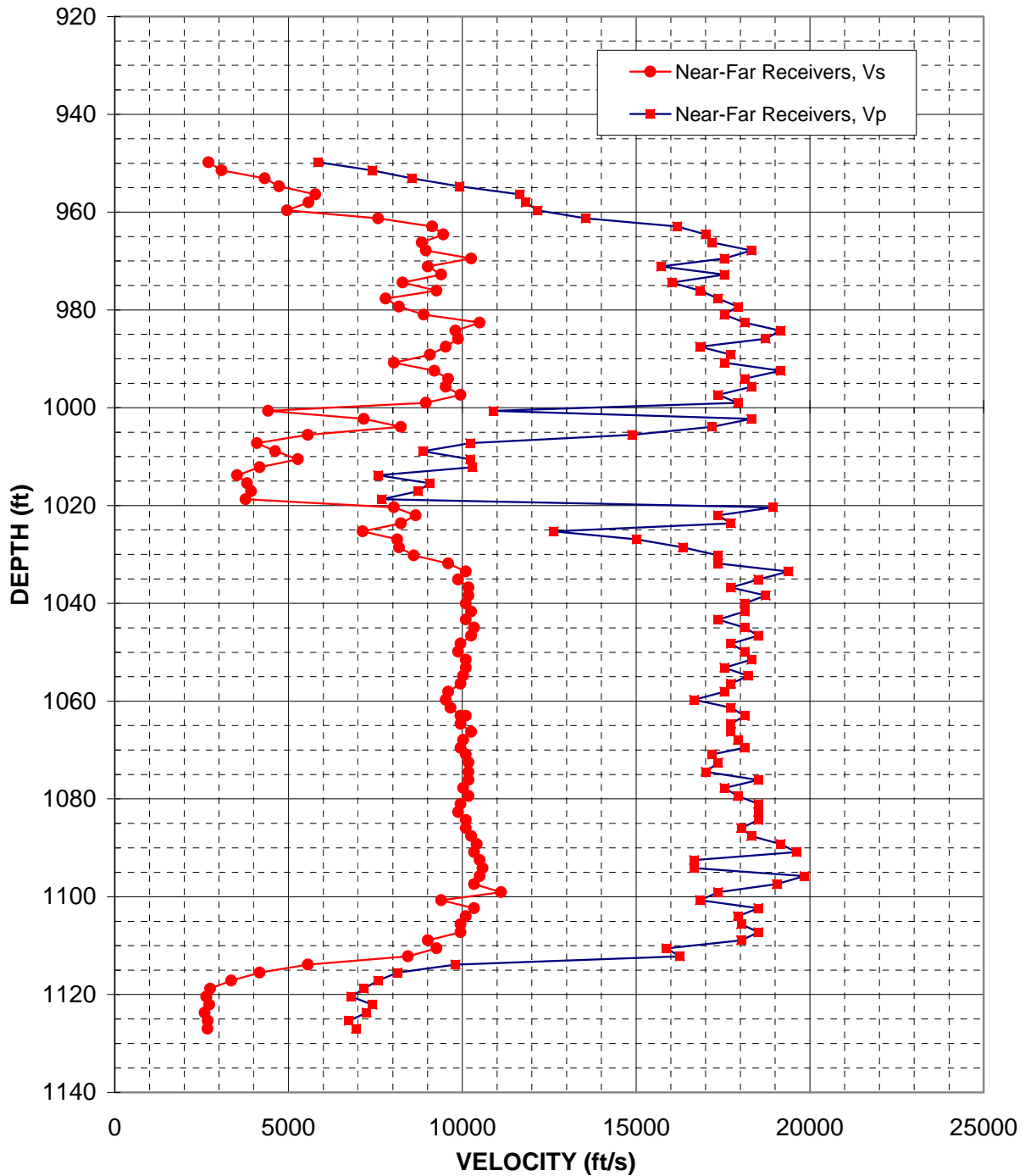


Figure 20: Boring BH-C4997 Log 4, Suspension R1-R2 P- and S_H -wave velocities

Table 19: Boring BH-C4997 Log 4, Suspension R1-R2 depths and P- and S_H-wave velocities

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN# 4							
American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
949.8	2700	5850	0.36	289.5	820	1780	0.36
951.4	3070	7410	0.40	290.0	940	2260	0.40
953.1	4310	8550	0.33	290.5	1320	2610	0.33
954.7	4730	9920	0.35	291.0	1440	3020	0.35
956.4	5770	11660	0.34	291.5	1760	3550	0.34
958.0	5580	11820	0.36	292.0	1700	3600	0.36
959.7	4960	12170	0.40	292.5	1510	3710	0.40
961.3	7580	13550	0.27	293.0	2310	4130	0.27
962.9	9130	16180	0.27	293.5	2780	4930	0.27
964.6	9460	17010	0.28	294.0	2880	5180	0.28
966.2	8830	17180	0.32	294.5	2690	5240	0.32
967.9	8950	18320	0.34	295.0	2730	5580	0.34
969.5	10260	17540	0.24	295.5	3130	5350	0.24
971.1	9010	15720	0.26	296.0	2750	4790	0.26
972.8	9390	17540	0.30	296.5	2860	5350	0.30
974.4	8280	16030	0.32	297.0	2520	4880	0.32
976.1	9260	16840	0.28	297.5	2820	5130	0.28
977.7	7800	17360	0.37	298.0	2380	5290	0.37
979.3	8180	17920	0.37	298.5	2490	5460	0.37
981.0	8890	17540	0.33	299.0	2710	5350	0.33
982.6	10500	18120	0.25	299.5	3200	5520	0.25
984.3	9800	19160	0.32	300.0	2990	5840	0.32
985.9	9880	18730	0.31	300.5	3010	5710	0.31
987.5	9520	16840	0.26	301.0	2900	5130	0.26
989.2	9070	17730	0.32	301.5	2760	5400	0.32
990.8	8030	17540	0.37	302.0	2450	5350	0.37
992.5	9200	19160	0.35	302.5	2800	5840	0.35
994.1	9590	18120	0.31	303.0	2920	5520	0.31
995.7	9520	18320	0.31	303.5	2900	5580	0.31
997.4	9950	17360	0.26	304.0	3030	5290	0.26
999.0	8950	17920	0.33	304.5	2730	5460	0.33
1000.7	4420	10890	0.40	305.0	1350	3320	0.40
1002.3	7170	18320	0.41	305.5	2180	5580	0.41
1003.9	8230	17180	0.35	306.0	2510	5240	0.35
1005.6	5560	14880	0.42	306.5	1690	4540	0.42
1007.2	4090	10220	0.40	307.0	1250	3120	0.40
1008.9	4610	8870	0.31	307.5	1410	2700	0.31

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN# 4							
American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
1010.5	5270	10220	0.32	308.0	1610	3120	0.32
1012.1	4170	10290	0.40	308.5	1270	3140	0.40
1013.8	3520	7580	0.36	309.0	1070	2310	0.36
1015.4	3810	9060	0.39	309.5	1160	2760	0.39
1017.1	3920	8730	0.37	310.0	1200	2660	0.37
1018.7	3770	7680	0.34	310.5	1150	2340	0.34
1020.3	8030	18940	0.39	311.0	2450	5770	0.39
1022.0	8660	17360	0.33	311.5	2640	5290	0.33
1023.6	8230	17730	0.36	312.0	2510	5400	0.36
1025.3	7130	12630	0.27	312.5	2170	3850	0.27
1026.9	8130	15020	0.29	313.0	2480	4580	0.29
1028.5	8180	16340	0.33	313.5	2490	4980	0.33
1030.2	8600	17360	0.34	314.0	2620	5290	0.34
1031.8	9590	17360	0.28	314.5	2920	5290	0.28
1033.5	10100	19380	0.31	315.0	3080	5910	0.31
1035.1	9880	18520	0.30	315.5	3010	5640	0.30
1036.8	10180	17730	0.25	316.0	3100	5400	0.25
1038.4	10180	18730	0.29	316.5	3100	5710	0.29
1040.0	10100	18120	0.27	317.0	3080	5520	0.27
1041.7	10260	18120	0.26	317.5	3130	5520	0.26
1043.3	10100	17360	0.24	318.0	3080	5290	0.24
1045.0	10340	18120	0.26	318.5	3150	5520	0.26
1046.6	10260	18520	0.28	319.0	3130	5640	0.28
1048.2	9950	17730	0.27	319.5	3030	5400	0.27
1049.9	9880	18120	0.29	320.0	3010	5520	0.29
1051.5	10100	18320	0.28	320.5	3080	5580	0.28
1053.2	10100	17540	0.25	321.0	3080	5350	0.25
1054.8	10030	18210	0.28	321.5	3060	5550	0.28
1056.4	9950	17730	0.27	322.0	3030	5400	0.27
1058.1	9590	17540	0.29	322.5	2920	5350	0.29
1059.7	9520	16670	0.26	323.0	2900	5080	0.26
1061.4	9660	17730	0.29	323.5	2940	5400	0.29
1063.0	9950	18120	0.28	324.0	3030	5520	0.28
1063.0	10100	18120	0.27	324.0	3080	5520	0.27
1064.6	9950	17730	0.27	324.5	3030	5400	0.27
1066.3	10260	17730	0.25	325.0	3130	5400	0.25
1067.9	10030	17920	0.27	325.5	3060	5460	0.27
1069.6	9950	18120	0.28	326.0	3030	5520	0.28
1070.9	10100	17180	0.24	326.4	3080	5240	0.24
1072.5	10180	17360	0.24	326.9	3100	5290	0.24

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN# 4							
American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
1074.5	10180	17010	0.22	327.5	3100	5180	0.22
1076.1	10180	18520	0.28	328.0	3100	5640	0.28
1077.8	10030	17540	0.26	328.5	3060	5350	0.26
1079.4	10180	17920	0.26	329.0	3100	5460	0.26
1081.0	9950	18520	0.30	329.5	3030	5640	0.30
1082.7	9880	18520	0.30	330.0	3010	5640	0.30
1084.3	10100	18520	0.29	330.5	3080	5640	0.29
1086.0	10100	18020	0.27	331.0	3080	5490	0.27
1087.6	10260	18320	0.27	331.5	3130	5580	0.27
1089.2	10420	19160	0.29	332.0	3180	5840	0.29
1090.9	10340	19610	0.31	332.5	3150	5980	0.31
1092.5	10500	16670	0.17	333.0	3200	5080	0.17
1094.2	10580	16670	0.16	333.5	3230	5080	0.16
1095.8	10500	19840	0.31	334.0	3200	6050	0.31
1097.4	10340	19050	0.29	334.5	3150	5810	0.29
1099.1	11110	17360	0.15	335.0	3390	5290	0.15
1100.7	9390	16840	0.27	335.5	2860	5130	0.27
1102.4	10340	18520	0.27	336.0	3150	5640	0.27
1104.0	10100	17920	0.27	336.5	3080	5460	0.27
1105.6	9950	18020	0.28	337.0	3030	5490	0.28
1107.3	9950	18520	0.30	337.5	3030	5640	0.30
1108.9	9010	18020	0.33	338.0	2750	5490	0.33
1110.6	9260	15870	0.24	338.5	2820	4840	0.24
1112.2	8440	16260	0.32	339.0	2570	4960	0.32
1113.9	5560	9800	0.26	339.5	1690	2990	0.26
1115.5	4170	8130	0.32	340.0	1270	2480	0.32
1117.1	3350	7580	0.38	340.5	1020	2310	0.38
1118.8	2740	7170	0.41	341.0	840	2180	0.41
1120.4	2640	6800	0.41	341.5	800	2070	0.41
1122.1	2720	7410	0.42	342.0	830	2260	0.42
1123.7	2580	7250	0.43	342.5	790	2210	0.43
1125.3	2680	6730	0.41	343.0	820	2050	0.41
1127.0	2670	6940	0.41	343.5	810	2120	0.41
Notes:				"-" means no data available at that particular interval of depth.			

Hanford WTP Seismic Borehole C4997 - Log 5 Receiver to Receiver V_s and V_p Analysis

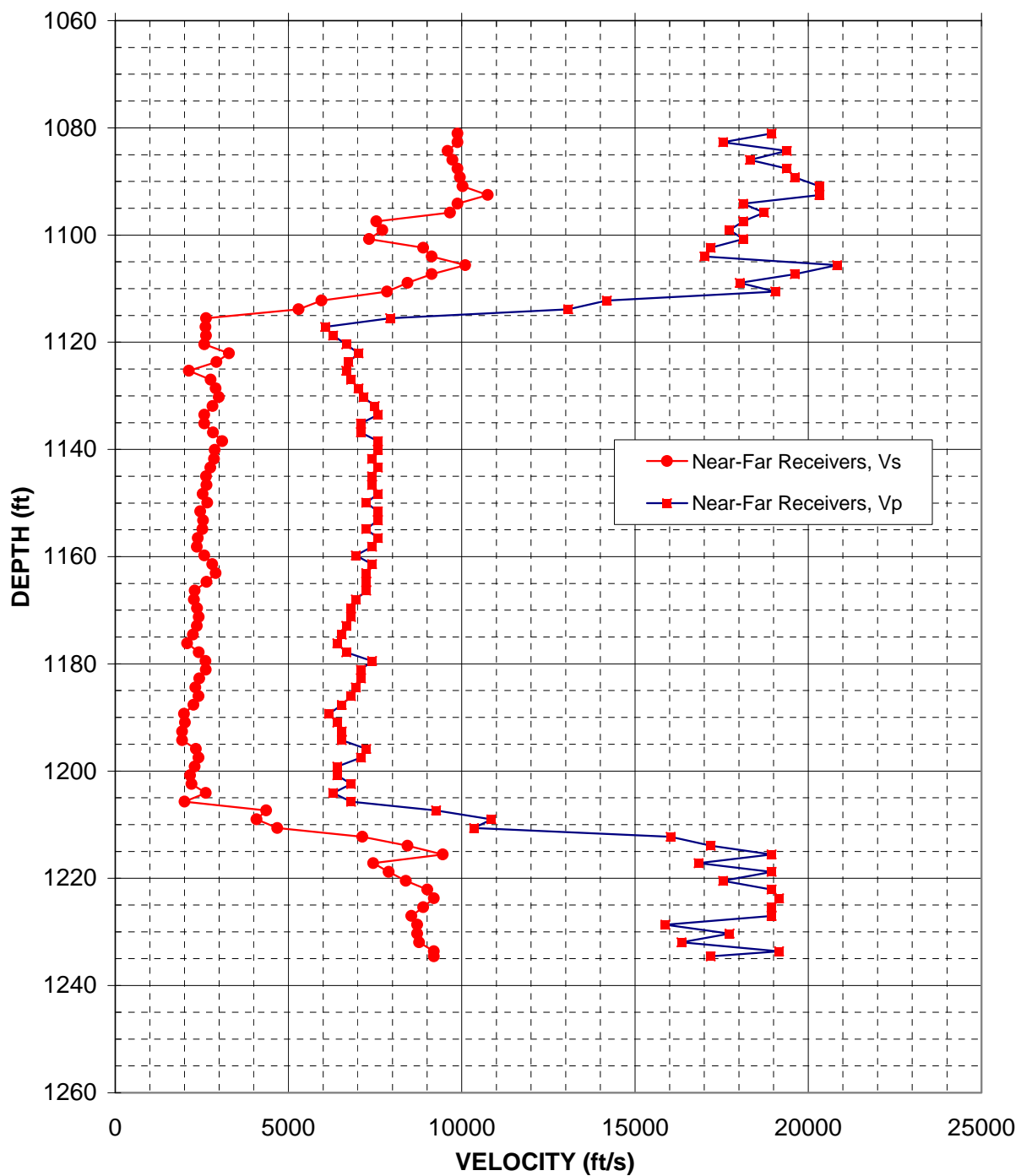


Figure 21: Boring BH-C4997 Log 5, Suspension R1-R2 P- and S_H -wave velocities

Table 20: Boring BH-C4997 Log 5, Suspension R1-R2 depths and P- and S_H-wave velocities

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN #5 MABTON LOGGED BY DIEHL							
American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
1081.0	9880	18940	0.31	329.5	3010	5770	0.31
1082.7	9880	17540	0.27	330.0	3010	5350	0.27
1084.3	9590	19380	0.34	330.5	2920	5910	0.34
1086.0	9730	18320	0.30	331.0	2970	5580	0.30
1087.6	9880	19380	0.32	331.5	3010	5910	0.32
1089.2	9950	19610	0.33	332.0	3030	5980	0.33
1090.9	10030	20330	0.34	332.5	3060	6200	0.34
1092.5	10750	20330	0.31	333.0	3280	6200	0.31
1094.2	9880	18120	0.29	333.5	3010	5520	0.29
1095.8	9660	18730	0.32	334.0	2940	5710	0.32
1097.4	7530	18120	0.40	334.5	2300	5520	0.40
1099.1	7710	17730	0.38	335.0	2350	5400	0.38
1100.7	7330	18120	0.40	335.5	2230	5520	0.40
1102.4	8890	17180	0.32	336.0	2710	5240	0.32
1104.0	9130	17010	0.30	336.5	2780	5180	0.30
1105.6	10100	20830	0.35	337.0	3080	6350	0.35
1107.3	9130	19610	0.36	337.5	2780	5980	0.36
1108.9	8440	18020	0.36	338.0	2570	5490	0.36
1110.6	7840	19050	0.40	338.5	2390	5810	0.40
1112.2	5950	14180	0.39	339.0	1810	4320	0.39
1113.9	5290	13070	0.40	339.5	1610	3980	0.40
1115.5	2620	7940	0.44	340.0	800	2420	0.44
1117.1	2600	6060	0.39	340.5	790	1850	0.39
1118.8	2620	6290	0.39	341.0	800	1920	0.39
1120.4	2570	6670	0.41	341.5	780	2030	0.41
1122.1	3280	7020	0.36	342.0	1000	2140	0.36
1123.7	2920	6730	0.38	342.5	890	2050	0.38
1125.3	2120	6670	0.44	343.0	650	2030	0.44
1127.0	2750	6800	0.40	343.5	840	2070	0.40
1128.6	2900	7020	0.40	344.0	880	2140	0.40
1130.3	2990	7170	0.39	344.5	910	2180	0.39
1131.9	2810	7490	0.42	345.0	860	2280	0.42
1133.5	2570	7580	0.43	345.5	780	2310	0.43
1135.2	2570	7090	0.42	346.0	780	2160	0.42
1136.8	2820	7090	0.41	346.5	860	2160	0.41
1138.5	3090	7580	0.40	347.0	940	2310	0.40

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN #5 MABTON LOGGED BY DIEHL							
American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
1140.1	2870	7580	0.42	347.5	880	2310	0.42
1141.7	2850	7410	0.41	348.0	870	2260	0.41
1143.4	2740	7580	0.42	348.5	840	2310	0.42
1145.0	2620	7410	0.43	349.0	800	2260	0.43
1146.7	2640	7410	0.43	349.5	800	2260	0.43
1148.3	2530	7580	0.44	350.0	770	2310	0.44
1149.9	2660	7250	0.42	350.5	810	2210	0.42
1151.6	2450	7580	0.44	351.0	750	2310	0.44
1153.2	2530	7580	0.44	351.5	770	2310	0.44
1154.9	2520	7250	0.43	352.0	770	2210	0.43
1156.5	2380	7580	0.45	352.5	730	2310	0.45
1158.1	2360	7410	0.44	353.0	720	2260	0.44
1159.8	2570	6940	0.42	353.5	780	2120	0.42
1161.4	2800	7410	0.42	354.0	850	2260	0.42
1163.1	2900	7250	0.40	354.5	880	2210	0.40
1164.7	2640	7250	0.42	355.0	800	2210	0.42
1166.3	2290	7250	0.44	355.5	700	2210	0.44
1168.0	2280	6940	0.44	356.0	690	2120	0.44
1169.6	2360	6800	0.43	356.5	720	2070	0.43
1171.3	2420	6800	0.43	357.0	740	2070	0.43
1172.9	2360	6670	0.43	357.5	720	2030	0.43
1174.5	2240	6540	0.43	358.0	680	1990	0.43
1176.2	2080	6410	0.44	358.5	630	1950	0.44
1177.8	2420	6670	0.42	359.0	740	2030	0.42
1179.5	2600	7410	0.43	359.5	790	2260	0.43
1181.1	2610	7090	0.42	360.0	800	2160	0.42
1182.7	2420	7090	0.43	360.5	740	2160	0.43
1184.4	2310	6940	0.44	361.0	710	2120	0.44
1186.0	2410	6800	0.43	361.5	730	2070	0.43
1187.7	2260	6540	0.43	362.0	690	1990	0.43
1189.3	1990	6170	0.44	362.5	610	1880	0.44
1190.9	2010	6410	0.45	363.0	610	1950	0.45
1192.6	1930	6540	0.45	363.5	590	1990	0.45
1194.2	1930	6540	0.45	364.0	590	1990	0.45
1195.9	2330	7250	0.44	364.5	710	2210	0.44
1197.5	2410	7090	0.43	365.0	730	2160	0.43
1199.2	2290	6410	0.43	365.5	700	1950	0.43
1200.8	2160	6410	0.44	366.0	660	1950	0.44
1202.4	2200	6800	0.44	366.5	670	2070	0.44
1204.1	2610	6290	0.40	367.0	800	1920	0.40

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 RUN #5 MABTON LOGGED BY DIEHL							
American Units					Metric Units		
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio		Depth at Midpoint Between Receivers	Velocity	
(ft)	V _s (ft/s)	V _p (ft/s)			(m)	V _s (m/s)	V _p (m/s)
1205.7	2000	6800	0.45		367.5	610	2070
1207.4	4360	9260	0.36		368.0	1330	2820
1209.0	4080	10860	0.42		368.5	1240	3310
1210.6	4680	10350	0.37		369.0	1430	3160
1212.3	7130	16030	0.38		369.5	2170	4880
1213.9	8440	17180	0.34		370.0	2570	5240
1215.6	9460	18940	0.33		370.5	2880	5770
1217.2	7450	16840	0.38		371.0	2270	5130
1218.8	7890	18940	0.40		371.5	2400	5770
1220.5	8390	17540	0.35		372.0	2560	5350
1222.1	9010	18940	0.35		372.5	2750	5770
1223.8	9200	19160	0.35		373.0	2800	5840
1225.4	8890	18940	0.36		373.5	2710	5770
1227.0	8550	18940	0.37		374.0	2610	5770
1228.7	8710	15870	0.28		374.5	2660	4840
1230.3	8710	17730	0.34		375.0	2660	5400
1232.0	8770	16340	0.30		375.5	2670	4980
1233.6	9200	19160	0.35		376.0	2800	5840
1234.6	9200	17180	0.30		376.3	2800	5240
Notes:				"-" means no data available at that particular interval of depth.			

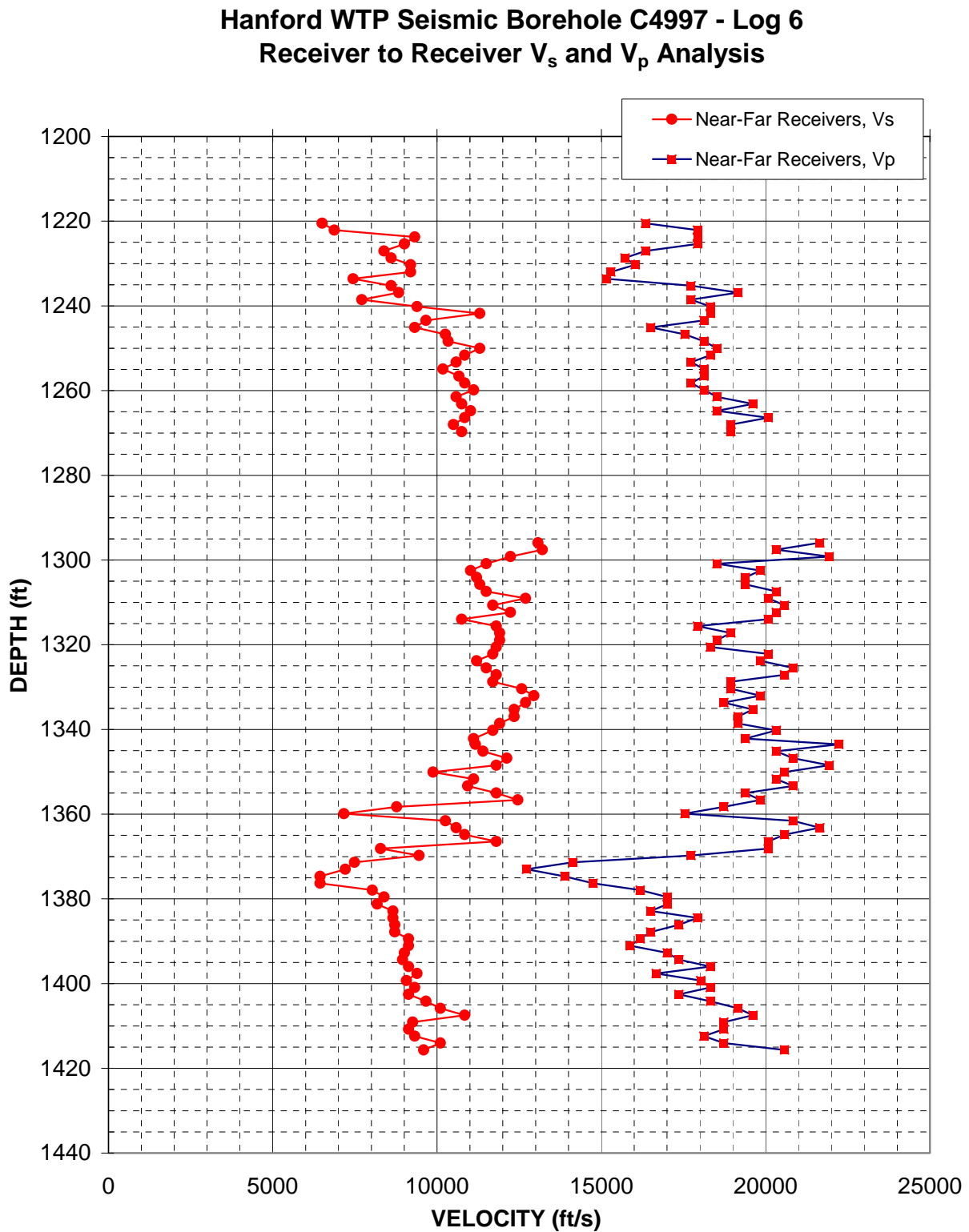


Figure 22: Boring BH-C4997 Log 6, Suspension R1-R2 P- and S_H -wave velocities

Table 21: Boring BH-C4997 Log 6, Suspension R1-R2 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 LOG #6**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1220.5	6500	16340	0.41	372.0	1980	4980	0.41
1222.1	6870	17920	0.41	372.5	2090	5460	0.41
1223.8	9320	17920	0.31	373.0	2840	5460	0.31
1225.4	9010	17920	0.33	373.5	2750	5460	0.33
1227.0	8390	16340	0.32	374.0	2560	4980	0.32
1228.7	8600	15720	0.29	374.5	2620	4790	0.29
1230.3	9200	16030	0.25	375.0	2800	4880	0.25
1232.0	9200	15290	0.22	375.5	2800	4660	0.22
1233.6	7450	15150	0.34	376.0	2270	4620	0.34
1235.2	8600	17730	0.35	376.5	2620	5400	0.35
1236.9	8830	19160	0.37	377.0	2690	5840	0.37
1238.5	7710	17730	0.38	377.5	2350	5400	0.38
1240.2	9390	18320	0.32	378.0	2860	5580	0.32
1241.8	11300	18320	0.19	378.5	3440	5580	0.19
1243.4	9660	18120	0.30	379.0	2940	5520	0.30
1245.1	9320	16500	0.27	379.5	2840	5030	0.27
1246.7	10260	17540	0.24	380.0	3130	5350	0.24
1248.4	10340	18120	0.26	380.5	3150	5520	0.26
1250.0	11300	18520	0.20	381.0	3440	5640	0.20
1251.6	10840	18320	0.23	381.5	3300	5580	0.23
1253.3	10580	17730	0.22	382.0	3230	5400	0.22
1254.9	10180	18120	0.27	382.5	3100	5520	0.27
1256.6	10670	18120	0.23	383.0	3250	5520	0.23
1258.2	10840	17730	0.20	383.5	3300	5400	0.20
1259.8	11110	18120	0.20	384.0	3390	5520	0.20
1261.5	10580	18520	0.26	384.5	3230	5640	0.26
1263.1	10750	19610	0.28	385.0	3280	5980	0.28
1264.8	11020	18520	0.23	385.5	3360	5640	0.23
1266.4	10840	20080	0.29	386.0	3300	6120	0.29
1268.0	10500	18940	0.28	386.5	3200	5770	0.28
1269.7	10750	18940	0.26	387.0	3280	5770	0.26
1271.3	-	-	-	387.5	-	-	-
1273.0	-	-	-	388.0	-	-	-
1274.6	-	-	-	388.5	-	-	-

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 LOG #6**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1276.3	-	-	-
1277.9	-	-	-
1279.5	-	-	-
1281.2	-	-	-
1282.8	-	-	-
1284.5	-	-	-
1286.1	-	-	-
1287.7	-	-	-
1289.4	-	-	-
1291.0	-	-	-
1292.7	-	-	-
1294.3	-	-	-
1295.9	13070	21650	0.21
1297.6	13200	20330	0.14
1299.2	12230	21930	0.27
1300.9	11490	18520	0.19
1302.5	11020	19840	0.28
1304.1	11200	19380	0.25
1305.8	11300	19380	0.24
1307.4	11490	20330	0.26
1309.1	12700	20080	0.17
1310.7	11700	20580	0.26
1312.3	12230	20330	0.22
1314.0	10750	20080	0.30
1315.6	11800	17920	0.12
1317.3	11900	18940	0.17
1318.9	11900	18520	0.15
1320.5	11800	18320	0.15
1322.2	11700	20080	0.24
1323.8	11200	19840	0.27
1325.5	11490	20830	0.28
1327.1	11800	20580	0.26
1328.7	11700	18940	0.19
1330.4	12580	18940	0.11
1332.0	12940	19840	0.13
1333.7	12700	18730	0.07
1335.3	12350	19610	0.17
1336.9	12350	19160	0.14

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
389.0	-	-	-
389.5	-	-	-
390.0	-	-	-
390.5	-	-	-
391.0	-	-	-
391.5	-	-	-
392.0	-	-	-
392.5	-	-	-
393.0	-	-	-
393.5	-	-	-
394.0	-	-	-
394.5	-	-	-
395.0	3980	6600	0.21
395.5	4020	6200	0.14
396.0	3730	6680	0.27
396.5	3500	5640	0.19
397.0	3360	6050	0.28
397.5	3420	5910	0.25
398.0	3440	5910	0.24
398.5	3500	6200	0.26
399.0	3870	6120	0.17
399.5	3560	6270	0.26
400.0	3730	6200	0.22
400.5	3280	6120	0.30
401.0	3600	5460	0.12
401.5	3630	5770	0.17
402.0	3630	5640	0.15
402.5	3600	5580	0.15
403.0	3560	6120	0.24
403.5	3420	6050	0.27
404.0	3500	6350	0.28
404.5	3600	6270	0.26
405.0	3560	5770	0.19
405.5	3830	5770	0.11
406.0	3950	6050	0.13
406.5	3870	5710	0.07
407.0	3760	5980	0.17
407.5	3760	5840	0.14

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 LOG #6**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1338.6	11900	19160	0.19
1340.2	11700	20330	0.25
1342.2	11110	19380	0.26
1343.5	11170	22220	0.33
1345.1	11400	20330	0.27
1346.8	12120	20830	0.24
1348.4	11800	21930	0.30
1350.1	9880	20580	0.35
1351.7	11110	20330	0.29
1353.4	10930	20830	0.31
1355.0	11800	19380	0.21
1356.6	12460	19840	0.17
1358.3	8770	18730	0.36
1359.9	7170	17540	0.40
1361.6	10260	20830	0.34
1363.2	10580	21650	0.34
1364.8	10840	20580	0.31
1366.5	11800	20080	0.24
1368.1	8280	20080	0.40
1369.8	9460	17730	0.30
1371.4	7490	14120	0.30
1373.0	7210	12720	0.26
1374.7	6440	13890	0.36
1376.3	6440	14750	0.38
1378.0	8030	16180	0.34
1379.6	8390	17010	0.34
1381.2	8180	17010	0.35
1382.9	8660	16500	0.31
1384.5	8660	17920	0.35
1386.2	8710	17360	0.33
1387.8	8710	16500	0.31
1389.4	9130	16180	0.27
1391.1	9130	15870	0.25
1392.7	9010	17010	0.30
1394.4	8950	17360	0.32
1396.0	9130	18320	0.33
1397.6	9390	16670	0.27
1399.3	9070	18020	0.33

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
408.0	3630	5840	0.19
408.5	3560	6200	0.25
409.1	3390	5910	0.26
409.5	3400	6770	0.33
410.0	3470	6200	0.27
410.5	3690	6350	0.24
411.0	3600	6680	0.30
411.5	3010	6270	0.35
412.0	3390	6200	0.29
412.5	3330	6350	0.31
413.0	3600	5910	0.21
413.5	3800	6050	0.17
414.0	2670	5710	0.36
414.5	2180	5350	0.40
415.0	3130	6350	0.34
415.5	3230	6600	0.34
416.0	3300	6270	0.31
416.5	3600	6120	0.24
417.0	2520	6120	0.40
417.5	2880	5400	0.30
418.0	2280	4310	0.30
418.5	2200	3880	0.26
419.0	1960	4230	0.36
419.5	1960	4500	0.38
420.0	2450	4930	0.34
420.5	2560	5180	0.34
421.0	2490	5180	0.35
421.5	2640	5030	0.31
422.0	2640	5460	0.35
422.5	2660	5290	0.33
423.0	2660	5030	0.31
423.5	2780	4930	0.27
424.0	2780	4840	0.25
424.5	2750	5180	0.30
425.0	2730	5290	0.32
425.5	2780	5580	0.33
426.0	2860	5080	0.27
426.5	2760	5490	0.33

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole C4997 LOG #6**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1400.9	9320	18320	0.33
1402.6	9130	17360	0.31
1404.2	9660	18320	0.31
1405.8	10100	19160	0.31
1407.5	10840	19610	0.28
1409.1	9260	18730	0.34
1410.8	9130	18730	0.34
1412.4	9320	18120	0.32
1414.0	10100	18730	0.29
1415.7	9590	20580	0.36

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
427.0	2840	5580	0.33
427.5	2780	5290	0.31
428.0	2940	5580	0.31
428.5	3080	5840	0.31
429.0	3300	5980	0.28
429.5	2820	5710	0.34
430.0	2780	5710	0.34
430.5	2840	5520	0.32
431.0	3080	5710	0.29
431.5	2920	6270	0.36

Notes: "-" means no data available at that particular interval of depth.

APPENDIX A

**SUSPENSION VELOCITY MEASUREMENT
QUALITY ASSURANCE SUSPENSION SOURCE
TO RECEIVER ANALYSIS RESULTS**

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Hanford WTP Seismic Borehole C4993 - Log 1
Source to Receiver and Receiver to Receiver Analysis

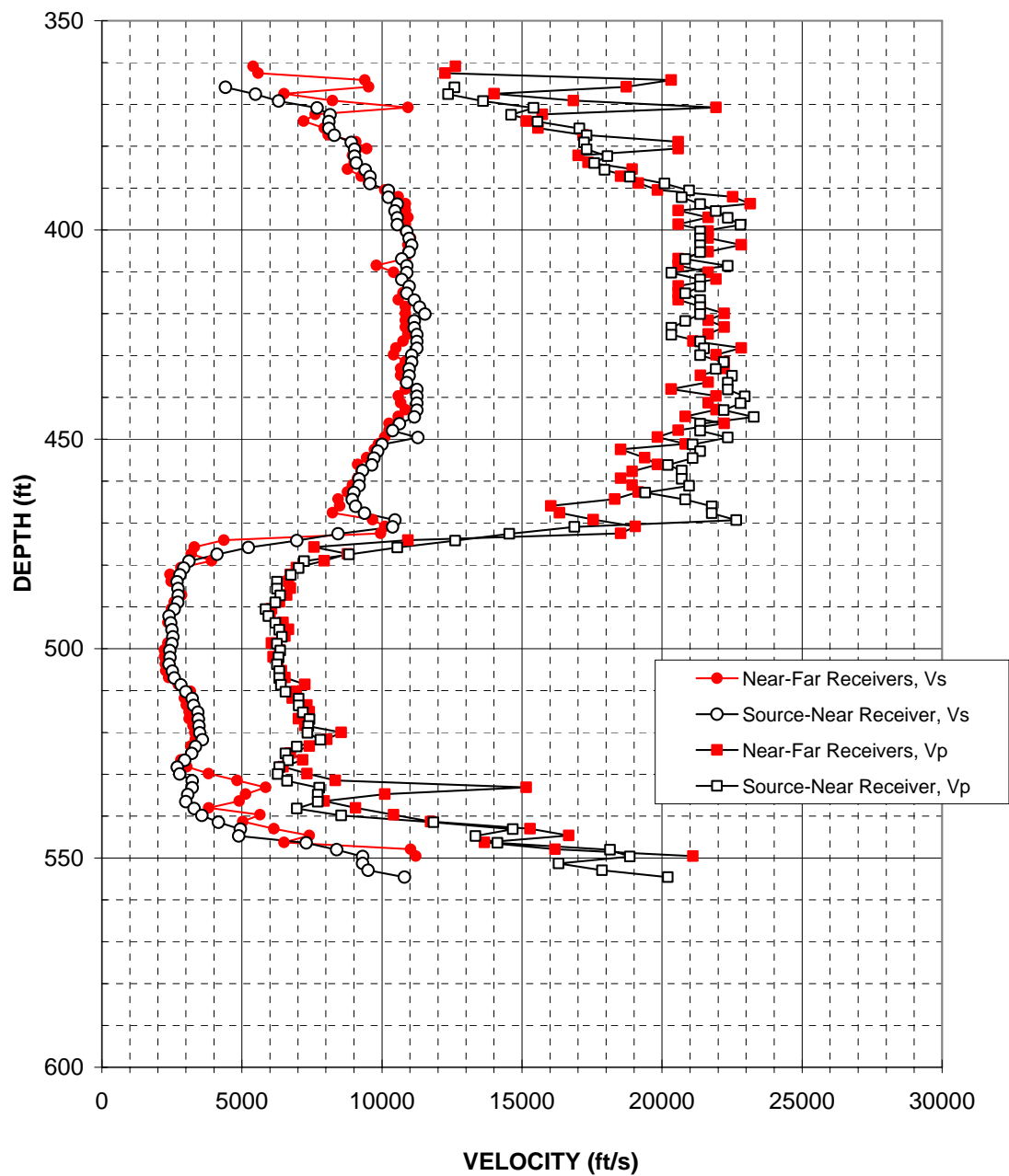


Figure A-1 Boring BH-C4993 Log 1, Suspension S-R1 P- and S_H -wave velocities

Table A-1 Boring BH-C4993 Log 1, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN #1**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
365.9	4410	12590	0.43
367.6	5490	12360	0.38
369.2	6310	13610	0.36
370.9	7690	15410	0.33
372.5	8150	14610	0.27
374.1	8100	15550	0.31
375.8	8100	17050	0.35
377.4	8300	17310	0.35
379.1	8910	17220	0.32
380.7	9020	17310	0.31
382.3	9020	18050	0.33
384.0	9080	17580	0.32
385.6	9400	17950	0.31
387.3	9570	18850	0.33
388.9	9570	20090	0.35
390.5	10230	20960	0.34
392.2	10230	20710	0.34
393.8	10550	21360	0.34
395.5	10470	21920	0.35
397.1	10550	22350	0.36
398.7	10550	22800	0.36
400.4	10890	21360	0.32
402.0	10980	21360	0.32
403.7	11070	21360	0.32
405.3	10980	21360	0.32
406.9	10710	20830	0.32
408.6	10890	22350	0.34
410.2	10890	20330	0.30
411.9	10710	21360	0.33
413.5	10980	21360	0.32
415.1	10890	20830	0.31
416.8	11160	21360	0.31
418.4	11340	21360	0.30
420.1	11540	21360	0.29
421.7	11160	20830	0.30

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
111.5	1340	3840	0.43
112.0	1670	3770	0.38
112.5	1920	4150	0.36
113.0	2340	4700	0.33
113.5	2480	4450	0.27
114.0	2470	4740	0.31
114.5	2470	5200	0.35
115.0	2530	5280	0.35
115.5	2710	5250	0.32
116.0	2750	5280	0.31
116.5	2750	5500	0.33
117.0	2770	5360	0.32
117.5	2870	5470	0.31
118.0	2920	5750	0.33
118.5	2920	6120	0.35
119.0	3120	6390	0.34
119.5	3120	6310	0.34
120.0	3210	6510	0.34
120.5	3190	6680	0.35
121.0	3210	6810	0.36
121.5	3210	6950	0.36
122.0	3320	6510	0.32
122.5	3350	6510	0.32
123.0	3370	6510	0.32
123.5	3350	6510	0.32
124.0	3270	6350	0.32
124.5	3320	6810	0.34
125.0	3320	6200	0.30
125.5	3270	6510	0.33
126.0	3350	6510	0.32
126.5	3320	6350	0.31
127.0	3400	6510	0.31
127.5	3460	6510	0.30
128.0	3520	6510	0.29
128.5	3400	6350	0.30

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN #1**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
423.4	11160	20330	0.28
425.0	11250	20330	0.28
426.6	11250	21360	0.31
428.3	11250	21500	0.31
429.9	11070	21360	0.32
431.6	11070	22200	0.33
433.2	10980	21920	0.33
434.8	10980	22500	0.34
436.5	10890	22350	0.34
438.1	11250	22350	0.33
439.8	11250	22960	0.34
441.4	11250	22800	0.34
443.0	11250	22200	0.33
444.7	11160	23280	0.35
446.3	10630	21360	0.34
448.0	10380	21360	0.35
449.6	11290	22350	0.33
451.2	10000	21090	0.36
452.9	9850	21360	0.36
454.5	9710	21090	0.37
456.2	9640	20210	0.35
457.5	9310	20710	0.37
459.4	9180	20710	0.38
461.1	9180	20960	0.38
462.7	9000	19400	0.36
464.4	8940	20830	0.39
466.0	9060	21770	0.40
467.6	9380	21770	0.39
469.3	10470	22650	0.36
470.9	10380	16880	0.20
472.6	8440	14550	0.25
474.2	6960	12620	0.28
475.8	5230	10550	0.34
477.5	4120	8820	0.36
479.1	3110	7220	0.39
480.8	2920	7030	0.40
482.4	2790	6750	0.40
484.0	2690	6250	0.39
485.7	2720	6250	0.38

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
129.0	3400	6200	0.28
129.5	3430	6200	0.28
130.0	3430	6510	0.31
130.5	3430	6550	0.31
131.0	3370	6510	0.32
131.5	3370	6770	0.33
132.0	3350	6680	0.33
132.5	3350	6860	0.34
133.0	3320	6810	0.34
133.5	3430	6810	0.33
134.0	3430	7000	0.34
134.5	3430	6950	0.34
135.0	3430	6770	0.33
135.5	3400	7090	0.35
136.0	3240	6510	0.34
136.5	3170	6510	0.35
137.0	3440	6810	0.33
137.5	3050	6430	0.36
138.0	3000	6510	0.36
138.5	2960	6430	0.37
139.0	2940	6160	0.35
139.4	2840	6310	0.37
140.0	2800	6310	0.38
140.5	2800	6390	0.38
141.0	2740	5910	0.36
141.5	2730	6350	0.39
142.0	2760	6640	0.40
142.5	2860	6640	0.39
143.0	3190	6900	0.36
143.5	3170	5140	0.20
144.0	2570	4430	0.25
144.5	2120	3850	0.28
145.0	1590	3210	0.34
145.5	1250	2690	0.36
146.0	950	2200	0.39
146.5	890	2140	0.40
147.0	850	2060	0.40
147.5	820	1910	0.39
148.0	830	1910	0.38

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN #1**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
487.3	2730	6370	0.39
489.0	2710	6190	0.38
490.6	2590	5840	0.38
492.2	2400	5950	0.40
493.9	2460	6190	0.41
495.5	2500	6340	0.41
497.2	2540	6430	0.41
498.8	2500	6250	0.40
500.5	2430	6370	0.41
502.1	2440	6310	0.41
503.7	2400	6250	0.41
505.4	2520	6340	0.41
507.0	2590	6340	0.40
508.7	2820	6400	0.38
510.3	3000	6550	0.37
511.9	3230	7030	0.37
513.6	3280	7030	0.36
515.2	3430	7180	0.35
516.9	3440	7420	0.36
518.5	3470	7380	0.36
520.1	3500	7340	0.35
521.8	3590	7800	0.37
523.4	3340	6960	0.35
525.1	3210	6550	0.34
526.7	2960	6650	0.38
528.3	2700	6340	0.39
530.0	2780	6280	0.38
531.6	3230	6620	0.34
533.3	3230	7760	0.40
534.9	3070	7710	0.41
536.5	3000	7710	0.41
538.2	3290	6960	0.36
539.8	3570	8540	0.39
541.5	4170	11840	0.43
543.1	4950	14670	0.44
544.7	4890	13340	0.42
546.4	7300	14120	0.32
548.0	8390	18150	0.36
549.7	9310	18850	0.34

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
148.5	830	1940	0.39
149.0	830	1890	0.38
149.5	790	1780	0.38
150.0	730	1810	0.40
150.5	750	1890	0.41
151.0	760	1930	0.41
151.5	770	1960	0.41
152.0	760	1910	0.40
152.5	740	1940	0.41
153.0	740	1920	0.41
153.5	730	1910	0.41
154.0	770	1930	0.41
154.5	790	1930	0.40
155.0	860	1950	0.38
155.5	910	2000	0.37
156.0	980	2140	0.37
156.5	1000	2140	0.36
157.0	1040	2190	0.35
157.5	1050	2260	0.36
158.0	1060	2250	0.36
158.5	1070	2240	0.35
159.0	1090	2380	0.37
159.5	1020	2120	0.35
160.0	980	2000	0.34
160.5	900	2030	0.38
161.0	820	1930	0.39
161.5	850	1910	0.38
162.0	980	2020	0.34
162.5	980	2360	0.40
163.0	940	2350	0.41
163.5	910	2350	0.41
164.0	1000	2120	0.36
164.5	1090	2600	0.39
165.0	1270	3610	0.43
165.5	1510	4470	0.44
166.0	1490	4070	0.42
166.5	2220	4300	0.32
167.0	2560	5530	0.36
167.5	2840	5750	0.34

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN #1**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
551.3	9310	16300	0.26
552.9	9510	17860	0.30
554.6	10800	20210	0.30

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
168.0	2840	4970	0.26
168.5	2900	5440	0.30
169.0	3290	6160	0.30

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4993 - Log 2 Source to Receiver and Receiver to Receiver Analysis

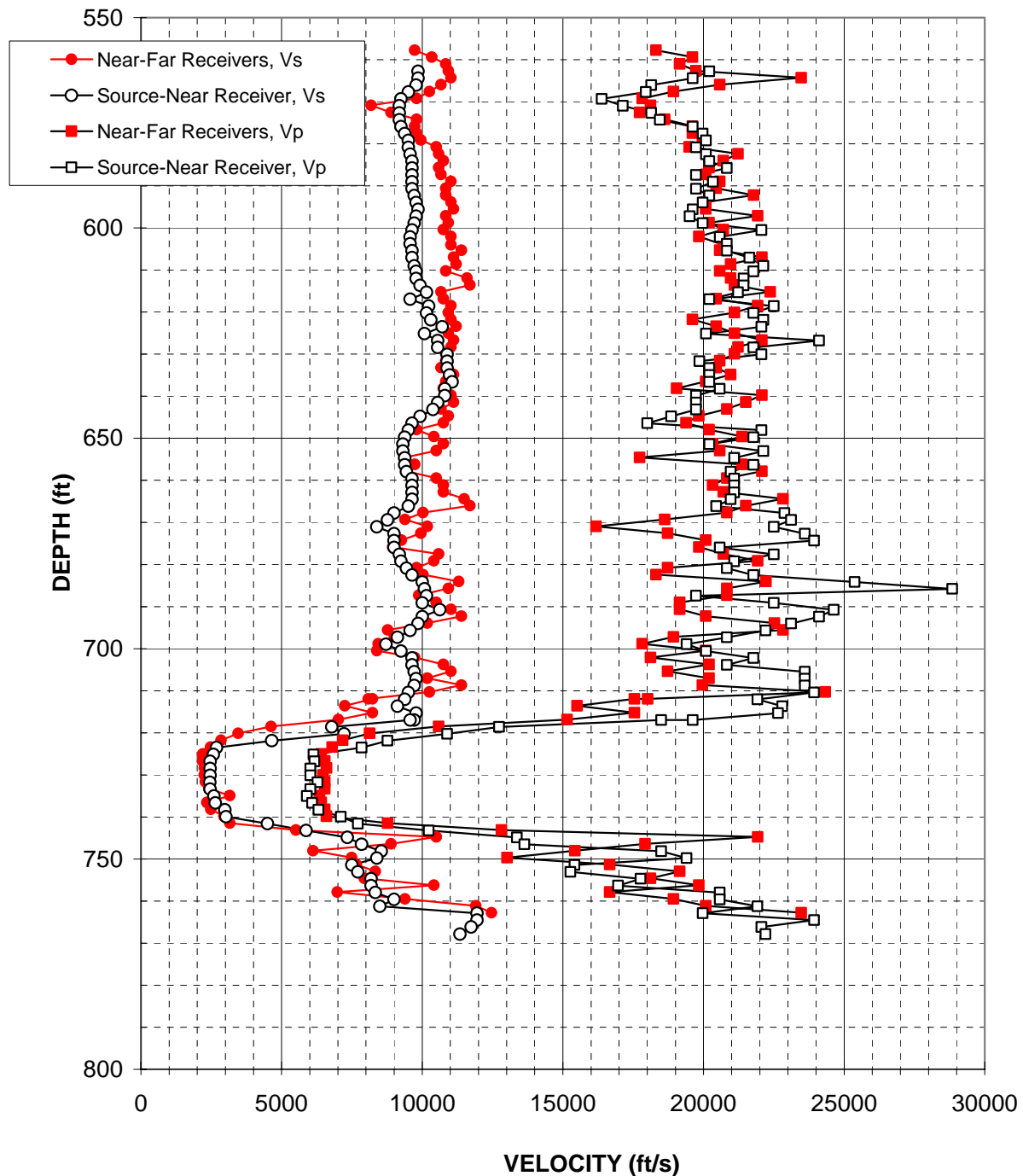


Figure A-2 Boring BH-C4993 Log 2, Suspension S-R1 P- and S_H -wave velocities

Table A-2 Boring BH-C4993 Log 2, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN #2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
562.8	9850	20210	0.34	171.5	3000	6160	0.34
564.4	9850	19620	0.33	172.0	3000	5980	0.33
566.1	9780	18150	0.30	172.5	2980	5530	0.30
567.7	9510	17950	0.31	173.0	2900	5470	0.31
569.3	9250	16380	0.27	173.5	2820	4990	0.27
571.0	9180	17130	0.30	174.0	2800	5220	0.30
572.6	9180	18150	0.33	174.5	2800	5530	0.33
574.3	9180	18440	0.34	175.0	2800	5620	0.34
575.9	9250	19620	0.36	175.5	2820	5980	0.36
577.6	9380	19970	0.36	176.0	2860	6090	0.36
579.2	9510	20090	0.36	176.5	2900	6120	0.36
580.8	9510	19740	0.35	177.0	2900	6020	0.35
582.5	9570	20090	0.35	177.5	2920	6120	0.35
584.1	9640	20210	0.35	178.0	2940	6160	0.35
585.8	9640	20830	0.36	178.5	2940	6350	0.36
587.4	9640	19740	0.34	179.0	2940	6020	0.34
589.0	9640	20330	0.35	179.5	2940	6200	0.35
590.7	9640	19740	0.34	180.0	2940	6020	0.34
592.3	9710	20210	0.35	180.5	2960	6160	0.35
594.0	9780	19970	0.34	181.0	2980	6090	0.34
595.6	9850	19620	0.33	181.5	3000	5980	0.33
597.2	9780	19510	0.33	182.0	2980	5950	0.33
598.9	9710	19970	0.35	182.5	2960	6090	0.35
600.5	9640	22060	0.38	183.0	2940	6720	0.38
602.2	9570	20580	0.36	183.5	2920	6270	0.36
603.8	9570	20830	0.37	184.0	2920	6350	0.37
605.4	9640	20830	0.36	184.5	2940	6350	0.36
607.1	9640	21630	0.38	185.0	2940	6590	0.38
609.0	9710	22130	0.38	185.6	2960	6750	0.38
610.4	9780	21770	0.37	186.0	2980	6640	0.37
612.0	9780	21430	0.37	186.5	2980	6530	0.37
613.6	9930	21430	0.36	187.0	3030	6530	0.36
615.3	10150	21230	0.35	187.5	3090	6470	0.35
616.9	9570	20210	0.36	188.0	2920	6160	0.36
618.6	10230	22500	0.37	188.5	3120	6860	0.37

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN #2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
620.2	10150	21770	0.36	189.0	3090	6640	0.36
621.8	10310	22130	0.36	189.5	3140	6750	0.36
623.5	10710	22060	0.35	190.0	3270	6720	0.35
625.1	10070	20090	0.33	190.5	3070	6120	0.33
626.8	10550	24110	0.38	191.0	3210	7350	0.38
628.4	10550	21770	0.35	191.5	3210	6640	0.35
630.0	10890	22060	0.34	192.0	3320	6720	0.34
631.7	10890	19850	0.28	192.5	3320	6050	0.28
633.3	10890	20210	0.30	193.0	3320	6160	0.30
635.0	10980	20210	0.29	193.5	3350	6160	0.29
636.6	11070	20210	0.29	194.0	3370	6160	0.29
638.2	10800	20580	0.31	194.5	3290	6270	0.31
639.9	10800	19740	0.29	195.0	3290	6020	0.29
641.5	10550	19740	0.30	195.5	3210	6020	0.30
643.2	10380	19740	0.31	196.0	3170	6020	0.31
644.8	9930	18850	0.31	196.5	3030	5750	0.31
646.4	9640	18000	0.30	197.0	2940	5490	0.30
648.1	9510	22060	0.39	197.5	2900	6720	0.39
649.7	9380	21770	0.39	198.0	2860	6640	0.39
651.4	9310	20210	0.37	198.5	2840	6160	0.37
653.0	9310	22130	0.39	199.0	2840	6750	0.39
654.7	9380	21090	0.38	199.5	2860	6430	0.38
656.3	9380	21770	0.39	200.0	2860	6640	0.39
657.9	9440	20960	0.37	200.5	2880	6390	0.37
659.6	9640	21090	0.37	201.0	2940	6430	0.37
661.2	9640	21090	0.37	201.5	2940	6430	0.37
662.9	9640	21090	0.37	202.0	2940	6430	0.37
664.5	9640	20960	0.37	202.5	2940	6390	0.37
666.1	9510	20450	0.36	203.0	2900	6230	0.36
667.8	9000	22880	0.41	203.5	2740	6970	0.41
669.4	8770	23120	0.42	204.0	2670	7050	0.42
671.1	8390	22500	0.42	204.5	2560	6860	0.42
672.7	9000	23600	0.41	205.0	2740	7190	0.41
674.3	9000	23940	0.42	205.5	2740	7300	0.42
676.0	9000	20580	0.38	206.0	2740	6270	0.38
677.6	9180	22500	0.40	206.5	2800	6860	0.40
679.3	9250	21090	0.38	207.0	2820	6430	0.38
680.9	9440	20830	0.37	207.5	2880	6350	0.37
682.5	9640	21770	0.38	208.0	2940	6640	0.38

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN #2**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
684.2	10000	25380	0.41
685.8	10070	28850	0.43
687.5	10150	19740	0.32
689.1	10000	22500	0.38
690.7	10630	24640	0.39
692.4	10000	24110	0.40
694.0	9850	23120	0.39
695.7	9570	22200	0.39
697.3	9120	20830	0.38
698.9	8710	19400	0.37
700.6	9250	20090	0.37
702.2	9640	21770	0.38
703.9	9640	20830	0.36
705.5	9710	23600	0.40
707.1	9780	23600	0.40
708.8	9710	23600	0.40
710.4	9510	23940	0.41
712.1	9380	21920	0.39
713.7	9120	22800	0.40
715.3	9780	22650	0.39
717.0	9710	19620	0.34
717.0	9570	18490	0.32
718.6	6780	12740	0.30
720.3	7220	10890	0.11
721.9	4660	8770	0.30
723.5	2690	7850	0.43
725.2	2580	6140	0.39
726.8	2460	6160	0.40
728.5	2460	6030	0.40
730.1	2460	6030	0.40
731.8	2450	6280	0.41
733.4	2460	6030	0.40
735.0	2600	5900	0.38
736.7	2650	6080	0.38
738.3	2990	6310	0.36
740.0	3030	7110	0.39
741.6	4500	7710	0.24
743.2	5870	10230	0.25
744.9	7340	13370	0.28

