Geotechnical Subsurface Investigation
Final Data Report
FSAR Appendix 2.5-A
Binder 2

Calvert Cliffs
Nuclear Power Plant
Unit 3

Constellation Generation Group
UniStar Nuclear Operating Services

GEOTECHNICAL SUBSURFACE INVESTIGATION DATA REPORT (REVISION NO. 1)

CGG Combined Operating License Application (COLA) Project
Calvert Cliffs Nuclear Power Plant (CCNPP)
Calvert County, Maryland

April 13, 2007

Prepared By:

SCHNABEL ENGINEERING NORTH, LLC
Gaithersburg, Maryland
(Schnabel Project No. 06120048)

Submitted To:

BECHTEL POWER CORPORATION
Frederick, Maryland
(Bechtel Subcontract No. 25237-103-HC4-CY00-00001)

Binder No. 2 of 3

Including:

Appendix F: Cone Penetration Testing (CPT)
Appendix G: Borehole Geophysics
Appendix H: SPT Hammer Energy Study

Schnabel
Schnabel Engineering North, LLC

Appendix F Core Penetration Test

APPENDIX F
CONE PENETRATION TESTING (CPT)

- CPT Report

CPT REPORT

Presentation of In Situ Testing Program Results
ConeTec, Inc.
August 31, 2006

PRESENTATION OF IN SITU TESTING PROGRAM RESULTS

Revision 1

Calvert Cliffs Nuclear Power Plant
Calvert County, Maryland

July 11 through 31, 2006

Prepared for:

Schnabel Engineering
Gaithersburg, MD

Prepared by:

CONETEC

ConeTec Inc.
Charles City, Virginia

November 13, 2006

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

This report presents the results of a peizo cone penetrometer testing (CPTU) program carried out at the site of the proposed nuclear power plant structure adjacent to the existing Calvert Cliffs Nuclear Power Plant. The work was performed under subcontract to Schnabel Engineering, Inc. of Gaithersburg, Maryland. The CPTU program took place during the period of July 11th through 31st, 2006.

A total of sixty-three CPTU and SCPTU soundings were completed at selected locations. The majority of the CPT soundings encountered refusal conditions before the target termination depth was achieved. In several locations, the CPT was continued below the refusal depths after pre-drilling operations were conducted. The CPT testing was performed to evaluate in situ geotechnical as well as seismic criteria. CPT sounding locations were selected and numbered under the direction and supervision of Mr. Bill Bradfield of Schnabel Engineering.

2.0 FIELD EQUIPMENT AND PROCEDURES

2.1 CONE PENETRATION TESTING

The cone penetrometer tests were carried out using an integrated electronic seismic piezo cone. The piezo cone used was a compression model cone penetrometer with a 15 cm^2 tip and a 225 cm^2 friction sleeve. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.85. The piezo cone dimensions and the operating procedure were in accordance with ASTM Standard D-5778-95. A diagram of the cone penetrometer used for this project is shown as Figure 1.

Pore pressure filter elements, made of porous plastic, were saturated under a vacuum using silicone oil as the saturating fluid. The pore pressure element was six millimeters thick and was located immediately behind the tip (the U_2 location) for all soundings.

The cone was advanced using a unitized, track-mounted, purpose-built 15 ton CPT rig. The following data were recorded every five centimeters (approximately every 2 inches) as the cone was advanced into the ground:

- Tip Resistance (qc)
- Sleeve Friction (fs)
- Dynamic Pore Pressure (U)

The field data recorded is included on the attached CD.

Before each sounding a complete set of analog baseline readings are taken with an integrated multi-meter and compared with the digitized value on the computer screen. This provides a check on the analog to digital conversion board.

Evaluation of the analog baselines is key to consistent readings. The baseline data should be stable and should not wander excessively during the course of a sounding. Baseline data can be used to apply corrections to the cone data where necessary. For this project, the baseline shift from sounding to sounding was small, typically less than 0.1% of full scale, and no data corrections were applied.

During seismic testing, the seismic signals were recorded using a geophone mounted in the cone as shown in Figure 1 and an up-hole integrated digital oscilloscope. A sledge hammer hit against a beam was used for the seismic source. Normal reaction for the beam was provided by the dead weight of the rig placed upon the beam. A schematic of the shear wave testing configuration is shown in Figure 2.

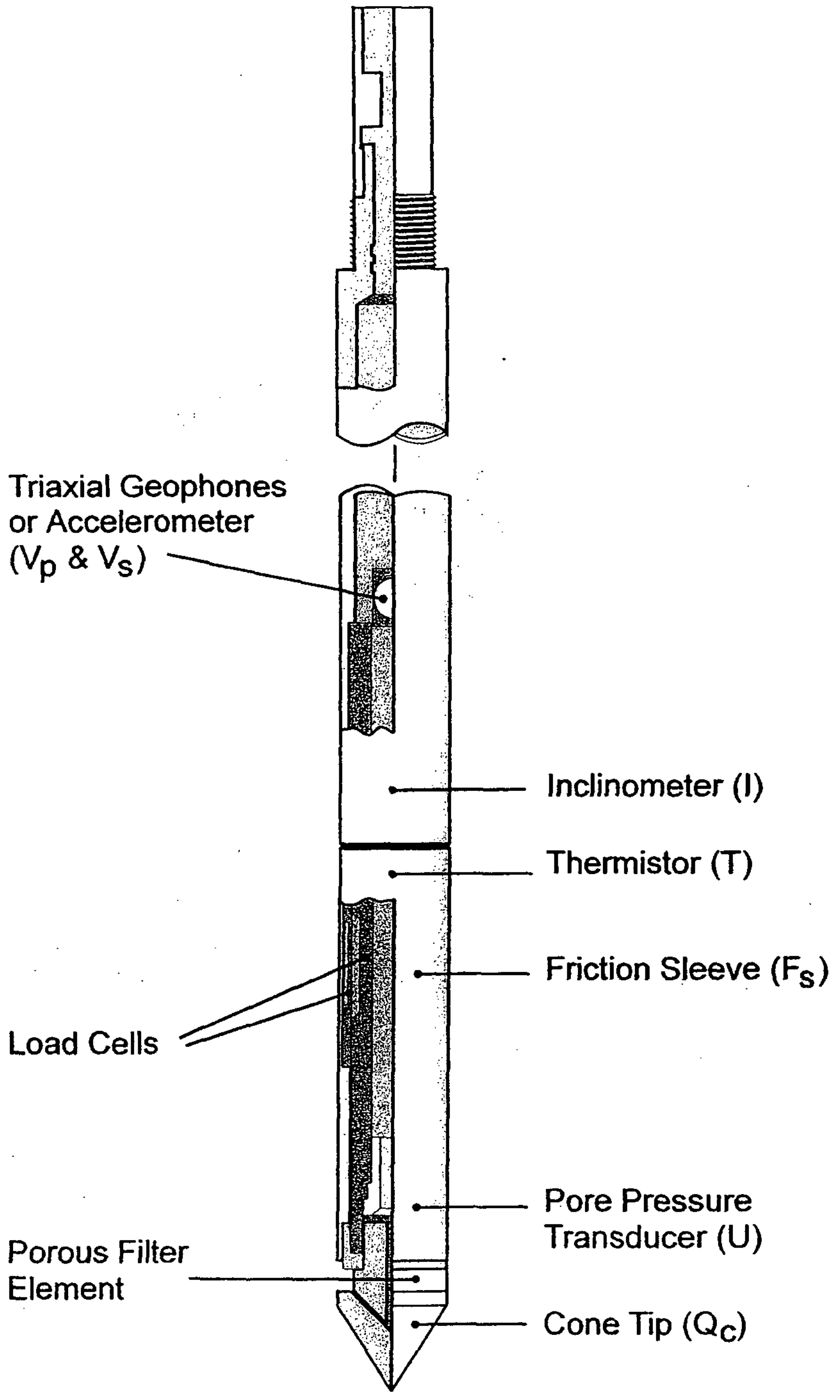


FIGURE 1 - TYPICAL CONE PENETROMETER

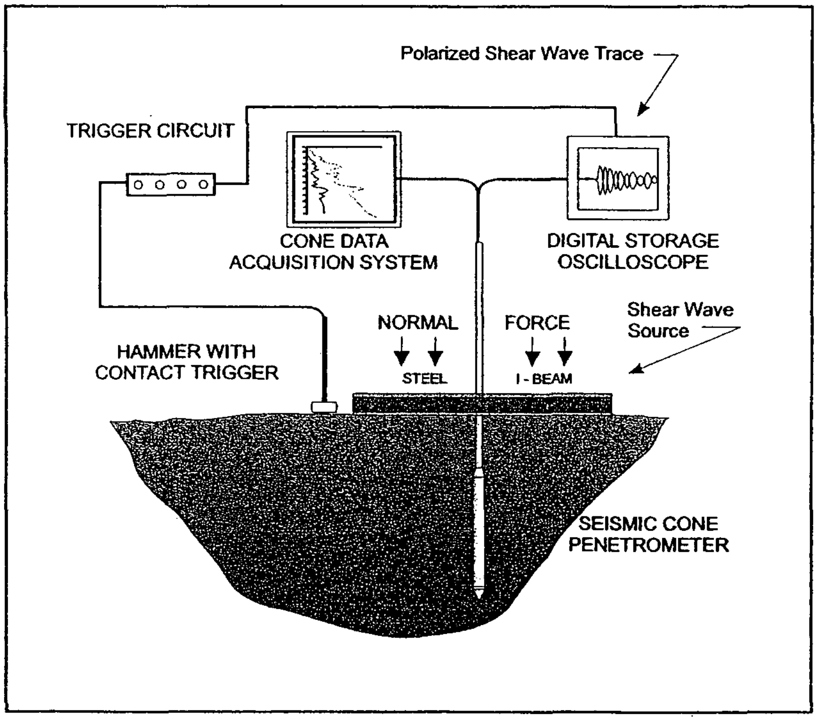


FIGURE 2 - SCHEMATIC OF SHEAR WAVE TESTING CONFIGURATION

2.2 PORE PRESSURE DISSIPATION TESTS

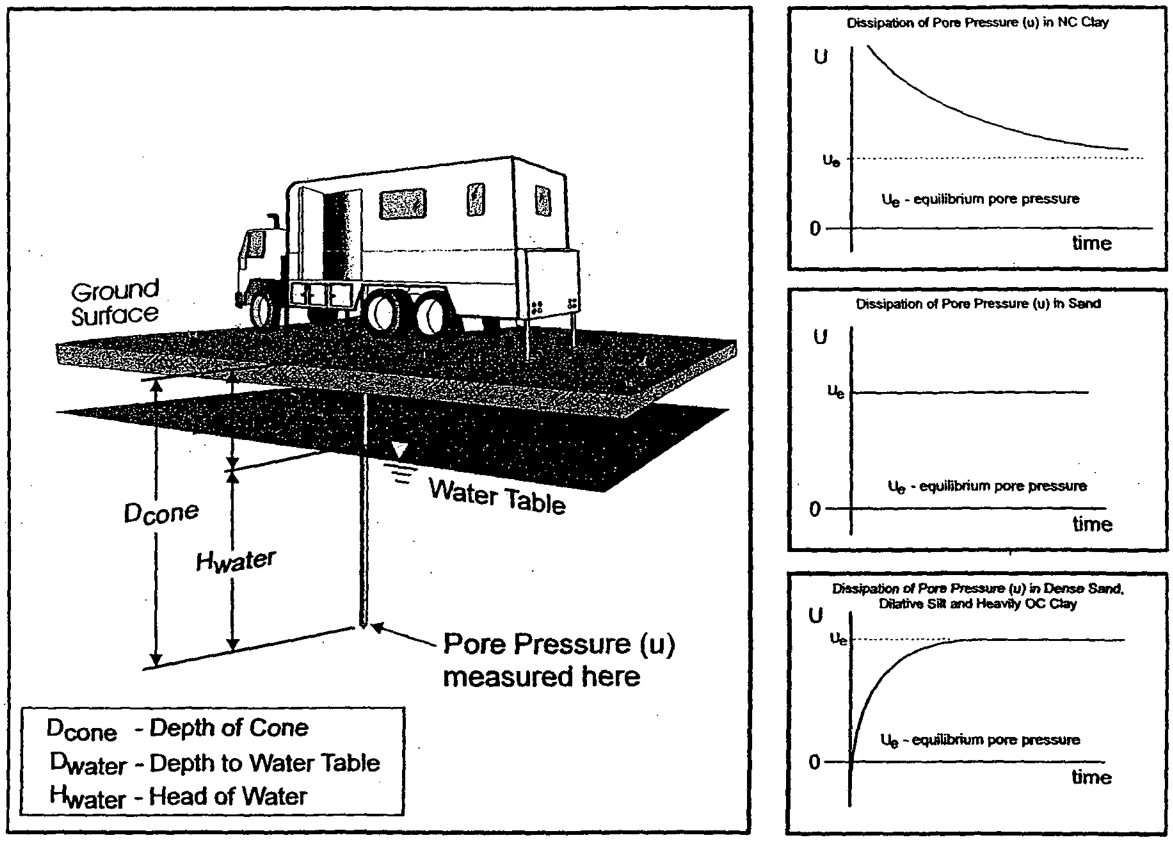
When cone penetration is stopped, the piezo cone essentially becomes a piezometer. While stopped, pore water pressures are automatically recorded at five-second intervals and the readings are stored in a dissipation file. Dissipation data can then be plotted onto a dissipation curve consisting of pore water pressure (U) verses time (t). The shapes of dissipation curves are very useful in evaluating soil type, drainage and in situ static water level.

A flat curve that stabilizes quickly (i.e. less than 30 seconds) is typical of a free draining sand. In this case, the final measured pore water pressure is the static in situ water pressure.

Soils that generate excess dynamic pore water pressure during penetration will dissipate this excess pressure when penetration stops. The shape of the dissipation curve and the time of dissipation can be used to estimate c_h, the coefficient of consolidation that can in turn be used to calculate K_h, the horizontal permeability.

Figure 3 shows some idealized shapes of various pore water pressure dissipation curves. The reader is referred Robertson et. al., 1992 to reference dissipation test data analytical techniques.

Estimation of Ground Water Table from CPT Dissipation Tests



Water Table Calculation

$$D_{water} = D_{cone} - H_{water}$$

where $H_{water} = U_e$ (depth units)

Useful Conversion Factors: 1psi = 0.704m = 2.31 feet (water)
1tsf = 0.958 bar = 13.9 psi
1m = 3.28 feet

FIGURE 3 - TYPICAL DISSIPATION TESTS

3.0 CONE PENETRATION TEST DATA AND INTERPRETATION

3.1 ANALYSIS OF PIEZOCONE DATA - GENERAL

A total of sixty three CPT soundings, involving approximately 2555 feet of CPTU testing and 996 feet of SCPTU soundings were completed.

The interpretation of cone data is based on the relationship between cone bearing, qc, sleeve friction, fs, and penetration pore water pressure, U. The friction ratio, Rf , (sleeve friction divided by cone bearing) is a calculated parameter which is used to infer soil behavior type. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

The interpretation of soils encountered on this project was carried out using established correlations presented in Appendix D. It should be noted that it is not always possible to clearly identify a soil type based on qc, fs and U. Occasionally soils will fall within different soil categories on the classification charts. In these situations, experience and judgment and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type. Computer tabulations of the interpreted soil types along with certain other geotechnical parameters for each cone hole is presented in Appendix B.

Each of the parameters measured in the sounding is discussed briefly below. A detailed explanation of CPTU testing and interpretation of the results can be found in Robertson et. al. 1992.

TIP RESISTANCE (q_c): The resistance to penetration, measured at the cone tip, provides an accurate profile of subsurface strata. The recorded tip resistance is a composite of the penetration resistance of the soils located five to ten cone diameters (7 to 14 inches) in front of and behind the tip. The actual resistance "sensed" by the tip depends on the soil properties and on the relative stiffness of the layers encountered. Tip resistance is often corrected for pore pressure effects when testing in soft saturated cohesive soils.

For this project the correction was made and the tip resistance shown, q_t *is the corrected* tip resistance.

The correction used is: $q_t = q_c + (1\text{-}a)U$

Where:
- q_t = corrected tip resistance
- q_c = measured tip resistance
- a = net area ratio for cone (0.85 for this project)
- U = dynamic pore water pressure measured behind tip

SLEEVE FRICTION (f_s) The resistance recorded on the friction sleeve, is a measure of the remolded strength of the soil. Values of sleeve friction in very soft soils (such as peat) may fluctuate due to the measured force being small relative to the capacity of the measuring load cell.

FRICTION RATIO (R_f) The ratio of sleeve friction to tip resistance expressed as a percentage, is an indicator of soil type. Cohesive soils generally have friction ratios that are greater than two, while sands and non-plastic silts have friction ratios that are lower than two.

PORE PRESSURE (U) Dynamic pore water pressure is measured during penetration. Dynamic pore water pressure data can be found in the .cor and .xls files. Static pore water pressure is measured when cone penetration is stopped. The measured dynamic pore water pressure changes with the location of the porous filter and negative readings are possible when the filter is located behind the tip.

It is important to note that the CPT classifies soil by physical behavior, not by grain size; therefore, the CPT classification should be verified against samples obtained from a conventional drilling program. While the CPT soil classification may not always be accurate in terms of the actual label it applies to a particular soil, it is very accurate in grouping soils with similar mechanical properties.

Table 1 presents a summary of the CPT sounding, including sounding depth.

3.2 CONE PLOTS

The data from the sounding was plotted using the computer program ScreenZ4. The CPT plot is included in Appendix A. ScreenZ4 was developed by ConeTec Inc. and it incorporates soil behavior type (SBT) classification as part of the plot. The soil classification is based on the classification chart reproduced chart in Appendix D.

3.3 PORE PRESSURE DISSIPATION TEST RESULTS

When conducting CPT investigations, pore water pressure dissipations are automatically recorded during pauses in penetration. The pore water pressure data is recorded at five second intervals. Pore pressure dissipation test plots are included in Appendix C. Usually, the water table depths used in the data interpretation are derived from the pore water pressure dissipation tests in freely draining layers below the water table. Because the predominant soil profile on this site consisted of silts and clays below the water table (within the exploration depths), it was not practical to record dissipation data until hydrostatic pressure was achieved on every sounding location. This was realized very early in testing program. This was then discussed with Schnabel representatives and it

CONETEC

Table 1: Sounding Information Table

Sounding ID	Filename	Depth (ft)	Date	Dissipation (minutes)	Estimated Water Table (ft)	Comments
C-301	948cp51	52.33	24-Jul		48	seismic
C-302	948cp05	61.68	12-Jul	121	53	
C-302-2	948cp57	55.28	26-Jul		53	
C-302-2a	948cp58	137.96	26-Jul	4	53	85 ft predrill
C-303	948cp04	25.43	12-Jul		25	
C-303a	948cp54	47.08	25-Jul		15	45 ft predrill
C-303a-1	948cp55	71.36	25-Jul		15	50 ft predrill
C-303b	948cp56	123.36	25-Jul	18	15	80 ft predrill
C-304	948cp03	26.74	12-Jul	18	25	seismic
C-305	948cp06	74.31	12-Jul		28	
C-306	948cp08	56.92	12-Jul	45	53	
C-306a	948cp59	102.53	27-Jul		53	80 ft predrill
C-307	948cp07	75.29	12-Jul		30	seismic
C-308	948cp25	48.23	17-Jul		27	seismic
C-309	948cp24	70.05	17-Jul	26	27	
C-311	948cp02	34.94	11-Jul		30	
C-312	948cp01	56.43	11-Jul		35	
C-313	948cp23	37.24	17-Jul		35	
C-314	948cp22	39.53	17-Jul		35	
C-401	948cp11	28.05	13-Jul		30	seismic
C-401-2a	948cp60	81.86	27-Jul		30	55 ft predrill, seismic
C-401-2b	948cp61	131.23	27-Jul	26	30	85 ft predrill, seismic
C-402	948cp10	34.45	13-Jul	61	30	
C-403	948cp52	43.80	24-Jul		35	
C-404	948cp20	80.05	14-Jul	14	72	seismic
C-405	948cp43	40.03	20-Jul		25	
C-406	914cp15	15.58	13-Jul	33	16	
C-407	948cp12	32.32	13-Jul	87	22	seismic
C-407-2a	948cp62	96.29	28-Jul	10	22	50 ft predrill, seismic
C-407-b	948cp63	142.39	31-Jul	5	22	95 ft predrill, seismic
C-408	948cp21	77.43	17-Jul		27	seismic
C-408a	948cp53	98.26	24-Jul		77	98 ft predrill, no casing
C-408-2a	948cp64	123.69	31-Jul		77	105 ft predrill, seismic
C-409	948cp49	80.54	21-Jul	50	34	
C-411	948cp50	80.38	24-Jul	76	34	
C-412	948cp44	76.77	20-Jul		18	
C-413	948cp28	13.62	18-Jul		see footnote	
C-414	948cp29	62.50	18-Jul	55	17	
C-415	948cp14	20.01	13-Jul		see footnote	
C-701	948cp46	29.53	21-Jul	1	see footnote	
C-701a	948cp48	28.05	21-Jul		see footnote	offset 15 ft
C-702	948cp45	20.34	21-Jul		see footnote	
C-703	948cp19	32.64	14-Jul	23	see footnote	
C-704	948cp17	48.23	14-Jul		22	
C-705	948cp18	33.96	14-Jul		see footnote	
C-706	948cp09	50.03	13-Jul		50	
C-707	948cp16	19.52	14-Jul		see footnote	
C-708	948cp42	50.03	20-Jul		22	
C-709	948cp38	50.03	19-Jul		36	
C-710	948cp31	21.16	18-Jul		see footnote	
C-711	948cp40	34.94	20-Jul		24	
C-712	948cp35	29.69	19-Jul	10	see footnote	
C-713	948cp13	41.83	13-Jul		see footnote	
C-714	948cp37	85.14	19-Jul	19	14	
C-715	948cp32	57.25	18-Jul		40	
C-716	948cp41	20.51	20-Jul		see footnote	
C-717	948cp33	66.60	19-Jul	50	18	
C-718	948cp36	34.12	19-Jul		see footnote	
C-719	948cp34	11.97	19-Jul		see footnote	
C-720	948cp39	70.70	20-Jul	60	21	
C-721	948cp27	52.00	18-Jul		30	
C-722	948cp30	38.39	18-Jul		see footnote	
C-723	948cp26	68.73	18-Jul	9	50	

Footnote: Sounding terminated above estimated water table depth

CONETEC

Table 2: Dissipation Test Summary

Sounding ID	Test Depth (ft)	Duration (minutes)	c_h (cm^2/min)
C-302	34.94	121	3.24
C-302-2a	127.46	4	4.148
C-303b	97.11	18	20.281
C-304	16.57	18	0.962
C-306	46.1	45	0.338
C-309	59.06	26	0.532
C-401-2b	128.12	25	6.246
C-402	21.33	61	0.936
C-404	66.11	14	1.551
C-406	13.12	33	3.401
C-407	11.15	18	1.419
C-407	13.78	31	2.651
C-407	18.54	40	0.31
C-407-2a	87.27	10	25.961
C-407-b	116.8	5	3.378
C-409	59.06	50	0.268
C-411	56.76	60	0.207
C-411	70.37	16	0.831
C-414	44.46	55	0.237
C-701	29.2	1	331.65
C-703	20.01	23	0.65
C-712	26.25	10	4.72
C-714	57.09	19	0.77
C-717	50.85	50	0.287
C-720	51.67	60	0.222
C-723	38.55	9	1.756

was decided to correlate groundwater information with nearby monitoring wells. At the time of this report, the well information was not made available. The water table depths used in the data correlations and sounding logs should be considered approximate. There were several soundings that also refused above the suspected water table. The water table was arbitrarily set to 100 ft (i.e. significantly below the termination depth) for data processing purposes.

3.4 SHEAR WAVE VELOCITY MEASUREMENTS

Shear wave velocity measurements were conducted in thirteen CPT soundings The shear wave measurements were taken on approximately 5-ft intervals in the soundings. Tabular summaries of the results and shear wave velocity plots are presented in Appendix B.

3.5 CPT DATA PROCESSING

The electronic data files were processed using the program CPTSumm. CPTSumm is a program developed by ConeTec to calculate common engineering parameters from CPT data. The processed data files are included on the data CD. The calculations used are summarized in the table in Appendix D. Each calculation is derived according to the referenced article.

For this project, a piezometric surface depths used in the data interpretation calculations are given in Table 1, as well as in the header of each .xls file.

Several pore pressure dissipation tests were conducted at this site. The dissipation test summary is presented in Table 2, and the plots are presented in Appendix C.

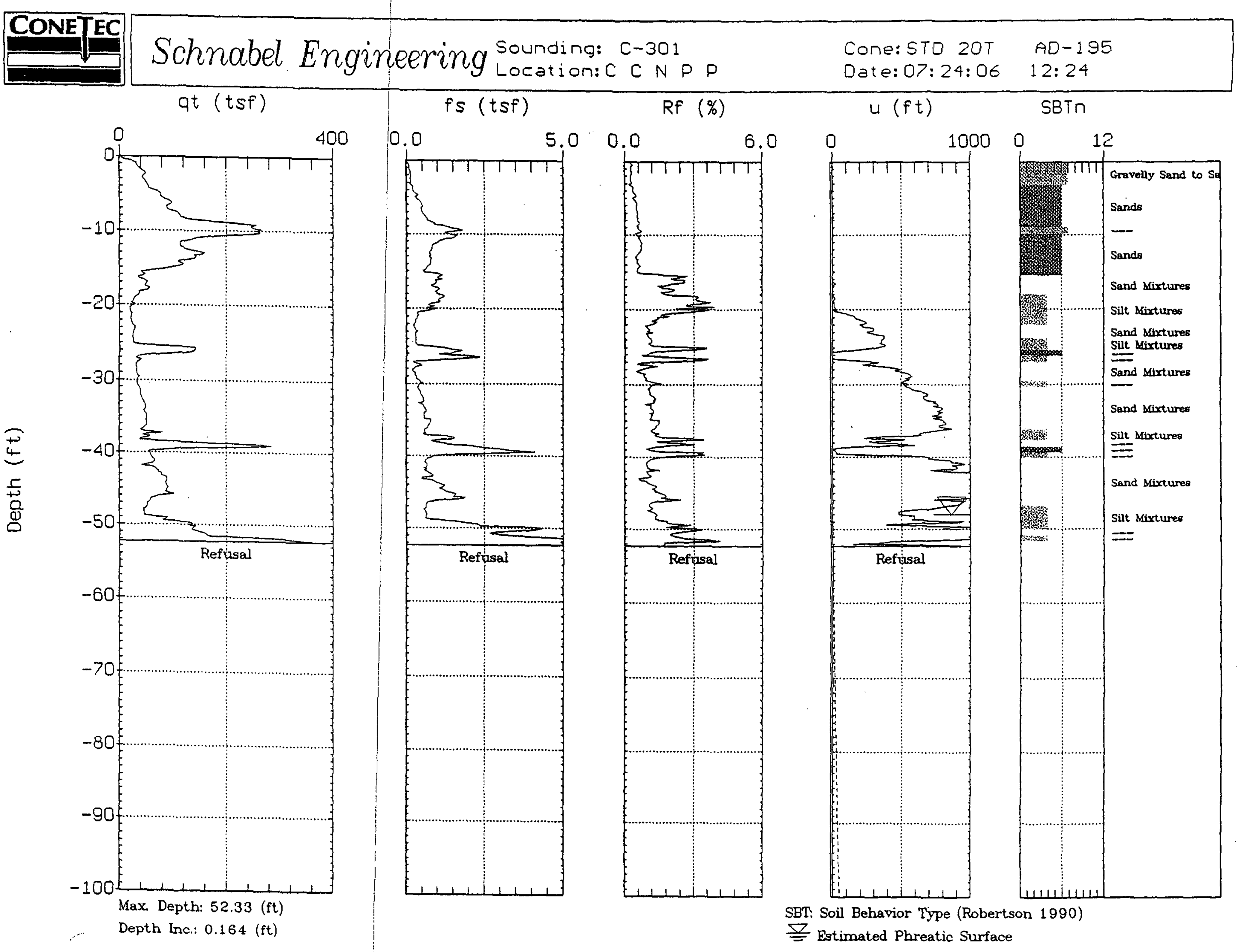
5.0 REFERENCES

Robertson, P.K., 1989, "Soil Classification using the Cone Penetration Test", Canadian Geotechnical Journal, vol. 27, pages 151-158.

Robertson, P.K., Sully, J., Woeller, D.G., Lunne, T., Powell, J.M., and Gillespie, D.J., 1992, "Estimating Coefficient of Consolidation from Piezocone Tests", Canadian Geotechnical Journal, vol. 29, pages 539-550.

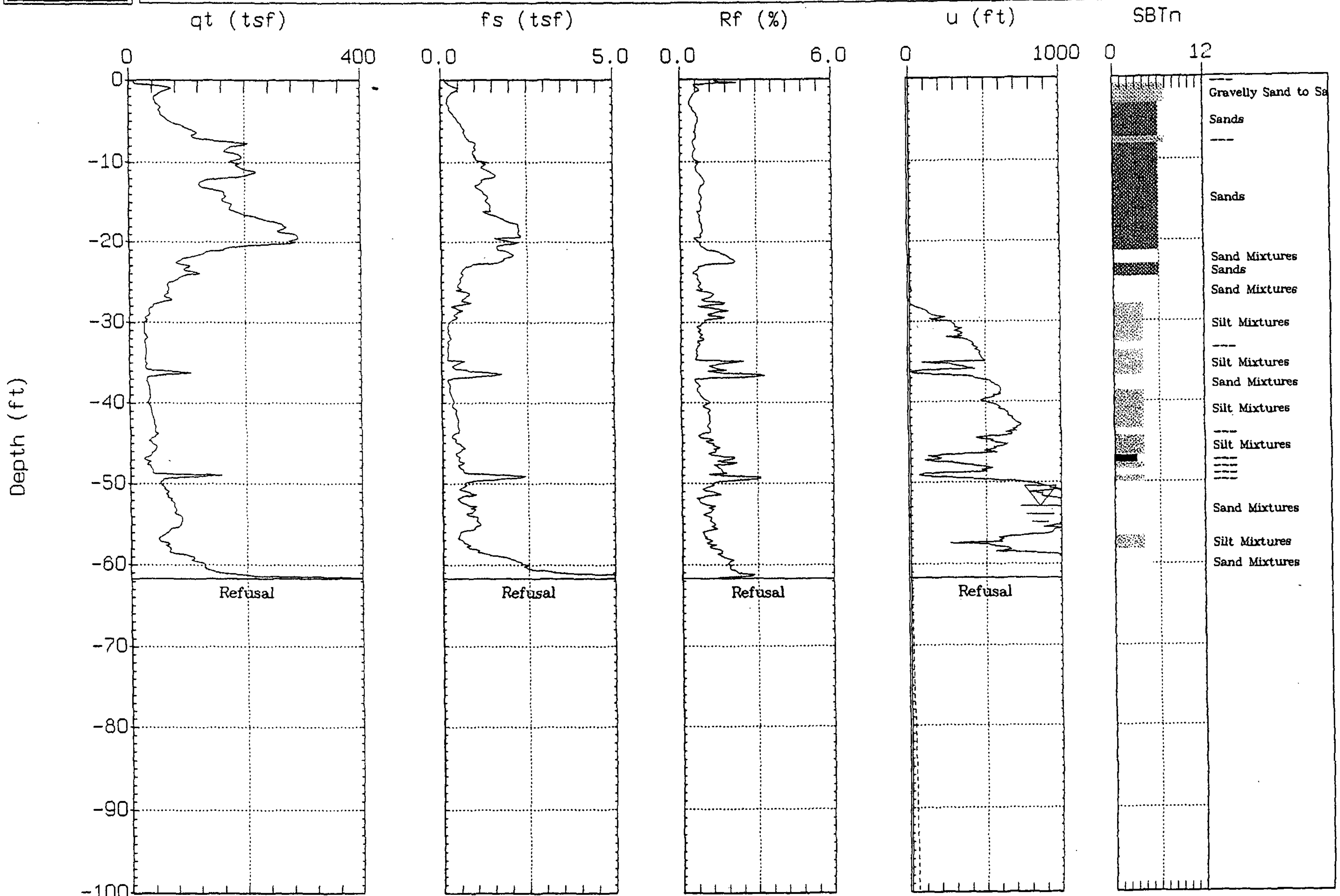
APPENDIX A
CPT PLOTS

Presentation of In Situ Testing Program Results
ConeTec, Inc.
November 13, 2006


CONETEC
Schnabel Engineering
Sounding: C-301
Location: C C N P P
Cone: STD 20T
AD-195
Date: 07:24:06
12:24
qt (tsf)
fs (tsf)
Rf (%)
u (ft)
SBTn
Depth (ft)
Refusal
Gravelly Sand to Sa
Sands
Sand Mixtures
Silt Mixtures
Max. Depth: 52.33 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

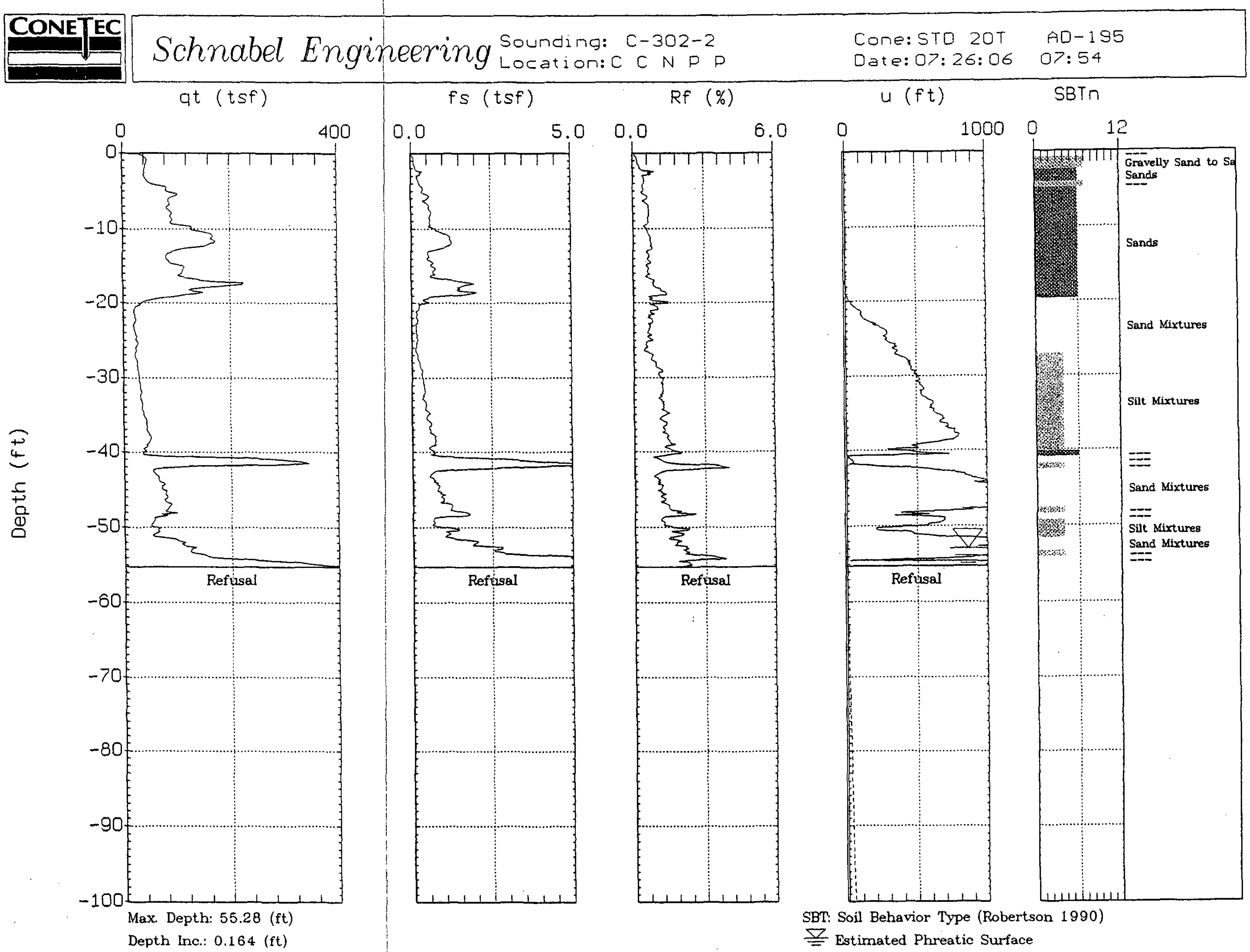
CONETEC

Schnabel Engineering
Sounding: C-302
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:12:06 10:00



Max. Depth: 61.68 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

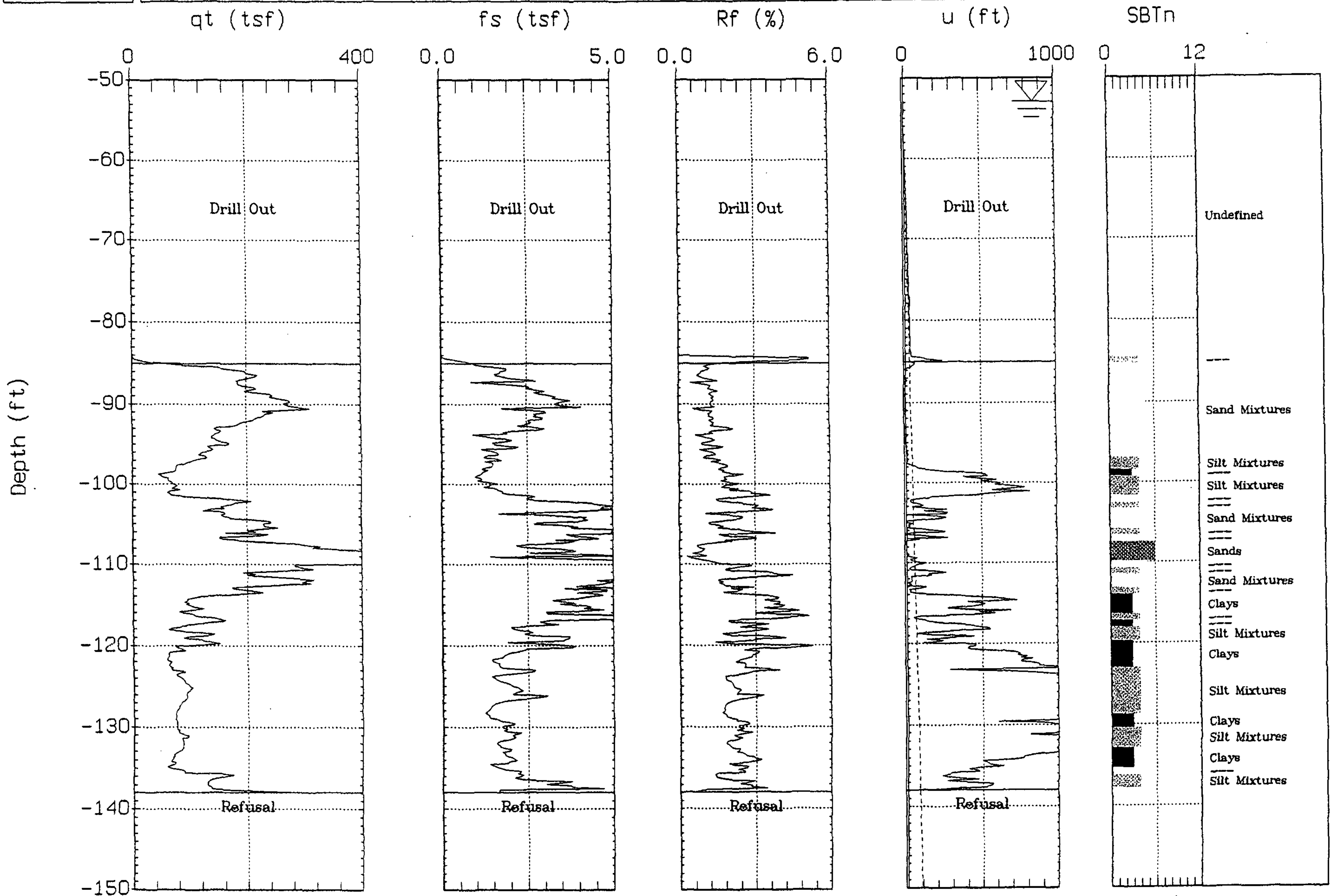


CONETEC
Schnabel Engineering
Sounding: C-302-2
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:26:06 07:54
qt (tsf)
fs (tsf)
Rf (%)
u (ft)
SBTn
Depth (ft)
Gravelly Sand to Sa
Sands
Sands
Sand Mixtures
Silt Mixtures
Sand Mixtures
Silt Mixtures
Sand Mixtures
Refusal
Refusal
Refusal
Refusal
Max. Depth: 55.28 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

Schnabel Engineering

Sounding: C-302-2a
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:26:06 10:40



Max. Depth: 137.96 (ft)
Depth Inc.: 0.164 (ft)

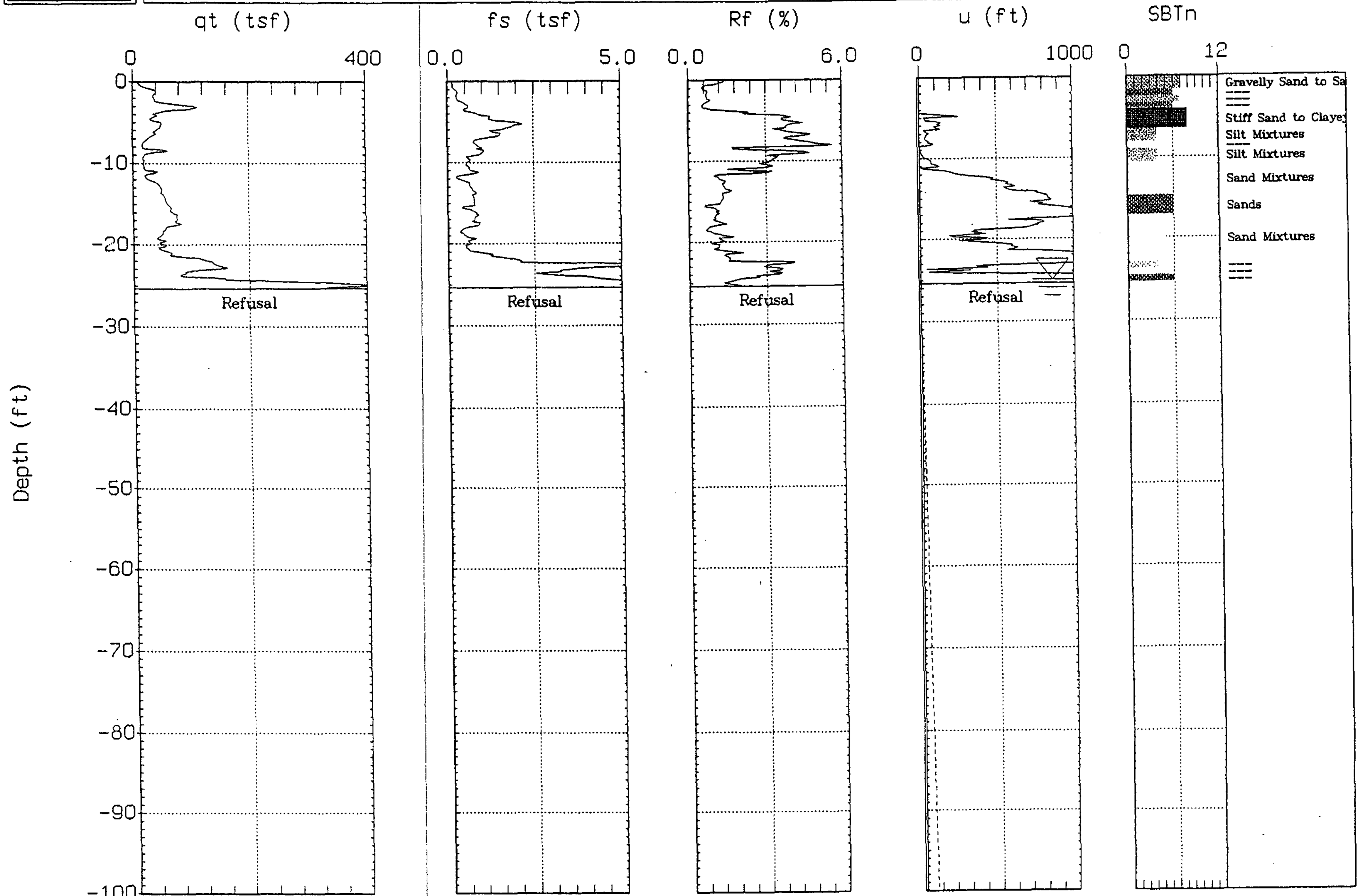
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-303
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:12:06 09:01



Max. Depth: 25.43 (ft)
Depth Inc.: 0.164 (ft)

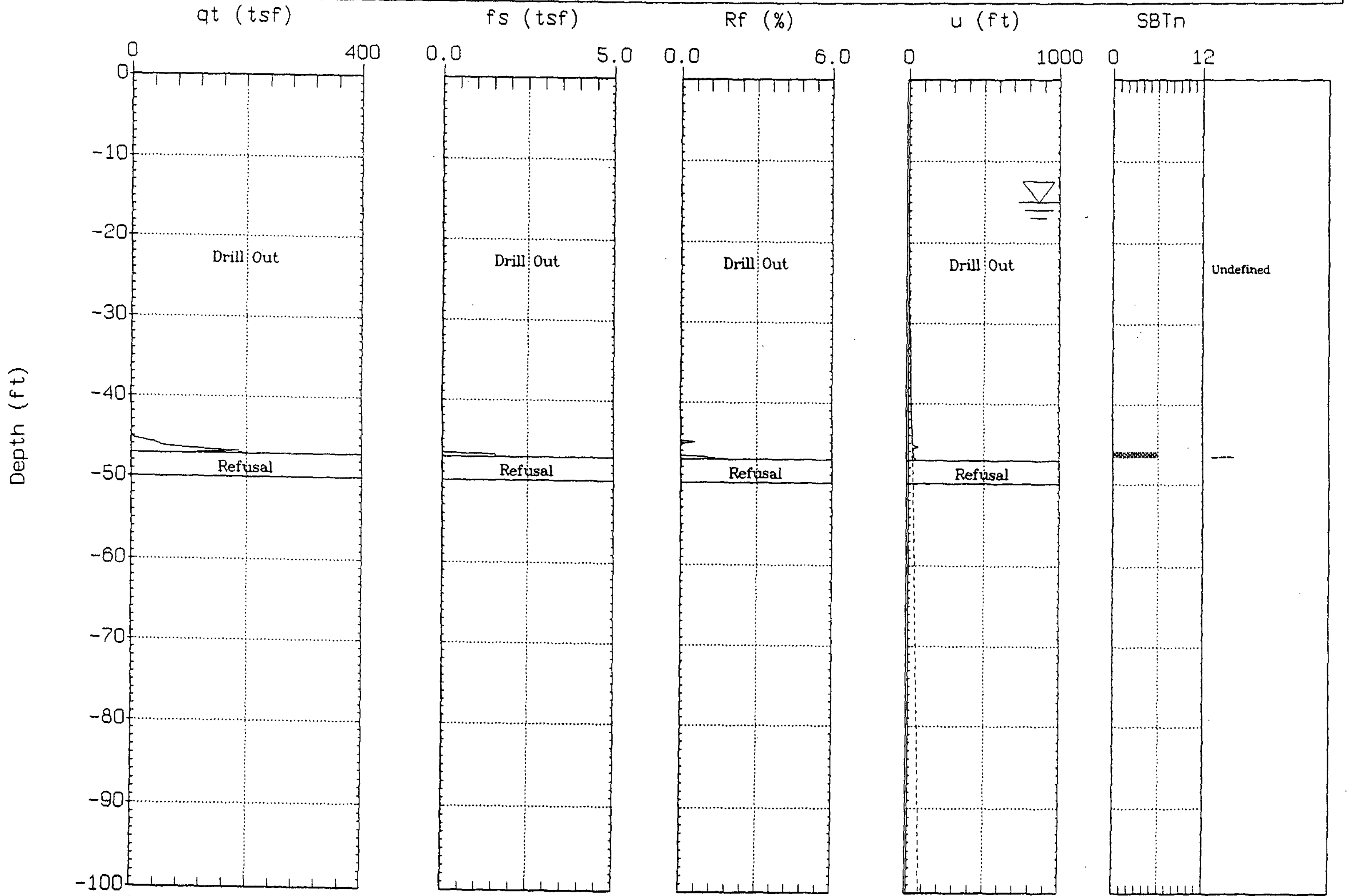
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

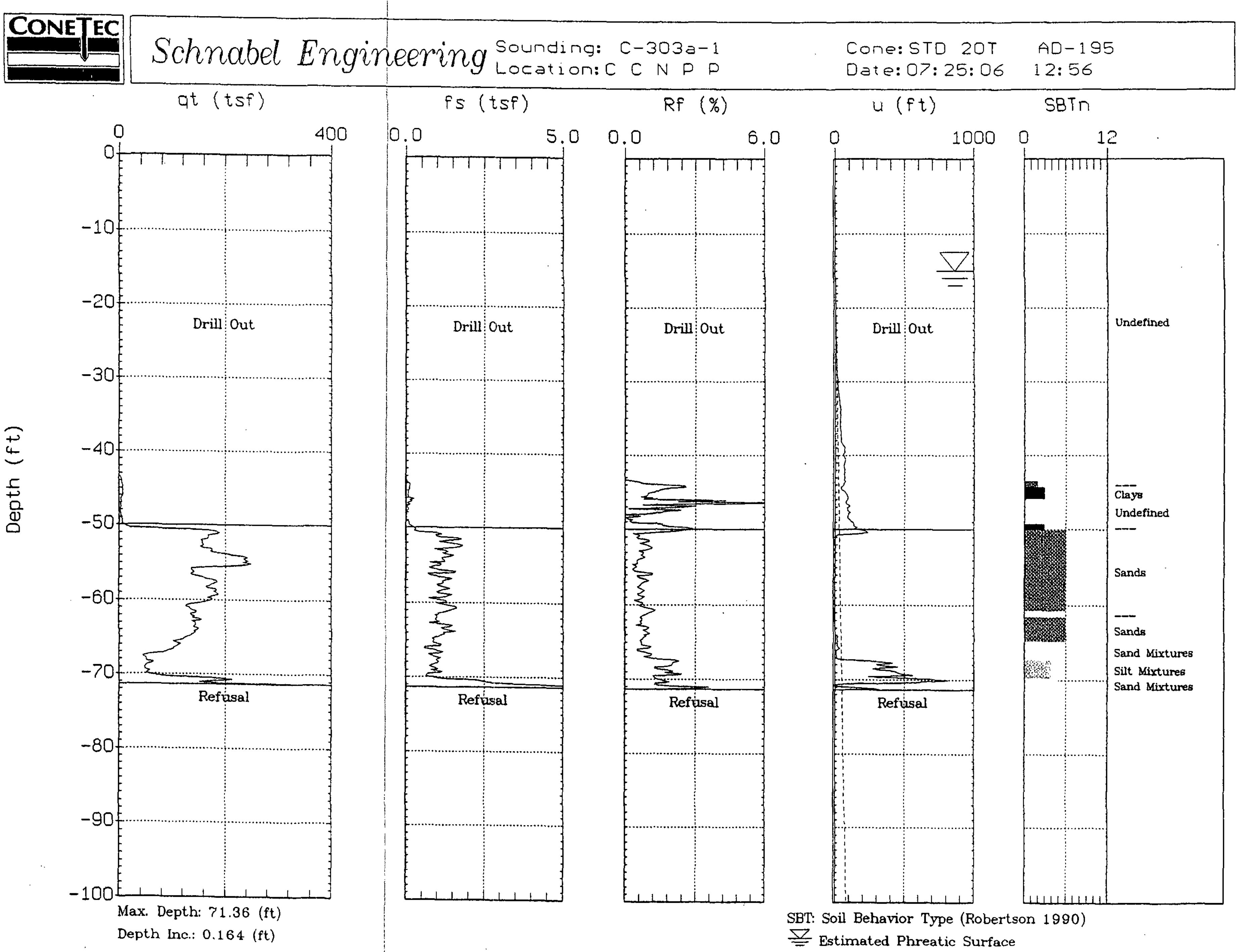
Sounding: C-303a
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:25:06 10:27



Max. Depth: 47.08 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

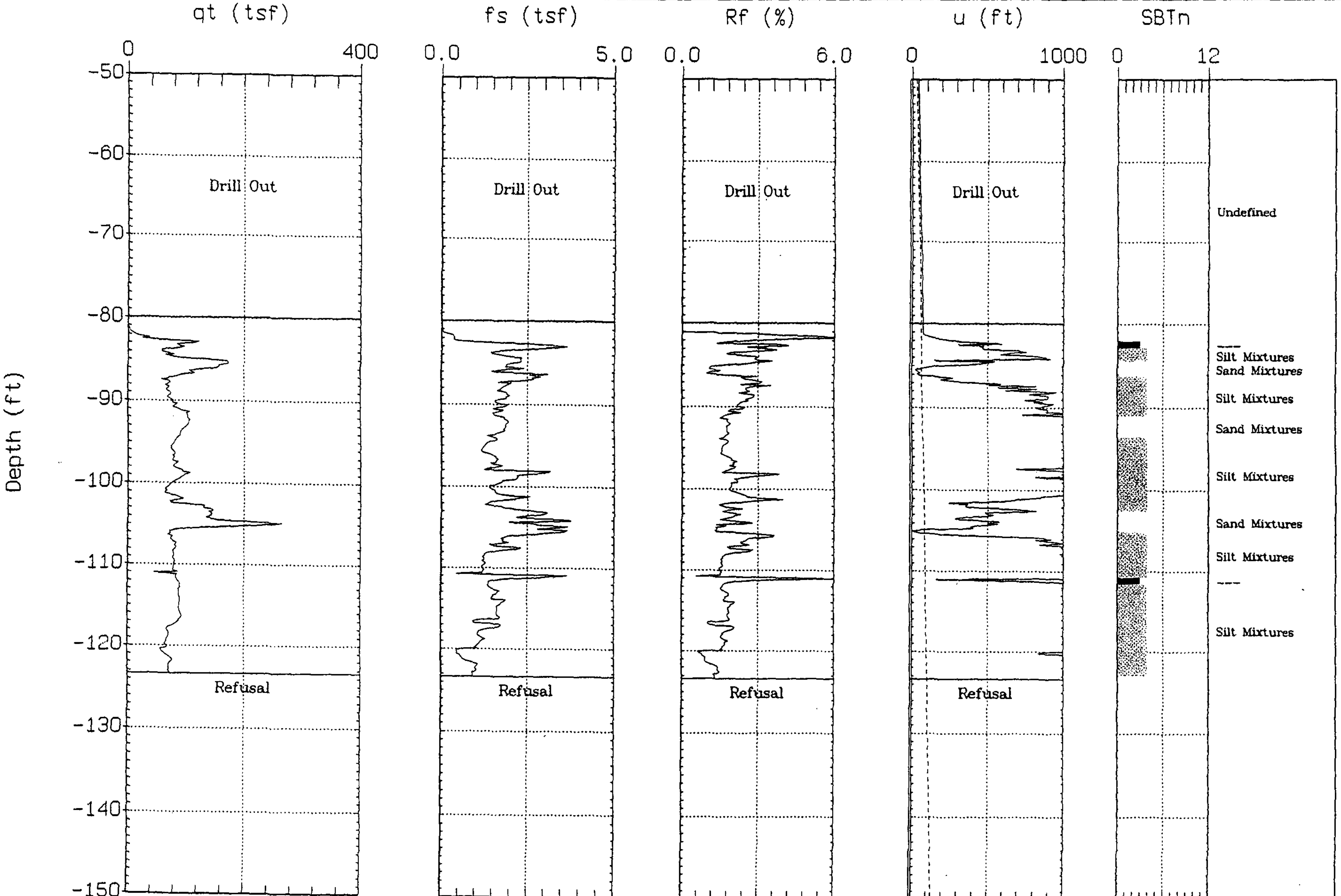


CONETEC
Schnabel Engineering
Sounding: C-303a-1
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:25:06 12:56
qt (tsf)
fs (tsf)
Rf (%)
u (ft)
SBTn
0
400
0.0
5.0
0.0
6.0
0
1000
0
12
Depth (ft)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Drill Out
Refusal
Undefined
Clays
Undefined
Sands
Sands
Sand Mixtures
Silt Mixtures
Sand Mixtures
Max. Depth: 71.36 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering Sounding: C-303b Location: C C N P P

Cone: STD 20T AD-195 Date: 07:25:06 15:32



Max. Depth: 123.36 (ft)
Depth Inc.: 0.164 (ft)

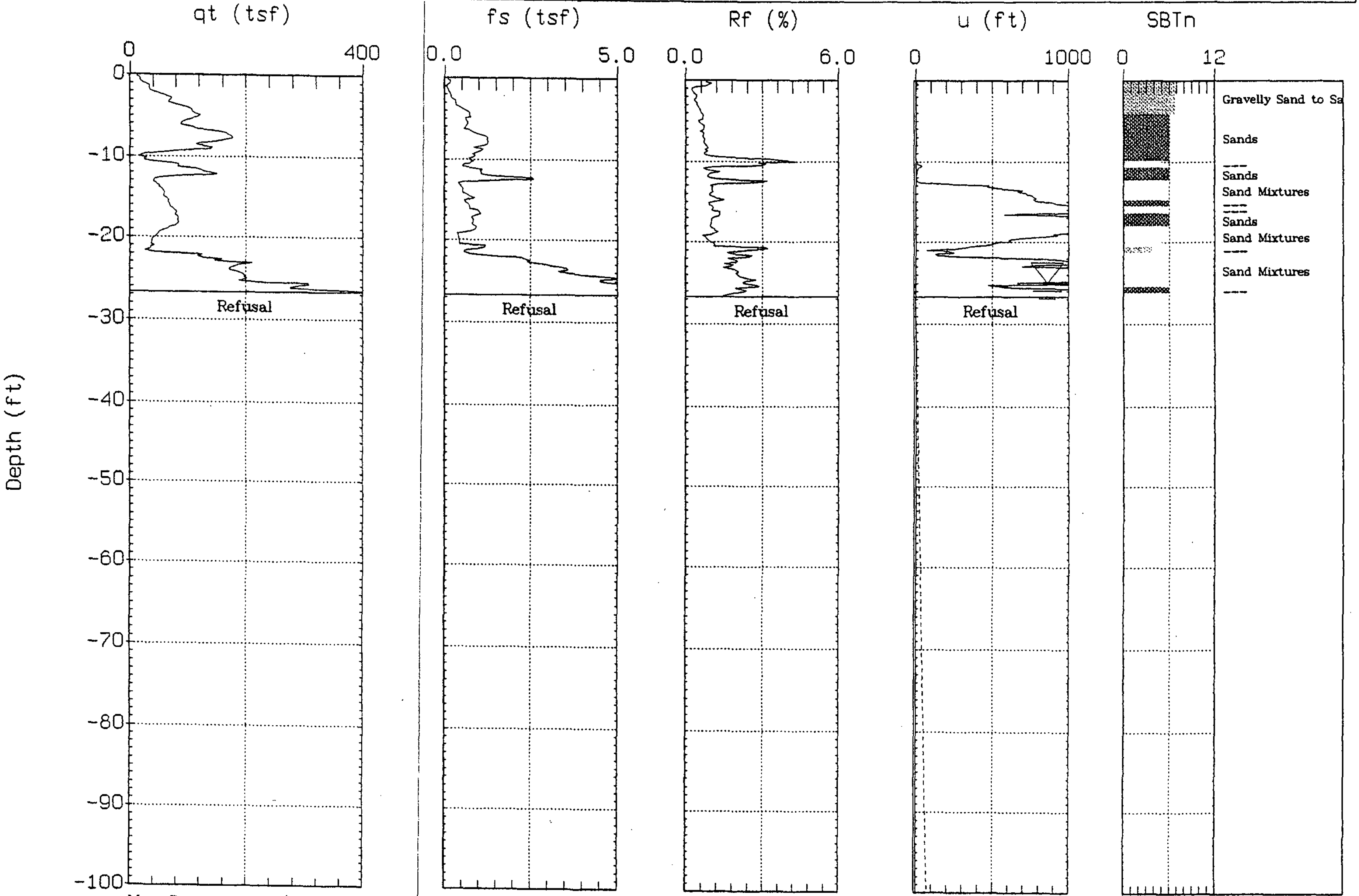
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-304
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:12:06 07:36



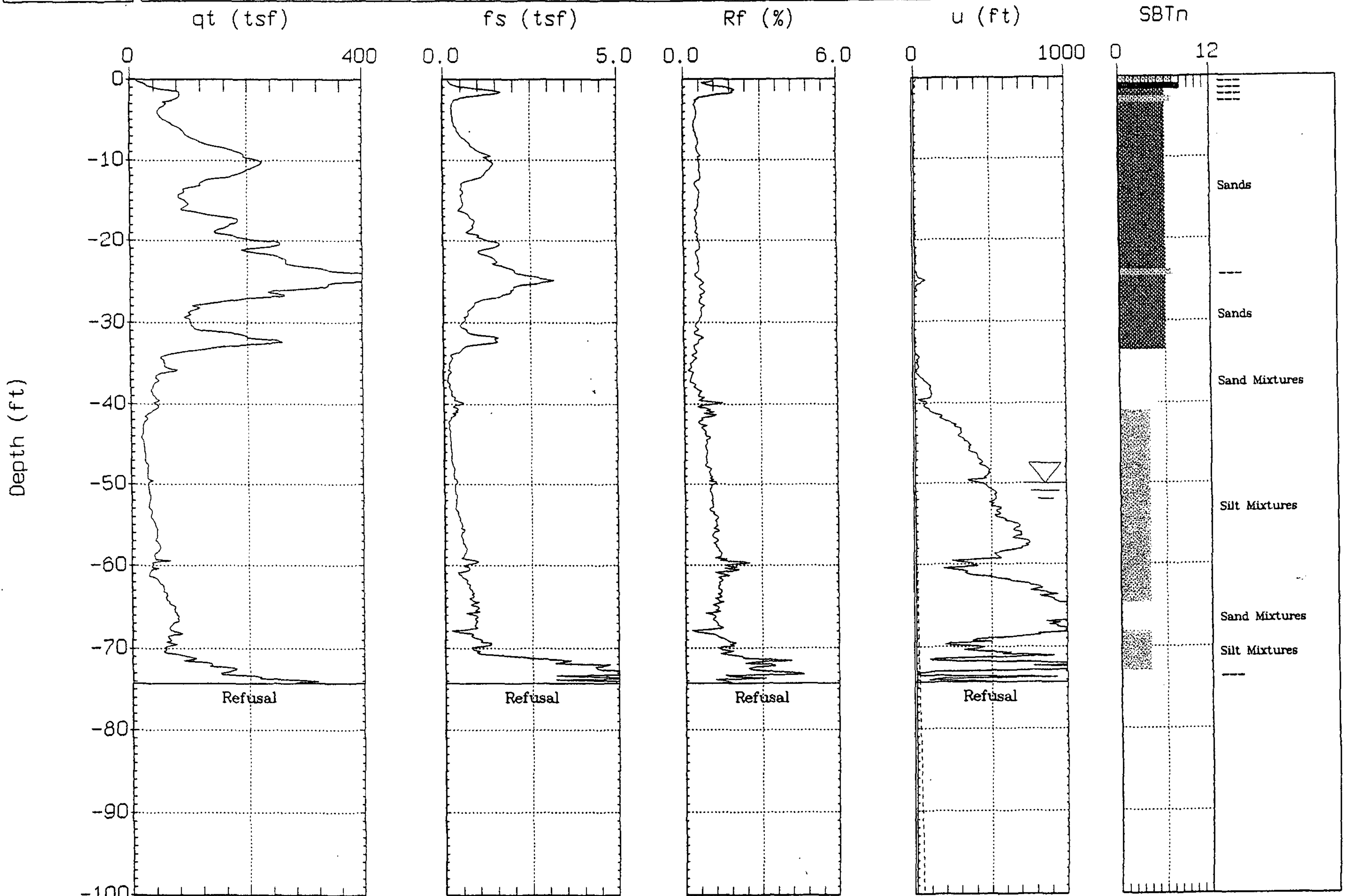
Max. Depth: 26.74 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering Sounding: C-305 Location: C C N P P

Cone: STD 20T AD-195 Date: 07:12:06 13:14



Max. Depth: 74.31 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

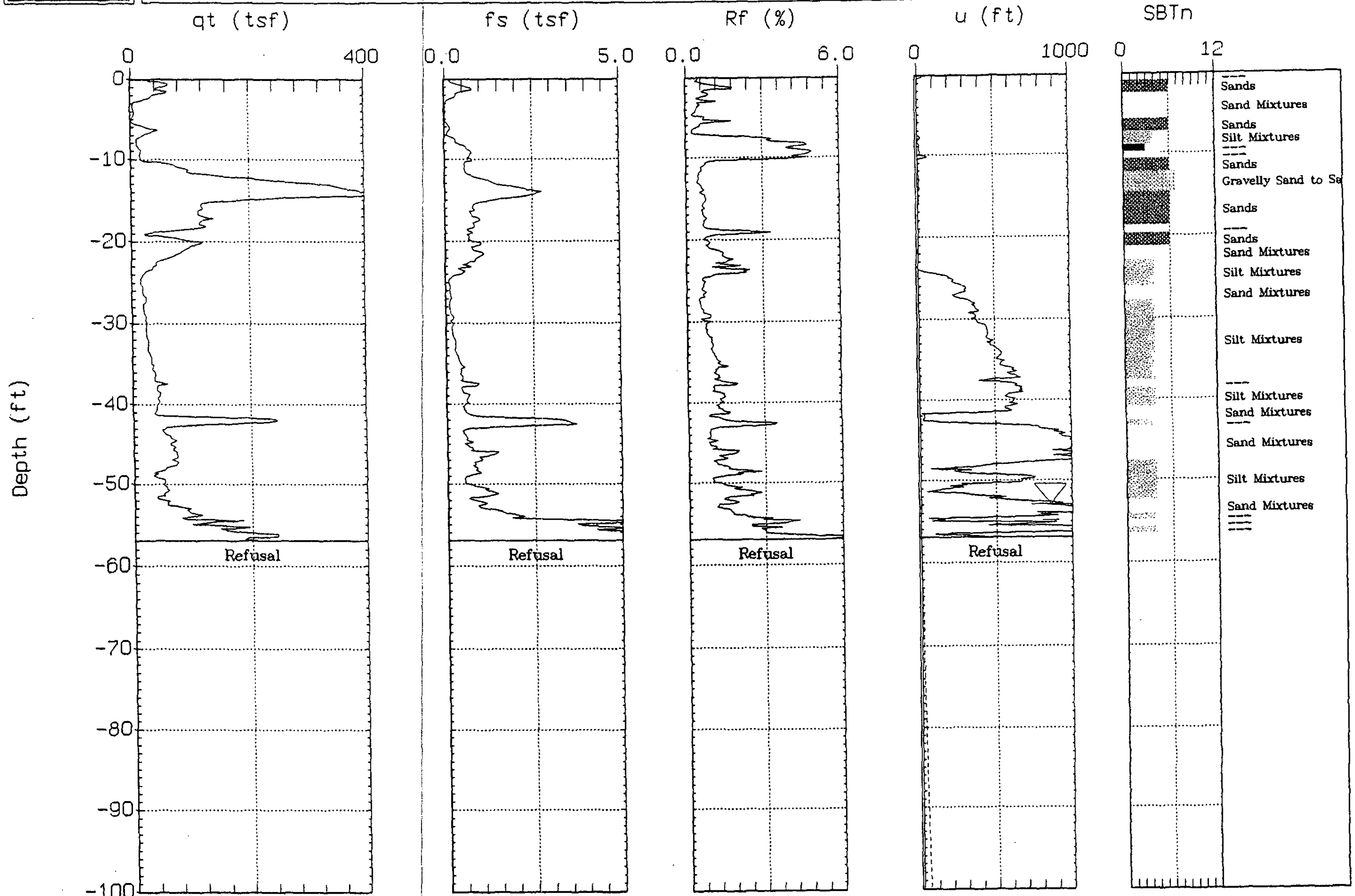
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-306
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:12:06 16:33



Max. Depth: 56.92 (ft)
Depth Inc.: 0.164 (ft)

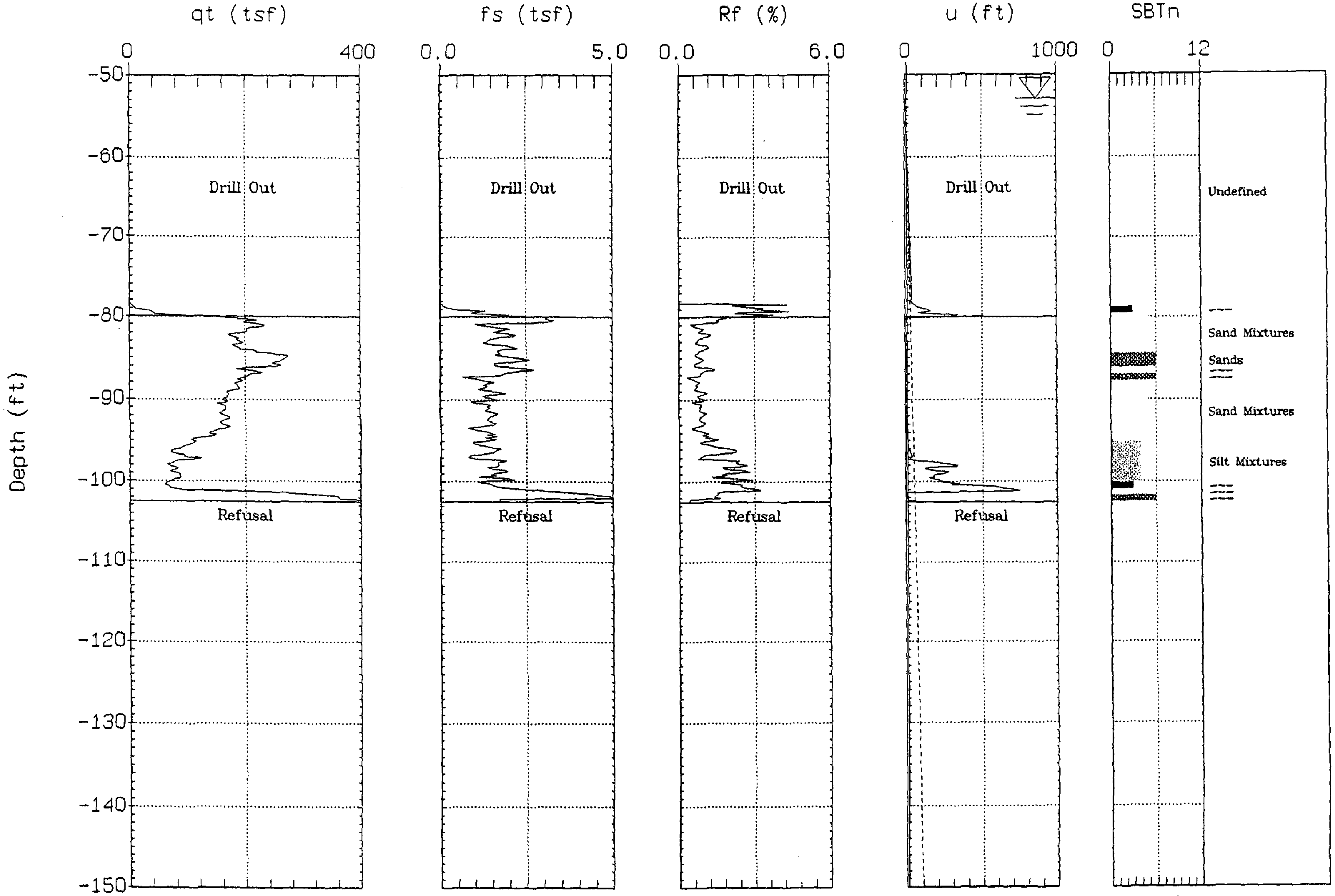
SBT: Soil Behavior Type (Robertson 1990)
▽ Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-306a
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:27:06 07:13



Max. Depth: 102.53 (ft)
Depth Inc.: 0.164 (ft)

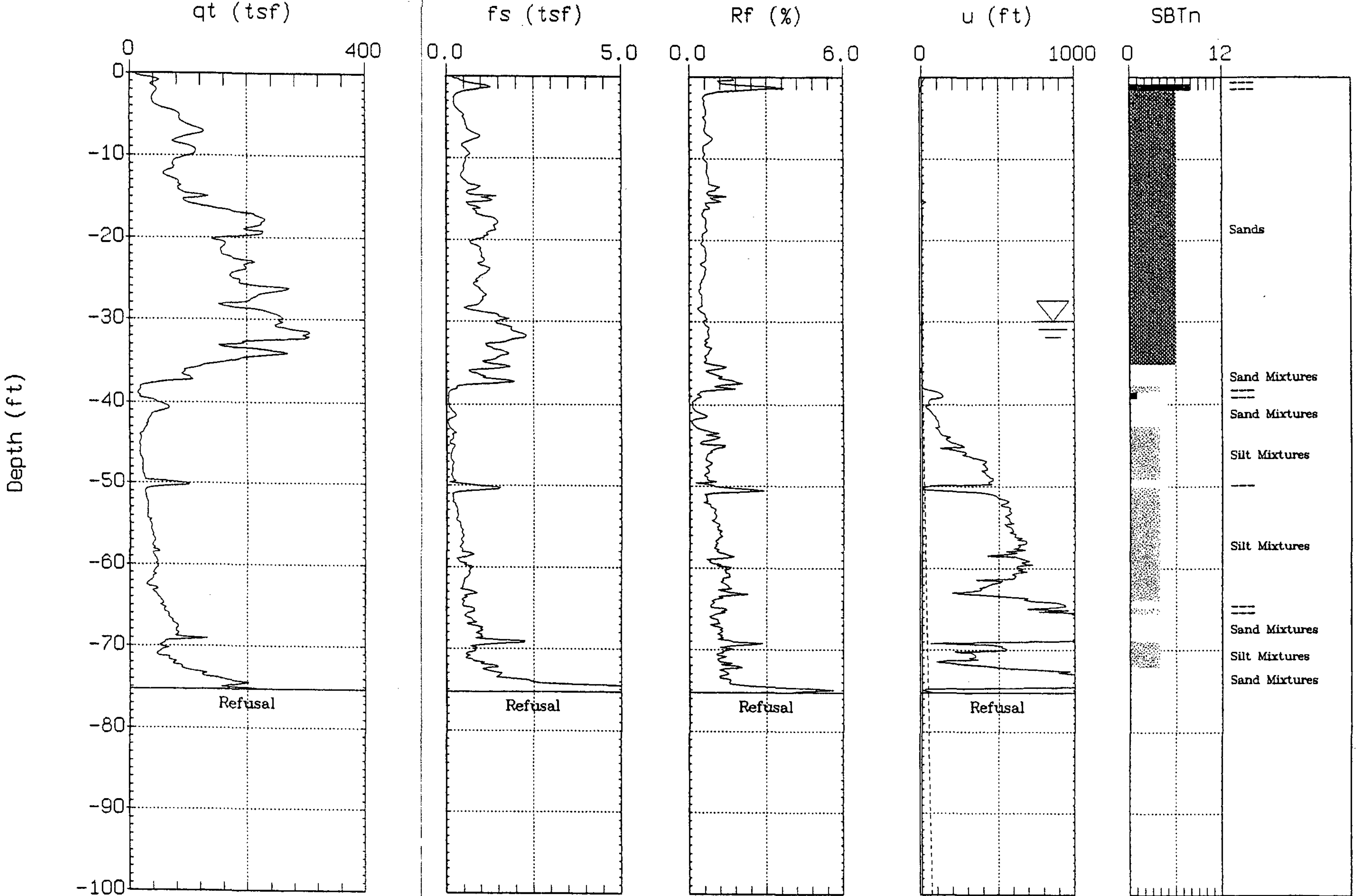
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-307
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:12:06 14:47



Max. Depth: 75.29 (ft)
Depth Inc.: 0.164 (ft)

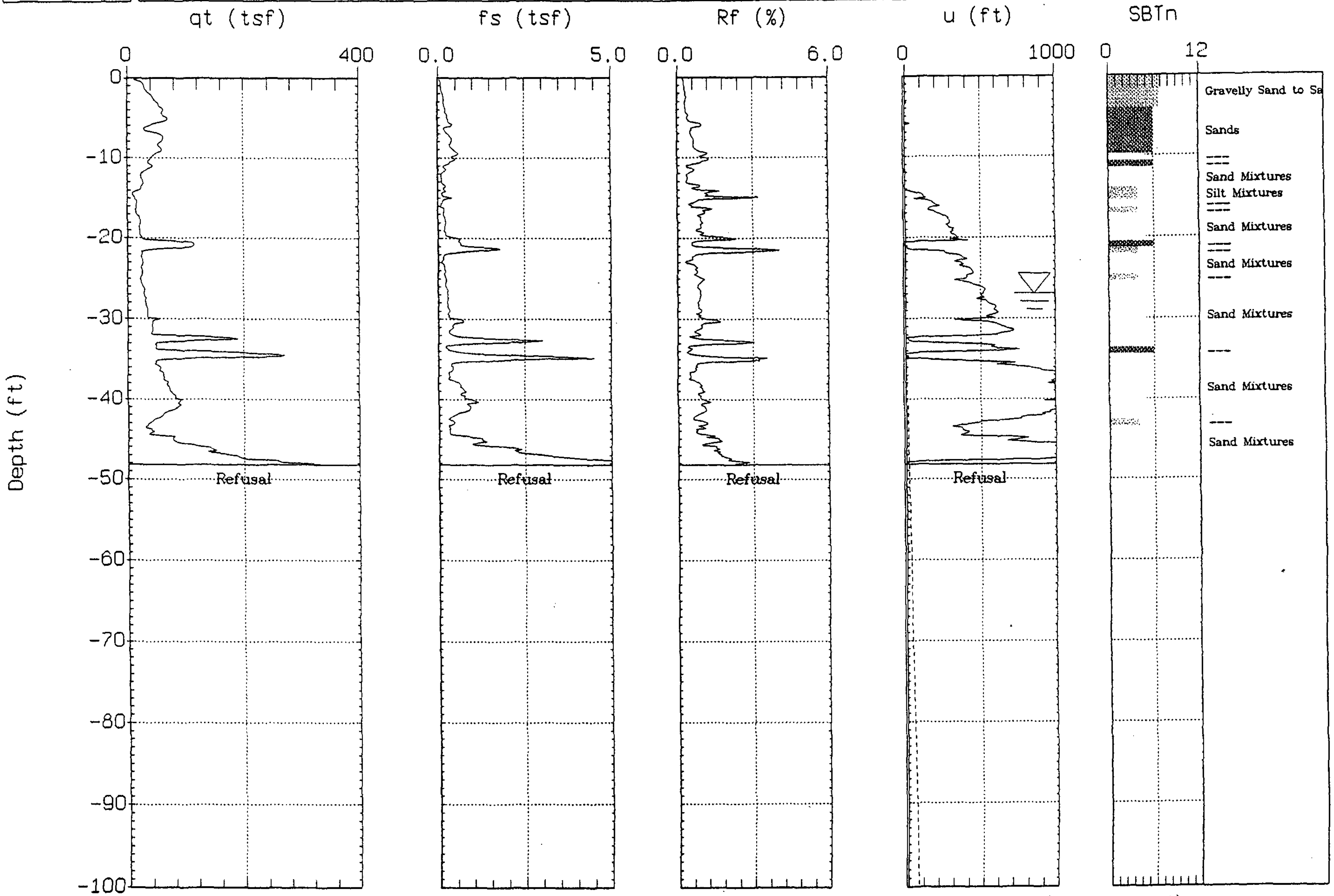
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-308
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:17:06 14:58



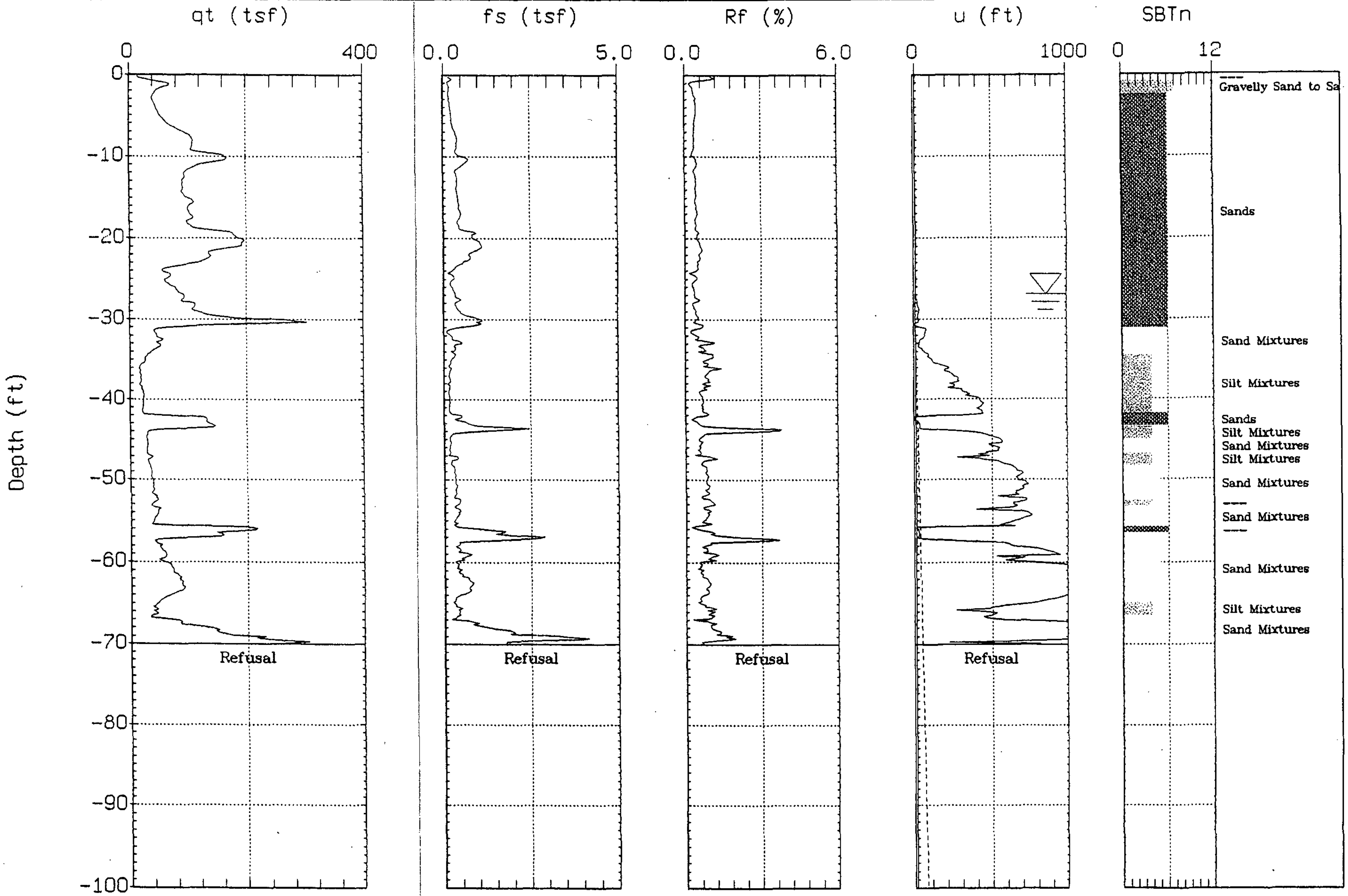
Max. Depth: 48.23 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering Sounding: C-309 Location: C C N P P

Cone: STD 20T. AD-195 Date: 07:17:06 13:13



Max. Depth: 70.05 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

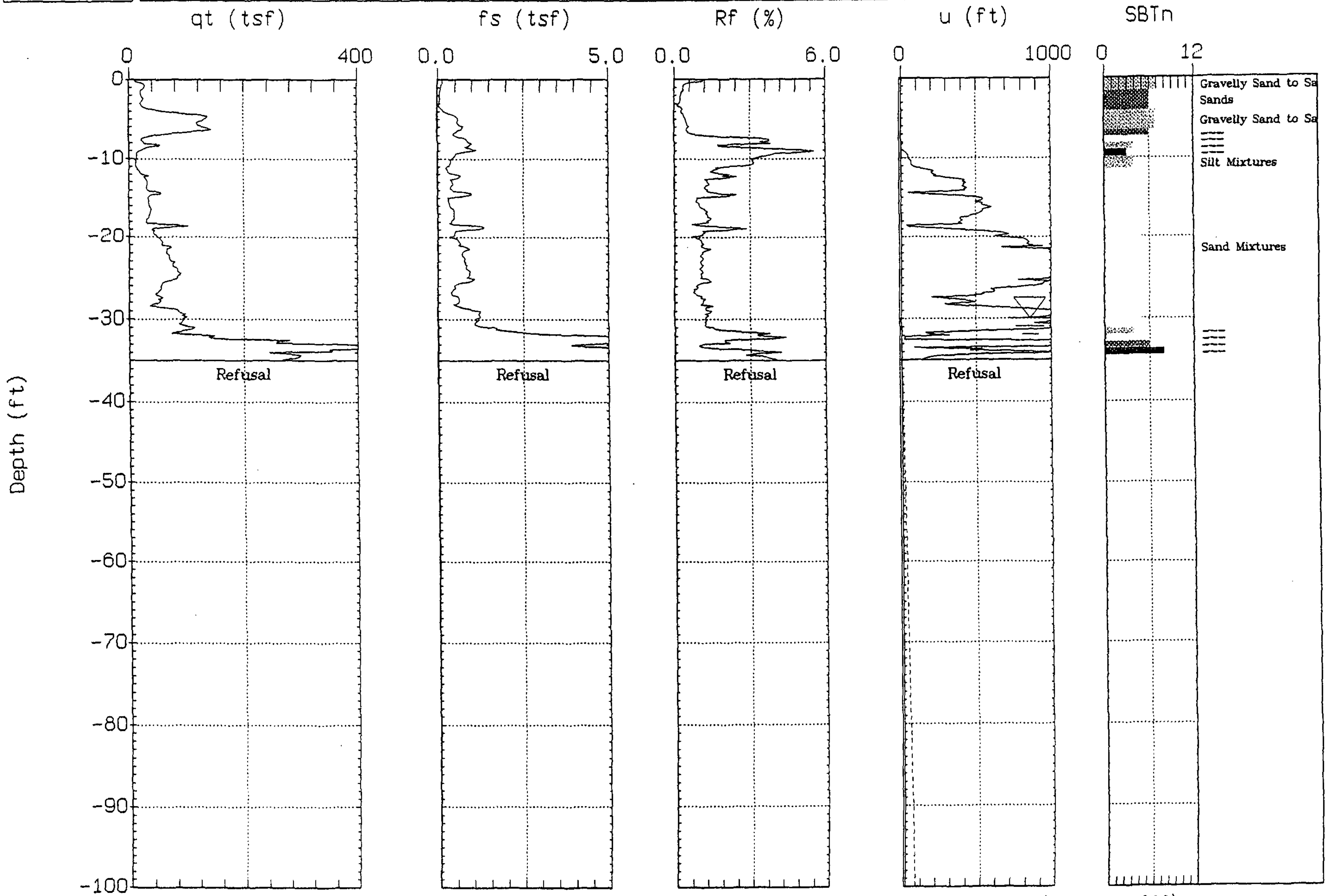
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-311
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:11:06 16:17



Max. Depth: 34.94 (ft)
Depth Inc.: 0.164 (ft)

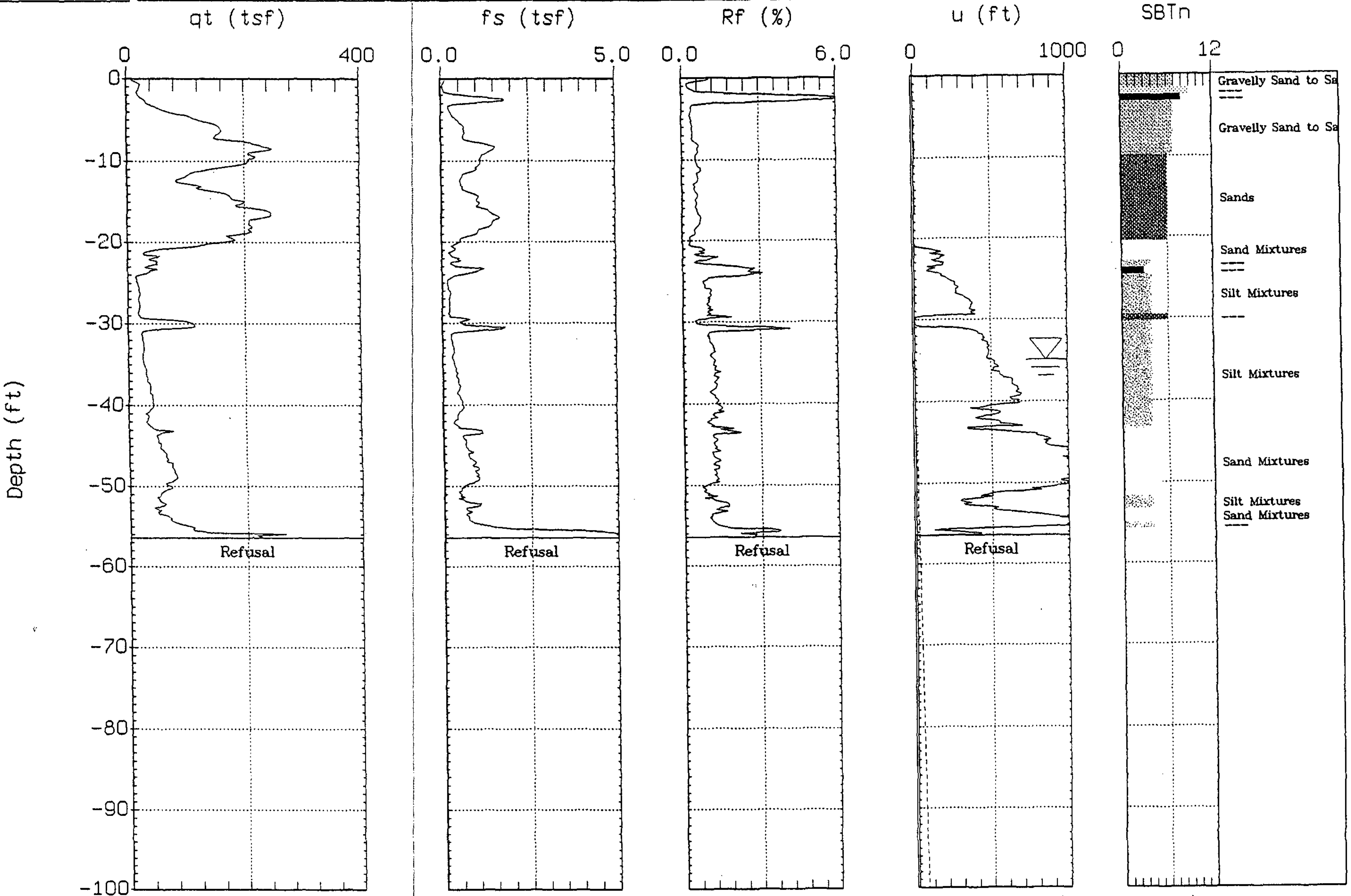
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-312
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:11:06 15:11



Max. Depth: 56.43 (ft)
Depth Inc.: 0.164 (ft)

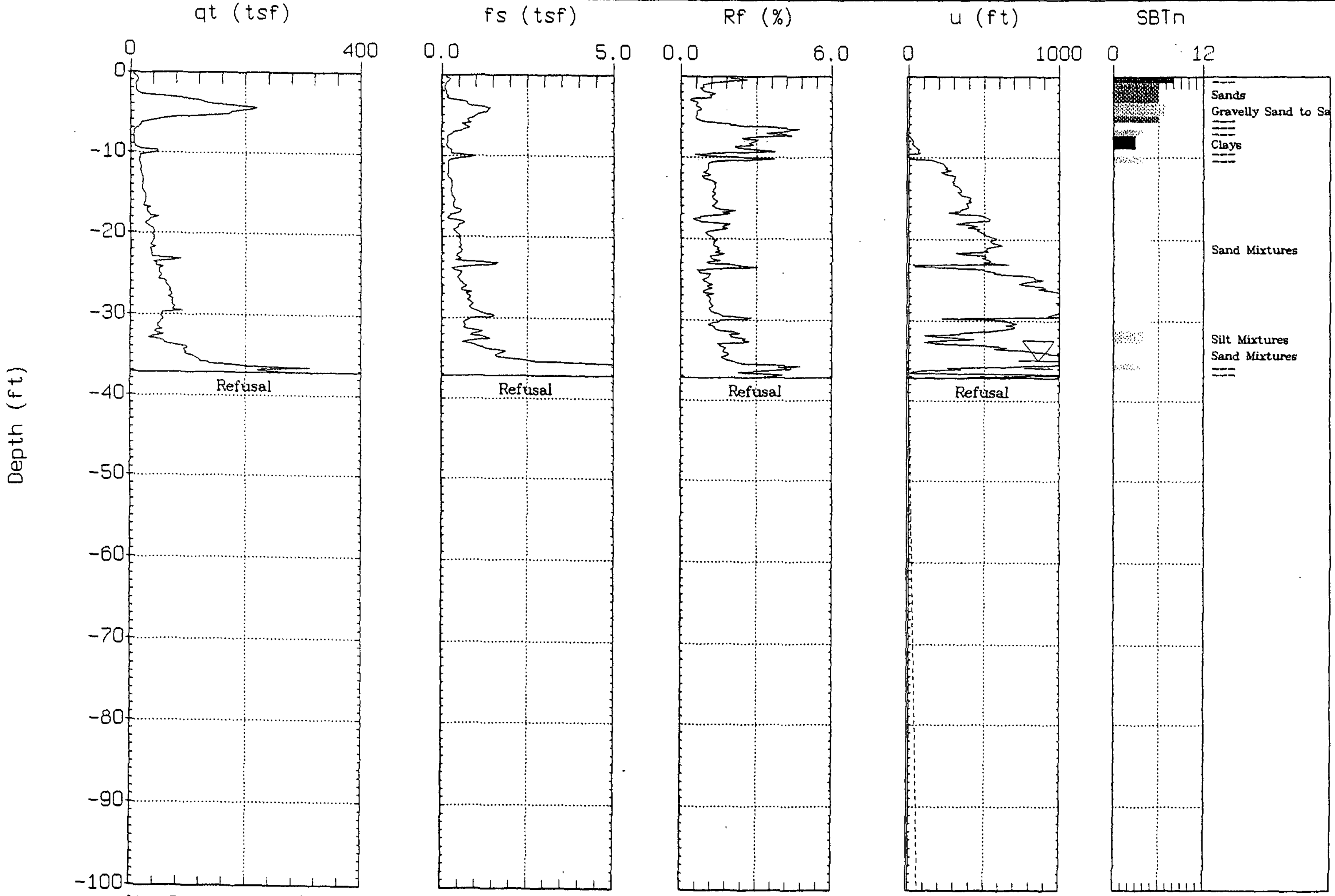
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-313
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:17:06 12:11



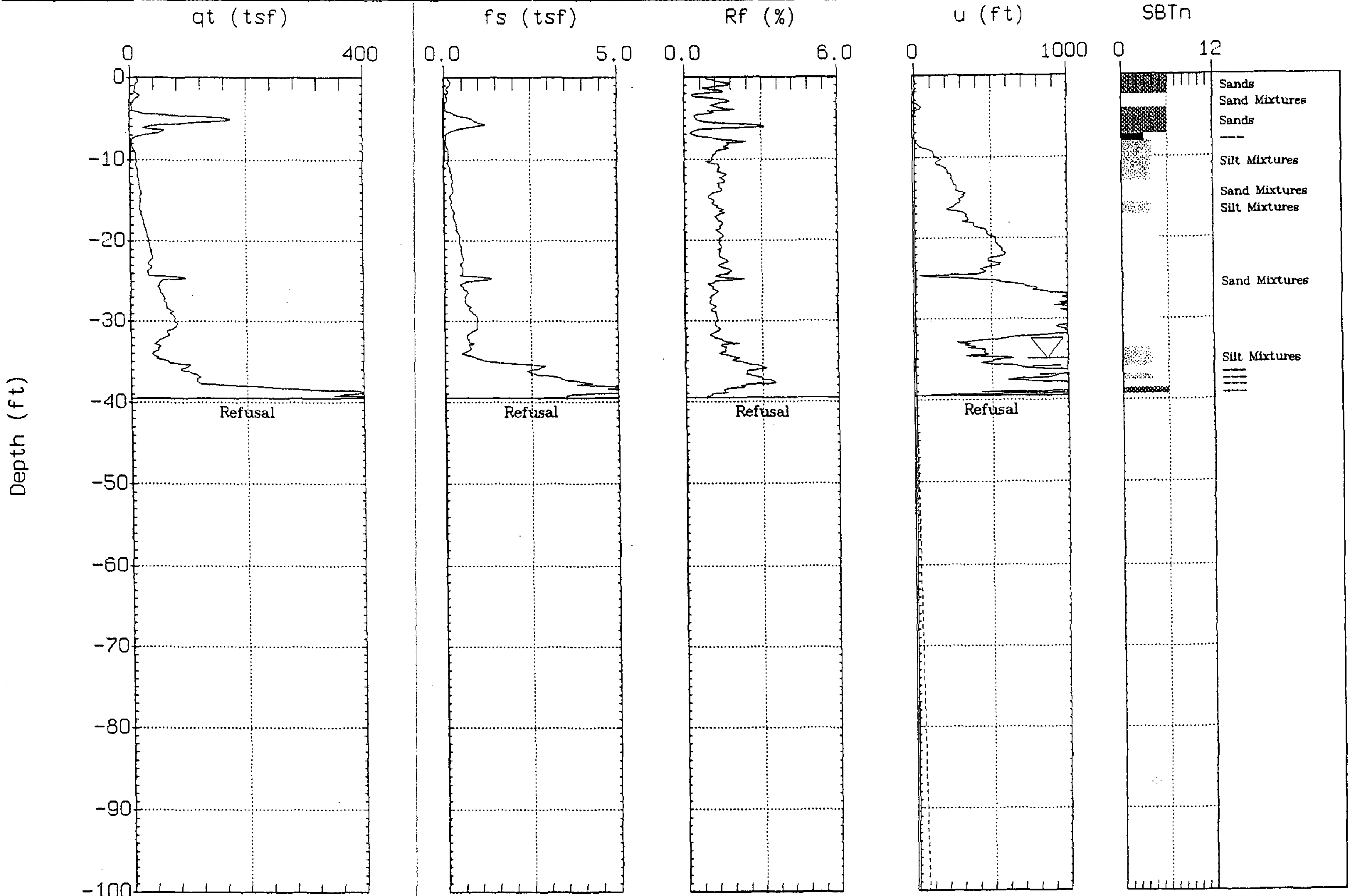
Max. Depth: 37.24 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

Schnabel Engineering

Sounding: C-314
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:17:06 11:14



Max. Depth: 39.53 (ft)
Depth Inc.: 0.164 (ft)

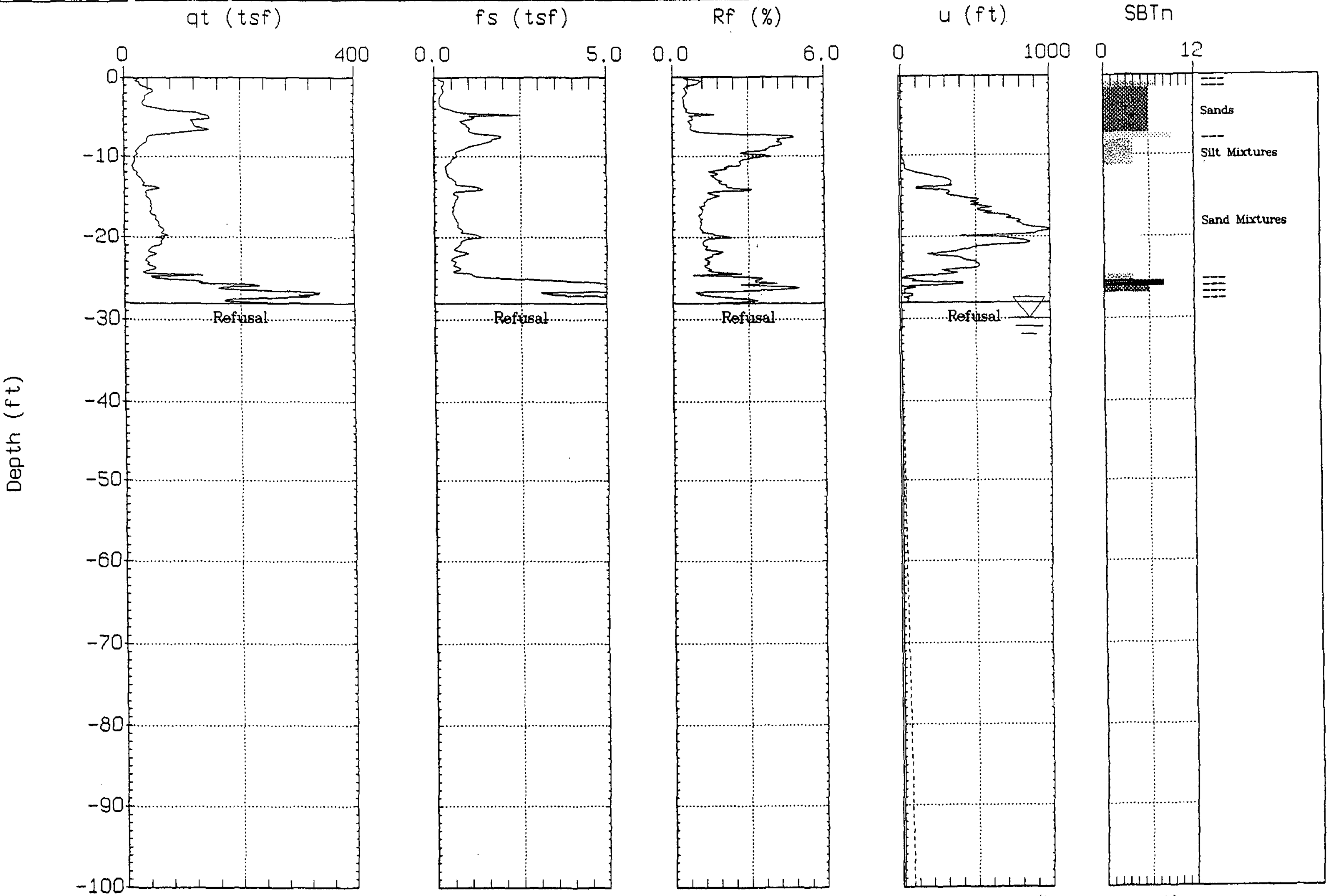
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

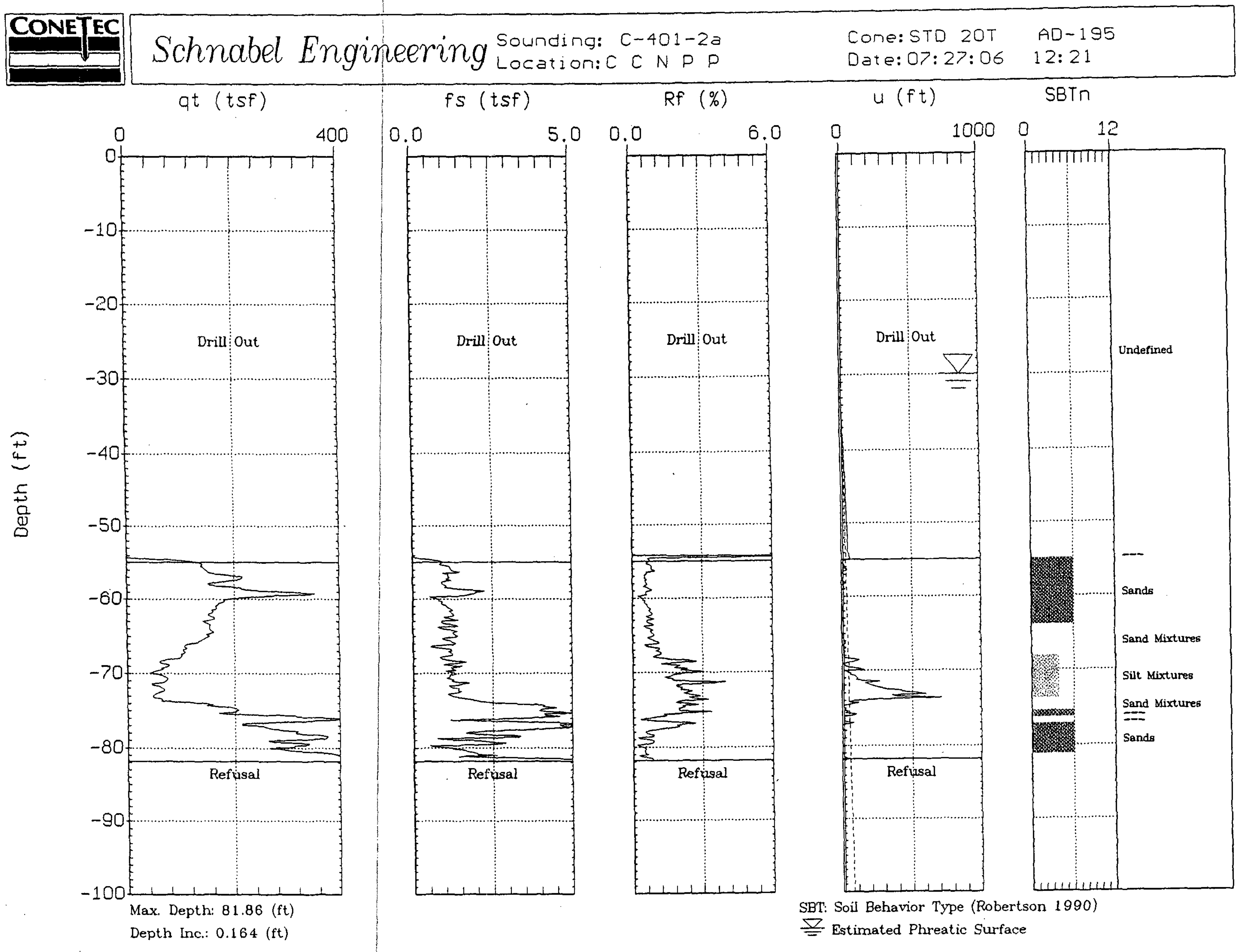
Sounding: C-401
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:13:06 10:28



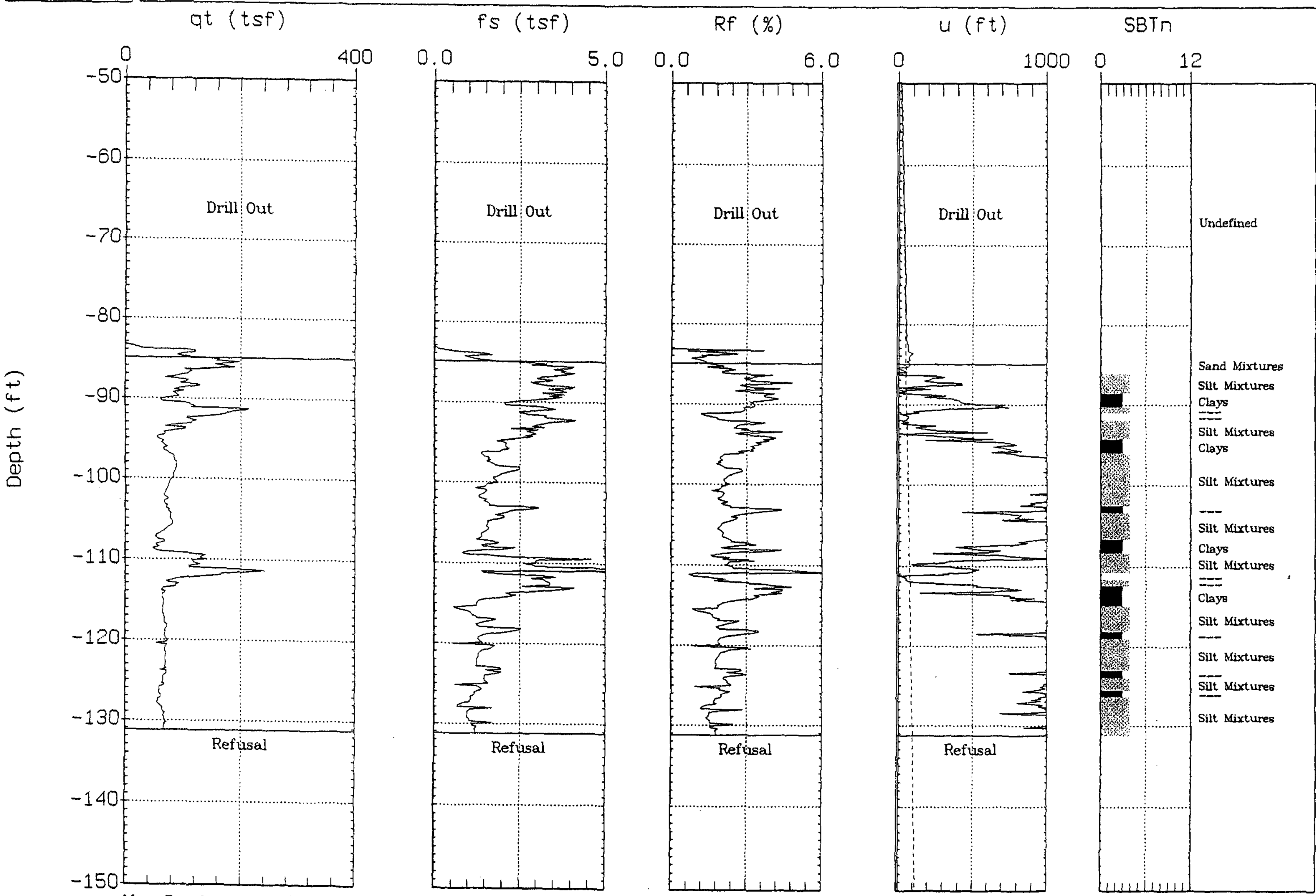
Max. Depth: 28.05 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface



CONETEC
Schnabel Engineering
Sounding: C-401-2a
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:27:06 12:21
qt (tsf)
fs (tsf)
Rf (%)
u (ft)
SBTn
Depth (ft)
Drill Out
Refusal
Undefined
Sands
Sand Mixtures
Silt Mixtures
Sand Mixtures
Sands
Max. Depth: 81.86 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

Schnabel Engineering
Sounding: C-401-2b
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:27:06 15:04



Max. Depth: 131.23 (ft)
Depth Inc.: 0.164 (ft)

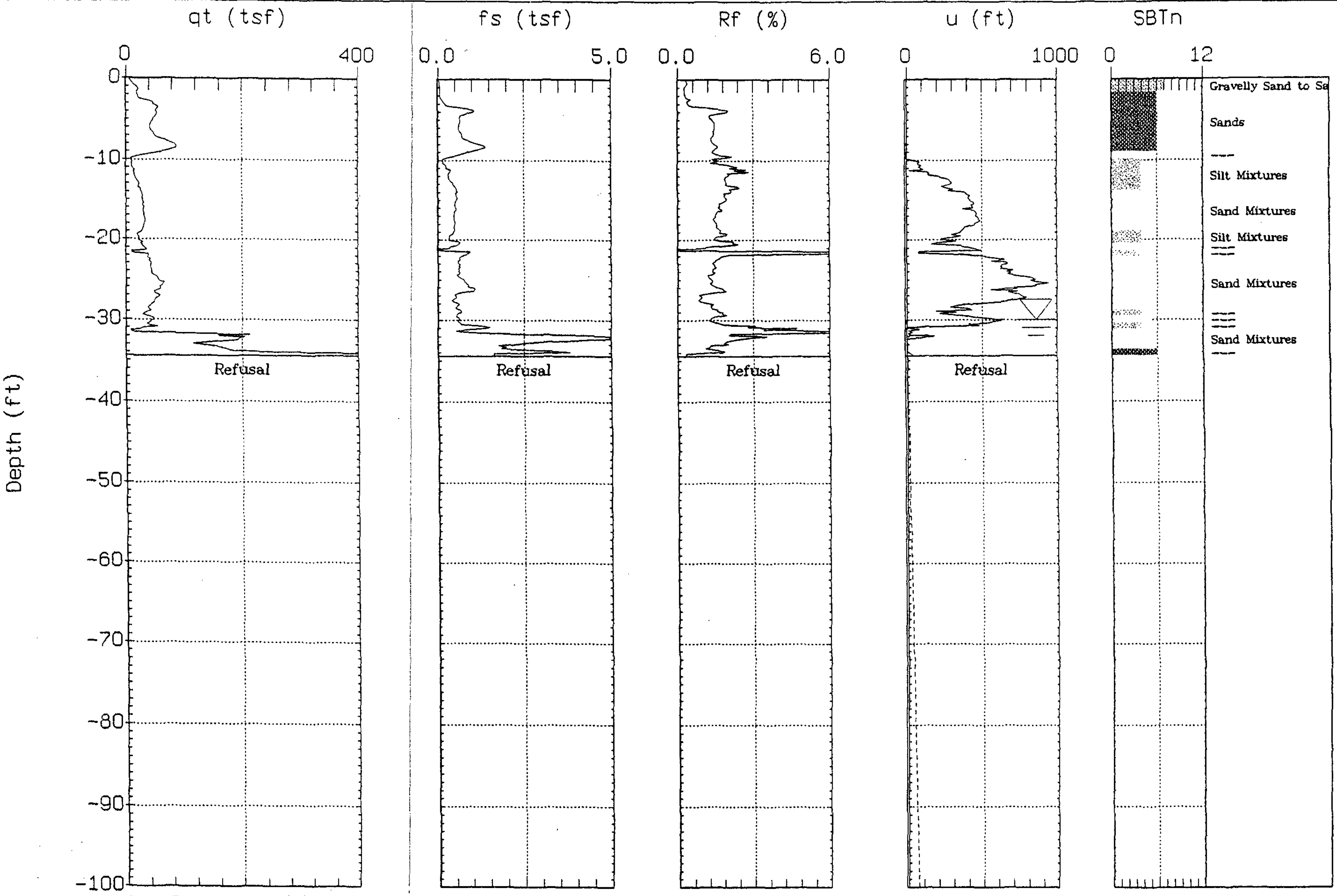
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-402
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:13:06 08:45

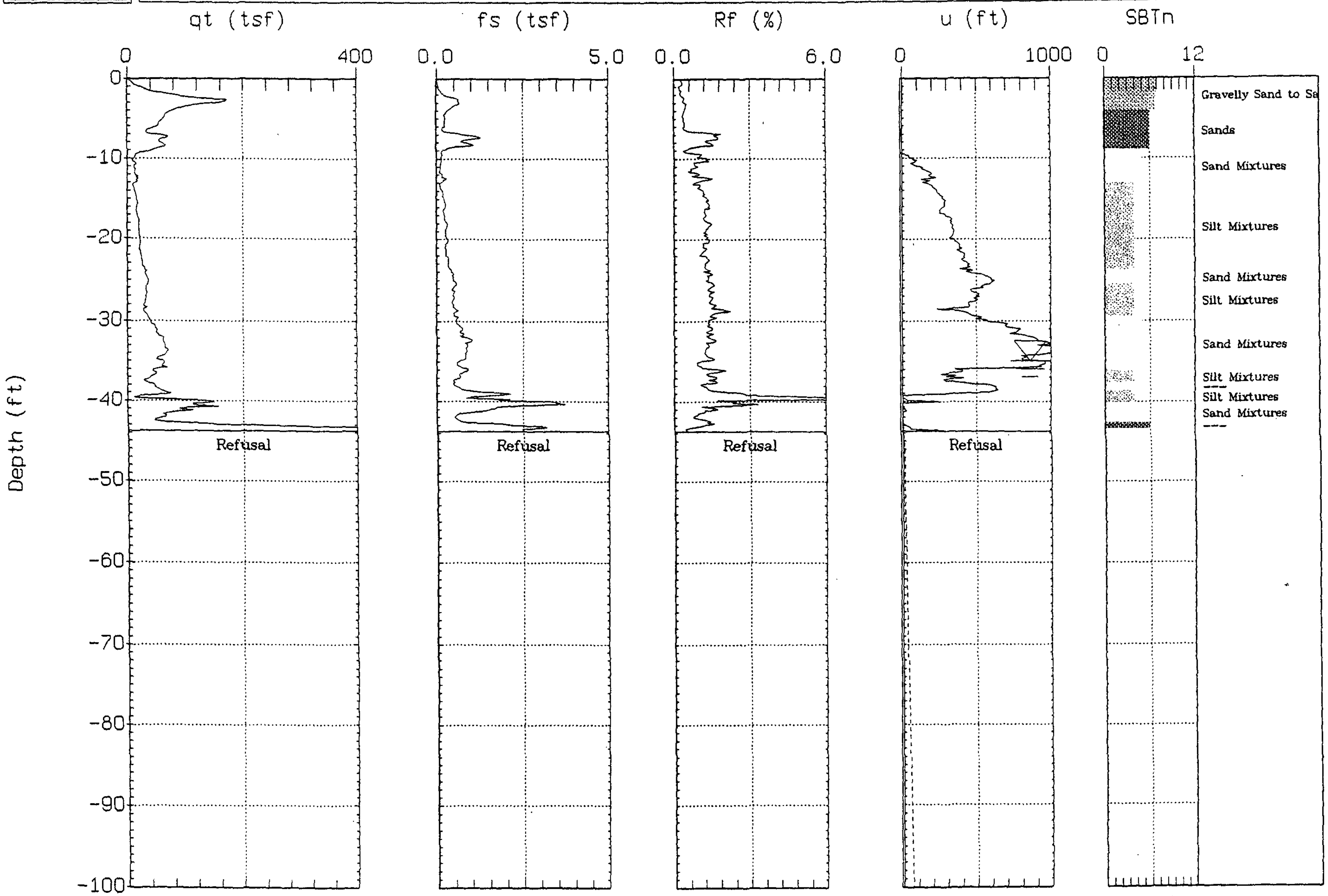


Max. Depth: 34.45 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

Schnabel Engineering Sounding: C-403 Location: C C N P P

Cone: STD 20T AD-195 Date: 07:24:06 14:30



Max. Depth: 43.80 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

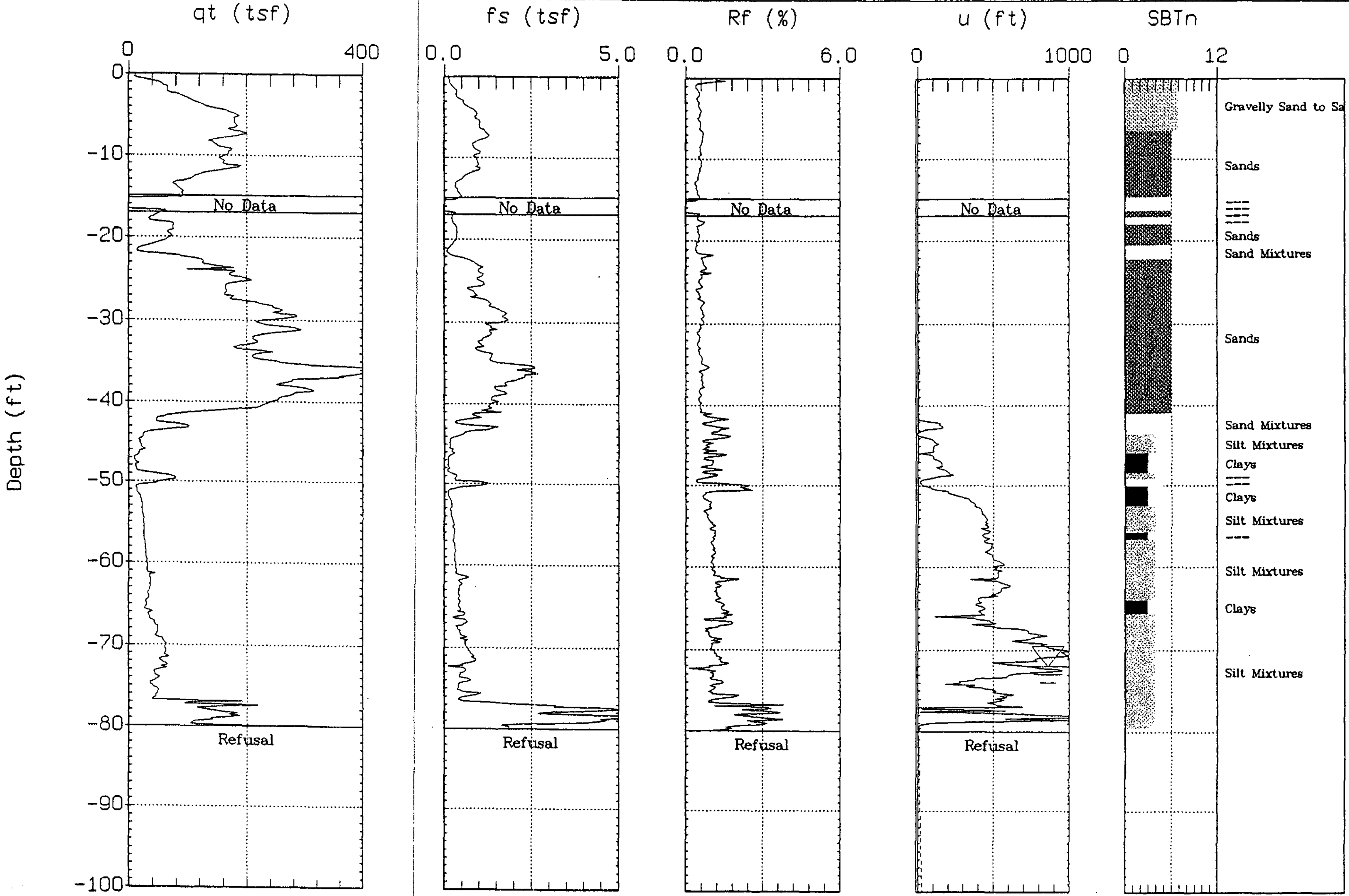
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-404
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:14:06 11:17



Max. Depth: 80.05 (ft)
Depth Inc.: 0.164 (ft)

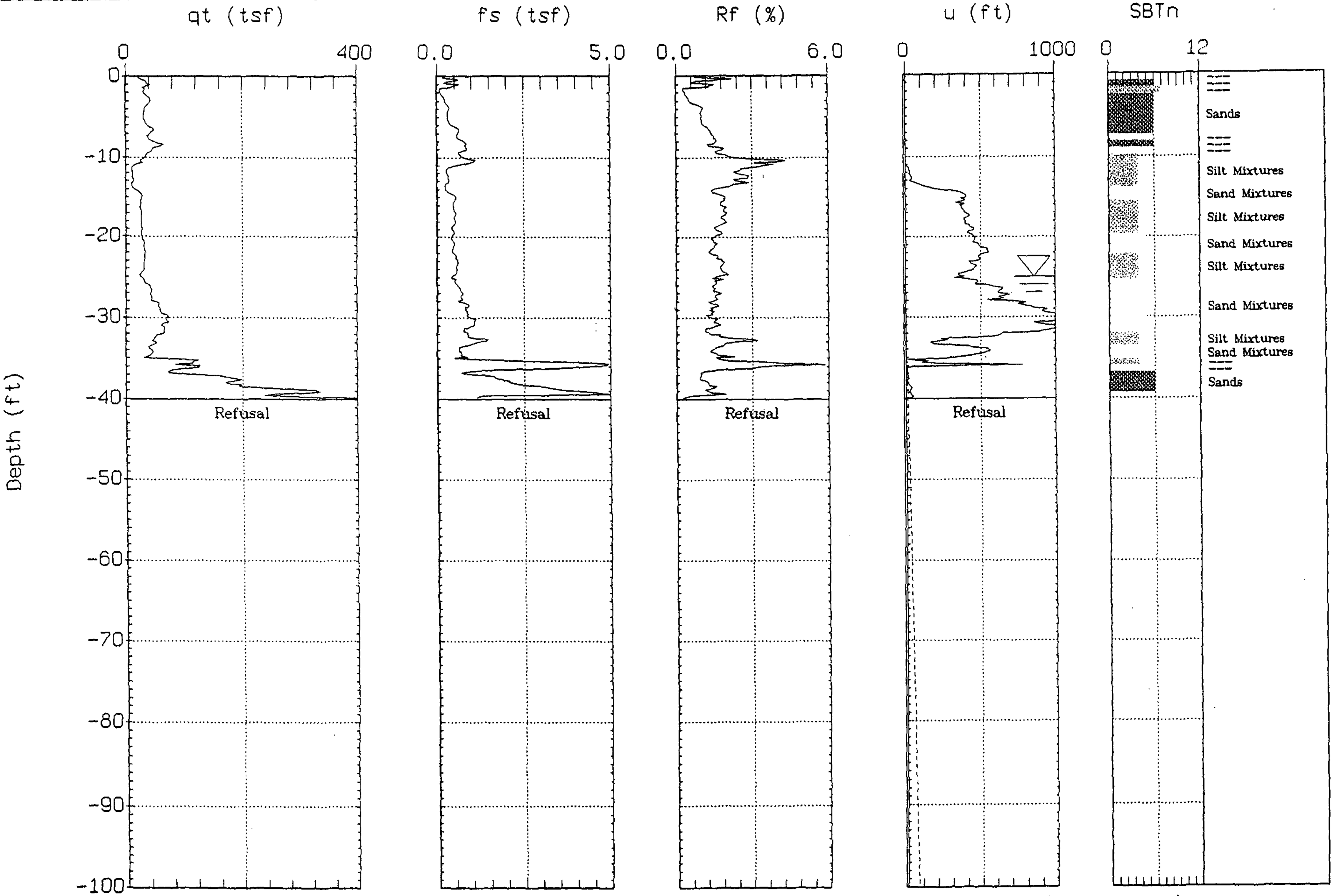
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-405
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:20:06 15:03



Max. Depth: 40.03 (ft)
Depth Inc.: 0.164 (ft)

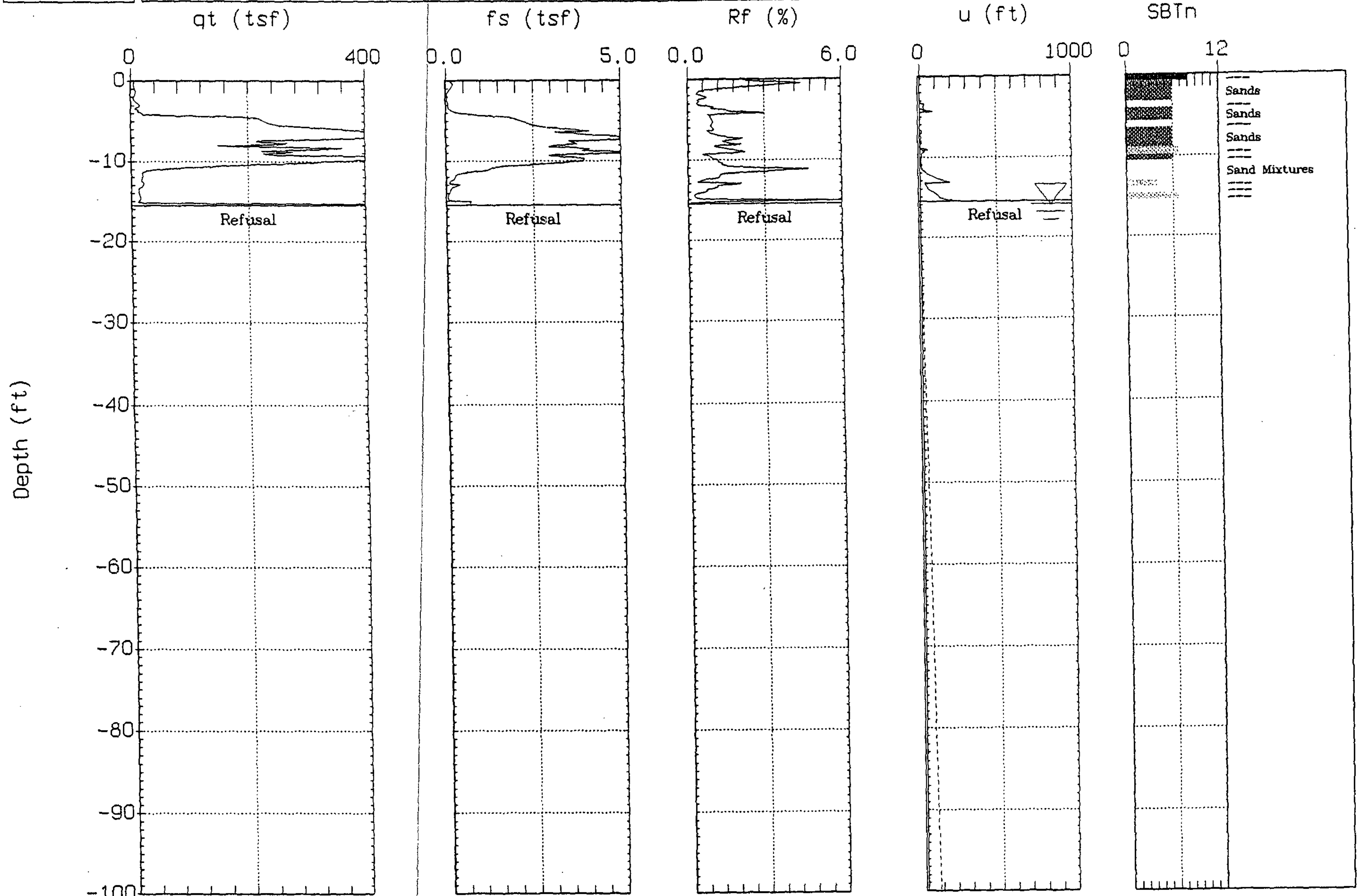
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-406
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:13:06 15:51



Max. Depth: 15.58 (ft)
Depth Inc.: 0.164 (ft)

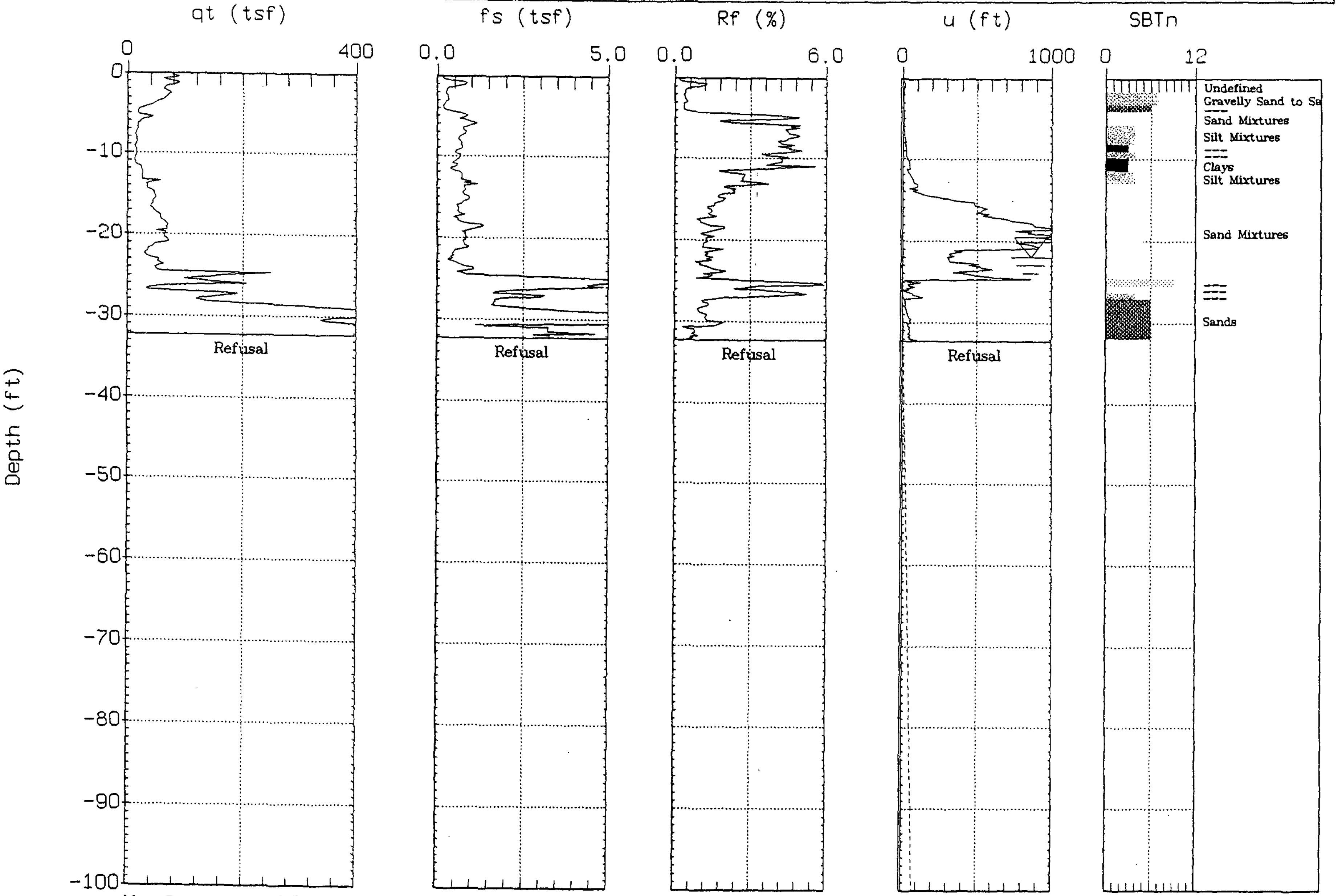
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

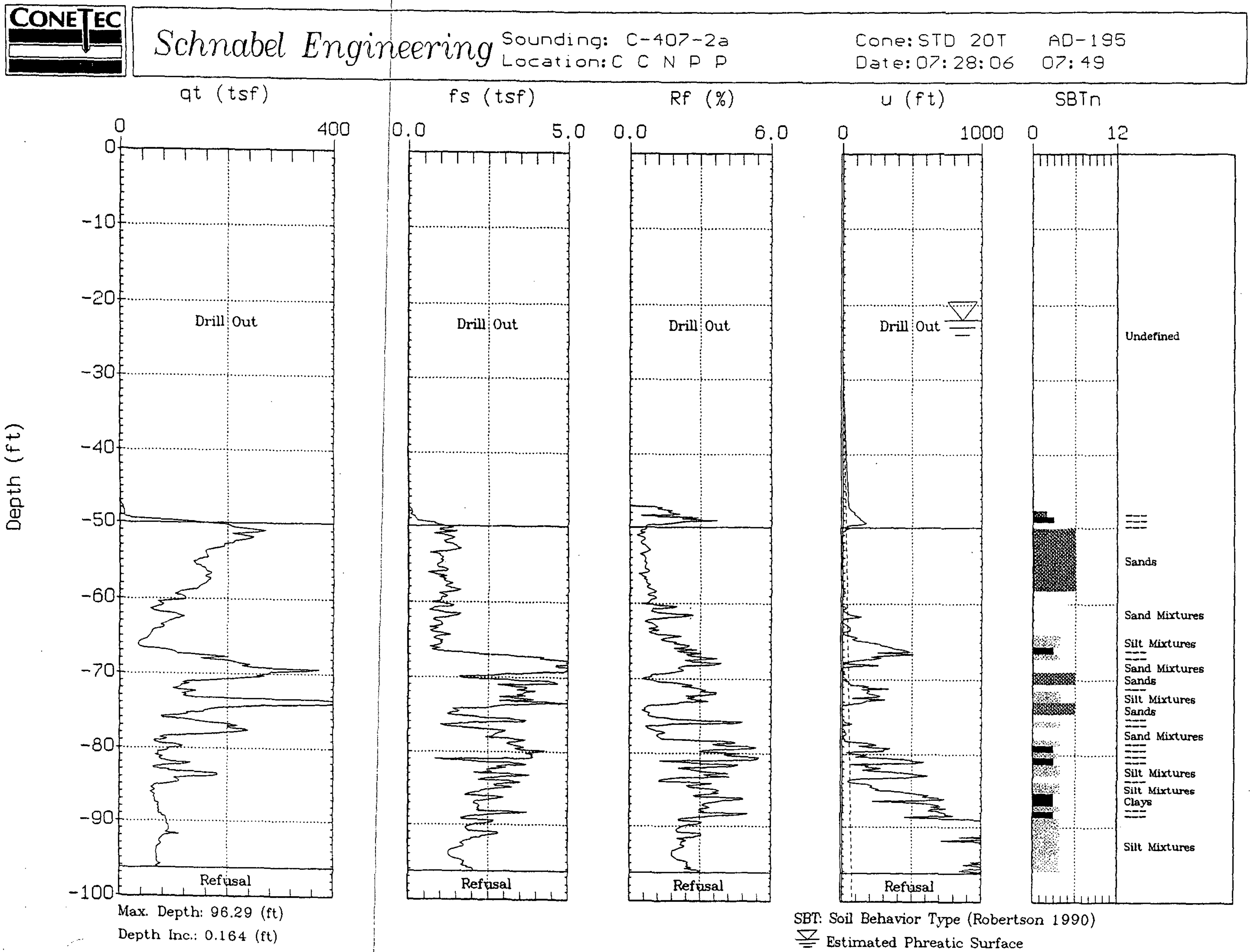
Sounding: C-407
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:13:06 11:25



Max. Depth: 32.32 (ft)
Depth Inc.: 0.164 (ft)

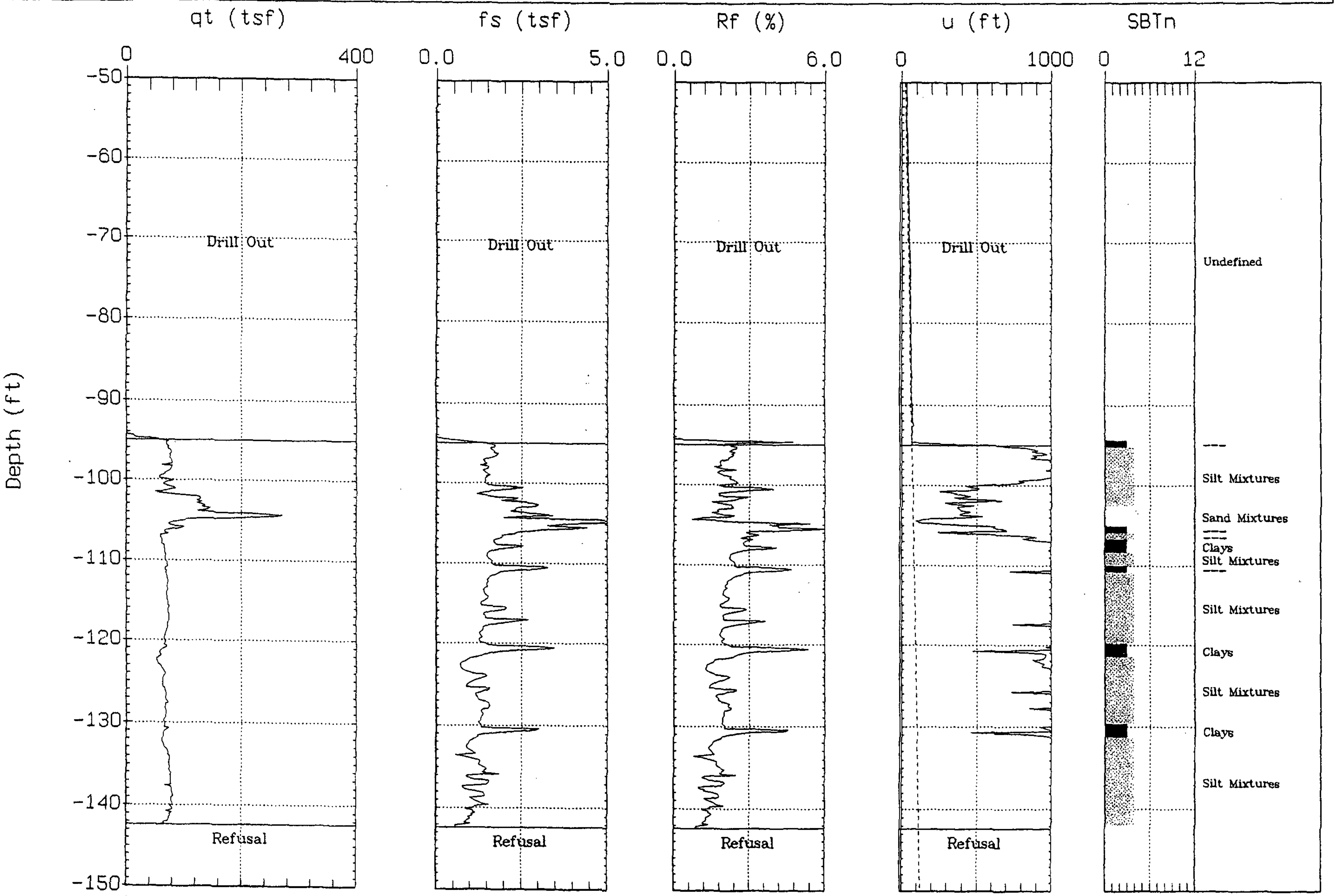
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface



CONETEC
Schnabel Engineering
Sounding: C-407-2a
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:28:06 07:49
qt (tsf)
fs (tsf)
Rf (%)
u (ft)
SBTn
Depth (ft)
Drill Out
Refusal
Undefined
Sands
Sand Mixtures
Silt Mixtures
Clays
Max. Depth: 96.29 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering Sounding: C-407-b Location: C C N P P Cone: STD 20T AD-195 Date: 07:31:06 09:33



Max. Depth: 142.39 (ft)
Depth Inc.: 0.164 (ft)