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
208.5	3050	7730	0.41
209.0	3070	8790	0.43
209.5	3090	6020	0.32
210.0	3050	6860	0.38
210.5	3240	7510	0.39
211.0	3050	7350	0.40
211.5	3000	7050	0.39
212.0	2920	6770	0.39
212.5	2780	6350	0.38
213.0	2650	5910	0.37
213.5	2820	6120	0.37
214.0	2940	6640	0.38
214.5	2940	6350	0.36
215.0	2960	7190	0.40
215.5	2980	7190	0.40
216.0	2960	7190	0.40
216.5	2900	7300	0.41
217.0	2860	6680	0.39
217.5	2780	6950	0.40
218.0	2980	6900	0.39
218.5	2960	5980	0.34
218.5	2920	5640	0.32
219.0	2070	3880	0.30
219.5	2200	3320	0.11
220.0	1420	2670	0.30
220.5	820	2390	0.43
221.0	790	1870	0.39
221.5	750	1880	0.40
222.0	750	1840	0.40
222.5	750	1840	0.40
223.0	750	1910	0.41
223.5	750	1840	0.40
224.0	790	1800	0.38
224.5	810	1850	0.38
225.0	910	1920	0.36
225.5	920	2170	0.39
226.0	1370	2350	0.24
226.5	1790	3120	0.25
227.0	2240	4070	0.28

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN #2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
746.5	7850	13640	0.25	227.5	2390	4160	0.25
748.2	8540	18490	0.36	228.0	2600	5640	0.36
749.8	8390	19400	0.39	228.5	2560	5910	0.39
751.4	7500	15410	0.34	229.0	2290	4700	0.34
753.1	7710	15270	0.33	229.5	2350	4650	0.33
754.7	8180	17760	0.37	230.0	2490	5410	0.37
756.4	8180	16960	0.35	230.5	2490	5170	0.35
758.0	8330	20580	0.40	231.0	2540	6270	0.40
759.6	9000	20580	0.38	231.5	2740	6270	0.38
761.3	8490	21920	0.41	232.0	2590	6680	0.41
762.9	11950	19970	0.22	232.5	3640	6090	0.22
764.6	11950	23940	0.33	233.0	3640	7300	0.33
766.2	11740	22060	0.30	233.5	3580	6720	0.30
767.8	11340	22200	0.32	234.0	3460	6770	0.32

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4993 - Log 3
Source to Receiver and Receiver to Receiver Analysis

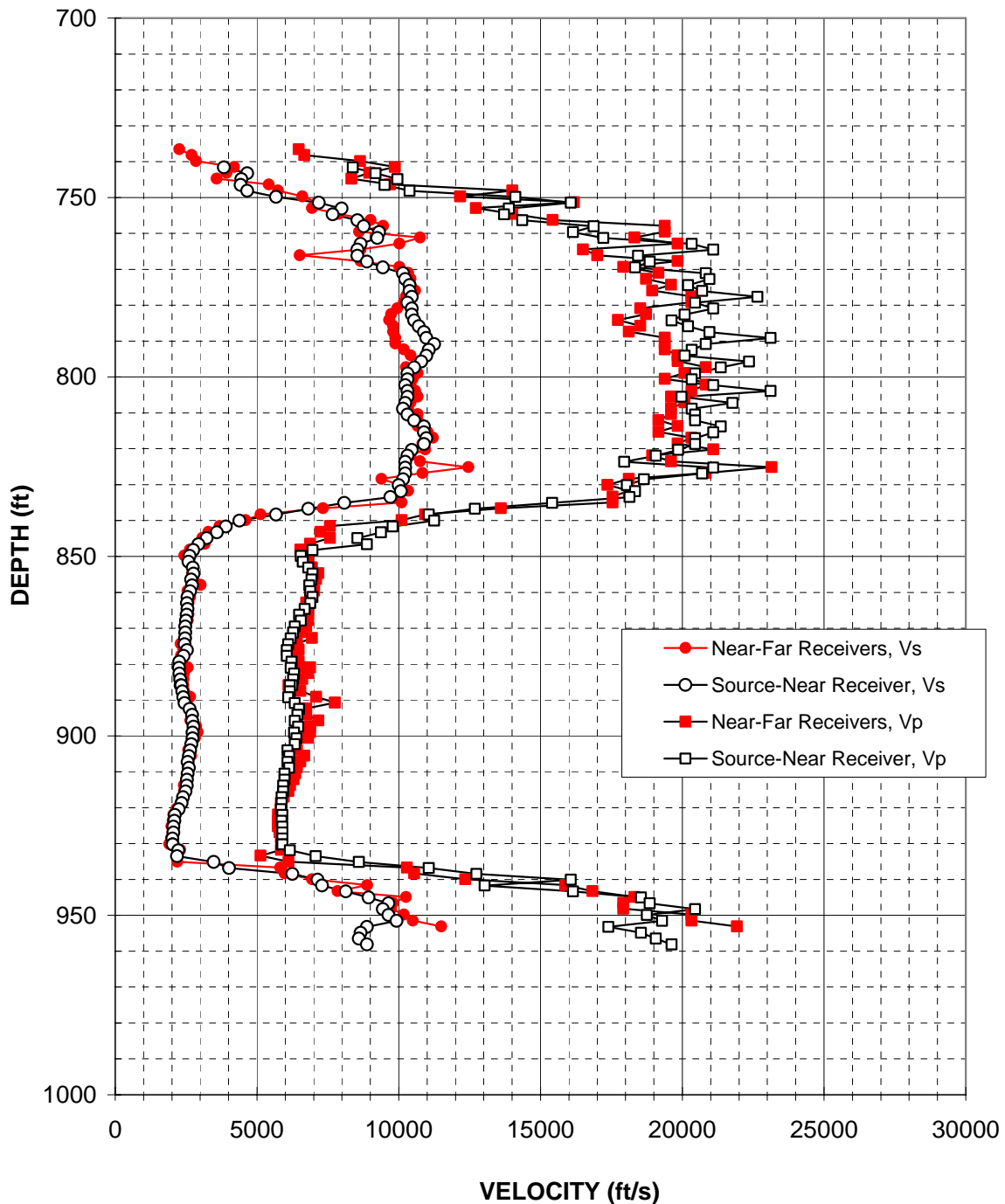


Figure A-3 Boring BH-C4993 Log 3, Suspension S-R1 P- and S_H -wave velocities

Table A-3 Boring BH-C4993 Log 3, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 LOG#3**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
741.6	3840	8390	0.37	226.0	1170	2560	0.37
743.2	4660	9180	0.33	226.5	1420	2800	0.33
744.9	4460	9960	0.37	227.0	1360	3030	0.37
746.5	4430	9510	0.36	227.5	1350	2900	0.36
748.2	4660	10380	0.37	228.0	1420	3170	0.37
749.8	5670	14120	0.40	228.5	1730	4300	0.40
751.4	7180	16070	0.38	229.0	2190	4900	0.38
753.1	7990	13890	0.25	229.5	2430	4230	0.25
754.7	7670	13720	0.27	230.0	2340	4180	0.27
756.4	8540	14360	0.23	230.5	2600	4380	0.23
758.0	8770	16880	0.32	231.0	2670	5140	0.32
759.6	9310	16150	0.25	231.5	2840	4920	0.25
761.3	9250	17220	0.30	232.0	2820	5250	0.30
762.9	8650	20330	0.39	232.5	2640	6200	0.39
764.6	8540	21090	0.40	233.0	2600	6430	0.40
766.2	8540	18440	0.36	233.5	2600	5620	0.36
767.8	8880	18850	0.36	234.0	2710	5750	0.36
769.5	9440	18340	0.32	234.5	2880	5590	0.32
771.1	10150	20830	0.34	235.0	3090	6350	0.34
772.8	10230	20960	0.34	235.5	3120	6390	0.34
774.4	10380	20210	0.32	236.0	3170	6160	0.32
776.0	10380	20710	0.33	236.5	3170	6310	0.33
777.7	10470	22650	0.36	237.0	3190	6900	0.36
779.3	10310	20450	0.33	237.5	3140	6230	0.33
781.0	10470	21090	0.34	238.0	3190	6430	0.34
782.6	10470	20090	0.31	238.5	3190	6120	0.31
784.2	10550	19620	0.30	239.0	3210	5980	0.30
785.9	10710	20210	0.30	239.5	3270	6160	0.30
787.5	10890	20960	0.32	240.0	3320	6390	0.32
789.2	10980	23120	0.35	240.5	3350	7050	0.35
790.8	11250	20830	0.29	241.0	3430	6350	0.29
792.4	11070	20330	0.29	241.5	3370	6200	0.29
794.1	10980	20090	0.29	242.0	3350	6120	0.29

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 LOG#3**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
795.7	10800	22350	0.35
797.4	10550	21360	0.34
799.0	10310	20450	0.33
800.6	10310	20330	0.33
802.3	10230	21090	0.35
803.9	10310	23120	0.38
805.6	10310	19970	0.32
807.2	10230	21770	0.36
808.9	10150	20330	0.33
810.5	10310	20450	0.33
812.1	10550	20450	0.32
813.8	10890	21360	0.32
815.4	10890	21090	0.32
817.1	10980	20450	0.30
818.7	10890	20450	0.30
820.3	10470	19850	0.31
822.0	10310	19070	0.29
823.6	10230	17950	0.26
825.3	10230	21090	0.35
826.9	10230	20710	0.34
828.5	10150	18650	0.29
830.2	10000	18050	0.28
831.8	10070	18340	0.28
833.5	9710	18150	0.30
835.1	8080	15410	0.31
836.7	6820	12690	0.30
838.4	5670	11070	0.32
840.0	4380	11250	0.41
841.7	3900	9780	0.41
843.3	3590	9370	0.41
844.9	3230	8540	0.42
846.6	2930	8880	0.44
848.2	2760	6960	0.41
849.9	2630	6550	0.40
851.5	2590	6620	0.41
853.1	2740	6820	0.40
854.8	2770	6960	0.41
856.4	2680	6920	0.41

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
242.5	3290	6810	0.35
243.0	3210	6510	0.34
243.5	3140	6230	0.33
244.0	3140	6200	0.33
244.5	3120	6430	0.35
245.0	3140	7050	0.38
245.5	3140	6090	0.32
246.0	3120	6640	0.36
246.5	3090	6200	0.33
247.0	3140	6230	0.33
247.5	3210	6230	0.32
248.0	3320	6510	0.32
248.5	3320	6430	0.32
249.0	3350	6230	0.30
249.5	3320	6230	0.30
250.0	3190	6050	0.31
250.5	3140	5810	0.29
251.0	3120	5470	0.26
251.5	3120	6430	0.35
252.0	3120	6310	0.34
252.5	3090	5680	0.29
253.0	3050	5500	0.28
253.5	3070	5590	0.28
254.0	2960	5530	0.30
254.5	2460	4700	0.31
255.0	2080	3870	0.30
255.5	1730	3370	0.32
256.0	1340	3430	0.41
256.5	1190	2980	0.41
257.0	1090	2860	0.41
257.5	980	2600	0.42
258.0	890	2710	0.44
258.5	840	2120	0.41
259.0	800	2000	0.40
259.5	790	2020	0.41
260.0	840	2080	0.40
260.5	840	2120	0.41
261.0	820	2110	0.41

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 LOG#3**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
858.1	2710	6850	0.41
859.7	2650	6890	0.41
861.3	2550	6960	0.42
863.0	2540	6890	0.42
864.6	2550	6680	0.42
866.3	2530	6490	0.41
867.9	2500	6550	0.41
869.5	2470	6340	0.41
871.2	2470	6280	0.41
872.8	2460	6190	0.41
874.5	2450	6110	0.40
876.1	2540	6050	0.39
877.7	2410	6050	0.41
879.4	2260	6220	0.42
881.0	2250	6190	0.42
882.7	2270	6310	0.43
884.3	2300	6280	0.42
886.0	2310	6250	0.42
886.0	2340	6160	0.42
887.6	2370	6160	0.41
889.2	2400	6110	0.41
890.9	2450	6340	0.41
892.5	2630	6490	0.40
894.2	2710	6430	0.39
895.8	2720	6340	0.39
897.4	2770	6460	0.39
899.1	2730	6310	0.38
900.7	2730	6400	0.39
902.4	2690	6340	0.39
904.0	2650	6080	0.38
905.6	2610	6140	0.39
907.3	2560	6080	0.39
908.9	2610	6140	0.39
910.6	2560	5970	0.39
912.2	2540	5970	0.39
913.8	2530	5920	0.39
915.5	2480	5920	0.39
917.1	2390	5870	0.40

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
261.5	830	2090	0.41
262.0	810	2100	0.41
262.5	780	2120	0.42
263.0	770	2100	0.42
263.5	780	2040	0.42
264.0	770	1980	0.41
264.5	760	2000	0.41
265.0	750	1930	0.41
265.5	750	1910	0.41
266.0	750	1890	0.41
266.5	750	1860	0.40
267.0	770	1850	0.39
267.5	730	1850	0.41
268.0	690	1900	0.42
268.5	690	1890	0.42
269.0	690	1920	0.43
269.5	700	1910	0.42
270.0	700	1910	0.42
270.0	710	1880	0.42
270.5	720	1880	0.41
271.0	730	1860	0.41
271.5	750	1930	0.41
272.0	800	1980	0.40
272.5	830	1960	0.39
273.0	830	1930	0.39
273.5	840	1970	0.39
274.0	830	1920	0.38
274.5	830	1950	0.39
275.0	820	1930	0.39
275.5	810	1850	0.38
276.0	790	1870	0.39
276.5	780	1850	0.39
277.0	790	1870	0.39
277.5	780	1820	0.39
278.0	770	1820	0.39
278.5	770	1800	0.39
279.0	760	1800	0.39
279.5	730	1790	0.40

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 LOG#3**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
918.8	2340	5870	0.41
920.4	2240	5840	0.41
922.0	2110	5900	0.43
923.7	2090	5870	0.43
925.3	2060	5900	0.43
927.0	2050	5900	0.43
928.6	2020	5900	0.43
930.2	2030	5870	0.43
930.2	2030	5900	0.43
931.9	2230	6160	0.42
933.5	2180	7070	0.45
935.2	3480	8600	0.40
936.8	4020	11070	0.42
938.4	6250	12740	0.34
940.1	7140	16070	0.38
941.7	7300	13030	0.27
943.4	8130	16150	0.33
945.0	8940	18540	0.35
946.6	9640	18850	0.32
948.3	9440	20450	0.36
949.9	9640	18750	0.32
951.6	9930	19290	0.32
953.2	8880	17400	0.32
954.8	8650	18540	0.36
956.5	8600	19070	0.37
958.1	8880	19620	0.37

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
280.0	710	1790	0.41
280.5	680	1780	0.41
281.0	640	1800	0.43
281.5	640	1790	0.43
282.0	630	1800	0.43
282.5	630	1800	0.43
283.0	620	1800	0.43
283.5	620	1790	0.43
283.5	620	1800	0.43
284.0	680	1880	0.42
284.5	670	2150	0.45
285.0	1060	2620	0.40
285.5	1220	3370	0.42
286.0	1910	3880	0.34
286.5	2180	4900	0.38
287.0	2220	3970	0.27
287.5	2480	4920	0.33
288.0	2730	5650	0.35
288.5	2940	5750	0.32
289.0	2880	6230	0.36
289.5	2940	5710	0.32
290.0	3030	5880	0.32
290.5	2710	5300	0.32
291.0	2640	5650	0.36
291.5	2620	5810	0.37
292.0	2710	5980	0.37

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4993 - Log 4A
Source to Receiver and Receiver to Receiver Analysis

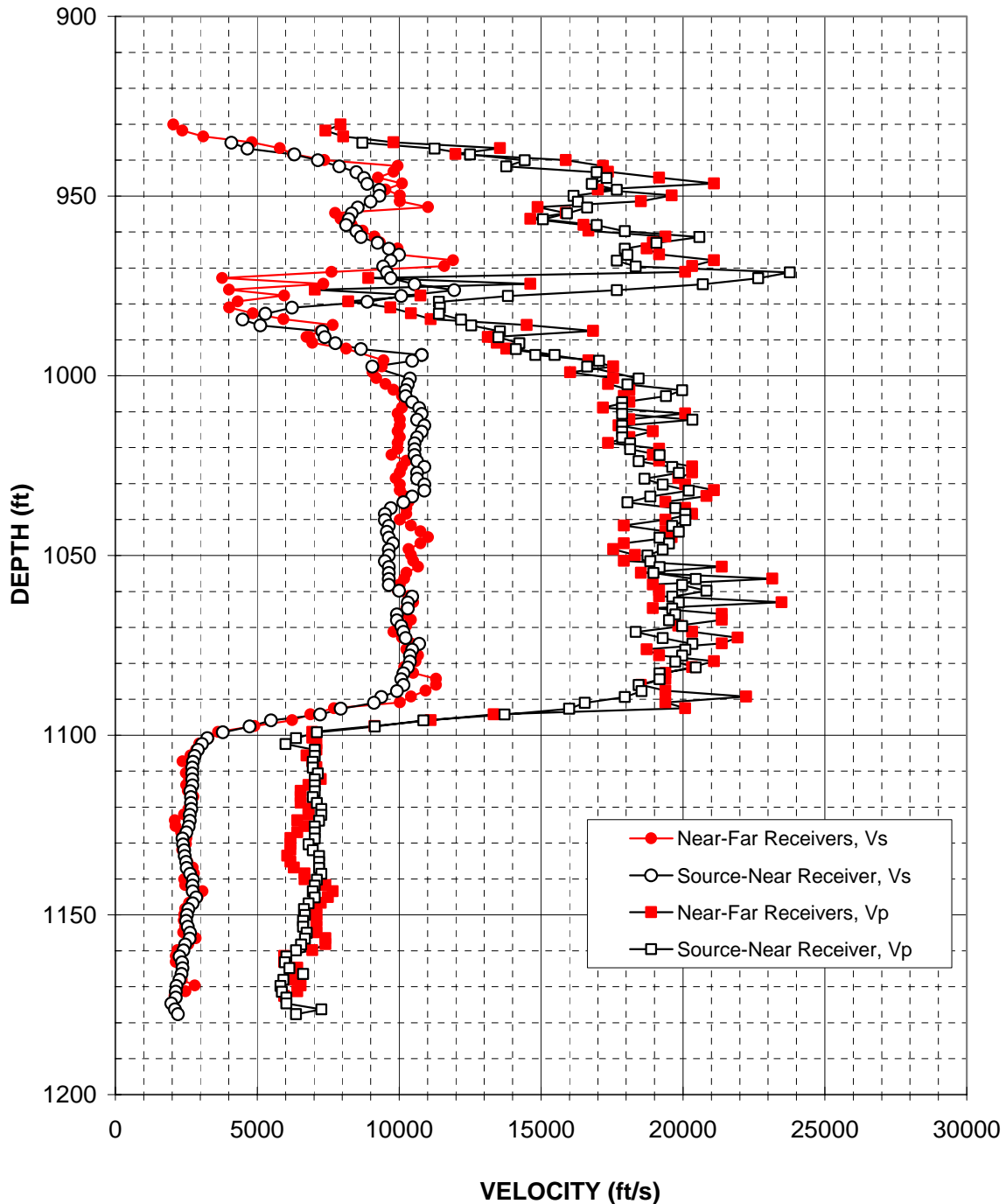


Figure A-4 Boring BH-C4993 Log 4A, Suspension S-R1 P- and S_H -wave velocities

Table A-4 Boring BH-C4993 Log 4A, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN#4 LOGGED BY J DIEHL**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
935.2	4090	8710	0.36	285.0	1250	2650	0.36
936.8	4660	11250	0.40	285.5	1420	3430	0.40
938.4	6310	12500	0.33	286.0	1920	3810	0.33
940.1	7140	14420	0.34	286.5	2180	4400	0.34
941.7	7890	13780	0.26	287.0	2410	4200	0.26
943.4	8490	16960	0.33	287.5	2590	5170	0.33
945.0	8770	17310	0.33	288.0	2670	5280	0.33
946.6	8880	16790	0.31	288.5	2710	5120	0.31
948.3	9310	17670	0.31	289.0	2840	5390	0.31
949.9	9310	16150	0.25	289.5	2840	4920	0.25
951.6	9000	16300	0.28	290.0	2740	4970	0.28
953.2	8540	16630	0.32	290.5	2600	5070	0.32
954.8	8330	15920	0.31	291.0	2540	4850	0.31
956.5	8230	15070	0.29	291.5	2510	4590	0.29
958.1	8130	16960	0.35	292.0	2480	5170	0.35
959.8	8490	17950	0.36	292.5	2590	5470	0.36
961.4	8650	20580	0.39	293.0	2640	6270	0.39
963.1	9250	19070	0.35	293.5	2820	5810	0.35
964.7	9640	17950	0.30	294.0	2940	5470	0.30
966.3	10000	18050	0.28	294.5	3050	5500	0.28
968.0	9710	17670	0.28	295.0	2960	5390	0.28
969.6	9440	18340	0.32	295.5	2880	5590	0.32
971.3	9570	23770	0.40	296.0	2920	7240	0.40
972.9	9710	22650	0.39	296.5	2960	6900	0.39
974.5	10550	20710	0.32	297.0	3210	6310	0.32
976.2	11950	17670	0.08	297.5	3640	5390	0.08
977.8	10070	13830	-0.06	298.0	3070	4220	-0.06
979.5	8880	11400	-0.27	298.5	2710	3480	-0.27
981.1	6220	11440	0.29	299.0	1900	3490	0.29
982.7	5290	11400	0.36	299.5	1610	3480	0.36
984.4	4490	12180	0.42	300.0	1370	3710	0.42
986.0	5110	12550	0.40	300.5	1560	3820	0.40
987.7	7300	13550	0.30	301.0	2220	4130	0.30
989.3	7380	13500	0.29	301.5	2250	4110	0.29
990.9	7760	14240	0.29	302.0	2360	4340	0.29

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN#4 LOGGED BY J DIEHL**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
992.6	8650	14120	0.20
994.2	10800	15480	0.03
994.2	10800	14800	-0.07
995.9	10470	17050	0.20
997.5	9060	16630	0.29
1000.8	10380	18440	0.27
1002.4	10310	18050	0.26
1004.1	10230	19970	0.32
1005.7	10230	19400	0.31
1007.3	10470	17860	0.24
1009.0	10710	17860	0.22
1010.6	10800	17860	0.21
1012.3	10630	20330	0.31
1013.9	10890	17860	0.20
1015.5	10800	17860	0.21
1017.2	10630	17860	0.23
1018.8	10550	18150	0.24
1020.5	10550	18150	0.24
1022.1	10550	19180	0.28
1023.7	10630	18440	0.25
1025.4	10890	19620	0.28
1027.0	10630	19850	0.30
1028.7	10630	18650	0.26
1030.3	10890	19290	0.27
1031.9	10890	20210	0.30
1033.6	10470	18850	0.28
1035.2	10150	18050	0.27
1036.9	9710	19740	0.34
1038.5	9510	20090	0.36
1040.1	9510	20090	0.36
1041.8	9640	19620	0.34
1043.4	9570	19850	0.35
1045.1	9640	19180	0.33
1046.7	9780	19510	0.33
1048.4	9640	19290	0.33
1050.0	9640	18750	0.32
1051.6	9510	18850	0.33
1053.3	9640	19180	0.33

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
302.5	2640	4300	0.20
303.0	3290	4720	0.03
303.0	3290	4510	-0.07
303.5	3190	5200	0.20
304.0	2760	5070	0.29
305.0	3170	5620	0.27
305.5	3140	5500	0.26
306.0	3120	6090	0.32
306.5	3120	5910	0.31
307.0	3190	5440	0.24
307.5	3270	5440	0.22
308.0	3290	5440	0.21
308.5	3240	6200	0.31
309.0	3320	5440	0.20
309.5	3290	5440	0.21
310.0	3240	5440	0.23
310.5	3210	5530	0.24
311.0	3210	5530	0.24
311.5	3210	5840	0.28
312.0	3240	5620	0.25
312.5	3320	5980	0.28
313.0	3240	6050	0.30
313.5	3240	5680	0.26
314.0	3320	5880	0.27
314.5	3320	6160	0.30
315.0	3190	5750	0.28
315.5	3090	5500	0.27
316.0	2960	6020	0.34
316.5	2900	6120	0.36
317.0	2900	6120	0.36
317.5	2940	5980	0.34
318.0	2920	6050	0.35
318.5	2940	5840	0.33
319.0	2980	5950	0.33
319.5	2940	5880	0.33
320.0	2940	5710	0.32
320.5	2900	5750	0.33
321.0	2940	5840	0.33

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN#4 LOGGED BY J DIEHL**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1054.9	9640	18960	0.33
1056.6	9640	20450	0.36
1058.2	9640	19970	0.35
1059.8	10000	20830	0.35
1061.5	10470	19620	0.30
1063.1	10310	19850	0.32
1064.8	10310	19620	0.31
1066.4	9930	19740	0.33
1068.0	9930	19510	0.33
1069.7	10070	19970	0.33
1071.3	10150	18340	0.28
1073.0	10230	19290	0.30
1074.6	10710	20330	0.31
1076.2	10470	20090	0.31
1077.9	10380	19970	0.31
1079.5	10380	19740	0.31
1081.2	10310	20450	0.33
1082.8	10150	19180	0.31
1084.4	10070	19180	0.31
1086.1	10150	18440	0.28
1087.7	9930	18540	0.30
1089.4	9370	17950	0.31
1091.0	9120	16540	0.28
1092.6	7940	16000	0.34
1094.3	7220	13720	0.31
1095.9	5490	10850	0.33
1097.6	4740	9150	0.32
1099.2	3790	7110	0.30
1100.8	3250	6370	0.32
1102.5	3050	6000	0.33
1104.1	2910	7030	0.40
1105.8	2800	7030	0.41
1107.4	2740	6960	0.41
1109.0	2710	6960	0.41
1110.7	2710	7140	0.42
1112.3	2710	7030	0.41
1114.0	2720	7030	0.41
1115.6	2650	7030	0.42

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
321.5	2940	5780	0.33
322.0	2940	6230	0.36
322.5	2940	6090	0.35
323.0	3050	6350	0.35
323.5	3190	5980	0.30
324.0	3140	6050	0.32
324.5	3140	5980	0.31
325.0	3030	6020	0.33
325.5	3030	5950	0.33
326.0	3070	6090	0.33
326.5	3090	5590	0.28
327.0	3120	5880	0.30
327.5	3270	6200	0.31
328.0	3190	6120	0.31
328.5	3170	6090	0.31
329.0	3170	6020	0.31
329.5	3140	6230	0.33
330.0	3090	5840	0.31
330.5	3070	5840	0.31
331.0	3090	5620	0.28
331.5	3030	5650	0.30
332.0	2860	5470	0.31
332.5	2780	5040	0.28
333.0	2420	4880	0.34
333.5	2200	4180	0.31
334.0	1670	3310	0.33
334.5	1440	2790	0.32
335.0	1160	2170	0.30
335.5	990	1940	0.32
336.0	930	1830	0.33
336.5	890	2140	0.40
337.0	850	2140	0.41
337.5	840	2120	0.41
338.0	830	2120	0.41
338.5	830	2180	0.42
339.0	830	2140	0.41
339.5	830	2140	0.41
340.0	810	2140	0.42

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN#4 LOGGED BY J DIEHL**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1117.2	2670	6960	0.41
1118.9	2670	7110	0.42
1120.5	2680	7260	0.42
1122.2	2630	7260	0.42
1123.8	2630	7180	0.42
1125.5	2590	7030	0.42
1127.1	2510	7030	0.43
1128.7	2370	7030	0.44
1130.4	2390	6820	0.43
1132.0	2430	6960	0.43
1133.7	2450	7180	0.43
1135.3	2500	7180	0.43
1136.9	2520	7180	0.43
1138.6	2640	7260	0.42
1140.2	2740	7110	0.41
1141.9	2720	7030	0.41
1143.5	2730	6960	0.41
1145.1	2850	7030	0.40
1146.8	2730	6820	0.40
1148.4	2580	6650	0.41
1150.1	2530	6680	0.42
1151.7	2500	6620	0.42
1153.3	2560	6620	0.41
1155.0	2640	6750	0.41

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
340.5	810	2120	0.41
341.0	810	2170	0.42
341.5	820	2210	0.42
342.0	800	2210	0.42
342.5	800	2190	0.42
343.0	790	2140	0.42
343.5	760	2140	0.43
344.0	720	2140	0.44
344.5	730	2080	0.43
345.0	740	2120	0.43
345.5	750	2190	0.43
346.0	760	2190	0.43
346.5	770	2190	0.43
347.0	800	2210	0.42
347.5	840	2170	0.41
348.0	830	2140	0.41
348.5	830	2120	0.41
349.0	870	2140	0.40
349.5	830	2080	0.40
350.0	790	2030	0.41
350.5	770	2040	0.42
351.0	760	2020	0.42
351.5	780	2020	0.41
352.0	800	2060	0.41

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4993 - Log 4B Source to Receiver and Receiver to Receiver Analysis

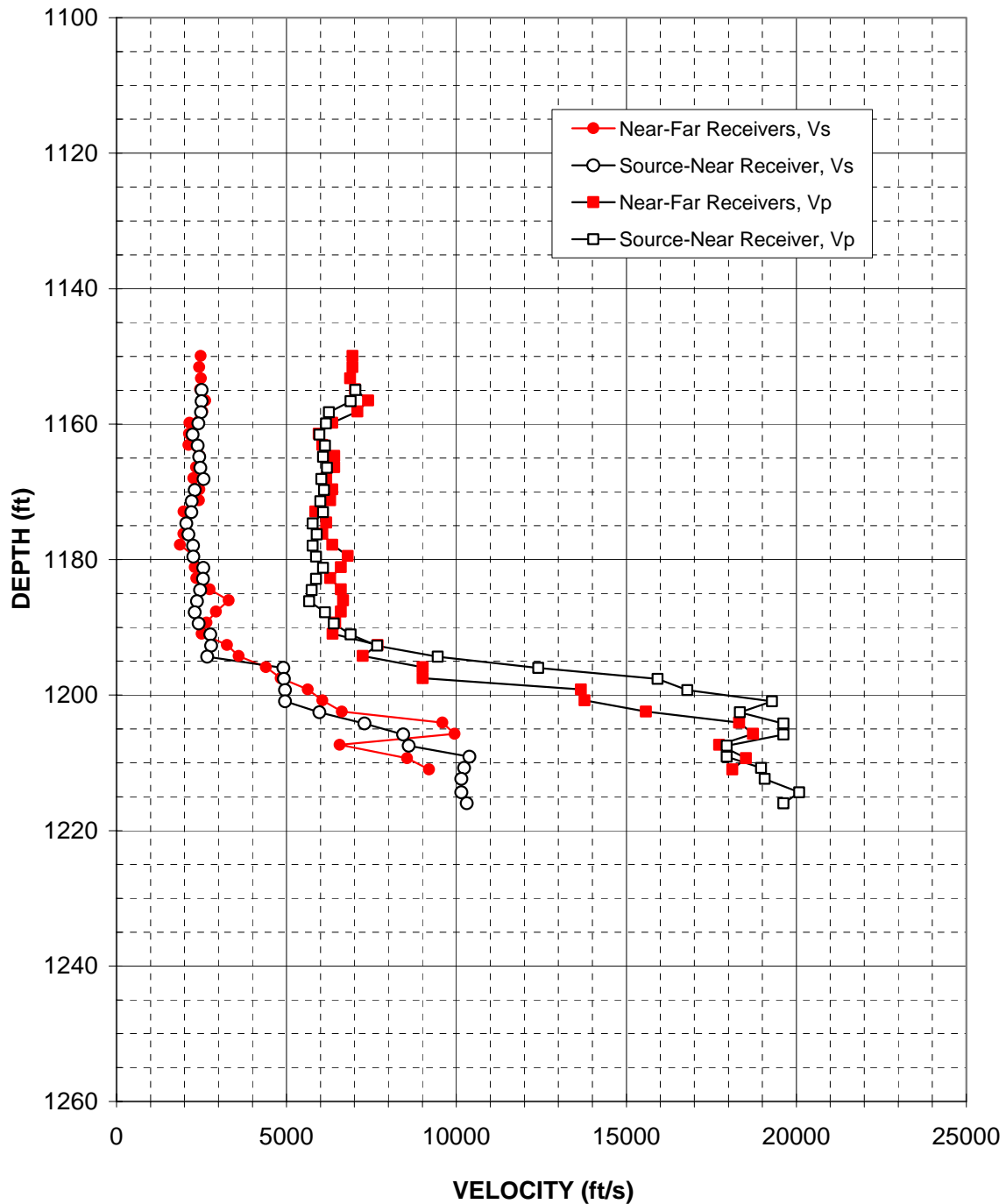


Figure A-5 Boring BH-C4993 Log 4B, Suspension S-R1 P- and S_H -wave velocities

Table A-5 Boring BH-C4993 Log 4B, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN #4B**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1155.0	2510	7030	0.43	352.0	760	2140	0.43
1156.6	2510	6890	0.42	352.5	760	2100	0.42
1158.3	2490	6250	0.41	353.0	760	1910	0.41
1159.9	2410	6160	0.41	353.5	730	1880	0.41
1161.5	2240	5970	0.42	354.0	680	1820	0.42
1163.2	2390	6140	0.41	354.5	730	1870	0.41
1164.8	2440	6080	0.40	355.0	740	1850	0.40
1166.5	2470	6190	0.41	355.5	750	1890	0.41
1168.1	2570	6030	0.39	356.0	780	1840	0.39
1169.7	2300	6110	0.42	356.5	700	1860	0.42
1171.4	2210	6000	0.42	357.0	670	1830	0.42
1173.0	2210	6080	0.42	357.5	670	1850	0.42
1174.7	2060	5770	0.43	358.0	630	1760	0.43
1176.3	2120	5900	0.43	358.5	650	1800	0.43
1177.9	2260	5770	0.41	359.0	690	1760	0.41
1179.6	2270	5870	0.41	359.5	690	1790	0.41
1181.2	2560	6080	0.39	360.0	780	1850	0.39
1182.9	2550	5870	0.38	360.5	780	1790	0.38
1184.5	2460	5740	0.39	361.0	750	1750	0.39
1186.1	2370	5670	0.39	361.5	720	1730	0.39
1187.8	2300	6140	0.42	362.0	700	1870	0.42
1189.4	2420	6400	0.42	362.5	740	1950	0.42
1191.1	2770	6890	0.40	363.0	840	2100	0.40
1192.7	2780	7670	0.42	363.5	850	2340	0.42
1194.3	2670	9450	0.46	364.0	810	2880	0.46
1196.0	4910	12410	0.41	364.5	1500	3780	0.41
1197.6	4930	15920	0.45	365.0	1500	4850	0.45
1199.3	4960	16790	0.45	365.5	1510	5120	0.45
1200.9	4960	19290	0.46	366.0	1510	5880	0.46
1202.6	5970	18340	0.44	366.5	1820	5590	0.44
1204.2	7300	19620	0.42	367.0	2220	5980	0.42
1205.8	8440	19620	0.39	367.5	2570	5980	0.39
1207.5	8600	17950	0.35	368.0	2620	5470	0.35
1209.1	10380	17950	0.25	368.5	3170	5470	0.25
1210.8	10230	18960	0.29	369.0	3120	5780	0.29

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 RUN #4B**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1212.4	10150	19070	0.30	369.5	3090	5810	0.30
1214.4	10150	20090	0.33	370.1	3090	6120	0.33
1216.0	10310	19620	0.31	370.6	3140	5980	0.31

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4993 - Log 5 Source to Receiver and Receiver to Receiver Analysis

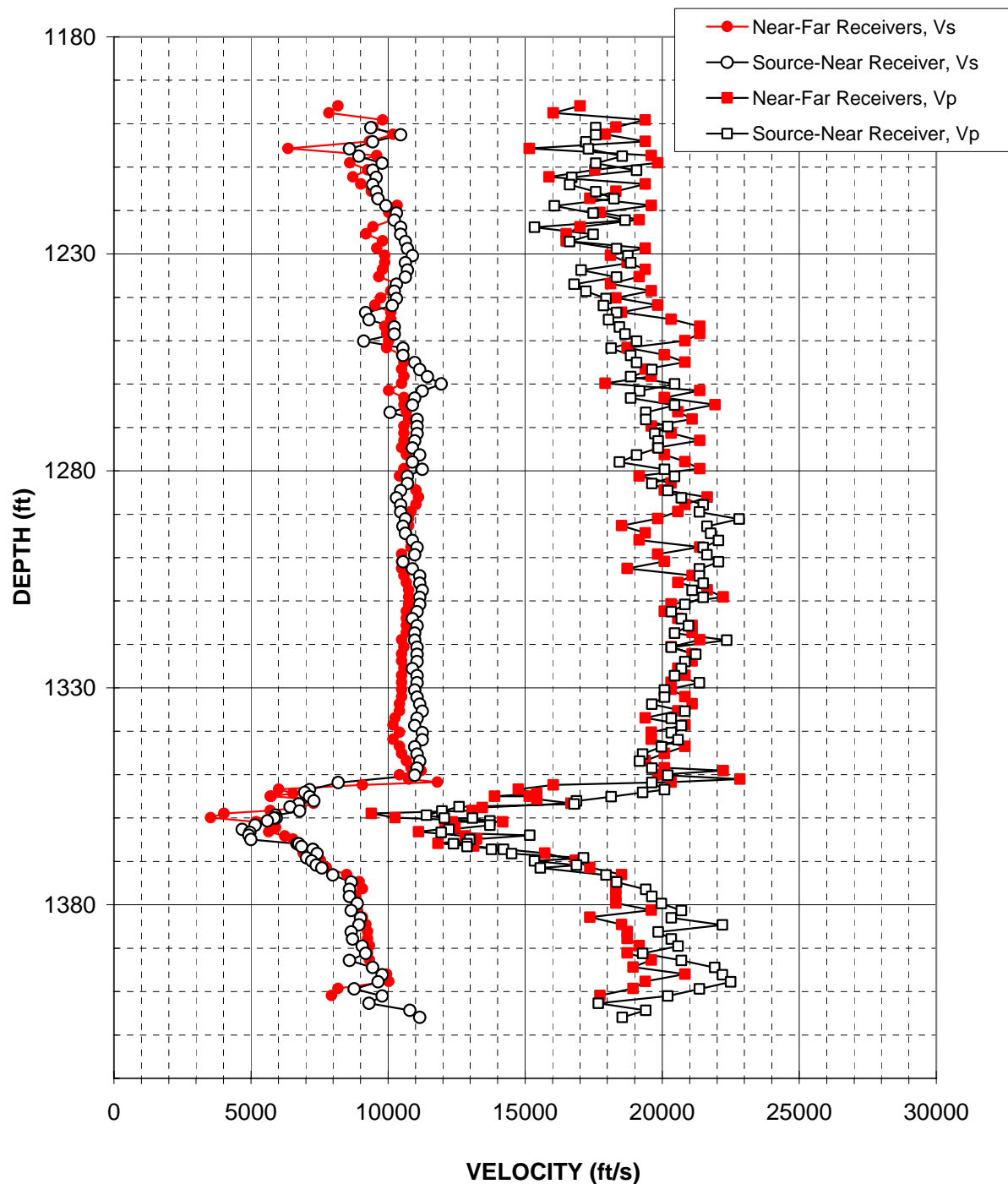


Figure A-6 Boring BH-C4993 Log 5, Suspension S-R1 P- and S_H -wave velocities

Table A-6 Boring BH-C4993 Log 5, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 LOG #5**

American Units			
Depth at Midpoint Between Source and Near Receiver (ft)	Velocity		Poisson's Ratio
	V _s (ft/s)	V _p (ft/s)	
1200.9	9370	17580	0.30
1202.6	10470	17580	0.23
1204.2	9440	17220	0.29
1205.8	8600	17310	0.34
1207.5	8940	18540	0.35
1209.1	9780	17580	0.28
1210.8	9440	19070	0.34
1212.4	9570	16710	0.26
1214.0	9440	16630	0.26
1215.7	9570	17580	0.29
1217.3	9640	18240	0.31
1219.0	9930	16070	0.19
1220.6	10310	17490	0.23
1222.2	10230	18650	0.28
1223.9	10470	15340	0.06
1225.5	10470	17490	0.22
1227.2	10630	16630	0.15
1228.8	10710	18340	0.24
1230.4	10890	18750	0.25
1232.1	10630	18850	0.27
1233.7	10710	17050	0.17
1235.4	10630	18340	0.25
1237.0	10310	16790	0.20
1238.6	10230	17220	0.23
1240.3	10310	17950	0.25
1241.9	10150	17860	0.26
1243.6	9180	18340	0.33
1245.2	9310	18050	0.32
1246.8	10230	18440	0.28
1248.5	10230	18650	0.28
1250.1	9120	19070	0.35
1251.8	10550	18150	0.24
1253.4	10550	18850	0.27
1255.0	10980	19070	0.25
1256.7	11160	19620	0.26

Metric Units			
Depth at Midpoint Between Source and Near Receiver (m)	Velocity		Poisson's Ratio
	V _s (m/s)	V _p (m/s)	
366.0	2860	5360	0.30
366.5	3190	5360	0.23
367.0	2880	5250	0.29
367.5	2620	5280	0.34
368.0	2730	5650	0.35
368.5	2980	5360	0.28
369.0	2880	5810	0.34
369.5	2920	5090	0.26
370.0	2880	5070	0.26
370.5	2920	5360	0.29
371.0	2940	5560	0.31
371.5	3030	4900	0.19
372.0	3140	5330	0.23
372.5	3120	5680	0.28
373.0	3190	4680	0.06
373.5	3190	5330	0.22
374.0	3240	5070	0.15
374.5	3270	5590	0.24
375.0	3320	5710	0.25
375.5	3240	5750	0.27
376.0	3270	5200	0.17
376.5	3240	5590	0.25
377.0	3140	5120	0.20
377.5	3120	5250	0.23
378.0	3140	5470	0.25
378.5	3090	5440	0.26
379.0	2800	5590	0.33
379.5	2840	5500	0.32
380.0	3120	5620	0.28
380.5	3120	5680	0.28
381.0	2780	5810	0.35
381.5	3210	5530	0.24
382.0	3210	5750	0.27
382.5	3350	5810	0.25
383.0	3400	5980	0.26

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 LOG #5**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1258.3	11440	18850	0.21
1260.0	11950	20450	0.24
1261.6	11250	19180	0.24
1263.2	10980	18850	0.24
1264.9	10890	20450	0.30
1266.5	10070	19400	0.32
1268.2	11070	19400	0.26
1269.8	11070	20210	0.29
1271.4	11070	19740	0.27
1273.1	10980	19850	0.28
1274.7	10890	19850	0.28
1276.4	11160	19070	0.24
1278.0	10890	18440	0.23
1279.7	11250	20090	0.27
1281.3	10710	20450	0.31
1282.9	10710	19620	0.29
1284.6	10470	20210	0.32
1286.2	10310	20710	0.34
1287.9	10470	21500	0.34
1289.5	10470	21360	0.34
1291.1	10630	22800	0.36
1292.8	10550	21630	0.34
1294.4	10630	21770	0.34
1296.1	10890	22060	0.34
1297.7	11070	21500	0.32
1299.3	10980	21630	0.33
1301.0	10550	22060	0.35
1302.6	10890	21360	0.32
1304.3	11160	21360	0.31
1305.9	11160	21500	0.32
1307.5	11250	21090	0.30
1309.2	11160	21500	0.32
1310.8	11160	20830	0.30
1312.5	11070	20330	0.29
1314.1	10890	20710	0.31
1315.7	11070	20960	0.31
1317.4	10980	20450	0.30
1319.0	10980	22350	0.34
1320.7	11070	20330	0.29

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
383.5	3490	5750	0.21
384.0	3640	6230	0.24
384.5	3430	5840	0.24
385.0	3350	5750	0.24
385.5	3320	6230	0.30
386.0	3070	5910	0.32
386.5	3370	5910	0.26
387.0	3370	6160	0.29
387.5	3370	6020	0.27
388.0	3350	6050	0.28
388.5	3320	6050	0.28
389.0	3400	5810	0.24
389.5	3320	5620	0.23
390.0	3430	6120	0.27
390.5	3270	6230	0.31
391.0	3270	5980	0.29
391.5	3190	6160	0.32
392.0	3140	6310	0.34
392.5	3190	6550	0.34
393.0	3190	6510	0.34
393.5	3240	6950	0.36
394.0	3210	6590	0.34
394.5	3240	6640	0.34
395.0	3320	6720	0.34
395.5	3370	6550	0.32
396.0	3350	6590	0.33
396.5	3210	6720	0.35
397.0	3320	6510	0.32
397.5	3400	6510	0.31
398.0	3400	6550	0.32
398.5	3430	6430	0.30
399.0	3400	6550	0.32
399.5	3400	6350	0.30
400.0	3370	6200	0.29
400.5	3320	6310	0.31
401.0	3370	6390	0.31
401.5	3350	6230	0.30
402.0	3350	6810	0.34
402.5	3370	6200	0.29

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 LOG #5**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1322.3	11070	21230	0.31
1323.9	11070	20830	0.30
1325.6	10890	20710	0.31
1327.2	11070	20450	0.29
1328.9	11070	21360	0.32
1330.5	10980	20090	0.29
1332.1	11070	20090	0.28
1333.8	11160	19620	0.26
1335.4	11250	20830	0.29
1337.1	11070	20330	0.29
1338.7	10980	20710	0.30
1340.3	11250	20330	0.28
1342.0	11250	20580	0.29
1343.6	10980	19970	0.28
1345.3	11070	19290	0.25
1346.9	11160	19180	0.24
1348.5	11070	19620	0.27
1350.2	10980	20210	0.29
1351.8	8180	19620	0.39
1353.5	7140	20090	0.43
1354.1	6960	19290	0.43
1355.1	7140	18150	0.41
1356.1	7300	16880	0.38
1356.8	6750	16790	0.40
1357.4	6430	12590	0.32
1358.4	6780	11970	0.26
1359.4	5900	11400	0.32
1360.0	5920	12050	0.34
1360.0	5840	13080	0.38
1360.7	5600	13720	0.40
1361.7	5150	13720	0.42
1362.7	4690	12230	0.41
1363.3	4960	11950	0.40
1364.0	4930	15170	0.44
1365.0	5000	12980	0.41
1365.9	6680	12390	0.29
1365.9	6750	12880	0.31
1366.6	6850	12880	0.30
1367.2	7260	14210	0.32

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
403.0	3370	6470	0.31
403.5	3370	6350	0.30
404.0	3320	6310	0.31
404.5	3370	6230	0.29
405.0	3370	6510	0.32
405.5	3350	6120	0.29
406.0	3370	6120	0.28
406.5	3400	5980	0.26
407.0	3430	6350	0.29
407.5	3370	6200	0.29
408.0	3350	6310	0.30
408.5	3430	6200	0.28
409.0	3430	6270	0.29
409.5	3350	6090	0.28
410.0	3370	5880	0.25
410.5	3400	5840	0.24
411.0	3370	5980	0.27
411.5	3350	6160	0.29
412.0	2490	5980	0.39
412.5	2180	6120	0.43
412.7	2120	5880	0.43
413.0	2180	5530	0.41
413.3	2220	5140	0.38
413.5	2060	5120	0.40
413.7	1960	3840	0.32
414.0	2070	3650	0.26
414.3	1800	3480	0.32
414.5	1800	3670	0.34
414.5	1780	3990	0.38
414.7	1710	4180	0.40
415.0	1570	4180	0.42
415.3	1430	3730	0.41
415.5	1510	3640	0.40
415.7	1500	4620	0.44
416.0	1520	3960	0.41
416.3	2040	3780	0.29
416.3	2060	3930	0.31
416.5	2090	3930	0.30
416.7	2210	4330	0.32

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4993 LOG #5**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1367.2	7260	13780	0.31
1368.2	7420	14520	0.32
1369.2	7030	17130	0.40
1369.9	7220	15340	0.36
1370.9	7380	16880	0.38
1371.5	7580	15550	0.34
1373.2	7990	17950	0.38
1374.8	8650	18340	0.36
1376.4	8600	19400	0.38
1378.1	8600	19620	0.38
1379.7	8880	19970	0.38
1381.4	8650	20710	0.39
1383.0	9000	20330	0.38
1384.6	8940	22200	0.40
1386.3	8650	19850	0.38
1387.9	8710	20330	0.39
1389.6	9060	20580	0.38
1391.2	9180	19290	0.35
1392.8	8600	20710	0.40
1394.5	9440	21920	0.39
1396.1	9780	22200	0.38
1397.8	9640	22500	0.39
1399.4	8770	21360	0.40
1401.0	9780	20210	0.35
1402.7	9310	17670	0.31
1404.3	10800	19400	0.28
1406.0	11160	18540	0.22

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
416.7	2210	4200	0.31
417.0	2260	4420	0.32
417.3	2140	5220	0.40
417.5	2200	4680	0.36
417.8	2250	5140	0.38
418.0	2310	4740	0.34
418.5	2430	5470	0.38
419.0	2640	5590	0.36
419.5	2620	5910	0.38
420.0	2620	5980	0.38
420.5	2710	6090	0.38
421.0	2640	6310	0.39
421.5	2740	6200	0.38
422.0	2730	6770	0.40
422.5	2640	6050	0.38
423.0	2650	6200	0.39
423.5	2760	6270	0.38
424.0	2800	5880	0.35
424.5	2620	6310	0.40
425.0	2880	6680	0.39
425.5	2980	6770	0.38
426.0	2940	6860	0.39
426.5	2670	6510	0.40
427.0	2980	6160	0.35
427.5	2840	5390	0.31
428.0	3290	5910	0.28
428.5	3400	5650	0.22

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4996 - Log 1 Source to Receiver and Receiver to Receiver Analysis

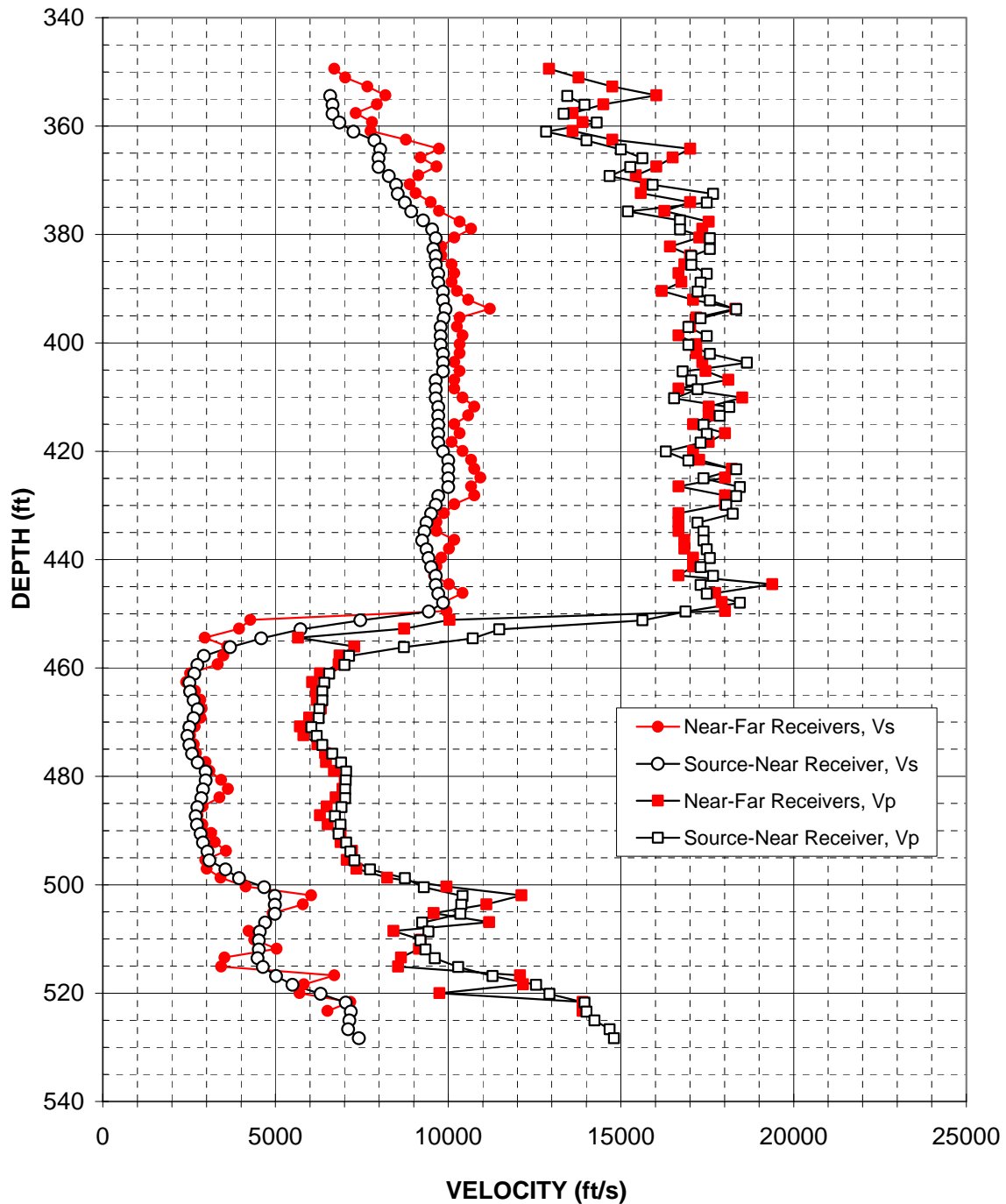


Figure A-7 Boring BH-C4996 Log 1, Suspension S-R1 P- and S_H -wave velocities

Table A-7 Boring BH-C4996 Log 1, Suspension S-R1 depths and P- and S_H-wave velocities

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Source-to-Receiver Travel Time Data - Borehole C4996 LOG #1							
American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
354.5	6590	13450	0.34	108.0	2010	4100	0.34
356.1	6650	13950	0.35	108.5	2030	4250	0.35
357.7	6650	13340	0.33	109.0	2030	4070	0.33
359.4	6850	14300	0.35	109.5	2090	4360	0.35
361.0	7260	12830	0.26	110.0	2210	3910	0.26
362.7	7870	14000	0.27	110.5	2400	4270	0.27
364.3	8040	15000	0.30	111.0	2450	4570	0.30
365.9	7990	15630	0.32	111.5	2430	4760	0.32
367.6	7990	15270	0.31	112.0	2430	4650	0.31
369.2	8280	14670	0.27	112.5	2520	4470	0.27
370.9	8490	15920	0.30	113.0	2590	4850	0.30
372.5	8540	17670	0.35	113.5	2600	5390	0.35
374.1	8740	17490	0.33	114.0	2670	5330	0.33
375.8	8930	15200	0.24	114.5	2720	4630	0.24
377.4	9270	16710	0.28	115.0	2830	5090	0.28
379.1	9530	16710	0.26	115.5	2910	5090	0.26
380.7	9640	17580	0.28	116.0	2940	5360	0.28
382.7	9570	17580	0.29	116.6	2920	5360	0.29
384.0	9640	17050	0.26	117.0	2940	5200	0.26
385.6	9640	17050	0.26	117.5	2940	5200	0.26
387.3	9710	17490	0.28	118.0	2960	5330	0.28
388.9	9710	17310	0.27	118.5	2960	5280	0.27
390.5	9850	17220	0.26	119.0	3000	5250	0.26
392.2	9850	17580	0.27	119.5	3000	5360	0.27
393.8	9930	18340	0.29	120.0	3030	5590	0.29
395.5	9870	17310	0.26	120.5	3010	5280	0.26
397.1	9780	16960	0.25	121.0	2980	5170	0.25
398.7	9780	17490	0.27	121.5	2980	5330	0.27
400.4	9780	16960	0.25	122.0	2980	5170	0.25
402.0	9850	17580	0.27	122.5	3000	5360	0.27
403.7	9850	18650	0.31	123.0	3000	5680	0.31
405.3	9850	16790	0.24	123.5	3000	5120	0.24
406.9	9640	17050	0.26	124.0	2940	5200	0.26
408.6	9640	17220	0.27	124.5	2940	5250	0.27
410.2	9640	16540	0.24	125.0	2940	5040	0.24
411.9	9710	18150	0.30	125.5	2960	5530	0.30
413.5	9710	17860	0.29	126.0	2960	5440	0.29
415.1	9710	17400	0.27	126.5	2960	5300	0.27

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Source-to-Receiver Travel Time Data - Borehole C4996 LOG #1							
American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
416.8	9710	17490	0.28	127.0	2960	5330	0.28
418.4	9710	17310	0.27	127.5	2960	5280	0.27
420.1	9850	16300	0.21	128.0	3000	4970	0.21
421.7	10000	16960	0.23	128.5	3050	5170	0.23
423.4	10000	18340	0.29	129.0	3050	5590	0.29
425.0	10000	17400	0.25	129.5	3050	5300	0.25
426.6	10000	18440	0.29	130.0	3050	5620	0.29
428.3	9710	18340	0.31	130.5	2960	5590	0.31
429.9	9640	18050	0.30	131.0	2940	5500	0.30
431.6	9510	18240	0.31	131.5	2900	5560	0.31
433.2	9380	17220	0.29	132.0	2860	5250	0.29
434.8	9310	17400	0.30	132.5	2840	5300	0.30
436.5	9250	17400	0.30	133.0	2820	5300	0.30
438.1	9380	17490	0.30	133.5	2860	5330	0.30
439.8	9430	17580	0.30	134.0	2870	5360	0.30
441.4	9510	17310	0.28	134.5	2900	5280	0.28
443.0	9640	17670	0.29	135.0	2940	5390	0.29
444.7	9640	17310	0.27	135.5	2940	5280	0.27
446.3	9710	17490	0.28	136.0	2960	5330	0.28
448.0	9850	18440	0.30	136.5	3000	5620	0.30
449.6	9440	16880	0.27	137.0	2880	5140	0.27
451.2	7460	15630	0.35	137.5	2270	4760	0.35
452.9	5720	11480	0.33	138.0	1740	3500	0.33
454.5	4590	10710	0.39	138.5	1400	3270	0.39
456.2	3690	8720	0.39	139.0	1120	2660	0.39
457.8	2930	7140	0.40	139.5	890	2170	0.40
459.4	2740	7000	0.41	140.0	830	2130	0.41
461.1	2650	6550	0.40	140.5	810	2000	0.40
462.7	2510	6420	0.41	141.0	760	1960	0.41
464.4	2530	6360	0.41	141.5	770	1940	0.41
466.0	2630	6360	0.40	142.0	800	1940	0.40
467.6	2750	6270	0.38	142.5	840	1910	0.38
469.3	2630	6250	0.39	143.0	800	1910	0.39
470.9	2510	6040	0.40	143.5	770	1840	0.40
472.6	2450	6190	0.41	144.0	750	1890	0.41
474.2	2510	6360	0.41	144.5	760	1940	0.41
475.8	2590	6640	0.41	145.0	790	2030	0.41
477.5	2750	6900	0.41	145.5	840	2100	0.41
479.1	2980	7050	0.39	146.0	910	2150	0.39
480.8	2980	7030	0.39	146.5	910	2140	0.39
482.4	2900	7020	0.40	147.0	880	2140	0.40

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio							
Based on Source-to-Receiver Travel Time Data - Borehole C4996 LOG #1							
American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
(ft)	V _s (ft/s)	V _p (ft/s)		(m)	V _s (m/s)	V _p (m/s)	
484.0	2850	7020	0.40	147.5	870	2140	0.40
485.7	2740	6920	0.41	148.0	830	2110	0.41
487.4	2690	6720	0.40	148.5	820	2050	0.40
489.0	2730	6890	0.41	149.0	830	2100	0.41
490.6	2830	6830	0.40	149.5	860	2080	0.40
492.2	2900	7050	0.40	150.0	880	2150	0.40
493.9	3030	7170	0.39	150.5	920	2180	0.39
495.5	3090	7290	0.39	151.0	940	2220	0.39
497.2	3550	7740	0.37	151.5	1080	2360	0.37
498.8	3950	8740	0.37	152.0	1200	2670	0.37
500.5	4670	9300	0.33	152.5	1420	2830	0.33
502.1	4980	10420	0.35	153.0	1520	3180	0.35
503.7	4980	10380	0.35	153.5	1520	3170	0.35
505.4	4980	10350	0.35	154.0	1520	3160	0.35
507.0	4700	9250	0.33	154.5	1430	2820	0.33
508.7	4550	9430	0.35	155.0	1390	2870	0.35
510.3	4520	9200	0.34	155.5	1380	2800	0.34
511.9	4520	9350	0.35	156.0	1380	2850	0.35
513.6	4490	9620	0.36	156.5	1370	2930	0.36
515.2	4640	10290	0.37	157.0	1410	3140	0.37
516.9	5020	11290	0.38	157.5	1530	3440	0.38
518.5	5490	12550	0.38	158.0	1670	3820	0.38
520.1	6310	12930	0.34	158.5	1920	3940	0.34
521.8	7030	13950	0.33	159.0	2140	4250	0.33
523.4	7180	14000	0.32	159.5	2190	4270	0.32
525.1	7140	14240	0.33	160.0	2180	4340	0.33
526.7	7110	14670	0.35	160.5	2170	4470	0.35
528.3	7420	14800	0.33	161.0	2260	4510	0.33
Notes:				"-" means no data available at that particular interval of depth.			