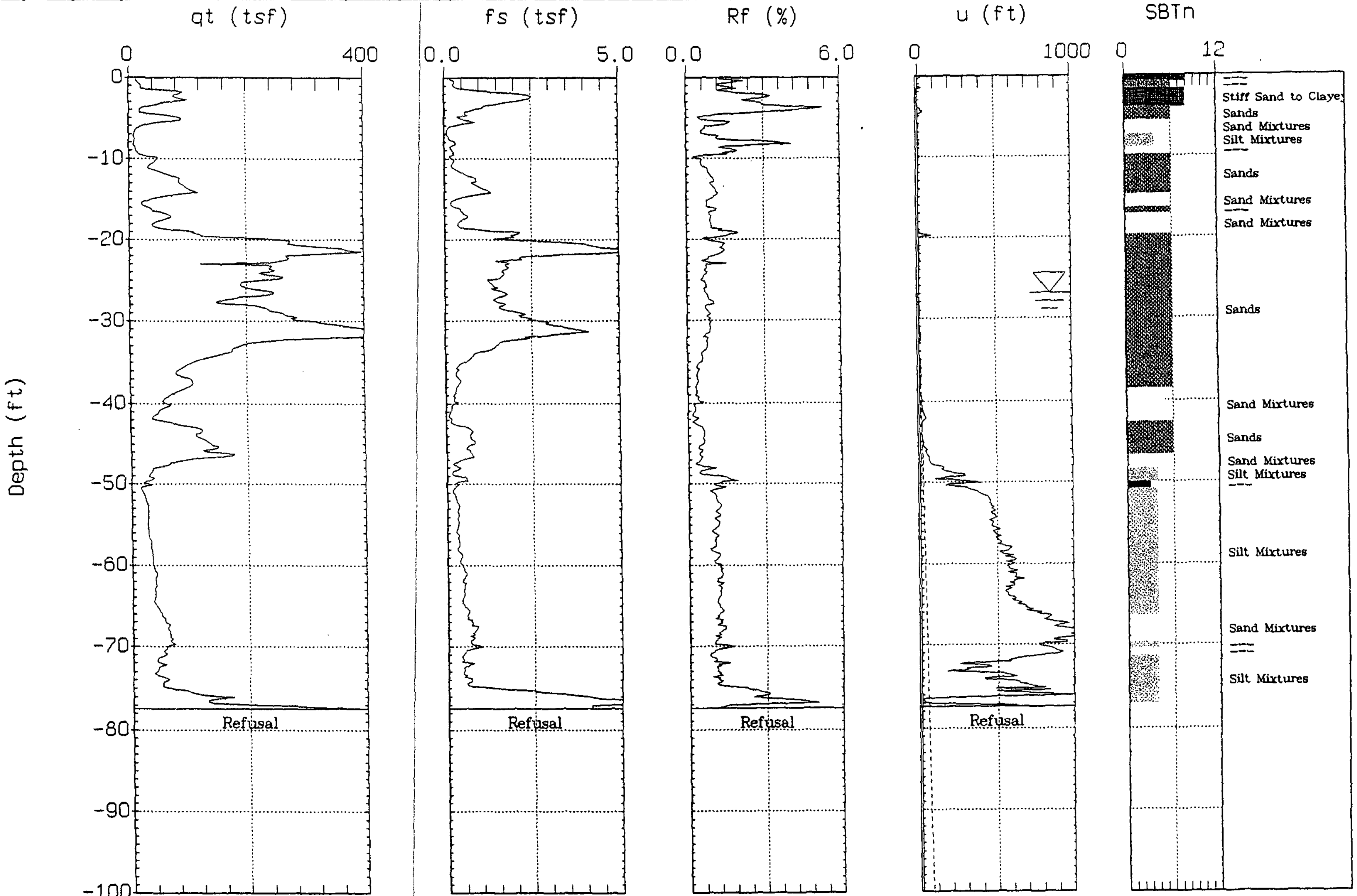
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-408
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:17:06 09:33



Max. Depth: 77.43 (ft)
Depth Inc.: 0.164 (ft)

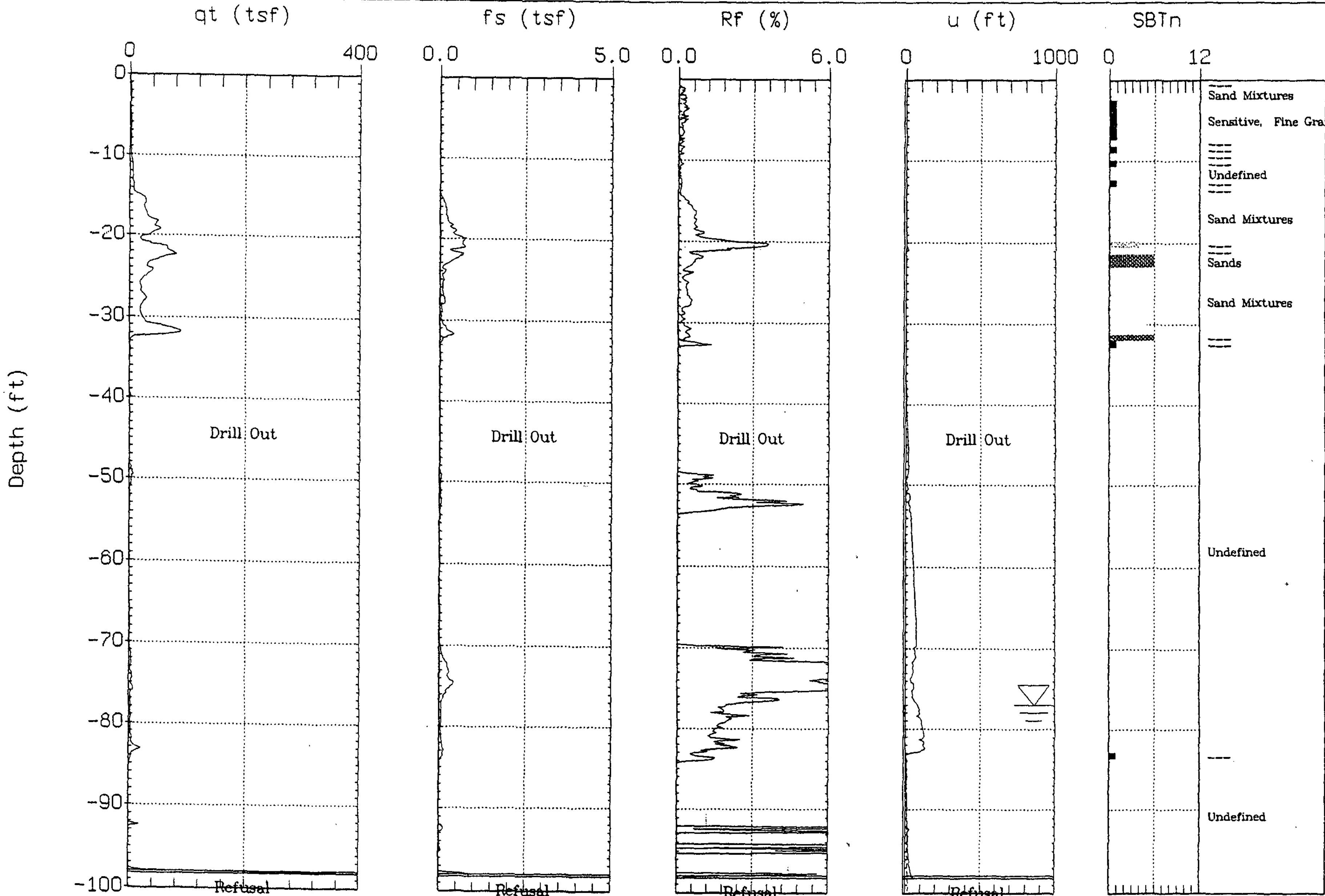
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-408a
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:24:06 16:52



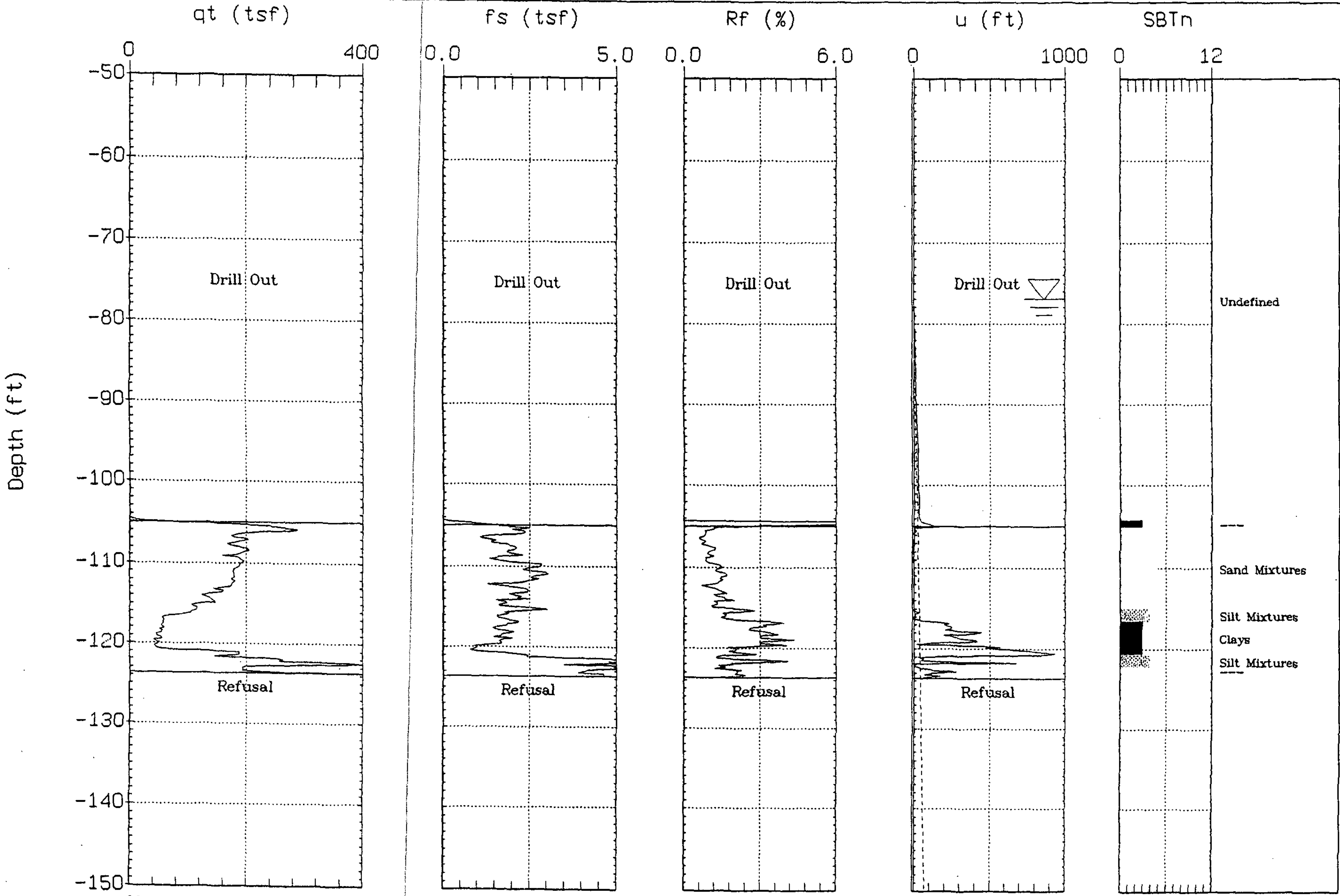
Max. Depth: 98.26 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-408-2a
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:31:06 15:16



Max. Depth: 123.69 (ft)
Depth Inc.: 0.164 (ft)

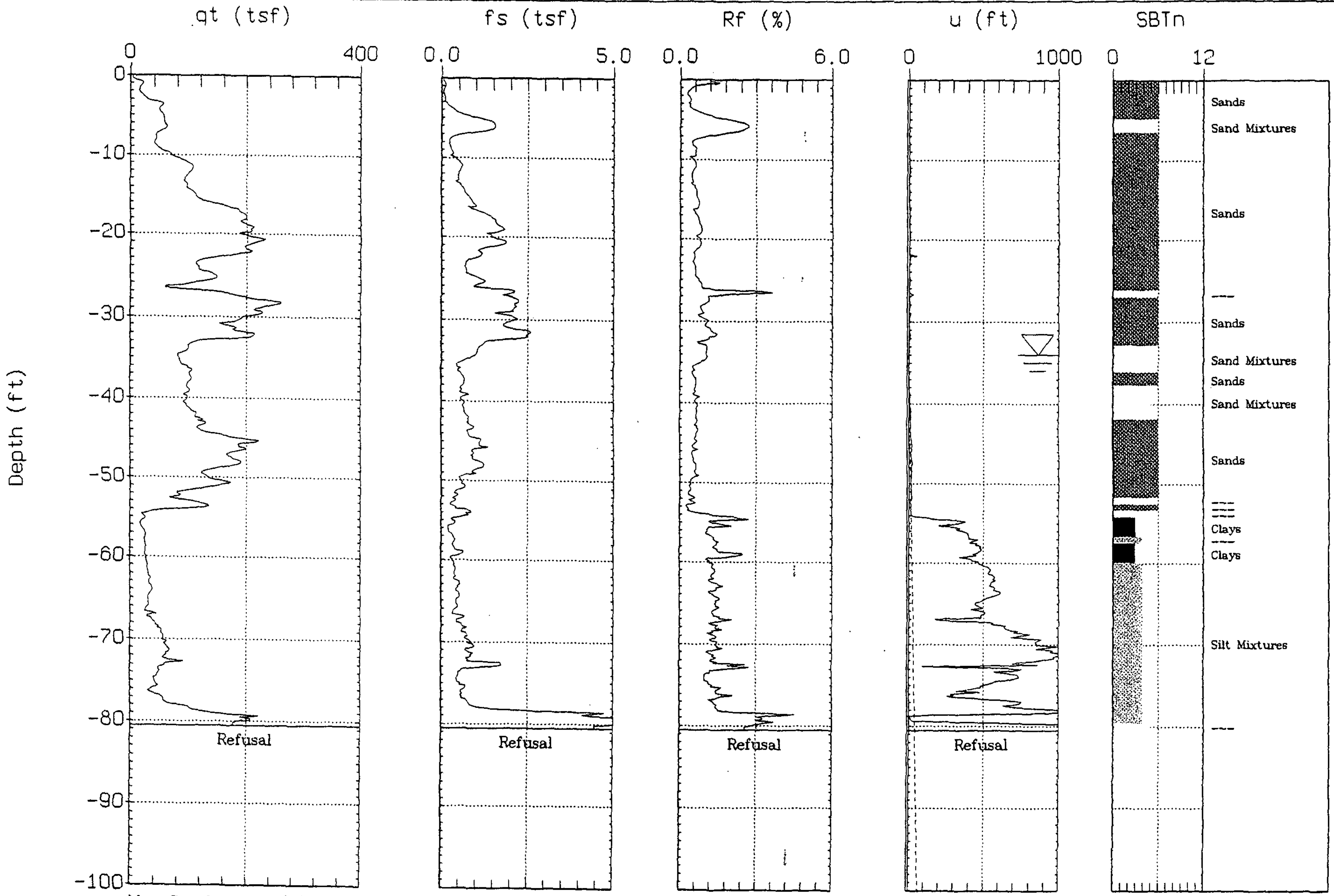
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-409
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:21:06 11:02



Max. Depth: 80.54 (ft)
Depth Inc.: 0.164 (ft)

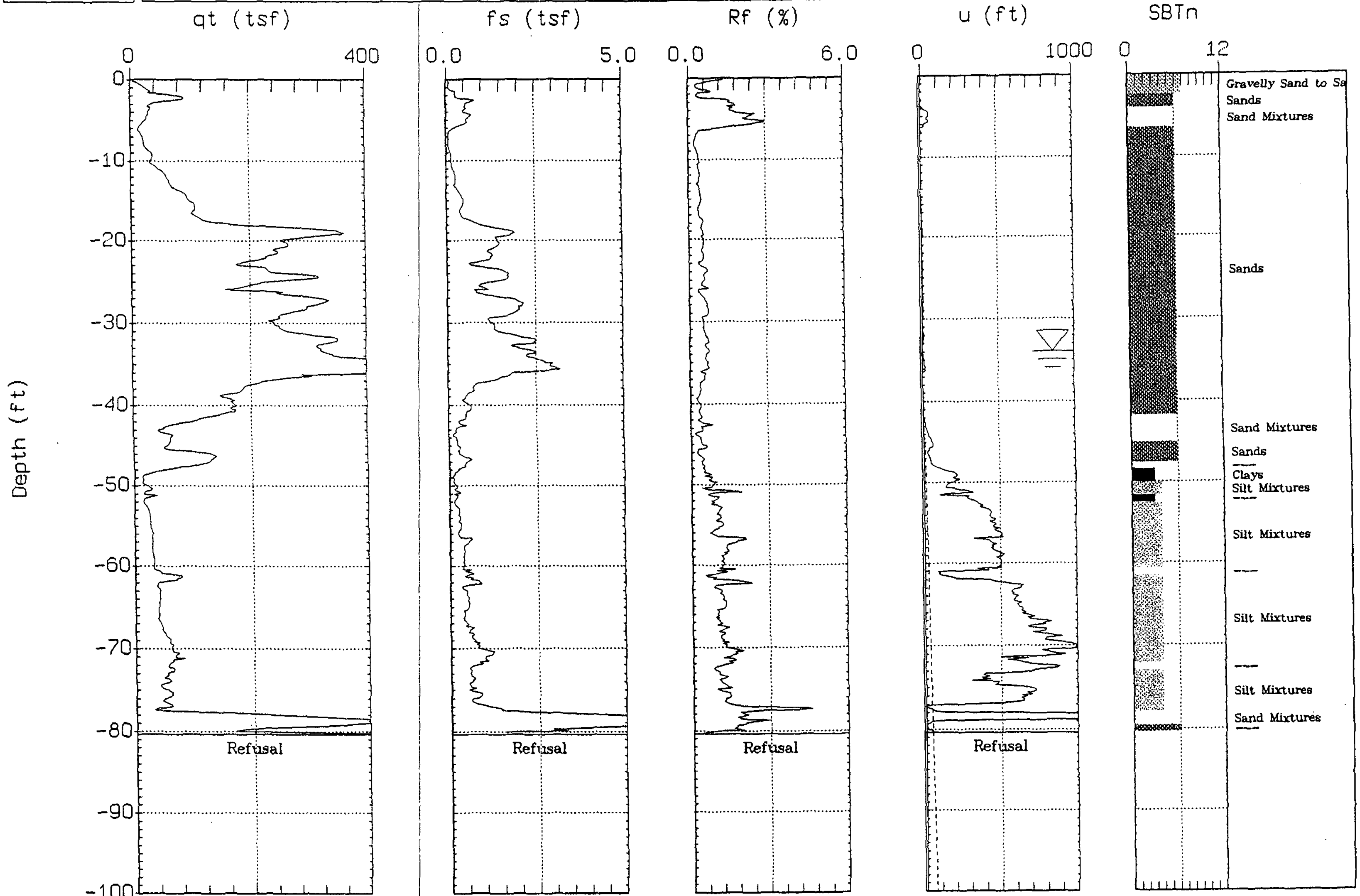
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-411
Location: C C N P P

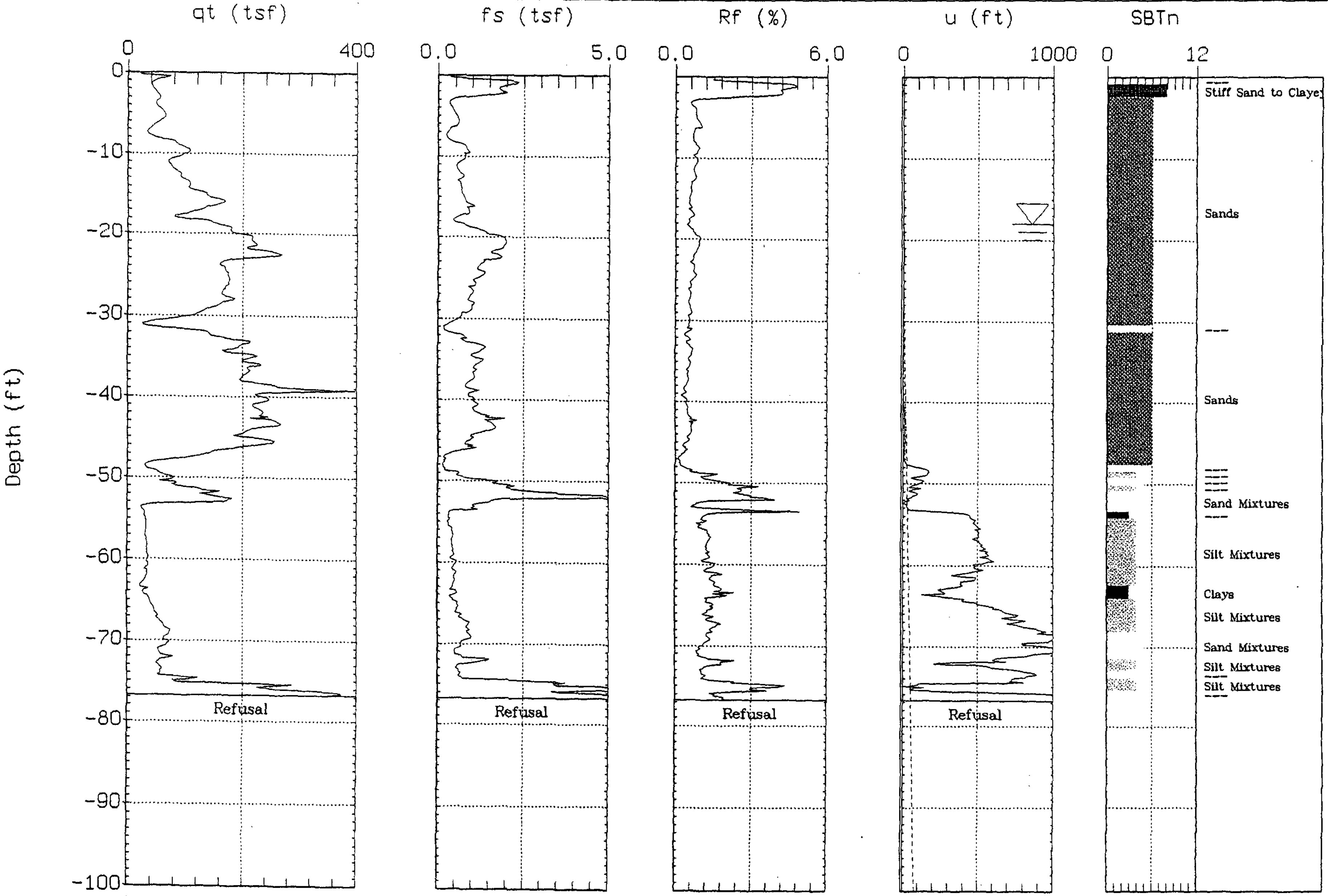
Cone: STD 20T AD-195
Date: 07:24:06 09:36



Max. Depth: 80.38 (ft)
Depth Inc.: 0.164 (ft)

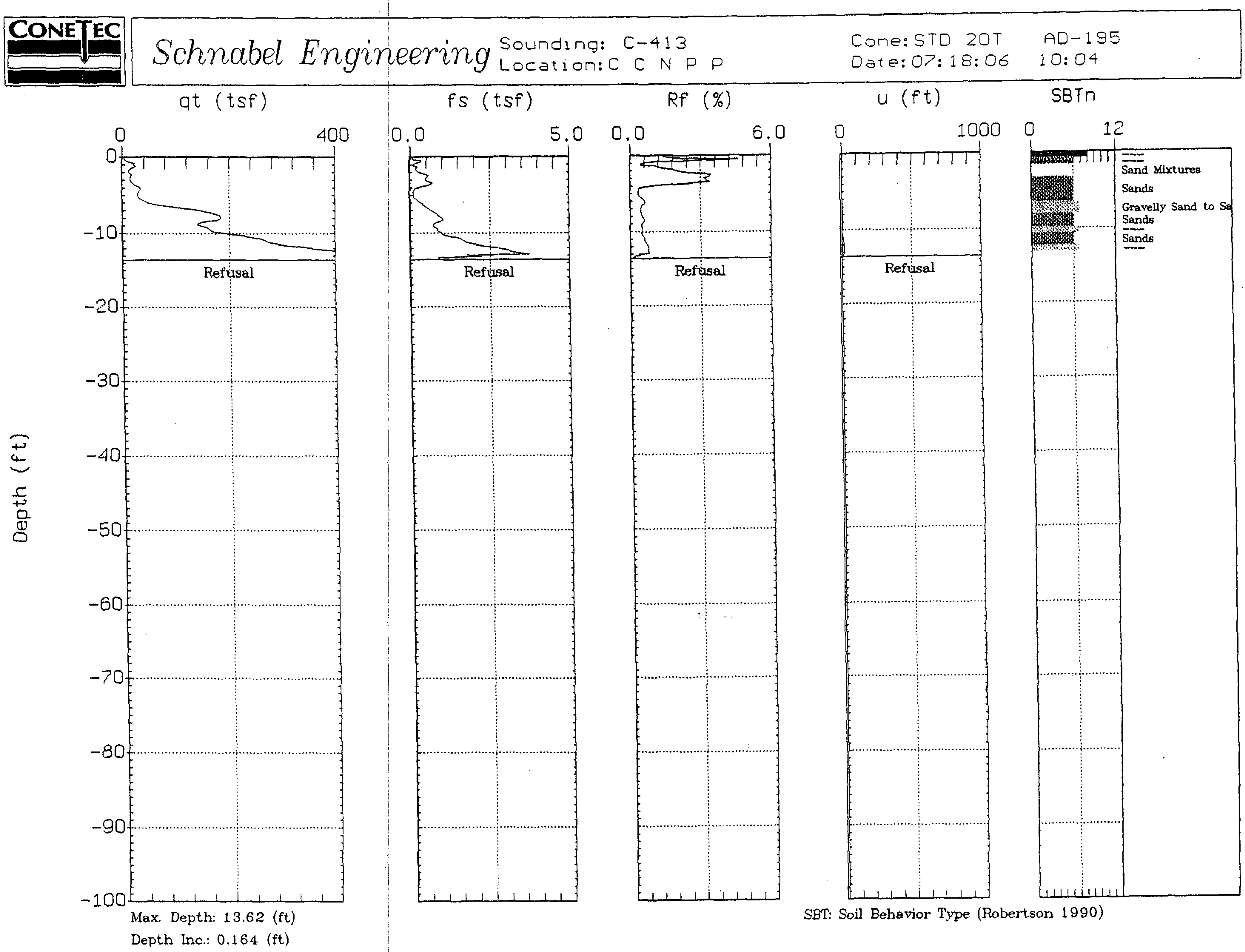
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

Schnabel Engineering
Sounding: C-412
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:20:06 15:57



Max. Depth: 76.77 (ft)
Depth Inc.: 0.164 (ft)

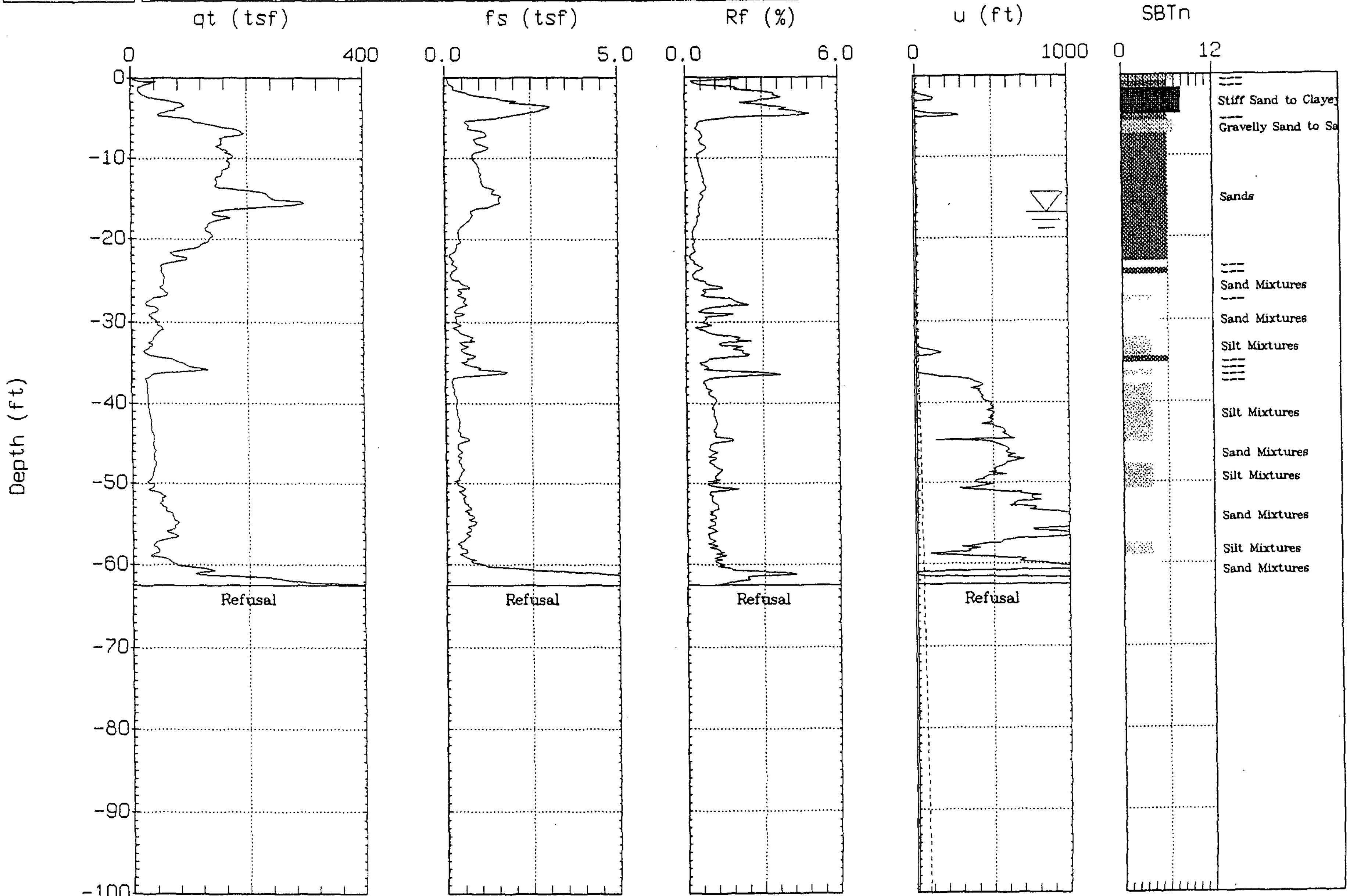
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface


CONETEC
Schnabel Engineering
Sounding: C-413
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:18:06 10:04
qt (tsf)
fs (tsf)
Rf (%)
u (ft)
SBTn
0
400
0.0
5.0
0.0
6.0
0
1000
0
12
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Depth (ft)
Refusal
Refusal
Refusal
Refusal
Sand Mixtures
Sands
Gravelly Sand to Sa
Sands
Sands
Max. Depth: 13.62 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)

Schnabel Engineering

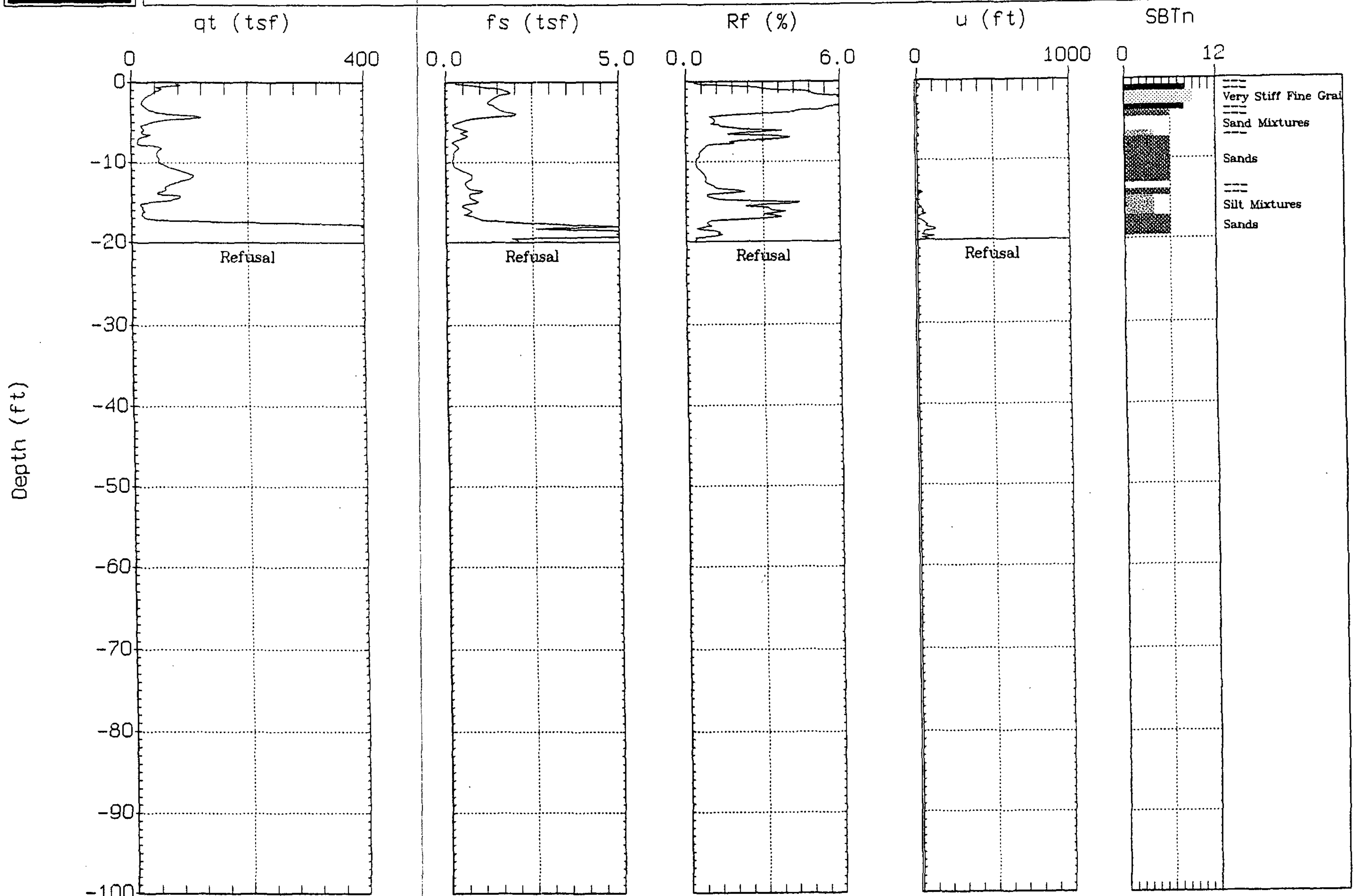
Sounding: C-414
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:18:06 10:41



Max. Depth: 62.50 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface



Max. Depth: 20.01 (ft)
Depth Inc.: 0.164 (ft)

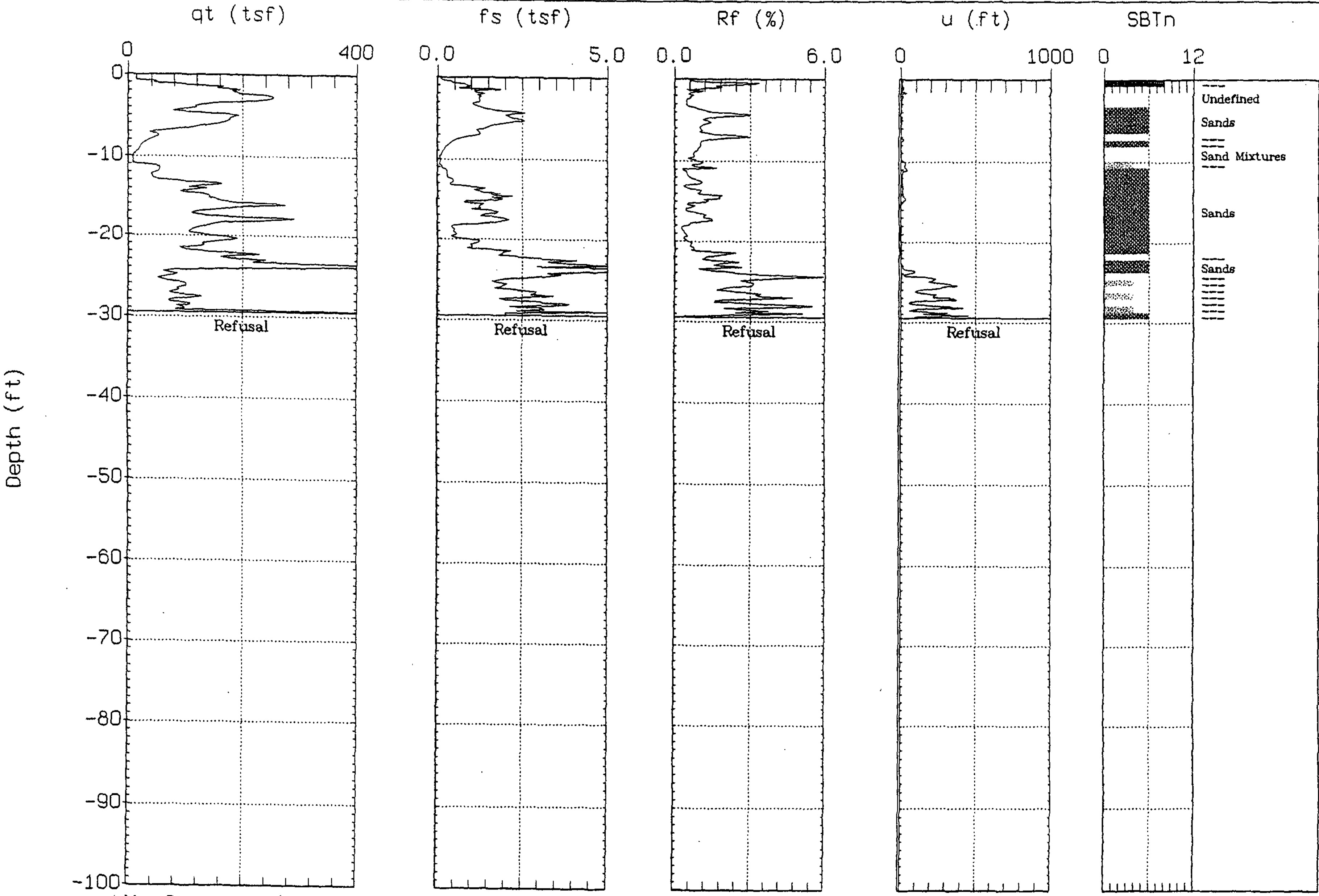
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-701
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:21:06 08:39



Max. Depth: 29.53 (ft)
Depth Inc.: 0.164 (ft)

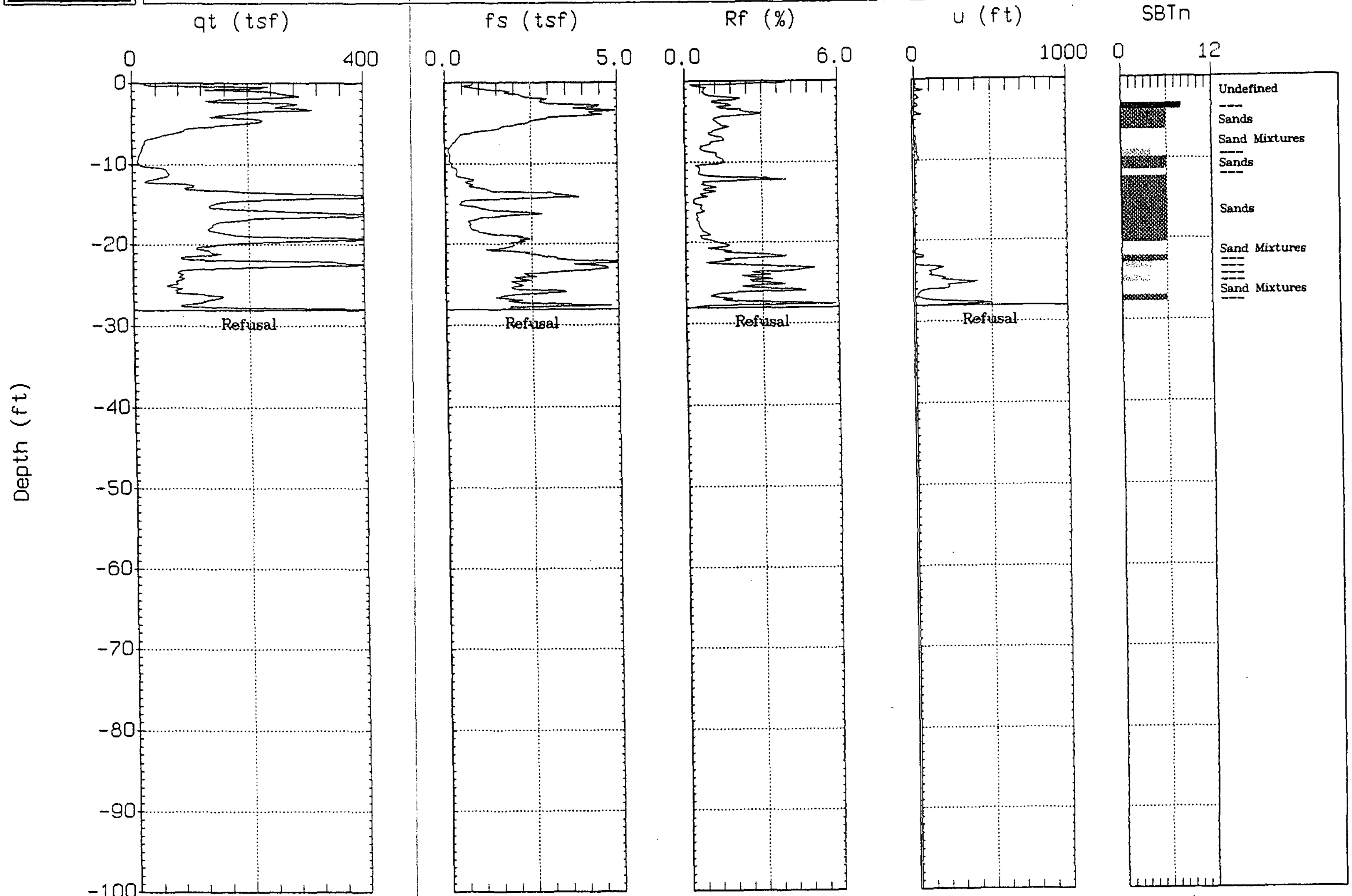
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-701a
Location: C C N P P

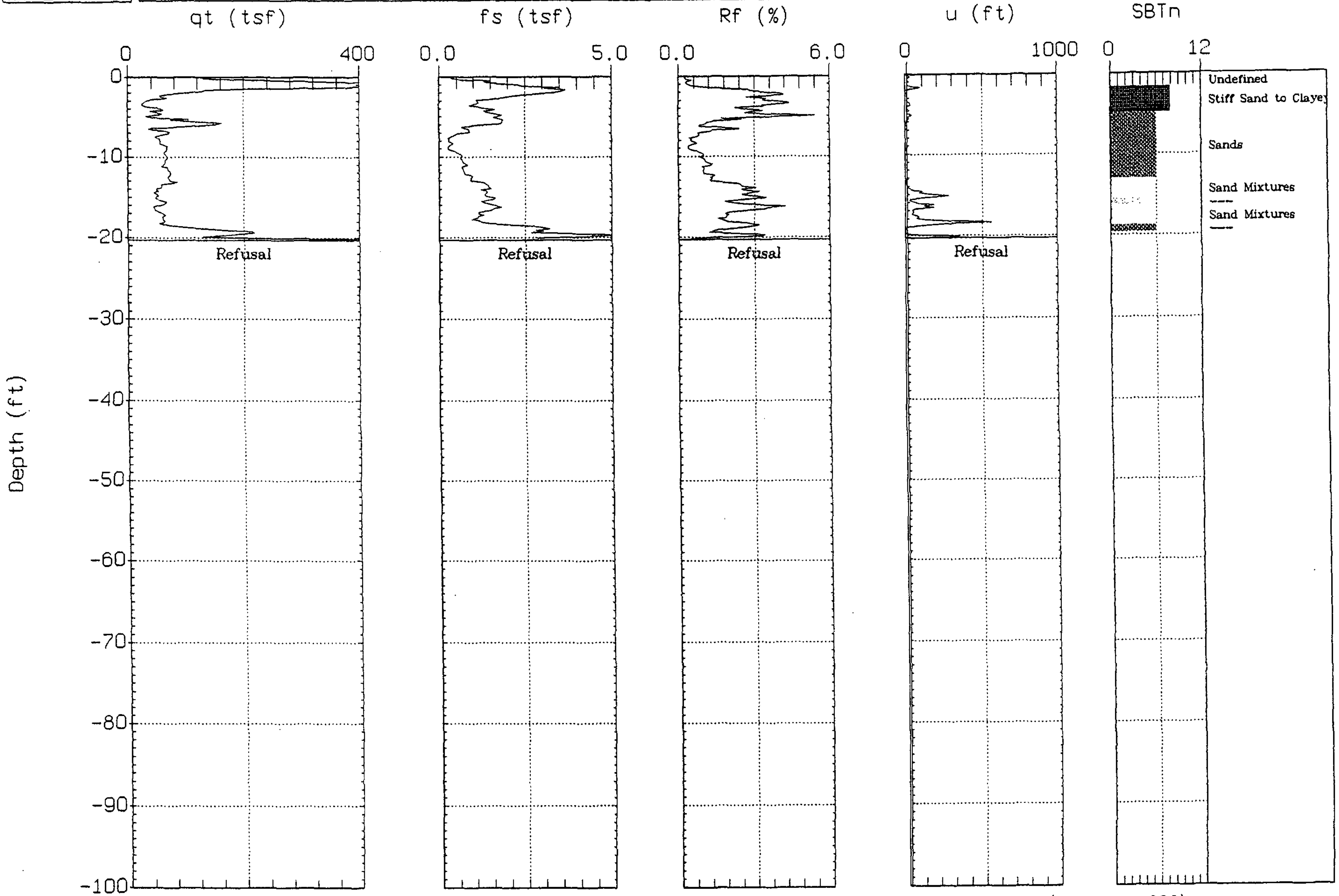
Cone: STD 20T AD-195
Date: 07:21:06 09:15



Max. Depth: 28.05 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

Schnabel Engineering
Sounding: C-702
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:21:06 08:09



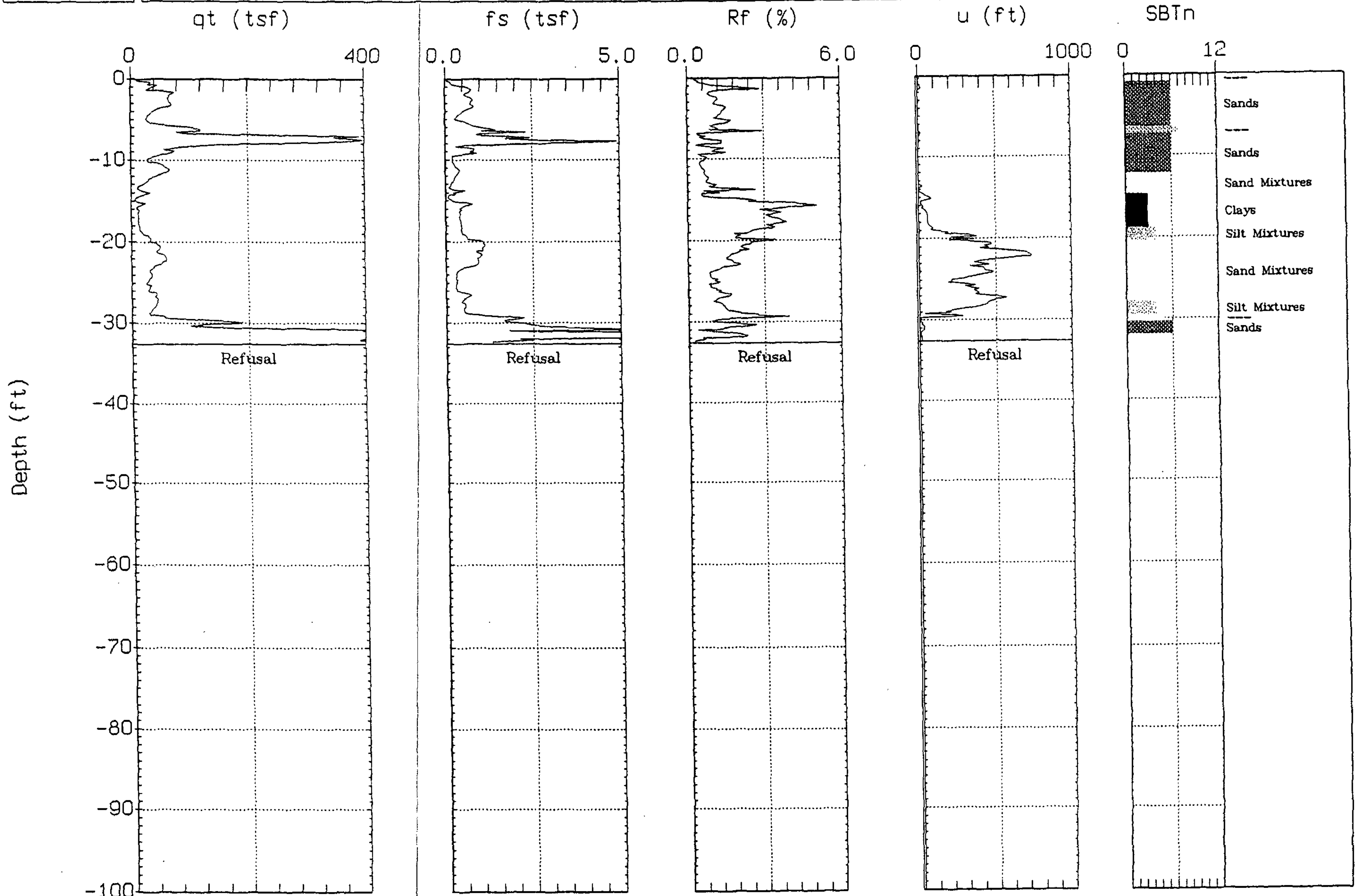
Max. Depth: 20.34 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

Schnabel Engineering

Sounding: C-703
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:14:06 10:10



Max. Depth: 32.64 (ft)
Depth Inc.: 0.164 (ft)

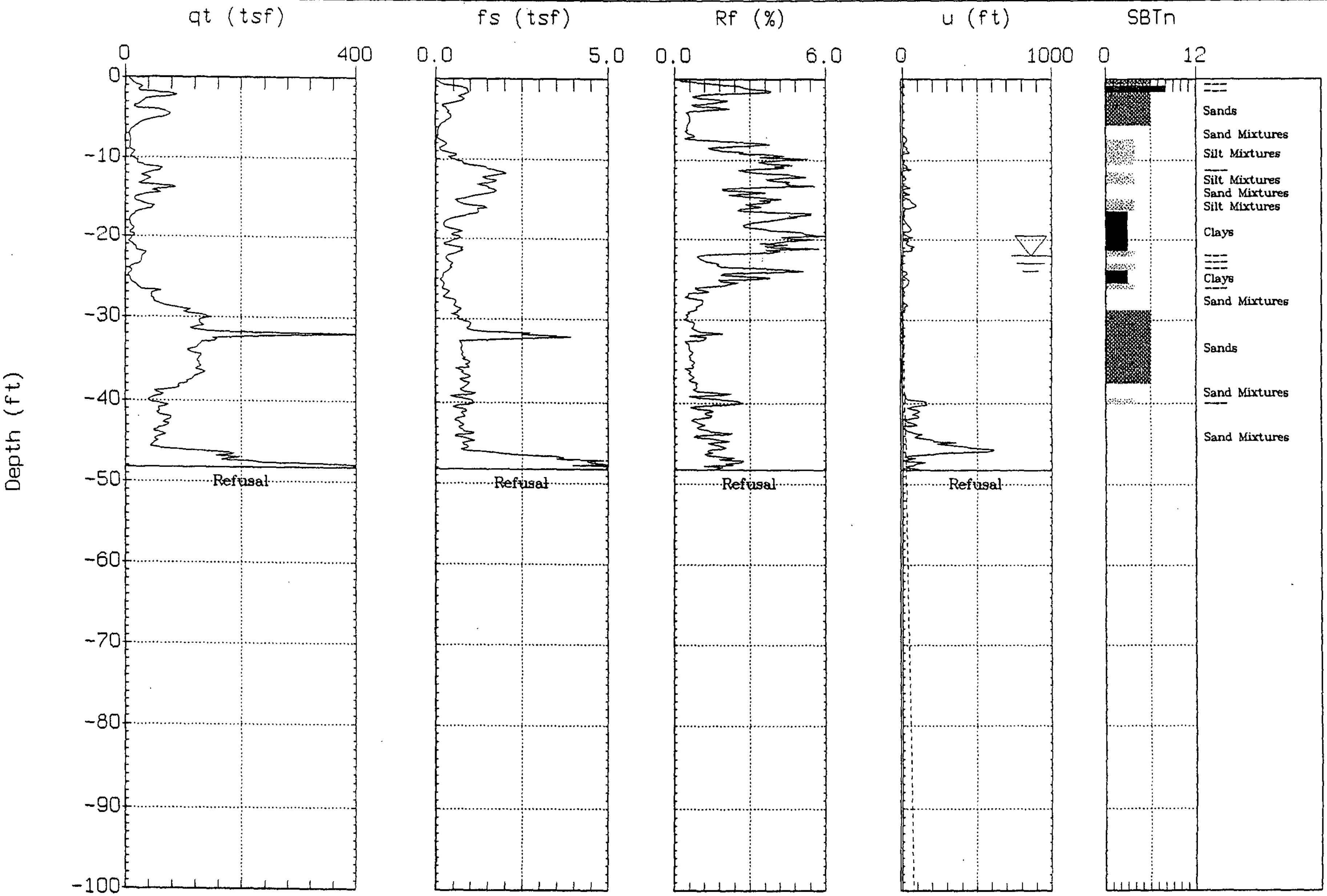
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-704
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:14:06 08:15



Max. Depth: 48.23 (ft)
Depth Inc.: 0.164 (ft)

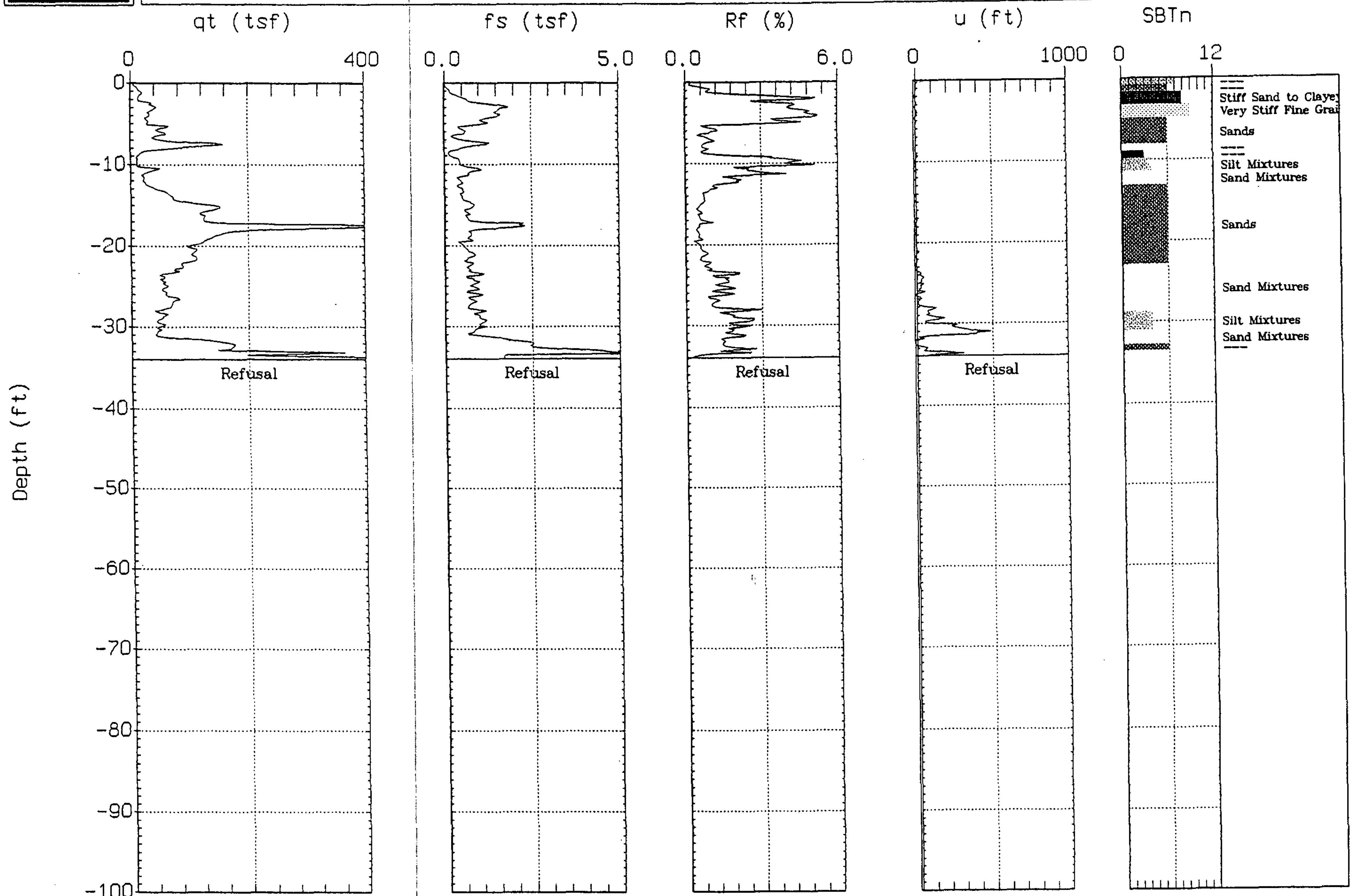
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-705
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:14:06 09:06



Max. Depth: 33.96 (ft)
Depth Inc.: 0.164 (ft)

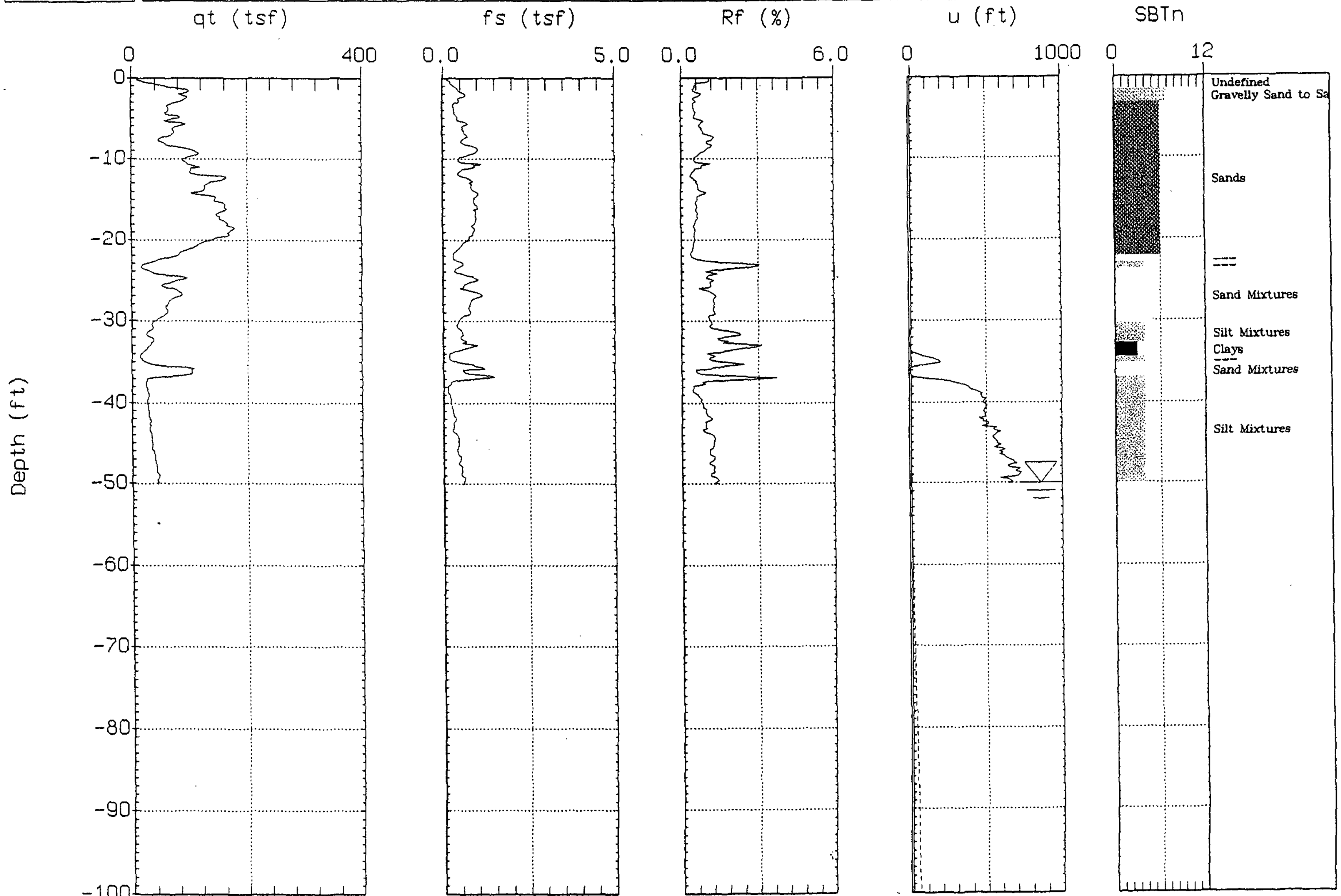
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-706
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:13:06 07:41

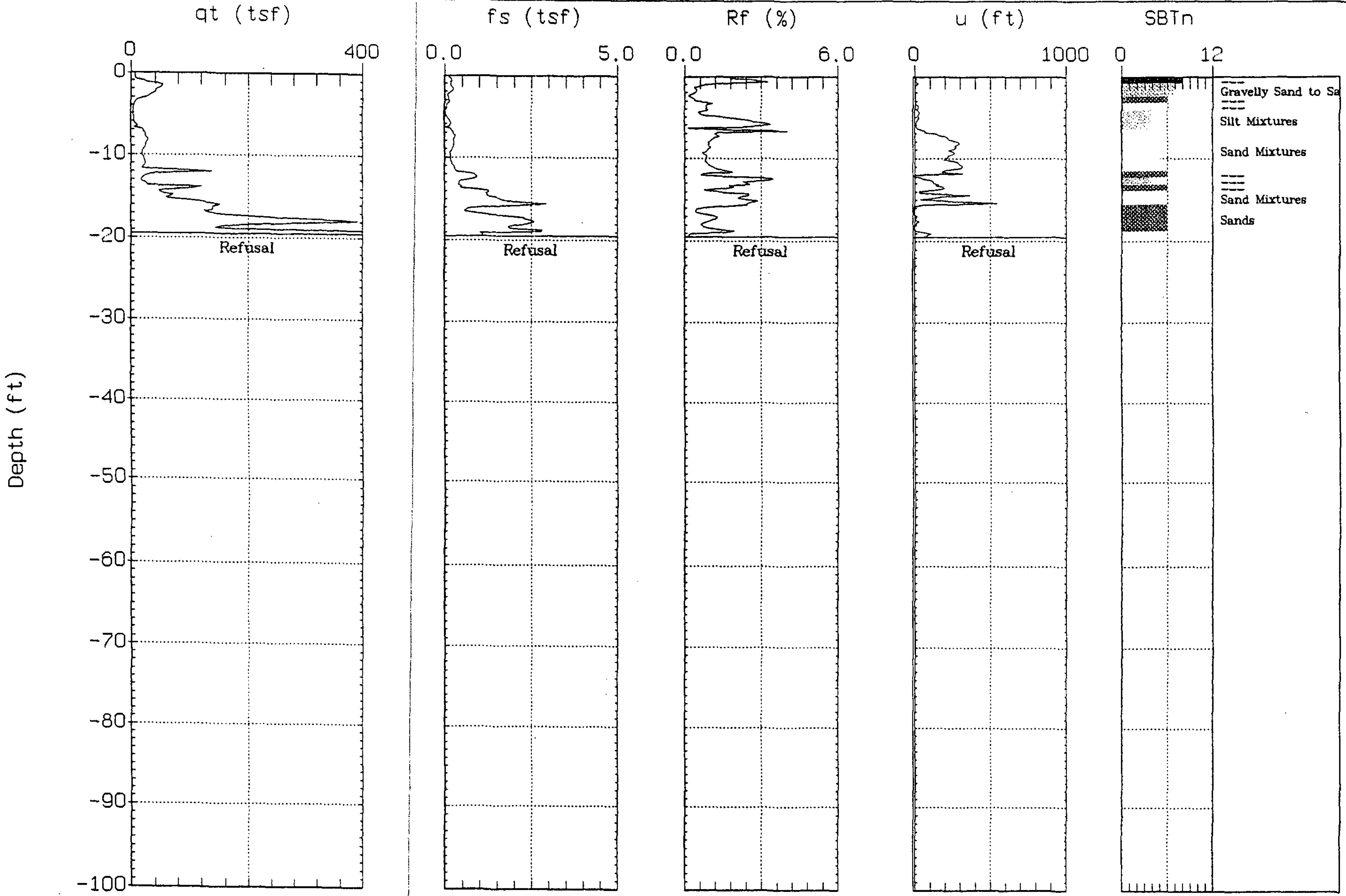


Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering Sounding: C-707 Location: C C N P P Cone: STD 20T AD-195 Date: 07:14:06 07:22



Max. Depth: 19.52 (ft)
Depth Inc.: 0.164 (ft)

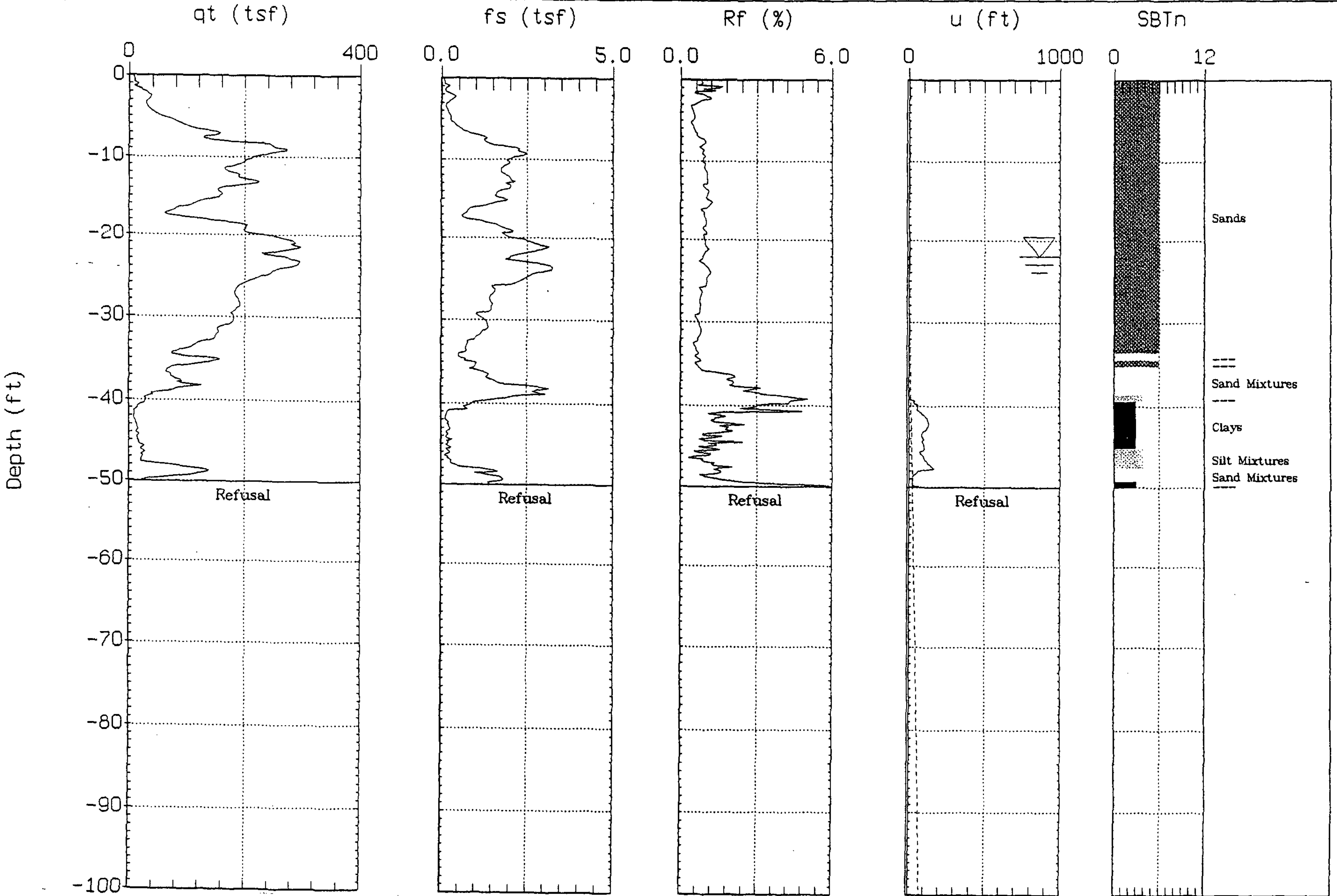
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-708
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:20:06 13:40



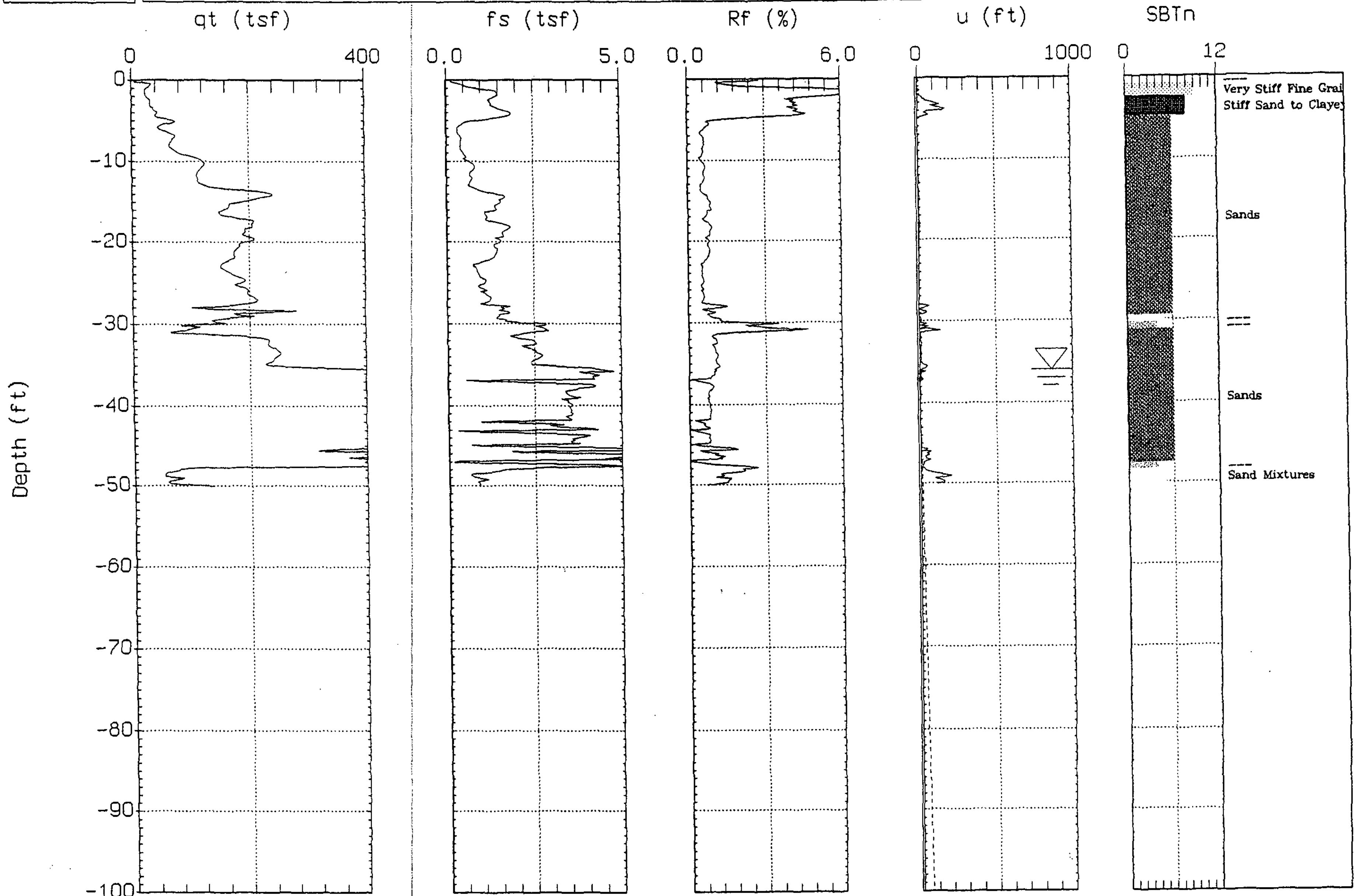
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering Sounding: C-709 Location: C C N P P

Cone: STD 20T AD-195 Date: 07:19:06 15:41

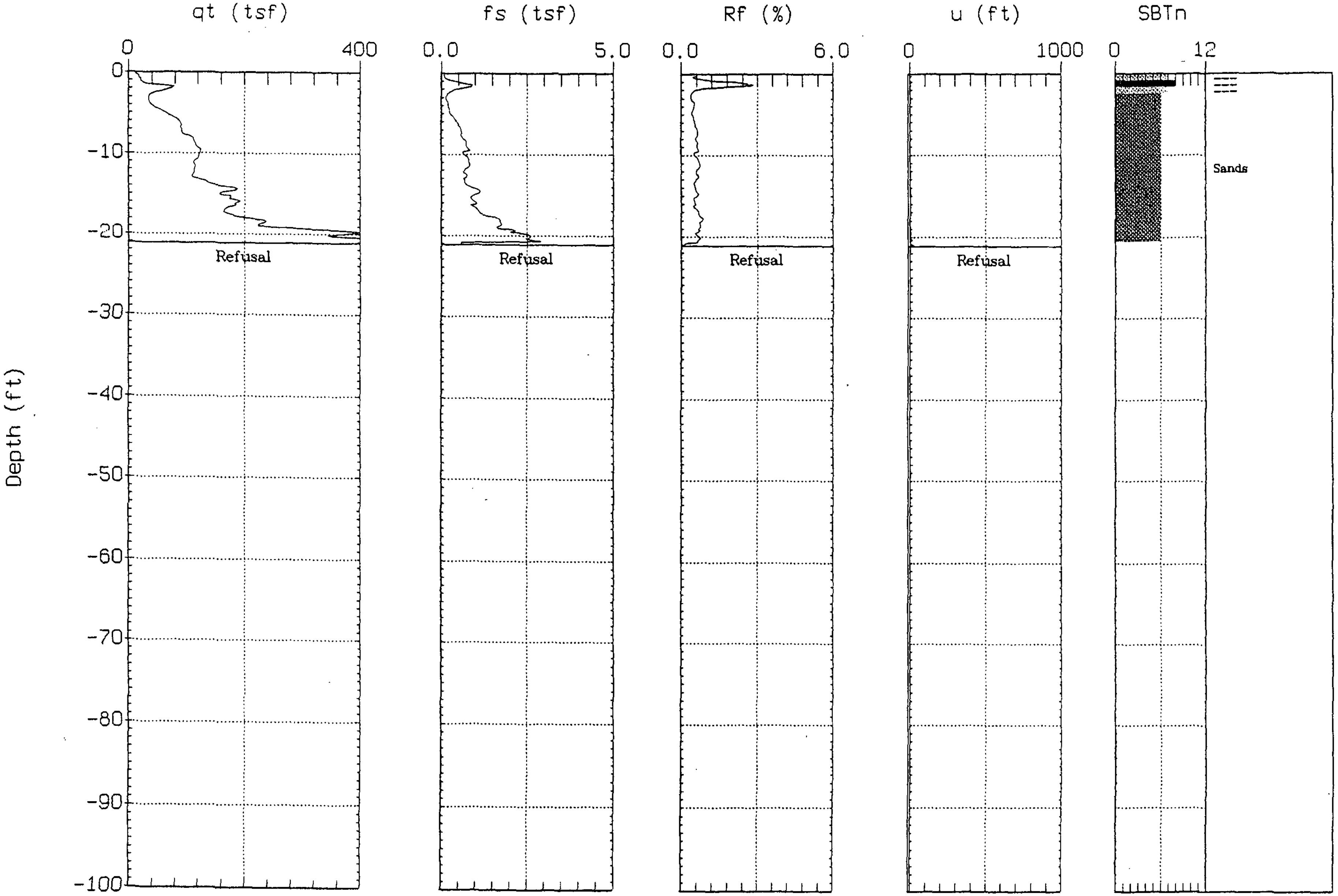


Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

Schnabel Engineering Sounding: C-710 Location: C C N P P

Cone: STD 20T AD-195 Date: 07:18:06 14:18



Max. Depth: 21.16 (ft)
Depth Inc.: 0.164 (ft)

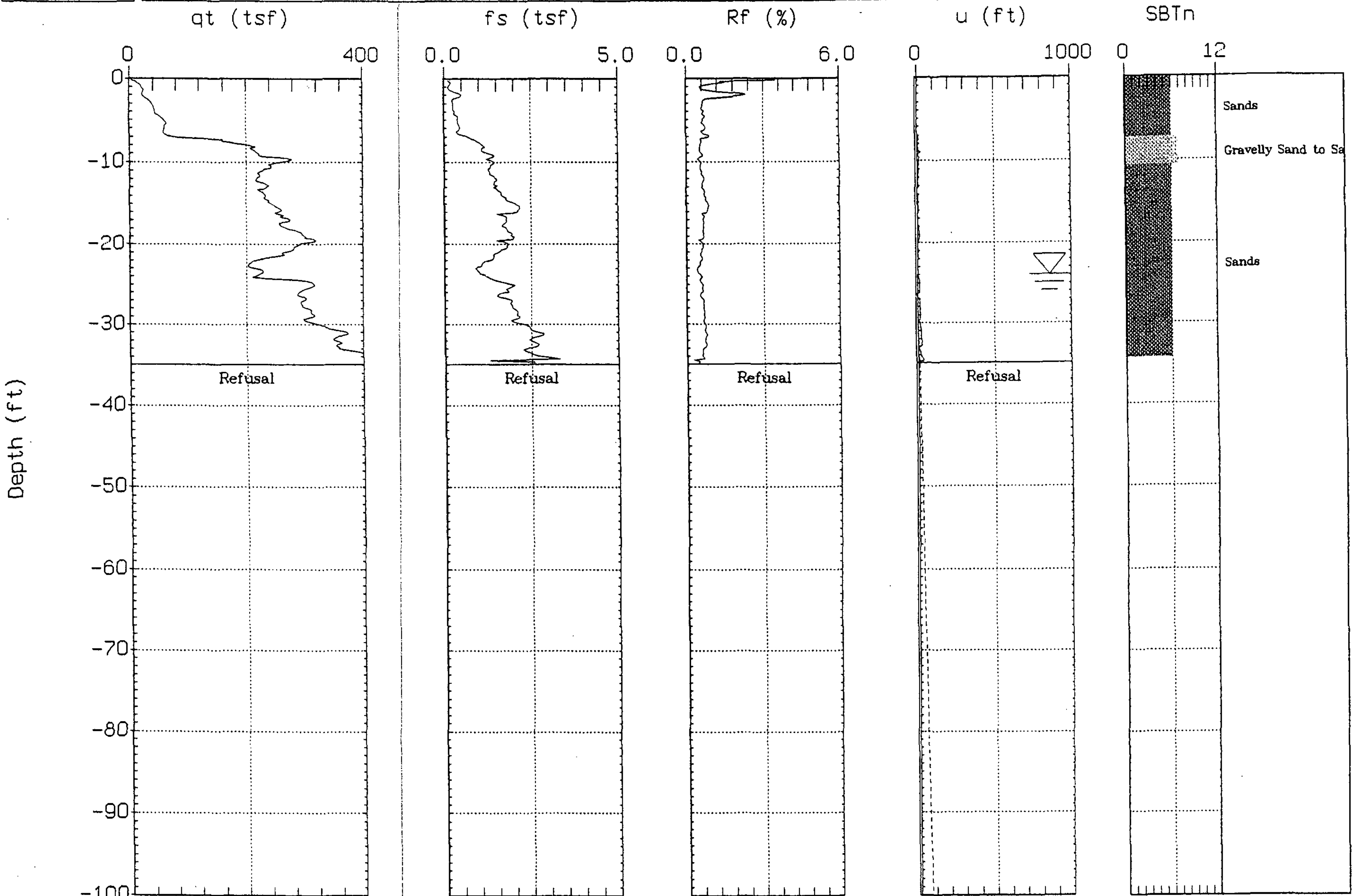
SBT: Soil Behavior Type (Robertson 1990)

ConeTec

Schnabel Engineering

Sounding: C-711
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:20:06 10:57



Max. Depth: 34.94 (ft)
Depth Inc.: 0.164 (ft)

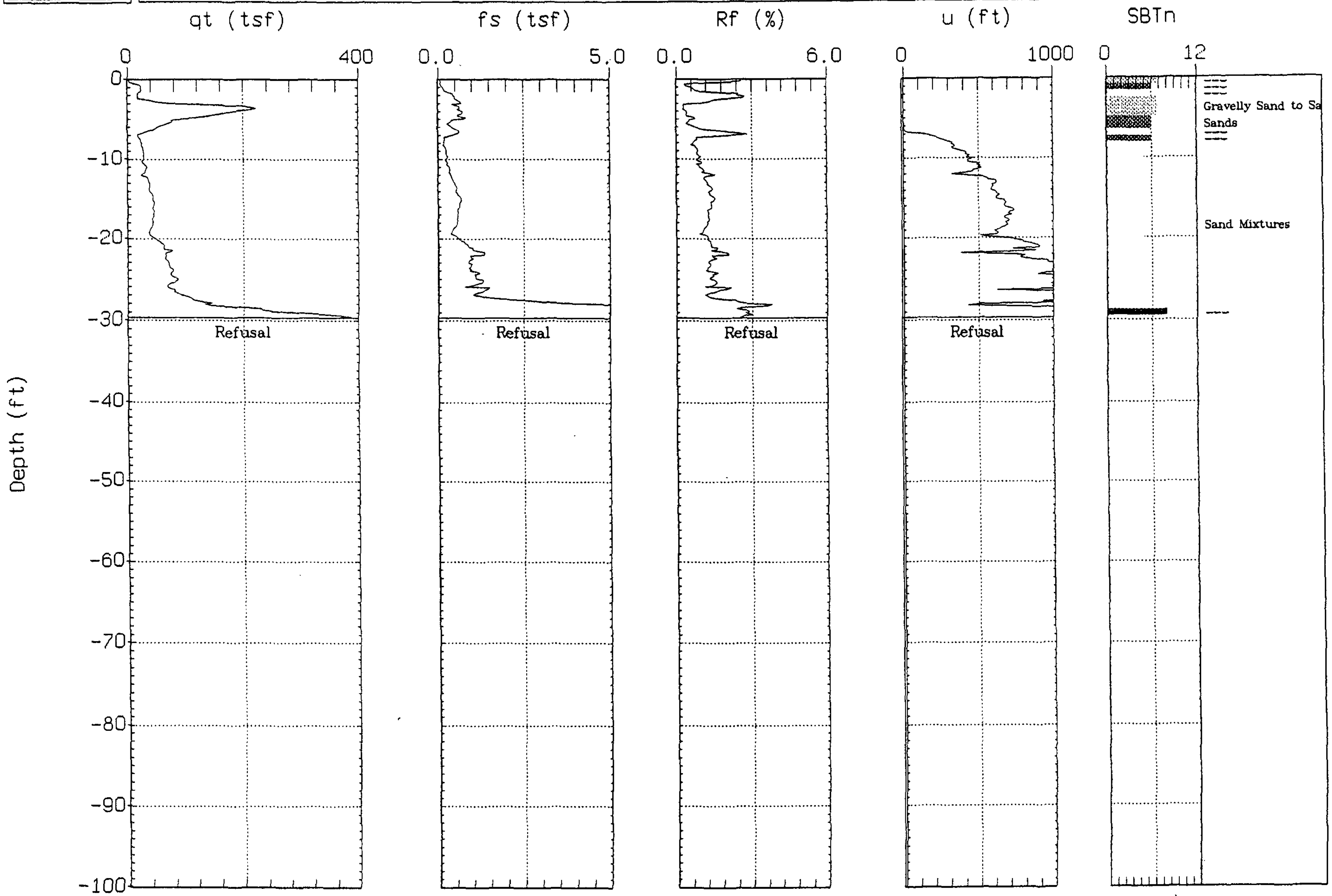
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONE TEC

Schnabel Engineering

Sounding: C-712
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:19:06 10:27



Max. Depth: 29.69 (ft)
Depth Inc.: 0.164 (ft)

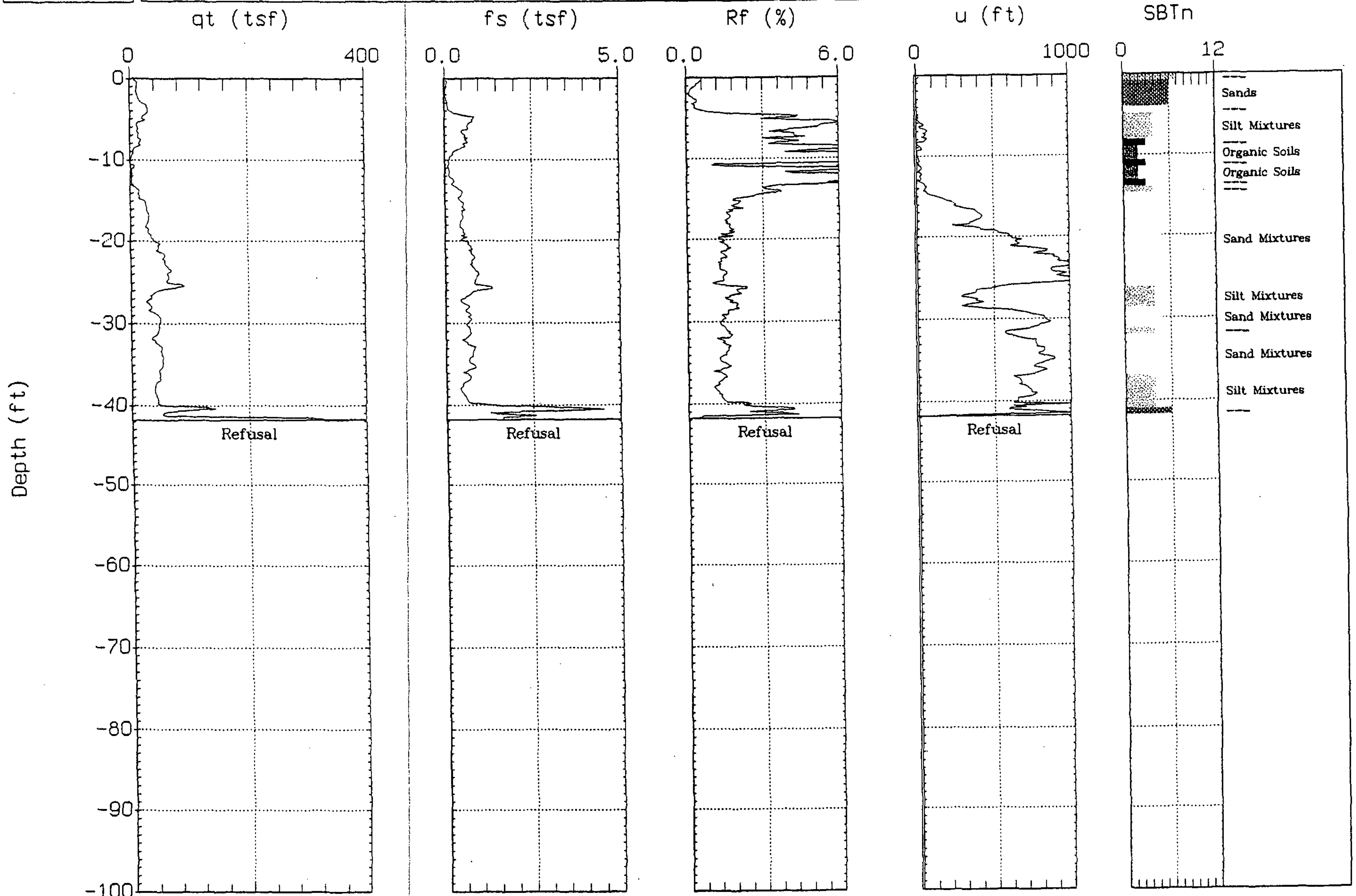
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-713
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:13:06 14:03



Max. Depth: 41.83 (ft)
Depth Inc.: 0.164 (ft)

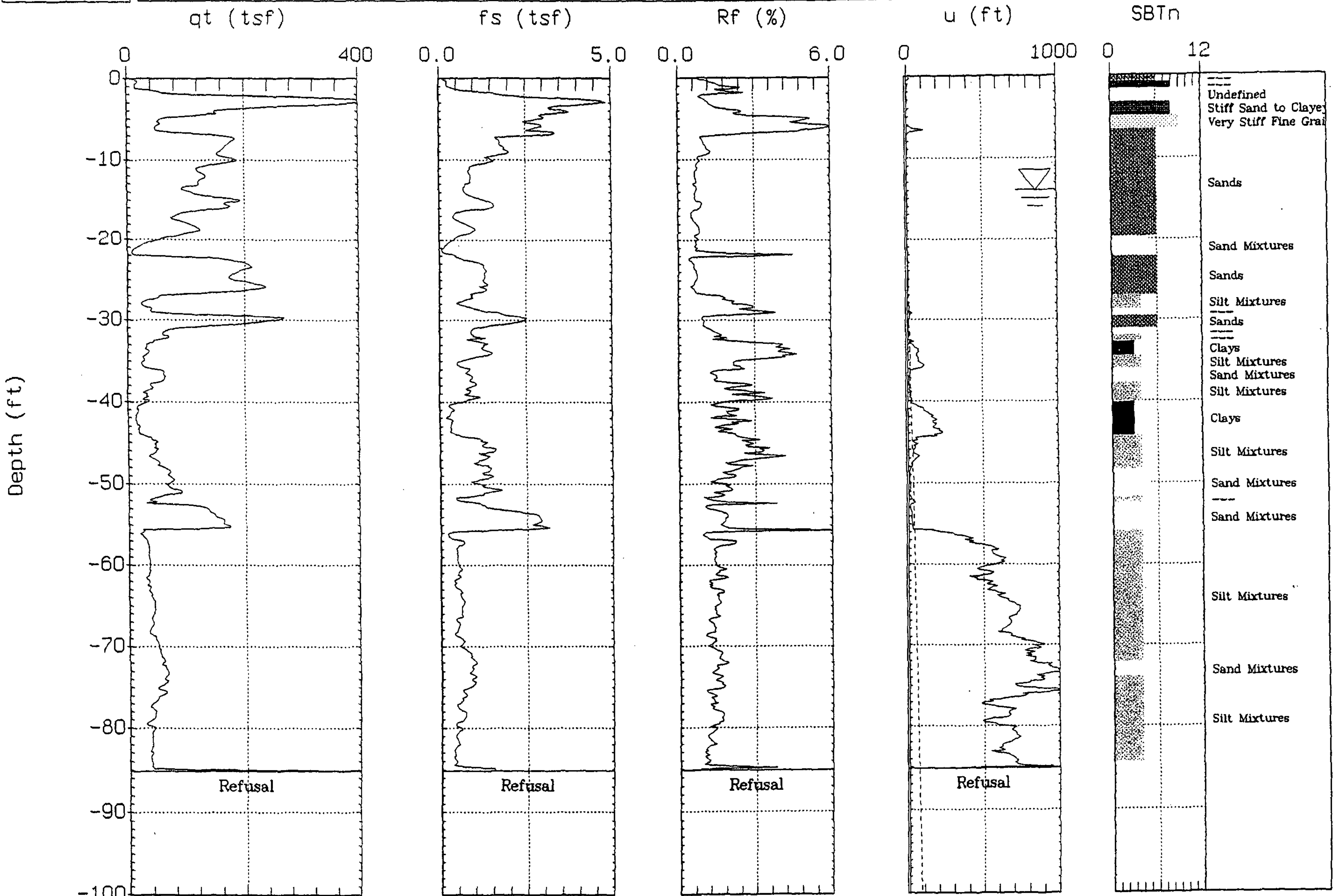
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-714
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:19:06 14:19

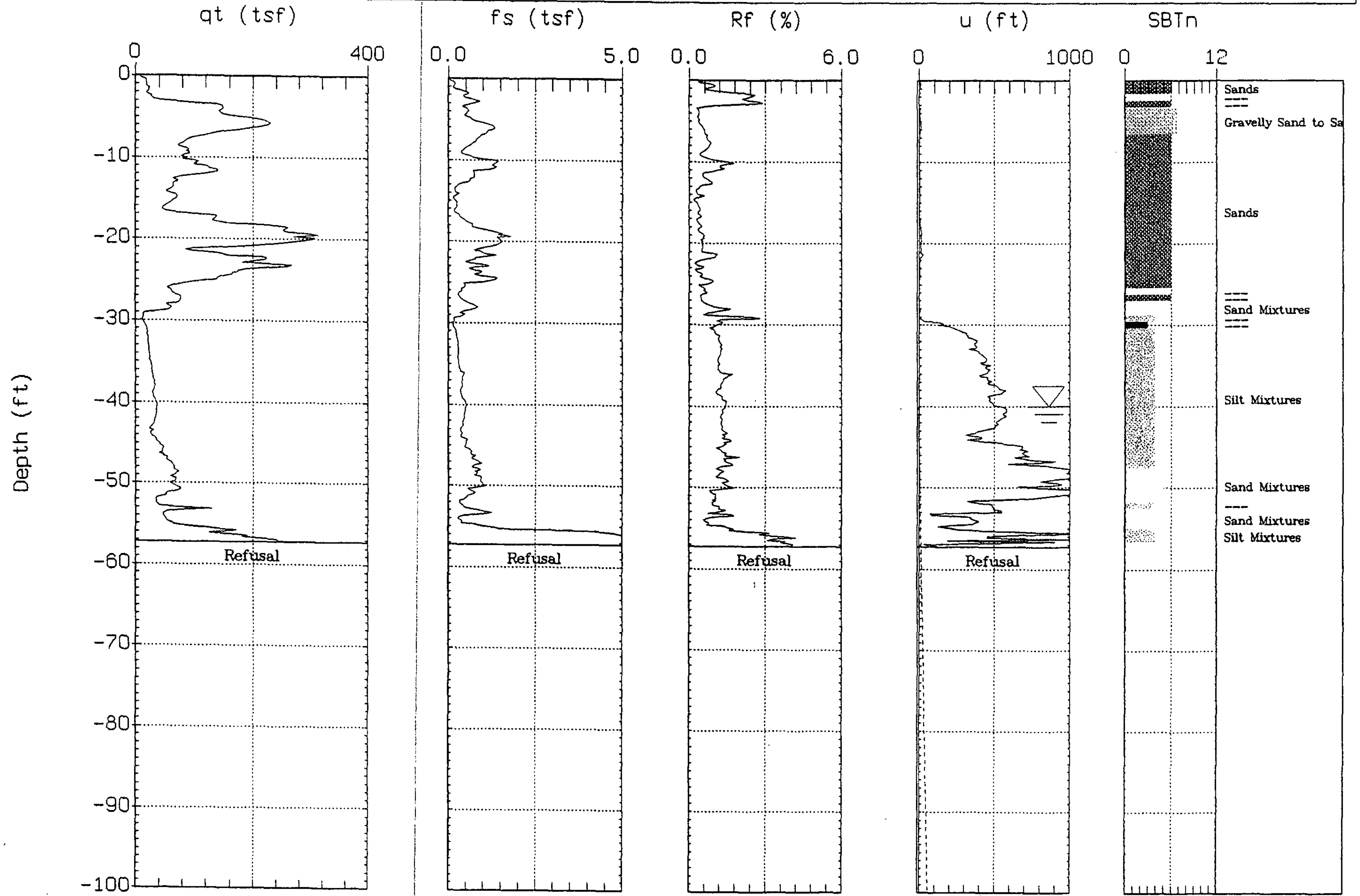


Max. Depth: 85.14 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

ConeTec — Schnabel Engineering

Sounding: C-715
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:18:06 15:27



Max. Depth: 57.25 (ft)
Depth Inc.: 0.164 (ft)

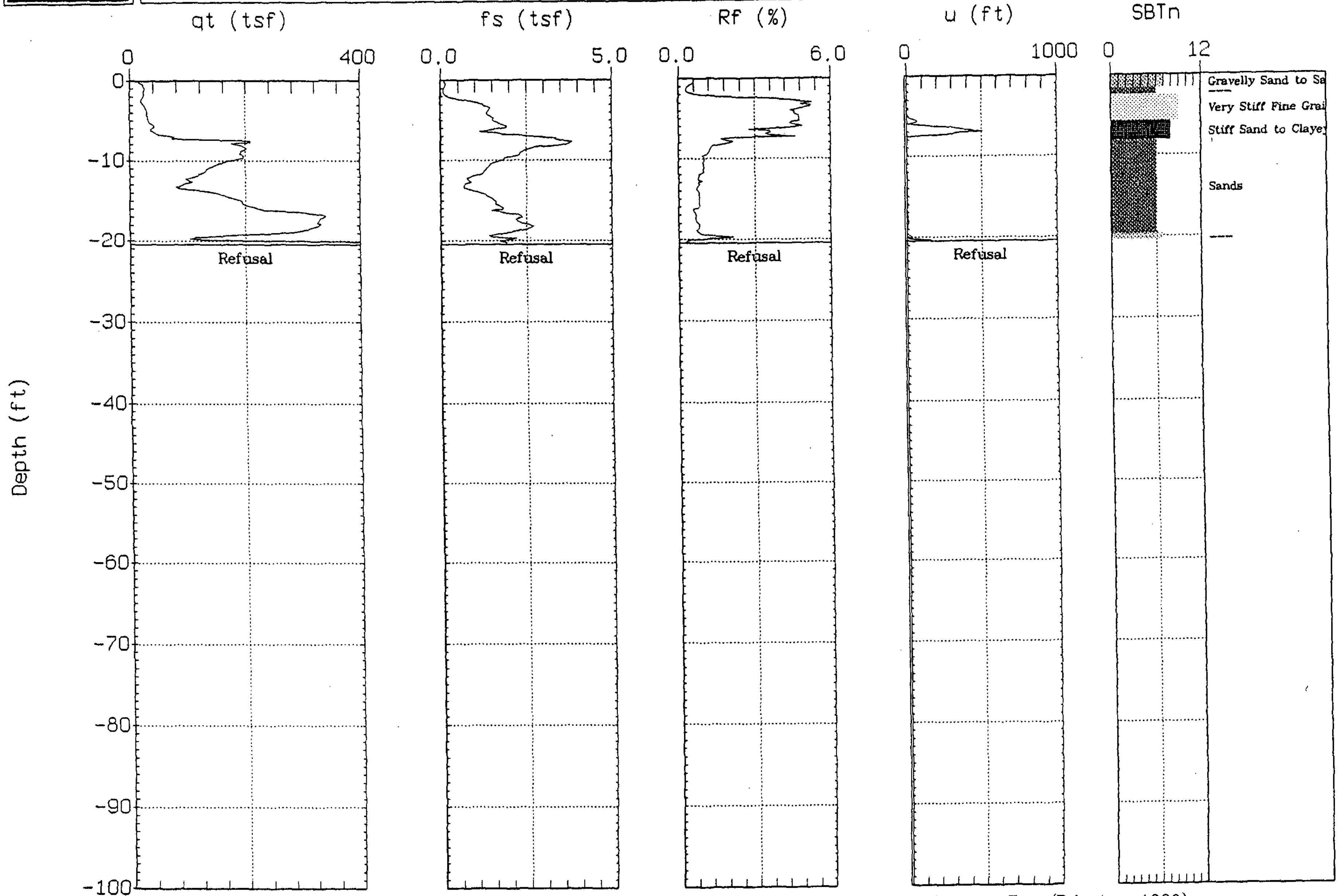
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-716
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:20:06 12:09



Max. Depth: 20.51 (ft)
Depth Inc.: 0.164 (ft)

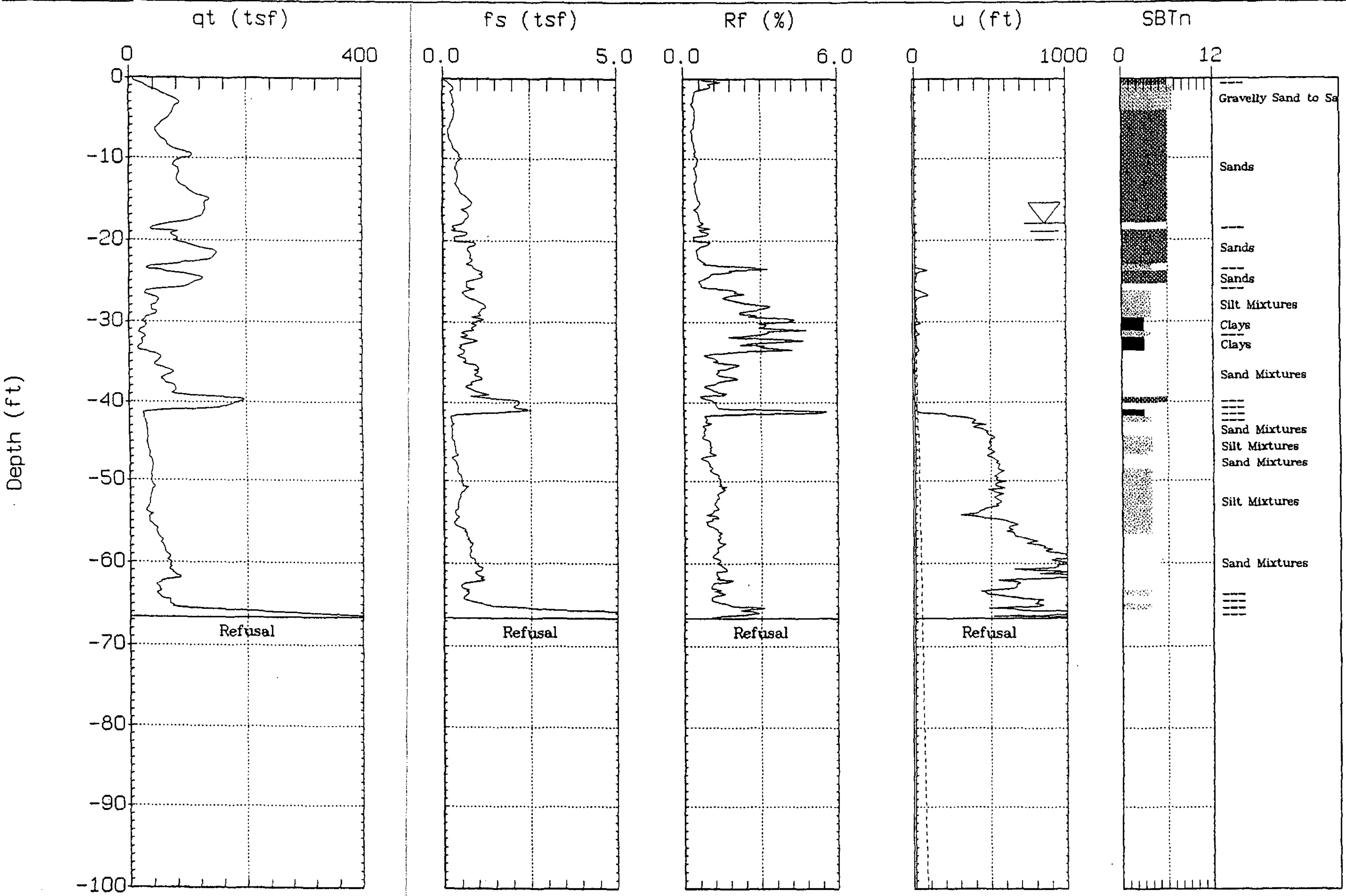
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

Sounding: C-717
Location: C C N P P

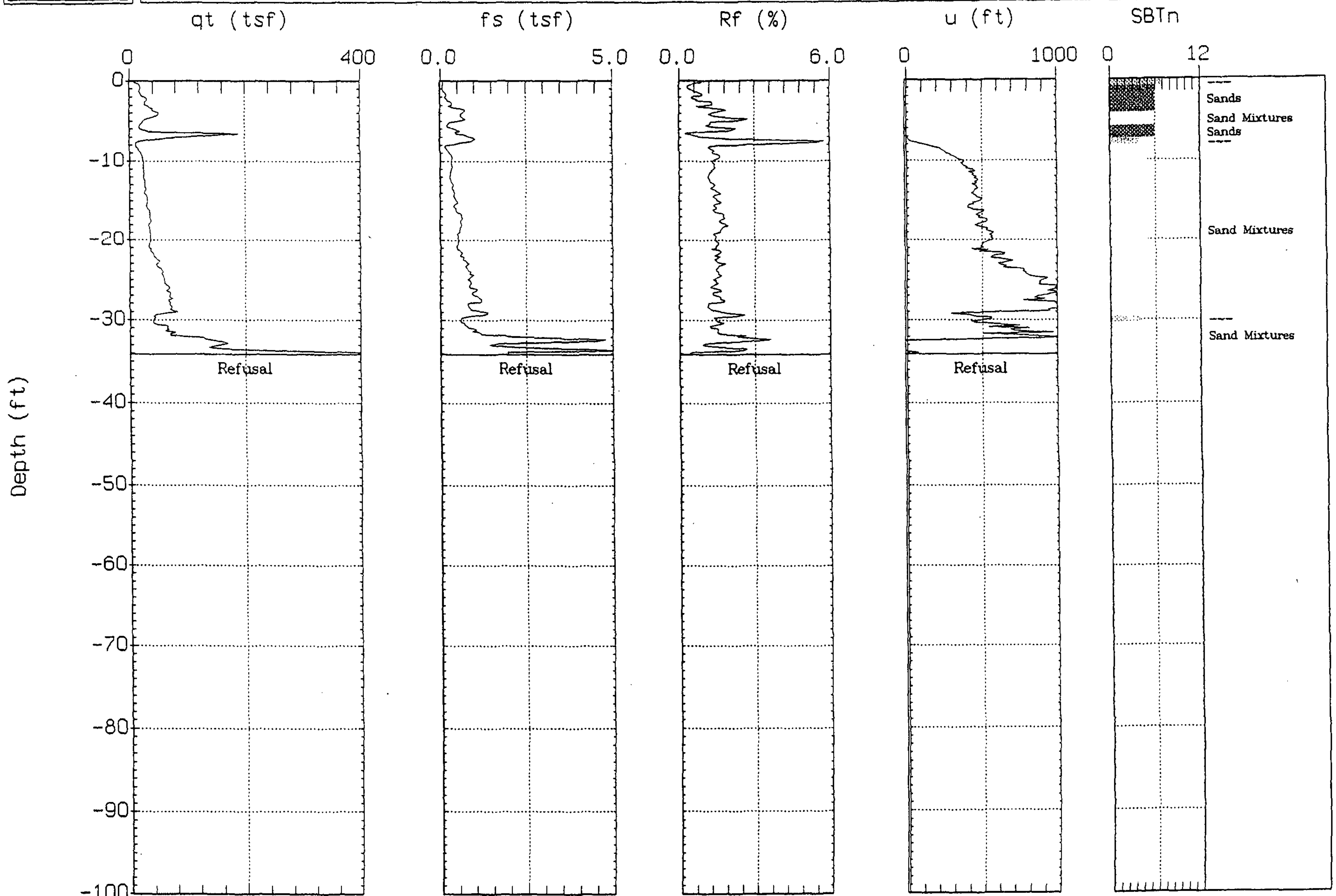
Cone: STD 20T AD-195
Date: 07:19:06 07:39



Max. Depth: 66.60 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

Schnabel Engineering
Sounding: C-718
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:19:06 11:26



Max. Depth: 34.12 (ft)
Depth Inc.: 0.164 (ft)

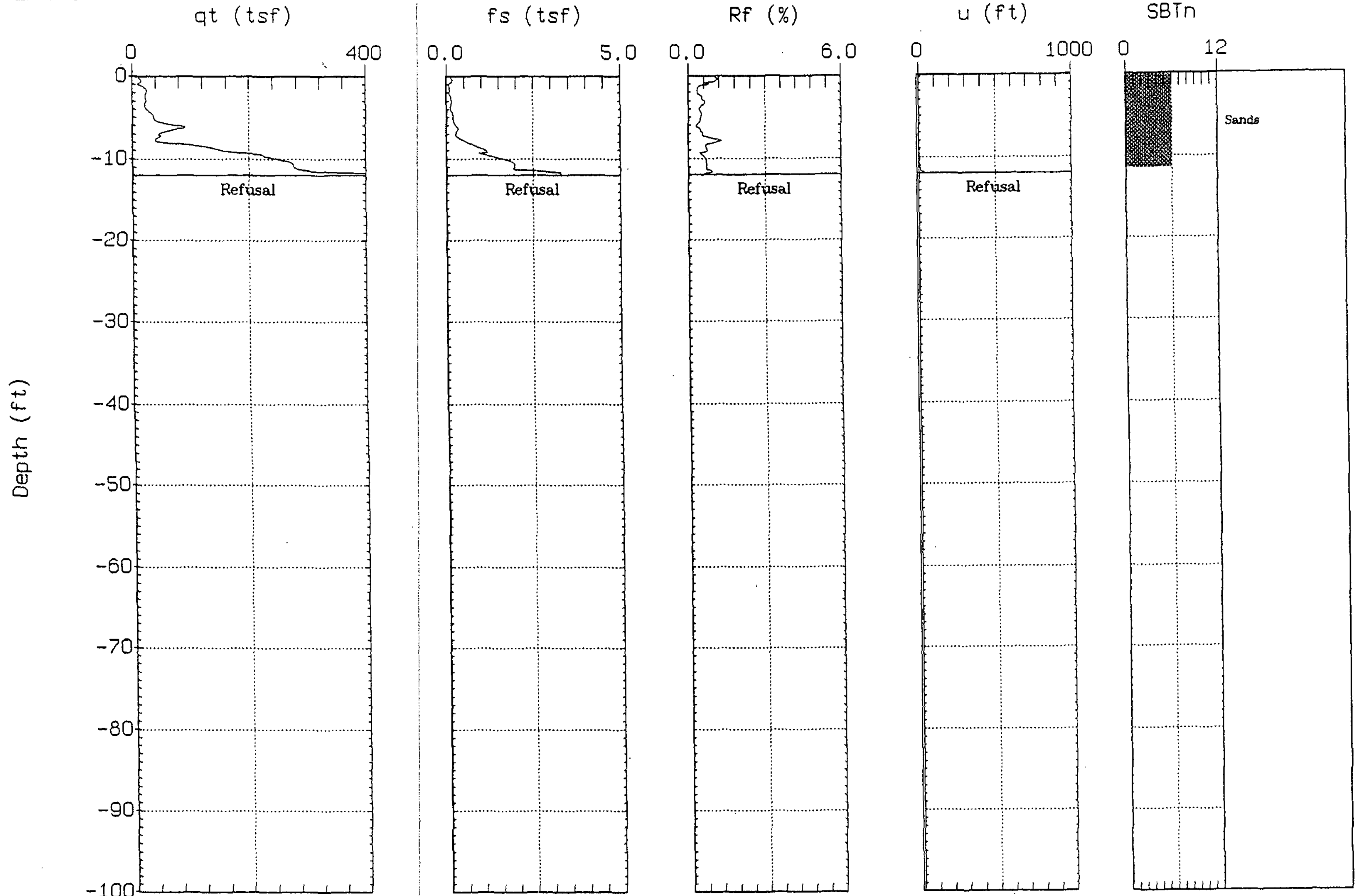
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

Schnabel Engineering

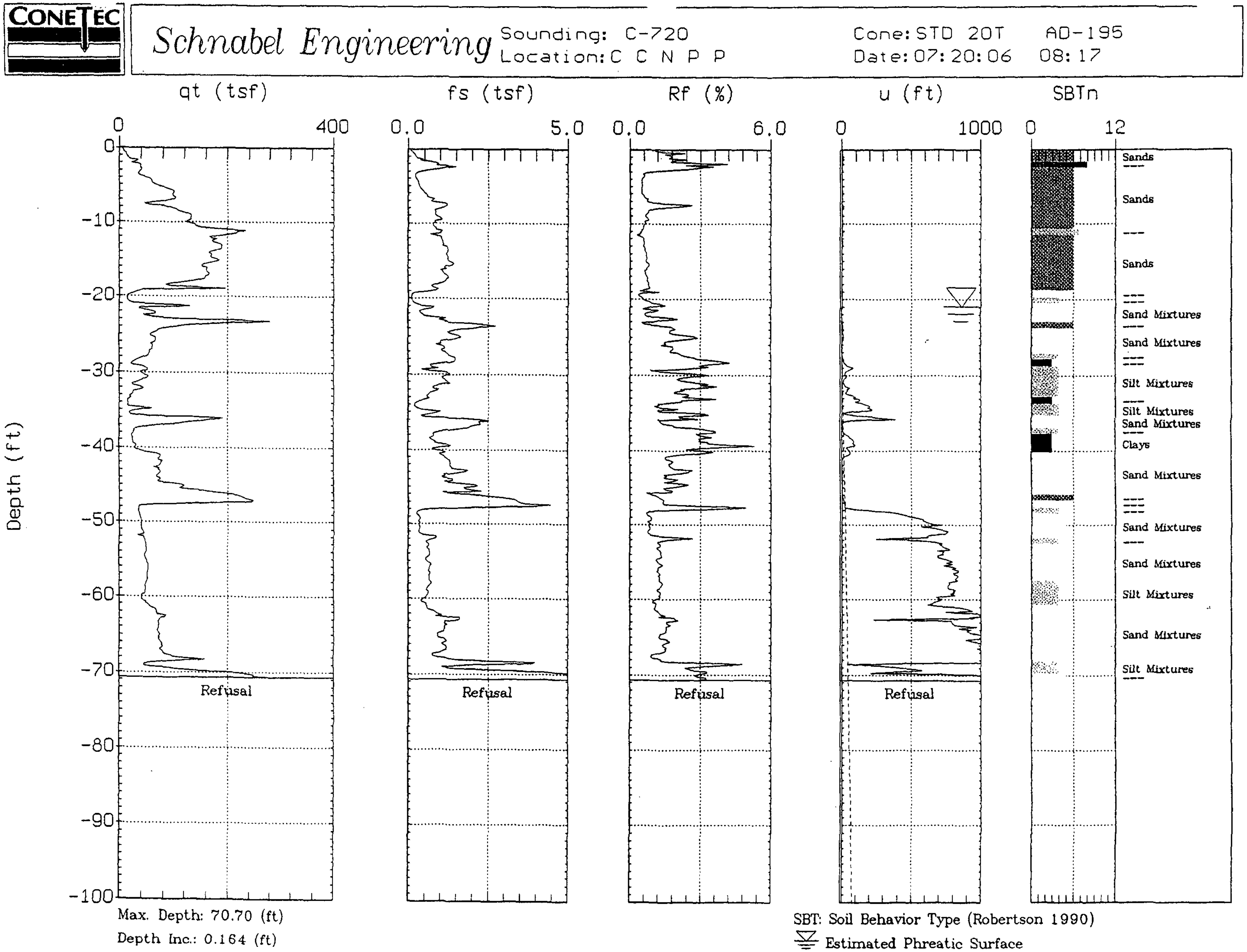
Sounding: C-719
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:19:06 09:44



Max. Depth: 11.97 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)



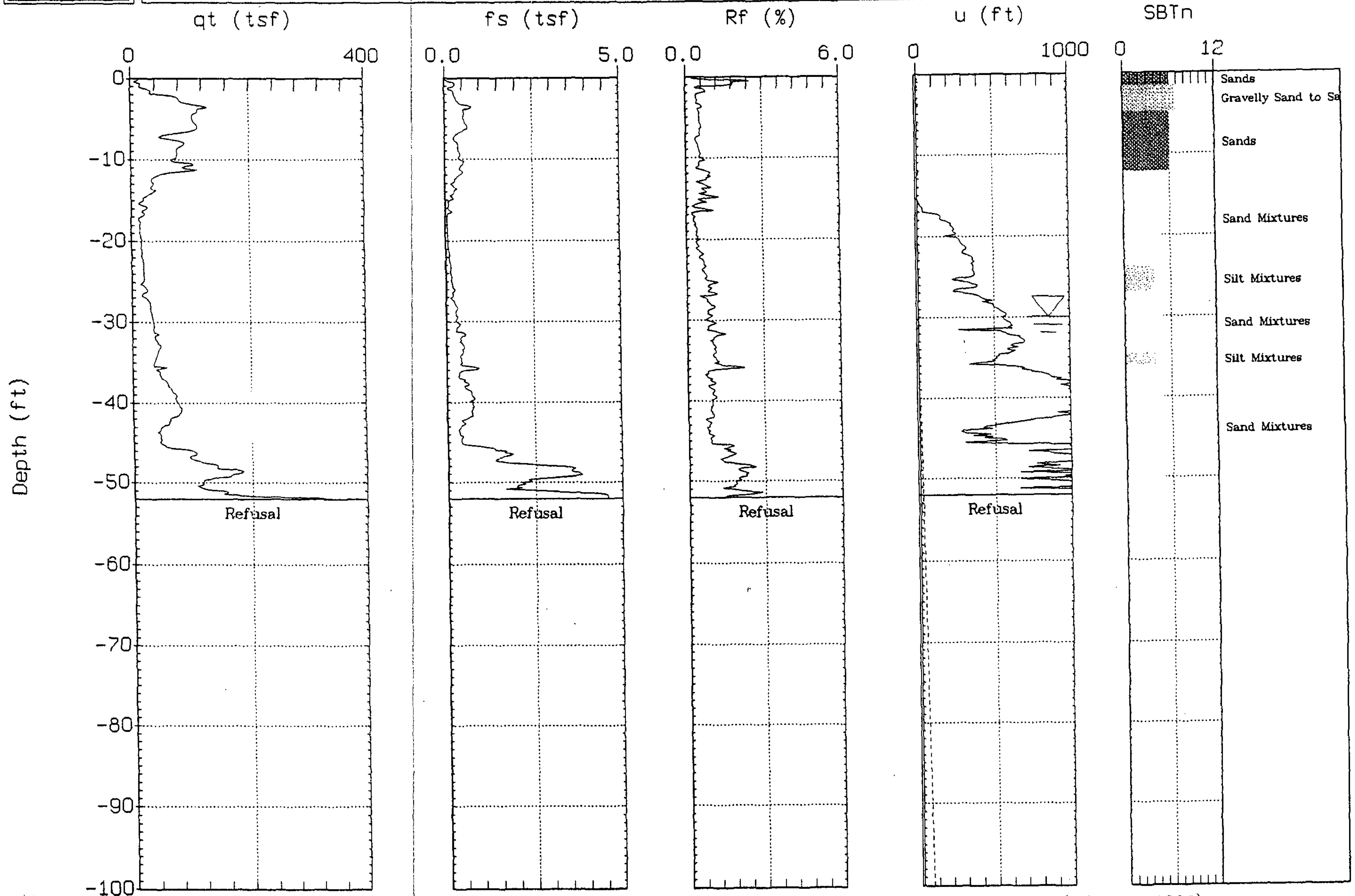
CONETEC
Schnabel Engineering
Sounding: C-720
Location: C C N P P
Cone: STD 20T AD-195
Date: 07:20:06 08:17
qt (tsf)
fs (tsf)
Rf (%)
u (ft)
SBTn
Depth (ft)
Refusal
Sands
Sand Mixtures
Silt Mixtures
Clays
Max. Depth: 70.70 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

CONETEC

Schnabel Engineering

Sounding: C-721
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:18:06 09:07

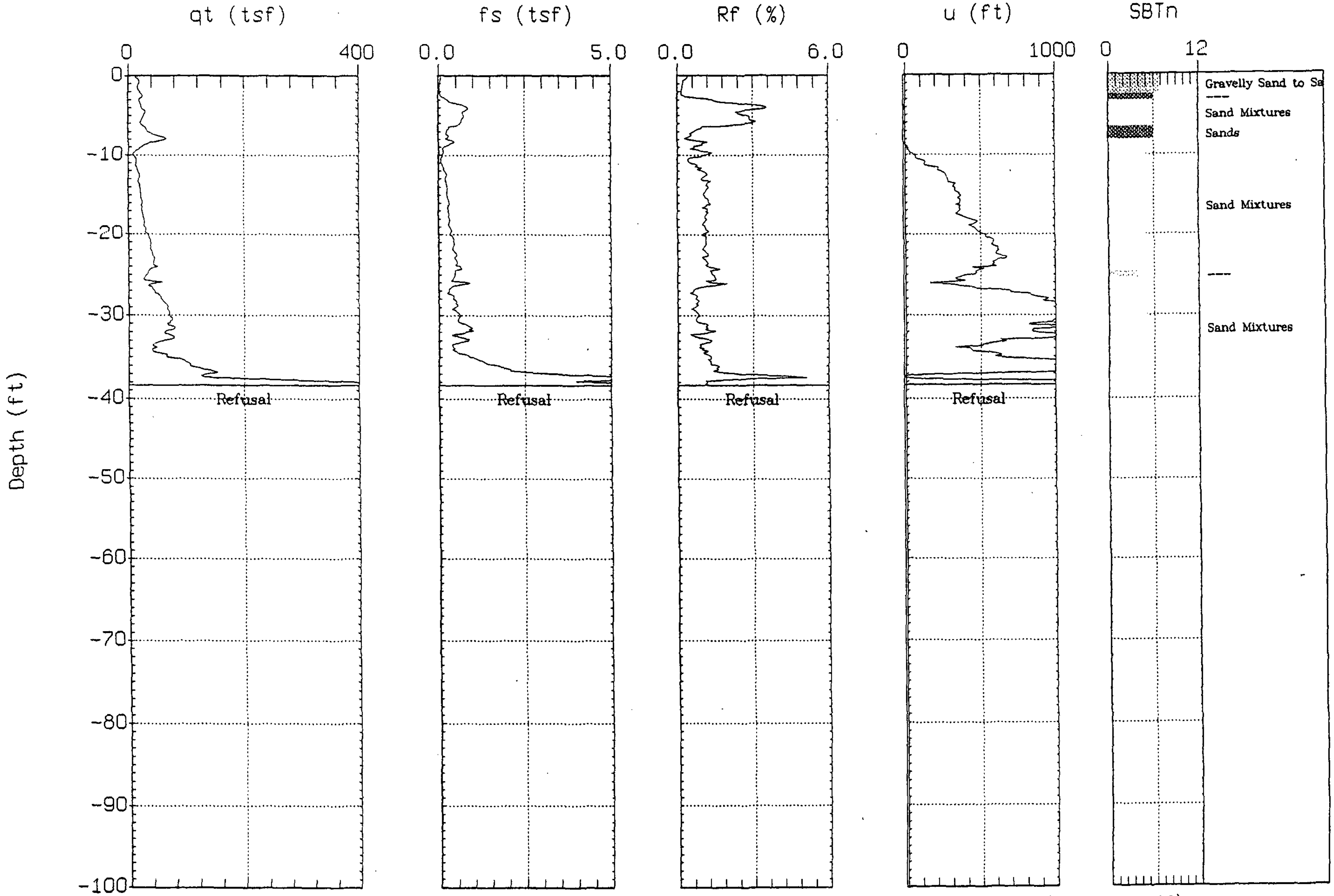


Max. Depth: 52.00 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

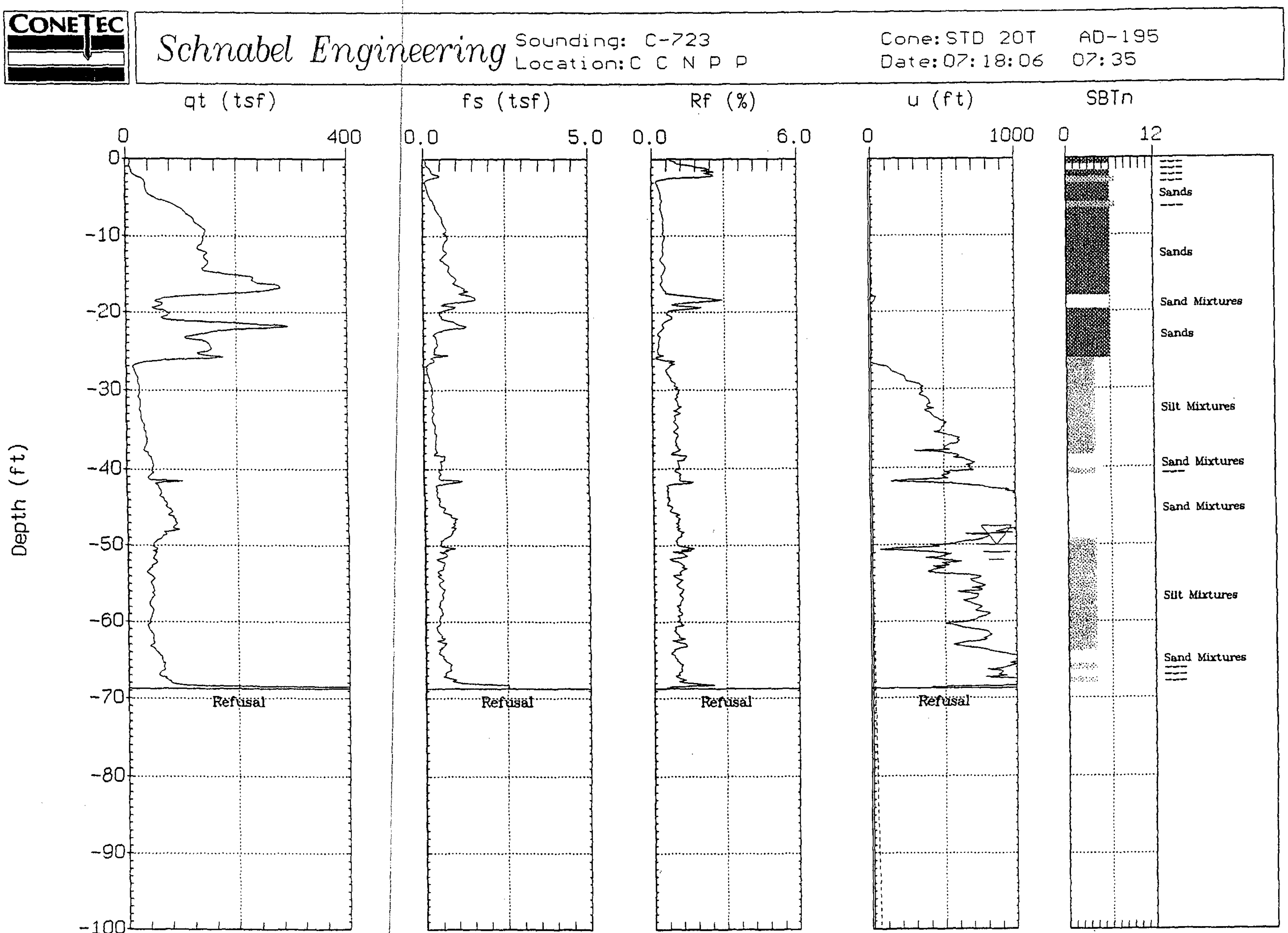
Schnabel Engineering Sounding: C-722 Location: C C N P P

Cone: STD 20T AD-195 Date: 07:18:06 12:45



Max. Depth: 38.39 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

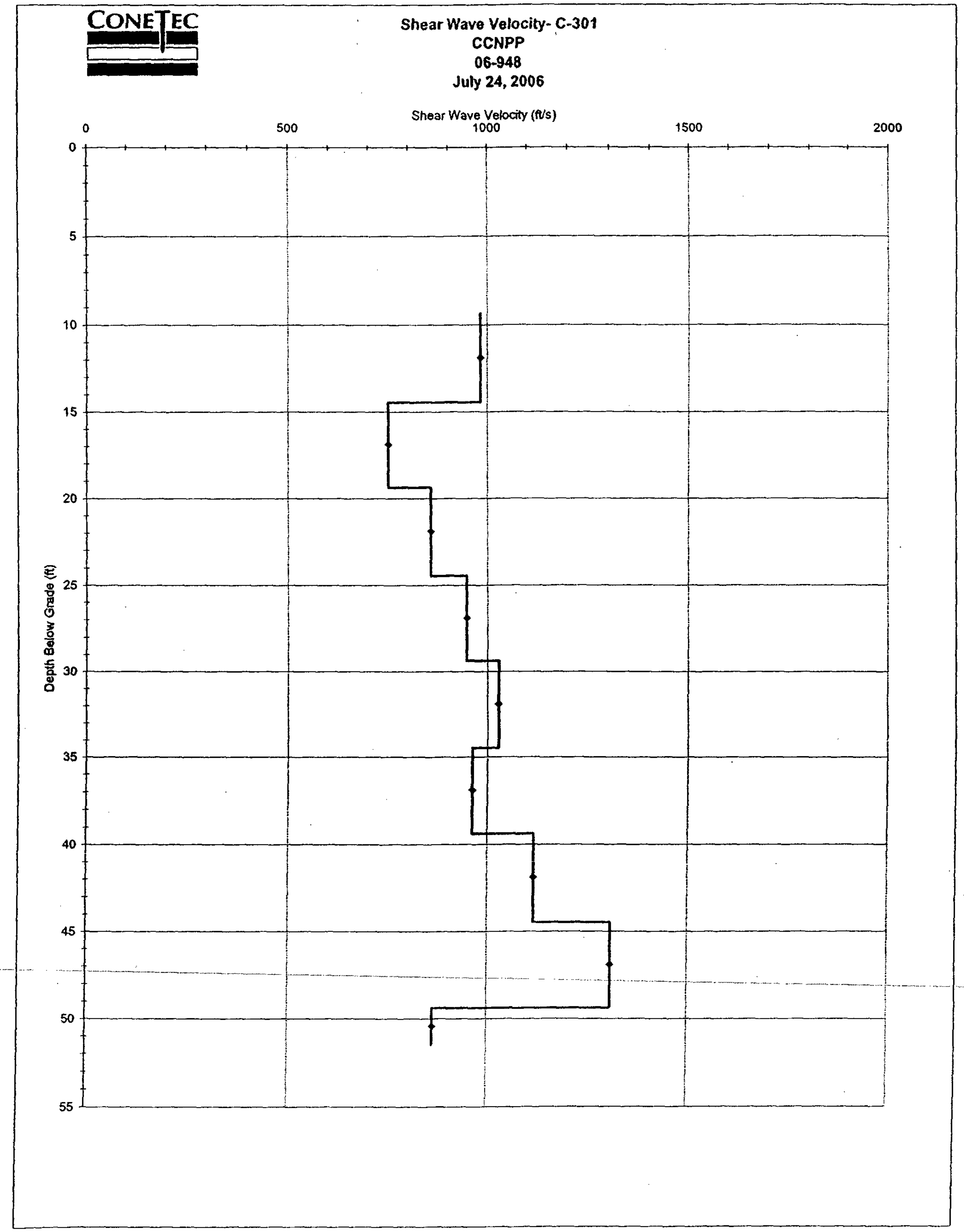


Max. Depth: 68.73 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)
Estimated Phreatic Surface

APPENDIX B
SHEAR WAVE VELOCITY TEST DATA

Presentation of In Situ Testing Program Results
ConeTec, Inc.
November 13, 2006


CONETEC
Shear Wave Velocity- C-301
CCNPP
06-948
July 24, 2006
Shear Wave Velocity (ft/s)
0
500
1000
1500
2000
Depth Below Grade (ft)
0
5
10
15
20
25
30
35
40
45
50
55

ConeTec Shear Wave Velocity Data Reduction Sheet

Hole: C-301
Location: CCNPP
Cone: AD-195
Date: 24-Jul-06
Source: Beam

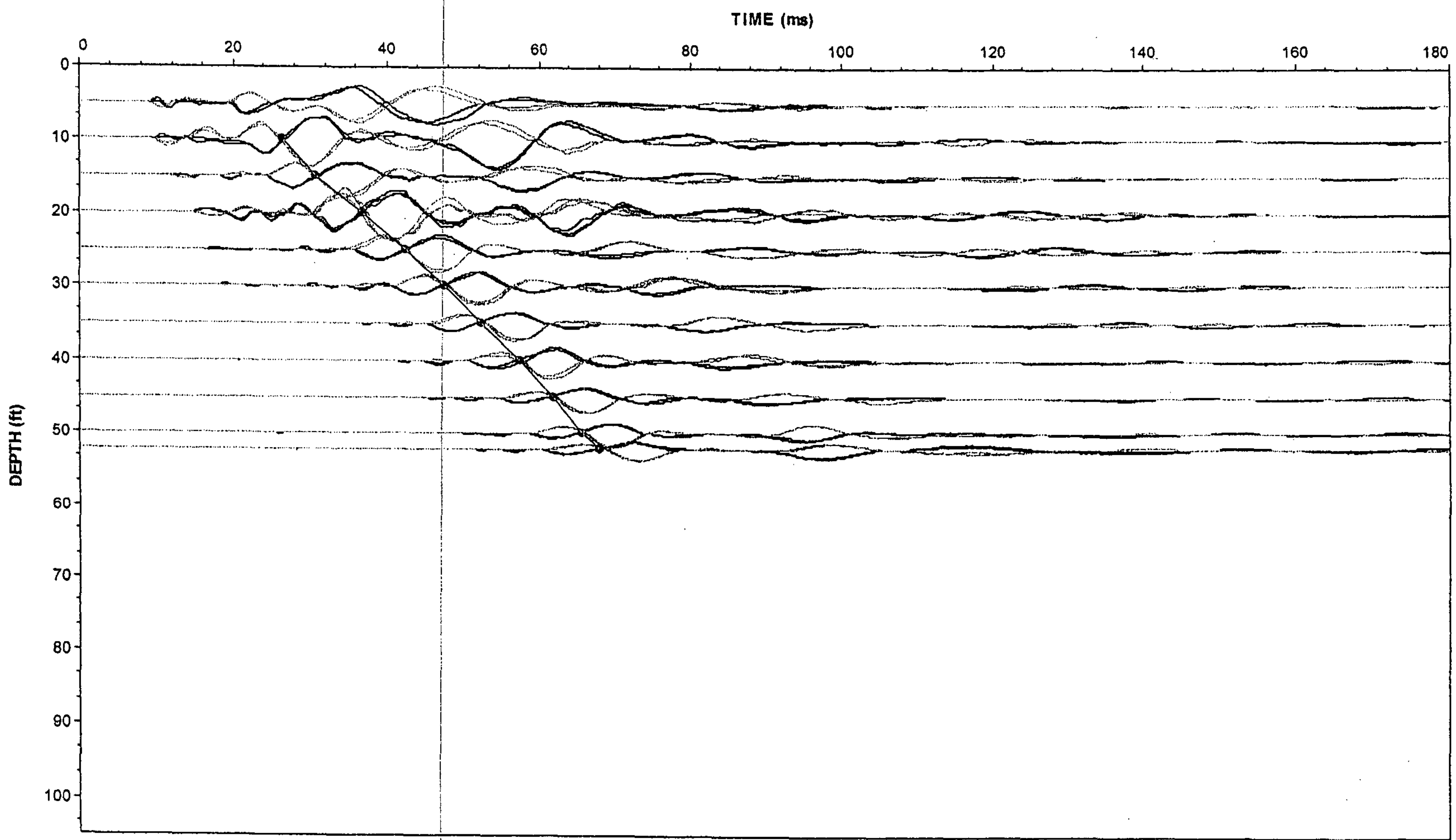
Source Depth	0.00 m
Source Offset	2.15 m

Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
3.05	2.85	3.57					
4.60	4.40	4.90	4.43	299.7	983.3	3.62	11.89
6.10	5.90	6.28	6.04	229.0	751.2	5.15	16.90
7.65	7.45	7.75	5.65	261.0	856.1	6.67	21.90
9.15	8.95	9.20	5.02	288.9	947.7	8.20	26.90
10.70	10.50	10.72	4.83	313.4	1028.2	9.72	31.91
12.20	12.00	12.19	5.02	293.4	962.5	11.25	36.91
13.75	13.55	13.72	4.49	340.8	1118.1	12.77	41.91
15.25	15.05	15.20	3.73	398.0	1305.9	14.30	46.92
15.90	15.70	15.85	2.45	263.0	863.0	15.37	50.44

CONETEC

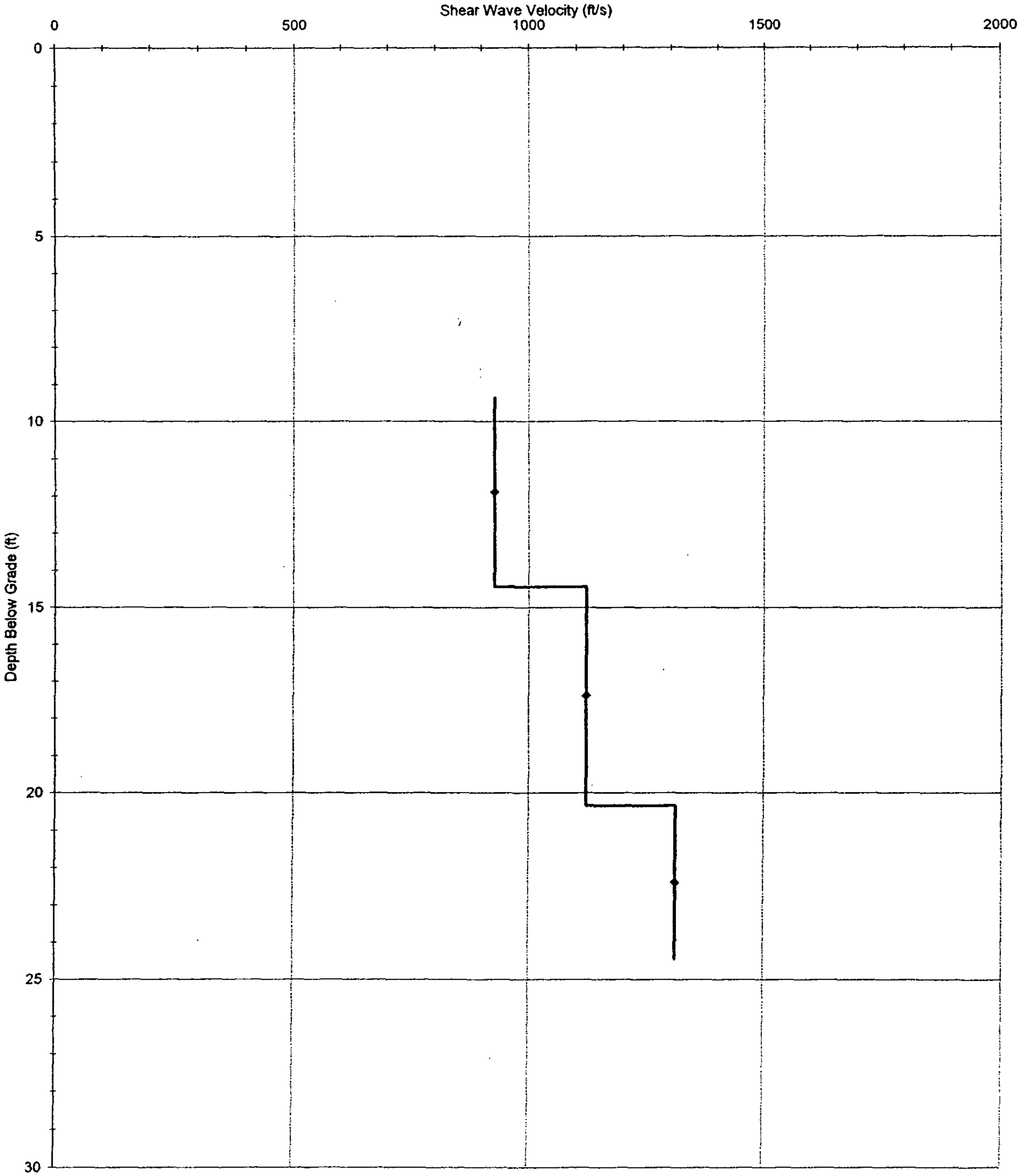
Job No: 06-948 | Client: Schnabel Engineering | Project Title: CCNPP | Operator: TS-SL | Hole: C301- ALT | Site: C C N P P