Hanford WTP Seismic Borehole C4996 - Log 2 Source to Receiver and Receiver to Receiver Analysis

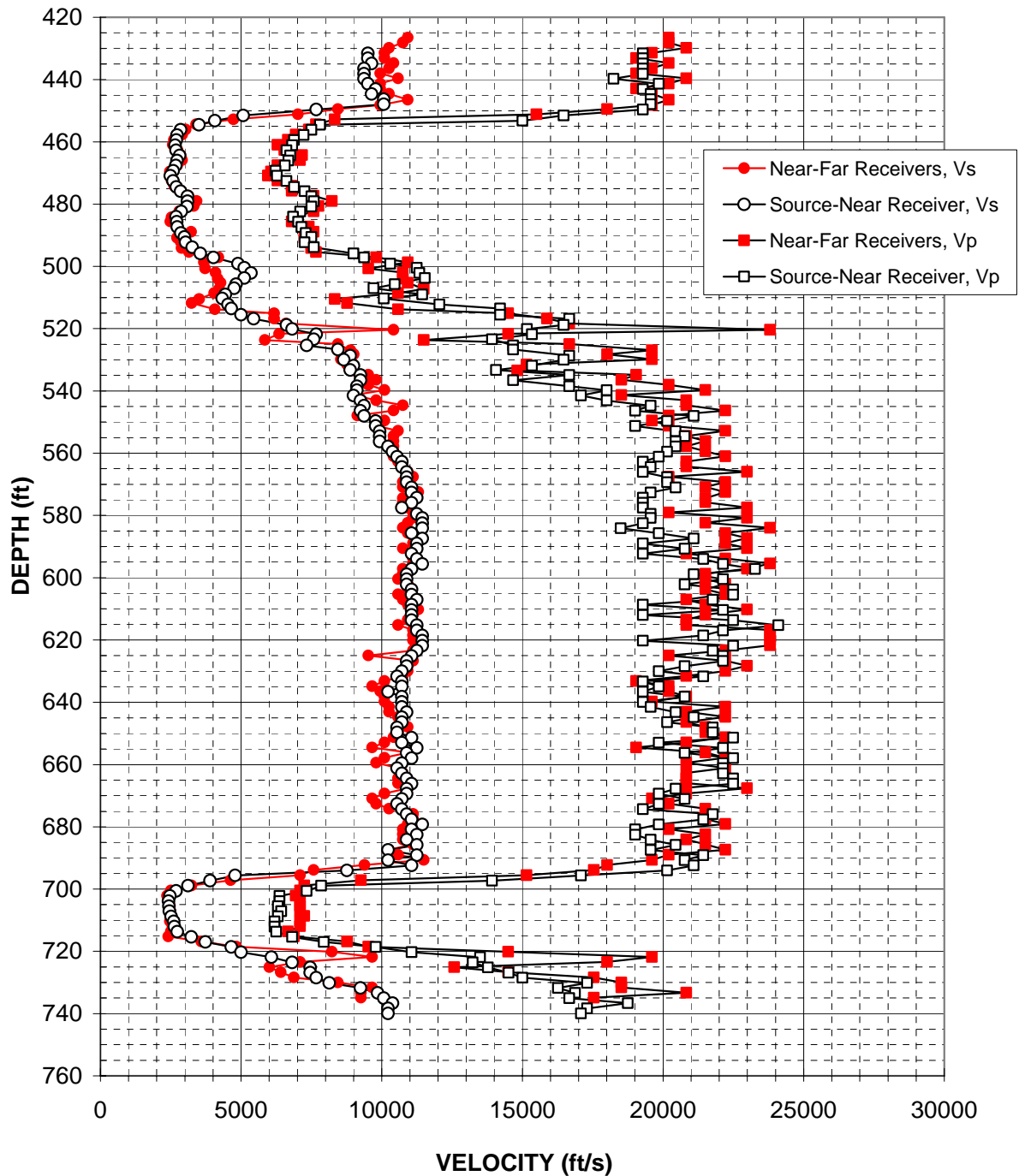


Figure A-8 Boring BH-C4996 Log 2, Suspension S-R1 P- and S_H -wave velocities

Table A-8 Boring BH-C4996 Log 2, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 LOG 2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
431.6	9510	19290	0.34	131.5	2900	5880	0.34
433.2	9510	19290	0.34	132.0	2900	5880	0.34
434.8	9640	19290	0.33	132.5	2940	5880	0.33
436.5	9380	19290	0.35	133.0	2860	5880	0.35
438.1	9380	19290	0.35	133.5	2860	5880	0.35
439.8	9380	18240	0.32	134.0	2860	5560	0.32
441.4	9510	19850	0.35	134.5	2900	6050	0.35
443.0	9780	19290	0.33	135.0	2980	5880	0.33
444.7	9640	19570	0.34	135.5	2940	5960	0.34
446.3	10070	19570	0.32	136.0	3070	5960	0.32
448.0	10070	19570	0.32	136.5	3070	5960	0.32
449.6	7670	19290	0.41	137.0	2340	5880	0.41
451.6	5080	16460	0.45	137.6	1550	5020	0.45
453.2	4070	15000	0.46	138.1	1240	4570	0.46
454.5	3500	7800	0.37	138.5	1070	2380	0.37
456.2	2850	7500	0.42	139.0	870	2290	0.42
457.8	2720	7220	0.42	139.5	830	2200	0.42
459.4	2700	6890	0.41	140.0	820	2100	0.41
461.1	2660	6820	0.41	140.5	810	2080	0.41
462.7	2690	6620	0.40	141.0	820	2020	0.40
464.4	2810	6750	0.39	141.5	860	2060	0.39
466.0	2720	6680	0.40	142.0	830	2040	0.40
467.6	2680	6550	0.40	142.5	820	2000	0.40
469.3	2590	6220	0.40	143.0	790	1900	0.40
470.9	2490	6280	0.41	143.5	760	1910	0.41
472.6	2580	6620	0.41	144.0	790	2020	0.41
474.5	2700	6890	0.41	144.6	820	2100	0.41
475.8	2850	7260	0.41	145.0	870	2210	0.41
477.5	3100	7500	0.40	145.5	940	2290	0.40
479.1	3100	7580	0.40	146.0	940	2310	0.40
480.8	3080	7500	0.40	146.5	940	2290	0.40
482.4	2870	7110	0.40	147.0	880	2170	0.40
484.0	2690	6850	0.41	147.5	820	2090	0.41

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 LOG 2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
485.7	2710	7030	0.41	148.0	830	2140	0.41
487.3	2730	7140	0.41	148.5	830	2180	0.41
489.3	2860	7300	0.41	149.1	870	2220	0.41
490.6	2990	7500	0.41	149.5	910	2290	0.41
492.2	3030	7260	0.39	150.0	920	2210	0.39
493.9	3260	7580	0.39	150.5	990	2310	0.39
495.9	3550	9000	0.41	151.1	1080	2740	0.41
497.2	4020	9380	0.39	151.5	1220	2860	0.39
499.1	4890	10310	0.35	152.1	1490	3140	0.35
500.5	5110	11250	0.37	152.5	1560	3430	0.37
502.1	5360	11340	0.36	153.0	1630	3460	0.36
503.7	5110	11540	0.38	153.5	1560	3520	0.38
505.7	4820	10470	0.37	154.1	1470	3190	0.37
507.0	4750	9710	0.34	154.5	1450	2960	0.34
509.0	4440	11440	0.41	155.1	1350	3490	0.41
510.3	4330	10070	0.39	155.5	1320	3070	0.39
512.3	4530	12050	0.42	156.1	1380	3670	0.42
513.6	4660	14210	0.44	156.5	1420	4330	0.44
515.5	5000	14210	0.43	157.1	1520	4330	0.43
516.9	5440	16670	0.44	157.5	1660	5080	0.44
518.8	6620	16460	0.40	158.1	2020	5020	0.40
520.1	6820	15170	0.37	158.5	2080	4620	0.37
521.8	7670	15340	0.33	159.0	2340	4680	0.33
523.4	7580	13920	0.29	159.5	2310	4240	0.29
525.4	7340	14670	0.33	160.1	2240	4470	0.33
526.7	8440	14670	0.25	160.5	2570	4470	0.25
528.7	8880	16670	0.30	161.1	2710	5080	0.30
530.0	8650	16460	0.31	161.5	2640	5020	0.31
531.9	9000	15340	0.24	162.1	2740	4680	0.24
533.3	8880	14060	0.17	162.5	2710	4290	0.17
534.9	9250	16670	0.28	163.0	2820	5080	0.28
536.5	9250	14670	0.17	163.5	2820	4470	0.17
538.5	9120	16670	0.29	164.1	2780	5080	0.29
539.8	9120	18000	0.33	164.5	2780	5490	0.33
541.5	9000	17090	0.31	165.0	2740	5210	0.31
543.1	9250	18000	0.32	165.5	2820	5490	0.32
544.7	9380	19570	0.35	166.0	2860	5960	0.35

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 LOG 2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
546.4	9250	19010	0.35	166.5	2820	5800	0.35
548.0	9380	21090	0.38	167.0	2860	6430	0.38
549.7	9780	20150	0.35	167.5	2980	6140	0.35
551.3	9780	19010	0.32	168.0	2980	5800	0.32
552.9	9930	20450	0.35	168.5	3030	6230	0.35
554.6	9930	20770	0.35	169.0	3030	6330	0.35
556.2	9930	20450	0.35	169.5	3030	6230	0.35
557.9	10230	20450	0.33	170.0	3120	6230	0.33
559.5	10380	20150	0.32	170.5	3170	6140	0.32
561.1	10550	19850	0.30	171.0	3210	6050	0.30
562.8	10710	19290	0.28	171.5	3270	5880	0.28
564.4	10710	19570	0.29	172.0	3270	5960	0.29
566.1	10890	19290	0.27	172.5	3320	5880	0.27
567.7	10890	20150	0.29	173.0	3320	6140	0.29
569.3	10890	20150	0.29	173.5	3320	6140	0.29
571.0	11070	20450	0.29	174.0	3370	6230	0.29
572.6	11070	19570	0.26	174.5	3370	5960	0.26
574.3	11250	19290	0.24	175.0	3430	5880	0.24
575.9	11070	19290	0.25	175.5	3370	5880	0.25
577.6	10710	19290	0.28	176.0	3270	5880	0.28
579.5	11250	19570	0.25	176.6	3430	5960	0.25
580.8	11440	19570	0.24	177.0	3490	5960	0.24
582.5	11440	19290	0.23	177.5	3490	5880	0.23
584.1	11440	18490	0.19	178.0	3490	5640	0.19
585.8	11070	19850	0.27	178.5	3370	6050	0.27
587.4	11440	21090	0.29	179.0	3490	6430	0.29
589.0	11250	19290	0.24	179.5	3430	5880	0.24
590.7	11250	20770	0.29	180.0	3430	6330	0.29
592.3	11070	19290	0.25	180.5	3370	5880	0.25
594.0	11250	21430	0.31	181.0	3430	6530	0.31
595.6	11440	22130	0.32	181.5	3490	6750	0.32
597.2	11070	23280	0.35	182.0	3370	7090	0.35
598.9	10890	21090	0.32	182.5	3320	6430	0.32
600.5	10890	22130	0.34	183.0	3320	6750	0.34
602.2	10890	20770	0.31	183.5	3320	6330	0.31
603.8	11070	22500	0.34	184.0	3370	6860	0.34
605.4	11070	22500	0.34	184.5	3370	6860	0.34

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 LOG 2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
607.1	11250	21770	0.32	185.0	3430	6640	0.32
608.7	11070	19290	0.25	185.5	3370	5880	0.25
610.4	11070	22130	0.33	186.0	3370	6750	0.33
612.0	11070	19290	0.25	186.5	3370	5880	0.25
613.6	11070	22500	0.34	187.0	3370	6860	0.34
615.3	11250	24110	0.36	187.5	3430	7350	0.36
616.9	11250	22130	0.33	188.0	3430	6750	0.33
618.6	11440	21430	0.30	188.5	3490	6530	0.30
620.2	11440	19290	0.23	189.0	3490	5880	0.23
621.8	11440	22500	0.33	189.5	3490	6860	0.33
623.5	11250	21770	0.32	190.0	3430	6640	0.32
625.1	11070	22130	0.33	190.5	3370	6750	0.33
626.8	10890	22130	0.34	191.0	3320	6750	0.34
628.4	10890	20770	0.31	191.5	3320	6330	0.31
630.0	10710	19850	0.29	192.0	3270	6050	0.29
631.7	10550	21430	0.34	192.5	3210	6530	0.34
633.3	10710	19290	0.28	193.0	3270	5880	0.28
635.0	10710	19850	0.29	193.5	3270	6050	0.29
636.6	10230	19290	0.30	194.0	3120	5880	0.30
638.2	10710	20770	0.32	194.5	3270	6330	0.32
639.9	10710	19290	0.28	195.0	3270	5880	0.28
641.5	10710	19570	0.29	195.5	3270	5960	0.29
643.2	10890	20450	0.30	196.0	3320	6230	0.30
644.8	10710	21090	0.33	196.5	3270	6430	0.33
646.4	10710	20150	0.30	197.0	3270	6140	0.30
648.1	10550	21770	0.35	197.5	3210	6640	0.35
649.7	10550	21770	0.35	198.0	3210	6640	0.35
651.4	11070	22500	0.34	198.5	3370	6860	0.34
653.0	10710	19850	0.29	199.0	3270	6050	0.29
654.7	11250	22130	0.33	199.5	3430	6750	0.33
656.3	10890	20770	0.31	200.0	3320	6330	0.31
657.9	11070	22500	0.34	200.5	3370	6860	0.34
659.6	10710	22130	0.35	201.0	3270	6750	0.35
661.2	10550	22130	0.35	201.5	3210	6750	0.35
662.9	10710	22130	0.35	202.0	3270	6750	0.35
664.5	10890	22500	0.35	202.5	3320	6860	0.35
666.1	11070	22500	0.34	203.0	3370	6860	0.34

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 LOG 2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
667.8	10890	20450	0.30	203.5	3320	6230	0.30
669.4	10890	19850	0.28	204.0	3320	6050	0.28
671.1	10710	20770	0.32	204.5	3270	6330	0.32
672.7	10550	19850	0.30	205.0	3210	6050	0.30
674.3	10710	19290	0.28	205.5	3270	5880	0.28
676.0	10890	21770	0.33	206.0	3320	6640	0.33
677.6	11070	21430	0.32	206.5	3370	6530	0.32
679.3	11440	19850	0.25	207.0	3490	6050	0.25
680.9	11070	19010	0.24	207.5	3370	5800	0.24
682.5	11250	19010	0.23	208.0	3430	5800	0.23
684.2	10890	19570	0.28	208.5	3320	5960	0.28
685.8	11250	20450	0.28	209.0	3430	6230	0.28
687.5	10230	19570	0.31	209.5	3120	5960	0.31
689.1	11250	21430	0.31	210.0	3430	6530	0.31
690.7	10230	20770	0.34	210.5	3120	6330	0.34
692.4	11070	21090	0.31	211.0	3370	6430	0.31
694.0	8770	20150	0.38	211.5	2670	6140	0.38
695.7	4790	17090	0.46	212.0	1460	5210	0.46
697.3	3900	13920	0.46	212.5	1190	4240	0.46
698.9	3110	7850	0.41	213.0	950	2390	0.41
700.6	2690	7340	0.42	213.5	820	2240	0.42
702.2	2470	6370	0.41	214.0	750	1940	0.41
703.9	2420	6370	0.42	214.5	740	1940	0.42
705.5	2440	6310	0.41	215.0	740	1920	0.41
707.1	2450	6430	0.41	215.5	750	1960	0.41
708.8	2510	6310	0.41	216.0	760	1920	0.41
710.4	2610	6190	0.39	216.5	790	1890	0.39
712.1	2630	6190	0.39	217.0	800	1890	0.39
713.7	2730	6250	0.38	217.5	830	1910	0.38
715.3	3230	6820	0.36	218.0	980	2080	0.36
717.0	3730	7940	0.36	218.5	1140	2420	0.36
718.6	4660	9780	0.35	219.0	1420	2980	0.35
720.3	5000	11070	0.37	219.5	1520	3370	0.37
721.9	6080	13500	0.37	220.0	1850	4110	0.37
723.5	6820	13240	0.32	220.5	2080	4030	0.32
725.2	7460	13780	0.29	221.0	2270	4200	0.29
726.8	7460	14520	0.32	221.5	2270	4420	0.32

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 LOG 2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
728.5	7670	15000	0.32	222.0	2340	4570	0.32
730.1	8130	17310	0.36	222.5	2480	5280	0.36
731.8	9250	16270	0.26	223.0	2820	4960	0.26
733.4	9850	16880	0.24	223.5	3000	5140	0.24
735.0	10070	16670	0.21	224.0	3070	5080	0.21
736.7	10380	18750	0.28	224.5	3170	5720	0.28
738.3	10230	17310	0.23	225.0	3120	5280	0.23
740.0	10230	17090	0.22	225.5	3120	5210	0.22

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Borehole C4996 - Log 3 Source to Receiver and Receiver to Receiver Analysis

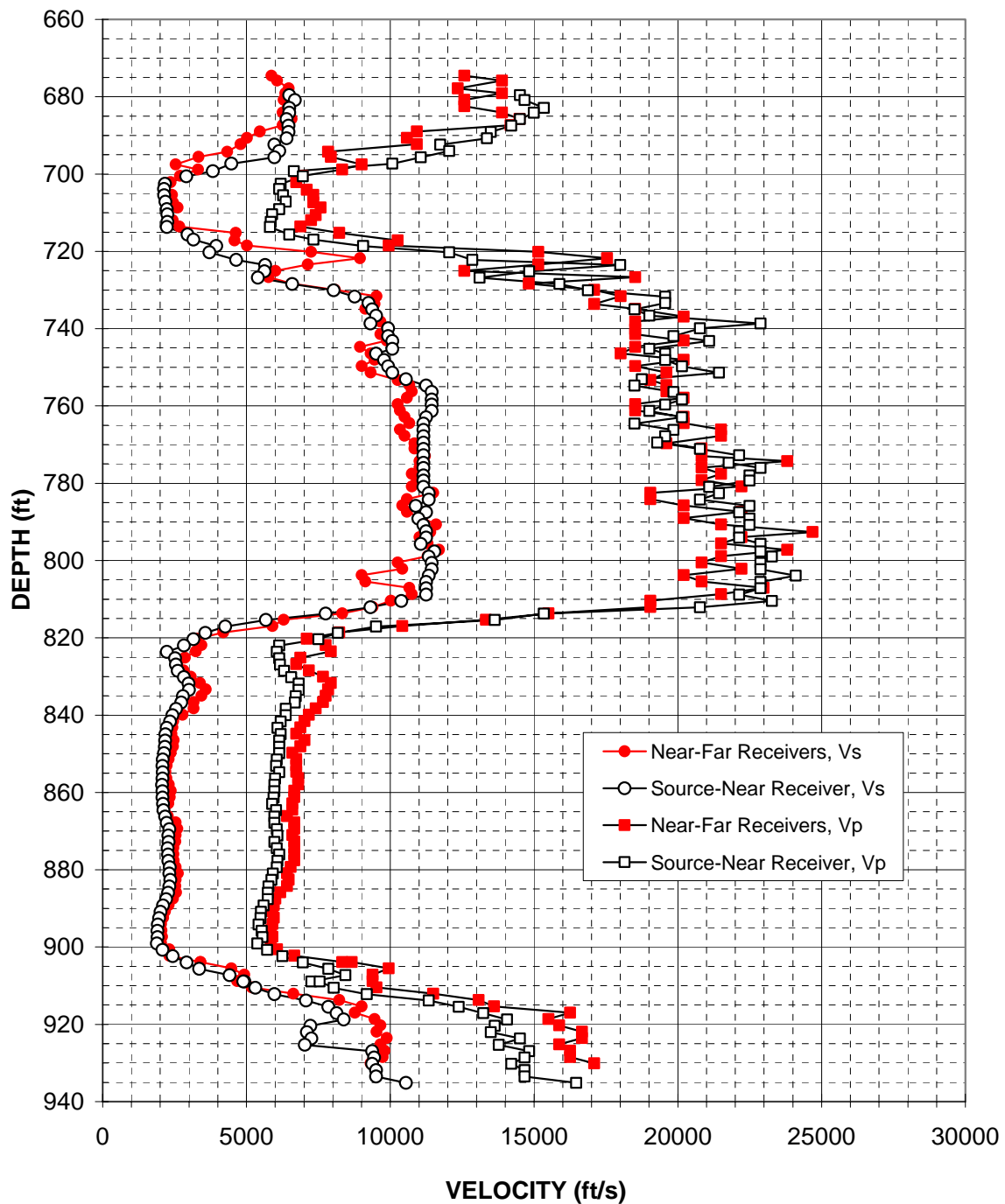


Figure A-9 Boring BH-C4996 Log 3, Suspension S-R1 P- and S_H -wave velocities

Table A-9 Boring BH-C4996 Log 3, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN#3**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
679.6	6490	14520	0.38	207.1	1980	4420	0.38
680.9	6680	14670	0.37	207.5	2040	4470	0.37
682.9	6490	15340	0.39	208.1	1980	4680	0.39
684.2	6490	15000	0.38	208.5	1980	4570	0.38
685.8	6400	14520	0.38	209.0	1950	4420	0.38
687.5	6460	14210	0.37	209.5	1970	4330	0.37
689.1	6460	13500	0.35	210.0	1970	4110	0.35
690.7	6400	13370	0.35	210.5	1950	4070	0.35
692.4	5970	11740	0.33	211.0	1820	3580	0.33
694.0	6140	12050	0.33	211.5	1870	3670	0.33
695.7	5970	11070	0.29	212.0	1820	3370	0.29
697.3	4470	10070	0.38	212.5	1360	3070	0.38
699.3	3840	6650	0.25	213.1	1170	2030	0.25
700.6	2910	6960	0.39	213.5	890	2120	0.39
702.6	2160	6190	0.43	214.1	660	1890	0.43
703.9	2130	6140	0.43	214.5	650	1870	0.43
705.5	2140	6280	0.43	215.0	650	1910	0.43
707.1	2180	6370	0.43	215.5	670	1940	0.43
709.1	2240	6140	0.42	216.1	680	1870	0.42
710.4	2250	5900	0.41	216.5	690	1800	0.41
712.4	2250	5840	0.41	217.1	690	1780	0.41
713.7	2240	5820	0.41	217.5	680	1770	0.41
715.7	2950	6490	0.37	218.1	900	1980	0.37
717.0	3150	7340	0.39	218.5	960	2240	0.39
718.6	3950	9060	0.38	219.0	1200	2760	0.38
720.3	3710	12050	0.45	219.5	1130	3670	0.45
722.2	4640	12860	0.43	220.1	1410	3920	0.43
723.5	5650	18000	0.45	220.5	1720	5490	0.45
725.2	5630	14840	0.42	221.0	1710	4520	0.42
726.8	5400	13110	0.40	221.5	1650	3990	0.40
728.5	6590	15880	0.40	222.0	2010	4840	0.40
730.1	8040	16880	0.35	222.5	2450	5140	0.35
731.8	8770	19570	0.37	223.0	2670	5960	0.37
733.4	9250	19570	0.36	223.5	2820	5960	0.36

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN#3**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
735.0	9380	18490	0.33	224.0	2860	5640	0.33
736.7	9510	19010	0.33	224.5	2900	5800	0.33
738.6	9310	22880	0.40	225.1	2840	6970	0.40
740.0	9930	20770	0.35	225.5	3030	6330	0.35
741.9	9930	19850	0.33	226.1	3030	6050	0.33
743.2	10070	21090	0.35	226.5	3070	6430	0.35
745.2	10070	19010	0.30	227.1	3070	5800	0.30
746.5	9510	19570	0.35	227.5	2900	5960	0.35
748.2	9780	19570	0.33	228.0	2980	5960	0.33
749.8	9930	20150	0.34	228.5	3030	6140	0.34
751.4	10070	21430	0.36	229.0	3070	6530	0.36
753.1	10550	18750	0.27	229.5	3210	5710	0.27
754.7	11250	18490	0.21	230.0	3430	5640	0.21
756.4	11440	19850	0.25	230.5	3490	6050	0.25
758.3	11440	20150	0.26	231.1	3490	6140	0.26
759.6	11440	19570	0.24	231.5	3490	5960	0.24
761.3	11440	19010	0.22	232.0	3490	5800	0.22
762.9	11250	20150	0.27	232.5	3430	6140	0.27
764.6	11160	18490	0.21	233.0	3400	5640	0.21
766.2	11160	19850	0.27	233.5	3400	6050	0.27
767.8	11160	19570	0.26	234.0	3400	5960	0.26
769.5	11160	19290	0.25	234.5	3400	5880	0.25
771.1	11160	20770	0.30	235.0	3400	6330	0.30
772.8	11160	22130	0.33	235.5	3400	6750	0.33
774.7	11160	21770	0.32	236.1	3400	6640	0.32
776.0	11160	22880	0.34	236.5	3400	6970	0.34
778.0	11160	22500	0.34	237.1	3400	6860	0.34
779.3	11160	22500	0.34	237.5	3400	6860	0.34
781.0	11160	21090	0.31	238.0	3400	6430	0.31
782.6	11340	21430	0.31	238.5	3460	6530	0.31
784.2	11340	20770	0.29	239.0	3460	6330	0.29
785.9	10890	22500	0.35	239.5	3320	6860	0.35
787.5	11250	22130	0.33	240.0	3430	6750	0.33
789.2	10980	22500	0.34	240.5	3350	6860	0.34
790.8	11160	22500	0.34	241.0	3400	6860	0.34
792.4	11250	22130	0.33	241.5	3430	6750	0.33
794.1	11250	22130	0.33	242.0	3430	6750	0.33

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN#3**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
795.7	11070	22880	0.35	242.5	3370	6970	0.35
797.7	11540	22880	0.33	243.1	3520	6970	0.33
799.0	11340	23280	0.34	243.5	3460	7090	0.34
800.6	11440	22880	0.33	244.0	3490	6970	0.33
802.3	11440	22880	0.33	244.5	3490	6970	0.33
803.9	11340	24110	0.36	245.0	3460	7350	0.36
805.6	11250	22880	0.34	245.5	3430	6970	0.34
807.2	11250	22880	0.34	246.0	3430	6970	0.34
808.9	11250	22130	0.33	246.5	3430	6750	0.33
810.5	10380	23280	0.38	247.0	3170	7090	0.38
812.1	9310	20770	0.37	247.5	2840	6330	0.37
813.8	7760	15340	0.33	248.0	2360	4680	0.33
815.4	5670	13640	0.40	248.5	1730	4160	0.40
817.1	4260	9510	0.37	249.0	1300	2900	0.37
818.7	3570	8180	0.38	249.5	1090	2490	0.38
820.3	3150	7500	0.39	250.0	960	2290	0.39
822.0	2820	6140	0.37	250.5	860	1870	0.37
823.6	2240	6050	0.42	251.0	680	1850	0.42
825.3	2520	6140	0.40	251.5	770	1870	0.40
826.9	2550	6160	0.40	252.0	780	1880	0.40
828.5	2620	6310	0.40	252.5	800	1920	0.40
830.2	2820	6550	0.39	253.0	860	2000	0.39
831.8	2990	6820	0.38	253.5	910	2080	0.38
833.5	3000	6820	0.38	254.0	910	2080	0.38
835.1	2790	6720	0.40	254.5	850	2050	0.40
836.7	2730	6680	0.40	255.0	830	2040	0.40
838.4	2560	6370	0.40	255.5	780	1940	0.40
840.0	2430	6370	0.41	256.0	740	1940	0.41
841.7	2340	6190	0.42	256.5	710	1890	0.42
843.3	2220	6080	0.42	257.0	680	1850	0.42
844.9	2180	6190	0.43	257.5	670	1890	0.43
846.6	2180	6140	0.43	258.0	660	1870	0.43
848.2	2160	6140	0.43	258.5	660	1870	0.43
849.9	2130	6140	0.43	259.0	650	1870	0.43
851.5	2090	6050	0.43	259.5	640	1850	0.43
853.1	2080	6030	0.43	260.0	630	1840	0.43
854.8	2090	6140	0.43	260.5	640	1870	0.43

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN#3**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
856.4	2080	6000	0.43	261.0	630	1830	0.43
858.1	2060	5970	0.43	261.5	630	1820	0.43
859.7	2080	5970	0.43	262.0	630	1820	0.43
861.3	2080	5950	0.43	262.5	630	1810	0.43
863.0	2100	5900	0.43	263.0	640	1800	0.43
864.6	2120	6030	0.43	263.5	640	1840	0.43
866.3	2170	5970	0.42	264.0	660	1820	0.42
867.9	2220	5970	0.42	264.5	680	1820	0.42
869.5	2320	6050	0.41	265.0	710	1850	0.41
871.2	2280	6080	0.42	265.5	700	1850	0.42
872.8	2300	5970	0.41	266.0	700	1820	0.41
874.5	2260	6050	0.42	266.5	690	1850	0.42
876.1	2270	6140	0.42	267.0	690	1870	0.42
877.7	2280	6080	0.42	267.5	700	1850	0.42
879.4	2340	6050	0.41	268.0	710	1850	0.41
881.0	2320	5920	0.41	268.5	710	1800	0.41
882.7	2350	5870	0.40	269.0	720	1790	0.40
884.3	2320	5770	0.40	269.5	710	1760	0.40
886.0	2270	5740	0.41	270.0	690	1750	0.41
887.6	2210	5740	0.41	270.5	670	1750	0.41
889.2	2100	5600	0.42	271.0	640	1710	0.42
890.9	2010	5510	0.42	271.5	610	1680	0.42
892.5	1960	5490	0.43	272.0	600	1670	0.43
894.2	1920	5420	0.43	272.5	590	1650	0.43
895.8	1900	5530	0.43	273.0	580	1690	0.43
897.4	1910	5560	0.43	273.5	580	1690	0.43
899.1	1890	5380	0.43	274.0	570	1640	0.43
900.7	2080	5720	0.42	274.5	630	1740	0.42
902.4	2440	6250	0.41	275.0	740	1910	0.41
904.0	2920	6960	0.39	275.5	890	2120	0.39
905.6	3360	7850	0.39	276.0	1020	2390	0.39
907.3	4410	8440	0.31	276.5	1340	2570	0.31
908.9	4930	7260	0.07	277.0	1500	2210	0.07
908.9	4890	7540	0.14	277.0	1490	2300	0.14
910.6	5310	8040	0.11	277.5	1620	2450	0.11
912.2	5970	9180	0.13	278.0	1820	2800	0.13
913.8	7070	11340	0.18	278.5	2150	3460	0.18

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN#3**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
915.5	7850	12390	0.16	279.0	2390	3780	0.16
917.1	8130	13240	0.20	279.5	2480	4030	0.20
918.8	8390	14060	0.22	280.0	2560	4290	0.22
920.4	7220	13640	0.31	280.5	2200	4160	0.31
922.0	7110	13500	0.31	281.0	2170	4110	0.31
923.7	7260	14520	0.33	281.5	2210	4420	0.33
925.3	7030	13780	0.32	282.0	2140	4200	0.32
927.0	9380	14840	0.17	282.5	2860	4520	0.17
928.6	9440	14670	0.15	283.0	2880	4470	0.15
930.2	9380	14210	0.11	283.5	2860	4330	0.11
931.9	9510	14670	0.14	284.0	2900	4470	0.14
933.5	9510	14670	0.14	284.5	2900	4470	0.14
935.2	10550	16460	0.15	285.0	3210	5020	0.15

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4996 - Log 4
Source to Receiver and Receiver to Receiver Analysis

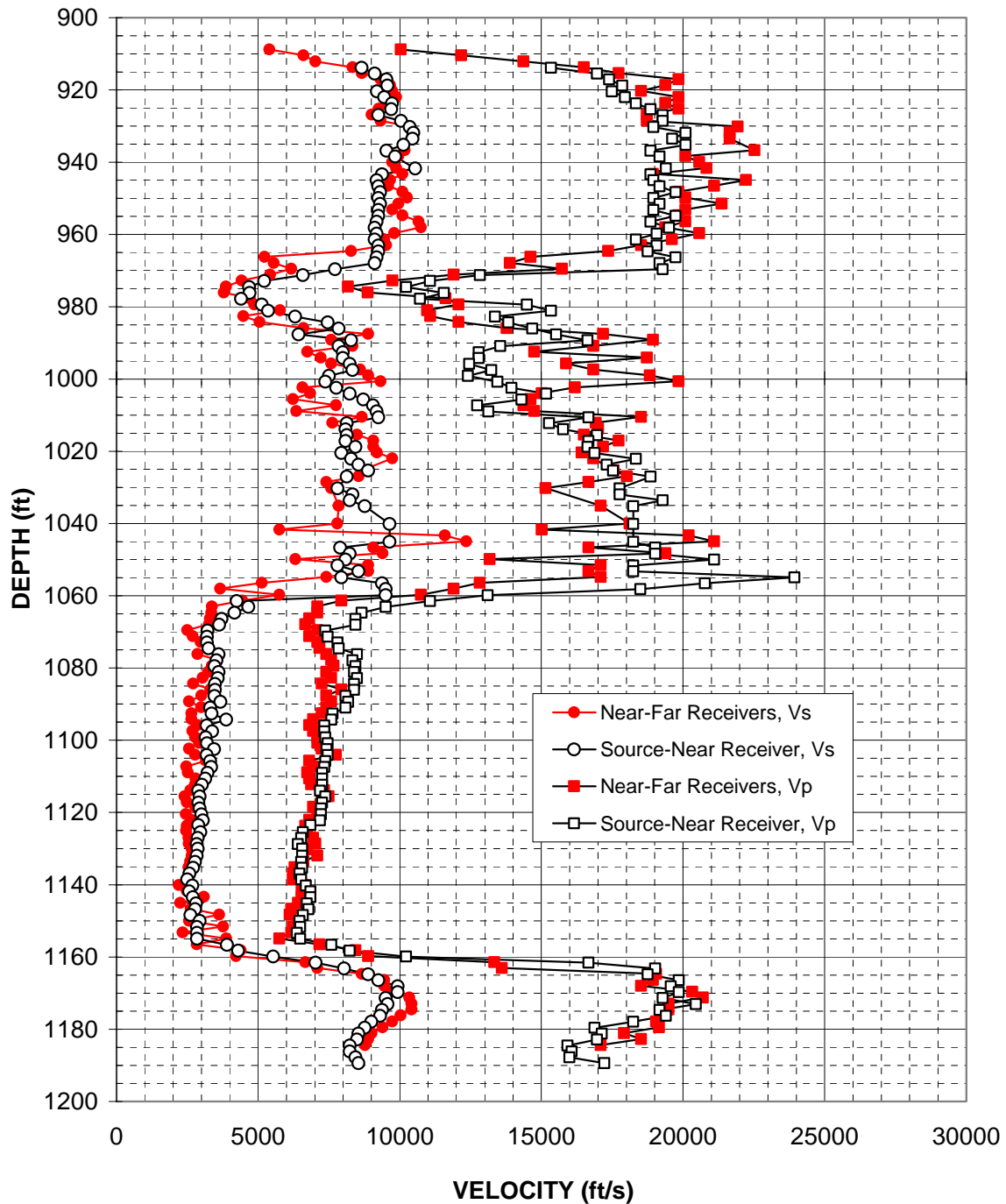


Figure A-10 Boring BH-C4996 Log 4, Suspension S-R1 P- and S_H -wave velocities

Table A-10 Boring BH-C4996 Log 4, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN #4**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
913.8	8650	15340	0.27	278.5	2640	4680	0.27
915.5	9120	16960	0.30	279.0	2780	5170	0.30
917.1	9530	17400	0.29	279.5	2910	5300	0.29
918.8	9560	17860	0.30	280.0	2910	5440	0.30
920.4	9200	17490	0.31	280.5	2800	5330	0.31
922.0	9450	17950	0.31	281.0	2880	5470	0.31
923.7	9730	18340	0.30	281.5	2960	5590	0.30
925.3	9700	18850	0.32	282.0	2960	5750	0.32
927.0	9250	19290	0.35	282.5	2820	5880	0.35
928.6	10040	19290	0.31	283.0	3060	5880	0.31
930.2	10350	18960	0.29	283.5	3160	5780	0.29
931.9	10480	20090	0.31	284.0	3190	6120	0.31
933.5	10450	19620	0.30	284.5	3180	5980	0.30
935.2	10140	20090	0.33	285.0	3090	6120	0.33
936.8	9530	18850	0.33	285.5	2910	5750	0.33
938.4	9840	19180	0.32	286.0	3000	5840	0.32
941.7	10550	19400	0.29	287.0	3210	5910	0.29
943.4	9380	18850	0.34	287.5	2860	5750	0.34
945.0	9180	18960	0.35	288.0	2800	5780	0.35
946.6	9250	19180	0.35	288.5	2820	5840	0.35
948.3	9310	19740	0.36	289.0	2840	6020	0.36
949.9	9250	18960	0.34	289.5	2820	5780	0.34
951.6	9310	19180	0.35	290.0	2840	5840	0.35
953.2	9250	18960	0.34	290.5	2820	5780	0.34
954.8	9250	19740	0.36	291.0	2820	6020	0.36
956.5	9180	18850	0.34	291.5	2800	5750	0.34
958.1	9120	19510	0.36	292.0	2780	5950	0.36
959.8	9180	19070	0.35	292.5	2800	5810	0.35
961.4	9120	18340	0.34	293.0	2780	5590	0.34
963.1	9250	19070	0.35	293.5	2820	5810	0.35
964.7	9250	18750	0.34	294.0	2820	5720	0.34
966.3	9180	19740	0.36	294.5	2800	6020	0.36
968.0	9120	19180	0.35	295.0	2780	5840	0.35
969.6	7710	19290	0.40	295.5	2350	5880	0.40
971.3	6590	12830	0.32	296.0	2010	3910	0.32

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN #4**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
972.9	5210	11070	0.36
974.5	4690	10230	0.37
976.2	4700	11560	0.40
977.8	4400	10710	0.40
979.5	5130	14480	0.43
981.1	5360	15340	0.43
982.7	6310	13370	0.36
984.4	7460	13830	0.30
986.0	7850	14670	0.30
987.7	6430	15520	0.40
989.3	8280	16630	0.33
990.9	7850	13550	0.25
992.6	7990	12780	0.18
994.2	7990	12780	0.18
995.9	8230	12450	0.11
997.5	8330	13240	0.17
999.1	7500	12410	0.21
1000.8	7380	13450	0.28
1002.4	7760	13950	0.28
1004.1	8230	15170	0.29
1005.7	8710	14300	0.21
1007.3	9060	12740	-0.01
1009.0	9180	13130	0.02
1010.6	9250	16670	0.28
1012.3	8130	15270	0.30
1013.9	8080	15770	0.32
1015.5	8130	16960	0.35
1017.2	8080	16670	0.35
1018.8	8440	16630	0.33
1020.5	7940	16880	0.36
1022.1	8280	18340	0.37
1023.7	8540	17310	0.34
1025.4	8880	17530	0.33
1027.0	8130	18850	0.39
1030.3	7800	17760	0.38
1031.9	8330	17760	0.36
1033.6	8230	19290	0.39
1035.2	8770	18240	0.35

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
296.5	1590	3370	0.36
297.0	1430	3120	0.37
297.5	1430	3520	0.40
298.0	1340	3270	0.40
298.5	1560	4420	0.43
299.0	1630	4680	0.43
299.5	1920	4070	0.36
300.0	2270	4220	0.30
300.5	2390	4470	0.30
301.0	1960	4730	0.40
301.5	2520	5070	0.33
302.0	2390	4130	0.25
302.5	2430	3900	0.18
303.0	2430	3900	0.18
303.5	2510	3800	0.11
304.0	2540	4030	0.17
304.5	2290	3780	0.21
305.0	2250	4100	0.28
305.5	2360	4250	0.28
306.0	2510	4620	0.29
306.5	2650	4360	0.21
307.0	2760	3880	-0.01
307.5	2800	4000	0.02
308.0	2820	5080	0.28
308.5	2480	4650	0.30
309.0	2460	4810	0.32
309.5	2480	5170	0.35
310.0	2460	5080	0.35
310.5	2570	5070	0.33
311.0	2420	5140	0.36
311.5	2520	5590	0.37
312.0	2600	5280	0.34
312.5	2710	5340	0.33
313.0	2480	5750	0.39
314.0	2380	5410	0.38
314.5	2540	5410	0.36
315.0	2510	5880	0.39
315.5	2670	5560	0.35

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN #4**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1040.1	9640	18240	0.31
1045.1	9640	18240	0.31
1046.7	7890	19010	0.40
1048.4	8230	19010	0.38
1050.0	8080	21090	0.41
1051.6	7800	18240	0.39
1053.3	8540	18240	0.36
1054.9	7940	23940	0.44
1056.6	9380	20770	0.37
1058.2	9510	18490	0.32
1059.8	9510	13110	-0.06
1061.5	4250	11070	0.41
1063.1	4660	9510	0.34
1064.8	4170	8650	0.35
1066.4	3710	8440	0.38
1068.0	3630	8440	0.39
1069.7	3210	7380	0.38
1071.3	3200	7460	0.39
1073.0	3200	7800	0.40
1074.6	3250	7850	0.40
1076.2	3610	8490	0.39
1077.9	3530	8330	0.39
1079.5	3460	8440	0.40
1081.2	3610	8390	0.39
1082.8	3570	8490	0.39
1084.4	3480	8390	0.40
1086.1	3480	8390	0.40
1087.7	3460	8080	0.39
1089.4	3670	8180	0.37
1091.0	3310	8080	0.40
1092.6	3360	7630	0.38
1094.3	3880	7580	0.32
1095.9	3180	7340	0.38
1097.6	3380	7340	0.37
1099.2	3150	7380	0.39
1100.8	3200	7460	0.39
1102.5	3440	7420	0.36
1104.1	3180	7460	0.39

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
317.0	2940	5560	0.31
318.5	2940	5560	0.31
319.0	2410	5800	0.40
319.5	2510	5800	0.38
320.0	2460	6430	0.41
320.5	2380	5560	0.39
321.0	2600	5560	0.36
321.5	2420	7300	0.44
322.0	2860	6330	0.37
322.5	2900	5640	0.32
323.0	2900	3990	-0.06
323.5	1290	3370	0.41
324.0	1420	2900	0.34
324.5	1270	2640	0.35
325.0	1130	2570	0.38
325.5	1110	2570	0.39
326.0	980	2250	0.38
326.5	980	2270	0.39
327.0	980	2380	0.40
327.5	990	2390	0.40
328.0	1100	2590	0.39
328.5	1080	2540	0.39
329.0	1060	2570	0.40
329.5	1100	2560	0.39
330.0	1090	2590	0.39
330.5	1060	2560	0.40
331.0	1060	2560	0.40
331.5	1060	2460	0.39
332.0	1120	2490	0.37
332.5	1010	2460	0.40
333.0	1020	2320	0.38
333.5	1180	2310	0.32
334.0	970	2240	0.38
334.5	1030	2240	0.37
335.0	960	2250	0.39
335.5	980	2270	0.39
336.0	1050	2260	0.36
336.5	970	2270	0.39

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN #4**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1105.8	3310	7380	0.37
1107.4	3340	7340	0.37
1109.0	3210	7260	0.38
1110.7	3140	7260	0.38
1112.3	3010	7260	0.40
1114.0	2880	7180	0.40
1115.6	2930	7380	0.41
1117.2	2900	7260	0.41
1118.9	2930	7220	0.40
1120.5	3000	7220	0.40
1122.2	3050	7180	0.39
1123.5	2880	6850	0.39
1125.5	2960	6590	0.37
1127.1	2870	6520	0.38
1128.7	2840	6400	0.38
1130.0	2870	6550	0.38
1132.0	2840	6550	0.38
1133.7	2780	6520	0.39
1135.3	2710	6550	0.40
1136.9	2580	6460	0.41
1138.6	2500	6520	0.41
1140.2	2680	6680	0.40
1141.9	2570	6850	0.42
1143.5	2700	6850	0.41
1145.1	2810	6720	0.39
1146.8	2780	6780	0.40
1148.4	2620	6590	0.41
1150.1	2930	6460	0.37
1151.7	2850	6490	0.38
1153.3	2850	6370	0.37
1155.0	2850	6490	0.38
1156.6	3900	7580	0.32
1158.3	4300	8230	0.31
1159.9	5530	10230	0.29
1161.5	7030	16670	0.39
1163.2	8040	19010	0.39
1164.8	8880	18750	0.36
1166.5	9250	19850	0.36

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
337.0	1010	2250	0.37
337.5	1020	2240	0.37
338.0	980	2210	0.38
338.5	960	2210	0.38
339.0	920	2210	0.40
339.5	880	2190	0.40
340.0	890	2250	0.41
340.5	880	2210	0.41
341.0	890	2200	0.40
341.5	910	2200	0.40
342.0	930	2190	0.39
342.4	880	2090	0.39
343.0	900	2010	0.37
343.5	880	1990	0.38
344.0	860	1950	0.38
344.4	880	2000	0.38
345.0	860	2000	0.38
345.5	850	1990	0.39
346.0	830	2000	0.40
346.5	790	1970	0.41
347.0	760	1990	0.41
347.5	820	2040	0.40
348.0	780	2090	0.42
348.5	820	2090	0.41
349.0	860	2050	0.39
349.5	850	2070	0.40
350.0	800	2010	0.41
350.5	890	1970	0.37
351.0	870	1980	0.38
351.5	870	1940	0.37
352.0	870	1980	0.38
352.5	1190	2310	0.32
353.0	1310	2510	0.31
353.5	1690	3120	0.29
354.0	2140	5080	0.39
354.5	2450	5800	0.39
355.0	2710	5720	0.36
355.5	2820	6050	0.36

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN #4**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1168.1	9930	19570	0.33
1169.7	9930	19850	0.33
1171.4	9510	19290	0.34
1173.0	9570	20450	0.36
1174.7	9380	19180	0.34
1176.3	9310	19400	0.35
1177.9	9000	18240	0.34
1179.6	8770	16880	0.32
1181.2	8540	17130	0.33
1182.9	8490	16960	0.33
1184.5	8230	15920	0.32
1186.1	8230	16070	0.32
1187.8	8440	16000	0.31
1189.4	8540	17220	0.34

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
356.0	3030	5960	0.33
356.5	3030	6050	0.33
357.0	2900	5880	0.34
357.5	2920	6230	0.36
358.0	2860	5840	0.34
358.5	2840	5910	0.35
359.0	2740	5560	0.34
359.5	2670	5140	0.32
360.0	2600	5220	0.33
360.5	2590	5170	0.33
361.0	2510	4850	0.32
361.5	2510	4900	0.32
362.0	2570	4880	0.31
362.5	2600	5250	0.34

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Borehole C4996 - Log 5A Source to Receiver and Receiver to Receiver Analysis

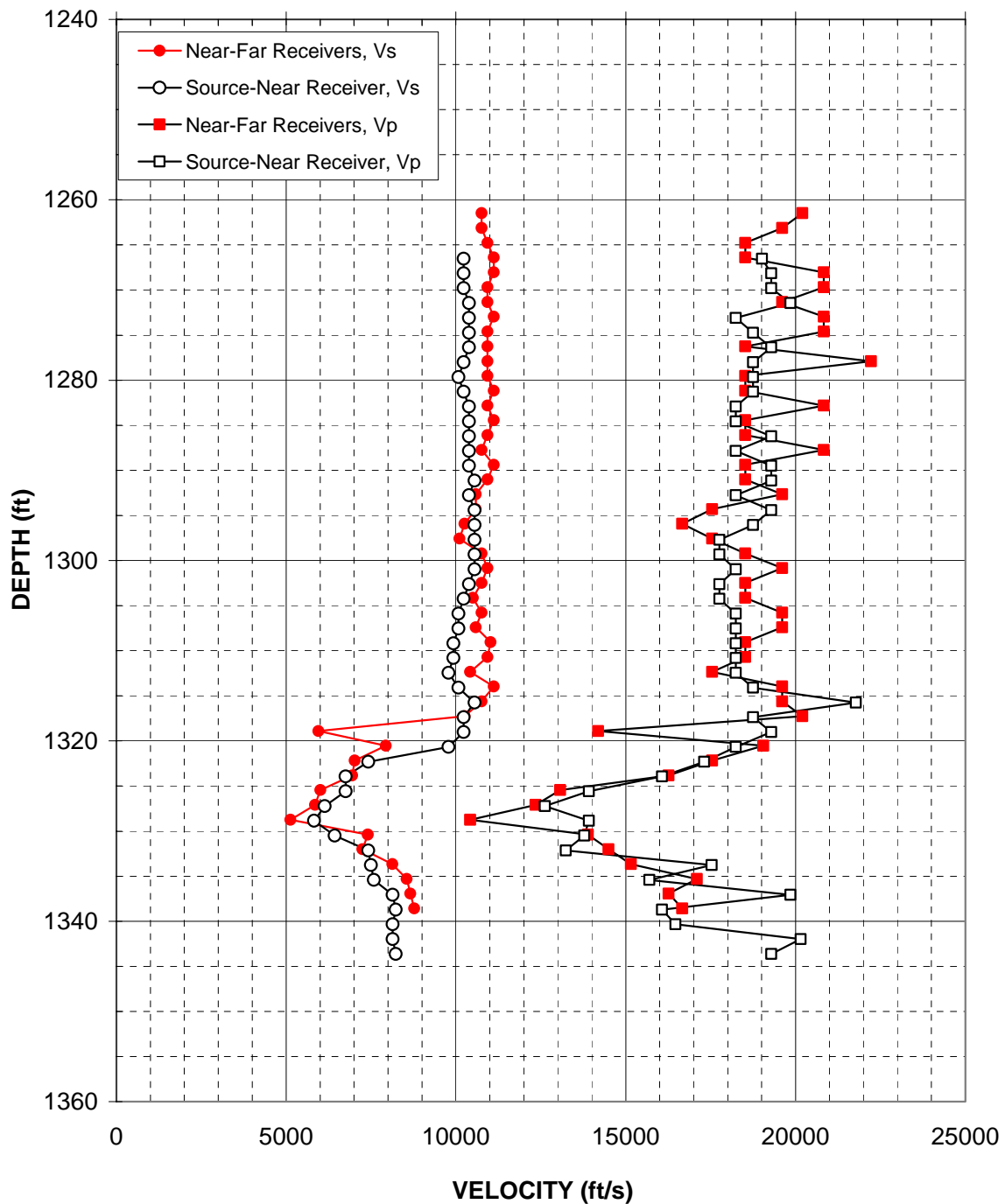


Figure A-11 Boring BH-C4996 Log 5A, Suspension S-R1 P- and S_H -wave velocities

Table A-11 Boring BH-C4996 Log 5A, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN #8A**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1266.5	10230	19010	0.30	386.0	3120	5800	0.30
1268.2	10230	19290	0.30	386.5	3120	5880	0.30
1269.8	10230	19290	0.30	387.0	3120	5880	0.30
1271.4	10380	19850	0.31	387.5	3170	6050	0.31
1273.1	10380	18240	0.26	388.0	3170	5560	0.26
1274.7	10380	18750	0.28	388.5	3170	5710	0.28
1276.4	10380	19290	0.30	389.0	3170	5880	0.30
1278.0	10230	18750	0.29	389.5	3120	5710	0.29
1279.7	10070	18750	0.30	390.0	3070	5710	0.30
1281.3	10230	18750	0.29	390.5	3120	5710	0.29
1282.9	10380	18240	0.26	391.0	3170	5560	0.26
1284.6	10380	18240	0.26	391.5	3170	5560	0.26
1286.2	10380	19290	0.30	392.0	3170	5880	0.30
1287.9	10380	18240	0.26	392.5	3170	5560	0.26
1289.5	10380	19290	0.30	393.0	3170	5880	0.30
1291.1	10550	19290	0.29	393.5	3210	5880	0.29
1292.8	10380	18240	0.26	394.0	3170	5560	0.26
1294.4	10550	19290	0.29	394.5	3210	5880	0.29
1296.1	10550	18750	0.27	395.0	3210	5710	0.27
1297.7	10550	17760	0.23	395.5	3210	5410	0.23
1299.3	10550	17760	0.23	396.0	3210	5410	0.23
1301.0	10550	18240	0.25	396.5	3210	5560	0.25
1302.6	10380	17760	0.24	397.0	3170	5410	0.24
1304.3	10230	17760	0.25	397.5	3120	5410	0.25
1305.9	10070	18240	0.28	398.0	3070	5560	0.28
1307.5	10070	18240	0.28	398.5	3070	5560	0.28
1309.2	9930	18240	0.29	399.0	3030	5560	0.29
1310.8	9930	18240	0.29	399.5	3030	5560	0.29
1312.5	9780	18240	0.30	400.0	2980	5560	0.30
1314.1	10070	18750	0.30	400.5	3070	5710	0.30
1315.7	10550	21770	0.35	401.0	3210	6640	0.35
1317.4	10230	18750	0.29	401.5	3120	5710	0.29
1319.0	10230	19290	0.30	402.0	3120	5880	0.30
1320.7	9780	18240	0.30	402.5	2980	5560	0.30
1322.3	7420	17310	0.39	403.0	2260	5280	0.39

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN #8A**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1323.9	6750	16070	0.39	403.5	2060	4900	0.39
1325.6	6750	13920	0.35	404.0	2060	4240	0.35
1327.2	6140	12620	0.35	404.5	1870	3850	0.35
1328.9	5820	13920	0.39	405.0	1770	4240	0.39
1330.5	6430	13780	0.36	405.5	1960	4200	0.36
1332.1	7420	13240	0.27	406.0	2260	4030	0.27
1333.8	7500	17530	0.39	406.5	2290	5340	0.39
1335.4	7580	15700	0.35	407.0	2310	4780	0.35
1337.1	8130	19850	0.40	407.5	2480	6050	0.40
1338.7	8230	16070	0.32	408.0	2510	4900	0.32
1340.3	8130	16460	0.34	408.5	2480	5020	0.34
1342.0	8130	20150	0.40	409.0	2480	6140	0.40
1343.6	8230	19290	0.39	409.5	2510	5880	0.39

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Borehole C4996 - Log 5B Source to Receiver and Receiver to Receiver Analysis

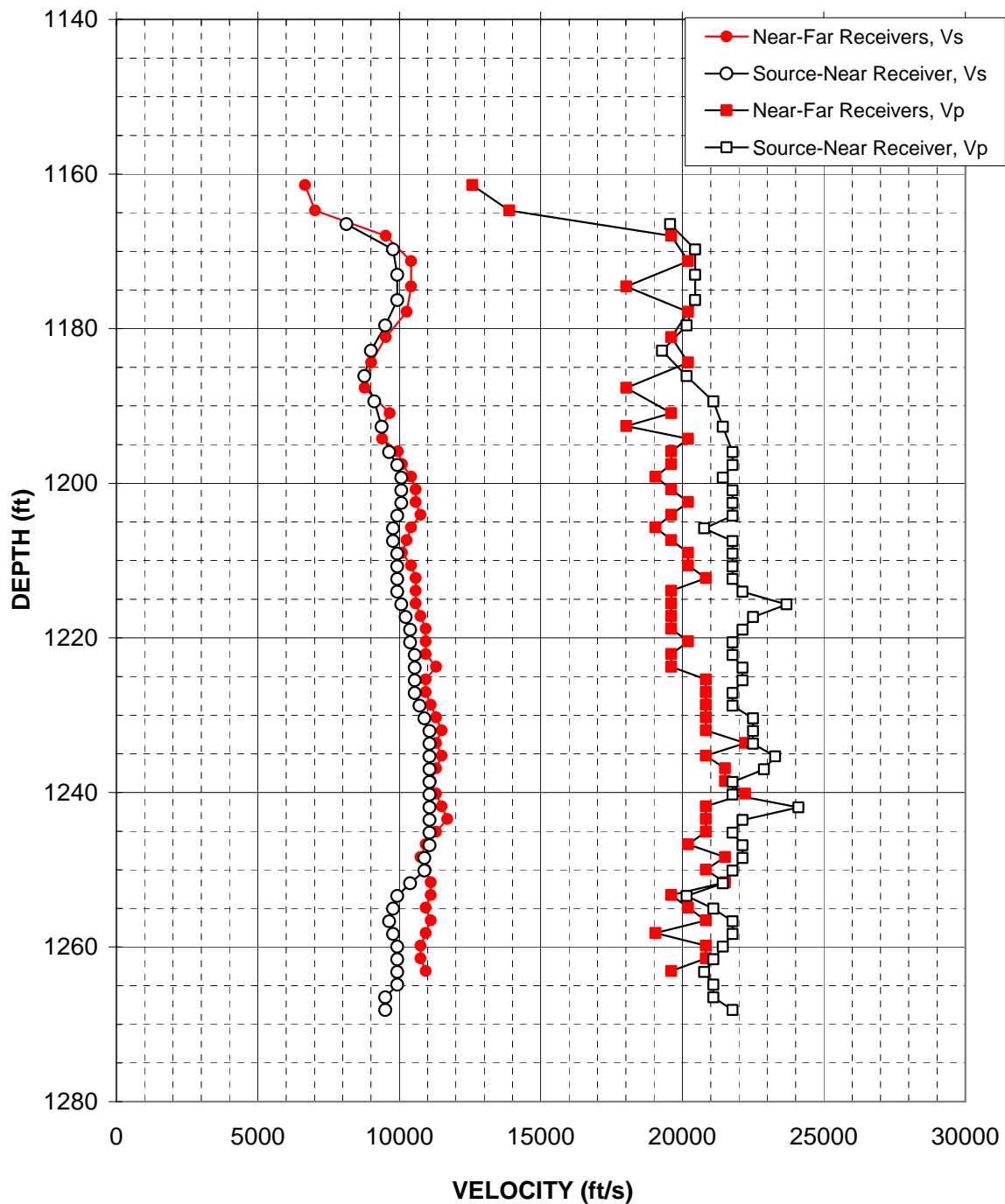


Figure A-12 Boring BH-C4996 Log 5B, Suspension S-R1 P- and S_H-wave velocities

Table A-12 Boring BH-C4996 Log 5B, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996**

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1161.4	6670	12580	0.30	354.0	2030	3830	0.30
1164.7	7020	13890	0.33	355.0	2140	4230	0.33
1168.0	9520	19610	0.35	356.0	2900	5980	0.35
1171.3	10420	20200	0.32	357.0	3180	6160	0.32
1174.5	10420	18020	0.25	358.0	3180	5490	0.25
1177.8	10260	20200	0.33	359.0	3130	6160	0.33
1181.1	9520	19610	0.35	360.0	2900	5980	0.35
1184.4	9010	20200	0.38	361.0	2750	6160	0.38
1187.7	8770	18020	0.34	362.0	2670	5490	0.34
1190.9	9660	19610	0.34	363.0	2940	5980	0.34
1192.6	9390	18020	0.31	363.5	2860	5490	0.31
1194.2	9390	20200	0.36	364.0	2860	6160	0.36
1195.9	9950	19610	0.33	364.5	3030	5980	0.33
1197.5	10100	19610	0.32	365.0	3080	5980	0.32
1199.2	10420	19050	0.29	365.5	3180	5810	0.29
1200.8	10580	19610	0.29	366.0	3230	5980	0.29
1202.4	10580	20200	0.31	366.5	3230	6160	0.31
1204.1	10750	19610	0.28	367.0	3280	5980	0.28
1205.7	10420	19050	0.29	367.5	3180	5810	0.29
1207.4	10260	19610	0.31	368.0	3130	5980	0.31
1209.0	10100	20200	0.33	368.5	3080	6160	0.33
1210.6	10420	20200	0.32	369.0	3180	6160	0.32
1212.3	10580	20830	0.33	369.5	3230	6350	0.33
1213.9	10580	19610	0.29	370.0	3230	5980	0.29
1215.6	10580	19610	0.29	370.5	3230	5980	0.29
1217.2	10750	19610	0.28	371.0	3280	5980	0.28
1218.8	10930	19610	0.27	371.5	3330	5980	0.27
1220.5	10930	20200	0.29	372.0	3330	6160	0.29
1222.1	10930	19610	0.27	372.5	3330	5980	0.27
1223.8	11300	19610	0.25	373.0	3440	5980	0.25
1225.4	10930	20830	0.31	373.5	3330	6350	0.31
1227.0	10930	20830	0.31	374.0	3330	6350	0.31
1228.7	11110	20830	0.30	374.5	3390	6350	0.30
1230.3	11300	20830	0.29	375.0	3440	6350	0.29
1232.0	11490	20830	0.28	375.5	3500	6350	0.28

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996**

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1233.6	11300	22220	0.33
1235.2	11490	20830	0.28
1236.9	11300	21510	0.31
1238.5	11110	21510	0.32
1240.2	11300	22220	0.33
1241.8	11490	20830	0.28
1243.4	11700	20830	0.27
1245.1	11300	20830	0.29
1246.7	10930	20200	0.29
1248.4	10750	21510	0.33
1250.0	10930	20830	0.31
1251.6	11110	21510	0.32
1253.3	11110	19610	0.26
1254.9	10930	20200	0.29
1256.6	11110	20830	0.30
1258.2	10930	19050	0.25
1259.8	10750	20830	0.32
1261.5	10750	20830	0.32
1263.1	10930	19610	0.27

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
376.0	3440	6770	0.33
376.5	3500	6350	0.28
377.0	3440	6550	0.31
377.5	3390	6550	0.32
378.0	3440	6770	0.33
378.5	3500	6350	0.28
379.0	3560	6350	0.27
379.5	3440	6350	0.29
380.0	3330	6160	0.29
380.5	3280	6550	0.33
381.0	3330	6350	0.31
381.5	3390	6550	0.32
382.0	3390	5980	0.26
382.5	3330	6160	0.29
383.0	3390	6350	0.30
383.5	3330	5810	0.25
384.0	3280	6350	0.32
384.5	3280	6350	0.32
385.0	3330	5980	0.27

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4996 - Log 6 Source to Receiver and Receiver to Receiver Analysis

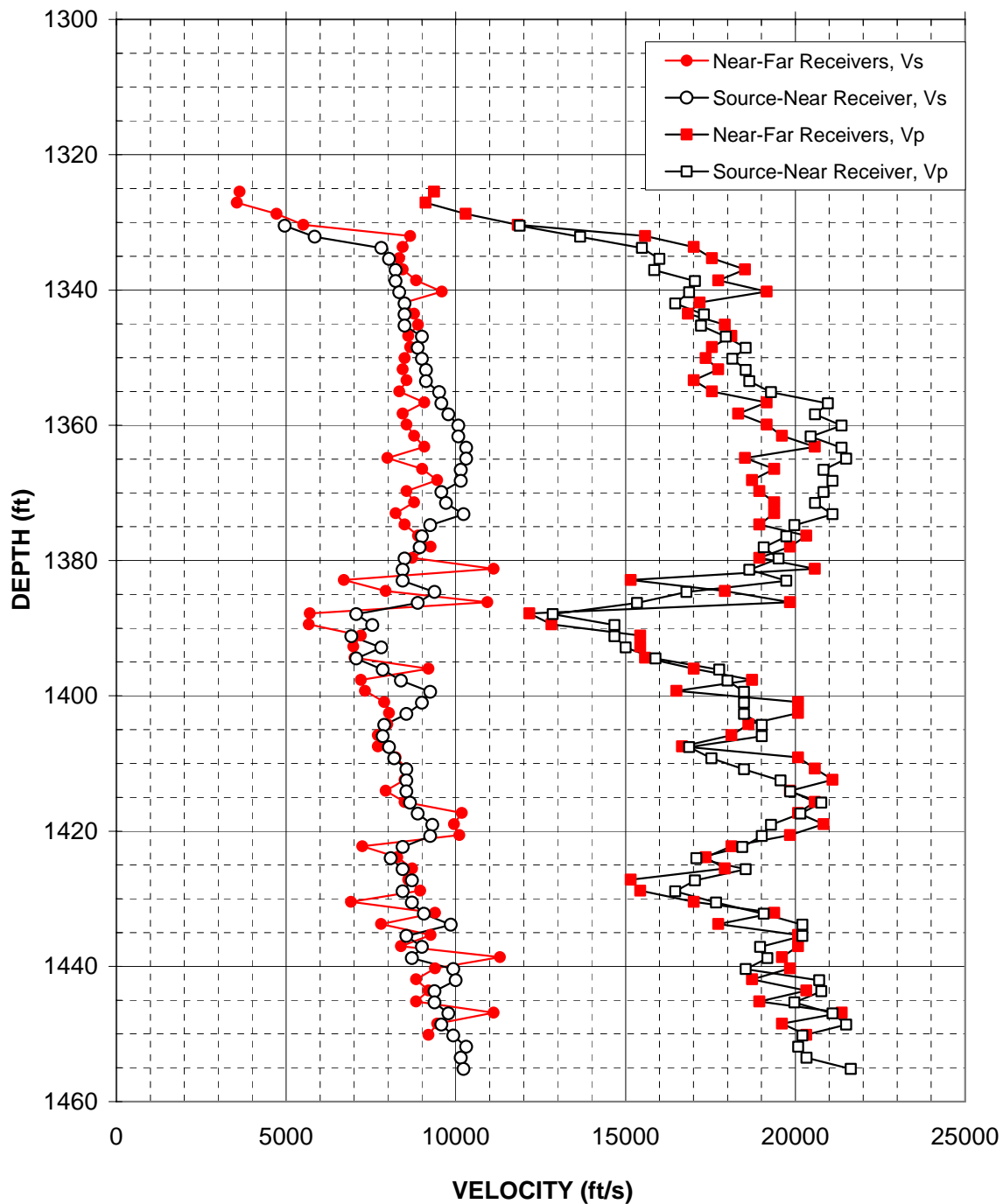


Figure A-13 Boring BH-C4996 Log 6, Suspension S-R1 P- and S_H-wave velocities

Table A-13 Boring BH-C4996 Log 6, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN #6**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1330.5	4960	11880	0.39	405.5	1510	3620	0.39
1332.1	5840	13660	0.39	406.0	1780	4160	0.39
1333.8	7800	15480	0.33	406.5	2380	4720	0.33
1335.4	8040	16000	0.33	407.0	2450	4880	0.33
1337.1	8230	15850	0.32	407.5	2510	4830	0.32
1338.7	8230	17050	0.35	408.0	2510	5200	0.35
1340.3	8330	16880	0.34	408.5	2540	5140	0.34
1342.0	8490	16460	0.32	409.0	2590	5020	0.32
1343.6	8490	17310	0.34	409.5	2590	5280	0.34
1345.3	8490	17220	0.34	410.0	2590	5250	0.34
1346.9	9000	17950	0.33	410.5	2740	5470	0.33
1348.5	8880	18540	0.35	411.0	2710	5650	0.35
1350.2	9000	18150	0.34	411.5	2740	5530	0.34
1351.8	9120	18540	0.34	412.0	2780	5650	0.34
1353.5	9120	18650	0.34	412.5	2780	5680	0.34
1355.1	9510	19290	0.34	413.0	2900	5880	0.34
1356.8	9570	20960	0.37	413.5	2920	6390	0.37
1358.4	9780	20580	0.35	414.0	2980	6270	0.35
1360.0	10070	21360	0.36	414.5	3070	6510	0.36
1361.7	10070	20450	0.34	415.0	3070	6230	0.34
1363.3	10310	21360	0.35	415.5	3140	6510	0.35
1365.0	10310	21500	0.35	416.0	3140	6550	0.35
1366.6	10150	20830	0.34	416.5	3090	6350	0.34
1368.2	10150	21090	0.35	417.0	3090	6430	0.35
1369.9	9570	20830	0.37	417.5	2920	6350	0.37
1371.5	9710	20580	0.36	418.0	2960	6270	0.36
1373.2	10230	21090	0.35	418.5	3120	6430	0.35
1374.8	9250	19970	0.36	419.0	2820	6090	0.36
1376.4	9000	19740	0.37	419.5	2740	6020	0.37
1378.1	8940	19070	0.36	420.0	2730	5810	0.36
1379.7	8490	19510	0.38	420.5	2590	5950	0.38
1381.4	8440	18650	0.37	421.0	2570	5680	0.37
1383.0	8440	19740	0.39	421.5	2570	6020	0.39
1384.6	9380	16790	0.27	422.0	2860	5120	0.27
1386.3	8880	15340	0.25	422.5	2710	4680	0.25

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN #6**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1387.9	7070	12860	0.28	423.0	2150	3920	0.28
1389.6	7540	14670	0.32	423.5	2300	4470	0.32
1391.2	6920	14670	0.36	424.0	2110	4470	0.36
1392.8	7800	15000	0.31	424.5	2380	4570	0.31
1394.5	7070	15880	0.38	425.0	2150	4840	0.38
1396.1	7850	17760	0.38	425.5	2390	5410	0.38
1397.8	8390	18000	0.36	426.0	2560	5490	0.36
1399.4	9250	18490	0.33	426.5	2820	5640	0.33
1401.0	9000	18490	0.34	427.0	2740	5640	0.34
1402.7	8540	18490	0.36	427.5	2600	5640	0.36
1404.3	7890	19010	0.40	428.0	2410	5800	0.40
1406.0	7850	19010	0.40	428.5	2390	5800	0.40
1407.6	8040	16880	0.35	429.0	2450	5140	0.35
1409.2	8180	17530	0.36	429.5	2490	5340	0.36
1410.9	8540	18490	0.36	430.0	2600	5640	0.36
1412.5	8540	19570	0.38	430.5	2600	5960	0.38
1414.2	8540	19850	0.39	431.0	2600	6050	0.39
1415.8	8650	20770	0.39	431.5	2640	6330	0.39
1417.4	8880	20150	0.38	432.0	2710	6140	0.38
1419.1	9310	19290	0.35	432.5	2840	5880	0.35
1420.7	9250	19010	0.35	433.0	2820	5800	0.35
1422.4	8440	18440	0.37	433.5	2570	5620	0.37
1424.0	8080	17090	0.36	434.0	2460	5210	0.36
1425.6	8440	18540	0.37	434.5	2570	5650	0.37
1427.3	8710	17050	0.32	435.0	2650	5200	0.32
1428.9	8440	16460	0.32	435.5	2570	5020	0.32
1430.6	8710	17670	0.34	436.0	2650	5390	0.34
1432.2	9060	19070	0.35	436.5	2760	5810	0.35
1433.9	9850	20210	0.34	437.0	3000	6160	0.34
1435.5	8540	20210	0.39	437.5	2600	6160	0.39
1437.1	9000	18960	0.35	438.0	2740	5780	0.35
1438.8	8710	19180	0.37	438.5	2650	5840	0.37
1440.4	9930	18540	0.30	439.0	3030	5650	0.30
1442.1	10000	20710	0.35	439.5	3050	6310	0.35
1443.7	9380	20770	0.37	440.0	2860	6330	0.37
1445.3	9380	19970	0.36	440.5	2860	6090	0.36
1447.0	9780	21090	0.36	441.0	2980	6430	0.36
1448.6	9570	21500	0.38	441.5	2920	6550	0.38

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4996 RUN #6**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1450.3	9930	20210	0.34	442.0	3030	6160	0.34
1451.9	10310	20090	0.32	442.5	3140	6120	0.32
1453.5	10150	20330	0.33	443.0	3090	6200	0.33
1455.2	10230	21630	0.36	443.5	3120	6590	0.36

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4997 - Log 1 Source to Receiver and Receiver to Receiver Analysis

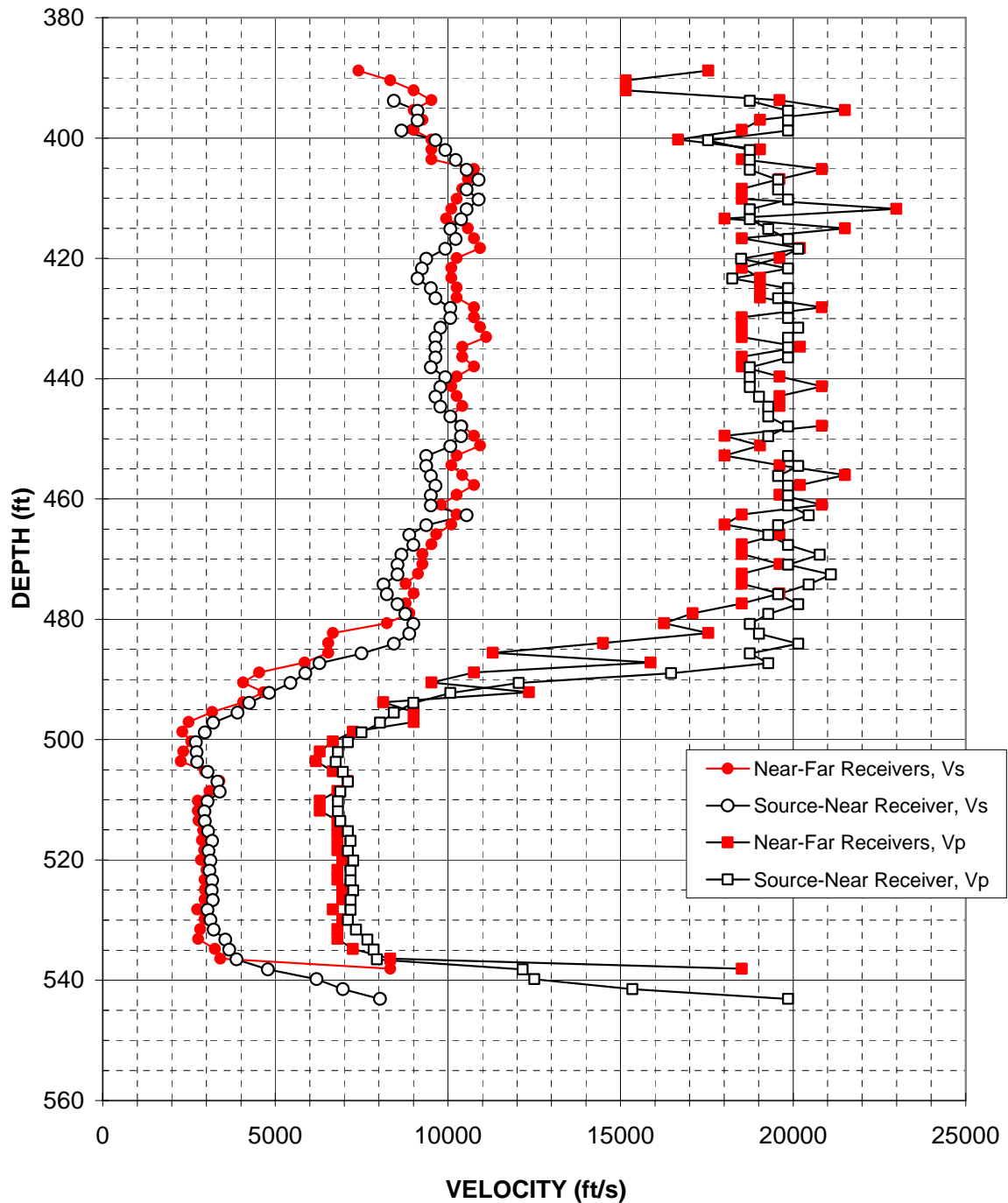


Figure A-14 Boring BH-C4997 Log 1, Suspension S-R1 P- and S_H -wave velocities

Table A-14 Boring BH-C4997 Log 1, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 RUN #1**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
393.8	8440	18750	0.37	120.0	2570	5710	0.37
395.5	9120	19850	0.37	120.5	2780	6050	0.37
397.1	9120	19850	0.37	121.0	2780	6050	0.37
398.7	8650	19850	0.38	121.5	2640	6050	0.38
400.4	9640	17530	0.28	122.0	2940	5340	0.28
402.0	9930	18750	0.31	122.5	3030	5710	0.31
403.7	10230	18750	0.29	123.0	3120	5710	0.29
405.3	10550	18750	0.27	123.5	3210	5710	0.27
406.9	10890	19570	0.28	124.0	3320	5960	0.28
408.6	10550	19570	0.30	124.5	3210	5960	0.30
410.2	10890	19850	0.28	125.0	3320	6050	0.28
411.9	10550	18750	0.27	125.5	3210	5710	0.27
413.5	10380	18750	0.28	126.0	3170	5710	0.28
415.1	10070	19290	0.31	126.5	3070	5880	0.31
416.8	10230	19850	0.32	127.0	3120	6050	0.32
418.4	9930	20150	0.34	127.5	3030	6140	0.34
420.1	9380	18490	0.33	128.0	2860	5640	0.33
421.7	9250	19850	0.36	128.5	2820	6050	0.36
423.4	9120	18240	0.33	129.0	2780	5560	0.33
425.0	9510	19850	0.35	129.5	2900	6050	0.35
426.6	9640	19570	0.34	130.0	2940	5960	0.34
428.3	10070	19850	0.33	130.5	3070	6050	0.33
429.9	10070	19850	0.33	131.0	3070	6050	0.33
431.6	9780	20150	0.35	131.5	2980	6140	0.35
433.2	9640	19850	0.35	132.0	2940	6050	0.35
434.8	9640	19850	0.35	132.5	2940	6050	0.35
436.5	9640	19850	0.35	133.0	2940	6050	0.35
438.1	9510	18750	0.33	133.5	2900	5710	0.33
439.8	9930	18750	0.31	134.0	3030	5710	0.31
441.4	9780	18750	0.31	134.5	2980	5710	0.31
443.0	9640	19010	0.33	135.0	2940	5800	0.33
444.7	9780	19290	0.33	135.5	2980	5880	0.33
446.3	10070	19290	0.31	136.0	3070	5880	0.31
448.0	10380	19850	0.31	136.5	3170	6050	0.31
449.6	10380	19290	0.30	137.0	3170	5880	0.30
451.2	10070	-	-	137.5	3070	-	-

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 RUN #1**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
452.9	9380	19850	0.36	138.0	2860	6050	0.36
454.5	9380	20150	0.36	138.5	2860	6140	0.36
456.2	9510	19570	0.35	139.0	2900	5960	0.35
457.8	9640	19850	0.35	139.5	2940	6050	0.35
459.4	9510	19850	0.35	140.0	2900	6050	0.35
461.1	9510	19850	0.35	140.5	2900	6050	0.35
462.7	10550	20450	0.32	141.0	3210	6230	0.32
464.4	9380	19570	0.35	141.5	2860	5960	0.35
466.0	8880	19290	0.37	142.0	2710	5880	0.37
467.6	9000	19850	0.37	142.5	2740	6050	0.37
469.3	8650	20770	0.39	143.0	2640	6330	0.39
470.9	8540	19850	0.39	143.5	2600	6050	0.39
472.6	8540	21090	0.40	144.0	2600	6430	0.40
474.2	8130	20450	0.41	144.5	2480	6230	0.41
475.8	8230	19570	0.39	145.0	2510	5960	0.39
477.5	8540	20150	0.39	145.5	2600	6140	0.39
479.1	8770	19290	0.37	146.0	2670	5880	0.37
480.8	9000	18750	0.35	146.5	2740	5710	0.35
482.4	8880	19010	0.36	147.0	2710	5800	0.36
484.0	8440	20150	0.39	147.5	2570	6140	0.39
485.7	7500	18750	0.40	148.0	2290	5710	0.40
487.3	6280	19290	0.44	148.5	1910	5880	0.44
489.0	5870	16460	0.43	149.0	1790	5020	0.43
490.6	5440	12050	0.37	149.5	1660	3670	0.37
492.2	4820	10070	0.35	150.0	1470	3070	0.35
493.9	4250	9000	0.36	150.5	1290	2740	0.36
495.5	3900	8440	0.36	151.0	1190	2570	0.36
497.2	3200	8040	0.41	151.5	980	2450	0.41
498.8	2960	7500	0.41	152.0	900	2290	0.41
500.5	2700	7110	0.42	152.5	820	2170	0.42
502.1	2720	6820	0.41	153.0	830	2080	0.41
503.7	2730	6750	0.40	153.5	830	2060	0.40
505.4	3040	6960	0.38	154.0	930	2120	0.38
507.0	3330	7110	0.36	154.5	1010	2170	0.36
508.7	3390	6890	0.34	155.0	1030	2100	0.34
510.3	3040	6820	0.38	155.5	930	2080	0.38
511.9	2950	6820	0.39	156.0	900	2080	0.39
513.6	2960	6890	0.39	156.5	900	2100	0.39
515.2	3050	7110	0.39	157.0	930	2170	0.39

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 RUN #1**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
516.9	3170	7180	0.38	157.5	970	2190	0.38
518.5	3070	7110	0.39	158.0	940	2170	0.39
520.1	3130	7260	0.39	158.5	950	2210	0.39
521.8	3100	7180	0.39	159.0	940	2190	0.39
523.4	3170	7180	0.38	159.5	970	2190	0.38
525.1	3150	7260	0.38	160.0	960	2210	0.38
526.7	3180	7180	0.38	160.5	970	2190	0.38
528.3	3040	7180	0.39	161.0	930	2190	0.39
530.0	3130	7110	0.38	161.5	950	2170	0.38
531.6	3210	7340	0.38	162.0	980	2240	0.38
533.3	3550	7670	0.36	162.5	1080	2340	0.36
534.9	3670	7850	0.36	163.0	1120	2390	0.36
536.5	3880	7940	0.34	163.5	1180	2420	0.34
538.2	4790	12160	0.41	164.0	1460	3710	0.41
539.8	6190	12500	0.34	164.5	1890	3810	0.34
541.5	6960	15340	0.37	165.0	2120	4680	0.37
543.1	8040	19850	0.40	165.5	2450	6050	0.40

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4997 - Log 2 Source to Receiver and Receiver to Receiver Analysis

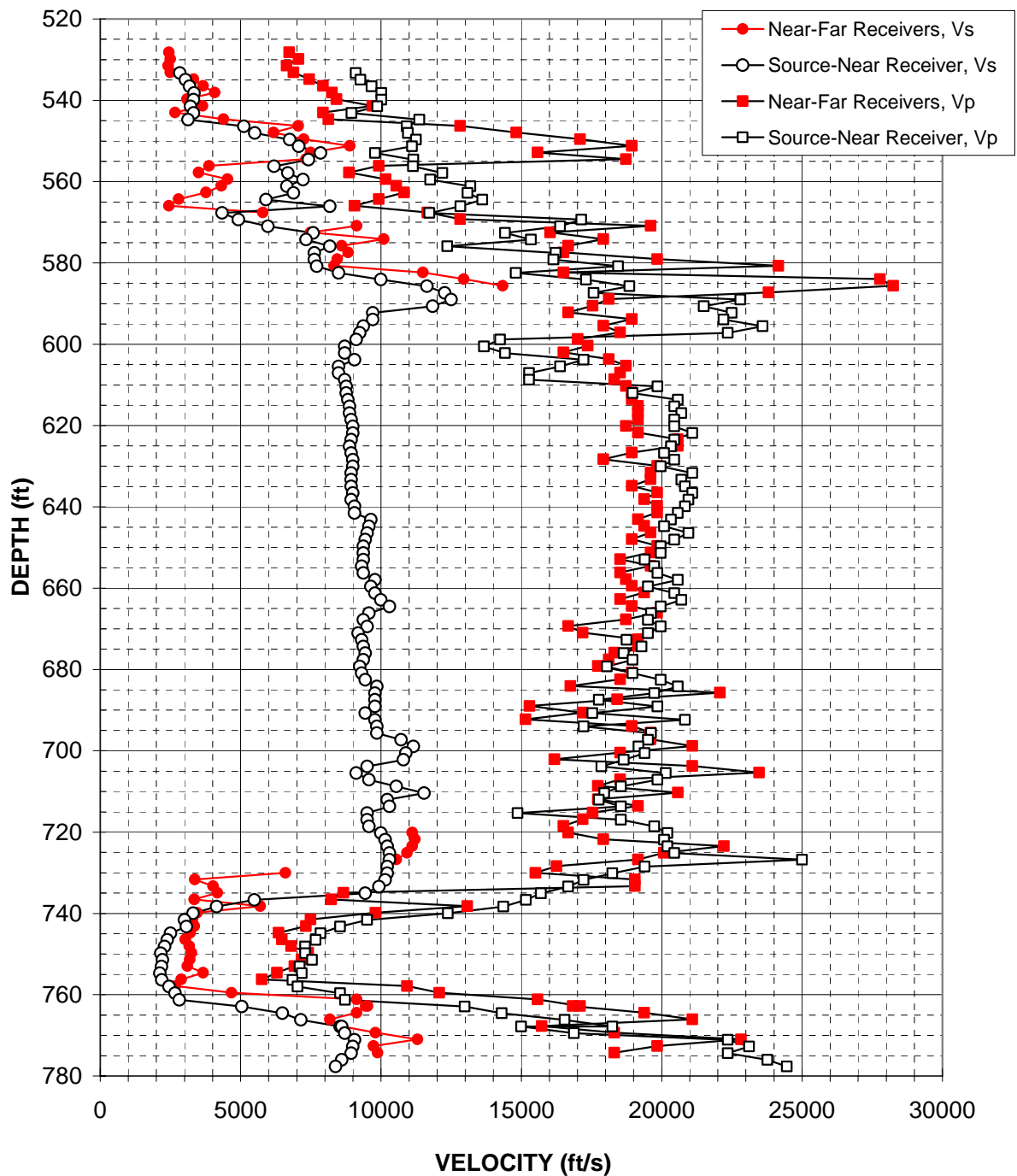


Figure A-15 Boring BH-C4997 Log 2, Suspension S-R1 P- and S_H -wave velocities

Table A-15: Boring BH-C4997 Log 2, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 LOG #2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
533.3	2830	9100	0.45	162.5	860	2770	0.45
534.9	3030	9270	0.44	163.0	920	2830	0.44
536.5	3180	9670	0.44	163.5	970	2950	0.44
538.2	3340	10010	0.44	164.0	1020	3050	0.44
539.8	3330	10010	0.44	164.5	1010	3050	0.44
541.5	3210	9870	0.44	165.0	980	3010	0.44
543.1	3330	8950	0.42	165.5	1010	2730	0.42
544.7	3130	11360	0.46	166.0	950	3460	0.46
546.4	5110	10920	0.36	166.5	1560	3330	0.36
548.0	5510	10960	0.33	167.0	1680	3340	0.33
549.7	6750	11250	0.22	167.5	2060	3430	0.22
551.3	7070	11100	0.16	168.0	2150	3380	0.16
552.9	7850	9780	-	168.5	2390	2980	-
554.6	7420	11160	0.10	169.0	2260	3400	0.10
556.2	6190	11140	0.28	169.5	1890	3400	0.28
557.9	6680	12180	0.28	170.0	2040	3710	0.28
559.5	7220	11760	0.20	170.5	2200	3580	0.20
561.1	6650	13180	0.33	171.0	2030	4020	0.33
562.8	6890	13080	0.31	171.5	2100	3990	0.31
564.4	5900	13610	0.38	172.0	1800	4150	0.38
566.1	8180	12830	0.16	172.5	2490	3910	0.16
567.7	4340	11720	0.42	173.0	1320	3570	0.42
569.3	4920	17130	0.46	173.5	1500	5220	0.46
571.0	5970	16380	0.42	174.0	1820	4990	0.42
572.6	7580	14420	0.31	174.5	2310	4400	0.31
574.3	7340	15340	0.35	175.0	2240	4680	0.35
575.9	8180	12360	0.11	175.5	2490	3770	0.11
577.6	7630	16230	0.36	176.0	2320	4950	0.36
579.2	7630	16150	0.36	176.5	2320	4920	0.36
580.8	7710	18440	0.39	177.0	2350	5620	0.39
582.5	8490	14800	0.25	177.5	2590	4510	0.25
584.1	10000	17310	0.25	178.0	3050	5280	0.25
585.8	11640	18850	0.19	178.5	3550	5750	0.19
587.4	12270	17580	0.02	179.0	3740	5360	0.02
589.0	12500	22800	0.29	179.5	3810	6950	0.29

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 LOG #2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
590.7	11840	21500	0.28	180.0	3610	6550	0.28
592.3	9710	22500	0.39	180.5	2960	6860	0.39
594.0	9710	22200	0.38	181.0	2960	6770	0.38
595.6	9380	23600	0.41	181.5	2860	7190	0.41
597.2	9250	22350	0.40	182.0	2820	6810	0.40
598.9	9120	14240	0.15	182.5	2780	4340	0.15
600.5	8710	13660	0.16	183.0	2650	4160	0.16
602.2	8710	14420	0.21	183.5	2650	4400	0.21
603.8	9060	17220	0.31	184.0	2760	5250	0.31
605.4	8490	16380	0.32	184.5	2590	4990	0.32
607.1	8490	15270	0.28	185.0	2590	4650	0.28
608.7	8710	15270	0.26	185.5	2650	4650	0.26
610.4	8770	19850	0.38	186.0	2670	6050	0.38
612.0	8770	18960	0.36	186.5	2670	5780	0.36
613.6	8820	20580	0.39	187.0	2690	6270	0.39
615.3	8880	20450	0.38	187.5	2710	6230	0.38
616.9	8880	20710	0.39	188.0	2710	6310	0.39
618.6	8940	20450	0.38	188.5	2730	6230	0.38
620.2	9000	20450	0.38	189.0	2740	6230	0.38
621.8	9000	21090	0.39	189.5	2740	6430	0.39
623.5	8940	20450	0.38	190.0	2730	6230	0.38
625.1	8880	20330	0.38	190.5	2710	6200	0.38
626.8	8940	20090	0.38	191.0	2730	6120	0.38
628.4	9000	20450	0.38	191.5	2740	6230	0.38
630.0	9000	19970	0.37	192.0	2740	6090	0.37
631.7	8940	21090	0.39	192.5	2730	6430	0.39
633.3	8940	20710	0.39	193.0	2730	6310	0.39
635.0	8940	20830	0.39	193.5	2730	6350	0.39
636.6	9000	21090	0.39	194.0	2740	6430	0.39
638.2	8940	20960	0.39	194.5	2730	6390	0.39
639.9	9060	20830	0.38	195.0	2760	6350	0.38
641.5	9060	20580	0.38	195.5	2760	6270	0.38
643.2	9640	20330	0.35	196.0	2940	6200	0.35
644.8	9570	20090	0.35	196.5	2920	6120	0.35
646.4	9510	20960	0.37	197.0	2900	6390	0.37
648.1	9440	20450	0.36	197.5	2880	6230	0.36
649.7	9380	19970	0.36	198.0	2860	6090	0.36
651.4	9380	19970	0.36	198.5	2860	6090	0.36

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 LOG #2**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
653.0	9380	19400	0.35	199.0	2860	5910	0.35
654.7	9310	19740	0.36	199.5	2840	6020	0.36
656.3	9380	19850	0.36	200.0	2860	6050	0.36
657.9	9780	20580	0.35	200.5	2980	6270	0.35
659.6	9640	19510	0.34	201.0	2940	5950	0.34
661.2	9780	20450	0.35	201.5	2980	6230	0.35
662.9	10000	20710	0.35	202.0	3050	6310	0.35
664.5	10310	19970	0.32	202.5	3140	6090	0.32
666.1	9570	19620	0.34	203.0	2920	5980	0.34
667.8	9380	19510	0.35	203.5	2860	5950	0.35
669.4	9510	19970	0.35	204.0	2900	6090	0.35
671.1	9180	19510	0.36	204.5	2800	5950	0.36
672.7	9310	18750	0.34	205.0	2840	5710	0.34
674.3	9380	19290	0.35	205.5	2860	5880	0.35
676.0	9440	18650	0.33	206.0	2880	5680	0.33
677.6	9380	18960	0.34	206.5	2860	5780	0.34
679.3	9250	18050	0.32	207.0	2820	5500	0.32
680.9	9310	18960	0.34	207.5	2840	5780	0.34
682.5	9440	19970	0.36	208.0	2880	6090	0.36
684.2	9850	20580	0.35	208.5	3000	6270	0.35
685.8	9780	19740	0.34	209.0	2980	6020	0.34
687.5	9780	17760	0.28	209.5	2980	5410	0.28
689.1	9780	19850	0.34	210.0	2980	6050	0.34
690.7	9440	17530	0.30	210.5	2880	5340	0.30
692.4	9780	20830	0.36	211.0	2980	6350	0.36
694.0	9850	17220	0.26	211.5	3000	5250	0.26
695.7	9850	19620	0.33	212.0	3000	5980	0.33
697.3	10710	19510	0.28	212.5	3270	5950	0.28
698.9	11160	19180	0.24	213.0	3400	5840	0.24
700.6	10890	19400	0.27	213.5	3320	5910	0.27
702.2	10800	18650	0.25	214.0	3290	5680	0.25
703.9	9510	17860	0.30	214.5	2900	5440	0.30
705.5	9120	20150	0.37	215.0	2780	6140	0.37
707.1	9570	19850	0.35	215.5	2920	6050	0.35
708.8	10550	18540	0.26	216.0	3210	5650	0.26
710.4	11540	17950	0.15	216.5	3520	5470	0.15
712.1	10230	17760	0.25	217.0	3120	5410	0.25
713.7	10310	18540	0.28	217.5	3140	5650	0.28

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 LOG #2**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
715.3	9510	14870	0.15
717.0	9510	18540	0.32
718.6	9570	19740	0.35
720.3	10000	20210	0.34
721.9	10150	20090	0.33
723.5	10230	20210	0.33

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
218.0	2900	4530	0.15
218.5	2900	5650	0.32
219.0	2920	6020	0.35
219.5	3050	6160	0.34
220.0	3090	6120	0.33
220.5	3120	6160	0.33

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4997 - Log 3 Source to Receiver and Receiver to Receiver Analysis

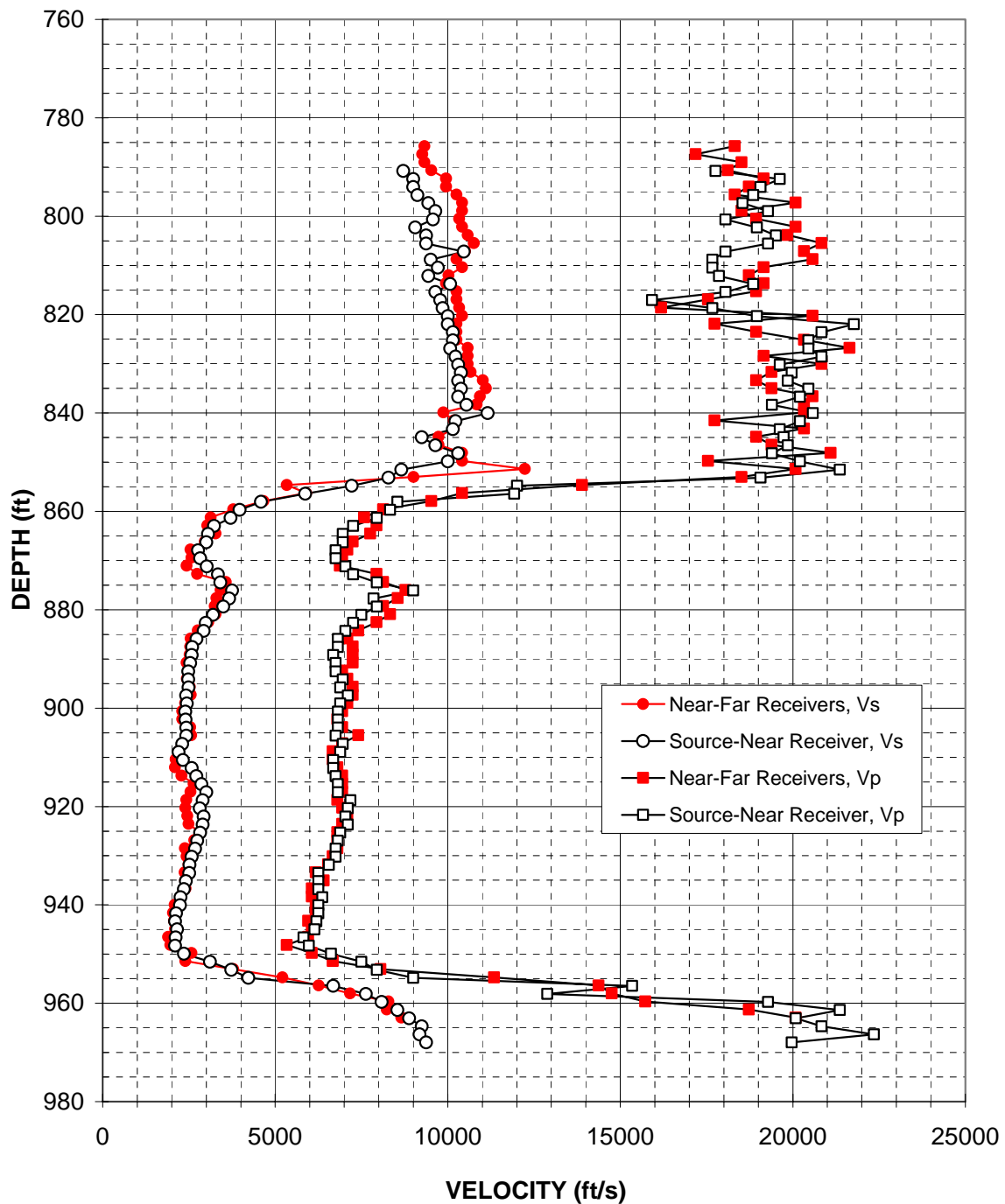


Figure A-16 Boring BH-C4997 Log 3, Suspension S-R1 P- and S_H -wave velocities

Table A-16 Boring BH-C4997 Log 3, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 RUN 3**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
790.8	8710	17760	0.34	241.0	2650	5410	0.34
792.4	9000	19620	0.37	241.5	2740	5980	0.37
794.1	9000	19070	0.36	242.0	2740	5810	0.36
795.7	9120	18850	0.35	242.5	2780	5750	0.35
797.4	9440	18540	0.33	243.0	2880	5650	0.33
799.0	9640	19290	0.33	243.5	2940	5880	0.33
800.6	9570	18050	0.30	244.0	2920	5500	0.30
802.3	9060	18960	0.35	244.5	2760	5780	0.35
803.9	9370	19510	0.35	245.0	2860	5950	0.35
805.6	9370	19290	0.35	245.5	2860	5880	0.35
807.2	10470	18050	0.25	246.0	3190	5500	0.25
808.9	9510	17670	0.30	246.5	2900	5390	0.30
810.5	9710	17670	0.28	247.0	2960	5390	0.28
812.1	9440	17860	0.31	247.5	2880	5440	0.31
813.8	10070	18850	0.30	248.0	3070	5750	0.30
815.4	9640	18050	0.30	248.5	2940	5500	0.30
817.1	9780	15920	0.20	249.0	2980	4850	0.20
818.7	9850	17670	0.27	249.5	3000	5390	0.27
820.3	10000	18960	0.31	250.0	3050	5780	0.31
822.0	10000	21770	0.37	250.5	3050	6640	0.37
823.6	10150	20830	0.34	251.0	3090	6350	0.34
825.3	10150	20450	0.34	251.5	3090	6230	0.34
826.9	10070	20450	0.34	252.0	3070	6230	0.34
828.5	10230	20830	0.34	252.5	3120	6350	0.34
830.2	10310	19620	0.31	253.0	3140	5980	0.31
831.8	10380	19970	0.31	253.5	3170	6090	0.31
833.5	10310	19850	0.32	254.0	3140	6050	0.32
835.1	10380	20450	0.33	254.5	3170	6230	0.33
836.7	10310	20210	0.32	255.0	3140	6160	0.32
838.4	10550	19400	0.29	255.5	3210	5910	0.29
840.0	11160	20580	0.29	256.0	3400	6270	0.29
841.7	10230	20210	0.33	256.5	3120	6160	0.33
843.3	10150	19620	0.32	257.0	3090	5980	0.32
844.9	9250	19740	0.36	257.5	2820	6020	0.36
846.6	9640	19850	0.35	258.0	2940	6050	0.35

848.2	10310	19400	0.30	258.5	3140	5910	0.30
849.9	10000	20210	0.34	259.0	3050	6160	0.34
851.5	8650	21360	0.40	259.5	2640	6510	0.40
853.1	8280	19070	0.38	260.0	2520	5810	0.38
854.8	7220	12010	0.22	260.5	2200	3660	0.22
856.4	5870	11930	0.34	261.0	1790	3630	0.34
858.1	4590	8540	0.30	261.5	1400	2600	0.30
859.7	3970	8330	0.35	262.0	1210	2540	0.35
861.3	3710	7940	0.36	262.5	1130	2420	0.36
863.0	3230	7260	0.38	263.0	980	2210	0.38
864.6	3050	6960	0.38	263.5	930	2120	0.38
866.3	3000	6960	0.39	264.0	910	2120	0.39
867.9	2770	6750	0.40	264.5	840	2060	0.40
869.5	2820	6750	0.39	265.0	860	2060	0.39
871.2	3010	7030	0.39	265.5	920	2140	0.39
872.8	3340	7260	0.37	266.0	1020	2210	0.37
874.5	3410	7940	0.39	266.5	1040	2420	0.39
876.1	3750	9000	0.39	267.0	1140	2740	0.39
877.7	3670	7850	0.36	267.5	1120	2390	0.36
879.4	3500	7940	0.38	268.0	1070	2420	0.38
881.0	3200	7500	0.39	268.5	980	2290	0.39
882.7	2990	7260	0.40	269.0	910	2210	0.40
884.3	2920	7030	0.40	269.5	890	2140	0.40
886.0	2720	6820	0.41	270.0	830	2080	0.41
887.6	2600	6820	0.42	270.5	790	2080	0.42
889.2	2580	6680	0.41	271.0	790	2040	0.41
890.9	2540	6750	0.42	271.5	770	2060	0.42
892.5	2480	6750	0.42	272.0	760	2060	0.42
894.2	2480	6960	0.43	272.5	760	2120	0.43
895.8	2490	6890	0.42	273.0	760	2100	0.42
897.4	2420	7110	0.43	273.5	740	2170	0.43
899.1	2440	6890	0.43	274.0	740	2100	0.43
900.7	2390	6820	0.43	274.5	730	2080	0.43
902.4	2400	6820	0.43	275.0	730	2080	0.43
904.0	2430	6820	0.43	275.5	740	2080	0.43
905.6	2430	6750	0.43	276.0	740	2060	0.43
907.3	2300	6960	0.44	276.5	700	2120	0.44
908.9	2200	6890	0.44	277.0	670	2100	0.44
910.6	2330	6680	0.43	277.5	710	2040	0.43
912.2	2580	6680	0.41	278.0	790	2040	0.41
913.8	2710	6750	0.40	278.5	830	2060	0.40
915.5	2860	6820	0.39	279.0	870	2080	0.39
917.1	3000	6820	0.38	279.5	910	2080	0.38
918.8	2900	7180	0.40	280.0	880	2190	0.40
920.4	2810	7110	0.41	280.5	860	2170	0.41
922.0	2920	7030	0.40	281.0	890	2140	0.40
923.7	2900	7110	0.40	281.5	880	2170	0.40

925.3	2820	6890	0.40	282.0	860	2100	0.40
927.0	2740	6820	0.40	282.5	840	2080	0.40
928.6	2680	6750	0.41	283.0	820	2060	0.41
930.2	2580	6750	0.41	283.5	790	2060	0.41
931.9	2520	6550	0.41	284.0	770	2000	0.41
933.5	2510	6250	0.40	284.5	760	1910	0.40
935.2	2410	6250	0.41	285.0	730	1910	0.41
936.8	2350	6250	0.42	285.5	720	1910	0.42
938.4	2260	6370	0.43	286.0	690	1940	0.43
940.1	2240	6250	0.43	286.5	680	1910	0.43
941.7	2130	6250	0.43	287.0	650	1910	0.43
943.4	2100	6190	0.43	287.5	640	1890	0.43
945.0	2160	6140	0.43	288.0	660	1870	0.43
946.6	2120	5820	0.42	288.5	640	1770	0.42
948.3	2100	5970	0.43	289.0	640	1820	0.43
949.9	2350	6620	0.43	289.5	720	2020	0.43
951.6	3110	7500	0.40	290.0	950	2290	0.40
953.2	3730	7940	0.36	290.5	1140	2420	0.36
954.8	4220	9000	0.36	291.0	1290	2740	0.36
956.5	6680	15340	0.38	291.5	2040	4680	0.38
958.1	7630	12880	0.23	292.0	2320	3930	0.23
959.8	8080	19290	0.39	292.5	2460	5880	0.39
961.4	8540	21360	0.40	293.0	2600	6510	0.40
963.1	8880	20090	0.38	293.5	2710	6120	0.38
964.7	9250	20830	0.38	294.0	2820	6350	0.38
966.3	9180	22350	0.40	294.5	2800	6810	0.40
968.0	9370	19970	0.36	295.0	2860	6090	0.36

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4997 - Log 4 Source to Receiver and Receiver to Receiver Analysis

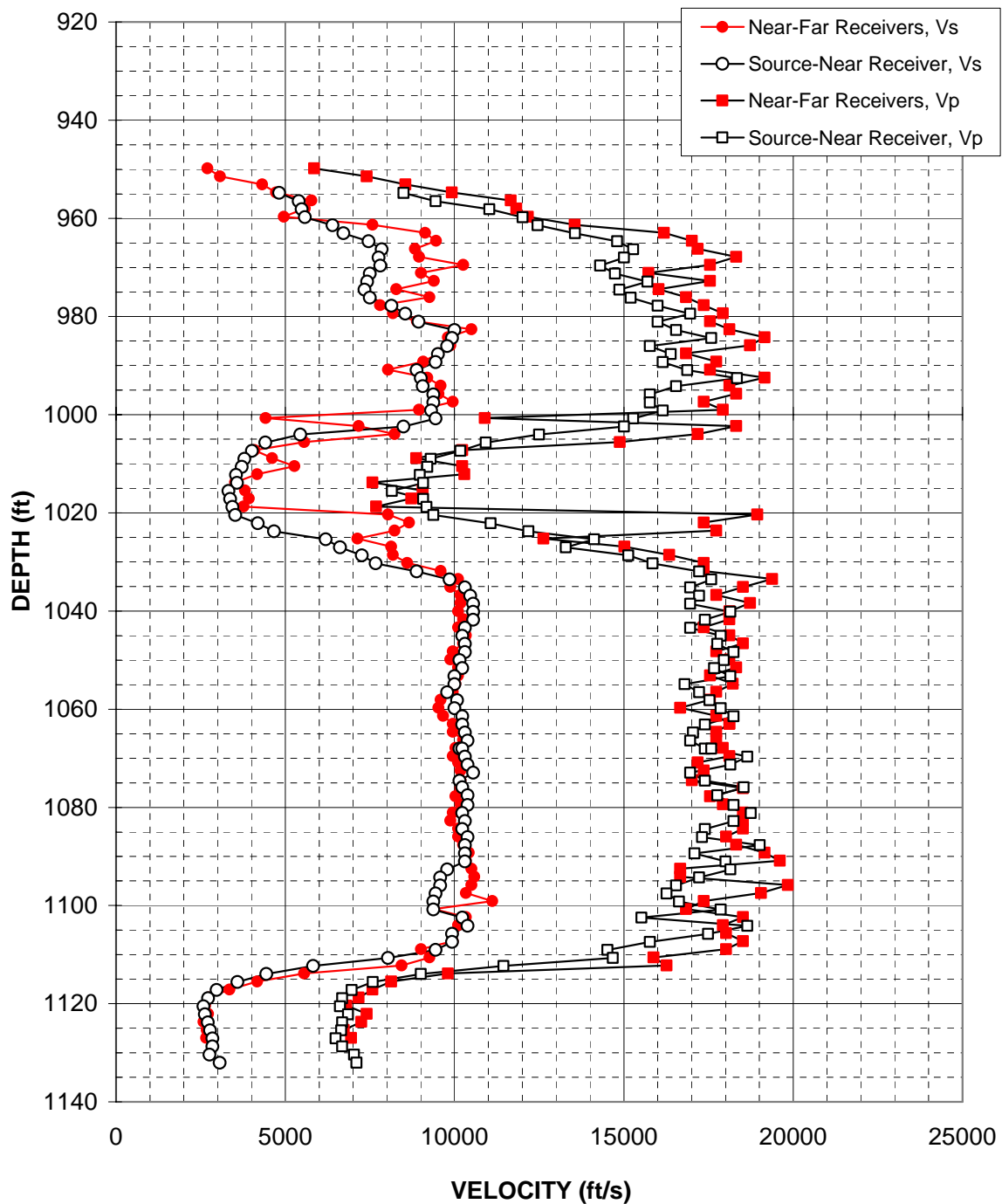


Figure A-17 Boring BH-C4997 Log 4, Suspension S-R1 P- and S_H -wave velocities

Table A-17 Boring BH-C4997 Log 4, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 RUN# 4**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
954.8	4820	8490	0.26	291.0	1470	2590	0.26
956.5	5400	9440	0.26	291.5	1650	2880	0.26
958.1	5490	11030	0.34	292.0	1670	3360	0.34
959.8	5580	12010	0.36	292.5	1700	3660	0.36
961.4	6400	12450	0.32	293.0	1950	3800	0.32
963.1	6720	13550	0.34	293.5	2050	4130	0.34
964.7	7460	14800	0.33	294.0	2270	4510	0.33
966.3	7850	15270	0.32	294.5	2390	4650	0.32
968.0	7760	15000	0.32	295.0	2360	4570	0.32
969.6	7800	14300	0.29	295.5	2380	4360	0.29
971.3	7500	14740	0.33	296.0	2290	4490	0.33
972.9	7420	15700	0.36	296.5	2260	4780	0.36
974.5	7340	14870	0.34	297.0	2240	4530	0.34
976.2	7500	15200	0.34	297.5	2290	4630	0.34
977.8	8130	16000	0.33	298.0	2480	4880	0.33
979.5	8540	16960	0.33	298.5	2600	5170	0.33
981.1	8940	16000	0.27	299.0	2730	4880	0.27
982.7	10000	16540	0.21	299.5	3050	5040	0.21
984.4	9930	17580	0.27	300.0	3030	5360	0.27
986.0	9780	15770	0.19	300.5	2980	4810	0.19
987.7	9510	16380	0.25	301.0	2900	4990	0.25
989.3	9440	16150	0.24	301.5	2880	4920	0.24
990.9	8880	16880	0.31	302.0	2710	5140	0.31
992.6	9000	18340	0.34	302.5	2740	5590	0.34
994.2	9060	16540	0.29	303.0	2760	5040	0.29
995.9	9380	15770	0.23	303.5	2860	4810	0.23
997.5	9380	15770	0.23	304.0	2860	4810	0.23
999.1	9310	16150	0.25	304.5	2840	4920	0.25
1000.8	9440	15270	0.19	305.0	2880	4650	0.19
1002.4	8490	15000	0.26	305.5	2590	4570	0.26
1004.1	5440	12500	0.38	306.0	1660	3810	0.38
1005.7	4410	10920	0.40	306.5	1340	3330	0.40
1007.3	4020	10170	0.41	307.0	1220	3100	0.41
1009.0	3790	9300	0.40	307.5	1160	2830	0.40
1010.6	3720	9200	0.40	308.0	1130	2800	0.40