Date: 07:24:06 12:24 | Cone: STD 20T AD-195



CONETEC

Shear Wave Velocity- C-304
CCNPP
06-948
July 12, 2006



ConeTec Shear Wave Velocity Data Reduction Sheet

Hole: C-304
Location: CCNPP
Cone: AD195
Date: 12-Jul-06
Source: Beam

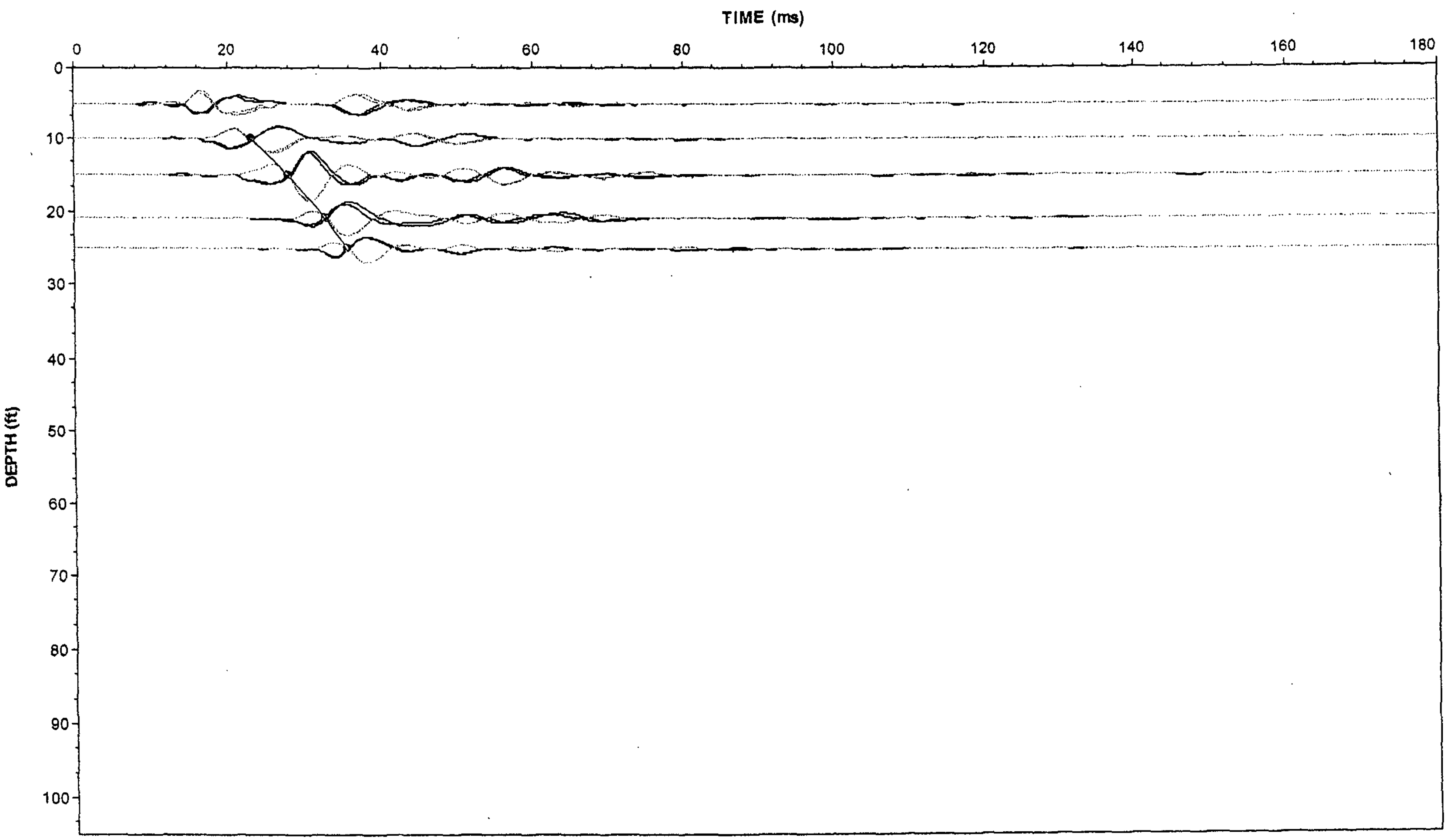
Source Depth	0.00 m
Source Offset	2.15 m

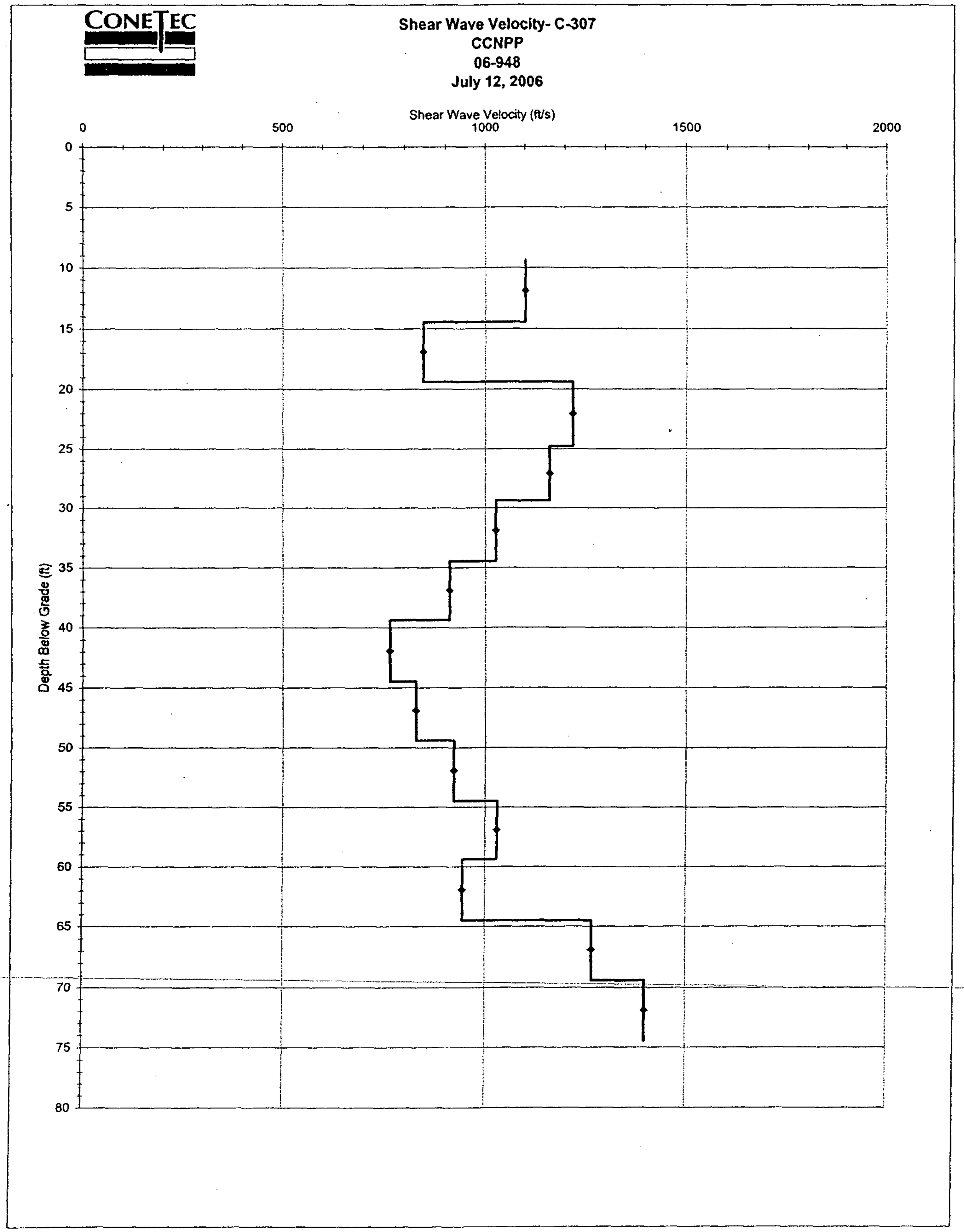
Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
3.05	2.85	3.57					
4.60	4.40	4.90	4.69	282.9	928.0	3.62	11.89
6.40	6.20	6.56	4.87	341.8	1121.4	5.30	17.39
7.65	7.45	7.75	2.98	399.5	1310.7	6.83	22.39

CONETEC

Job No: 06-948 | Client: Schnabel Engineering | Project Title: CCNPP | Operator: TS-SL | Hole: 304-ALT | Site: C C N P P

Date: 07:12:06 07:36 | Cone: STD 20T AD-195





CONETEC
Shear Wave Velocity- C-307
CCNPP
06-948
July 12, 2006
Shear Wave Velocity (ft/s)
0
500
1000
1500
2000
Depth Below Grade (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80

ConeTec Shear Wave Velocity Data Reduction Sheet

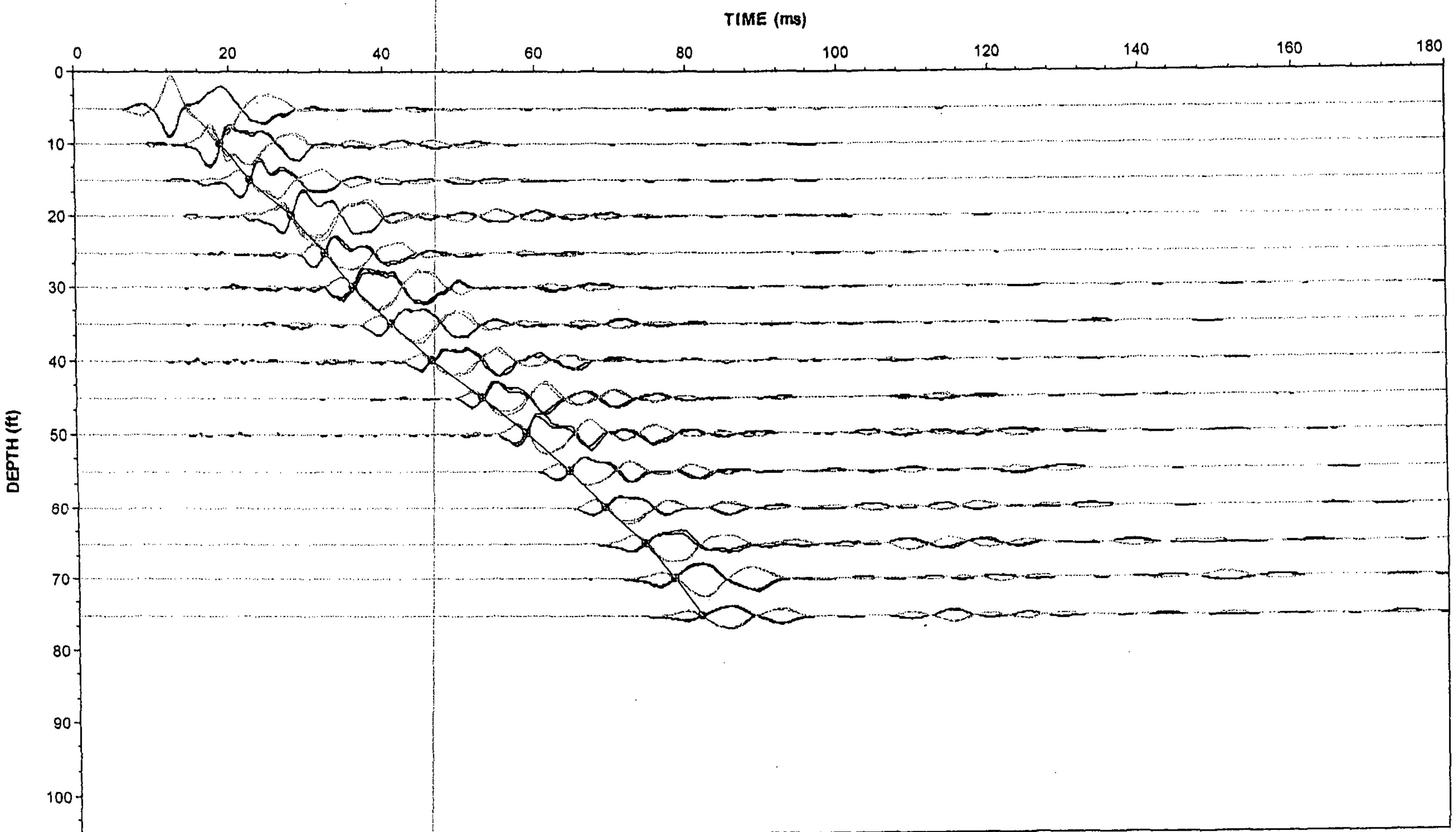
Hole: C-307
Location: CCNPP
Cone: AD195
Date: 12-Jul-06
Source: Beam

Source Depth	0.00 m
Source Offset	2.15 m

Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
3.05	2.85	3.57					
4.60	4.40	4.90	3.96	335.5	1100.7	3.62	11.89
6.10	5.90	6.28	5.36	257.7	845.4	5.15	16.90
7.75	7.55	7.85	4.23	371.5	1218.7	6.72	22.06
9.15	8.95	9.20	3.83	354.0	1161.2	8.25	27.07
10.70	10.50	10.72	4.84	313.0	1026.8	9.72	31.91
12.20	12.00	12.19	5.31	277.6	910.6	11.25	36.91
13.75	13.55	13.72	6.57	232.8	763.7	12.77	41.91
15.25	15.05	15.20	5.88	252.2	827.6	14.30	46.92
16.80	16.60	16.74	5.46	281.0	922.0	15.82	51.92
18.30	18.10	18.23	4.74	313.9	1029.9	17.35	56.92
19.85	19.65	19.77	5.35	287.8	944.3	18.87	61.92
21.35	21.15	21.26	3.86	386.2	1267.0	20.40	66.93
22.90	22.70	22.80	3.62	426.2	1398.1	21.92	71.93

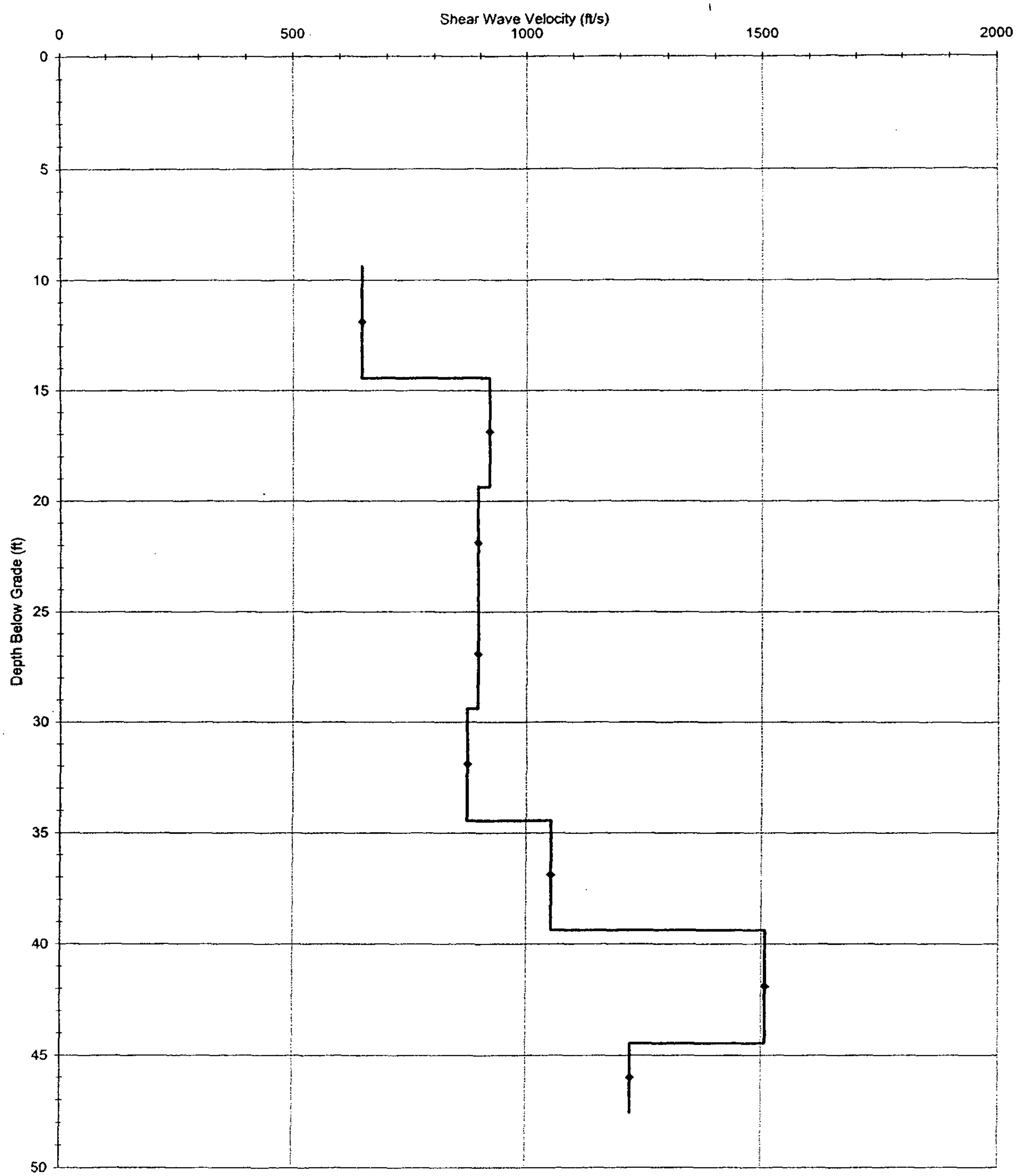
CONETEC

Job No: 06-948 Client: Schnabel Engineering Project Title: CCNPP Operator: TS-SL Hole: C307-ALT Site: C C N P P
Date: 07:12:06 14:47 Cone: STD 20T AD-195



CONETEC

Shear Wave Velocity- C-308
CCNPP
06-948
July 17, 2006



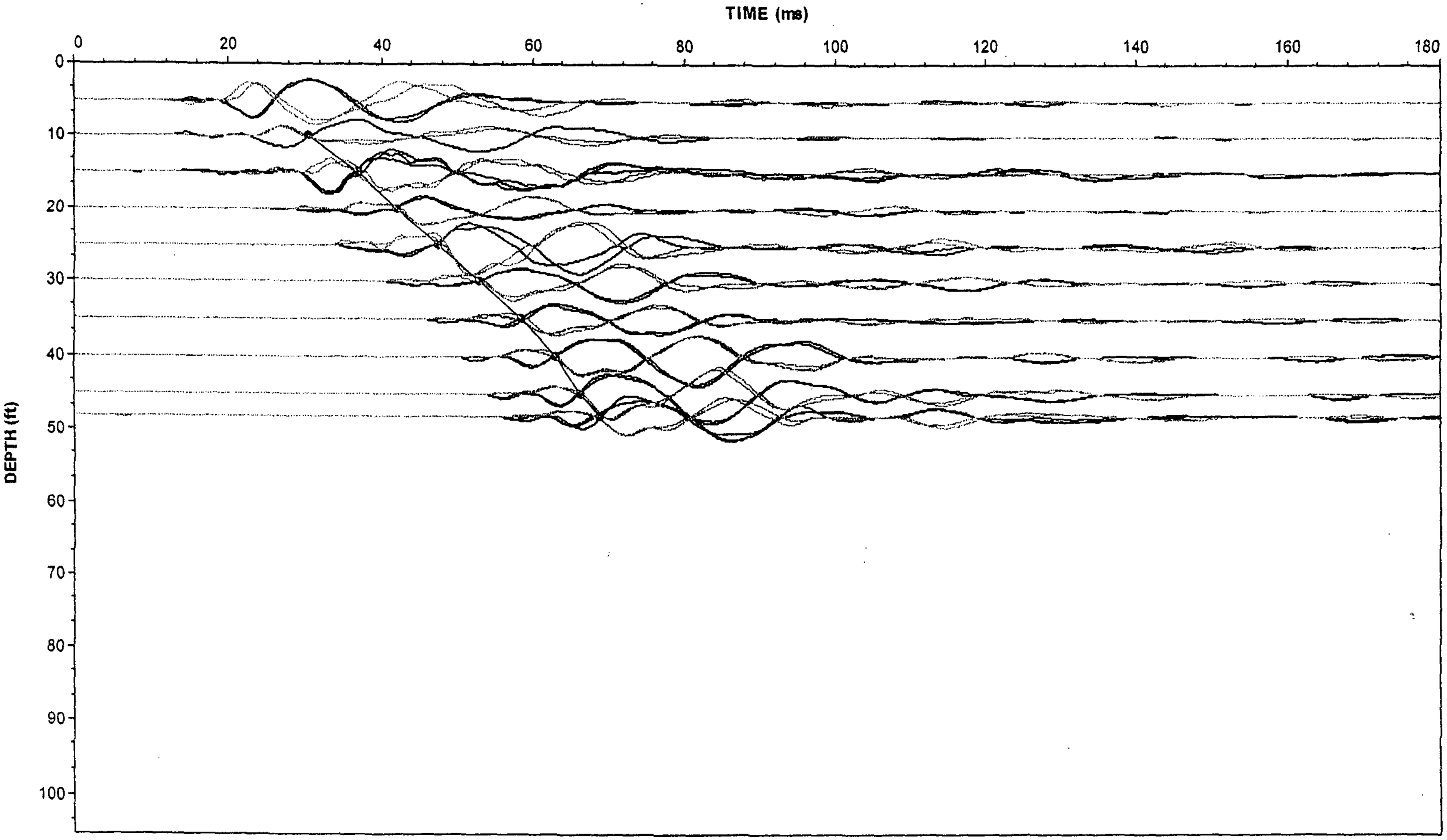
ConeTec Shear Wave Velocity Data Reduction Sheet

Hole: C-308
Location: CCNPP
Cone: AD195
Date: 17-Jul-06
Source: Beam

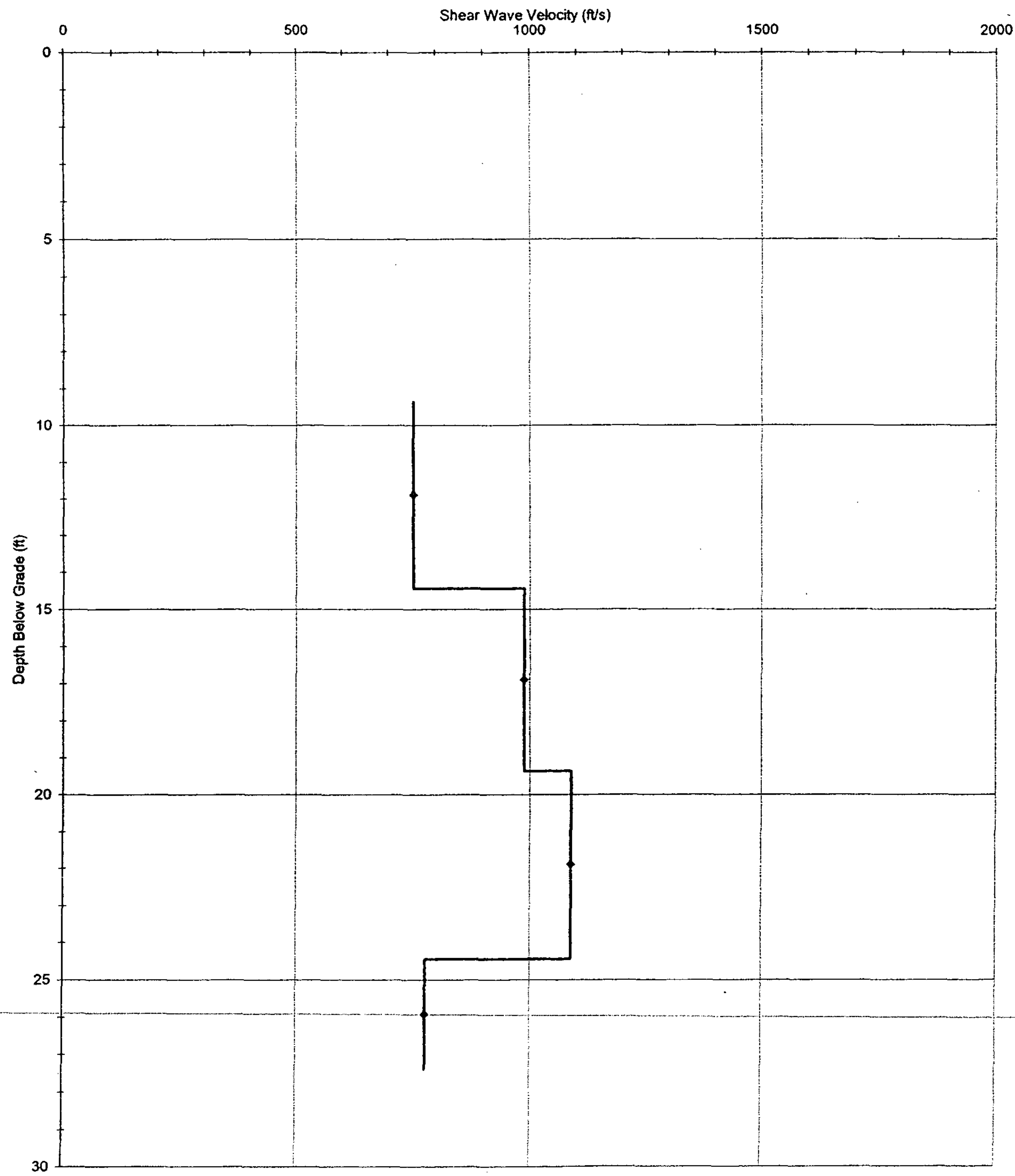
Source Depth	0.00 m
Source Offset	2.15 m

Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
3.05	2.85	3.57					
4.60	4.40	4.90	6.75	196.7	645.5	3.62	11.89
6.10	5.90	6.28	4.93	280.5	920.2	5.15	16.90
7.65	7.45	7.75	5.41	272.7	894.6	6.67	21.90
9.15	8.95	9.20	5.31	272.9	895.4	8.20	26.90
10.70	10.50	10.72	5.69	265.8	871.9	9.72	31.91
12.20	12.00	12.19	4.59	321.3	1054.1	11.25	36.91
13.75	13.55	13.72	3.33	459.5	1507.6	12.77	41.91
14.70	14.50	14.66	2.52	372.9	1223.5	14.02	46.01

Job No: 06-948 Date: 07:17:06 14:58	Client: Schnabel Engineering Cone: STD 20T AD-195	Project Title: CCNPP	Operator: TS-SL	Hole: C-308	Site: C C N P P



Shear Wave Velocity- C-401
CCNPP
06-948
July 13, 2006



CONETEC

ConeTec Shear Wave Velocity Data Reduction Sheet

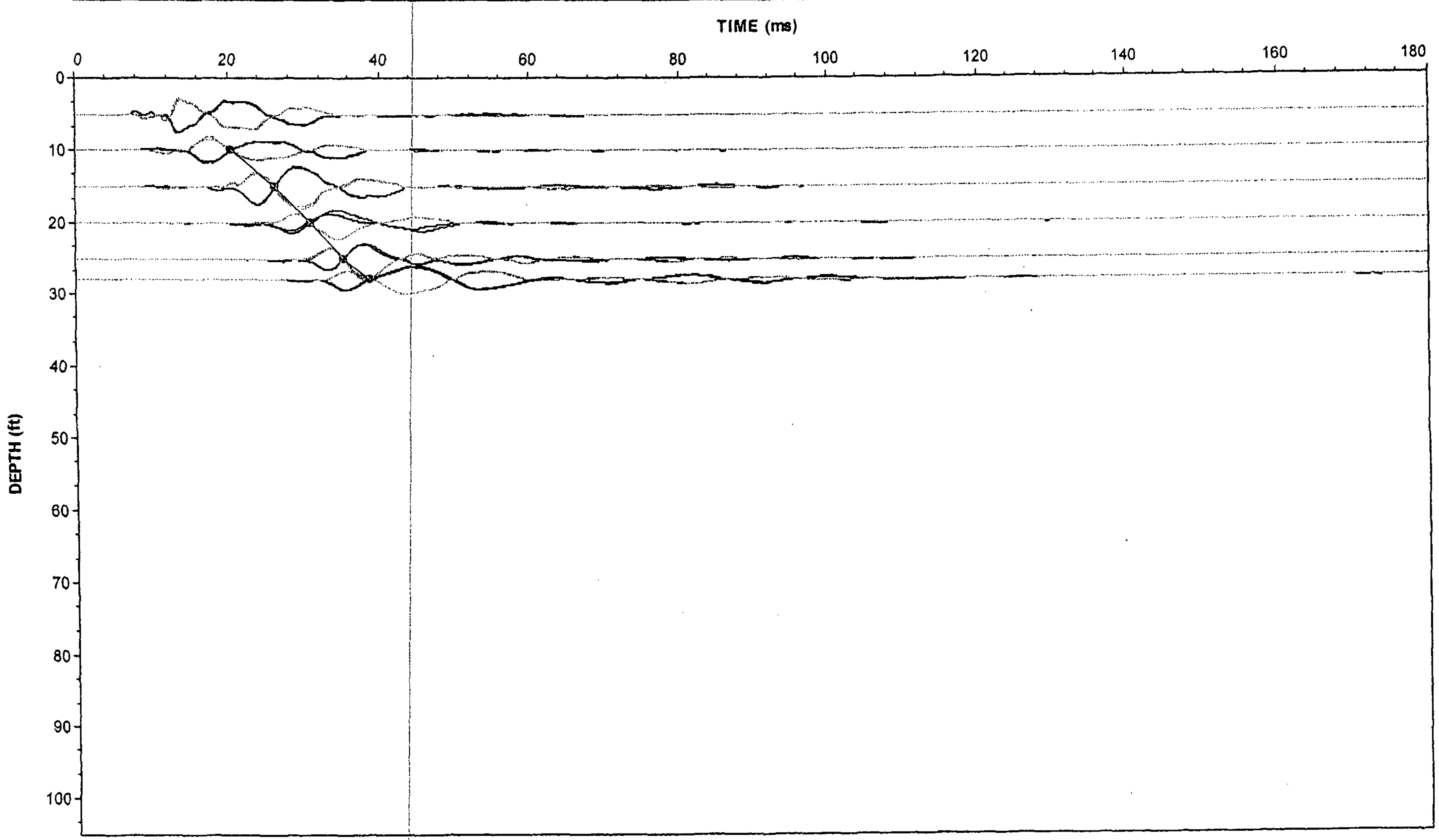
Hole: C-401
Location: CCNPP
Cone: AD195
Date: 13-Jul-06
Source: Beam

Source Depth	0.00 m
Source Offset	2.15 m

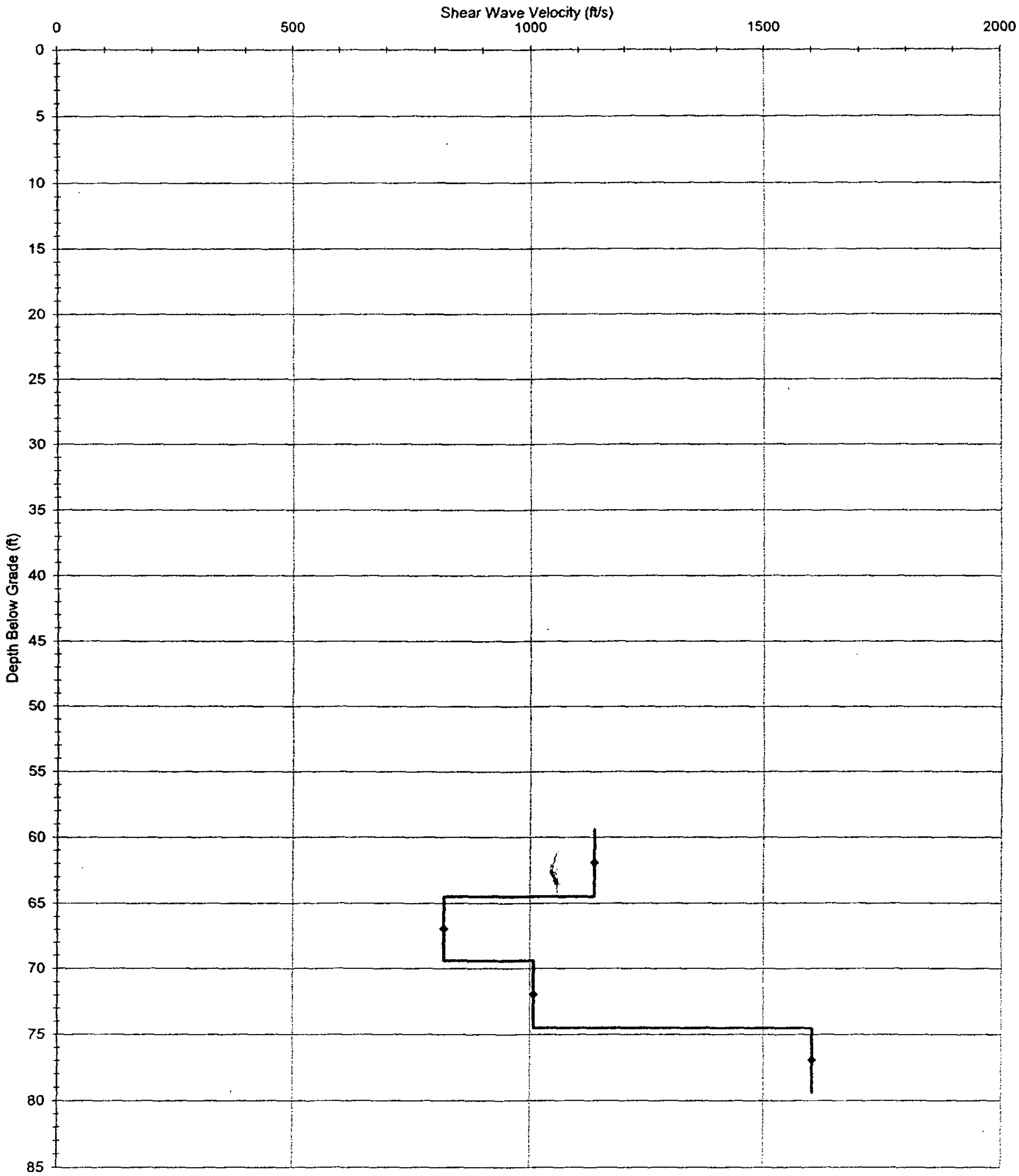
Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
3.05	2.85	3.57					
4.60	4.40	4.90	5.79	229.3	752.4	3.62	11.89
6.10	5.90	6.28	4.59	301.0	987.6	5.15	16.90
7.65	7.45	7.75	4.44	332.0	1089.1	6.67	21.90
8.55	8.35	8.62	3.66	237.1	777.8	7.90	25.92

CONETEC

Job No: 06-948 Date: 07:13:06 10:28 | Client: Schnabel Engineering Cone: STD 20T AD-195 | Project Title: CCNPP | Operator: TS-SL | Hole: C401-ALT | Site: C C N P P



Shear Wave Velocity- C-401-2a
CCNPP
06-948
July 27, 2006



ConeTec Shear Wave Velocity Data Reduction Sheet

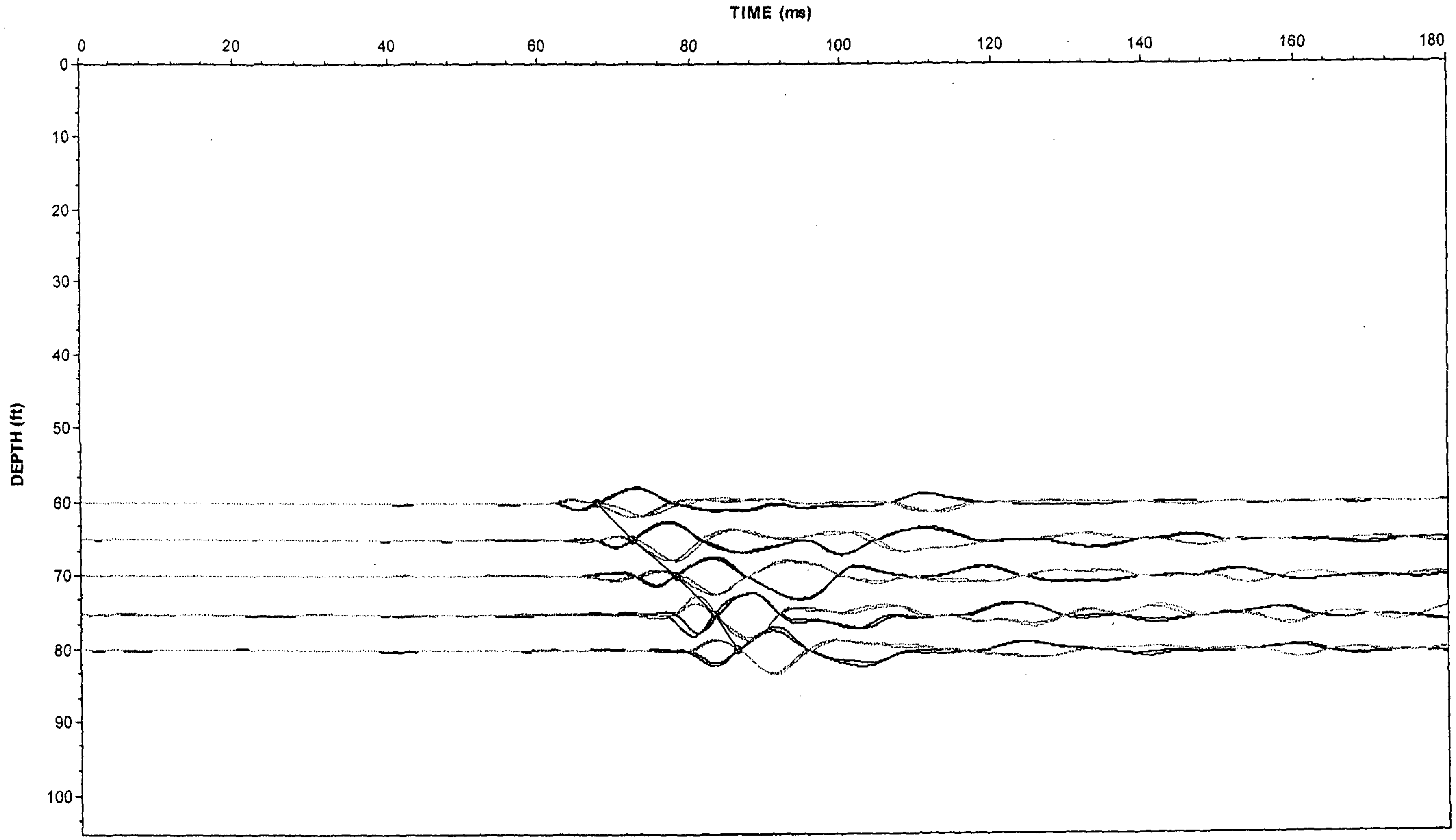
Hole: C-401-2a
Location: CCNPP
Cone: AD195
Date: 27-Jul-06
Source: Beam

Source Depth	0.00 m
Source Offset	2.15 m

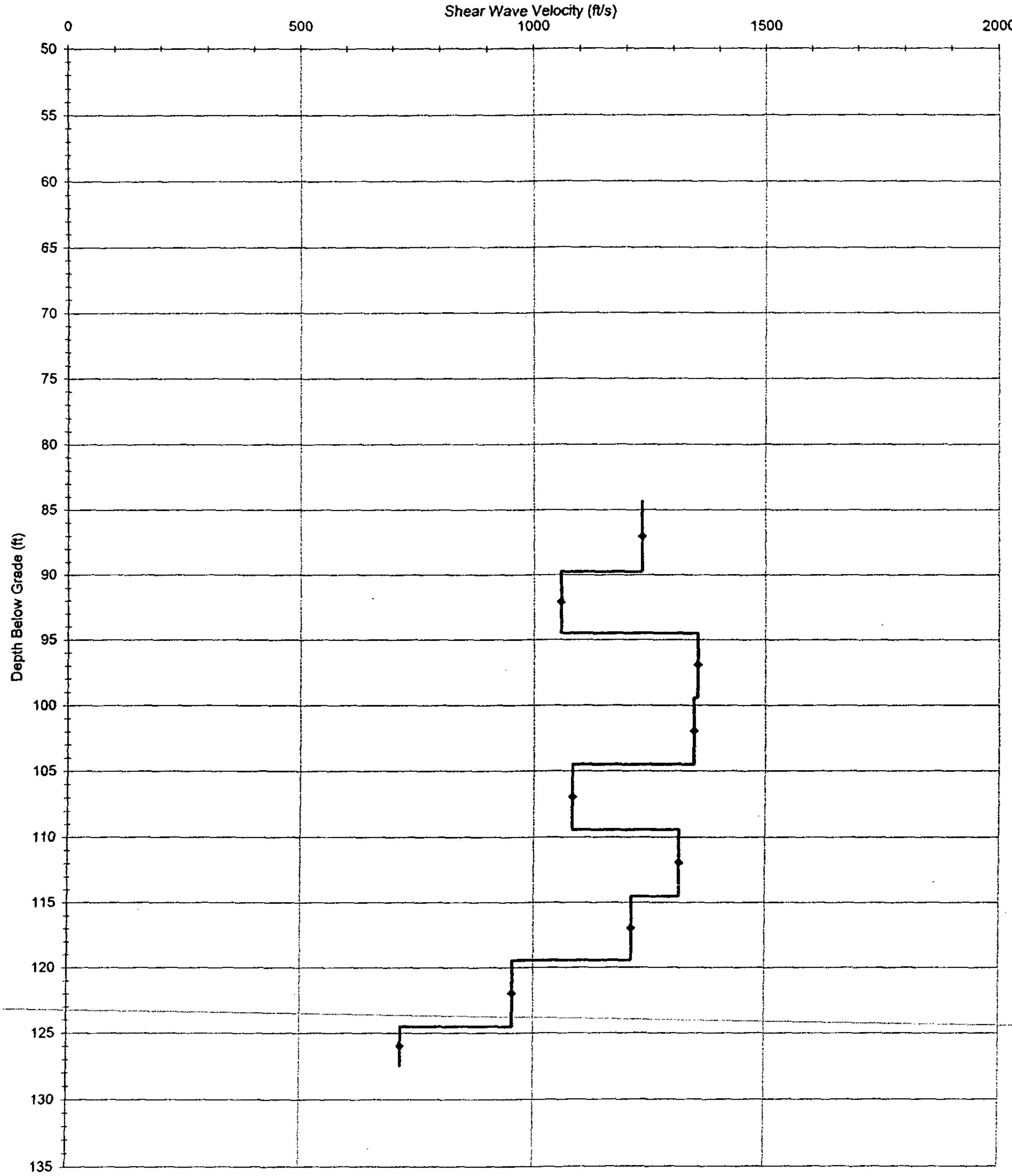
Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
18.30	18.10	18.23					
19.85	19.65	19.77	4.45	346.2	1135.7	18.87	61.92
21.35	21.15	21.26	5.98	249.4	818.4	20.40	66.93
22.90	22.70	22.80	5.02	307.2	1007.8	21.92	71.93
24.40	24.20	24.30	3.06	487.7	1600.1	23.45	76.93

CONETEC

Job No: 06-948	Client: Schnabel Engineering	Project Title: CCNPP	Operator: TS-SL	Hole: C-401-2A	Site: C C N P P
Date: 07:27:06 12:21	Cone: STD 20T AD-195				



Shear Wave Velocity- C-401-2b
CCNPP
06-948
July 27, 2006



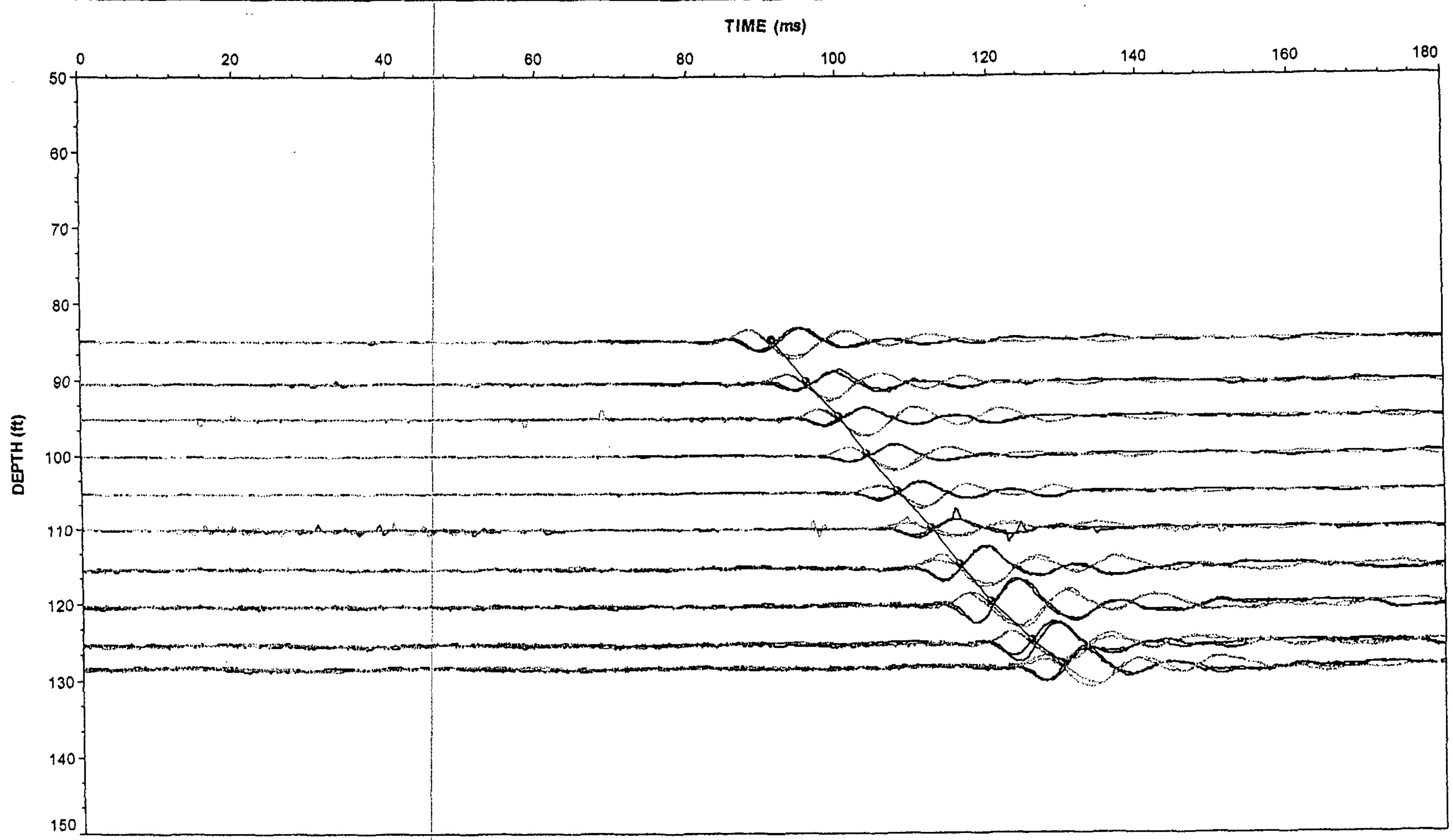
ConeTec Shear Wave Velocity Data Reduction Sheet

Hole:	C-401-2b
Location:	CCNPP
Cone:	AD195
Date:	27-Jul-06
Source:	Beam
Source Depth	0.00 m
Source Offset	2.15 m

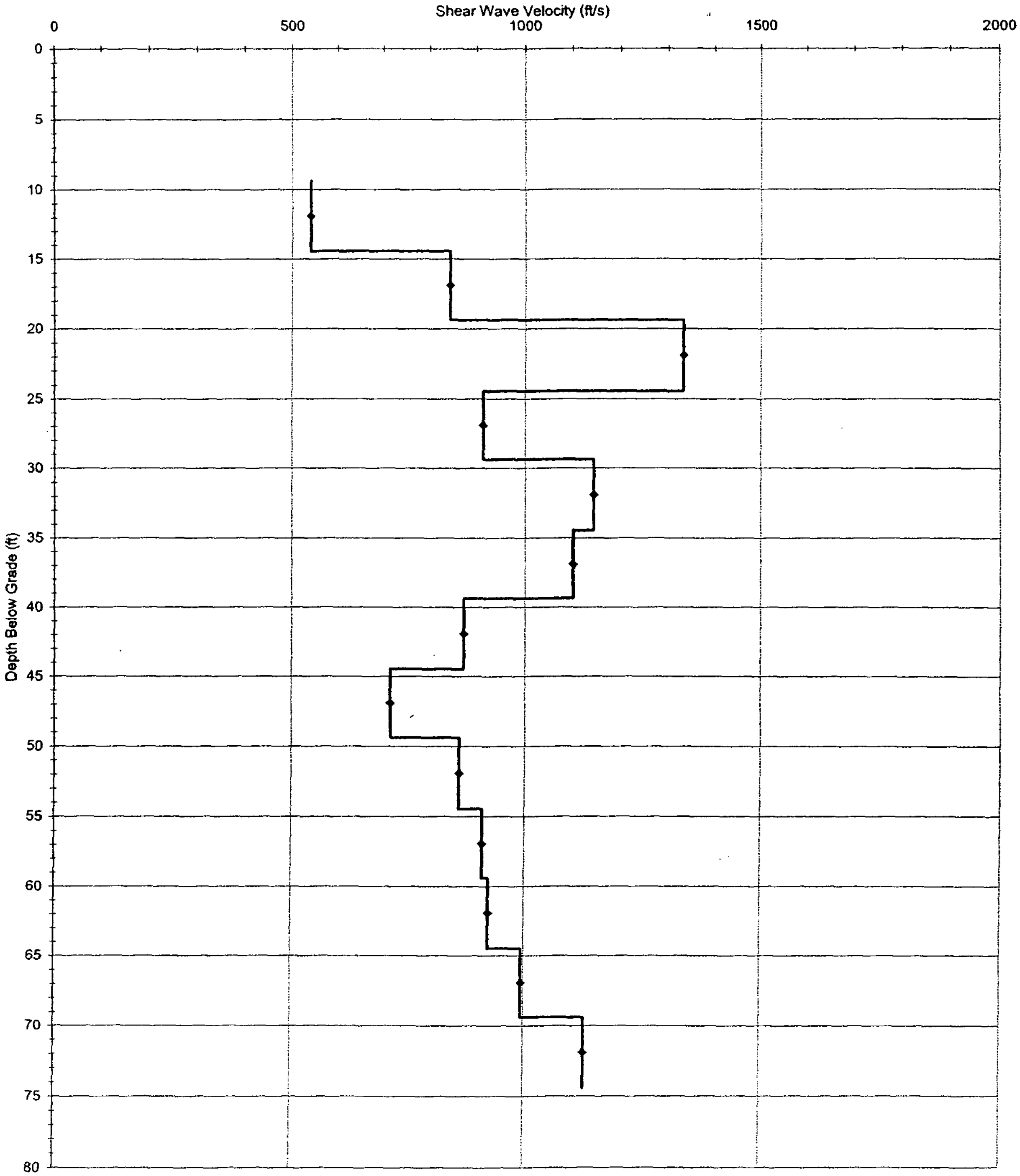
Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
25.90	25.70	25.79					
27.55	27.35	27.43	4.38	375.6	1232.4	26.52	87.02
29.00	28.80	28.88	4.49	322.4	1057.6	28.07	92.11
30.50	30.30	30.38	3.63	412.5	1353.5	29.55	96.95
32.05	31.85	31.92	3.77	410.2	1345.7	31.07	101.95
33.55	33.35	33.42	4.54	330.0	1082.8	32.60	106.95
35.10	34.90	34.97	3.86	400.5	1313.9	34.12	111.96
36.60	36.40	36.46	4.06	369.2	1211.2	35.65	116.96
38.15	37.95	38.01	5.31	291.2	955.3	37.17	121.96
39.05	38.85	38.91	4.11	218.8	718.0	38.40	125.98

CONETEC

Job No: 06-948 Client: Schnabel Engineering Project Title: CCNPP Operator: TS-SL Hole: C-401-2B Site: C C N P P
Date: 07:27:06 15:04 Cone: STD 20T AD-195



Shear Wave Velocity- C-404
CCNPP
06-948
July 14, 2006



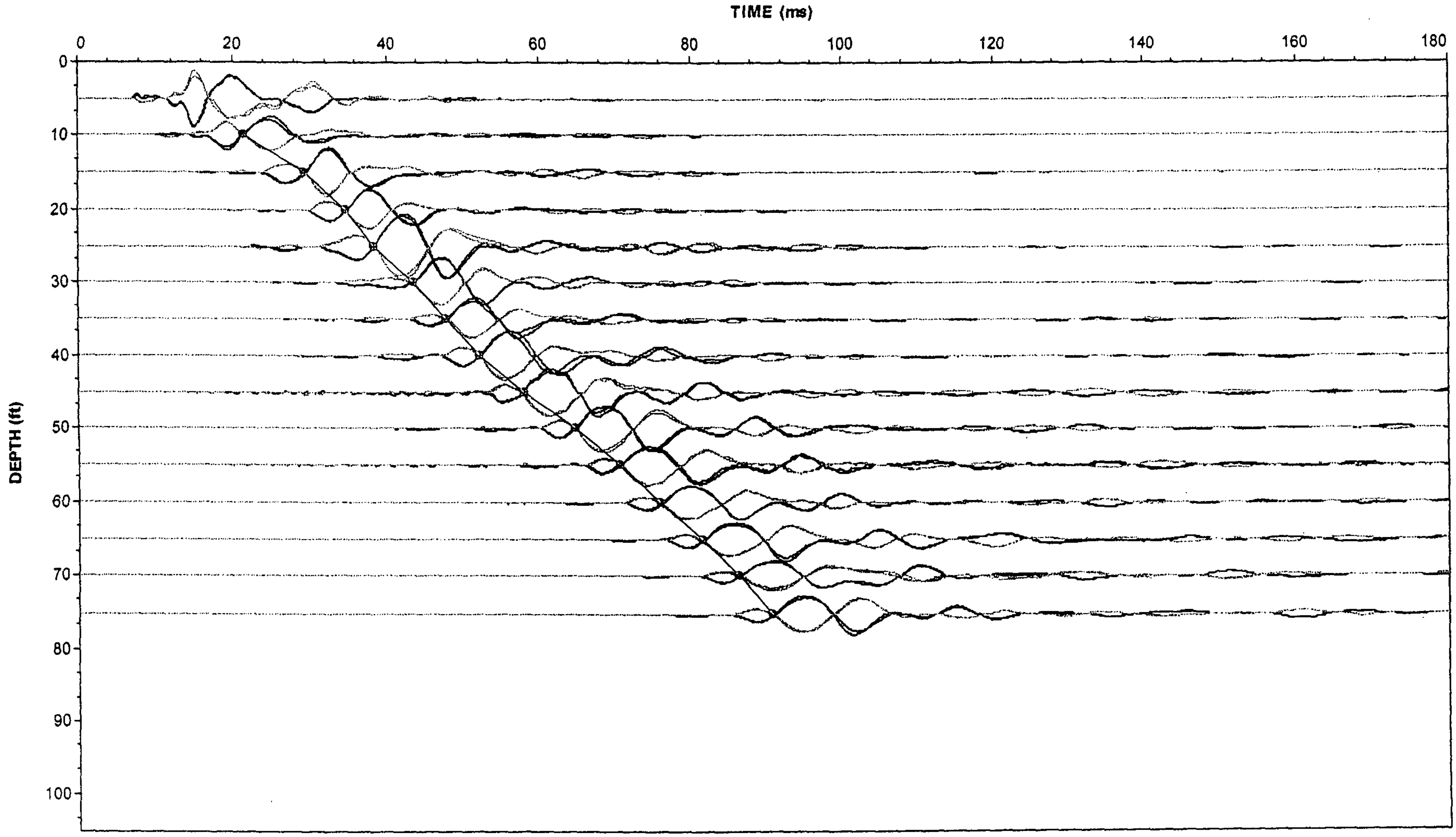
ConeTec Shear Wave Velocity Data Reduction Sheet

Hole: C-404
Location: CCNPP
Cone: AD195
Date: 14-Jul-06
Source: Beam

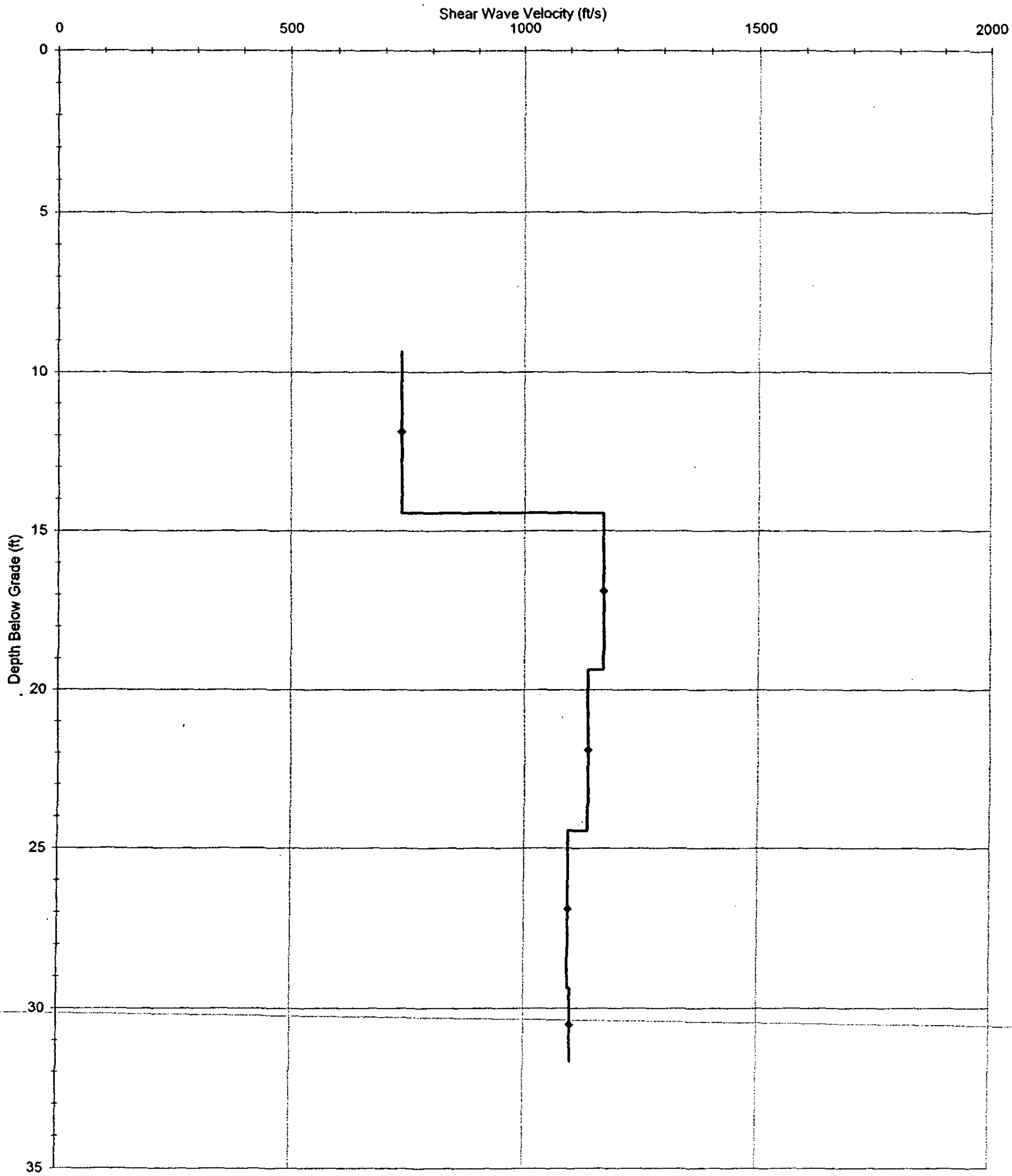
Source Depth	0.00 m
Source Offset	2.15 m

Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
3.05	2.85	3.57					
4.60	4.40	4.90	8.06	164.6	540.1	3.62	11.89
6.10	5.90	6.28	5.39	256.6	841.8	5.15	16.90
7.65	7.45	7.75	3.63	405.9	1331.5	6.67	21.90
9.15	8.95	9.20	5.21	278.2	912.6	8.20	26.90
10.70	10.50	10.72	4.34	348.5	1143.4	9.72	31.91
12.20	12.00	12.19	4.39	335.4	1100.5	11.25	36.91
13.75	13.55	13.72	5.75	265.8	872.0	12.77	41.91
15.25	15.05	15.20	6.80	218.0	715.3	14.30	46.92
16.80	16.60	16.74	5.84	262.8	862.2	15.82	51.92
18.30	18.10	18.23	5.36	277.8	911.5	17.35	56.92
19.85	19.65	19.77	5.46	281.8	924.6	18.87	61.92
21.35	21.15	21.26	4.92	303.1	994.4	20.40	66.93
22.90	22.70	22.80	4.49	343.4	1126.6	21.92	71.93

Job No: 06-948	Client: Schnabel Engineering	Project Title: CCNPP	Operator: TS-SL	Hole: C-404-ALT	Site: C C N P P
Date: 07:14:06 11:17	Cone: STD 20T AD-195				



Shear Wave Velocity- C-407
CCNPP
06-948
July 13, 2006



CONETEC

ConeTec Shear Wave Velocity Data Reduction Sheet

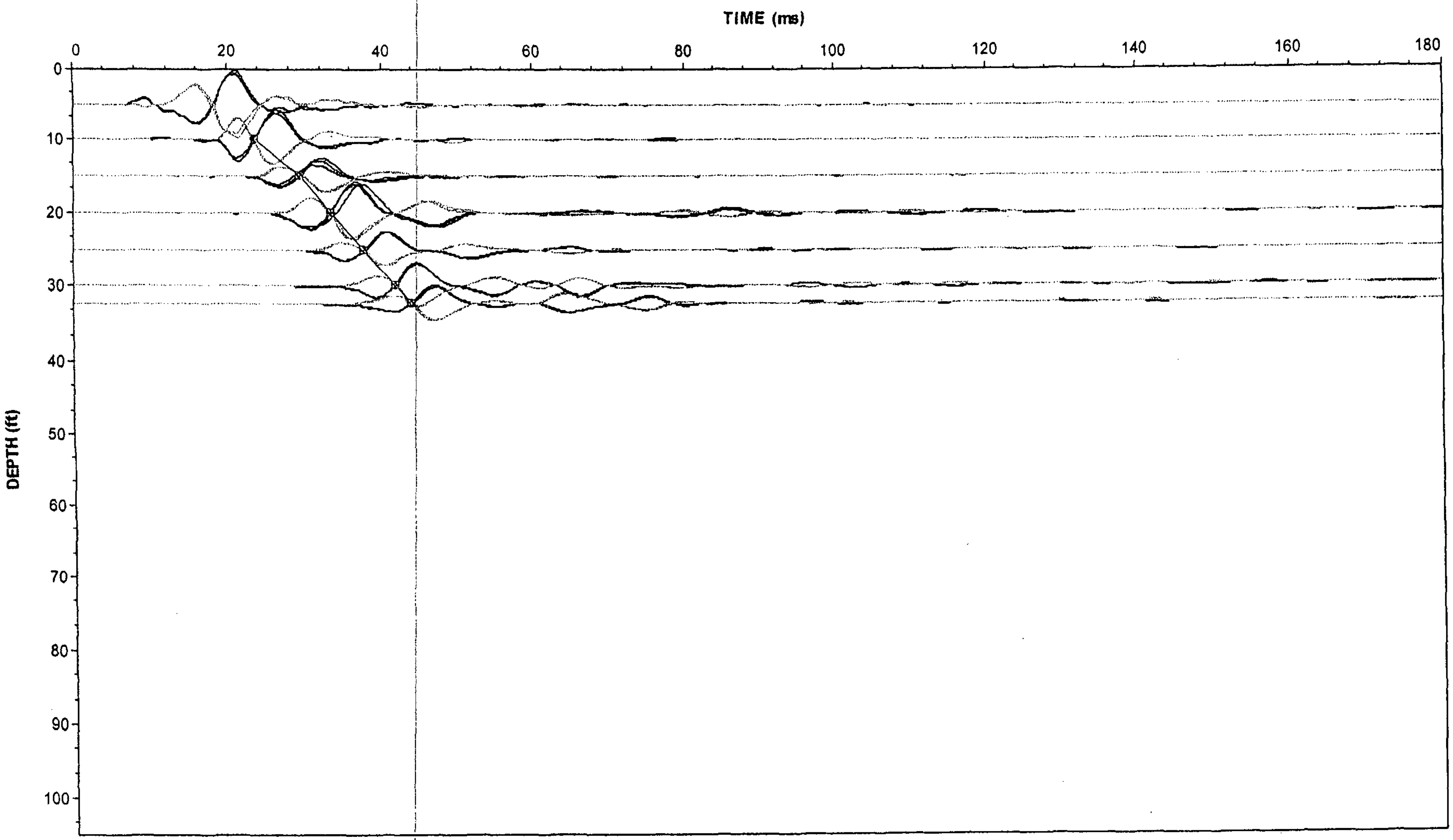
Hole: C-407
Location: CCNPP
Cone: AD195
Date: 13-Jul-06
Source: Beam

Source Depth	0.00 m
Source Offset	2.15 m

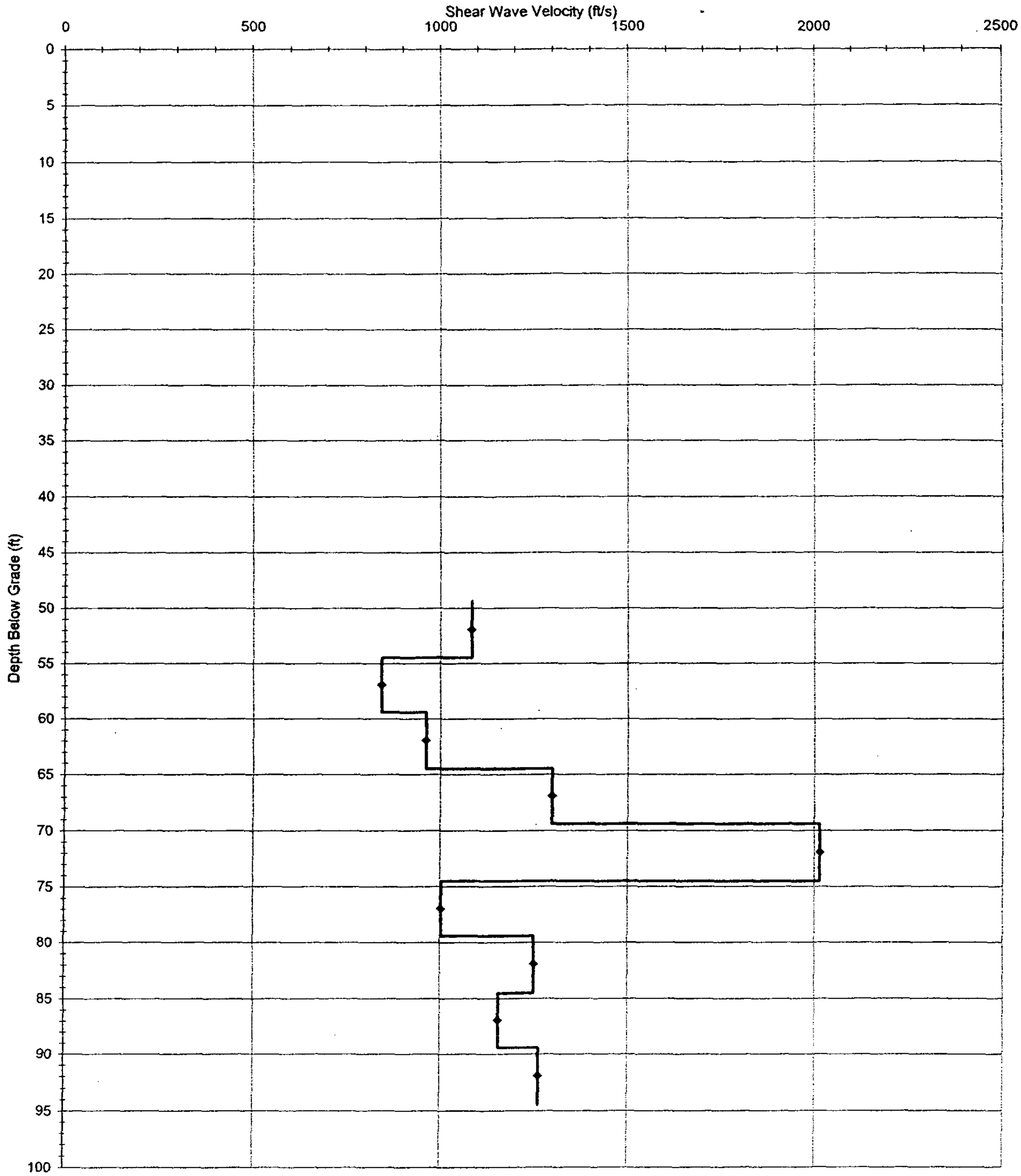
Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
3.05	2.85	3.57					
4.60	4.40	4.90	5.94	223.5	733.4	3.62	11.89
6.10	5.90	6.28	3.87	357.2	1172.0	5.15	16.90
7.65	7.45	7.75	4.25	347.1	1138.6	6.67	21.90
9.15	8.95	9.20	4.34	334.1	1096.0	8.20	26.90
9.85	9.65	9.89	2.03	335.8	1101.6	9.30	30.51

CONETEC

Job No: 06-948 Client: Schnabel Engineering Project Title: CCNPP Operator: TS-SL Hole: C407-ALT Site: C C N P P
Date: 07:13:06 11:25 Cone: STD 20T AD-195



Shear Wave Velocity- C-407-2a
CCNPP
06-948
July 28, 2006



ConeTec Shear Wave Velocity Data Reduction Sheet

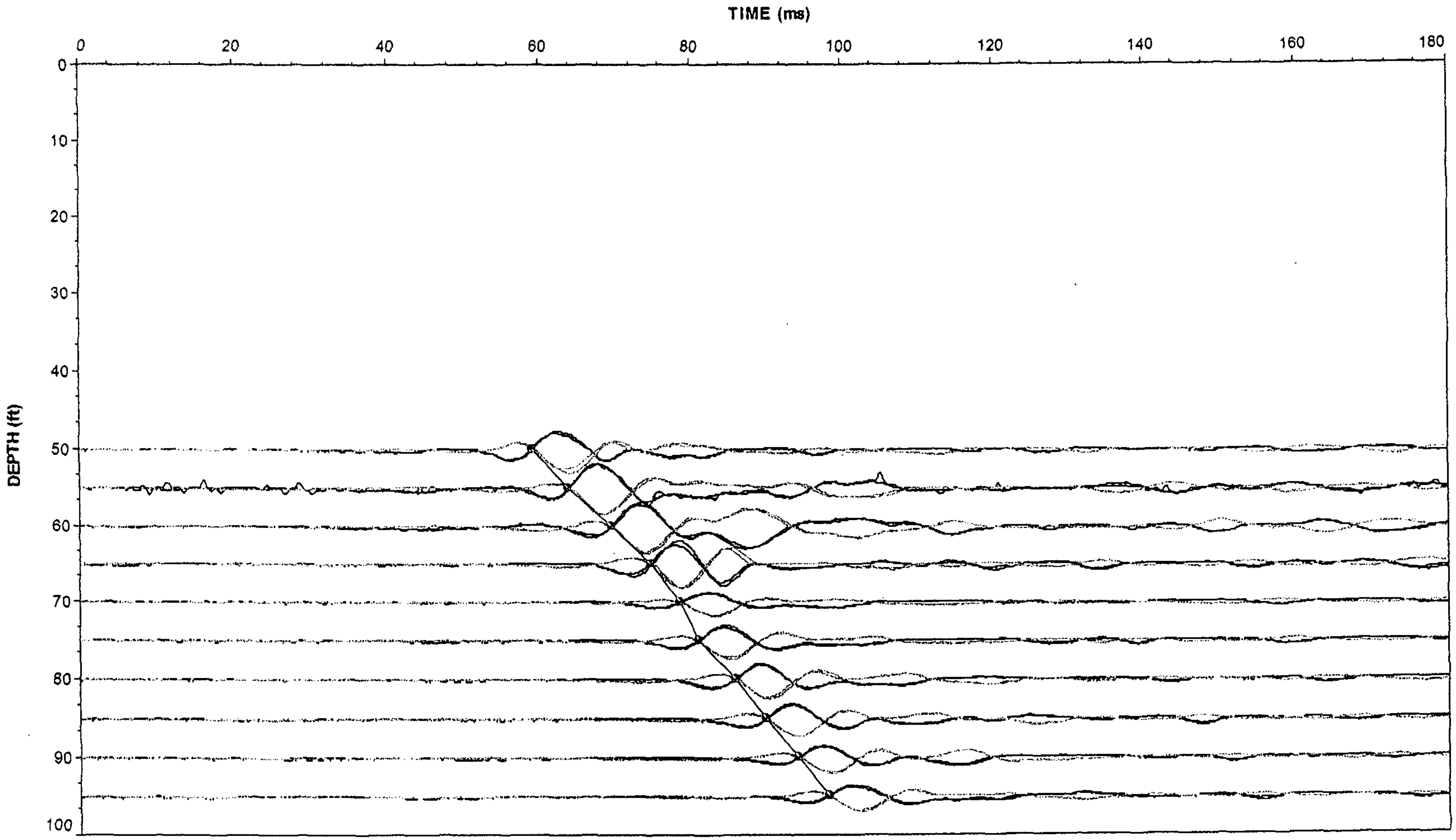
Hole: C-407-2a
Location: CCNPP
Cone: AD195
Date: 28-Jul-06
Source: Beam

Source Depth	0.00	m
Source Offset	2.15	m

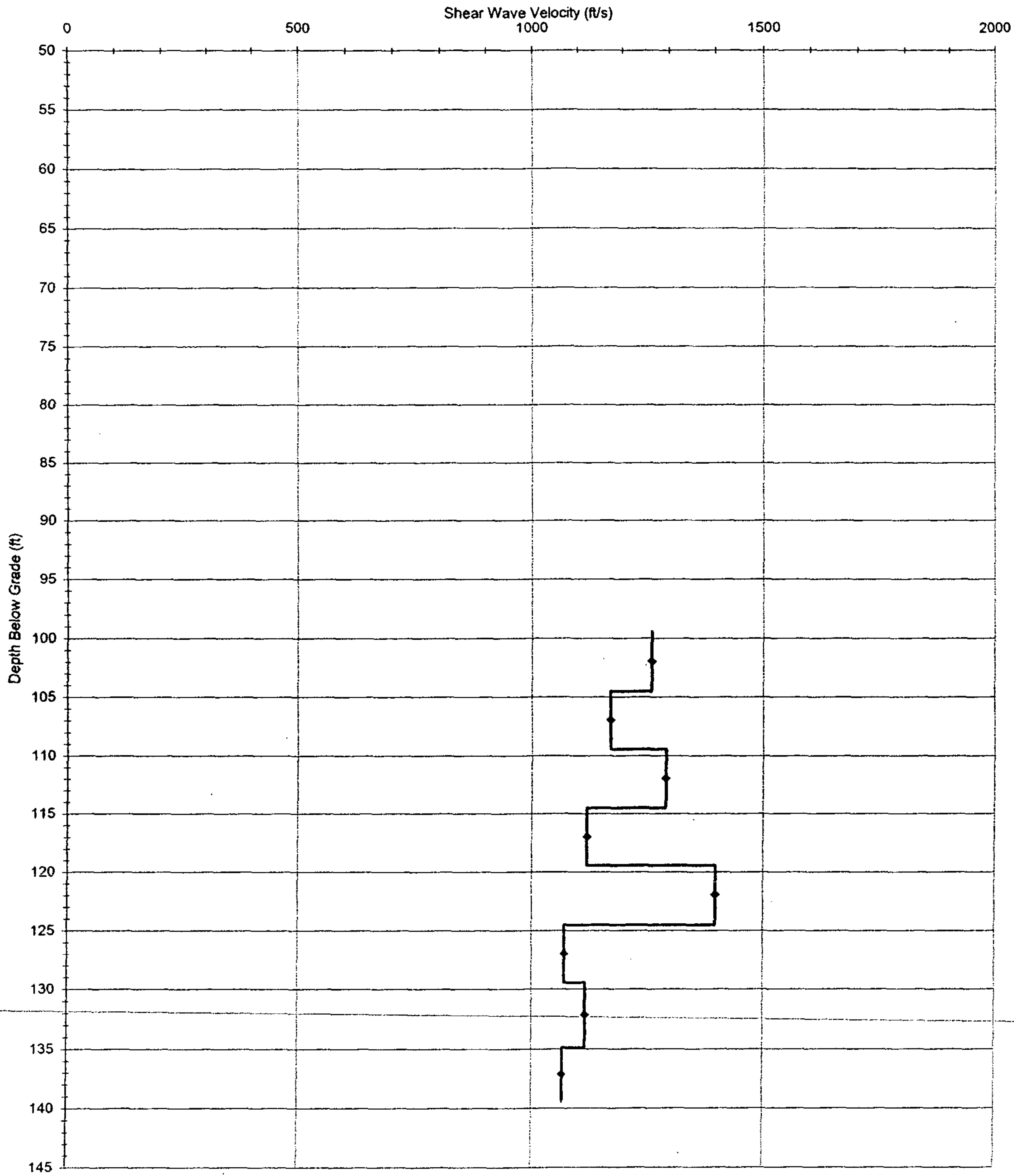
Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
15.25	15.05	15.20					
16.80	16.60	16.74	4.65	330.3	1083.8	15.82	51.92
18.30	18.10	18.23	5.79	257.2	843.9	17.35	56.92
19.85	19.65	19.77	5.25	293.3	962.3	18.87	61.92
21.35	21.15	21.26	3.77	395.7	1298.3	20.40	66.93
22.90	22.70	22.80	2.51	614.4	2015.6	21.92	71.93
24.40	24.20	24.30	4.89	305.8	1003.2	23.45	76.93
25.95	25.75	25.84	4.05	381.4	1251.4	24.97	81.94
27.45	27.25	27.33	4.24	352.4	1156.3	26.50	86.94
29.00	28.80	28.88	4.01	385.1	1263.6	28.03	91.94

ConeTec

Job No: 06-948 Client: Schnabel Engineering Project Title: CCNPP Operator: TS-SL Hole: C-407-2A Site: C C N P P
Date: 07:28:06 07:49 Cone: STD 20T AD-195



Shear Wave Velocity- C-407-b
CCNPP
06-948
July 31, 2006



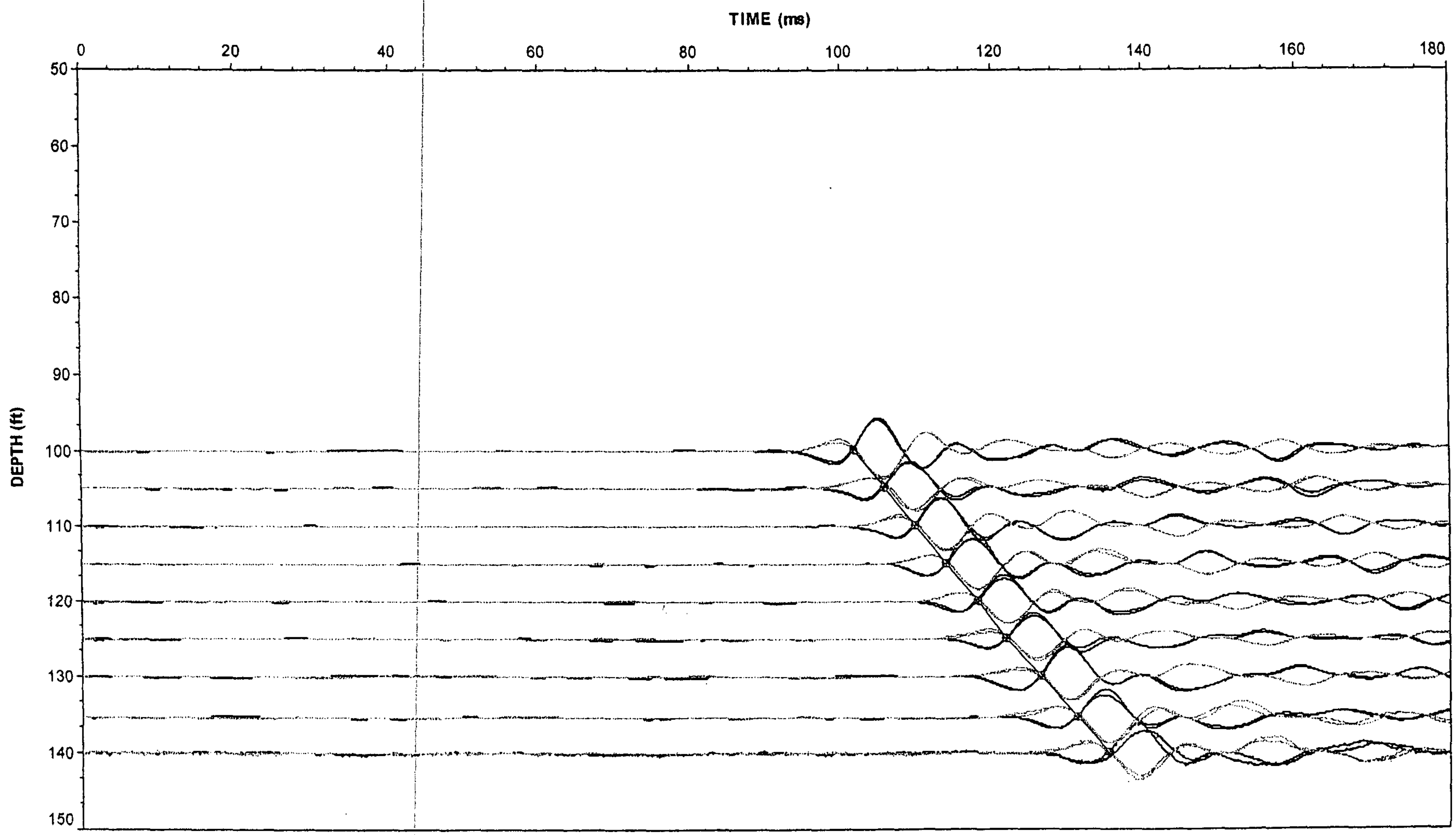
ConeTec Shear Wave Velocity Data Reduction Sheet

Hole: C-407-b
Location: CCNPP
Cone: AD195
Date: 31-Jul-06
Source: Beam

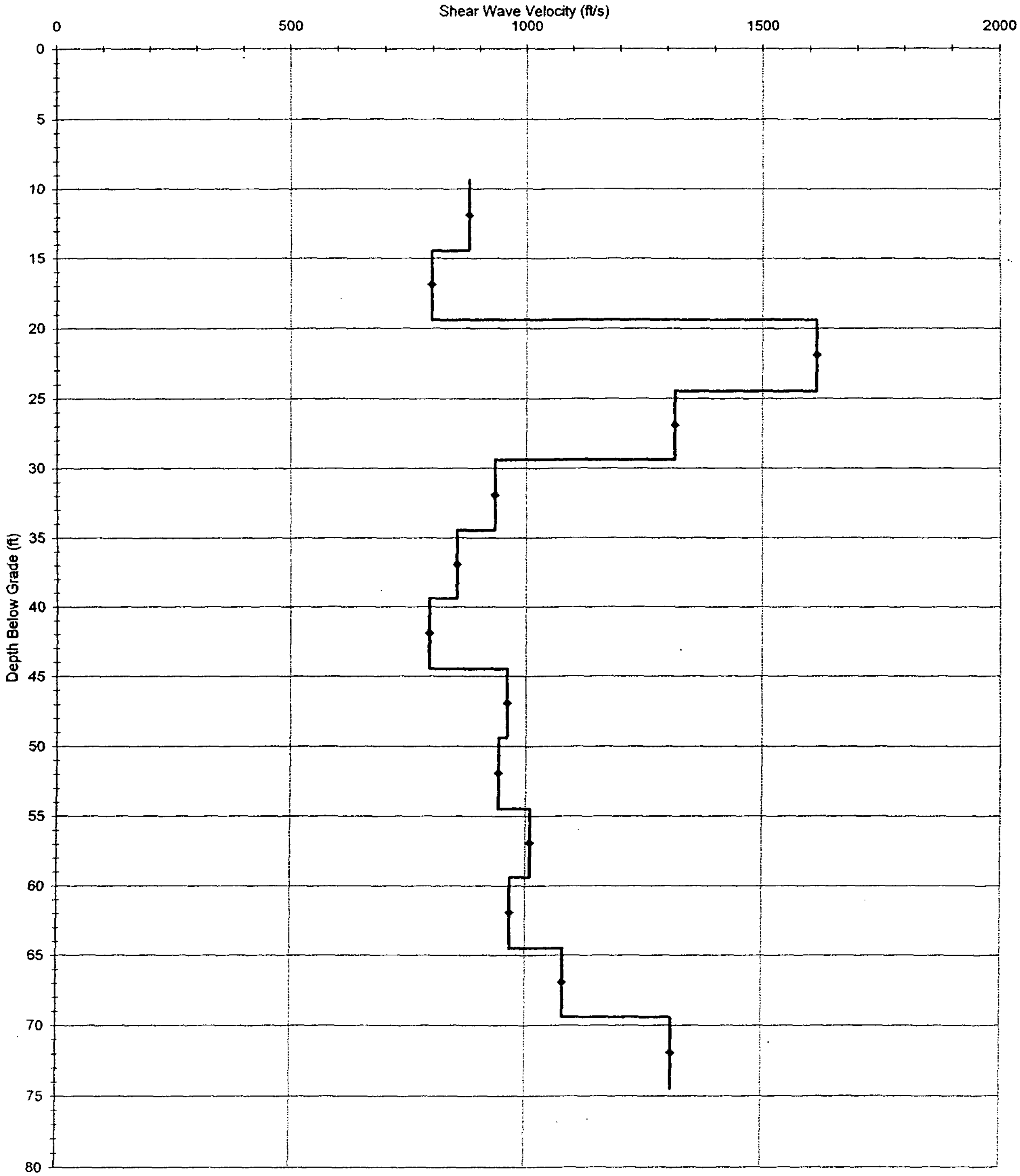
Source Depth	0.00 m
Source Offset	2.15 m

Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
30.50	30.30	30.38					
32.05	31.85	31.92	4.02	384.7	1262.0	31.07	101.95
33.55	33.35	33.42	4.19	357.6	1173.3	32.60	106.95
35.10	34.90	34.97	3.93	394.0	1292.6	34.12	111.96
36.60	36.40	36.46	4.38	342.0	1122.0	35.65	116.96
38.15	37.95	38.01	3.63	426.7	1400.0	37.17	121.96
39.65	39.45	39.51	4.59	326.6	1071.6	38.70	126.97
41.30	41.10	41.16	4.83	341.2	1119.5	40.27	132.13
42.70	42.50	42.55	4.30	325.3	1067.1	41.80	137.14

Job No: 06-948	Client: Schnabel Engineering	Project Title: CCNPP	Operator: TS-SL	Hole: C407-b	Site: C C N P P
Date: 07:31:06 09:33	Cone: STD 20T AD-195				



Shear Wave Velocity- C-408
CCNPP
06-948
July 17, 2006



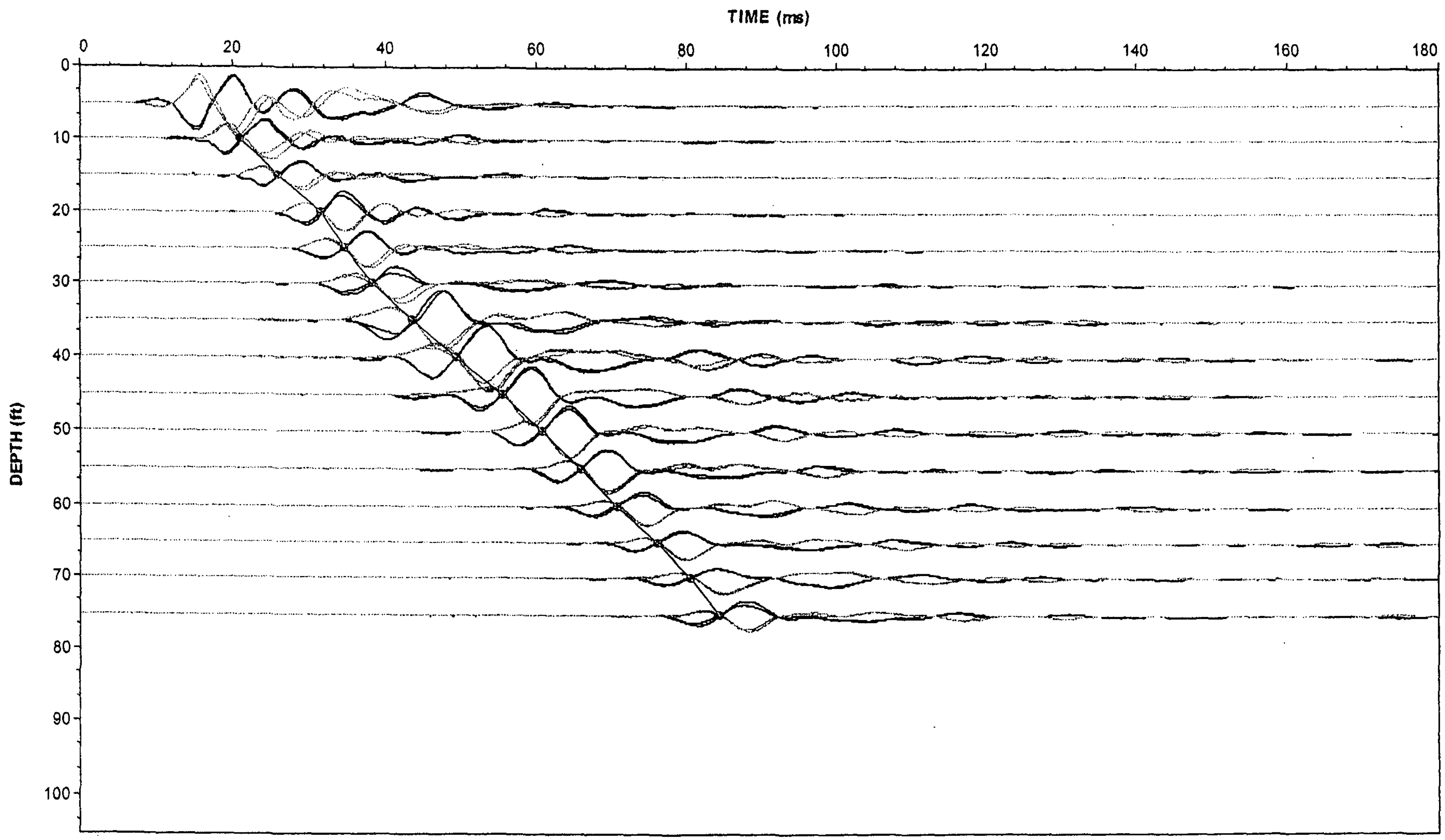
ConeTec Shear Wave Velocity Data Reduction Sheet

Hole: C-408
Location: CCNPP
Cone: AD195
Date: 17-Jul-06
Source: Beam

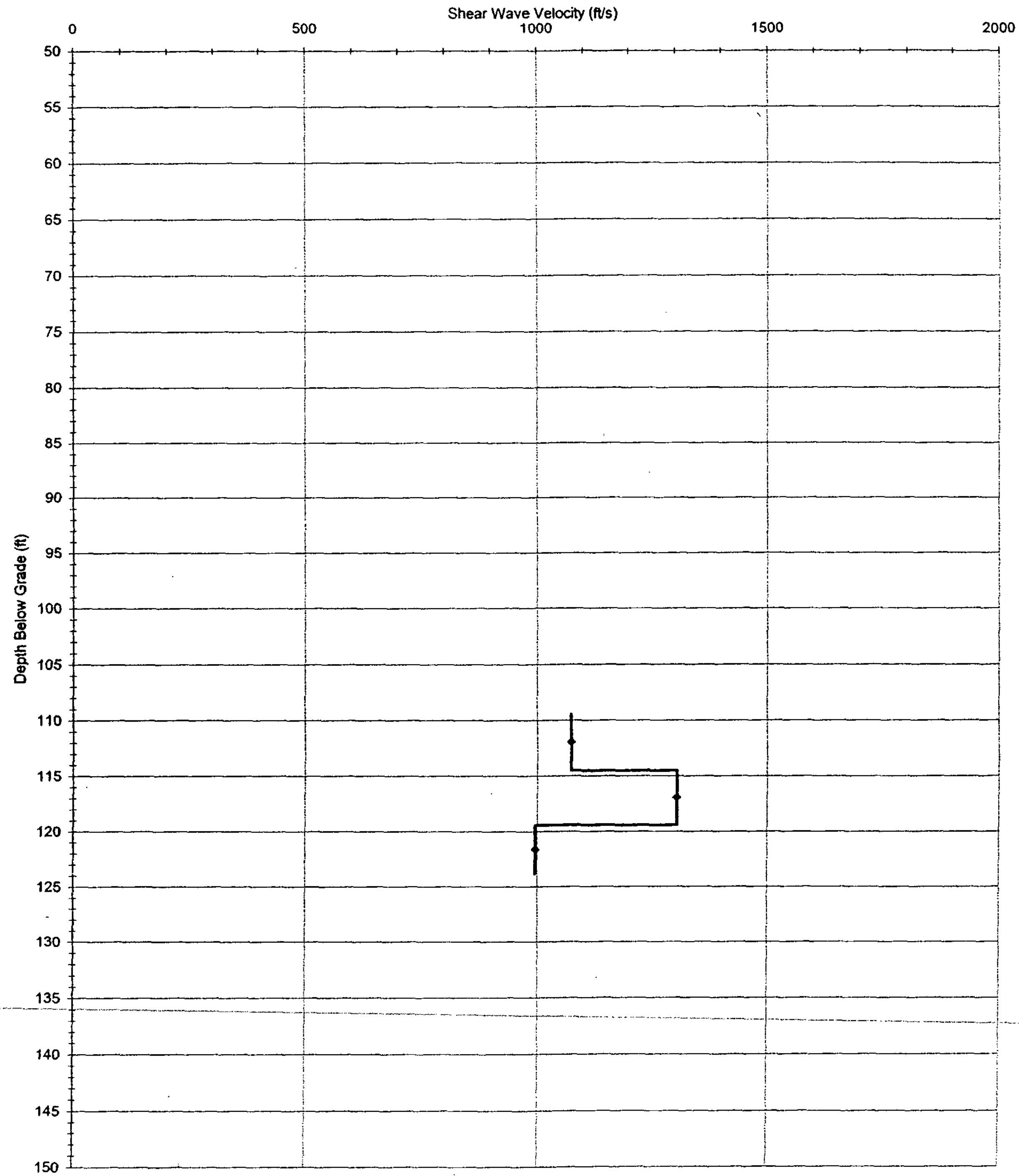
Source Depth	0.00 m
Source Offset	2.15 m

Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
3.05	2.85	3.57					
4.60	4.40	4.90	4.97	267.0	875.8	3.62	11.89
6.10	5.90	6.28	5.69	242.8	796.5	5.15	16.90
7.65	7.45	7.75	3.00	492.0	1614.2	6.67	21.90
9.15	8.95	9.20	3.62	400.7	1314.7	8.20	26.90
10.70	10.50	10.72	5.32	284.4	932.9	9.72	31.91
12.20	12.00	12.19	5.68	259.4	850.9	11.25	36.91
13.75	13.55	13.72	6.33	241.5	792.2	12.77	41.91
15.25	15.05	15.20	5.07	292.5	959.6	14.30	46.92
16.80	16.60	16.74	5.35	287.0	941.6	15.82	51.92
18.30	18.10	18.23	4.84	307.9	1010.0	17.35	56.92
19.85	19.65	19.77	5.23	294.6	966.4	18.87	61.92
21.35	21.15	21.26	4.53	329.4	1080.8	20.40	66.93
22.90	22.70	22.80	3.86	399.3	1310.1	21.92	71.93

ConeTec	Job No: 06-948	Client: Schnabel Engineering	Project Title: CCNPP	Operator: TS-SL	Hole: C-408-ALT	Site: C C N P P
	Date: 07:17:06 09:33	Cone: STD 20T AD-195				



Shear Wave Velocity- C-408-2a
CCNPP
06-948
July 31, 2006



ConeTec Shear Wave Velocity Data Reduction Sheet

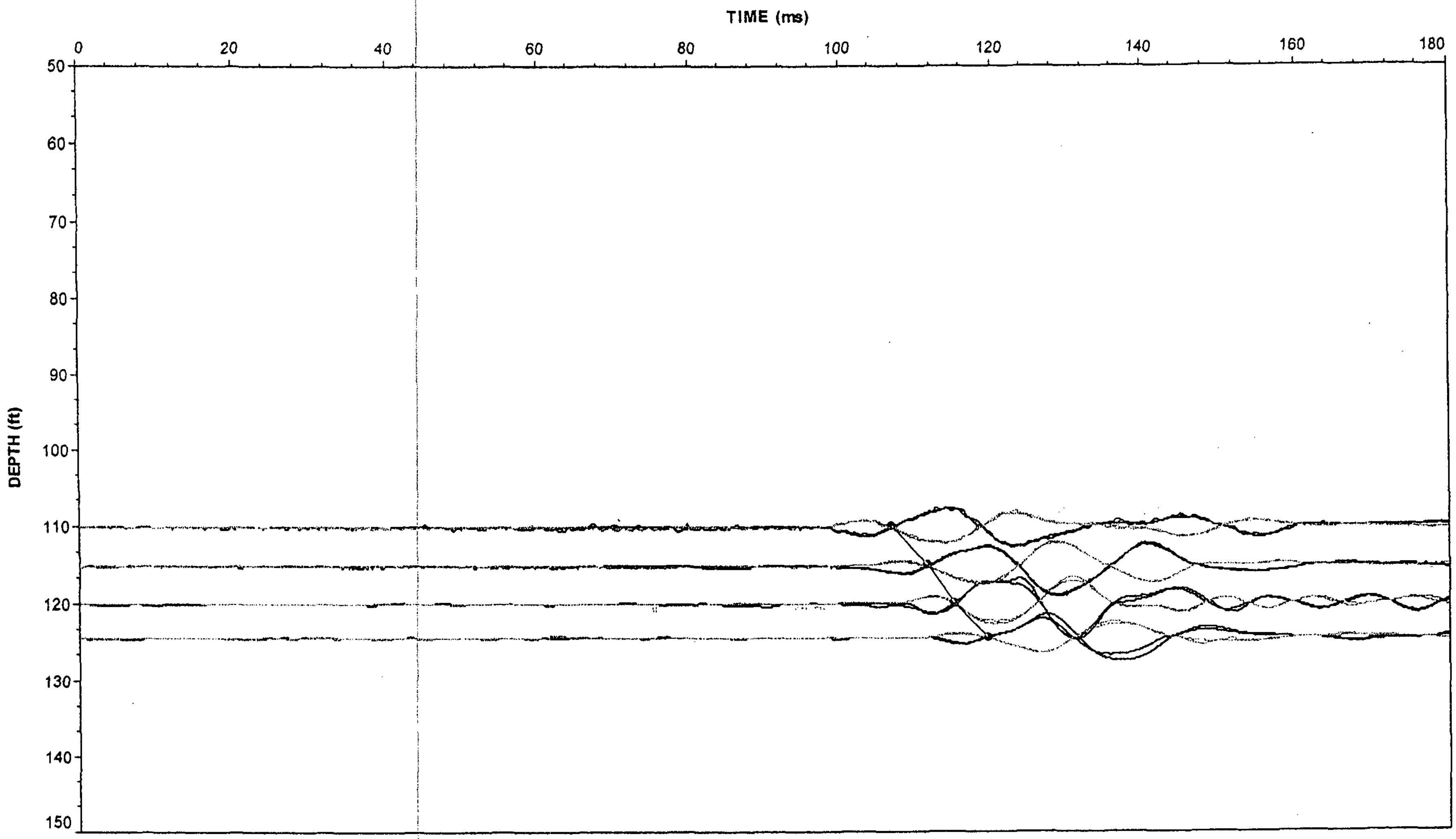
Hole: C-408-2a
Location: CCNPP
Cone: AD195
Date: 31-Jul-06
Source: Beam

Source Depth	0.00 m
Source Offset	2.15 m

Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
33.55	33.35	33.42					
35.10	34.90	34.97	4.73	327.2	1073.4	34.12	111.96
36.60	36.40	36.46	3.76	397.9	1305.5	35.65	116.96
37.95	37.75	37.81	4.44	303.4	995.5	37.07	121.64

Job No: 06-948 | Client: Schnabel Engineering | Project Title: CCNPP | Operator: TS-SL | Hole: C408-2a | Site: C C N P P

Date: 07:31:06 15:16 | Cone: STD 20T AD-195



APPENDIX C
PORE PRESSURE DISSIPATION TESTS

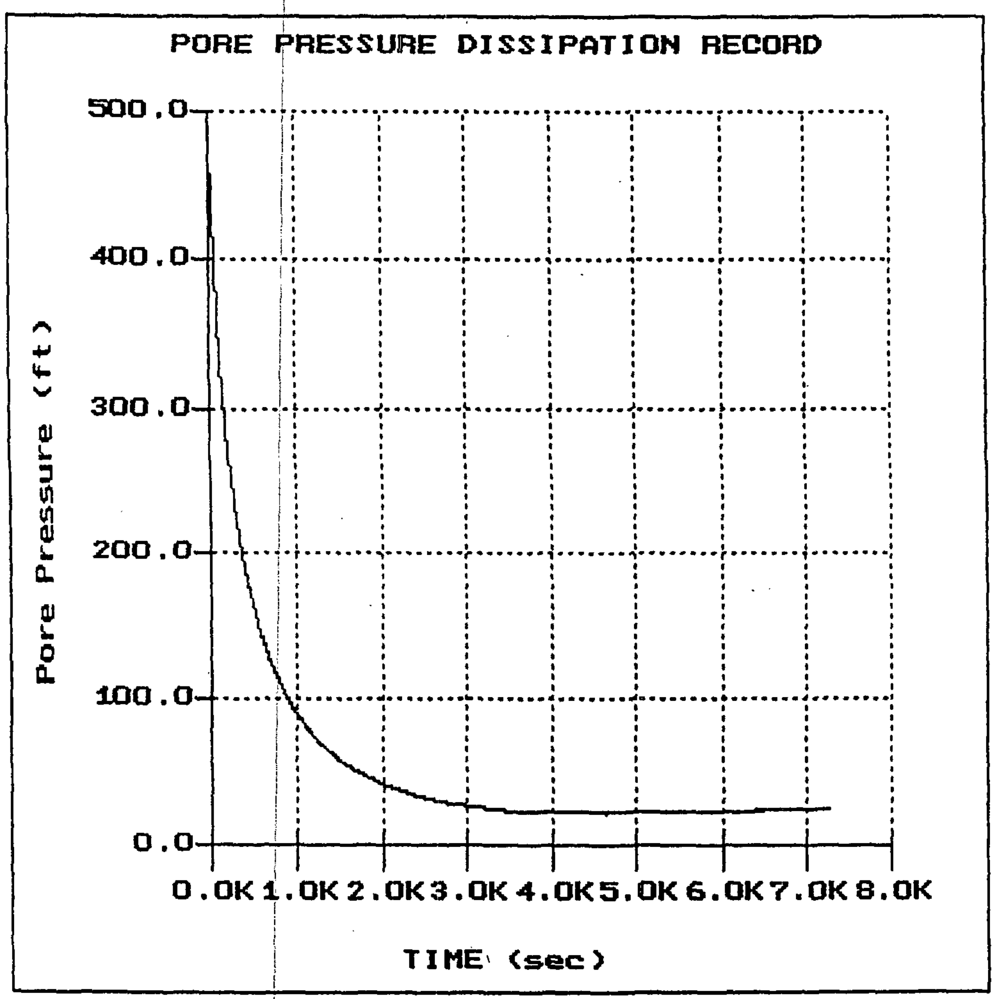
Presentation of In Situ Testing Program Results
ConeTec, Inc.
November 13, 2006

Schnabel

Hole: C-302
Location:C C N P P

Cone:STD 20T AD-195
Date:07:12:06 10:00

File: 948CP05.PPD
Depth (m): 10.65
(ft): 34.94
Duration : 7240.0s
U-min: 21.68 4635.0s
U-max: 494.11 0.0s

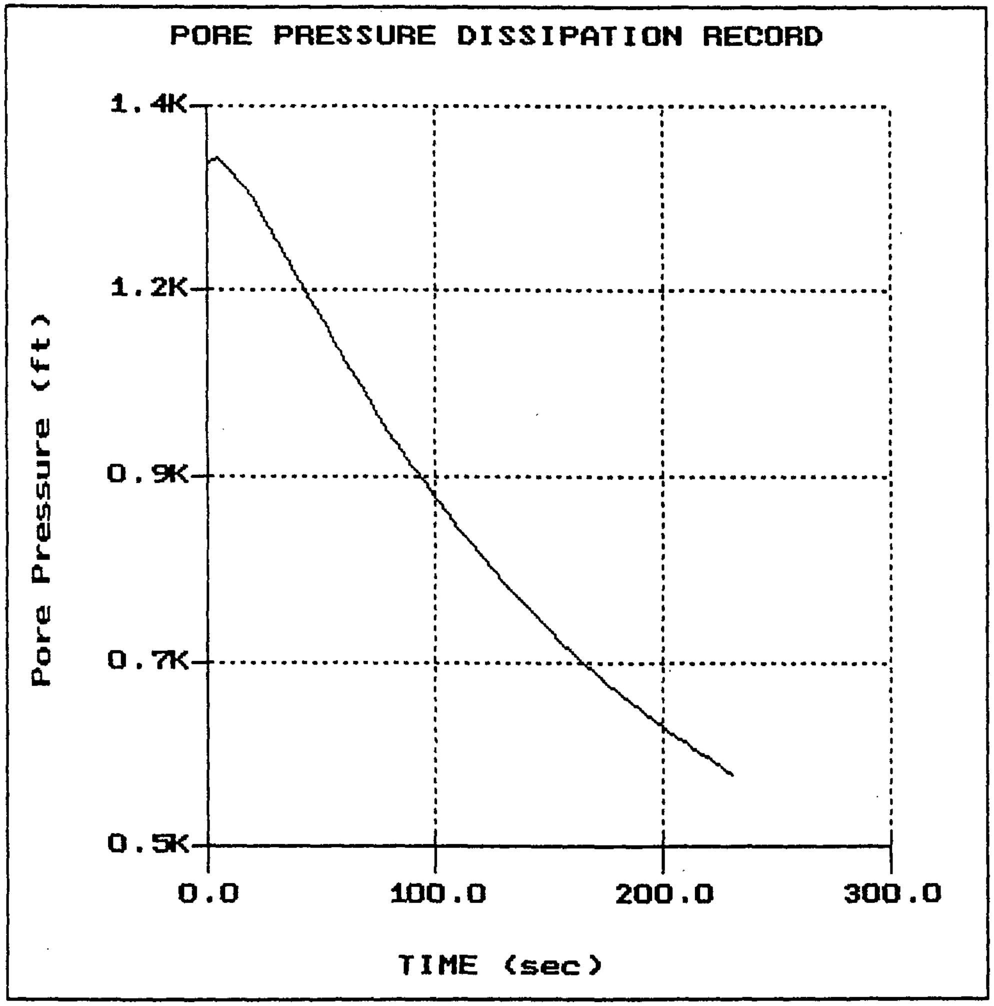


Schnabel

Hole: C-302-2a
Location:C C N P P

Cone:STD 20T AD-195
Date:07:26:06 10:40

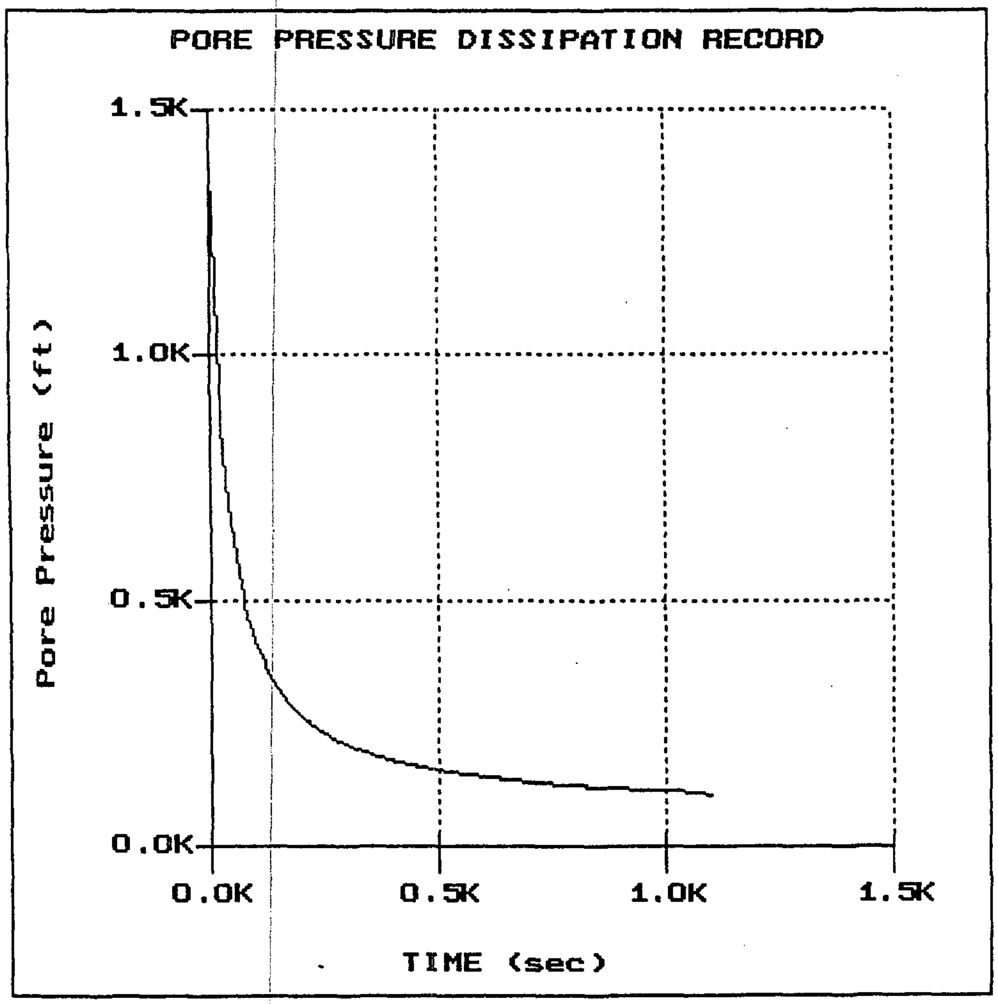
File: 948CP58.PPD
Depth (m): 38.85
(ft): 127.46
Duration : 230.0s
U-min: 587.87 230.0s
U-max: 1338.07 5.0s



Schnabel

Hole: C-303b
Location:C C N P P

Cone:STD 20T AD-195
Date:07:25:06 15:32



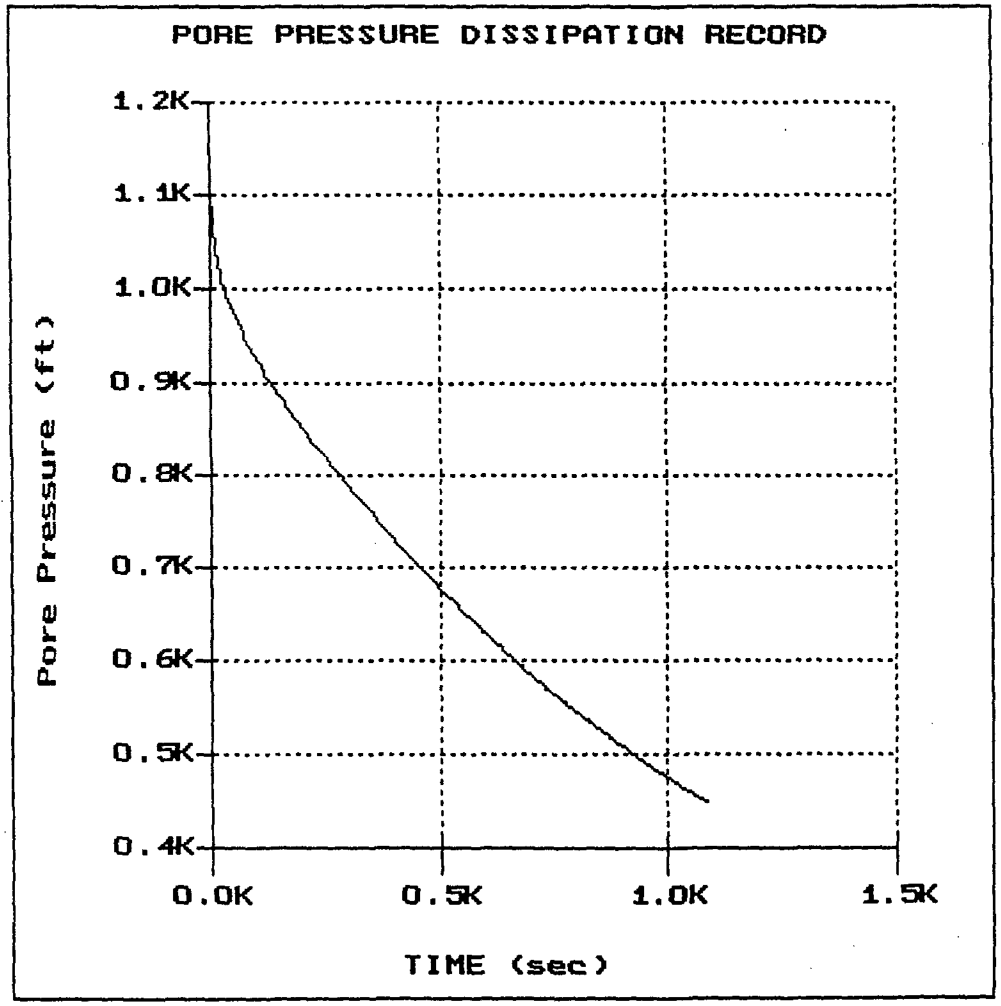
File: 948CP56.PPD
Depth (m): 29.60
(ft): 97.11
Duration : 1095.0s
U-min: 103.57 1095.0s
U-max: 1401.43 0.0s

Schnabel

Hole: C-304
Location:C C N P P

Cone:STD 20T AD-195
Date:07:12:06 07:36

File: 948CP03.PPD
Depth (m): 5.05
(ft): 16.57
Duration : 1085.0s
U-min: 449.39 1085.0s
U-max: 1112.82 0.0s

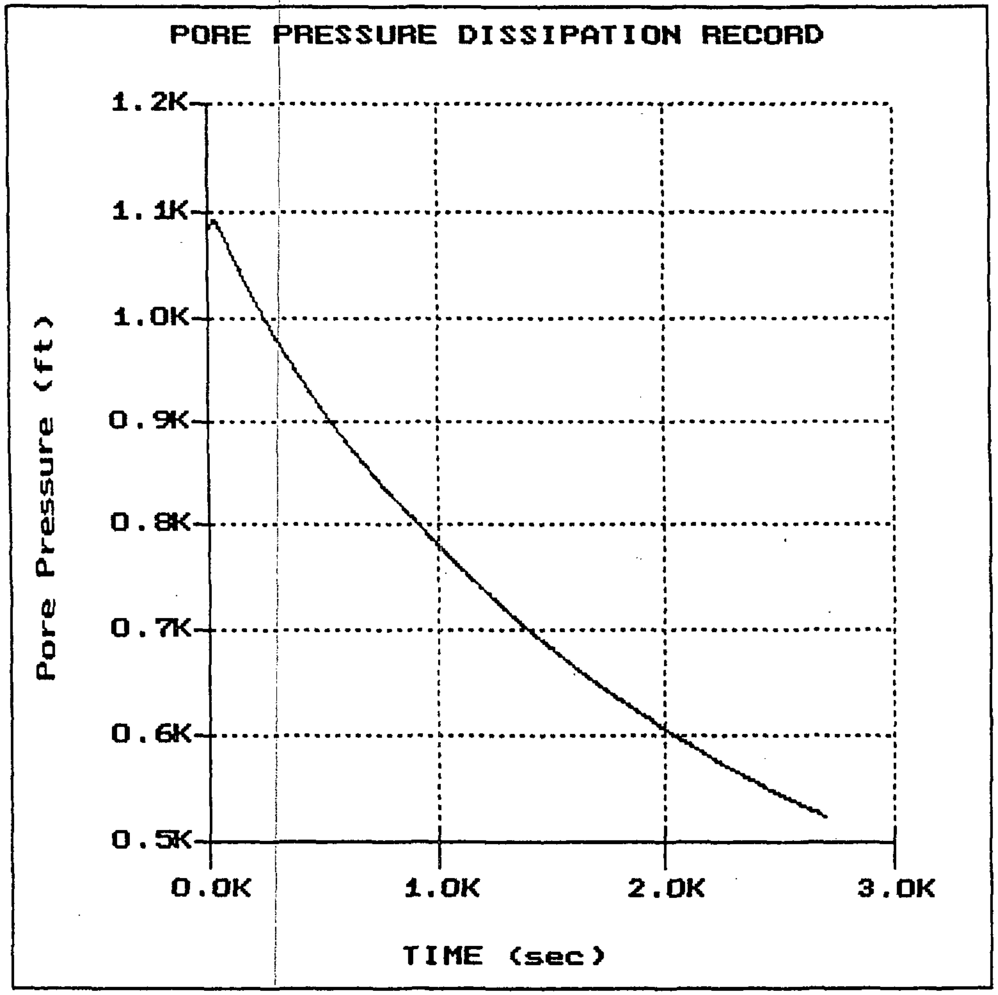


Schnabel

Hole: C-306
Location:C C N P P

Cone:STD 20T AD-195
Date:07:12:06 16:33

File: 948CP08.PPD
Depth (m): 14.05
(ft): 46.10
Duration : 2700.0s
U-min: 523.72 2700.0s
U-max: 1132.71 0.0s

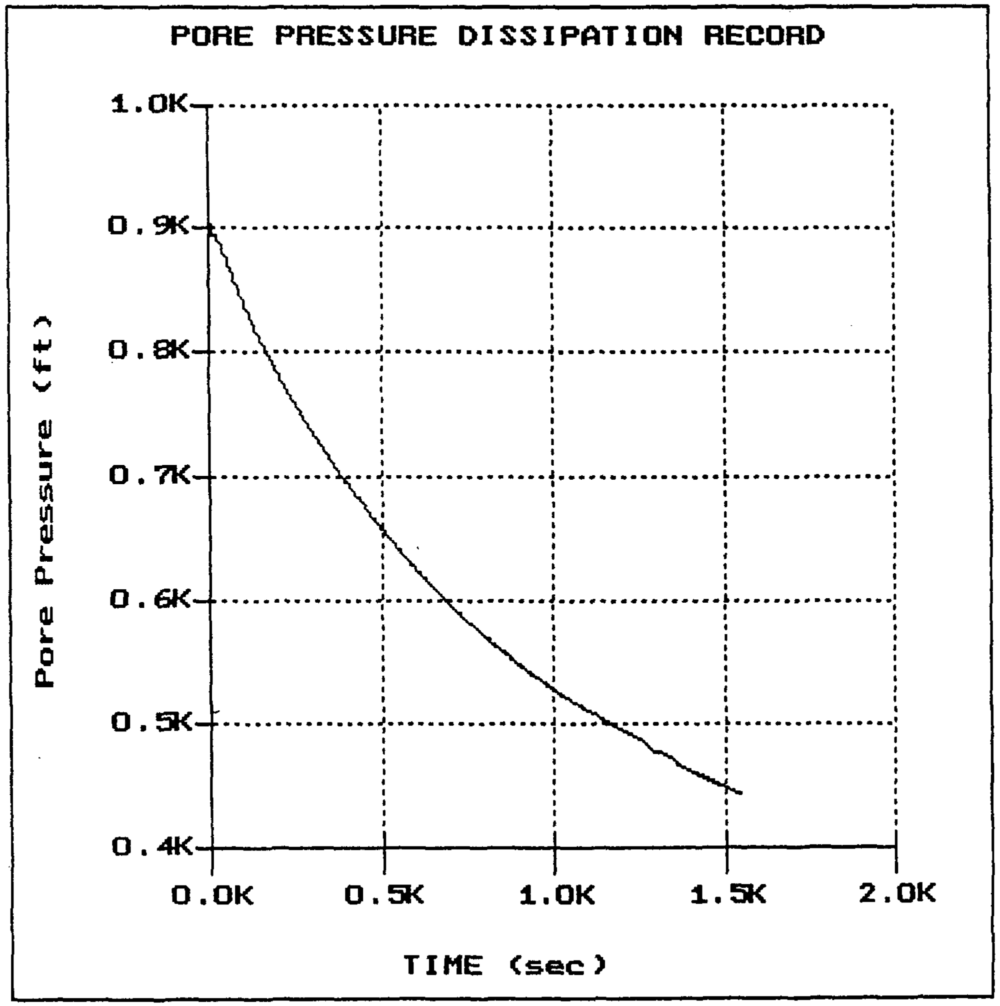


Schnabel

Hole: C-309
Location:C C N P P

Cone:STD 20T AD-195
Date:07:17:06 13:13

File: 948CP24.PPD
Depth (m): 18.00
(ft): 59.06
Duration : 1545.0s
U-min: 442.72 1545.0s
U-max: 911.73 0.0s

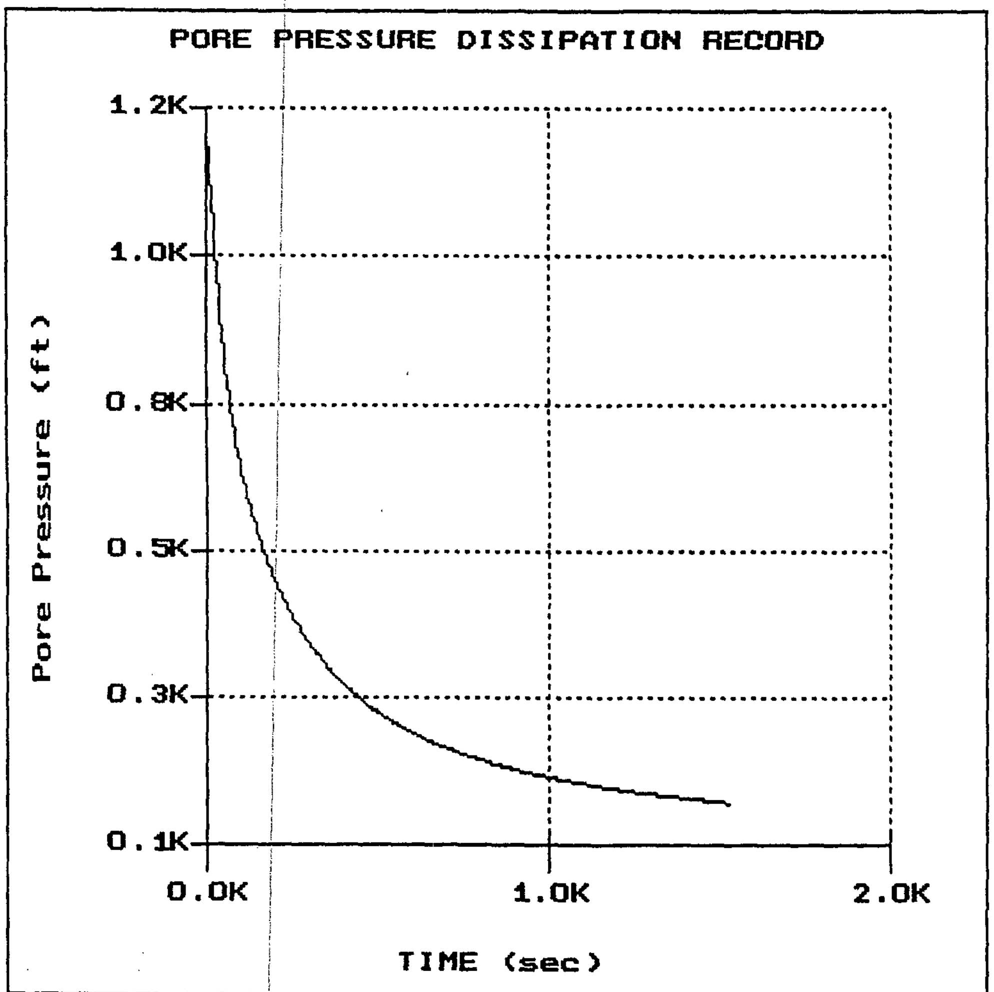


Schnabel

Hole: C-401-2b
Location:C C N P P

Cone:STD 20T AD-195
Date:07:27:06 15:04

File: 948CP61.PPD
Depth (m): 39.05
(ft): 128.12
Duration : 1525.0s
U-min: 159.27 1525.0s
U-max: 1149.75 0.0s

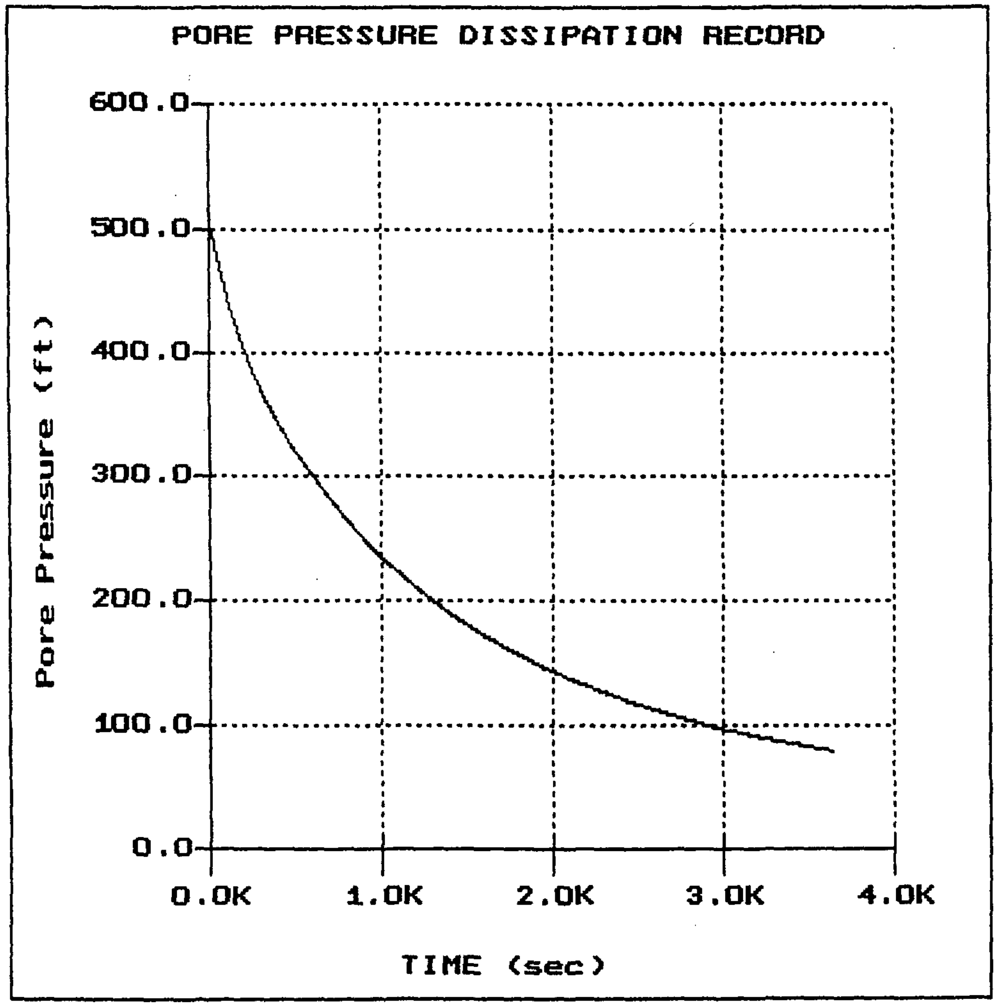


Schnabel

Hole: C-402
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:13:06 08:45

File: 948CP10.PPD
Depth (m): 6.50
(ft): 21.33
Duration : 3635.0s
U-min: 79.92 3635.0s
U-max: 518.37 0.0s

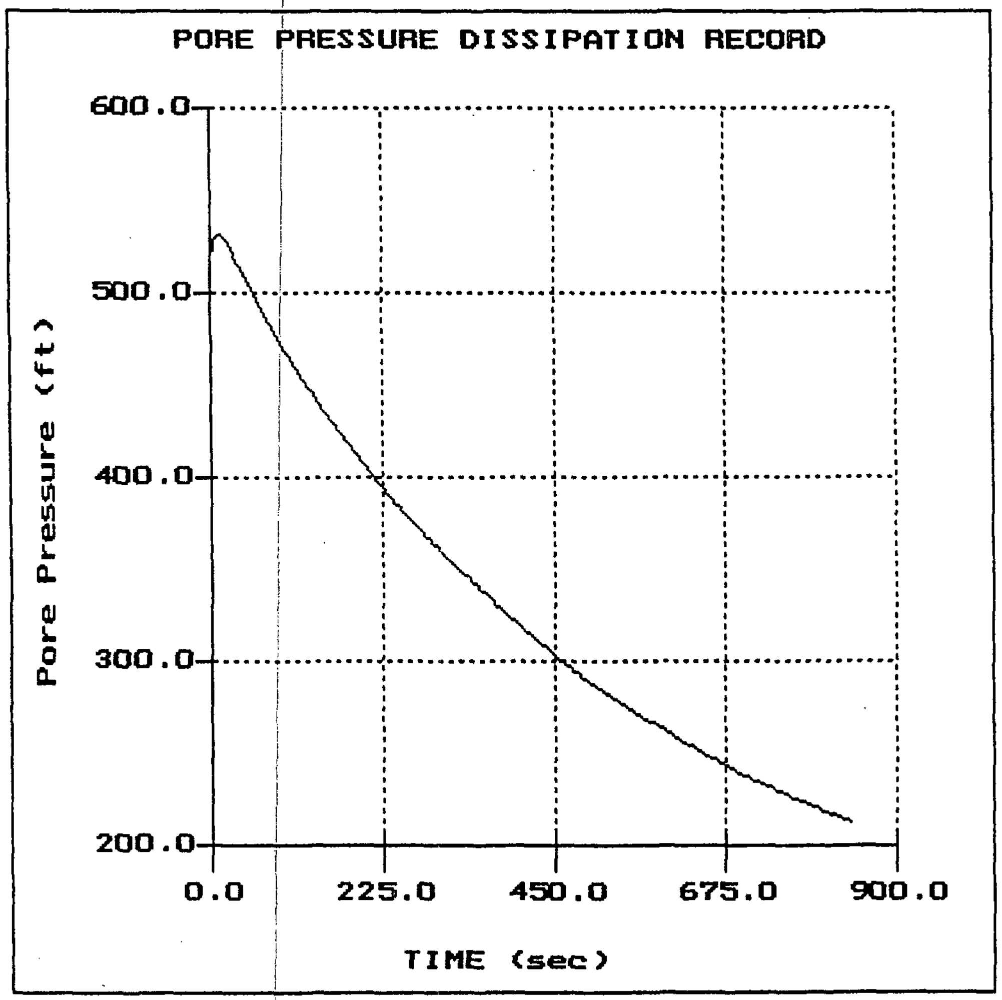


Schnabel

Hole: C-404
Location:C C N P P

Cone:STD 20T AD-195
Date:07:14:06 11:17

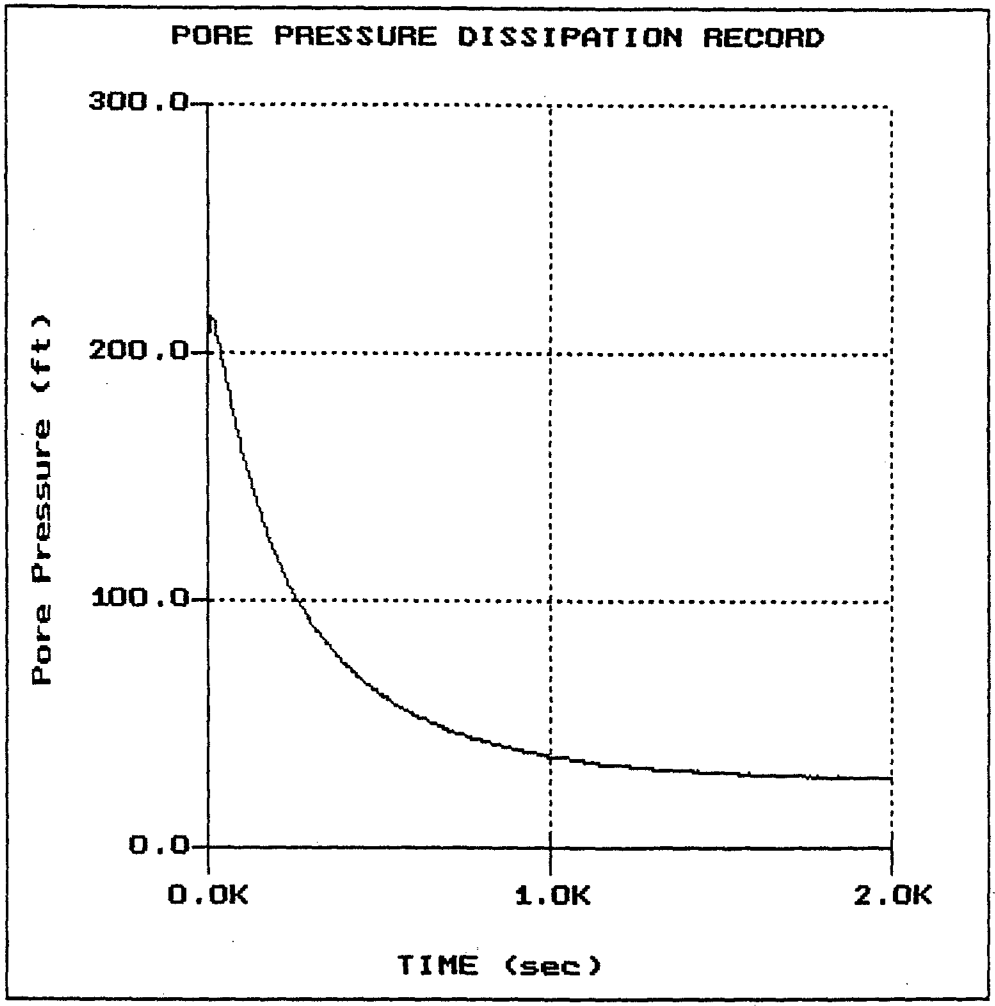
File: 948CP20.PPD
Depth (m): 20.15
(ft): 66.11
Duration : 840.0s
U-min: 212.49 840.0s
U-max: 532.36 10.0s



Schnabel

Hole: C-406
Location:C C N P P

Cone:STD 20T AD-195
Date:07:13:06 15:51



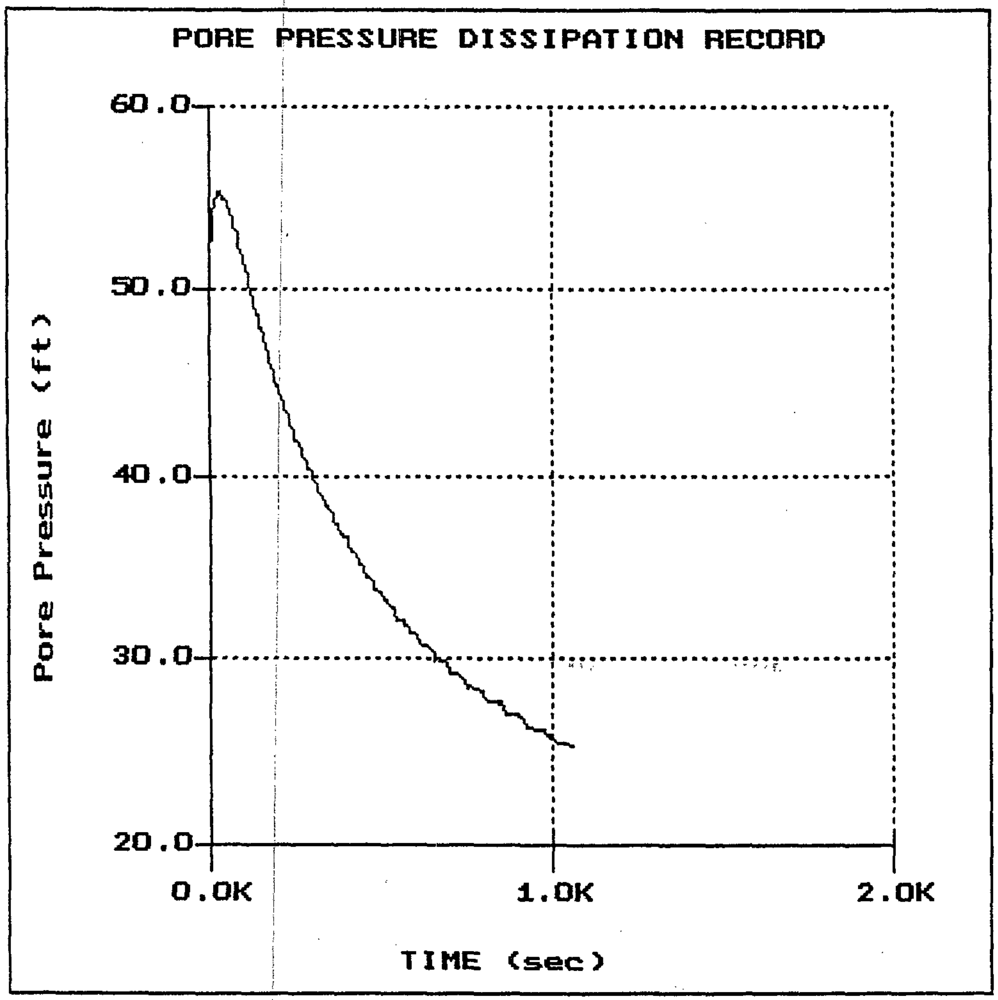
File: 948CP15.PPD
Depth (m): 4.00
(ft): 13.12
Duration : 2000.0s
U-min: 28.44 1980.0s
U-max: 214.70 5.0s

Schnabel

Hole: C-407
Location:C C N P P

Cone:STD 20T AD-195
Date:07:13:06 11:25

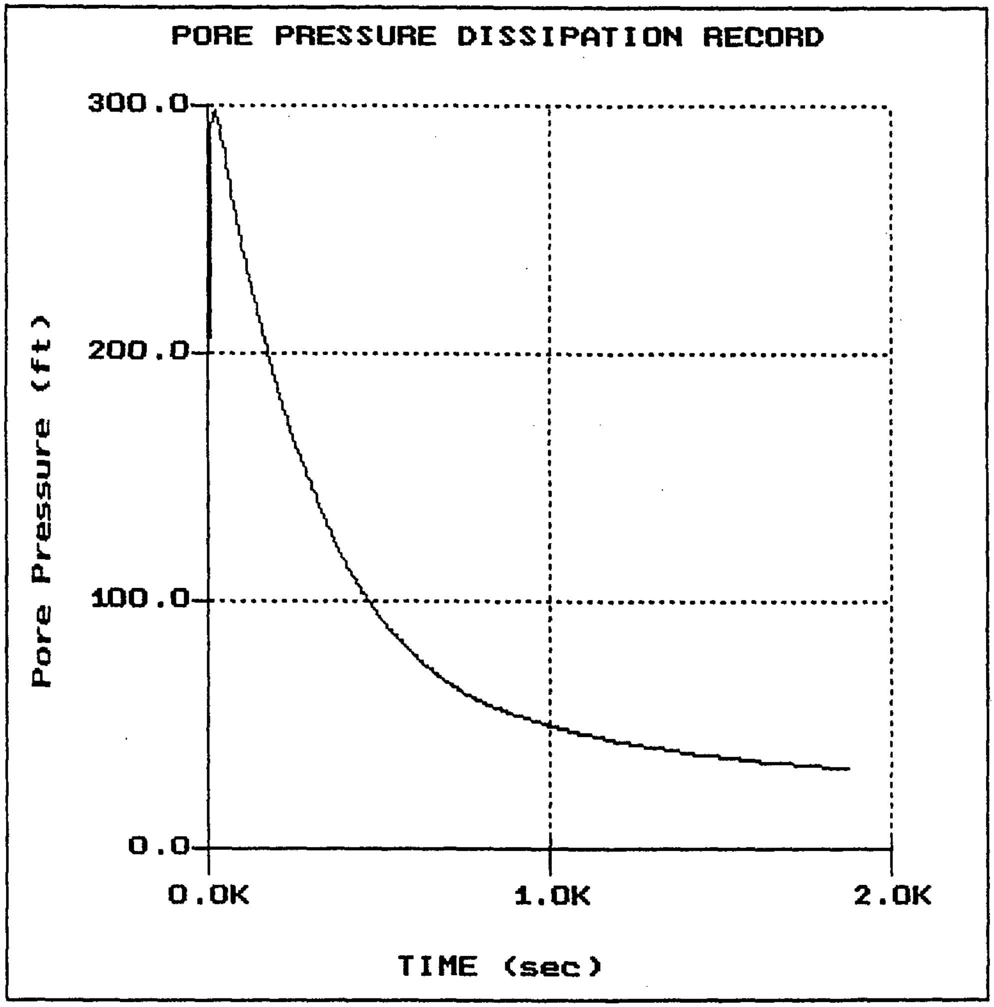
File: 948CP12.PPD
Depth (m): 3.40
(ft): 11.15
Duration : 1060.0s
U-min: 25.25 1060.0s
U-max: 55.33 30.0s



Schnabel

Hole: C-407
Location:C C N P P

Cone:STD 20T AD-195
Date:07:13:06 11:25



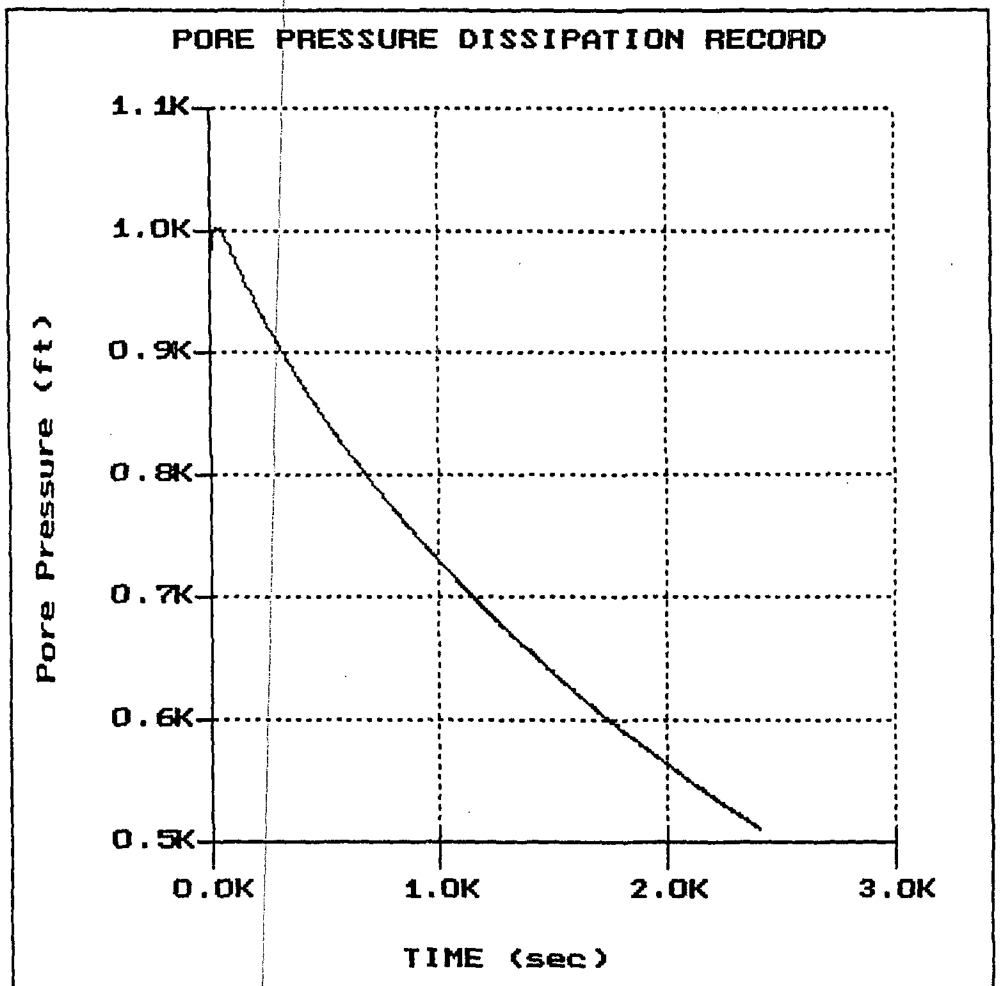
File: 948CP12.PPD
Depth (m): 4.20
(ft): 13.78
Duration : 1870.0s
U-min: 33.13 1865.0s
U-max: 298.18 20.0s