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 RUN# 4**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1012.3	3540	8980	0.41	308.5	1080	2740	0.41
1013.9	3570	9070	0.41	309.0	1090	2770	0.41
1015.5	3330	8150	0.40	309.5	1010	2480	0.40
1017.2	3380	9070	0.42	310.0	1030	2770	0.42
1018.8	3440	9170	0.42	310.5	1050	2800	0.42
1020.5	3520	9380	0.42	311.0	1070	2860	0.42
1022.1	4190	11070	0.42	311.5	1280	3370	0.42
1023.7	4670	12180	0.41	312.0	1420	3710	0.41
1025.4	6190	14120	0.38	312.5	1890	4300	0.38
1027.0	6620	13290	0.34	313.0	2020	4050	0.34
1028.7	7260	15130	0.35	313.5	2210	4610	0.35
1030.3	7670	15850	0.35	314.0	2340	4830	0.35
1031.9	8880	17220	0.32	314.5	2710	5250	0.32
1033.6	9850	17580	0.27	315.0	3000	5360	0.27
1035.2	10310	16960	0.21	315.5	3140	5170	0.21
1036.9	10470	17220	0.21	316.0	3190	5250	0.21
1038.5	10550	16960	0.18	316.5	3210	5170	0.18
1040.1	10550	18150	0.24	317.0	3210	5530	0.24
1041.8	10550	17400	0.21	317.5	3210	5300	0.21
1043.4	10310	16960	0.21	318.0	3140	5170	0.21
1045.1	10230	17860	0.26	318.5	3120	5440	0.26
1046.7	10310	17760	0.25	319.0	3140	5410	0.25
1048.4	10310	18240	0.27	319.5	3140	5560	0.27
1050.0	10150	17950	0.27	320.0	3090	5470	0.27
1051.6	10230	17670	0.25	320.5	3120	5390	0.25
1053.3	10000	18150	0.28	321.0	3050	5530	0.28
1054.9	10000	16790	0.23	321.5	3050	5120	0.23
1056.6	9780	17220	0.26	322.0	2980	5250	0.26
1058.2	10070	17530	0.25	322.5	3070	5340	0.25
1059.8	10000	17860	0.27	323.0	3050	5440	0.27
1061.5	10230	18240	0.27	323.5	3120	5560	0.27
1063.1	10230	17400	0.24	324.0	3120	5300	0.24
1064.8	10310	17050	0.21	324.5	3140	5200	0.21
1066.4	10380	16960	0.20	325.0	3170	5170	0.20
1068.0	10150	17400	0.24	325.5	3090	5300	0.24
1068.0	10230	17580	0.24	325.5	3120	5360	0.24
1069.7	10310	18650	0.28	326.0	3140	5680	0.28
1071.3	10380	18150	0.26	326.5	3170	5530	0.26

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 RUN# 4**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1073.0	10550	16960	0.18
1074.6	10150	17400	0.24
1075.9	10230	18540	0.28
1077.6	10380	17760	0.24
1079.5	10380	18240	0.26
1081.2	10230	18750	0.29
1082.8	10310	18240	0.27
1084.4	10230	17400	0.24
1086.1	10380	17310	0.22
1087.7	10310	19010	0.29
1089.4	10310	17090	0.21
1091.0	10310	18000	0.26
1092.6	9780	18150	0.30
1094.3	9570	17220	0.28
1095.9	9570	16540	0.25
1097.6	9440	16270	0.25
1099.2	9380	16630	0.27
1100.8	9380	17860	0.31
1102.5	10230	15520	0.12
1104.1	10380	18650	0.28
1105.8	9930	17490	0.26
1107.4	9930	15770	0.17
1109.0	9440	14520	0.13
1110.7	8040	14670	0.29
1112.3	5820	11440	0.33
1114.0	4440	9000	0.34
1115.6	3590	7580	0.36
1117.2	2970	6960	0.39
1118.9	2720	6680	0.40
1120.5	2590	6620	0.41
1122.2	2630	6850	0.41
1123.8	2710	6680	0.40
1125.5	2780	6650	0.39
1127.1	2850	6490	0.38
1128.7	2850	6680	0.39
1130.4	2770	7030	0.41
1132.0	3070	7110	0.39

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
327.0	3210	5170	0.18
327.5	3090	5300	0.24
327.9	3120	5650	0.28
328.4	3170	5410	0.24
329.0	3170	5560	0.26
329.5	3120	5710	0.29
330.0	3140	5560	0.27
330.5	3120	5300	0.24
331.0	3170	5280	0.22
331.5	3140	5800	0.29
332.0	3140	5210	0.21
332.5	3140	5490	0.26
333.0	2980	5530	0.30
333.5	2920	5250	0.28
334.0	2920	5040	0.25
334.5	2880	4960	0.25
335.0	2860	5070	0.27
335.5	2860	5440	0.31
336.0	3120	4730	0.12
336.5	3170	5680	0.28
337.0	3030	5330	0.26
337.5	3030	4810	0.17
338.0	2880	4420	0.13
338.5	2450	4470	0.29
339.0	1770	3490	0.33
339.5	1350	2740	0.34
340.0	1090	2310	0.36
340.5	910	2120	0.39
341.0	830	2040	0.40
341.5	790	2020	0.41
342.0	800	2090	0.41
342.5	830	2040	0.40
343.0	850	2030	0.39
343.5	870	1980	0.38
344.0	870	2040	0.39
344.5	840	2140	0.41
345.0	940	2170	0.39

Hanford WTP Seismic Borehole C4997 - Log 5 Source to Receiver and Receiver to Receiver Analysis

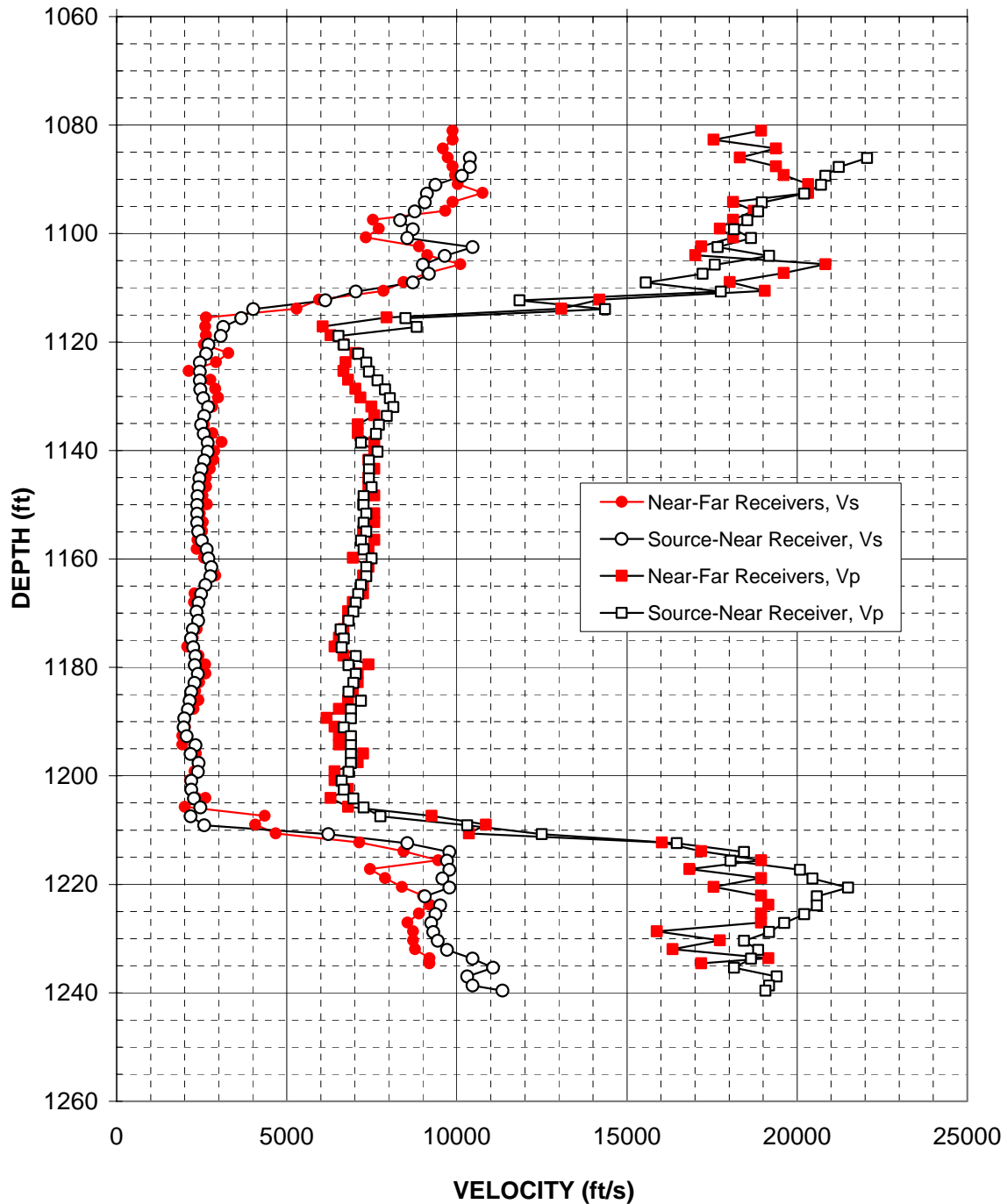


Figure A-18 Boring BH-C4997 Log 5, Suspension S-R1 P- and S_H -wave velocities

Table A-18 Boring BH-C4997 Log 5, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 RUN #5 MABTON LOGGED BY
DIEHL**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1086.1	10380	22060	0.36	331.0	3170	6720	0.36
1087.7	10380	21230	0.34	331.5	3170	6470	0.34
1089.4	10150	20830	0.34	332.0	3090	6350	0.34
1091.0	9380	20710	0.37	332.5	2860	6310	0.37
1092.6	9120	20210	0.37	333.0	2780	6160	0.37
1094.3	9060	18960	0.35	333.5	2760	5780	0.35
1095.9	8770	18850	0.36	334.0	2670	5750	0.36
1097.6	8330	18540	0.37	334.5	2540	5650	0.37
1099.2	8710	18150	0.35	335.0	2650	5530	0.35
1100.8	8540	18650	0.37	335.5	2600	5680	0.37
1102.5	10470	17670	0.23	336.0	3190	5390	0.23
1104.1	9640	19180	0.33	336.5	2940	5840	0.33
1105.8	9000	17580	0.32	337.0	2740	5360	0.32
1107.4	9180	17220	0.30	337.5	2800	5250	0.30
1109.0	8710	15550	0.27	338.0	2650	4740	0.27
1110.7	7030	17760	0.41	338.5	2140	5410	0.41
1112.3	6140	11840	0.32	339.0	1870	3610	0.32
1114.0	4020	14360	0.46	339.5	1220	4380	0.46
1115.6	3670	8490	0.39	340.0	1120	2590	0.39
1117.2	3140	8820	0.43	340.5	960	2690	0.43
1118.9	3070	6520	0.36	341.0	940	1990	0.36
1120.5	2700	6680	0.40	341.5	820	2040	0.40
1122.2	2640	7110	0.42	342.0	800	2170	0.42
1123.8	2450	7340	0.44	342.5	750	2240	0.44
1125.5	2450	7420	0.44	343.0	750	2260	0.44
1127.1	2450	7670	0.44	343.5	750	2340	0.44
1128.7	2460	7890	0.45	344.0	750	2410	0.45
1130.4	2550	8040	0.44	344.5	780	2450	0.44
1132.0	2690	8130	0.44	345.0	820	2480	0.44
1133.7	2580	7940	0.44	345.5	790	2420	0.44
1135.3	2480	7710	0.44	346.0	760	2350	0.44
1136.9	2570	7630	0.44	346.5	780	2320	0.44
1138.6	2680	7180	0.42	347.0	820	2190	0.42

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 RUN #5 MABTON LOGGED BY
DIEHL**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1140.2	2680	7670	0.43	347.5	820	2340	0.43
1141.9	2580	7420	0.43	348.0	790	2260	0.43
1143.5	2500	7420	0.44	348.5	760	2260	0.44
1145.1	2440	7420	0.44	349.0	740	2260	0.44
1146.8	2410	7500	0.44	349.5	730	2290	0.44
1148.4	2390	7260	0.44	350.0	730	2210	0.44
1150.1	2370	7260	0.44	350.5	720	2210	0.44
1151.7	2370	7340	0.44	351.0	720	2240	0.44
1153.3	2370	7260	0.44	351.5	720	2210	0.44
1155.0	2400	7340	0.44	352.0	730	2240	0.44
1156.6	2510	7180	0.43	352.5	760	2190	0.43
1158.3	2650	7260	0.42	353.0	810	2210	0.42
1159.9	2700	7500	0.43	353.5	820	2290	0.43
1161.5	2790	7340	0.42	354.0	850	2240	0.42
1163.2	2760	7340	0.42	354.5	840	2240	0.42
1164.8	2620	7180	0.42	355.0	800	2190	0.42
1166.5	2480	7110	0.43	355.5	760	2170	0.43
1168.1	2410	7030	0.43	356.0	730	2140	0.43
1169.7	2350	6960	0.44	356.5	720	2120	0.44
1171.4	2400	6820	0.43	357.0	730	2080	0.43
1173.0	2240	6590	0.43	357.5	680	2010	0.43
1174.7	2190	6680	0.44	358.0	670	2040	0.44
1176.3	2260	6620	0.43	358.5	690	2020	0.43
1177.9	2320	7030	0.44	359.0	710	2140	0.44
1179.6	2300	6820	0.44	359.5	700	2080	0.44
1181.2	2390	7030	0.43	360.0	730	2140	0.43
1182.9	2290	6960	0.44	360.5	700	2120	0.44
1184.5	2200	6820	0.44	361.0	670	2080	0.44
1186.1	2150	7180	0.45	361.5	660	2190	0.45
1187.8	2100	6890	0.45	362.0	640	2100	0.45
1189.4	1990	6890	0.45	362.5	610	2100	0.45
1191.1	1970	6680	0.45	363.0	600	2040	0.45
1192.7	2060	6890	0.45	363.5	630	2100	0.45
1194.3	2320	6890	0.44	364.0	710	2100	0.44
1196.0	2180	6890	0.44	364.5	660	2100	0.44
1197.6	2410	6890	0.43	365.0	730	2100	0.43

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 RUN #5 MABTON LOGGED BY
DIEHL**

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(ft)	(ft/s)	(ft/s)	
1199.3	2390	6820	0.43
1200.9	2200	6620	0.44
1202.6	2200	6680	0.44
1204.2	2280	6960	0.44
1205.8	2460	7260	0.43
1207.5	2180	7760	0.46
1209.1	2580	10310	0.47
1210.8	6220	12500	0.34
1212.4	8540	16460	0.32
1214.0	9780	18440	0.30
1215.7	9710	18050	0.30
1217.3	9780	20090	0.34
1219.0	9570	20450	0.36
1220.6	9780	21500	0.37
1222.2	9060	20580	0.38
1223.9	9510	20580	0.36
1225.5	9380	20210	0.36
1227.2	9250	19620	0.36
1228.8	9310	19180	0.35
1230.4	9440	18440	0.32
1232.1	9710	18850	0.32
1233.7	10470	18650	0.27
1235.4	11070	18150	0.20
1237.0	10310	19400	0.30
1238.6	10470	19180	0.29
1239.6	11340	19070	0.23

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p	
(m)	(m/s)	(m/s)	
365.5	730	2080	0.43
366.0	670	2020	0.44
366.5	670	2040	0.44
367.0	700	2120	0.44
367.5	750	2210	0.43
368.0	660	2360	0.46
368.5	790	3140	0.47
369.0	1900	3810	0.34
369.5	2600	5020	0.32
370.0	2980	5620	0.30
370.5	2960	5500	0.30
371.0	2980	6120	0.34
371.5	2920	6230	0.36
372.0	2980	6550	0.37
372.5	2760	6270	0.38
373.0	2900	6270	0.36
373.5	2860	6160	0.36
374.0	2820	5980	0.36
374.5	2840	5840	0.35
375.0	2880	5620	0.32
375.5	2960	5750	0.32
376.0	3190	5680	0.27
376.5	3370	5530	0.20
377.0	3140	5910	0.30
377.5	3190	5840	0.29
377.8	3460	5810	0.23

Notes: "-" means no data available at that particular interval of depth.

Hanford WTP Seismic Borehole C4997 - Log 6 Source to Receiver and Receiver to Receiver Analysis

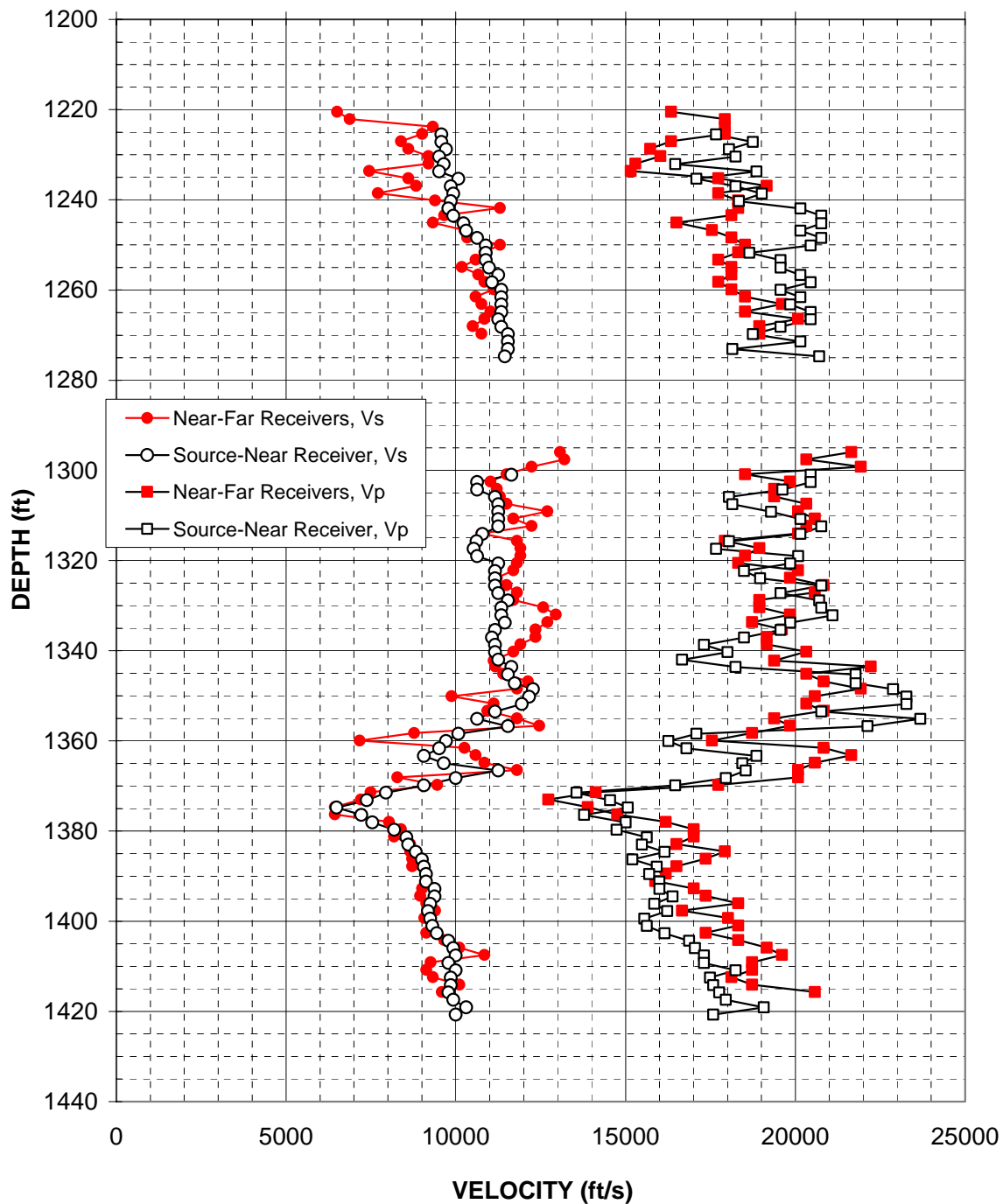


Figure A-19 Boring BH-C4997 Log 6, Suspension S-R1 P- and S_H -wave velocities

Table A-19 Boring BH-C4997 Log 6, Suspension S-R1 depths and P- and S_H-wave velocities

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 LOG #6**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1225.5	9570	17670	0.29	373.5	2920	5390	0.29
1227.2	9570	18750	0.32	374.0	2920	5710	0.32
1228.8	9710	18050	0.30	374.5	2960	5500	0.30
1230.4	9510	18240	0.31	375.0	2900	5560	0.31
1232.1	9640	16460	0.24	375.5	2940	5020	0.24
1233.7	9510	18850	0.33	376.0	2900	5750	0.33
1235.4	10070	17090	0.23	376.5	3070	5210	0.23
1237.0	9850	18240	0.29	377.0	3000	5560	0.29
1238.6	9930	19010	0.31	377.5	3030	5800	0.31
1240.3	9850	18340	0.30	378.0	3000	5590	0.30
1241.9	9780	20150	0.35	378.5	2980	6140	0.35
1243.6	9930	20770	0.35	379.0	3030	6330	0.35
1245.2	10230	20770	0.34	379.5	3120	6330	0.34
1246.8	10310	20150	0.32	380.0	3140	6140	0.32
1248.5	10630	20770	0.32	380.5	3240	6330	0.32
1250.1	10890	20450	0.30	381.0	3320	6230	0.30
1251.8	10890	18650	0.24	381.5	3320	5680	0.24
1253.4	10890	19570	0.28	382.0	3320	5960	0.28
1255.0	10980	19570	0.27	382.5	3350	5960	0.27
1256.7	11250	20150	0.27	383.0	3430	6140	0.27
1258.3	11070	20450	0.29	383.5	3370	6230	0.29
1260.0	11340	19570	0.25	384.0	3460	5960	0.25
1261.6	11340	20150	0.27	384.5	3460	6140	0.27
1263.2	11340	19850	0.26	385.0	3460	6050	0.26
1264.9	11340	20450	0.28	385.5	3460	6230	0.28
1266.5	11250	20450	0.28	386.0	3430	6230	0.28
1268.2	11340	19570	0.25	386.5	3460	5960	0.25
1269.8	11540	18750	0.20	387.0	3520	5710	0.20
1271.4	11540	20150	0.26	387.5	3520	6140	0.26
1273.1	11540	18150	0.16	388.0	3520	5530	0.16
1274.7	11440	20710	0.28	388.5	3490	6310	0.28
1276.4	-	-	-	389.0	-	-	-
1278.0	-	-	-	389.5	-	-	-

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 LOG #6**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1279.7	-	-	-	390.0	-	-	-
1281.3	-	-	-	390.5	-	-	-
1282.9	-	-	-	391.0	-	-	-
1284.6	-	-	-	391.5	-	-	-
1286.2	-	-	-	392.0	-	-	-
1287.9	-	-	-	392.5	-	-	-
1289.5	-	-	-	393.0	-	-	-
1291.1	-	-	-	393.5	-	-	-
1292.8	-	-	-	394.0	-	-	-
1294.4	-	-	-	394.5	-	-	-
1296.1	-	-	-	395.0	-	-	-
1297.7	-	-	-	395.5	-	-	-
1299.3	-	-	-	396.0	-	-	-
1301.0	11640	20450	0.26	396.5	3550	6230	0.26
1302.6	10630	20450	0.32	397.0	3240	6230	0.32
1304.3	10630	19620	0.29	397.5	3240	5980	0.29
1305.9	11160	18050	0.19	398.0	3400	5500	0.19
1307.5	11250	18150	0.19	398.5	3430	5530	0.19
1309.2	11250	19290	0.24	399.0	3430	5880	0.24
1310.8	11250	20150	0.27	399.5	3430	6140	0.27
1312.5	11250	20770	0.29	400.0	3430	6330	0.29
1314.1	10780	20150	0.30	400.5	3290	6140	0.30
1315.7	10610	18050	0.24	401.0	3230	5500	0.24
1317.4	10530	17670	0.22	401.5	3210	5390	0.22
1319.0	10630	20090	0.31	402.0	3240	6120	0.31
1320.7	11250	19850	0.26	402.5	3430	6050	0.26
1322.3	11160	18490	0.21	403.0	3400	5640	0.21
1323.9	11160	18960	0.24	403.5	3400	5780	0.24
1325.6	11160	20770	0.30	404.0	3400	6330	0.30
1327.2	11250	19570	0.25	404.5	3430	5960	0.25
1328.9	11540	20710	0.27	405.0	3520	6310	0.27
1330.5	11340	20770	0.29	405.5	3460	6330	0.29
1332.1	11340	21090	0.30	406.0	3460	6430	0.30
1333.8	11440	19850	0.25	406.5	3490	6050	0.25
1335.4	11160	19570	0.26	407.0	3400	5960	0.26
1337.1	11070	18490	0.22	407.5	3370	5640	0.22
1338.7	11160	17310	0.14	408.0	3400	5280	0.14

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 LOG #6**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1340.3	11160	18000	0.19	408.5	3400	5490	0.19
1342.0	11250	16670	0.08	409.0	3430	5080	0.08
1343.6	11640	18240	0.16	409.5	3550	5560	0.16
1345.3	11540	21770	0.30	410.0	3520	6640	0.30
1347.2	11740	21770	0.30	410.6	3580	6640	0.30
1348.5	12270	22880	0.30	411.0	3740	6970	0.30
1350.2	12160	23280	0.31	411.5	3710	7090	0.31
1351.8	11950	23280	0.32	412.0	3640	7090	0.32
1353.5	11160	20770	0.30	412.5	3400	6330	0.30
1355.1	10630	23680	0.37	413.0	3240	7220	0.37
1356.8	11540	22130	0.31	413.5	3520	6750	0.31
1358.4	10070	17090	0.23	414.0	3070	5210	0.23
1360.0	9710	16270	0.22	414.5	2960	4960	0.22
1361.7	9510	16790	0.26	415.0	2900	5120	0.26
1363.3	9060	18850	0.35	415.5	2760	5750	0.35
1365.0	9640	18440	0.31	416.0	2940	5620	0.31
1366.6	11250	18540	0.21	416.5	3430	5650	0.21
1368.2	10000	17950	0.28	417.0	3050	5470	0.28
1369.9	9060	16460	0.28	417.5	2760	5020	0.28
1371.5	7940	13550	0.24	418.0	2420	4130	0.24
1373.2	7380	14550	0.33	418.5	2250	4430	0.33
1374.8	6490	15070	0.39	419.0	1980	4590	0.39
1376.4	7220	13780	0.31	419.5	2200	4200	0.31
1378.1	7540	15000	0.33	420.0	2300	4570	0.33
1379.7	8180	14740	0.28	420.5	2490	4490	0.28
1381.4	8540	15630	0.29	421.0	2600	4760	0.29
1383.0	8600	15480	0.28	421.5	2620	4720	0.28
1384.6	8820	16150	0.29	422.0	2690	4920	0.29
1386.3	9000	15200	0.23	422.5	2740	4630	0.23
1387.9	9060	15920	0.26	423.0	2760	4850	0.26
1389.6	9120	15700	0.25	423.5	2780	4780	0.25
1391.2	9120	16000	0.26	424.0	2780	4880	0.26
1392.8	9370	16000	0.24	424.5	2860	4880	0.24
1394.5	9370	16380	0.26	425.0	2860	4990	0.26
1396.1	9250	15850	0.24	425.5	2820	4830	0.24
1397.8	9180	16230	0.26	426.0	2800	4950	0.26
1399.4	9250	15550	0.23	426.5	2820	4740	0.23

**Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole C4997 LOG #6**

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V _s	V _p			V _s	V _p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
1401.0	9310	15630	0.22	427.0	2840	4760	0.22
1402.7	9440	16150	0.24	427.5	2880	4920	0.24
1404.3	9780	16880	0.25	428.0	2980	5140	0.25
1406.0	9930	17050	0.24	428.5	3030	5200	0.24
1407.6	10000	17310	0.25	429.0	3050	5280	0.25
1409.2	9780	17310	0.27	429.5	2980	5280	0.27
1410.9	10000	18240	0.29	430.0	3050	5560	0.29
1412.5	9850	17490	0.27	430.5	3000	5330	0.27
1414.2	9850	17580	0.27	431.0	3000	5360	0.27
1415.8	9780	17760	0.28	431.5	2980	5410	0.28
1417.4	9930	17950	0.28	432.0	3030	5470	0.28
1419.1	10310	19070	0.29	432.5	3140	5810	0.29
1420.7	10000	17580	0.26	433.0	3050	5360	0.26

Notes: "-" means no data available at that particular interval of depth.

APPENDIX B

BORING GEOPHYSICAL LOGGING SYSTEMS - NIST TRACEABLE CALIBRATION PROCEDURES AND CALIBRATION RECORDS

CALIBRATION PROCEDURE FOR GEOVision SEISMIC RECORDER/LOGGER

Reviewed 4/6/06

Objective

The timing/sampling accuracy of seismic recorders or data loggers is required for several GEOVision field procedures including Seismic Refraction, Downhole Seismic Velocity Logging, and P-S Suspension Logging. This procedure describes the method for measuring the timing accuracy of a seismic data logger, such as the OYO Model 170, OYO/Robertson Model 3403, Geometrics Strataview or Geometrics Geode. The objective of this procedure is to verify that the timing accuracy of the recorder is accurate to within 1%.

Frequency of Calibration

The calibration of each GEOVision seismic data logger is twelve (12) months. In the case of rented seismic data loggers, calibration must be performed prior to use.

Test Equipment Required

The following equipment is required. Item #2 must have current NIST traceable calibration.

1. Function generator, Krohn Hite 5400B or equivalent
2. Frequency counter, HP 5315A or equivalent
3. Test cables, from item 1 to item 2, and from item 1 to subject data logger.

Procedure

This procedure is designed to be performed using the accompanying Seismograph Calibration Data Sheet with the same revision number. All data must be entered and the procedure signed by the technician performing the test.

1. Record all identification data on the form provided.
2. Connect function generator to data logger (such as OYO Model 170) using test cable
3. Connect the function generator to the frequency counter using test cable.

4. Set up generator to produce a 100.0 Hz, 0.25 volt (amplitude is approximate, modify as necessary to yield less than full scale waveforms on logger display) peak square wave or sine wave. Verify frequency using the counter and initial space on the data sheet.
5. Initialize data logger and record a data record of at least 0.1 second using a 100 microsecond or less sample period.
6. Measure the recorded square wave frequency by measuring the duration of 9 cycles of data. This measurement can be made using the data logger display device, or by printing out a paper tape. If a paper tape can be printed, the resulting printout must be attached to this procedure. Record the data in the space provided.
7. Repeat steps 5 and 6 three more times using separate files.

Criteria

The duration for 9 cycles in any file must be 90.0 milliseconds plus or minus 0.9 milliseconds, corresponding to an average frequency for the nine cycles of 100.0 Hz plus or minus 1 Hz (obtained by dividing 9 cycles by the duration in milliseconds).

If the results are outside this range, the data logger must be marked with a GEOVision REJECT tag until it can be repaired and retested.

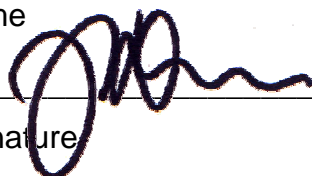
If results are acceptable affix label indicating the initials of the person performing the calibration, the date of calibration, and the due date for the next calibration (12 months).

Procedure Approval

Approved by:

John G. Diehl

Name



Signature

President

Title

April 6, 2006

Date

Client Approval (if required):

Name

Title

Signature

Date



Calibration Report

METROLOGY

7300 Fenwick Lane
Westminster, CA 92683
866-723-2257
edisonmetrology.com

GEOVision Geophysical Services

1151 Pomona Road, Unit P
Corona, CA 92882
P.O. No.: 6303-060815-01

Manufacturer: Oyo
Model Number: 03331-0000
Description: Seismograph,
Asset Number: 15014
Serial Number: 15014

Calibration Date: 08/16/2006
Calibration Due Date: 08/16/2007
Calibration Interval: 12 Months
Condition As Found: In Tolerance
Condition As Left: In Tolerance

Remarks:

The UUT (unit under test) was calibrated using the customer's procedure. The UUT was operated by the customer's personnel and data collection was observed by SCE personnel. The UUT was found to be in tolerance to customer supplied specifications. The reference standards used are in compliance with ISO/IEC 17025:1999 and laboratory accreditation criteria established by NIST/NVLAP under the specific scope of accreditation for lab code 105014-0. Frequency is accredited.
Please see attached data.

Standards Utilized

I.D. No.	Mfg.	Model No.	Description	Cal. Date	Due Date
S1-01252	Hewlett Packard	5335A OPT 010,203040	Counter, Universal,	06/16/2006	12/16/2006
S1-03079	Hewlett Packard	3325B	Generator, Function,	04/04/2006	04/04/2007
S1-03686	Fluke	910	Standard, Frequency, Controlled, Gps	01/16/2006	01/16/2007

Procedure: Customer
Temperature: 23° C
Humidity: 47% RH
Test No.: 506737

Calibration Performed By:			Quality Reviewer:	
Cordero, Denise M	Metrologist	714-895-0714	<i>Denise M. Cordero</i>	8/16/2006
Name	Title	Phone	Name	Date

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SEISMOGRAPH CALIBRATION DATA SHEET REV 4/6/06

INSTRUMENT DATA

SYSTEM MFR: OYO	MODEL NO.: 3331
SERIAL NO.: 15014	CALIBRATION DATE: 8/16/2006
BY: ROBERT STELLER	DUE DATE: 8/16/2007
COUNTER MFR: HEWLETT PACKARD	MODEL NO.: 5335A
SERIAL NO.: 2626A09881	CALIBRATION DATE: 6/16/2006
BY: SCE #S1-01252	DUE DATE: 12/16/2006
FCTN GEN MFR: HEWLETT PACKARD	MODEL NO.: 3325B
SERIAL NO.: 2847A11880	CALIBRATION DATE: 4/4/2006
BY: SCE #S1-03073	DUE DATE: 4/4/2007

SYSTEM SETTINGS:

GAIN:	10
FILTER:	20 KHZ
RANGE:	100 MILLISEC
DELAY:	0
STACK: 1 (STD)	1
PULSE:	1.6
DISPLAY:	NA
SYSTEM: DATE = CORRECT DATE & TIME	8/16/2006, 10:38 AM

PROCEDURE:

SET FREQUENCY TO 100.0HZ SQUAREWAVE WITH AMPLITUDE APPROXIMATELY 0.25 VOLT PEAK. RECORD BOTH ON DISK AND PAPER TAPE, IF AVAILABLE. ANALYZE AND PRINT WAVEFORMS FROM ANALYSIS UTILITY. ATTACH PAPER COPIES OF PRINTOUT AND PAPER TAPES, IF AVAILABLE, TO THIS FORM. AVERAGE FREQUENCY MUST BE BETWEEN 99.0 AND 101.0 HZ.

AS FOUND 100.0 AS LEFT 100.0

WAVEFORM	FILE NO	FREQUENCY	TIME FOR 9 CYCLES Hn	TIME FOR 9 CYCLES Hr	TIME FOR 9 CYCLES V	AVERAGE FREQ.
SQUARE	501	100.0	90.0	90.0	90.0	100.0
SQUARE	502	100.0	90.0	90.0	90.0	100.0
SINE	503	100.0	90.0	90.0	90.0	100.0
SINE	504	100.0	90.0	90.0	90.0	100.0

CALIBRATED BY:	ROBERT STELLER	8/16/2006	<i>Rob Steller</i>
	NAME	DATE	SIGNATURE

OYO

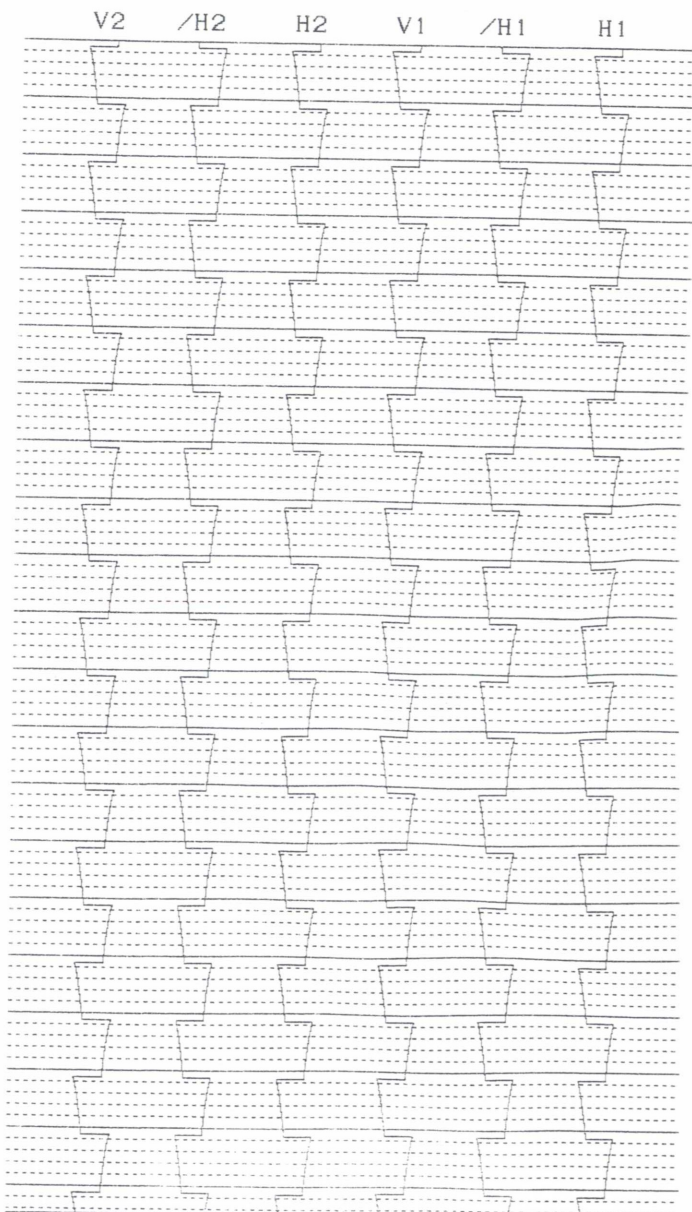
S/N 15014

Suspension 170 1.42

ID_NO. : 501
HOLE NO. : 0
DEPTH : 0.0 [m]
DATE : 16/08/06 10:44:56 AM
H-SAMPLE RATE: 100 [μSEC]
V-SAMPLE RATE: 100 [μSEC]
PULSE WIDTH : 1.6 [mSEC]
DELAY TIME : 0 [mSEC]

	H1	/H1	V1	H2	/H2	V2
GAIN	:X 10	X 10	X 10	X 10	X 10	X 10
LCF [Hz]	: 5	5	5	5	5	5
HCF [Hz]	: 20K	20K	20K	20K	20K	20K
STACK	: 1	1	1	1	1	1

TRACE SIZE : 1
H-TIME SCALE: 1.00 [mSEC/LINE]
V-TIME SCALE: 1.00 [mSEC/LINE]



OYO

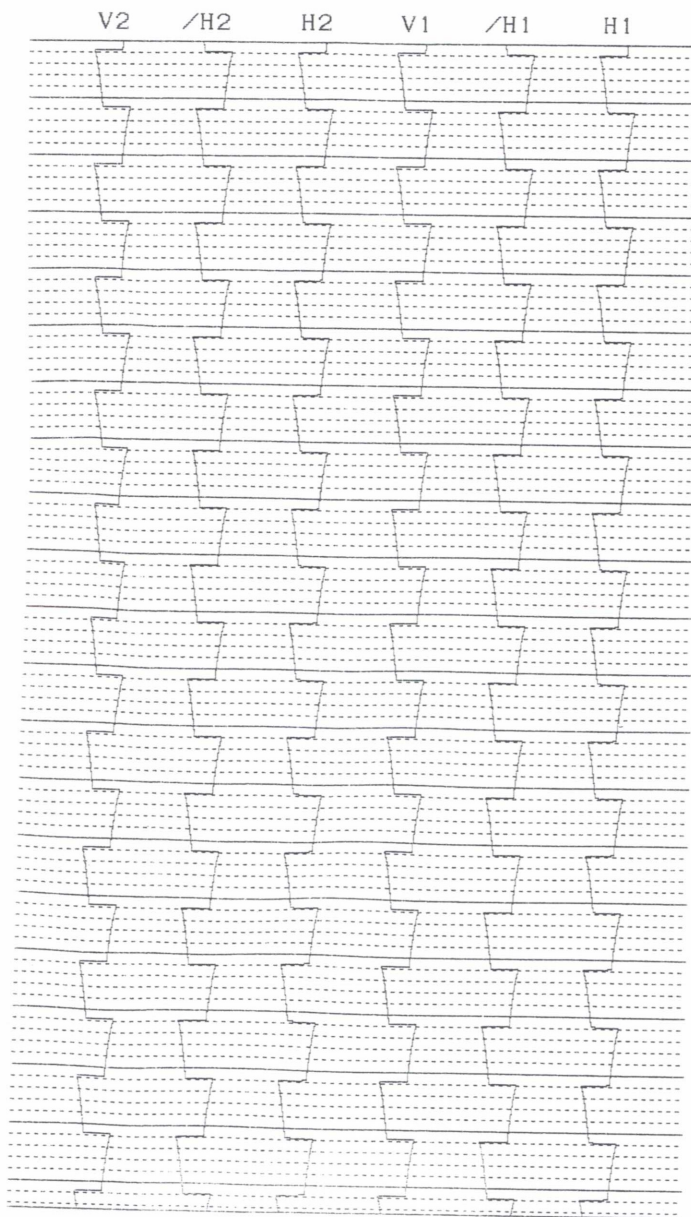
S/N 15014

Suspension 170 1.42

ID_NO. : 502
HOLE NO. : 0
DEPTH : 0.0 [m]
DATE : 16/08/06 10:45:55 AM
H-SAMPLE RATE: 100 [μSEC]
V-SAMPLE RATE: 100 [μSEC]
PULSE WIDTH : 1.6 [mSEC]
DELAY TIME : 0 [mSEC]

	H1	/H1	V1	H2	/H2	V2
GAIN	:X 10	X 10	X 10	X 10	X 10	X 10
LCF [Hz]	: 5	5	5	5	5	5
HCF [Hz]	: 20K	20K	20K	20K	20K	20K
STACK	: 1	1	1	1	1	1

TRACE SIZE : 1
H-TIME SCALE: 1.00 [mSEC/LINE]
V-TIME SCALE: 1.00 [mSEC/LINE]



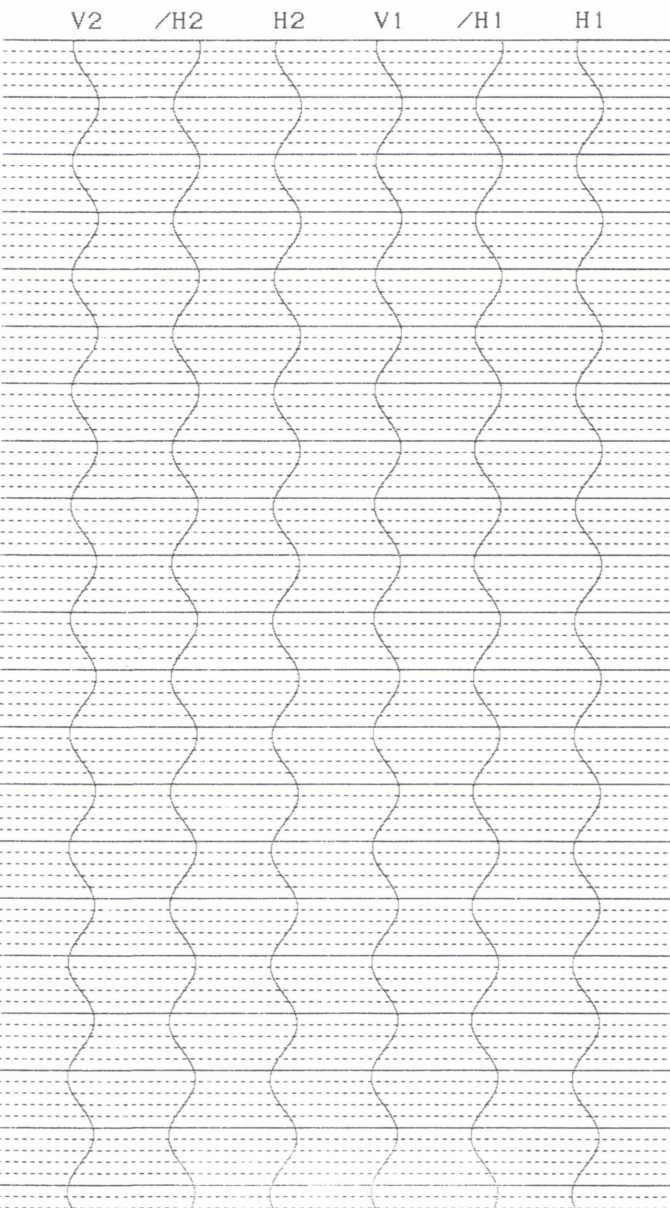
OYO

Suspension 170 1.42 S/N 15014

ID_NO. : 503
HOLE NO. : 0
DEPTH : 0.0 [m]
DATE : 16/08/06 10:46:52 AM
H-SAMPLE RATE: 100 [μSEC]
V-SAMPLE RATE: 100 [μSEC]
PULSE WIDTH : 1.6 [mSEC]
DELAY TIME : 0 [mSEC]

	H1	/H1	V1	H2	/H2	V2
GAIN	:X 10	X 10	X 10	X 10	X 10	X 10
LCF [Hz]	: 5	5	5	5	5	5
HCF [Hz]	: 20K	20K	20K	20K	20K	20K
STACK	: 1	1	1	1	1	1

TRACE SIZE : 1
H-TIME SCALE: 1.00 [mSEC/LINE]
V-TIME SCALE: 1.00 [mSEC/LINE]



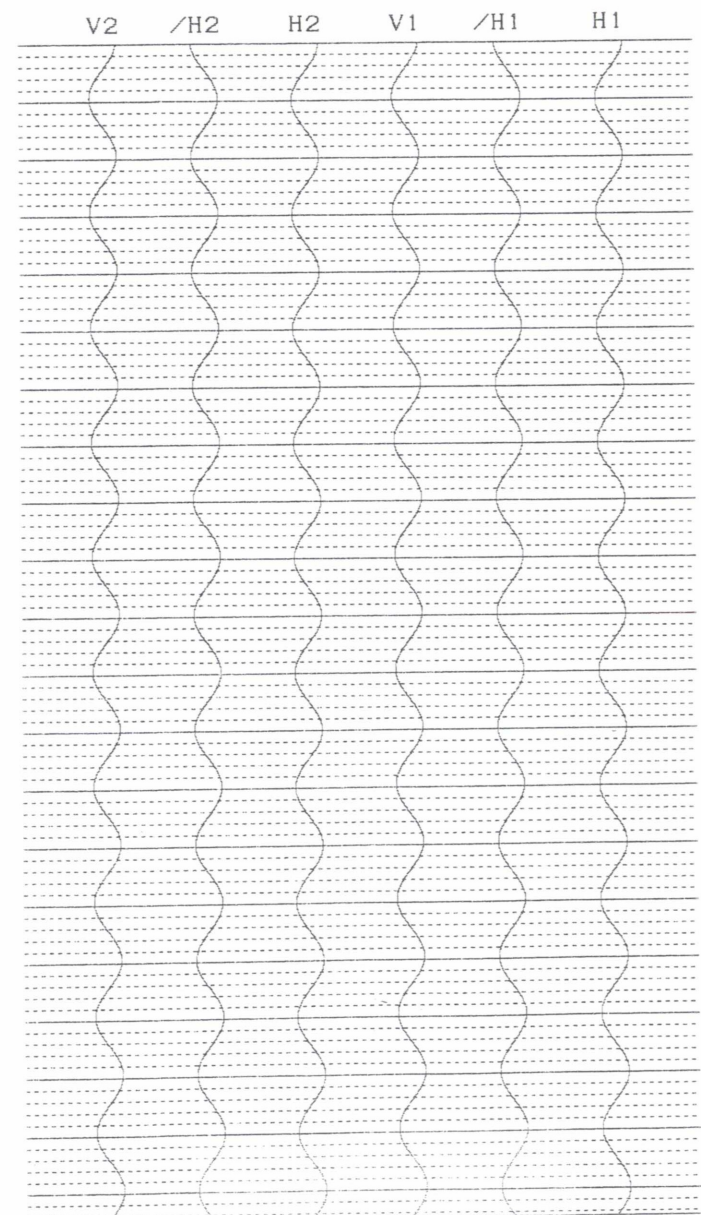
OYO

Suspension 170 1.42

ID_NO. : 504
HOLE NO. : 0
DEPTH : 0.0 [m]
DATE : 16/08/06 10:47:45 AM
H-SAMPLE RATE: 100 [μSEC]
V-SAMPLE RATE: 100 [μSEC]
PULSE WIDTH : 1.6 [mSEC]
DELAY TIME : 0 [mSEC]

	H1	/H1	V1	H2	/H2	V2
GAIN	:X 10	X 10	X 10	X 10	X 10	X 10
LCF [Hz]	: 5	5	5	5	5	5
HCF [Hz]	: 20K	20K	20K	20K	20K	20K
STACK	: 1	1	1	1	1	1

TRACE SIZE : 1
H-TIME SCALE: 1.00 [mSEC/LINE]
V-TIME SCALE: 1.00 [mSEC/LINE]



Calibration Report

METROLOGY

7300 Fenwick Lane
Westminster, CA 92683
866-723-2257
edisonmetrology.com

GEOVision Geophysical Services

1151 Pomona Road, Unit P
Corona, CA 92882
P.O. No.: 6162-060414-01

Manufacturer: Oyo Corporation
Model Number: 3331-A
Description: Logger, Suspension,
Asset Number: 19029
Serial Number: 19029

Calibration Date: 04/21/2006
Calibration Due Date: 04/21/2007
Calibration Interval: 12 Months
Condition As Found: In Tolerance
Condition As Left: In Tolerance

Remarks:

The UUT (unit under test) was calibrated using the customer's procedure. The UUT was operated by the customer's personnel and data collection was observed by SCE personnel. The UUT was found to be in tolerance to customer supplied specifications. The reference standards used are in compliance with ISO/IEC 17025:1999 and laboratory accreditation criteria established by NIST/NVLAP under the specific scope of accreditation for lab code 105014-0. Frequency is accredited.
Please see attached data.

Standards Utilized

I.D. No.	Mfg.	Model No.	Description	Cal. Date	Due Date
S1-01252	Hewlett Packard	5335A OPT 010,203040	Counter, Universal	12/09/2005	06/09/2006
S1-03355	Hewlett Packard	3325B OPT 001, 002	Generator, Function, Synthesizer	11/03/2005	11/03/2006
S1-03686	Fluke	910	Standard, Frequency, Controlled, Gps	01/16/2006	01/16/2007

Procedure: Customer
Temperature: 23° C
Humidity: 40% RH
Test No.: 501206

Calibration Performed By:			Quality Reviewer:	
Branson, Craig A	Metrologist	714-895-0714		04-21-06
Name	Title	Phone	Name	Date

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SEISMOGRAPH CALIBRATION DATA SHEET REV 4/6/06

INSTRUMENT DATA

SYSTEM MFR: OYO	MODEL NO.: 3331A
SERIAL NO.: 19029	CALIBRATION DATE: 4/21/2006
BY: ROBERT STELLER	DUE DATE: 4/21/2007
COUNTER MFR: HEWLETT PACKARD	MODEL NO.: 5335A
SERIAL NO.: 2626A09881	CALIBRATION DATE: 12/9/2005
BY: SCE #S1-01252	DUE DATE: 6/9/2006
FCTN GEN MFR: HEWLETT PACKARD	MODEL NO.: 3325B
SERIAL NO.: 2847A14447	CALIBRATION DATE: 11/3/2005
BY: SCE #S1-03355	DUE DATE: 11/3/2006

SYSTEM SETTINGS:

GAIN:	10
FILTER:	20 KHZ
RANGE:	100 MILLISEC
DELAY:	0
STACK: 1 (STD)	1
PULSE:	1.6
DISPLAY:	NA
SYSTEM: DATE = CORRECT DATE & TIME	4/21/2006, 10:30AM

PROCEDURE:

SET FREQUENCY TO 100.0HZ SQUAREWAVE WITH AMPLITUDE APPROXIMATELY 0.25 VOLT PEAK. RECORD BOTH ON DISK AND PAPER TAPE, IF AVAILABLE. ANALYZE AND PRINT WAVEFORMS FROM ANALYSIS UTILITY. ATTACH PAPER COPIES OF PRINTOUT AND PAPER TAPES, IF AVAILABLE, TO THIS FORM. AVERAGE FREQUENCY MUST BE BETWEEN 99.0 AND 101.0 HZ.