Schnabel

Hole: C-407
Location:C C N P P

Cone:STD 20T AD-195
Date:07:13:06 11:25

File: 948CP12.PPD
Depth (m): 5.65
(ft): 18.54
Duration : 2400.0s
U-min: 510.30 2400.0s
U-max: 1024.03 0.0s

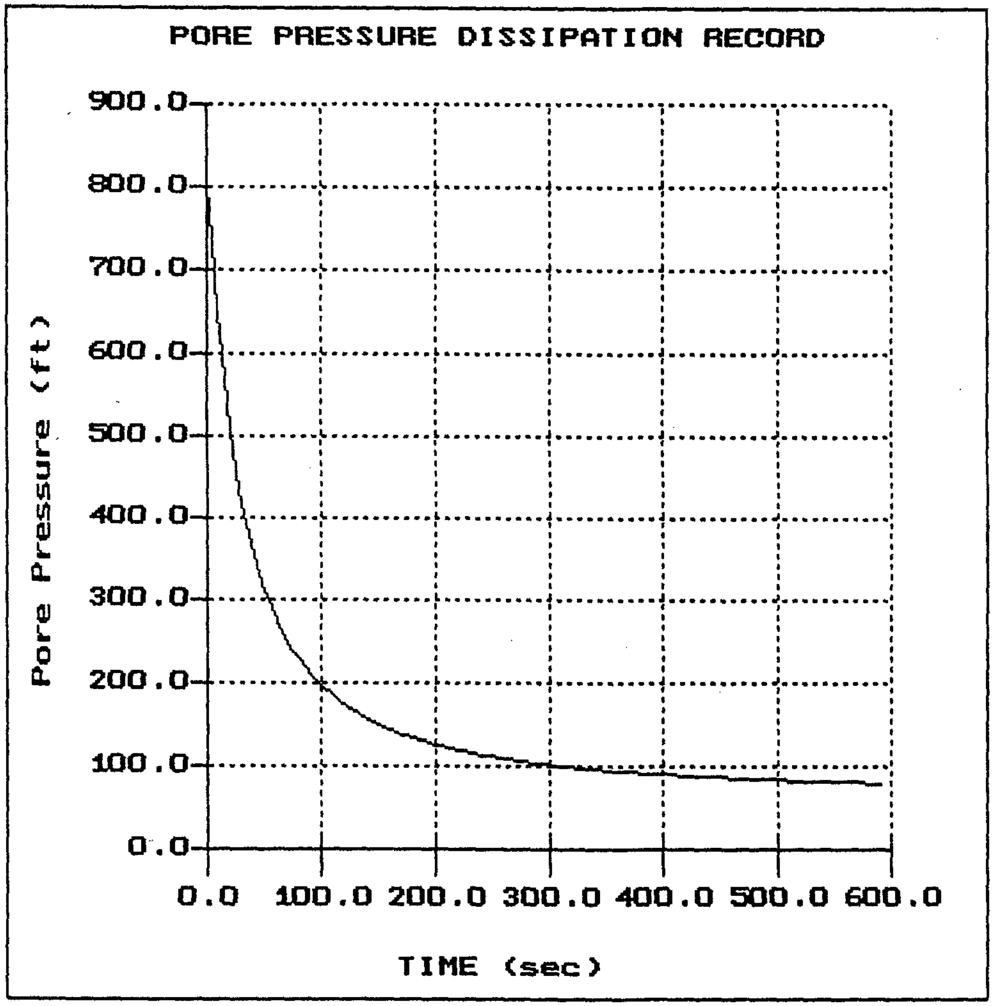


Schnabel

Hole: C-407-2a
Location:C C N P P

Cone:STD 20T AD-195
Date:07:28:06 07:49

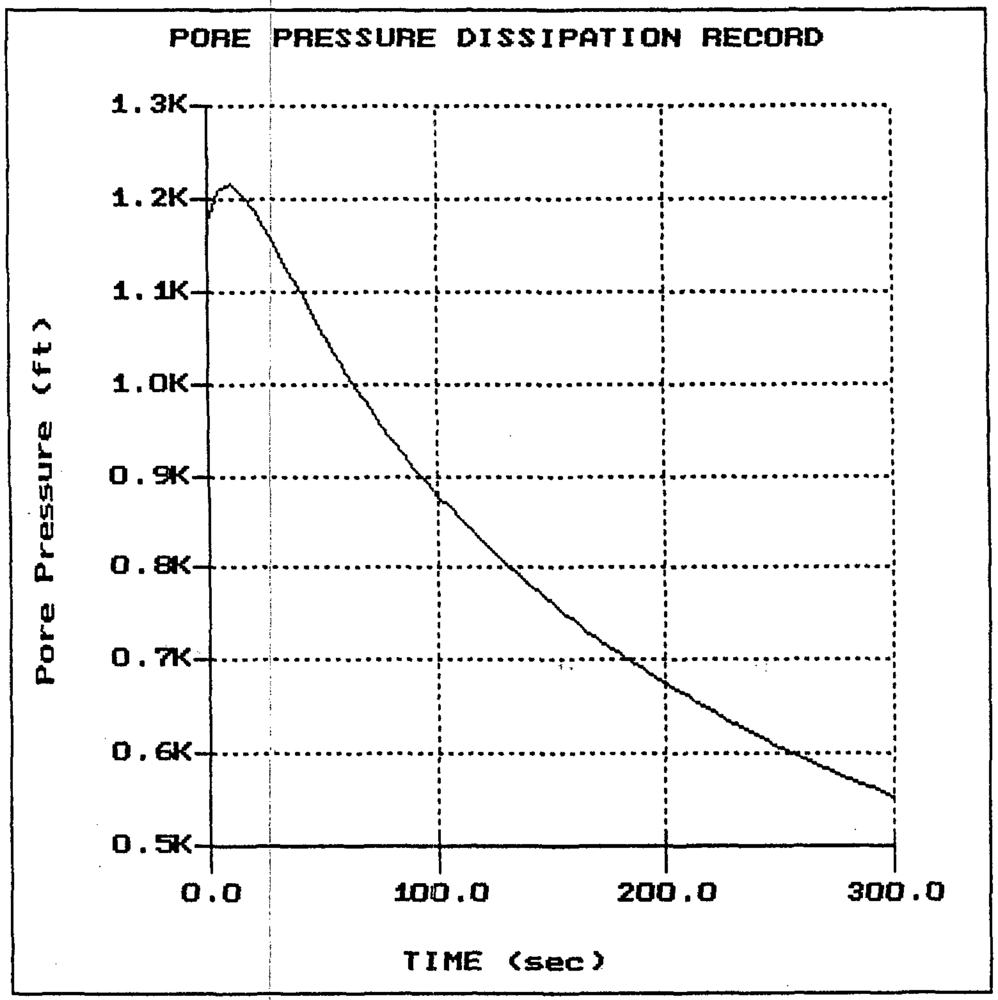
File: 948CP62.PPD
Depth (m): 26.60
(ft): 87.27
Duration : 590.0s
U-min: 79.54 590.0s
U-max: 802.81 0.0s



Schnabel

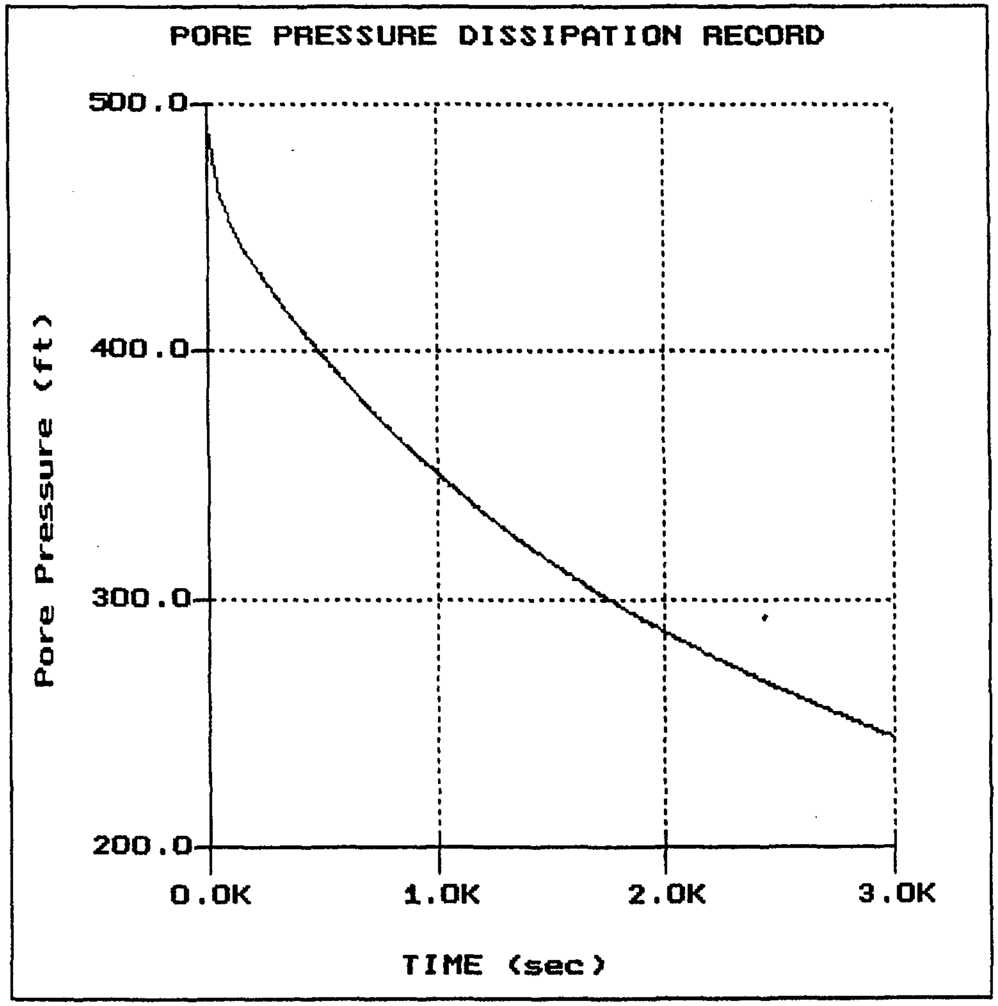
Hole: C-407-b
Location:C C N P P

Cone:STD 20T AD-195
Date:07:31:06 09:33



File: 948CP63.PPD
Depth (m): 35.60
(ft): 116.80
Duration : 300.0s
U-min: 552.16 300.0s
U-max: 1215.92 10.0s

Schnabel	Hole: C-409 Location:C C N P P	Cone:STD 20T AD-195 Date:07:21:06 11:02



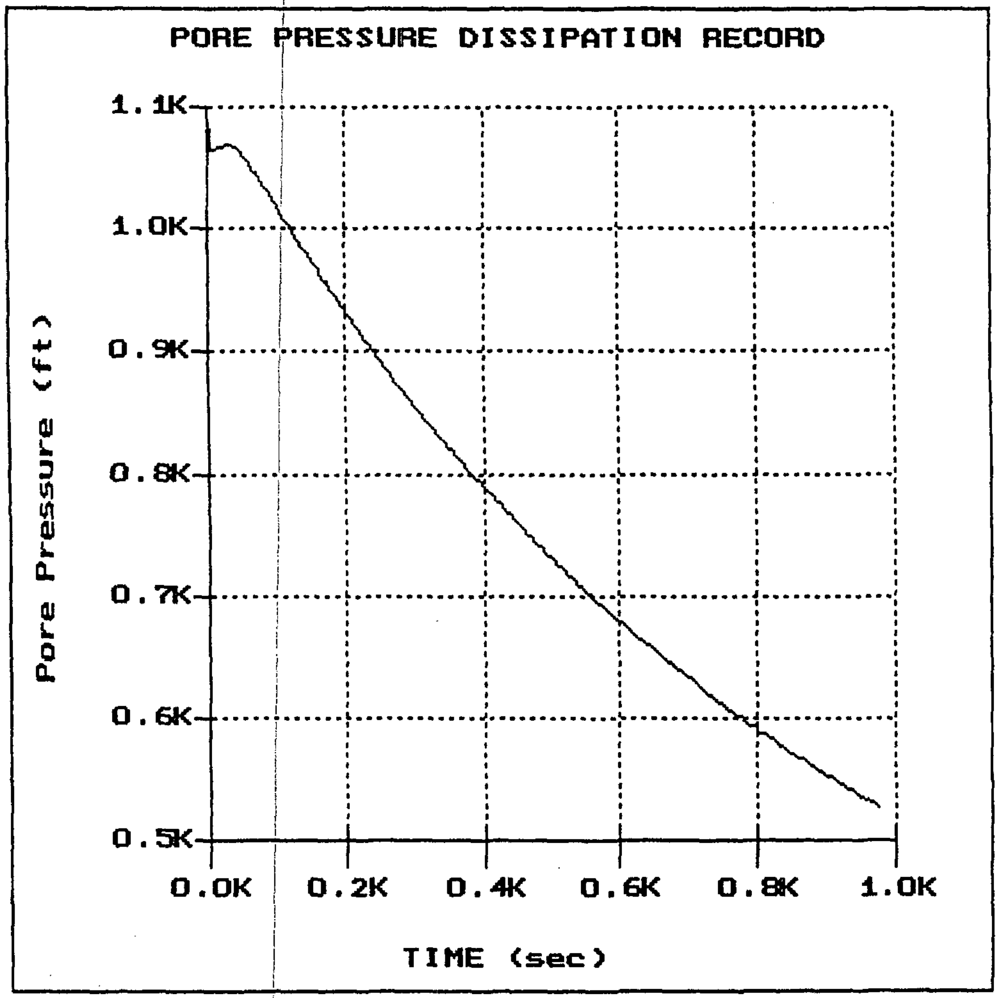
File: 948CP49.PPD
Depth (m): 18.00
(ft): 59.06
Duration : 2990.0s
U-min: 244.78 2990.0s
U-max: 489.18 5.0s

Schnabel

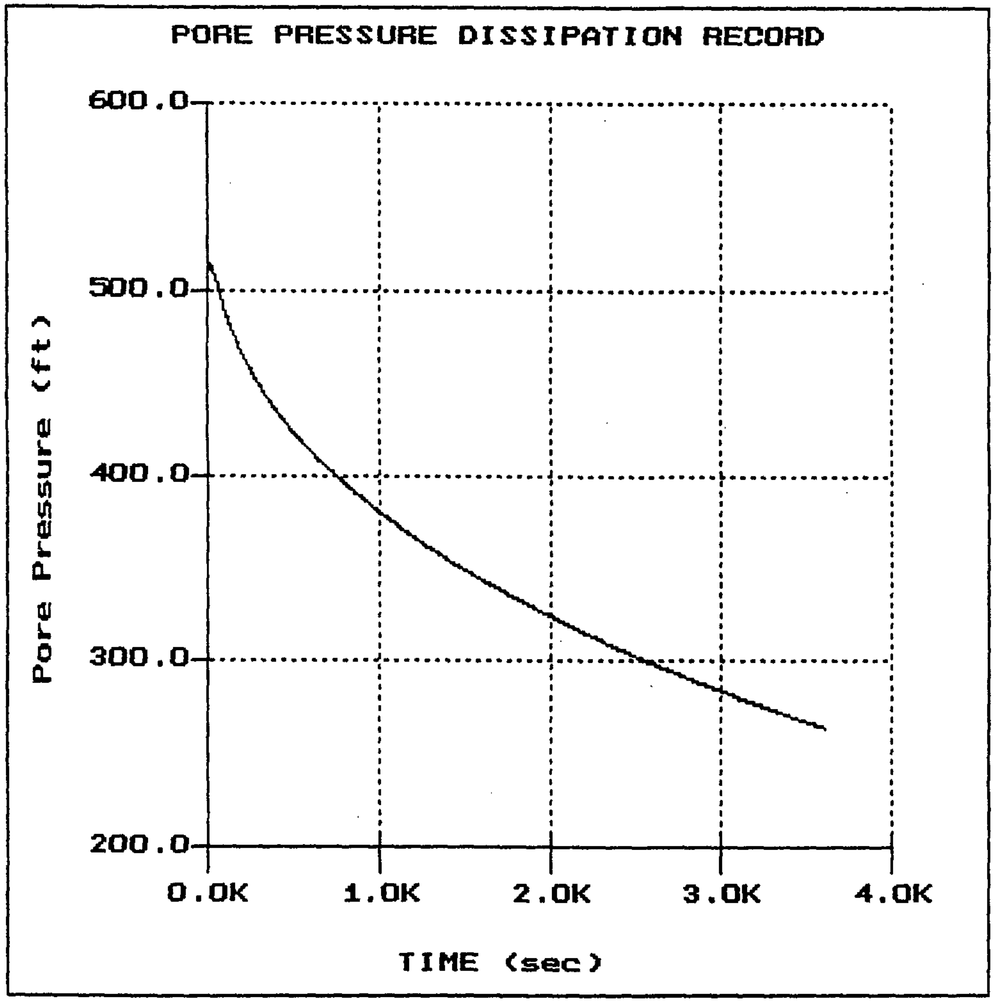
Hole: C-411
Location:C C N P P

Cone:STD 20T AD-195
Date:07:24:06 09:36

File: 948CP50.PPD
Depth (m): 21.45
(ft): 70.37
Duration : 975.0s
U-min: 527.57 975.0s
U-max: 1097.47 0.0s



Schnabel	Hole: C-411 Location:C C N P P	Cone:STD 20T AD-195 Date:07:24:06 09:36



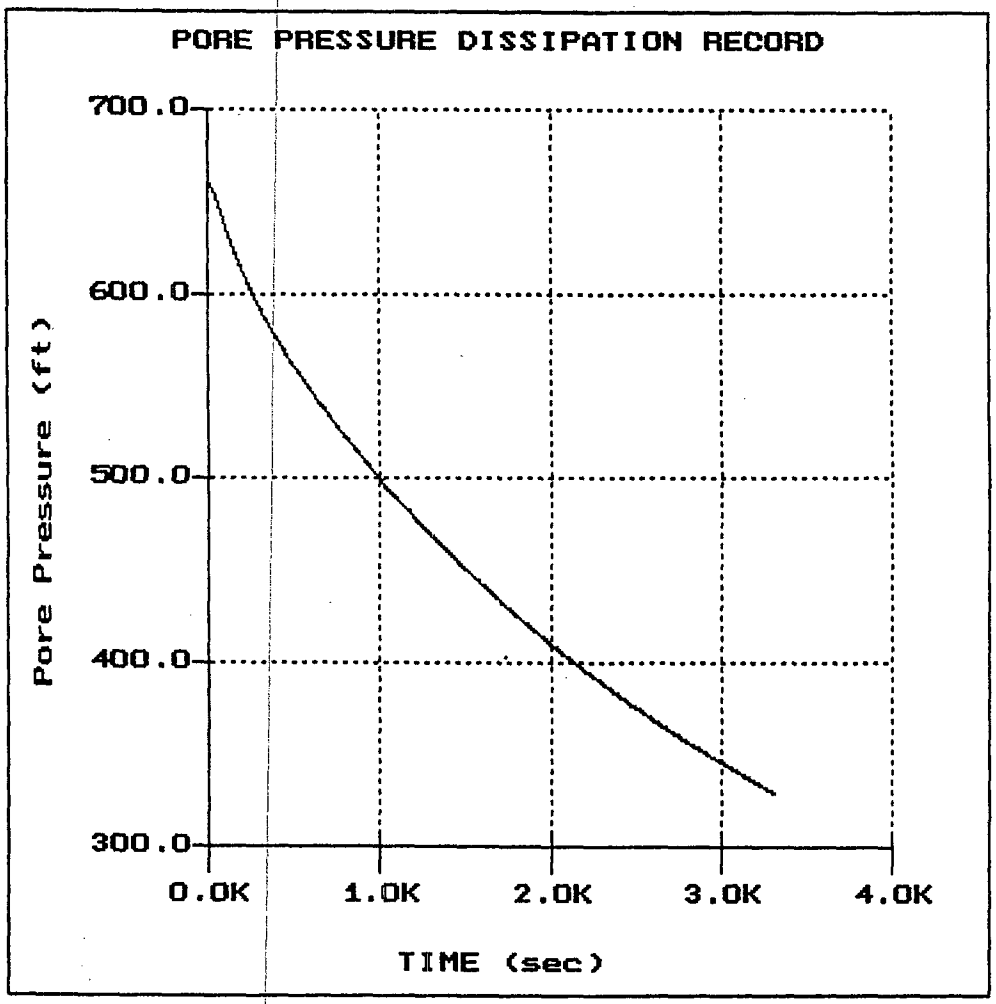
File: 948CP50.PPD
Depth (m): 17.30
(ft): 56.76
Duration : 3605.0s
U-min: 264.30 3605.0s
U-max: 515.32 0.0s

Schnabel

Hole: C-414
Location:C C N P P

Cone:STD 20T AD-195
Date:07:18:06 10:41

File: 948CP29.PPD
Depth (m): 13.55
(ft): 44.46
Duration : 3310.0s
U-min: 329.44 3310.0s
U-max: 661.32 5.0s

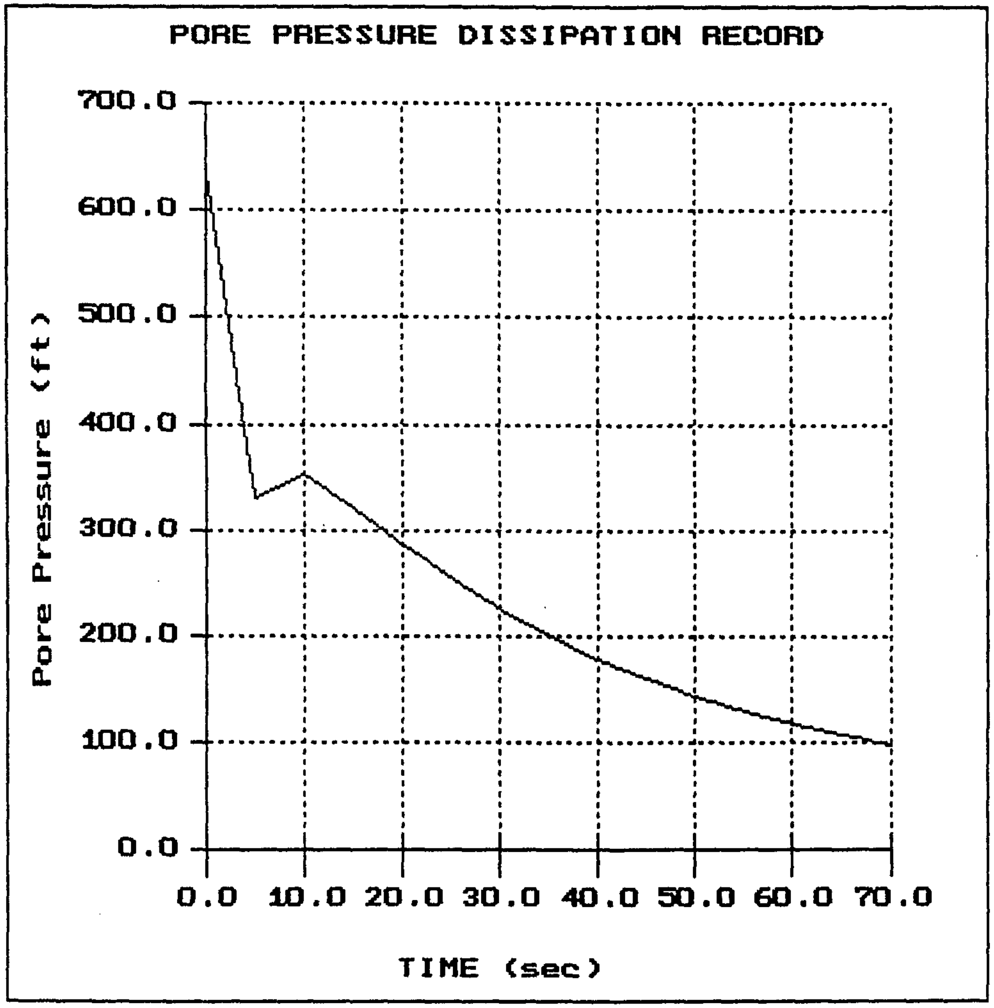


Schnabel

Hole: C-701
Location:C C N P P

Cone:STD 20T AD-195
Date:07:21:06 08:39

File: 948CP46.PPD
Depth (m): 8.90
(ft): 29.20
Duration : 70.0s
U-min: 97.61 70.0s
U-max: 634.10 0.0s

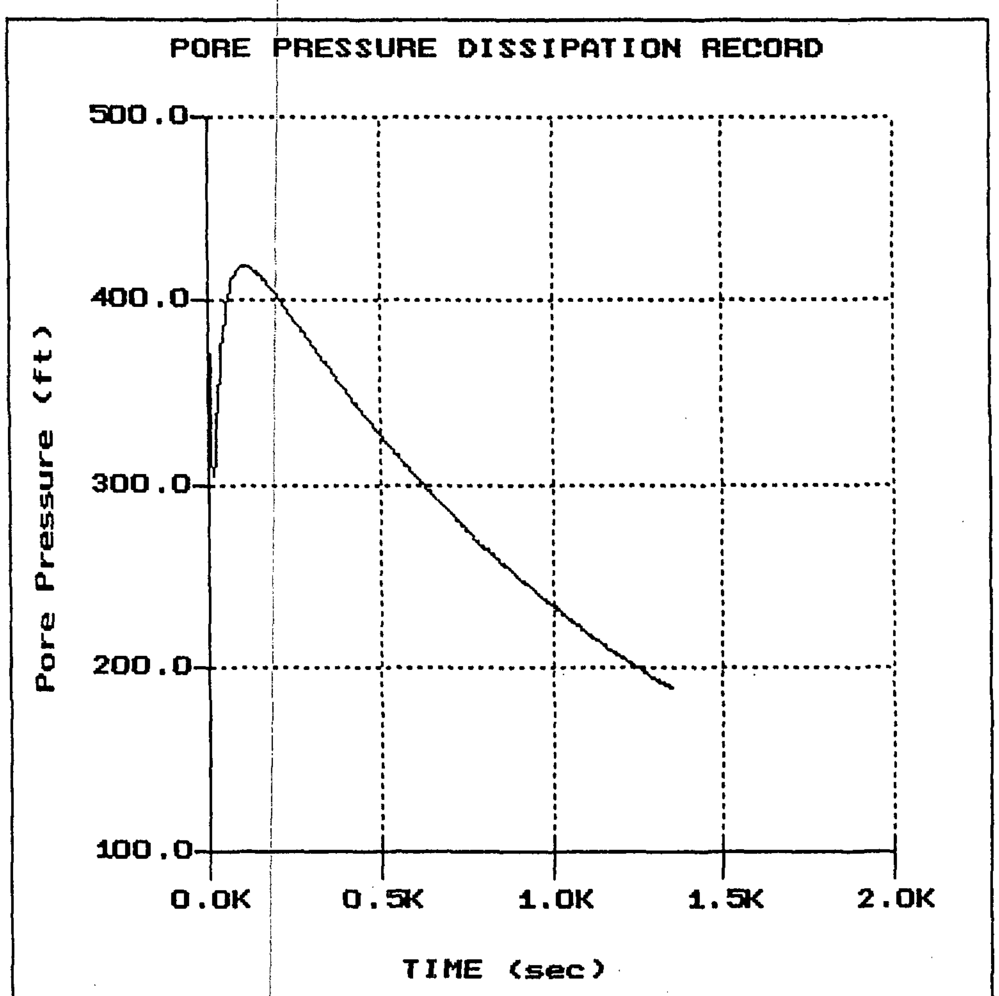


Schnabel

Hole: C-703
Location:C C N P P

Cone:STD 20T AD-195
Date:07:14:06 10:10

File: 948CP19.PPD
Depth (m): 6.10
(ft): 20.01
Duration : 1350.0s
U-min: 188.42 1350.0s
U-max: 418.09 105.0s



Schnabel

Hole: C-712
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:19:06 10:27

File: 948CP35.PPD
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(ft): 26.25
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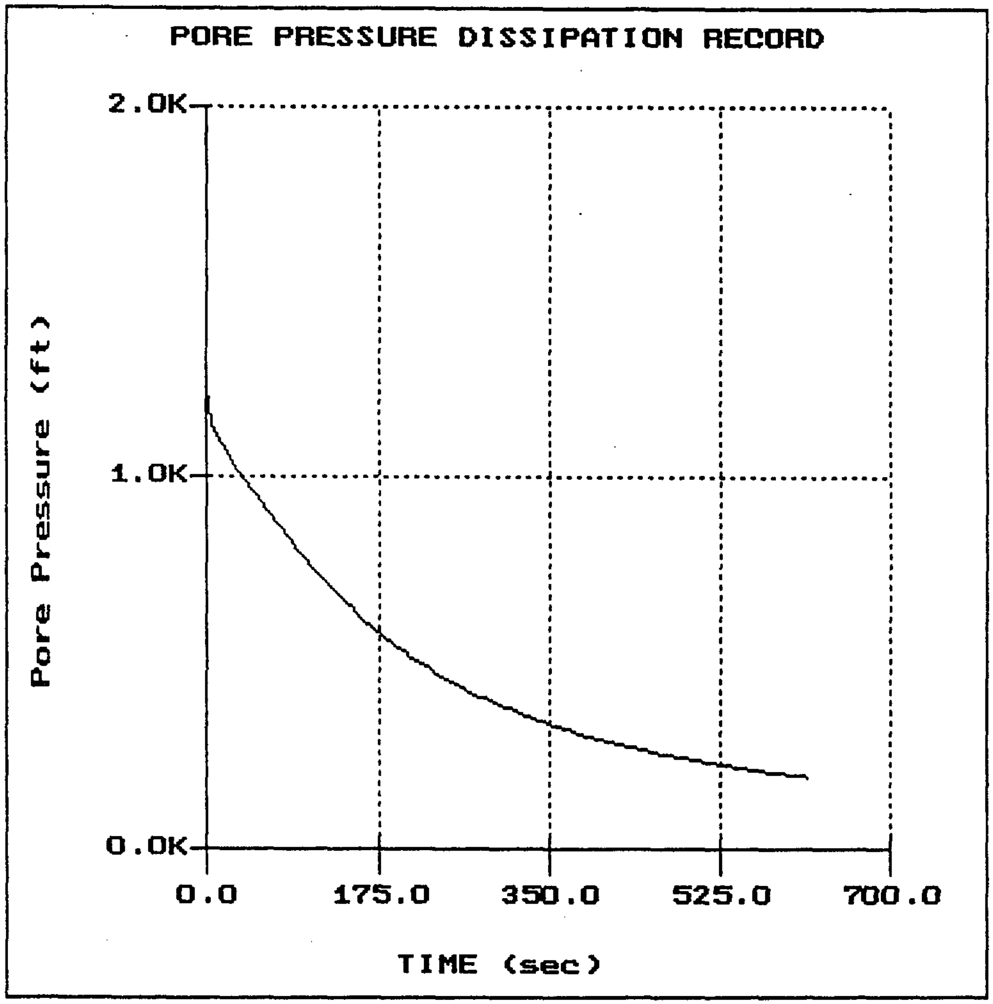
U-max: 1241.45 0.0s



Schnabel

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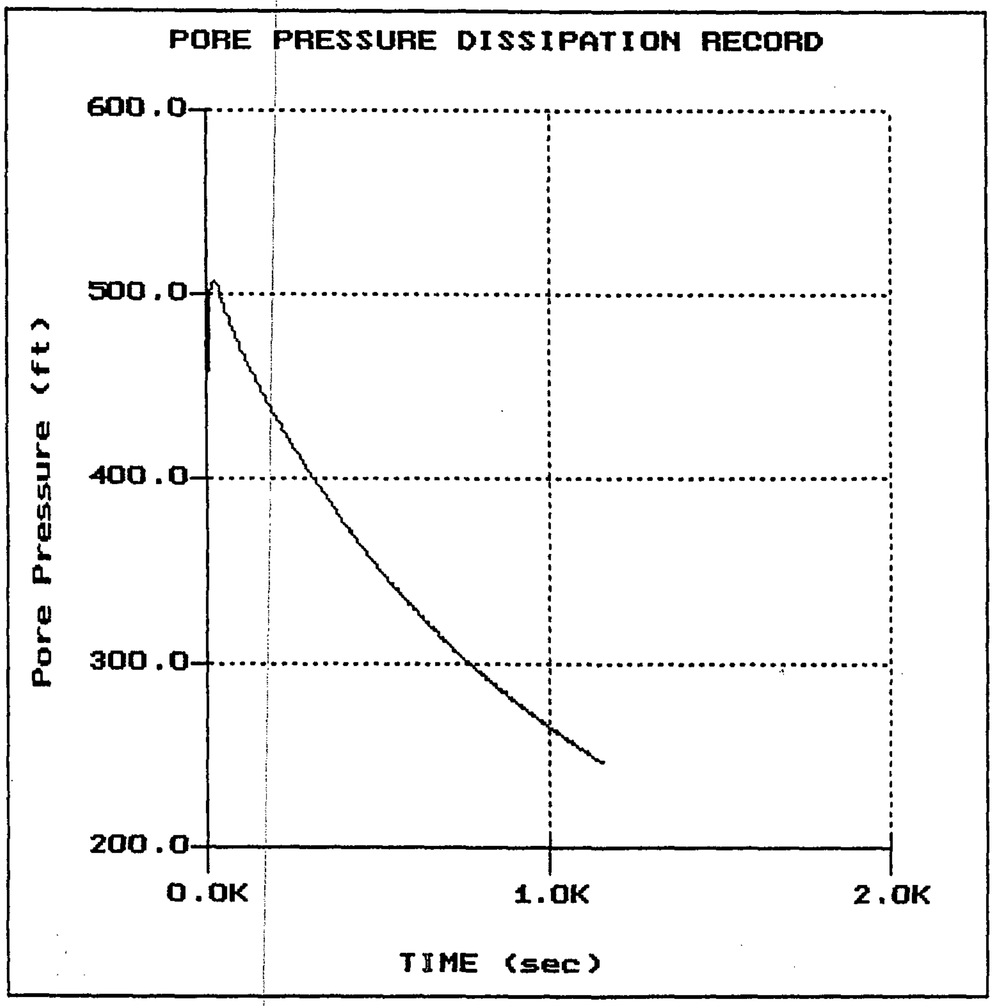
Location:C C N P P

Cone:STD 20T AD-195
Date:07:19:06 14:19

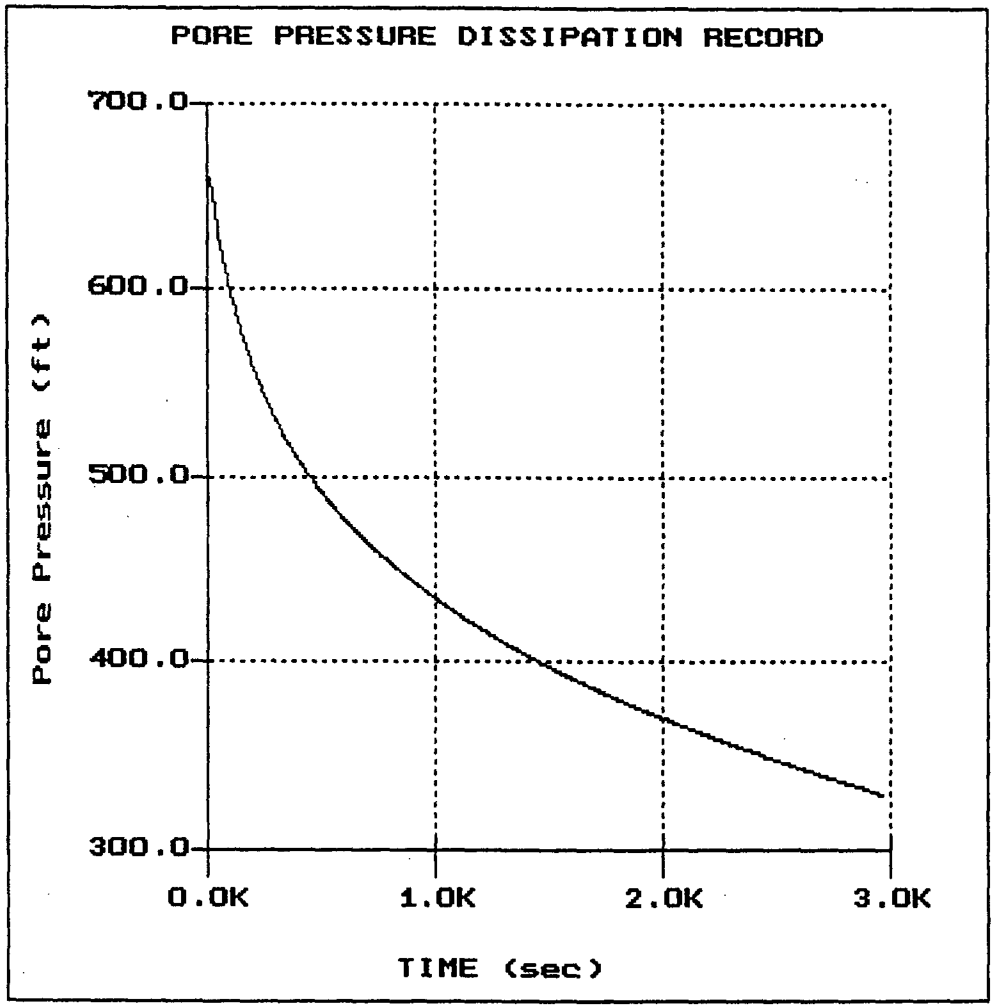


File: 948CP37.PPD
Depth (m): 17.40
(ft): 57.09
Duration : 1160.0s
U-min: 246.66 1160.0s
U-max: 507.48 20.0s

Schnabel

Hole: C-717
Location:C C N P P

Cone:STD 20T AD-195
Date:07:19:06 07:39

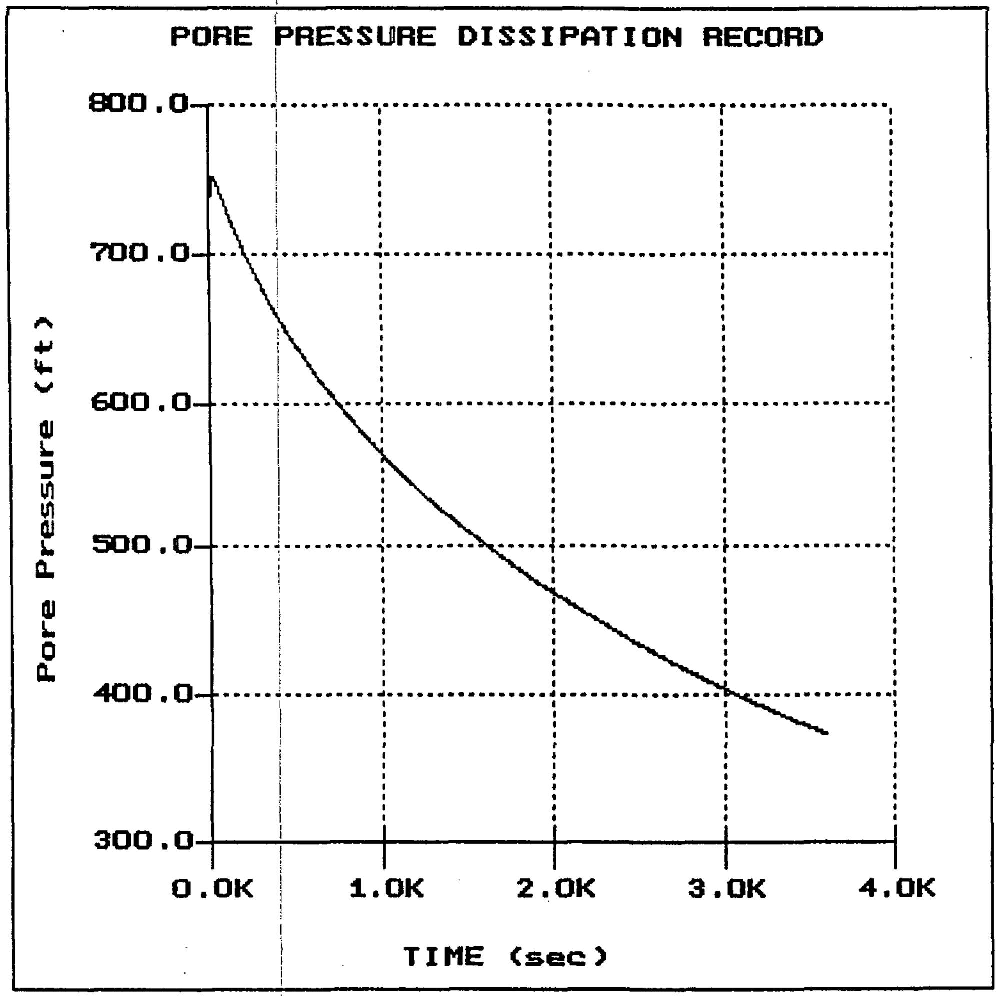


File: 948CP33.PPD
Depth (m): 15.50
(ft): 50.85
Duration : 2970.0s
U-min: 328.97 2970.0s
U-max: 661.60 5.0s

Schnabel

Hole: C-720
Location:C C N P P

Cone:STD 20T AD-195
Date:07:20:06 08:17



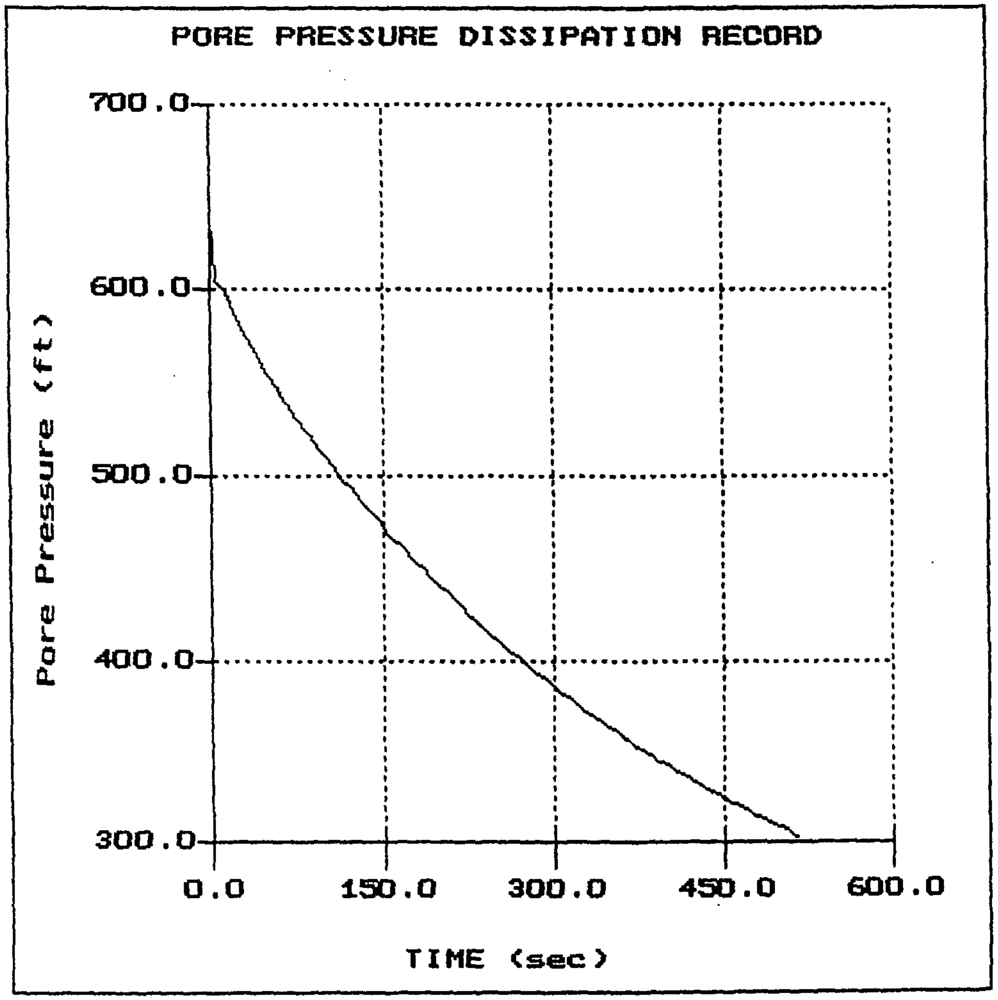
File: 948CP39.PPD
Depth (m): 15.75
(ft): 51.67
Duration : 3590.0s
U-min: 372.57 3590.0s
U-max: 751.61 20.0s

Schnabel

Hole: C-723
Location: C C N P P

Cone: STD 20T AD-195
Date: 07:18:06 07:35

File: 948CP26.PPD
Depth (m): 11.75
(ft): 38.55
Duration : 515.0s
U-min: 302.64 515.0s
U-max: 640.67 0.0s



APPENDIX D
CPT INTERPRETATION METHODS

Presentation of In Situ Testing Program Results
ConeTec, Inc.
November 13, 2006

ConeTec Interpretations as of June 30, 2004 (Release 1.22A)

ConeTec's interpretation routine provides a tabular output of geotechnical parameters based on current published CPT correlations and is subject to change to reflect the current state of practice. The interpreted values are not considered valid for all soil types. The interpretations are presented only as a guide for geotechnical use and should be carefully scrutinized for consideration in any geotechnical design. *Reference to current literature is strongly recommended. ConeTec does not warranty the* correctness or the applicability of any of the geotechnical parameters interpreted by the program and does not assume liability for any use of the results in any design or review. Representative hand calculations should be made for any parameter that is critical for design purposes. The end user of the interpreted output should also be fully aware of the techniques and the limitations of any method used in this program. The purpose of this document is to inform the user as to which methods were used and what the appropriate papers and/or publications are for further reference.

The CPT interpretations are based on values of tip, sleeve friction and pore pressure averaged over a user specified interval (e.g. 0.20m). Note that q_t is the tip resistance corrected for pore pressure effects and q_c is the recorded tip resistance. Since all ConeTec cones have equal end area friction sleeves, pore pressure corrections to sleeve friction, f_s, are not required.

The tip correction is: $q_t = q_c + (1-a) \bullet u_2$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the cone (typically 0.85 for ConeTec cones)

The total stress calculations are based on soil unit weights that have been assigned to the Soil Behavior Type zones, from a user defined unit weight profile or by using a single value throughout the profile. Effective vertical overburden stresses are calculated based on a hydrostatic distribution of equilibrium pore pressures below the water table or from a user defined equilibrium pore pressure profile (this can be obtained from CPT dissipation tests). For over water projects the effects of the column of water have been taken into account as has the appropriate unit weight of water. How this is done depends on where the instruments were zeroed (i.e. on deck or at mud line).

Details regarding the interpretation methods for all of the interpreted parameters are provided in Table 1. *The appropriate references cited in Table 1 are listed in Table 2. Where methods are based on charts or* techniques that are too complex to describe in this summary the user should refer to the cited material.

The estimated Soil Behavior Types (normalized and non-normalized) are based on the charts developed by Robertson and Campanella shown in Figures 1 and 2. The Bq classification charts are not reproduced in this document but can be reviewed in Lunne, Robertson and Powell (1997) or Robertson (1990).

Where the results of a calculation/interpretation are declared *'invalid'* the value will be represented by the text strings "-9999" or "-9999.0". In some cases the value 0 will be used. Invalid results will occur because of (and not limited to) one or a combination of:

1. Invalid or undefined CPT data (e.g. drilled out section or data gap).

2. Where the interpretation method is inappropriate, for example, drained parameters in an undrained material (and vice versa).

3. Where interpretation input values are beyond the range of the referenced charts or specified limitations of the interpretation method.

4. Where pre-requisite or intermediate interpretation calculations are invalid.

The parameters selected for output from the program are often specific to a particular project. As such, not all of the interpreted parameters listed in Table 1 may be included in the output files delivered with this report.

The output files are often delivered in one (or more) of the following three formats:

File Type	Typical Extensions	Description
Printable	IFP, NLP	ASCII files formatted for direct printing either by copying to a printer port, through a text editor or through a dedicated printing routine (such as ConeTec's CTPRINT). Typically formatted for 132 columns wide and 70 lines per page. Any printer would need to be set to have a compressed font (16cpi) as its default.
Importable	IFI, NLI	Tab delimited ASCII files (not for use with text editors) meant for importing into spreadsheet and database applications (e.g. Excel, Lotus, Quattro, Access). Some column and cell formatting maybe required depending on the quality of the application's import utility.
Spreadsheet	XLS	IFI, NLI files exported directly to Excel format. Column and cell formatting has been done. Header information is exported to start in Column C allowing the depth columns A and/or B to be duplicated on each printed page without repetition of part of the header information.

Table 1
CPT Interpretation Methods

Interpreted Parameter	Description	Equation	Ref
Depth	Mid Layer Depth *(where interpretations are done at each point then Mid Layer Depth = Recorded Depth)*	*Depth (Layer Top) + Depth (Layer Bottom) / 2.0*	
Elevation	Elevation of Mid Layer based on sounding collar elevation supplied by client	Elevation = Collar Elevation - Depth	
Avgqc	Averaged recorded tip value (q_c)	$Avgqc = \frac{1}{n}\sum_{i=1}^{n} q_c$ *n=1 when interpretations are done at each point*	
Avgqt	Averaged corrected tip (q_t) where: $q_t = q_c + (1-a) \bullet u$	$Avgqt = \frac{1}{n}\sum_{i=1}^{n} q_t$ *n=1 when interpretations are done at each point*	
Avgfs	Averaged sleeve friction (f_s)	$Avgfs = \frac{1}{n}\sum_{i=1}^{n} fs$ *n=1 when interpretations are done at each point*	
AvgRf	Averaged friction ratio (Rf) where friction ratio is defined as: $Rf = 100\% \bullet \frac{fs}{qt}$	$AvgRf = 100\% \bullet \frac{Avgfs}{Avgqt}$ *n=1 when interpretations are done at each point*	
Avgu	Averaged dynamic pore pressure *(u)*	$Avgu = \frac{1}{n}\sum_{i=1}^{n} u_i$ *n=1 when interpretations are done at each point*	
AvgRes	Averaged Resistivity (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} RESISTIVITY_i$ *n=1 when interpretations are done at each point*	

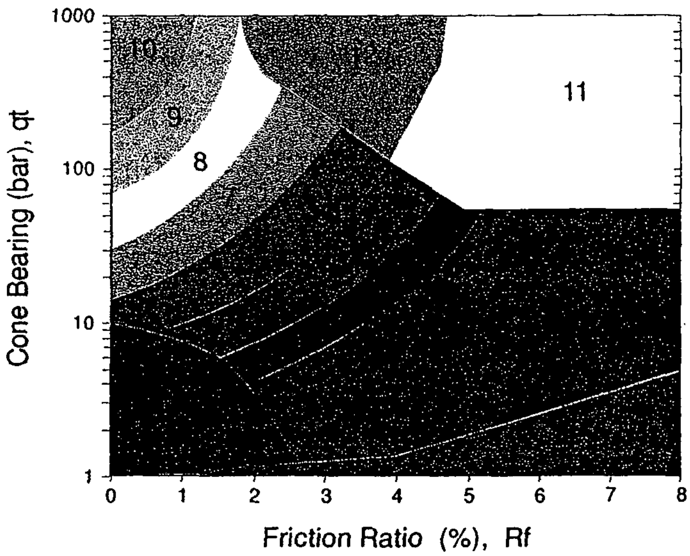
Interpreted Parameter	Description	Equation	Ref
AvgUVIF	Averaged UVIF ultra-violet induced fluorescence (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} UVIF_i$ *n=1 when interpretations are done at each point*	
AvgTemp	Averaged Temperature (this data is not always available since it is a specialized test)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} TEMPERATURE_i$ *n=1 when interpretations are done at each point*	
AvgGamma	Averaged Gamma Counts (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} GAMMA_i$ *n=1 when interpretations are done at each point*	
SBT	Soil Behavior Type as defined by Robertson and Campanella	See Figure 1	2, 5
U.Wt.	Unit Weight of soil determined from one of the following user selectable options: 1) uniform value 2) value assigned to each SBT zone 3) user supplied unit weight profile	See references	5
T. Stress σ_v	Total vertical overburden stress at Mid Layer Depth. *A layer is defined as the averaging interval specified by the user. For data interpreted at each point the Mid Layer Depth is the same as the recorded depth.*	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ *where* γ_i is layer unit weight h_i is layer thickness	
E. Stress σ_v'	Effective vertical overburden stress at Mid Layer Depth	*Estress = Tstress -* u_{eq}	
Ueq	Equilibrium pore pressure determined from one of the following user selectable options: 1) hydrostatic from water table depth 2) user supplied profile	For hydrostatic option: $u_{eq} = \gamma_w \bullet (D - D_{wt})$ where u_{eq} is equilibrium pore pressure γ_w is unit weight of water D is the current depth D_{wt} is the depth to the water table	
Cn	SPT N_{60} overburden correction factor	$Cn=(\sigma_v')^{-0.5}$ where σ_v' *is in tsf* $0.5 < C_n < 2.0$	
N_{60}	SPT N value at 60% energy calculated from qt/N ratios assigned to each SBT zone. This method has abrupt N value changes at zone boundaries.	*See Figure 1*	4, 5
$(N_1)_{60}$	SPT N_{60} value corrected for overburden pressure	$(N_1)_{60} = Cn \bullet N_{60}$	4
$N_{60}I_c$	SPT N_{60} values based on the Ic parameter	$(qt/pa)/ N_{60} = 8.5 (1 - Ic/4.6)$	5
$(N_1)_{60}Ic$	SPT N_{60} value corrected for overburden pressure (using N_{60} I_c). User has 2 options.	1) $(N_1)_{60}Ic= Cn \bullet (N_{60} Ic)$ 2) $q_{c1n}/ (N_1)_{60}Ic = 8.5 (1 - Ic/4.6)$	4 5
$(N_1)_{60cs}Ic$	Clean sand equivalent SPT $(N_1)_{60}Ic$. User has 3 options.	1) $(N_1)_{60cs}Ic = \quad + \quad ((N_1)_{60}Ic)$ 2) $(N_1)_{60cs}Ic = K_{SPT} * ((N_1)_{60}Ic)$ 3) $q_{c1ncs})/ (N_1)_{60cs}Ic = 8.5 (1 - Ic/4.6)$ FC 5%: = 0, =1.0 FC 35% = 5.0, =1.2 5% < FC < 35% = exp[1.76 – (190/FC^2)] = [0.99 + (FC$^{1.5}$/1000)]	10 10 5
Su	Undrained shear strength - N_{kt} is user selectable	$Su = \frac{qt - \sigma_v}{N_{kt}}$	1, 5
k	Coefficient of permeability (assigned to each SBT zone)		5

CONETEC

Interpreted Parameter	Description	Equation	Ref
Bq	Pore pressure parameter	$Bq = \frac{\Delta u}{qt - \sigma_v}$ *where:* $\Delta u = u - u_{eq}$ *and* u = *dynamic pore pressure* u_{eq} = *equilibrium pore pressure*	1, 5
Q_t	Normalized q_t for Soil Behavior Type classification as defined by Robertson, 1990	$Qt = \frac{qt - \sigma_v}{\sigma'_v}$	2, 5
F_r	Normalized Friction Ratio for Soil Behavior Type classification as defined by Robertson, 1990	$Fr = 100\% \bullet \frac{fs}{qt - \sigma_v}$	2, 5
SBTn	Normalized Soil Behavior Type as defined by Robertson and Campanella	See Figure 2	2, 5
SBT-BQ	Non-normalized soil behavior type based on the Bq parameter	See Figure 5.7 (reference 5)	2, 5
SBT-BQn	Normalized Soil Behavior base on the Bq parameter	See Figure 5.8 (reference 5) or Figure 3 (reference 2)	2, 5
I_c	Soil index for estimating grain characteristics	$Ic = [(3.47 - \log_{10}Q)^2 + (\log_{10} Fr + 1.22)^2]^{0.5}$ *Where:* $Q = \left(\frac{qt - \sigma_v}{P_{a2}}\right)\left(\frac{P_a}{\sigma'_v}\right)^n$ *And* *Fr is in percent* P_a = *atmospheric pressure* P_{a2} = *atmospheric pressure* *n varies from 0.5 to 1.0 and is selected in an iterative manner based on the resulting* I_c	3, 8
FC	Apparent fines content (%)	$FC = 1.75(Ic^{3.25}) - 3.7$ $FC = 100$ for $Ic > 3.5$ $FC = 0$ for $Ic < 1.26$ $FC = 5\%$ if $1.64 < Ic < 2.6$ AND $F_r < 0.5$	3
Ic Zone	This parameter is the Soil Behavior Type zone based on the Ic parameter (valid for zones 2 through 7 on SBTn chart)	Ic < 1.31 Zone = 7 1.31 < Ic < 2.05 Zone = 6 2.05 < Ic < 2.60 Zone = 5 2.60 < Ic < 2.95 Zone = 4 2.95 < Ic < 3.60 Zone = 3 Ic > 3.60 Zone = 2	3
PHI ϕ	Friction Angle determined from one of the following user selectable options: a) Campanella and Robertson b) Durgunoglu and Mitchel c) Janbu	See reference	5
Dr	Relative Density determined from one of the following user selectable options: a) Ticino Sand b) Hokksund Sand c) Schmertmann 1976 d) Jamiolkowski - All Sands	See reference	5

Interpreted Parameter	Description	Equation	Ref
OCR	Over Consolidation Ratio	a) Based on Schmertmann's method involving a plot of S_u/σ_v' /($S_u/\sigma_v')_{NC}$ and OCR where the Su/p' ratio for NC clay is user selectable	9
State Parameter	The state parameter is used to describe whether a soil is contractive (SP is positive) or dilative (SP is negative) at large strains based on the work by Been and Jefferies	See reference	8, 6, 5
Es/qt	Intermediate parameter for calculating Youngs Modulus, E, in sands. It is the Y axis of the reference chart.	Based on Figure 5.59 in the reference	5
Youngs Modulus E	Youngs Modulus based on the work by Baldi. There are three types of sands considered in this technique. The user selects the appropriate type for the site from: a) OC Sands b) Aged NC Sands c) Recent NC Sands Each sand type has a family of curves that depend on mean normal stress. The program calculates mean normal stress and linearly interpolates between the two extremes provided in Baldi's chart.	Mean normal stress is evaluated from: $\sigma_m' = \frac{1}{3} \bullet (\sigma_v' + \sigma_h' + \sigma_h')$ where σ_v'= vertical effective stress σ_h'= horizontal effective stress and $\sigma_h = K_o * \sigma_v'$ with Ko assumed to be 0.5	5
q_{c1}	q_t normalized for overburden stress used for seismic analysis	$q_{c1} = q_t \bullet (Pa/\sigma_v')^{0.5}$ where: Pa = atm. Pressure q_t is in Mpa	3
q_{c1n}	q_{c1} in dimensionless form used for seismic analysis	$q_{c1n} = (q_{c1} / Pa)(Pa/\sigma_v')$ where: Pa = atm. Pressure and n ranges from 0.5 to 0.75 based on Ic.	3
K_{SPT}	Equivalent clean sand factor for $(N_1)60$	$K_{SPT} = 1 + ((0.75/30) * (FC - 5))$	10
K_{CPT}	Equivalent clean sand correction for q_{c1N}	$K_{cpt} = 1.0$ for $I_c \leq 1.64$ $K_{cpt} = f(I_c)$ for $I_c > 1.64$ (see reference)	10
q_{c1ncs}	Clean sand equivalent q_{c1n}	$q_{c1ncs} = q_{c1n} \bullet K_{cpt}$	3
CRR	Cyclic Resistance Ratio (for Magnitude 7.5)	$q_{c1ncs} < 50$: $CRR_{7.5} = 0.833\,[(q_{c1ncs}/1000] + 0.05$ $50 \leq q_{c1ncs} < 160$: $CRR_{7.5} = 93\,[(q_{c1ncs}/1000]^3 + 0.08$	10
CSR	Cyclic Stress Ratio	$CSR = (\tau_{av}/\sigma_v') = 0.65\,(a_{max} / g)\,(\sigma_v/ \sigma_v')\,r_d$ $r_d = 1.0 - 0.00765\,z$ $z \leq 9.15m$ $r_d = 1.174 - 0.0267\,z$ $9.15 < z \leq 23m$ $r_d = 0.744 - 0.008\,z$ $23 < z \leq 30m$ $r_d = 0.50$ $z > 30m$	10

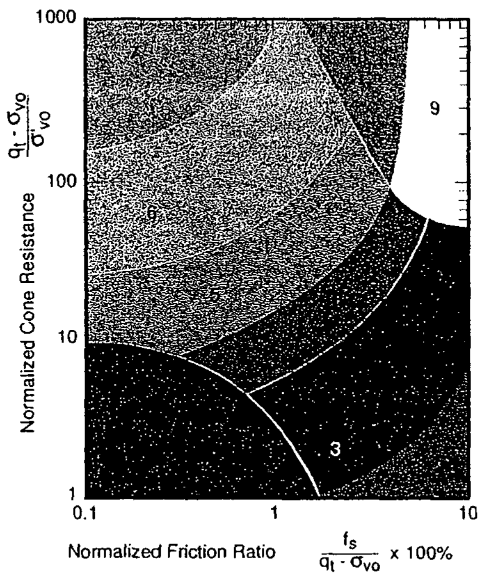
Interpreted Parameter	Description	Equation	Ref
MSF	Magnitude Scaling Factor	See Reference	10
FofS	Factor of Safety against Liquefaction	FS = ($CRR_{7.5}$ / CSR) MSF	10
Liquefaction Status	Statement indicating possible liquefaction	Takes into account FofS and limitations based I_c and q_{c1ncs}.	10



Zone	qt / N	Soil Behavior Type
1	2	sensitive fine grained
2	1	organic material
3	1	clay
4	1.5	silty clay to clay
5	2	clayey silt to silty clay
6	2.5	sandy silt to clayey silt
7	3	silty sand to sandy silt
8	4	sand to silty sand
9	5	sand
10	6	gravelly sand to sand
11	1	very stiff fine grained *
12	2	sand to clayey sand *

* overconsolidated or cemented

Figure 1 Non-Normalized Behavior Type Classification Chart



Zone	Normalized Soil Behavior Type
1	sensitive fine grained
2	organic material
3	clay to silty clay
4	clayey silt to silty clay
5	silty sand to sandy silt
6	clean sands to silty sands
7	gravelly sand to sand
8	very stiff sand to clayey sand
9	very stiff fine grained

Figure 2 Normalized Behavior Type Classification Chart

Table 2 References

No.	References
1	Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.
2	Robertson, P.K., 1990, "Soil Classification Using the Cone Penetration Test", Canadian Geotechnical Journal, Volume 27.
3	Robertson, P.K. and Fear, C.E., 1998, "Evaluating cyclic liquefaction potential using the cone penetration test", Canadian Geotechnical Journal, 35: 442-459.
4	Robertson, P.K. and Wride, C.E., 1998, "Cyclic Liquefaction and its Evaluation Based on SPT and CPT", NCEER Workshop Paper, January 22, 1997
5	Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, " Cone Penetration Testing in Geotechnical Practice," Blackie Academic and Professional.
6	Plewes, H.D., Davies, M.P. and Jefferies, M.G., 1992, "CPT Based Screening Procedure for Evaluating Liquefaction Susceptibility", 45th Canadian Geotechnical Conference, Toronto, Ontario, October 1992.
7	Jefferies, M.G. and Davies, M.P., 1993. "Use of CPTu to Estimate equivalent N_{60}", Geotechnical Testing Journal, 16(4): 458-467.
8	Been, K. and Jefferies, M.P., 1985, "A state parameter for sands", Geotechnique, 35(2), 99-112.
9	Schmertmann, 1977, "Guidelines for Cone Penetration Test Performance and Design", Federal Highway Administration Report FHWA-TS-78-209, U.S. Department of Transportation
10	Proceedings of theNCEER Workshop on Evaluation of Liquefaction Resistance of Soils, Salt LakeCity, 1996. Chaired by Leslie Youd.

Appendix G Borehole Geophysics Report

APPENDIX G
BOREHOLE GEOPHYSICS

- Borehole Geophysics Report

BOREHOLE GEOPHYSICS REPORT

Borehole Geophysical Logging
GEOVision, Inc.
November 14, 2006

GEOVision
geophysical services

FINAL REPORT

BORING GEOPHYSICAL LOGGING
BORINGS B-301, B-304, B-307, B-318
B-323, B-401, B-404, B-407, B-418 AND B-423

CALVERT CLIFFS NUCLEAR POWER PLANT
COMBINED OPERATING LICENSE APPLICATION
CALVERT COUNTY, MARYLAND

Report 6165-01 vol 1 of 2 rev A

November 14, 2006

FINAL REPORT

BORING GEOPHYSICAL LOGGING
BORINGS B-301, B-304, B-307, B-318
B-323, B-401, B-404, B-407, B-418 AND B-423

CALVERT CLIFFS NUCLEAR POWER PLANT
COMBINED OPERATING LICENSE APPLICATION
CALVERT COUNTY, MARYLAND

Report 6165-01 vol 1 of 2 rev A

November 14, 2006

Prepared for:

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Prepared by

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APPENDICIES

INTRODUCTION

Boring geophysical measurements were collected in ten uncased borings located at the Calvert Cliffs Nuclear Power Plant, located in Calvert County, Maryland. Geophysical data acquisition was performed between June 1 and June 30, 2006 by Rob Steller of **GEO***Vision*. The work was performed under subcontract with Schnabel Engineering, Inc., (Schnabel) with Brian Banks serving as the point of contact for Schnabel.

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

SCOPE OF WORK

This report presents the results of boring geophysical measurements collected between June 1 and June 30, 2006, in ten uncased borings, as detailed below. The purpose of these studies was to supplement stratigraphic information obtained during Schnabel's soil sampling program and to acquire shear wave velocities and compressional wave velocities as a function of depth, as a component of the Calvert Cliffs Nuclear Power Plant (CCNPP) Combined Operating License Application (COLA) Project.

BORING DESIGNATION	DATES LOGGED	ELEVATION	COORDINATES - FEET MARYLAND STATE PLANE (NAD 1927)	
			NORTH	EAST
B-301	6/5/06	96.84	217024.06	960815.05
B-304	6/1-2/06	68.00	217188.61	960896.88
B-307	6/15/06	119.28	216955.27	960690.13
B-318	6/4/06	NA	217019.30	961227.20
B-323	6/13/06	107.48	217027.97	960060.86
B-401	6/28/06	72.06	216344.12	961516.81
B-404	6/27/06	67.90	216441.34	961596.49
B-407	6/16/06	81.63	216238.96	961412.45
B-418	6/29-30/06	NA	216355.30	961988.60
B-423	6/13/06	110.14	216331.76	960850.21

Table 1 Boring locations and logging dates

The OYO/Robertson Model 3403 suspension logging telemetry unit, and the OYO Model 170 Suspension Logging Recorder and Suspension Logging Probe were 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:

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

INSTRUMENTATION

Suspension Instrumentation

Suspension soil velocity measurements were performed in all borings using the Model 3403 suspension logging system, serial number 160023, manufactured by the Robertson Geologging division of OYO Corporation. Additional velocity measurements were performed in boring B-304 using the Model 170 suspension logging system, serial number 19029, manufactured by OYO Corporation. These additional measurements were made at the request of the client, to demonstrate that both systems produce the same results, and provide validation of each system. Both of these systems directly determines the average velocity of a 3.3 foot high segment of the soil column surrounding the boring of interest by measuring the elapsed time between arrivals of a wave propagating upward through the soil column. 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.

Winch Geovision 4-conductor
Sheave - Measuring wheel Geovision S/N 102
OYO/Robertson Suspension telemetry unit Model 3403 S/N 160023
Or OYO PS170 Recorder and case Model 3331A S/N 19029
OYO PS Logger Borehole Probe, includes:
Reducer Model 3348A S/N 28063
Isolation tube, 1m Model 3387B S/N 28068
Weight Model 3302W S/N 12007
OYO PS 170 Source Model 3304 S/N 19043
Receiver/Sensor S/N 20040, S/N 30086
Driver Model 3386A S/N 27073

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, with the center point of the receiver pair 12.1 feet above the bottom end of the probe.

The probe receives control signals from, and sends the amplified receiver signals to, instrumentation on the surface via an armored 4 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 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 6.52 foot separation of source and receiver 1 permits the P-wave signal to pass and damp significantly before the slower S_H-wave signal arrives at the receiver. In faster 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.

Review of the displayed data on the CRT, LCD or 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 C.

Caliper / Natural Gamma Instrumentation

Caliper and natural gamma data were collected using a Model 3ACS 3-leg caliper probe, serial numbers 2915 and 5368, manufactured by Robertson Geologging, Ltd. With the short arm configuration used in these surveys, the probes permitted measurement of boring diameters between 1.6 and 16 inches. With serial number 2915, caliper measurements were collected concurrent with measurement of natural gamma emission from the boring walls. Both probes were 6.82 feet long, and 1.5 inches in diameter.

This probe is useful in the following studies:

- Measurement of boring diameter and volume
- Location of hard and soft formations
- Location of fissures, caving, pinching and casing damage
- Bed boundary identification
- Strata correlation between borings

The probe receives control signals from, and sends the digitized measurement values to, a Robertson Micrologger II, S/N 5310, on the surface via an armored 4 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 probe and depth data are transmitted by USB link from the Micrologger unit to a laptop computer where it is displayed and stored on hard disk.

The caliper consists of three arms, each with a toothed quadrant at their base, pivoted in the lower probe body. A toothed rack engages with each quadrant, thus constraining the arms to move together. Linear movement of the rack is converted to opening and closing of the arms. Springs hold the arms open in the operating position. A motor drive is provided to retract the arms, allowing the probe to be lowered into the boring. The rack is coupled to a potentiometer which converts movement into a voltage sensed by the probe's microprocessor.

Natural gamma measurements rely upon small quantities of radioactive material contained in all rocks to emit gamma radiation as they decay. Trace amounts of Uranium and Thorium are present in a few minerals, where potassium-bearing minerals such as feldspar, mica and clays will include traces of a radioactive isotope of Potassium. These emit gamma radiation as they decay with an extremely long half-life. This radiation is detected by scintillation - the production of a tiny flash of light when gamma rays strike a crystal of sodium iodide. The light is converted into an electrical pulse by a photomultiplier tube. Pulses above a threshold value of 60 KeV are counted by the probe's microprocessor. The measurement is useful because the radioactive elements are concentrated in certain rock types e.g. clay or shales, and depleted in others e.g. sandstone or coal.

Resistivity / Spontaneous Potential / Natural Gamma Instrumentation

Resistivity, spontaneous potential and natural gamma data were collected using a Model ELXG electric log probe, S/N 5490, manufactured by Robertson Geologging, Ltd. This probe measures Single Point Resistance (SPR), short normal (16") resistivity, long normal (64") resistivity, Spontaneous Potential (SP) and natural gamma. The probe is 8.20 feet long, and 1.73 inches in diameter.

This probe is useful in the following studies:

- Bed boundary identification
- Strata correlation between borings
- Strata geometry and type (shale indication)

The probe receives control signals from, and sends the digitized measurement values to, a Robertson Micrologger II, S/N 5310, on the surface via an armored 4 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 probe and depth data are transmitted by USB link from the Micrologger unit to a laptop computer where it is displayed and stored on hard disk.

The resistivity section of the probe operates by driving an alternating current into the formation from the central SPR/DRIVE electrode. The current returns via the logging cable armor. To ensure adequate penetration of the formation the logging cable is insulated for approximately 30 feet from the cablehead. Voltages are measured between the 16" and 64" electrodes and the remote earth connection at surface, as noted below:

- Single Point Resistance (SPR): The current flowing to the cable armor is measured along with the voltage at the SPR electrode. The voltage divided by current gives resistance.

- Spontaneous Potential (SP): This is the DC bias of the 16" electrode with respect to the voltage return at the surface (ground stake).

Data quality depends upon good grounding at the surface. This is achieved with a metal stake driven into the mud-pit.

Natural gamma data was collected during the caliper data run.

Boring Deviation Instrumentation

Robertson Geologging HIRAT

Boring deviation data were collected in borings B-301, B-304, B-318, B-401, B-404 and B-418 using a High Resolution Acoustic Televiewer probe (HiRAT), serial numbers 5174 and 5500, manufactured by Robertson Geologging, Ltd. This probe is generally used to acquire acoustic images of the boring wall, but may also be used to collect boring deviation data. The probe is 7.58 feet long, and 1.9 inches in diameter, and is fitted with upper and lower four-arm centralizers.

In this application, this probe is useful in the following studies:

- Measurement of boring inclination and deviation from vertical
- Determination of need to correct soil and geophysical log depths to true vertical depths

The probe receives control signals from, and sends the digitized measurement values to, a Robertson Micrologger II, S/N 5310, on the surface via an armored 4 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 probe and depth data are transmitted by USB link from the Micrologger unit to a laptop computer where it is displayed and stored on hard disk.

Mt. Sopris Deviation Probe

Boring deviation data were collected in borings B-307, B-323, B-407 and B-423 using a Model 2DVA-1000 deviation probe, manufactured by Mt. Sopris Instruments, Inc. The probe is 4.95 feet long, and 1.5 inches in diameter.

This probe is useful in the following studies:

- Measurement of boring inclination and deviation from vertical
- Determination of need to correct soil and geophysical log depths to true vertical depths

The probe receives control signals from, and sends the digitized measurement values to, a Mt. Sopris MGX II control unit, on the surface via an armored single conductor cable. The cable is wound onto the drum of a winch and is used to support the probe in the boring. Cable travel is measured to provide probe depth data, using a 0.5 foot circumference sheave fitted with a digital rotary encoder. The probe and depth data are transmitted by RS-232 serial link from the MGX II unit to a laptop computer where it is displayed and stored on hard disk.

MEASUREMENT PROCEDURES

Suspension Measurement Procedures

All ten borings were logged as uncased borings, filled with bentonite or polymer based drilling mud. Measurements followed the GEO*Vision* Procedure for P-S Suspension Seismic Velocity Logging, revision 1.3, as presented in Appendix E. These procedures were supplied and approved in advance of the work. In each boring, the probe was positioned with the top of the probe at the top of the mud box, and the electronic depth counter was set to 8.2 feet, the distance between the mid-point of the receiver and the top of the probe, minus the height of the mud box, 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, below.

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.

Caliper / Natural Gamma Measurement Procedures

All ten borings were logged as uncased borings, filled with bentonite or polymer based drilling mud. Measurements followed the ASTM D6167 Conducting Borehole Geophysical Logging – Mechanical Caliper, as presented in Appendix E.

Prior to and following each logging run, the caliper tool was verified, using the manufacturer's supplied three point calibration jig, which is a circular plate with a series of holes in the top surface into which the tips of the caliper arms fit. This has circles of diameters from 2" to 12", with NIST traceable calibration as documented in Appendix C. The calibration jig is placed over a bucket with the probe standing upright with its nose section passing through the jig's central hole. The caliper probe arms are opened under program control, and a log is recorded as the tips of the arms are placed in the holes on the calibration jig. The measured dimensions, as displayed on the recording computer screen was recorded on the field log sheet, as well as in the digital record, and compared with the calibration jig dimensions. If the verification records did not fall within +/- 0.05 inches of the calibration jig values, the caliper tool was re-calibrated, using the three point calibration jig, and the log repeated. As with the verification, the tips of the caliper arms are placed in the holes marked with the required diameter. During calibration, the value of the current calibration point, as stamped on the jig, is entered via the control computer. The system counts for 15 seconds to make an average of the response. The procedure is repeated for the second and third required openings.

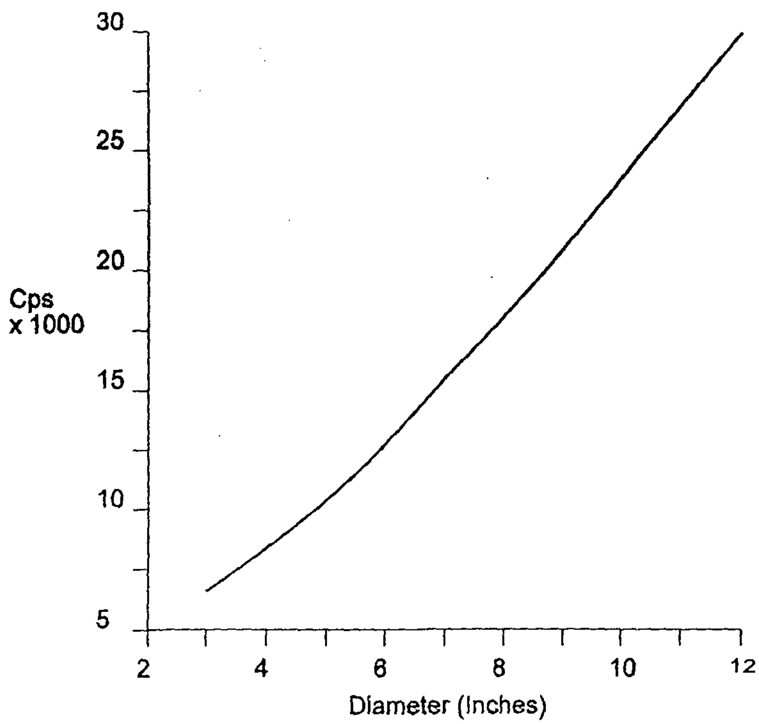


Figure 1. Example Calibration Curve for Caliper Probe

The computation and generation of the calibration coefficient file is entirely automatic. The calibration file is simply the set of coefficients of a quadratic curve which fits the three data points. Figure 1 shows the response of a caliper probe using data gathered during calibration.

Natural gamma was not calibrated in the field, as it is a qualitative measurement, not a quantitative value, and is used only to assist in picking transitions between stratigraphic units, as described in ASTM D6274, Conducting Borehole Geophysical Logging - Gamma, which is included in Appendix E.

In each boring, the probe was positioned with the top of the probe at the top of the mud box, and the electronic depth counter was set to 6.82 feet, the specified length of the probe, minus the height of the mud box, as verified with a tape measure, and recorded on the field logs. The probe was lowered to the bottom of the boring, where the caliper legs were opened, and data collection begun. The probe was then returned to the surface at 9.8 feet/sec, collecting data continuously at 0.05 foot spacing, as summarized in Table 2.

Upon completion of the measurements, the probe zero depth indication at the depth reference point was verified prior to removal from the boring, as summarized in Table 3.

Resistivity / Spontaneous Potential Measurement Procedures

All ten borings were logged as uncased borings, filled with bentonite or polymer based drilling mud. The probe was connected to the logging cable using a 32.8 foot long insulating cable section or "yoke". The probe head was insulated by wrapping all exposed metal of the cablehead and probe with self-amalgamating insulation tape. The 32.8 foot insulating yoke was checked for any damage, and repaired with self-amalgamating insulation tape as needed.

The reference ground stake was driven firmly into the mud pit, and connected to the ground socket on the winch switch box.

This sonde was not calibrated in the field, as it is used to provide qualitative measurements, not quantitative values, and is used only to assist in picking transitions between stratigraphic units, as described in ASTM D5753, Planning and Conducting Borehole Geophysical Surveys, which is included in Appendix E.

In each boring, the probe was positioned with the top of the probe at the top of the mud box, and the electronic depth counter was set to 8.2 feet, the specified length of the probe, minus the height of the mud box, as verified with a tape measure. When logging on the smaller drill rigs, the depth was zeroed to the top of the yoke, and 32.8 feet was added to the zero depth, as recorded in the field logs. The probe was lowered to the bottom of the boring, where data collection was begun. The probe was then returned to the surface at 10 feet/sec, collecting data continuously at 0.05 foot spacing, as summarized in Table 2. The natural gamma data collected in these logs is redundant with the data collected in the caliper / natural gamma logs, and the caliper / natural data may be used to verify the natural gamma data collected in these logs.

Normally, when the un-insulated section of the logging cable leaves the boring fluid, the log is terminated, as the electrical measurements do not function under these conditions. However, in these surveys, the log was continued, in order to collect as much natural gamma data as possible before the yoke connector reached the measuring wheel.

Upon completion of the measurements, the probe zero depth indication at the depth reference point was verified prior to removal from the boring, as summarized in Table 3.

Boring Deviation Measurement Procedures

All ten borings were logged as uncased borings, filled with bentonite or polymer based drilling mud. Measurements followed the GEO*Vision* standard field procedures, as presented in Appendix E.

Prior to use, the HiRAT or deviation probe tiltmeter and compass functions were checked by hanging from the drill rig and by comparison with a Brunton surveyors' compass.

In each boring logged with the Robertson HiRAT, the probe was positioned with the top of the probe at the top of the mud box, and the electronic depth counter was set to 4.71 feet, the specified length of the probe, minus the height of the mud box, as verified with a tape measure, and recorded on the field logs. In each boring logged with the Mt. Sopris 2DVA-1000, the probe was positioned with the bottom of the probe at the top of the mud box, and the electronic depth counter was set to 0.0 feet, minus the mud box height, as recorded on the field logs. The probe was lowered to the bottom of the boring, and data collection begun. The probe was then returned to the surface at 9.8 feet/sec, collecting data continuously, as summarized in Table 2.

Upon completion of the measurements, the probe zero depth indication at the depth reference point was verified prior to removal from the boring, as summarized in Table 3.

BORING NUMBER	TOOL AND RUN NUMBER	DEPTH RANGE (FEET)	OPEN HOLE (FEET)	DEPTH TO BOTTOM OF CASING (FEET)	SAMPLE INTERVAL (FEET)	DATE LOGGED
B-301	SUSPENSION 1	0.6 – 390.4	403.2	NO CASING	1.6	6/5/06
B-301	DEVIATION 1	0 – 402.5	-	NO CASING	.008	6/5/06
B-301	ELOG/GAMMA 1	402.0 – 1.7	-	NO CASING	0.05	6/5/06
B-301	ELOG/GAMMA 2	402.0 – 1.7	-	NO CASING	0.05	6/5/06
B-301	CALIPER 1	402.0 - 0	-	NO CASING	0.05	6/5/06
B-304	SUSPENSION 1	1.6 – 182.1	194.2	NO CASING	1.6	6/1/06
B-304	SUSPENSION 2	1.6 – 180.5	193.9	NO CASING	1.6	6/1/06
B-304	DEVIATION 1	0 – 194.0		NO CASING	.008	6/1/06
B-304	ELOG/GAMMA 1	40.5 – 195.4	195.4	NO CASING	0.05	6/1/06
B-304	ELOG/GAMMA 2	195.4 – 20.2	-	NO CASING	0.05	6/1/06
B-304	CALIPER 1	188.0 – 0	-	NO CASING	0.05	6/2/06
B-304	CALIPER 2	189.0 - 0	-	NO CASING	0.05	6/2/06
B-307	SUSPENSION 1	1.6 – 187.0	200.1	NO CASING	1.6	6/15/06
B-307	CALIPER 1	197.0 -0	-	NO CASING	0.05	6/15/06
B-307	ELOG 1	200.0 – 4.1	200	NO CASING	0.05	6/15/06
B-307	DEVIATION 1	0 – 195.0	-	NO CASING	0.1	6/15/06
B-318	SUSPENSION 1	1.6 – 190.3	203.0	NO CASING	1.6	6/4/06
B-318	DEVIATION 1	0 – 86.4	-	NO CASING	.008	6/4/06
B-318	DEVIATION 2	83.5 – 198.5	-	NO CASING	.008	6/4/06
B-318	ELOG/GAMMA 1	18.0 – 197.0	-	NO CASING	0.05	6/4/06
B-318	ELOG/GAMMA 2	197.0 – 40.0	-	NO CASING	0.05	6/4/06
B-318	CALIPER 1	195.0 - 0	-	NO CASING	0.05	6/4/06
B-323	SUSPENSION 1	1.6 – 190.3	203.4	NO CASING	1.6	6/4/06
B-323	CALIPER 1	203.5 - 0	-	NO CASING	0.05	6/4/06
B-323	ELOG/GAMMA 1	202.5 – 18.3	-	NO CASING	0.05	6/4/06
B-323	DEVIATION 1	190.0 – 180.0	-	NO CASING	0.1	6/4/06
B-323	DEVIATION 2	190.0 - 0	-	NO CASING	0.1	6/4/06
B-401	SUSPENSION 1	1.6 – 388.8	401.5	NO CASING	1.6	6/28/06
B-401	DEVIATION 1	3.2 – 401.0	-	NO CASING	.008	6/28/06
B-401	CALIPER/GAMMA 1	397.0 - 0	-	NO CASING	0.05	6/28/06
B-401	ELOG/GAMMA 1	399.5 – 1.8	-	NO CASING	0.05	6/28/06
B-404	SUSPENSION 1	1.6 – 187.0	199.8	NO CASING	1.6	6/27/06
B-404	DEVIATION 1	3.1 – 196.0	-	NO CASING	.008	6/27/06
B-404	CALIPER/GAMMA 1	195.0 - 0	-	NO CASING	0.05	6/27/06
B-404	ELOG/GAMMA 1	195.0 - 0	-	NO CASING	0.05	6/27/06
B-407	SUSPENSION 1	1.6 – 183.7	196.5	NO CASING	1.6	6/16/06
B-407	CALIPER 1	193.0 - 0	-	NO CASING	0.05	6/16/06
B-407	ELOG/GAMMA 1	197.0 – 17.6	197.0	NO CASING	0.05	6/16/06

B-407	DEVIATION 1	0 – 182.8	-	NO CASING	0.1	6/16/06
B-418	SUSPENSION 1	1.6 – 187.0	199.8	NO CASING	1.6	6/29/06
B-418	DEVIATION 1	199.4 – 3.3	199.4	NO CASING	.008	6/29/06
B-418	CALIPER/GAMMA 1	197.0 – 162.8	-	NO CASING	0.05	6/29/06
B-418	CALIPER/GAMMA 2	197.0 - 0	-	NO CASING	0.05	6/29/06
B-418	ELOG/GAMMA 1	197.0 20.0	-	NO CASING	0.05	6/29/06
B-423	DEVIATION 1	193.5 – 187.0	198.1	NO CASING	0.1	6/13/06
B-423	DEVIATION 2	193.5 - 0	-	NO CASING	0.1	6/13/06
B-423	SUSPENSION 1	1.6 – 185.4	-	NO CASING	1.6	6/13/06
B-423	CALIPER 1	193.0 – 0	-	NO CASING	0.05	6/13/06
B-423	ELOG/GAMMA 1	200.0 - 3.3	200.0	NO CASING	0.05	6/13/06

- PROBE DID NOT TOUCH BOTTOM OF BORING

Table 2. Logging dates and depth ranges

BORING NUMBER	TOOL AND RUN NUMBER	TOOL HIT BOTTOM DEPTH (FEET)	DRILLER DEPTH (FEET)	STARTING DEPTH REF. (FEET)	ENDING DEPTH REF. (FEET)	ASDE (FEET)
B-301	SUSPENSION 1	403.2	403	NA	NA	
B-301	DEVIATION 1	-	403	3.22	3.22	0.00
B-301	ELOG/GAMMA 1	-	403	6.70	6.70	0.00
B-301	ELOG/GAMMA 2	-	403	6.70	6.70	0.00
B-301	CALIPER 1	-	403	5.32	5.32	0.00
B-304	SUSPENSION 1	194.2	200	0.00	0.10	0.10
B-304	SUSPENSION 2	193.9	200	0.30	0.30	0.00
B-304	DEVIATION 1		200	3.22	3.22	0.00
B-304	ELOG/GAMMA 1	195.4	200	7.70	7.70	0.00
B-304	ELOG/GAMMA 2	-	200	7.70	7.70	0.00
B-304	CALIPER 1	-	200	5.32	5.32	0.00
B-304	CALIPER 2	-	200	5.32	5.32	0.00
B-307	SUSPENSION 1	200.1	200	6.64	6.64	0.00
B-307	CALIPER 1	-	200	5.32	5.32	0.00
B-307	ELOG 1	200	200	6.70	6.70	0.00
B-307	DEVIATION 1	-	200	-1.50	-1.50	0.00
B-318	SUSPENSION 1	203.0	201	NA	NA	
B-318	DEVIATION 1	-	201	3.22	3.22	0.00
B-318	DEVIATION 2	-	201	3.22	3.22	0.00
B-318	ELOG/GAMMA 1	-	201	39.95	39.95	0.00
B-318	ELOG/GAMMA 2	-	201	39.95	39.95	0.00
B-318	CALIPER 1	-	201	5.32	5.32	0.00
B-323	SUSPENSION 1	203.4	200	6.43	6.69	0.26
B-323	CALIPER 1	-	200	5.12	5.12	0.00
B-323	ELOG/GAMMA 1	-	200	39.50	39.50	0.00
B-323	DEVIATION 1	-	200	-1.50	-3.13	1.63
B-323	DEVIATION 2	-	200	-1.50	-1.50	0.00
B-401	SUSPENSION 1	401.5	400	6.63	6.69	0.06
B-401	DEVIATION 1	-	400	3.22	3.22	0.00
B-401	CALIPER/GAMMA 1	-	400	5.32	5.45	0.13
B-401	ELOG/GAMMA 1	-	400	6.70	6.75	0.05
B-404	SUSPENSION 1	199.8	200	0.00	0.00	0.00
B-404	DEVIATION 1	-	200	3.12	3.15	0.02
B-404	CALIPER/GAMMA 1	-	200	5.12	5.10	0.02
B-404	ELOG/GAMMA 1	-	200	39.40	39.45	0.05
B-407	SUSPENSION 1	196.5	200	NA	NA	
B-407	CALIPER 1	-	200	5.32	5.32	0.00

B-407	ELOG/GAMMA 1	197.0	200	39.50	39.50	0.00
B-407	DEVIATION 1	-	200	-1.50	-1.50	0.00
B-418	SUSPENSION 1	199.8	200	0.00	0.00	0.00
B-418	DEVIATION 1	199.4	200	3.22	3.25	0.02
B-418	CALIPER/GAMMA 1	-	200	5.32	5.35	0.03
B-418	CALIPER/GAMMA 2	-	200	5.32	5.32	0.00
B-418	ELOG/GAMMA 1	-	200	39.50	39.50	0.00
B-423	DEVIATION 1	198.1	200	-1.80	-3.10	1.30
B-423	DEVIATION 2	-	200	-1.80	-1.80	0.00
B-423	SUSPENSION 1	-	200	6.33	6.33	0.00
B-423	CALIPER 1	-	200	5.02	5.02	0.00
B-423	ELOG/GAMMA 1	200.0	200	6.40	6.40	0.00

- PROBE DID NOT TOUCH BOTTOM OF BORING

Table 3. Boring Bottom Depths and After Survey Depth Error (ASDE)

DATA ANALYSIS

Suspension Analysis

Using the proprietary OYO 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 2 of 2 (CDR) of this report.

The P-wave velocity over the 6.5 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 4.9 feet to correspond to the mid-point of the 6.5 foot S-R1 interval, as illustrated in Figure 1. Travel times were obtained by picking the first break of the P-wave signal at receiver 1 and subtracting 0.3 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 2000 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 6.5 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 4.9 foot to correspond to the mid-point of the 6.5 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 0.3 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 John Diehl and Tony Martin as a component of **GEO***Vision*'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.

Caliper / Natural Gamma Analysis

No analysis is required with the caliper or natural gamma data, however depths to identifiable boring features were compared to verify compatible depth readings on all logs. These data were combined with the resistivity, ELOG based natural gamma and spontaneous potential (SP) logs, and converted to LAS and PDF formats for transmittal to the client.

Resistivity / Natural Gamma / Spontaneous Potential Analysis

No analysis is required with the resistivity, natural gamma or spontaneous potential data, however depths to identifiable boring features were compared to verify compatible depth readings on all logs. These data were combined with the caliper and caliper-based natural gamma logs, and converted to LAS and PDF formats for transmittal to the client.

Boring Deviation Analysis

Robertson Geologging HIRAT

The collected Acoustic Televiewer data was processed with Robertson Geologging's RGLDIP program, version 6.2, to extract the deviation data and produce an ASCII file and plots of deviation data.

Mt. Sopris Deviation Probe

Deviation logs in borings B-307, B-323, B-407 and B-423 were surveyed using the Mt. Sopris 2DVA-100 probe, and the results were analyzed by Nate Davis of COLOG, using Mt. Sopris MSLOG 7.2 program to produce an ASCII file and plots of deviation data.

RESULTS

Suspension Results

Suspension R1-R2 P- and S_H-wave velocities are plotted in Figures 5, 8, 9, 12, 15, 18, 21, 24, 27, 30 and 33. The suspension velocity data presented in these figures are presented in Tables 5 - 15. The PSLOG and EXCEL analysis files for each boring are included in the boring specific directories on volume 2 of 2 (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 Figures A-1 through A-11 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 6.5 feet, creating a significant smoothing relative to the R1-R2 plots. S-R1 data are presented in Tables A-1 through A-11, and included in the EXCEL analysis files for each boring on volume 2 of 2 (CDR) of this report.

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

The **GEO***Vision* standard field log sheets for all borings are reproduced in Appendix D.

The **GEO***Vision* standard field procedures are reproduced in Appendix E.

Caliper/ Natural Gamma Results

Caliper and natural gamma data is presented in combined log plots with resistivity and spontaneous potential as single page logs in Figures 6, 10, 13, 16, 19, 22, 25, 28, 31 and 34, as well as multi-page logs in Appendix B. LAS 2.0 data and Acrobat files of the plots for each boring are included in the boring specific sub-directories in the data directory on volume 2 of 2 (CDR) of this report.

Resistivity / Spontaneous Potential Results

Resistivity and spontaneous potential data is presented in combined log plots with caliper and natural gamma data as single page logs in Figures 6, 10, 13, 16, 19, 22, 25, 28, 31 and 34, as well as multi-page logs in Appendix B. LAS 2.0 data and Acrobat files for each boring are included in the boring specific sub-directories in the data directory on volume 2 of 2 (CDR) of this report.

Boring Deviation Results

Boring deviation data is presented graphically in Figures 7, 11, 14, 17, 20, 23, 26, 29, 32 and 35, and summarized in Table 4. Deviation data plots in Acrobat format and deviation data at 1.0 foot stations are presented in text format in the boring specific sub-directories in the data directory on volume 2 of 2 (CDR) of this report.

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. All of the borings at this site were ideal for collection of Suspension PS velocity data, with minor exceptions due to some significant wash-outs of the borings at water table, as shown in the caliper logs. Despite these washouts, the quality of these data ranged from good to excellent. Each boring is discussed in more detail below.

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.

B-301: These data show excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped. This data set agrees well with data from other borings on the site, when depth shifted to correct for boring collar elevation. This is an excellent velocity data set.

B-304: These data show excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped. This data set agrees well with data from other borings on the site, when depth shifted to correct for boring collar elevation. This is an excellent velocity data set.

B-307: These data show excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped. This data set agrees well with data from other borings on the site, when depth shifted to correct for boring collar elevation. This is an excellent velocity data set.

B-318: These data show excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped. This data set agrees well with data from other borings on the site, when depth shifted to correct for boring collar elevation. This is an excellent velocity data set.

B-323: These data show excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped. This data set agrees well with data from other borings on the site, when depth shifted to correct for boring collar elevation. This is an excellent velocity data set.

B-401: These data show excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped. This data set agrees well with data from other borings on the site, when depth shifted to correct for boring collar elevation. This is an excellent velocity data set.

B-404: These data show excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped. This data set agrees well with data from other borings on the site, when depth shifted to correct for boring collar elevation. This is an excellent velocity data set.

B-407: These data show excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped. This data set agrees well with data from other borings on the site, when depth shifted to correct for boring collar elevation. This is an excellent velocity data set.

B-418: These data show excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped. This data set agrees well with data from other borings on the site, when depth shifted to correct for boring collar elevation. This is an excellent velocity data set.

B-423: These data show excellent correlation between R1 – R2 and S – R1 data, as well as excellent correlation between P-wave and S_H-wave velocities. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped. This data set agrees well with data from other borings on the site, when depth shifted to correct for boring collar elevation. This is an excellent velocity data set.

Discussion of Caliper / Natural Gamma Results

B-301: Caliper data shows erosion of the upper 30 feet of the boring, and several washouts to greater than 12 inches diameter. Below 42 feet, boring gauge is very consistent. Natural gamma was not collected with this tool in this boring.

B-304: Caliper data shows no erosion of the upper section of this boring. The boring gauge is very consistent for the entire depth. Natural gamma was not collected with this tool in this boring.

B-307: Caliper data shows erosion of the upper 20 feet of the boring, and several washouts to greater than 12 inches diameter. Below 20 feet, boring gauge is very consistent, with a small narrowing at approximately 165 feet. Natural gamma was not collected with this tool in this boring.

B-318: Caliper data shows slight erosion of the upper 45 feet of the boring, with several washouts to 7 inches diameter. Below 45 feet, the boring gauge is variable. Natural gamma was not collected with this tool in this boring.

B-323: Caliper data shows erosion of the upper 20 feet of the boring, and several washouts to greater than 12 inches diameter. Below 20 feet, boring gauge is very consistent, with a small narrowing at approximately 165 feet. Natural gamma was not collected with this tool in this boring.

B-401: Caliper data shows erosion of the upper 20 feet of the boring, and several washouts to greater than 12 inches diameter. Below 45 feet, boring gauge is very consistent. Natural gamma was collected with this tool in this boring, as well as with the ELOG tool, and the comparison between the two data sets provides an almost exact match, verifying the performance of the natural gamma measuring systems.

B-404: Caliper data shows erosion of the upper 45 feet of the boring, and a number of washouts to 8 - 12 inches diameter. Below 45 feet, boring gauge is consistent. Natural gamma was collected with this tool in this boring, as well as with the ELOG tool, and the comparison between the two data sets provides an almost exact match, verifying the performance of the natural gamma measuring systems.

B-407: Caliper data shows some erosion of the upper 55 feet of the boring, though this boring was drilled with a 5 inch bit to 55 feet, and the boring is close to this gauge. One washout to greater than 12 inches diameter occurs at approximately 7 feet. Below 55 feet, boring gauge is very consistent. Natural gamma was not collected with this tool in this boring.

B-418: Caliper data shows erosion of the upper 12 feet of the boring, and a several shallow washouts to 8 inches diameter. Below 12 feet, boring gauge is consistent, with periodic increases in diameter which correspond to bit location when flushing the boring before collecting a drive sample. Natural gamma was collected with this tool in this boring, as well as with the ELOG tool, and the comparison between the two data sets provides an almost exact match, verifying the performance of the natural gamma measuring systems.

B-423: Caliper data shows erosion of the upper 30 feet of the boring, and one large washout to greater than 12 inches diameter. Below 30 feet, boring gauge is consistent. Natural gamma was not collected with this tool in this boring.

Discussion of Resistivity / Spontaneous Potential Results

B-301: These data show good correlation between the different logs below 40 feet. The electrical data is degraded above this depth, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains good to the surface, and agrees well with data from other borings at this site, when depth shifted to correct for elevation differences.

B-304: These data show good correlation between the different logs below 40 feet. The electrical data is degraded above this depth, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains good to 20 feet, where the log was stopped as the upper yoke electrode had reached the top of the drill rig tower.

B-307: These data show good correlation between the different logs below 40 feet. The electrical data is degraded above this depth, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains good to 8 feet, where the log was stopped as the upper yoke electrode had reached the top of the drill rig tower.

B-318: These data show good correlation between the different logs below 40 feet. The electrical data is degraded above this depth, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains good to 20 feet, where the log was stopped as the upper yoke electrode had reached the top of the drill rig tower.

B-323: These data show good correlation between the different logs below 40 feet. The electrical data is degraded above this depth, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains good to 20 feet, where the log was stopped as the upper yoke electrode had reached the top of the drill rig tower.

B-401: These data show good correlation between the different logs below 40 feet. The electrical data is degraded above this depth, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains good to the surface, and agrees well with data from other borings at this site, when depth shifted to correct for elevation differences. Comparison between the two natural gamma data sets in this boring provides an almost exact match, verifying the performance of the natural gamma measuring systems.

B-404: These data show good correlation between the different logs below 40 feet. The electrical data is degraded above this depth, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains good to the surface, and agrees well with data from other borings at this site, when depth shifted to correct for elevation differences. Comparison between the two natural gamma data sets in this boring provides an almost exact match, verifying the performance of the natural gamma measuring systems.

B-407: These data show good correlation between the different logs below 40 feet. The electrical data is degraded above this depth, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains good to 20 feet, where the log was stopped as the upper yoke electrode had reached the top of the drill rig tower.

B-418: These data show good correlation between the different logs below 40 feet. The electrical data is degraded above this depth, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains good to 20 feet and agrees well with data from other borings at this site, when depth shifted to correct for elevation differences. Comparison between the two natural gamma data sets in this boring provides an almost exact match, verifying the performance of the natural gamma measuring systems.

B-423: These data show good correlation between the different logs below 40 feet. The electrical data is degraded above this depth, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains good to the surface.

Discussion of Boring Deviation Results

All ten borings were inclined at less than 1 degree from vertical, and the maximum error in depth value was less than 0.1 foot, as presented in Table 4. This error is significantly less than depth errors from other causes, and no adjustment of log depths are indicated.

BORING NUMBER	MEAN DEVIATION AND AZIMUTH (DEGREES)	SURVEY DEPTH (FEET)	VERTICAL DEPTH (FEET)	DEPTH ERROR (FEET)	HORIZONTAL OFFSET (FEET)
B-301	0.52 - N167.9	403.0	403.0	0.0	3.69
B-304	0.69 – N249.6	194.3	194.3	0.0	2.32
B-307	0.76 – N256.4	195.2	195.2	0.0	2.58
B-318	0.74 – N147.2	198.5	198.4	0.1	2.58
B-323	0.38 – N256.4	189.9	189.9	0.0	1.26
B-401	0.91 – N264.8	401.3	401.2	0.1	6.38
B-404	0.28 – N189.5	196.8	196.8	0.0	0.95
B-407	0.61 – N271.2	182.8	182.7	0.1	1.99
B-418	0.32 – N187.9	199.3	199.3	0.0	1.12
B-423	0.42 – N76.6	193.5	193.5	0.0	1.41

Table 4. Boring Deviation Data Summary

Quality Assurance

These boring geophysical measurements were performed using industry-standard or better methods for measurements and analyses. All work was performed under **GEO***Vision* 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 measurements are very reliable with estimated precision of +/- 5%. Standardized field procedures and quality assurance checks contribute to the reliability of these data.

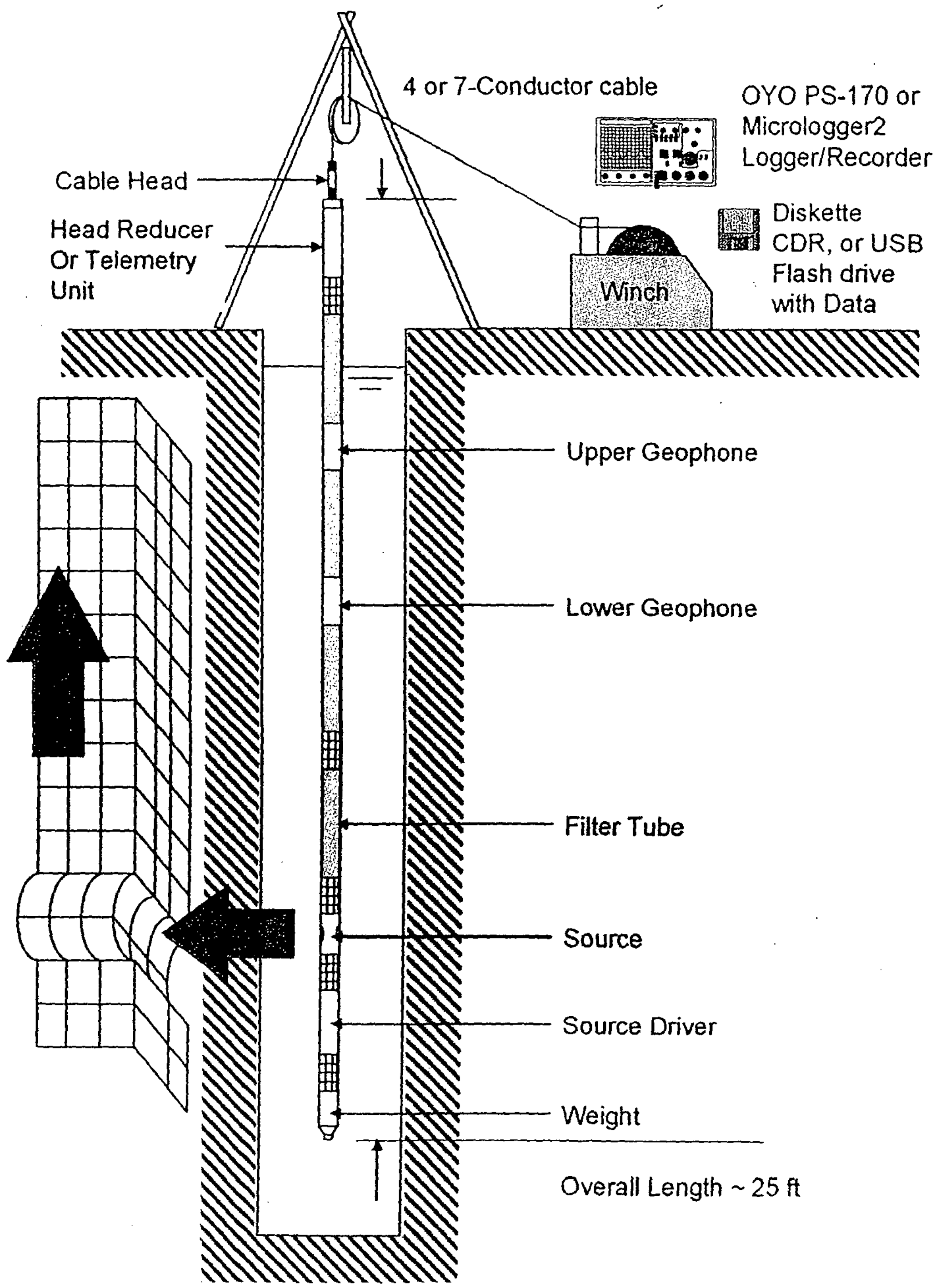


Figure 2: Concept illustration of P-S logging system

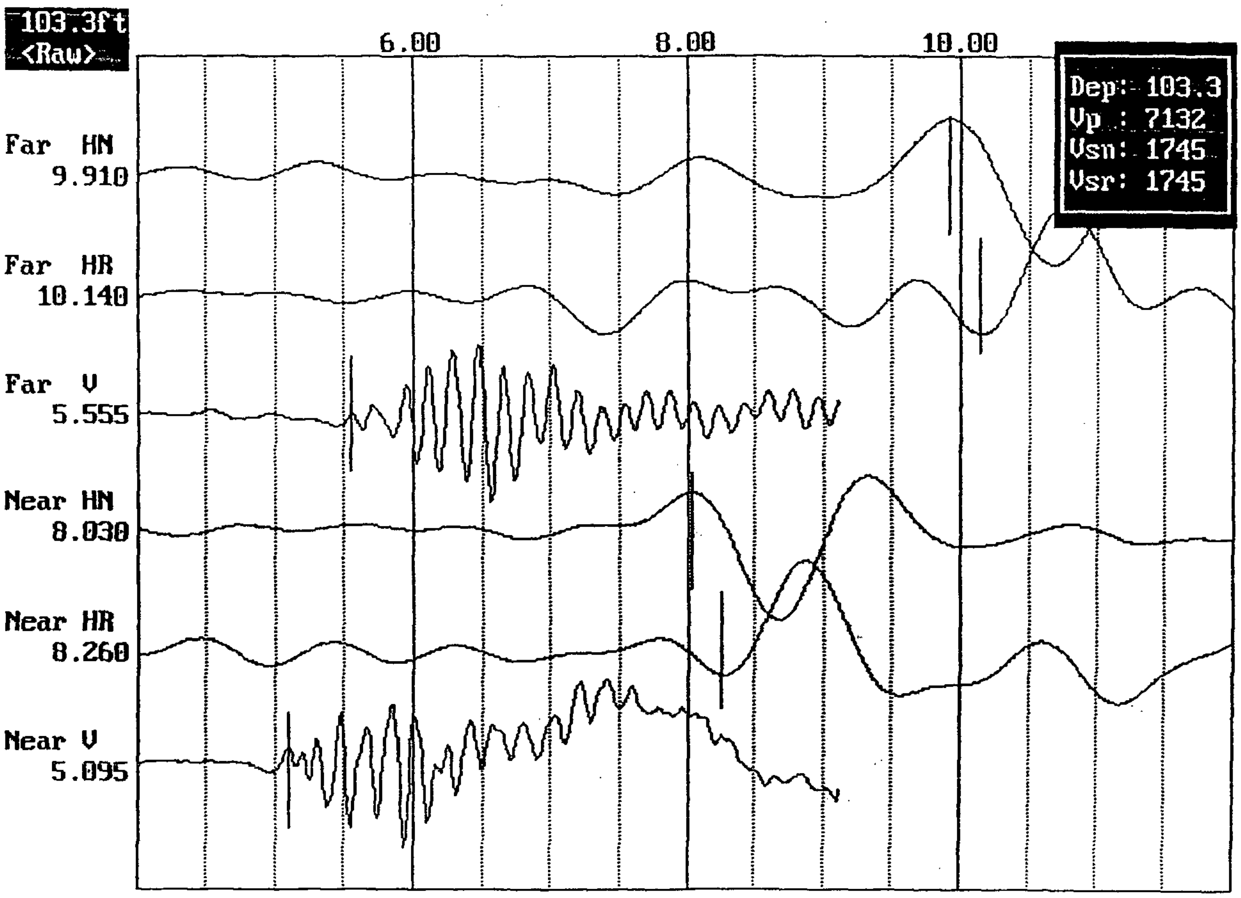


Figure 3: Example of filtered (1400 Hz lowpass) record

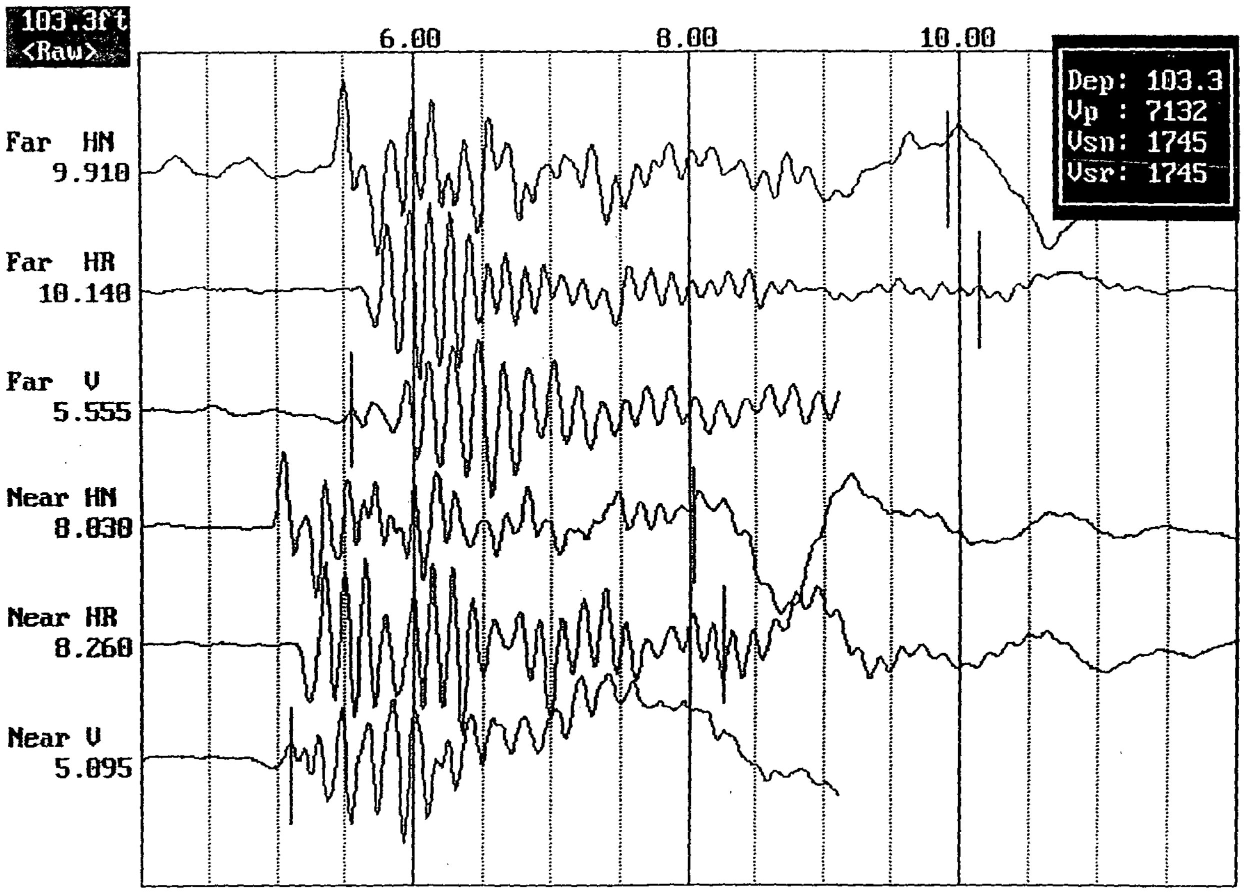


Figure 4. Example of unfiltered record

CCNPP COLA Borehole B-301 velocity data
Receiver to Receiver V_s and V_p Analysis

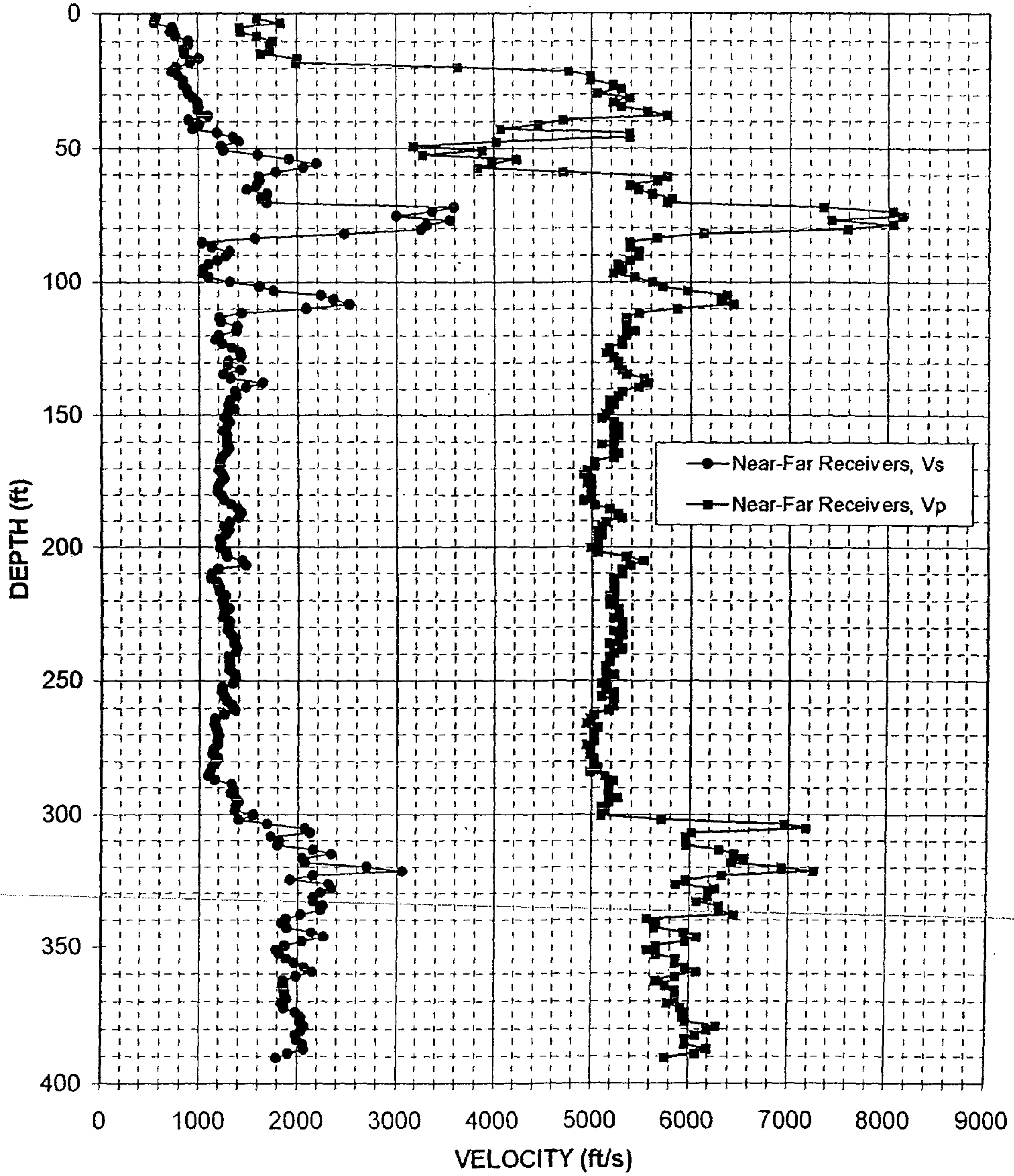


Figure 5: Boring B-301, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)	Depth (feet)	V_s (feet/sec)	V_p (feet/sec)	Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	560	1590	83.7	1570	5650	165.7	1220	5210
3.3	550	1830	85.3	1030	5380	167.3	1200	5010
4.9	730	1410	86.9	1130	5380	169.0	1200	5010
6.6	710	1420	88.6	1310	5460	170.6	1190	4940
8.2	770	1590	90.2	1270	5460	172.2	1230	4900
9.8	890	1750	91.9	1190	5380	173.9	1250	4980
11.5	900	1720	93.5	1090	5250	175.5	1200	4940
13.1	840	1720	95.1	1040	5290	177.2	1180	4980
14.8	850	1630	96.8	1030	5210	178.8	1190	4980
16.4	1000	2000	98.4	1090	5420	180.5	1220	4980
18.0	920	1980	100.1	1310	5600	182.1	1250	4900
19.7	770	3620	101.7	1610	5700	183.7	1320	5010
21.3	720	4760	103.4	1750	5950	185.4	1380	5170
23.0	790	4980	105.0	2240	6350	187.0	1420	5250
24.6	840	4980	106.6	2360	6290	188.7	1390	5290
26.3	840	5210	108.3	2530	6410	190.3	1310	5130
27.9	880	5290	109.9	2080	5850	191.9	1250	5090
29.5	900	5050	111.6	1430	5460	193.6	1290	5050
31.2	940	5380	113.2	1200	5330	195.2	1260	5090
32.8	990	5210	114.8	1220	5330	196.9	1200	5050
34.5	1000	5290	116.5	1380	5330	198.5	1210	5050
36.1	990	5560	118.1	1380	5420	200.1	1200	4980
37.7	1090	5750	119.8	1190	5330	201.8	1260	5050
39.4	900	4690	121.4	1160	5290	203.4	1280	5330
41.0	1000	4440	123.0	1230	5290	205.1	1440	5510
42.7	940	4070	124.7	1330	5170	206.7	1470	5380
44.3	1180	5380	126.3	1410	5130	208.3	1180	5290
45.9	1340	5380	128.0	1420	5210	210.0	1120	5290
47.6	1410	4020	129.6	1290	5250	211.6	1110	5210
49.2	1220	3170	131.2	1290	5250	213.3	1170	5210
50.9	1250	3880	132.9	1420	5290	214.9	1190	5210
52.5	1600	3270	134.5	1240	5330	216.5	1200	5210
54.1	1920	4220	136.2	1310	5510	218.2	1260	5170
55.8	2190	3970	137.8	1640	5560	219.8	1230	5210
57.4	2060	3830	139.4	1470	5460	221.5	1240	5170
59.1	1780	4690	141.1	1360	5290	223.1	1290	5250
60.7	1610	5750	142.7	1370	5250	224.7	1250	5250
62.3	1620	5650	144.4	1310	5170	226.4	1230	5210
64.0	1590	5380	146.0	1290	5210	228.0	1300	5290
65.6	1490	5460	147.6	1350	5170	229.7	1290	5290
67.3	1700	5600	149.3	1280	5130	231.3	1280	5210
68.9	1630	5800	150.9	1250	5090	232.9	1310	5290
70.5	1690	5750	152.6	1300	5210	234.6	1350	5250
72.2	3580	7330	154.2	1280	5250	236.2	1350	5170
73.8	3370	8030	155.8	1230	5210	237.9	1380	5290
75.5	3000	8130	157.5	1280	5250	239.5	1360	5210
77.1	3550	7410	159.1	1270	5210	241.1	1290	5170
78.7	3300	8030	160.8	1270	5090	242.8	1300	5170
80.4	3250	7580	162.4	1300	5210	244.4	1300	5130
82.0	2480	6120	164.0	1270	5250	246.1	1300	5130

Table 5. Boring B-301, Suspension R1-R2 depths and P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
247.7	1340	5210
249.3	1360	5130
251.0	1340	5090
252.6	1230	5130
254.3	1230	5210
255.9	1250	5090
257.6	1270	5210
259.2	1330	5210
260.8	1360	5170
262.5	1250	5010
264.1	1150	4980
265.8	1150	4940
267.4	1170	5050
269.0	1180	5010
270.7	1190	5010
272.3	1180	5010
274.0	1180	4940
275.6	1140	4980
277.2	1130	4980
278.9	1180	5010
280.5	1150	5010
282.2	1120	5050
283.8	1100	4980
285.4	1080	5130
287.1	1150	5210
288.7	1320	5170
290.4	1330	5170
292.0	1320	5170
293.6	1360	5250
295.3	1390	5170
296.9	1370	5090
298.6	1360	5130
300.2	1540	5090
301.8	1390	5700
303.5	1680	6940
305.1	2070	7170
306.8	2120	6010
308.4	1720	5950
310.0	1800	5950
311.7	1790	5950
313.3	2150	6290
315.0	2340	6440
316.6	2040	6540
318.2	2070	6410
319.9	2700	6920
321.5	3060	7250
323.2	2150	6310
324.8	1920	5950
326.4	2310	5850
328.1	2340	6240
329.7	2230	6170
331.4	2160	6170
333.0	2160	6060
334.7	2250	6290
336.3	2230	6290
337.9	2030	6440
339.6	1880	5560
341.2	1840	5650
342.9	1890	5630
344.5	2140	5930
346.1	2260	6060
347.8	2040	5950
349.4	1870	5650
351.1	1780	5560
352.7	1810	5650
354.3	1880	5850
356.0	1970	5850
357.6	2070	5950
359.3	2150	6060
360.9	1980	5850
362.5	1850	5650
364.2	1860	5750
365.8	1860	5850
367.5	1870	5850
369.1	1890	5850
370.7	1840	5770
372.4	1860	5910
374.0	1980	5950
375.7	2030	5930
377.3	2030	5950
378.9	2070	6270
380.6	2040	6170
382.2	1980	6060
383.9	1990	5950
385.5	2050	5950
387.1	2070	6170
388.8	1900	6060
390.4	1790	5750

Table 6, continued Boring B-301, Suspension R1-R2 depths and P- and S_H-wave velocities

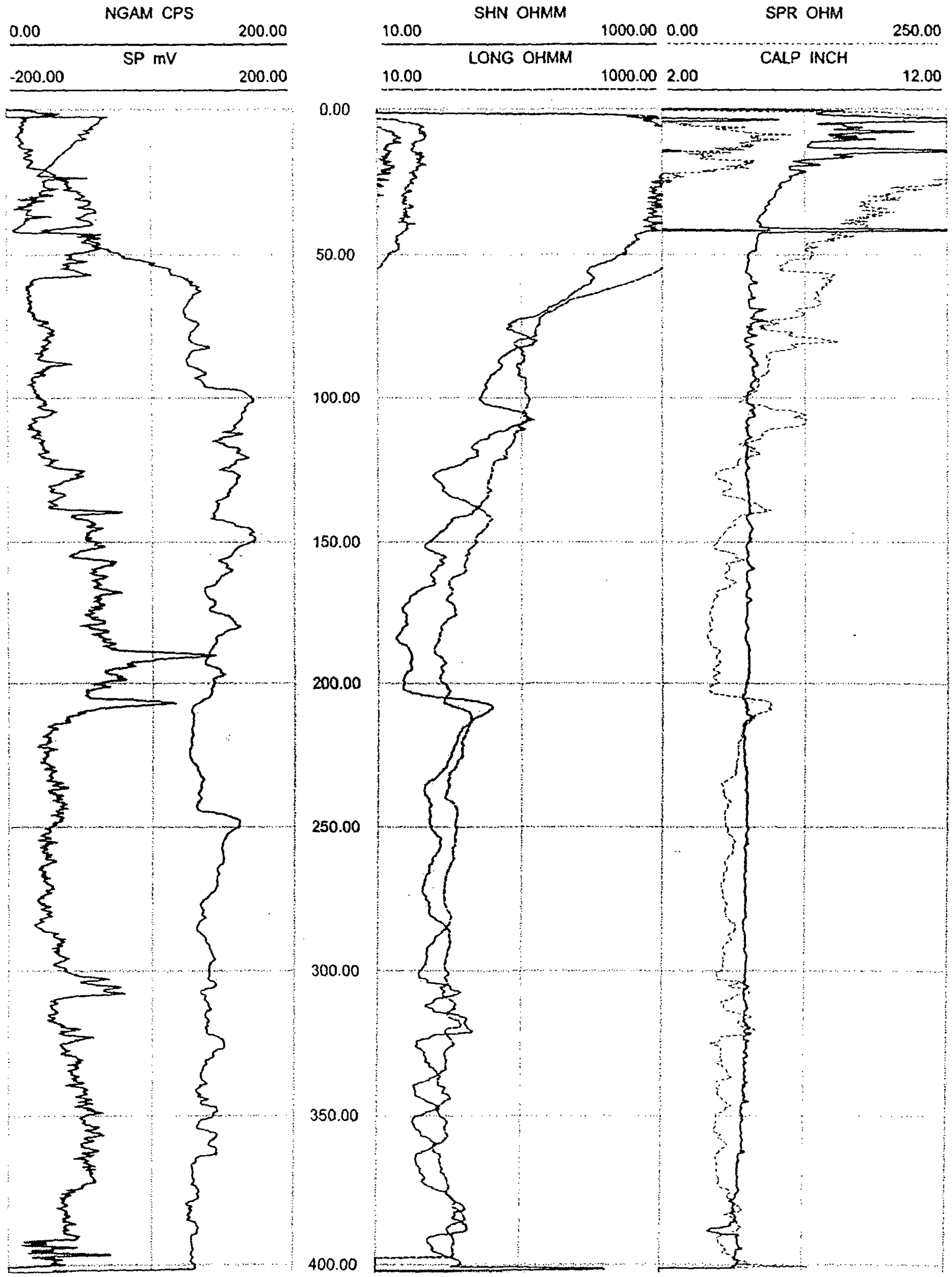


Figure 6. Boring B-301, Caliper, Natural gamma, Resistivity and SP logs

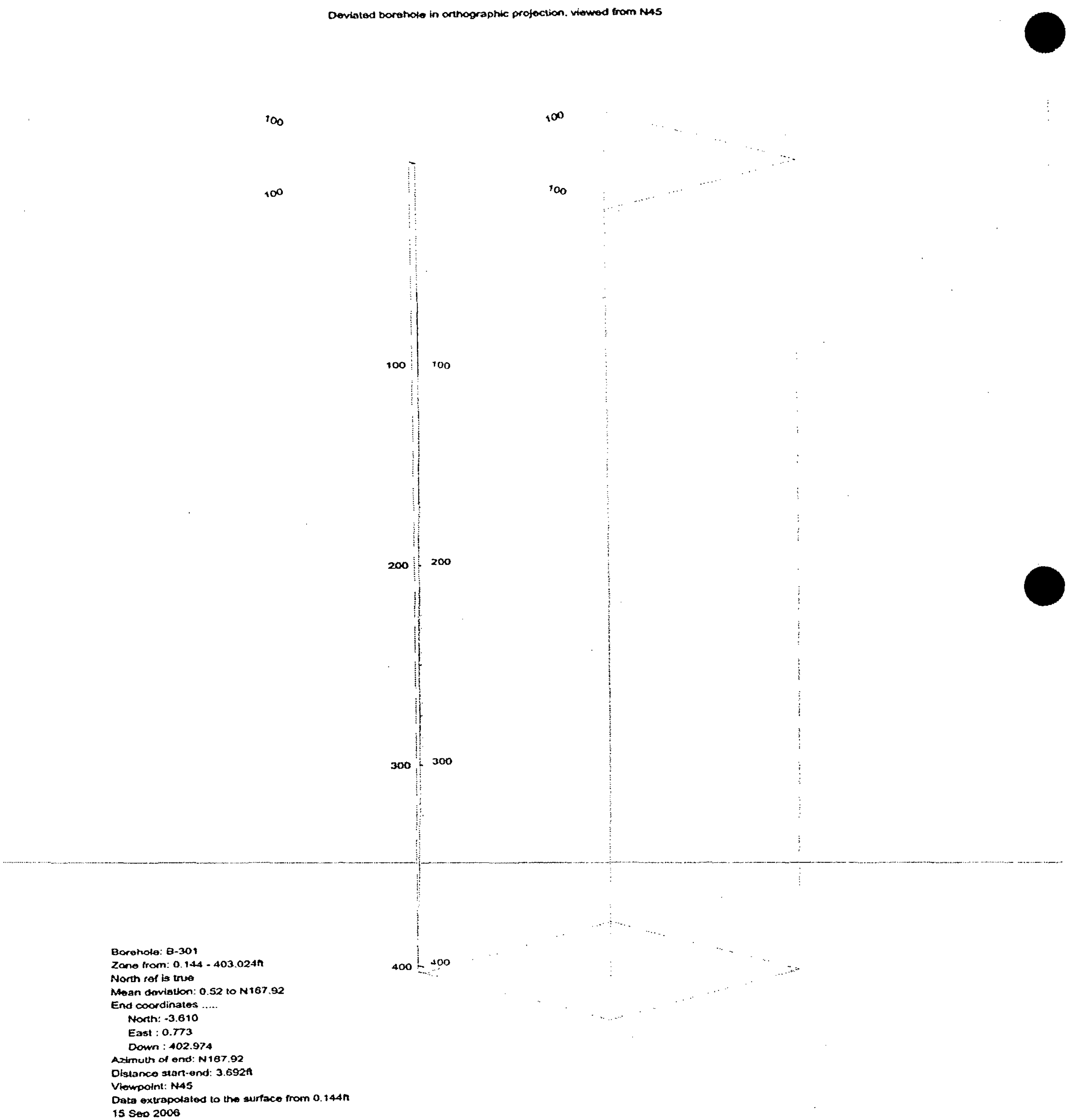


Figure 7. Boring B-301, Deviation Projection (dimensions in feet)

CCNPP COLA Borehole B-304 S/N 19029 velocity data
Receiver to Receiver V_s and V_p Analysis

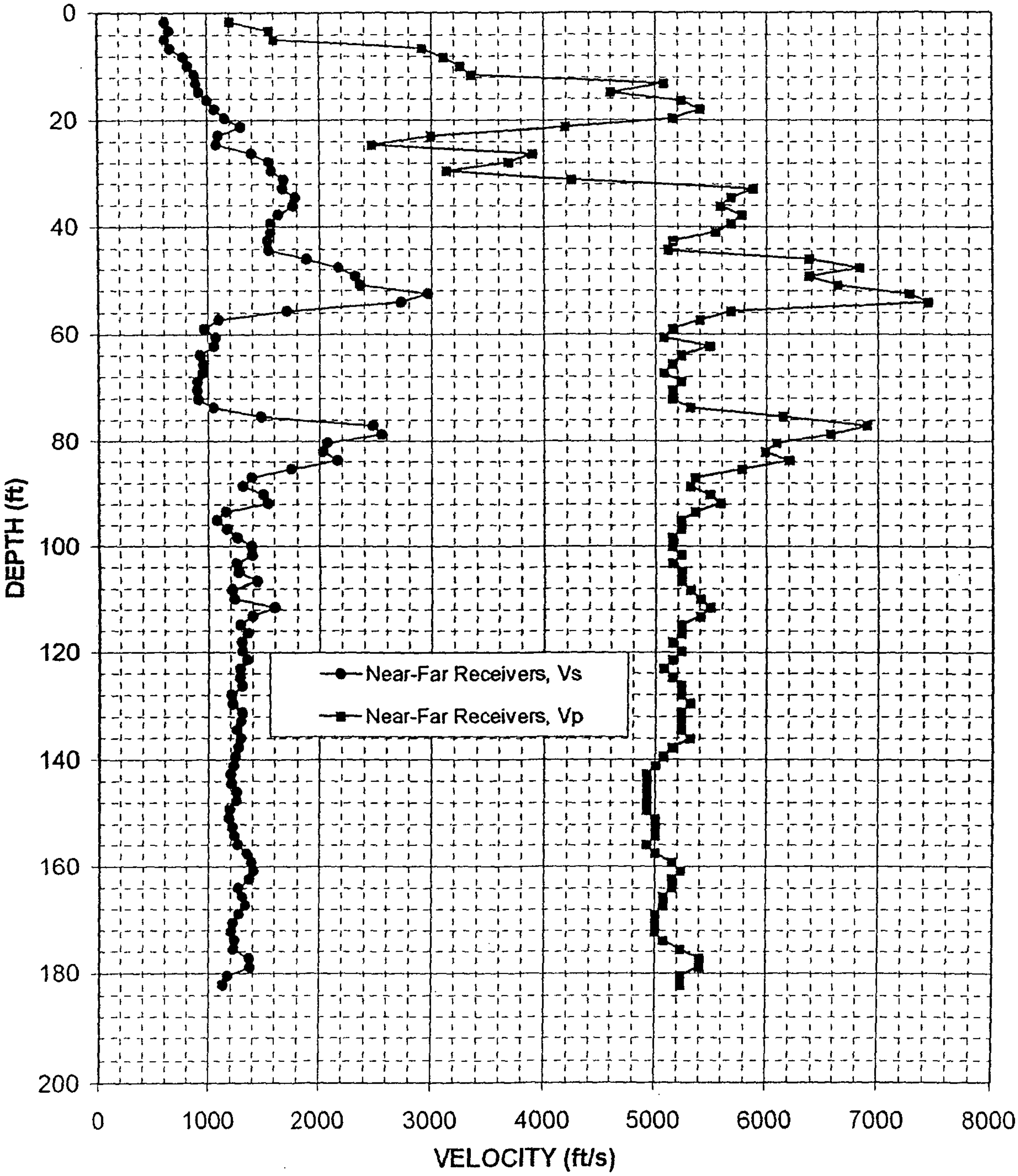


Figure 8. Boring B-304, S/N 19029, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	610	1200
3.3	650	1550
4.9	610	1590
6.6	660	2910
8.2	780	3100
9.8	820	3250
11.5	880	3350
13.1	900	5070
14.8	920	4580
16.4	1000	5230
18.0	1060	5400
19.7	1150	5150
21.3	1300	4180
23.0	1090	2990
24.6	1070	2460
26.3	1390	3890
27.9	1550	3680
29.5	1570	3130
31.2	1680	4240
32.8	1670	5870
34.5	1780	5670
36.1	1770	5580
37.7	1630	5770
39.4	1560	5670
41.0	1560	5530
42.7	1530	5150
44.3	1550	5110
45.9	1880	6370
47.6	2170	6830
49.2	2320	6370
50.9	2360	6630
52.5	2960	7280
54.1	2720	7440
55.8	1710	5670
57.4	1090	5400
59.1	960	5150
60.7	1070	5070
62.3	1050	5490
64.0	920	5230
65.6	950	5150
67.3	950	5070
68.9	900	5230
70.5	900	5150
72.2	910	5150
73.8	1050	5310
75.5	1470	6140
77.1	2470	6900
78.7	2540	6560
80.4	2070	6080
82.0	2030	5980
83.7	2160	6200
85.3	1750	5770
86.9	1390	5350
88.6	1310	5310
90.2	1490	5490
91.9	1540	5580
93.5	1160	5350
95.1	1080	5230
96.8	1170	5230
98.4	1260	5150
100.1	1390	5150
101.7	1390	5230
103.4	1250	5150
105.0	1270	5230
106.6	1440	5230
108.3	1210	5310
109.9	1230	5400
111.6	1590	5490
113.2	1390	5400
114.8	1280	5230
116.5	1350	5230
118.1	1300	5150
119.8	1300	5230
121.4	1340	5150
123.0	1280	5070
124.7	1280	5150
126.3	1300	5230
128.0	1200	5230
129.6	1210	5310
131.2	1300	5230
132.9	1290	5230
134.5	1250	5230
136.2	1290	5310
137.8	1270	5150
139.4	1240	5070
141.1	1220	5000
142.7	1200	4920
144.4	1200	4920
146.0	1250	4920
147.6	1250	4920
149.3	1190	4920
150.9	1180	5000
152.6	1210	5000
154.2	1230	5000
155.8	1260	4920
157.5	1340	5000
159.1	1390	5150
160.8	1410	5230
162.4	1370	5150
164.0	1270	5150
165.7	1300	5070
167.3	1330	5070
169.0	1270	5000
170.6	1220	5000
172.2	1200	5000
173.9	1230	5070
175.5	1220	5230
177.2	1370	5400
178.8	1380	5400
180.5	1170	5230
182.1	1130	5230

Table 7. Boring B-304, S/N 19029 Suspension R1-R2 depths and P- and S_H-wave velocities

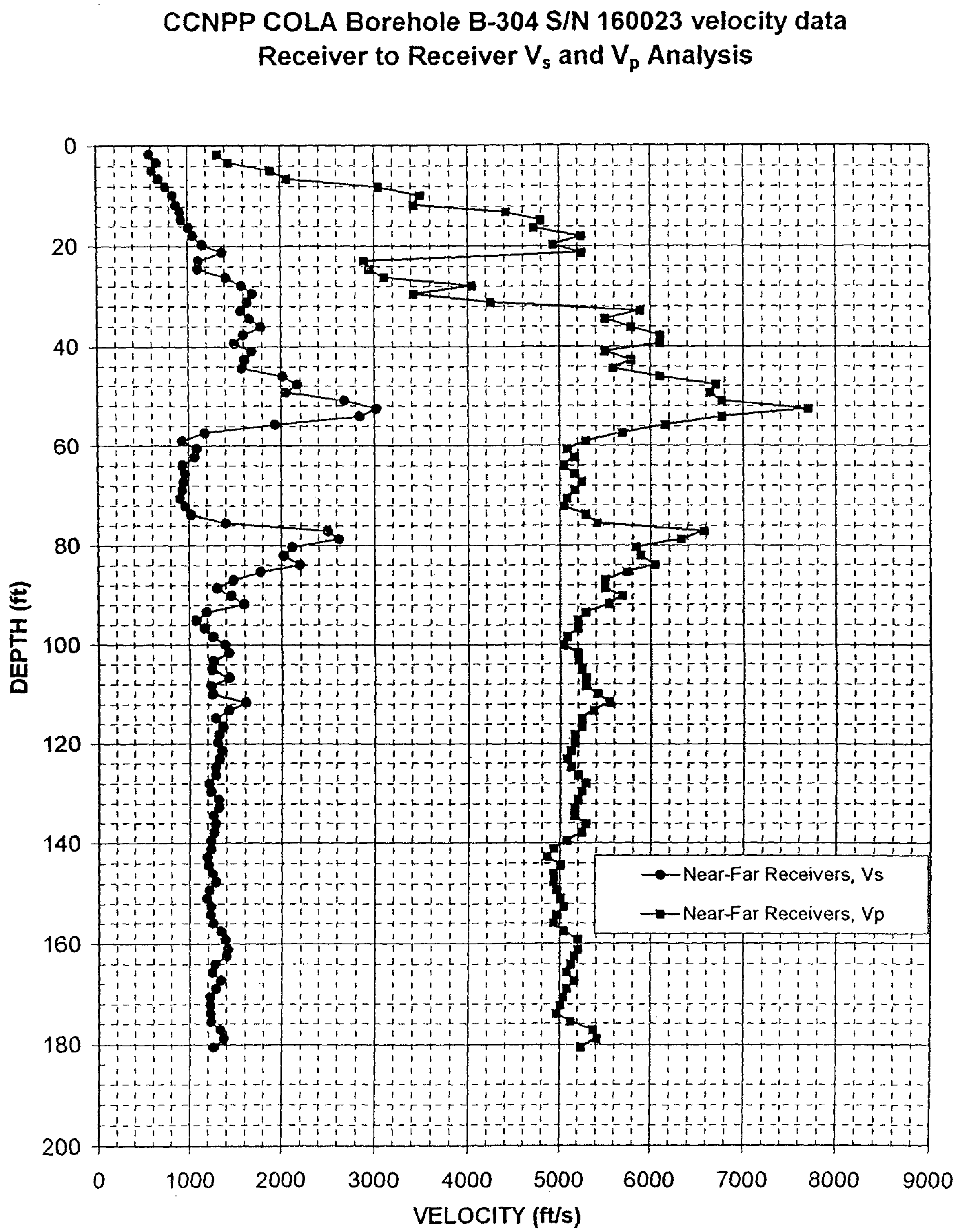


Figure 9. Boring B-304, S/N 160023, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	580	1320
3.3	650	1430
4.9	600	1880
6.6	670	2050
8.2	750	3040
9.8	830	3490
11.8	870	3410
13.1	910	4400
14.8	920	4780
16.4	1010	4710
18.0	1050	5230
19.7	1150	4920
21.3	1370	5230
23.0	1110	2890
24.6	1100	2940
26.3	1410	3100
27.9	1570	4030
29.5	1690	3410
31.2	1630	4240
32.8	1560	5870
34.5	1660	5490
36.1	1780	5770
37.7	1590	6080
39.4	1490	6080
41.0	1670	5490
42.7	1600	5770
44.3	1570	5580
45.9	2010	6080
47.6	2160	6690
49.2	2040	6630
50.9	2680	6760
52.5	3020	7690
54.1	2840	6760
55.8	1920	6140
57.4	1170	5670
59.1	920	5270
60.7	1080	5070
62.3	1060	5150
64.0	930	5030
65.6	950	5150
67.3	940	5230
68.9	920	5150
70.5	900	5070
72.2	950	5030
73.8	1020	5270
75.5	1390	5400
77.1	2500	6560
78.7	2610	6310
80.4	2100	5820
82.0	2020	5870

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
84.0	2190	6030
85.3	1770	5720
86.9	1470	5490
88.6	1300	5490
90.2	1450	5670
91.9	1590	5530
93.5	1180	5270
95.1	1070	5190
96.8	1160	5190
98.4	1250	5070
100.1	1380	5030
101.7	1420	5190
103.4	1250	5190
105.0	1240	5230
106.6	1420	5270
108.3	1230	5270
109.9	1240	5400
111.6	1600	5530
113.2	1420	5350
114.8	1280	5230
116.5	1350	5230
118.1	1310	5150
119.8	1300	5150
121.4	1340	5110
123.0	1320	5070
124.7	1280	5110
126.3	1280	5190
128.0	1210	5270
129.6	1230	5230
131.2	1310	5190
132.9	1310	5150
134.5	1250	5150
136.2	1280	5270
137.8	1260	5230
139.4	1230	5070
141.1	1230	4920
142.7	1190	4850
144.4	1200	5000
146.0	1240	4920
147.6	1280	4920
149.3	1210	4960
150.9	1180	5000
152.6	1230	5030
154.2	1220	4960
155.8	1250	4920
157.5	1340	5030
159.1	1380	5190
161.1	1410	5190
162.4	1390	5150
164.0	1270	5110

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
165.7	1240	5070
167.3	1340	5150
169.0	1280	5070
170.6	1220	5030
172.2	1220	5000
173.9	1220	4960
175.5	1230	5110
177.2	1330	5350
178.8	1370	5400
180.5	1260	5230

Table 8. Boring B-304, S/N 160023 Suspension R1-R2 depths and P- and S_H-wave velocities

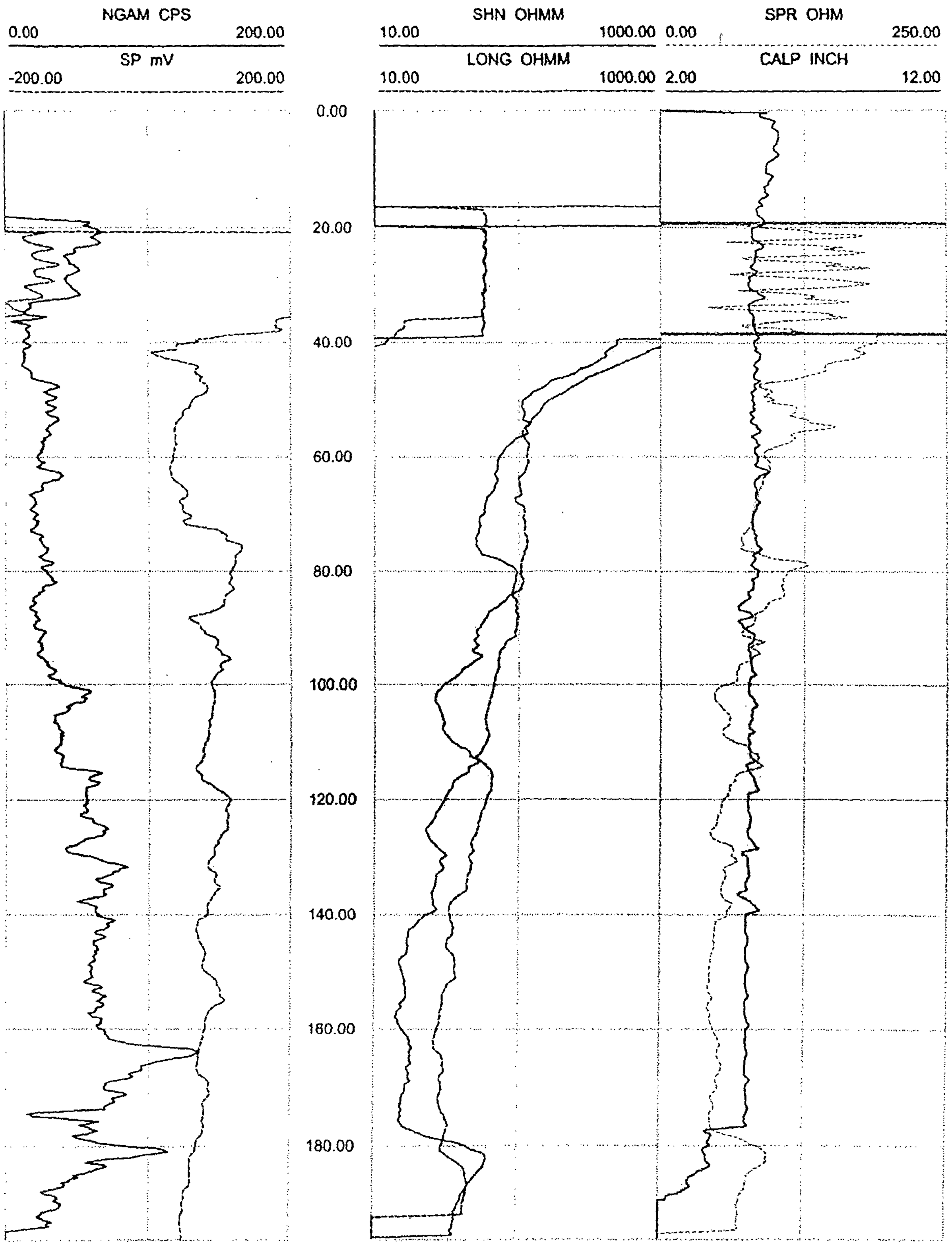
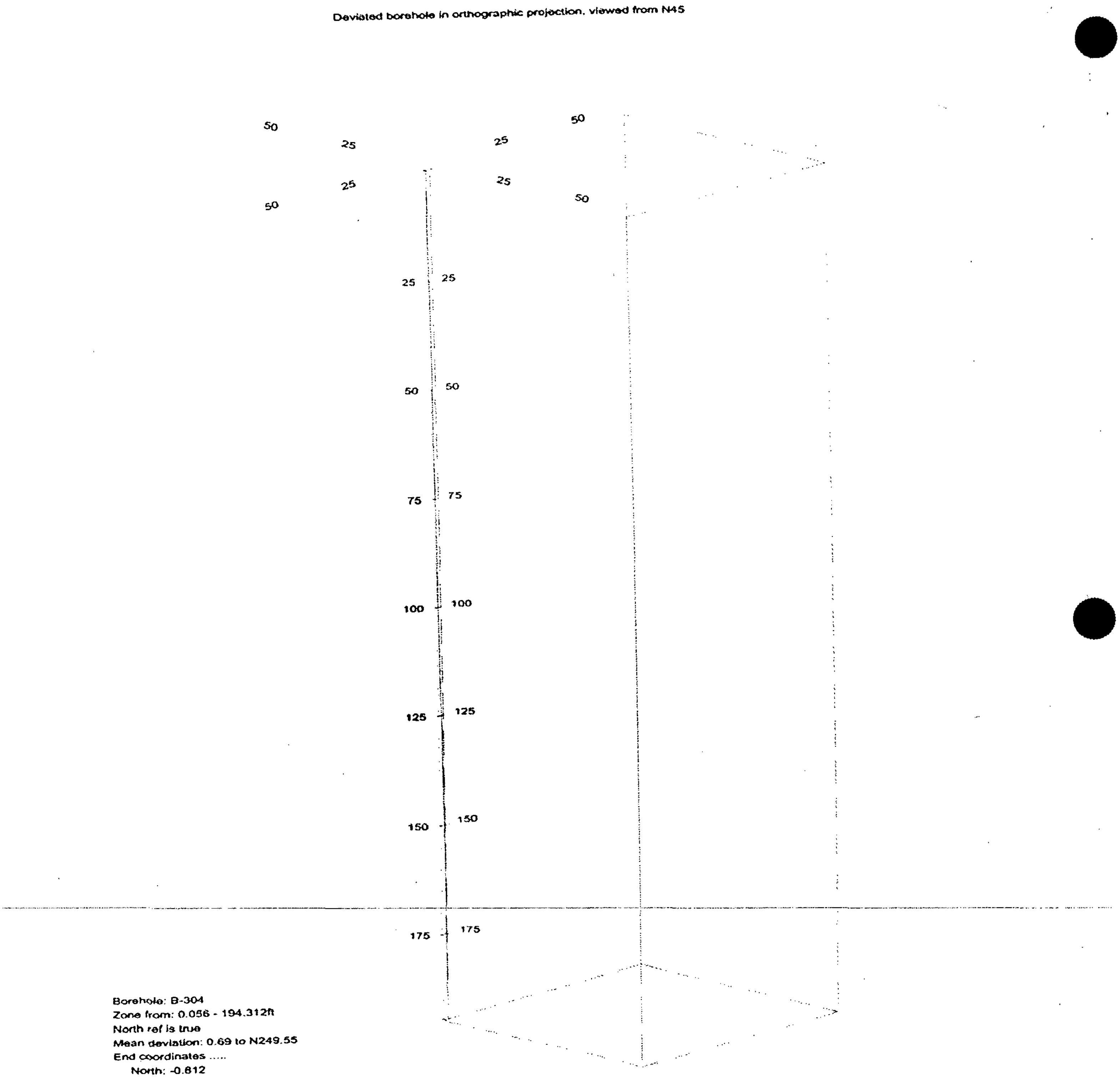


Figure 10. Boring B-304, Caliper, Natural gamma, Resistivity and SP logs



Borehole: B-304
Zone from: 0.056 - 194.312ft
North ref is true
Mean deviation: 0.69 to N249.55
End coordinates .....
North: -0.812
East : -2.177
Down : 194.292
Azimuth of end: N249.56
Distance start-end: 2.324ft
Viewpoint: N45
Data extrapolated to the surface from 0.056ft
15 Sep 2006

Figure 11. Boring B-304, Deviation Projection (dimensions in feet)

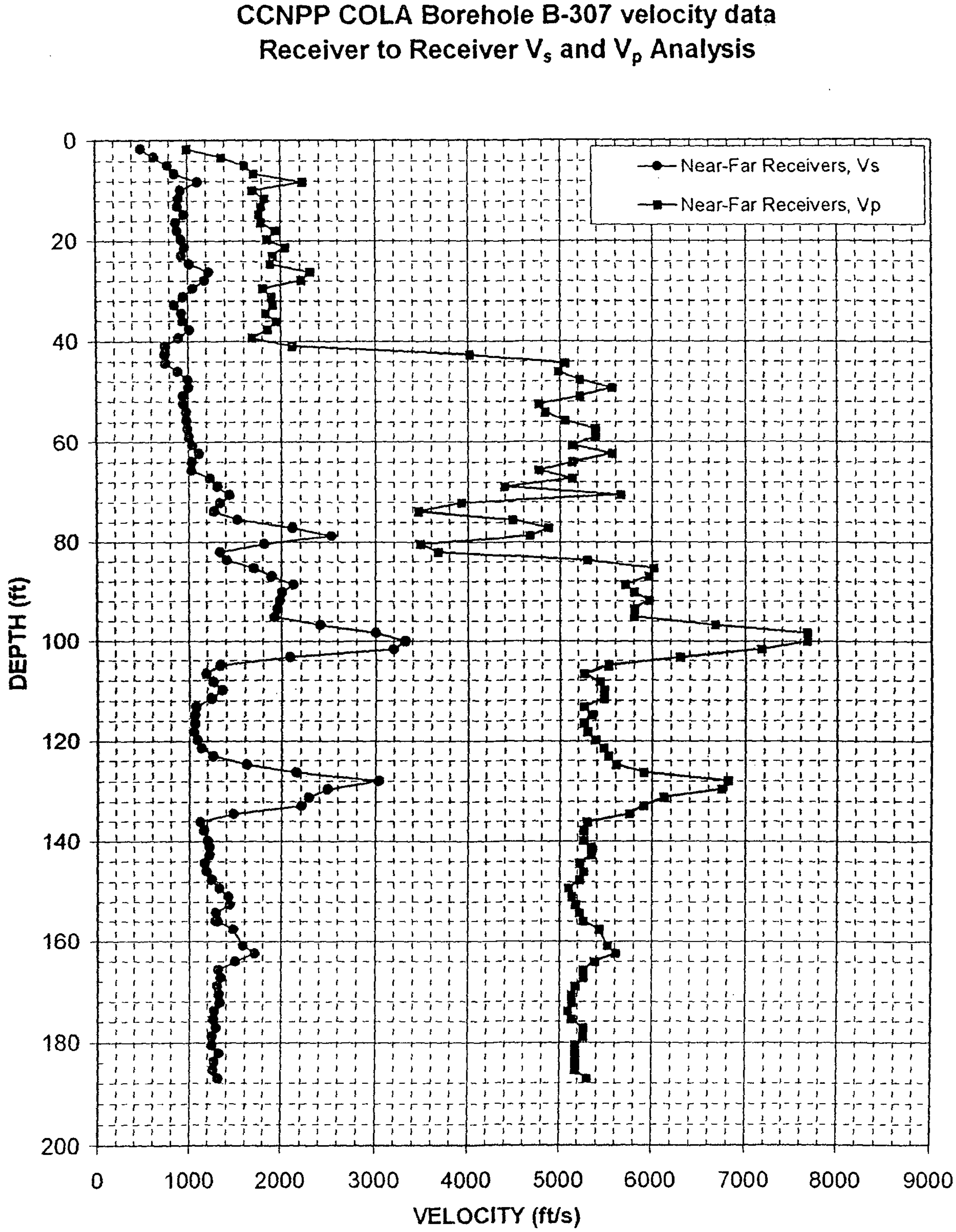


Figure 12. Boring B-307, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	490	990
3.3	630	1360
4.9	780	1600
6.6	850	1700
8.2	1100	2220
9.8	920	1680
11.5	890	1810
13.1	890	1770
14.8	960	1750
16.4	860	1770
18.0	880	1930
19.7	930	1840
21.3	960	2030
23.0	920	1890
24.6	1010	1870
26.3	1220	2300
27.9	1170	2210
29.5	1040	1790
31.2	940	1880
32.8	840	1890
34.5	930	1820
36.1	930	1940
37.7	1010	1840
39.4	890	1680
41.0	740	2110
42.7	740	4020
44.3	750	5050
45.9	880	4980
47.6	990	5210
49.2	990	5560
50.9	930	5210
52.5	940	4760
54.1	970	4830
55.8	970	5050
57.4	980	5380
59.1	1000	5380
60.7	1030	5130
62.3	1110	5560
64.0	1030	5130
65.6	1020	4760
67.3	1230	5130
68.9	1300	4390
70.5	1430	5650
72.2	1330	3920
73.8	1270	3450
75.5	1520	4470
77.1	2110	4870
78.7	2530	4660
80.4	1800	3470
82.0	1330	3660
83.7	1400	5290
85.3	1690	6010
86.9	1880	5950
88.6	2120	5700
90.2	2000	5800
91.9	1970	5950
93.5	1940	5800
95.1	1920	5800
96.8	2410	6670
98.4	3000	7660
100.1	3320	7660
101.7	3190	7170
103.4	2080	6290
105.0	1330	5510
106.6	1170	5250
108.3	1250	5420
109.9	1340	5460
111.6	1230	5460
113.2	1070	5250
114.8	1050	5330
116.5	1050	5250
118.1	1040	5290
119.8	1080	5380
121.4	1130	5460
123.0	1250	5510
124.7	1610	5600
126.3	2150	5900
128.0	3030	6800
129.6	2490	6730
131.2	2280	6120
132.9	2210	5900
134.5	1470	5750
136.2	1110	5290
137.8	1150	5250
139.8	1190	5250
141.1	1210	5330
142.7	1210	5330
144.4	1160	5210
146.0	1180	5250
147.6	1240	5210
149.3	1320	5090
150.9	1410	5130
152.6	1430	5170
154.2	1280	5210
155.8	1280	5250
155.8	1300	5250
157.5	1460	5420
160.8	1570	5510
162.4	1700	5600
164.0	1490	5380
165.7	1310	5250
167.3	1330	5250
169.0	1300	5170
170.6	1310	5130
172.2	1320	5130
173.9	1260	5090
175.5	1250	5130
177.2	1280	5250
178.8	1240	5250
180.5	1240	5170
182.1	1310	5170
183.7	1260	5170
185.4	1250	5170
187.0	1300	5290

Table 9. Boring B-307, Suspension R1-R2 depths and P- and S_H-wave velocities

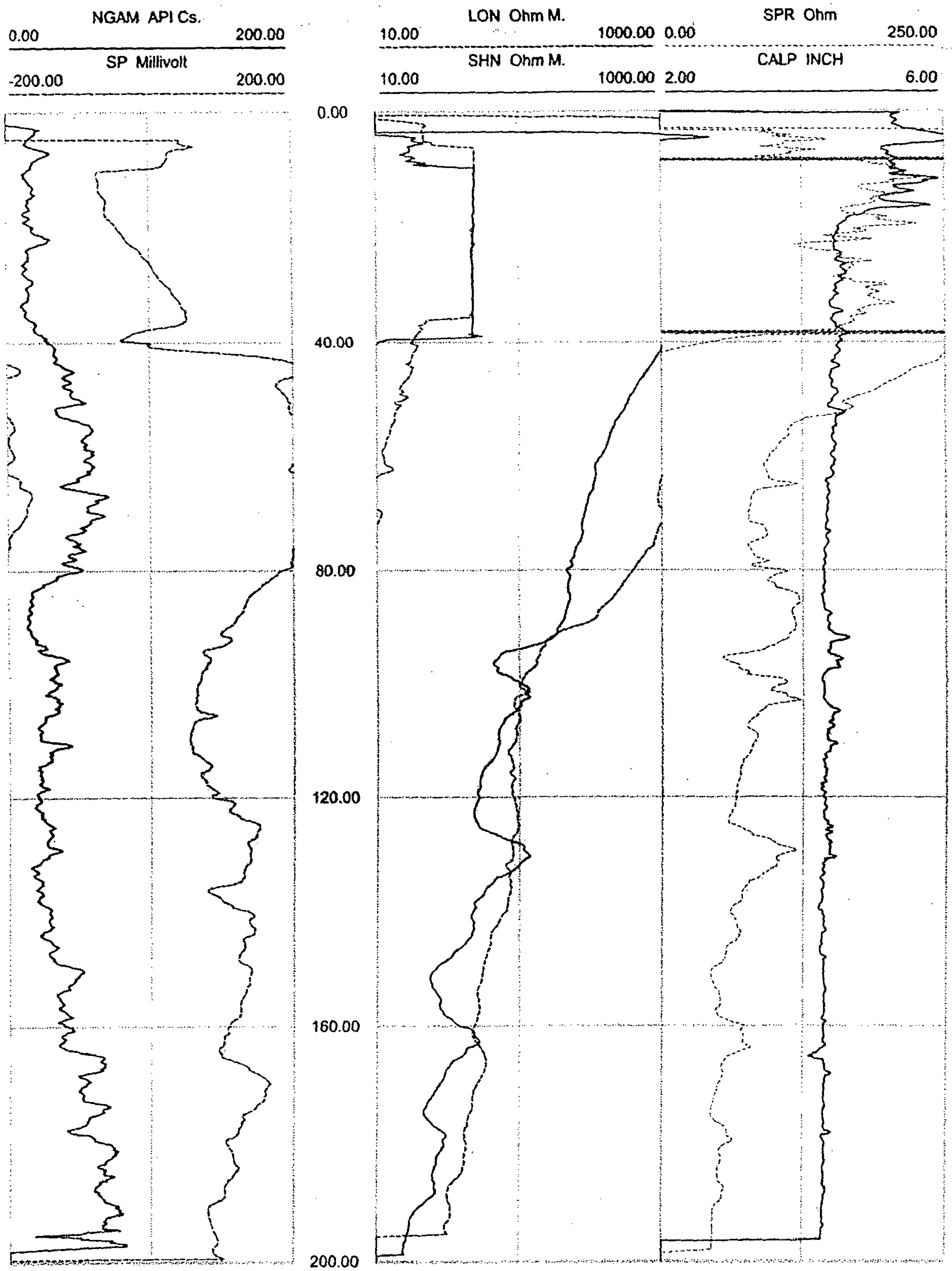


Figure 13. Boring B-307, Caliper, Natural gamma, Resistivity and SP logs

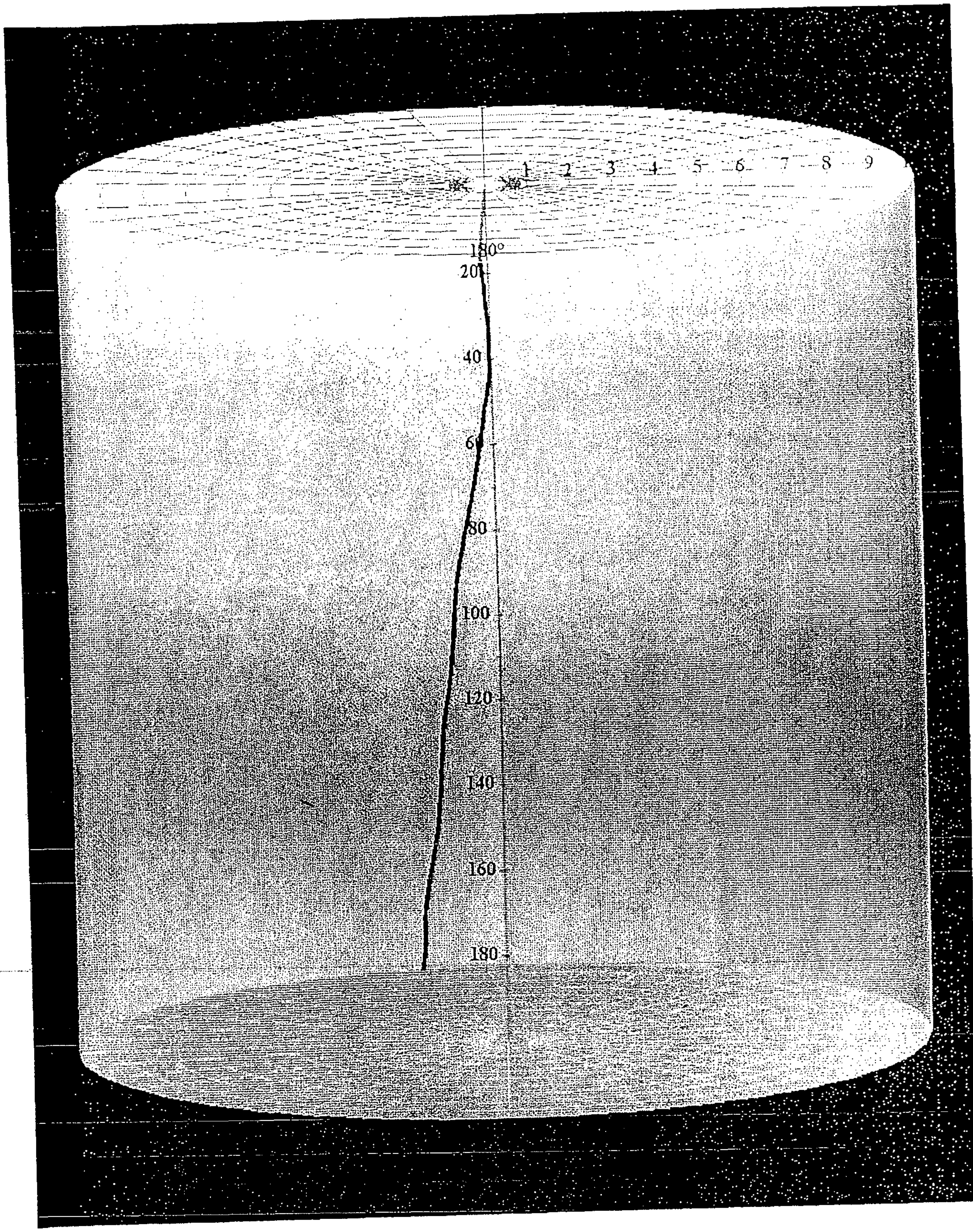


Figure 14. Boring B-307, Deviation Projection (dimensions in feet)

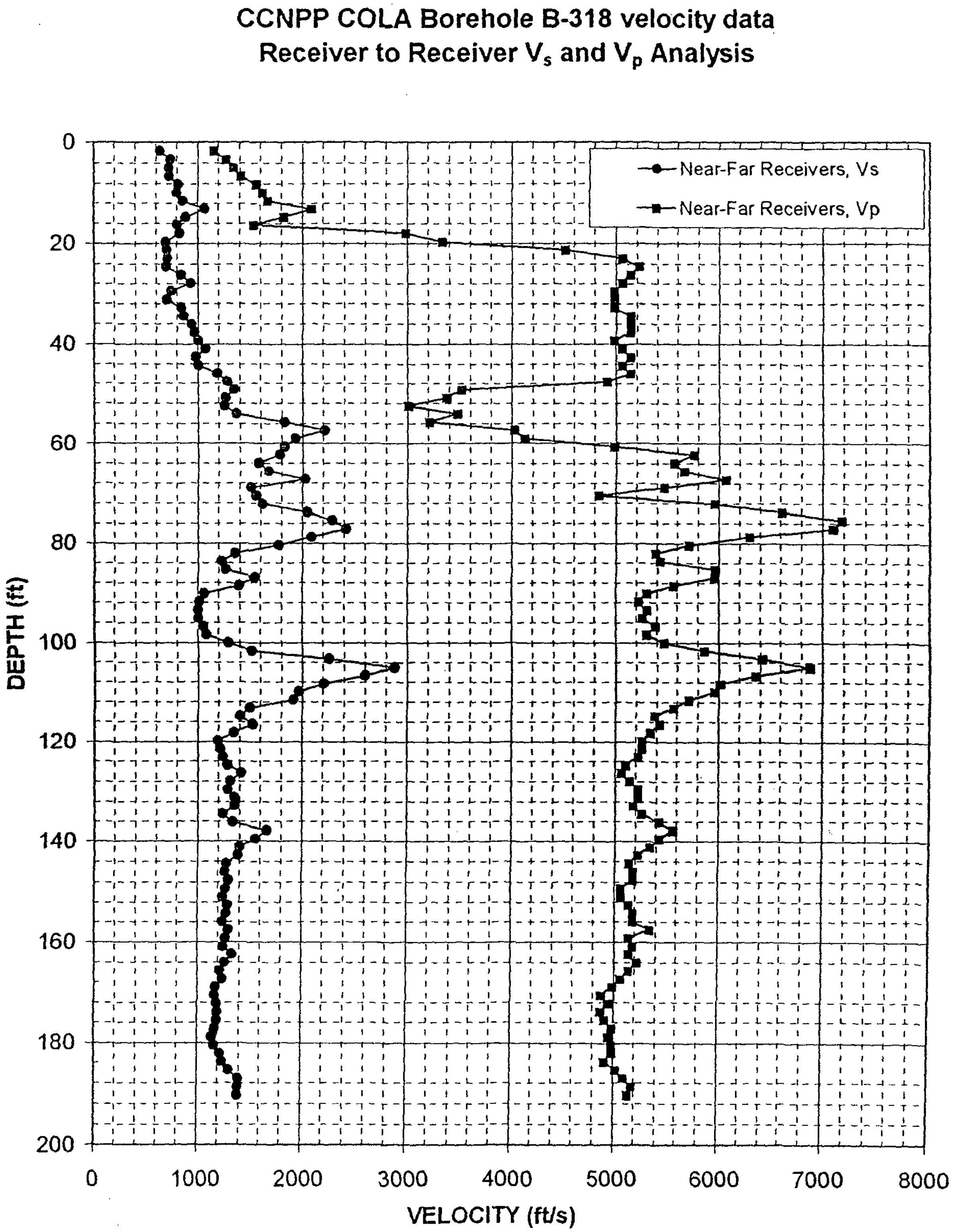


Figure 15. Boring B-318, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	630	1150
3.3	730	1260
4.9	720	1330
6.6	720	1400
8.2	800	1550
9.8	790	1610
11.5	850	1660
13.1	1060	2080
14.8	880	1810
16.4	800	1520
18.0	820	2980
19.7	690	3330
21.3	700	4500
23.0	700	5050
24.6	690	5210
26.3	830	5130
27.9	930	5050
29.5	740	4980
31.2	690	4980
32.8	840	4980
34.5	850	5130
36.1	930	5130
37.7	960	5130
39.4	1000	4980
41.0	1070	5050
42.7	970	5130
44.3	1000	5050
45.9	1180	5130
47.6	1280	4900
49.2	1340	3510
50.9	1260	3370
52.5	1250	3000
54.1	1360	3470
55.8	1820	3210
57.4	2210	4020
59.1	1930	4120
60.7	1820	4980
62.3	1770	5750
64.0	1570	5560
65.6	1670	5650
67.3	2020	6060
68.9	1500	5460
70.5	1550	4830
72.2	1610	5950
73.8	2040	6600
75.5	2280	7170
77.1	2420	7090
78.7	2080	6290
80.4	1760	5700
82.0	1350	5380
83.7	1220	5420
85.3	1260	5950
86.9	1540	5950
88.6	1390	5560
90.2	1060	5290
91.9	1010	5210
93.5	1000	5290
95.1	1000	5250
96.8	1050	5380
98.4	1080	5290
100.1	1290	5460
101.7	1510	5850
103.4	2250	6410
105.0	2870	6870
106.6	2590	6350
108.3	2200	6010
109.9	1960	5950
111.6	1910	5700
113.2	1490	5560
114.8	1400	5380
116.5	1520	5420
118.1	1340	5330
119.8	1190	5250
121.4	1210	5250
123.0	1240	5210
124.7	1280	5090
126.3	1410	5050
128.0	1300	5130
129.6	1280	5210
131.2	1350	5210
132.9	1350	5170
134.5	1230	5250
136.2	1330	5420
137.8	1650	5560
139.4	1550	5420
141.1	1400	5330
142.7	1380	5210
144.4	1270	5130
146.0	1260	5170
147.6	1290	5170
149.3	1270	5050
150.9	1240	5050
152.6	1280	5130
154.2	1270	5170
155.8	1230	5170
157.5	1290	5330
159.1	1260	5130
160.8	1240	5170
162.4	1330	5130
164.0	1260	5210
165.7	1210	5130
167.3	1240	5050
169.0	1170	4980
170.6	1160	4870
172.2	1190	4940
173.9	1190	4870
175.5	1190	4900
177.2	1170	4980
178.8	1140	4940
180.5	1160	4980
182.1	1220	4980
183.7	1240	4900
185.4	1300	5010
187.0	1390	5090
188.7	1390	5170
190.3	1380	5130

Table 10. Boring B-318, Suspension R1-R2 depths and P- and S_H-wave velocities

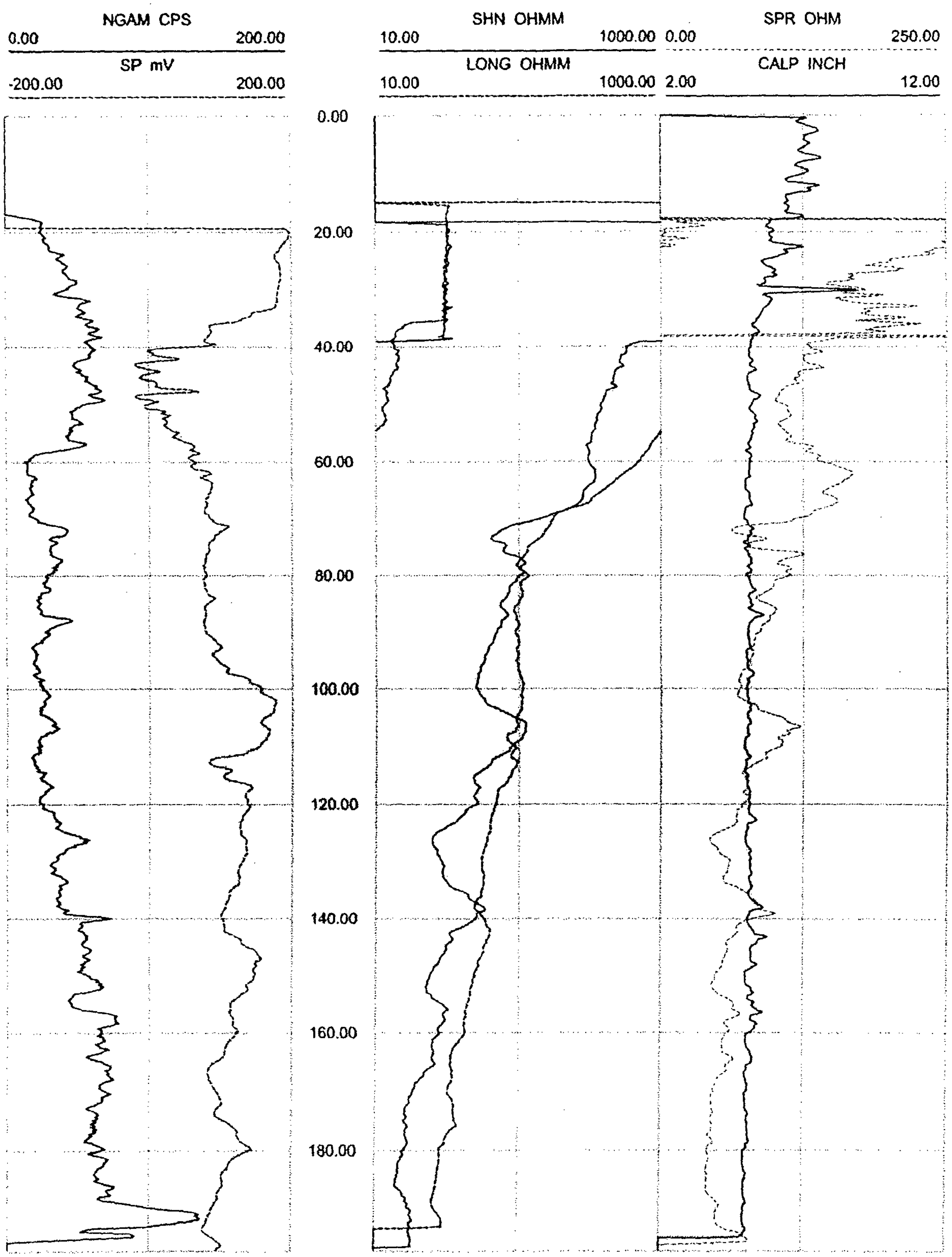


Figure 16. Boring B-318, Caliper, Natural gamma, Resistivity and SP logs

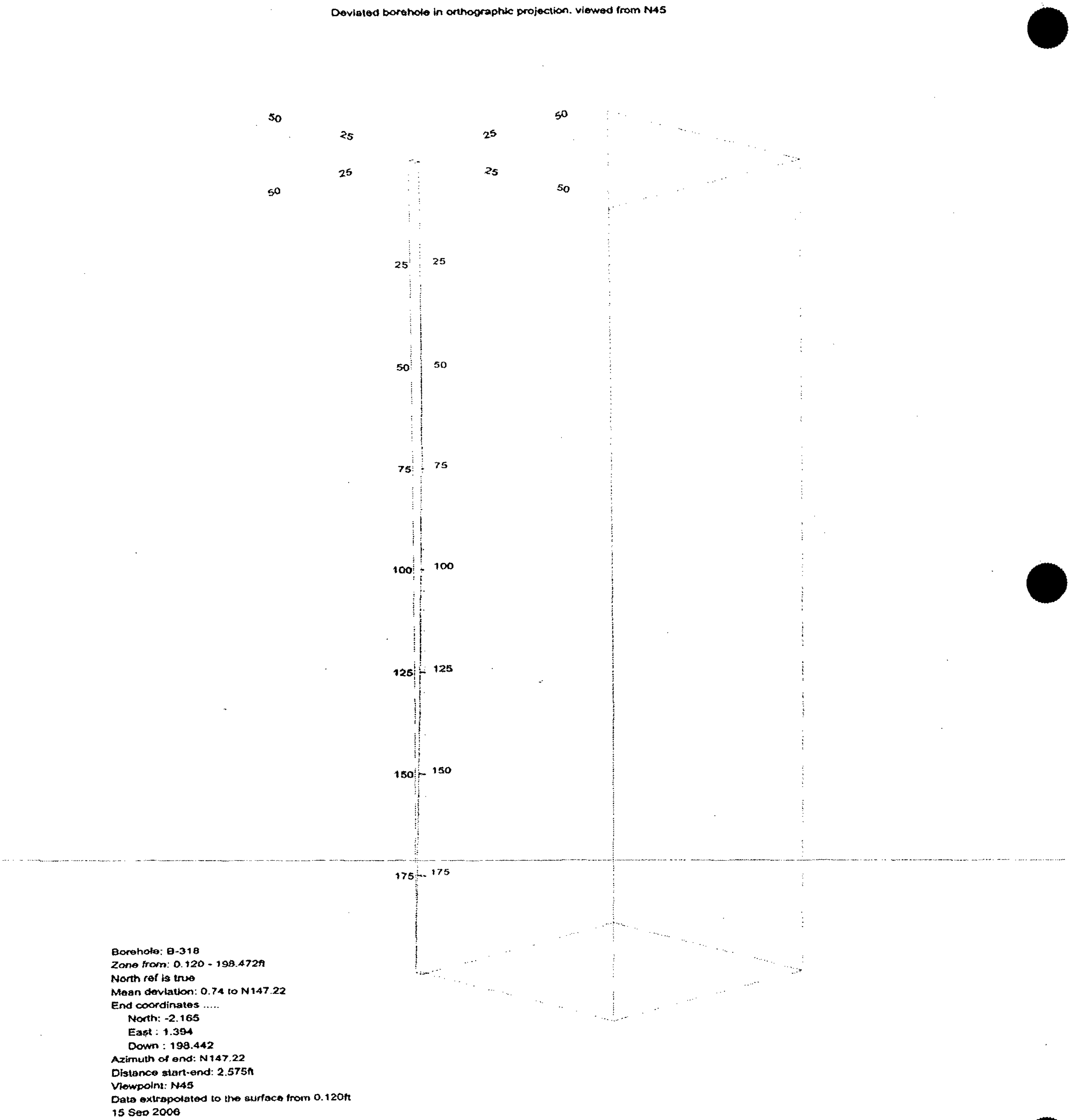


Figure 17. Boring B-318, Deviation Projection (dimensions in feet)

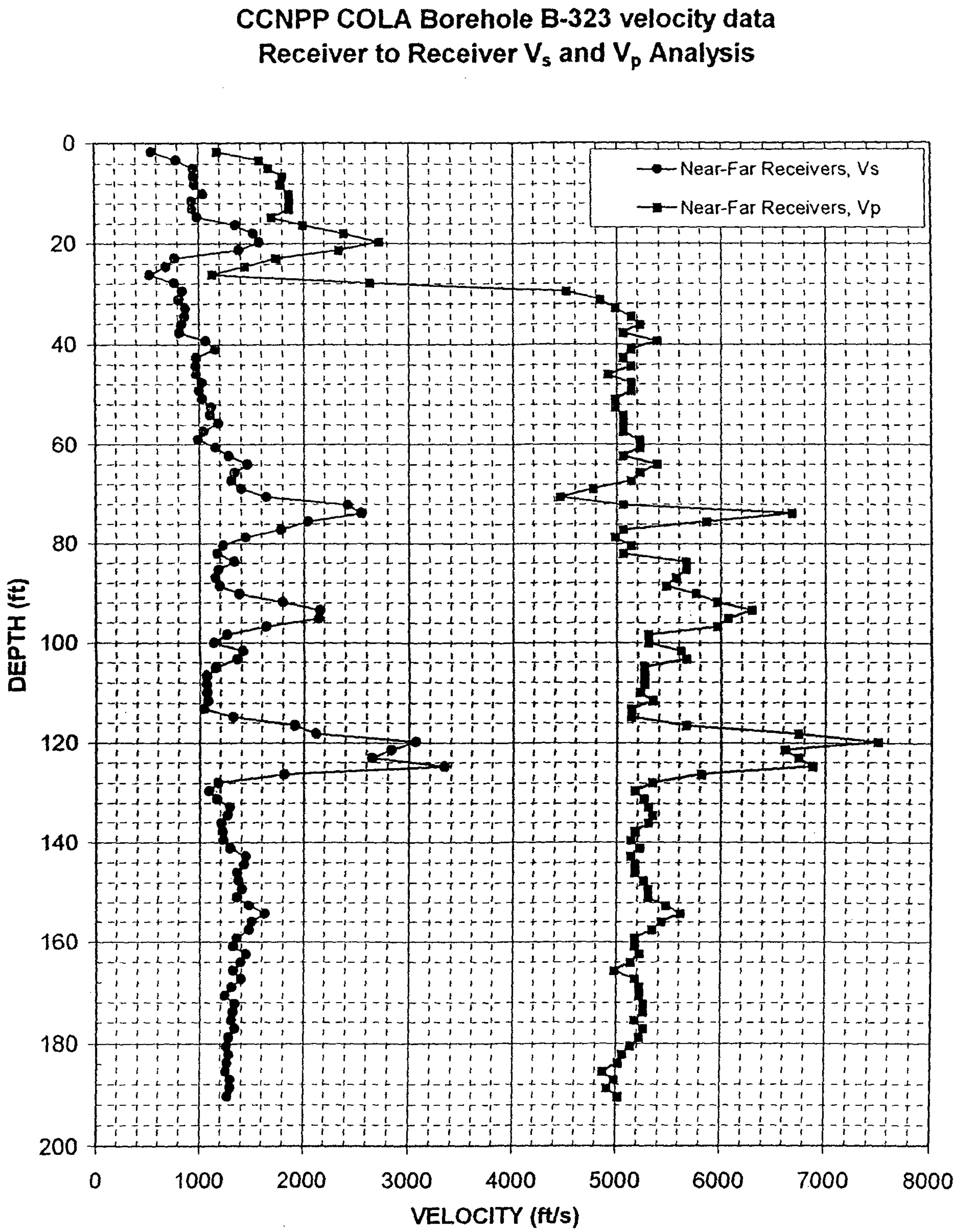


Figure 18. Boring B-323, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	550	1170
3.3	780	1570
4.9	940	1660
6.6	940	1790
8.2	950	1770
10.2	1030	1850
11.5	930	1850
13.1	930	1850
14.8	980	1680
16.4	1340	1980
18.0	1520	2380
19.7	1570	2710
21.3	1380	2330
23.0	760	1730
24.6	680	1430
26.3	520	1120
27.9	760	2620
29.5	840	4500
31.2	800	4830
32.8	860	4980
34.5	850	5130
36.1	830	5210
37.7	810	5050
39.4	1060	5380
41.0	1150	5130
42.7	970	5050
44.3	960	5130
45.9	970	4900
47.6	1020	5130
49.2	990	5130
50.9	1020	4980
52.5	1100	4980
54.1	1100	5050
55.8	1170	5050
57.4	1030	5050
59.1	980	5210
60.7	1150	5210
62.3	1280	5050
64.0	1460	5380
65.6	1330	5210
67.3	1300	5130
68.9	1390	4760
70.5	1630	4440
72.2	2420	5050
73.8	2540	6670
75.5	2030	5850
77.1	1770	5050
78.7	1440	4980
80.4	1220	5130
82.0	1160	5050
83.7	1330	5650
85.3	1170	5650
86.9	1150	5560
88.6	1190	5460
90.2	1380	5750
91.9	1790	5950
93.5	2150	6290
95.1	2140	6060
96.8	1630	5950
98.4	1260	5290
100.1	1130	5290
101.7	1410	5600
103.4	1360	5650
105.0	1150	5250
106.6	1060	5250
108.3	1050	5250
109.9	1060	5210
111.6	1070	5330
113.2	1030	5130
114.8	1310	5130
116.5	1900	5650
118.1	2110	6730
119.8	3060	7490
121.4	2820	6600
123.0	2650	6730
124.7	3330	6870
126.3	1800	5800
128.0	1170	5330
129.6	1080	5170
131.2	1160	5250
132.9	1280	5290
134.5	1260	5330
136.2	1200	5290
137.8	1210	5170
139.4	1220	5130
141.1	1290	5210
142.7	1440	5130
144.4	1420	5170
146.0	1360	5170
147.6	1370	5250
149.3	1400	5290
150.9	1350	5290
152.6	1470	5460
154.2	1620	5600
155.8	1490	5420
157.5	1470	5330
159.1	1360	5170
160.8	1310	5170
162.4	1440	5210
164.0	1390	5130
165.7	1320	4980
167.3	1390	5170
169.0	1300	5210
170.6	1230	5210
172.2	1330	5250
173.9	1310	5250
175.5	1300	5170
177.2	1330	5250
178.8	1280	5210
180.5	1250	5130
182.1	1280	5050
183.7	1260	5010
185.4	1240	4870
187.0	1290	4980
188.7	1290	4900
190.3	1260	5010

Table 11. Boring B-323, Suspension R1-R2 depths and P- and S_H-wave velocities

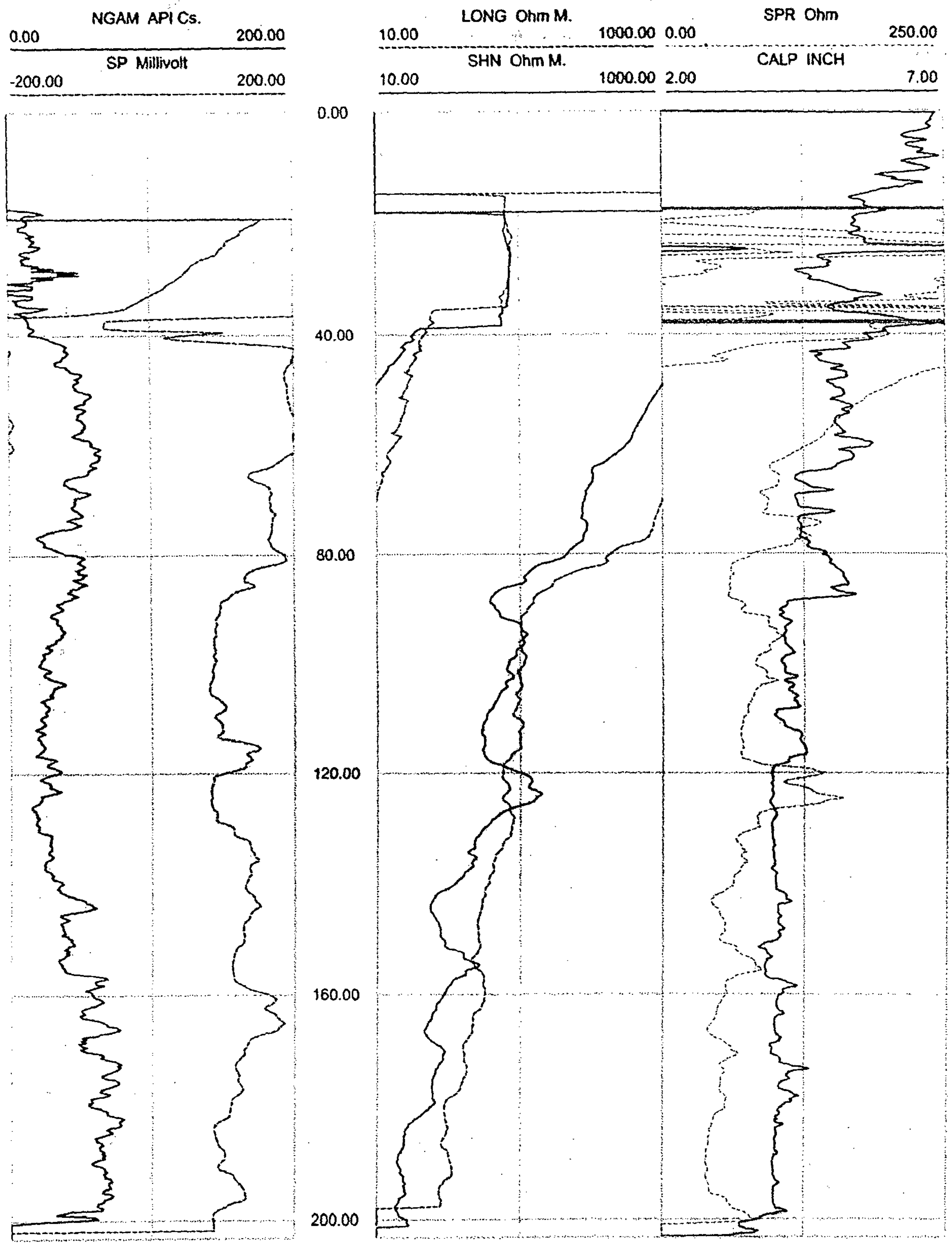


Figure 19. Boring B-323, Caliper, Natural gamma, Resistivity and SP logs

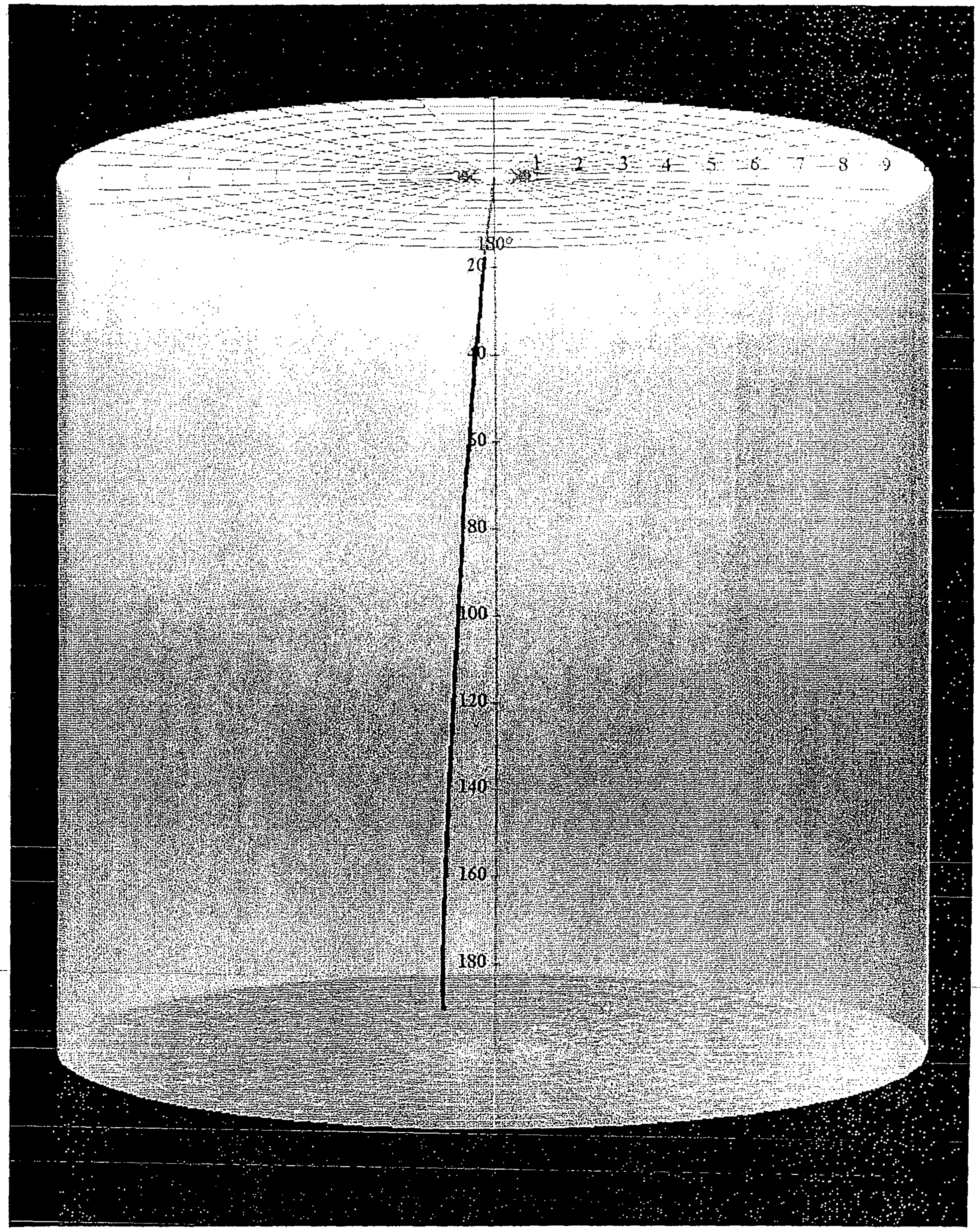


Figure 20. Boring B-323, Deviation Projection (dimensions in feet)

CCNPP COLA Borehole B-401 velocity data
Receiver to Receiver V_s and V_p Analysis

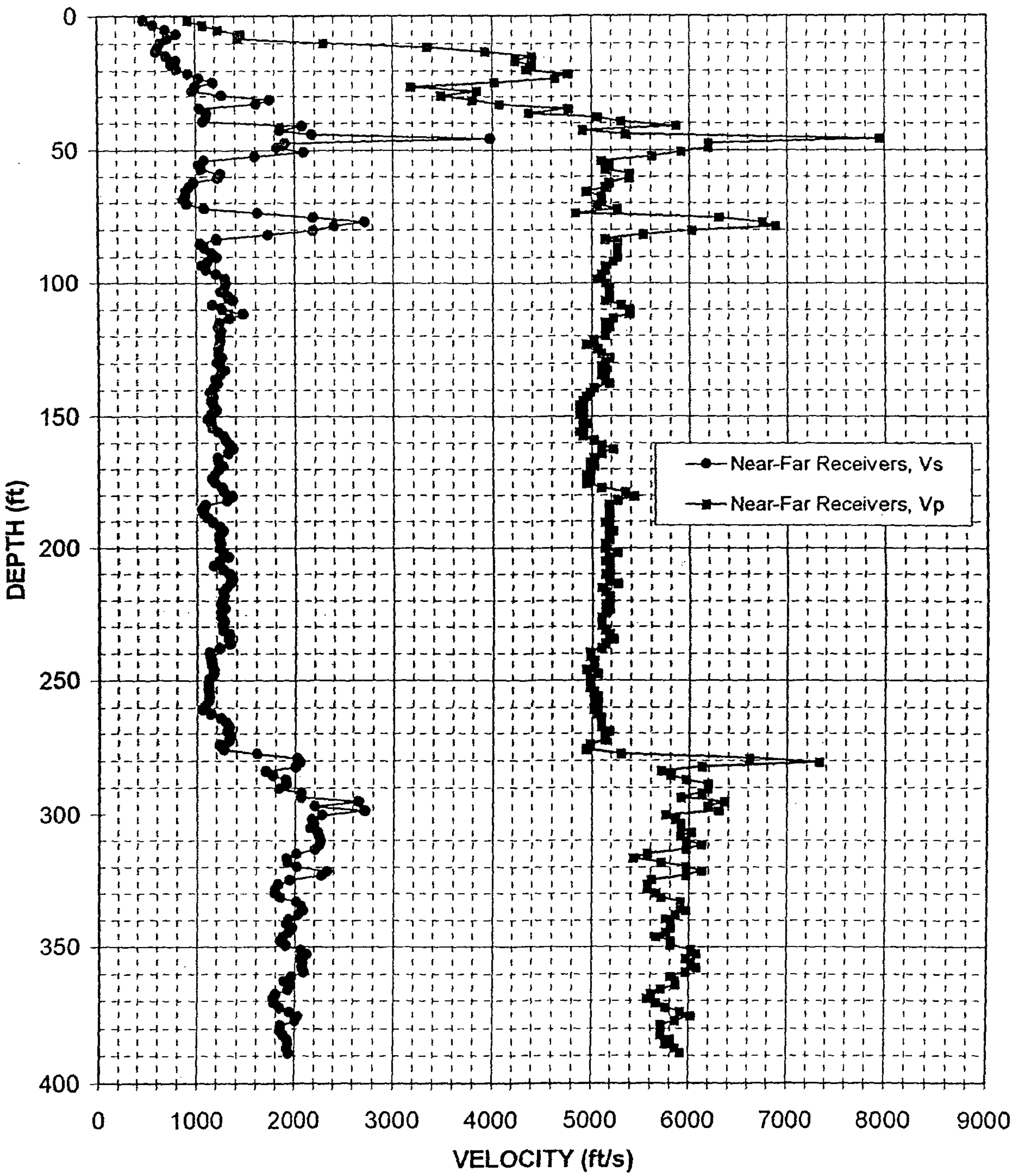


Figure 21: Boring B-401, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)	Depth (feet)	V_s (feet/sec)	V_p (feet/sec)	Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	470	920	83.7	1200	5130	165.7	1200	5010
3.3	560	1060	85.3	1030	5250	167.3	1220	4980
4.9	690	1220	86.9	1080	5250	169.0	1260	5010
6.6	800	1450	88.6	1150	5250	170.6	1210	4980
8.2	710	1410	90.2	1200	5250	172.2	1170	4940
9.8	640	2280	91.9	1110	5210	173.9	1150	4980
11.5	620	3330	93.5	1050	5130	175.5	1180	4940
13.1	590	3920	95.1	1090	5130	177.2	1250	5090
14.8	700	4390	96.8	1190	5090	178.8	1270	5330
16.4	800	4220	98.4	1280	5050	180.5	1350	5420
18.0	750	4390	100.1	1290	5130	182.1	1300	5250
19.7	800	4330	101.7	1280	5170	183.7	1080	5170
21.3	920	4760	103.4	1240	5170	185.4	1050	5170
23.0	1030	4630	105.0	1310	5170	187.0	1070	5170
24.6	1170	4020	106.6	1360	5130	188.7	1100	5170
26.3	990	3170	108.3	1150	5290	190.3	1160	5130
27.9	960	3830	109.9	1250	5380	191.9	1220	5170
29.5	1260	3470	111.6	1460	5380	193.6	1260	5210
31.2	1750	3790	113.2	1330	5210	195.2	1220	5170
32.8	1600	4070	114.8	1230	5130	196.9	1230	5170
34.5	1030	4760	116.5	1210	5170	198.5	1230	5130
36.1	1100	4360	118.1	1240	5130	200.1	1230	5130
37.7	1100	5050	119.8	1230	5130	201.8	1260	5250
39.4	1060	5290	121.4	1230	5010	203.4	1310	5170
41.0	2070	5850	123.0	1220	4940	205.1	1220	5130
42.7	1840	4900	124.7	1220	5050	206.7	1170	5170
44.3	2160	5330	126.3	1210	5090	208.3	1260	5170
45.9	3970	7940	128.0	1250	5170	210.0	1320	5130
47.6	1890	6170	129.6	1200	5130	211.6	1340	5170
49.2	1810	6170	131.2	1230	5090	213.3	1330	5250
50.9	2080	5900	132.9	1280	5130	214.9	1290	5090
52.5	1590	5600	134.5	1230	5090	216.5	1260	5130
54.1	1070	5090	136.2	1190	5130	218.2	1260	5170
55.8	1020	5170	137.8	1200	5170	219.8	1250	5170
57.4	1040	5130	139.4	1170	5010	221.5	1230	5130
59.1	1240	5380	141.1	1130	4980	223.1	1270	5170
60.7	1210	5380	142.7	1160	4940	224.7	1230	5130
62.3	970	5170	144.4	1140	4900	226.4	1240	5090
64.0	930	5130	146.0	1170	4870	228.0	1270	5090
65.6	890	4940	147.6	1190	4900	229.7	1250	5090
67.3	880	5090	149.3	1140	4870	231.3	1260	5130
68.9	860	5090	150.9	1110	4900	232.9	1320	5170
70.5	900	5050	152.6	1140	4940	234.6	1310	5210
72.2	1080	5250	154.2	1150	4900	236.2	1330	5130
73.8	1610	4830	155.8	1210	4870	237.9	1220	5090
75.5	2180	6290	157.5	1270	4900	239.5	1120	4980
77.1	2710	6730	159.1	1290	5010	241.1	1130	4980
78.7	2400	6870	160.8	1330	5090	242.8	1140	5010
80.4	2180	6010	162.4	1360	5210	244.4	1150	5010
82.0	1720	5510	164.0	1310	5090	246.1	1160	4940

Table 12. Boring B-401, Suspension R1-R2 depths and P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
247.7	1160	5050
249.3	1120	4980
251.0	1100	4980
252.6	1100	4980
254.3	1110	5010
255.9	1110	5050
257.6	1110	5010
259.2	1080	5050
260.8	1050	5010
262.5	1130	5050
264.1	1240	5090
265.8	1290	5090
267.4	1320	5090
269.0	1300	5170
270.7	1340	5130
272.3	1320	5130
274.0	1220	4980
275.6	1270	4940
277.2	1600	5290
278.9	2010	6600
280.5	2040	7330
282.2	2000	6120
283.8	1690	5700
285.4	1760	5800
287.1	1890	5950
288.7	1890	6170
290.4	1830	6170
292.0	2060	6120
293.6	2050	5900
295.3	2650	6350
296.9	2200	6170
298.6	2710	6290
300.2	2280	5750
301.8	2170	5850
303.5	2190	5900
305.1	2150	5900
306.8	2230	6010
308.4	2240	5900
310.0	2260	5950
311.7	2240	6120
313.3	2200	5950
315.0	2000	5560
316.6	1900	5420
318.2	1920	5700
319.9	2010	5950
321.5	2330	6120
323.2	2270	5950
324.8	1940	5600
326.4	1820	5560
328.1	1790	5560

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
329.7	1780	5650
331.4	1830	5700
333.0	2000	5900
334.7	2060	5900
336.3	2080	5950
337.9	2030	5850
339.6	1930	5750
341.2	1900	5800
342.9	1960	5800
344.5	1930	5750
346.1	1870	5650
347.8	1840	5800
349.4	1890	5800
351.1	2050	6010
352.7	2120	6060
354.3	2040	5950
356.0	2080	6010
357.6	2060	6060
359.3	2090	5950
360.9	1960	5800
362.5	1880	5850
364.2	1940	5850
365.8	1920	5700
367.5	1790	5600
369.1	1760	5560
370.7	1780	5650
372.4	1830	5750
374.0	1940	5900
375.7	2030	6010
377.3	2000	5850
378.9	1840	5700
380.6	1830	5700
382.2	1870	5700
383.9	1910	5800
385.5	1920	5750
387.1	1910	5850
388.8	1930	5900

Table 13, continued. Boring B-401, Suspension R1-R2 depths and P- and S_H-wave velocities

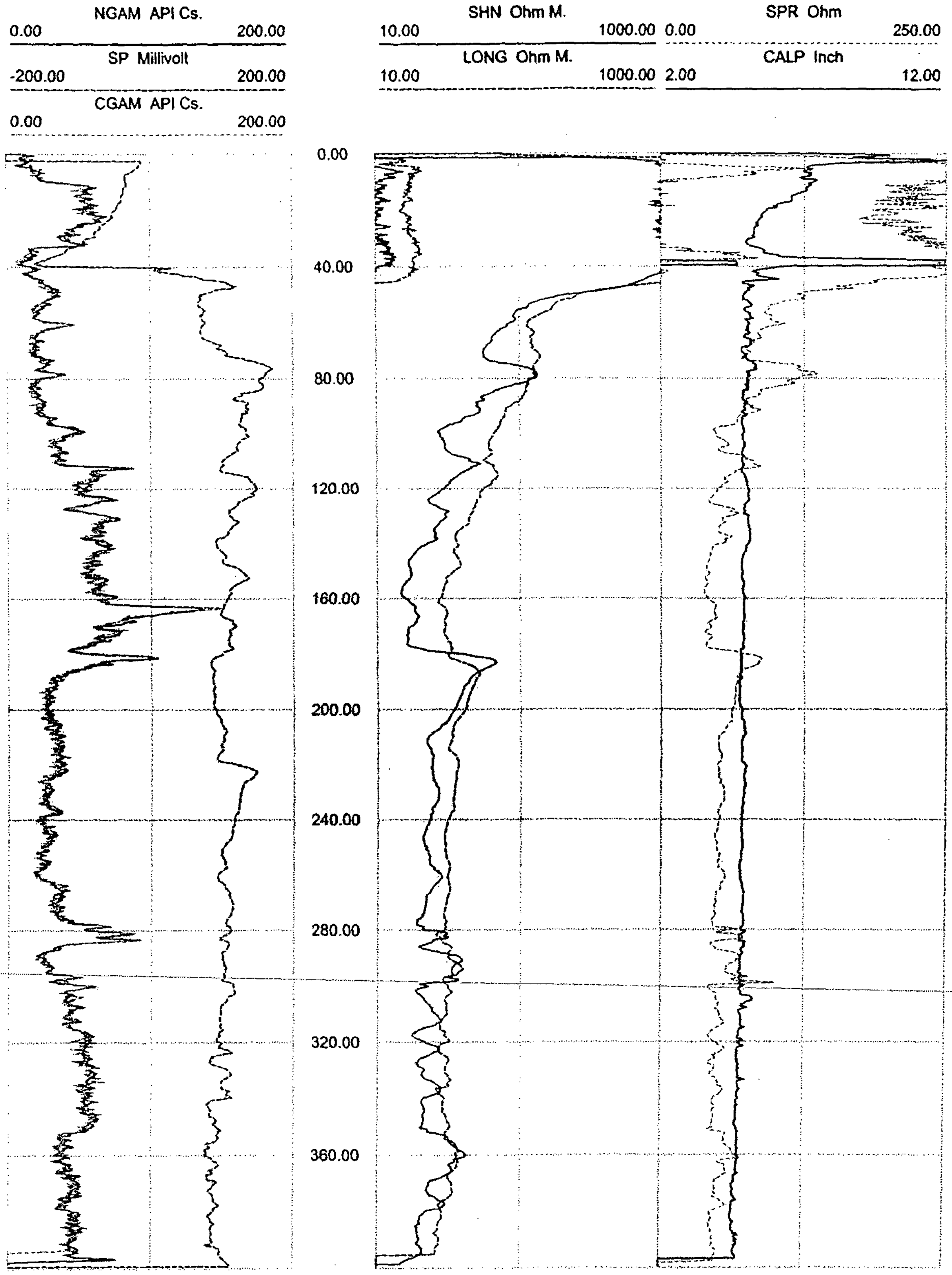


Figure 22. Boring B-401, Caliper, Natural gamma, Resistivity and SP logs

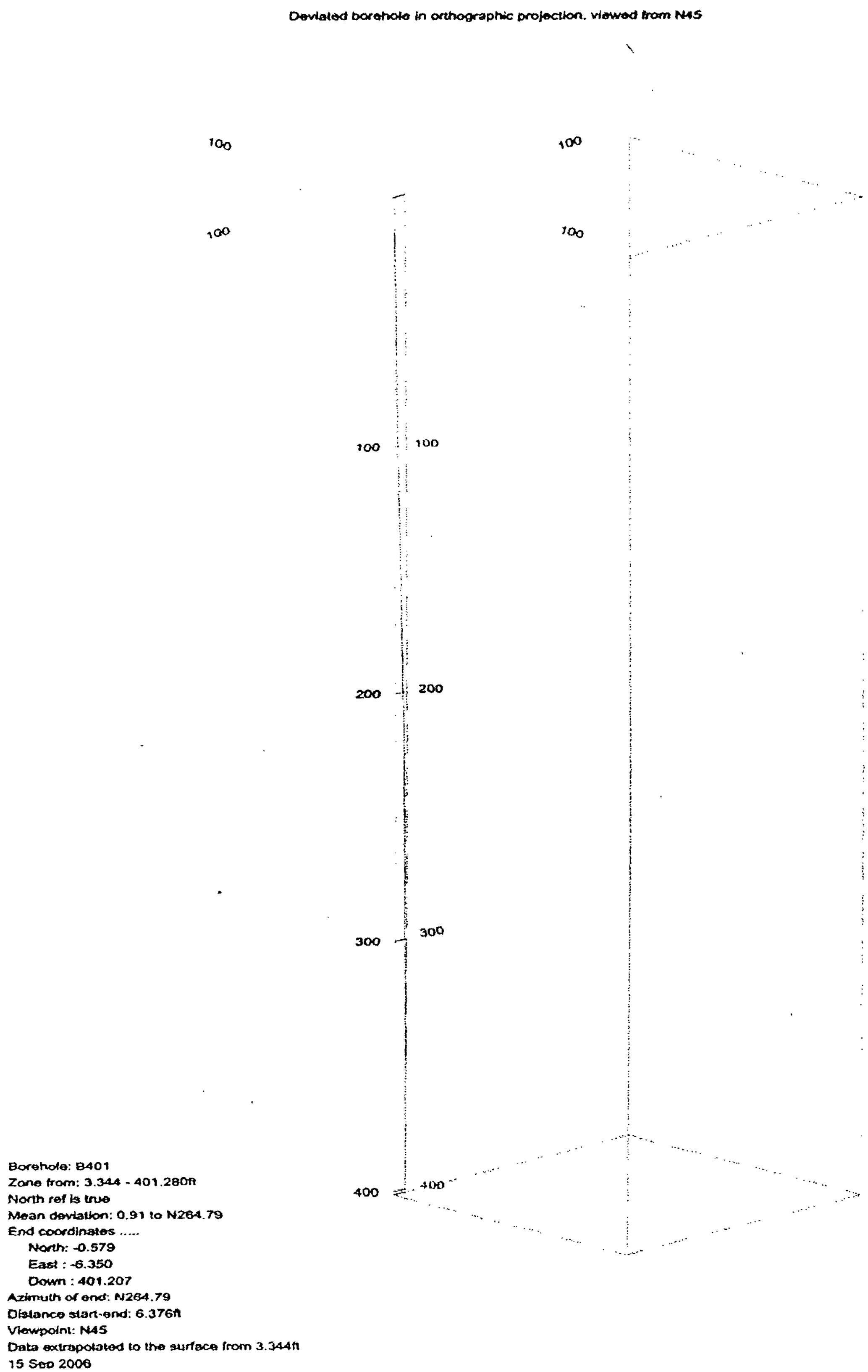


Figure 23. Boring B-401, Deviation Projection (dimensions in feet)

CCNPP COLA Borehole B-404 velocity data
Receiver to Receiver V_s and V_p Analysis

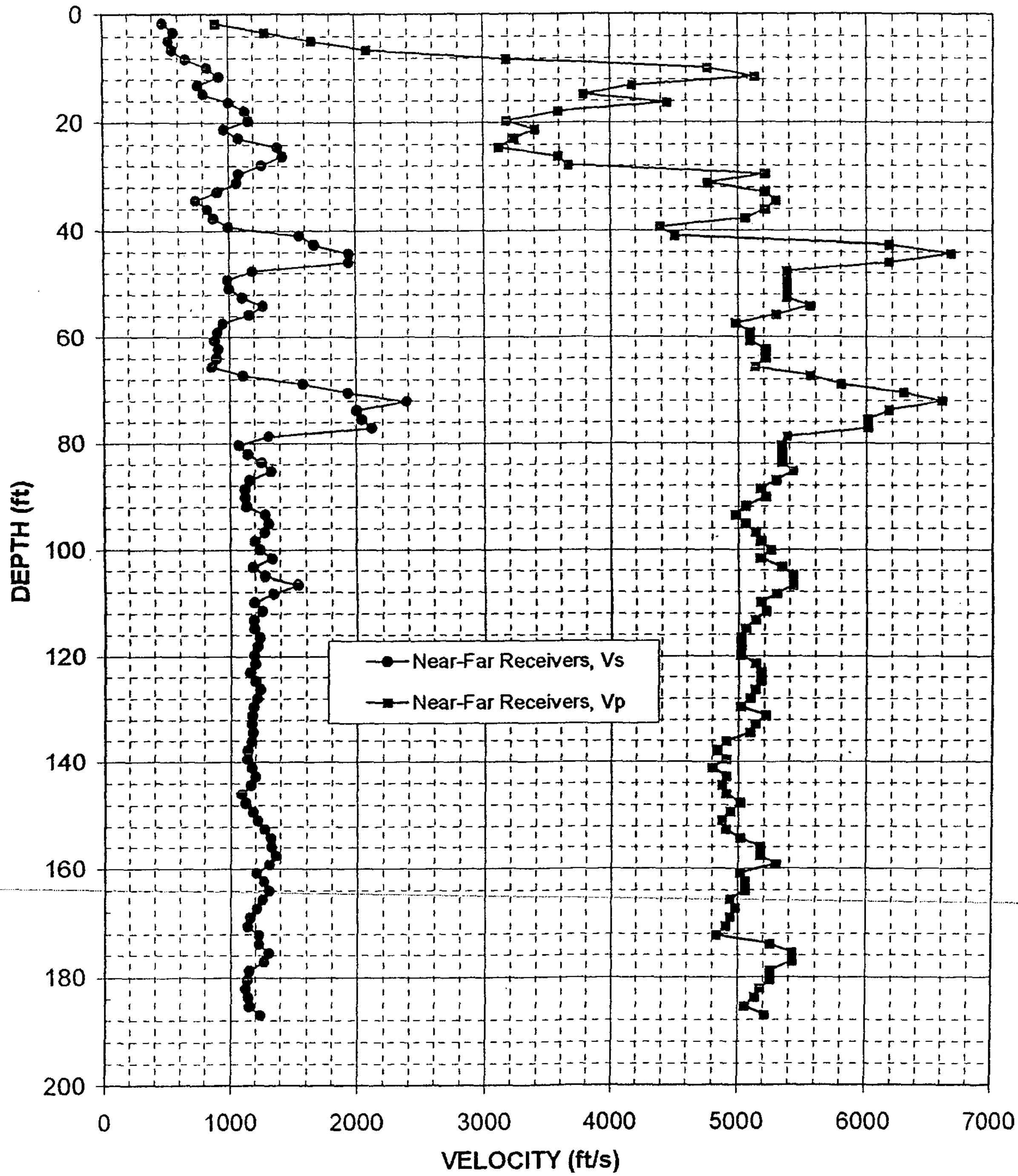


Figure 24: Boring B-404, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	480	900
3.3	560	1280
4.9	520	1650
6.6	560	2080
8.2	660	3170
9.8	830	4760
11.5	930	5130
13.1	760	4170
14.8	800	3790
16.4	1000	4440
18.0	1130	3580
19.7	1160	3170
21.3	960	3400
23.0	1080	3240
24.6	1380	3120
26.3	1420	3580
27.9	1260	3660
29.5	1080	5210
31.2	1060	4760
32.8	910	5210
34.5	740	5290
36.1	830	5210
37.7	870	5050
39.4	1000	4390
41.0	1550	4500
42.7	1670	6170
44.3	1940	6670
45.9	1940	6170
47.6	1180	5380
49.2	980	5380
50.9	1000	5380
52.5	1100	5380
54.1	1260	5560
55.8	1150	5290
57.4	940	4980
59.1	910	5090
60.7	880	5090
62.3	910	5210
64.0	890	5210
65.6	860	5130
67.3	1100	5560
68.9	1570	5800
70.5	1930	6290
72.2	2380	6600
73.8	2000	6170
75.5	2030	6010
77.1	2110	6010
78.7	1300	5380
80.4	1070	5330
82.0	1140	5330
83.7	1240	5330
85.3	1320	5420
86.9	1150	5290
88.6	1110	5170
90.2	1110	5210
91.9	1130	5050
93.5	1280	4980
95.1	1300	5050
96.8	1270	5130
98.4	1190	5170
100.1	1230	5250
101.7	1330	5170
103.4	1180	5330
105.0	1270	5420
106.6	1530	5420
108.3	1340	5290
109.9	1190	5170
111.6	1240	5210
113.2	1180	5130
114.8	1190	5050
116.5	1230	5010
118.1	1210	5010
119.8	1190	5010
121.4	1190	5130
123.0	1150	5170
124.7	1190	5170
126.3	1230	5130
128.0	1210	5090
129.6	1180	5010
131.2	1170	5210
132.9	1170	5130
134.5	1170	5090
136.2	1160	4900
137.8	1130	4830
139.4	1130	4900
141.1	1170	4800
142.7	1190	4900
144.4	1150	4870
146.0	1090	4900
147.6	1110	5010
149.3	1170	4940
150.9	1210	4870
152.6	1270	4900
154.2	1320	5010
155.8	1320	5170
157.5	1360	5170
159.1	1310	5290
160.8	1200	5010
162.4	1260	5050
164.0	1300	5050
165.7	1250	4940
167.3	1210	4980
169.0	1150	4940
170.6	1130	4900
172.2	1220	4830
173.9	1220	5250
175.5	1300	5420
177.2	1260	5420
178.8	1150	5250
180.5	1130	5250
182.1	1110	5170
183.7	1130	5130
185.4	1150	5050
187.0	1230	5210

Table 14. Boring B-404, Suspension R1-R2 depths and P- and S_H-wave velocities

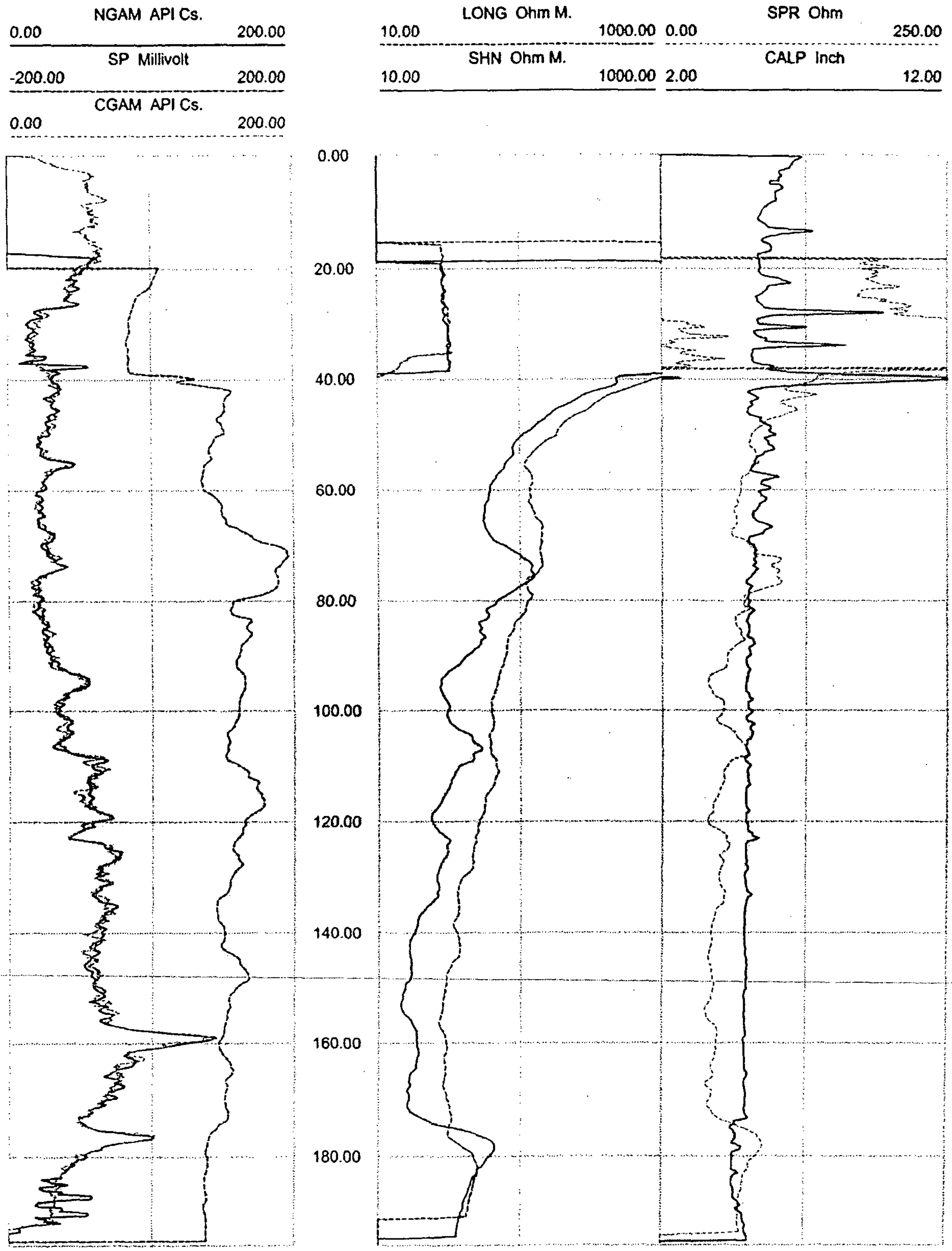


Figure 25. Boring B-404, Caliper, Natural gamma, Resistivity and SP logs

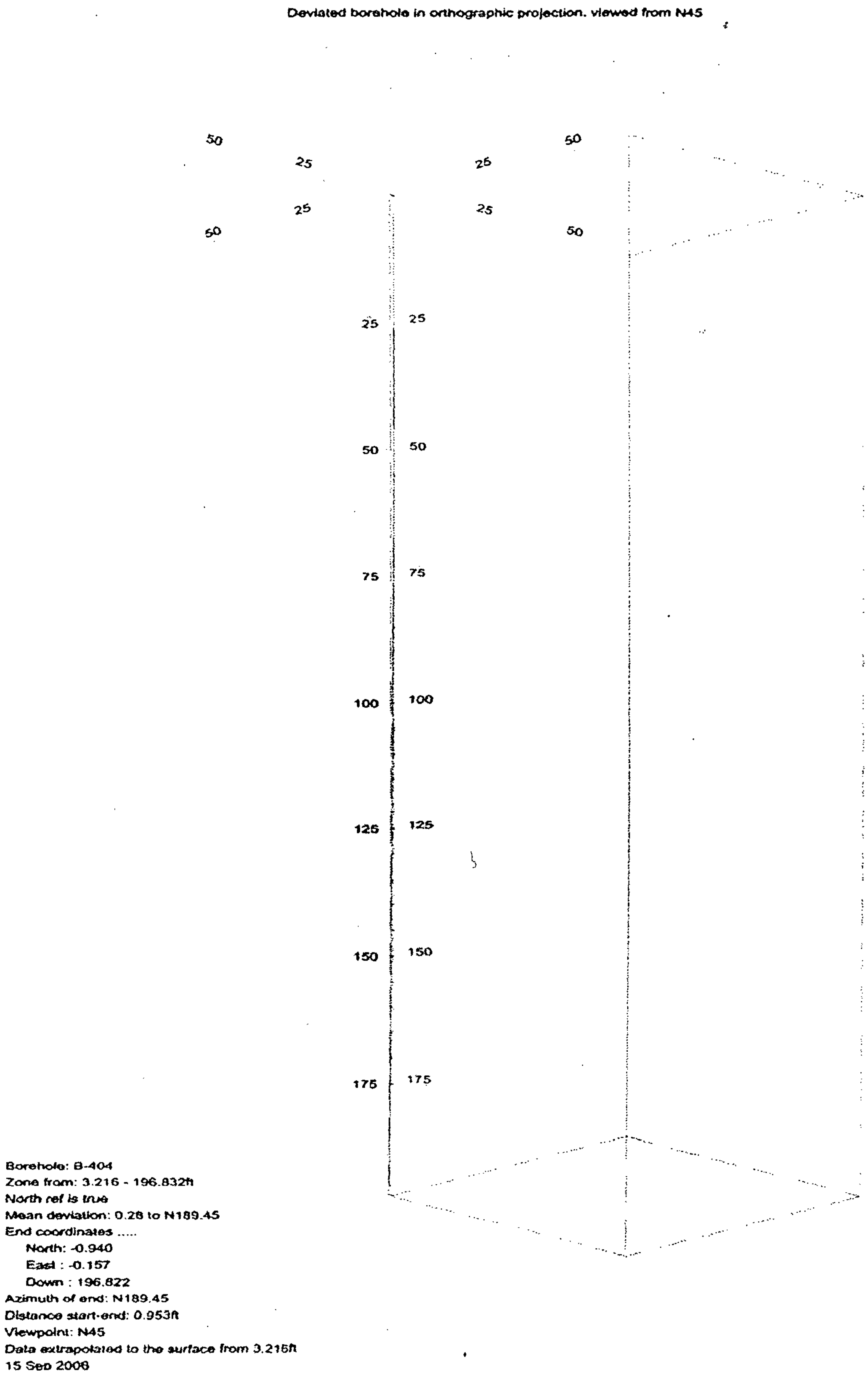


Figure 26. Boring B-404, Deviation Projection (dimensions in feet)

CCNPP COLA Borehole B-407 velocity data
Receiver to Receiver V_s and V_p Analysis

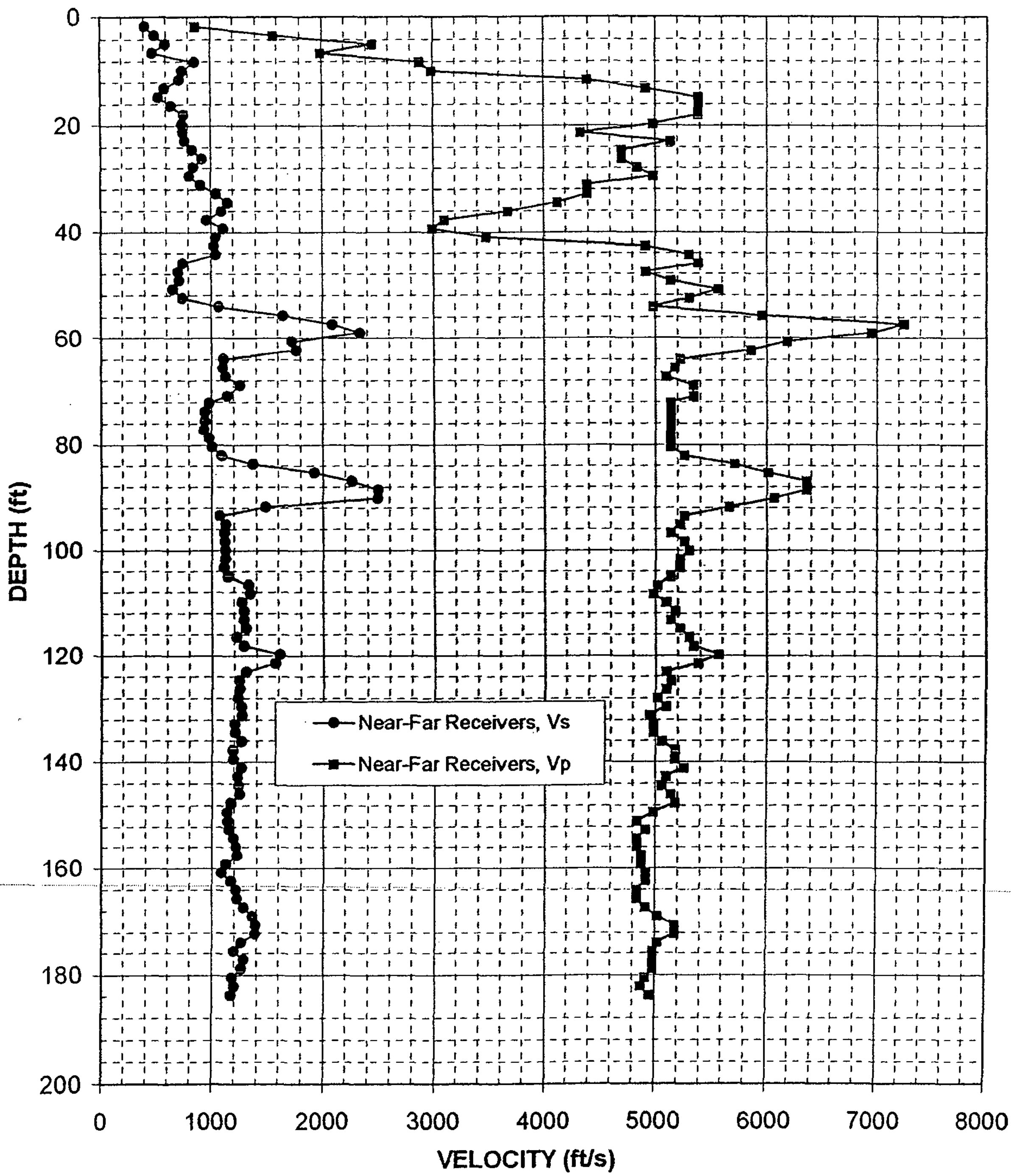


Figure 27: Boring B-407, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	400	850
3.3	490	1560
4.9	600	2450
6.6	480	1980
8.2	850	2870
9.8	740	2980
11.5	720	4390
13.1	580	4900
14.8	520	5380
16.4	640	5380
18.0	750	5380
19.7	740	4980
21.3	750	4330
23.0	770	5130
24.6	830	4690
26.3	920	4690
27.9	840	4830
29.5	800	4980
31.2	900	4390
32.8	1040	4390
34.5	1150	4120
36.1	1090	3660
37.7	960	3090
39.4	1100	2980
41.0	1040	3470
42.7	1020	4900
44.3	1040	5290
45.9	740	5380
47.6	700	4900
49.2	710	5130
50.9	650	5560
52.5	740	5290
54.1	1060	4980
55.8	1640	5950
57.4	2080	7250
59.1	2330	6940
60.7	1720	6170
62.3	1750	5850
64.0	1100	5210
65.6	1100	5170
67.3	1130	5090
68.9	1250	5330
70.9	1140	5330
72.2	970	5130
73.8	940	5130
75.5	930	5130
77.1	930	5130
78.7	970	5130
80.4	1000	5130
82.0	1090	5250
83.7	1370	5700
85.3	1920	6010
86.9	2250	6350
88.6	2490	6350
90.2	2490	6060
91.9	1480	5650
93.5	1070	5250
95.1	1120	5210
96.8	1110	5130
98.4	1110	5250
100.1	1120	5290
101.7	1120	5210
103.4	1110	5210
105.0	1150	5130
106.6	1330	5010
108.3	1340	4980
109.9	1270	5090
111.6	1280	5170
113.2	1280	5130
114.8	1300	5210
116.5	1220	5290
118.1	1280	5330
119.8	1600	5560
121.4	1560	5380
123.0	1300	5090
124.7	1240	5130
126.3	1240	5090
128.0	1230	5010
129.6	1260	5090
131.2	1270	4940
132.9	1200	4980
134.5	1200	4980
136.2	1260	5050
137.8	1180	5170
139.4	1190	5170
141.1	1260	5250
142.7	1230	5090
144.4	1230	5050
146.0	1240	5130
147.6	1170	5170
149.3	1130	4980
150.9	1140	4830
152.6	1150	4900
154.2	1190	4830
155.8	1210	4830
157.5	1220	4870
159.1	1120	4870
160.8	1080	4900
162.4	1170	4900
164.0	1210	4830
165.7	1220	4830
167.3	1280	4900
169.0	1360	5010
170.6	1390	5170
172.2	1380	5170
173.9	1260	5010
175.5	1190	4980
177.2	1280	4980
178.8	1260	4980
180.5	1180	4900
182.1	1190	4870
183.7	1170	4940

Table 15. Boring B-407, Suspension R1-R2 depths and P- and S_H-wave velocities

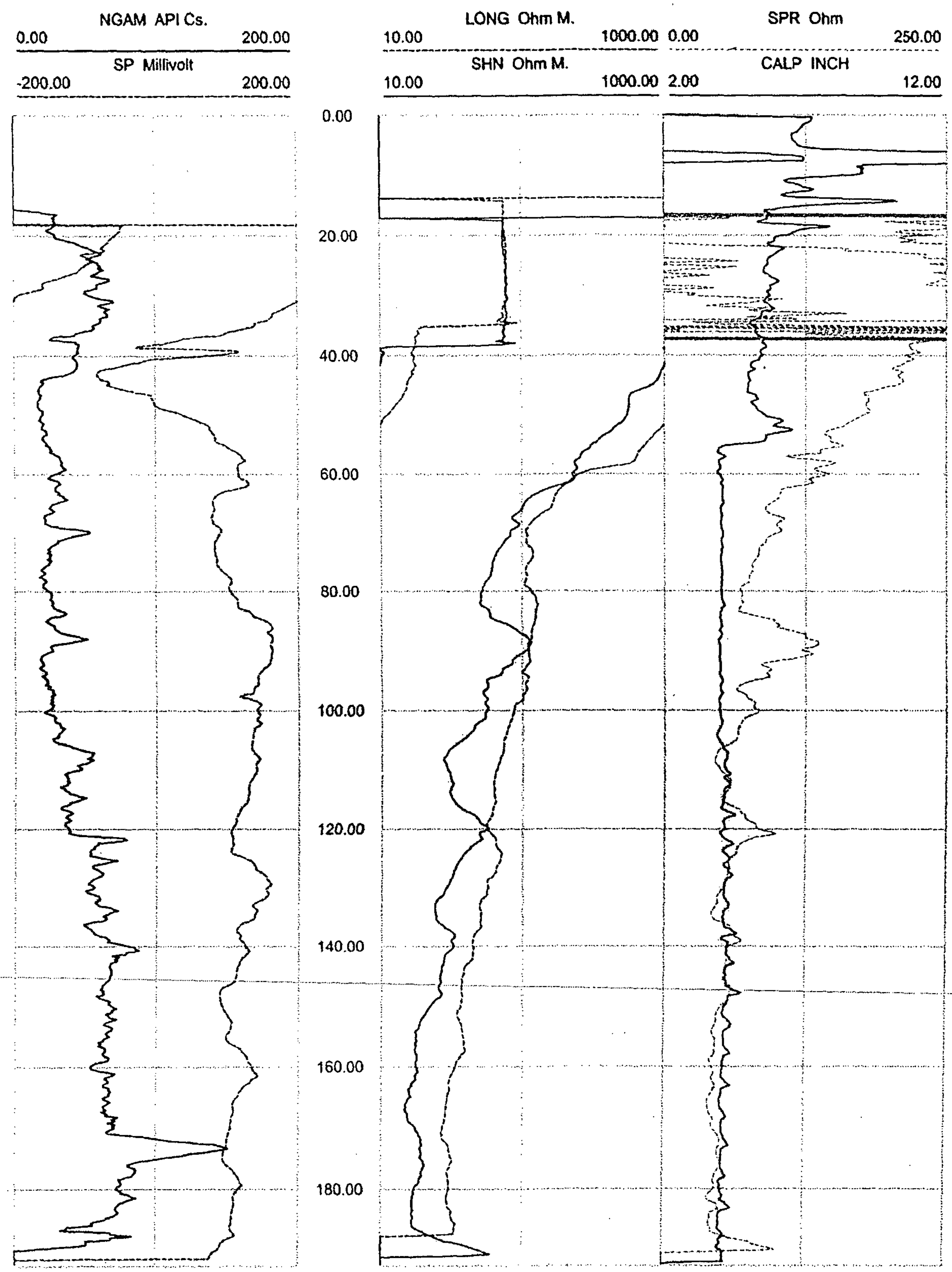


Figure 28. Boring B-407, Caliper, Natural gamma, Resistivity and SP logs

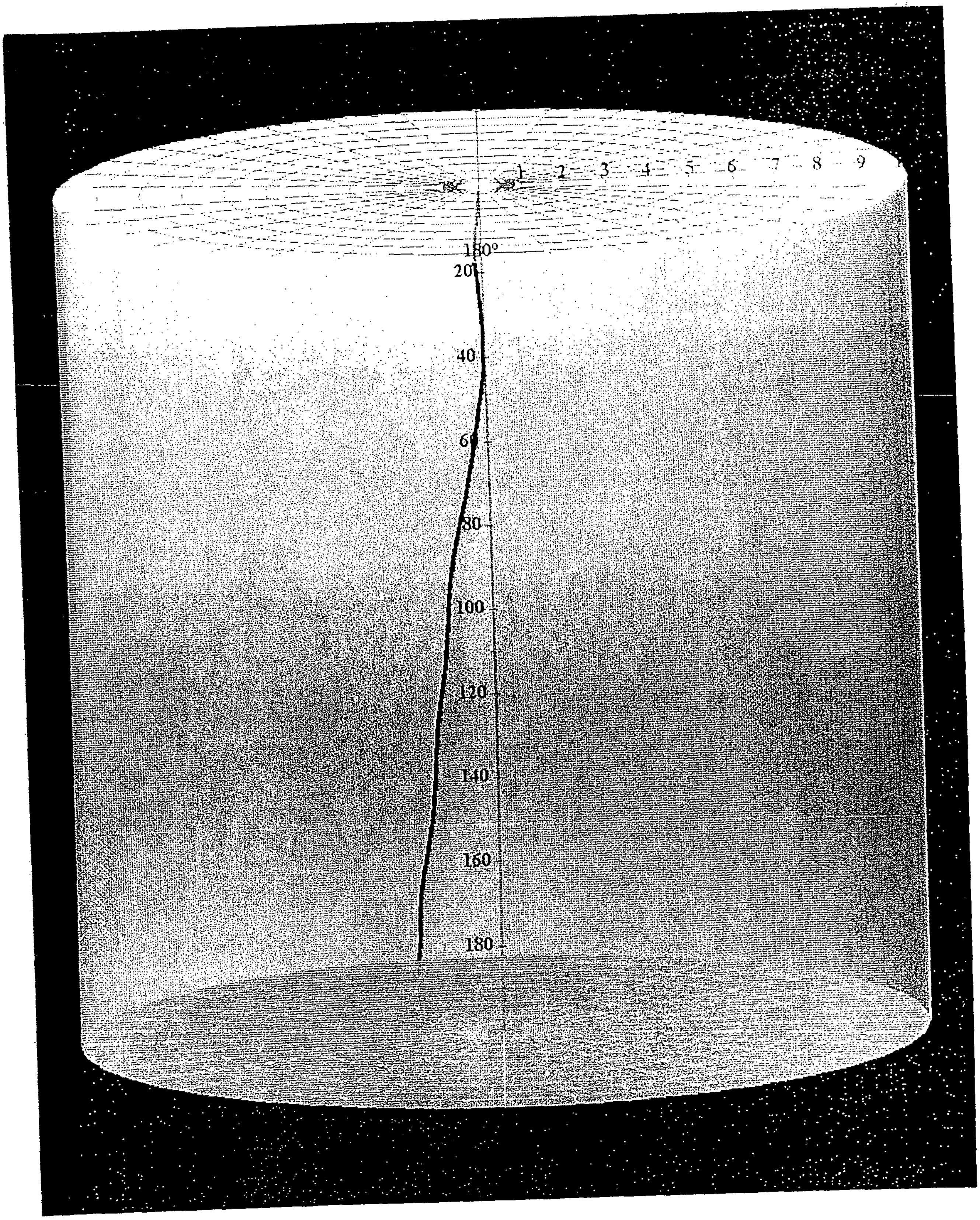


Figure 29. Boring B-407, Deviation Projection (dimensions in feet)

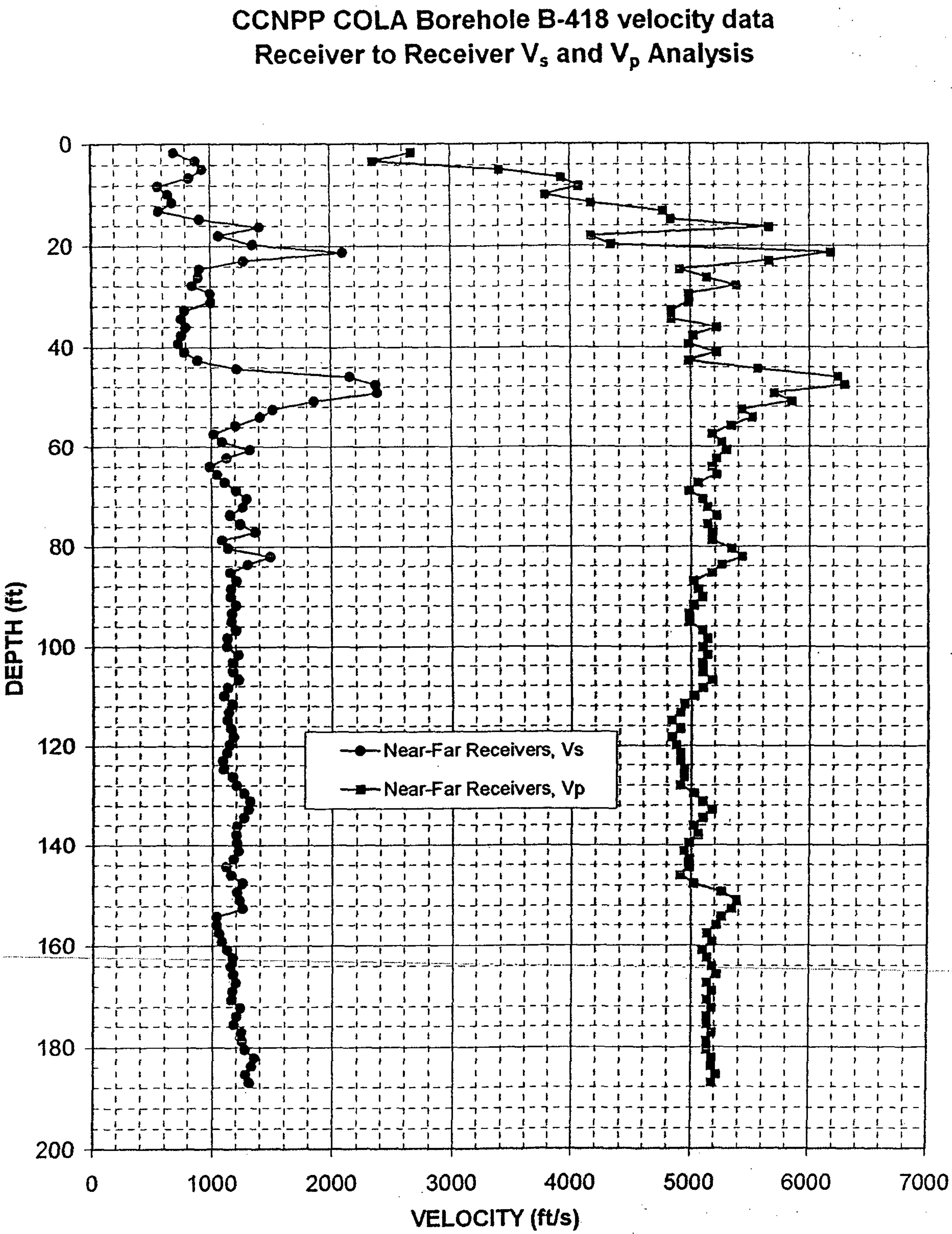


Figure 30: Boring B-418, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	690	2670
3.3	880	2350
4.9	930	3400
6.6	820	3920
8.2	560	4070
9.8	650	3790
11.5	680	4170
13.1	560	4760
14.8	910	4830
16.4	1410	5650
18.0	1060	4170
19.7	1350	4330
21.3	2100	6170
23.0	1270	5650
24.6	900	4900
26.3	890	5130
27.9	840	5380
29.5	1000	4980
31.2	1000	4980
32.8	780	4830
34.5	750	4830
36.1	790	5210
37.7	750	5010
39.4	720	4980
41.0	780	5210
42.7	890	4980
44.3	1210	5560
45.9	2150	6230
47.6	2360	6290
49.2	2380	5700
50.9	1850	5850
52.5	1510	5420
54.1	1400	5510
55.8	1200	5330
57.4	1020	5170
59.1	1090	5250
60.7	1320	5290
62.3	1120	5210
64.0	980	5170
65.6	1040	5210
67.3	1110	5050
68.9	1200	4980
70.5	1290	5090
72.2	1260	5130
73.8	1150	5210
75.5	1230	5130
77.1	1360	5170
78.7	1090	5170
80.4	1130	5330
82.0	1480	5420
83.7	1300	5250
85.3	1150	5170
86.9	1200	5010
88.6	1150	5050
90.2	1150	5090
91.9	1190	5010
93.5	1160	4980
95.1	1160	4980
96.8	1190	5090
98.4	1120	5130
100.1	1120	5090
101.7	1220	5130
103.4	1170	5090
105.0	1170	5090
106.6	1220	5170
108.3	1120	5090
109.9	1090	5010
111.6	1160	4940
113.2	1130	4900
114.8	1120	4830
116.5	1150	4900
118.1	1170	4830
119.8	1140	4870
121.4	1110	4900
123.0	1080	4900
124.7	1090	4940
126.3	1170	4940
128.0	1190	4900
129.6	1260	5010
131.2	1310	5090
132.9	1300	5170
134.5	1260	5090
136.2	1200	5010
137.8	1190	5050
139.4	1200	4980
141.1	1210	4940
142.7	1170	4980
144.4	1110	4980
146.0	1150	4900
147.6	1240	5010
149.3	1200	5250
150.9	1220	5380
152.6	1240	5330
154.2	1030	5250
155.8	1030	5210
157.5	1050	5130
159.1	1070	5170
160.8	1120	5090
162.4	1170	5130
164.0	1150	5170
165.7	1170	5210
167.3	1190	5130
169.0	1160	5170
170.6	1150	5130
172.2	1230	5170
173.9	1190	5130
175.5	1170	5130
177.2	1240	5170
178.8	1240	5130
180.5	1270	5130
182.1	1340	5170
183.7	1320	5170
185.4	1270	5210
187.0	1300	5170

Table 16. Boring B-418, Suspension R1-R2 depths and P- and S_H-wave velocities

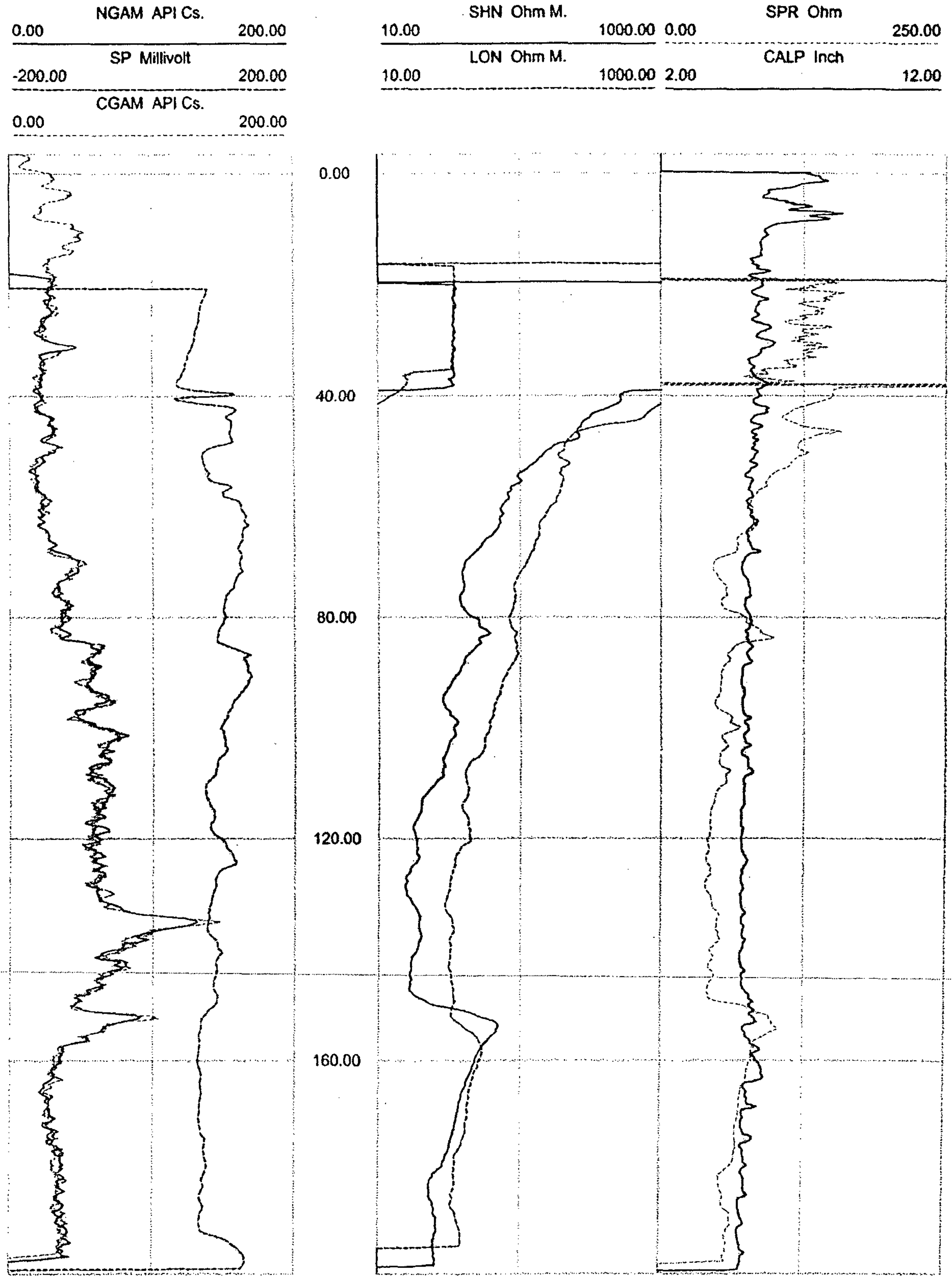
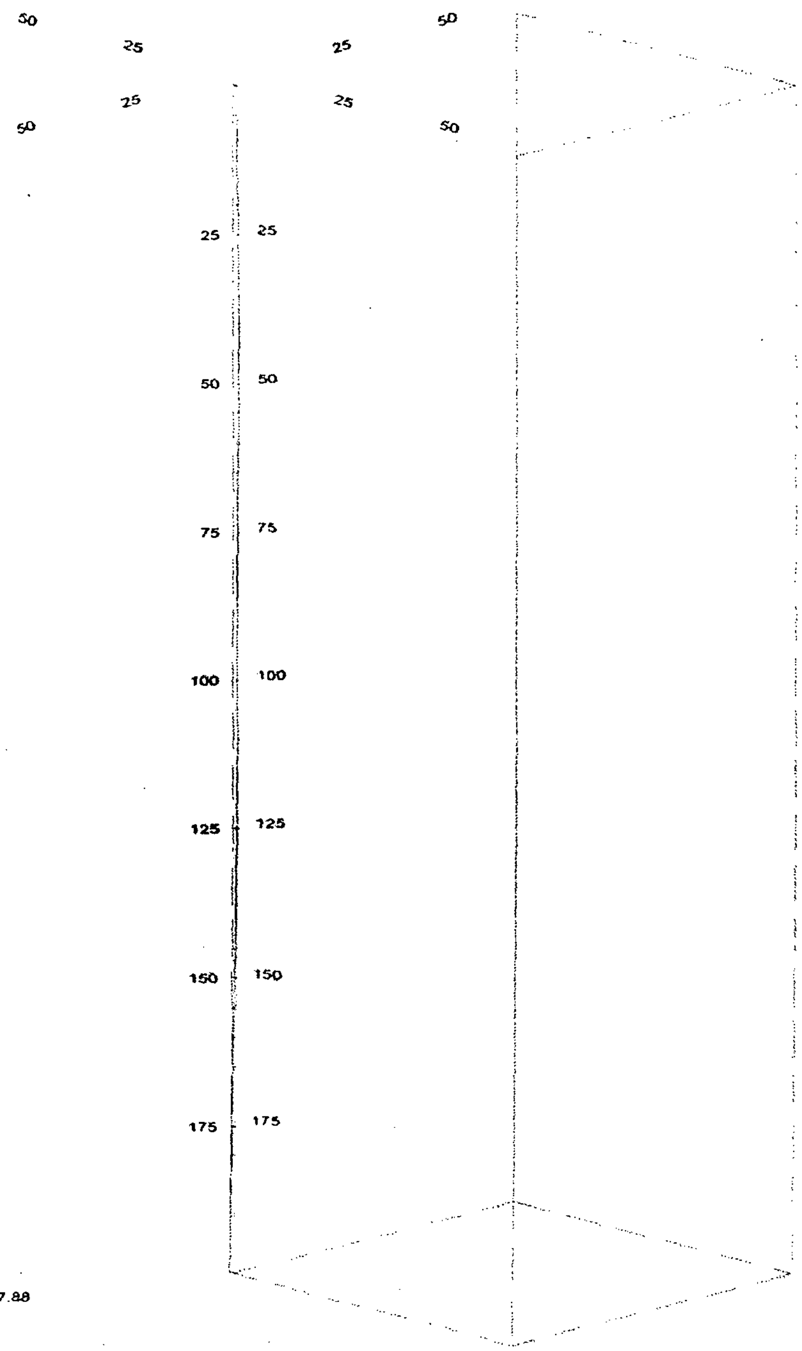


Figure 31. Boring B-418, Caliper, Natural gamma, Resistivity and SP logs

Deviated borehole in orthographic projection, viewed from N45



Borehole: B418
Zone from: 3.248 - 199.264ft
North ref is true
Mean deviation: 0.32 to N187.88
End coordinates .....
North: -1.109
East : -0.153
Down : 199.255
Azimuth of end: N187.87
Distance start-end: 1.120ft
Viewpoint: N45
Data extrapolated to the surface from 3.248ft
15 Sep 2006

Figure 32. Boring B-418, Deviation Projection (dimensions in feet)

CCNPP COLA Borehole B-423 velocity data
Receiver to Receiver V_s and V_p Analysis

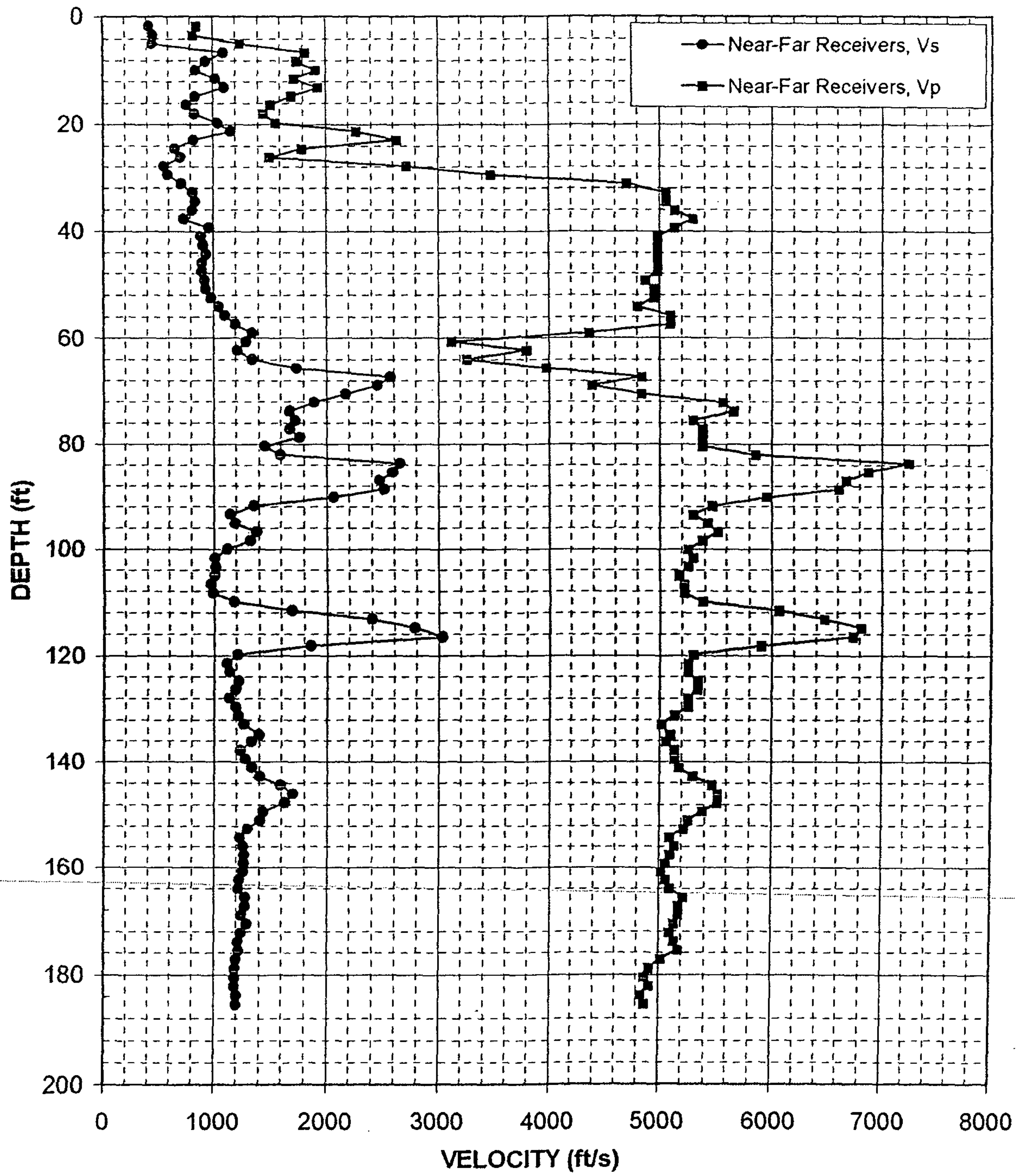


Figure 33: Boring B-423, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	420	850
3.3	460	810
4.9	440	1230
6.6	1090	1810
8.2	930	1740
9.8	840	1900
11.5	1020	1720
13.1	1100	1930
14.8	830	1690
16.4	760	1510
18.0	830	1440
19.7	1040	1550
21.3	1150	2270
23.0	820	2620
24.6	650	1780
26.3	700	1490
27.9	550	2710
29.5	590	3470
31.2	710	4690
32.8	810	5050
34.5	840	5050
36.1	800	5130
37.7	730	5290
39.4	960	5130
41.0	880	4980
42.7	900	4980
44.3	930	4980
45.9	890	4980
47.6	890	4980
49.2	920	4870
50.9	930	4940
52.5	970	4940
54.1	1040	4800
55.8	1100	5090
57.4	1190	5090
59.1	1340	4360
60.7	1280	3120
62.3	1200	3790
64.0	1340	3250
65.6	1730	3970
67.3	2560	4830
68.9	2450	4390
70.5	2160	4830
72.2	1880	5560
73.8	1670	5650
75.5	1720	5290
77.1	1670	5380
78.7	1750	5380
80.4	1450	5380
82.0	1590	5850
83.7	2650	7250
85.3	2580	6870
86.9	2470	6670
88.6	2510	6600
90.2	2060	5950
91.9	1360	5460
93.5	1140	5290
95.1	1180	5420
96.8	1380	5510
98.4	1320	5380
100.1	1110	5250
101.7	1000	5290
103.4	1010	5250
105.0	1000	5170
106.6	960	5210
108.3	980	5210
109.9	1170	5380
111.6	1680	6060
113.2	2400	6470
114.8	2780	6800
116.5	3030	6730
118.1	1850	5900
119.8	1200	5290
121.4	1110	5250
123.0	1130	5250
124.7	1210	5330
126.3	1190	5330
128.0	1130	5250
129.6	1190	5250
131.2	1210	5130
132.9	1260	5010
134.8	1390	5090
136.2	1330	5050
137.8	1230	5130
139.4	1280	5130
141.1	1330	5170
142.7	1400	5290
144.4	1590	5460
146.0	1690	5510
147.6	1620	5510
149.3	1430	5380
150.9	1400	5250
152.6	1290	5210
154.2	1230	5090
155.8	1250	5130
157.5	1260	5090
159.1	1260	5050
160.8	1250	5010
162.4	1220	5050
164.0	1210	5090
165.7	1280	5210
167.3	1270	5170
169.0	1240	5170
170.6	1290	5130
172.2	1230	5090
173.9	1210	5130
175.5	1220	5170
177.2	1190	5010
178.8	1180	4900
180.5	1180	4870
182.1	1180	4900
183.7	1190	4830
185.4	1190	4870

Table 17. Boring B-423, Suspension R1-R2 depths and P- and S_H-wave velocities

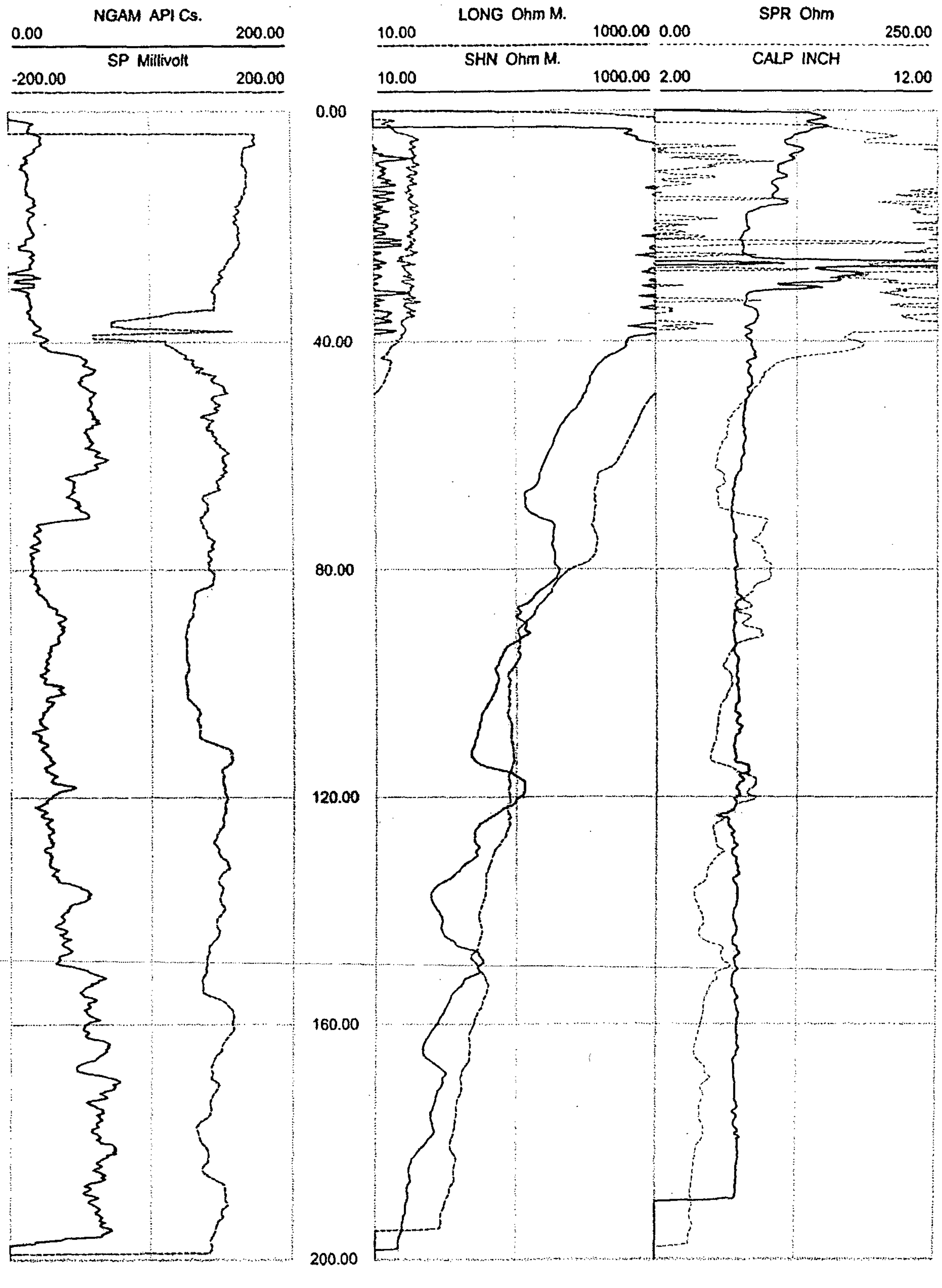


Figure 34. Boring B-423, Caliper, Natural gamma, Resistivity and SP logs

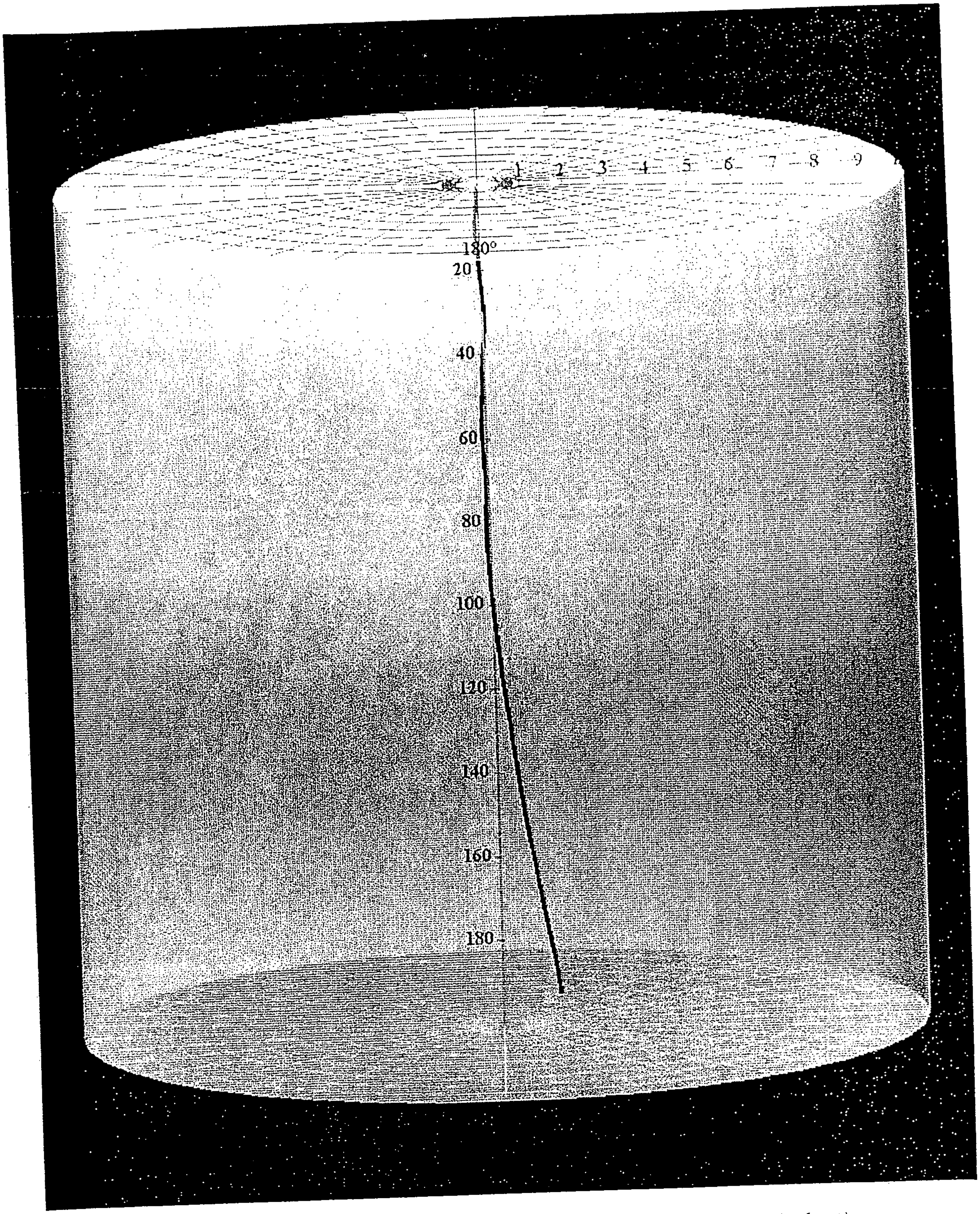


Figure 35. Boring B-423, Deviation Projection (dimensions in feet)

APPENDIX A

SUSPENSION VELOCITY MEASUREMENT QUALITY ASSURANCE SUSPENSION SOURCE TO RECEIVER ANALYSIS RESULTS

CCNPP COLA Borehole B-301 velocity data
Source to Receiver and Receiver to Receiver Analysis

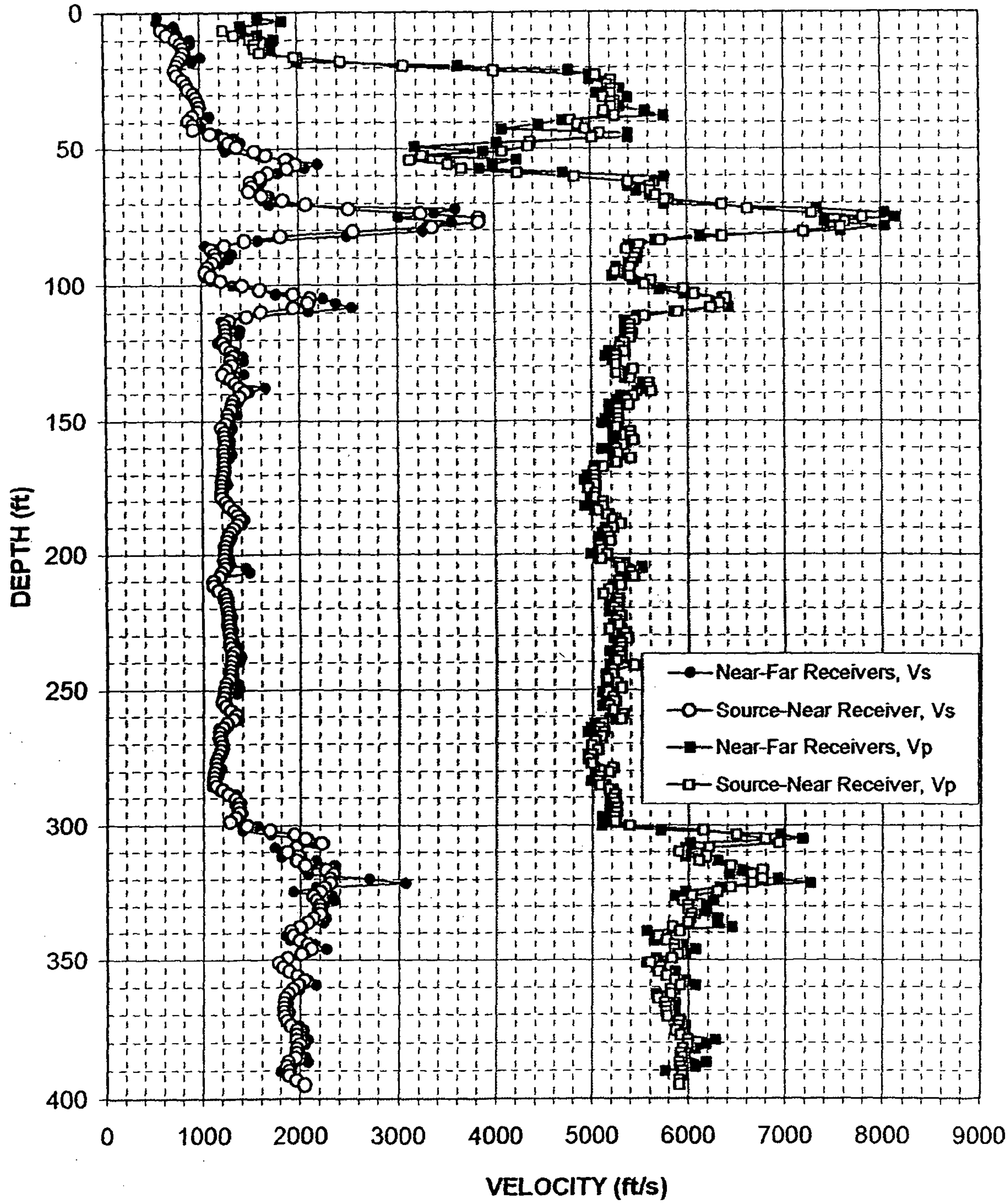


Figure A-1. Boring B-301, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	610	1240
8.2	660	1350
9.8	750	1520
11.5	800	1560
13.1	830	1570
14.8	830	1610
16.4	810	1960
18.0	780	2430
19.7	760	3080
21.3	740	4000
23.0	760	5050
24.6	820	5220
26.3	860	5170
27.9	880	5220
29.5	940	5220
31.2	960	5130
32.8	980	5220
34.5	990	5220
36.1	980	5130
37.7	930	5260
39.4	880	4790
41.0	930	4870
42.7	930	4940
44.3	1100	5090
45.9	1250	5020
47.6	1290	4380
49.2	1370	4350
50.9	1550	4080
52.5	1670	3260
54.1	1870	3130
55.8	1980	3520
57.4	1880	3660
59.1	1690	4230
60.7	1610	4830
62.3	1510	5390
64.0	1520	5620
65.6	1490	5620
67.3	1620	5670
68.9	1840	5770
70.5	2080	6360
72.2	2510	6620
73.8	3240	7280
75.5	3840	7810
77.1	3840	7630
78.7	3360	7580
80.4	2560	7200
82.0	1810	6360
83.7	1440	5720
85.3	1240	5500
86.9	1110	5370
88.6	1140	5480
90.2	1150	5460
91.9	1110	5430
93.5	1060	5410
95.1	1040	5260
96.8	1090	5410
98.4	1200	5620
100.1	1420	5550
101.7	1600	5950
103.4	1940	6070
105.0	2120	6390
106.6	2090	6330
108.3	1940	6240
109.9	1610	5900
111.6	1460	5550
113.2	1280	5460
114.8	1240	5410
116.5	1240	5410
118.1	1250	5410
119.8	1250	5410
121.4	1220	5340
123.0	1250	5300
124.7	1300	5340
126.3	1320	5260
128.0	1300	5260
129.6	1310	5260
131.2	1250	5430
132.9	1210	5260
134.5	1300	5410
136.2	1340	5600
137.8	1380	5600
139.4	1440	5620
141.1	1380	5430
142.7	1320	5370
144.4	1310	5390
146.0	1300	5280
147.6	1260	5280
149.3	1260	5280
150.9	1240	5280
152.6	1200	5260
154.2	1230	5410
155.8	1230	5410
157.5	1230	5430
159.1	1230	5320
160.8	1220	5260
162.4	1220	5280
164.0	1230	5410
165.7	1220	5260
167.3	1220	5110
169.0	1230	5020
170.6	1210	5030
172.2	1200	5030
173.9	1200	5030
175.5	1200	4960
177.2	1200	5030
178.8	1200	5030
180.4	1240	5110
182.1	1270	5110
183.7	1330	5050
185.4	1360	5150
187.0	1380	5220
188.7	1360	5300
190.3	1320	5220
191.9	1290	5150
193.6	1260	5170
195.2	1250	5200
196.9	1240	5070
198.5	1230	5090
200.1	1230	5150
201.8	1220	5090
203.4	1230	5280
205.1	1230	5300
206.7	1200	5410
208.3	1170	5430
210.0	1110	5280
211.6	1120	5300
213.3	1160	5170
214.9	1230	5110
216.5	1240	5280
218.2	1250	5280
219.8	1250	5240
221.5	1260	5280
223.1	1270	5300
224.7	1260	5260
226.4	1270	5280
228.0	1270	5170
229.7	1270	5340
231.3	1280	5370
232.9	1270	5300
234.6	1290	5300
236.2	1320	5280
237.9	1300	5300
239.5	1300	5260
241.1	1290	5430
242.8	1280	5220
244.4	1280	5220
246.1	1270	5150
247.7	1240	5260
249.3	1220	5300
251.0	1220	5150

Table A-1. Boring B-301, S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
252.6	1210	5220
254.3	1200	5240
255.9	1230	5170
257.5	1280	5220
259.2	1340	5320
260.8	1310	5300
262.5	1240	5110
264.1	1200	5070
265.8	1170	5110
267.4	1160	5090
269.0	1180	5030
270.7	1190	5000
272.3	1180	5050
274.0	1160	5000
275.6	1140	4960
277.2	1140	5000
278.9	1130	5220
280.5	1120	5170
282.2	1110	5070
283.8	1110	5050
285.4	1130	5070
287.1	1200	5170
288.7	1260	5240
290.4	1330	5220
292.0	1360	5240
293.6	1360	5260
295.3	1370	5260
296.9	1330	5240
298.6	1270	5240
300.2	1440	5390
301.8	1680	6150
303.5	1940	6490
305.1	2050	6790
306.8	2220	6940
308.4	1950	6210
310.0	1860	5900
311.7	1980	6180
313.3	1970	6100
315.0	2040	6430
316.6	2260	6760
318.2	2340	6650
319.9	2300	6760
321.5	2300	6650
323.2	2240	6430
324.8	2200	6290
326.4	2130	6040
328.1	2170	5940
329.7	2200	5990
331.4	2200	5990
333.0	2200	6040
334.6	2130	6010
336.3	2080	5990
337.9	1990	5830
339.6	1910	5910
341.2	1920	5680
342.9	1990	5770
344.5	2080	5850
346.1	2110	5850
347.8	2010	5900
349.4	1860	5820
351.1	1770	5600
352.7	1820	5710
354.3	1880	5690
356.0	1970	5770
357.6	2040	5850
359.3	1980	5920
360.9	1920	5810
362.5	1880	5810
364.2	1840	5680
365.8	1830	5750
367.5	1830	5770
369.1	1830	5770
370.7	1840	5780
372.4	1860	5910
374.0	1910	5900
375.7	1960	5860
377.3	1960	5920
378.9	1960	5990
380.6	1990	5990
382.2	1960	5940
383.9	1960	5920
385.5	1950	5940
387.1	1880	5910
388.8	1860	5920
390.4	1890	5940
392.1	1890	5940
393.7	1960	5910
395.3	2040	5910

Table A-1, continued. Boring B-301, S - R1 quality assurance analysis P- and S_H-wave data

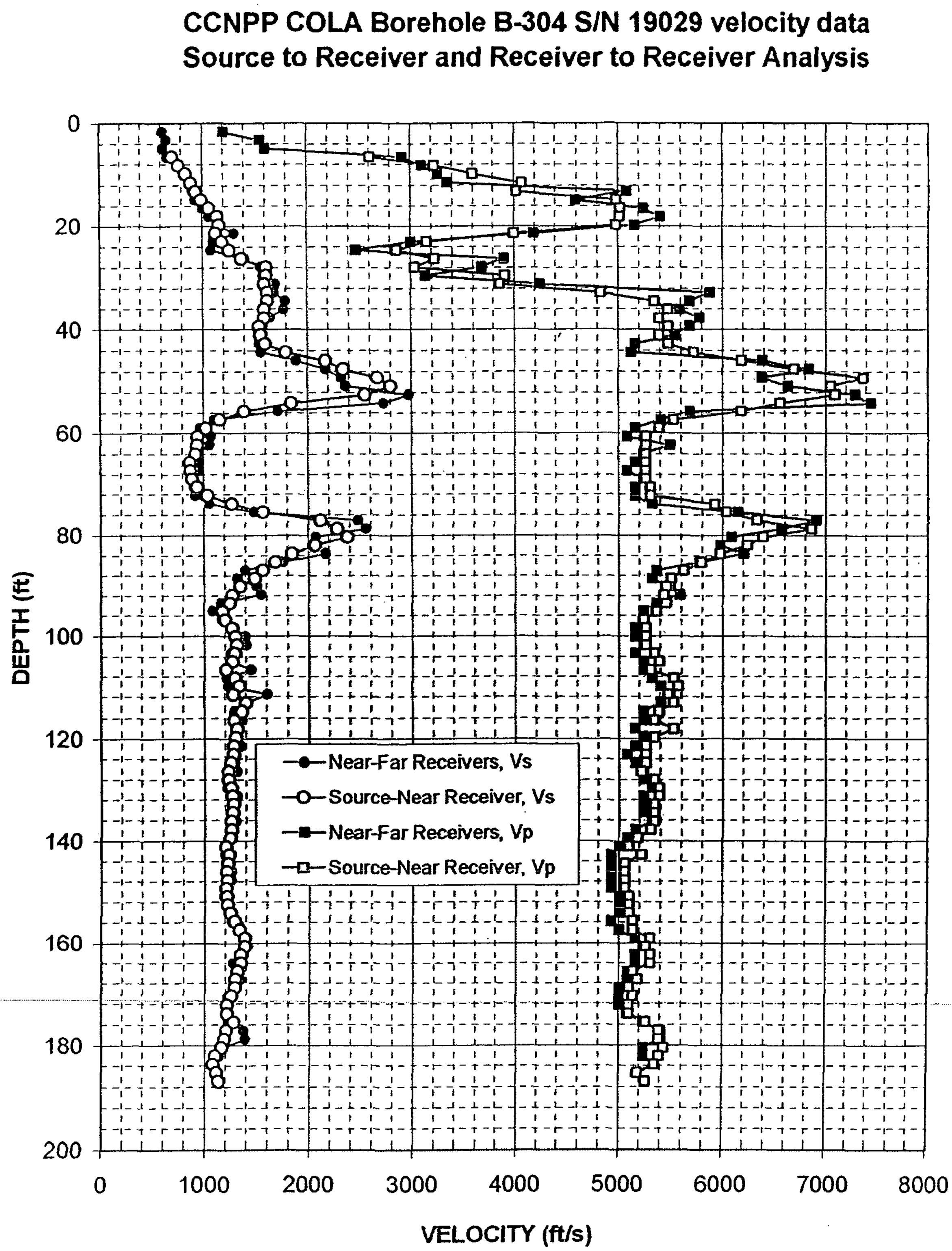


Figure A-2. Boring B-304, S/N 19029, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	710	2610
8.2	770	3230
9.9	840	3600
11.5	890	4080
13.1	930	4020
14.8	990	4980
16.4	1060	5020
18.1	1140	5020
19.7	1160	4980
21.3	1130	4000
23.0	1190	3150
24.6	1260	2860
26.3	1380	3230
27.9	1610	3030
29.5	1610	3900
31.2	1590	3860
32.8	1620	4830
34.5	1620	5340
36.1	1590	5480
37.7	1590	5390
39.4	1540	5480
41.0	1550	5390
42.7	1590	5480
44.3	1790	5720
45.9	2170	6180
47.6	2350	6690
49.2	2670	7370
50.9	2800	7050
52.5	2550	7090
54.1	1850	6550
55.8	1390	6180
57.4	1160	5530
59.1	1020	5390
60.7	940	5260
62.3	940	5260
64.0	920	5260
65.6	870	5260
67.3	880	5260
68.9	890	5260
70.6	940	5300
72.2	1030	5300
73.8	1270	5930
75.5	1570	6040
77.1	2120	6330
78.8	2280	6860
80.4	2380	6390
82.0	2070	6240
83.7	1850	5980
85.3	1680	5800
87.0	1560	5620
88.6	1490	5500
90.2	1350	5460
91.9	1270	5430
93.5	1250	5460
95.2	1180	5370
96.8	1210	5240
98.4	1270	5260
100.1	1300	5260
101.7	1310	5260
103.4	1290	5340
105.0	1270	5390
106.6	1210	5300
108.3	1290	5530
109.9	1340	5570
111.6	1280	5480
113.2	1400	5530
114.8	1360	5390
116.5	1290	5340
118.1	1310	5530
119.8	1300	5340
121.4	1290	5260
123.0	1280	5260
124.7	1260	5260
126.3	1230	5220
128.0	1230	5340
129.6	1260	5390
131.2	1270	5390
132.9	1280	5340
134.5	1270	5340
136.2	1260	5340
137.8	1260	5300
139.4	1250	5170
141.1	1210	5090
142.7	1240	5220
144.4	1230	5050
146.0	1220	5050
147.7	1220	5050
149.3	1210	5050
150.9	1220	5090
152.6	1220	5090
154.2	1250	5090
155.9	1290	5130
157.5	1340	5130
159.1	1390	5300
160.8	1390	5260
162.4	1350	5300
164.1	1350	5300
165.7	1310	5130
167.3	1290	5170
169.0	1290	5090
170.6	1260	5130
172.3	1220	5090
173.9	1220	5090
175.5	1280	5260
177.2	1210	5390
178.8	1190	5390
180.5	1160	5430
182.1	1100	5390
183.7	1080	5340
185.4	1110	5170
187.0	1140	5260