AS FOUND 100.0 AS LEFT 100.0

WAVEFORM	FILE NO	FREQUENCY	TIME FOR 9 CYCLES Hn	TIME FOR 9 CYCLES Hr	TIME FOR 9 CYCLES V	AVERAGE FREQ.
SQUARE	201	100.0	90.0	90.0	90.0	100.0
SQUARE	202	100.0	90.0	90.0	90.0	100.0
SINE	203	100.0	89.9	89.9	89.9	100.1
SINE	204	100.0	90.0	90.0	89.9	100.0

CALIBRATED BY:	ROBERT STELLER	4/21/2006	<i>Rob Steller</i>
	NAME	DATE	SIGNATURE

Seismic recorder/Logger Calibration Data Sheet Rev 1.30 4-6-06
--

OYO

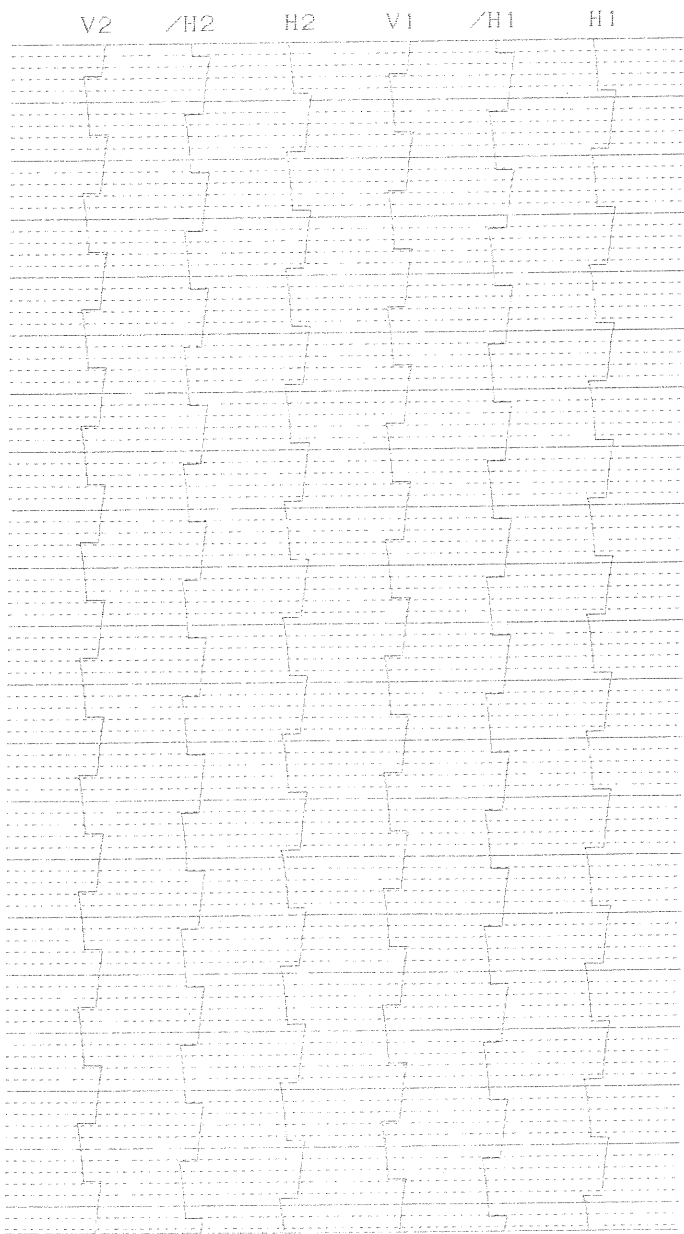
S/N 1902a

Suspension 170 4.25

ID_NO. : 201
HOLE NO. : 0
DEPTH : 0.0 [m]
DATE : 21/04/06 10:41:08 AM
H-SAMPLE RATE: 100 [μSEC]
V-SAMPLE RATE: 100 [μSEC]
PULSE WIDTH : 1.6 [mSEC]
DELAY TIME : 3 [mSEC]

	H1	/H1	V1	H2	/H2	V2
GAIN	:X	10	X	10	X	10
LCF [Hz]	:	5	5	5	5	5
HCF [Hz]	:	20K	20K	20K	20K	20K
STACK	:	1	1	1	1	1

TRACE SIZE : 1
H-TIME SCALE: 1.00 [mSEC/LINE]
V-TIME SCALE: 1.00 [mSEC/LINE]



OYO

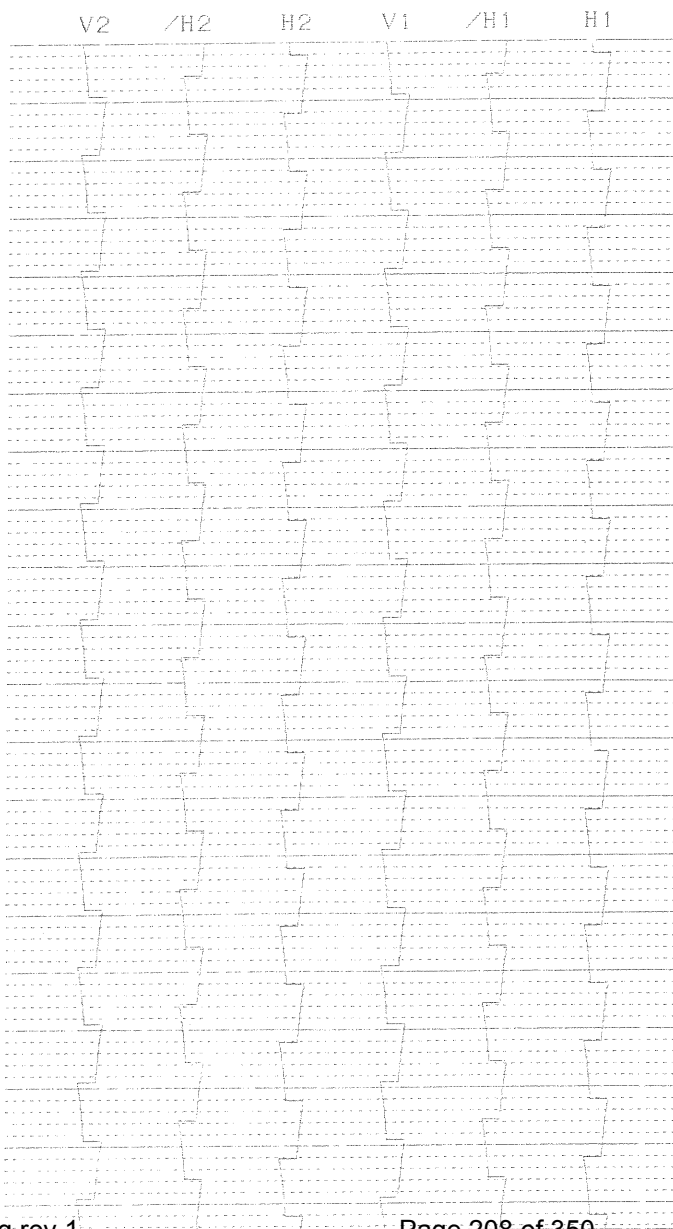
S/N 1902a

Suspension 170 4.25

ID_NO. : 202
HOLE NO. : 0
DEPTH : 0.0 [m]
DATE : 21/04/06 10:45:05 AM
H-SAMPLE RATE: 100 [μSEC]
V-SAMPLE RATE: 100 [μSEC]
PULSE WIDTH : 1.6 [mSEC]
DELAY TIME : 3 [mSEC]

	H1	/H1	V1	H2	/H2	V2
GAIN	:X	10	X	10	X	10
LCF [Hz]	:	5	5	5	5	5
HCF [Hz]	:	20K	20K	20K	20K	20K
STACK	:	1	1	1	1	1

TRACE SIZE : 1
H-TIME SCALE: 1.00 [mSEC/LINE]
V-TIME SCALE: 1.00 [mSEC/LINE]



OYO

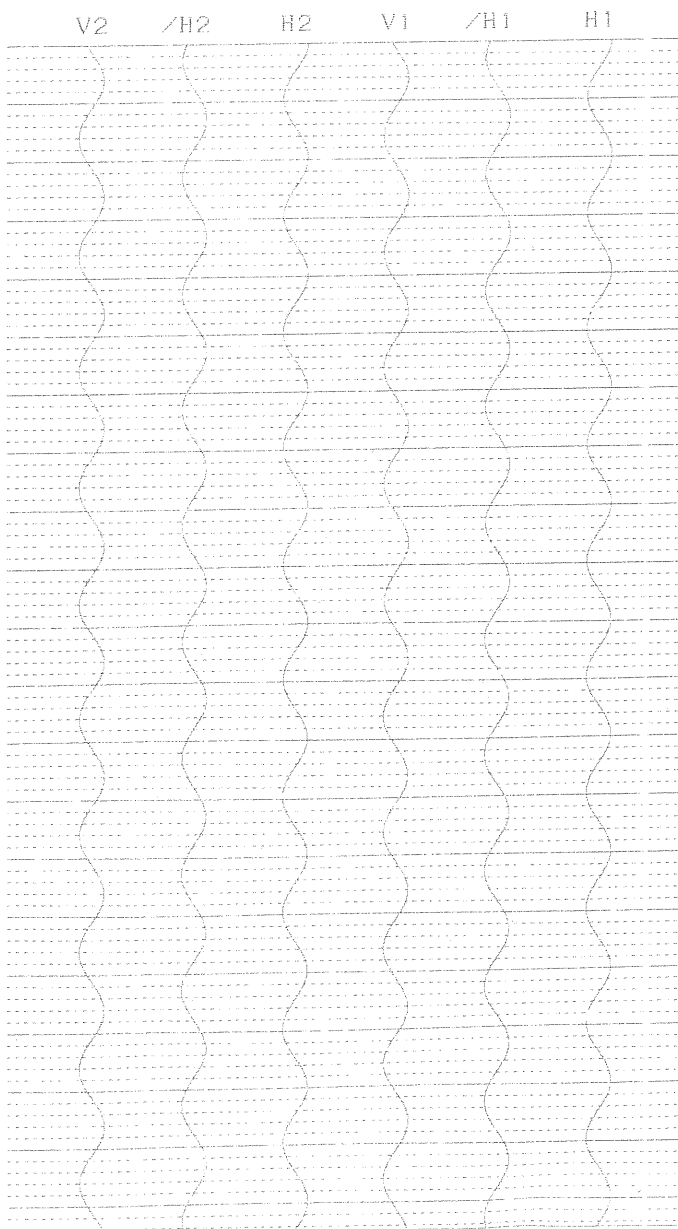
S/N 19029

Suspension 170 4.25

ID_NO. : 203
HOLE NO. : 0
DEPTH : 0.0 [m]
DATE : 21/04/06 10:46:15 AM
H-SAMPLE RATE: 100 [μSEC]
V-SAMPLE RATE: 100 [μSEC]
PULSE WIDTH : 1.6 [mSEC]
DELAY TIME : 3 [mSEC]

	H1	/H1	V1	H2	/H2	V2
GAIN	:X 10	X 10	X 10	X 10	X 10	X 10
LCF [Hz]	: 5	5	5	5	5	5
HCF [Hz]	: 20K	20K	20K	20K	20K	20K
STACK	: 1	1	1	1	1	1

TRACE SIZE : 1
H-TIME SCALE: 1.00 [mSEC/LINE]
V-TIME SCALE: 1.00 [mSEC/LINE]



OYO

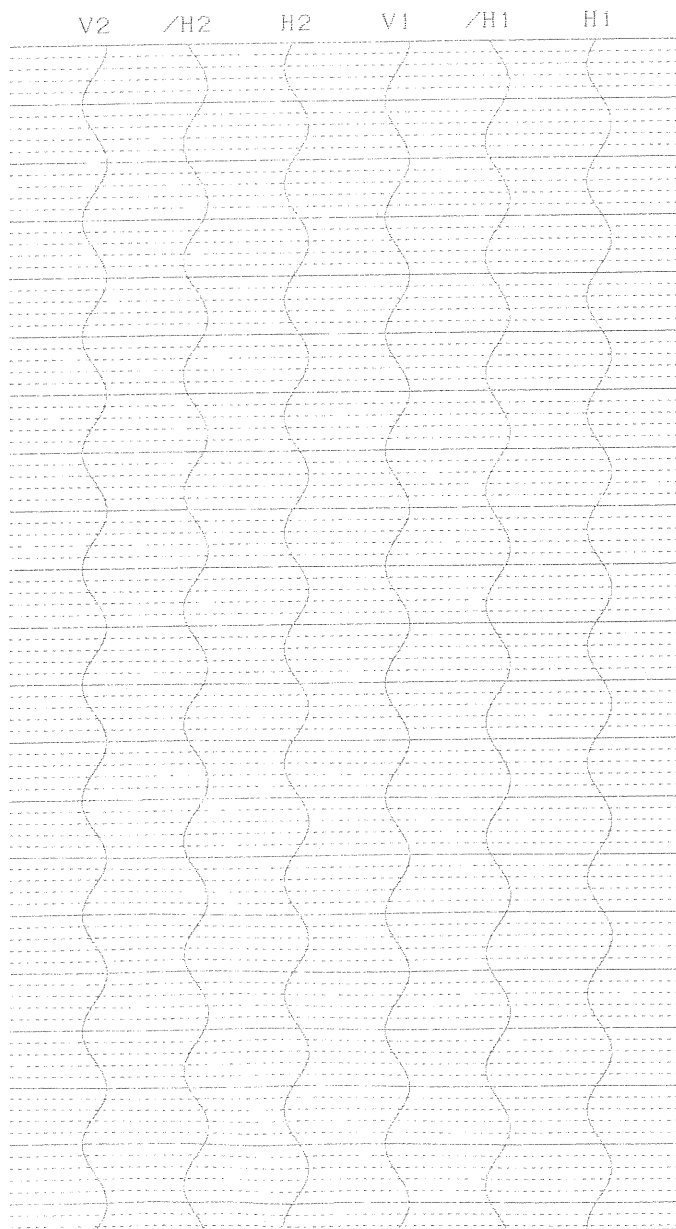
S/N 19029

Suspension 170 4.25

ID_NO. : 204
HOLE NO. : 0
DEPTH : 0.0 [m]
DATE : 21/04/06 10:47:47 AM
H-SAMPLE RATE: 100 [μSEC]
V-SAMPLE RATE: 100 [μSEC]
PULSE WIDTH : 1.6 [mSEC]
DELAY TIME : 3 [mSEC]

	H1	/H1	V1	H2	/H2	V2
GAIN	:X 10	X 10	X 10	X 10	X 10	X 10
LCF [Hz]	: 5	5	5	5	5	5
HCF [Hz]	: 20K	20K	20K	20K	20K	20K
STACK	: 1	1	1	1	1	1

TRACE SIZE : 1
H-TIME SCALE: 1.00 [mSEC/LINE]
V-TIME SCALE: 1.00 [mSEC/LINE]



APPENDIX C

BORING GEOPHYSICAL LOGGING

FIELD DATA LOGS

Table of Contents

Boring BH-C4993 Field Logs	212
Boring BH-C4996 Field Logs	245
Boring BH-C4997 Field Logs	305



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 2-12-06
CLIENT: PNNL JOB: 6303
AUTHOR: JW PAGE 1 OF 6

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: Kene OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____
Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____
BOREHOLE DESIGNATION: C4993 LOCATION: "THE PIT"
RUN #1

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED _____ UNCASED X

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____ ; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 562'

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING 363; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____; FRESH WATER MUD X; SALT WATER MUD; _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: _____



SITE: Hanford WTP DATE: 9-12-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 2 OF 6

LOGGING CREW: JGD
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: _____ DEPARTURE TIME: _____
ARRIVED ON SITE: 11:30 pm 9/11
STANDBY TIME: 0 CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: 3 am 9/12
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOLIBIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES X; NO _____; STORED WITH NEW _____
WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Reducer 20034
Surge 21050
WT 470151
driver 33093
in iso 30083

114.0m	# 108
114.5	107
115.0	106
115.5	105
116.0	104
116.5	103
117.0	102
117.5	101
118.0	100
118.5	099
119.0	098
119.5	097
120.0	096
120.5	095
121.0	094
121.5	093
122.0	092
122.5	091
123.0	090
123.5	089
124.0	088
124.5	087
125.0	086
125.5	085
126.0	084
126.5	083
127.0	082
127.5	081 gain ↓
128.0	080
128.5	079
129.0	078
129.5m	# 077

Zero check
Mesh counter +.2m
elect +.6m.

109.0	
109.5	
110.0	116 casing
110.5	115
111.0	114
111.5	113
112.0	112
112.5	111
113.0	110
113.5m	# 109

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-12-06
CLIENT: PNNL JOB: 6303
AUTHOR: JMD PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
-----------------	---------------	------------------------	----------------------	--------------------------------------

130.0	426.51	076		
130.5	428.15	075		
131.0	429.79	074		
131.5	431.43	073		
132.0	433.07	072		
132.5	434.71	071		
133.0	436.35	070		
133.5	437.99	069		
134.0	439.63	068		
134.5	441.27	067		
135.0	442.91	066		
135.5	444.55	065		
136.0	446.19	064		
136.5	447.83	063		
137.0	449.48	062		
137.5	451.12	061		
138.0	452.76	060		
138.5	454.40	059		
139.0	456.04	058		
139.5	457.68	057		
140.0	459.32	056		
140.5	460.96	055		
141.0	462.60	054		
141.5	464.24	053		
142.0	465.88	052		reduce range.
142.5	467.52	051		
143.0	469.16	050		
143.5	470.80	049		
144.0	472.44	048		↑ top of interbed. gas!
144.5	474.08	047		
145.0	475.72	046		
145.5	477.36	045		
146.0	479.00	044		top rec'r atten.
146.5	480.64	043		
147.0	482.28	042		
147.5	483.92	041		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 09-12-06
CLIENT: PNNL JOB: 6303
AUTHOR: JLD PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
148.0	485.56	040		
148.5	487.20	039		
149.0	488.85	038		
149.5	490.49	037		
150.0	492.13	036		
150.5	493.77	035		
151.0	495.41	034		
151.5	497.05	033		
152.0	498.69	032		
152.5	500.33	031		
153.0	501.97	030		
153.5	503.61	029		
154.0	505.25	028		
154.5	506.89	027		
155.0	508.53	026		
155.5	510.17	025		
156.0	511.81	024		
156.5	513.45	023		
157.0	515.09	022		
157.5	516.73	021		
158.0	518.37	020		
158.5	520.01	019		
159.0	521.65	018		
159.5	523.29	017		↑ Nice! sedna gain
160.0	524.93	016		
160.5	526.57	015		
161.0	528.22	014		
161.5	529.86	013		
162.0	531.50	012		
162.5	533.14	011		↓ bolt of in bed??
163.0	534.78	010		
163.5	536.42	009		
164.0	538.06	008		
164.5	539.70	007		
165.0	541.34	006		
165.5	542.98	005		
166.0	544.62	004		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-12-06
CLIENT: PNNL JOB: 6303
AUTHOR: JSD PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
166.5	546.26	003		
167.0	547.90	002		
167.5	549.54	001		← 1st meas.
168.0	551.18			
168.5	552.82			
169.0	554.46			
169.5	556.10			
170.0	557.74			
170.5	559.38			
171.0	561.02			
171.5	562.66			bottom TD.
172.0	564.30			
172.5	565.94			
173.0	567.59			562.0
173.5	569.23			- 12.1
174.0	570.87			549.9
174.5	572.51			
175.0	574.15			
175.5	575.79			
176.0	577.43			
176.5	579.07			
177.0	580.71			
177.5	582.35			
178.0	583.99			
178.5	585.63			
179.0	587.27			
179.5	588.91			
180.0	590.55			
180.5	592.19			
181.0	593.83			
181.5	595.47			
182.0	597.11			
182.5	598.75			
183.0	600.39			
183.5	602.03			
184.0	603.67			
184.5	605.31	GEOVISION Report 6303-01 Vol 1 of 3 WTP P-S Logging rev 1		Page 217 of 350



GEOVision Geophysical Services 1151 Pomona Road, Suite P, Corona, CA 92882 Ph (951) 549-1234 Fx (951) 549-1236
GEOVision Report 6303-01 Vol 1 of 3 WTP P-S Logging rev 1 Page 218 of 350



SITE: Hanford WTP DATE: 9-18-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 1 OF 6

LOGGING CREW: _____

VEHICLE(S) USED AND MILEAGE: _____

MOBILIZED FROM: _____ DEPARTURE TIME: _____

ARRIVED ON SITE: 1615 pm.

STANDBY TIME: 0 CAUSE: _____

LOGGING STARTED: 1645 LOGGING COMPLETED: started in to hole.

STANDBY TIME: 1700-1800 9-18-06 CAUSE: _____

LOGGING STARTED: 1700 LOGGING COMPLETED: 1900

DEMOLIBIZED TO: _____ ARRIVAL TIME: _____

ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO X; STORED WITH NEW _____

WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐

INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐

RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Source 21050

driver 33093

WT 470157

ISO 300083

reducer 20034

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-18-06
CLIENT: PNNL JOB: 6303
AUTHOR: 160 PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
166.5	546.26			" "
167.0	547.90			WSTE. O
167.5	549.54			@ 6.5 in bags
168.0	551.18			
168.5	552.82			
169.0	554.46			
169.5	556.10			stop here.
170.0	557.74	128		
170.5	559.38	127		
171.0	561.02	126		
171.5	562.66	125		Stopped here
172.0	564.30	124		on RvN #1
172.5	565.94	123		
173.0	567.59	122		
173.5	569.23	121		
174.0	570.87	120		
174.5	572.51	119		
175.0	574.15	118		
175.5	575.79	117		
176.0	577.43	116		
176.5	579.07	115		← done. Change paper
177.0	580.71	114		
177.5	582.35	113		
178.0	583.99	112		
178.5	585.63	111		
179.0	587.27	110		
179.5	588.91	109		
180.0	590.55	108		
180.5	592.19	107		
181.0	593.83	106		
181.5	595.47	105		
182.0	597.11	104		
182.5	598.75	103		
183.0	600.39	102		
183.5	602.03	101		
184.0	603.67	100.		
184.5	605.31	99		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-18-06
CLIENT: PNNL JOB: 6303
AUTHOR: JM PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
185.0	606.96	098		
185.5	608.60	097		
186.0	610.24	096		
186.5	611.88	095		
187.0	613.52	094		
187.5	615.16	093		
188.0	616.80	092		
188.5	618.44	091		
189.0	620.08	090		
189.5	621.72	089		
190.0	623.36	088		
190.5	625.00	087		
191.0	626.64	086		
191.5	628.28	085		
192.0	629.92	084		
192.5	631.56	083		
193.0	633.20	082		
193.5	634.84	081		
194.0	636.48	080		
194.5	638.12	079		
195.0	639.76	078		
195.5	641.40	077		
196.0	643.04	076		
196.5	644.69	075		
197.0	646.33	074		
197.5	647.97	073		
198.0	649.61	072		
198.5	651.25	071		
199.0	652.89	070		
199.5	654.53	069		
200.0	656.17	068		
200.5	657.81	067		
201.0	659.45	066		
201.5	661.09	065		
202.0	662.73	064		
202.5	664.37	063		
203.0	666.01	062		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-18-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
-----------------	---------------	------------------------	----------------------	--------------------------------------

203.5	667.65	061		
204.0	669.29	060		
204.5	670.93	059		
205.0	672.57	058		
205.5	674.21	057		
206.0	675.85	056		
206.5	677.49	055		
207.0	679.13	054		
207.5	680.77	053		
208.0	682.41	052		
208.5	684.06	051		
209.0	685.70	050		
209.5	687.34	049		
210.0	688.98	048		
210.5	690.62	047		
211.0	692.26	046		
211.5	693.90	045		
212.0	695.54	044		
212.5	697.18	043		
213.0	698.82	042		
213.5	700.46	041		
214.0	702.10	040		
214.5	703.74	039		
215.0	705.38	038		
215.5	707.02	037		
216.0	708.66	036		min gain!
216.5	710.30	035		
217.0	711.94	033, 034		34 @ reduced range
217.5	713.58	032		
218.0	715.22	031		← here.
218.5	716.86	030		
219.0	718.50	029		
219.5	720.14	028		
220.0	721.78	027		
220.5	723.43	026		
221.0	725.07	025		
221.5	726.71	024		727.1' top of interbed.
222.0	728.35	023		
222.5	729.99	022		
223.0	731.63	021		
223.5	733.27	020		
224.0	734.91	019		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-18-06
CLIENT: PNNL JOB: 6303
AUTHOR: J60 PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
224.5	736.55	018		
225.0	738.19	017		
225.5	739.83	016		
226.0	741.47	015		incr. range 742.3 bot
226.5	743.11	014		incr. far gain interbed.
227.0	744.75	013		
227.5	746.39	012		
228.0	748.03	011		
228.5	749.67	010		
229.0	751.31	009		
229.5	752.95	008		
230.0	754.59	007		
230.5	756.23	006		red. gain
231.0	757.87	005		
231.5	759.51	004		
232.0	761.15	003		
232.5	762.80	002		← TD.
233.0	764.44			
233.5	766.08			
234.0	767.72			
234.5	769.36	* NO	"001" -	↓ NO 9-18-06
235.0	771.00			
235.5	772.64			
236.0	774.28			
236.5	775.92			
237.0	777.56			
237.5	779.20			
238.0	780.84			
238.5	782.48			
239.0	784.12			
239.5	785.76			
240.0	787.40			
240.5	789.04			
241.0	790.68			
241.5	792.32	232.		775.3
242.0	793.96	- 167.		- 12.1
242.5	795.60	68m		763.2
243.0	797.24			
243.5	798.88	130 menst's	~ 130 min.	
244.0	800.52		~ 2 hrs.	
244.5	802.17			
245.0	803.81			



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 9-23-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 1 OF

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns _____ OFFICE PHONE: cell 509-531-7478

CONTACT: Doug McFarland OFFICE PHONE: cell 509-306-9401

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____

Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C 4993 LOCATION: The pit

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED _____ UNCASED _____

DIAMETERS AND DEPTH RANGES: 9" 0 TO ; TO

BOREHOLE TOTAL DEPTH AS DRILLED: 965.4

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER____; FRESH WATER MUD X; SALT WATER MUD:_____

OTHER: _____

DEPTH TO BOREHOLE FLUID: N/A TIME SINCE LAST CIRCULATION: _____

flow top
935'

845.

next
742.3



SITE: Hanford WTP DATE: 9-23-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD. PAGE 1 OF 6
2

LOGGING CREW: JGD.
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: _____ DEPARTURE TIME: _____
ARRIVED ON SITE: 6:45 am
STANDBY TIME: _____ CAUSE: safety / setup.
LOGGING STARTED: 8:00. LOGGING COMPLETED: 10:00 am
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOLIBIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO X; STORED WITH NEW _____
WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Zero check - 1m ok.

redner iso 300083 driver 33093
21037 source Wt 470151
21050

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP C4993 DATE: 9-23-06
CLIENT: PNNL RUN #3 JOB: 6303
AUTHOR: JGD PAGE 3A OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
224.5	736.55	135		stop here.
225.0	738.19	134		
225.5	739.83	133		
226.0	741.47	132		
226.5	743.11	131		
227.0	744.75	130		
227.5	746.39	129		
228.0	748.03	128		
228.5	749.67	127		
229.0	751.31	126		
229.5	752.95	125		stop here JGD 9.23.06
230.0	754.59	124		
230.5	756.23	123		
231.0	757.87	122		
231.5	759.51	121		
232.0	761.15	120		war. gain. far
232.5	762.80	119		
233.0	764.44	118		
233.5	766.08	117		← previous. log ends here.
234.0	767.72	116		
234.5	769.36	115		
235.0	771.00	114		
235.5	772.64	113		
236.0	774.28	112		
236.5	775.92	111		
237.0	777.56	110		
237.5	779.20	109		
238.0	780.84	108		
238.5	782.48	107		
239.0	784.12	106		
239.5	785.76	105		
240.0	787.40	104		
240.5	789.04	103		
241.0	790.68	102		
241.5	792.32	101		
242.0	793.96	100		
242.5	795.60	099		
243.0	797.24	098		
243.5	798.88	097		
244.0	800.52	096		
244.5	802.17	095		
245.0	803.81	094		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-23-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
245.5	805.45	093		
246.0	807.09	092		
246.5	808.73	091		
247.0	810.37	090		
247.5	812.01	089		
248.0	813.65	088		
248.5	815.29	087		
249.0	816.93	086		
249.5	818.57	085		
250.0	820.21	084		
250.5	821.85	083		
251.0	823.49	082		
251.5	825.13	081		
252.0	826.77	080		
252.5	828.41	079		
253.0	830.05	078		
253.5	831.69	077		reduce range + gain
254.0	833.33	076		
254.5	834.97	075		
255.0	836.61	074		
255.5	838.25	073		
256.0	839.90	072		
256.5	841.54	071		
257.0	843.18	070		
257.5	844.82	069		top of interval.
258.0	846.46	068		
258.5	848.10	067		
259.0	849.74	066		
259.5	851.38	065		
260.0	853.02	064		
260.5	854.66	063		
261.0	856.30	062		
261.5	857.94	061		
262.0	859.58	060		
262.5	861.22	059		
263.0	862.86	058		
263.5	864.50	057		
264.0	866.14	056		
264.5	867.78	055		
265.0	869.42	054		
265.5	871.06	052 53		Nice!
266.0	872.70	051 52		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-23-06
CLIENT: PNNL JOB: 6303
AUTHOR: JOD PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
266.5	874.34	050 51		
267.0	875.98	049 50		
267.5	877.62	048 49		
268.0	879.27	047 48		
268.5	880.91	046 47		
269.0	882.55	045		
269.5	884.19	044		
270.0	885.83	043		
270.5	887.47	042		
271.0	889.11	041		
271.5	890.75	040		
272.0	892.39	039		
272.5	894.03	038		
273.0	895.67	037		
273.5	897.31	036		
274.0	898.95	035		
274.5	900.59	034		
275.0	902.23	033 33		
275.5	903.87	032 32		
276.0	905.51	031 31		
276.5	907.15	029 30		
277.0	908.79	028 29		
277.5	910.43	027 28		
278.0	912.07	026 27		
278.5	913.71	025 26		
279.0	915.35	024 25		
279.5	916.99	023 24		
280.0	918.64	022 23		
280.5	920.28	021 22		
281.0	921.92	020 21		
281.5	923.56	019 20		
282.0	925.20	018 019		
282.5	926.84	017		
283.0	928.48	016		
283.5	930.12	015		
284.0	931.76	014		
284.5	933.40	013		
285.0	935.04	012		
285.5	936.68	011		
286.0	938.32	010		
286.5	939.96	009		
287.0	941.60	008		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-23-06
CLIENT: PNNL JOB: 6303
AUTHOR: J/60 PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
287.5	943.24	007		
288.0	944.88	006		
288.5	946.52	005		
289.0	948.16	004		
289.5	949.80	003		
290.0	951.44	002		
290.5	953.08	001		← TD.
291.0	954.72			
291.5	956.36			
292.0	958.01			
292.5	959.65			
293.0	961.29			
293.5	962.93			
294.0	964.57			
294.5	966.21			
295.0	967.85			
295.5	969.49			
296.0	971.13			965.4
296.5	972.77			- 12.1
297.0	974.41			
297.5	976.05			953.3
298.0	977.69			
298.5	979.33			
299.0	980.97			
299.5	982.61			
300.0	984.25			
300.5	985.89			
301.0	987.53			
301.5	989.17			
302.0	990.81			
302.5	992.45			
303.0	994.09			
303.5	995.73			
304.0	997.38			
304.5	999.02			
305.0	1000.66			
305.5	1002.30			
306.0	1003.94			
306.5	1005.58			
307.0	1007.22			
307.5	1008.86			
308.0	1010.50			



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 9-30-06
CLIENT: PNNL JOB: 6303
AUTHOR: JBG PAGE 1 OF 6

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: Doug McFarland OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____

Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C4993 LOCATION: _____

RUN # 4

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED _____ UNCASD X

DIAMETERS AND DEPTH RANGES: 9" 0 TO TD; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 1222

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____; FRESH WATER MUD X; SALT WATER MUD; _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: _____

bottom
interbed
1191

top
interbed
1095

fract.
zone
980-990

flow top 935



SITE: Hanford WTP DATE: 9-30-06
CLIENT: PNNL JOB: 6303
AUTHOR: _____ PAGE 2 OF 6

LOGGING CREW: _____
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: _____ DEPARTURE TIME: _____
ARRIVED ON SITE: 10pm.
STANDBY TIME: 2hrs. CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOLIBIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO _____; STORED WITH NEW _____
WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: redner 21037
iso tube 300883
driver 33093
source 21050
WE 470751

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-30-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
287.5	943.24	142		Stop here
288.0	944.88	141	283.5	150.
288.5	946.52	140	284.0	149
289.0	948.16	139	284.5	148
289.5	949.80	138	285.0	147
290.0	951.44	137	285.5	146
290.5	953.08	136	286.0	145
291.0	954.72	135	286.5	144
291.5	956.36	134	287.0	143
292.0	958.01	133		
292.5	959.65	132		Zero check
293.0	961.29	131		OK
293.5	962.93	130		@ "0.0" -10"
294.0	964.57	129		~.2m bgs
294.5	966.21	128		
295.0	967.85	127		
295.5	969.49	126		
296.0	971.13	124, 125		
296.5	972.77	123		
297.0	974.41	122		Reduced gr response
297.5	976.05	121		gain 0 up.
298.0	977.69	120		
298.5	979.33	119		
299.0	980.97	118		
299.5	982.61	117		
300.0	984.25	116		
300.5	985.89	115		
301.0	987.53	114		
301.5	989.17	113		
302.0	990.81	112		
302.5	992.45	111		
303.0	994.09	110		
303.5	995.73	109		
304.0	997.38	108		
304.5	999.02	107		
305.0	1000.66	106		
305.5	1002.30	105		
306.0	1003.94	104		
306.5	1005.58	103		
307.0	1007.22	102		
307.5	1008.86	101		
308.0	1010.50	100		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-30-06
CLIENT: PNNL JOB: 6303
AUTHOR: JCD PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
308.5	1012.14	99		
309.0	1013.78	98		
309.5	1015.42	97		
310.0	1017.06	96		
310.5	1018.70	95		
311.0	1020.34	94		
311.5	1021.98	93		
312.0	1023.62	92		
312.5	1025.26	91		
313.0	1026.90	90		
313.5	1028.54	89		
314.0	1030.18	88		
314.5	1031.82	87		
315.0	1033.46	86		
315.5	1035.10	85		
316.0	1036.75	84		
316.5	1038.39	83		
317.0	1040.03	82		
317.5	1041.67	81		
318.0	1043.31	80		
318.5	1044.95	79		
319.0	1046.59	78		
319.5	1048.23	77		
320.0	1049.87	76		
320.5	1051.51	75		
321.0	1053.15	74		
321.5	1054.79	73		
322.0	1056.43	72		
322.5	1058.07	71		
323.0	1059.71	70		
323.5	1061.35	69		
324.0	1062.99	68		
324.5	1064.63	67		
325.0	1066.27	66		
325.5	1067.91	65		
326.0	1069.55	64		
326.5	1071.19	63		
327.0	1072.83	62		
327.5	1074.48	61		
328.0	1076.12	60		
328.5	1077.76	59		
329.0	1079.40	58		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-30-06
CLIENT: PNNL JOB: 6303
AUTHOR: _____ PAGE 5 OF 6 JFD

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
329.5	1081.04	59		
330.0	1082.68	56		
330.5	1084.32	65		
331.0	1085.96	54		
331.5	1087.60	53		
332.0	1089.24	52		
332.5	1090.88	51		
333.0	1092.52	50		
333.5	1094.16	49		
334.0	1095.80	48		← top of interbed.
334.5	1097.44	47		
335.0	1099.08	46		
335.5	1100.72	46		
336.0	1102.36	44		
336.5	1104.00	43		
337.0	1105.64	42		
337.5	1107.28	41		
338.0	1108.92	40		
338.5	1110.56	39		
339.0	1112.20	38		
339.5	1113.85	37		
340.0	1115.49	36		
340.5	1117.13	35		
341.0	1118.77	34		
341.5	1120.41	33		
342.0	1122.05	32		
342.5	1123.69	31		
343.0	1125.33	30		
343.5	1126.97	29		
344.0	1128.61	28		
344.5	1130.25	27		
345.0	1131.89	26		
345.5	1133.53	25		
346.0	1135.17	24		
346.5	1136.81	23		
347.0	1138.45	22		
347.5	1140.09	21		
348.0	1141.73	20		
348.5	1143.37	19		
349.0	1145.01	18		
349.5	1146.65	17		
350.0	1148.29	16		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-30-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
350.5	1149.93	15		
351.0	1151.57	14		
351.5	1153.22	13		
352.0	1154.86	12		
352.5	1156.50	11		
353.0	1158.14	10		
353.5	1159.78	9		
354.0	1161.42	7		
354.5	1163.06	6		
355.0	1164.70	5		
355.5	1166.34	4		
356.0	1167.98	3		
356.5	1169.62	2		
357.0	1171.26	8		
357.5	1172.90	GO 1		
358.0	1174.54			
358.5	1176.18			
359.0	1177.82			
359.5	1179.46			
360.0	1181.10			
360.5	1182.74			
361.0	1184.38			
361.5	1186.02			
362.0	1187.66			
362.5	1189.30			
363.0	1190.94			
363.5	1192.59			
364.0	1194.23			
364.5	1195.87			
365.0	1197.51			
365.5	1199.15			
366.0	1200.79			
366.5	1202.43			
367.0	1204.07			
367.5	1205.71			
368.0	1207.35			
368.5	1208.99			
369.0	1210.63			
369.5	1212.27			
370.0	1213.91			
370.5	1215.55			
371.0	1217.19			

9-30-06
11-30-06

WATCH
OUT!
DOE could
not pass this
(1183')

unable to penetrate
past this location.

probe tip is at

1172.9
+12.1
1185.0 ft.

← bottom of
interbeds

← TD here.



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 10-1-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD. PAGE 1 OF

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: Doug McFarland OFFICE PHONE:

CONTACT: OFFICE PHONE:

CONTACT: OFFICE PHONE:

DIRECTIONS TO SITE:
Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION:

EA#: C4993 5 4B JGD 1-23-07

BOREHOLE DESIGNATION: RUN #5 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:

BOREHOLE CONSTRUCTION: CASED UNCASD X

DIAMETERS AND DEPTH RANGES: 9" 0 TO TD; , TO

BOREHOLE TOTAL DEPTH AS DRILLED: 1222

CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO

DEPTH TO BEDROCK: DEPTH TO WATER TABLE:

BOREHOLE FLUID: WATER ; FRESH WATER MUD X; SALT WATER MUD;

OTHER:

DEPTH TO BOREHOLE FLUID: TIME SINCE LAST CIRCULATION:



SITE: Hanford WTP DATE: 10-1-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGA PAGE 1 OF 3
2

LOGGING CREW: JGA
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: _____ DEPARTURE TIME: _____
ARRIVED ON SITE: 1630
STANDBY TIME: 6 CAUSE: _____
LOGGING STARTED: 1700 LOGGING COMPLETED: _____
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOLIBIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO X *checked OK*; STORED WITH NEW _____
WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: redner 21037
iso tube 300083
driver 33093
source 21050
wt 470151

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-1-06
CLIENT: PNNL JOB: 6303
AUTHOR: JH PAGE 3 OF 3

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
350.5	1149.93	038		
351.0	1151.57	037		Zero check in
351.5	1153.22	036		
352.0	1154.86	035		+ 0.2m. @ zero.
352.5	1156.50	034		
353.0	1158.14	033		
353.5	1159.78	032		
354.0	1161.42	031		
354.5	1163.06	030		
355.0	1164.70	029		
355.5	1166.34	028		
356.0	1167.98	027		WATCH OUT
356.5	1169.62	026		
357.0	1171.26	025		
357.5	1172.90	024		
358.0	1174.54	023		
358.5	1176.18	022		
359.0	1177.82	021		
359.5	1179.46	020		
360.0	1181.10	019		
360.5	1182.74	018		
361.0	1184.38	017		
361.5	1186.02	016		
362.0	1187.66	015		
362.5	1189.30	014		
363.0	1190.94	013		← bottom of interbed.
363.5	1192.59	012		
364.0	1194.23	011		
364.5	1195.87	010		
365.0	1197.51	009		
365.5	1199.15	008		
366.0	1200.79	007		
366.5	1202.43	006		
367.0	1204.07	005		
367.5	1205.71	004		
368.0	1207.35	003		
368.5	1208.99	002		
369.0	1210.63	001		← TD here
369.5	1212.27			YES.
370.0	1213.91			
370.5	1215.55			bottom @ 369.1m + 12.1 ft
371.0	1217.19			



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 10-8-06
CLIENT: PNNL JOB: 6303
AUTHOR: Diehl PAGE 1 OF 6

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: Doug OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____

Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C 4993 LOCATION: "The Pit"

RUN # 5 1-23-07 both Makaton

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASSED _____ UNCASSED X

DIAMETERS AND DEPTH RANGES: 9" 0 TO _____; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 1411 ft

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____; FRESH WATER MUD X; SALT WATER MUD; _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: N/A TIME SINCE LAST CIRCULATION: _____

*not interbed - clay
inclusion.*



SITE: Hanford WTP DATE: 10-8-06
CLIENT: PNNL JOB: 6303
AUTHOR: JH PAGE 1 OF 6
2

LOGGING CREW: DIETZ
VEHICLE(S) USED AND MILEAGE:
MOBILIZED FROM: DEPARTURE TIME:
ARRIVED ON SITE: 8 pm.
STANDBY TIME: CAUSE:
LOGGING STARTED: ~ 9 pm enter LOGGING COMPLETED:
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOLIBIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ☒; NO ☐; STORED WITH NEW ☐
WINCH COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES: new wt. - installed
batteries in correct - fixed.

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: reducer 21037
iso 300083
driver 33093
source 21050
wt 470157

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-8-06
CLIENT: PNNL JOB: 6303
AUTHOR: 1 GD PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
350.5	1149.93			
351.0	1151.57			
351.5	1153.22			
352.0	1154.86			
352.5	1156.50			
353.0	1158.14			
353.5	1159.78			
354.0	1161.42			
354.5	1163.06			
355.0	1164.70			
355.5	1166.34			
356.0	1167.98			
356.5	1169.62			
357.0	1171.26			
357.5	1172.90			
358.0	1174.54			
358.5	1176.18			
359.0	1177.82			
359.5	1179.46			
360.0	1181.10			
360.5	1182.74			
361.0	1184.38			
361.5	1186.02			
362.0	1187.66			
362.5	1189.30			
363.0	1190.94			
363.5	1192.59			
364.0	1194.23			
364.5	1195.87	140		
365.0	1197.51	139		
365.5	1199.15	138		
366.0	1200.79	137		
366.5	1202.43	136		
367.0	1204.07	135		
367.5	1205.71	134		
368.0	1207.35	133		
368.5	1208.99	132		
369.0	1210.63	131		
369.5	1212.27	130		
370.0	1213.91	129		
370.5	1215.55	128		
371.0	1217.19	127		

Zero check ok -
@ "φ" - 2m. bgs

Stop.

← last log ended.

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-8-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
371.5	1218.83	126		
372.0	1220.47	125		
372.5	1222.11	124		
373.0	1223.75	123		
373.5	1225.39	122		
374.0	1227.03	121		
374.5	1228.67	120		
375.0	1230.31	119		
375.5	1231.96	118		
376.0	1233.60	117		
376.5	1235.24	116		
377.0	1236.88	115		
377.5	1238.52	114		
378.0	1240.16	113		
378.5	1241.80	112		
379.0	1243.44	111		
379.5	1245.08	110		
380.0	1246.72	109		
380.5	1248.36	108		
381.0	1250.00	107		
381.5	1251.64	106		
382.0	1253.28	105		
382.5	1254.92	104		
383.0	1256.56	103		
383.5	1258.20	102		
384.0	1259.84	101		
384.5	1261.48	100		change diskette
385.0	1263.12	99		
385.5	1264.76	98		
386.0	1266.40	97		
386.5	1268.04	96		
387.0	1269.69	95		
387.5	1271.33	94		
388.0	1272.97	93		
388.5	1274.61	92		
389.0	1276.25	91		
389.5	1277.89	90		
390.0	1279.53	89		
390.5	1281.17	88		
391.0	1282.81	87		
391.5	1284.45	86		
392.0	1286.09	85		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-8-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
392.5	1287.73	84		
393.0	1289.37	83		
393.5	1291.01	82		
394.0	1292.65	81		
394.5	1294.29	80		
395.0	1295.93	79		
395.5	1297.57	78		
396.0	1299.21	77		
396.5	1300.85	76		
397.0	1302.49	75		
397.5	1304.13	74		
398.0	1305.77	73		
398.5	1307.41	72		
399.0	1309.06	71		
399.5	1310.70	70		
400.0	1312.34	69		
400.5	1313.98	68		
401.0	1315.62	67		
401.5	1317.26	66		
402.0	1318.90	65		
402.5	1320.54	64		
403.0	1322.18	63		
403.5	1323.82	62		
404.0	1325.46	61		
404.5	1327.10	60		
405.0	1328.74	59		
405.5	1330.38	58		
406.0	1332.02	57		
406.5	1333.66	56		
407.0	1335.30	55		
407.5	1336.94	54		
408.0	1338.58	53		
408.5	1340.22	52		
409.0	1341.86	51		
409.5	1343.50	50		
410.0	1345.14	49		
410.5	1346.78	48		
411.0	1348.43	47	411.25	46 gain ↓
411.5	1350.07	45	411.75	44
412.0	1351.71	43	412.25	42
412.5	1353.35	41	412.75	40
413.0	1354.99	38		res

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-8-06
CLIENT: PNNL JOB: 6303
AUTHOR: JFO PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
413.5	1356.63	35-36	413.25 57	35 ← top of interbed.
414.0	1358.27	34	413.75 35	
414.5	1359.91	32	414.25 33	
415.0	1361.55	29	414.75 30, 31	range 5+10
415.5	1363.19	26	415.25 27, 28	range 5+10
416.0	1364.83	24	415.75 25	
416.5	1366.47	22	416.25 23	
417.0	1368.11	21		
417.5	1369.75	20		
418.0	1371.39	19		
418.5	1373.03	18		
419.0	1374.67	17		← bot of interbed.?
419.5	1376.31	16		
420.0	1377.95	15		
420.5	1379.59	14		
421.0	1381.23	13		
421.5	1382.87	12		
422.0	1384.51	11		
422.5	1386.15	10		
423.0	1387.80	9		
423.5	1389.44	8		
424.0	1391.08	007		
424.5	1392.72	006		
425.0	1394.36	005		
425.5	1396.00	004		
426.0	1397.64	003		
426.5	1399.28	002		← TD ?
427.0	1400.92	001		
427.5	1402.56			@ 27.3 m.
428.0	1404.20			
428.5	1405.84			
429.0	1407.48			
429.5	1409.12			
430.0	1410.76			← drilled
430.5	1412.40			
431.0	1414.04			
431.5	1415.68			
432.0	1417.32			1411.0
432.5	1418.96			- 12.1
433.0	1420.60			
433.5	1422.24			1398.9
434.0	1423.88			



Original handwritten
in poor ink, and copied
over by author on
original date 8/3/06
J. Diehl per telecon with
R Steller 2/27/07 JMD

P-S SUSPENSION VELOCITY FIELD LOG

SITE: HANFORD WTP B4996 DATE: 8/3/06
CLIENT: PNNL JOB: 6303
AUTHOR: R. STELLER PAGE 1 OF 6

CONTACT: MARTY GARDENER CELL PHONE: 509-372-8029
PHONE:
CONTACT: ALAN ROHAY OFFICE PHONE: 509-376-6925
PHONE:
CONTACT: TOM BROUNS CELL PHONE: 509-531-7478
PHONE:
CONTACT: PHONE:
PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B4996 LOCATION: N4,745.88 E 10,005.89

RUN #1

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ☒ UNCASD
DIAMETERS AND DEPTH RANGES: 0 TO 350 ; 350' TO 532'
BOREHOLE TOTAL DEPTH AS DRILLED: 532'
CONDUCTOR CASING?: YES ☒ DEPTH TO BOTTOM OF CASING 350' ; NO STEEL
DEPTH TO BEDROCK: DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ; FRESH WATER MUD ☒ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: 6 hrs



SITE: HANFORD WTP B4996 DATE: 8/3/06
CLIENT: PNNL JOB: 6303
AUTHOR: R. STELLER PAGE 2 OF 6

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: —
MOBILIZED FROM: — DEPARTURE TIME: —
ARRIVED ON SITE: —
STANDBY TIME: — CAUSE: —
LOGGING STARTED: 4:32 LOGGING COMPLETED: 6:00
STANDBY TIME: — CAUSE: —
LOGGING STARTED: — LOGGING COMPLETED: —
DEMOLIBIZED TO: — ARRIVAL TIME: —
ADDITIONAL DEMOB TIME: — REASON: —

BATTERIES CHANGED BEFORE LOGGING: YES —; NO ✓; STORED WITH NEW —
WINCH — COMPROBE ☐ GREY ☐ OYO ☐ RG ☐ OTH ☒
INSTRUMENT OYO 12004 ☐ 15014 ☐ 19029 ☒ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☐ 11001 ☐ 23053 ☐ 30086 ☒

MAINTENANCE PERFORMED ON SITE: —

EQUIPMENT PROBLEMS OR FAILURES: —

SUGGESTIONS, ADDITIONS, CHANGES: —

COMMENTS: ZERO @ 6.56' - 5.3' = 1.26' = .38m.
EXIT = .30m END OF SURVEY ERROR = .08m

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: HANFORD WTP B4996 DATE: 8/3/06
CLIENT: PNNL JOB: 6303
AUTHOR: R. STELLER PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
-----------------	---------------	------------------------	----------------------	--------------------------------------

100.5	329.72			
101.0	331.36			
101.5	333.01			
102.0	334.65			
102.5	336.29			
103.0	337.93			
103.5	339.57			
104.0	341.21			
104.5	342.85			
105.0	344.49			
105.5	346.13			
106.0	347.77			
106.5	349.41	001		
107.0	351.05	2		STEEL CASE TO 350'
107.5	352.69	3		
108.0	354.33	4		
108.5	355.97	5		
109.0	357.61	6		
109.5	359.25	7		
110.0	360.89	8		
110.5	362.53	9		
111.0	364.17	10		
111.5	365.81	11		
112.0	367.45	12		
112.5	369.09	13		
113.0	370.73	14		
113.5	372.38	15		
114.0	374.02	16		
114.5	375.66	17		
115.0	377.30	18		
115.5	378.94	19		
116.0	380.58	20		
116.5	382.22	21		
117.0	383.86	22		
117.5	385.50	23		
118.0	387.14	24		
118.5	388.78	25		
119.0	390.42	26		
119.5	392.06	27		
120.0	393.70	28		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: HANFORD WTP B4996

DATE: 8/3/06

CLIENT: PNNL

JOB: 6303

AUTHOR: R. STELLER

PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
-----------------	---------------	------------------------	----------------------	--------------------------------------

120.5	395.34	29		
121.0	396.98	30		
121.5	398.62	31		
122.0	400.26	32		
122.5	401.90	33		
123.0	403.54	34		
123.5	405.18	35		
124.0	406.82	36		
124.5	408.46	37		
125.0	410.10	38		
125.5	411.75	39		
126.0	413.39	40		
126.5	415.03	41		
127.0	416.67	42		
127.5	418.31	43		
128.0	419.95	44		
128.5	421.59	45		
129.0	423.23	46		
129.5	424.87	47		
130.0	426.51	48		
130.5	428.15	49		
131.0	429.79	50		
131.5	431.43	51		
132.0	433.07	52		
132.5	434.71	53		
133.0	436.35	54		
133.5	437.99	55		
134.0	439.63	56		
134.5	441.27	57		
135.0	442.91	58		
135.5	444.55	59		
136.0	446.19	60		
136.5	447.83	61		INTERBED ↓
137.0	449.48	62		
137.5	451.12	63		
138.0	452.76	64		
138.5	454.40	65		
139.0	456.04	66		
139.5	457.68	67		
140.0	459.32	68		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: HANFORD WTP B4996 DATE: 8/3/00
CLIENT: PNNL JOB: 6303
AUTHOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
-----------------	---------------	------------------------	----------------------	--------------------------------------

140.5	460.96	69		
141.0	462.60	70		
141.5	464.24	71		
142.0	465.88	72		
142.5	467.52	73		
143.0	469.16	74		
143.5	470.80	75		
144.0	472.44	76		
144.5	474.08	77		
145.0	475.72	78		
145.5	477.36	79		
146.0	479.00	80		
146.5	480.64	81		
147.0	482.28	82		
147.5	483.92	83		
148.0	485.56	84		
148.5	487.20	85		
149.0	488.85	86		
149.5	490.49	87		
150.0	492.13	88		
150.5	493.77	89		
151.0	495.41	90		
151.5	497.05	91		BASALT ↓
152.0	498.69	92		
152.5	500.33	93		
153.0	501.97	94		
153.5	503.61	95		
154.0	505.25	96		
154.5	506.89	97		
155.0	508.53	98		
155.5	510.17	99		
156.0	511.81	100		
156.5	513.45	101		
157.0	515.09	102		
157.5	516.73	103		
158.0	518.37	104		
158.5	520.01	105		BOTTOM MEASURE?
159.0	521.65	106		At 159.7m
159.5	523.29	107		
160.0	524.93			

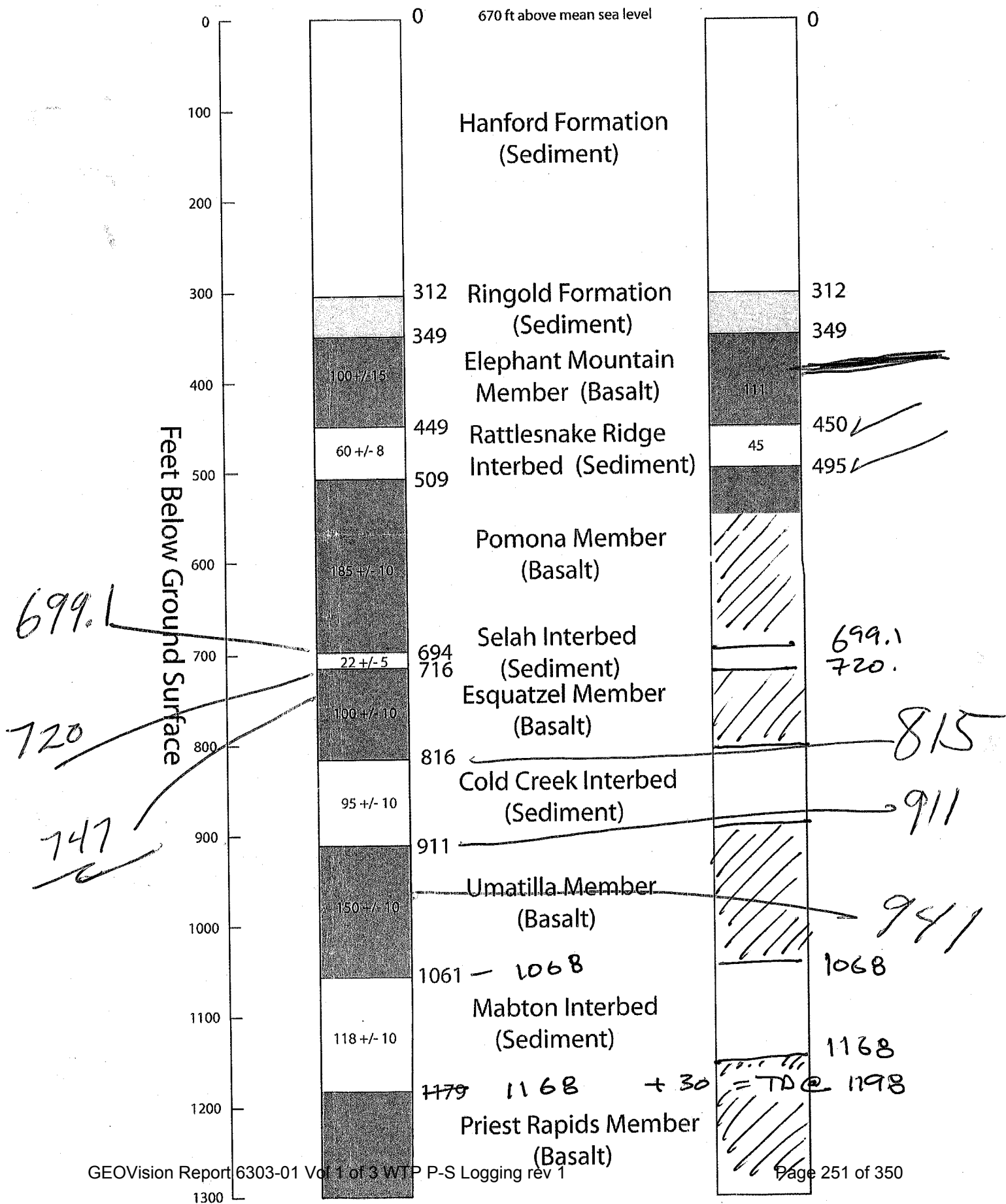
GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: HANFORD WTP B4996 DATE: 8/3/06
CLIENT: PNNL JOB: 6303
AUTHOR: R. STELLER PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
-----------------	---------------	------------------------	----------------------	--------------------------------------

160.5	526.57			
161.0	528.22			
161.5	529.86			
162.0	531.50			
162.5	533.14			T.D. @ 532'
163.0	534.78			
163.5	536.42			
164.0	538.06			
164.5	539.70			
165.0	541.34			
165.5	542.98			
166.0	544.62			
166.5	546.26			
167.0	547.90			
167.5	549.54			
168.0	551.18			
168.5	552.82			
169.0	554.46			
169.5	556.10			
170.0	557.74			
170.5	559.38			
171.0	561.02			
171.5	562.66			
172.0	564.30			
172.5	565.94			
173.0	567.59			
173.5	569.23			
174.0	570.87			
174.5	572.51			
175.0	574.15			
175.5	575.79			
176.0	577.43			
176.5	579.07			
177.0	580.71			
177.5	582.35			
178.0	583.99			
178.5	585.63			
179.0	587.27			
179.5	588.91			
180.0	590.55			

Actual





P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 2-11-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 1 OF 2

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____

Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C4996 LOCATION: _____

RUN #2

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASSED TO 349' UNCASSED 349-TO

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 747.1

CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____; FRESH WATER MUD X; SALT WATER MUD; _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: N/A TIME SINCE LAST CIRCULATION: _____



SITE: Hanford WTP DATE: 8-11-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGO PAGE 2 OF 8

LOGGING CREW: JGO.
VEHICLE(S) USED AND MILEAGE: 150
MOBILIZED FROM: Spokane DEPARTURE TIME: _____
ARRIVED ON SITE: 0735am
STANDBY TIME: - CAUSE: _____
LOGGING STARTED: 0910 LOGGING COMPLETED: 1230
STANDBY TIME: - CAUSE: _____
LOGGING STARTED: N/A LOGGING COMPLETED: _____
DEMOLIBIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES ☒ ; NO _____ ; STORED WITH NEW _____
WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☐ 19029 ☒ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☐ 11001 ☐ 23053 ☒

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Receiver 28063
Receiver 28053 23053
150 - IM 24053
Source 21050
Driver 27073
Wt. 38118

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-11-06
CONT: PNNL JOB: 6303
AUTHOR: JGD PAGE 3 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
-----------------	---------------	------------------------	----------------------	--------------------------------------

130.0	426.51	193		
130.5	428.15	192		
131.0	429.79	191		
131.5	431.43	190		
132.0	433.07	189		
132.5	434.71	188		
133.0	436.35	187		
133.5	437.99	186		
134.0	439.63	185		
134.5	441.27	184		
135.0	442.91	183		Reduce gain to min
135.5	444.55	182		
136.0	446.19	181		reduce gain
136.5	447.83	180		
137.0	449.48	179		transition
137.5	451.12	178		
138.0	452.76	177		
138.5	454.40	176		
139.0	456.04	175		NICE
139.5	457.68	174		↑
140.0	459.32	173		↓
140.5	460.96	172		
141.0	462.60	171		
141.5	464.24	170		
142.0	465.88	169		NICE
142.5	467.52	168		
143.0	469.16	167		↑
143.5	470.80	166		
144.0	472.44	165		
144.5	474.08	164		↓
145.0	475.72	163		
145.5	477.36	162		NICE
146.0	479.00	161		incr. gain
146.5	480.64	160		
147.0	482.28	159		
147.5	483.92	158		