Table A-2. Boring B-304, S/N 19029, S - R1 quality assurance analysis P- and S_H-wave data

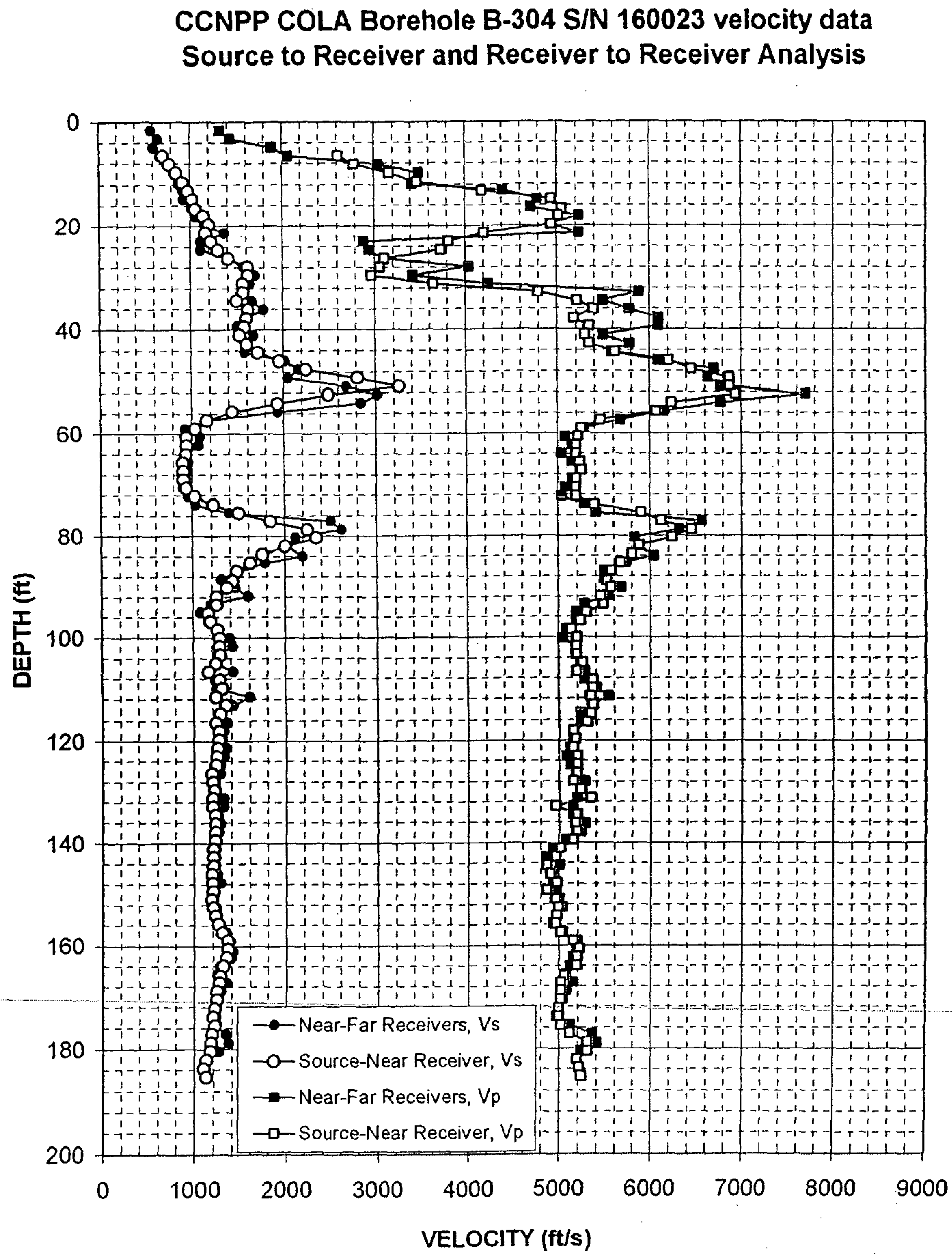


Figure A-3. Boring B-304, S/N 160023, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	710	2620
8.2	780	2790
9.9	860	3170
11.5	920	3470
13.1	970	4180
14.8	1020	4940
16.7	1060	5050
18.1	1140	5020
19.7	1200	4940
21.3	1170	4210
23.0	1220	3810
24.6	1290	3730
26.3	1410	3100
27.9	1610	3060
29.5	1610	2960
31.2	1560	3640
32.8	1570	4790
34.5	1500	5220
36.1	1610	5390
37.7	1600	5170
39.4	1570	5340
41.0	1520	5300
42.7	1600	5340
44.3	1720	5620
45.9	1950	6210
47.6	2250	6460
49.2	2810	6860
50.9	3260	6860
52.5	2490	6940
54.1	1930	6240
55.8	1440	6070
57.4	1160	5460
59.1	1030	5260
60.7	940	5220
62.3	940	5200
64.0	930	5200
65.6	900	5240
67.3	900	5260
68.9	900	5200
70.6	940	5200
72.2	1030	5200
73.8	1220	5390
75.5	1500	5900
77.1	1840	6120
78.8	2250	6460
80.4	2350	6240
82.0	2000	5870
83.7	1750	5800
85.3	1610	5670
87.0	1470	5570
88.9	1420	5530
90.2	1360	5570
91.9	1250	5460
93.5	1250	5480
95.2	1160	5300
96.8	1190	5240
98.4	1260	5130
100.1	1280	5200
101.7	1280	5200
103.4	1290	5200
105.0	1240	5260
106.6	1160	5200
108.3	1280	5370
109.9	1310	5370
111.6	1240	5340
113.2	1340	5370
114.8	1280	5340
116.5	1230	5300
118.1	1270	5150
119.8	1270	5170
121.4	1250	5150
123.0	1240	5200
124.7	1230	5200
126.3	1190	5200
128.0	1200	5150
129.6	1220	5240
131.2	1200	5340
132.9	1200	4960
134.5	1230	5200
136.2	1230	5170
137.8	1230	5200
139.4	1230	5150
141.1	1210	5020
142.7	1210	4960
144.4	1210	4870
146.0	1190	4900
147.7	1200	4980
149.3	1200	4870
150.9	1190	4960
152.6	1210	5000
154.2	1230	4980
155.9	1260	4960
157.5	1300	5020
159.1	1360	5150
160.8	1360	5220
162.4	1340	5200
164.1	1310	5200
166.0	1280	5050
167.3	1270	5020
169.0	1240	5020
170.6	1240	5020
172.3	1220	5000
173.9	1200	5000
175.5	1220	5020
177.2	1190	5110
178.8	1180	5300
180.5	1160	5300
182.1	1120	5200
183.7	1100	5220
185.4	1120	5240

Table A-3. Boring B-304, S/N 160023, S - R1 quality assurance analysis P- and S_H-wave data

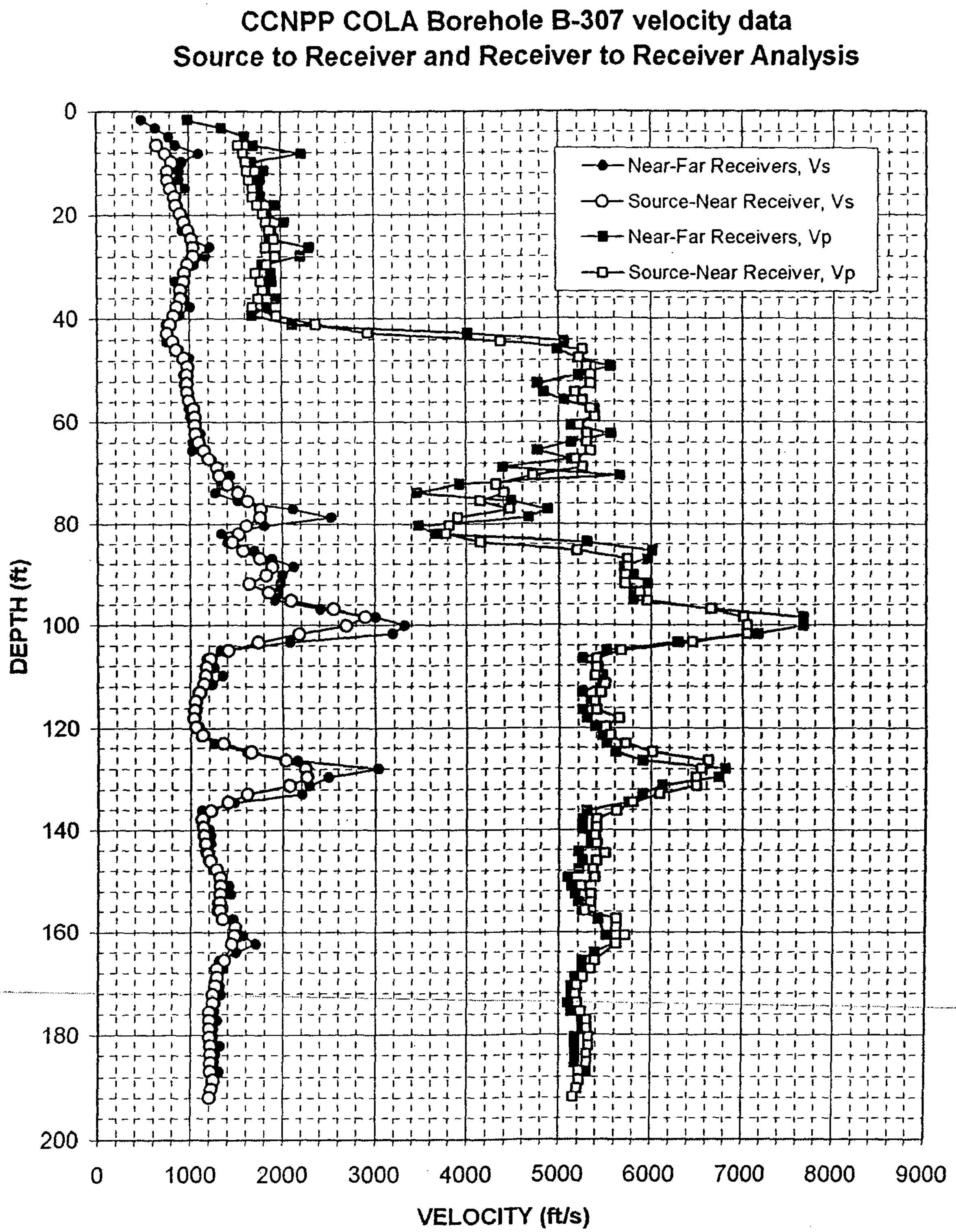


Figure A-4. Boring B-307, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	660	1530
8.2	750	1590
9.8	820	1620
11.5	770	1630
13.1	770	1650
14.8	800	1690
16.4	840	1690
18.0	860	1740
19.7	900	1800
21.3	950	1840
23.0	990	1870
24.6	1030	1920
26.3	1040	1830
27.9	1050	1940
29.5	980	1840
31.2	950	1720
32.8	940	1780
34.5	900	1800
36.1	900	1750
37.7	870	1680
39.4	830	1950
41.0	790	2370
42.7	760	2940
44.3	820	4380
45.9	850	5260
47.6	940	5220
49.2	980	5300
50.9	970	5340
52.5	970	5340
54.1	970	5170
55.8	990	5260
57.4	1040	5340
59.1	1060	5390
60.7	1060	5220
62.3	1060	5300
64.0	1100	5300
65.6	1150	5340
67.3	1200	5170
68.9	1290	5260
70.5	1320	4720
72.2	1400	4320
73.8	1520	4410
75.5	1630	4150
77.1	1770	4470
78.7	1760	3900
80.4	1610	3810
82.0	1530	3780
83.7	1450	4150
85.3	1570	5200
86.9	1760	5740
88.6	1890	5740
90.2	1820	5720
91.9	1640	5720
93.5	1850	5870
95.1	2090	5950
96.8	2560	6650
98.4	2900	7010
100.1	2690	7050
101.7	2180	7050
103.4	1740	6460
105.0	1410	5670
106.6	1220	5410
108.3	1180	5410
109.9	1170	5390
111.6	1150	5500
113.2	1100	5460
114.8	1050	5390
116.5	1040	5410
118.1	1040	5650
119.8	1050	5500
121.4	1130	5550
123.0	1350	5720
124.7	1660	6010
126.3	2030	6620
128.0	2250	6550
129.6	2260	6490
131.2	2070	6490
132.9	1620	6090
134.5	1400	5800
136.2	1220	5620
137.8	1130	5410
139.4	1140	5410
141.1	1150	5390
142.7	1160	5410
144.7	1190	5500
146.0	1210	5410
147.6	1280	5370
149.3	1320	5390
150.9	1320	5240
152.6	1320	5340
154.2	1320	5340
155.8	1320	5280
157.5	1340	5620
159.1	1490	5620
160.8	1510	5720
160.8	1470	5620
162.4	1450	5620
165.7	1360	5390
167.3	1280	5340
169.0	1280	5260
170.6	1270	5200
172.2	1240	5170
173.9	1240	5200
175.5	1200	5240
177.2	1200	5300
178.8	1200	5300
180.4	1200	5320
182.1	1210	5320
183.7	1210	5300
185.4	1210	5300
187.0	1210	5220
188.7	1240	5220
190.3	1220	5200
191.9	1200	5150

Table A-4. Boring B-307, S - R1 quality assurance analysis P- and S_H-wave data

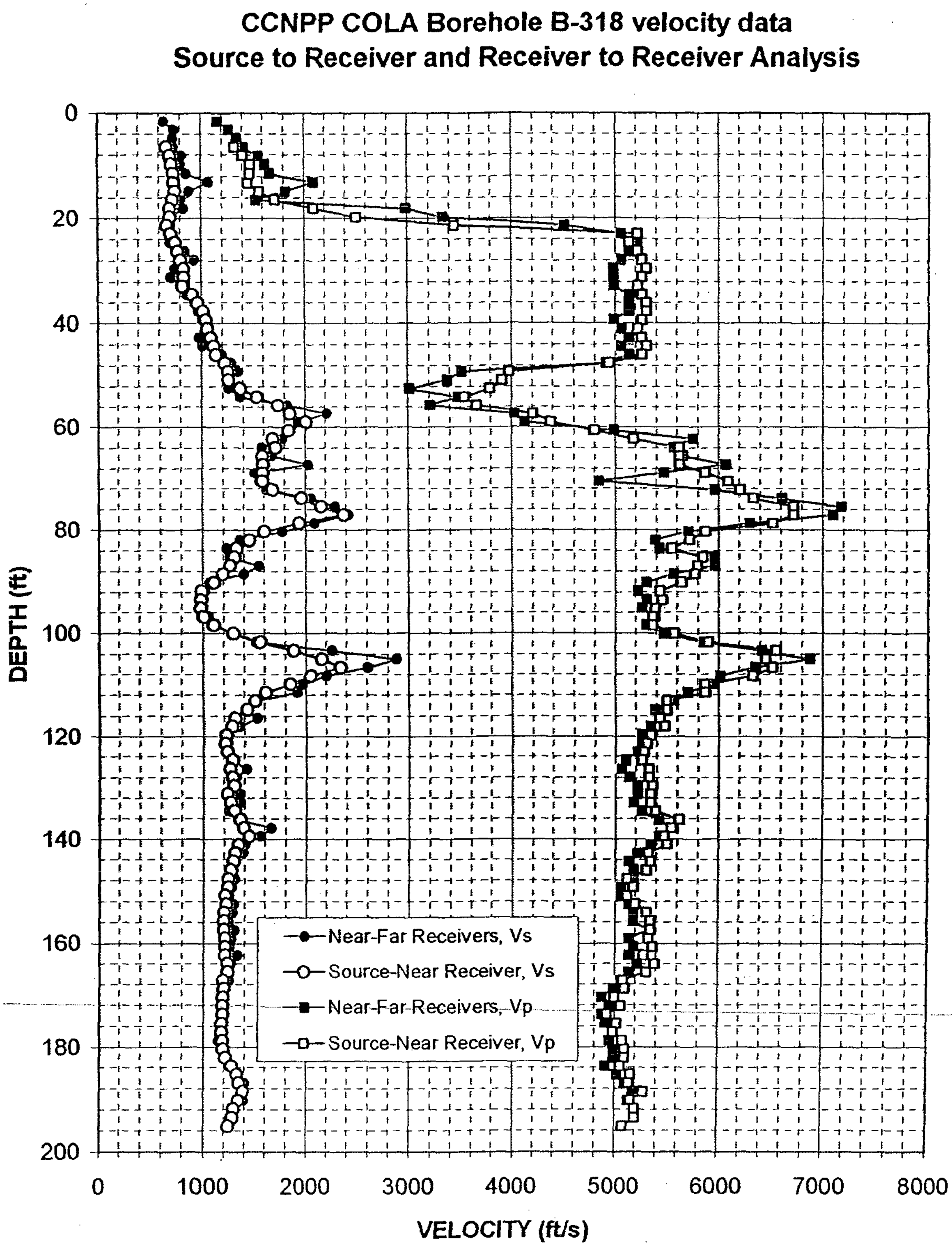


Figure A-5. Boring B-318, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	670	1320
8.2	700	1400
9.8	720	1480
11.5	740	1470
13.1	740	1450
14.8	750	1560
16.4	730	1720
18.0	700	2100
19.7	700	2510
21.3	670	3450
23.0	710	5220
24.6	750	5130
26.3	770	5220
27.9	800	5260
29.5	830	5300
31.2	830	5260
32.8	820	5220
34.5	910	5260
36.1	960	5300
37.7	1020	5300
39.4	1040	5260
41.0	1060	5220
42.7	1090	5260
44.3	1120	5300
45.9	1140	5260
47.6	1220	4940
49.2	1250	3980
50.9	1260	3900
52.5	1370	3790
54.1	1530	3540
55.8	1740	3660
57.4	1850	4210
59.1	2010	4380
60.7	1840	4790
62.3	1690	5170
64.0	1720	5620
65.6	1580	5620
67.3	1590	5620
68.9	1590	5870
70.5	1580	6090
72.2	1680	6210
73.8	1960	6330
75.5	2160	6720
77.1	2380	6720
78.7	1940	6520
80.4	1600	5870
82.0	1460	5720
83.7	1330	5550
85.3	1310	5850
86.9	1260	5800
88.6	1190	5770
90.2	1110	5650
91.9	990	5430
93.5	980	5460
95.1	980	5390
96.8	1010	5370
98.4	1110	5370
100.1	1290	5570
101.7	1560	5900
103.4	1880	6550
105.0	2160	6460
106.6	2350	6520
108.3	2050	6330
109.9	1850	5870
111.6	1610	5870
113.2	1510	5500
114.8	1430	5500
116.5	1310	5430
118.1	1280	5480
119.8	1220	5340
121.4	1210	5300
123.0	1230	5280
124.7	1290	5260
126.3	1260	5320
128.0	1290	5320
129.6	1300	5370
131.2	1230	5340
132.9	1270	5340
134.5	1300	5390
136.2	1360	5620
137.8	1390	5550
139.4	1450	5480
141.1	1340	5500
142.7	1310	5320
144.4	1290	5340
146.0	1270	5300
147.6	1240	5110
149.3	1240	5170
150.9	1210	5110
152.6	1220	5200
154.2	1200	5300
155.8	1200	5340
157.5	1200	5340
159.1	1210	5320
160.8	1210	5370
162.4	1210	5280
164.0	1230	5390
165.7	1230	5300
167.3	1190	5070
169.0	1200	5090
170.6	1190	5000
172.2	1180	5050
173.9	1180	4920
175.5	1180	5020
177.2	1180	4980
178.8	1180	5070
180.4	1190	5090
182.1	1210	5090
183.7	1270	5050
185.4	1320	5150
187.0	1340	5130
188.7	1380	5280
190.3	1340	5150
191.9	1290	5200
193.6	1280	5200
195.2	1240	5070

Table A-5. Boring B-318, S - R1 quality assurance analysis P- and S_H-wave data

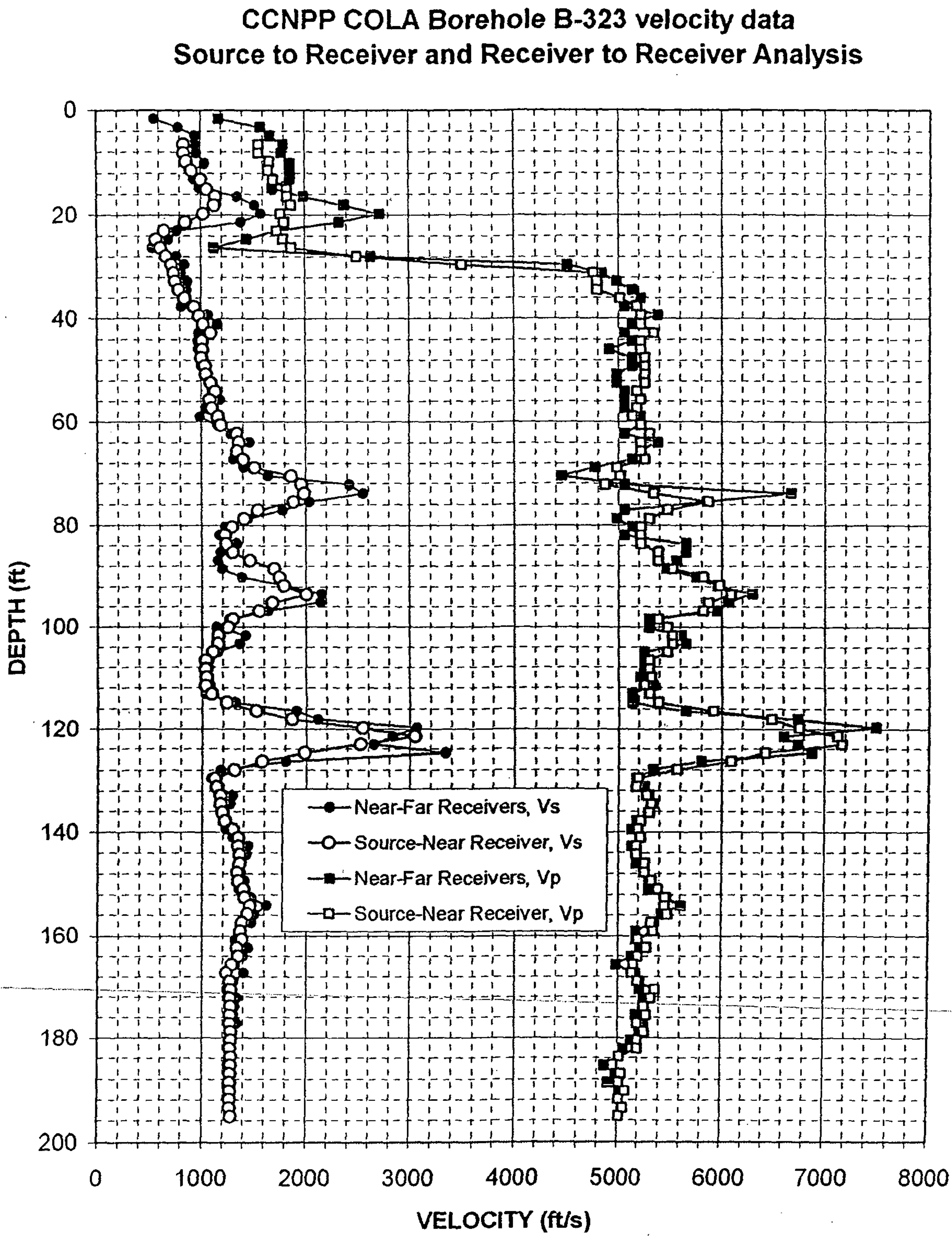


Figure A-6. Boring B-323, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	840	1560
8.2	840	1550
9.8	860	1660
11.5	910	1650
13.1	1000	1700
15.1	1060	1830
16.4	1140	1830
18.0	1130	1870
19.7	1030	1770
21.3	850	1810
23.0	650	1730
24.6	570	1790
26.3	610	1870
27.9	660	2500
29.5	720	3510
31.2	740	4760
32.8	760	4790
34.5	790	4790
36.1	840	5020
37.7	930	5170
39.4	980	5220
41.0	1020	5220
42.7	1090	5340
44.3	1010	5220
45.9	1010	5220
47.6	1000	5260
49.2	1040	5260
50.9	1040	5260
52.5	1090	5260
54.1	1130	5170
55.8	1080	5220
57.4	1100	5170
59.1	1160	5130
60.7	1190	5220
62.3	1340	5300
64.0	1360	5220
65.6	1340	5220
67.3	1400	5260
68.9	1510	4980
70.5	1860	5020
72.2	1960	4870
73.8	1990	5340
75.5	1880	5870
77.1	1540	5480
78.7	1410	5300
80.4	1290	5220
82.0	1230	5220
83.7	1230	5220
85.3	1300	5390
86.9	1460	5390
88.6	1700	5530
90.2	1750	5820
91.9	1790	5980
93.5	2010	6090
95.1	1680	5870
96.8	1550	5820
98.4	1300	5390
100.1	1250	5480
101.7	1160	5530
103.4	1150	5530
105.0	1110	5480
106.6	1040	5300
108.3	1040	5300
109.9	1040	5320
111.6	1040	5260
113.2	1090	5300
114.8	1230	5390
116.5	1520	5930
118.1	1860	6490
119.8	2550	6760
121.4	3050	7130
123.0	2520	7160
124.7	1990	6420
126.3	1570	6090
128.0	1310	5570
129.6	1120	5200
131.2	1140	5170
132.9	1180	5280
134.5	1180	5320
136.2	1190	5300
137.8	1220	5220
139.4	1300	5200
141.1	1350	5220
142.7	1350	5170
144.4	1360	5170
146.0	1360	5260
147.6	1340	5260
149.3	1350	5320
150.9	1400	5390
152.6	1410	5460
154.2	1460	5460
155.8	1440	5480
157.5	1380	5320
159.1	1370	5340
160.8	1380	5200
162.4	1340	5280
164.0	1350	5200
165.7	1290	5150
167.3	1230	5130
169.0	1270	5200
170.6	1280	5370
172.2	1270	5320
173.9	1280	5260
175.5	1270	5280
177.2	1270	5200
178.8	1280	5260
180.4	1280	5200
182.1	1270	5200
183.7	1280	5020
185.4	1280	4960
187.0	1270	5030
188.7	1270	5020
190.3	1270	5070
191.9	1270	5020
193.6	1270	5050
195.2	1280	5020

Table A-6. Boring B-323, S - R1 quality assurance analysis P- and S_H-wave data

CCNPP COLA Borehole B-401 velocity data
Source to Receiver and Receiver to Receiver Analysis

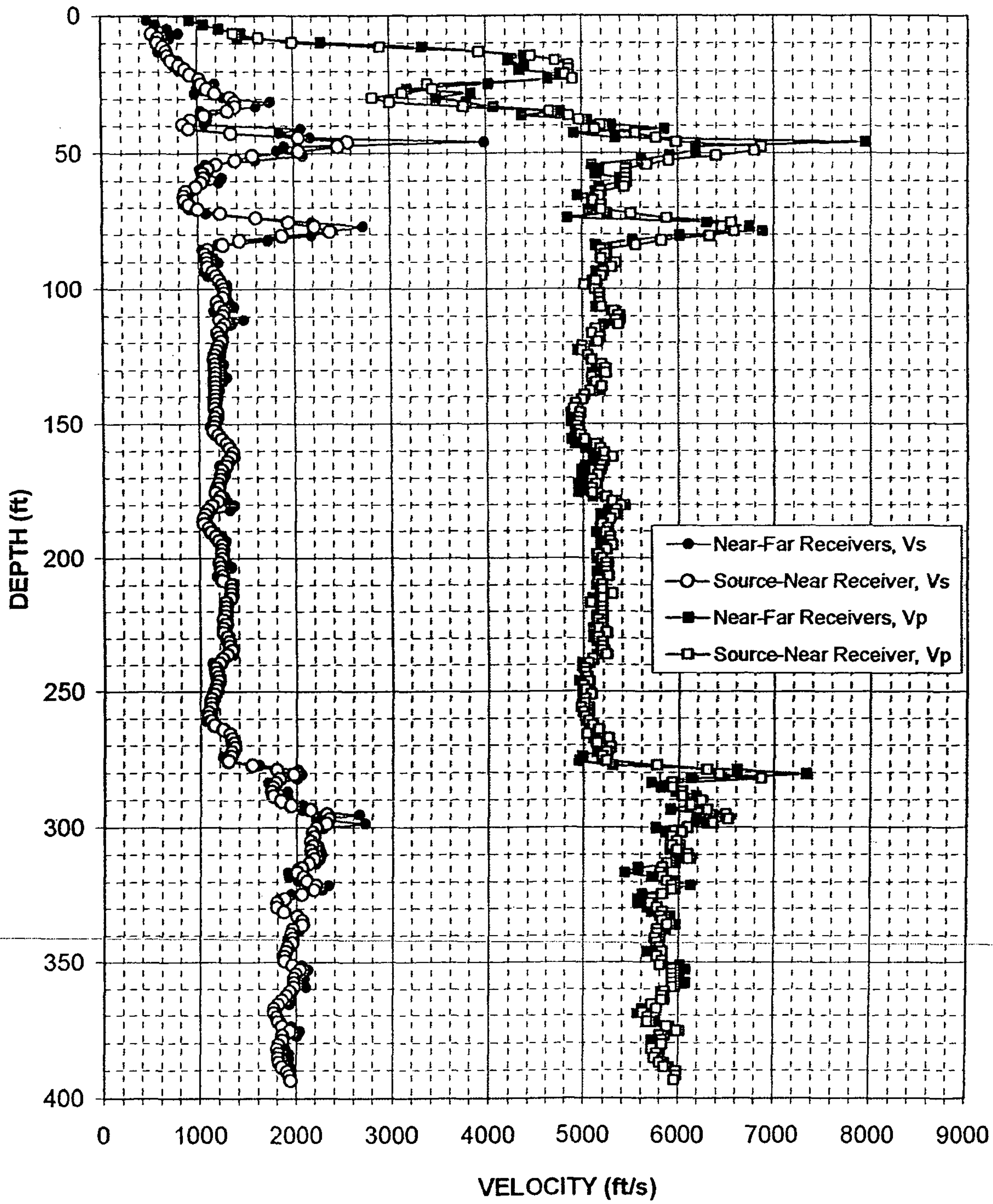


Figure A-7. Boring B-401, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	530	1380
8.2	590	1640
9.8	580	1990
11.5	640	2910
13.1	680	3930
14.8	700	4470
16.4	730	4720
18.0	810	4870
19.7	870	4870
21.3	930	4830
23.0	1020	4900
24.6	1040	3400
26.3	1100	3450
27.9	1180	3130
29.5	1340	2820
31.2	1380	3000
32.8	1390	3770
34.5	1310	4660
36.1	1070	4870
37.7	930	4980
39.4	850	5200
41.0	910	5130
42.7	1340	5550
44.3	2050	5770
45.9	2570	5980
47.6	2470	6860
49.2	2050	6790
50.9	1570	6390
52.5	1380	5900
54.1	1190	5670
55.8	1110	5460
57.4	1060	5460
59.1	1060	5460
60.7	1030	5460
62.3	980	5430
64.0	870	5200
65.6	860	5170
67.3	860	5110
68.9	900	5200
70.5	1000	5200
72.2	1230	5500
73.8	1600	5870
75.5	1940	6550
77.1	2220	6460
78.7	2380	6590
80.4	1870	6330
82.0	1430	5820
83.7	1250	5550
85.3	1100	5200
86.9	1070	5240
88.6	1090	5200
90.2	1090	5340
91.9	1100	5300
93.5	1150	5220
95.1	1180	5200
96.8	1210	5130
98.4	1240	5020
100.1	1260	5130
101.7	1270	5170
103.4	1250	5170
105.0	1190	5170
106.6	1220	5200
108.3	1260	5320
109.9	1250	5370
111.6	1220	5340
113.2	1270	5370
114.8	1230	5130
116.5	1190	5090
118.1	1210	5170
119.8	1230	5150
121.4	1200	5000
123.0	1190	5000
124.7	1160	5050
126.3	1160	5090
128.0	1170	5200
129.6	1170	5240
131.2	1170	5240
132.9	1170	5090
134.5	1170	5130
136.2	1170	5200
137.8	1170	5070
139.4	1160	5020
141.1	1170	5000
142.7	1170	4920
144.4	1170	4900
146.0	1190	4980
147.6	1170	4960
149.3	1170	4960
150.9	1160	4940
152.6	1150	4960
154.2	1200	4980
155.8	1230	5020
157.5	1280	5130
159.1	1310	5170
160.8	1340	5220
162.4	1330	5300
164.0	1290	5220
165.7	1280	5200
167.3	1240	5170
169.0	1220	5150
170.6	1220	5090
172.2	1200	5130
173.9	1200	5090
175.5	1160	5090
177.2	1210	5240
178.8	1190	5300
180.4	1130	5390
182.1	1080	5340
183.7	1060	5320
185.4	1030	5280
187.0	1040	5200
188.7	1090	5260
190.3	1120	5240
191.9	1170	5280
193.6	1200	5280
195.2	1230	5300
196.9	1230	5240
198.5	1230	5150
200.1	1230	5200
201.8	1200	5240
203.4	1210	5240
205.1	1220	5240
206.7	1230	5260
208.3	1230	5150
210.0	1330	5200
211.6	1330	5200
213.3	1330	5300
214.9	1320	5200
216.5	1270	5070
218.2	1270	5200
219.8	1270	5200
221.5	1260	5200
223.1	1240	5150
224.7	1270	5200
226.4	1240	5150
228.0	1240	5240
229.7	1280	5150
231.3	1300	5200
232.9	1300	5200
234.6	1330	5200
236.2	1280	5240
237.9	1230	5090
239.5	1200	5050
241.1	1160	5020
242.8	1170	5020
244.4	1180	5030
246.1	1190	5050
247.7	1170	5000
249.3	1160	5020
251.0	1140	5070

Table A-7. Boring B-401, S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
252.6	1110	5020
254.3	1110	5020
255.9	1110	4980
257.5	1090	5000
259.2	1090	5020
260.8	1110	5050
262.5	1140	5090
264.1	1230	5150
265.8	1300	5030
267.4	1330	5260
269.0	1340	5130
270.7	1350	5280
272.3	1320	5240
274.0	1310	5200
275.6	1290	5240
277.2	1540	5770
278.9	1790	6300
280.5	1970	6420
282.2	1820	6860
283.8	1780	5930
285.4	1750	5930
287.1	1740	6040
288.7	1750	6040
290.4	1830	6240
292.0	1940	6120
293.6	2140	6300
295.3	2320	6490
296.9	2350	6520
298.6	2320	6360
300.2	2210	6090
301.8	2170	6040
303.5	2190	5930
305.1	2150	5980
306.8	2170	5930
308.4	2150	5980
310.0	2170	6090
311.7	2190	6090
313.3	2130	5870
315.0	2060	5820
316.6	2010	5800
318.2	2070	5820
319.9	2110	5870
321.5	2210	5930
323.2	2190	5930
324.8	2060	5820
326.4	1870	5720
328.1	1790	5690
329.7	1790	5770
331.4	1860	5820
333.0	2010	5800
334.6	2060	5820
336.3	2060	5870
337.9	1950	5770
339.6	1940	5770
341.2	1950	5740
342.9	1950	5770
344.5	1910	5800
346.1	1890	5820
347.8	1870	5770
349.4	1870	5820
351.1	1950	5800
352.7	2040	5930
354.3	1990	5930
356.0	1970	5930
357.6	1970	5930
359.3	1970	5930
360.9	1920	5850
362.5	1890	5820
364.2	1850	5820
365.8	1810	5720
367.5	1760	5770
369.1	1760	5620
370.7	1790	5670
372.4	1810	5670
374.0	1850	5870
375.7	1920	5980
377.3	1850	5800
378.9	1850	5820
380.6	1810	5820
382.2	1790	5720
383.9	1810	5770
385.5	1810	5740
387.1	1820	5800
388.8	1850	5850
390.4	1910	5980
392.1	1920	5980
393.7	1940	5950

Table A-7, continued. Boring B-401, S - R1 quality assurance analysis P- and S_H-wave data

CCNPP COLA Borehole B-404 velocity data
Source to Receiver and Receiver to Receiver Analysis

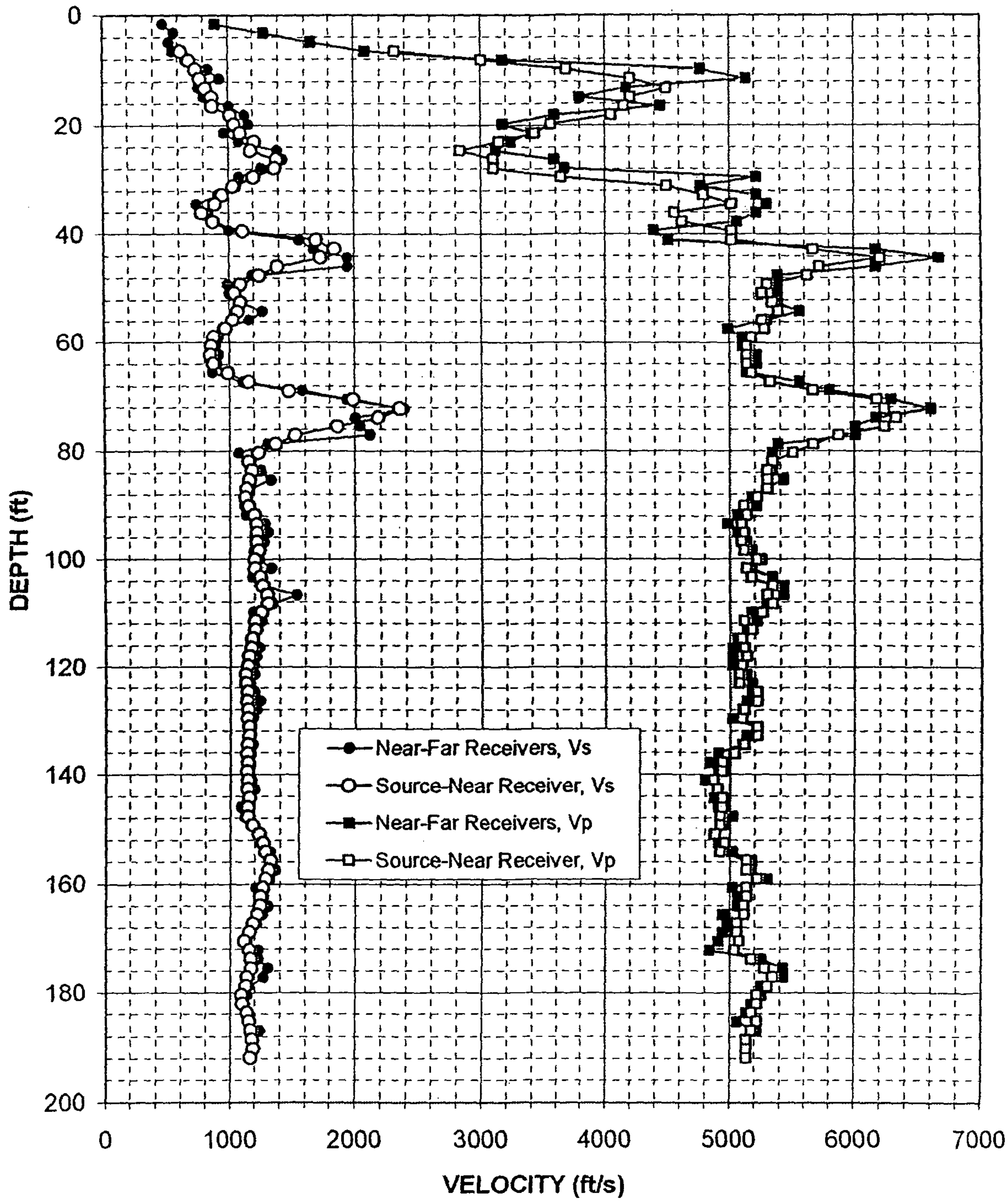


Figure A-8. Boring B-404, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	620	2320
8.2	690	3000
9.8	740	3680
11.5	780	4210
13.1	820	4500
14.8	870	4210
16.4	880	4150
18.0	1020	4050
19.7	1050	3560
21.3	1100	3430
23.0	1210	3150
24.6	1180	2830
26.3	1380	3100
27.9	1370	3100
29.5	1200	3640
31.2	1040	4500
32.8	950	4790
34.5	890	5020
36.1	780	4560
37.7	880	4620
39.4	1110	5020
41.0	1690	5020
42.7	1840	5670
44.3	1730	6210
45.9	1380	5720
47.6	1240	5620
49.2	1090	5300
50.9	1040	5260
52.5	1090	5340
54.1	1070	5390
55.8	1030	5260
57.4	970	5280
59.1	880	5170
60.7	850	5130
62.3	850	5130
64.0	870	5130
65.6	990	5170
67.3	1150	5320
68.9	1470	5670
70.5	1980	6180
72.2	2350	6240
73.8	2180	6330
75.5	1860	6240
77.1	1520	5870
78.7	1370	5670
80.4	1230	5500
82.0	1150	5340
83.7	1180	5300
85.3	1160	5300
86.9	1140	5300
88.6	1130	5220
90.2	1160	5110
91.9	1200	5130
93.5	1220	5090
95.1	1220	5110
96.8	1220	5090
98.4	1230	5110
100.1	1200	5220
101.7	1200	5130
103.4	1250	5170
105.0	1270	5340
106.6	1300	5300
108.3	1310	5340
109.9	1250	5260
111.6	1200	5110
113.2	1200	5170
114.8	1180	5090
116.5	1170	5110
118.1	1150	5130
119.8	1140	5090
121.4	1130	5070
123.0	1130	5070
124.7	1140	5220
126.3	1130	5220
128.0	1150	5110
129.6	1140	5090
131.2	1150	5220
132.9	1150	5220
134.5	1140	5110
136.2	1140	5030
137.8	1140	4940
139.4	1140	4940
141.1	1140	4870
142.7	1140	4900
144.4	1150	4940
146.0	1140	4940
147.6	1140	4920
149.3	1180	4920
150.9	1230	4880
152.6	1270	4960
154.2	1290	4920
155.8	1320	5130
157.5	1310	5130
159.1	1290	5220
160.8	1260	5130
162.4	1240	5130
164.0	1240	5110
165.7	1220	5110
167.3	1190	5050
169.0	1150	5050
170.6	1110	5070
172.2	1150	5030
173.9	1170	5170
175.5	1170	5280
177.2	1130	5340
178.8	1130	5300
180.4	1090	5220
182.1	1100	5220
183.7	1130	5170
185.4	1150	5220
187.0	1170	5170
188.7	1180	5130
190.3	1190	5130
191.9	1160	5130

Table A-8. Boring B-404, S - R1 quality assurance analysis P- and S_H-wave data

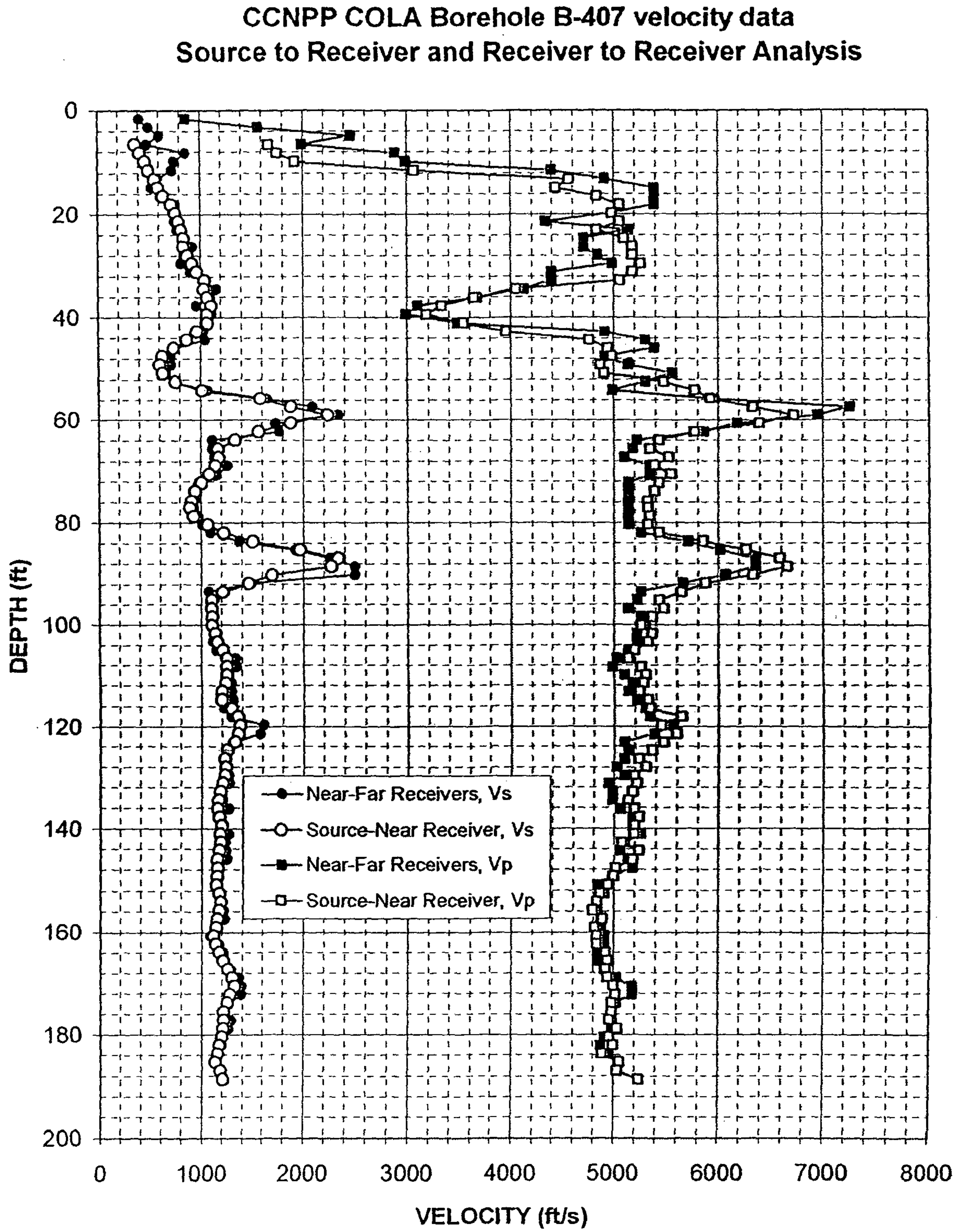


Figure A-9. Boring B-407, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	370	1670
8.2	410	1750
9.8	460	1920
11.5	500	3060
13.1	560	4560
14.8	590	4440
16.4	640	4830
18.0	720	5050
19.7	760	4980
21.3	790	5050
23.0	820	4830
24.6	840	5090
26.3	840	5170
27.9	880	5170
29.5	920	5260
31.2	960	5170
32.8	1040	5050
34.5	1030	4050
36.1	1060	3640
37.7	1110	3330
39.4	1060	3180
41.0	1070	3540
42.7	960	3950
44.3	870	4760
45.9	740	4940
47.6	630	4980
49.2	600	4870
50.9	630	4900
52.5	760	5480
54.1	1010	5770
55.8	1580	5930
57.4	1880	6330
59.1	2240	6720
60.7	1880	6390
62.3	1560	5770
64.0	1330	5430
65.6	1170	5340
67.3	1170	5530
68.9	1140	5390
70.5	1080	5550
72.2	1010	5430
73.8	940	5390
75.8	910	5320
77.1	890	5320
78.7	930	5340
80.4	1060	5320
82.0	1220	5430
83.7	1510	5850
85.3	1970	6270
86.9	2340	6590
88.6	2270	6650
90.2	1690	6330
91.9	1470	5870
93.5	1210	5650
95.1	1100	5430
96.8	1100	5480
98.4	1110	5370
100.1	1110	5260
101.7	1140	5370
103.4	1160	5320
105.0	1210	5200
106.6	1250	5130
108.3	1250	5260
109.9	1250	5300
111.6	1240	5280
113.2	1200	5240
114.8	1200	5320
116.5	1290	5340
118.1	1360	5650
119.8	1380	5460
121.4	1360	5600
123.0	1330	5480
124.7	1250	5370
126.3	1230	5240
128.0	1240	5300
129.6	1230	5200
131.2	1210	5220
132.9	1180	5170
134.5	1170	5130
136.2	1160	5200
137.8	1170	5240
139.4	1200	5200
141.1	1180	5200
142.7	1190	5070
144.4	1170	5240
146.0	1150	5170
147.6	1160	5020
149.3	1150	5000
150.9	1150	4940
152.6	1170	4870
154.2	1190	4830
155.8	1170	4790
157.5	1150	4880
159.1	1150	4810
160.8	1120	4830
162.4	1140	4830
164.0	1170	4920
165.7	1210	4940
167.3	1260	4920
169.0	1300	4940
170.6	1320	5000
172.2	1280	5020
173.9	1250	4980
175.5	1220	4980
177.2	1220	4960
178.8	1210	5030
180.4	1200	4960
182.1	1170	5000
183.7	1160	4880
185.4	1140	5050
187.0	1180	5030
188.7	1210	5240

Table A-9. Boring B-407, S - R1 quality assurance analysis P- and S_H-wave data

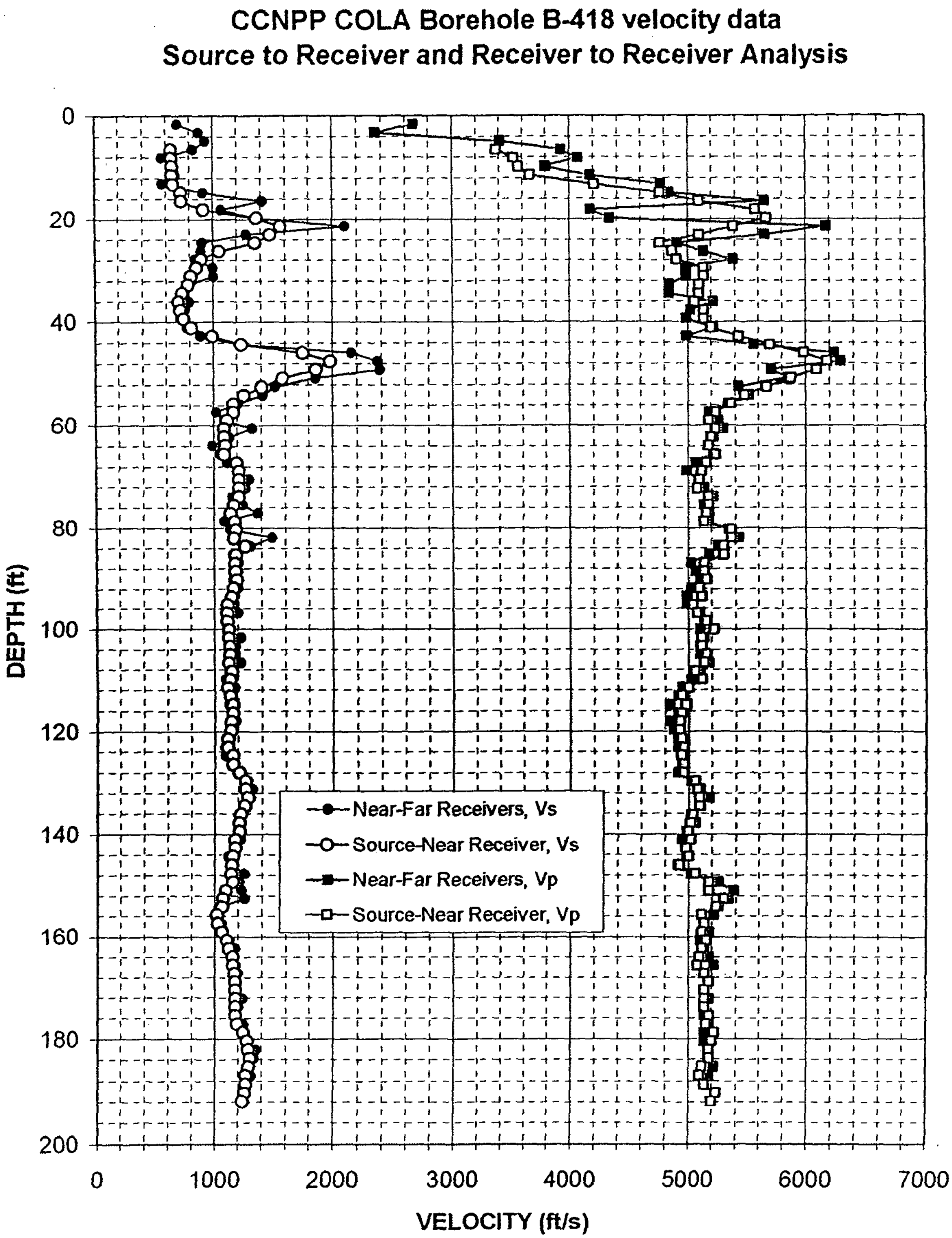


Figure A-10. Boring B-418, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	650	3380
8.2	650	3520
9.8	660	3560
11.5	660	3660
13.1	660	4210
14.8	730	4760
16.4	740	5090
18.0	920	5570
19.7	1360	5670
21.3	1560	5390
23.0	1470	5090
24.6	1350	4760
26.3	1050	4870
27.9	900	4900
29.5	860	5130
31.2	810	5130
32.8	790	5090
34.5	740	5090
36.1	710	5050
37.7	720	5130
39.4	750	5130
41.0	810	5200
42.7	1000	5430
44.3	1230	5690
45.9	1750	5980
47.6	1980	6180
49.2	1860	6090
50.9	1580	5870
52.5	1400	5670
54.1	1250	5480
55.8	1170	5370
57.4	1170	5240
59.1	1110	5170
60.7	1090	5240
62.3	1090	5200
64.0	1100	5170
65.6	1090	5240
67.3	1190	5150
68.9	1210	5110
70.5	1210	5090
72.2	1210	5070
73.8	1210	5170
75.5	1170	5170
77.1	1140	5150
78.7	1170	5130
80.4	1180	5370
82.0	1170	5370
83.7	1260	5300
85.3	1180	5300
86.9	1170	5130
88.6	1180	5130
90.2	1190	5150
91.9	1160	5090
93.5	1150	5110
95.1	1110	5030
96.8	1110	5070
98.4	1110	5150
100.1	1120	5220
101.7	1120	5110
103.4	1130	5110
105.0	1130	5150
106.6	1120	5130
108.3	1150	5050
109.9	1130	5110
111.6	1110	5000
113.2	1130	4940
114.8	1150	4980
116.5	1150	4940
118.1	1140	4920
119.8	1140	4920
121.4	1110	4940
123.0	1110	4960
124.7	1150	4940
126.3	1150	4960
128.0	1210	4960
129.6	1260	5050
131.2	1260	5070
132.9	1290	5090
134.5	1250	5090
136.2	1220	5030
137.8	1210	5020
139.4	1210	5000
141.1	1170	5020
142.7	1170	4980
144.4	1150	5000
146.0	1150	4920
147.6	1140	5050
149.3	1150	5170
150.9	1100	5170
152.6	1070	5300
154.2	1060	5240
155.8	1020	5110
157.5	1030	5130
159.1	1060	5110
160.8	1100	5150
162.4	1120	5110
164.0	1150	5090
165.7	1150	5070
167.3	1170	5130
169.0	1170	5170
170.6	1170	5130
172.2	1170	5130
173.9	1170	5130
175.5	1170	5170
177.2	1190	5150
178.8	1240	5220
180.4	1270	5200
182.1	1290	5170
183.7	1300	5170
185.4	1290	5110
187.0	1260	5090
188.7	1260	5130
190.3	1250	5240
191.9	1230	5200

Table A-10. Boring B-418, S - R1 quality assurance analysis P- and S_H-wave data

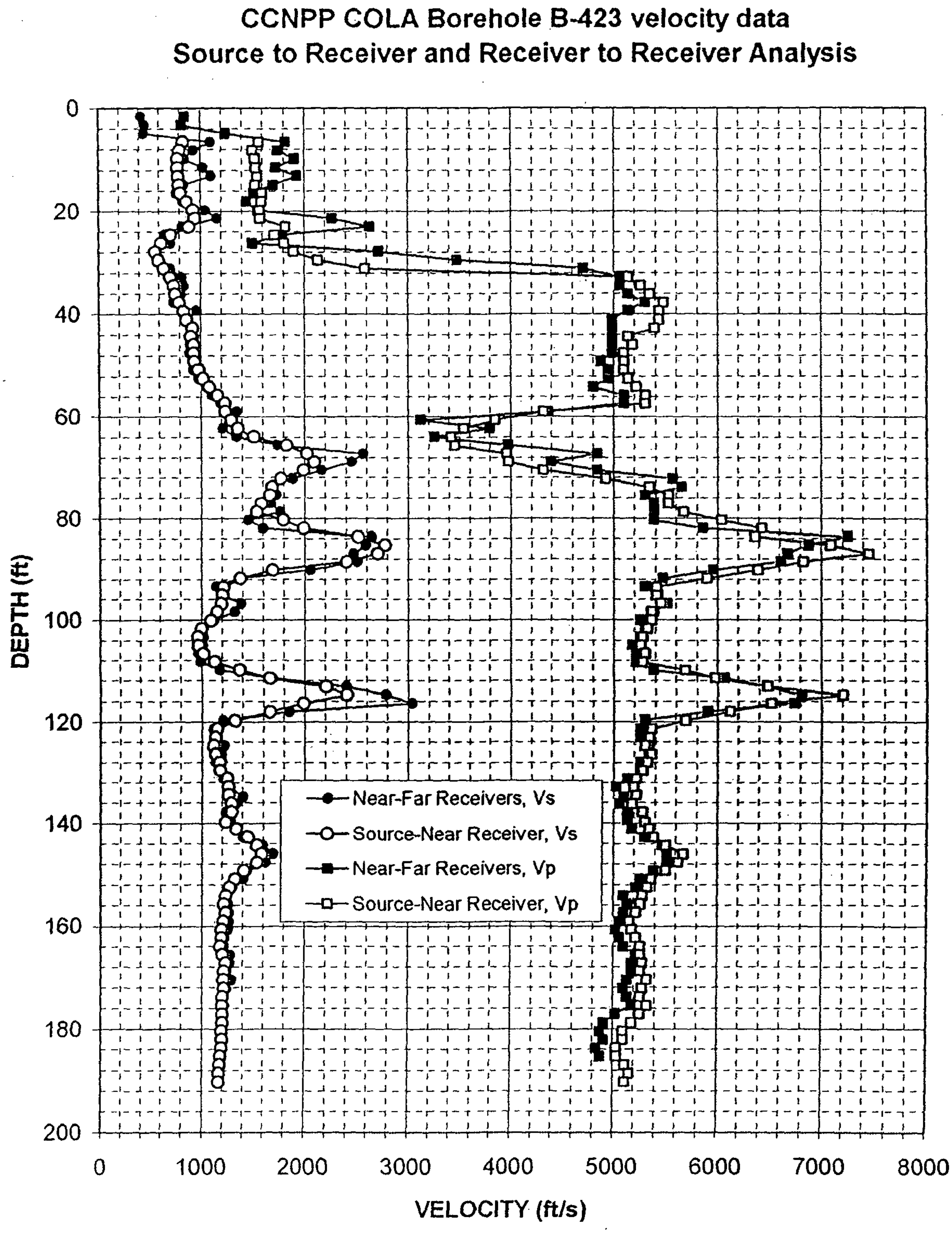


Figure A-11. Boring B-423, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)	Depth (feet)	V_s (feet/sec)	V_p (feet/sec)	Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.6	830	1560	88.6	2410	6830	170.6	1210	5320
8.2	800	1510	90.2	1690	6390	172.2	1220	5280
9.8	780	1530	91.9	1380	5900	173.9	1210	5260
11.5	780	1530	93.5	1220	5410	175.5	1200	5320
13.1	780	1550	95.1	1210	5410	177.2	1210	5260
14.8	790	1530	96.8	1190	5460	178.8	1210	5170
16.4	810	1590	98.4	1150	5370	180.4	1190	5090
18.0	870	1590	100.1	1090	5370	182.1	1200	5090
19.7	930	1570	101.7	1000	5320	183.7	1190	5030
21.3	950	1570	103.4	960	5280	185.4	1180	5030
23.0	890	1820	105.0	970	5260	187.0	1170	5110
24.6	720	1710	106.6	1020	5300	188.7	1170	5150
26.3	620	1810	108.3	1130	5280	190.3	1170	5110
27.9	560	1900	109.9	1370	5690			
29.5	590	2130	111.6	1660	5980			
31.2	650	2590	113.2	2210	6490			
32.8	710	5130	114.8	2410	7200			
34.5	740	5260	116.5	1990	6520			
36.1	760	5340	118.1	1660	6120			
37.7	800	5480	119.8	1320	5690			
39.4	830	5430	121.4	1150	5370			
41.0	860	5430	123.0	1140	5340			
42.7	920	5390	124.7	1110	5300			
44.3	910	5130	126.3	1140	5370			
45.9	930	5170	128.0	1170	5320			
47.6	940	5090	129.6	1180	5280			
49.2	940	5090	131.2	1250	5220			
50.9	980	5090	132.9	1260	5200			
52.5	1020	5130	134.5	1260	5220			
54.1	1080	5220	136.2	1290	5170			
55.8	1160	5300	137.8	1290	5280			
57.4	1230	5300	139.8	1230	5300			
59.1	1230	4320	141.1	1340	5340			
60.7	1290	3850	142.7	1450	5390			
62.3	1360	3540	144.4	1530	5500			
64.0	1510	3420	146.0	1580	5670			
65.6	1830	3460	147.6	1530	5620			
67.3	2030	3960	149.3	1410	5500			
68.9	2100	3980	150.9	1320	5370			
70.5	1990	4320	152.6	1280	5320			
72.2	1770	4920	154.2	1230	5280			
73.8	1680	5340	155.8	1220	5260			
75.5	1660	5530	157.5	1230	5220			
77.1	1580	5530	159.1	1210	5150			
78.7	1530	5670	160.8	1190	5170			
80.4	1800	6040	162.4	1190	5220			
82.0	1990	6420	164.0	1180	5260			
83.7	2520	6360	165.7	1210	5260			
85.3	2770	7090	167.3	1230	5280			
86.9	2710	7450	169.0	1220	5260			

Table A-11. Boring B-423, S - R1 quality assurance analysis P- and S_H-wave data

APPENDIX B

CALIPER, NATURAL GAMMA, RESISTIVITY, AND SPONTANEOUS POTENTIAL LOGS

ROBERTSON GEOLOGGING LIMITED

CCNPP COLA

B301ELOGUP02

COMPANY	GEOVision	OTHER SERVICES
WELL	B-301	
FIELD		
COUNTRY		
STATE		
COUNTY		
LAT.:		
LONG.:		

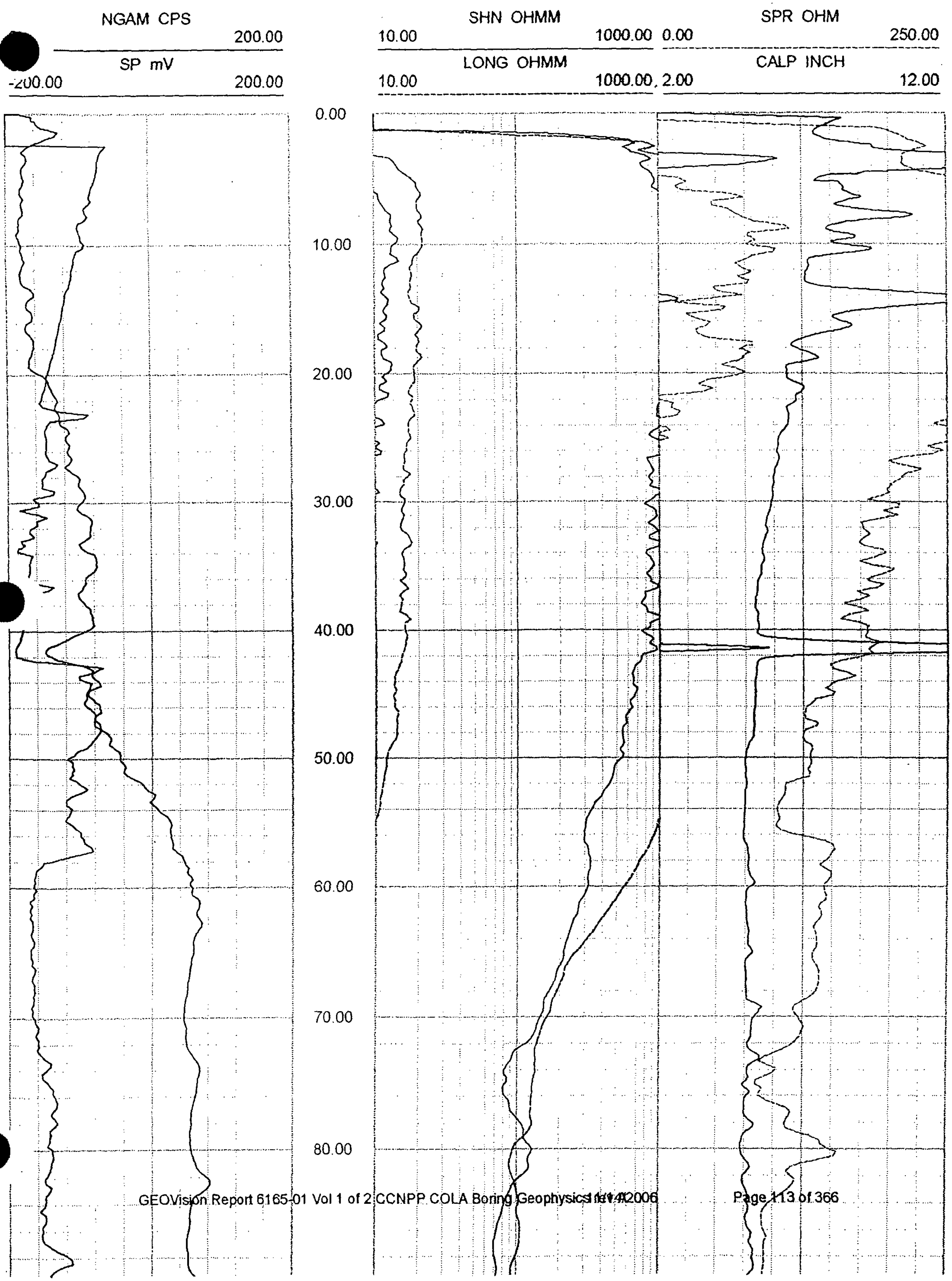
Perm. Da..	Elev	KB	0.00
Log. Datum		DF	0.00
Drill Datum		GL	0.00

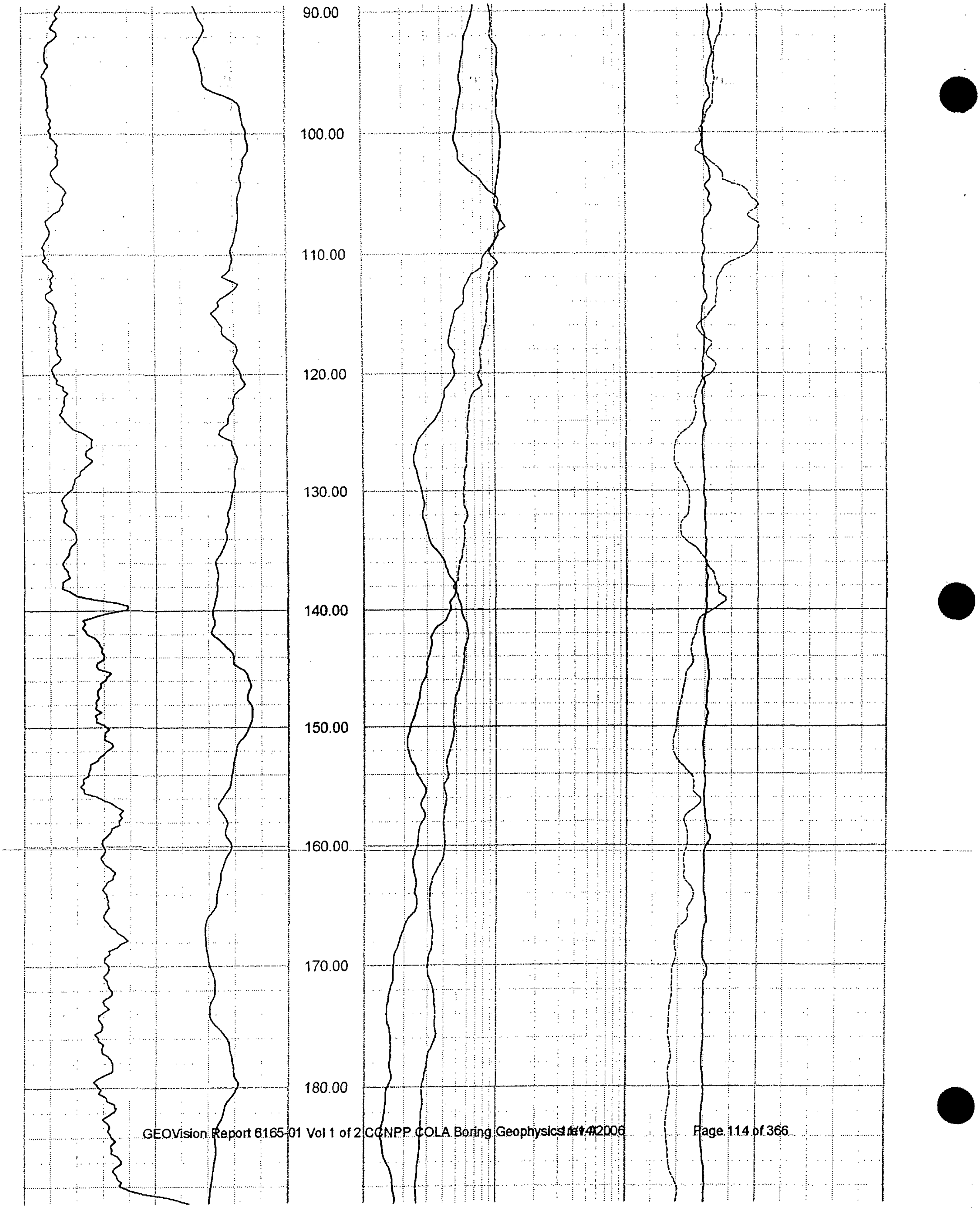
DATE	05 Jun 06	21 Oct 05	21 Oct 05
RUN#	4	0	0
TYPE OF LOG	CALIPER		
DEPTH DRILLER	403.00	0.00	0.00
DEPTH LOGGER	403.00	0.00	0.00
LOG DEEPEST	0.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
4	4.25	0.00	403.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\CC\B-301 5 June 2006 boring geophysics..


NGAM CPS
200.00
SP mV
-200.00
200.00
SHN OHMM
10.00
1000.00
LONG OHMM
10.00
1000.00
SPR OHM
0.00
250.00
CALP INCH
2.00
12.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00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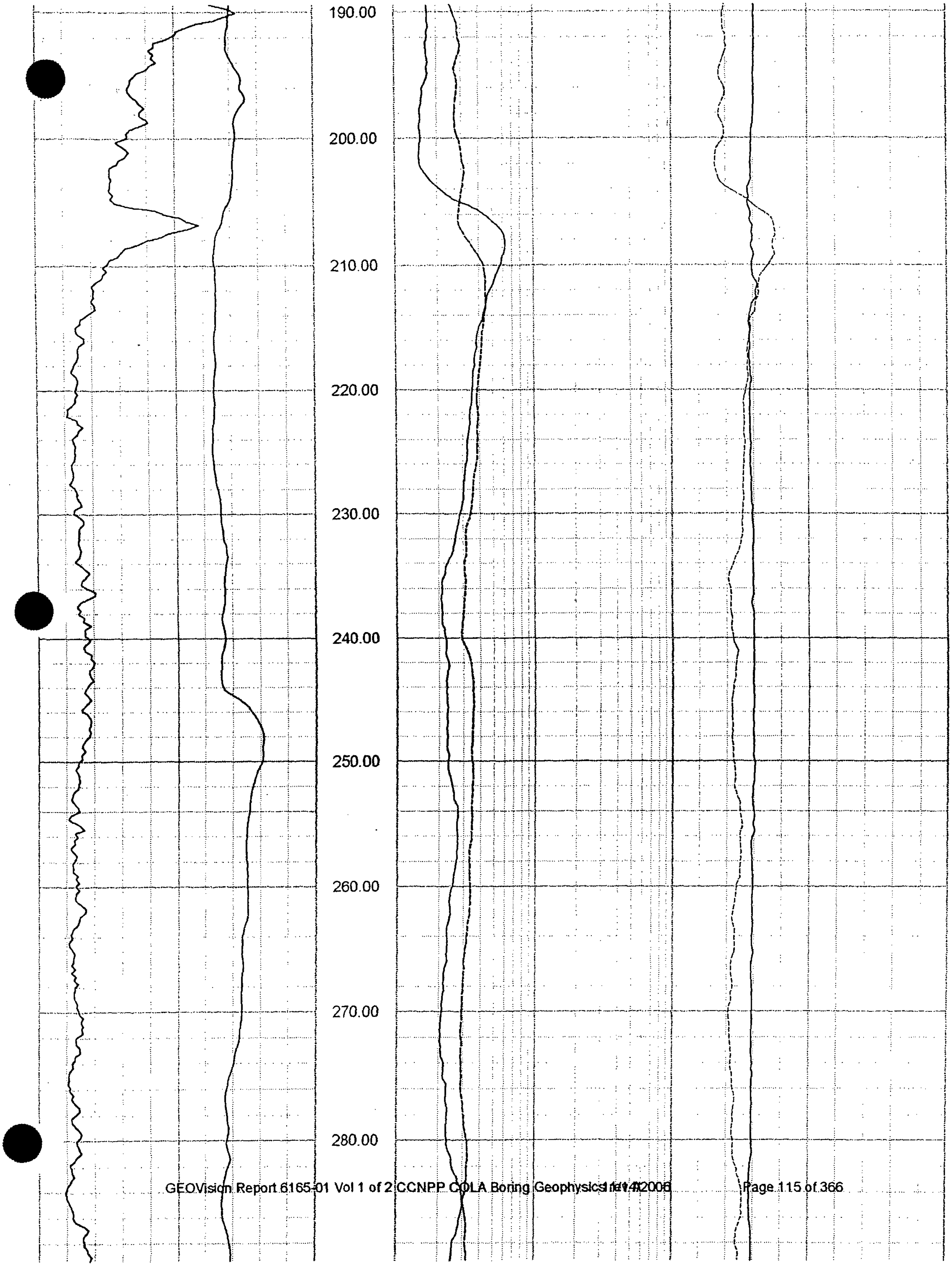
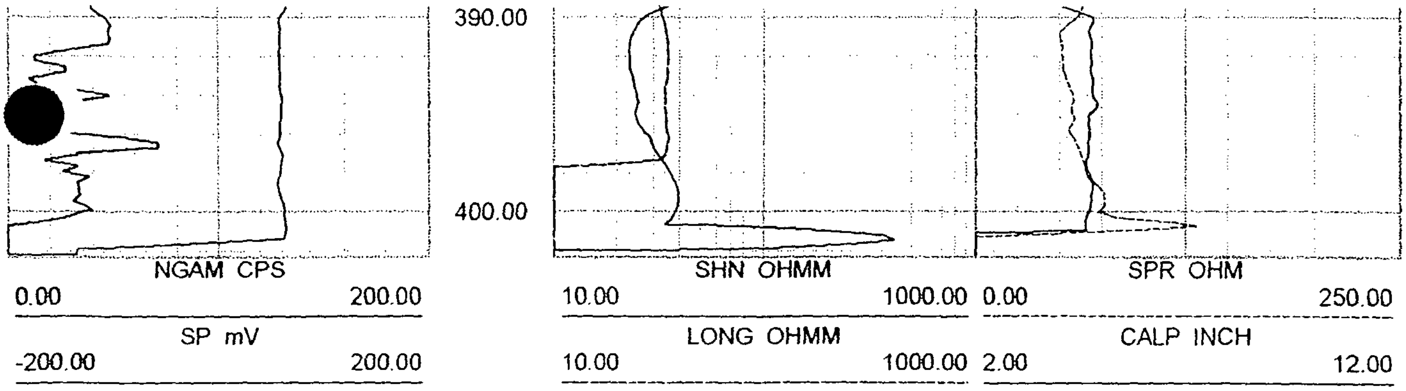
100.00
110.00
120.00
130.00
140.00
150.00
160.00
170.00
180.00


190.00
200.00
210.00
220.00
230.00
240.00
250.00
260.00
270.00
280.00


290.00
300.00
310.00
320.00
330.00
340.00
350.00
360.00
370.00
380.00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400.00
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SP mV
-200.00
200.00
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10.00
1000.00
LONG OHMM
10.00
1000.00
SPR OHM
0.00
250.00
CALP INCH
2.00
12.00

ROBERTSON GEOLOGGING LIMITED

CCNPP COLA

B304ELOGUP01

COMPANY	GEOVision
WELL	B-304
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

OTHER SERVICES

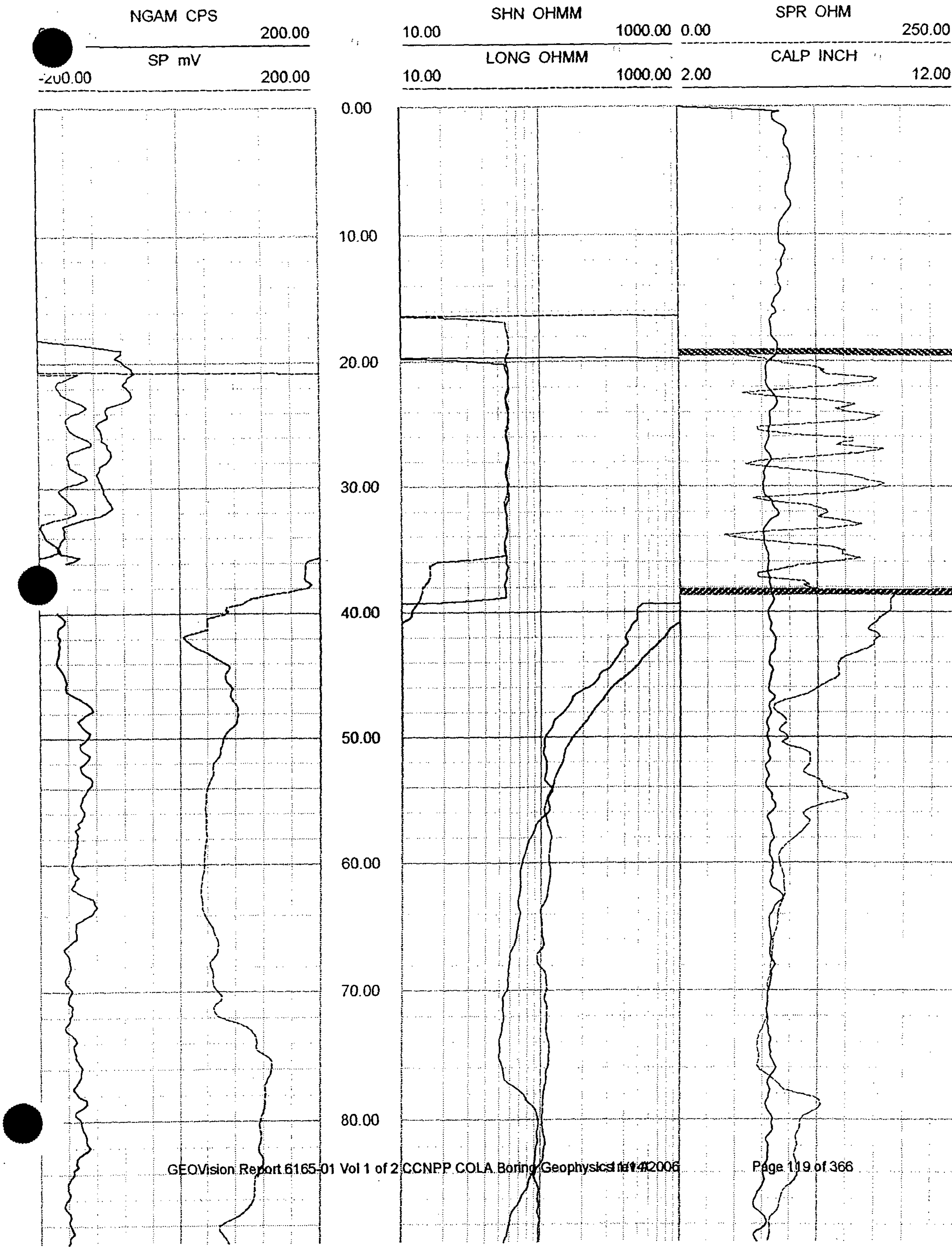
Perm. Da..	Elev	KB	0.00
Log. Datum		DF	0.00
Drill Datum		GL	0.00

DATE	01 Jun 06	21 Oct 05	21 Oct 05
RUN#	0	0	0
TYPE OF LOG			
DEPTH DRILLER	0.00	0.00	0.00
DEPTH LOGGER	0.00	0.00	0.00
LOG DEEPEST	0.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE			
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY			
WITNESSED BY			

RUN#	BIT RECORD			CASING RECORD			
	SIZE	FROM	TO	SIZE	WEIGHT	FROM	TO
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\CC\B-304 1-2 June 2006 boring geophysi..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SP mV
-200.00
200.00
SHN OHMM
10.00
1000.00
LONG OHMM
10.00
1000.00
SPR OHM
0.00
250.00
CALP INCH
2.00
12.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00


90.00
100.00
110.00
120.00
130.00
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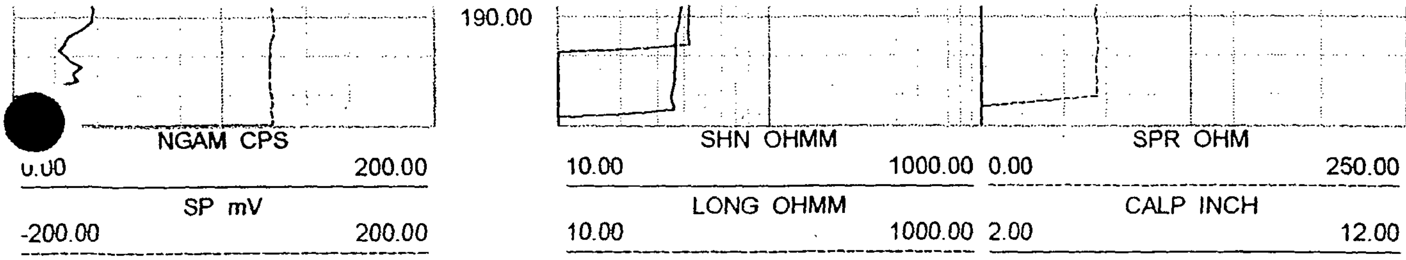
160.00
170.00
180.00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0.00 200.00
SP mV
-200.00 200.00
SHN OHMM
10.00 1000.00
LONG OHMM
10.00 1000.00
SPR OHM
0.00 250.00
CALP INCH
2.00 12.00

ROBERTSON GEOLOGGING LIMITED

CCNPP COLA

B307ELOGUP01

COMPANY	GEOVision	OTHER SERVICES
WELL	B-307	
FIELD		
COUNTRY		
STATE		
COUNTY		
LAT.:		
LONG.:		

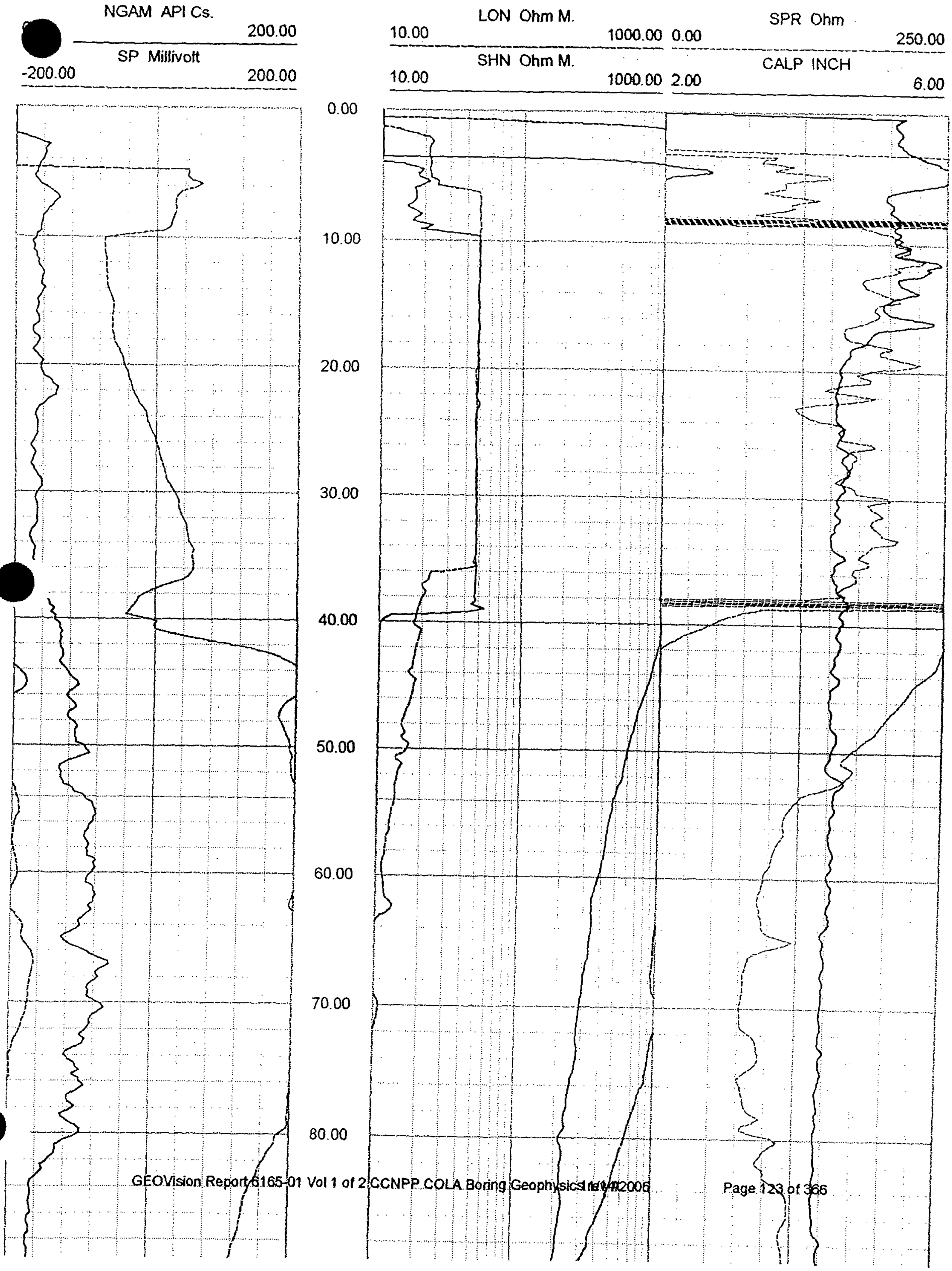
Perm. Da..	Elev	KB	0.00
Log. Datum		DF	0.00
Drill Datum		GL	0.00

DATE	15 Jun 06	21 Oct 05	21 Oct 05
RUN#	5	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	200.00	0.00	0.00
DEPTH LOGGER	200.00	0.00	0.00
LOG DEEPEST	200.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD			CASING RECORD			
	SIZE	FROM	TO	SIZE	WEIGHT	FROM	TO
5	4.25	0.00	200.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\CC\B-307 15 June 2006 boring geophysic..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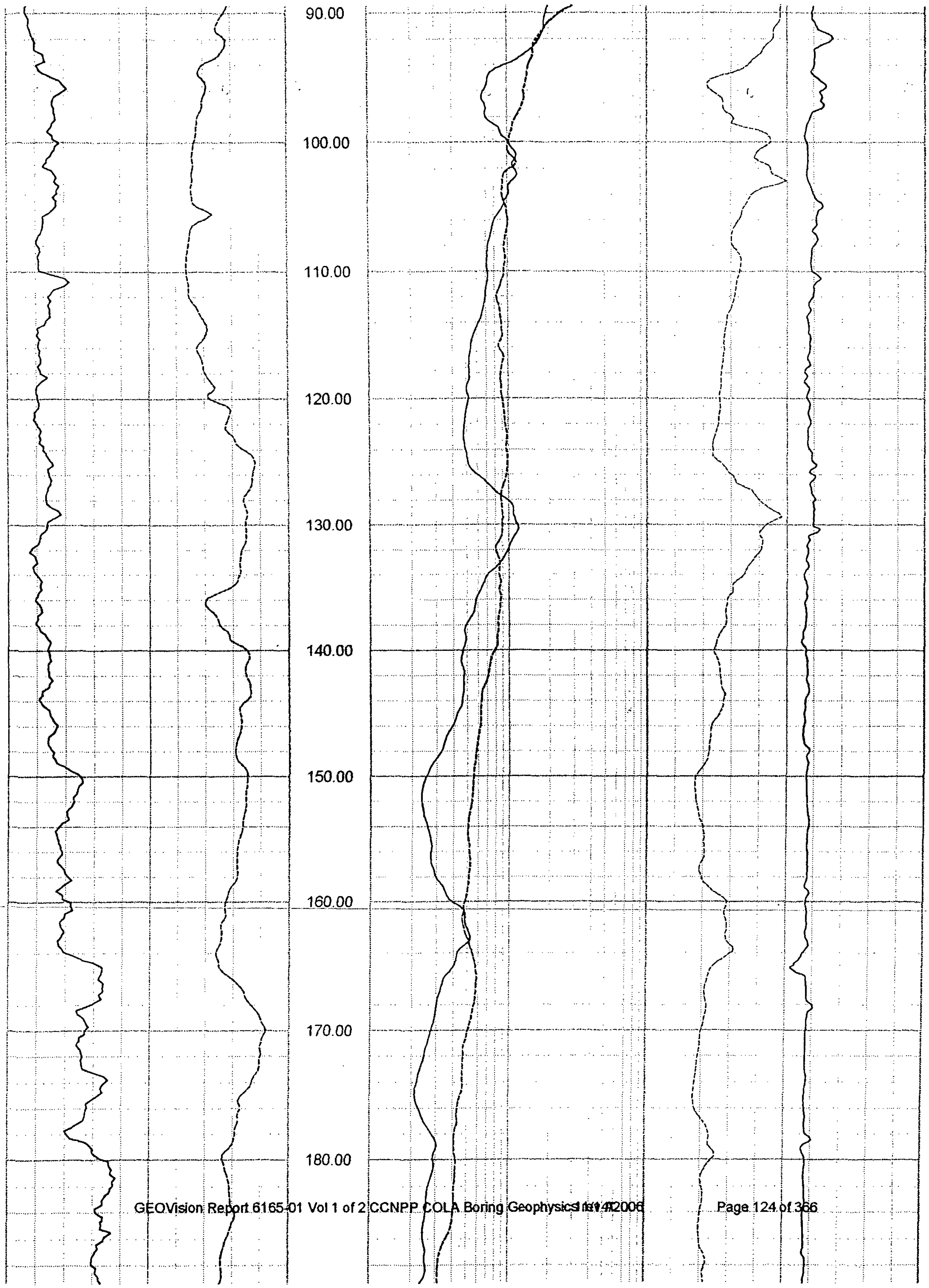
-200.00
200.00
LON Ohm M.
10.00
1000.00
SHN Ohm M.
10.00
1000.00
SPR Ohm
0.00
250.00
CALP INCH
2.00
6.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00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100.00
110.00
120.00
130.00
140.00
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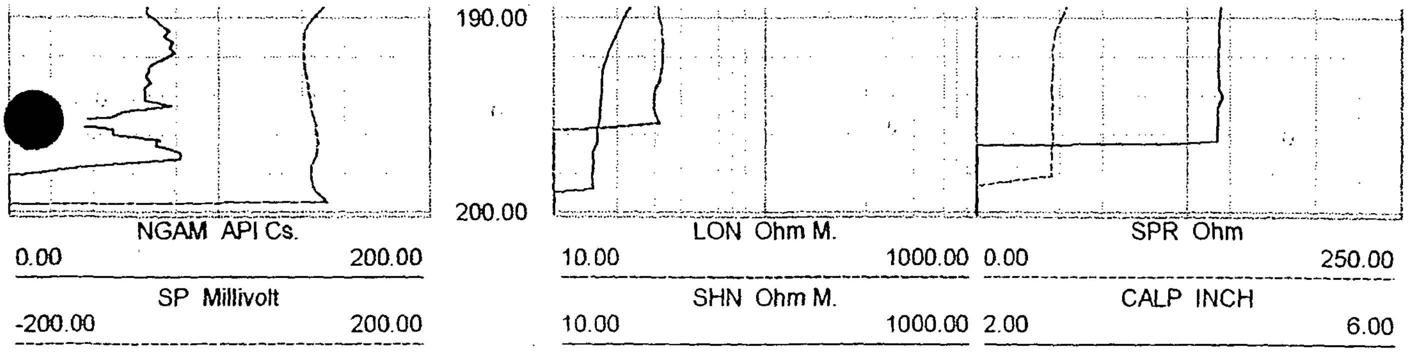
170.00
180.00



190.00
200.00
NGAM API Cs.
0.00
200.00
SP Millivolt
-200.00
200.00
LON Ohm M.
10.00
1000.00
SHN Ohm M.
10.00
1000.00
SPR Ohm
0.00
250.00
CALP INCH
2.00
6.00

ROBERTSON GEOLOGGING LIMITED

CCNPP COLA

B318ELOGDOWN01

COMPANY	GEOVision	OTHER SERVICES
WELL	B-318	
FIELD		
COUNTRY		
STATE		
COUNTY		
LAT.:		
LONG.:		

Perm. Da..	Elev	KB	0.00
Log. Datum		DF	0.00
Drill Datum		GL	0.00

DATE	04 Jun 06	21 Oct 05	21 Oct 05
RUN#	4	0	0
TYPE OF LOG	CALIPER		
DEPTH DRILLER	201.00	0.00	0.00
DEPTH LOGGER	0.00	0.00	0.00
LOG DEEPEST	0.00	0.00	0.00
LOG SHALLOW	18.40	0.00	0.00
FLUID IN HOLE	WATER		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
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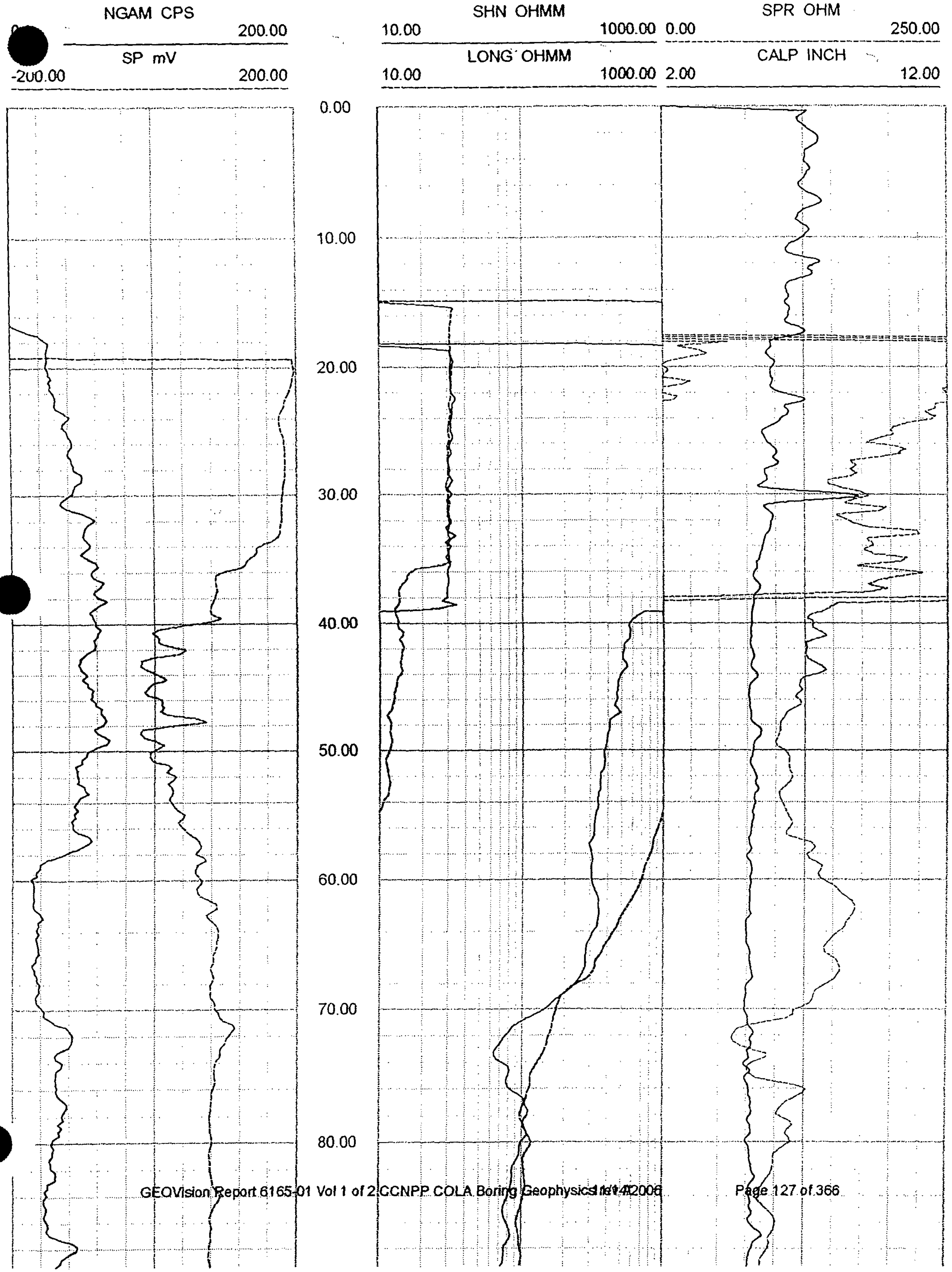
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\CC\B-318 4 June 2006 boring geophysics..



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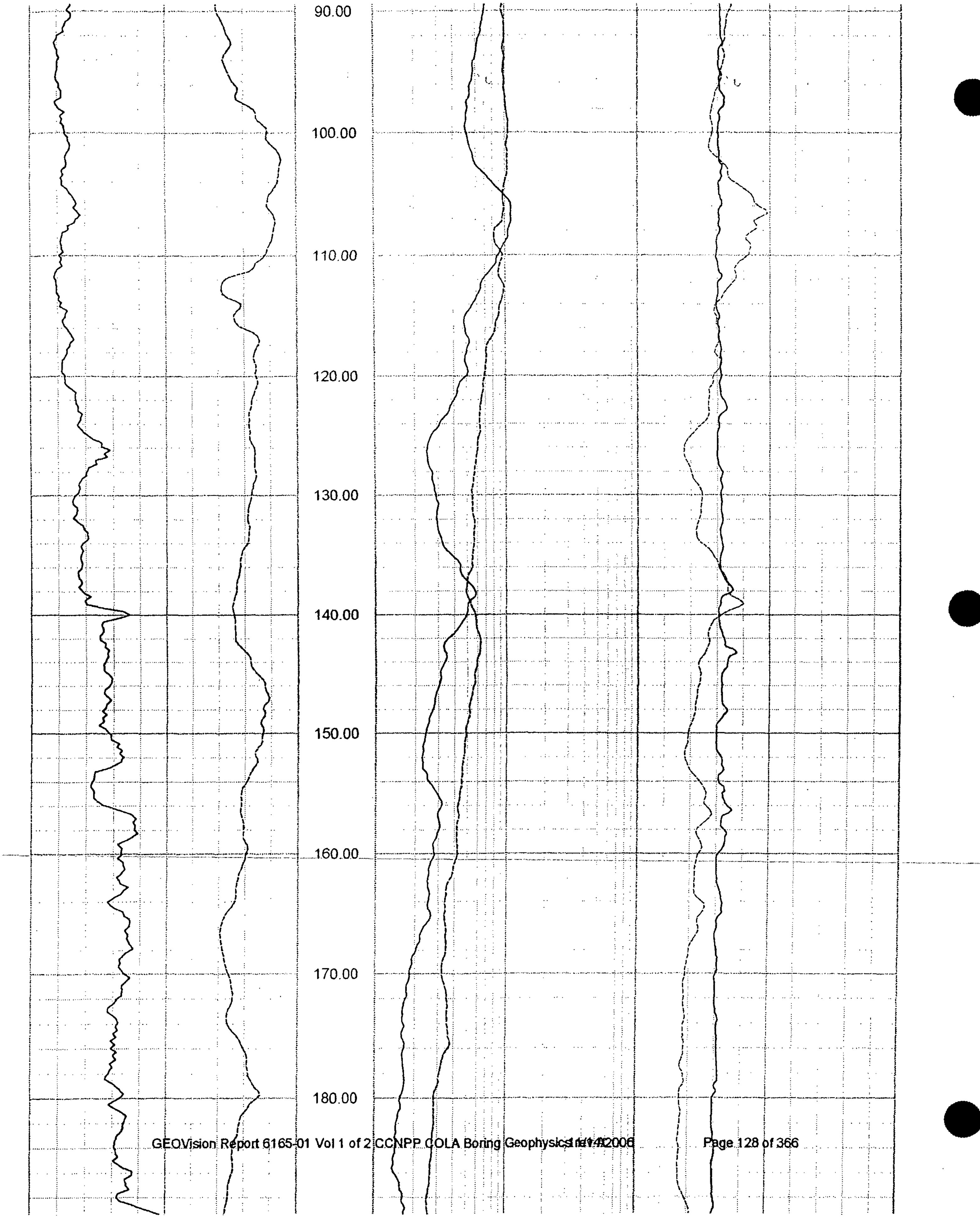
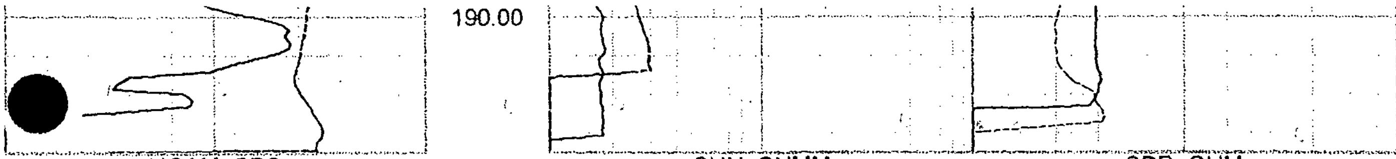
0 200.00
SP mV
-200.00 200.00
SHN OHMM
10.00 1000.00
LONG OHMM
10.00 1000.00
SPR OHM
0.00 250.00
CALP INCH
2.00 12.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00


90.00
100.00
110.00
120.00
130.00
140.00
150.00
160.00
170.00
180.00



NGAM CPS
0.00 200.00
SP mV
-200.00 200.00

SHN OHMM
10.00 1000.00
LONG OHMM
10.00 1000.00

SPR OHM
0.00 250.00
CALP INCH
2.00 12.00

ROBERTSON GEOLOGGING LIMITED

CCNPP COLA

B323ELOGUP01

COMPANY	GEOVision	OTHER SERVICES
WELL	B-323	
FIELD		
COUNTRY		
STATE		
COUNTY		
LAT.:		
LONG.:		

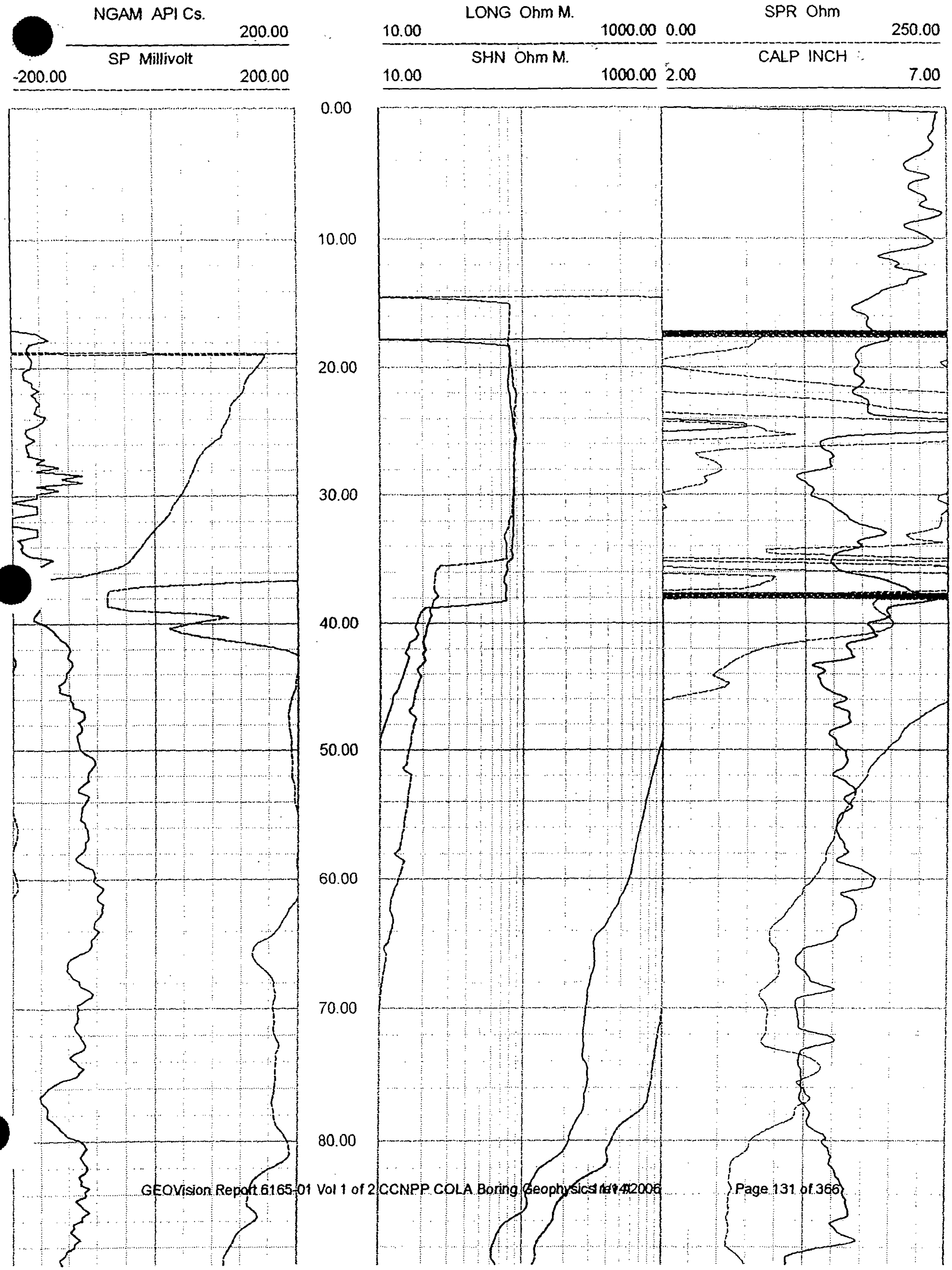
Perm. Da..	Elev	KB	0.00
Log. Datum		DF	0.00
Drill Datum		GL	0.00

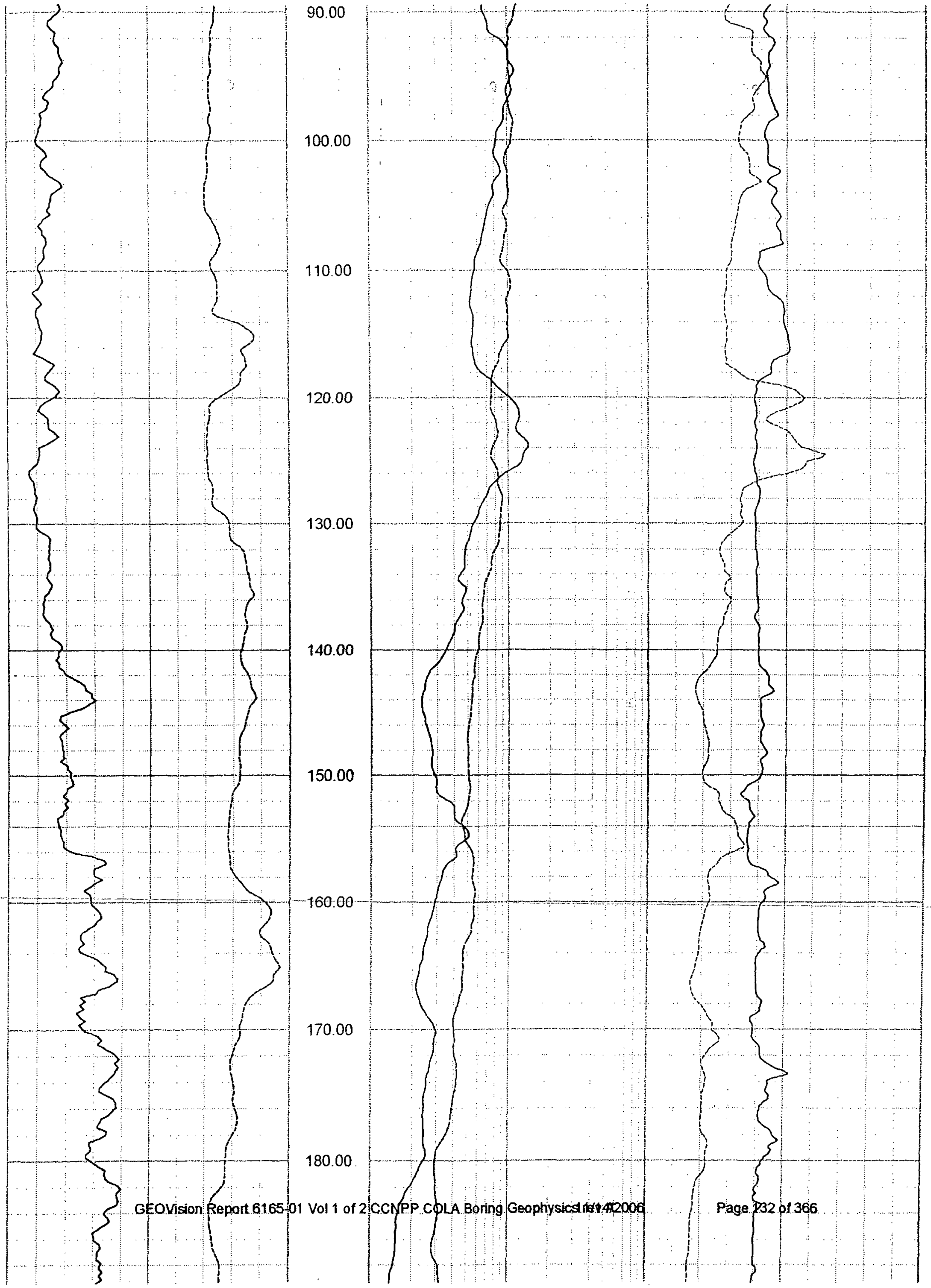
DATE	13 Jun 06	21 Oct 05	21 Oct 05
RUN#	6	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	200.00	0.00	0.00
DEPTH LOGGER	203.00	0.00	0.00
LOG DEEPEST	0.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

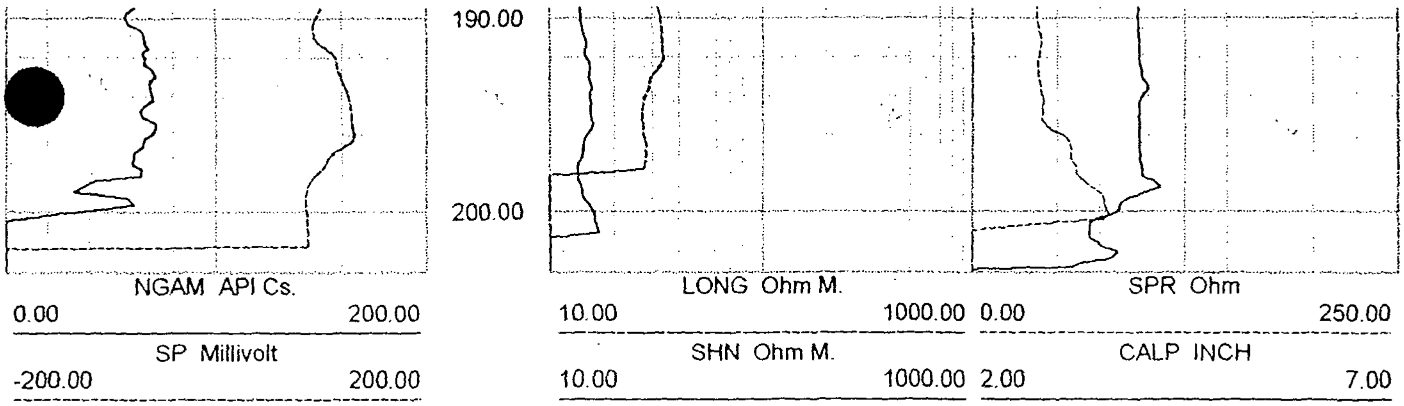
RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
6	4.25	0.00	200.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\CC\B-323 13 June 2006 boring geophysic..


NGAM API Cs.
200.00
SP Millivolt
-200.00
200.00
LONG Ohm M.
10.00
1000.00
SHN Ohm M.
10.00
1000.00
SPR Ohm
0.00
250.00
CALP INCH
2.00
7.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00


90.00
100.00
110.00
120.00
130.00
140.00
150.00
160.00
170.00
180.00


190.00
200.00
NGAM API Cs.
0.00
200.00
SP Millivolt
-200.00
200.00
LONG Ohm M.
10.00
1000.00
SHN Ohm M.
10.00
1000.00
SPR Ohm
0.00
250.00
CALP INCH
2.00
7.00

ROBERTSON GEOLOGGING LIMITED

CCNPP COL

B401ELOGUP01

COMPANY	GEOVision	OTHER SERVICES
WELL	B-401	
FIELD		
COUNTRY		
STATE		
COUNTY		
LAT.:		
LONG.:		

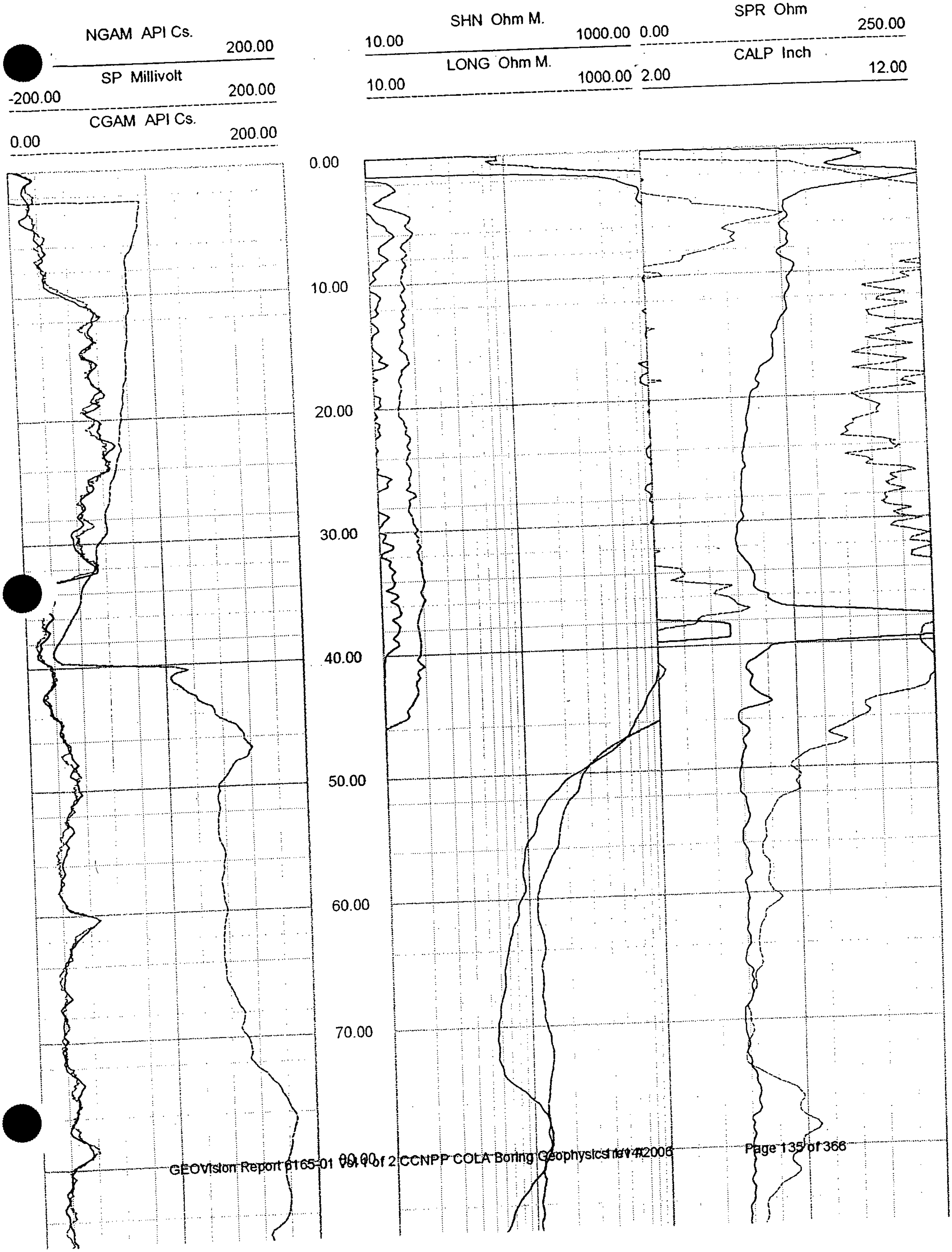
Perm. Da..	Elev	KB	0.00
Log. Datum		DF	0.00
Drill Datum		GL	0.00

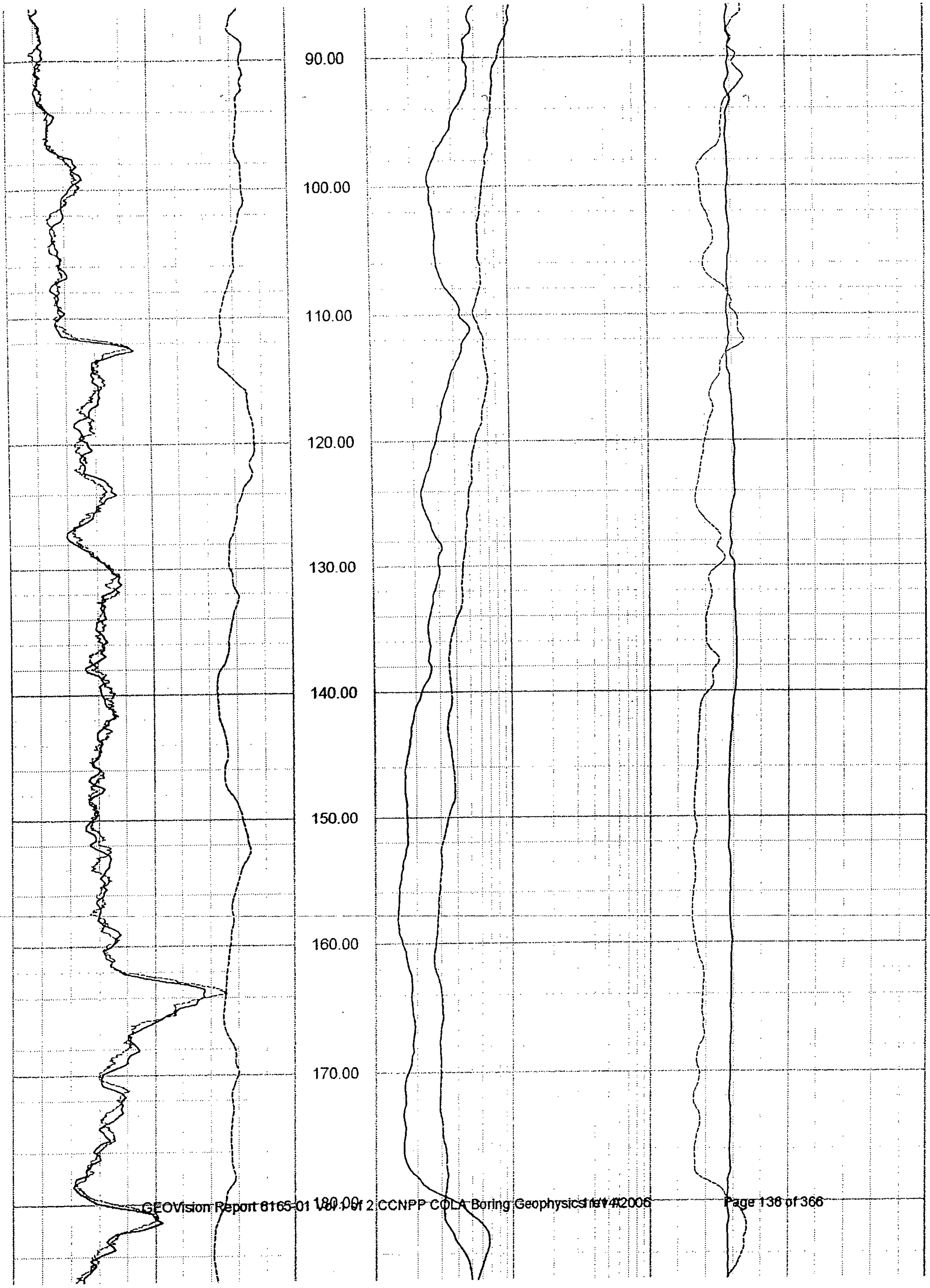
DATE	28 Jun 06	21 Oct 05	21 Oct 05
RUN#	6	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	400.00	0.00	0.00
DEPTH LOGGER	400.00	0.00	0.00
LOG DEEPEST	399.50	0.00	0.00
LOG SHALLOW	6.70	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

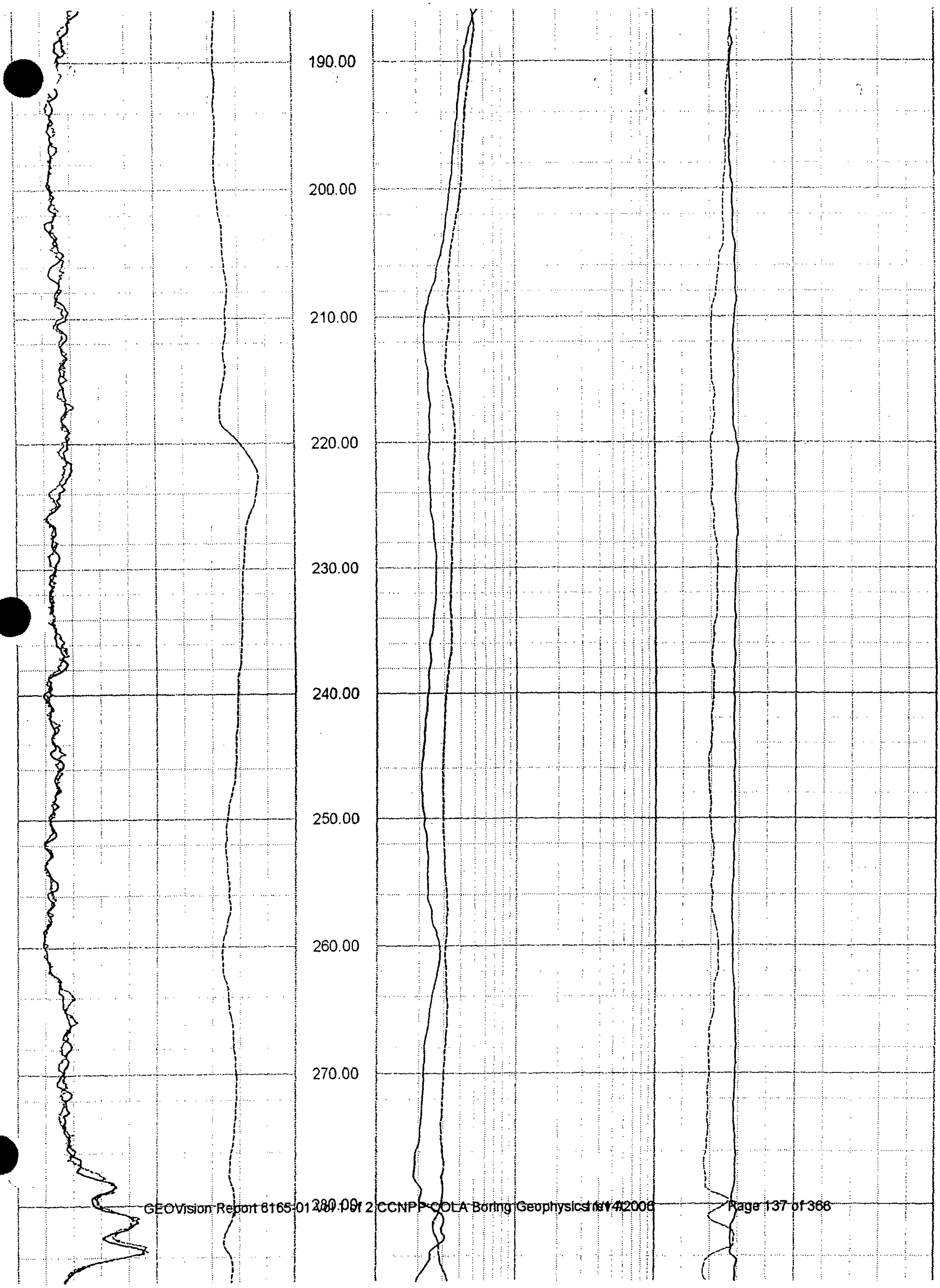
RUN#	BIT RECORD			CASING RECORD			
	SIZE	FROM	TO	SIZE	WEIGHT	FROM	TO
6	4.25	0.00	200.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

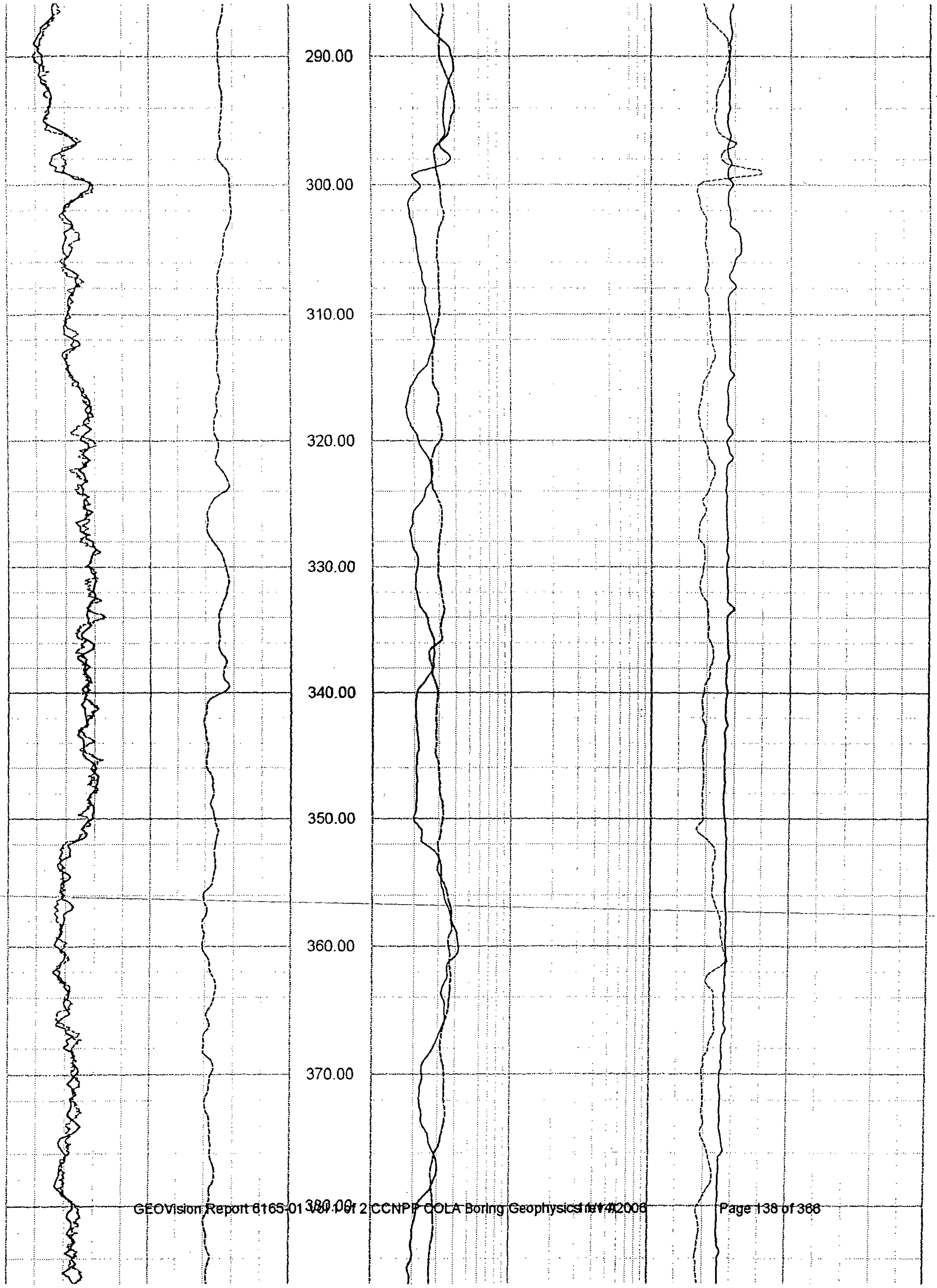
ROBERTSON GEOLOGGING TECHNOLOGY

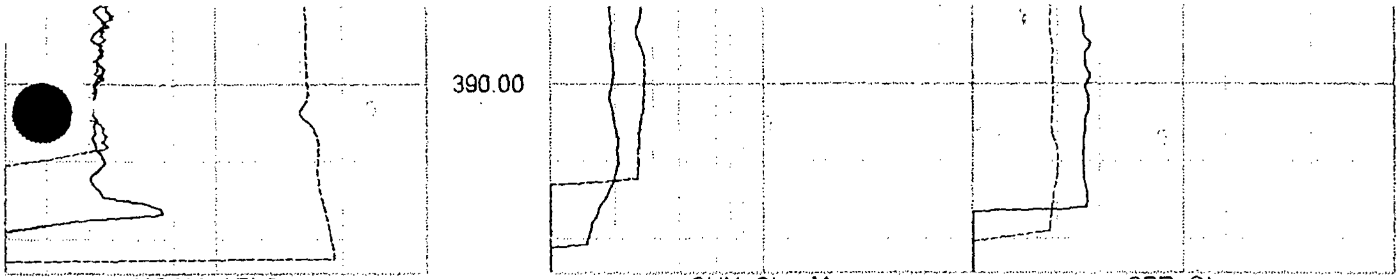
REMARKS (C:\Data\PS\CC\B-401 28 June boring geophysics\B40..


NGAM API Cs.
200.00
SP Millivolt
-200.00
200.00
CGAM API Cs.
0.00
200.00
SHN Ohm M.
10.00
1000.00
LONG Ohm M.
10.00
1000.00
SPR Ohm
0.00
250.00
CALP Inch
2.00
12.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00


90.00
100.00
110.00
120.00
130.00
140.00
150.00
160.00
170.00
180.00


190.00
200.00
210.00
220.00
230.00
240.00
250.00
260.00
270.00
280.00


290.00
300.00
310.00
320.00
330.00
340.00
350.00
360.00
370.00
380.00



NGAM API Cs.	SHN Ohm M.	SPR Ohm
0.00 200.00	10.00 1000.00	0.00 250.00
SP Millivolt	LONG Ohm M.	CALP Inch
-200.00 200.00	10.00 1000.00	2.00 12.00
CGAM API Cs.		
0.00 200.00		

ROBERTSON GEOLOGGING LIMITED

CCNPP COL

B404ELOGUP01

COMPANY	GEOVision
WELL	B-404
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

OTHER SERVICES

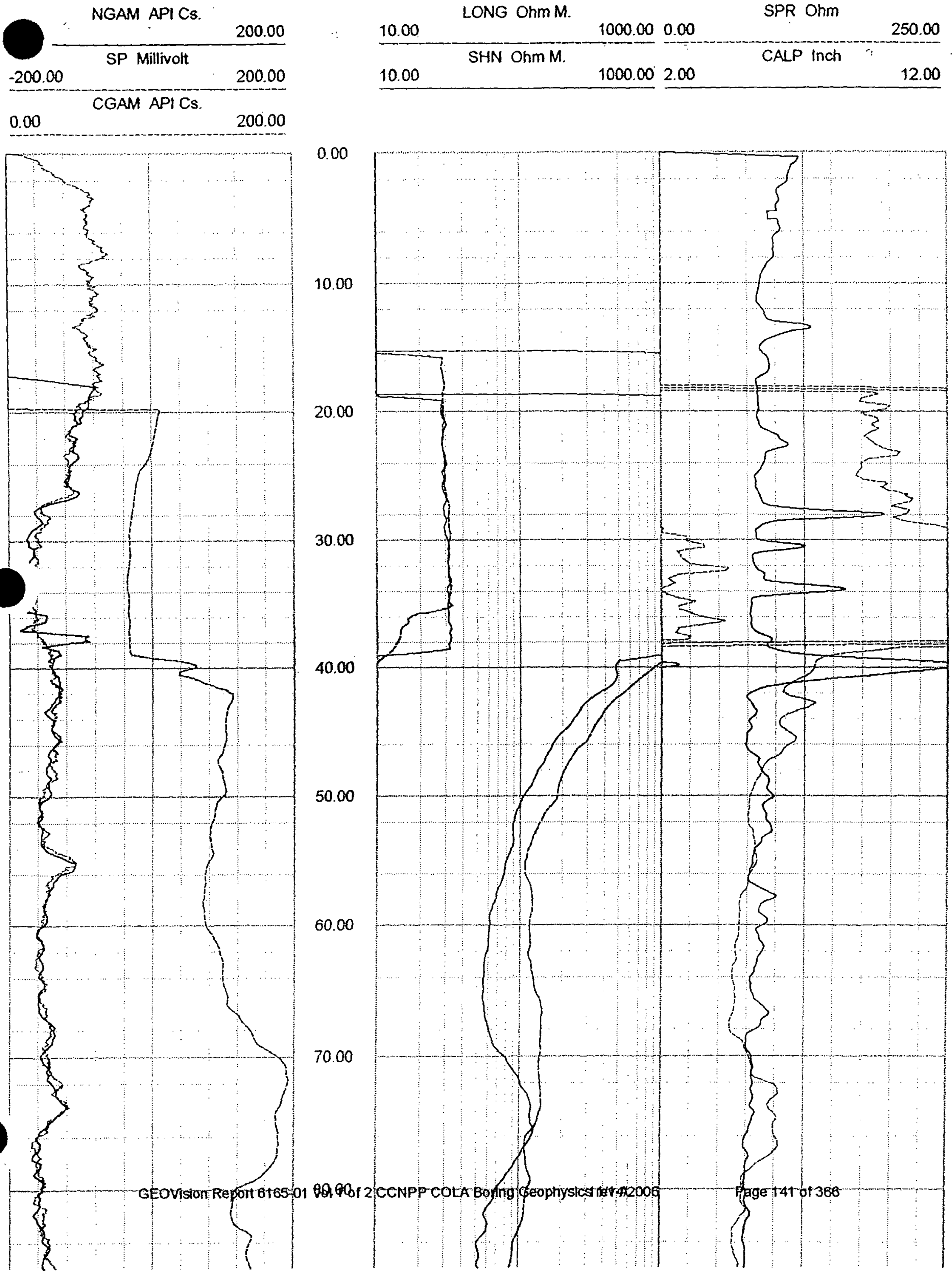
Perm. Da..	Elev	KB	0.00
Log. Datum		DF	0.00
Drill Datum		GL	0.00

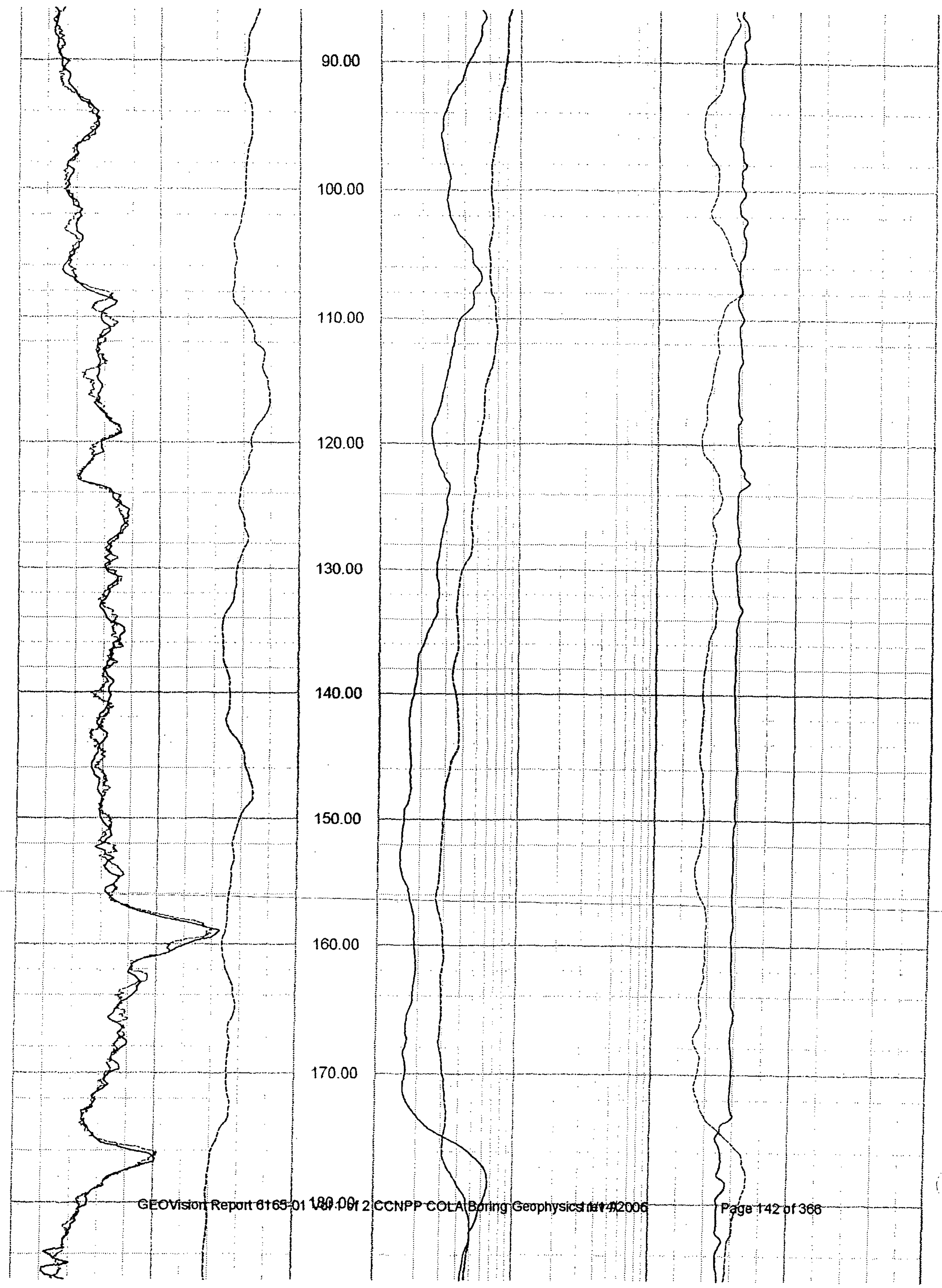
DATE	27 Jun 06	21 Oct 05	21 Oct 05
RUN#	6	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	200.00	0.00	0.00
DEPTH LOGGER	200.00	0.00	0.00
LOG DEEPEST	195.00	0.00	0.00
LOG SHALLOW	22.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
6	4.25	0.00	200.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

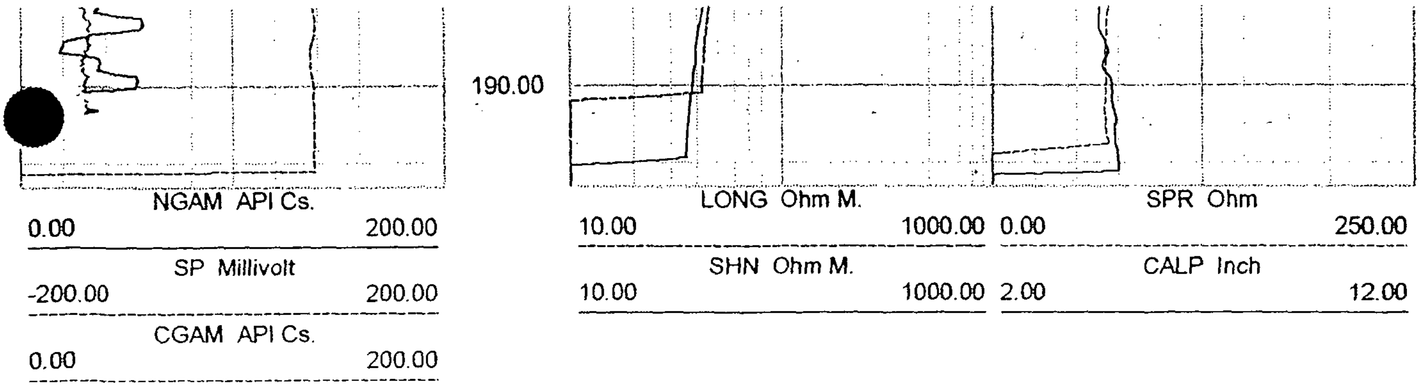
ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\CC\B-404 27 June boring geophysics\B40..


NGAM API Cs.
200.00
SP Millivolt
-200.00
200.00
CGAM API Cs.
0.00
200.00
LONG Ohm M.
10.00
1000.00
SHN Ohm M.
10.00
1000.00
SPR Ohm
0.00
250.00
CALP Inch
2.00
12.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00



90.00
100.00
110.00
120.00
130.00
140.00
150.00
160.00
170.00
180.00


190.00
NGAM API Cs.
0.00 200.00
SP Millivolt
-200.00 200.00
CGAM API Cs.
0.00 200.00
LONG Ohm M.
10.00 1000.00
SHN Ohm M.
10.00 1000.00
SPR Ohm
0.00 250.00
CALP Inch
2.00 12.00

ROBERTSON GEOLOGGING LIMITED

CCNPP COLA

B407ELOGUP01

COMPANY	GEOVision	OTHER SERVICES	
WELL	B-407		
FIELD			
COUNTRY			
STATE			
COUNTY			
LAT.:			
LONG.:			

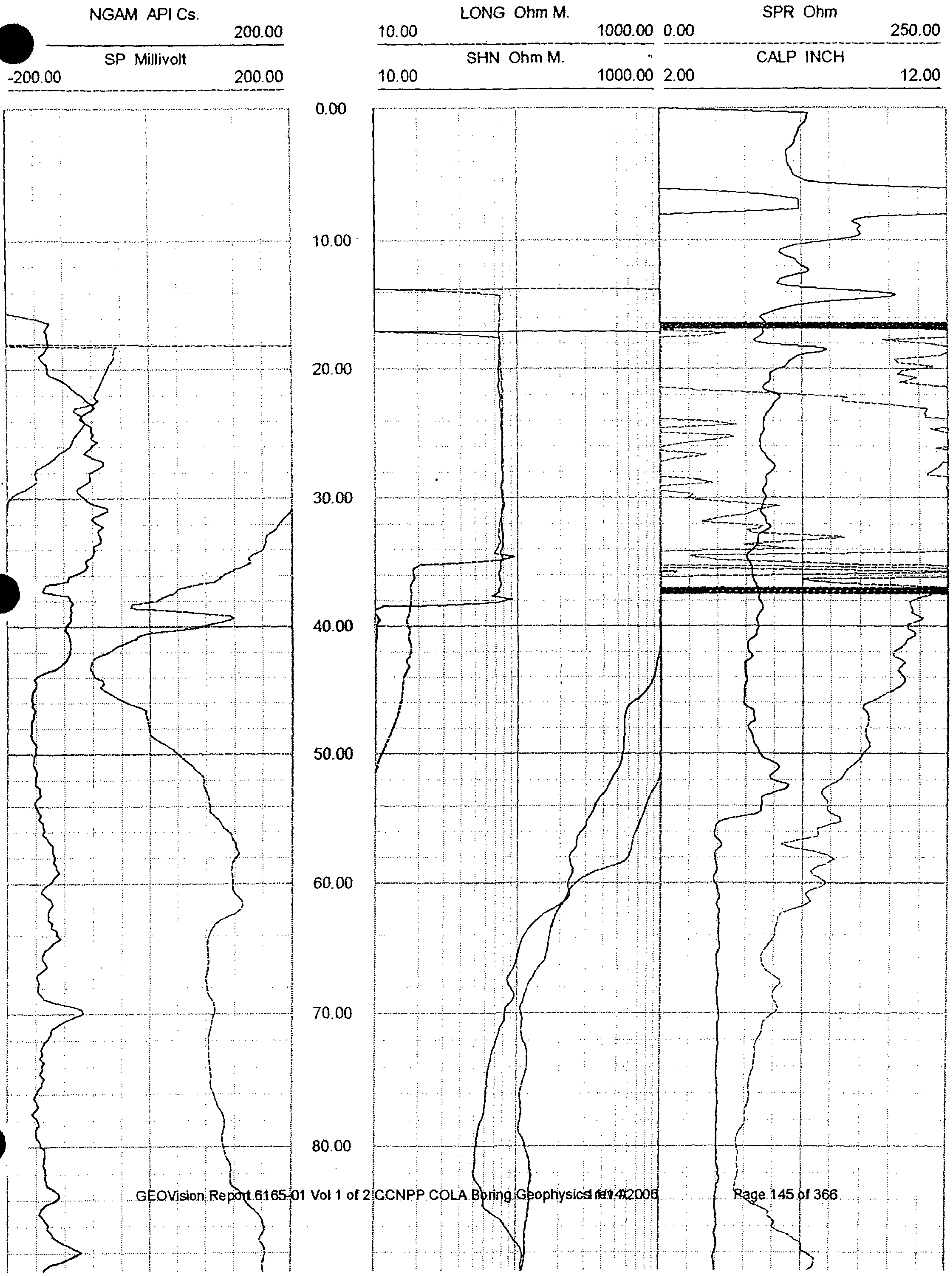
Perm. Da..	Elev	KB	0.00
Log. Datum		DF	0.00
Drill Datum		GL	0.00

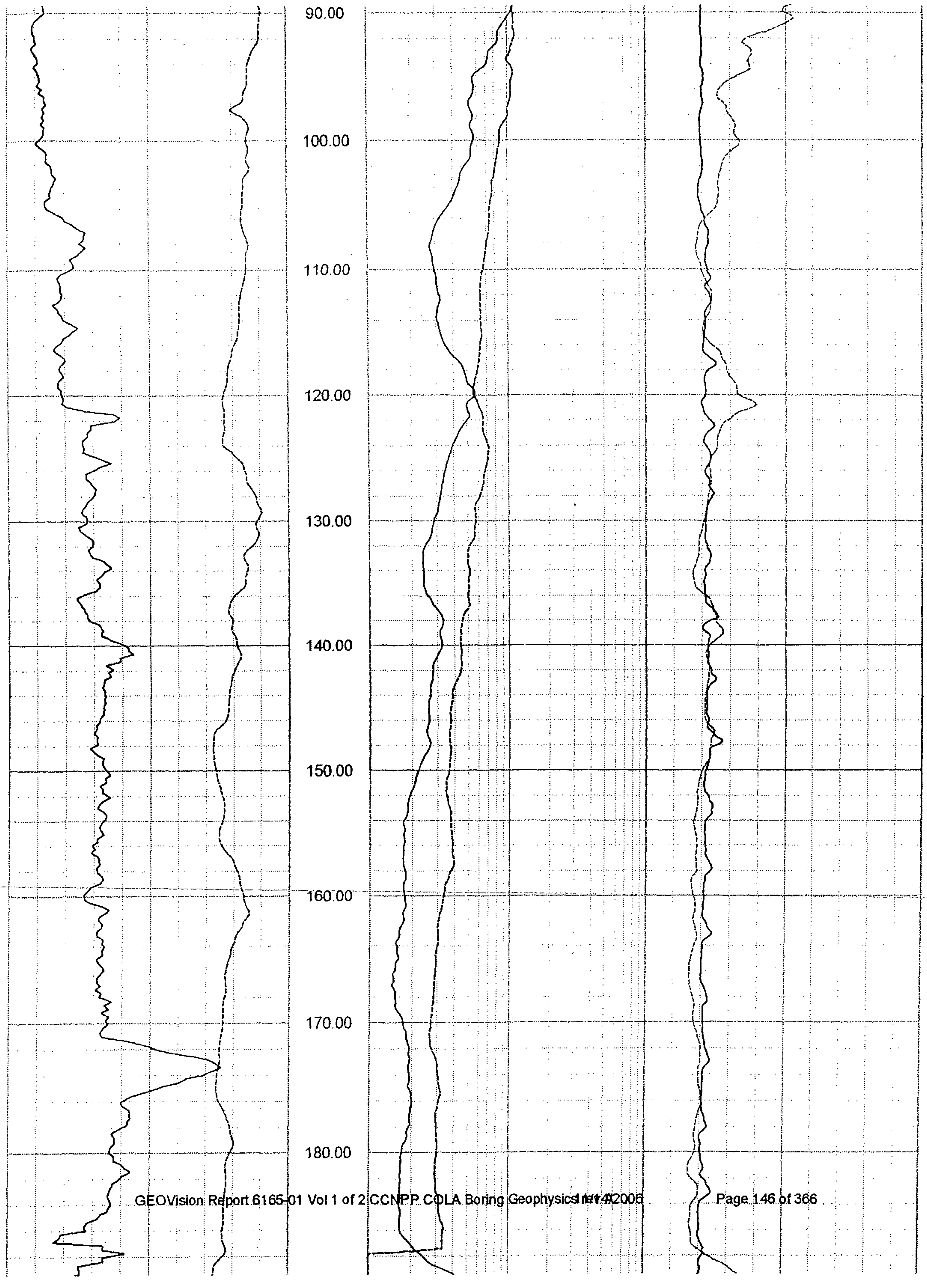
DATE	16 Jun 06	21 Oct 05	21 Oct 05
RUN#	11	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	200.00	0.00	0.00
DEPTH LOGGER	196.00	0.00	0.00
LOG DEEPEST	193.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

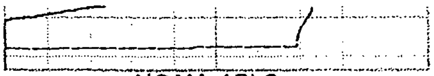
RUN#	BIT RECORD			CASING RECORD			
	SIZE	FROM	TO	SIZE	WEIGHT	FROM	TO
11	4.25	0.00	200.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ROBERTSON GEOLOGGING TECHNOLOGY

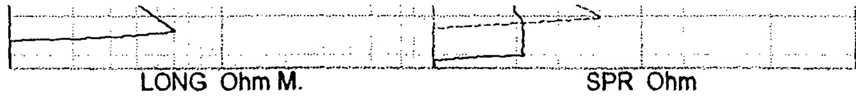
REMARKS (C:\Data\PS\CC\B-407 16 June 2006 boring geoephysi..


NGAM API Cs.
200.00
SP Millivolt
-200.00
200.00
LONG Ohm M.
10.00
1000.00
SHN Ohm M.
10.00
1000.00
SPR Ohm
0.00
250.00
CALP INCH
2.00
12.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00


90.00
100.00
110.00
120.00
130.00
140.00
150.00
160.00
170.00
180.00



190.00



NGAM API Cs.		LONG Ohm M.		SPR Ohm	
	200.00	10.00	1000.00	0.00	250.00
SP Millivolt		SHN Ohm M.		CALP INCH	
-200.00	200.00	10.00	1000.00	2.00	12.00

ROBERTSON GEOLOGGING LIMITED

CCNPP COL

B418ELOGUP01

COMPANY	GEOVision		OTHER SERVICES
WELL	B-418		
FIELD			
COUNTRY			
STATE			
COUNTY			
LAT.:			
LONG.:			

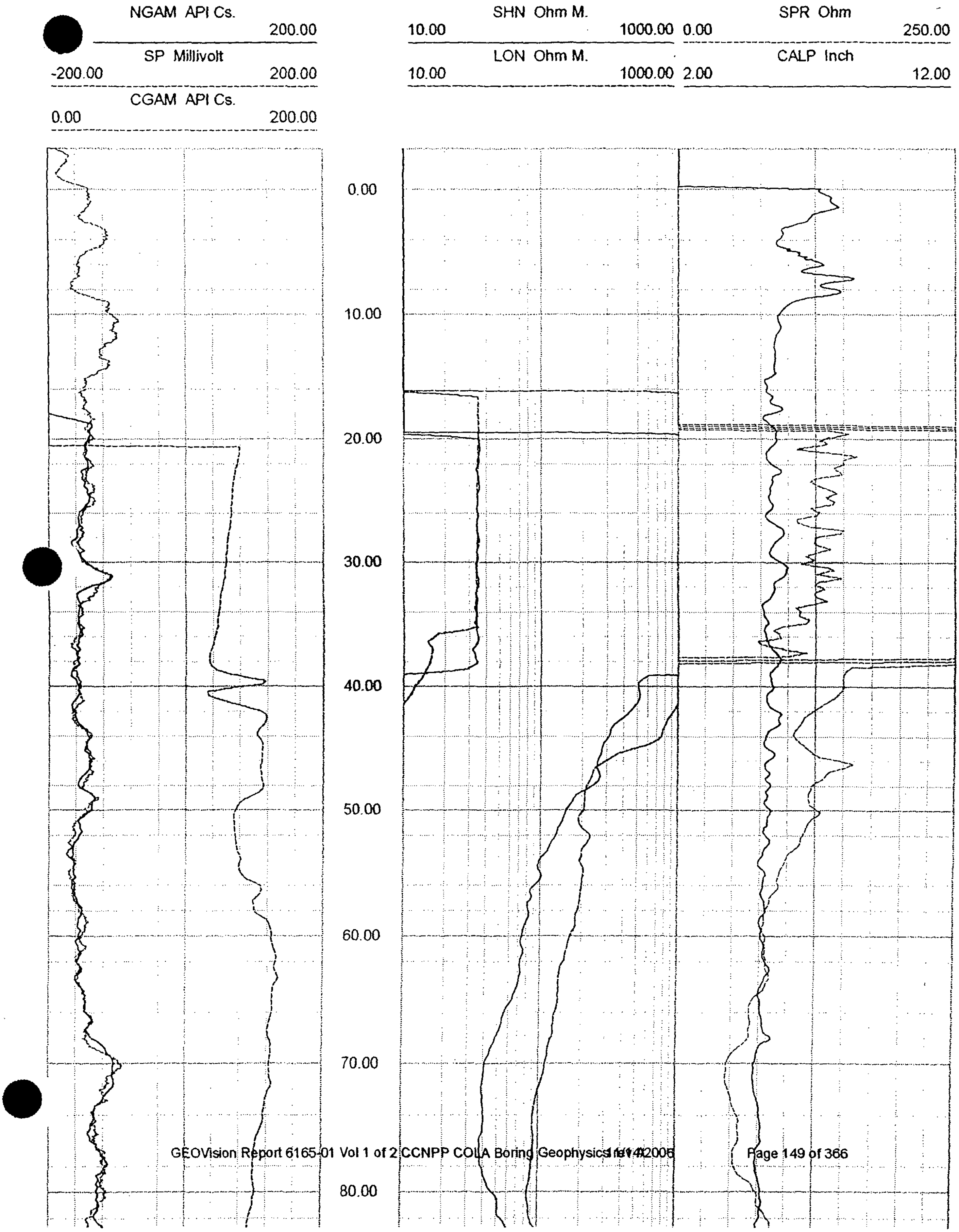
Perm. Da..	Elev	KB	0.00
Log. Datum		DF	0.00
Drill Datum		GL	0.00

DATE	30 Jun 06	21 Oct 05	21 Oct 05
RUN#	9	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	200.00	0.00	0.00
DEPTH LOGGER	200.00	0.00	0.00
LOG DEEPEST	197.00	0.00	0.00
LOG SHALLOW	20.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

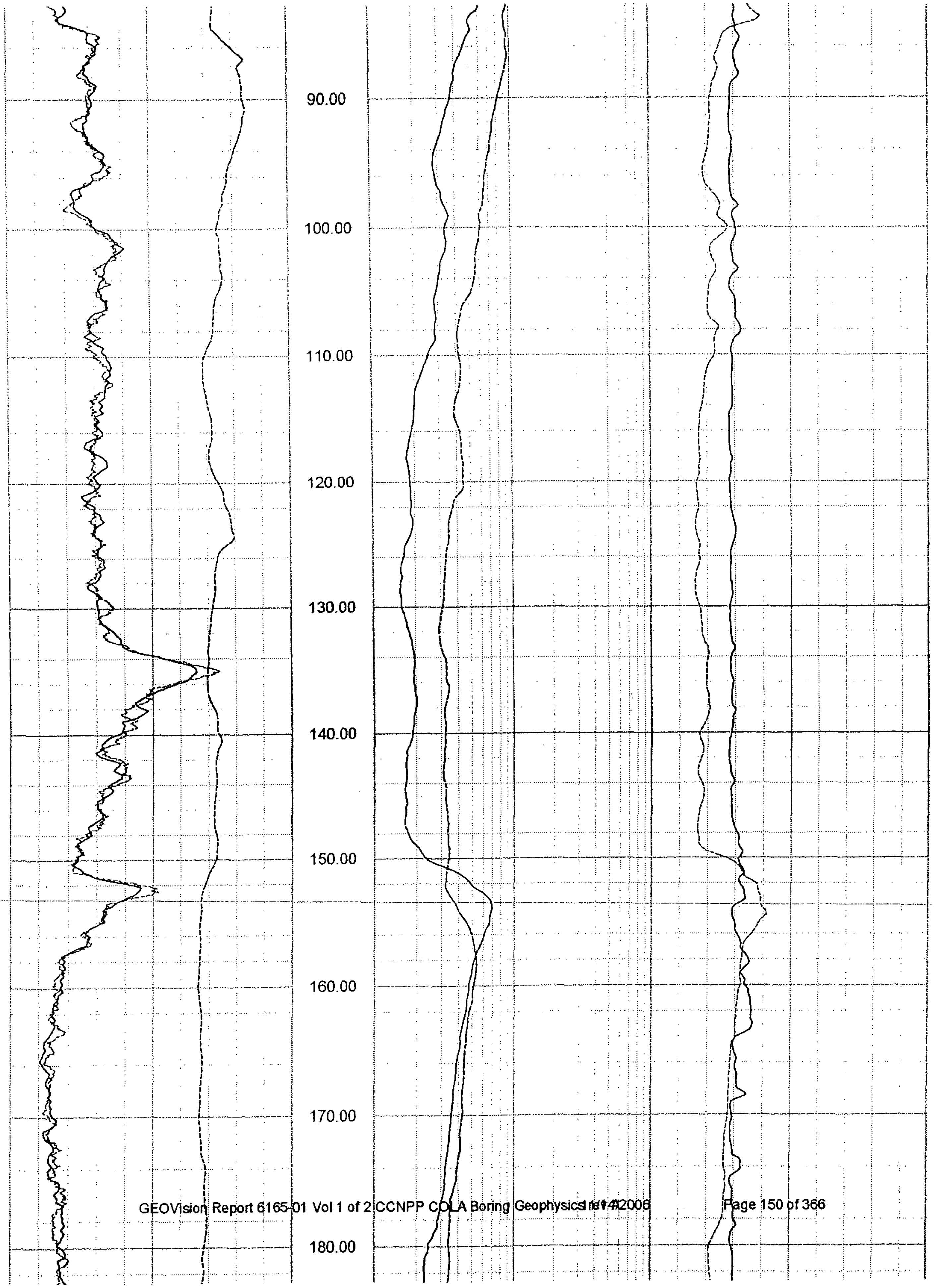
RUN#	BIT RECORD			CASING RECORD			
	SIZE	FROM	TO	SIZE	WEIGHT	FROM	TO
9	4.25	0.00	200.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

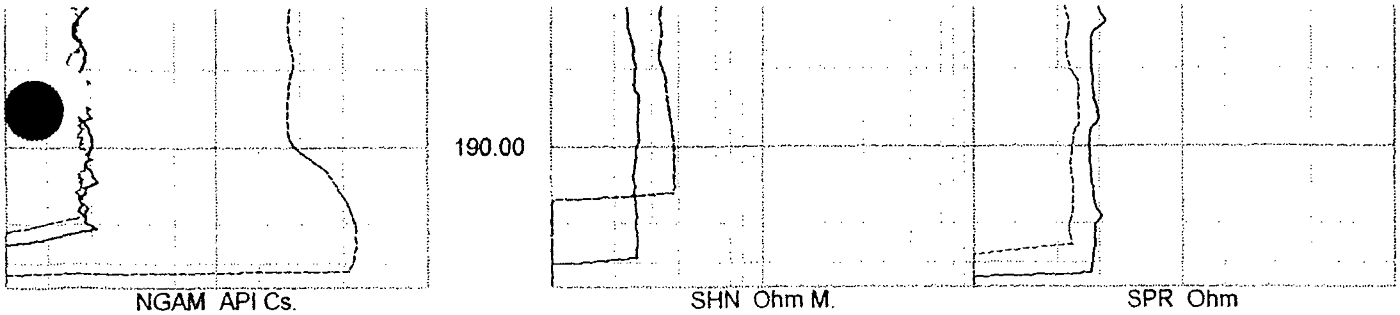
ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\CC\B-418 29-30 June boring geophysics\..



NGAM API Cs.
200.00
SP Millivolt
-200.00
200.00
CGAM API Cs.
0.00
200.00
SHN Ohm M.
10.00
1000.00
LON Ohm M.
10.00
1000.00
SPR Ohm
0.00
250.00
CALP Inch
2.00
12.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00


90.00
100.00
110.00
120.00
130.00
140.00
150.00
160.00
170.00
180.00



NGAM API Cs.		SHN Ohm M.		SPR Ohm	
0.00	200.00	10.00	1000.00	0.00	250.00
SP Millivolt		LON Ohm M.		CALP Inch	
-200.00	200.00	10.00	1000.00	2.00	12.00
CGAM API Cs.					
0.00	200.00				

ROBERTSON GEOLOGGING LIMITED

CCNPP COLA

B423ELOGUP01

COMPANY	GEOVision	OTHER SERVICES
WELL	B-423	
FIELD		
COUNTRY		
STATE		
COUNTY		
LAT.:		
LONG.:		

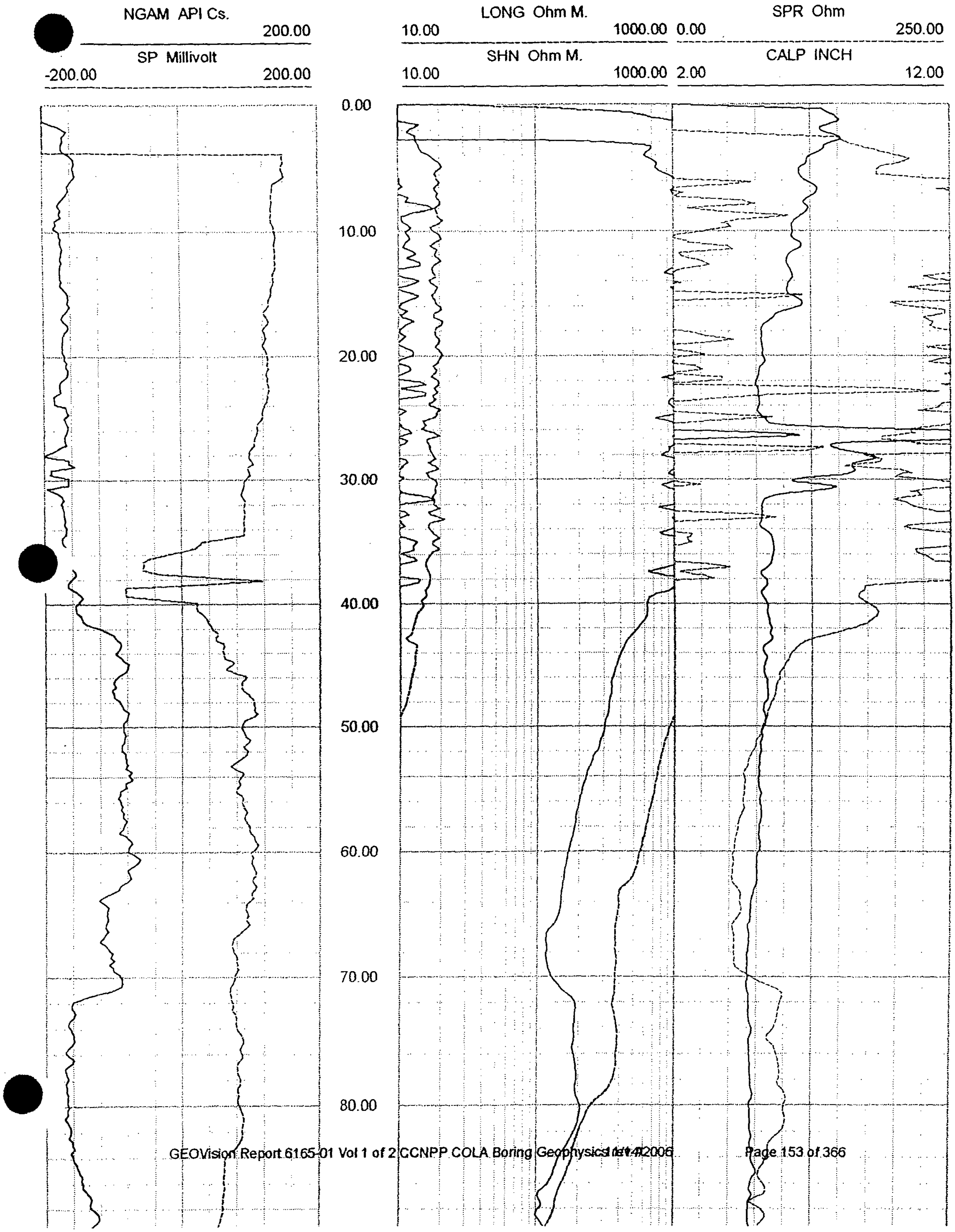
Perm. Da..	Elev	KB	0.00
Log. Datum		DF	0.00
Drill Datum		GL	0.00

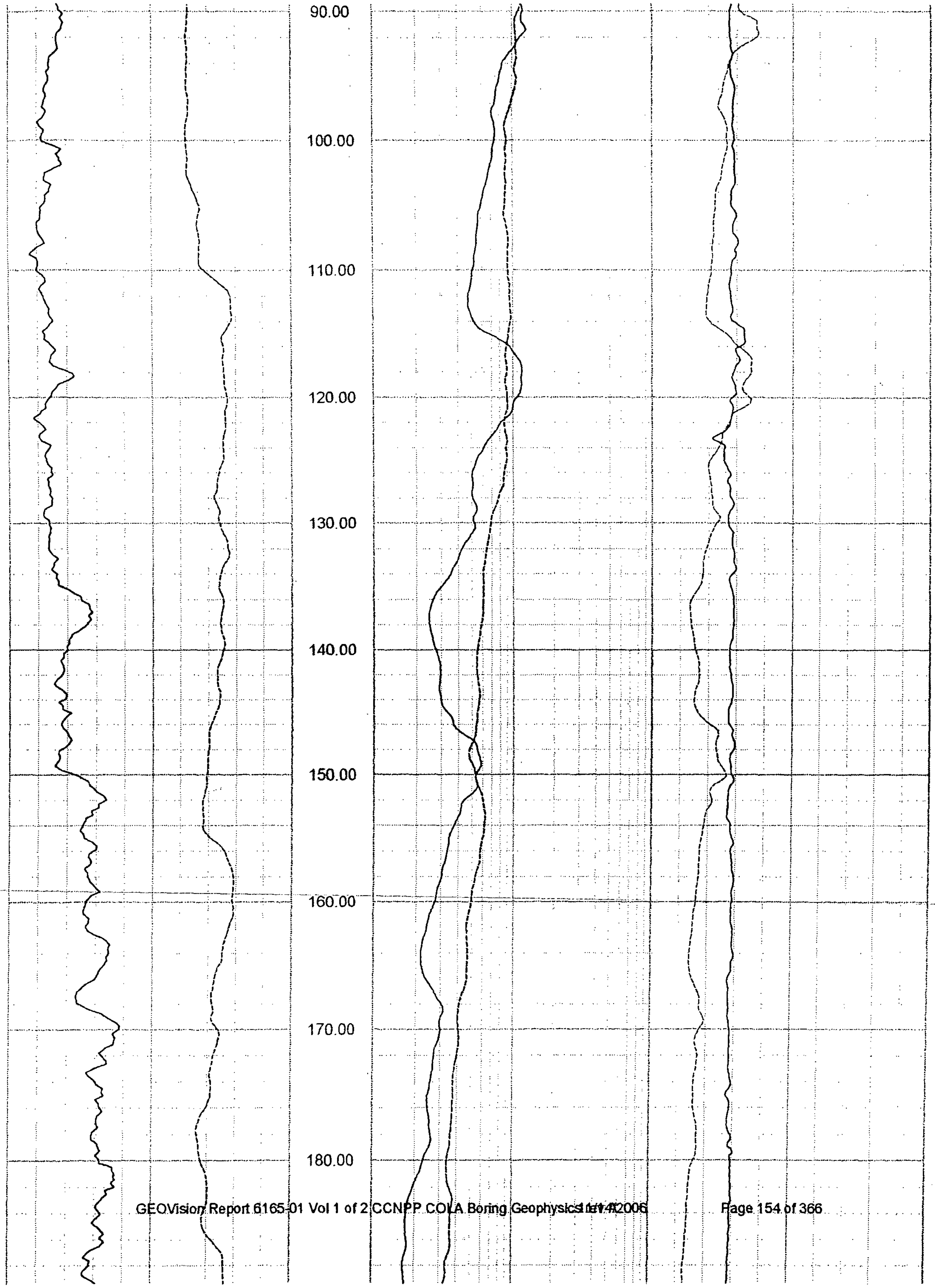
DATE	13 Jun 06	21 Oct 05	21 Oct 05
RUN#	8	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	200.00	0.00	0.00
DEPTH LOGGER	200.00	0.00	0.00
LOG DEEPEST	200.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

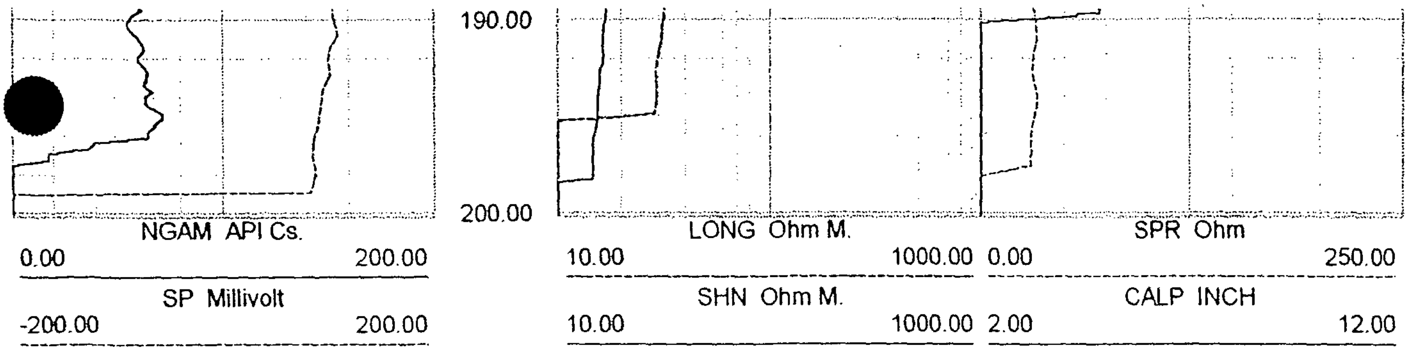
RUN#	BIT RECORD			CASING RECORD			
	SIZE	FROM	TO	SIZE	WEIGHT	FROM	TO
8	4.25	0.00	200.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\CC\B-423 13 June 2006 boring geophysic..


NGAM API Cs.
200.00
SP Millivolt
-200.00
200.00
LONG Ohm M.
10.00
1000.00
SHN Ohm M.
10.00
1000.00
SPR Ohm
0.00
250.00
CALP INCH
2.00
12.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00


90.00
100.00
110.00
120.00
130.00
140.00
150.00
160.00
170.00
180.00


190.00
200.00
NGAM API Cs.
0.00
200.00
SP Millivolt
-200.00
200.00
LONG Ohm M.
10.00
1000.00
SHN Ohm M.
10.00
1000.00
SPR Ohm
0.00
250.00
CALP INCH
2.00
12.00

APPENDIX C

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	President
Name	Title
[signature]	April 6, 2006
Signature	Date

Client Approval (if required):

Name	Title
Signature	Date

EDISON ESI

METROLOGY

TEST NUMBER 501206

Calibration Report

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

Manufacturer:	Oyo Corporation	**Calibration Date:**	04/21/2006
Model Number:	3331-A	**Calibration Due Date:**	04/21/2007
Description:	Logger, Suspension,	**Calibration Interval:**	12 Months
Asset Number:	19029	**Condition As Found:**	In Tolerance
Serial Number:	19029	**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
[illegible]3686	Fluke	910	Standard, Frequency, Controlled, Gps	01/16/2006	01/16/2007

Procedure: Customer
Temperature: 23° C
Humidity: 40% RH
[illegible] No.: 501206

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

GEOVision geophysical services

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 (NAME) 4/21/2006 (DATE) Robt Steller (SIGNATURE)

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

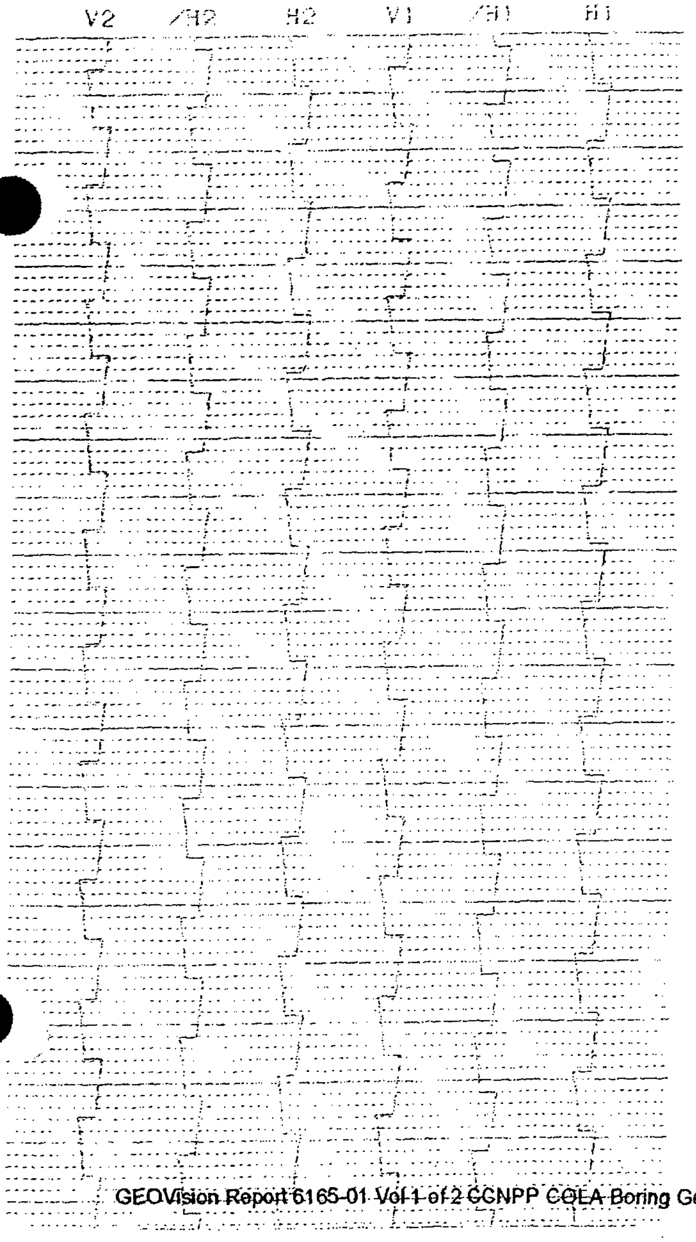
OYO S/N 1902a

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	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]



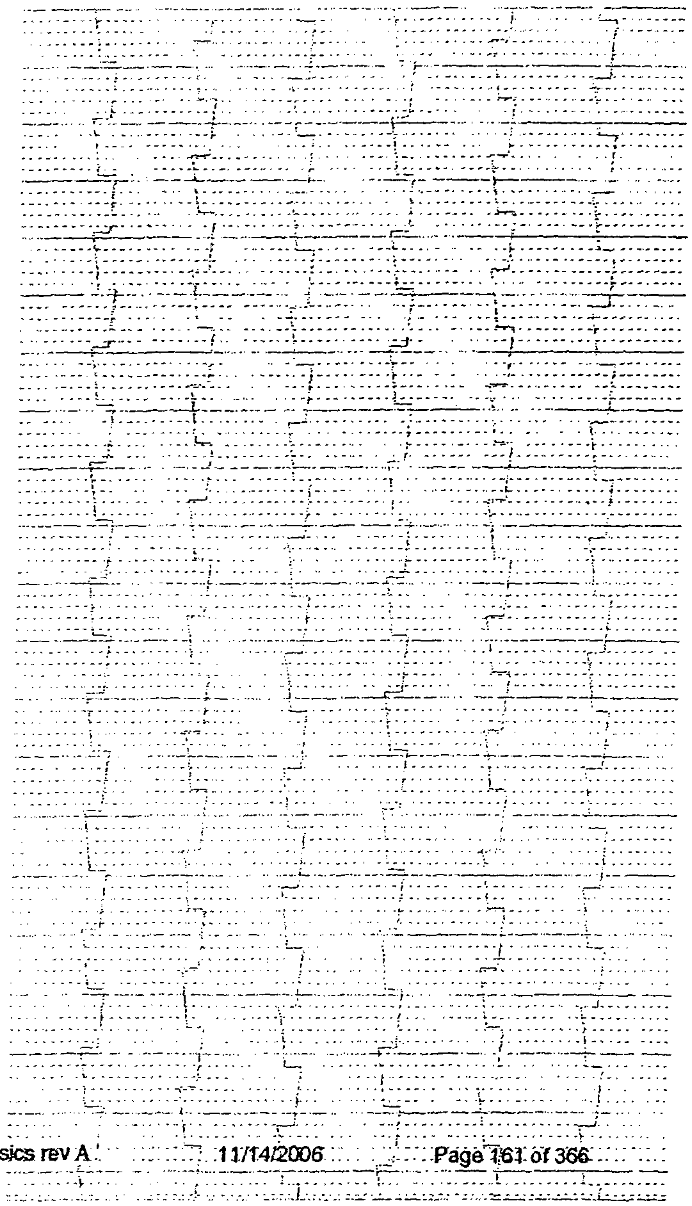
OYO S/N 1902a

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: 50 [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

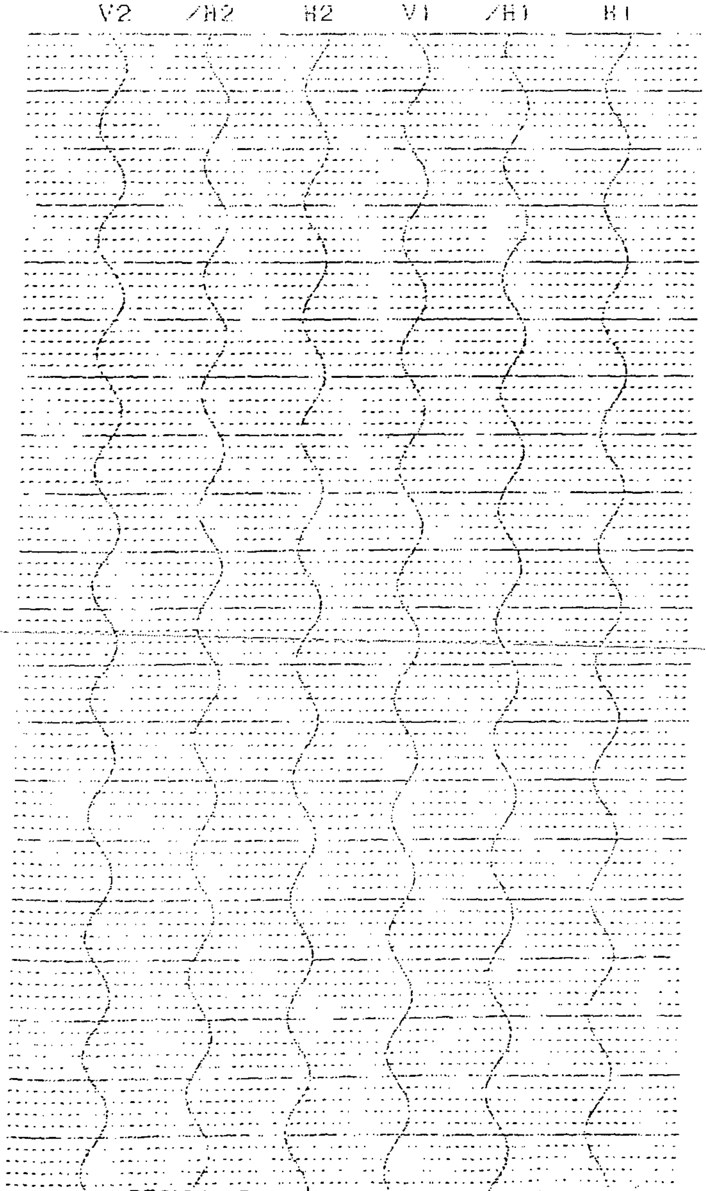
Suspension 170 4.25

ID_NO.	:	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]

V2 /H2 H2 V1 /H1 H1



OYO S/N 19029

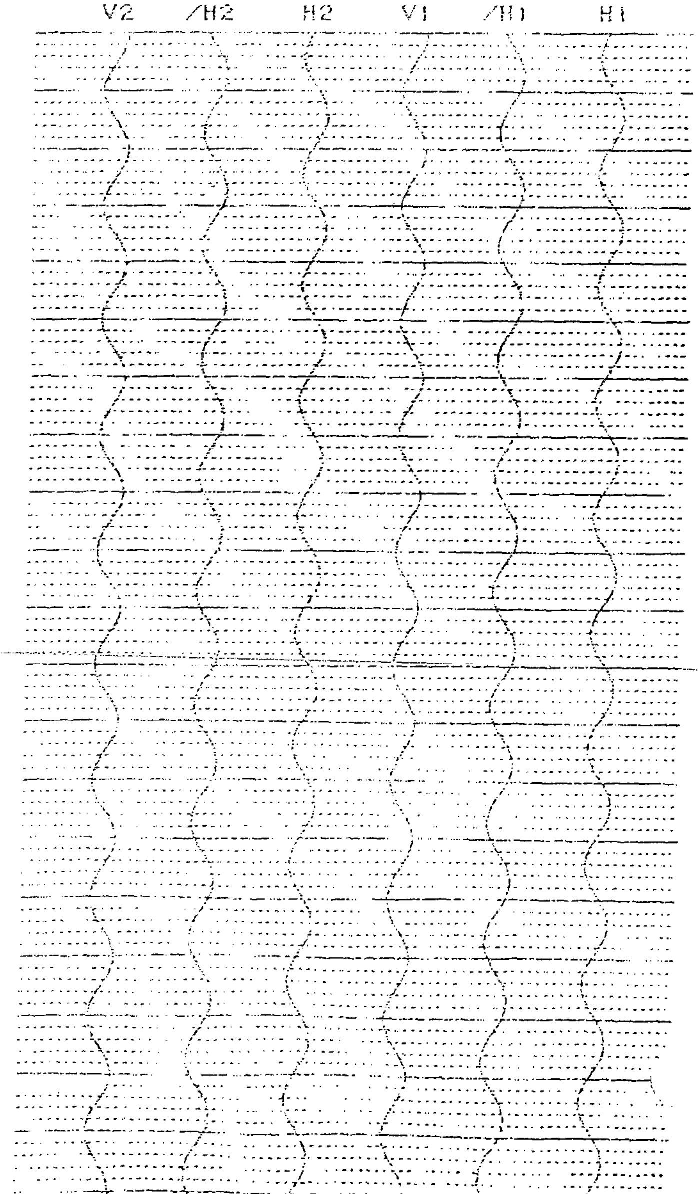
Suspension 170 4.25

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]

V2 /H2 H2 V1 /H1 H1



TEST NUMBER
501203

EDISON ESI

METROLOGY

Calibration Report

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

Manufacturer:	Oyo	**Calibration Date:**	04/21/2006
Model Number:	3403	**Calibration Due Date:**	04/21/2007
Description:	Unit, Suspension Telemetry,	**Calibration Interval:**	12 Months
Asset Number:	160023	**Condition As Found:**	In Tolerance
Serial Number:	160023	**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
586	Fluke	910	Standard, Frequency, Controlled, Gps	01/16/2006	01/16/2007

Procedure: Customer
Temperature: 23° C
Humidity: 40% RH
No.: 501203

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

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MD
4-21-06

GEOVision
geophysical services

SEISMOGRAPH CALIBRATION DATA SHEET REV 4/6/06

INSTRUMENT DATA

SYSTEM MFR:	OYO	MODEL NO.:	3403
SERIAL NO.:	160023	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:	2
FILTER:	10 KHZ
RANGE:	100 MILLISEC, 100 MICROSECOND SAMPLE RATE
DELAY:	0
STACK: 1 (STD)	1
PULSE:	1.6
DISPLAY:	NA
SYSTEM: DATE = CORRECT DATE & TIME	4/21/2006, 11:07AM

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	305	100.0	90.0	90.0	90.0	100.0
SQUARE	306	100.0	90.0	90.0	90.0	100.0
SINE	307	100.0	90.0	90.0	90.0	100.0
SINE	308	100.0	90.1	90.0	90.0	100.0

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

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

EDISON ESI

METROLOGY

TEST NUMBER
501204

Calibration Report

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

Manufacturer:	Oyo	**Calibration Date:**	04/21/2006
Model Number:	3403	**Calibration Due Date:**	04/21/2007
Description:	Unit, Suspension Telemetry,	**Calibration Interval:**	12 Months
Asset Number:	160024	**Condition As Found:**	In Tolerance
Serial Number:	160024	**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
[illegible]686	Fluke	910	Standard, Frequency, Controlled, Gps	01/16/2006	01/16/2007

Procedure:	Customer
Temperature:	23° C
Humidity:	40% RH
[illegible]No.:	501204

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

MRA 4-21-06

GEOVision geophysical services

SEISMOGRAPH CALIBRATION DATA SHEET REV 4/6/06

INSTRUMENT DATA

SYSTEM MFR:	OYO	MODEL NO.:	3403
SERIAL NO.:	160024	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:	2
FILTER:	10 KHZ
RANGE:	100 MILLISEC, 100 MICROSECOND SAMPLE RATE
DELAY:	0
STACK: 1 (STD)	1
PULSE:	1.6
DISPLAY:	NA
SYSTEM: DATE = CORRECT DATE & TIME	4/21/2006, 11:30AM

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	401	100.0	90.0	90.0	90.0	100.0
SQUARE	402	100.0	90.0	90.0	90.0	100.0
SINE	403	100.0	89.9	90.0	90.1	100.0
SINE	404	100.0	90.0	90.1	90.1	99.9

CALIBRATED BY: ROBERT STELLER 4/21/2006 Rob Steller

NAME DATE SIGNATURE

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

TEST NUMBER
501205

EDISON ESI

METROLOGY

Calibration Report

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

Manufacturer:	Geometrics	**Calibration Date:**	04/21/2006
Model Number:	STRATAVIEW	**Calibration Due Date:**	04/21/2007
Description:	Siesmograph,	**Calibration Interval:**	12 Months
Asset Number:	75299	**Condition As Found:**	In Tolerance
Serial Number:	75299	**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
-03686	Fluke	910	Standard, Frequency, Controlled, Gps	01/16/2006	01/16/2007

Procedure: Customer
Temperature: 23° C
Humidity: 40% RH
it No.: 501205

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

GEOVision geophysical services

SEISMOGRAPH CALIBRATION DATA SHEET REV 4/6/06

INSTRUMENT DATA

SYSTEM MFR:	GEOMETRICS	MODEL NO.:	STRATAVIEW
SERIAL NO.:	75299	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:	15 DB
FILTER:	NONE
RANGE:	256 MILLISEC, 31 MICROSECOND SAMPLE RATE
DELAY:	0
STACK: 1 (STD)	1
PULSE:	NA
DISPLAY:	NA
SYSTEM: DATE = CORRECT DATE & TIME	4/21/2006, 12:09PM

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

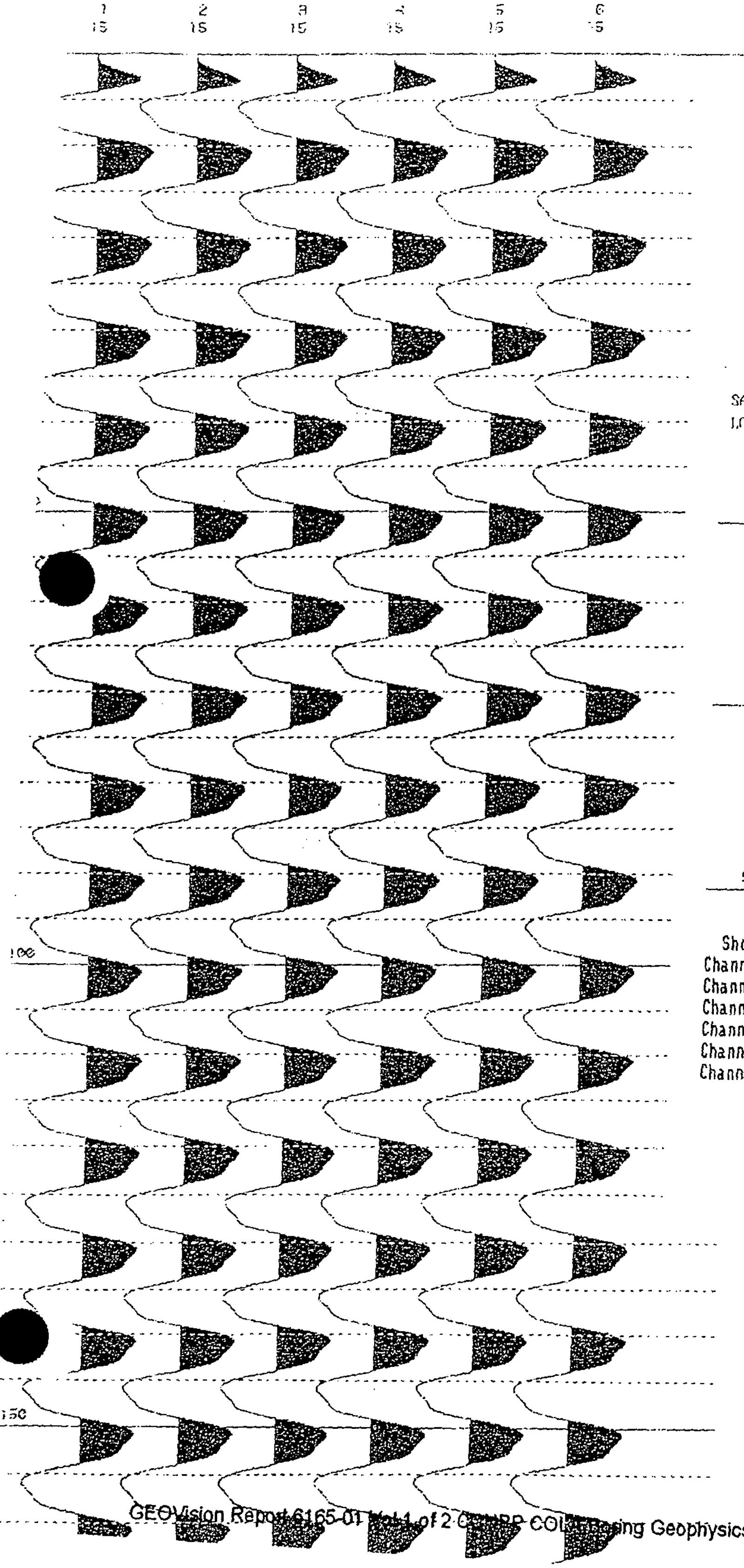
WAVEFORM	FILE NO	FREQUENCY	TIME FOR 9 CYCLES Hn	TIME FOR 9 CYCLES Hr	TIME FOR 9 CYCLES V	AVERAGE FREQ.
SQUARE	501	100.0	90.0	90.0	90.0	100.0
SQUARE	502	100.0	90.0	90.0	90.0	100.0
SINE	503	100.0	90.0	90.0	90.0	100.0
SINE	504	100.0	90.0	90.0	90.0	100.0

CALIBRATED BY: ROBERT STELLER (NAME) 4/21/2006 (DATE) Robert Steller (SIGNATURE)

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

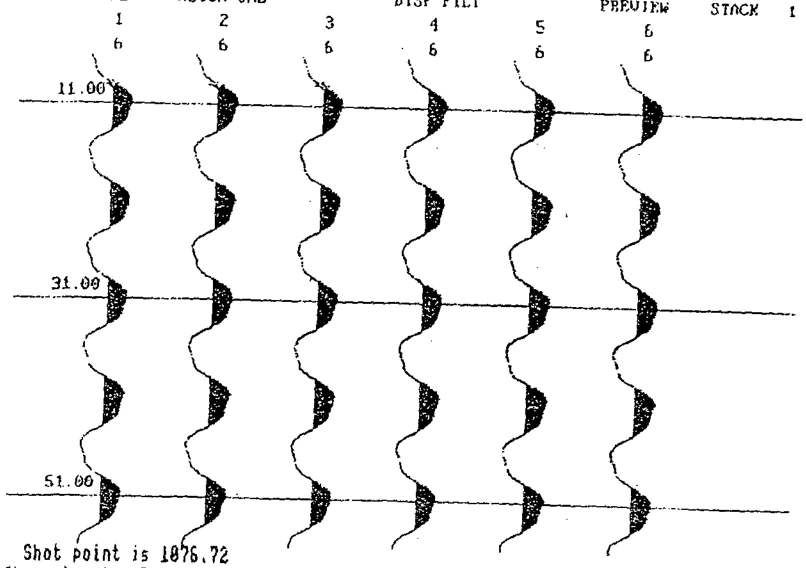
1...ICS S/N 75299 StrataView

FROM 501.DAT 15:14:03 21/APR/2006
NUMBER 00-00 GROUP INTERVAL 3.28
LOC 1076.72 PHONE 1 LOC 1000.00 PHONE 6 LOC 1016.40
.E INTERVAL 031 uS RECORD LEN 256 MS DELAY 0 MS
'ILT LO CUT 0HZ NOTCH 0HZ STACKS 1
FILT HI CUT 250HZ OUT FIXED GAIN



S/N 75299

SAMPLING 0.031 ms LENGTH 256 ms DELAY 0 ms READ FROM 501.DAT
LO CUT 0HZ NOTCH 0HZ DISP FILT PREVIEW STACK 1



Shot point is 1076.72

Channel 1	Phone location 1000.00	Arrival time	9.0 msec
Channel 2	Phone location 1003.28	Arrival time	9.0 msec
Channel 3	Phone location 1006.56	Arrival time	8.9 msec
Channel 4	Phone location 1009.84	Arrival time	109.0 msec
Channel 5	Phone location 1013.12	Arrival time	108.9 msec
Channel 6	Phone location 1016.40	Arrival time	108.9 msec

OMETRICS StrotoView

'AD FROM 502.DAT 15:15:49 21/APR/2006
NE NUMBER 00-00 GROUP INTERVAL 3.28
IOT LOC 1076.72 PHONE 1 LOC 1000.00 PHONE 6 LOC 1016.40
MPLE INTERVAL 031 uS RECORD LEN 256 MS DELAY 0 MS
Q FILT LO CUT 0HZ NOTCH 0HZ STACKS 1
SP FILT HI CUT 250HZ OUT FIXED GAIN

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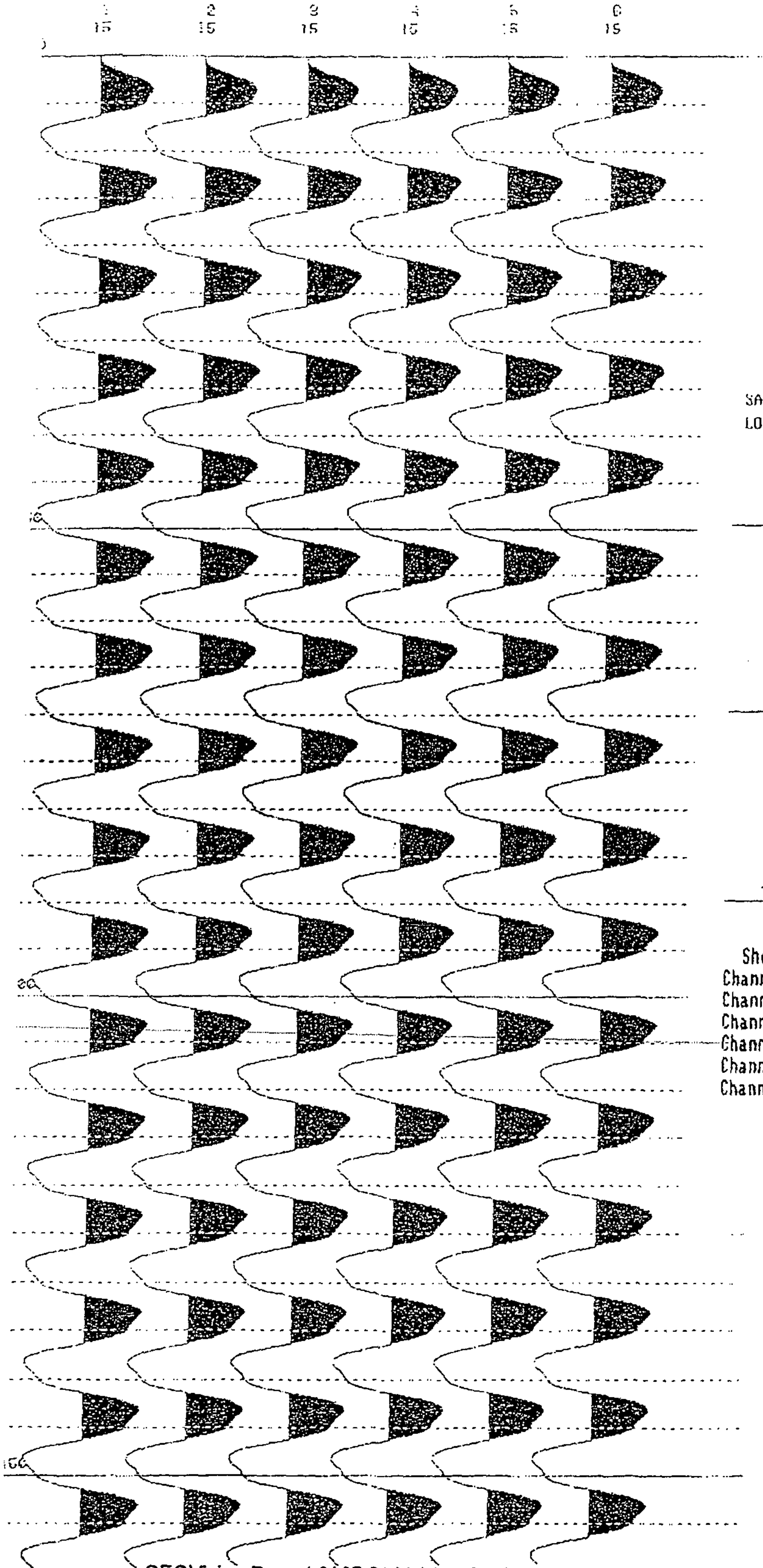
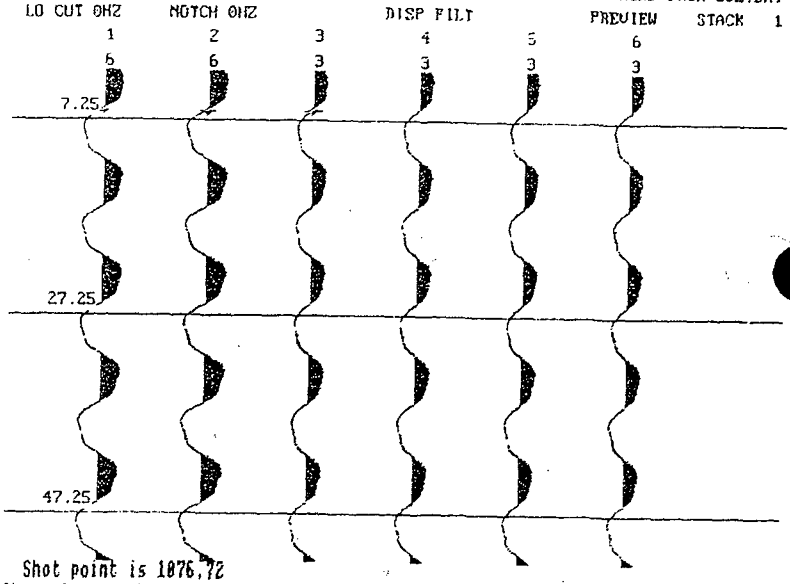


S/N 75249

SAMPLING 0.031 ms LENGTH 256 ms DELAY 0 ms READ FROM 502.DAT
LO CUT 0HZ NOTCH 0HZ DISP FILT PREVIEW STACK 1



Shot point is 1076.72

Channel	1	Phone location	1000.00	Arrival time	6.4	msec
Channel	2	Phone location	1003.28	Arrival time	6.4	msec
Channel	3	Phone location	1006.56	Arrival time	6.4	msec
Channel	4	Phone location	1009.84	Arrival time	96.4	msec
Channel	5	Phone location	1013.12	Arrival time	96.4	msec
Channel	6	Phone location	1016.40	Arrival time	96.4	msec

ICS S/N 75299 StrataView

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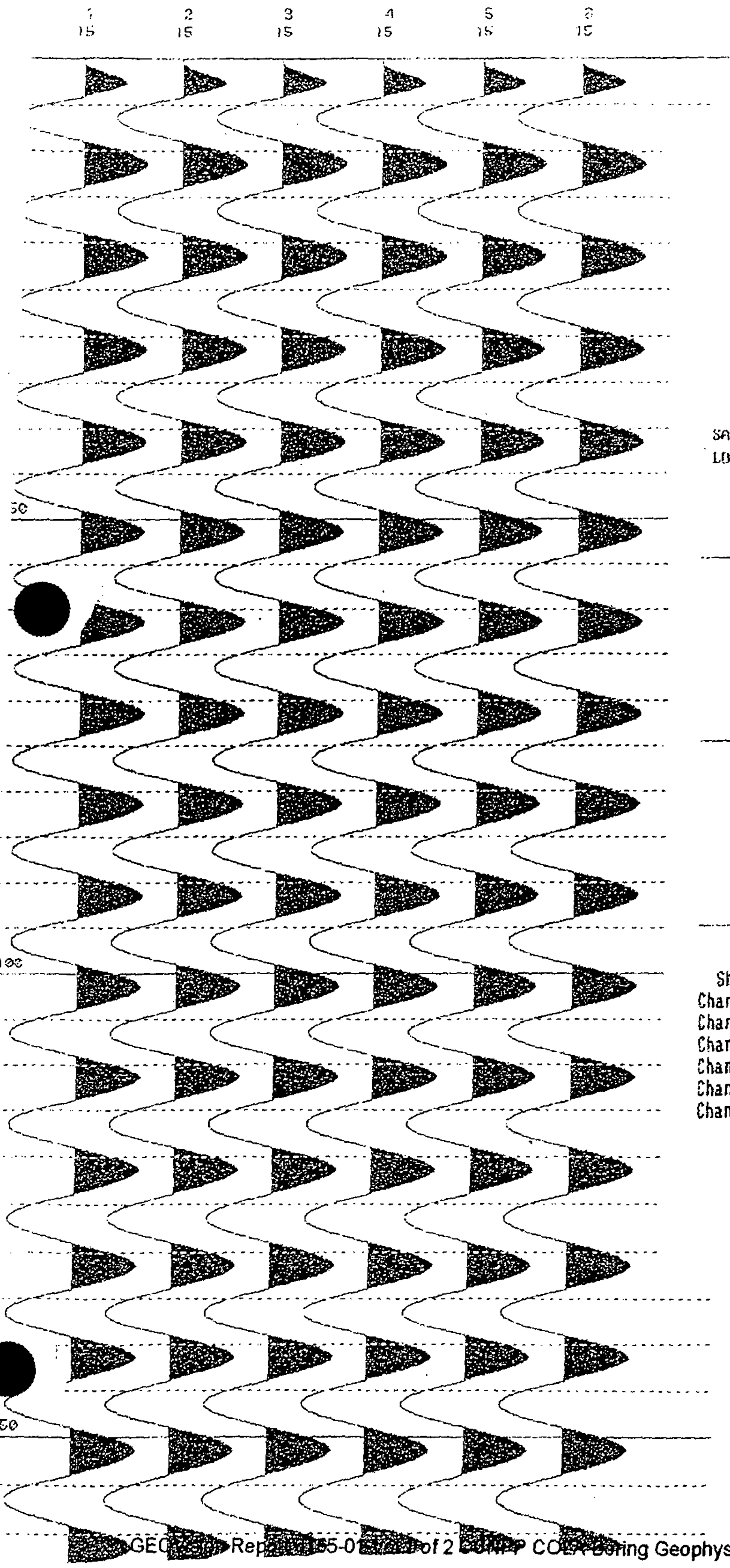
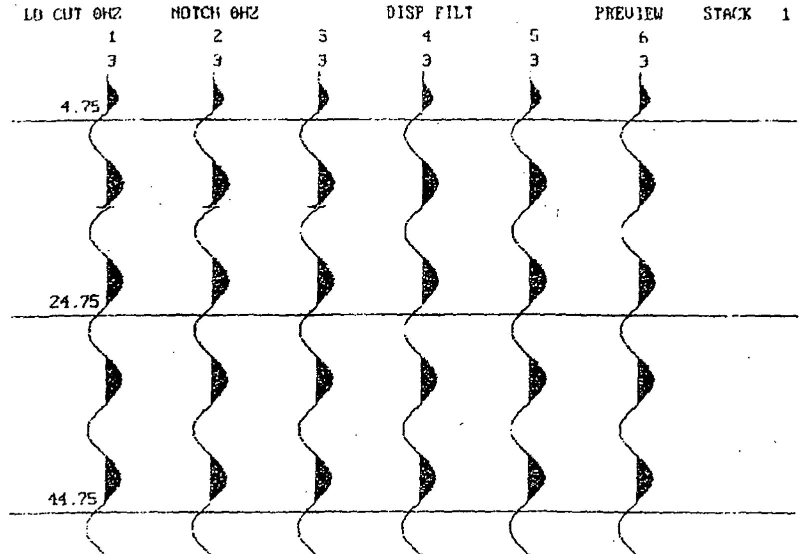
D FROM 503.DAT 15:17:14 21/APR/2006
NE NUMBER 00-00 GROUP INTERVAL 3.28
T LOC 1076.72 PHONE 1 LOC 1000.00 PHONE 6 LOC 1016.40
MPLE INTERVAL 031 uS RECORD LEN 256 MS DELAY 0 MS
 FILT LO CUT 0HZ NOTCH 0HZ STACKS 1
SP FILT HI CUT 250HZ OUT FIXED GAIN



S/N 75299

SAMPLING 0.031 ms LENGTH 256 ms DELAY 0 ms READ FROM 503.DAT
LO CUT 0HZ NOTCH 0HZ DISP FILT PREVIEW STACK 1



Shot point is 1076.72

Channel 1	Phone location 1000.00	Arrival time	13.8 msec
Channel 2	Phone location 1003.28	Arrival time	13.8 msec
Channel 3	Phone location 1006.56	Arrival time	13.8 msec
Channel 4	Phone location 1009.84	Arrival time	103.8 msec
Channel 5	Phone location 1013.12	Arrival time	103.8 msec
Channel 6	Phone location 1016.40	Arrival time	103.8 msec

OMETRICS S/N 75299 StrataView

ID FROM 504.DAT 15:19:34 21/APR/2006

IE NUMBER 00-00 GROUP INTERVAL 3.28

IT LOC 1876.72 PHONE 1 LOC 1000.00 PHONE 6 LOC 1016.40

MPLE INTERVAL 031 uS RECORD LEN 256 MS DELAY 0 MS

FILT LO CUT 0HZ NOTCH 0HZ STACKS 1

SP FILT HI CUT 250HZ OUT FIXED GAIN

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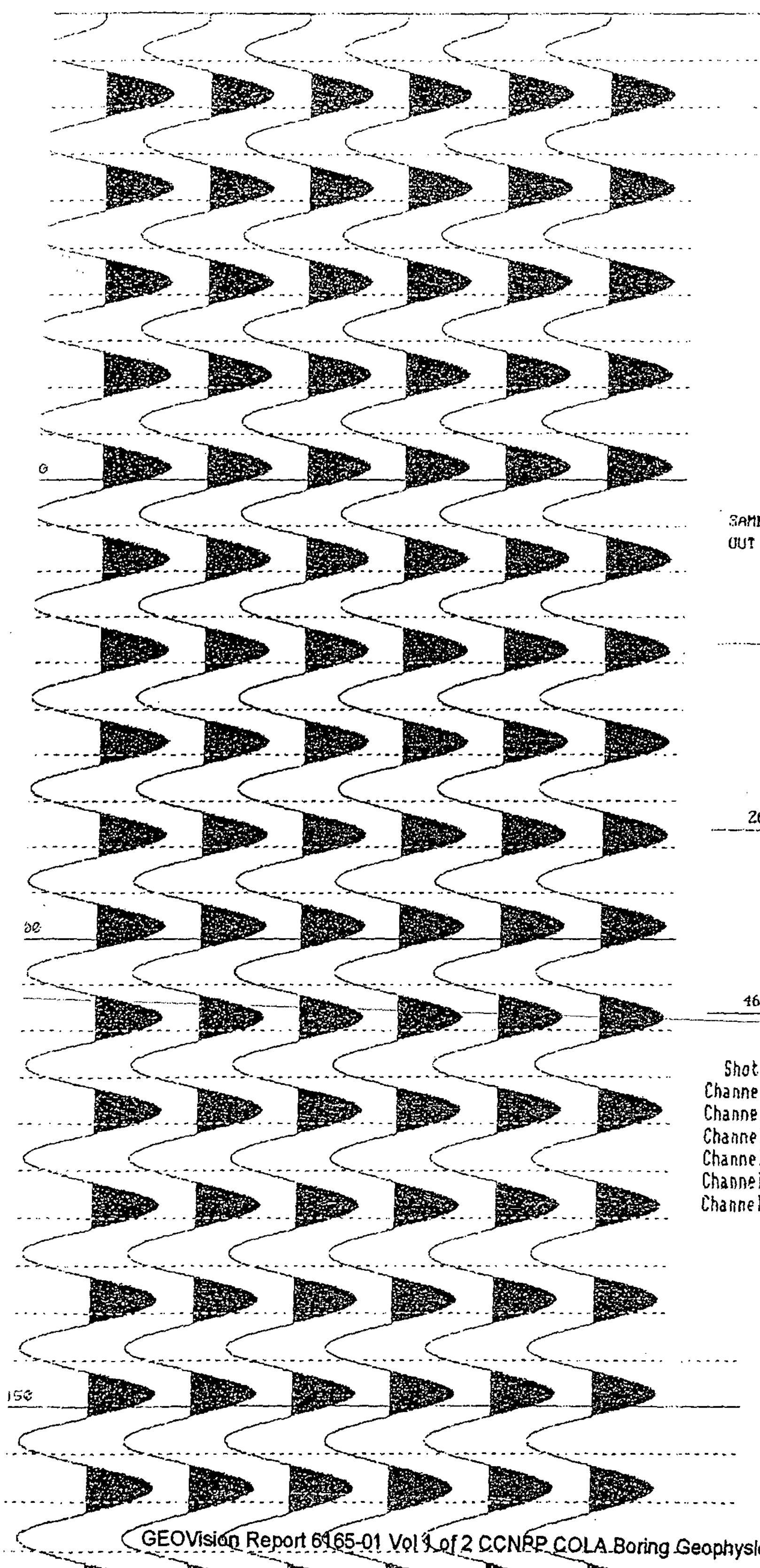
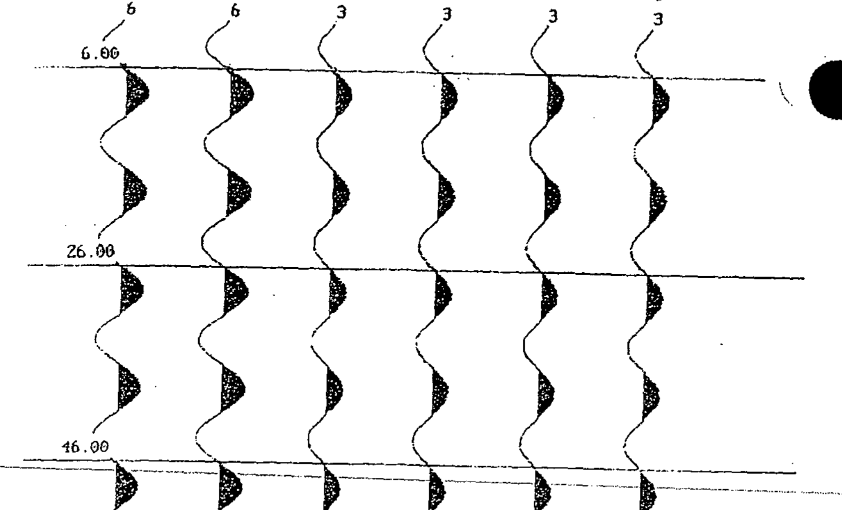


S/N 75299

SAMPLING 0.031 ms LENGTH 256 ms DELAY 0 ms SAVED AS 504.DAT

OUT OUT DISP FILT PREVIEW STACK 0



Shot point is 1876.72

Channel	1	Phone location	1000.00	Arrival time	6.0	msec
Channel	2	Phone location	1003.28	Arrival time	6.0	msec
Channel	3	Phone location	1006.56	Arrival time	6.0	msec
Channel	4	Phone location	1009.84	Arrival time	96.0	msec
Channel	5	Phone location	1013.12	Arrival time	96.0	msec
Channel	6	Phone location	1016.40	Arrival time	96.0	msec

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:1999

NVLAP LAB CODE: 105014-0

Southern California Edison Company

Westminster, CA

is recognized by the National Voluntary Laboratory Accreditation Program for conformance with criteria set forth in NIST Handbook 150:2001 and all requirements of ISO/IEC 17025:1999. Accreditation is granted for specific services, listed on the Scope of Accreditation, for:

CALIBRATION LABORATORIES

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

2006-04-01 through 2007-03-31
Effective dates

For the National Institute of Standards and Technology

NVLAP® **National Voluntary Laboratory Accreditation Program**

SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

Southern California Edison Company
7300 Fenwick Lane
Westminster, CA 92683
Ms. Jennifer E. Smith
Phone: 714-895-0133 Fax: 714-895-0781
E-mail: Jennifer.Smith@sce.com
URL: http://www.edisonmetrology.com

CALIBRATION LABORATORIES **NVLAP LAB CODE 105014-0**

NVLAP Code: 20/A01 ANSI/NCSL Z540-1-1994; Part 1 Compliant

DIMENSIONAL

NVLAP Code: 20/D03
Gage Blocks

Nominal Length in in	*Best Uncertainty (±) in μin* [note 1]
0.01 to < 0.05	1.9
0.05 to < 0.1	1.7
0.1 to < 1.0	1.2
1.0	1.4
2.0	1.8
3.0	2.2
4.0	2.9
5.0	5.4
6.0	5.6
7.0	5.8
8.0	6.0
10.0	6.8
12.0	7.2
16.0	8.1
20.0	9.4

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Nominal Length in mm	*Best Uncertainty (±) in nm* [note 1]
0.5 to < 1.0	52
1.0 to < 2.5	44
2.5 to < 25.0	39
25.0	44
50.0	47
75.0	60
100.0	80

NVLAP Code: 20/D11
Spherical Diameter; Ring Gages

Range in inches	*Best Uncertainty (±) in µin* [note 1]	*Remarks*
0.040 to 0.825	6	Comparison to gage blocks
> 0.825 to 1.510	7	Comparison to gage blocks
> 1.510 to 2.510	8	Comparison to gage blocks
> 2.510 to 4.510	12	Comparison to gage blocks
> 4.510 to 6.510	14	Comparison to gage blocks
> 6.510 to 9.010	16	Comparison to gage blocks
> 9.010 to 12.010	19	Comparison to gage blocks
> 12.010 to 13.25	31	Comparison to gage blocks

ELECTROMAGNETICS - DC/LOW FREQUENCY

NVLAP Code: 20/E02
AC Current

Range	*Best Uncertainty (±) in ppm* [note 1] *Frequency in Hz*			
	10	*20*	*40*	*400 to 10 k*
10 mA	270	199	127	116
20 mA	270	199	127	116
30 mA	270	199	127	116
50 mA	286	208	141	130
100 mA	270	199	127	116

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National Voluntary Laboratory Accreditation Program

200 mA	270	199	127	116
300 mA	270	199	127	116
500 mA	270	208	141	130

	10	*20*	*40*	*400 to 5 k*	*10 k*		
1A	270	199	127	116	130		
	10	*20*	*40*	*400 to 10 k*			
2A	271	200	129	118			
3A	271	200	129	118			
	10	*20*	*40*	*400 to 5 k*	*10 k*		
5A	286	209	142	132	148		
	10	*20*	*40*	*400*	*1 k*	*5 k*	*10 k*
10A	273	233	132	121	121	143	143
							400 to 10 k
20A							144

NVLAP Code: 20/E05
DC Current

Range	*Best Uncertainty (±) in ppm* [note 1]
10 nA	2.9
100 nA	2.3
1 µA	2.0
10 µA	2.0
100 µA	2.0
1 mA	1.9
10 mA	1.9
100 mA	1.9
1 A	10.4
10 A	10.4
30 A	20.6

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CALIBRATION LABORATORIES **NVLAP LAB CODE 105014-0**

DC Resistance

Nominal Value in Ω	*Best Uncertainty (±) in ppm* [note 1]	*Remarks*
100 μ	8.20	Automated DC Resistance Calibration System
1 m	5.50	Automated DC Resistance Calibration System
10 m	3.70	Automated DC Resistance Calibration System
100 m	2.10	Automated DC Resistance Calibration System
1	0.40	Automated DC Resistance Calibration System
10	0.40	Automated DC Resistance Calibration System
25	0.50	Automated DC Resistance Calibration System
100	0.50	Automated DC Resistance Calibration System
1 k	0.50	Automated DC Resistance Calibration System
10 k	0.50	Automated DC Resistance Calibration System
100 k	1.50	Automated DC Resistance Calibration System
1 M	2.30	Automated DC Resistance Calibration System
10 M	3.30	Automated DC Resistance Calibration System
100 M	4.00	Automated DC Resistance Calibration System

NVLAP Code: 20/E06
DC Voltage

Range	***Best Uncertainty (±) in ppm*** [notes 1,2]	***Remarks***
1.018 V	0.80	Automated DC Calibration System
10.00 V	0.20	Automated DC Calibration System
1.000 V	0.80	Automated DC Calibration System
1 mV to 100 mV	1.3 [note 6]	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage
100 mV	0.7	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage
1.0 V	0.3	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage

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10.0 V	0.3	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage
20.0 V	0.5	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage
100.0 V	0.3	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage
1000.0 V	0.7	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage

NVLAP Code: 20/E09
LF AC Voltage

Best Uncertainty (±) in ppm *notes 1,3,4*
Frequency in Hz

Range	*10*	*20*	*40*	*100*	*1k*	*10k*	*20k*	*50k*	*100k*	*300k*	*500k*	*800k*	*1M*
2 mV	448	912	889	969	379	865	1073	405	1131	1265	2116	2595	2938
10 mV	119	230	102	177	245	169	180	220	343	243	676	425	488
20 mV	83	70	67	67	66	76	76	165	261	361	521	372	442
30 mV	134	111	80	78	62	63	71	133	219	345	535	688	791
100 mV	36	72	23	42	34	35	34	43	77	169	220	287	225
190 mV	36	31	22	20	21	26	21	42	80	136	124	264	215
300 mV	46	61	30	32	34	19	28	36	59	116	143	189	205
1 V	120	36	18	10	13	12	11	25	14	87	102	104	98
1.9 V	36	22	22	9	9	9	8	18	11	94	101	85	89
3 V	26	34	25	17	14	14	13	27	14	100	108	95	97
10 V	20	42	19	10	10	9	10	11	16	80	100	111	100
19 V	26	23	20	11	9	9	10	11	16	98	109	82	82
30 V	30	37	26	19	15	16	19	37	44	118			
100 V	140	46	20	16	15	19	11	40	22				
190 V	47	27	20	20	13	13	13	41	26				
300 V			37	29	18	27	22	29	46				
500 V			33	25	17	20	19	38	52				

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700 V	29	23	18	17	19	44	54
1000 V	22	23	21	19	22		

TIME AND FREQUENCY

NVLAP Code: 20/F01
Frequency Dissemination

Range	*Best Uncertainty (±)* note 1	*Remarks*
10 MHz	1.2×10^{-12}	GPS Receiver

MECHANICAL

NVLAP Code: 20/M05
Flow Rate

Nominal Flow Rate	*Best Uncertainty (±) in percent* notes 1, 5
(0.8 to 30) L/s	0.3
(0.1 to 800) mL/s	0.4
(0.006 to 0.1) mL/s	0.7

NVLAP Code: 20/M06
Force

Nominal Force in lb	*Best Uncertainty (±)* note 1	*Remarks*
2 to 200	0.025 %	Dead Weight
> 200 to 300	0.086 lb	Proving Ring
> 300 to 500	0.14 lb	Proving Ring
> 500 to 1000	0.28 lb	Proving Ring
> 1000 to 2000	0.55 lb	Proving Ring
> 2000 to 5000	0.84 lb	Proving Ring
> 5000 to 10 000	1.7 lb	Proving Ring
> 10 000 to 20 000	5.5 lb	Proving Ring
> 20 000 to 35 000	5.8 lb	Proving Ring
> 35 000 to 50 000	13 lb	Proving Ring

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> 50 000 to 60 000	16 lb	Proving Ring
> 60 000 to 100 000	26 lb	Proving Ring
> 100 000 to 300 000	113 lb	Proving Ring

NVLAP Code: 20/M08
Mass

Range	*Best Uncertainty (±) in mg* [notes 1,2]	*Remarks*
10 kg	2.3	Echelon I
5 kg	0.93	Echelon I
3 kg	0.65	Echelon I
2 kg	0.43	Echelon I
1 kg	0.052	Echelon I
500 g	0.043	Echelon I
300 g	0.041	Echelon I
200 g	0.034	Echelon I
100 g	0.020	Echelon I
50 g	0.013	Echelon I
30 g	0.013	Echelon I
20 g	0.0095	Echelon I
10 g	0.0073	Echelon I
5 g	0.0048	Echelon I
3 g	0.0038	Echelon I
2 g	0.0029	Echelon I
1 g	0.0030	Echelon I
500 mg	0.0017	Echelon I
300 mg	0.0013	Echelon I
200 mg	0.0010	Echelon I
100 mg	0.0009	Echelon I
50 mg	0.0007	Echelon I
30 mg	0.0007	Echelon I
20 mg	0.0005	Echelon I
10 mg	0.0005	Echelon I
5 mg	0.0006	Echelon I
3 mg	0.0006	Echelon I

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CALIBRATION LABORATORIES **NVLAP LAB CODE 105014-0**

2 mg	0.0005	Echelon I
1 mg	0.0005	Echelon I
30 kg	56	Echelon II
20 kg	22	Echelon II

THERMODYNAMIC

NVLAP Code: 20/T05
Pressure

Range	*Best Uncertainty (±) in ppm* note 1	*Remarks*
> 1.5 to 50	20	Gas
> 50 to 1450	45	Gas
> 1450 to 16 000	90	Gas
> 1000 to 10 000	60	Oil
> 10 000 to 30 000	110	Oil
> 30 000 to 50 000	210	Oil

1. Represents an expanded uncertainty using a coverage factor, k = 2, at an approximate level of confidence of 95 %.
2. Approximate value. Actual value determined by the test statistics.
3. All ACV measurements performed via AC/DC transfer system.
4. Uncertainties listed are representative of the laboratory's accredited capabilities within the stated ranges. Accreditation is not limited to only those fixed values shown.
5. Dependent upon principle of operation of device being calibrated and its performance relative to standards at the time of the test.
6. The equation: uncert. = $(A + B/mVDC^2)^{0.5}$ (where A = 0.16 and B = 0.013333) is provided in order for potential customers to calculate approximate uncertainties for values down to 1 mV. Example: uncertainty at 1 mVDC would calculate to approximately ±115.47 ppm.
7. The laboratory maintains Echelon II capability for ranges 20 kg to 1 mg and separate Echelon III for all ranges.
8. Avoirdupois mass calibration services are available by comparison to equivalent metric standards. Uncertainties may be appropriately larger.

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MICRO PRECISION CALIBRATION INC.
12686 Hoover Street, Garden Grove, CA 92841
Ph. (714) 901-5659 Fax (714) 901-5649

Calibration Report

Customer: GEOVISION
Corona CA 92882
Account#: 15214
Cust.PO#:
Page 1 of 2

MPC Ctrl#: AM6766
Report#: 199974
Print Date: 041006
MPC Job#: L25384

Instrument: Caliper Calibration Plate

Mfg: Robertson Geo Logging
Model: N/A
Size:
Res.:

Serial#: 201
Cust Ctrl#:
Location:
Department:

Work Performed: Inspected, cleaned, and calibrated.
Parts Replaced: None

Calibration Condition as Received: In tolerance
Calibration Condition as Returned: In tolerance

Functions/Parameters Tested

Actual Values (inch)	As Measured
1.969	1.965
3.937	3.939
8.000	7.995
12.00	11.9965

Unless noted otherwise, Pass/Fail criteria is based on published manufacturer specifications and, unless noted otherwise, this instrument meets these specifications.
Services provided comply with ISO 17025:1999, ISO 9001:2000, MPC QM rev.3, MPC CSD rev.2 and customer purchase order requirements as required.

Calibration standards used for performance testing:

MPC#	Instrument	Due Date	Traceability
K3263	Pratt & Whitney C Super Micrometer	060706	192068
I2111	Mitutoyo 516-126 Gage Block Set	082406	397060

Environmental: 69 Deg / 40% Rh
Accuracy Ratio: 4:1
Cal Procedure: 33K6-4-552-1
Technician: CHRIS SPANGLER

Cal Int.: 12
Cal Date: 040606
Due Date: 040607
Quality Approval: ____________

QC 32

Form Cert 04-25-05

GEOVision Borehole Geophysics depth wheel verification

Performed by Robert Steller on September 23, 2006

	Depth reading in #1	Depth reading out	Depth reading in #2
Depth wheel S/N 101 500 pulse/revolution Circumference = 983mm (3225.07 millifeet)	100.1 feet (30.51 m)	99.95 feet (30.46 m)	100.05 feet (30.50 m)
Depth wheel S/N 102 500 pulse/revolution Circumference = 994mm (3261.15 millifeet)	100.00 feet (30.48) m	100.05 feet (30.50 m)	100.00 feet (30.48) m
Aries winch 200 pulse/revolution Circumference = 305.9mm (1003.51 millifeet)	100.05 feet (30.50) m	100.05 feet (30.50 m)	100.00 feet (30.48) m
Depth wheel S/N 103 500 pulse/revolution Circumference = 1000mm (3.281 feet)			
Comprobe winch 500 pulse/revolution Circumference = 1000mm (3.281 feet)			

All measurements taken with a Stanley 100ft flexible stainless steel tape model number 34-130, and a Keeson 300 foot fiberglass tape, both marked in feet, inches and 1/8ths of inches. Enough cable was spooled off of the winch to allow the cable and tape measures to be laid flat on the parking lot surface side-by-side. A permanent marker was used to mark a 100.0 foot interval on the cable, and the marks were also tagged with electrical tape for visibility. The cable was then spooled back onto the winch. When the first mark was at the top of the measuring wheel, a matching permanent mark was placed, and the recording system (Robertson Micrologger) was set to 0.0 feet depth. The cable was spooled in to the second mark, and the distance was recorded. The recording system was set to 0.0 feet again, and the cable spooled out to the first mark again, and the distance was recorded. The process was repeated one more time to spool the cable back onto the winch, and the distance was recorded.

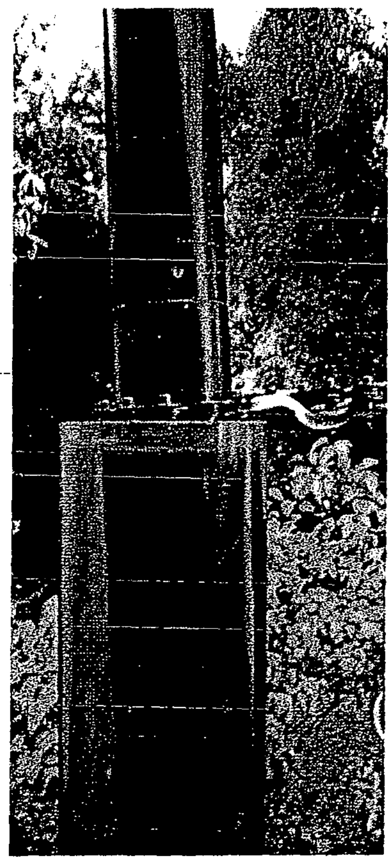
Estimated accuracy is of these measurements is +/- 0.1 foot or +/- 0.03m.

GEOVision Suspension PS probe Receiver 1–Receiver 2 (R1-R2) spacing verification

Performed by Robert Steller on September 23, 2006

	R2 center to R1 center hanging dry	R2 center to R1 center hanging submerged	R1 bottom to source center hanging submerged with 1m isolation tube S/N 280068
Receiver S/N 30086	40.2in 1.02m	40.0in 1.02m	76.0in 1.93m
Receiver S/N 20042	39.8in 1.01m	39.6in 1.01m	75.7in 1.92m
Receiver S/N 12008	40.2in 1.02m	40.0in 1.02m	76.0in 1.93m

All measurements taken with a Lufkin 3.7m flexible steel tape model number HV1034DM, marked in mm and 100th of feet. Probe suspended in 3-inch diameter clear PVC pipe, using chain clamp placed between bottom and center of Receiver 2 hard section (See Figure). Probe "bounced" to establish unrestricted hanging length before measurement. Probe allowed to relax for 5 minutes prior to each measurement. Water level set to submerge bottom of Receiver 2 hard section. Estimated accuracy due to hysterisis in rubber section approximately +/- 0.01' or +/- 0.003m.



APPENDIX D

BORING GEOPHYSICAL LOGGING FIELD DATA LOGS

GEOVision
geophysical services

B-301 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: CCNPP COLA DATE: 6/5/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSÈLLI PHONE: 703-906-1797

BOREHOLE CONSTRUCTION: CASED____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 20' ; 4¾" 20' TO 403'
BOREHOLE TOTAL DEPTH AS DRILLED: 403'
CONDUCTOR CASING?: YES____ DEPTH TO BOTTOM OF CASING______; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
PS P-S VELO	001 – 238	0.6' – 390.4'	6/5/06	10:10 – 12:30
DEVIATION	B301AUDOWN01	Ø – 402.5'	6/5/06	13:05 – 13:50
ELOG/GAMMA	B301ELOGUP01	402.0' – 1.7'	6/5/06	14:20 – 15:02
ELOG/GAMMA	B301ELOGUP02	402.0' – 1.7'	6/5/06	15:14 – 15:45
CAL TEST	B301TESTCAL01	Ø	6/5/06	16:05 – 16:10
CALIPER	B301CALUP01	402.0 – (-1.0)	6/5/06	16:25 – 16:55
CAL TEST	B301TESTCAL02	Ø	6/5/06	17:00 – 17:05

GEOVision
geophysical services

P-S SUSPENSION VELOCITY FIELD LOG

SITE: CALVERT CLIFFS COLA ~~B-401~~ 301 DATE: 6/5/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 8

CONTACT: ______ OFFICE PHONE: ______
CELL 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: B-~~401~~ 301 LOCATION: ______

COUNTY: ______ RANGE: ______ TOWNSHIP: ______ SECTION: ______
BOREHOLE CONSTRUCTION: CASED ______ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO ~~30'~~ 20' ; 4 3/4 30 TO ~~403'~~ 403'
BOREHOLE TOTAL DEPTH AS DRILLED: ~~402'~~ 403'
CONDUCTOR CASING?: YES ______ DEPTH TO BOTTOM OF CASING ______; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈ 30'
BOREHOLE FLUID: WATER ______; FRESH WATER MUD ✓; SALT WATER MUD ______;
OTHER: ______
DEPTH TO BOREHOLE FLUID: ∅ TIME SINCE LAST CIRCULATION: 1/2 HR

GEOVision
geophysical services

SITE: CALVERT CLIFFS COLA B-401 301 DATE: 6/5/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 8

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:30
ARRIVED ON SITE: 8:00
STANDBY TIME: ______ CAUSE: ______
LOGGING STARTED: 10:10 LOGGING COMPLETED: 12:30
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: CALVERT CLIFFS COLA B-~~40~~301 DATE: 6/5/06

CLIENT: SCHNABEL JOB: 6165

AUTHOR: R. STELLER PAGE 3 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	1		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA ~~B-401~~ 301 DATE: 6/5/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 4 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-~~40~~ 301 DATE: 6/5/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 5 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		
46.0	150.92	92		
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37	113		
57.0	187.01	114		-
57.5	188.65	115		
58.0	190.29	116		
58.5	191.93	117		
59.0	193.57	118		
59.5	195.21	119		
60.0	196.85	120		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-~~40r~~ 301 DATE: 6/5/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 6 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	121		
61.0	200.13	122		
61.5	201.77	123		
62.0	203.41	124		
62.5	205.05	125		
63.0	206.69	126		
63.5	208.33	127		
64.0	209.97	128		
64.5	211.61	129		
65.0	213.25	130		
65.5	214.90	131		
66.0	216.54	132		
66.5	218.18	133		
67.0	219.82	134		
67.5	221.46	135		
68.0	223.10	136		
68.5	224.74	137		
69.0	226.38	138		
69.5	228.02	139		
70.0	229.66	140		
70.5	231.30	141		
71.0	232.94	142		
71.5	234.58	143		
72.0	236.22	144		
72.5	237.86	145		
73.0	239.50	146		
73.5	241.14	147		
74.0	242.78	148		
74.5	244.42	149		
75.0	246.06	150		
75.5	247.70	151		
76.0	249.34	152		
76.5	250.98	153		
77.0	252.62	154		
77.5	254.27	155		
78.0	255.91	156		
78.5	257.55	157		
79.0	259.19	158		
79.5	260.83	159		
80.0	262.47	160		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA ~~B-40r~~ 301 DATE: 6/5/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 7 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
80.5	264.11	161		
81.0	265.75	162		
81.5	267.39	163		
82.0	269.03	164		
82.5	270.67	165		
83.0	272.31	166		
83.5	273.95	167		
84.0	275.59	168		
84.5	277.23	169		
85.0	278.87	170		
85.5	280.51	171		
86.0	282.15	172		
86.5	283.79	173		
87.0	285.43	174		
87.5	287.07	175		
88.0	288.71	176		
88.5	290.35	177		
89.0	291.99	178		
89.5	293.64	179		
90.0	295.28	180		CHANGE↓
90.5	296.92	181		
91.0	298.56	182		
91.5	300.20	183		
92.0	301.84	184		
92.5	303.48	185		
93.0	305.12	186		
93.5	306.76	187		
94.0	308.40	188		
94.5	310.04	189		
95.0	311.68	190		
95.5	313.32	191		
96.0	314.96	192		
96.5	316.60	193		
97.0	318.24	194		
97.5	319.88	195		
98.0	321.52	196		
98.5	323.16	197		
99.0	324.80	198		
99.5	326.44	199		
100.0	328.08	200		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA ~~B-401~~ B-301 DATE: 6/5/06

CLIENT:__SCHNABEL JOB:_6165

AUTHOR:_R. STELLER

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
100.5	329.72	201		
101.0	331.36	202		
101.5	333.01	203		
102.0	334.65	204		
102.5	336.29	205		
103.0	337.93	206		
103.5	339.57	207		
104.0	341.21	208		
104.5	342.85	209		
105.0	344.49	210		
105.5	346.13	211		
106.0	347.77	212		
106.5	349.41	213		
107.0	351.05	214		
107.5	352.69	215		
108.0	354.33	216		
108.5	355.97	217		
109.0	357.61	218		
109.5	359.25	219		
110.0	360.89	220		
110.5	362.53	221		
111.0	364.17	222		
111.5	365.81	223		
112.0	367.45	224		
112.5	369.09	225		
113.0	370.73	226		
113.5	372.38	227		
114.0	374.02	228		
114.5	375.66	229		
115.0	377.30	230		
115.5	378.94	231		
116.0	380.58	232		
116.5	382.22	233		
117.0	383.86	234		
117.5	385.50	235		
118.0	387.14	236		BOTTOM MEASUREMENTS
118.5	388.78	237		HIT BOTTOM @ 119.2m - TIP @ 403.2'
119.0	390.42	238		
119.5	392.06			
120.0	393.70			

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B-301 ACOUSTIC TELEVIEWER FIELD LOG

SITE: CCNPP COLA DATE: 6/5/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-301 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 20' ; 4 3/4" 20' TO 403'
BOREHOLE TOTAL DEPTH AS DRILLED: 403'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈30'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈4 HR.

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SITE: CCNPP COLA B-301 DATE: 6 / 5 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:30
ARRIVED ON SITE: 8:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 13:05 LOGGING COMPLETED: 13:50

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
TELEVIEWER OPTICAL #5117___ ACOUSTIC #5174 ✓ OTHER___

PROBE TILT TEST 88.2 BRUNTON TILT 88°
PROBE AZIMUTH TEST 336.7 BRUNTON AZIMUTH 337° PROBE HANGING 0.3°

PROBE OFFSET	OPTICAL 1.88M(6.17FT)	ACOUSTIC 1.44M(4.72FT)
CASING STICK-UP	-	- 1.50 FT
DEPTH REF. OFFSET		3.22 FT.

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B301 Au down01	Ø	13:05	402.5'	13:50

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-301 ELOG FIELD LOG

SITE: CCNPP COLA DATE: 6/ 5 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-301 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 20'; 4 3/4" 20' TO 403'
BOREHOLE TOTAL DEPTH AS DRILLED:
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈30'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈6 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:30
ARRIVED ON SITE: 8:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 14:20 LOGGING COMPLETED: 15:45

SITE:_CCNPP COLA B-301 DATE: 6/ 7/2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

WINCH: COMPROBE____ SILVER ✓ OYO____ OTHER________
MICROLOGGER 5301 ✓ OTHER________
ELOG PROBE 5490 ✓ OTHER________

PROBE OFFSET	2.50M(8.20 FT)	
CASING STICK-UP	-1.50	
DEPTH REF. OFFSET	6.70FT.	

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B301ELOG UP 01	14:20	402'	1.7'	~~1.7'~~ 15:02
B301ELOG UP 02	15:14	402'	1.7'	15:45

MAINTENANCE PERFORMED ON SITE:________

EQUIPMENT PROBLEMS OR FAILURES:________

SUGGESTIONS, ADDITIONS, CHANGES:________

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B-301 CALIPER FIELD LOG

SITE: CCNPP COLA DATE: 6 / 5 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-301 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6 ~~4¼~~ 0 TO ~~403'~~ ~~30~~ 20, 4¾" ~~30~~ 20' TO 403'
BOREHOLE TOTAL DEPTH AS DRILLED: 403'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈30'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 6 HR.

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:30
ARRIVED ON SITE: 8:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 16:20 LOGGING COMPLETED: 17:05

SITE:_CCNPP COLA B-301 DATE: 6/ 5 /2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
CALIPER PROBE 5368 ✓ OTHER___

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	12 IN MAX 2.08M(6.82 FT) ARMS - 1.5 5.32'	24 IN MAX ARMS - ___

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B301TESTCAL01	Ø	16:05	Ø	16:10
B301 CAL UP01	402'	16:25	~1.0	16:55
B301TEST CAL 02	Ø	17:00	Ø	17:05

CALIBRATION PLATE S/N 201

		AS BUILT		
		1.968 IN	3.937 IN	8.000 IN
	FILE NAME	(50 MM)	(100 MM)	203.2 MM
AS MEAS.	B301TESTCAL01	1.97	3.91	8.02
AS MEAS.	B301TESTCAL02	1.98	3.94	8.03
AS MEAS.				
AS MEAS.				
AS MEAS.				
AS MEAS.				

MAINTENANCE PERFORMED ON SITE:___

EQUIPMENT PROBLEMS OR FAILURES:___

SUGGESTIONS, ADDITIONS, CHANGES:___

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B-304 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: CCNPP COLA DATE: 6/1-2/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI PHONE: 703-906-1797

BOREHOLE CONSTRUCTION: CASED____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 1/4 0 TO 200' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES____ DEPTH TO BOTTOM OF CASING____; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
OYO PS	001 – 112	1.6 – 182.1'	6/1/06	11:00 – 13:30
RG PS	201 – 311	1.6 – 180.5'	6/1/06	14:05 – 15:35
4ARM CAL	B304ARMPRECAL	0.2 – 2.0'	6/1/06	16:10 – 16:12
4ARM CAL/DEV	B304 DOWN 01	0.0 – 194.0	6/1/06	16:20 – 17:20
4ARM CAL	B304 POSCAL	1.0 – (-1.0)	6/1/06	17:32 – 17:34
ELOG/GAMMA	B304ELOGDOWN01	40.5 – 195.4	6/1/06	18:00 – 18:20
ELOG/GAMMA	B304ELOGUP01	195.4 – 20.2	6/1/06	18:25 – 18:45
3 ARM CAL	B304 TESTCAL01	Ø	6/2/06	11:25 – 11:30
3 ARM CAL	B304CALUP01	188 – Ø	6/2/06	11:33 – 11:53
3 ARM CAL	B304 TESTCAL02	Ø	6/2/06	11:55 – 12:00
3 ARM CAL	B304 TESTCAL03	Ø	6/2/06	12:05 – 12:10
3 ARM CAL	B304CALUP02	189.0 – Ø	6/2/06	12:13 – 12:33
3 ARM CAL	B304 TESTCAL04	Ø	6/2/06	12:40 – 12:45

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: CALVERT CLIFFS COLA B-304 DATE: 6/1/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 5

CONTACT: ______ OFFICE PHONE: ______
CELL 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 ______ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 200' ; ______, ______ TO ______
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ______ DEPTH TO BOTTOM OF CASING ______; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈ 60'
BOREHOLE FLUID: WATER ______; FRESH WATER MUD ✓; SALT WATER MUD ______;
OTHER: ______
DEPTH TO BOREHOLE FLUID: ______ TIME SINCE LAST CIRCULATION: 2HRS

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geophysical services

SITE: CALVERT CLIFFS COLA B-304 DATE: 6/1/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 5

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 6:00
ARRIVED ON SITE: 7:00
STANDBY TIME: ~ CAUSE: DOCUMENTATION, MOVE ON SITE
OYO LOGGING STARTED: 11:00. LOGGING COMPLETED: 13:30
STANDBY TIME: CAUSE:
RS LOGGING STARTED: 14:05 LOGGING COMPLETED: 15:35
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:
OYO DATA FILES: 001 - 112

EQUIPMENT PROBLEMS OR FAILURES: ROBERTSON DATA FILES: 201 - 311

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: OYO ZERO ON RETURN = +0.03 m ROBERTSON @ 0.3 FT ABOVE PLATE
ROBERTSON ZERO ON RETURN = 0.3 FT.

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-304 DATE: 6/1/06

CLIENT: SCHNABEL JOB: 6165

AUTHOR: R. STELLER PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	OYO ~~UNFILTERED~~ FILE NO.	ROBERTSON ~~FILTERED~~ FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	081	201	
1.0	3.28	2	202	
1.5	4.92	3	203	
2.0	6.56	4	204	
2.5	8.20	5	205	
3.0	9.84	6	206	
3.5	11.48	7	207	
4.0	13.12	8	208	
4.5	14.76	9	209	
5.0	16.40	10	210	
5.5	18.04	11	211	
6.0	19.69	12 13	212, 213	
6.5	21.33	14	214	
7.0	22.97	15	215	
7.5	24.61	16	216	
8.0	26.25	17	217	
8.5	27.89	18	218	
9.0	29.53	19	219	
9.5	31.17	20	220	
10.0	32.81	21	221	
10.5	34.45	22	222	500 m/s.
11.0	36.09	23	223	
11.5	37.73	24	224	
12.0	39.37	25	225	
12.5	41.01	26	226	
13.0	42.65	27	227	
13.5	44.29	28	228	
14.0	45.93	29	229	
14.5	47.57	30	230	
15.0	49.21	31	231	
15.5	50.85	32	232	
16.0	52.49	33	233	
16.5	54.13	34	234	
17.0	55.77	35	235	
17.5	57.41	36	236	
18.0	59.06	37	237	
18.5	60.70	38	238	
19.0	62.34	39	239	CLIPPED
19.5	63.98	40	240	
20.0	65.62	41	241	

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA____B-304____ DATE:__6/1/06____

C[illegible]T:__SCHNABEL____ JOB:_6165____

A[illegible]OR:_R. STELLER____ PAGE__4__OF__5__

ROBERTSON

DEPTH METERS	DEPTH FEET	~~UNFILTERED~~ FILE NO. 040	~~FILTERED~~ FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	42	242	
21.0	68.90	43	243	
21.5	70.54	44	244	
22.0	72.18	45	245	
22.5	73.82	46	246	
23.0	75.46	47	247	
23.5	77.10	48	248	
24.0	78.74	49	249	
24.5	80.38	50	250	
25.0	82.02	51	251	
25.5	83.66	52	252	
26.0	85.30	53	253	
26.5	86.94	54	254	
27.0	88.58	55	255	
27.5	90.22	56	256	
[illegible].0	91.86	57	257	
28.5	93.50	58	258	Vs=340 m/s
29.0	95.14	59	259	
29.5	96.78	60	260	
30.0	98.43	61	261	
30.5	100.07	62	262	
31.0	101.71	63	263 CLIPPED	
31.5	103.35	64	264	
32.0	104.99	65	265	
32.5	106.63	66	266 CLIPPED	
33.0	108.27	67	267	
33.5	109.91	68	268	
34.0	111.55	69	269 CLIPPED	
34.5	113.19	70	270	
35.0	114.83	71	271	
35.5	116.47	72	272 CLIPPED	
36.0	118.11	73	273	
36.5	119.75	74	274	
37.0	121.39	75	275	
37.5	123.03	76	276	
38.0	124.67	77	277	
38.5	126.31	78	278	
39.0	127.95	79	279	
39.5	129.59	80	280	
40.0	131.23	81	281	

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-304 DATE: 6/1/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	OYO ~~UNFILTERED~~ FILE NO.	ROBERTSON ~~FILTERED~~ FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	82	282	
41.0	134.51	83	283	
41.5	136.15	84	284 CLIPPED	
42.0	137.80	85	285 "	
42.5	139.44	86	286 "	
43.0	141.08	87	287 "	
43.5	142.72	88	288 "	
44.0	144.36	89	289 "	
44.5	146.00	90	290 "	
45.0	147.64	91	291 "	
45.5	149.28	92	292 "	
46.0	150.92	93	293	
46.5	152.56	94	294	
47.0	154.20	95	295	
47.5	155.84	96	296	
48.0	157.48	97	297	
48.5	159.12	98	298	
49.0	160.76	99	299	
49.5	162.40	100	300 CLIPPED	
50.0	164.04	101	301 "	OYO DISK 2 & NEW PAPER.
50.5	165.68	102	302 "	
51.0	167.32	103	303 "	
51.5	168.96	104	304	
52.0	170.60	105	305	
52.5	172.24	106	306	
53.0	173.88	107	307	
53.5	175.52	108	308	
54.0	177.17	109	309	
54.5	178.81	110	310	
55.0	180.45	111	311	
55.5	182.09	112		ROBERTSON HIT @ 55.4 m (TIP @ 193.9')
56.0	183.73			OYO HIT @ 55.8 m (TIP @ 185.2')
56.5	185.37			
57.0	187.01			BOTTOM MEASURE ?
57.5	188.65			
58.0	190.29			
58.5	191.93			
59.0	193.57			
59.5	195.21			
60.0	196.85			

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ACOUSTIC TELEVIEWER FIELD LOG

SITE: ~~GRAND GULF~~ COL CCNPP COLA B-304 DATE: 6/1/2006
CLIENT: WLA JOB: 6242
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: JIM HENGISH OFFICE PHONE: 601-437-7354
CELL PHONE: 415-488-7382
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-304 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 200'; ___, ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING ___; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ~60'
BOREHOLE FLUID: WATER ___; FRESH WATER MUD ✓; SALT WATER MUD ___;
OTHER:
DEPTH TO BOREHOLE FLUID: ___ TIME SINCE LAST CIRCULATION: 6 HRS

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geophysical services

SITE: GRAND GULF COL B-304 DATE: 6/ 1 /2006
CLIENT: WLA JOB: 6242
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 6:00
ARRIVED ON SITE: 7:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 16:10 LOGGING COMPLETED:

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER OPTICAL #5117 ___ ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 85.2° BRUNTON TILT 84° PROBE HANGING 0.4°
PROBE AZIMUTH TEST 293.3° BRUNTON AZIMUTH 289°

PROBE OFFSET	OPTICAL 1.88M(6.17FT)	ACOUSTIC 1.44M(4.72FT)
CASING STICK-UP	-	- 1.50'
DEPTH REF. OFFSET		3.22 FT ✓

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B304 PRECAL	2.0	~~1.0~~ 16:10	02	16:12
B304 AV DOWN01	0.0	16:20	84'	17:20
B304 POSCAL	1.0	17:32	-1.0	17:34
B304ELOG DOWN01	40.5	18:00	195.4	18:20
B304 ELOG UP 01	195.4	18:25	20.2	18:45

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES: ELOG DOWN01 AND ELOG UP01 DIFFER IN DEPTH BY ~ 10' DUE TO LOG UP WITH INCORRECT DIRECTION? CHECK IN ANALYSIS.

SUGGESTIONS, ADDITIONS, CHANGES: ELOG EXTENSION 32.8'
STICK-UP = 1.50' PROBE LENGTH = 9.2 START @ 9.2 - 1.5' = 7.7'
6:45 PM

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B-304 CALIPER FIELD LOG

SITE: CCNPP COLA DATE: 6/ 2 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-304 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4.25 0 TO 200' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≤60'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 1/2 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 10:15
ARRIVED ON SITE: 10:45
STANDBY TIME: – CAUSE: –
LOGGING STARTED: 11:30 LOGGING COMPLETED: 12:40

SITE: CCNPP COLA B-304 DATE: 6 / 2 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE___ SILVER √ OYO___ OTHER___
MICROLOGGER 5301 √ OTHER___
CALIPER PROBE 5368 √ OTHER___

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	12 IN MAX 2.08M(6.82 FT) ARMS - 1.50 5.32 FT	24 IN MAX ARMS - ___

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B304 TEST CAL 01	ø	11:25 20:15	ø	~~11:30~~ 20:18
B304 CAL UP 01	188 195	11:33 20:20	ø	11:53 20:44
B304 TEST CAL 02	ø	11:55 20:48	ø	12:00 20:50
B304 TEST CAL 03	ø	12:05	ø	12:10
B304 CAL UP 02	189'	12:13	ø	12:33
B304 ~~CAL~~ TEST CAL 04	ø	12:40	ø	12:45

CALIBRATION PLATE S/N 201

	FILE NAME	AS BUILT 1.968 IN (50 MM)	3.937 IN (100 MM)	8.000 IN 203.2 MM
AS MEAS.	B 304 TEST CAL 01	1.97	3.92	8.00
AS MEAS.	B 304 TEST CAL 02	1.92	3.87	7.88
AS MEAS.	B 304 TEST CAL 03	1.97	3.97	8.00
AS MEAS.	B 304 TEST CAL 04	1.96	3.96	8.00
AS MEAS.				
AS MEAS.				

1.96 3.93 8.00
~~1.94 3.96 8.04~~
1.97 3.95 8.03

MAINTENANCE PERFORMED ON SITE:___

EQUIPMENT PROBLEMS OR FAILURES:___

SUGGESTIONS, ADDITIONS, CHANGES:___

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B-307 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: CCNPP COLA
DATE: 6/15/2006
CLIENT: SCHNABEL
JOB: 6165
AUTHOR: R. STELLER
PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI
PHONE: 703-906-1797

BOREHOLE CONSTRUCTION: CASED____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 20'; 4 1/4" 20 TO 200'
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES____ DEPTH TO BOTTOM OF CASING____; NO ✓
DEPTH TO BEDROCK: UN
BOREHOLE FLUID: WATER____; FRESH WATER MUD ✓; SALT WATER MUD____;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
SUSPENSION P.S	001 - 114	1.6' - 187.0'	6/15/06	20:00 - 21:05
CALIPER TEST	B307TESTCAL01	Ø	6/15/06	21:25 - 21:35
CALIPER	B307CALIP01	197.0 - (-0.5)	6/15/06	21:45 - 22:05
CALIPER TEST	B307TESTCAL02	Ø	6/15/06	22:10 - 22:15
ELOG/GAMMA	B307ELOGCLP01	200.0' - 4.05'	6/15/06	22:27 - 22:50
DEVIATION	B307DEVDOWN01	Ø - 195.0'	6/15/06	23:20 - 0:15

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: CALVERT CLIFFS COLA B-307 DATE: 6/15/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 5

CONTACT:______ OFFICE PHONE:______
CELL 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: B-307 LOCATION:______

COUNTY:______ RANGE:______ TOWNSHIP:______ SECTION:______
BOREHOLE CONSTRUCTION: CASED______ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 20; 4 1/4 20 TO 200'
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES______ DEPTH TO BOTTOM OF CASING______; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:______
BOREHOLE FLUID: WATER______; FRESH WATER MUD ✓; SALT WATER MUD______;
OTHER:______
DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: ½ HR

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SITE: CALVERT CLIFFS COLA B-307 DATE: 6/15/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 5

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 17:00
ARRIVED ON SITE: 18:30
STANDBY TIME: ______ CAUSE: ______
LOGGING STARTED: ______ LOGGING COMPLETED: ______
STANDBY TIME: ______ CAUSE: ______
LOGGING STARTED: 20:00 LOGGING COMPLETED: 21:05
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 ☐	30086 ☑

MAINTENANCE PERFORMED ON SITE: ______

EQUIPMENT PROBLEMS OR FAILURES: ______

SUGGESTIONS, ADDITIONS, CHANGES: ______

COMMENTS: DEPTH OFFSET = 8.14' − 1.5' = 6.64' ≈ 2.02m

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-307 DATE: 6/15/06
CLIENT:__SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	1		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-307 DATE: 6/15/06
CLIENT:__SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-307 DATE: 6/15/06
CLIENT:__SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		
46.0	150.92	92		
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37	113		
57.0	187.01	114		BOTTOM MEASUREMENT ?
57.5	188.65			HIT BOTTOM @57.3m => TIP AT
58.0	190.29			200.1'
58.5	191.93			
59.0	193.57			
59.5	195.21			
60.0	196.85			

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B-307 CALIPER FIELD LOG

SITE: CCNPP COLA DATE: 6 / 15 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
 CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
 PHONE:
CONTACT: PHONE:
 PHONE:
CONTACT: PHONE:
 PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-307 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 20'; 4¼", 20 TO 200'
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: UK DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 2 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 17:00
ARRIVED ON SITE: 18:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 21:25 LOGGING COMPLETED: 22:15

SITE:_CCNPP COLA B-307 DATE: 6/ 15/2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
CALIPER PROBE 5368 ✓ OTHER___

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	12 IN MAX 2.08M(6.82 FT) ARMS - 1.5' 5.32'	24 IN MAX ARMS - ___

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B307 TESTCAL 01	Ø	21:25	Ø	21:35
B307 CALI 01	197.0	21:45	-0.5	22:05
B307 TESTCAL 02	Ø	22:10	Ø	22:15

CALIBRATION PLATE S/N 201

	FILE NAME	AS BUILT 1.968 IN (50 MM)	3.937 IN (100 MM)	8.000 IN 203.2 MM
AS MEAS.	B307 TESTCAL 01	1.94	3.94	8.01
AS MEAS.	B307 TESTCAL 02	1.88	3.87	7.94
AS MEAS.				
AS MEAS.				
AS MEAS.				
AS MEAS.				

MAINTENANCE PERFORMED ON SITE:___

EQUIPMENT PROBLEMS OR FAILURES:___

SUGGESTIONS, ADDITIONS, CHANGES:___

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B-307 ELOG FIELD LOG

SITE: CCNPP COLA DATE: 6/15/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-307 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 20'; 4 1/4", 20' TO 200'
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING ___; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ___; FRESH WATER MUD ✓; SALT WATER MUD ___;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 4 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 17:00
ARRIVED ON SITE: 18:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 22:27 LOGGING COMPLETED: 22:50

SITE: CCNPP COLA B-307 DATE: 6/18/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE____ SILVER ✓ OYO____ OTHER____
MICROLOGGER 5301 ✓ OTHER____
ELOG PROBE 5490 ✓ OTHER____

PROBE OFFSET	2.50M(8.20 FT)	
CASING STICK-UP	-1.5	
DEPTH REF. OFFSET	6.7 FT.	

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B307 Elog ul 01	200'	22:27	4.05	22:50

MAINTENANCE PERFORMED ON SITE:____

EQUIPMENT PROBLEMS OR FAILURES:____

SUGGESTIONS, ADDITIONS, CHANGES:____

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B-307 ~~ACOUSTIC TELE~~VIEWER FIELD LOG
DEVIATION

SITE:_CCNPP COLA ____ DATE: 6/15 /2006
CLIENT:_SCHNABEL ____ JOB:_6165
AUTHOR:_R. STELLER ____ PAGE 1 OF 2

CONTACT:_RUBEN TARUSELLI ____ _OFFICE__ PHONE:____
_CELL____ PHONE:_703-906-1797
CONTACT:____ _OFFICE__ PHONE:____
____ PHONE:____
CONTACT:____ ____ PHONE:____
____ PHONE:____
CONTACT:____ ____ PHONE:____
____ PHONE:____
DRILLER:____ ____ PHONE:____
COMPANY:____ ____ PHONE:____

DIRECTIONS TO SITE:____

GENERAL SITE CONDITIONS/LOCATION:____

BOREHOLE DESIGNATION: B-307 LOCATION:____

COUNTY:____ RANGE:____ TOWNSHIP:____ SECTION:____
BOREHOLE CONSTRUCTION: CASED____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 20'; 4 3/4 20 TO 200'
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES____ DEPTH TO BOTTOM OF CASING____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:____
BOREHOLE FLUID: WATER____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 2 HRS

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geophysical services

SITE: CCNPP COLA B-307 DATE: 6/15/2006

CLIENT: SCHNABEL JOB: 6165

AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER

VEHICLE(S) USED AND MILEAGE: RENTAL

MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 17:00

ARRIVED ON SITE: 18:30

STANDBY TIME: CAUSE:

LOGGING STARTED: 23:20 LOGGING COMPLETED:

WINCH: COMPROBE___ SILVER___ OYO___ OTHER COLOG MGXII

MICROLOGGER 5301___ OTHER MGXII

TELEVIEWER OPTICAL #5117___ ACOUSTIC #5174___ OTHER COLOG OVAZ

PROBE TILT TEST 87.7 BRUNTON TILT 88 HANGING 0.6°

PROBE AZIMUTH TEST 282.1 BRUNTON AZIMUTH 276

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	OPTICAL 1.88M(6.17FT) -	ACOUSTIC 1.44M(4.72FT) -

ZERO@ -1.5'

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
~~B307Down~~				
B307 DEVDOWN01	Ø	23:20	195	12:15

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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geophysical services

B-318 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: CCNPP COLA | DATE: 6/4/2006
CLIENT: SCHNABEL | JOB: 6165
AUTHOR: R. STELLER | PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI | PHONE: 703-906-1797

BOREHOLE CONSTRUCTION: CASED____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½ 0 TO 201 ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 201'
CONDUCTOR CASING?: YES____ DEPTH TO BOTTOM OF CASING____; NO ✓
DEPTH TO BEDROCK:____
BOREHOLE FLUID: WATER____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
RG PS	001 - 116	1.6 - 190.3	6/4/06	14:30 - 16:00
DEVIATION	B318AHDOWN01	Ø - 86.4	6/4/06	16:20 - 16:50
DEVIATION	B318ALDOWN02	83.5 - 198.5	6/4/06	18:00 - 18:32
ELOG/GAMMA	B318ELOGDOWN01	18.0 - 197.0	6/4/06	19:05 - 19:24
ELOG/GAMMA	B318ELOGUP01	197.0 - 40.0	6/4/06	19:25 - 19:45
GAMMA	B318ELOGUP02	40.0 - Ø	6/4/06	19:50 - 20:00
3 ARM CAL	B318TESTCAL01	Ø	6/4/06	20:15 - 20:18
3 ARM CAL	B318 CALUP01	195.0 - Ø	6/4/06	20:26 - 20:44
3 ARM CAL	B318TESTCAL02	Ø	6/4/06	20:46 - 20:50

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: CALVERT CLIFFS COLA B-318 DATE: 6/4/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 5

CONTACT: ______ OFFICE PHONE: ______
CELL 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: B-~~304~~ 318 LOCATION: ______

COUNTY: ______ RANGE: ______ TOWNSHIP: ______ SECTION: ______
BOREHOLE CONSTRUCTION: CASED ______ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 1/2 0 TO ~~200~~ 201'; ______, ______ TO ______
BOREHOLE TOTAL DEPTH AS DRILLED: ~~200'~~ 201'
CONDUCTOR CASING?: YES ______ DEPTH TO BOTTOM OF CASING ______; NO ______
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈ 96'
BOREHOLE FLUID: WATER ______; FRESH WATER MUD ✓; SALT WATER MUD ______;
OTHER: ______
DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: 1/2 hr

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SITE: CALVERT CLIFFS COLA B-318 DATE: 6/4/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 5

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINTON PARK DEPARTURE TIME: 1:00 PM
ARRIVED ON SITE: 13:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 14:30 LOGGING COMPLETED: 16:00
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: CALVERT CLIFFS COLA B-318 DATE: 6/4/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	1		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-318 DATE: 6/4/06

CLIENT: SCHNABEL JOB: 6165

AUTHOR: R. STELLER PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-318 DATE: 6/4/06
CLIENT:__SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		
46.0	150.92	92		
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37	113		
57.0	187.01	114		BOTTOM MEASUREMENT?
57.5	188.65	115		
58.0	190.29	116		|
58.5	191.93			BOTTOM @ 58.2m.
59.0	193.57			
59.5	195.21			
60.0	196.85			

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B-318 ACOUSTIC TELEVIEWER FIELD LOG

SITE: ~~GRAND GULF COL~~ CALVERT CLIFFS COLA DATE: 6/4/2006
CLIENT: ~~WLA~~ SCHNABEL JOB: ~~6242~~ 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: ~~JIM HENGISH~~ OFFICE PHONE: 601-437-7354
CELL PHONE: 415-488-7382
CONTACT: ______ OFFICE PHONE: ______
PHONE: ______
CONTACT: ______ PHONE: ______
PHONE: ______
CONTACT: ______ PHONE: ______
PHONE: ______
DRILLER: ______ PHONE: ______
COMPANY: ______ PHONE: ______

DIRECTIONS TO SITE: ______

GENERAL SITE CONDITIONS/LOCATION: ______

BOREHOLE DESIGNATION: B-318 LOCATION: ______

COUNTY: ______ RANGE: ______ TOWNSHIP: ______ SECTION: ______
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 1/4 0 TO ~~200~~ 201' ______, ______ TO ______
BOREHOLE TOTAL DEPTH AS DRILLED: 201'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING ______; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ~90' ?
BOREHOLE FLUID: WATER Ø; FRESH WATER MUD ✓; SALT WATER MUD ______;
OTHER: ______
DEPTH TO BOREHOLE FLUID: ______ TIME SINCE LAST CIRCULATION: 1 1/2 HR

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SITE: GRAND GULF COL B-318 DATE: 6/4/2006
CLIENT: WLA JOB: ~~6242~~ 6165
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 800PM
ARRIVED ON SITE: 13:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 16:20 LOGGING COMPLETED: 20:00

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
TELEVIEWER OPTICAL #5117___ ACOUSTIC #5174 ✓ OTHER___

PROBE TILT TEST 87.6 BRUNTON TILT 88.0 HANGING 0-20°
PROBE AZIMUTH TEST 34.2 BRUNTON AZIMUTH 37.0

PROBE OFFSET	OPTICAL 1.88M(6.17FT)	ACOUSTIC 1.44M(4.72FT)
CASING STICK-UP	-	- 1.50FT
DEPTH REF. OFFSET		3.22'

ELOG (8.2 FT
- 1.50
+ 32.8
39.45'

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B318AL DOWN 01	0'	16:20	86.4'	16:50
B318AL DOWN 02	83.5	18:00	198.5	18:32
B318 ELOG DOWN 01	18.0	19:05	197	19:24
B318 ELOG UP 01	197	19:25	40'	19:45
B318 ELOG UP 02	40	19:50	0'	20:00

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-318 CALIPER FIELD LOG

SITE: CCNPP COLA DATE: 6 / 4 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI _OFFICE_ PHONE:
CELL PHONE: 703-906-1797
CONTACT: _OFFICE_ PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 1/4 0 TO 201' ; ___ , ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 201
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: 4 HRS

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 13:00
ARRIVED ON SITE: 13:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 20:15 LOGGING COMPLETED: ~~[illegible]~~ 20:50

SITE:_CCNPP COLA _____B-318_____ DATE: 6 / 4 /2006
CLIENT:_SCHNABEL_____ JOB:_6165
AUTHOR:_R. STELLER_____ PAGE 2 OF 2

WINCH: COMPROBE_____ SILVER ✓ OYO_____ OTHER_____
MICROLOGGER 5301 ✓ OTHER_____
CALIPER PROBE 5368 ✓ OTHER_____

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	12 IN MAX 2.08M(6.82 FT) ARMS - 1.50 5.32'	24 IN MAX ARMS - _____

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B318TESTCAL01	Ø	20:15	Ø	20:18
B318CALUP01	195'	20:26	Ø	20:44
B318TESTCAL02	Ø	20:48	Ø	20:50

CALIBRATION PLATE S/N 201

		AS BUILT		
		1.968 IN	3.937 IN	8.000 IN
	FILE NAME	(50 MM)	(100 MM)	203.2 MM
AS MEAS.	B318-~~CAL01~~ TESTCAL01	1.96	3.97	8.00
AS MEAS.	B318-TESTCAL02	1.97	3.95	8.03
AS MEAS.				
AS MEAS.				
AS MEAS.				
AS MEAS.				

MAINTENANCE PERFORMED ON SITE:_____

EQUIPMENT PROBLEMS OR FAILURES:_____

SUGGESTIONS, ADDITIONS, CHANGES:_____

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B-323 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: CCNPP COLA DATE: 6 / 13 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI PHONE: 703-906-1797

BOREHOLE CONSTRUCTION: CASED___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8 0 TO 200' ; ___, ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES___ DEPTH TO BOTTOM OF CASING___; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER___; FRESH WATER MUD ✓; SALT WATER MUD ___;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
SUSPENSION P-S	001 - 116	1.6' - 190.3'	6/13/06	09:00 - 11:00
CALIPER TEST	B323TESTCAL01	Ø	6/13/06	11:15 - 11:25
CALIPER	B323CALUP01	203.5' - Ø	6/13/06	11:40 - 12:02
CALIPER TEST	B323TESTCAL02	Ø	6/13/06	12:05 - 12:08
ELOG	B323 ELOGUP01	202.5' - 18.3'	6/13/06	12:27 - 12:47
DEVIATION	B323 DEV UP01	190.0 - 180.0'	6/13/06	14:33 - 14:35
DEVIATION	B323DEV UP02	190.0 - Ø	6/13/06	14:40 - 15:30.

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: CALVERT CLIFFS COLA B-323 DATE: 6/13/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 5

CONTACT: ______ OFFICE PHONE: ______
CELL 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: B-323 LOCATION: ______

COUNTY: ______ RANGE: ______ TOWNSHIP: ______ SECTION: ______
BOREHOLE CONSTRUCTION: CASED ______, UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 ½" 0 TO 200' ; ______, ______ TO ______
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ______ DEPTH TO BOTTOM OF CASING ______; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ______
BOREHOLE FLUID: WATER ______; FRESH WATER MUD ✓; SALT WATER MUD ______;
OTHER: ______
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ½ HR

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SITE: CALVERT CLIFFS COLA B-323 DATE: 6/13/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 5

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:00
ARRIVED ON SITE: 7:30
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
STANDBY TIME: CAUSE:
LOGGING STARTED: 09:00 LOGGING COMPLETED: 11:00
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 ☐	30086 ☑

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: MUD BOX - 1.7' = .518m. TOOL = 8.14' - 6.40'
-1.96 m OFFSET TO TOP OF TOOL
ROUND-TRIP ≥ 2.04 m.

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-323 DATE: 6/13/06
CLIENT:__SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	001		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-323 DATE: 6/13/06
CLIENT:__SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-323 DATE: 6/13/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		
46.0	150.92	92		
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37	113		
57.0	187.01	114		BOTTOM measure ?
57.5	188.65	115		
58.0	190.29	116		HIT BOTTOM @ 58.3m - TAPE @
58.5	191.93			2024' ?
59.0	193.57			
59.5	195.21			
60.0	196.85			

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B-323 CALIPER FIELD LOG

SITE: CCNPP COLA DATE: 6 / 13 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-323 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4.25 0 TO 200' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: TIME SINCE LAST CIRCULATION: 2 HRS

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:00
ARRIVED ON SITE: 7:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 11:20 LOGGING COMPLETED:

SITE: CCNPP COLA B-323 DATE: 6/13/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
CALIPER PROBE 5368 ✓ OTHER___

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	12 IN MAX 2.08M(6.82 FT) ARMS - 1.7' 5.12	24 IN MAX ARMS -

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B323TESTCAL01	Ø	11:15	Ø	11:25
B323CALIP01	203.5	11:40	Ø	12:02
B323TESTCAL02	Ø	12:05	Ø	12:08

CALIBRATION PLATE S/N 201

	FILE NAME	AS BUILT 1.968 IN (50 MM)	3.937 IN (100 MM)	8.000 IN 203.2 MM
AS MEAS.	B323TESTCAL01	1.96	3.94	7.95
AS MEAS.	B323TESTCAL02	2.00	3.92	8.02
AS MEAS.				
AS MEAS.				
AS MEAS.				
AS MEAS.				

MAINTENANCE PERFORMED ON SITE:___

EQUIPMENT PROBLEMS OR FAILURES:___

SUGGESTIONS, ADDITIONS, CHANGES:___

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B-323 ELOG FIELD LOG

SITE: CCNPP COLA DATE: 6/13/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-323 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4⅞ 0 TO 203' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 203'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 5 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:00
ARRIVED ON SITE: 7:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 12:30 LOGGING COMPLETED:

SITE:_CCNPP COLA B-323 DATE: 6/13/2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
ELOG PROBE 5490 ✓ OTHER___

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	2.50M(8.20 FT) - 1.5 + 31.5'	32.8 TO HOLE TOP.

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B323ELOG UP01	202.5'	12:27	18.3'	12:47

MAINTENANCE PERFORMED ON SITE:___

EQUIPMENT PROBLEMS OR FAILURES:___

SUGGESTIONS, ADDITIONS, CHANGES:___

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B-323 ~~ACOUSTIC TELEVIEWER~~ DEVIATION FIELD LOG

SITE: CCNPP COLA DATE: __/__/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI _OFFICE__ PHONE:
_CELL__ PHONE: 703-906-1797
CONTACT: _OFFICE__ PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-323 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½ 0 TO 203'; ___, ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 203'
CONDUCTOR CASING?: YES___ DEPTH TO BOTTOM OF CASING___; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER___; FRESH WATER MUD ✓; SALT WATER MUD ___;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 5 HRS

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geophysical services

SITE: CCNPP COLA B323 DATE: 6/13/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: DEPARTURE TIME:
ARRIVED ON SITE:
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:

WINCH: COMPROBE___ SILVER___ OYO___ OTHER max II
MICROLOGGER 5301___ OTHER max II
TELEVIEWER OPTICAL #5117___ ACOUSTIC #5174___ OTHER MC SOPRIS DEVIATION

PROBE TILT TEST 88.9° BRUNTON TILT 89°
PROBE AZIMUTH TEST 353° BRUNTON AZIMUTH 350°

PROBE OFFSET	OPTICAL 1.88M(6.17FT)	ACOUSTIC 1.44M(4.72FT)
CASING STICK-UP	-	- 1.80
DEPTH REF. OFFSET		-1.8

Ø @ top of probe.

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B323DEVUP01	190.0	14:33	180'	14:35
B323DEVUP02	190.0	14:40	Ø	15:30.

MAINTENANCE PERFORMED ON SITE: Hit bottom @ 190.1' (Top of probe.)
zero @ end -3.13'

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-4a BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: CCNPP COLA — DATE: 6/28/2006
CLIENT: SCHNABEL — JOB: 6165
AUTHOR: R. STELLER — PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI — PHONE: 703-906-1797

BOREHOLE CONSTRUCTION: CASED____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½" 0 TO 400' ; ______, ______ TO ______
BOREHOLE TOTAL DEPTH AS DRILLED: 400'
CONDUCTOR CASING?: YES____ DEPTH TO BOTTOM OF CASING______; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER, C. CARPER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
SUSPENSION P.S	001 - 237.0	1.6' - 388.8	6/28/06	12:05 - 14:37
ACOUSTIC TV	BA01ACUDOWN01	3.2' - 401.0'	6/28/06	15:05 - 16:59
CALIPER TEST	BA01CALTEST01	ø	6/28/06	17:17 - 17:20
CALIPER/GAMMA	BA01CALUP01	397.0' - ø'	6/28/06	17:28 - 17:48
CALIPER TEST	BA01CALTEST02	ø	6/28/06	17:50 - 17:55
ELOG	BA01ELOGUP01	399.5' - 1.8'	6/28/06	18:34 - 19:14

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: CALVERT CLIFFS COLA B-401 DATE: 6/28/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 8

CONTACT: ________ OFFICE PHONE: ________
CELL 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: B-401 LOCATION: ________

COUNTY: ________ RANGE: ________ TOWNSHIP: ________ SECTION: ________
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½" 0 TO 400' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 400'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ________
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: ________
DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: ½ HR

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SITE: CALVERT CLIFFS COLA B-401 DATE: 6/28/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 8

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 8:30
ARRIVED ON SITE: 9:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 12:05 LOGGING COMPLETED: 14:37
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 ☐	30086 ☑

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: 2800 = 8.14' − 1.5' = 6.64' = 2.02m, 2.04m ON EXM

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-401 DATE: 6/28/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 3 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	1		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B- 401 DATE: 6/28/06
CLIENT: SCHNABEL JOB: 6165
HOR: R. STELLER PAGE 4 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-401 DATE: 6/28/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 5 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		
46.0	150.92	92		
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37	113		
57.0	187.01	114		
57.5	188.65	115		
58.0	190.29	116		
58.5	191.93	117		
59.0	193.57	118		
59.5	195.21	119		
60.0	196.85	120		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-401 DATE: 6/28/06
CLIENT:__SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 6 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	121		
61.0	200.13	122		
61.5	201.77	123		
62.0	203.41	124		
62.5	205.05	125		
63.0	206.69	126		
63.5	208.33	127		
64.0	209.97	128		
64.5	211.61	129		
65.0	213.25	130		
65.5	214.90	131		
66.0	216.54	132		
66.5	218.18	133		
67.0	219.82	134		
67.5	221.46	135		
68.0	223.10	136		
68.5	224.74	137		
69.0	226.38	138		
69.5	228.02	139		
70.0	229.66	140		
70.5	231.30	141		
71.0	232.94	142		
71.5	234.58	143		
72.0	236.22	144		
72.5	237.86	145		
73.0	239.50	146		
73.5	241.14	147		
74.0	242.78	148		
74.5	244.42	149		
75.0	246.06	150		
75.5	247.70	151		
76.0	249.34	152		
76.5	250.98	153		
77.0	252.62	154		
77.5	254.27	155		
78.0	255.91	156		
78.5	257.55	157		
79.0	259.19	158		
79.5	260.83	159		
80.0	262.47	160		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-401 DATE: 6/28/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 7 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
80.5	264.11	161		
81.0	265.75	162		
81.5	267.39	163		
82.0	269.03	164		
82.5	270.67	165		
83.0	272.31	166		
83.5	273.95	167		
84.0	275.59	168		
84.5	277.23	169		
85.0	278.87	170		
85.5	280.51	171		
86.0	282.15	172		
86.5	283.79	173		
87.0	285.43	174		
87.5	287.07	175		
88.0	288.71	176		
88.5	290.35	177		
89.0	291.99	178		
89.5	293.64	179		
90.0	295.28	180		
90.5	296.92	181		
91.0	298.56	182		
91.5	300.20	183		
92.0	301.84	184		
92.5	303.48	185		
93.0	305.12	186		
93.5	306.76	187		
94.0	308.40	188		
94.5	310.04	189		
95.0	311.68	190		
95.5	313.32	191		
96.0	314.96	192		
96.5	316.60	193		
97.0	318.24	194		
97.5	319.88	195		
98.0	321.52	196		
98.5	323.16	197		
99.0	324.80	198		
99.5	326.44	199		
100.0	328.08	200		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-401 DATE: 6/28/06
NT:__SCHNABEL JOB:_6165
HOR:_R. STELLER PAGE 8 OF 8

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
100.5	329.72	201		
101.0	331.36	202		
101.5	333.01	203		
102.0	334.65	204		
102.5	336.29	205		
103.0	337.93	206		
103.5	339.57	207		
104.0	341.21	208		
104.5	342.85	209		
105.0	344.49	210		
105.5	346.13	211		
106.0	347.77	212		
106.5	349.41	213		
107.0	351.05	214		
107.5	352.69	215		
108.0	354.33	216		
108.5	355.97	217		
109.0	357.61	218		
109.5	359.25	219		
110.0	360.89	220		
110.5	362.53	221		
111.0	364.17	222		
111.5	365.81	223		
112.0	367.45	224		
112.5	369.09	225		
113.0	370.73	226		
113.5	372.38	227		
114.0	374.02	228		
114.5	375.66	229		
115.0	377.30	230		
115.5	378.94	231		
116.0	380.58	232		
116.5	382.22	233		
117.0	383.86	234		
117.5	385.50	235		
118.0	387.14	236		
118.5	388.78	237		HIT BOTTOM @ 118.7m =>
119.0	390.42			TIP OF PROBE @ 401.5'
119.5	392.06			
120.0	393.70			

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B-401 ACOUSTIC TELEVIEWER FIELD LOG

SITE: CCNPP COLA DATE: 6 / 28 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-401 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8 0 TO 400' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 400'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈2 hrs.

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SITE:_CCNPP COLA B-401 DATE: 6/ 28/2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

LOGGING CREW:_R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: _RENTAL
MOBILIZED FROM: LEXINGTON PARK, MD DEPARTURE TIME: 8:30
ARRIVED ON SITE: 9:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 15:10 LOGGING COMPLETED: 16:59

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
TELEVIEWER OPTICAL #5117___ ACOUSTIC ~~#5174~~ 5500 OTHER___

PROBE TILT TEST 81.2° BRUNTON TILT 82° HANGING 0.2°
PROBE AZIMUTH TEST 140.9° BRUNTON AZIMUTH 141°

PROBE OFFSET	OPTICAL 1.88M(6.17FT)	ACOUSTIC 1.44M(4.72FT)
CASING STICK-UP	-	- 1.5'
DEPTH REF. OFFSET		3.22'

3.22' ON EXIT.

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B401A4D00N01	3.22	15:05	401.0	16:59

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-401 CALIPER FIELD LOG

SITE: CCNPP COLA DATE: 6 / 28 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI _OFFICE_ PHONE:
CELL PHONE: 703-906-1797
CONTACT: _OFFICE_ PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-401 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 1/2" 0 TO 400' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 400'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ~~Ø~~ ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER: RDS 6/28/06
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ? 4 HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK, MD. DEPARTURE TIME: 8:30
ARRIVED ON SITE: 9:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 17:17 LOGGING COMPLETED: 17:55

SITE: CCNPP COLA B-401 DATE: 6/20/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE____ SILVER ✓ OYO____ OTHER____
MICROLOGGER 5301 ✓ OTHER____
CALIPER PROBE 5368___ OTHER 2915

PROBE OFFSET	12 IN MAX 2.08M(6.82 FT)	24 IN MAX
CASING STICK-UP	ARMS - 1.5'	ARMS -
DEPTH REF. OFFSET	5.32'	5.45' ON EXIT

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B401 CALTEST 01	Ø	17:17	Ø	17:20
B401 CALUP 01	397.0	17:28	Ø	17:48
B401 CALTEST 02	Ø	17:50	Ø	17:55

CALIBRATION PLATE S/N 201

		AS BUILT		
		1.968 IN	3.937 IN	8.000 IN
	FILE NAME	(50 MM)	(100 MM)	203.2 MM
AS MEAS.	B401 CALTEST01	1.97	3.94	8.00
AS MEAS.	B401 CALTEST02	2.01	3.97	8.04
AS MEAS.				
AS MEAS.				
AS MEAS.				
AS MEAS.				