JGD
8-11-06

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-11-06
 CONT: PNNL JOB: 6303
 AUTHOR: JLD PAGE 4 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
148.0	485.56	156 157		
148.5	487.20	155 156	JLD 8-11-06	Nice!
149.0	488.85	154 155		
149.5	490.49	153 154		
150.0	492.13	152 153		
150.5	493.77	151 152		reduce gain
151.0	495.41	150 151		interbed
151.5	497.05	149, 150		
152.0	498.69	148		
152.5	500.33	147		
153.0	501.97	146		
153.5	503.61	145		
154.0	505.25	144		reduce gain
154.5	506.89	143		incr. gain
155.0	508.53	142		
155.5	510.17	141		
156.0	511.81	140		
156.5	513.45	139		
157.0	515.09	138		
157.5	516.73	137		
158.0	518.37	136		
158.5	520.01	135		
159.0	521.65	133 134	JLD 8-11-06	incr. gain, for
159.5	523.29	132 133		
160.0	524.93	131 132		
160.5	526.57	130 131		
161.0	528.22	129 130		
161.5	529.86	128 129		
162.0	531.50	127 128		
162.5	533.14	126, 127		change paper
163.0	534.78	125		
163.5	536.42	124		
164.0	538.06	123		
164.5	539.70	122		
165.0	541.34	121		
165.5	542.98	120		
166.0	544.62	119		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-11-06
 C NT: PNNL JOB: 6303
 AUTHOR: JGD PAGE 5 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
166.5	546.26	118		
167.0	547.90	117		
167.5	549.54	116		
168.0	551.18	115		
168.5	552.82	114		
169.0	554.46	113		
169.5	556.10	112		
170.0	557.74	111		
170.5	559.38	110		
171.0	561.02	109		
171.5	562.66	108		
172.0	564.30	107		
172.5	565.94	106		
173.0	567.59	105		
173.5	569.23	104		
174.0	570.87	103		
174.5	572.51	102		
175.0	574.15	101		new di/c
175.5	575.79	100		
176.0	577.43	099		
176.5	579.07	098		
177.0	580.71	097		
177.5	582.35	096		
178.0	583.99	095		
178.5	585.63	094		
179.0	587.27	093		
179.5	588.91	092		
180.0	590.55	091		
180.5	592.19	090		
181.0	593.83	089		
181.5	595.47	088		
182.0	597.11	087		
182.5	598.75	086		
183.0	600.39	085		
183.5	602.03	084		
184.0	603.67	083		
184.5	605.31	082		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-11-06
 (ENT: PNNL JOB: 6303
 AUTHOR: JGD PAGE 6 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
185.0	606.96	081		
185.5	608.60	080		
186.0	610.24	079		
186.5	611.88	078		
187.0	613.52	077		
187.5	615.16	076		
188.0	616.80	075		
188.5	618.44	074		
189.0	620.08	073		
189.5	621.72	072		
190.0	623.36	071		
190.5	625.00	070		
191.0	626.64	069		
191.5	628.28	068		
192.0	629.92	067		
192.5	631.56	066		
193.0	633.20	065		
193.5	634.84	064		
194.0	636.48	063		
194.5	638.12	062		
195.0	639.76	061		
195.5	641.40	060		
196.0	643.04	059		
196.5	644.69	058		
197.0	646.33	057		
197.5	647.97	056		
198.0	649.61	055		
198.5	651.25	054		
199.0	652.89	053		
199.5	654.53	052		
200.0	656.17	051		
200.5	657.81	050		
201.0	659.45	049		
201.5	661.09	048		
202.0	662.73	047		
202.5	664.37	046		
203.0	666.01	045		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-11-06
 CONTENT: PNNL JOB: 6303
 AUTHOR: JGD PAGE 7 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
203.5	667.65	044		
204.0	669.29	043		
204.5	670.93	042		
205.0	672.57	041		
205.5	674.21	040		
206.0	675.85	039		
206.5	677.49	038		
207.0	679.13	037		
207.5	680.77	036		
208.0	682.41	035		
208.5	684.06	034		
209.0	685.70	032 033		
209.5	687.34	032		min gain
210.0	688.98	031		reduce gain
210.5	690.62	030		
211.0	692.26	028, 029		reduce range.
211.5	693.90	027		
212.0	695.54	026		
212.5	697.18	025		
213.0	698.82	024		
213.5	700.46	023		
214.0	702.10	022		
214.5	703.74	021		NICE!
215.0	705.38	019 020		
215.5	707.02	019		
216.0	708.66	018		
216.5	710.30	017		
217.0	711.94	015 016		in-r. range? make sure!
217.5	713.58	014, 015		in-r. gain
218.0	715.22	013		
218.5	716.86	012		
219.0	718.50	011		
219.5	720.14	010		
220.0	721.78	009		
220.5	723.43	008		in-r. gain
221.0	725.07	007		
221.5	726.71	006		
222.0	728.35	005		
222.5	729.99	004		
223.0	731.63	003		min gains
223.5	733.27	002		
224.0	734.91	001		

GEOVISION SUSPENSION LOGGING FIELD NOTES

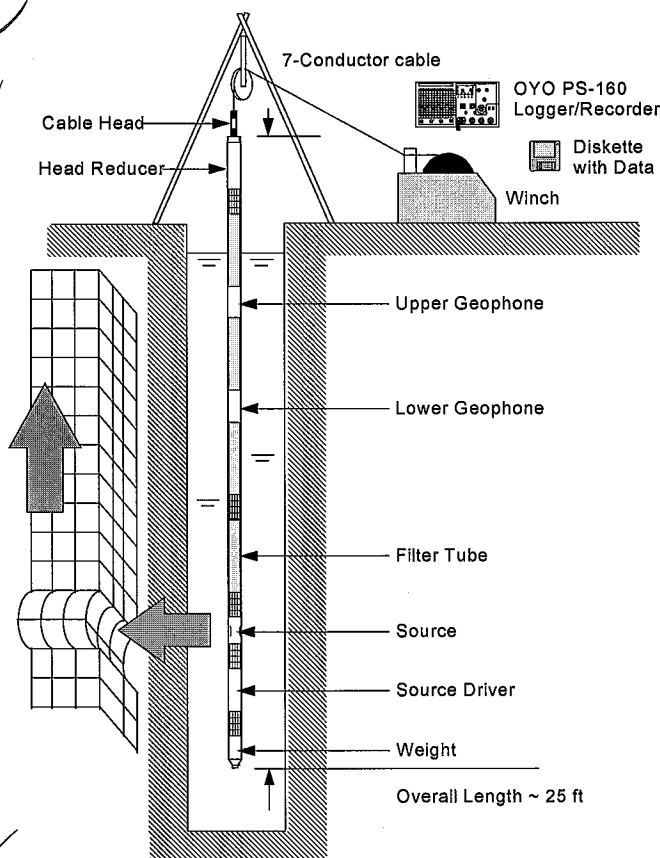
SITE: Hanford WTP DATE: B-11-06
CONT: PNNL JOB: 6303
AUTHOR: JGD PAGE 8 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
224.5	736.55			
225.0	738.19			
225.5	739.83			
226.0	741.47			
226.5	743.11			
227.0	744.75			
227.5	746.39			
228.0	748.03		←	TD 747.1
228.5	749.67			
229.0	751.31			- 12.5
229.5	752.95			734.6
230.0	754.59			
230.5	756.23			
231.0	757.87			
231.5	759.51			
232.0	761.15			
232.5	762.80			
233.0	764.44			
233.5	766.08			
234.0	767.72			
234.5	769.36			
235.0	771.00			
235.5	772.64			
236.0	774.28			
236.5	775.92			
237.0	777.56			
237.5	779.20			
238.0	780.84			
238.5	782.48			
239.0	784.12			
239.5	785.76			
240.0	787.40			
240.5	789.04			
241.0	790.68			
241.5	792.32			
242.0	793.96			
242.5	795.60			
243.0	797.24			
243.5	798.88			
244.0	800.52			
244.5	802.17			
245.0	803.81			

8/10/06 Revised 7-6-06
JGD+AJM

FIELD NOTES ON OPERATING THE SUSPENSION LOGGER

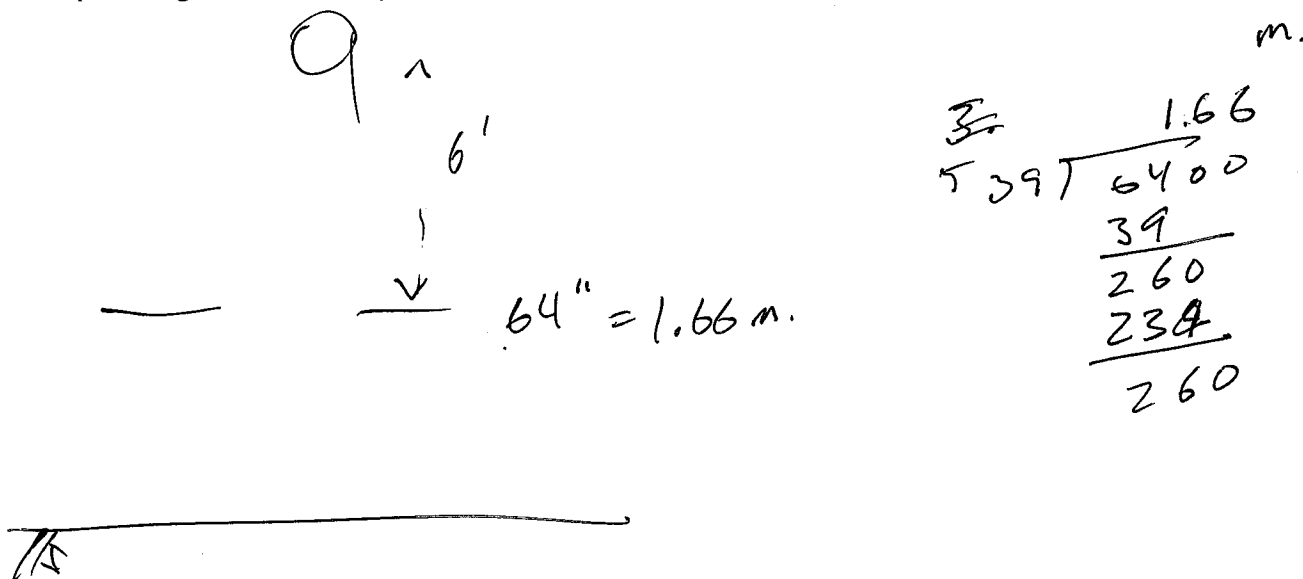
1. Unpack, lay entire probe on the ground, in order ✓
2. Remove caps, clean as necessary, assemble in order shown at right, check alignment of "red dots" ✓
3. Set up winch, motor, etc.
4. Connect recorder a) power, b) sheave (depth encoder to sheave), and c) probe (winch to probe) ✓
5. Turn recorder on. Should see 3 batt lights. Check if internal battery is dead, (defaults??) Should be * ✓
 - DELAY=4ms (3ms on 4 conductor)
 - FILTER HP=100Hz (5Hz okay but will need 100Hz for marine logging), LP=20KHz (may need 1KHz)
 - PULSE LENGTH =1.6ms
 - SYETEM settings - not manual, want semi-auto
 - date code - reenter
 - WINCH display, press "." (depth preset), set interval to 5m. Lower cable slightly – depths should increase with no + sign, if there is reverse direction #key.
6. Run "monitor", look at signals. Stomp.* ✓
7. "Charge", watch neon lights on back (red.....out) * ✓
8. Do "Shot" repeatedly. Listen to source. At pulse = 1.6ms should get 7-8 shots (tells quality of source flexures and internal batteries). Helps if someone is holding the source with 2 hands to "feel" equality of pulse strength. * ✓
9. Lower probe carefully into borehole ✓
10. Adjust until center between receivers is at ground level. Set winch depth to zero (WINCH ".", "0", "0", "0", "0". Calculate when TD will be reached. (TD-3.8m, or 12.5ft using 1m filter tube) ✓
11. Lower probe until entirely submersed. Run Monitor again*
12. Lower probe to bottom. Use Monitor to see when meet bottom (more accurate than slack cable) *
13. Check that disk is in the recorder*
14. Take record, check gains, check length, rerun and make tape (generally keep gains below 500)
15. Wait until done printing until moving winch
16. Keep moving up, watch out: 100 records per disk (50 records for DD diskette). If end of paper, must turn off power to change paper. *
17. Watch for inverter noise near surface (spikes near 4ms) *
18. Check "zero" depth coming out. Record on Notes.
19. Layout probe. Discharge capacitor using shot key.
20. Clean & pack.



Supplies Needed

1. Dielectric silicon grease (get at automotive store)
2. Preformatted DS/DD (720kbyte) diskettes, 1 for each 80 feet depth. Need 4 disks for 100m borehole (1/2m intervals) *
3. Paper for recorder. Take 1 per diskette. *
4. Paper towels for cleaning the system before use. Tissues will work.
5. May need straps to hold winch at depths below 200ft.
6. Entire system shown above. Don't forget
 - a) P-S probe including 6 parts, plus 2m iso tube for rock sites
 - b) Power, sheave, and probe cables for recorder
 - c) OYO P-S 170 recorder or Robertson Micrologger2
 - d) May need "quad-pod" if drill rig not present
 - e) Motor, motor controller, and sheave, including bag of bolts and wrench
 - f) Inverter, or Honda generator
7. Batteries, qty=2, 12VDC, deep cycle marine, 100a-h + +
8. Gas for generator?
9. Logging forms. Find in \\GEOSERV\geovision\Procedures\P-S Log\Suspension Logging Field Forms
10. Map to site?

* IMPORTANT: Steps marked with "*" will not apply to the modern Robertson Geologging P-S Logging system. This system has neither paper printout capabilities, diskette storage (stores data on laptop hard disk), or "monitor" capability. Refer to Robertson operating manual for specific instructions.





P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 8-17-06
CLIENT: PNNL JOB: 6303
AUTHOR: J60 PAGE 1 OF 10

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____

Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C4996 LOCATION: _____

RVN #3

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED TO 349' UNCASD 349 - TO

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 941'

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____; FRESH WATER MUD X; SALT WATER MUD; _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: N/A TIME SINCE LAST CIRCULATION: > 8 hrs.



SITE: Hanford WTP DATE: 8-17-06
CLIENT: PNNL JOB: 6303
AUTHOR: JSD PAGE 2 OF 10

LOGGING CREW: John Diehl
VEHICLE(S) USED AND MILEAGE:
MOBILIZED FROM: DEPARTURE TIME:
ARRIVED ON SITE: 2pm 1 hr. wait + 1 hr set up + 2 hr fix
STANDBY TIME: 4am - 6am CAUSE: X
LOGGING STARTED: 6am LOGGING COMPLETED: 9am
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ☒; NO ☐; STORED WITH NEW ☐
WINCH COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☐ 19029 ☒ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☐ 11001 ☐ 23053 ☒

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES: X broken wire on center pin
of recorder - to - comp probe winch cable @ winch
end.

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: Reducer 28063
Rec'r 23053
Iso. In 24053
Source 21050
Driver 27073
Wt. 32118

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-17-06
CONT: PNNL JOB: 6303
AUTHOR: JN PAGE 3 OF 10

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
-----------------	---------------	------------------------	----------------------	--------------------------------------

130.0	426.51			
130.5	428.15			
131.0	429.79			
131.5	431.43			
132.0	433.07			
132.5	434.71			
133.0	436.35			
133.5	437.99			
134.0	439.63			
134.5	441.27			
135.0	442.91			
135.5	444.55			
136.0	446.19			
136.5	447.83			
137.0	449.48			
137.5	451.12			
138.0	452.76			
138.5	454.40			
139.0	456.04			
139.5	457.68			
140.0	459.32			
140.5	460.96			
141.0	462.60			
141.5	464.24			
142.0	465.88			
142.5	467.52			
143.0	469.16			
143.5	470.80			
144.0	472.44			
144.5	474.08			
145.0	475.72			
145.5	477.36			
146.0	479.00			
146.5	480.64			
147.0	482.28			
147.5	483.92			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-17-06
CONT: PNNL JOB: 6303
AUTHOR: JSD PAGE 4 OF 10

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
-----------------	---------------	------------------------	----------------------	--------------------------------------

148.0	485.56			
-------	--------	--	--	--

148.5	487.20			
149.0	488.85			
149.5	490.49			
150.0	492.13			
150.5	493.77			
151.0	495.41			
151.5	497.05			
152.0	498.69			
152.5	500.33			
153.0	501.97			
153.5	503.61			
154.0	505.25			
154.5	506.89			
155.0	508.53			
155.5	510.17			
156.0	511.81			
156.5	513.45			
157.0	515.09			
157.5	516.73			
158.0	518.37			
158.5	520.01			
159.0	521.65			
159.5	523.29			
160.0	524.93			
160.5	526.57			
161.0	528.22			
161.5	529.86			
162.0	531.50			
162.5	533.14			
163.0	534.78			
163.5	536.42			
164.0	538.06			
164.5	539.70			
165.0	541.34			
165.5	542.98			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 2-17-06
CONT: PNNL JOB: 6303
AUTHOR: JSD PAGE 5 OF 10

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
166.0	544.62			
166.5	546.26			

167.0	547.90			
167.5	549.54			
168.0	551.18			
168.5	552.82			
169.0	554.46			
169.5	556.10			
170.0	557.74			
170.5	559.38			
171.0	561.02			
171.5	562.66			
172.0	564.30			
172.5	565.94			
173.0	567.59			
173.5	569.23			
174.0	570.87			
174.5	572.51			
175.0	574.15			
175.5	575.79			
176.0	577.43			
176.5	579.07			
177.0	580.71			
177.5	582.35			
178.0	583.99			
178.5	585.63			
179.0	587.27			
179.5	588.91			
180.0	590.55			
180.5	592.19			
181.0	593.83			
181.5	595.47			
182.0	597.11			
182.5	598.75			
183.0	600.39			
183.5	602.03			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-17-06
 CLIENT: PNNL JOB: 6303
 AUTHOR: [Signature] PAGE 6 OF 10

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
184.0	603.67			
184.5	605.31			
185.0	606.96			

185.5	608.60			
186.0	610.24			
186.5	611.88			
187.0	613.52			
187.5	615.16			
188.0	616.80			
188.5	618.44			
189.0	620.08			
189.5	621.72			
190.0	623.36			
190.5	625.00			
191.0	626.64			
191.5	628.28			
192.0	629.92			
192.5	631.56			
193.0	633.20			
193.5	634.84			
194.0	636.48			
194.5	638.12			
195.0	639.76			
195.5	641.40			
196.0	643.04			
196.5	644.69			
197.0	646.33			
197.5	647.97			
198.0	649.61			
198.5	651.25			
199.0	652.89			
199.5	654.53			
200.0	656.17			
200.5	657.81			
201.0	659.45			
201.5	661.09			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: B-17-06
 (ENT: PNNL JOB: 6303
 AUTHOR: JOO PAGE 7 OF 10

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
202.0	662.73			
202.5	664.37			
203.0	666.01			
203.5	667.65			
204.0	669.29			
204.5	670.93			
205.0	672.57			ok
205.5	674.21	158		
206.0	675.85	157		
206.5	677.49	156		
207.0	679.13	155		Stop here
207.5	680.77	154		
208.0	682.41	153		
208.5	684.06	152		
209.0	685.70	151		
209.5	687.34	150		men gain.
210.0	688.98	149		
210.5	690.62	148		reduce gain, reduce R.
211.0	692.26	147		
211.5	693.90	146		
212.0	695.54	145		
212.5	697.18	144		
213.0	698.82	143		
213.5	700.46	142	↑ top	
214.0	702.10	141		
214.5	703.74	140		
215.0	705.38	139		
215.5	707.02	138		
216.0	708.66	137		
216.5	710.30	136		
217.0	711.94	135		
217.5	713.58	134		
218.0	715.22	133		inc. range.
218.5	716.86	132		
219.0	718.50	131		
219.5	720.14	130	↓ bottom of section	
220.0	721.78	129		
220.5	723.43	128		
221.0	725.07	127		
221.5	726.71	126		inc. gain - far
222.0	728.35	125		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-17-06
 () ENT: PNNL JOB: 6303
 AUTHOR: q60 PAGE 8 OF 10

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
222.5	729.99	124		
223.0	731.63	123		
223.5	733.27	122		
224.0	734.91	121		← when started
224.5	736.55	120		last time
225.0	738.19	119		
225.5	739.83	118		
226.0	741.47	117		
226.5	743.11	116		
227.0	744.75	115		
227.5	746.39	114		
228.0	748.03	113		
228.5	749.67	112		
229.0	751.31	111		
229.5	752.95	110		
230.0	754.59	109		
230.5	756.23	108		
231.0	757.87	107		
231.5	759.51	106		
232.0	761.15	105		
232.5	762.80	104		
233.0	764.44	103		
233.5	766.08	102		
234.0	767.72	101		change disk
234.5	769.36	100		
235.0	771.00	99		
235.5	772.64	98		
236.0	774.28	97		
236.5	775.92	96		
237.0	777.56	95		
237.5	779.20	94		
238.0	780.84	93		
238.5	782.48	92		
239.0	784.12	91		
239.5	785.76	90		
240.0	787.40	89		
240.5	789.04	88		
241.0	790.68	87		
241.5	792.32	86		
242.0	793.96	85		
242.5	795.60	84		
243.0	797.24	83		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: B-17-06
 INT: PNNL JOB: 6303
 AUTHOR: JGP PAGE 9 OF 10

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS
243.5	798.88	82		
244.0	800.52	81		
244.5	802.17	80		
245.0	803.81	79		
245.5	805.45	78		
246.0	807.09	77		
246.5	808.73	76		
247.0	810.37	75		
247.5	812.01	74		red. range
248.0	813.65	73	top of	
x 248.5	815.29	72	interval	
249.0	816.93	71		red. gain near
249.5	818.57	70		incr. gain both
250.0	820.21	69		
250.5	821.85	68		
251.0	823.49	67		
251.5	825.13	66		
252.0	826.77	65		
252.5	828.41	64		
253.0	830.05	63		
253.5	831.69	62		
254.0	833.33	61		
254.5	834.97	60		
255.0	836.61	59		
255.5	838.25	57		
256.0	839.90	057 56		
256.5	841.54	058 55		
257.0	843.18	055 54		
257.5	844.82	054 53		
258.0	846.46	053 52		
258.5	848.10	052 51		
259.0	849.74	051 50		
259.5	851.38	050 49		
260.0	853.02	049		
260.5	854.66	048		
261.0	856.30	047		
261.5	857.94	046		
262.0	859.58	045		
262.5	861.22	044		
263.0	862.86	043		
263.5	864.50	042		
264.0	866.14	041		

← out of seq.

JMP
B-17-06

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-17-06
 (ENT: PNNL JOB: 6303
 AUTHOR: JSD PAGE 10 OF 10

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
264.5	867.78	040		
265.0	869.42	039		
265.5	871.06	038		
266.0	872.70	037		
266.5	874.34	036		
267.0	875.98	035		
267.5	877.62	034		
268.0	879.27	033		
268.5	880.91	032		
269.0	882.55	031		
269.5	884.19	030		
270.0	885.83	029		
270.5	887.47	028		
271.0	889.11	027		
271.5	890.75	026		
272.0	892.39	025		
272.5	894.03	024		↑
273.0	895.67	023		NICE!
273.5	897.31	022		
274.0	898.95	021		
274.5	900.59	020		red. g range.
275.0	902.23	019		
275.5	903.87	017, 018, 018		incr. range H+V ok
276.0	905.51	016		incr. range H
276.5	907.15	015		incr. gain far
277.0	908.79	014		
277.5	910.43	013		bottom of interbed
278.0	912.07	012		
278.5	913.71	011		
279.0	915.35	010		
279.5	916.99	009		
280.0	918.64	008		
280.5	920.28	007		
281.0	921.92	006		
281.5	923.56	005		
282.0	925.20	004		min range, min gain
282.5	926.84	003		
283.0	928.48	002		← ? TD
283.5	930.12	001		
284.0	931.76			
284.5	933.40			
285.0	935.04			



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: B-22-06
CLIENT: PNNL JOB: 6303
AUTHOR: Job Diem PAGE 1 OF 9

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____
Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C4996 LOCATION: _____
RUN #4

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: Cased _____ UNCased _____

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 1198'

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: 240' ?

BOREHOLE FLUID: WATER _____; FRESH WATER MUD X; SALT WATER MUD; _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: _____



SITE: Hanford WTP DATE: B-22-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 2 OF 9

LOGGING CREW: JGD
VEHICLE(S) USED AND MILEAGE: 96 DODGE
MOBILIZED FROM: _____ DEPARTURE TIME: _____
ARRIVED ON SITE: 2:30 pm
STANDBY TIME: _____ CAUSE: testing
LOGGING STARTED: _____ LOGGING COMPLETED: _____
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOBILIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES ☒ ; NO _____; STORED WITH NEW _____
WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☐ 11001 ☐ 23053 ☒

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Redner 21037
Iso 24653
Source 39118
Denier 33093
Wt 38118

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-22-06
CONT: PNNL JOB: 6303
AUTHOR: JLD PAGE 3 OF 9

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
224.5	736.55			
225.0	738.19			
225.5	739.83			
226.0	741.47			
226.5	743.11			
227.0	744.75			
227.5	746.39			
228.0	748.03			
228.5	749.67			
229.0	751.31			
229.5	752.95			
230.0	754.59			
230.5	756.23			
231.0	757.87			
231.5	759.51			
232.0	761.15			
232.5	762.80			
233.0	764.44			
233.5	766.08			
234.0	767.72			
234.5	769.36			
235.0	771.00			
235.5	772.64			
236.0	774.28			
236.5	775.92			
237.0	777.56			
237.5	779.20			
238.0	780.84			
238.5	782.48			
239.0	784.12			
239.5	785.76			
240.0	787.40			
240.5	789.04			
241.0	790.68			
241.5	792.32			
242.0	793.96			
242.5	795.60			
243.0	797.24			
243.5	798.88			
244.0	800.52			
244.5	802.17			
245.0	803.81			

↓
B/24/06
stop here.

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-22-06
 CONTRACT: PNNL JOB: 6303
 AUTHOR: J60 PAGE 4 OF 9

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
245.5	805.45			
246.0	807.09			
246.5	808.73			
247.0	810.37			
247.5	812.01			
248.0	813.65			
248.5	815.29			
249.0	816.93			
249.5	818.57			
250.0	820.21			
250.5	821.85			
251.0	823.49			
251.5	825.13			
252.0	826.77			
252.5	828.41			
253.0	830.05			
253.5	831.69			
254.0	833.33			
254.5	834.97			
255.0	836.61			
255.5	838.25			
256.0	839.90			
256.5	841.54			
257.0	843.18			
257.5	844.82			
258.0	846.46			
258.5	848.10			
259.0	849.74			
259.5	851.38			
260.0	853.02			
260.5	854.66			
261.0	856.30			
261.5	857.94			
262.0	859.58			
262.5	861.22			
263.0	862.86			
263.5	864.50			
264.0	866.14			
264.5	867.78			
265.0	869.42			
265.5	871.06			
266.0	872.70			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-22-06
CONT: PNNL JOB: 6303
AUTHOR: JGD PAGE 5 OF 9

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
266.5	874.34			
267.0	875.98			
267.5	877.62			
268.0	879.27			
268.5	880.91			
269.0	882.55			
269.5	884.19			
270.0	885.83			
270.5	887.47			
271.0	889.11			
271.5	890.75			
272.0	892.39			
272.5	894.03			
273.0	895.67			
273.5	897.31			
274.0	898.95			
274.5	900.59			
275.0	902.23			
275.5	903.87			
276.0	905.51			
276.5	907.15		8:32pm	Stop here (per Alan)
277.0	908.79	164		
277.5	910.43	168		
278.0	912.07	167		
278.5	913.71	166		
279.0	915.35	165		
279.5	916.99	164		
280.0	918.64	163		
280.5	920.28	162		
281.0	921.92	161		
281.5	923.56	160		
282.0	925.20	159		
282.5	926.84	158		
283.0	928.48	157		
283.5	930.12	156		
284.0	931.76	155		
284.5	933.40	154		
285.0	935.04	153		
285.5	936.68	152		
286.0	938.32	151		
286.5	939.96	150		
287.0	941.60	149		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-22-06
CONT: PNNL JOB: 6303
AUTHOR: J60 PAGE 6 OF 9

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
287.5	943.24	148		
288.0	944.88	147		
288.5	946.52	146		
289.0	948.16	145		
289.5	949.80	144		
290.0	951.44	143		
290.5	953.08	142		
291.0	954.72	141		
291.5	956.36	140		
292.0	958.01	139		
292.5	959.65	138		
293.0	961.29	137		
293.5	962.93	136		
294.0	964.57	135		
294.5	966.21	134		
295.0	967.85	133		
295.5	969.49	132		
296.0	971.13	131		
296.5	972.77	130		
297.0	974.41	129		
297.5	976.05	128		
298.0	977.69	127		
298.5	979.33	126		
299.0	980.97	125		
299.5	982.61	124		
300.0	984.25	123		
300.5	985.89	122		
301.0	987.53	121		
301.5	989.17	120		
302.0	990.81	119		
302.5	992.45	118		
303.0	994.09	117		
303.5	995.73	116		
304.0	997.38	115		
304.5	999.02	114		
305.0	1000.66	113		
305.5	1002.30	112		
306.0	1003.94	111		
306.5	1005.58	110		
307.0	1007.22	109		
307.5	1008.86	108		
308.0	1010.50	107		

J60
8-22-06

min gain again

reduce gain

gain up.

gain down.

gain up.

gain up.

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-22-06
CONT: PNNL JOB: 6303
AUTHOR: J60 PAGE 7 OF 9

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
308.5	1012.14	106		
309.0	1013.78	105		
309.5	1015.42	104		
310.0	1017.06	103		
310.5	1018.70	102		
311.0	1020.34	101		
311.5	1021.98	100		min gains again
312.0	1023.62	099		
312.5	1025.26	098		
313.0	1026.90	097		
313.5	1028.54	096		lossy - hi gain
314.0	1030.18	095		
314.5	1031.82	094		
315.0	1033.46	093		
315.5	1035.10	092		
316.0	1036.75	091		
316.5	1038.39	090	in r. range	- check
317.0	1040.03	089		
317.5	1041.67	088		
318.0	1043.31	087		
318.5	1044.95	086		
319.0	1046.59	085		
319.5	1048.23	084		
320.0	1049.87	083	value range	
320.5	1051.51	082		
321.0	1053.15	081		
321.5	1054.79	080		
322.0	1056.43	079		
322.5	1058.07	078		
323.0	1059.71	077		
323.5	1061.35	076		
324.0	1062.99	075		
324.5	1064.63	074	value range ? No. not yet	
325.0	1066.27	073		
325.5	1067.91	072		
326.0	1069.55	071		
326.5	1071.19	070		↑ top of interval?
327.0	1072.83	069		
327.5	1074.48	068	J60 8-22-06	
328.0	1076.12	067		
328.5	1077.76	066 066		
329.0	1079.40	065		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-22-06
 INT: PNNL JOB: 6303
 AUTHOR: JSD PAGE 8 OF 9

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
329.5	1081.04	064		
330.0	1082.68	063		
330.5	1084.32	062		
331.0	1085.96	061		
331.5	1087.60	060		
332.0	1089.24	059		
332.5	1090.88	058		
333.0	1092.52	057		
333.5	1094.16	056		
334.0	1095.80	055		
334.5	1097.44	054		
335.0	1099.08	053		
335.5	1100.72	052		
336.0	1102.36	051		
336.5	1104.00	050		
337.0	1105.64	049		
337.5	1107.28	048		
338.0	1108.92	047		
338.5	1110.56	046		
339.0	1112.20	045		
339.5	1113.85	044		
340.0	1115.49	043		
340.5	1117.13	042		
341.0	1118.77	041		
341.5	1120.41	040		
342.0	1122.05	039		
342.5	1123.69	038		
343.0	1125.33	037		
343.5	1126.97	036		
344.0	1128.61	035		
344.5	1130.25	034		
345.0	1131.89	033		
345.5	1133.53	032		
346.0	1135.17	031		
346.5	1136.81	030		
347.0	1138.45	029		
347.5	1140.09	028		
348.0	1141.73	027		
348.5	1143.37	026		
349.0	1145.01	025		
349.5	1146.65	024		
350.0	1148.29	023		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8-22-06
 (ENT: PNNL JOB: 6303
 AUTHOR: J69 PAGE 9 OF 9

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
350.5	1149.93	022		
351.0	1151.57	021		
351.5	1153.22	020		
352.0	1154.86	019	incr. gain	
352.5	1156.50	018		
353.0	1158.14	017		
353.5	1159.78	016		
354.0	1161.42	015		
354.5	1163.06	014	incr. range	
355.0	1164.70	013	reduce gain	bot of intrbed.
355.5	1166.34	012	increase	
356.0	1167.98	011		
356.5	1169.62	010	J69 8-22-06	
357.0	1171.26	009		
357.5	1172.90	008		
358.0	1174.54	007		
358.5	1176.18	006		
359.0	1177.82	005		
359.5	1179.46	004		
360.0	1181.10	003		
360.5	1182.74	002		
361.0	1184.38	001		← start.
361.5	1186.02			
362.0	1187.66			~5:58 pm.
362.5	1189.30			
363.0	1190.94			
363.5	1192.59			
364.0	1194.23			
364.5	1195.87			↓ TD
365.0	1197.51			
365.5	1199.15			
366.0	1200.79			
366.5	1202.43			
367.0	1204.07			1198.0
367.5	1205.71			- 12.5
368.0	1207.35			
368.5	1208.99			1185.5
369.0	1210.63			
369.5	1212.27			
370.0	1213.91			
370.5	1215.55			
371.0	1217.19			



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC PAGE 1 OF 18

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____

Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C 4996 LOCATION: _____

Runs 5A + 5B

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED _____ UNCASD _____

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____ ; _____, _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: _____

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____; FRESH WATER MUD X; SALT WATER MUD: _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: _____



notes and
* initials added
by JGO per
telecon with
Charles Carter
This date 2-26-07
JW

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC * PAGE 1 OF 18

LOGGING CREW: _____
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: _____ DEPARTURE TIME: _____
ARRIVED ON SITE: 8:00 am
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOBILIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

trip in @ 9:00 am

BATTERIES CHANGED BEFORE LOGGING: YES ☒; NO _____; STORED WITH NEW _____
WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☒
5B * 5A *

NOTES
added
by
JGO per
telecon

MAINTENANCE PERFORMED ON SITE: _____

WJ CC
2-26-07

EQUIPMENT PROBLEMS OR FAILURES: _____

See also notes
after p. 18.
JW 2-26-07

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Set RP (0.44m) @ 9:00 am

Read 408m @ 10:20 am
Recheck RP @ 2:30 pm after receiver failure
Run 2: Set RP @ 0.4m @ 3:10 pm
Read 385.0m @ 3:45 pm. Read 105m @ 7:30 pm. Check RP @ 9:05 pm

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/2006
CLIENT: PNNL JOB: 6303
AUTHOR: CC *CC* * PAGE 3 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
98.0	321.52			
98.5	323.16			** NOTES ADDED BY JGD 2-26-07 PER TELECON WITH CC. 1. These two pages were collected in the field on CC's laptop during logging because there were insufficient pages on the field form. 2. These pages were printed and added to the hand log upon return to Geovision. <i>JGD</i> 2-26-07
99.0	324.80			
99.5	326.44			
100.0	328.08			
100.5	329.72			
101.0	331.36			
101.5	333.01			
102.0	334.65			
102.5	336.29			
103.0	337.93			
103.5	339.57			
104.0	341.21			
104.5	342.85		**	
105.0	344.49	503		
105.5	346.13			
106.0	347.77	502		
106.5	349.41			
107.0	351.05	501		
107.5	352.69			
108.0	354.33	500		
108.5	355.97			
109.0	357.61	499		
109.5	359.25			
110.0	360.89	498		
110.5	362.53			
111.0	364.17	497		
111.5	365.81			
112.0	367.45	496		
112.5	369.09			
113.0	370.73	495		
113.5	372.38			
114.0	374.02	494		
114.5	375.66			
115.0	377.30	493		
115.5	378.94			
116.0	380.58	492		
116.5	382.22			
117.0	383.86	491		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/2006
CLIENT: PNNL JOB: 6303
AUTHOR: CC *cc* PAGE 4 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
117.5	385.50			
118.0	387.14	490	<i>** -</i>	<i>see previous</i>
118.5	388.78			<i>page 100</i>
119.0	390.42	489		<i>2-26-07</i>
119.5	392.06			
120.0	393.70	488		
120.5	395.34			
121.0	396.98	487		
121.5	398.62			
122.0	400.26	486		
122.5	401.90			
123.0	403.54	485		
123.5	405.18			
124.0	406.82	484		
124.5	408.46			
125.0	410.10	483		
125.5	411.75			
126.0	413.39	482		
126.5	415.03			
127.0	416.67	481		
127.5	418.31			
128.0	419.95	480		
128.5	421.59			
129.0	423.23	479		
129.5	424.87			

130.0	426.51			
130.5	428.15			
131.0	429.79			
131.5	431.43			
132.0	433.07			
132.5	434.71			
133.0	436.35			
133.5	437.99			
134.0	439.63			
134.5	441.27			
135.0	442.91			
135.5	444.55			
136.0	446.19			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC # PAGE 5 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
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130.0	426.51	478		
130.5	428.15			
131.0	429.79	477		
131.5	431.43			
132.0	433.07	476		
132.5	434.71			
133.0	436.35	475		
133.5	437.99			
134.0	439.63	474		
134.5	441.27			
135.0	442.91	473		
135.5	444.55			
136.0	446.19	472		
136.5	447.83			
137.0	449.48	471		
137.5	451.12			
138.0	452.76	470		
138.5	454.40			
139.0	456.04	469		
139.5	457.68			
140.0	459.32	468		
140.5	460.96			
141.0	462.60	467		
141.5	464.24			
142.0	465.88	466		
142.5	467.52			
143.0	469.16	465		
143.5	470.80			
144.0	472.44	464		
144.5	474.08			
145.0	475.72	463		
145.5	477.36			
146.0	479.00	462		
146.5	480.64			
147.0	482.28	461		
147.5	483.92			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC & PAGE 6 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
148.0	485.56	460		
148.5	487.20			
149.0	488.85	459		
149.5	490.49			
150.0	492.13	458		
150.5	493.77			
151.0	495.41	457		New paper
151.5	497.05			
152.0	498.69	456		
152.5	500.33			
153.0	501.97	455		
153.5	503.61			
154.0	505.25	454		
154.5	506.89			
155.0	508.53	453		
155.5	510.17			
156.0	511.81	452		
156.5	513.45			
157.0	515.09	451		
157.5	516.73			
158.0	518.37	450		
158.5	520.01			
159.0	521.65	449		
159.5	523.29			
160.0	524.93	448		
160.5	526.57			
161.0	528.22	447		
161.5	529.86			
162.0	531.50	446		
162.5	533.14			
163.0	534.78	445		
163.5	536.42			
164.0	538.06	444		
164.5	539.70			
165.0	541.34	443		
165.5	542.98			
166.0	544.62	442		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC * PAGE 7 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
166.5	546.26			
167.0	547.90	441		
167.5	549.54			
168.0	551.18	440		
168.5	552.82			
169.0	554.46	439		
169.5	556.10			
170.0	557.74	438		
170.5	559.38			
171.0	561.02	437		
171.5	562.66			
172.0	564.30	436		
172.5	565.94			
173.0	567.59	435		
173.5	569.23			
174.0	570.87	434		
174.5	572.51			
175.0	574.15	433		
175.5	575.79			
176.0	577.43	432		
176.5	579.07			
177.0	580.71	431		
177.5	582.35			
178.0	583.99	430		
178.5	585.63			
179.0	587.27	429		
179.5	588.91			
180.0	590.55	428		
180.5	592.19			
181.0	593.83	427		
181.5	595.47			
182.0	597.11	426		
182.5	598.75			
183.0	600.39	425		
183.5	602.03			
184.0	603.67	424		
184.5	605.31			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC * PAGE 8 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
185.0	606.96	423		
185.5	608.60			
186.0	610.24	422		
186.5	611.88			
187.0	613.52	421		
187.5	615.16			
188.0	616.80	420		
188.5	618.44			
189.0	620.08	419		
189.5	621.72			
190.0	623.36	418		
190.5	625.00			
191.0	626.64	417		
191.5	628.28			
192.0	629.92	416		
192.5	631.56			
193.0	633.20	415		
193.5	634.84			
194.0	636.48	414		
194.5	638.12			
195.0	639.76	413		
195.5	641.40			
196.0	643.04	412		
196.5	644.69			
197.0	646.33	411		
197.5	647.97			
198.0	649.61	410		
198.5	651.25			
199.0	652.89	409		
199.5	654.53			
200.0	656.17	408		
200.5	657.81			
201.0	659.45	407		
201.5	661.09			
202.0	662.73	406		
202.5	664.37			
203.0	666.01	405		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC & PAGE 9 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
203.5	667.65			
204.0	669.29	404		
204.5	670.93			
205.0	672.57	403		
205.5	674.21			
206.0	675.85	402		
206.5	677.49			
207.0	679.13	401		
207.5	680.77			
208.0	682.41	400		
208.5	684.06			
209.0	685.70	399		DISK CHANGE
209.5	687.34			
210.0	688.98	398		
210.5	690.62			
211.0	692.26	397		
211.5	693.90			
212.0	695.54	396		
212.5	697.18			
213.0	698.82	395		
213.5	700.46			
214.0	702.10	394		
214.5	703.74			
215.0	705.38	393		
215.5	707.02			
216.0	708.66	392		
216.5	710.30			
217.0	711.94	391		
217.5	713.58			
218.0	715.22	390		
218.5	716.86			
219.0	718.50	389		
219.5	720.14			
220.0	721.78	388		
220.5	723.43			
221.0	725.07	387		
221.5	726.71			
222.0	728.35	386		
222.5	729.99			
223.0	731.63	385		
223.5	733.27			
224.0	734.91	384		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC* PAGE 10 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
224.5	736.55			
225.0	738.19	383		
225.5	739.83			
226.0	741.47	382		
226.5	743.11			
227.0	744.75	381		
227.5	746.39			
228.0	748.03	380		
228.5	749.67			
229.0	751.31	379		
229.5	752.95			
230.0	754.59	378		
230.5	756.23			
231.0	757.87	377		
231.5	759.51			
232.0	761.15	376		
232.5	762.80			
233.0	764.44	375		
233.5	766.08			
234.0	767.72	374		
234.5	769.36			
235.0	771.00	373		
235.5	772.64			
236.0	774.28	372		
236.5	775.92			
237.0	777.56	371		
237.5	779.20			
238.0	780.84	370		
238.5	782.48			
239.0	784.12	369		
239.5	785.76			
240.0	787.40	368		
240.5	789.04			
241.0	790.68	367		
241.5	792.32			
242.0	793.96	366		
242.5	795.60			
243.0	797.24	365		
243.5	798.88			
244.0	800.52	364		
244.5	802.17			
245.0	803.84	363		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC * PAGE 11 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
245.5	805.45			
246.0	807.09	362		
246.5	808.73			
247.0	810.37	361		
247.5	812.01			
248.0	813.65	360		
248.5	815.29			
249.0	816.93	359		
249.5	818.57			
250.0	820.21	358		
250.5	821.85			
251.0	823.49	357		
251.5	825.13			
252.0	826.77	356		
252.5	828.41			
253.0	830.05	355		
253.5	831.69			
254.0	833.33	354		
254.5	834.97			
255.0	836.61	353		
255.5	838.25			
256.0	839.90	352		
256.5	841.54			
257.0	843.18	351		
257.5	844.82			
258.0	846.46	350		
258.5	848.10			
259.0	849.74	349		
259.5	851.38			
260.0	853.02	348		
260.5	854.66			
261.0	856.30	347		
261.5	857.94			
262.0	859.58	346		
262.5	861.22			
263.0	862.86	345		
263.5	864.50			
264.0	866.14	344		
264.5	867.78			
265.0	869.42	343		
265.5	871.06			
266.0	872.70			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC * PAGE 12 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
266.5	874.34			
267.0	875.98	341		
267.5	877.62			
268.0	879.27	340		
268.5	880.91			
269.0	882.55	339		
269.5	884.19			
270.0	885.83	338		
270.5	887.47			
271.0	889.11	337		
271.5	890.75			
272.0	892.39	336		
272.5	894.03			
273.0	895.67	335		
273.5	897.31			
274.0	898.95	334		
274.5	900.59			
275.0	902.23	333		
275.5	903.87			
276.0	905.51	332		
276.5	907.15			
277.0	908.79	331		
277.5	910.43			
278.0	912.07	330		
278.5	913.71			
279.0	915.35	329		New paper
279.5	916.99			
280.0	918.64	328		
280.5	920.28			
281.0	921.92	327		
281.5	923.56			
282.0	925.20	326		
282.5	926.84			
283.0	928.48	325		
283.5	930.12			
284.0	931.76	324		
284.5	933.40			
285.0	935.04	323		
285.5	936.68			
286.0	938.32	322		
286.5	939.96			
287.0	941.60			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC * PAGE 13 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
287.5	943.24			
288.0	944.88	320		
288.5	946.52			
289.0	948.16	319		
289.5	949.80			
290.0	951.44	318		
290.5	953.08			
291.0	954.72	317		
291.5	956.36			
292.0	958.01	316		
292.5	959.65			
293.0	961.29	313		
293.5	962.93			
294.0	964.57	312		
294.5	966.21			
295.0	967.85	311		
295.5	969.49			
296.0	971.13	310		
296.5	972.77			
297.0	974.41	309		
297.5	976.05			
298.0	977.69	* 315 *		
298.5	979.33			
299.0	980.97	307		
299.5	982.61			
300.0	984.25	306		
300.5	985.89			
301.0	987.53	* 314 *		
301.5	989.17			
302.0	990.81	305		
302.5	992.45			
303.0	994.09	304		
303.5	995.73			
304.0	997.38	303		Disk change
304.5	999.02			
305.0	1000.66	302		
305.5	1002.30			
306.0	1003.94	301		
306.5	1005.58			
307.0	1007.22	300		
307.5	1008.86			
308.0	1010.50			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC * PAGE 14 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
308.5	1012.14			
309.0	1013.78	298		
309.5	1015.42			
310.0	1017.06	297		
310.5	1018.70			
311.0	1020.34	296		
311.5	1021.98			
312.0	1023.62	295		
312.5	1025.26			
313.0	1026.90	294		
313.5	1028.54			
314.0	1030.18	293		
314.5	1031.82			
315.0	1033.46	292		
315.5	1035.10			
316.0	1036.75	291		
316.5	1038.39			
317.0	1040.03	290		
317.5	1041.67			
318.0	1043.31	289		
318.5	1044.95			
319.0	1046.59	288		
319.5	1048.23			
320.0	1049.87	287		
320.5	1051.51			
321.0	1053.15	286		
321.5	1054.79			
322.0	1056.43	285		
322.5	1058.07			
323.0	1059.71	284		
323.5	1061.35			
324.0	1062.99	283		
324.5	1064.63			
325.0	1066.27	163 282	++ see next page	
325.5	1067.91		JRP 2-26-07	
326.0	1069.55	162 281		
326.5	1071.19			
327.0	1072.83	161 280		
327.5	1074.48			
328.0	1076.12	160 279		
328.5	1077.76			
329.0	1079.40	159 278		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC # PAGE 15 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
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329.5	1081.04	158		
330.0	1082.68	157 277		++ NOTE ADDED BY
330.5	1084.32	156		JGD 2-26-07
331.0	1085.96	155 276		Receiver failure started
331.5	1087.60	154		at #123 (see below).
332.0	1089.24	153 275		Receiver was changed
332.5	1090.88	152		at #163 and logging
333.0	1092.52	151 274		on run #2 (5B) commenced
333.5	1094.16	150		with #200 at 385m.
334.0	1095.80	149 273		Duplicate logs are
334.5	1097.44	148		due to overlap of
335.0	1099.08	147 272		data deemed necessary
335.5	1100.72	146		by Charles Carter,
336.0	1102.36	145 271		geophysicist in the
336.5	1104.00	144		field. This note
337.0	1105.64	143 270		added per telecon with
337.5	1107.28	142		C. Carter by J. Diehl
338.0	1108.92	141 269		JGD 2-26-07
338.5	1110.56	140		
339.0	1112.20	139 268		
339.5	1113.85	138		
340.0	1115.49	137 267		
340.5	1117.13	136		
341.0	1118.77	135 266		
341.5	1120.41	134		
342.0	1122.05	133 265		
342.5	1123.69	132		
343.0	1125.33	131 264		
343.5	1126.97	130		
344.0	1128.61	129 263		
344.5	1130.25	128		
345.0	1131.89	127 262		
345.5	1133.53	126		
346.0	1135.17	125 261		
346.5	1136.81	124		
347.0	1138.45	123 260		
347.5	1140.09	122		? can't get H1(R1)
348.0	1141.73	121 259		
348.5	1143.37	120		
349.0	1145.01	119 258		
349.5	1146.65	118		
350.0	1148.29	117 257		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC # PAGE 16 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
350.5	1149.93	116		
351.0	1151.57	115 256		
351.5	1153.22	114		
352.0	1154.86	113 255		
352.5	1156.50	112		
353.0	1158.14	111 254		
353.5	1159.78	110		
354.0	1161.42	109 253		
354.5	1163.06	108		disk change (R1)
355.0	1164.70	107 252		
355.5	1166.34	106		
356.0	1167.98	105 251		
356.5	1169.62	104		
357.0	1171.26	103 250		
357.5	1172.90	102		
358.0	1174.54	101 249		
358.5	1176.18	100		
359.0	1177.82	99 248		
359.5	1179.46	98		
360.0	1181.10	97 247		
360.5	1182.74	96		
361.0	1184.38	95 246		
361.5	1186.02	94		
362.0	1187.66	93 245		
362.5	1189.30	92		
363.0	1190.94	91 244		Go TO 1M
363.5	1192.59	90 243		
364.0	1194.23	89 242		
364.5	1195.87	88 241		
365.0	1197.51	87 240		
365.5	1199.15	86 239		
366.0	1200.79	85 238		
366.5	1202.43	84 237		
367.0	1204.07	83 236		
367.5	1205.71	82 235		
368.0	1207.35	81 234		
368.5	1208.99	80 233		
369.0	1210.63	79 232		
369.5	1212.27	78 231		
370.0	1213.91	77 230		
370.5	1215.55	76 229		
371.0	1217.19	75 228		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/26/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC * PAGE 17 OF 18

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
371.5	1218.83	74 227		
372.0	1220.47	73 226		
372.5	1222.11	72 225		
373.0	1223.75	71 224		
373.5	1225.39	70 223		
374.0	1227.03	69 222		
374.5	1228.67	68 221		
375.0	1230.31	67 220		
375.5	1231.96	66 219		
376.0	1233.60	65 218		
376.5	1235.24	64 217		
377.0	1236.88	63 216		
377.5	1238.52	62 215		
378.0	1240.16	61 214		
378.5	1241.80	60 213		
379.0	1243.44	59 212		
379.5	1245.08	58 211		
380.0	1246.72	57 210		
380.5	1248.36	56 209		
381.0	1250.00	55 208		
381.5	1251.64	54 207		
382.0	1253.28	53 206		
382.5	1254.92	52 205		
383.0	1256.56	51 204		
383.5	1258.20	50 203		Paper change Run 2
384.0	1259.84	49 202		Paper change / p
384.5	1261.48	48 201		
385.0	1263.12	47 200		
385.5	1264.76	46		
386.0	1266.40	45		
386.5	1268.04	44		
387.0	1269.69	43		
387.5	1271.33	42		
388.0	1272.97	41		
388.5	1274.61	40		
389.0	1276.25	39		
389.5	1277.89	38		
390.0	1279.53	37		
390.5	1281.17	36		
391.0	1282.81	35		
391.5	1284.45	34		
392.0	1286.09	33		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/28/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC + PAGE 18 OF 18 *

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
392.5	1287.73	32		
393.0	1289.37	31		
393.5	1291.01	30		
394.0	1292.65	29		
394.5	1294.29	28		
395.0	1295.93	27		
395.5	1297.57	26		
396.0	1299.21	25		
396.5	1300.85	24		
397.0	1302.49	23		
397.5	1304.13	22		
398.0	1305.77	21		
398.5	1307.41	20		
399.0	1309.06	19		
399.5	1310.70	18		
400.0	1312.34	17		
400.5	1313.98	16		
401.0	1315.62	15		
401.5	1317.26	14		
402.0	1318.90	13		
402.5	1320.54	12		
403.0	1322.18	11		
403.5	1323.82	10		
404.0	1325.46	9		
404.5	1327.10	8		
405.0	1328.74	007		
405.5	1330.38	6		
406.0	1332.02	5		
406.5	1333.66	4		
407.0	1335.30	3		
407.5	1336.94	2		
408.0	1338.58	001		
408.5	1340.22			
409.0	1341.86			
409.5	1343.50			
410.0	1345.14			
410.5	1346.78			
411.0	1348.43			
411.5	1350.07			
412.0	1351.71			
412.5	1353.35			
413.0	1354.99			

John Diehl

From: Charles G. Carter
Sent: Monday, February 26, 2007 2:43 PM
To: John Diehl
Subject: C4996

John,
here is what I have in my field notebook.

C4996 8/28

Reference point = 0.44m

Set zero (0.44m) @ 9:00am
Acquired file 001 @ 408.0m @ 10:20am
Checked zero (0.1m) @ 2:30pm

Run 2

Set zero (0.44m) @ 3:10pm
Acquired file 200 @ 385.0m @ 3:45pm
Acquired reading @ 105m @ 7:30pm
Checked zero (0.4m) @ 9:05pm

The reason for the time gap between last reading and checking zero was getting the winch cable stuck between the drum and the winch frame.

Before I started I noted:

Head Reducer : S/N 20034
Receiver: S/N 23053
1m Iso Tube: S/N 24053
Source: S/N 21050
Source Driver: S/N 33093
Weight: S/N 38118

I did not record the receiver S/N for Run 2, but I left it connected to the iso tube, and Tony called and asked where the iso tube was. He probably used the same one.

-----Original Message-----

From: John Diehl
Sent: Fri 2/23/2007 5:15 PM
To: Charles G. Carter
Cc: Robert Steller (Interserv)
Subject: RE: Pittsburg site map

OK. No problem. If someone ships me a receiver I can do these.

John

Received by
JMC
2/26/07
notes by Charles
Carter in field
notebook on
8/28/06

Confirmed with
A. Martin, The
replacement
receiver is
S/N 26066
JMC 2/26/07



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 9/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: A. Martin PAGE 1 OF 5

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: Rob Skeller OFFICE PHONE: 626-798-9112 *h*
cell

CONTACT: _____ OFFICE PHONE: 813-414-7919

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____
Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____
BOREHOLE DESIGNATION: C4996 LOCATION: _____
RUN #6

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED UNCASED

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____ ; _____, _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: _____

CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____; FRESH WATER MUD _____; SALT WATER MUD; _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: _____



SITE: Hanford WTP DATE: 9/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: A. Moran PAGE 1 OF 5
2

LOGGING CREW: _____
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: Richland DEPARTURE TIME: 0915
ARRIVED ON SITE: 0500
STANDBY TIME: Trip in @ 0615 hrs / 0730 CAUSE: _____
LOGGING STARTED: 0815 LOGGING COMPLETED: 0950
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOLIBIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

Rebuild source 39118 before logging

BATTERIES CHANGED BEFORE LOGGING: YES ☒; NO ☐; STORED WITH NEW ☐
WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☐ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☐ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: 630 hrs - probe fault @ 100m
problem source - does not fire out of hole, but source, 180, rev. sparks / together on
system works - suspect receiver. change receiver @ 180 hrs

EQUIPMENT PROBLEMS OR FAILURES: poor electrical connection or problem with geocamp
for for receiver on 2nd run - gains set to 500-2k and signal quality good so
logging conducted. After completion of log, bypass wind and find no problem with geocamp.
Problem appeared to be poor connection at wind.
SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: HR - 20034, R - 26060 changed to 33094, 150 - 300083 changed
to 24053, source - 39118, SD - 33093, W - 33118

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: ca PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
392.5	1287.73			10' check ohg
393.0	1289.37			
393.5	1291.01			
394.0	1292.65			
394.5	1294.29			
395.0	1295.93			
395.5	1297.57			
396.0	1299.21			
396.5	1300.85			
397.0	1302.49			
397.5	1304.13			
398.0	1305.77			
398.5	1307.41			
399.0	1309.06			
399.5	1310.70			
400.0	1312.34			
400.5	1313.98			
401.0	1315.62			
401.5	1317.26			
402.0	1318.90			
402.5	1320.54			
403.0	1322.18			
403.5	1323.82			
404.0	1325.46	504		start @ 0818h
404.5	1327.10	505		note: gain v. for receiver
405.0	1328.74	506		very high, however signal quality
405.5	1330.38	507		is good!
406.0	1332.02	508		
406.5	1333.66	509		
407.0	1335.30	510		
407.5	1336.94	511		
408.0	1338.58	512		
408.5	1340.22	513		
409.0	1341.86	514		
409.5	1343.50	515		
410.0	1345.14	516		
410.5	1346.78	517		
411.0	1348.43	518		
411.5	1350.07	519		
412.0	1351.71	520		
412.5	1353.35	521		
413.0	1354.99	522		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: *Alan* PAGE 4 ^{9/6/06} OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
413.5	1356.63	523		
414.0	1358.27	527		
414.5	1359.91	525		
415.0	1361.55	526		
415.5	1363.19	527		
416.0	1364.83	528		
416.5	1366.47	529		
417.0	1368.11	530		
417.5	1369.75	531		
418.0	1371.39	532		
418.5	1373.03	533		
419.0	1374.67	534		
419.5	1376.31	535		
420.0	1377.95	536		
420.5	1379.59	537		
421.0	1381.23	538		
421.5	1382.87	539		
422.0	1384.51	540		
422.5	1386.15	541		
423.0	1387.80	542		
423.5	1389.44	543		gone 2k for for 11/V
424.0	1391.08	544		
424.5	1392.72	545		
425.0	1394.36	546		
425.5	1396.00	547		
426.0	1397.64	548		
426.5	1399.28	549		
427.0	1400.92	550		
427.5	1402.56	551		
428.0	1404.20	552		
428.5	1405.84	553		
429.0	1407.48	554		
429.5	1409.12	555		
430.0	1410.76	556		
430.5	1412.40	557		
431.0	1414.04	558		
431.5	1415.68	559		
432.0	1417.32	560		
432.5	1418.96	561		
433.0	1420.60	562		
433.5	1422.24	563		
434.0	1423.88	564		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: co PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
434.5	1425.52	565		
435.0	1427.17	566		
435.5	1428.81	567		
436.0	1430.45	568		
436.5	1432.09	569		
437.0	1433.73	570		
437.5	1435.37	571		
438.0	1437.01	572		
438.5	1438.65	573		
439.0	1440.29	574		
439.5	1441.93	575		
440.0	1443.57	576		
440.5	1445.21	577		
441.0	1446.85	578		
441.5	1448.49	579		
442.0	1450.13	580		0912 hrs
442.5	1451.77			of chert ✓ @ 950 hrs
443.0	1453.41			(better than 0.1m)
443.5	1455.05			
444.0	1456.69			
444.5	1458.33			
445.0	1459.97			
445.5	1461.61			
446.0	1463.25			
446.5	1464.90			
447.0	1466.54			
447.5	1468.18			
448.0	1469.82			
448.5	1471.46			
449.0	1473.10			
449.5	1474.74			
450.0	1476.38			
450.5	1478.02			
451.0	1479.66			
451.5	1481.30			
452.0	1482.94			
452.5	1484.58			
453.0	1486.22			
453.5	1487.86			
454.0	1489.50			
454.5	1491.14			
455.0	1492.78			



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 8/27/06
CLIENT: PNNL JOB: 6303
AUTHOR: cc PAGE 1 OF 5

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____
Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C4997 LOCATION: _____

RUN #1 J62 1-23-07

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED _____ UNCASD _____

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 567'

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____; FRESH WATER MUD X; SALT WATER MUD; _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: _____



SITE: Hanford WTP DATE: 8/27/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC PAGE 1 OF 5
2

LOGGING CREW: CL
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: Pasco Airport DEPARTURE TIME: 12:00pm
ARRIVED ON SITE: 2:00pm
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 4:00pm LOGGING COMPLETED: 5:35pm
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOLIBIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO X; STORED WITH NEW _____

WINCH _____ COMPROBE ☒ ** GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☐ 11001 ☐ 23053 ☒ ** see p. 3

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Set RP @ 3:30pm

1st Reading @ 164.0m at 3:58pm

last Reading @ 118.5m at 5:35pm

check RP @ 6:02pm

zero check per telecom JSD/cc
2-26-06

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/27/2006
CLIENT: PNNL JOB: 6303
AUTHOR: CC *CC* PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
117.5	385.50			
118.0	387.14			
118.5	388.78	92	**	
119.0	390.42	91		
119.5	392.06	90		
120.0	393.70	89		
120.5	395.34	88		
121.0	396.98	87		
121.5	398.62	86		
122.0	400.26	85		
122.5	401.90	84		
123.0	403.54	83		
123.5	405.18	82		
124.0	406.82	81		
124.5	408.46	80		
125.0	410.10	79		
125.5	411.75	78		
126.0	413.39	77		
126.5	415.03	76		
127.0	416.67	75		
127.5	418.31	74		
128.0	419.95	73		
128.5	421.59	72		
129.0	423.23	71		
129.5	424.87	70		
130.0	426.51			
130.5	428.15			
131.0	429.79	** NOTES ADDED BY JGD 2-26-07		
131.5	431.43	PER TELECON WITH CC		
132.0	433.07	1. This page was data collected in the		
132.5	434.71	field on CC's laptop during logging		
133.0	436.35	because the form provided by		
133.5	437.99	GV only went to 130m.		
134.0	439.63	2. This page was printed upon		
134.5	441.27	return to the GV office (GEOvision)		
135.0	442.91	and added to the hand log		
135.5	444.55	by CC.		
136.0	446.19	JGD 2-26-07		
136.5	447.83			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/27/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
-----------------	---------------	------------------------	----------------------	--------------------------------------

130.0	426.51	69		
130.5	428.15	68		
131.0	429.79	67		
131.5	431.43	66		
132.0	433.07	65		
132.5	434.71	64		
133.0	436.35	63		
133.5	437.99	62		
134.0	439.63	61		
134.5	441.27	60		
135.0	442.91	59		
135.5	444.55	58		
136.0	446.19	57		
136.5	447.83	56		
137.0	449.48	55		
137.5	451.12	54		
138.0	452.76	53		
138.5	454.40	52		
139.0	456.04	51		
139.5	457.68	50		
140.0	459.32	49		
140.5	460.96	48		
141.0	462.60	47		
141.5	464.24	46		
142.0	465.88	45		
142.5	467.52	44		
143.0	469.16	43		
143.5	470.80	42		
144.0	472.44	41		
144.5	474.08	40		
145.0	475.72	39		
145.5	477.36	38		
146.0	479.00	37		
146.5	480.64	36		
147.0	482.28	35		
147.5	483.92	34		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 8/27/06
CLIENT: PNNL JOB: 6303
AUTHOR: CC PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
148.0	485.56	33		
148.5	487.20	32		
149.0	488.85	31		
149.5	490.49	30		
150.0	492.13	029		
150.5	493.77	28		
151.0	495.41	27		
151.5	497.05	26		
152.0	498.69	25		
152.5	500.33	24		
153.0	501.97	23		
153.5	503.61	22		
154.0	505.25	21		
154.5	506.89	20		
155.0	508.53	19		
155.5	510.17	18		
156.0	511.81	17		
156.5	513.45	16		
157.0	515.09	15		
157.5	516.73	14		
158.0	518.37	13		paper change
158.5	520.01	12		
159.0	521.65	11		
159.5	523.29	10		
160.0	524.93	029		
160.5	526.57	8		
161.0	528.22	7		
161.5	529.86	6		
162.0	531.50	5		
162.5	533.14	4		
163.0	534.78	3		
163.5	536.42	2		
164.0	538.06	001		
164.5	539.70			
165.0	541.34			
165.5	542.98			
166.0	544.62			



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 2/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: A. Martin PAGE 1 OF 7
2/6/06

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: Kent Reynolds OFFICE PHONE: 509-308-3000

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____
Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____
BOREHOLE DESIGNATION: C4997 LOCATION: _____

RUN #2

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED _____ UNCASD _____

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____ ; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: _____

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____; FRESH WATER MUD _____; SALT WATER MUD; _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: _____



SITE: Hanford WTP DATE: 9/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: A. Moran PAGE 1 OF 87
2

LOGGING CREW: _____

VEHICLE(S) USED AND MILEAGE: _____

MOBILIZED FROM: - DEPARTURE TIME: -

ARRIVED ON SITE: -

STANDBY TIME: Tap-e 1055 CAUSE: _____

LOGGING STARTED: 1127hr LOGGING COMPLETED: 1308hr, perched on 1400hr

STANDBY TIME: _____ CAUSE: _____

LOGGING STARTED: _____ LOGGING COMPLETED: _____

DEMOBILIZED TO: Richland ARRIVAL TIME: 1445hr

ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO ☒; STORED WITH NEW _____

WINCH _____ COMPROBE ☐ GREY ☐ OYO ☐ RG ☐ OTH ☐

INSTRUMENT OYO 12004 ☐ 15014 ☐ 19029 ☐ RG 160023 ☐ 160024 ☐

RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☐ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: Nak: gear on Fertiga look ok
on surface are with wind hyperscable

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Some equipment is C4996 on 9/6/06.

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: Morton PAGE 3 OF 846 7

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
148.0	485.56			
148.5	487.20			
149.0	488.85			
149.5	490.49			
150.0	492.13			
150.5	493.77			
151.0	495.41			
151.5	497.05			
152.0	498.69			
152.5	500.33			
153.0	501.97			
153.5	503.61			
154.0	505.25			
154.5	506.89			
155.0	508.53			
155.5	510.17			
156.0	511.81			
156.5	513.45			
157.0	515.09			
157.5	516.73			
158.0	518.37			
158.5	520.01			
159.0	521.65			
159.5	523.29			
160.0	524.93			
160.5	526.57			
161.0	528.22	247		1302 hrs
161.5	529.86	246		1320 - 2 hrs check @ 0.1m
162.0	531.50	245		should be 0.3 - with 0.1m. ✓
162.5	533.14	244		
163.0	534.78	243		
163.5	536.42	242		
164.0	538.06	240 241		
164.5	539.70	239		
165.0	541.34	238		
165.5	542.98	237		
166.0	544.62	236		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9/8/06
CLIENT: PNNL JOB: 6303
AUTHOR: Marta PAGE 4 OF 5 9/8/06 7

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
166.5	546.26	235		
167.0	547.90	234		
167.5	549.54	231 233		
168.0	551.18	231		
168.5	552.82	230		
169.0	554.46	229		
169.5	556.10	228		
170.0	557.74	227		
170.5	559.38	226		
171.0	561.02	225		
171.5	562.66	224		
172.0	564.30	223		
172.5	565.94	222		
173.0	567.59	221		
173.5	569.23	220		
174.0	570.87	219		
174.5	572.51	218		
175.0	574.15	217		
175.5	575.79	216		
176.0	577.43	215		
176.5	579.07	214		
177.0	580.71	213		
177.5	582.35	212		
178.0	583.99	211		
178.5	585.63	210		
179.0	587.27	209		
179.5	588.91	208		
180.0	590.55	207		
180.5	592.19	206		
181.0	593.83	205		
181.5	595.47	204		
182.0	597.11	203		
182.5	598.75	202		
183.0	600.39	201		
183.5	602.03	200		
184.0	603.67	199		
184.5	605.31	198		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: *Merb* PAGE 5 OF 7

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
185.0	606.96	157		
185.5	608.60	196		
186.0	610.24	195		
186.5	611.88	154		
187.0	613.52	193		
187.5	615.16	192		
188.0	616.80	191		
188.5	618.44	190		
189.0	620.08	189		
189.5	621.72	188		
190.0	623.36	187		
190.5	625.00	186		
191.0	626.64	185		
191.5	628.28	184		
192.0	629.92	183		
192.5	631.56	182		
193.0	633.20	181		
193.5	634.84	180		
194.0	636.48	179		
194.5	638.12	178		
195.0	639.76	177		
195.5	641.40	176		
196.0	643.04	175		
196.5	644.69	174		
197.0	646.33	173		
197.5	647.97	172		
198.0	649.61	171		
198.5	651.25	170		
199.0	652.89	169		
199.5	654.53	168		
200.0	656.17	167		
200.5	657.81	166		
201.0	659.45	165		
201.5	661.09	164		
202.0	662.73	163		
202.5	664.37	162		
203.0	666.01	161		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: Mark PAGE 6 OF 7

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
203.5	667.65	160		
204.0	669.29	159		
204.5	670.93	158		
205.0	672.57	157		
205.5	674.21	156		
206.0	675.85	155		
206.5	677.49	154		
207.0	679.13	153		
207.5	680.77	152		
208.0	682.41	151		
208.5	684.06	150		
209.0	685.70	149		
209.5	687.34	148		
210.0	688.98	147		
210.5	690.62	146		
211.0	692.26	145		
211.5	693.90	144		
212.0	695.54	143		
212.5	697.18	142		
213.0	698.82	141		
213.5	700.46	140		
214.0	702.10	139		
214.5	703.74	138		
215.0	705.38	137		
215.5	707.02	136		
216.0	708.66	135		
216.5	710.30	134		
217.0	711.94	133		
217.5	713.58	132		
218.0	715.22	131		
218.5	716.86	130		
219.0	718.50	129		
219.5	720.14	128		
220.0	721.78	127		
220.5	723.43	126		
221.0	725.07	125		
221.5	726.71	124		
222.0	728.35	123		
222.5	729.99	122		
223.0	731.63	121		
223.5	733.27	120		
224.0	734.91	119		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9/6/06
CLIENT: PNNL JOB: 6303
AUTHOR: Mrb PAGE 7 OF 7

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
224.5	736.55	118		
225.0	738.19	117		
225.5	739.83	116		
226.0	741.47	115		
226.5	743.11	114		
227.0	744.75	113		
227.5	746.39	112		
228.0	748.03	111		
228.5	749.67	110		
229.0	751.31	109		
229.5	752.95	107 108		
230.0	754.59	105 106 <i>as 9/6/06</i>		
230.5	756.23	103, 104 104		
231.0	757.87	102		
231.5	759.51	100, 101		
232.0	761.15	99		
232.5	762.80	97, 98		98 <i>repe</i> - 5/10
233.0	764.44	96		
233.5	766.08	95		
234.0	767.72	94		
234.5	769.36	93		
235.0	771.00	92		
235.5	772.64	91		
236.0	774.28	90		2m mark on probe set @ 0.3 as ref point @ 5'7"
236.5	775.92			
237.0	777.56			
237.5	779.20			
238.0	780.84			
238.5	782.48			
239.0	784.12			
239.5	785.76			
240.0	787.40			
240.5	789.04			
241.0	790.68			
241.5	792.32			
242.0	793.96			
242.5	795.60			
243.0	797.24			
243.5	798.88			
244.0	800.52			
244.5	802.17			
245.0	803.81			



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 9-13-06
CLIENT: PNNL JOB: 6303
AUTHOR: JM PAGE 1 OF 6

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____
Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C4997 LOCATION: _____

RUN #3 JOD 1-23-07

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED _____ UNCASD _____

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 977'

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____; FRESH WATER MUD _____; SALT WATER MUD: _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: _____



SITE: Hanford WTP DATE: 9-13-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGO PAGE 1 OF 6

LOGGING CREW: _____

VEHICLE(S) USED AND MILEAGE: _____

MOBILIZED FROM: _____ DEPARTURE TIME: _____

ARRIVED ON SITE: 11:00 pm 9-12-06

STANDBY TIME: _____ CAUSE: _____

LOGGING STARTED: 12:15 am LOGGING COMPLETED: 2 am

STANDBY TIME: _____ CAUSE: 10 min house probe

LOGGING STARTED: _____ LOGGING COMPLETED: _____

DEMOBILIZED TO: _____ ARRIVAL TIME: _____

ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO X; STORED WITH NEW _____

WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐

INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐

RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Reducer 20034

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-15-06
CLIENT: PNNL JOB: 6303
AUTHOR: J60 PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
224.5	736.55			
225.0	738.19			
225.5	739.83			
226.0	741.47			
226.5	743.11			
227.0	744.75			
227.5	746.39			
228.0	748.03			
228.5	749.67			
229.0	751.31			
229.5	752.95			
230.0	754.59			
230.5	756.23			
231.0	757.87			
231.5	759.51			zero check
232.0	761.15			
232.5	762.80			< .2m
233.0	764.44			~ 4 in.
233.5	766.08			
234.0	767.72			
234.5	769.36			
235.0	771.00			
235.5	772.64			
236.0	774.28			
236.5	775.92			
237.0	777.56			
237.5	779.20			
238.0	780.84			STOP HERE
238.5	782.48			
239.0	784.12	110		
239.5	785.76	109		
240.0	787.40	108		
240.5	789.04	107		
241.0	790.68	106		
241.5	792.32	105		
242.0	793.96	104		
242.5	795.60	103		
243.0	797.24	102		
243.5	798.88	101		
244.0	800.52	100		
244.5	802.17	099		
245.0	803.81	098		

FULL DISKETTE

bottom
↓ of cement

< ch. paper

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-13-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
245.5	805.45	097		
246.0	807.09	096		
246.5	808.73	095		
247.0	810.37	094		
247.5	812.01	093		
248.0	813.65	092		
248.5	815.29	091		
249.0	816.93	090		
249.5	818.57	089		
250.0	820.21	088		0130 pm
250.5	821.85	087		
251.0	823.49	086		
251.5	825.13	085		
252.0	826.77	084		
252.5	828.41	083		
253.0	830.05	082		
253.5	831.69	081		
254.0	833.33	080		
254.5	834.97	079		
255.0	836.61	078		
255.5	838.25	077		
256.0	839.90	076		
256.5	841.54	075		
257.0	843.18	074		
257.5	844.82	073		min gain.
258.0	846.46	072		reduce gain -
258.5	848.10	071		top of interbed?
259.0	849.74	070		
259.5	851.38	069		reduce range.
260.0	853.02	068		
260.5	854.66	067		← here.
261.0	856.30	066		
261.5	857.94	065		
262.0	859.58	064		
262.5	861.22	063		
263.0	862.86	062		
263.5	864.50	061		
264.0	866.14	060		
264.5	867.78	059		
265.0	869.42	058		
265.5	871.06	057		
266.0	872.70	056		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-13-06
CLIENT: PNNL JOB: 6303
AUTHOR: JLH PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
266.5	874.34	055		
267.0	875.98	054		
267.5	877.62	053		
268.0	879.27	052		
268.5	880.91	051		
269.0	882.55	050		
269.5	884.19	049		
270.0	885.83	048		
270.5	887.47	047		
271.0	889.11	046		
271.5	890.75	045		
272.0	892.39	044		
272.5	894.03	043		
273.0	895.67	042		
273.5	897.31	041		
274.0	898.95	040		
274.5	900.59	039		
275.0	902.23	038		
275.5	903.87	037		
276.0	905.51	036		
276.5	907.15	035		
277.0	908.79	034		
277.5	910.43	033		
278.0	912.07	032		
278.5	913.71	031		
279.0	915.35	030		
279.5	916.99	029		
280.0	918.64	028		
280.5	920.28	027		
281.0	921.92	026		
281.5	923.56	025		
282.0	925.20	024		
282.5	926.84	023		
283.0	928.48	022		
283.5	930.12	021		
284.0	931.76	020		
284.5	933.40	019		
285.0	935.04	018		
285.5	936.68	016		
286.0	938.32	015	JLH 9-13-06	
286.5	939.96	014	JLH 9-13-06	
287.0	941.60	013	JLH 9-13-06	

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 2-13-06
CLIENT: PNNL JOB: 6303
AUTHOR: Jro PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
287.5	943.24	013		
288.0	944.88	012		
288.5	946.52	010		
289.0	948.16	010		
289.5	949.80	009		
290.0	951.44	008		incr. range.
290.5	953.08	007		
291.0	954.72	006		
291.5	956.36	005		
292.0	958.01	004		
292.5	959.65	003		
293.0	961.29	002		
293.5	962.93	001		
294.0	964.57			← BOTTOM.
294.5	966.21			
295.0	967.85			
295.5	969.49			
296.0	971.13			
296.5	972.77			
297.0	974.41			
297.5	976.05			
298.0	977.69			
298.5	979.33			
299.0	980.97			
299.5	982.61			
300.0	984.25			
300.5	985.89			
301.0	987.53			977.0 TD
301.5	989.17			- 12.1
302.0	990.81			964.9
302.5	992.45			
303.0	994.09			
303.5	995.73			
304.0	997.38			
304.5	999.02			
305.0	1000.66			
305.5	1002.30			
306.0	1003.94			
306.5	1005.58			
307.0	1007.22			
307.5	1008.86			
308.0	1010.50			



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 9-24-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGO PAGE 1 OF 5

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: Doug McFarland. OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____
Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____
BOREHOLE DESIGNATION: C4997 LOCATION: center.
RUN 4

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED UNCASED X

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 1137 ft.

CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING _____; NO

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER; FRESH WATER MUD X; SALT WATER MUD

OTHER: _____

DEPTH TO BOREHOLE FLUID: N/A TIME SINCE LAST CIRCULATION: _____

top
interval
1111

top
flow
950-



SITE: Hanford WTP DATE: 9-24-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 1 OF 5
2

LOGGING CREW: _____
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: Richland DEPARTURE TIME: _____
ARRIVED ON SITE: 2145 / 9:45 pm.
STANDBY TIME: 0 CAUSE: _____
LOGGING STARTED: 10:40 into hole LOGGING COMPLETED: 12:30
STANDBY TIME: _____ CAUSE: depart site 1:30
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMobilized TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO X check ok; STORED WITH NEW _____
WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Zero checks - 2m ok.

<u>redner</u>	<u>iso</u>	<u>300083</u>	<u>driver</u>	<u>33693</u>
<u>21037</u>				
	<u>source</u>	<u>21050</u>	<u>wt</u>	<u>470151</u>

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-24-06
CLIENT: PNNL JOB: 6303
AUTHOR: _____ PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
287.5	943.24			
288.0	944.88			Step here
288.5	946.52			
289.0	948.16	dec	JW 9-24-06	
289.5	949.80	(H0)		
290.0	951.44	109		← stopped here @ ~ 12:30
290.5	953.08	108		
291.0	954.72	107		
291.5	956.36	106		
292.0	958.01	105		
292.5	959.65	104		
293.0	961.29	103		
293.5	962.93	102		
294.0	964.57	101		
294.5	966.21	100		
295.0	967.85	99		
295.5	969.49	98		
296.0	971.13	97		
296.5	972.77	96		
297.0	974.41	95		
297.5	976.05	94		
298.0	977.69	93		
298.5	979.33	92		
299.0	980.97	91		
299.5	982.61	90		
300.0	984.25	89		
300.5	985.89	88		
301.0	987.53	87		
301.5	989.17	86		
302.0	990.81	85		
302.5	992.45	84		
303.0	994.09	83		
303.5	995.73	82		Normal gains.
304.0	997.38	81		
304.5	999.02	80		
305.0	1000.66	79		reduce gains.
305.5	1002.30	78		
306.0	1003.94	77		
306.5	1005.58	76		
307.0	1007.22	75		
307.5	1008.86	74		Signal back.
308.0	1010.50	73		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-24-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGO PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
308.5	1012.14	72		
309.0	1013.78	71		
309.5	1015.42	70		
310.0	1017.06	69		
310.5	1018.70	68		
311.0	1020.34	67		incr. num + far gain
311.5	1021.98	66		
312.0	1023.62	65		reduct signal for
312.5	1025.26	64		incr gain
313.0	1026.90	63		
313.5	1028.54	62		
314.0	1030.18	61		
314.5	1031.82	60		
315.0	1033.46	59		
315.5	1035.10	58		
316.0	1036.75	57		
316.5	1038.39	56		
317.0	1040.03	55		
317.5	1041.67	54		
318.0	1043.31	53		
318.5	1044.95	52		
319.0	1046.59	51		
319.5	1048.23	50		
320.0	1049.87	49		
320.5	1051.51	48		
321.0	1053.15	47		
321.5	1054.79	46		
322.0	1056.43	45		
322.5	1058.07	043 44	JMK 9-24-06	
323.0	1059.71	042 43		
323.5	1061.35	041 42		
324.0	1062.99	040 41		
324.5	1064.63	039		
325.0	1066.27	038		
325.5	1067.91	037		
326.0	1069.55	036		
326.5	1071.19	035		
327.0	1072.83	034		
327.5	1074.48	033		
328.0	1076.12	032		
328.5	1077.76	031		
329.0	1079.40	030		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 9-24-06
CLIENT: PNNL JOB: 6303
AUTHOR: JW PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
329.5	1081.04	029		
330.0	1082.68	028		
330.5	1084.32	027		
331.0	1085.96	026		
331.5	1087.60	025		
332.0	1089.24	024		
332.5	1090.88	023		
333.0	1092.52	022		
333.5	1094.16	021		
334.0	1095.80	020		
334.5	1097.44	019		
335.0	1099.08	018		
335.5	1100.72	017		
336.0	1102.36	016		
336.5	1104.00	015		Reduce range.
337.0	1105.64	014		
337.5	1107.28	013		Reduce gain
338.0	1108.92	012		
338.5	1110.56	011		Bottom flow.
339.0	1112.20	010		
339.5	1113.85	009		
340.0	1115.49	008		
340.5	1117.13	007		
341.0	1118.77	006		
341.5	1120.41	005		
342.0	1122.05	004		
342.5	1123.69	007 003		
343.0	1125.33	004 002		
343.5	1126.97	004 001		
344.0	1128.61			
344.5	1130.25			
345.0	1131.89			
345.5	1133.53			
346.0	1135.17			
346.5	1136.81			
347.0	1138.45			
347.5	1140.09			
348.0	1141.73	343.6 tp @ TD.		
348.5	1143.37			
349.0	1145.01			
349.5	1146.65			
350.0	1148.29			

JW
9-24-06

← here ?

1137.0
- 12.1
1124.9



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 10-2-06
CLIENT: PNNL JOB: 6303
AUTHOR: John Diehl PAGE 1 OF 5

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____

Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C4997 LOCATION: _____

RUN # 5

940
Umatilla

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

1108-1205
Mabton

BOREHOLE CONSTRUCTION: CASED _____ UNCASD _____

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____ ; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 1245 ft.

CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____ ; NO _____

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER _____ ; FRESH WATER MUD _____ ; SALT WATER MUD; _____

OTHER: _____

DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: _____



SITE: Hanford WTP DATE: 10-2-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD. PAGE 1 OF 5
2

LOGGING CREW: Dienl
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: _____ DEPARTURE TIME: _____
ARRIVED ON SITE: ~ 0430
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: ~ 0500 LOGGING COMPLETED: ~ 0630
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOBILIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO _____; STORED WITH NEW _____
WINCH COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: Reduced 21037
ISO 300083
drive 33093
Source 21050
Wt 470157

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-2-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
329.5	1081.04	95		← stop here.
330.0	1082.68	94		
330.5	1084.32	93		Zero check ok
331.0	1085.96	92		JM 2-26-07
331.5	1087.60	91		
332.0	1089.24	90		
332.5	1090.88	89		
333.0	1092.52	88		
333.5	1094.16	87		
334.0	1095.80	86		
334.5	1097.44	85		
335.0	1099.08	84		
335.5	1100.72	83		
336.0	1102.36	82		
336.5	1104.00	81		range down
337.0	1105.64	80		gain down
337.5	1107.28	79		
338.0	1108.92	78		← top of interest
338.5	1110.56	77		
339.0	1112.20	76		
339.5	1113.85	75		
340.0	1115.49	74		
340.5	1117.13	73		
341.0	1118.77	72		
341.5	1120.41	71		
342.0	1122.05	70		
342.5	1123.69	69		
343.0	1125.33	68		
343.5	1126.97	67		← logged to here
344.0	1128.61	66		last run.
344.5	1130.25	65		
345.0	1131.89	64		
345.5	1133.53	63		
346.0	1135.17	62		
346.5	1136.81	61		↑
347.0	1138.45	60		grouted, signal weaker
347.5	1140.09	59		
348.0	1141.73	58		
348.5	1143.37	57		
349.0	1145.01	56		
349.5	1146.65	55		
350.0	1148.29	54		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-2-06
CLIENT: PNNL JOB: 6303
AUTHOR: J60 PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
350.5	1149.93	53		
351.0	1151.57	52		
351.5	1153.22	51		
352.0	1154.86	50		
352.5	1156.50	49		
353.0	1158.14	48		
353.5	1159.78	47		
354.0	1161.42	46		↑
354.5	1163.06	45		
355.0	1164.70	44		
355.5	1166.34	43		
356.0	1167.98	42		
356.5	1169.62	41		↑
357.0	1171.26	40		
357.5	1172.90	39		
358.0	1174.54	38		
358.5	1176.18	37		
359.0	1177.82	36		
359.5	1179.46	35		
360.0	1181.10	34		↑
360.5	1182.74	33		
361.0	1184.38	32		
361.5	1186.02	31		
362.0	1187.66	30		nie.
362.5	1189.30	29		
363.0	1190.94	28		nie.
363.5	1192.59	27		
364.0	1194.23	26		
364.5	1195.87	25		
365.0	1197.51	24		
365.5	1199.15	23		
366.0	1200.79	22		
366.5	1202.43	21		
367.0	1204.07	20		
367.5	1205.71	19		← interbed starts
368.0	1207.35	18		
368.5	1208.99	17		
369.0	1210.63	16		
369.5	1212.27	15		
370.0	1213.91	14		
370.5	1215.55	13		
371.0	1217.19	12		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-2-06
CLIENT: PNNL JOB: 6303
AUTHOR: J6D PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
371.5	1218.83	11		
372.0	1220.47	010		
372.5	1222.11	009		
373.0	1223.75	008		
373.5	1225.39	007		
374.0	1227.03	006		
374.5	1228.67	003 005		
375.0	1230.31	002 004		
375.5	1231.96	001 003		← TD here
376.0	1233.60	002		
376.5	1235.24	001		
377.0	1236.88			
377.5	1238.52			
378.0	1240.16			
378.5	1241.80			
379.0	1243.44			
379.5	1245.08			
380.0	1246.72			
380.5	1248.36			
381.0	1250.00			
381.5	1251.64			
382.0	1253.28			
382.5	1254.92			
383.0	1256.56			1245.0
383.5	1258.20			- 12.1
384.0	1259.84			
384.5	1261.48			1232.9
385.0	1263.12			
385.5	1264.76			
386.0	1266.40			
386.5	1268.04			1235
387.0	1269.69			12.1
387.5	1271.33			(1247.1)
388.0	1272.97			
388.5	1274.61			
389.0	1276.25			
389.5	1277.89			
390.0	1279.53			
390.5	1281.17			
391.0	1282.81			
391.5	1284.45			
392.0	1286.09			



P-S SUSPENSION VELOCITY FIELD LOG

SITE: Hanford WTP DATE: 10-9-06
CLIENT: PNNL JOB: 6303
AUTHOR: _____ PAGE 1 OF 5

CONTACT: Marty Gardner OFFICE PHONE: cell 509-372-8029

CONTACT: Alan Rohay OFFICE PHONE: cell 509-531-2295

CONTACT: Tim Brouns OFFICE PHONE: cell 509-531-7478

CONTACT: Doug OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

CONTACT: _____ OFFICE PHONE: _____

DIRECTIONS TO SITE: _____
Richland, WA - drive north on George Washington Blvd all the way, turn right at the T

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____

BOREHOLE DESIGNATION: C4997 LOCATION: _____
WNP#6

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____

BOREHOLE CONSTRUCTION: CASED UNCASED

DIAMETERS AND DEPTH RANGES: _____ 0 TO _____; _____ TO _____

BOREHOLE TOTAL DEPTH AS DRILLED: 1428' Final (432m)

CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING _____; NO

DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____

BOREHOLE FLUID: WATER; FRESH WATER MUD; SALT WATER MUD;

OTHER: _____

DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: _____



SITE: Hanford WTP DATE: 10-9-06
CLIENT: PNNL JOB: 6303
AUTHOR: J Diehl PAGE 1 OF 5
2

LOGGING CREW: Diehl
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: _____ DEPARTURE TIME: _____
ARRIVED ON SITE: 11:30 am
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 12:30 pm LOGGING COMPLETED: _____
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOLIBIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO X ^{checked.}; STORED WITH NEW _____
WINCH _____ COMPROBE ☒ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☒ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☒ 11001 ☐ 23053 ☐ 330094 ☒
START END.

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: receiver failed in hole.
replaced w/ spare.

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: iso 300083 24053 1428
Wt 470151 - 12
drill 33093 1416
source 21050

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-9-06
CLIENT: PNNL JOB: 6303
AUTHOR: J60 PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
371.5	1218.83			
372.0	1220.47	120		← stop!
372.5	1222.11	119		
373.0	1223.75	118		
373.5	1225.39	117		Zero check ok.
374.0	1227.03	116		@ "0.0" actually +.2m ags
374.5	1228.67	115		
375.0	1230.31	114		
375.5	1231.96	113		
376.0	1233.60	112		
376.5	1235.24	111		← last log started here
377.0	1236.88	110		
377.5	1238.52	109		
378.0	1240.16	108		
378.5	1241.80	107		new diskette
379.0	1243.44	106		
379.5	1245.08	105		
380.0	1246.72	104		
380.5	1248.36	103		
381.0	1250.00	102		
381.5	1251.64	101		
382.0	1253.28	100		
382.5	1254.92	99		
383.0	1256.56	98		
383.5	1258.20	97		
384.0	1259.84	96		
384.5	1261.48	95		
385.0	1263.12	94		
385.5	1264.76	93		
386.0	1266.40	92		
386.5	1268.04	91		
387.0	1269.69	90		
387.5	1271.33	89		
388.0	1272.97	88		
388.5	1274.61	87		
389.0	1276.25	86		
389.5	1277.89	85		
390.0	1279.53	84		
390.5	1281.17	83		
391.0	1282.81	82		
391.5	1284.45	81		
392.0	1286.09	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-9-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
392.5	1287.73	79		
393.0	1289.37	78		
393.5	1291.01	77		
394.0	1292.65	76		
394.5	1294.29	75		
395.0	1295.93	74		
395.5	1297.57	73		
396.0	1299.21	72		
396.5	1300.85	71		
397.0	1302.49	70		
397.5	1304.13	69		
398.0	1305.77	68		
398.5	1307.41	67		
399.0	1309.06	66		
399.5	1310.70	65		
400.0	1312.34	64		
400.5	1313.98	63		
401.0	1315.62	62		
401.5	1317.26	61		
402.0	1318.90	60		
402.5	1320.54	59		
403.0	1322.18	58		
403.5	1323.82	57		
404.0	1325.46	56		
404.5	1327.10	55		
405.0	1328.74	54		
405.5	1330.38	53		
406.0	1332.02	52		
406.5	1333.66	51		
407.0	1335.30	50		
407.5	1336.94	49		
408.0	1338.58	48		
408.5	1340.22	47		
409.0	1341.86	46		
409.5	1343.50	45		
410.0	1345.14	44		
410.5	1346.78	43		
411.0	1348.43	42		
411.5	1350.07	41		
412.0	1351.71	40		
412.5	1353.35	39		
413.0	1354.99	38		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: Hanford WTP DATE: 10-9-06
CLIENT: PNNL JOB: 6303
AUTHOR: JGD PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
413.5	1356.63	37		
414.0	1358.27	36		
414.5	1359.91	35		
415.0	1361.55	34		
415.5	1363.19	33		
416.0	1364.83	32		
416.5	1366.47	31		
417.0	1368.11	30		
417.5	1369.75	29		
418.0	1371.39	28		
418.5	1373.03	27		
419.0	1374.67	26		
419.5	1376.31	25		
420.0	1377.95	24		
420.5	1379.59	23		
421.0	1381.23	22		
421.5	1382.87	21		
422.0	1384.51	20		
422.5	1386.15	19		
423.0	1387.80	18		
423.5	1389.44	17		
424.0	1391.08	16		
424.5	1392.72	15		
425.0	1394.36	14		
425.5	1396.00	13		
426.0	1397.64	12		
426.5	1399.28	11		
427.0	1400.92	10		
427.5	1402.56	9		
428.0	1404.20	8		
428.5	1405.84	7		
429.0	1407.48	006		
429.5	1409.12	005		
430.0	1410.76	004		
430.5	1412.40	003		
431.0	1414.04	002		
431.5	1415.68	001		
432.0	1417.32			
432.5	1418.96			
433.0	1420.60			
433.5	1422.24			
434.0	1423.88			

JGD 4-06
10

← far near sensor pack died
(H + V)
replace receiver + iso.

← TD?

APPENDIX D

BORING GEOPHYSICAL LOGGING

FIELD MEASUREMENT PROCEDURES

PROCEDURE FOR OYO P-S SUSPENSION SEISMIC VELOCITY LOGGING

Background

This procedure describes a method for measuring shear and compressional wave velocities in soil and rock. The OYO P-S Suspension Method is applied by generating shear and compressional waves in a borehole using the OYO P-S Suspension Logger borehole tool and measuring the travel time between two receiver geophones or hydrophones located in the same tool.

Objective

The outcome of this procedure is a plot and table of P and S_H wave velocity versus depth for each borehole. Standard analysis is performed on receiver to receiver data. Data is presented in report format, with ASCII data files and digital records transmitted on diskette.

Instrumentation

1. OYO Model 170 Digital Logging Recorder or equivalent
2. OYO P-S Suspension Logger probe or equivalent, including two sets horizontal and vertical geophones, seismic source, and power supply for the source and receivers
3. Winch and winch controller, with logging cable
4. Batteries to operate P-S Logger and winch

The Suspension P-S Logger system, manufactured by OYO Corporation, or the Robertson Digital P-S Suspension Probe with the Robertson Micrologger2 are currently the only commercially available suspension logging systems. As shown in Figure 1, these systems consists of a borehole probe suspended by a cable and a recording/control electronics package on the surface.

The suspension system probe consists of a combined reversible polarity solenoid horizontal shear-wave generator (S_H) and compressional-wave generator (P), joined to

two biaxial geophones by a flexible isolation cylinder. The separation of the two geophones is one meter, allowing average wave velocity in the region between the geophones to be determined by inversion of the wave travel time between the two geophones. The total length of the probe is approximately 7 meters; the center point of the geophones is approximately 5 meters above the bottom end of the probe.

The probe receives control signals from, and sends the amplified geophone signals to, the instrumentation package on the surface via an armored 4 or 7 conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured by a rotary encoder to provide probe depth data.

The entire probe is suspended by the cable and may be centered in the borehole by nylon "whiskers." Therefore, source motion is not coupled directly to the borehole walls; rather, the source motion creates a horizontally propagating pressure wave in the fluid filling the borehole and surrounding the source. This pressure wave produces a horizontal displacement of the soil forming the wall of the borehole. This displacement propagates up and down the borehole wall, in turn causing a pressure wave to be generated in the fluid surrounding the geophones as the soil displacement wave passes their location.

Environmental Conditions

The OYO P-S Suspension Logging Method can be used in either cased or uncased boreholes. For best results, the uncased borehole must be between 10 and 20 cm in diameter, or 4 to 8 inches. A cased borehole may be as small as 3 inches, if properly grouted (see below) and the grout annulus does not exceed 1 inch.

Uncased boreholes are preferred because the effects of the casing and grouting are removed. It is recommended that the borehole be drilled using the rotary mud method. This method does little damage to the borehole wall, and the drilling fluid coats and seals the borehole wall reducing fluid loss and wall collapse. The borehole fluid is required for the logging, and must be well circulated prior to logging.

If the borehole must be cased, the casing must be PVC and properly installed and grouted. Any voids in the grout will cause problems with the data. Likewise, large grout bulbs used to fill cavities will also cause problems. The grout must be set before testing. This means the grouting must take place at least 48 hours before testing.

For borehole casing, applicable preparation procedures are presented in ASTM Standard D4428/D4428M-91 Section 4.1 (see ASTM website for copy).

Calibration

Calibration of the digital recorder is required. Calibration is limited to the timing accuracy of the recorder. GEOVision's Seismograph Calibration Procedure or equivalent should be used. Calibration must be performed on an annual basis.

Measurement Procedure

The entire probe is lowered into the borehole to a specific measurement depth by the winch. A measurement sequence is then initiated by the operator from the instrumentation package control panel. No further operator intervention is then needed to complete the measurement sequence described below.

The system electronics activates the SH-wave source in one direction and records the output of the two horizontally oriented geophone axes which are situated parallel to the axis of motion of the source. The source is then activated in the opposite direction, and the horizontal output signals are again recorded, producing a SH-wave record of polarity opposite to the previous record. The source is finally actuated in the first direction again, and the responses of the vertical geophone axes to the resultant P-wave are recorded during this sampling.

The data from each geophone during each source activation is recorded as a different channel on the recording system. The seismograph has at least six channels (two simultaneous recording channels), each with at least a 12 bit 1024 sample record. Newer seismographs may have longer record lengths. The recorded data is displayed on a CRT or LCD display and possibly on paper tape output as six channels with a common time scale. Data is stored on digital media for further processing. Up to 8 sampling sequences can be stacked (averaged) to improve the signal to noise ratio of the signals.

Review of the data on the display or paper tape allows the operator to set the gains, filters, delay time, pulse length (energy), sample rate, and stacking number in order to optimize the quality of the data before recording. In the case of the Model 170, printed data is verified by the operator prior to moving the probe. In the case of the Robertson Micrologger2, storage on the hard disk should be verified from time-to-time, certainly before exiting the borehole.

Typical depth spacing for measurements is 1.0 meters, or 3.3 feet. Alternative spacing is 0.5 meter, or 1.6 feet.

Required Field Records

- 1) Field log for each borehole showing
 - a) Borehole identification
 - b) Date of test
 - c) Tester or data recorder

- d) Description of measurement
 - e) Any deviations from test plan and action taken as a result
 - f) QA Review
- 2) Paper output records are no longer required, since the Micrologger2 cannot generate them. However, data must be stored in at least 2 places prior to leaving the site
 - 3) List of record ID numbers (for data on digital media) and corresponding depth
 - 4) Diskettes, CDROM, or USB flash drives with backup copies of data on hard disk, labeled with borehole designation, record ID numbers, date, and tester name.

An example Field Log is attached to this procedure.

Analysis

Following completion of field work, the recorded digital records are processed by computer using the OYO Corporation software program PSLOG and interactively analyzed by an experienced geophysicist to produce plots and tables of P and S_H wave velocity versus depth.

The digital time series records from each depth are transferred to a personal computer for analysis. Figure 2 shows a sample of the data from a single depth. These digital records are analyzed to locate the first minima on the vertical axis records, indicating the arrival of P-wave energy. The difference in travel time between these arrivals is used to calculate the P-wave velocity for that 1-meter interval. When observable, P-wave arrivals on the horizontal axis records are used to verify the velocities determined from the vertical axis data. In addition, the soil velocity calculated from the travel time from source to first receiver is compared to the velocity derived from the travel time between receivers.

The digital records are studied to establish the presence of clear SH-wave pulses, as indicated by the presence of opposite polarity pulses on each pair of horizontal records. Ideally, the SH-wave signals from the 'normal' and 'reverse' source pulses are very nearly inverted images of each other. Digital FFT – IFFT lowpass filtering are used to remove the higher frequency P-wave signal from the SH-wave signal.

The first maxima are picked for the 'normal' signals and the first minima are picked for the 'reverse' signals. The absolute arrival time of the 'normal' and 'reverse' signals may vary by +/- 0.2 milliseconds, due to differences in actuation time of the solenoid source caused by constant mechanical bias in the source or by borehole inclination. This variation does not affect the velocity determinations, as the differential time is measured between arrivals of waves created by the same source actuation. The final velocity

value is the average of the values obtained from the 'normal' and 'reverse' source actuations.

In Figure 2, the time difference over the 1-meter interval of 1.70 millisecond is equivalent to a SH-wave velocity of 588 m/sec. Whenever possible, time differences are determined from several phase points on the S_H -wave pulse trains to verify the data obtained from the first arrival of the S_H -wave pulse. In addition, the soil velocity calculated from the travel time from source to first receiver is compared to the velocity derived from the travel time between receivers.

Figure 3 is a sample composite plot of the far normal horizontal geophone records for a range of depths. This plot shows the waveforms at each depth, clearly showing the S-wave arrivals. This display format is used during analysis to observe trends in velocity with changing depth.

Once the proper picks are entered in PSLOG, the picks are transferred to an Excel spreadsheet where V_s and V_p are calculated. The spreadsheet allows output for presentation in charts and tables.

Standard analysis is performed on receiver 1 to receiver 2 data, with separate analysis performed on source to receiver data as a quality assurance procedure.

Registered Geophysicist Anthony M. [Signature] Date 4/10/06

QA Review [Signature] Date 4/10/06

References:

1. "In Situ P and S Wave Velocity Measurement", Ohya, S. 1986. Proceedings of In-Situ '86, *Use of In-Situ Tests In Geotechnical Engineering*, an ASCE Specialty Conference sponsored by the Geotechnical Engineering Division of ASCE and co-sponsored by the Civil Engineering Dept of Virginia Tech.
2. Guidelines for Determining Design Basis Ground Motions, Report TR-102293, Electric Power Research Institute, Palo Alto, California, November 1993, Sections 7 and 8.
3. "Standard test Methods for Crosshole Seismic Testing", ASTM Standard D4428/D4428M-91, July 1991, Philadelphia, PA

OYO SUSPENSION P-S VELOCITY LOGGING SETUP

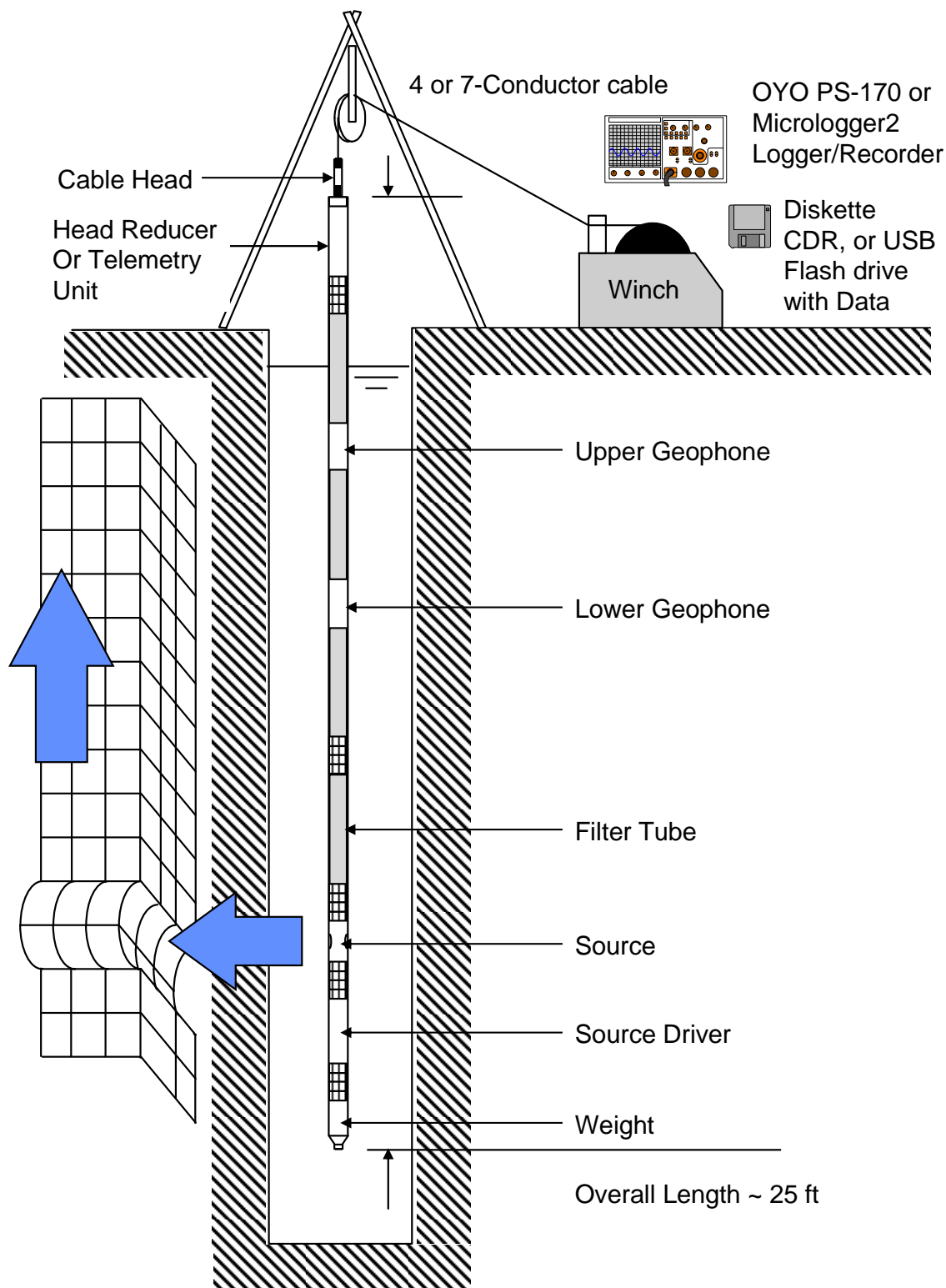


Figure 1. Suspension PS logging method setup

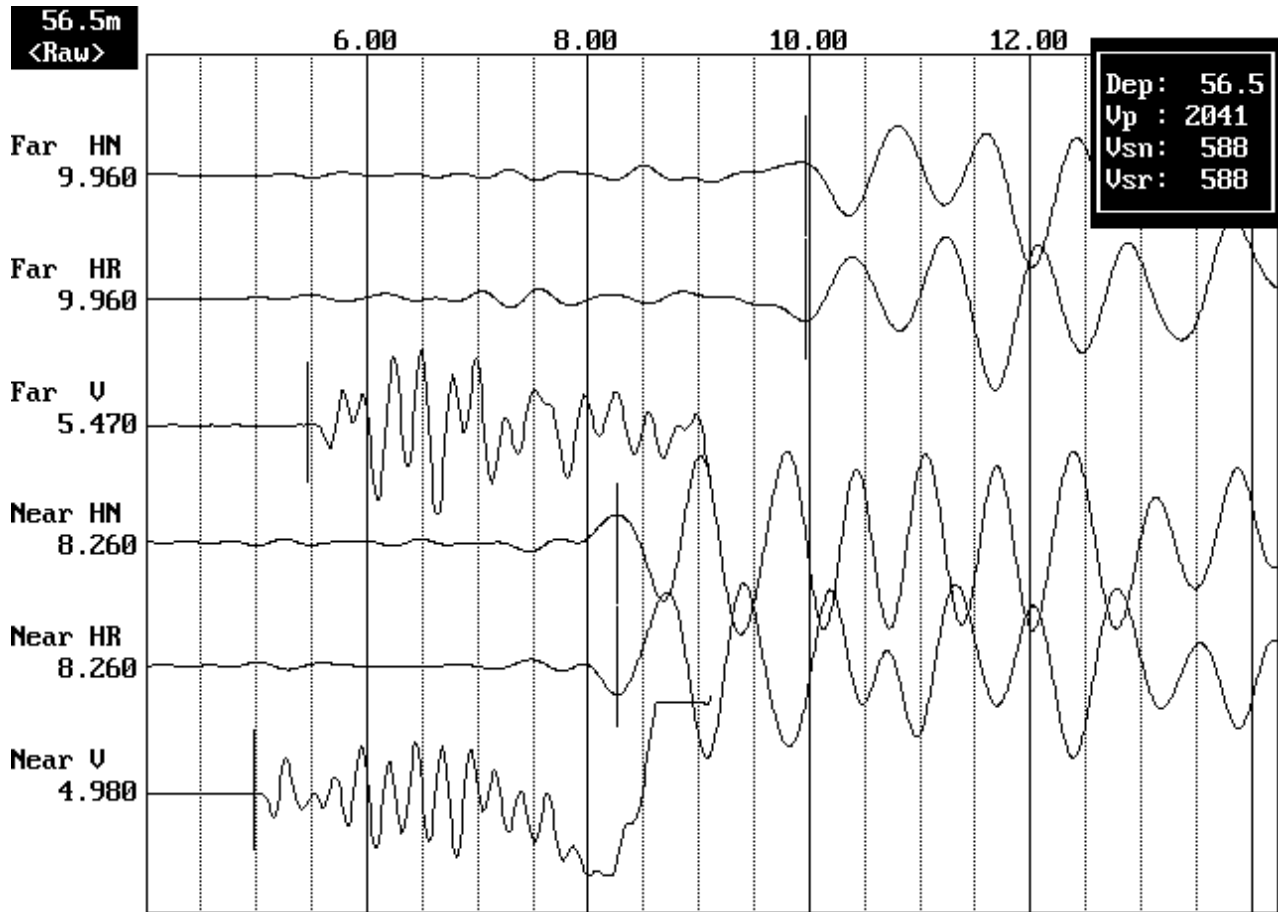


Figure 2. Sample suspension method waveform data showing horizontal normal and reversed (HR and HN), and vertical (V) waveforms received at the near (bottom 3 channels) and far (top 3 channels) geophones. The arrivals in milliseconds for each pick are shown on the left. The box in the upper right corner shows the depth in the borehole and the velocities calculated based on the picks.

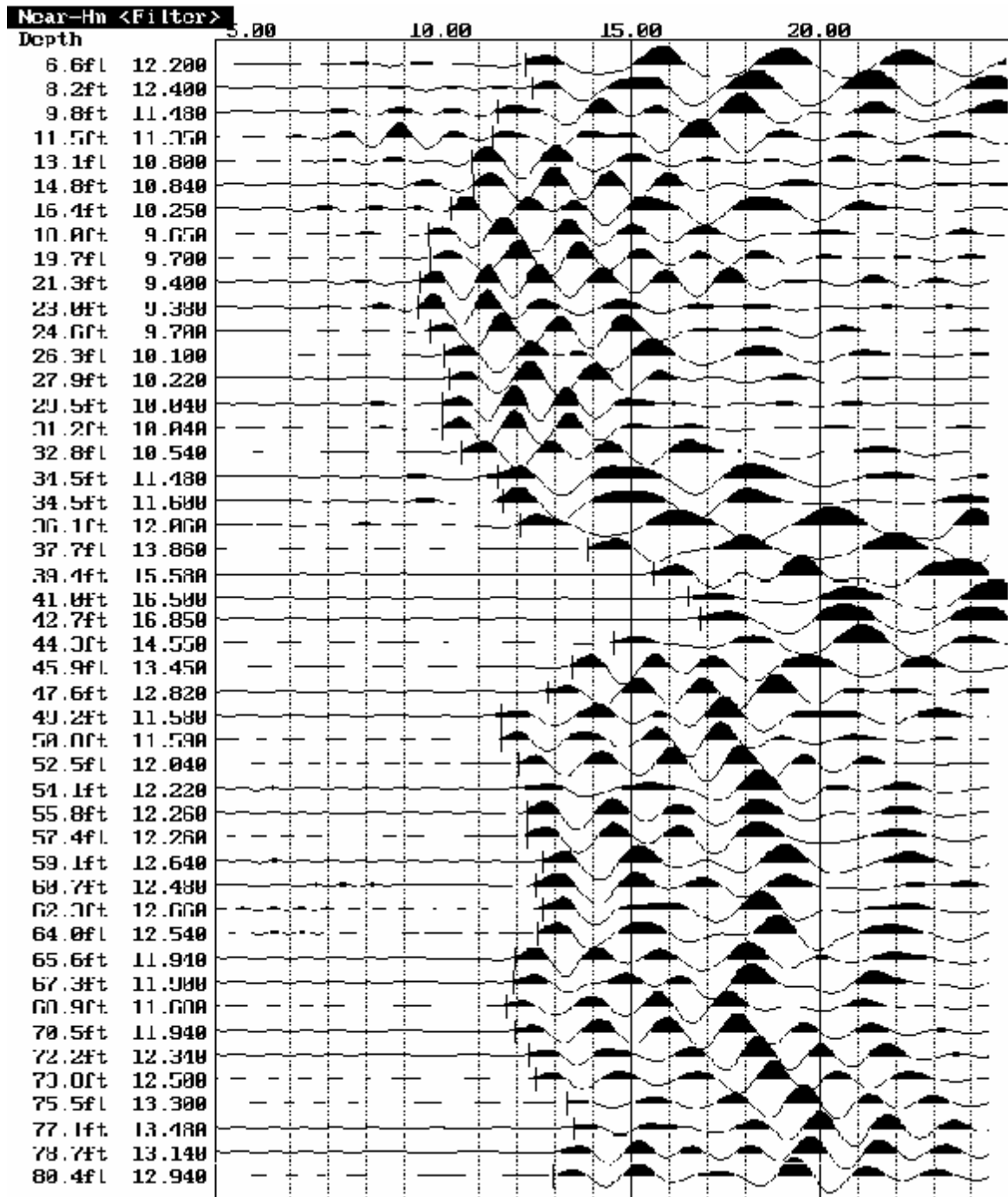


Figure 3. Sample composite waveform plot for normal shear waves received at the near geophone in a single borehole



P-S SUSPENSION VELOCITY FIELD LOG

SITE: _____ DATE: _____
CLIENT: _____ JOB: _____
AUTHOR: _____ PAGE 1 OF _____

CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

DIRECTIONS TO SITE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____
BOREHOLE DESIGNATION: _____ LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED _____ UNCASD _____
DIAMETERS AND DEPTH RANGES: _____ 0 TO _____ ; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED: _____
CONDUCTOR CASING?: YES _____ DEPTH TO BOTTOM OF CASING _____; NO _____
DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____
BOREHOLE FLUID: WATER _____; FRESH WATER MUD _____; SALT WATER MUD _____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: _____



SITE: _____ DATE: _____
CLIENT: _____ JOB: _____
AUTHOR: _____ PAGE 2 OF _____

LOGGING CREW: _____
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM: _____ DEPARTURE TIME: _____
ARRIVED ON SITE: _____
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: _____ LOGGING COMPLETED: _____
DEMOBILIZED TO: _____ ARRIVAL TIME: _____
ADDITIONAL DEMOB TIME: _____ REASON: _____

BATTERIES CHANGED BEFORE LOGGING: YES _____; NO _____; STORED WITH NEW _____
WINCH COMPROBE ☐ GREY ☐ OYO ☐ RG ☐ OTH ☐
INSTRUMENT OYO 12004 ☐ 15014 ☐ 19029 ☐ RG 160023 ☐ 160024 ☐
RECEIVER S/N 12008 ☐ 20042 ☐ 26066 ☐ 11001 ☐ 23053 ☐

MAINTENANCE PERFORMED ON SITE: _____

EQUIPMENT PROBLEMS OR FAILURES: _____

SUGGESTIONS, ADDITIONS, CHANGES: _____

COMMENTS: _____

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: _____ DATE: _____
 CLIENT: _____ JOB: _____
 AUTHOR: _____ PAGE _____ OF _____

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
90.5	296.92			
91.0	298.56			
91.5	300.20			
92.0	301.84			
92.5	303.48			
93.0	305.12			
93.5	306.76			
94.0	308.40			
94.5	310.04			
95.0	311.68			
95.5	313.32			
96.0	314.96			
96.5	316.60			
97.0	318.24			
97.5	319.88			
98.0	321.52			
98.5	323.16			
99.0	324.80			
99.5	326.44			
100.0	328.08			
100.5	329.72			
101.0	331.36			
101.5	333.01			
102.0	334.65			
102.5	336.29			
103.0	337.93			
103.5	339.57			
104.0	341.21			
104.5	342.85			
105.0	344.49			
105.5	346.13			
106.0	347.77			
106.5	349.41			
107.0	351.05			
107.5	352.69			
108.0	354.33			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: _____ DATE: _____
CLIENT: _____ JOB: _____
AUTHOR: _____ PAGE _____ OF _____

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
108.5	355.97			
109.0	357.61			
109.5	359.25			
110.0	360.89			
110.5	362.53			
111.0	364.17			
111.5	365.81			
112.0	367.45			
112.5	369.09			
113.0	370.73			
113.5	372.38			
114.0	374.02			
114.5	375.66			
115.0	377.30			
115.5	378.94			
116.0	380.58			
116.5	382.22			
117.0	383.86			
117.5	385.50			
118.0	387.14			
118.5	388.78			
119.0	390.42			
119.5	392.06			
120.0	393.70			
120.5	395.34			
121.0	396.98			
121.5	398.62			
122.0	400.26			
122.5	401.90			
123.0	403.54			
123.5	405.18			
124.0	406.82			
124.5	408.46			
125.0	410.10			
125.5	411.75			
126.0	413.39			