MAINTENANCE PERFORMED ON SITE:____

EQUIPMENT PROBLEMS OR FAILURES:____

SUGGESTIONS, ADDITIONS, CHANGES:____

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B-401 ELOG FIELD LOG

SITE: CCNPP COLA DATE: 6/28/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI _OFFICE_ PHONE:
CELL PHONE: 703-906-1797
CONTACT: _OFFICE_ PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-401 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½ 0 TO 400' ; ___, ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 400'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING ___; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ___; FRESH WATER MUD ✓; SALT WATER MUD ___;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 5 HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK, MD. DEPARTURE TIME: 8:30
ARRIVED ON SITE: 9:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 18:34 LOGGING COMPLETED: 19:14

SITE:_CCNPP COLA B - 401 DATE: 6/28/2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

WINCH: COMPROBE____ SILVER ✓ OYO____ OTHER________
MICROLOGGER 5301 ✓ OTHER________
ELOG PROBE 5490 ✓ OTHER________

PROBE OFFSET	2.50M(8.20 FT)	
CASING STICK-UP	1.5	
DEPTH REF. OFFSET	6.70'	6.75' AT EXIT

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
~~B401 ELOG DOWN 01~~				
B401 ELOG UP 01	399.5'	18:34	1.85	19:14

MAINTENANCE PERFORMED ON SITE:________

EQUIPMENT PROBLEMS OR FAILURES:________

SUGGESTIONS, ADDITIONS, CHANGES:________

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B-404 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: CCNPP COLA
DATE: 6 / 27 /2006

CLIENT: SCHNABEL
JOB: 6165

AUTHOR: R. STELLER
PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI
PHONE: 703-906-1797

BOREHOLE CONSTRUCTION: CASED____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½" 0 TO 200' ; ______, ______ TO ______
BOREHOLE TOTAL DEPTH AS DRILLED: 200
CONDUCTOR CASING?: YES____ DEPTH TO BOTTOM OF CASING______; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
SUSPENSION PS	001 - 114	1.6' - 187.0'	6/27/06	10:45 - 12:07
ACOUSTIC TV.	B404 AU DOWN01	3.1' - 196.0'	6/27/06	12:50 - 14:00
CALIPER TEST	B404 CAL TEST01	Ø	6/27/06	14:20 - 14:25
CALIPER/GAMMA	B404 CALUP01	195.0 - Ø	6/27/06	14:32 - 14:52
CALIPER TEST	B404 CALTEST02	Ø	6/27/06	14:55 - 14:59
ELOG	B404 ELOG UP01	195.0 - 19.2'	6/27/06	15:10 - 15:28

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: CALVERT CLIFFS COLA B-404 DATE: 6/27/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 5

CONTACT: ______ OFFICE PHONE: ______
CELL 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: B-404 LOCATION: ______

COUNTY: ______ RANGE: ______ TOWNSHIP: ______ SECTION: ______
BOREHOLE CONSTRUCTION: CASED ______ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½ 0 TO 200' ; ______, ______ TO ______
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ______ DEPTH TO BOTTOM OF CASING ______; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ______
BOREHOLE FLUID: WATER ______; FRESH WATER MUD ✓; SALT WATER MUD ______;
OTHER: ______
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ½ HR

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geophysical services

SITE: CALVERT CLIFFS COLA B-404 DATE: 6/27/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 5

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 8:30
ARRIVED ON SITE: 9:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 10:45 LOGGING COMPLETED: 12:07
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	☐	300B6	☑

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: DEPTH REFERENCE AT TOP RECIEVER 1.64' - 1.6' = 0 m.
DEPTH AT EXIT = 0.0 m

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-404 DATE: 6/27/06
CLIENT:__SCHNABEL JOB:_6165
HOR:_R. STELLER PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	001		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-404 DATE: 6/27/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-404 DATE: 6/27/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		
46.0	150.92	92		
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37	113		
57.0	187.01	114		BOTTOM MEASUREMENT
57.5	188.65			HIT BOTTOM @ 57.2 m.
58.0	190.29			
58.5	191.93			
59.0	193.57			
59.5	195.21			
60.0	196.85			

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B-404 ACOUSTIC TELEVIEWER FIELD LOG

SITE: CCNPP COLA DATE: 6/26/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-404 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½ 0 TO 200' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 72 HR

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SITE: CCNPP COLA B-404 DATE: 6 / 26/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 8:30
ARRIVED ON SITE: 9:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 12:50 LOGGING COMPLETED: 14:00

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
TELEVIEWER OPTICAL #5117___ ACOUSTIC ~~#5174~~ 5500 OTHER___

PROBE TILT TEST 0.8° BRUNTON TILT 0°
PROBE AZIMUTH TEST 211.2° BRUNTON AZIMUTH 214° PROBE HANG @ 0.2°

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	OPTICAL 1.88M(6.17FT) - 	ACOUSTIC 1.44M(4.72FT) - 1.6 3.12'

3.15' ON EXIT.

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B404 AU 0000001	3.1'	12:50	196'	14:00

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-404 CALIPER FIELD LOG

SITE: CCNPP COLA DATE: 6/26/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI _OFFICE_ PHONE:
CELL PHONE: 703-906-1797
CONTACT: _OFFICE_ PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-404 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½" 0 TO 200'; ___, ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING ___; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ___; FRESH WATER MUD ✓; SALT WATER MUD ___;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈ 3 HRS

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 8:30
ARRIVED ON SITE: 9:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 14:20 LOGGING COMPLETED: 14:58

SITE: CCNPP COLA B-404 DATE: 6/ 26/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE____ SILVER ✓ OYO____ OTHER________
MICROLOGGER 5301 ✓ OTHER________
CALIPER PROBE 5368___ OTHER * 2915

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	12 IN MAX 2.08M(6.82 FT) ARMS - 1.7' 5.12'	24 IN MAX ARMS - ______ S 10 on ?

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B404 CAL TEST 01	Ø	14:20	Ø	14:25
B404 CAL UP 01	195	14:32	Ø	14:52
B404 CAL TEST 02	Ø	14:55	Ø	14:58

CALIBRATION PLATE S/N 201		AS BUILT		
		1.968 IN	3.937 IN	8.000 IN
	FILE NAME	(50 MM)	(100 MM)	203.2 MM
AS MEAS.	B404 CAL TEST 01	1.97	3.95	8.04
AS MEAS.	B404 CAL TEST 02	1.99	3.97	7.97
AS MEAS.				
AS MEAS.				
AS MEAS.				
AS MEAS.				

MAINTENANCE PERFORMED ON SITE:________________

EQUIPMENT PROBLEMS OR FAILURES:________________

SUGGESTIONS, ADDITIONS, CHANGES:________________

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B-404 ELOG FIELD LOG

SITE: CCNPP COLA DATE: 6/26/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI _OFFICE_ PHONE:
CELL PHONE: 703-906-1797
CONTACT: _OFFICE_ PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-404 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½ 0 TO 200' ; ___, ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING ___; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ___; FRESH WATER MUD ✓; SALT WATER MUD ___;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ~4 HRS

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 8:30
ARRIVED ON SITE: 9:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 15:10 LOGGING COMPLETED: 15:28

SITE:_CCNPP COLA B-A04 DATE: 6 / 26 /2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

WINCH: COMPROBE____ SILVER ✓ OYO____ OTHER____
MICROLOGGER 5301 ✓ OTHER____
ELOG PROBE 5490 ✓ OTHER____

PROBE OFFSET	2.50M(8.20 FT)	
CASING STICK-UP	-1.5' + 32.8	
DEPTH REF. OFFSET	34.4'	39.45 on exit.

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B404ELOGUP01	195	15:10	~~19.15~~ ok ~~15:15~~ RAS 6/26/06	15:28

MAINTENANCE PERFORMED ON SITE:____

EQUIPMENT PROBLEMS OR FAILURES:____

SUGGESTIONS, ADDITIONS, CHANGES:____

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B-407 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: CCNPP COLA DATE: 6 / 16 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI PHONE: 703-906-1797

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 3/4" 0 TO 200' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
SUSPENSION P.S.	001 - 112	1.6' - 183.7'	6/16/06	9:08 - 10:28
CALIPER TEST	B407TESTCAL01	Ø	6/16/06	10:58 - 11:04
CALIPER	B407 CAL UP01	193.0 - Ø	6/16/06	11:10 - 11:30
CALIPER TEST	B407TESTCAL02	Ø	6/16/06	11:36 - 11:42
ELOG/GAMMA	B407ELOGUP01	192.0 - 17.6	6/16/06	11:55 - 12:16
DEVIATION	B407DEV DOWN01	Ø - 182.8'	6/16/06	12:53 - 13:37

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: CALVERT CLIFFS COLA B-407 DATE: 6/16/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF ____

CONTACT: ____ OFFICE PHONE: ____
CELL 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: B-407 LOCATION: ____

COUNTY: ____ RANGE: ____ TOWNSHIP: ✓ SECTION: ____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8 0 TO ~~200'~~ 200'; ~~4 7/8~~ ____ TO 200'
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ____
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: ____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 1/2 HR

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SITE: CALVERT CLIFFS COLA B-405 DATE: 6/16/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 5

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:05
ARRIVED ON SITE: 7:35
STANDBY TIME: ______ CAUSE: ______
LOGGING STARTED: 9:08 LOGGING COMPLETED: 10:29
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 ☐	30086 ☑

MAINTENANCE PERFORMED ON SITE: ______

EQUIPMENT PROBLEMS OR FAILURES: ______

SUGGESTIONS, ADDITIONS, CHANGES: ______

COMMENTS: ______

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-407 DATE: 6/16/06

CLIENT: SCHNABEL JOB: 6165

AUTHOR: R. STELLER PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	1		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-407 DATE: 6/16/08
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-407 DATE: 6/12/08
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		
46.0	150.92	92		
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37			HIT BOTTOM @ 56.2 m => 196.5'
57.0	187.01			BOTTOM MEASUREMENTS
57.5	188.65			
58.0	190.29			
58.5	191.93			
59.0	193.57			
59.5	195.21			
60.0	196.85			

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B-407 CALIPER FIELD LOG

SITE: CCNPP COLA   DATE: 6/16/2006
CLIENT: SCHNABEL   JOB: 6165
AUTHOR: R. STELLER   PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI   OFFICE PHONE:
    CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
    PHONE:
CONTACT: PHONE:
    PHONE:
CONTACT: PHONE:
    PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-407   LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4⅞ 0 TO 200' ; ___, ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING ___; NO ✓
DEPTH TO BEDROCK: NA   DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ___; FRESH WATER MUD ✓; SALT WATER MUD ___;
OTHER:
DEPTH TO BOREHOLE FLUID: TIME SINCE LAST CIRCULATION: 3 HR.

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK   DEPARTURE TIME: 7:05
ARRIVED ON SITE: 7:35
STANDBY TIME: CAUSE:
LOGGING STARTED: 10:58   LOGGING COMPLETED: 11:42

SITE:_CCNPP COLA B-407 DATE: 8 / 14 /2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

WINCH: COMPROBE____ SILVER √ OYO____ OTHER
MICROLOGGER 5301 √ OTHER________
CALIPER PROBE 5368 √ OTHER________

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	12 IN MAX 2.08M(6.82 FT) ARMS - 1.5' 5.32'	24 IN MAX ARMS - ________ ________

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B407 TEST CAL 01	∅	10:58	∅	11:04
B407 CAL UP 01	193.0'	11:10	∅	11:30
B407 TEST CAL 02	∅	11:36	∅	11:42

CALIBRATION PLATE S/N 201		AS BUILT		
		1.968 IN	3.937 IN	8.000 IN
	FILE NAME	(50 MM)	(100 MM)	203.2 MM
AS MEAS.	B407 TEST CAL 01	1.96	3.94	8.00
AS MEAS.	B407 TEST CAL 02	1.98	3.94	8.00
AS MEAS.				
AS MEAS.				
AS MEAS.				
AS MEAS.				

MAINTENANCE PERFORMED ON SITE:________

EQUIPMENT PROBLEMS OR FAILURES:________

SUGGESTIONS, ADDITIONS, CHANGES:________

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B-407 ELOG FIELD LOG

SITE: CCNPP COLA DATE: 6 / 16 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-407 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 3/4 0 TO 200' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: TIME SINCE LAST CIRCULATION: 8 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: Lexington Park DEPARTURE TIME: 7:05
ARRIVED ON SITE: 7:35
STANDBY TIME: CAUSE:
LOGGING STARTED: 11:50 LOGGING COMPLETED: 12:20

SITE: CCNPP COLA B-407 | DATE: / /2006
CLIENT: SCHNABEL | JOB: 6165
AUTHOR: R. STELLER | PAGE 2 OF 2

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
ELOG PROBE 5490 ✓ OTHER ___

PROBE OFFSET	2.50M(8.20 FT)	32.8
CASING STICK-UP	-1.50	
DEPTH REF. OFFSET	34.5'	

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B407ELOG u01	142.0	11:55	17.6	12:16

MAINTENANCE PERFORMED ON SITE: ___

EQUIPMENT PROBLEMS OR FAILURES: ___

SUGGESTIONS, ADDITIONS, CHANGES: ___

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B-407 DEVIATION ~~ACOUSTIC TELEVIEWER~~ FIELD LOG

SITE: CCNPP COLA ______ DATE: 6/16/2006
CLIENT: SCHNABEL ______ JOB: 6165
AUTHOR: R. STELLER ______ PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI ______ OFFICE PHONE: ______
CELL PHONE: 703-906-1797
CONTACT: ______ OFFICE PHONE: ______
PHONE: ______
CONTACT: ______ PHONE: ______
PHONE: ______
CONTACT: ______ PHONE: ______
PHONE: ______
DRILLER: ______ PHONE: ______
COMPANY: ______ PHONE: ______

DIRECTIONS TO SITE: ______

GENERAL SITE CONDITIONS/LOCATION: ______

BOREHOLE DESIGNATION: B-407 LOCATION: ______

COUNTY: ______ RANGE: ______ TOWNSHIP: ______ SECTION: ______
BOREHOLE CONSTRUCTION: CASED ______ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 3/4 0 TO 200' ; ______, ______ TO ______
BOREHOLE TOTAL DEPTH AS DRILLED: 205'
CONDUCTOR CASING?: YES ______ DEPTH TO BOTTOM OF CASING ______; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ______
BOREHOLE FLUID: WATER ______; FRESH WATER MUD ✓; SALT WATER MUD ______;
OTHER: ______
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 8 HRS

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SITE: CCNPP COLA B-407 DATE: 6/16/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:05
ARRIVED ON SITE: 7:35
STANDBY TIME: CAUSE:
LOGGING STARTED: 12:53 LOGGING COMPLETED:

WINCH: COMPROBE___ SILVER___ OYO___ OTHER MAX II
MICROLOGGER 5301___ OTHER MAX II
TELEVIEWER OPTICAL #5117___ ACOUSTIC #5174___ OTHER 2VOA

PROBE TILT TEST 88.3 BRUNTON TILT 89°
PROBE AZIMUTH TEST 21.5 BRUNTON AZIMUTH 25°

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	OPTICAL 1.88M(6.17FT) -___	ACOUSTIC 1.44M(4.72FT) -___

zero @ -1.5'

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B407DEVDOWN01	Ø	12:53	182.0	13:37

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-418 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: CCNPP COLA DATE: 6/29/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI PHONE: 703-906-1797

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8 0 TO 200' ; ______, ______ TO ______
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ______; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER, C. CARTER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
SUSPENSION PS	001-114	1.6' - 187.0'	6/29/06	13:53 - 15:24
ACOUSTIC TV.	B418 AN UP01	199.4' - 3.3'	6/29/06	15:51 - 16:49
CALIPER TEST	B418 CALTEST 01	∅	6/29/06	16:55 - 17:00
CALIPER/GAMMA	B418 CAL UP 01	197.0' - 162.8'	6/29/06	17:05 - 17:17
CALIPER-TEST	B418 CALTEST02	∅	6/30/06	8:05 - 8:09
CALIPER/GAMMA	B418 CALUP02	197.0' - ∅	6/30/06	9:15 - 9:40
CALIPER-TEST	B418 CALTEST03	∅	6/30/06	9:41 - 9:45
ELOG	B418 ELOG UP01	197.0' - 20.0	6/30/06	9:58 - 10:15

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: CALVERT CLIFFS COLA B-41B DATE: 6/29/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 6

CONTACT: ____ OFFICE PHONE: ____
CELL 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: B-41B LOCATION: ____

COUNTY: ____ RANGE: ____ TOWNSHIP: ____ SECTION: ____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½" 0 TO 200' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: NA
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: ____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈ 1 HR

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SITE: CALVERT CLIFFS COLA B-418 DATE: 6/29/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 6

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: ______ DEPARTURE TIME: 12:30
ARRIVED ON SITE: 13:00
STANDBY TIME: ______ CAUSE: ______
LOGGING STARTED: 13:55 LOGGING COMPLETED: 15:24
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 ☐	300BC ☑

MAINTENANCE PERFORMED ON SITE: ______

EQUIPMENT PROBLEMS OR FAILURES: ______

SUGGESTIONS, ADDITIONS, CHANGES: ______

COMMENTS: ZERO = 1.5' - 1.5' = 0.0 m. 0.0 m ON EXIT

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA___B-418___ DATE:___6/29/06___
C..NT:__SCHNABEL___ JOB:_6165___
..HOR:_R. STELLER___ PAGE___3___OF___6___

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	001		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-418 DATE: 6/29/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-418 DATE: 6/29/06

CLIENT: SCHNABEL JOB: 6165

OPERATOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		MUD CAKE?
46.0	150.92	92		
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37	113		
57.0	187.01	114		BOTTOM MEASUREMENT?
57.5	188.65			HIT BOTTOM @ 57.2 m.
58.0	190.29			
58.5	191.93			
59.0	193.57			
59.5	195.21			
60.0	196.85			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-418 DATE: 6/29/06
CLIENT:__SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49			
61.0	200.13			T.D. @ 200'
61.5	201.77			
62.0	203.41			
62.5	205.05			
63.0	206.69			
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			

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B-418 ACOUSTIC TELEVIEWER FIELD LOG

SITE: CCNPP COLA DATE: 6 / 29 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-418 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½" 0 TO 200' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈ 2 HR

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SITE: CCNPP COLA B-41B DATE: 6/29/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK, MD DEPARTURE TIME: 12:30
ARRIVED ON SITE: 13:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 15:51 LOGGING COMPLETED: 16:49

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
TELEVIEWER OPTICAL #5117___ ACOUSTIC #~~5174~~ 5500 OTHER___

PROBE TILT TEST 84° BRUNTON TILT 83° probe hanging .15°
PROBE AZIMUTH TEST 168.4° BRUNTON AZIMUTH 168°

PROBE OFFSET	OPTICAL 1.88M(6.17FT)	ACOUSTIC 1.44M(4.72FT)
CASING STICK-UP	-	- 1.8'
DEPTH REF. OFFSET		3.22'

3.25' ON EXIT

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B41BAUUP 01	199.4	15:51	3.25'	16:49

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-418 CALIPER FIELD LOG

SITE: CCNPP COLA
DATE: 6/29/2006, 6/30/2006
CLIENT: SCHNABEL
JOB: 6165
AUTHOR: R. STELLER
PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI — OFFICE PHONE:
CELL PHONE: 703-906-1797

CONTACT: — OFFICE PHONE:
PHONE:

CONTACT: — PHONE:
PHONE:

CONTACT: — PHONE:
PHONE:

DRILLER: — PHONE:
COMPANY: — PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-418 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½" 0 TO 200' ; ___, ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING ___; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ___; FRESH WATER MUD ✓; SALT WATER MUD ___;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈ 2 HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 12:30
ARRIVED ON SITE: 13:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 6/29/06 16:55 LOGGING COMPLETED: 6/30/06 9:45

SITE: CCNPP COLA B-418 DATE: 6/29/2006 6/30/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
CALIPER PROBE 5368 ___ OTHER 2915

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	12 IN MAX 2.08M(6.82 FT) ARMS - -1.5 5.32'	24 IN MAX ARMS - ___ 5.35' ON EXIT

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME	
B418 CAL TEST 01	0	16:55	Ø	17:00	6/29/06
B418 CAL UP 01	197.0'	17:05	Ø 162.8'	17:17	6/29/06
B418 CAL TEST 02	Ø	8:05	Ø	8:09	6/30/06
B418 CAL UP 02	197.0'	9:15	Ø	9:40	6/30/06
B418 CAL TEST 03	Ø	9:41	Ø	9:45	6/30/06

CALIBRATION PLATE S/N 201

		AS BUILT		
		1.968 IN	3.937 IN	8.000 IN
	FILE NAME	(50 MM)	(100 MM)	203.2 MM
AS MEAS.	B418 CAL TEST 01	1.97	3.91	7.98
AS MEAS.	B418 CAL TEST 02	1.98	3.94	7.98
AS MEAS.	B418 CAL TEST 03	2.00	3.94	7.97
AS MEAS.				
AS MEAS.				
AS MEAS.				

MAINTENANCE PERFORMED ON SITE: ___

EQUIPMENT PROBLEMS OR FAILURES: ___

SUGGESTIONS, ADDITIONS, CHANGES: ___

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B-418 ELOG FIELD LOG

SITE: CCNPP COLA DATE: 6 / 30 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI _OFFICE_ PHONE:
CELL PHONE: 703-906-1797
CONTACT: _OFFICE_ PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-418 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4½ 0 TO 200' ; ___, ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES___ DEPTH TO BOTTOM OF CASING___; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: NA
BOREHOLE FLUID: WATER___; FRESH WATER MUD ✓; SALT WATER MUD___;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈ 1 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK, MD DEPARTURE TIME: 7:00
ARRIVED ON SITE: 7:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 9:58 LOGGING COMPLETED: 10:15

SITE:_CCNPP COLA B- 418 DATE: 6/30/2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
ELOG PROBE 5490 ✓ OTHER___

PROBE OFFSET	2.50M(8.20 FT)	
CASING STICK-UP	~1.5 + 32.8	
DEPTH REF. OFFSET	39.5	

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B418ELOGAP01	197.0	9:58	20.0	10:15

MAINTENANCE PERFORMED ON SITE:___

EQUIPMENT PROBLEMS OR FAILURES:___

SUGGESTIONS, ADDITIONS, CHANGES:___

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B-423 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: CCNPP COLA DATE: 6 / 13 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI PHONE: 703-906-1797

BOREHOLE CONSTRUCTION: CASED____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 3/4 0 TO 200' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES____ DEPTH TO BOTTOM OF CASING____; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER____; FRESH WATER MUD ✓ ; SALT WATER MUD ____;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
DEVIATION	B423DEVUP01	193.5 - 187.0	6/13/06	16:15 - 16:20
DEVIATION	B423DEVUP02	193.5 - (-3.1)	6/13/06	16:20 - 17:12
SUSPENSION RS.	001 - 113	1.6' - 185.4'	6/13/06	17:44 - 19:58
CALIPER TEST	B423TESTCAL01	ϕ	6/13/06	19:25 - 19:30
CALIPER TEST	B423TESTCAL02	ϕ	6/13/06	19:35 - 19:40
CALIPER	B423CALUP01	193' - ϕ	6/13/06	19:47 - 20:08
CALIPER TEST	B423TESTCAL03	-2.95	6/13/06	20:11 - 20:15
ELOG	B423ELOGUP01	200' - 3.3'	6/13/06	20:24 - 20:50

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B-423 ~~ACOUSTIC TELEVIEWER~~ DEVIATION FIELD LOG

SITE: CCNPP COLA DATE: 6/13/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-423 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8 0 TO 200' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: TIME SINCE LAST CIRCULATION: < 8 HR.

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SITE: CCNPP COLA B-423 DATE: 6/13/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:00
ARRIVED ON SITE: 7:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 6:15 LOGGING COMPLETED:

WINCH: COMPROBE___ SILVER___ OYO___ OTHER MGXII
MICROLOGGER 5301___ OTHER MGXII
TELEVIEWER OPTICAL #5117___ ACOUSTIC #5174___ OTHER COMPROBE

PROBE TILT TEST 2.8 BRUNTON TILT 4°
PROBE AZIMUTH TEST 11.8 BRUNTON AZIMUTH

PROBE OFFSET	OPTICAL 1.88M(6.17FT)	ACOUSTIC 1.44M(~~4.72FT~~)
CASING STICK-UP	-	- 1.8'
DEPTH REF. OFFSET		- 1.8'

BOPRIS REV. 0

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B423DEVUP01	193.5	16:15	187.0	16:20
B423DEVUP02	193.5	16:20	-3.1	17:12

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES: Runout zero -3.1'

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: CALVERT CLIFFS COLA B-423 DATE: 6/13/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 5

CONTACT: ______ OFFICE PHONE: ______
CELL 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: B-423 LOCATION: ______

COUNTY: ______ RANGE: ______ TOWNSHIP: ______ SECTION: ______
BOREHOLE CONSTRUCTION: CASED ______ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 3/4 0 TO 200'; ______, ______ TO ______
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
CONDUCTOR CASING?: YES ______ DEPTH TO BOTTOM OF CASING ______; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ______
BOREHOLE FLUID: WATER ______; FRESH WATER MUD ✓; SALT WATER MUD ______;
OTHER: ______
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 3 HR.

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SITE: CALVERT CLIFFS COLA B-423 DATE: 6/13/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 2 OF 5

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:00
ARRIVED ON SITE: 7:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 12:44 LOGGING COMPLETED: 13:58
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 ☐	30086 ☑	

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: DEPTH ZERO 2.48m − .55m (1.8') → 1.93m

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-423 DATE: 6/13/06
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	1		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: CALVERT CLIFFS COLA B-423 DATE: 6/13/06

NT: SCHNABEL JOB: 6165

HOR: R. STELLER PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE:_CALVERT CLIFFS COLA B-423 DATE: 6/13/06
CLIENT:__SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		
46.0	150.92	92		
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37	113		
57.0	187.01			BOTTOM MEASUREMENT?
57.5	188.65			HIT BOTTOM @ 56.7m TAPE 198.1
58.0	190.29			
58.5	191.93			
59.0	193.57			
59.5	195.21			
60.0	196.85			

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B-423 CALIPER FIELD LOG

SITE: CCNPP COLA DATE: 6/15/2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI _OFFICE_ PHONE:
CELL PHONE: 703-906-1797
CONTACT: _OFFICE_ PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-423 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/4 0 TO 200' ; ___ , ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
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: ? 4HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:00
ARRIVED ON SITE: 7:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 19:25 LOGGING COMPLETED: 20:18

SITE:_CCNPP COLA B-423 DATE: 6 / 13/2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

WINCH: COMPROBE____ SILVER ✓ OYO____ OTHER____
MICROLOGGER 5301 ✓ OTHER____
CALIPER PROBE 5368 ✓ OTHER____

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	12 IN MAX 2.08M(6.82 FT) ARMS - 1.8' 5.02'	24 IN MAX ARMS - ____

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B423TESTCAL01	Ø	19:28	Ø	19:30
B423TESTCAL02	Ø	19:38	Ø	19:40
B423CALUP01	193'	19:47	Ø	20:08
B423 TESTCAL03	-2.95	20:11	-2.95	20:15

CALIBRATION PLATE S/N 201

	FILE NAME	AS BUILT 1.968 IN (50 MM)	3.937 IN (100 MM)	8.000 IN 203.2 MM
AS MEAS.	B423TESTCAL01	2.02	4.01	8.08
AS MEAS.	B423TESTCAL02	1.97	3.94	8.00
AS MEAS.	B423TESTCAL03	1.96	3.92	8.01
AS MEAS.				
AS MEAS.				
AS MEAS.				

MAINTENANCE PERFORMED ON SITE:____

EQUIPMENT PROBLEMS OR FAILURES:____

SUGGESTIONS, ADDITIONS, CHANGES:____

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B-423 ELOG FIELD LOG

SITE: CCNPP COLA DATE: 6 / 13 /2006
CLIENT: SCHNABEL JOB: 6165
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: RUBEN TARUSELLI OFFICE PHONE:
CELL PHONE: 703-906-1797
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-423 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 3/4 0 TO 200' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 200'
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: 25 HR.

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: LEXINGTON PARK DEPARTURE TIME: 7:00
ARRIVED ON SITE: 7:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 20:24 LOGGING COMPLETED: 20:50

SITE:_CCNPP COLA B-423 DATE: 6/13/2006
CLIENT:_SCHNABEL JOB:_6165
AUTHOR:_R. STELLER PAGE 2 OF 2

WINCH: COMPROBE____ SILVER ✓ OYO____ OTHER________
MICROLOGGER 5301 ✓ OTHER________
ELOG PROBE 5490 ✓ OTHER________

PROBE OFFSET CASING STICK-UP DEPTH REF. OFFSET	2.50M(8.20 FT) -1.8 6.4	

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B423ELOGAP01	200'	20:24	8.3'	20:50

MAINTENANCE PERFORMED ON SITE:________

EQUIPMENT PROBLEMS OR FAILURES:________

SUGGESTIONS, ADDITIONS, CHANGES:________

APPENDIX E

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 Vs and Vp 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 [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

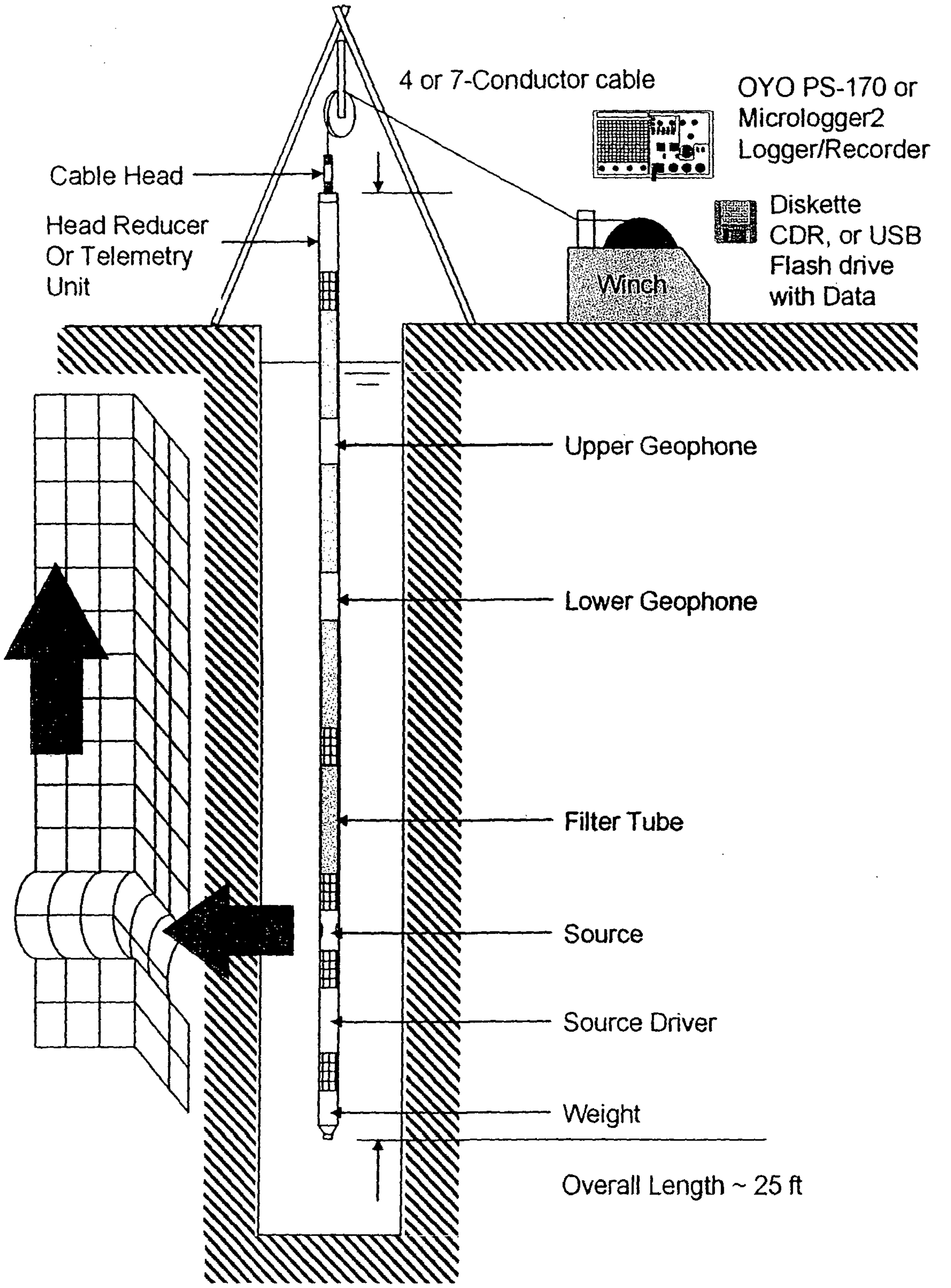

Figure 1. Suspension PS logging method setup

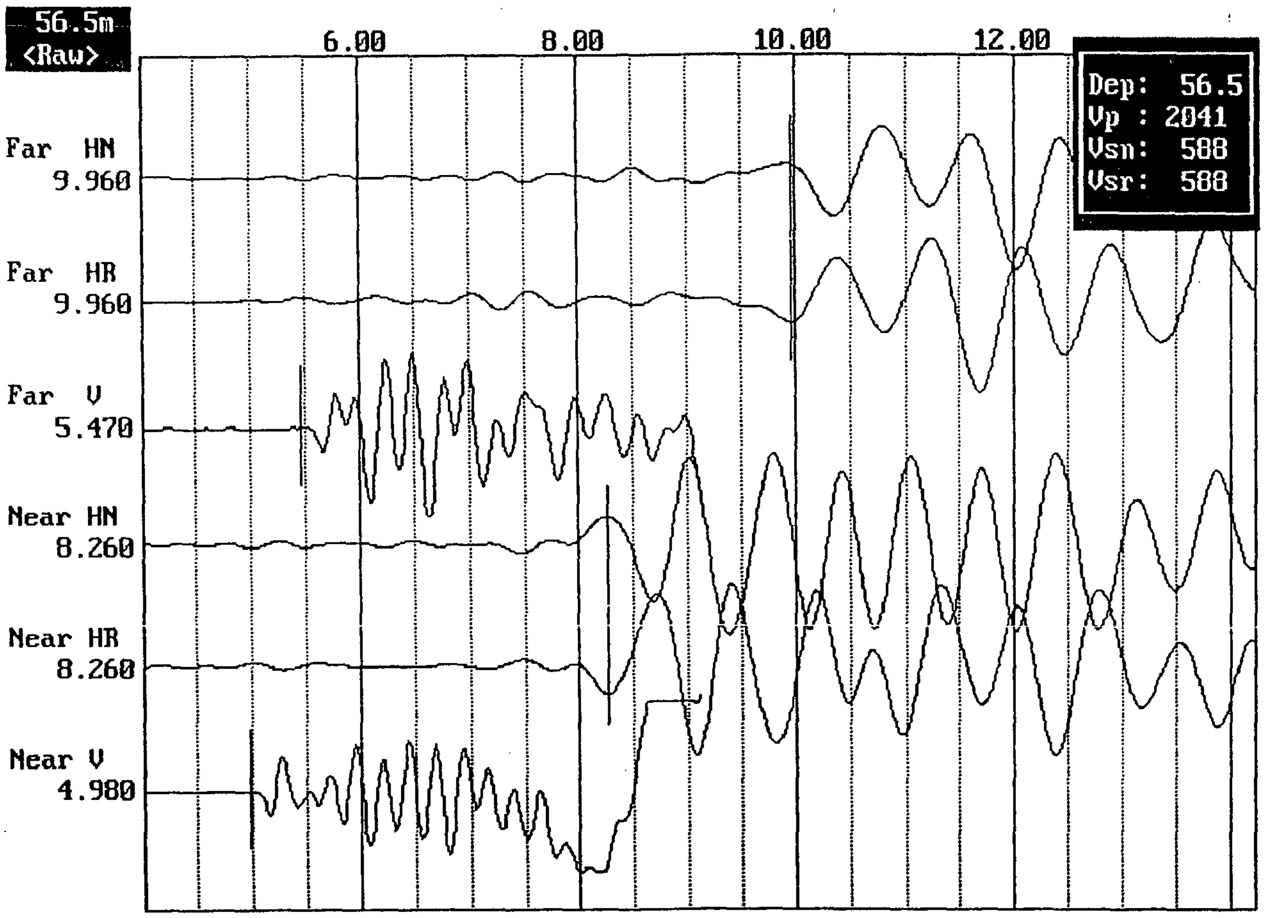

Figure 2. Sample suspension method waveform data showing horizontal normal and reversed (HR and HN), and vertical (V) waveforms received at the near (bottom 3 channels) and far (top 3 channels) geophones. The arrivals in milliseconds for each pick are shown on the left. The box in the upper right corner shows the depth in the borehole and the velocities calculated based on the picks.

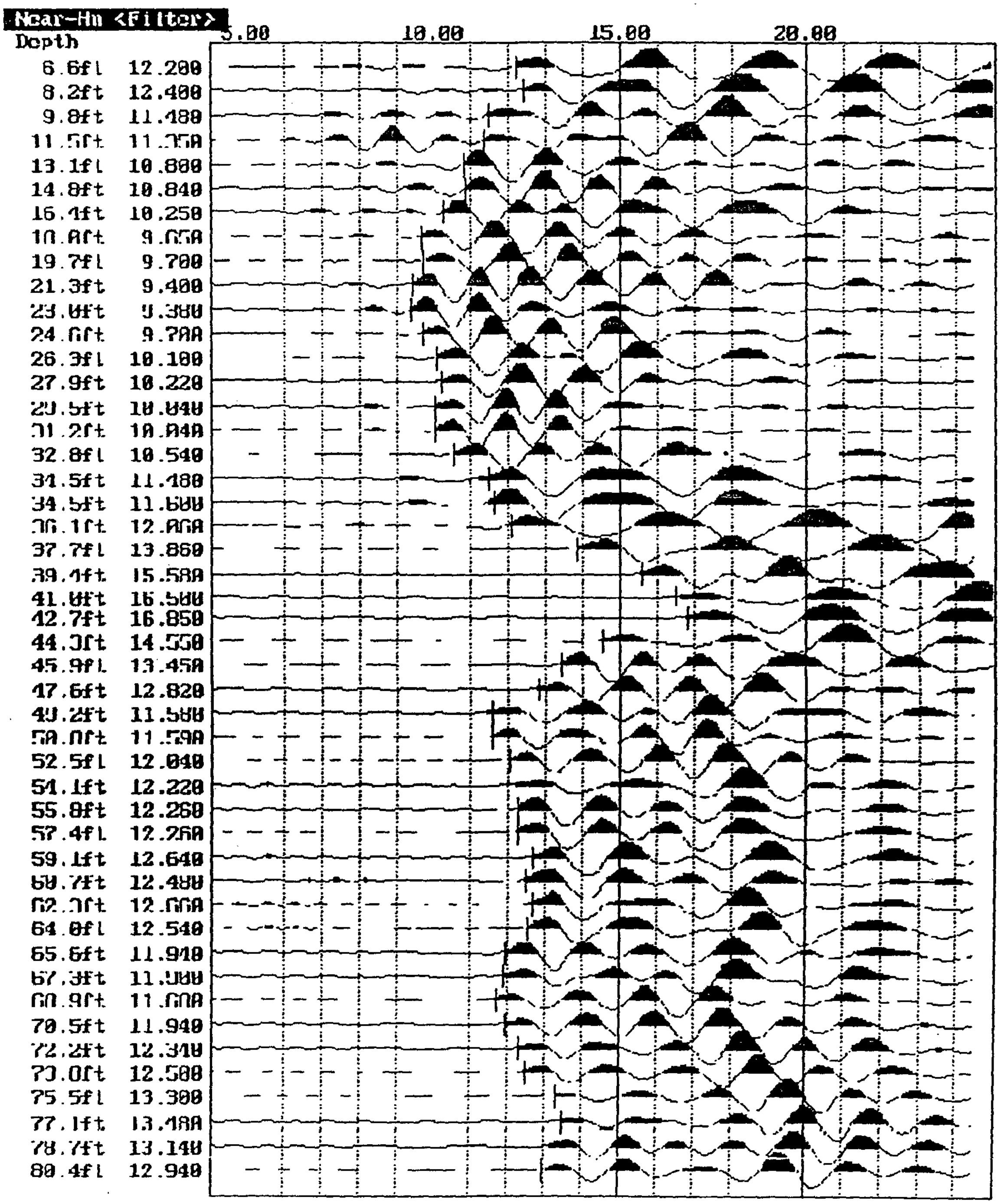

Figure 3. Sample composite waveform plot for normal shear waves received at the near geophone in a single borehole

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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_____ 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:_________

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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:____
____
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____
____
____

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
0.5	1.64			
1.0	3.28			
1.5	4.92			
2.0	6.56			
2.5	8.20			
3.0	9.84			
3.5	11.48			
4.0	13.12			
4.5	14.76			
5.0	16.40			
5.5	18.04			
6.0	19.69			
6.5	21.33			
7.0	22.97			
7.5	24.61			
8.0	26.25			
8.5	27.89			
9.0	29.53			
9.5	31.17			
10.0	32.81			
10.5	34.45			
11.0	36.09			
11.5	37.73			
12.0	39.37			
12.5	41.01			
13.0	42.65			
13.5	44.29			
14.0	45.93			
14.5	47.57			
15.0	49.21			
15.5	50.85			
16.0	52.49			
16.5	54.13			
17.0	55.77			
17.5	57.41			
18.0	59.06			

GEOVISION SUSPENSION LOGGING FIELD NOTES

S: ______ DATE: ______
NT: ______ JOB: ______
AUTHOR: ______ PAGE ______ OF ______

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
18.5	60.70			
19.0	62.34			
19.5	63.98			
20.0	65.62			
20.5	67.26			
21.0	68.90			
21.5	70.54			
22.0	72.18			
22.5	73.82			
23.0	75.46			
23.5	77.10			
24.0	78.74			
24.5	80.38			
25.0	82.02			
25.5	83.66			
26.0	85.30			
26.5	86.94			
27.0	88.58			
27.5	90.22			
28.0	91.86			
28.5	93.50			
29.0	95.14			
29.5	96.78			
30.0	98.43			
30.5	100.07			
31.0	101.71			
31.5	103.35			
32.0	104.99			
32.5	106.63			
33.0	108.27			
33.5	109.91			
34.0	111.55			
34.5	113.19			
35.0	114.83			
35.5	116.47			
36.0	[illegible]			

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
36.5	119.75			
37.0	121.39			
37.5	123.03			
38.0	124.67			
38.5	126.31			
39.0	127.95			
39.5	129.59			
40.0	131.23			
40.5	132.87			
41.0	134.51			
41.5	136.15			
42.0	137.80			
42.5	139.44			
43.0	141.08			
43.5	142.72			
44.0	144.36			
44.5	146.00			
45.0	147.64			
45.5	149.28			
46.0	150.92			
46.5	152.56			
47.0	154.20			
47.5	155.84			
48.0	157.48			
48.5	159.12			
49.0	160.76			
49.5	162.40			
50.0	164.04			
50.5	165.68			
51.0	167.32			
51.5	168.96			
52.0	170.60			
52.5	172.24			
53.0	173.88			
53.5	175.52			
54.0	177.17			

SITE: DATE:
CLIENT: JOB:
AUTHOR: PAGE OF

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
54.5	178.81			
55.0	180.45			
55.5	182.09			
56.0	183.73			
56.5	185.37			
57.0	187.01			
57.5	188.65			
58.0	190.29			
58.5	191.93			
59.0	193.57			
59.5	195.21			
60.0	196.85			
60.5	198.49			
61.0	200.13			
61.5	201.77			
62.0	203.41			
62.5	205.05			
63.0	206.69			
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			

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
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			
80.5	264.11			
81.0	265.75			
81.5	267.39			
82.0	269.03			
82.5	270.67			
83.0	272.31			
83.5	273.95			
84.0	275.59			
84.5	277.23			
85.0	278.87			
85.5	280.51			
86.0	282.15			
86.5	283.79			
87.0	285.43			
87.5	287.07			
88.0	288.71			
88.5	290.35			
89.0	291.99			
89.5	293.64			
90.0	295.28			

GEOVISION SUSPENSION LOGGING FIELD NOTES

S[illegible]: ______ DATE: ______
C[illegible]NT: ______ 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

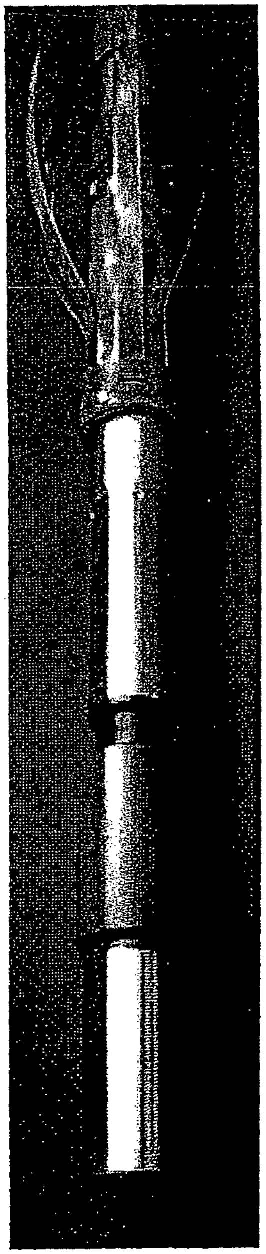
DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
108.5	355.97			
109.0	357.61			
109.5	359.25			
110.0	360.89			
110.5	362.53			
111.0	364.17			
111.5	365.81			
112.0	367.45			
112.5	369.09			
113.0	370.73			
113.5	372.38			
114.0	374.02			
114.5	375.66			
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			

PROCEDURE FOR USING THE ROBERTSON GEOLOGGING HI-RESOLUTION ACOUSTIC TELEVIEWER (HiRAT)

Reviewed 2/13/06

Background

The acoustic televiewer is a device for producing a qualitative image of the wall of a borehole. Because it uses ultrasound rather than visible light it is able to work in dirty or opaque borehole fluids, although heavy drilling mud will cause excessive dispersion of the acoustic beam. The picture below shows the sonde's lower nylon section, and one of the bowspring attachments which are used to centralize the sonde in the borehole.



Pulses of ultrasound (0.5 - 1.5MHz) are generated by a piezo-electric resonator. The pulses are transmitted through the oil in which the resonator is immersed, through the wall of the acoustic housing, then propagate through the borehole fluid and are reflected from the wall of the borehole. The reflected energy is picked up by the same transducer, from which is recorded both the ***amplitude*** of the returned pulse and the ***travel-time*** which have elapsed. Blanking must be applied to prevent the transducer from registering reflections from the inside surface of the acoustic housing. The material of the housing is chosen so that its acoustic properties are similar to the oil which fills it. The housing is not designed to withstand borehole fluid pressures, but has a piston device to allow equalization between inside and outside pressure.

The ***amplitude*** of the returned pulse is a function of the acoustic reflectivity of the borehole wall. If the beam strikes a hard borehole wall normally to the surface the energy will be returned to the transducer and a strong return will be recorded. If the formation is softer, then less energy will be reflected. Also, if the surface of the borehole is rough, or effectively missing because of the presence of a fracture or other structure, then energy will be dispersed and a poor return will be recorded.

The ***travel-time*** is a simple function of the diameter of the borehole and the velocity of sound in the borehole fluid (typically 1.5Km/sec). An A/D converter monitors the output from the transducer once the blanking period has expired and a comparator is used to detect the peak amplitude during the sampling window.

The coaxially-mounted transducer has a planar radiating surface, but the vibration characteristics are such that the acoustic pulse is emitted as a 'pencil' beam. The emitted beam is deflected by a planar mirror so that it leaves the acoustic housing at right angles to the sonde axis. The mirror is rotated to scan the borehole wall. The ultrasound pulses are synchronized with rotation of the mirror so that up to 360 pulses are emitted in every revolution. Because of the time which must elapse for the two-way transit of the borehole fluid, there is an upper limit upon the number of radial samples that may be acquired from a borehole of a particular radius. In larger boreholes, therefore, it may be necessary to reduce the number of radial samples. The sonde is able to operate at 90, 180 or 360 samples per revolution.

An image of the borehole wall is produced by moving the sonde along the borehole axis while it is scanning radially. By the same logic as shown above, it can be seen that any horizontal point will be imaged by more than one sweep of the acoustic beam so long as the axial movement of the sonde during one complete sweep is no greater than the beam diameter. An upper limit is therefore imposed upon the logging speed which will be a function of the rotational speed of the transducer, the radial sampling interval and borehole diameter.

Objective

The objective of this procedure is to provide a pseudo "core" of the borehole, and map the orientation and angles of cracks and voids in rock boreholes.

Instrumentation

This procedure is written specifically for the Robertson Geologging High-Resolution Acoustic Televiewer (HiRAT). The required equipment includes:

1. The Robertson High-Resolution Acoustic Televiewer (HiRAT) sonde with centralizers
2. A 4-conductor wire-line winch with cable at least 30m (100ft) longer than the depth of the borehole (RG Smart Winch or equivalent. GEOVision has adapted all our 4-conductor winches)
3. A sheave with depth encoder with minimum 500 pulse/revolution
4. A Robertson Geologging Micrologger II
5. A laptop with Winlogger installed and the following minimum system requirements:
   - Windows 98SE or above
   - 64M System memory
   - 800x600x24 SVGA Display with DirectX 8.0
   - 500Mhz CPU
   - USB 2.0 connection
6. Battery power supply with cables

Environmental Conditions

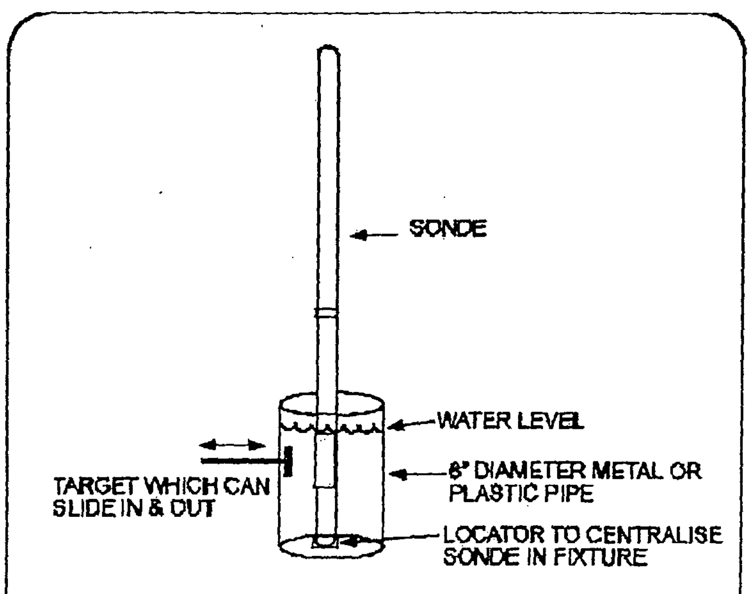
This tool is designed for fluid-filled boreholes between 67 and 150mm (3-6in) in rock. Since fine cracks are usually not visible in the walls of soil borings, the televiewers add very little information from a soil boring than a simple video. Now if the boring has soil AND rock, televiewer visuals in the soil may still be useful.

Calibration

The acoustic televiewer uses the variability in reflectance and the travel time to make an image of the borehole wall, mostly resulting from relative differences of materials and the physical characteristics of the wall. Since these are relative measurements, no field calibration of the sonde is required. However, it is important that the same location in the borehole be checked at the start and finish of the logging to make sure that the response or functionality haven't changed during the measurement.

A test fixture may be used to check function of the acoustic televiewer prior to use. This test fixture should comprise a plastic pipe, with a known internal diameter between 3 and 6 inches. This should be filled with water and the sonde stood upright in the fixture. A target made of metal or metal foil is glued on the inside of the container, or optionally on a seal and shaft so that it can be moved in and out on a line radial to the center-line of the pipe. A representation of this is shown in the figure below.

The purpose of this test fixture is to check the ability of the sonde to differentiate between materials of different acoustic reflectances, and different travel times, and to check the calibration of the caliper function of the sensor using the measured diameter of the pipe. However, if calibrated caliper measurements are required, it is recommended that a mechanical 3-arm caliper tool be used for this purpose because it can be calibrated in the field prior to use. The HiRAT will give very accurate results but this procedure does not cover calibration.



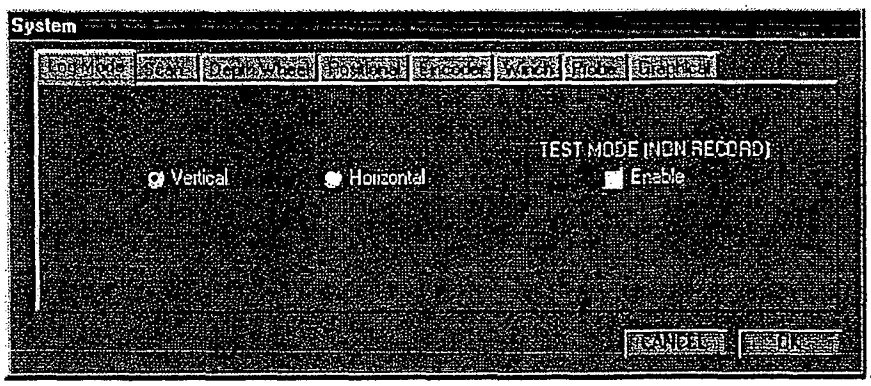
TELEVIEWER TEST JIG

Hi-RAT Field Procedure

Because the logging software is a standalone module, there are a number of settings which must be initialized independently of the WinLogger software. These include the depth measurement subsystem and sonde operating modes. Click on 'System' on the menu bar to show the following dialog boxes:

1.0 Log Mode

The sonde can operate in three distinct modes:



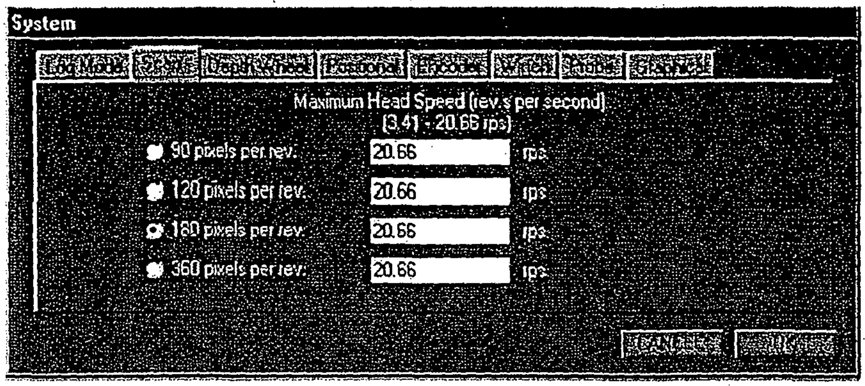
- Vertical mode is used for boreholes which are drilled from the surface and are deviated at less than 70 degrees from the vertical. Most exploration boreholes will fall into this class. In this mode the image is orientated according to compass directions (magnetic co-ordinates).

- Horizontal mode is used for boreholes which are sub-horizontal so their inclination will probably exceed 70 degrees from the vertical. Boreholes in this class would normally be drilled as part of ground investigations for tunneling and mining, drilling ahead of a drive to determine the nature and extent of fracturing. In this mode the image is orientated according to gravitational coordinates (up/down) since there is no unique point of the image circle which can be orientated to North with any precision.

- Test mode is used to exercise all sonde functions without creating a log. The image will scroll on the screen in the normal fashion, and orientation readouts will be refreshed continuously.

2.0 Scan Parameters

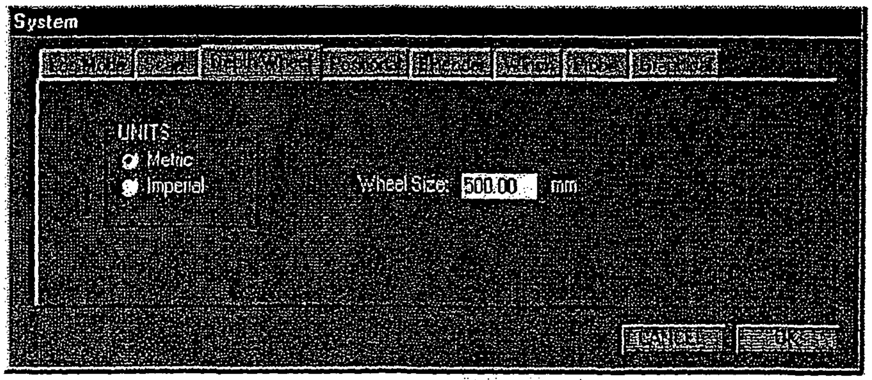
The scan parameters control the radial sampling of the borehole. The values will be retained between logging sessions, so the sonde will be initialized correctly at power-on. There are three parameters in the dialog:



- The radial sampling rate can be set to one of 90, 120, 180, 360 samples per revolution. There is a relationship between the logging speed and the radial sampling rate, since the time taken to send the dataset to the surface depends upon its length. The size of the log file is also determined by the radial sampling rate. The probe will always try to use the maximum head speed entered. If limited by a low Baud rate or a large 'window' setting then the probe will reduce its head speed automatically to compensate - see sonde operation section.

3.0 Depth Wheel Configuration

The depth measurement system is dependent upon the combination of depth measurement wheel with its calibrated groove, and the shaft encoder which translates rotation into pulses which are counted by the logging system controller. Two parameters are therefore required: depth wheel circumference and encoder pulse rate. The encoder parameters are covered in a subsequent topic.

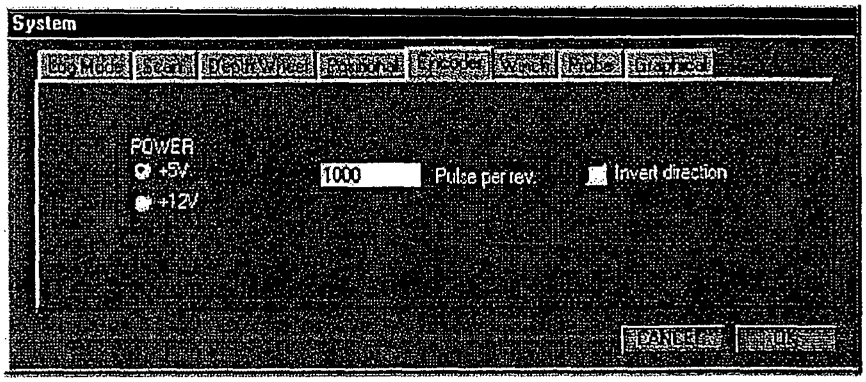


- Select Metric or Imperial depth measurement units from the left-hand pane.

- Type the circumference of the depth measurement wheel into the 'wheel size' box. The standard sizes of GEOVision wheels are 1000mm. If you are measuring in Imperial units (or changing back to metric units), the standard wheel size can be converted automatically by clicking the left mouse button and choosing the appropriate conversion. The size is always specified in units of 1/1000 of the depth unit i.e. millimetres (mm) or millifeet (mft).

4.0 Encoder Configuration

The depth measurement system is dependent upon the combination of depth measurement wheel with its calibrated groove, and the shaft encoder which translates rotation into pulses which are counted by the logging system controller. The depth wheel circumference is covered in a previous topic. In order to accommodate a variety of encoders, their operational characteristics can be configured in the software.



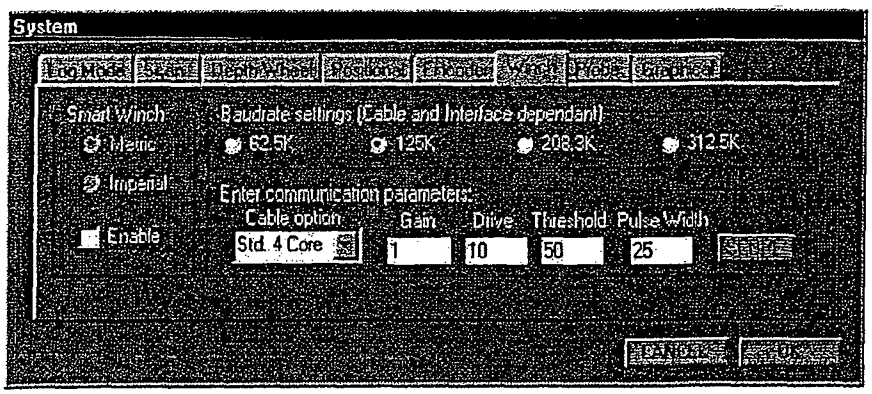
- Select supply voltage from the radio buttons in the left-hand pane. The options are 5 Volt and 12 Volt. GEOVision encoders are always specified for 5 Volt operation.

- Type the number of pulses emitted per revolution into the central box. The standard values for all GEOVision winches are 500 pulses/rev.

- The logical direction of movement can be reversed if required to accommodate the directional characteristics (phase lead or lag) of the different encoder types.

5.0 Winch and Cable Configuration

Support for remote control of the RG Smart Winch is provided, and can be enabled by checking the ***Enable*** control in the left-hand Smart Winch pane. If the Smart Winch control is enabled, it is also necessary to select the measure units in force - select ***Metric*** or ***Imperial*** from the radio buttons on offer.



The Baud settings can be chosen to match the *quality* of the communication channel. The channel will be effected by cable type and length. Typically a Baudrate of 312.5K is used. The remaining controls in the dialog relate to the communications parameters. The operation is entirely compatible with the WinLogger software operation and the values would be expected to be the same as those in force for logging six-channel type sondes with that software. (Certain probe types may be fitted with a digital interface that does not require set-up and in this case the parameter edit boxes will not appear.)

- ***Cable Option*** is used to select the logging cable type which is available on the winch. The options are *Not Connected*, *Std. 4 Core*, *Differential* and *Monocable*. The only cable types used in GEOVision systems is Std. 4 Core. Select the appropriate type from the drop-down menu box. Note this value can only be changed when the probe power is turned off.

- ***Gain*** is related to cable length and uphole signal attenuation. Gain values range from 0-3 and control the amplification applied to the incoming signal. Use the *Scope* dialog to visualize the incoming signals. Gain should be set so that the signal reaches between 70% and 100% of the height of the display, generally obtained with a setting of 0 for GEOVision winches. If the peak height exceeds this level, clipping will result in artifacts which will be detected erroneously. Click *Apply* to set the parameters before proceeding to the *Scope* dialog.

- ***Threshold*** is the level at which the incoming signals are detected. Gain and Threshold are related, and can be visualized using the *Scope* dialog. Set the gain so that the signal reaches between 70% and 100% of the height of the display. Then adjust the threshold so that it is between 50% and 70% of the height of the pulses displayed and clear of any region of 'overshoot' of the positive and negative pulses. This will ensure that peaks are detected and noise is ignored. Generally a setting of 25 is used for GEOVision winches. When the scope dialog is displayed, the position of the mouse is reported as a threshold value to make it simpler to infer the correct setting. The scope option is greyed out when the probe power is turned off.

- ***Drive*** sets the strength of the downhole signal. It is not possible to visualize the downhole signal, but the effect of insufficient drive is to disable downhole communication, which will result in the commands being ignored by the sonde. Values range from 0 -127, and for GEOVision winches will be around 10. Increase the drive for longer cables.

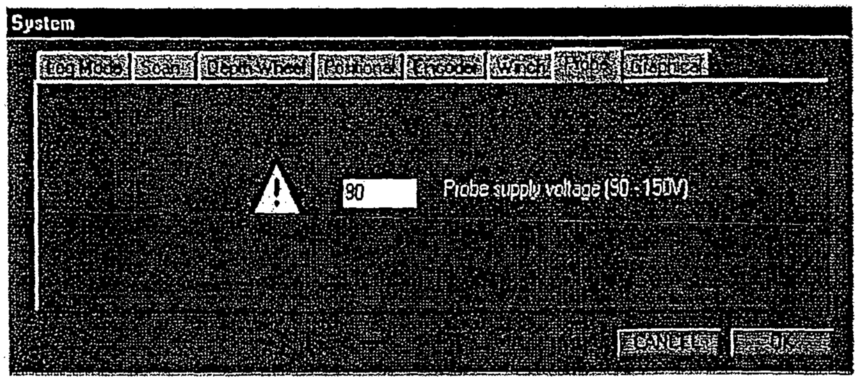
- ***Pulse Width*** This is the width of the transmitted communication pulses in 100nS steps. The default is 25 equivalent to 2.5uS. The range is from 8 to 64. The pulse width can be reduced to prevent signal overshoot on short cables. The default value is used in most cases. Note any changes only come into effect during a log. (Note setting too large a pulse width when using the highest Baud rates will automatically be prevented within the probe and the pulse width reduced.)

IMPORTANT Please note the effects of changing 'Baud' will not appear until the first new log is made. The setting for 'threshold' may be effected by an increase in the 'Baud' rate please recheck 'threshold' if 'Baud' is altered using the 'Scope' function after making a short test log.

The parameters which are entered will be applied automatically if you close the dialog with ***OK***. The above parameters once set correctly will be remembered by the system and should never need to be altered.

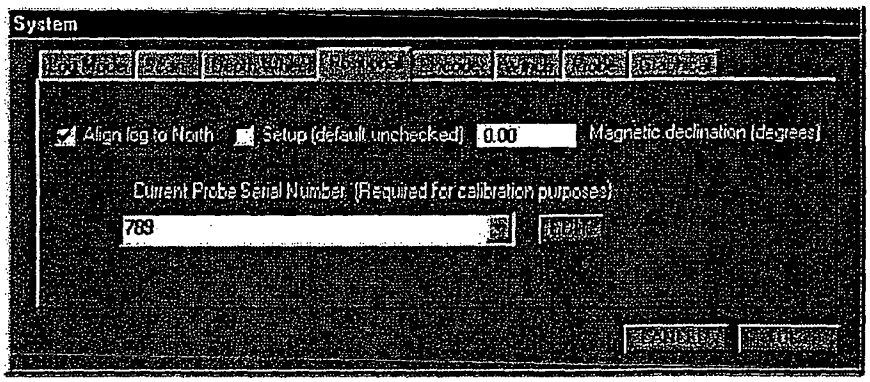
6.0 Probe Configuration

The probe is normally energized at 90 Volts from the surface. However, it may be necessary to compensate for voltage drop on longer cables due to the higher power draw of this sonde. The voltage at the surface may be increased in order to deliver 90 Volts at the sonde. Simply type the value into the text box provided. The voltage should be set at 90V for all GEOVision winches. Values outside the indicated range will be rejected.



7.0 Positional Configuration

The probe includes a 3-axis orientation package, and is capable of producing a borehole image aligned to geographic North. This is achieved by determining and applying two image rotation parameters:



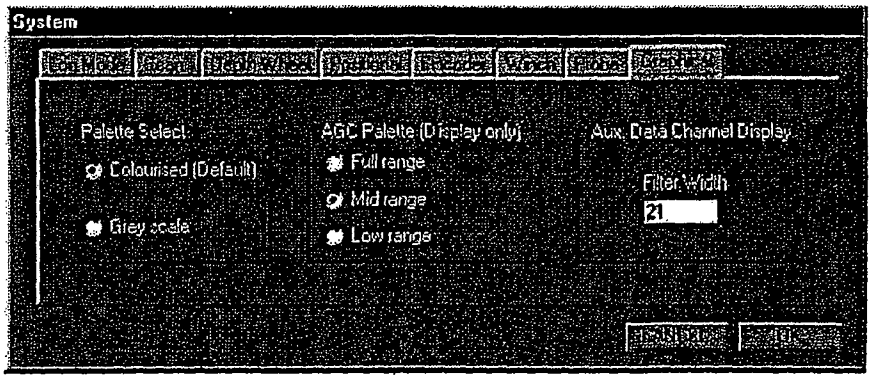
- ***Magnetic Declination*** is used to correct for the difference between Magnetic North and True North. The value varies from place to place, so the local value must be inserted here if you wish to perform this correction during data collection. This correction may also be made during processing. If the value is zero, the log will be referred to Magnetic North.
- ***Align to North*** is a check-box used to select image rotation to start at Magnetic North. If in addition a value is set for Magnetic Declination (see above) the image will be rotated to start at True North. If the box is not checked, the image will not be oriented to geographic co-ordinates, but will use the local co-ordinate frame of the sonde (X, Y, Z axis of the orientation module). This mode may be used to inspect the inside of magnetic casing, where an orientated image would be subjected to random effects caused by the metalwork.
- Set-up mode is selected by checking the ***Setup*** box, and is used to determine the required image rotation offset to correct for the angle between the axis of the orientation package and the index mark of the rotating transducer section. In set-up mode the normal sonde azimuth display is modified, and will instead show the 'relative bearing' which is measured between the high side of the borehole and the orientation sensor index. Check ***Setup***, then OK to close the dialog. The icon adjacent to the sonde azimuth readout at the top of the screen is modified with the legend CAL when the system is in set-up mode. The sonde must now be placed in a stand or jig so that it

is inclined at about 20 degrees to the vertical, and adjacent to a target fixed to the jig so that it is directly above the transducer in the vertical plane. Lower the sonde with its attachment into a large bucket of water so that the transducer and target are fully immersed. Start the radial amplitude display, when it will be possible to see the strong signal returning from the target. Rotate the sonde so that the image of the target moves to the top of the display. When the two are coincident, the 'relative bearing' reads out the image rotation offset. This value is fixed for the sonde unless it is disassembled and rebuilt, at which point the procedure MUST be repeated. Please see the additional topic on the Radial Amplitude Display for further details.

- The ***Serial Number*** list box is used to select the sonde which is in use. When the appropriate sonde is selected, the image rotation offset determined by the above procedure is selected. To edit the image offset click the '***Edit***' and enter the new offset. Several serial numbers and associated offsets can be stored and selected as required.

8.0 Graphical

The palette can be changed between a colored and grey scale setting. The changes affect the log screen palette display and are also applied when replaying a log. Selecting Full range in the 'AGC Palette' will cause the software to spread the palette over the full 16bit signal. 'Mid range' will spread the palette over the first quarter of the 16bit range and 'Low range' will spread the palette over the first eighth of the 16 bit range. In most cases the 'Low range' selection is used. Note these settings do not affect the stored log data in any way. The 'Filter Width' is applied to the Natural Gamma trace data and is a simply running average filter. The range of the filter width is from 1 to 50 (x 10 millidepth units ie. mm or mft).

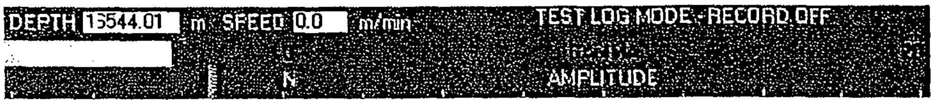


9.0 Sonde Operation

When the operations specified above have been reviewed and the correct settings have been selected, the system is ready for use. The main screen area is divided into 3 horizontal elements. At the top is the depth and orientation readout, together with the scale headings for the scrolling display of unwrapped borehole image.

On the left side of the depth track is the travel time display, with text boxes for sonde inclination, azimuth and head temperature.

On the right side is the display of amplitude and indication of current operating mode. Located in the center above the depth track are the text boxes for depth and cable speed (computed at the surface). The ranges for the 'Natural Gamma' channel overlay (optional) are shown above the Amplitude.



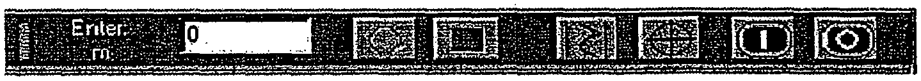
The central area is utilized for the scrolling display of unwrapped borehole data. The display is orientated with the left edge corresponding to North point of the aligned image data (if orientation is selected) according to the outputs of the sonde's orientation package.

The lower area has controls for the winch (applicable to RG Smart Winch only), depth initialization and sonde control.

The winch control area is only displayed when RG SmartWinch operation is enabled - see section 5 - and has four controls. Set Target Speed by typing the required speed into the window and pressing Enter.

Cable movement is initiated by clicking on either the UP or DOWN arrow control.

Cable movement is halted by clicking on the square STOP control.



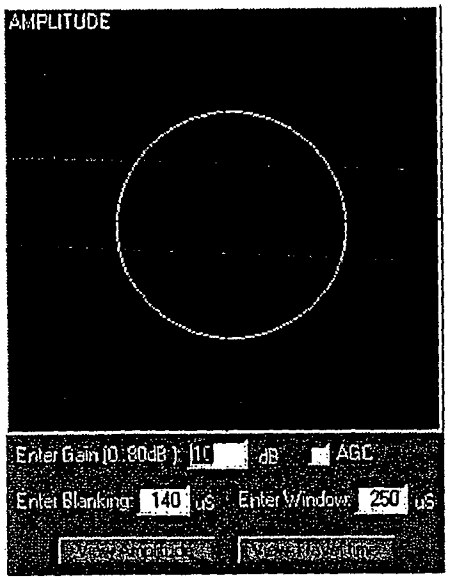
Depth is initialized by typing the required value into the entry box and pressing Enter. The entry box is not available at times when the system is in logging mode and the depth should not be changed by user entry.

Sonde power is applied by clicking on the green-colored 1 button. Power is turned off by clicking on the red-colored 0 button. There is no indicator for the state of the power supply on the desktop, so the external indicators should be observed for this purpose.

To make a log ensure that the Test Mode is disabled - see section 1, Log Mode setting. Click File|New Log and select a filename. Old logs may be overwritten if necessary -TAKE CARE. The header editor will be started automatically. A previous set of header data may be loaded by clicking LOAD and choosing a template.

To start logging, click on the red Record (circle) control. The log data will start to scroll down the screen after a brief pause for synchronization. The messages "DSP2: Detecting data stream" and "Updating probe settings" will be observed at the bottom of the screen during this process. Note that the screen scrolling direction is not affected by the actual direction of movement of the sonde. To cease logging, click on the black STOP control (square). The data should be immediately backed up to a USB drive, CD, or other data storage prior to beginning another log.

If the data display from a probe which is properly connected appears to occupy only half of the track area, with the remainder filled with random colors such as green which are not part of the regular palette, then it is most likely that the downhole data communication is not functioning properly. This symptom is due to the fact that the probe settings cannot be communicated properly, and it is operating in its default power-up mode. If this is the case, the Drive setting of the System|Winch dialog should be increased or decreased accordingly. See section 5 for full details.



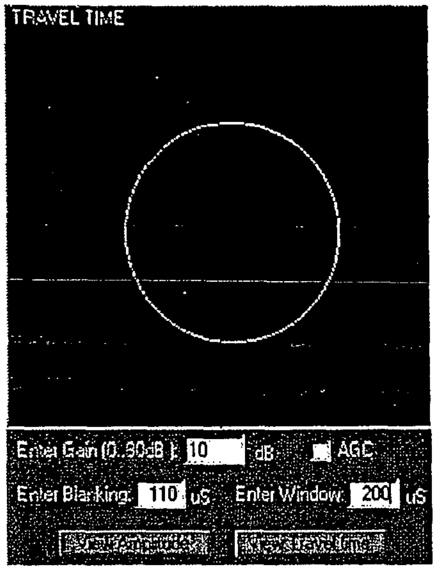
To adjust the sonde gain it is necessary to use the Radial Amplitude plot, which is enabled by clicking on the circle with cross-hairs symbol. When the dialog is active a new window will open on top of the unwrapped data display. In this display, the data is presented as a 'polar' plot. Press the 'View Amplitude' button to display the amplitude plot. This plot shows amplitude increasing towards the outside of the circle and the compass direction following the sweep of the transducer. The line indicating the data is drawn in the regular palette, so that high amplitudes are drawn in white and low amplitudes in black/brown. The picture here shows the image of the inside of a cylinder.

If the data is concentrated in a small circle at the center, the gain is too low and should be increased. If the data is obviously clipped at the outside of the circle, then the gain should be reduced. Type the new gain value into the entry box and press Enter. The ideal would be to set a gain value which allows the peak values to be displayed without clipping, with the majority of the data around the half-way level. It may also be necessary to adjust the blanking to ensure that internal reflections from the acoustic housing are not detected at the new gain value. This will be apparent in the unwrapped data display as pronounced patterning unrelated to the true target. The AGC option causes the probe to set gain automatically thus preventing signal saturation in most cases. (The gain is varied in 6dB steps

Blanking Period and window length can be set independently. Blanking is set to avoid reflections from the housing of the acoustic transducer or random reflections from a rugose borehole, and window length is set to accommodate the range of borehole radius that might be expected. An error will be indicated if the sum of the blanking period and window length would be greater than 409 microseconds, which is the maximum range of the timer. The default value for the blanking period is 145 microseconds, which is the minimum required for the two-way transit from the transceiver to the outer surface of the acoustic housing. It is not advisable to reduce this value beyond the default setting, although it may be increased for larger boreholes at the rate of 1.5mm of one-way travel per microsecond.

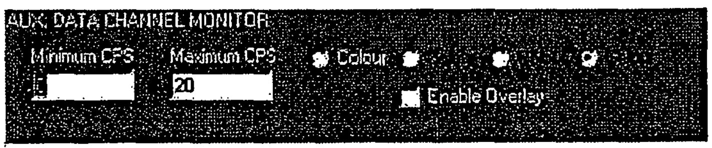
Window Length (sample time) defines the period during which the arrival gate remains open to detect the returned acoustic pulse. The acoustic pulse will travel in water at a speed of approximately 1.5mm per microsecond. The default window length is 150 microseconds, which is equivalent to 225 mm of (two-way) travel in the borehole fluid, or approximately 110mm of borehole diameter. If this is added to the default blanking period, which is equivalent to the outside diameter of the acoustic housing, it can be seen that the default set-up will be correct for boreholes up to 150mm. An error will be indicated if the sum of the blanking period and window length would be greater than 409 microseconds, which is the maximum range of the timer. Choose your window setting to best match the borehole diameter.

Pressing the 'View Travel time' button changes the display to that shown below:



The unhatched ring between the two cross hatched zones represents the sample window. The width of this ring will vary with window length value. The profile of a cylinder is represented here appearing as a circle in the sample window.


Pressing this button displays the following dialog box:



This box allows you to enable the Natural Gamma option by checking the 'Enable Overlay' check box. The Overlay appears as a trace upon the Amplitude plot. The trace range and color can also be set by this dialog. The level of filtering can also be altered (see section 8) (note that any displayed trace data is automatically aligned with the acoustic scan data but only when logging up. The Natural Gamma sensor occupies a higher position in the probe so sufficient data has to be prebuffered so that the acoustic data can depth aligned with gamma. The prebuffering results in a delay at the start of a log before correct gamma data appears this is normal.)

Data Analysis and Interpretation

RG-DIP, the manufacturer's image interpretation package, offers manual and automatic feature recognition options. Feature orientations (dip/strike and azimuth) are automatically calculated. Display options include stereographic projections of zone axes, orientation frequency plots and 'synthetic cores' for comparison with real core data. The last option is invaluable for orientating core samples, particularly in the case of incomplete recovery.

Reporting

The final report will include the objective and scope of the survey, location of the boreholes, discussion of instrumentation and procedures in the field and lab. For each borehole there will be a plot showing the dip/strike and azimuth of features. The next page shows an example.

Assumptions and limitations of the results will be discussed. Supporting references will be listed as necessary

Required Field Records

Field log for each borehole showing

a) Location and description of the borehole

b) Date of test

c) Field personnel

d) Instrumentation

e) Any deviations from test plan and action taken as a result

This procedure has been reviewed and approved by the undersigned:

Professional Geophysicist ______ [signature] ______ Date Feb 13. 2006

QA Review ______ [signature] ______ Date Feb 13. 2006

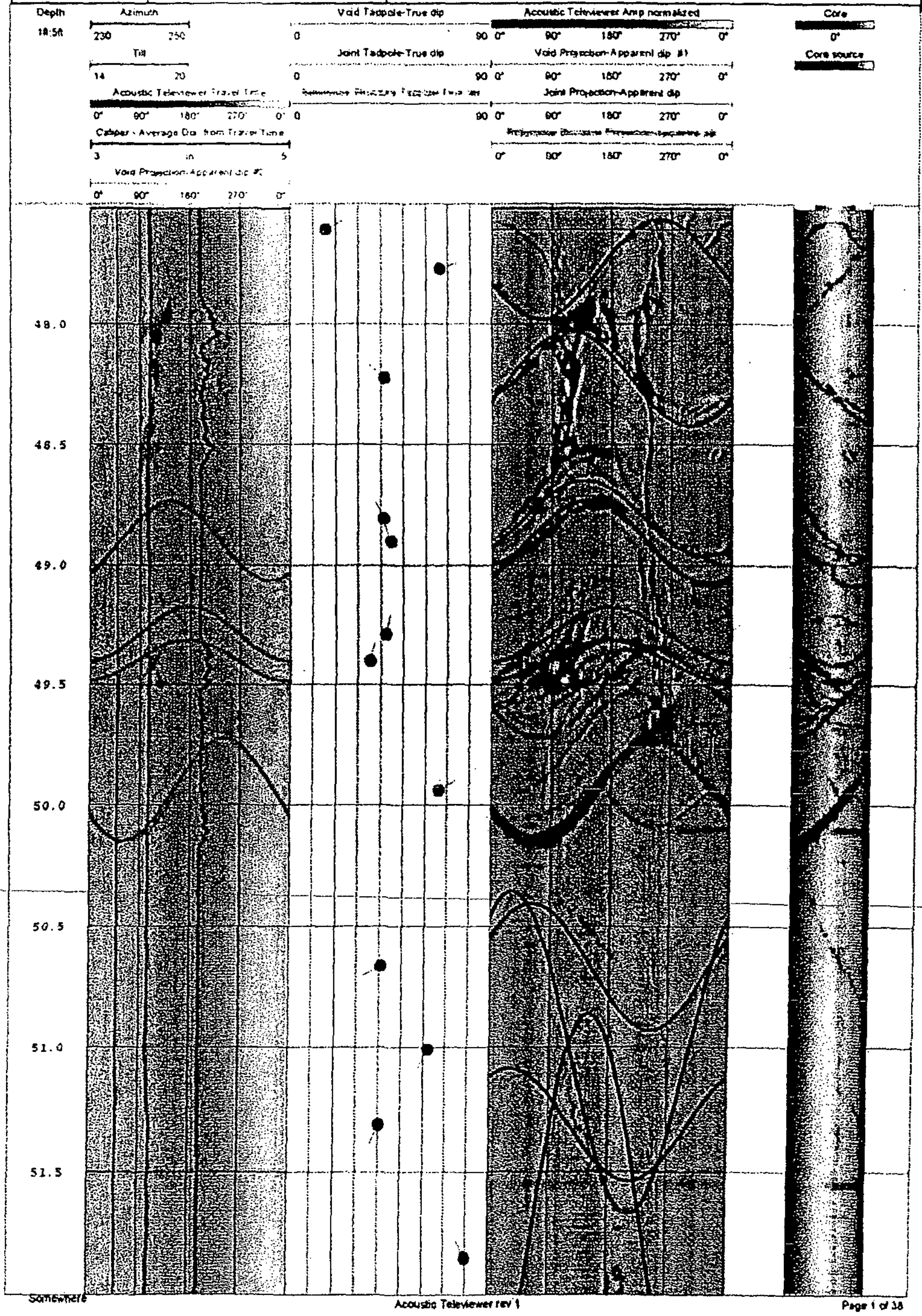
B-XXX	Company	Geovision Geophysical Services
	Location	Somewhere Dam

BH	B-XXX Acoustic Televiewer		
Date	7/8/05	BH Fluid	Air/Water
Casing	4" Steel to 15 ft		
File Name	BXXXdown1		
Depth Drilled	300 feet		
Depth Logged	299.3 feet		
Logged by	Rob Steller		
Client	Best Customer Inc.		

Notes:

1) All orientations referenced to True North

2) Tadpole tails indicate dip direction with True North as up.



Designation: D 5753 – 05

Standard Guide for Planning and Conducting Borehole Geophysical Logging[1]

This standard is issued under the fixed designation D 5753; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers the documentation and general procedures necessary to plan and conduct a geophysical log program as commonly applied to geologic, engineering, ground-water, and environmental (hereafter referred to as geotechnical) investigations. It is not intended to describe the specific or standard procedures for running each type of geophysical log and is limited to measurements in a single borehole. It is anticipated that standard guides will be developed for specific methods subsequent to this guide.

1.2 Surface or shallow-depth nuclear gages for measuring water content or soil density (that is, those typically thought of as construction quality assurance devices), measurements while drilling (MWD), cone penetrometer tests, and logging for petroleum or minerals are excluded.

1.3 Borehole geophysical techniques yield direct and indirect measurements with depth of the (*1*) physical and chemical properties of the rock matrix and fluid around the borehole, (2) fluid contained in the borehole, and (*3*) construction of the borehole.

1.4 To obtain detailed information on operating methods, publications (for example, **2, 5, 7, 18, 24, 29, 34, 35,** and **36**)[2] should be consulted. A limited amount of tutorial information is provided, but other publications listed herein, including a glossary of terms and general texts on the subject, should be consulted for more complete background information.

1.5 This guide provides an overview of the following: (*1*) the uses of single borehole geophysical methods, (2) general logging procedures, (*3*) documentation, (*4*) calibration, and (5) factors that can affect the quality of borehole geophysical logs and their subsequent interpretation. Log interpretation is very important, but specific methods are too diverse to be described in this guide.

1.6 Logging procedures must be adapted to meet the needs of a wide range of applications and stated in general terms so that flexibility or innovation are not suppressed.

1.7 *This standard does not purport to address all of the safety and liability concerns, if any, (for example, lost or lodged probes and radioactive sources*[3]*) associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 *ASTM Standards:* [4]

D 653 Terminology Relating to Soil, Rock, and Contained Fluids

D 5088 Practice for the Decontamination of Field Equipment Used at Non-Radioactive Waste Sites

D 5608 Practice for the Decontamination of Field Equipment Used at Low Level Radioactive Waste Sites

3. Terminology

3.1 Definitions—Definitions shall be in accordance with Terminology D 653.

[1] This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.01 on Surface and Subsurface Characteristics.

Current edition approved June 1, 2005. Published June 2005. Originally approved in 1995. Last previous edition approved in 1995 as D 5753–95.

[2] The boldface numbers in parentheses refer to the list of references at the end of this standard.

[3] The use of radioactive materials required for some log measurements is regulated by federal, state, and local agencies. Specific requirements and restrictions must be addressed prior to their use.

[4] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3.2 *Definitions of Terms Specific to This Standard:* Descriptions of Terms Specific to This Standard—Terms shall be in accordance with Ref (1).

4. Summary of Guide

4.1 This guide applies to borehole geophysical techniques that are commonly used in geotechnical investigations. This guide briefly describes the significance and use, apparatus, calibration and standardization, procedures and reports for planning and conducting borehole geophysical logging. These techniques are described briefly in Table 1 and their applications in Table 2.[5]

4.2 Many other logging techniques and applications are described in the textbooks in the reference list. There are a number of logging techniques with potential geotechnical applications that are either still in the developmental stage or have limited commercial availability. Some of these techniques and a reference on each are as follows: buried electrode direct current resistivity **(37)**, deeply penetrating electromagnetic techniques **(38)**, gravimeter **(39)**, magnetic susceptibility **(40)**, magnetometer, nuclear activation **(41)**, dielectric constant **(42)**, radar **(50)**, deeply penetrating seismic **(39)**, electrical polarizability **(45)**, sequential fluid conductivity **(46)**, and diameter **(48)**. Many of the guidelines described in this guide also apply to the use of these newer techniques that are still in the research phase. Accepted practices should be followed at the present time for these techniques.

5. Significance and Use

5.1 An appropriately developed, documented, and executed guide is essential for the proper collection and application of borehole geophysical logs.

5.1.1 The benefits of its use include improving the following:

5.1.1.1 Selection of logging methods and equipment,

5.1.1.2 Log quality and reliability, and

5.1.1.3 Usefulness of the log data for subsequent display and interpretation.

5.1.2 This guide applies to commonly used logging methods (see Table 1 and Table 2) for geotechnical investigations.

5.1.3 It is essential that personnel (see 7.3.3) consult up-to-date textbooks and reports on each of the logging techniques, applications, and interpretation methods. A partial list of selected publications is given at the end of this guide.

5.1.4 This guide is not meant to describe the specific or standard procedures for running each type of geophysical log and is limited to measurements in a single borehole.

6. Apparatus

6.1 *Geophysical Logging System*, including probes, cable, draw works, depth measurement system, interfaces and surface controls, and digital and analog recording equipment.

6.1.1 Logging probes, also called sondes or tools, enclose the sensors, sources, electronics for transmitting and receiving signals, and power supplies.

6.1.2 Logging cable routinely carries signals to and from the logging probe and supports the weight of the probe.

6.1.3 The draw works move the logging cable and probe up and down the borehole and provide the connection with the interfaces and surface controls.

6.1.4 The depth measurement system provides probe depth information for the interfaces and surface controls and recording systems.

6.1.5 The surface interfaces and controls provide some or all of the following: electrical connection, signal conditioning, power, and data transmission between the recording system and probe.

6.1.6 The recording system includes the digital recorder and an analog display or hard copy device.

7. Calibration and Standardization of Geophysical Logs

7.1 *General:*

7.1.1 National Institute of Standards and Technology (NIST) calibration and operating procedures do not exist for the borehole geophysical logging industry. However, calibration or standardization physical models are available (see Appendix X1).

7.1.2 Geophysical logs can be used in a qualitative (for example, comparative) or quantitative manner, depending on the project objectives. (For example, a gamma-gamma log can be used to indicate that one rock is more or less dense than another, or it can be expressed in density units.)

7.1.3 The calibration and standardization scope and frequency shall be sufficient for project objectives.

7.1.3.1 Calibration or standardization should be performed each time a logging probe is modified or repaired or at periodic intervals.

7.2 *Calibration*:

7.2.1 Calibration is the process of establishing values for log response. It can be accomplished with a representative physical model or laboratory analysis of representative samples. Calibration data values related to the physical properties (for example, porosity) may be recorded in units (for example, pulses/s or μm/ft) that can be converted to apparent porosity units.

7.2.1.1 At least three, and preferably more, values are needed to establish a calibration curve, and the interface or contact between different values in the model should be recorded. Because of the variability in subsurface conditions, many more values are needed if sample analyses are used for calibration.

7.2.1.2 The statistical scatter in regression of core analysis against geophysical log values may be caused by the difference between the sample size and geophysical volume of investigation and may not represent measurement error.

7.2.2 *Physical Models*—A representative model simulates the chemical and physical composition of the rock and fluids to be measured.

7.2.2.1 Physical models include calibration pits, coils, resistors, rings, temperature baths, etc.

7.2.2.2 The calibration of nuclear probes should be performed in a physical model that is nearly infinite with respect to probe response.

[5] The references indicated in these tables should be consulted for detailed information on each of these techniques and applications.

TABLE 1 Common Geophysical Logs

Type of Log (References)	Varieties and Related Techniques	Properties Measured	Required Hole Conditions	Other Limitations	Typical Measuring Units and Calibration or Standardization	Brief Probe Description
Spontaneous potential (7, 8, 12)	differential	electric potential caused by salinity differences in borehole and interstitial fluids, streaming potentials	uncased hole filled with conductive fluid	salinity difference needed between borehole fluid and interstitial fluids; needs correction for other than NaCl fluids	mV; calibrated power supply	records natural voltages between electrode in well and another at surface
Single-point resistance (7)	conventional, differential	resistance of rock, saturating fluid, and borehole fluid	uncased hole filled with conductive fluid	not quantitative; hole diameter effects are significant	Ω; V-Ω meter	constant current applied across lead electrode in well and another at surface of well
Multi-electrode resistivity (7, 8, 13)	various normal focused, guard, lateral arrays	resistivity and saturating fluids	uncased hole filled with conductive fluid	reverses or provides incorrect values and thickness in thin beds	Ω-m; resistors across electrodes	current and potential electrodes in probe and remote current and potential electrodes
Induction (10, 11)	various coil spacings	conductivity or resistivity of rock and saturating fluids	uncased hole or nonconductive casing; air or fluid filled	not suitable for high resistivities	mS or Ω-m; standard dry air zero check or conductive ring	transmitting coil(s) induce eddy currents in formation; receiving coil(s) measures induced voltage from secondary magnetic field
Gamma (5, 7, 22)	gamma spectral (44)	gamma radiation from natural or artificial radioisotopes	any hole conditions	may be problem with very large hole, or several strings of casing and cement	pulses per second or API units; gamma source	scintillation crystal and photomultiplier tube measure gamma radiation
Gamma-gamma (23, 24)	compensated (dual detector)	electron density	optimum results in uncased hole; can be calibrated for casing	severe hole-diameter effects; difficulty measuring formation density through casing or drill stem	gs/cm^3; Al, Mg, or Lucite blocks	scintillation crystal(s) shielded from radioactive source measure Compton scattered gamma
Neutron (7, 14, 25)	epithermal, thermal, compensated sidewall, activation, pulsed	hydrogen content	optimum results in uncased hole; can be calibrated for casing	hole diameter and chemical effects	pulses/s or API units; calibration pit or plastic sleeve	crystal(s) or gas-filled tube(s) shielded from radioactive neutron source
Acoustic velocity (5, 26, 27)	compensated, waveform, cement bond	compressional wave velocity or transit time, or compressional wave amplitude	fluid filled, uncased, except cement bond	does not detect secondary porosity; cement bond and wave form require expert analysis	velocity units, for example, ft/s or m/s or μs/ft; steel pipe	1 or more transmitters and 2 or more receivers
Acoustic televiewer (28, 7)	acoustic caliper	acoustic reflectivity of borehole wall	fluid filled, 3 to 16-in. diameter; problems in deviated holes	heavy mud or mud cake attenuate signal; very slow logging speed	orientated image-magnetometer must be checked	rotating transducer sends and receives high-frequency pulses
Borehole video	axial or side view (radial)	visual image on tape	air or clean water; clean borehole wall	may need special cable	NA[A]	video camera and light source
Caliper (29, 7)	oriented, 4-arm high-resolution, *x-y* or max-min bow spring	borehole or casing diameter	any conditions	deviated holes limit some types; significant resolution difference between tools	distance units, for example, in.; jig with holes or rings	1 to 4 retractable arms contact borehole wall
Temperature (30, 31, 32)	differential	temperature of fluid near sensor	fluid filled	large variation in accuracy and resolution of tools	°C or °F; ice bath or constant temperature bath	thermistor or solid-state sensor
Fluid conductivity (7)	fluid resistivity	most measure resistivity of fluid in hole	fluid filled	accuracy varies, requires temperature correction	μS/cm or Ω-m; conductivity cell	ring electrodes in a tube
Flow (12, 33, 7)	impellers, heat pulse	vertical velocity of fluid column	fluid filled	impellers require higher velocities. Needs to be centralized.	velocity units, for example, ft/min; lab flow column or log in casing	rotating impellers; thermistors detect heated water; other sensors measure tagged fluid.
Deviation (4, 7, 47)	magnetic, gyroscopic, or mechanical	horizontal and vertical displacement of borehole	any conditions (see limitations)	magnetic methods orientation not valid in steel casing	degrees and depth units; orientation and inclination must be checked	various techniques to measure inclination and bearing of borehole

[A] NA = not applicable.

TABLE 2 Log Selection Chart for Geotechnical Applications Using Common Geophysical Logs[A]

Information Desired	Acoustic		Electric and Induction					Fluid Logs				Radioactive or Nuclear				Other Methods			
	Acoustic Tele-viewer	Acoustic Velocity, Δt, CBL, VDL, FWS	Induced Polari-zation	Multi-electrode Resistivity, Normal, Lateral, Micro Guard Resistivity	Single-Point Resis-tance	Sponta-neous Poten-tial	Induc-tion (Conduc-tivity)	Flow Meter	Fluid Resistivity	Fluid Sampler	Temper-ature, Differ-ential Temper-ature	Gamma-Gamma Density	Gamma	Neutron	Spectral Gamma	Borehole Video	Caliper	Casing Collar Locator	Deviation
Lithology and Correlation																			
Bed/aquifer thickness; correlation, structure	•	•		•	•	•	★					Δ	√	Δ	√	◇	√		
Lithology—depositional environment	?	•		•	•	•	★					Δ	√	Δ	√	◇	√		
Shale or clay content			•	•		•	★					Δ	√	Δ	√				
Bulk density												Δ							
Formation resistivity				•			★												
Injection/production profiles				?			?	□	□		□	Δ		Δ					
Permeability estimates		•						□	□		□		√						
Porosity (amount and type)	•	•		•			★					Δ		Δ					
Mineral identification			•									Δ			√				
Potassium-uranium thorium content (KUT)															√				
Rock Structure																			
Strike and dip of bedding	•															◇			√
Fracture detection (number of fractures), RQD	•	•		•	•											◇	√		
Fracture orientation and character	•															◇			√
Thin bed resolution	•			?	•											◇	√		
Fluid Parameters																			
Borehole fluid characteristics								?	□	□	□								
Fluid flow						•		□	□		□					◇			
Formation water quality				•		•	★			□									
Moisture content—water saturation				?			?					Δ		Δ					
Temperature		?									□								
Water level and water table	•	•		•	•	•	?		□		□	Δ		Δ		◇			
Borehole Parameters																			
Casing evaluation integrity, leaks, damage, screen location	■	■					?	■			■					◆	√	†	
Deviation of borehole																			√
Diameter of borehole	•																√		
Examination behind casing		•					★					Δ		Δ					
Location of debris in wells	•															◆	√	√	
Well completion evaluation, for example, cement bond, seal location, grout location	?	■					★					Δ	√	Δ					

[A] Required hole conditions: ■ = cased fluid-filled hole, ◆ = clear fluid or dry cased hole, □ = screened or open fluid-filled hole, ◇ = clear fluid or dry open hole, † = steel casing only, Δ = active nuclear log to be run in stable holes, ★ = open or nonconductive cased holes, dry or fluid filled, √ = no restrictions, • = open fluid-filled hole only, and ? = possible applications.

7.2.2.3 Some probes have internal devices such as resistors, but this does not substitute for checking the probe response in an environment that simulates borehole conditions, and the use of such devices is considered standardization.

7.2.2.4 *Calibration Facilities*—Commonly used calibration pits or models for use by anyone at the present time are listed in Appendix X1 **(14-18)**. The user should inquire concerning the present validity of any facility.

7.2.3 *Sample Analyses*:

7.2.3.1 Representative samples from boreholes in the project area that have been collected carefully and analyzed quantitatively also may be used to calibrate log response.

.3.2 To reduce depth errors, the sample recovery of rock ɛs in calibration holes needs to approach 100 % for the intervals used for calibration. Log response should be used to select sample depths to span the range of desired log calibration values and to be within thick units to minimize the effects of potential depth errors. Samples need to be analyzed immediately or steps taken to preserve them for later analysis.

7.2.3.3 Samples to be used for log calibration should be analyzed only from depth intervals at which the log response is relatively uniform for a depth interval considerably greater than the vertical dimension of the volume of investigation of the logging probe. Samples near lithologic contacts or fluid interfaces should not be used because of possible boundary effects or depth errors.

7.3 *Standardization*:

7.3.1 Standardization is the process of checking the log response to reveal evidence of repeatability and consistency.

7.3.2 Standardization is needed to establish comparability between logs made with different equipment or at different times and to ensure the accuracy of measurements.

7.3.2.1 Standardization checks should include at least two different measurement values approximating the range of interest (For example, aluminum and magnesium or plastic blocks are used commonly to check the response of gamma-gamma density logging systems in the field.)

7.3.3 Standardization uses some type of a standard that may used in the field or laboratory and repeat logs.

7.3.3.1 Log response needs to be checked using field standards often enough to satisfy the project objectives. Standardization of the log response provides the basis for correcting for changes (for example, changes in output with time due to system drift or changes of equipment).

7.3.3.2 Selected log intervals should be repeated (that is, re-logged). Repeat logs provide information on the stability of logging equipment.

7.3.3.3 A representative borehole may be used to check log response periodically. This borehole environment and the rocks and fluids penetrated may change with time.

8. Procedure

8.1 *Planning the Logging Program*:

8.1.1 A work plan should be developed prior to implementing the logging program.

8.1.2 The key steps in developing a logging work plan should include the following:

8.1.2.1 *Log Selection*—See Table 1 and Table 2.

8.1.2.2 *Personnel Selection*—See 8.3.2.

8.1.2.3 *Quality Control and Documentation*—See 8.4.

8.1.2.4 *Calibration and Standardization Procedures*—See Section 7.

8.1.2.5 *Equipment Liability*—See 1.7.

8.1.2.6 *Equipment Decontamination*—In environmental investigations, equipment decontamination may be required before, after, and between individual wells. Equipment decontamination may involve a number of standardized procedures, depending on the nature of the project (see Practices D 5088 and D 5608). A decontamination program should be agreed upon by all parties before logging commences, and procedures specified by the work plan should be followed.[6]

8.1.2.7 *Log Interpretation*—See 8.5.

8.2 *Field Assessment of Borehole Conditions*:

8.2.1 Borehole conditions can have a profound influence on the quality of log data and subsequent interpretation. Important parameters to consider include the following:

8.2.1.1 Drilling method, casing, drill hole history, and well completion materials.

8.2.1.2 *Borehole Fluid Properties*—Resistivity, temperature, density, viscosity, and chemistry at the time of logging.

8.2.1.3 Borehole diameter, rugosity, and stability.

8.2.1.4 Deviation of borehole.

8.2.1.5 Wellhead pressure.

8.2.2 *Logging Operations*:

8.2.2.1 Determine the sequence and direction of logging. The sequence in which a suite of logs is run is important from both a data quality and operational viewpoint. Because logging operations mix the borehole fluid, logs of fluid properties (for example, temperature, fluid resistivity, and fluid sampling should be run prior to other logs). Consideration should also be given to when borehole video surveys are performed because some logging tools may degrade borehole clarity. Tools that have arms or bowsprings that contact the borehole wall should be run late in the logging sequence because of the greater possibility of material from the borehole wall falling into the borehole. Because of the consequences of losing a tool with a radioactive source, these tools should be run last, and after a caliper log. Unstable boreholes should not be logged with radioactive source probes. All logs except fluid properties and video should be run with the probe moving up the borehole to reduce depth errors.

8.2.2.2 Select the depth reference. The selected depth reference needs to be stable and accessible.

8.2.2.3 Select horizontal and vertical scales.

8.2.2.4 Select the digitizing interval. See 8.3.1.2.

8.3 *Other Considerations*:

8.3.1 *Data Formats*—There are two methods of recording log data, digital and analog. Digital recording of logs should be used because of the numerous benefits of data manipulation. Digital recording is not yet practical for some logs such as video or acoustic televiewer.

8.3.1.1 An analog display should be available to be viewed in the field to verify the correct tool operation. Depth scales and units of measurement for the horizontal scale must be indicated clearly on each log.

8.3.1.2 The digital data are recorded at an operator-selected depth interval that should be as small as possible, at most, half the thickness of the smallest rock unit that can be resolved. The time interval for digital samples can also be selected by the operator. ASCII is the recommended format except for such logs as spectral gamma, full waveform sonic, borehole video, and acoustic televiewer. The digital file header should include all of the necessary information to reconstruct the logging

[6] Equipment decontamination procedures may have specific safety and equipment limitations that must be addressed prior to their use.

procedures accurately and should duplicate the information included in the written header of the log.

8.3.1.3 Unprocessed data should be available. Nonproprietary processing algorithms shall be furnished if processed data is provided.

8.3.2 *Personnel*:

8.3.2.1 Personnel not having specialized training or experience should be cautious about using borehole geophysics and should solicit assistance from qualified practitioners or attend courses on borehole geophysics.

8.3.2.2 Personnel operating logging equipment should have an understanding of the theory, field procedures, and methods of log interpretation.

8.3.2.3 A geoscientist, with experience in borehole geophysics, who understands the project objectives and local geohydrology may need to be available to examine logging results during logging operations when consistent with objectives of the program. This geoscientist is responsible for determining whether the instructions selected in the prelogging conference are being followed and whether changes should be made.

8.3.2.4 Log interpretation should be performed by a geoscientist with experience in borehole geophysics and knowledge of the site geology and hydrology.

8.4 *Field Documentation*—A documentation plan for both the analog plot and digital data file should be established and become part of the work plan. Documentation of the following procedures is needed: calibration of logging probes, field operation of geophysical logging equipment, applicable decontamination, and format for presenting geophysical well log data. Repair, standardization, and calibration information should also be documented. Probes should be numbered to simplify the identification of associated documentation. Document all field problems including equipment malfunctions. This should include the steps taken to solve the problem and how the logs might have been affected. Repeat runs and field standardization should be more frequent when equipment problems occur. The use of one borehole on the project to check the probe response may aid in the identification of equipment or other problems. Probes should be recalibrated in a physical model after major repairs have been made.

8.4.1 *Log Headings (Headers)*—The log heading should contain all of the information that is necessary to analyze the log trace. Because auxiliary documents are frequently unavailable to other users of the log, all of the critical information concerning the log should be included on the final log heading. The header information should also be included in the same computer file as the log data. The following items listed are necessary and should be included on the log headings and computer files when appropriate. If information is not available or applicable, it should be noted on the heading. The following information should be included:

8.4.1.1 *Background Well Information*:

Owner of well and address, location of well (UTM coordinates, ¼ section, etc.); date; logging contractor and address; logging operator; drilling contractor and address; client and address; observer and address; elevation of top casing and distance above ground; and drilling history, methods etc.

8.4.1.2 *Borehole Conditions*:

Casing description; description of log depth datum; elevation of log depth datum; type of drilling fluid; resistivity and temperature of borehole fluid; depth of origin of borehole fluid samples; fluid level; time since last mud circulation; bottom hole temperature; and problems and unusual conditions.

8.4.1.3 *Equipment Data and Logging Parameters*:

Description of probe reference point; model and manufacturer of logging tools; logging company tool number; date and type of last calibration; date, type, and response of field standardization; top and bottom of logged interval; logging speed and direction; vertical depth error after logging; time constant or the time interval of digital samples; identification of disk containing digitized logs; and equipment problems.

8.4.1.4 *Specific Information for Nuclear Logging Probes*:

Source description, initial source strength, and date determined; source to detector or receiver spacing; detector description; and data filtering or enhancement parameters.

8.4.1.5 *Specific Information for Acoustic and Electric Logging Probes*:

source or transmitter description and signal output; source or transmitter to detector or receiver spacing; detector or receiver description; and data filtering or enhancement parameters.

8.4.2 *Quality Control During Logging Operations*:

request changes in logging speed and time constant; repeat logs or log intervals based on field log analysis; check depth readout against log; note errors or changes on the log; and verify documentation listed above.

8.5 *Log Interpretation*—The full potential of a logging program cannot be realized until the logging measurements are interpreted. Log interpretation should start at the time of data acquisition and should continue as an iterative process throughout the project.

8.5.1 Logs should be analyzed and described as a suite and combined with information on lithology and fluid quality because of the synergistic nature of log data. The nonunique response of logs dictates the use of data from other sources to check the log interpretation, and this background data must be included in the report. A computer will be used in most cases to aid analysis of the logs, and information on the software and algorithms used should be included in the report.

8.5.2 Important interpretation steps include the following:

8.5.2.1 Establishing database (for example, format conversion, depth corrections, editing, and filtering).

8.5.2.2 Applying borehole corrections (for example, correct electric logs for borehole diameter and fluid resistivity).

8.5.2.3 Performing initial data inversion-conversion log units to values appropriate for investigation (for example, density units to porosity).

8.5.2.4 Performing large-scale data inversion (for example, cross sections, regional correlation, and model parameters).

9. Report

9.1 Depending on the project objective, report only data or data and interpretations.

9.1.1 Both types of reports should include the following:

9.1.1.1 Objectives and scope.

9.1.1.2 Field Documentation (for example, site conditions, borehole conditions, data collection procedures, calibration and ıardization of logging probes, field operation of geophysi- . logging equipment, and format for recording geophysical log data, including any filtering or processing of the data, problems, and unusual conditions; see 8.4).

9.1.1.3 Both the digital log data and log plots.

9.1.1.4 Abstract, executive summary, or conclusions.

9.1.2 Interpretation reports should include the following:

9.1.2.1 Log composites (for example, summary plots showing logs, lithology, well construction, and water quality zones). These composites are commonly annotated to indicate the features of interest and correlated with lithologic descriptions.

9.1.2.2 Brief description of the geologic and hydrologic setting.

9.1.2.3 Specific information on log analysis, that is, depth corrections and recalibration of logs, physical models or sample analyses that were used for calibration, methods of log interpretation, software used, and copies of cross-plots or other plots of data resulting from log analysis.

9.1.2.4 Well-to-well correlation sections and comparison to surface geophysical and other testing data, when available.

10. Keywords

10.1 acoustic logging; acoustic televiewer; borehole geophysics; borehole video; caliper logging; chemical properties and physical properties; deviation; electric logging; environmental; fluid conductivity/resistivity logging; fluid logging; gamma logging; gamma-gamma logging; geology; geophysics; geotechnical; ground water; hydrology; induction logging; log calibration and standardization; log headings; neutron logging; nuclear logging; resistivity logging; singlepoint resistance logging; spontaneous potential logging; temperature logging; well logging

APPENDIX

(Nonmandatory Information)

X1. CALIBRATION FACILITIES AVAILABLE FOR PUBLIC USE (1989)

X1.1 *Name and Location*—American Petroleum Institute Calibration Facility, University of Houston, Houston, TX: four ts **(14, 19, 20)**.

X1.2 *Who to Contact:* University of Houston, Cullen College of Engineering, (713) 749-3423.

X1.3 *Probes That Can Be Calibrated*—Pit 1: neutron and gamma-gamma; Pit 2: gamma (simulated shale); Pits 3 and 4: spectral gamma.

X1.3.1 *Name and Location*—U.S. Department of Energy, Grand Junction, CO: 20 models or pits **(18)**.

X1.3.2 *Who to Contact*—U.S. Department of Energy, Grand Junction Operations Office, or the prime contractor at the U.S. Department of Energy office, (303) 248-7768 or 6702.

X1.4 *Probes That Can Be Calibrated*—Gamma, gamma spectral, neutron, gamma-gamma, and magnetic susceptibility. Also, wet and dry borehole size factors and a 300-ft borehole with radium foil at known depths for check of depth measurements.

X1.4.1 *Name and Location*—U.S. Bureau of Mines density pits Pit 1: six holes and magnetic susceptibility (Pits 2). Denver Federal Center, Lakewood, CO: Pit six holes; Pit 2: three holes **(17)**.

X1.4.2 *Who to Contact*—U.S. Geological Survey, Water Resources Division, Borehole Geophysics Project, Building 25, Denver Federal Center, (303) 236-5913.

X1.5 *Probes That Can Be Calibrated*—Pit 1: gamma-gamma, acoustic, resistivity; and Pit 2: magnetic susceptibility.

X1.5.1 *Name and Location*—U.S. Department of Energy, Fractured igneous rock calibration models, Denver Federal Center, Lakewood, CO: Three models or pits **(16)**.

X1.5.2 *Who to Contact*—U.S. Geological Survey, Water Resources Division, Borehole Geophysics Project, Building 25, Denver Federal Center, (303) 236-5913.

X1.6 *Probes That Can Be Calibrated*—Fracture detection probes, neutron, gamma-gamma, short-spaced resistivity, and acoustic velocity.

X1.7 *Other Facilities*—The Geological Survey of Canada is developing a system of deep test holes and calibration facilities that are presently available at several locations in Canada. Gamma, gamma spectral, and coal property models are completed, and other physical property models are under construction **(15)**. Calibration facilities at universities, private logging companies, and government agencies may also be available at other locations for use by outside logging groups.

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Designation: D 6167 – 97 (Reapproved 2004)

Standard Guide for Conducting Borehole Geophysical Logging: Mechanical Caliper[1]

This standard is issued under the fixed designation D 6167; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers the general procedures necessary to conduct caliper logging of boreholes, wells, access tubes, caissons, or shafts (hereafter referred as boreholes) as commonly applied to geologic, engineering, ground-water, and environmental (hereafter referred as geotechnical) investigations. Caliper logging for mineral or petroleum exploration and development are excluded.

1.2 This guide defines a caliper log as a record of borehole diameter with depth.

1.2.1 Caliper logs are essential in the interpretation of geophysical logs since they can be significantly affected by borehole diameter.

1.2.2 Caliper logs are commonly used to measure borehole diameter, shape, roughness, and stability; calculate borehole volume; provide information on borehole construction; and delineate lithologic contacts, fractures, and solution cavities and other openings.

1.3 This guide is restricted to mechanically based devices with spring-loaded arms, which are the most common calipers used in caliper logging with geotechnical applications.

1.4 This guide provides an overview of caliper logging, including general procedures, specific documentation, calibration and standardization, and log quality and interpretation.

1.5 To obtain additional information on caliper logs see Section 9 of this guide.

1.6 This guide is to be used in conjunction with Guide D 5753.

1.7 This guide should not be used as a sole criterion for caliper logging and does not replace professional judgement. Caliper logging procedures should be adapted to meet the needs of a range of applications and stated in general terms so that flexibility or innovation is not suppressed.

1.8 The geotechnical industry uses English or SI units. The caliper log is typically recorded in units of inches, millimetres, or centimetres.

1.9 *This guide does not purport to address all of the safety and liability problems (for example, lost or lodged probes and equipment decontamination) associated with its use.*

1.10 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 653 Terminology Relating to Soil, Rock and Contained Fluids

D 5088 Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites

D 5608 Practice for Decontamination of Field Equipment Used at Low Level Radioactive Waste Sites

D 5753 Guide for Planning and Conducting Borehole Geophysical Logging

3. Terminology

3.1 *Definitions:* Definitions shall be in accordance with Terminology D 653, Section 12, Ref (**1**),[3] or as defined below:

3.1.1 *accuracy, n*—how close a measured log values approaches true value. It is determined in a controlled environment. A controlled environment represents a homogeneous sample volume with known properties.

3.1.2 *depth of investigation, n*—the radial distance from the measurement point to a point where the predominant measured response may be considered centered, that is not to be confused with borehole depth (for example, distance) measured from the surface.

3.1.3 *measurement resolution, n*—the minimum change in measured value that can be detected.

[1] This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.01 on Surface and Subsurface Characterization.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The boldface numbers given in parentheses refer to a list of references at the end of the text.

3.1.4 *repeatability, n*—the difference in magnitude of two measurements with the same equipment and in the same environment.

3.1.5 *vertical resolution, n*—the minimum thickness that can be separated into distinct units.

3.1.6 *volume of investigation, n*—the volume that contributes 90 % of the measured response. It is determined by a combination of theoretical and empirical modeling. The volume of investigation is non-spherical and has gradational boundaries.

4. Summary of Guide

4.1 This guide applies to borehole caliper logging and is to be used in conjunction with Guide D 5753.

4.2 This guide briefly describes the significance and use, apparatus, calibration and standardization, procedures, and reports for conducting borehole caliper logging.

5. Significance and Use

5.1 An appropriately developed, documented, and executed guide is essential for the proper collection and application of caliper logs. This guide is to be used in conjunction with Guide D 5753.

5.2 The benefits of its use include the following: improving selection of caliper logging methods and equipment, caliper log quality and reliability, and usefulness of the caliper log data for subsequent display and interpretation.

5.3 This guide applies to commonly used caliper logging methods for geotechnical applications.

5.4 It is essential that personnel (see the Personnel section of Guide D 5753) consult up-to-date textbooks and reports on the caliper technique, application, and interpretation methods.

6. Interferences

6.1 Most extraneous effects on caliper logs are caused by instrument problems and borehole conditions.

6.2 Instrument problems include the following: electrical leakage of cable and grounding problems, temperature drift, wear of mechanical components including the hinge pins and in the linear potentiometer (mechanical hysteresis), damaged or bent arms, and lack of lubrication of the mechanical components.

6.3 Borehole conditions include heavy drilling mud, borehole deviation, and drilling-related borehole irregularities.

7. Apparatus

7.1 A geophysical logging system has been described in the general guide (see the Apparatus section of Guide D 5753).

7.2 Caliper logs may be obtained with probes having a single arm, three arms (averaging or summation), multiple independent arms (x-y caliper), multiple-feeler arms, bow springs, or gap wheels. Single-arm and three-arm averaging probes are most commonly used for geotechnical investigations.

7.2.1 A single-arm caliper commonly provides a record of borehole diameter while being used to decentralize another type of log, such as a side-collimated gamma-gamma probe (see Fig. 1). The caliper arm generally follows the high side of a deviated hole. The single-arm decentralizing caliper may not have the resolution needed for some applications.

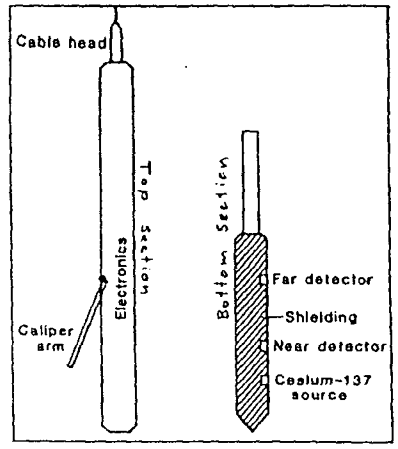

FIG. 1 Probe for Making Side-Collimated Gamma-Gamma Logs with Single-Arm Caliper (2)

7.2.2 The three-arm averaging or summation caliper has arms of equal length oriented 120° apart (see Fig. 2). All arms move together, which provides an average diameter measurement. This caliper provides higher resolution than the single-arm caliper measurement (see Fig. 3).

7.2.3 Multiple independent arm calipers generally have three or four independent arms of equal length; these arms are sometimes oriented. Horizontal resolution, that provides accurate borehole-diameter measurement regardless of borehole shape, is related to the number of independent arms. In general, calipers with four or more independent arms will have higher resolution than three-arm averaging (see Fig. 3). The four independent-arm caliper log may show borehole elongation (elliptical borehole shape) and better indicates the actual irregularity of the borehole.

7.3 Caliper probes using arms are typically spring loaded. The arms are retracted and opened with an electric motor and

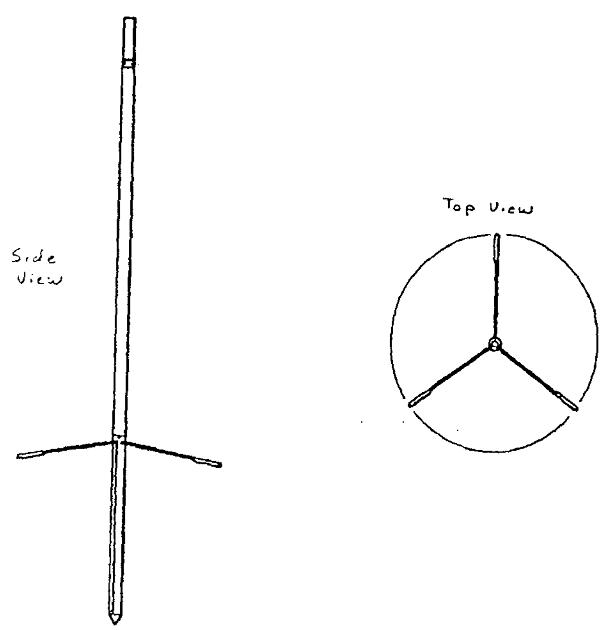

FIG. 2 Three-Arm Averaging Caliper

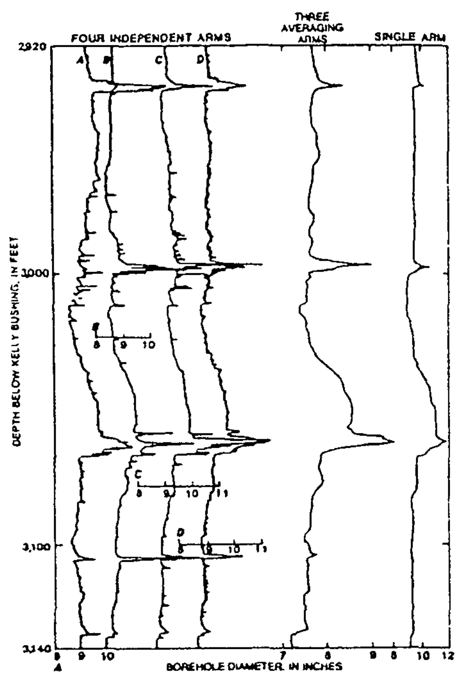

FIG. 3 Caliper Logs From Probes Having Four Independent Arms, Three Averaging Arms, and a Single Arm, Madison Limestone Test Well 1, Wyoming (2)

retention spring. The arms and gears are lubricated. Caliper probes closed by hand are held closed with an electric solenoid or weighted retention ring that is released with a sudden drop. Typically, the caliper arms are mechanically connected to a linear or rotary potentiometer such that changes in the angle of the arms causes changes in resistance. These changes in resistance are proportional to average borehole diameter. In some probes, the voltage changes are converted to a varying pulse rate or digitized downhole to eliminate or minimize cable transmission noise. Different arm length can be used to optimize sensitivity for the borehole-diameter range expected.

7.4 The concepts of volume of investigation and depth of investigation are not applicable to caliper logs since it is a surface-contact measurement.

7.5 Vertical resolution of caliper measurements is a function of the size of the contact surface (arm tip or pad), the response of the mechanical and electronic components, and digitizing interval used. The theoretical limit of vertical resolution is equal to the width of the caliper pad or tip. Selection of arm lengths and angle, and tip diameter will affect sensitivity. Shorter arms generally will provide more detail of the rugosity (borehole roughness as defined by Ref. (2)) of the borehole wall than longer arms. However, size of caliper probe and borehole diameter may also determine arm lengths used.

7.6 Measurement resolution of typical caliper probes is 0.05 in. (0.13 cm) of borehole diameter.

7.7 A variety of caliper logging equipment is available for geotechnical investigations. It is not practical to list all of the sources of potentially acceptable equipment.

8. Calibration and Standardization of Caliper Logs

8.1 *General:*

8.1.1 National Institute of Standards and Technology (NIST) calibration and standardization procedures do not exist for caliper logging.

8.1.2 Caliper logs can be used in a qualitative (for example, comparative) or quantitative (for example, borehole diameter corrections) manner depending upon the project objectives.

8.1.3 Caliper calibration methods and frequency shall be sufficient to meet project objectives.

8.1.3.1 Calibration and standardization should be performed each time a caliper probe is suspected to be damaged, modified, repaired, and at periodic intervals.

8.2 Calibration is the process of establishing values for caliper response and is accomplished with a physical model of a known diameter. Calibration data values related to the physical properties (for example, borehole diameter, roughness) may be recorded in units (for example, counts per second), that can be converted to units of length (for example, inches, millimetres, or centimetres.)

8.2.1 At least two, and preferably more, values, which approximate the anticipated operating range, are needed to establish a calibration curve (for example, 4- and 10-in. (10.2- and 25.4-cm) rings) if the borehole diameter to be logged is 5 in. (12.7 cm)).

8.2.2 Physical models of measured diameter that may be used to calibrate the caliper response may include rings or bars made of rigid materials that are not easily deformed and resist wear.

8.2.2.1 Calibration of caliper probes is done most accurately in rings of different diameters.

8.2.2.2 A calibration bar is a plate that is drilled and marked at regular intervals and machined to fit over the body of the probe (see Fig. 4). One arm is placed in the appropriate hole for the range to be logged.

8.2.2.3 Calibration can be checked by using casing of measured diameter logged in the borehole.

8.3 Standardization is the process of checking logging response to show evidence of repeatability and consistency.

8.3.1 Calibration serves as a check of standardization.

8.3.2 A representative borehole may be used to periodically check caliper response providing the borehole environment does not change with time. Caliper response may not repeat exactly because the probe may rotate, causing the arms to follow slightly different paths within the borehole.

9. Procedure

9.1 See the Procedure section of Guide D 5753 for planning a logging program, data formats, personnel qualifications, field documentation, and header documentation.

9.2 Caliper specific information (for example, arm length) should be documented.

9.3 Identify caliper logging objectives.

9.4 Select appropriate equipment to meet objectives.

9.4.1 Caliper equipment decontamination is addressed according to project specifications (see Practice D 5088 for non-radioactive waste sites and Practice D 5608 for low level radioactive waste sites). Some materials commonly used for caliper-arm lubrication may be environmentally sensitive.

9.5 Select the order in the logging sequence in which the caliper probe is to be run (see 8.2.2.1 of Guide D 5753).

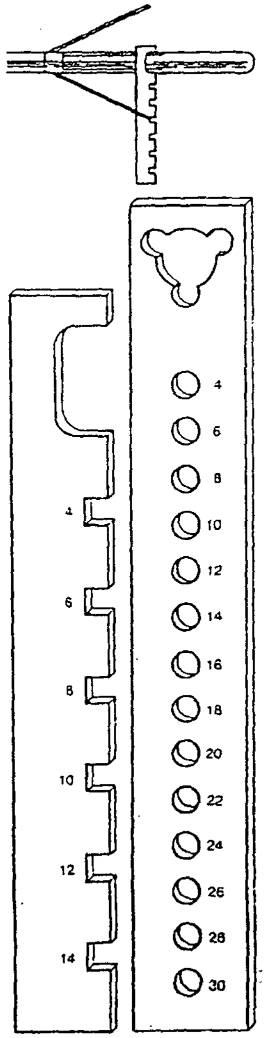

FIG. 4 Calibration Bars for Caliper Probes (3)

9.5.1 Caliper probes are run before any probe utilizing nuclear sources and more expensive centralized probes.

9.5.2 Caliper probes are run after any television camera and fluid property probes are run.

9.6 Caliper operation and calibration are checked at the start of each borehole or at an interval consistent with project objectives. (see the Procedure section of Guide D 5753). After calibration, the caliper arms are closed before lowering.

9.7 Select and document the depth reference.

9.7.1 The selected depth reference needs to be stable and accessible (for example, top of borehole casing).

9.8 Determine and document probe zero reference point (for example, top of probe or cablehead) and depth offset to caliper measurement point.

9.8.1 The measurement point of a caliper is the end of caliper arms and it changes as the arms open and close with the sine of arm angle multiplied by length of arm. Typically, the measurement point varies less than a few tenths of a foot (a few centimetres).

9.8.2 The measurement point will change if the arm length is changed.

9.9 Select horizontal and vertical scales for log display.

9.10 Select digitizing interval (or sample rate if applicable) to meet project objectives (see 8.3.1.2 of Guide D 5753).

9.10.1 Maximum vertical resolution requires the selection of a digitizing interval at least as small as the arm tip contact height.

9.10.2 Typically, this interval is no larger than 0.1 ft (0.03 m) for high-resolution applications.

9.11 The caliper probe is lowered to the bottom of the borehole.

9.11.1 Any time the caliper probe is lowered in the borehole, the arms should be closed to avoid damaging equipment or borehole.

9.11.2 Selection of probe speed while lowering is based on knowledge of borehole depth, stability, and other conditions.

9.12 Open caliper arm(s).

9.13 Select logging speed.

9.13.1 A logging speed of approximately 15 ft (5 m) per min is recommended for high-resolution applications. Faster logging speeds may induce noise due to the caliper probe bumping the borehole wall. Slower logging speeds will not enhance measurement resolution for most systems.

9.14 Collect caliper data while the probe is moving up the borehole.

9.15 When the probe reaches the top of the borehole:

9.15.1 If surface casing is present, compare and document caliper measurement.

9.15.2 Check depth reference and document after survey depth error (ASDE).

9.15.3 Determine if ASDE meets project objectives.

9.15.4 Typical tolerance for ASDE is ±0.4 ft per 100-ft (0.4 m per 100-m) interval logged.

9.16 Selected borehole intervals should be repeated (that is, relogged) under similar logging parameters as the initial log. Repeat logs provide information on the stability of the caliper equipment. The interval repeated should have enough variability, if possible, to check repeatability and resolution.

9.16.1 Repeat logs should be compared with the original log to ensure correct operation of the probe prior to ending a logging event.

9.16.2 Repeat sections may not repeat exactly due to a different orientation of the logging probe on the repeat run or changes in the borehole between logging runs (see Section 6).

9.16.3 Close caliper arms prior to lowering the probe down the borehole for a repeat section.

9.17 Evaluate the field log quality and compare log with drilling and completion information.

9.17.1 A reduction in borehole diameter over large depth sections may be indicative of borehole deviation on three-arm averaging caliper logs.

9.17.1.1 The magnitude of borehole deviation that causes this effect depends upon the length of the caliper arms being used and the strength of the tensioning spring within the caliper. Typically, a borehole deviation of greater than 15° is likely to produce this effect.

9.17.1.2 Converting the three-arm averaging caliper by removing two of the caliper arms may allow a good log to be obtained in these types of boreholes.

9.17.2 Mud can prevent caliper arms from opening fully, and thick mud cake may prevent accurate measurement of drilled diameter. Lack of caliper arm movement, especially in the bottom of a mud drilled borehole, may be indicative of arm sticking due to heavy mud.

9.17.2.1 If mud interferences are suspected, the borehole may be reconditioned, the caliper probe cleaned and lubricated, and the caliper log repeated.

9.18 Post-acquisition calibration checks may be required (surface casing or calibration standard) to meet the objectives of the logging program. Typical tolerances between pre- and post-calibration are ±0.2 in. (0.5 cm).

10. Interpretation of Results

10.1 See the Log Interpretation section of Guide D 5753 for procedures on log interpretation.

10.2 A valid caliper log is essential in the interpretation of the logs that are affected by changes in borehole diameter, including those logs that are labeled 'borehole compensated.' It is not always possible to compensate logs for substantial differences in borehole diameter.

10.2.1 Caliper logs can be analyzed individually (that is, borehole volume).

10.2.2 Caliper logs can be analyzed as part of a suite to take advantage of the synergistic nature of log data.

10.3 The caliper log should be depth correlated with the other geophysical logs as the first step to interpretation. This is especially important for logs that use the caliper data for borehole correction and depth adjustment.

10.4 Other pertinent information, including borehole construction (casing size), drilling history (hole size, drill method, penetration rate, core loss, fluid loss, etc.), and geologic information, should be integrated with the caliper-log data.

10.5 Interpretations based on changes in borehole diameter may be related to changes in drilling, mud cake, mud rings, borehole construction, lithology and structure, fractures and solution openings, and stress-induced breakouts.

10.6 The measured borehole diameter may be significantly different than the drilled diameter because of plastic formations extruded into the borehole and friable formations enlarging the borehole. A series of caliper logs may also show increases or decreases in borehole diameter with time.

10.6.1 Caliper logs are useful for determining what other logs can be made and what range of borehole diameters will be accepted by centralizers or decentralizers.

10.7 Fractures and solution openings may be obvious on a caliper log; however, their character may not be uniquely defined.

10.7.1 The single-arm caliper log may completely miss a feature or indicate only a small anomaly.

10.7.2 The three-arm averaging caliper log of a fracture dipping at an angle such that the three arms enter the opening at different depths will indicate three separate anomalies rather than one.

10.8 Borehole-diameter information is essential for calculation of volumetric rate from flowmeter logs.

10.9 Caliper logs provide useful information for borehole completion and testing.

10.9.1 Caliper logs are used to locate the optimum placement of inflatable packers for borehole testing. Inflatable packers can only form an effective seal within a specified range of borehole diameters, and can be damaged if they are set in rough or irregular parts of the borehole.

10.9.2 Caliper logs are used to estimate the volume of borehole completion material (cement, gravel, etc.) needed to fill the annular space between borehole and casing(s) or well screen.

10.10 Caliper logs may be applied to correlate lithology between boreholes based upon enlargements related to lithology.

11. Report

11.1 Consult the Report section, Guide D 5753 for requirements of the report.

11.2 Reports presenting caliper logs shall describe the components of the caliper logging system, the principles of the methods used, and their limits, methods and results of calibration and standardization, and performance verification (for example, diameter of surface casing, correlation with other logs, repeat sections, ASDE, etc.).

11.3 Information on the software and algorithms used should be included in the report.

11.4 Any deviations from this guide should be justified with documentation.

11.5 Presentation of caliper logs should be designed to meet project objectives. At a minimum, depth (y-axis) and units of measurement (x-axis) scales should be clearly marked (see Fig. 3). There may be a difference between presentations of data collected in the field versus in final report. Any scale "wraps" should be clearly marked.

11.5.1 Caliper logs are typically displayed with linear scales in inches, millimetres, or centimetres.

12. Keywords

12.1 borehole correction; borehole diameter; borehole geophysics; borehole volume; caliper log; ground water; single-arm caliper; three-arm caliper; well construction; well logging

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Designation: D 6274 – 98 (Reapproved 2004)

Standard Guide for Conducting Borehole Geophysical Logging - Gamma[1]

This standard is issued under the fixed designation D 6274; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers the general procedures necessary to conduct gamma, natural gamma, total count gamma, or gamma ray (hereafter referred to as gamma) logging of boreholes, wells, access tubes, caissons, or shafts (hereafter referred to as boreholes) as commonly applied to geologic, engineering, ground-water, and environmental (hereafter referred to as geotechnical) investigations. Spectral gamma and logging where gamma measurements are made in conjunction with a nuclear source are excluded (for example, neutron activation and gamma-gamma density logs). Gamma logging for minerals or petroleum applications are excluded.

1.2 This guide defines a gamma log as a record of gamma activity of the formation adjacent to a borehole with depth (See Fig. 1).

1.2.1 Gamma logs are commonly used to delineate lithology, correlate measurements made on different logging runs, and define stratigraphic correlation between boreholes (See Fig. 2).

1.3 This guide is restricted to gamma logging with nuclear counters consisting of scintillation detectors (crystals coupled with photomultiplier tubes), which are the most common gamma measurement devices used in geotechnical applications.

1.4 This guide provides an overview of gamma logging including general procedures, specific documentation, calibration and standardization, and log quality and interpretation.

1.5 To obtain additional information on gamma logs, see Section 13.

1.6 This guide is to be used in conjunction with Guide D 5753.

1.7 Gamma logs should be collected by an operator that is trained in geophysical logging procedures. Gamma logs should be interpreted by a professional experienced in log analysis.

1.8 The geotechnical industry uses English or SI units. The gamma log is typically recorded in units of counts per second (cps) or American Petroleum Institute (API) units.

1.9 *This guide does not purport to address all of the safety and liability problems (for example, lost or lodged probes and equipment decontamination) associated with its use.*

1.10 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.11 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 653 Terminology Relating to Soil, Rock and Contained Fluids

D 5088 Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites

D 5608 Practice for Decontamination of Field Equipment Used at Low Level Radioactive Waste Sites

D 5753 Guide for Planning and Conducting Borehole Geophysical Logging

D 6167 Guide for Conducting Borehole Geophysical Logging: Mechanical Caliper

3. Terminology

3.1 *Definitions:*

3.1.1 Definitions shall be in accordance with Terminology D 653, Section 13, Ref (1), or as defined below.

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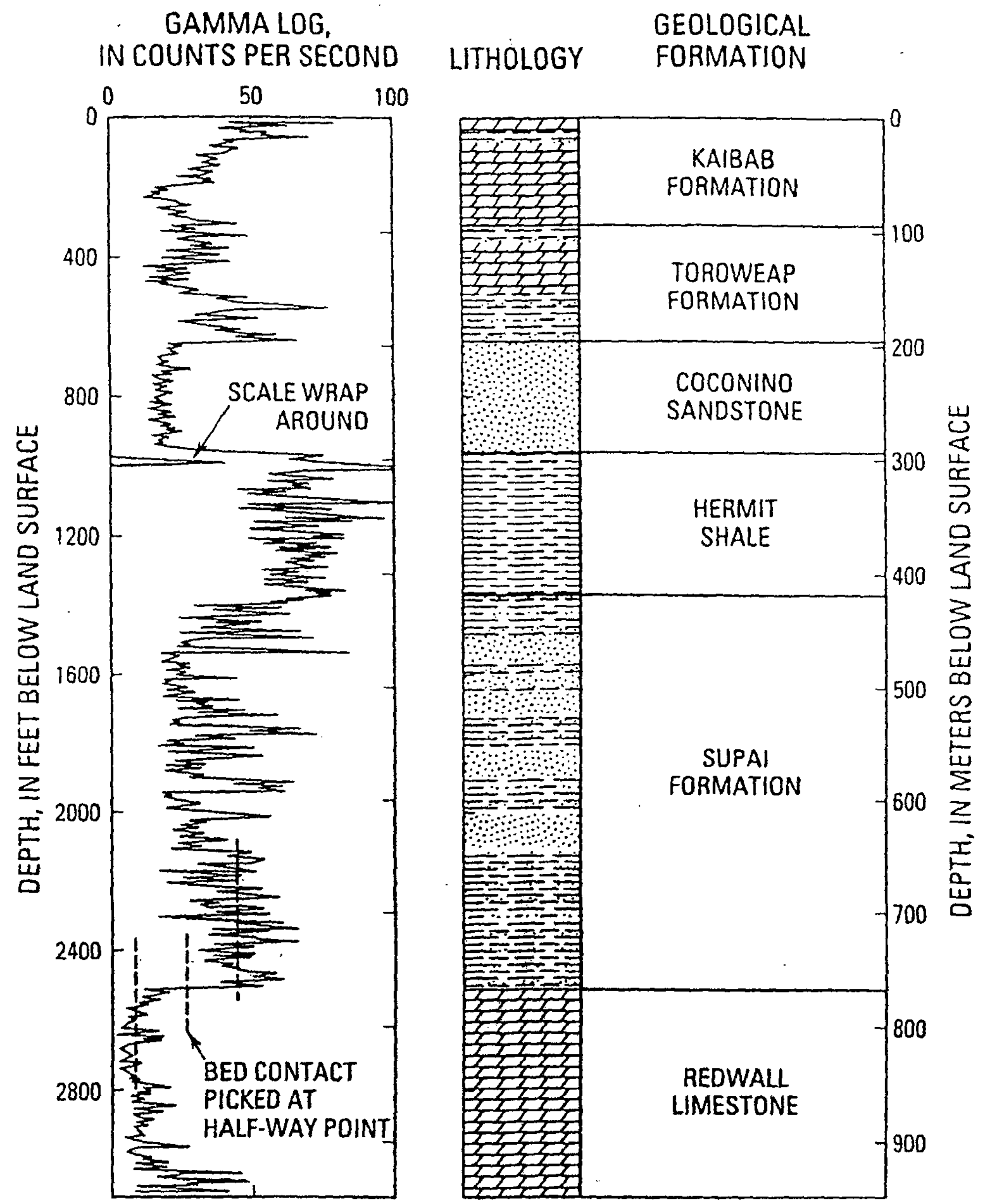
[1] This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.01 on Surface and Subsurface Characterization.

Current edition approved July 1, 2004. Published August 2004. Originally approved in 1998. Last previous edition approved in 1998 as D 6274 - 98.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.



NOTE 1—This figure demonstrates how the log can be used to identify specific formations, illustrating scale wrap-around for a local gamma peak, and showing how the contact between two formations is picked to coincide with the half-way point of the transition between the gamma activities of the two formations.

FIG. 1 Example of a Gamma Log From Near the South Rim of the Grand Canyon

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *accuracy, n*—how close measured log values approach true value. It is determined in a controlled environment. A controlled environment represents a homogeneous sample volume with known properties.

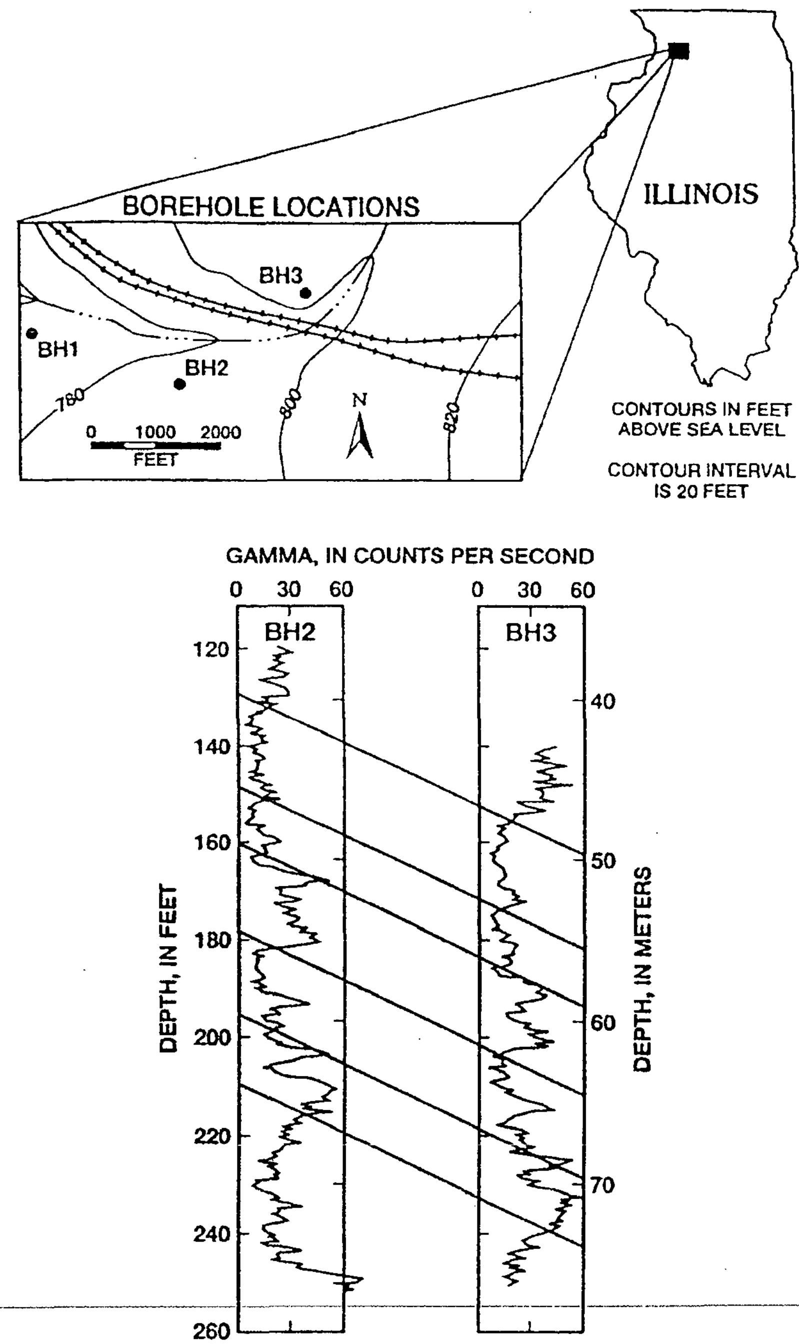
3.2.2 *dead time, n*—the time after each pulse when a second pulse cannot be detected.

3.2.3 *dead time effect, n*—the inability to distinguish closely-spaced nuclear counts leads to a significant underestimation of gamma activity in high radiation environments and is known as the "dead time effect".

3.2.4 *depth of investigation, n*—the radial distance from the measurement point to a point where the predominant measured response may be considered centered, which is not to be confused with borehole depth (for example, distance) measured from the surface.

3.2.5 *measurement resolution, n*—the minimum change in measured value that can be detected.

3.2.6 *repeatability, n*—the difference in magnitude of two measurements with the same equipment and in the same environment.



NOTE 1—From a study site showing how the gamma logs can be used to identify where beds intersect each of the individual boreholes, demonstrating lateral continuity of the subsurface geology.

FIG. 2 Example of Gamma Logs From Two Boreholes

3.2.7 *vertical resolution, n*—the minimum thickness that can be separated into distinct units.

3.2.8 *volume of investigation, n*—the volume that contributes 90 % of the measured response. It is determined by a combination of theoretical and empirical modeling. The volume of investigation is non-spherical and has gradational boundaries.

4. Summary of Guide

4.1 This guide applies to borehole gamma logging and is to be used in conjunction with Guide D 5753.

4.2 This guide briefly describes the significance and use, apparatus, calibration and standardization, procedures, and reports for conducting borehole gamma logging.

5. Significance and Use

5.1 An appropriately developed, documented, and executed guide is essential for the proper collection and application of gamma logs. This guide is to be used in conjunction with Guide D 5753.

5.2 The benefits of its use include improving selection of gamma logging methods and equipment, gamma log quality and reliability, and usefulness of the gamma log data for subsequent display and interpretation.

5.3 This guide applies to commonly used gamma logging methods for geotechnical applications.

5.4 It is essential that personnel (see the Personnel section of Guide D 5753) consult up-to-date textbooks and reports on the gamma technique, application, and interpretation methods.

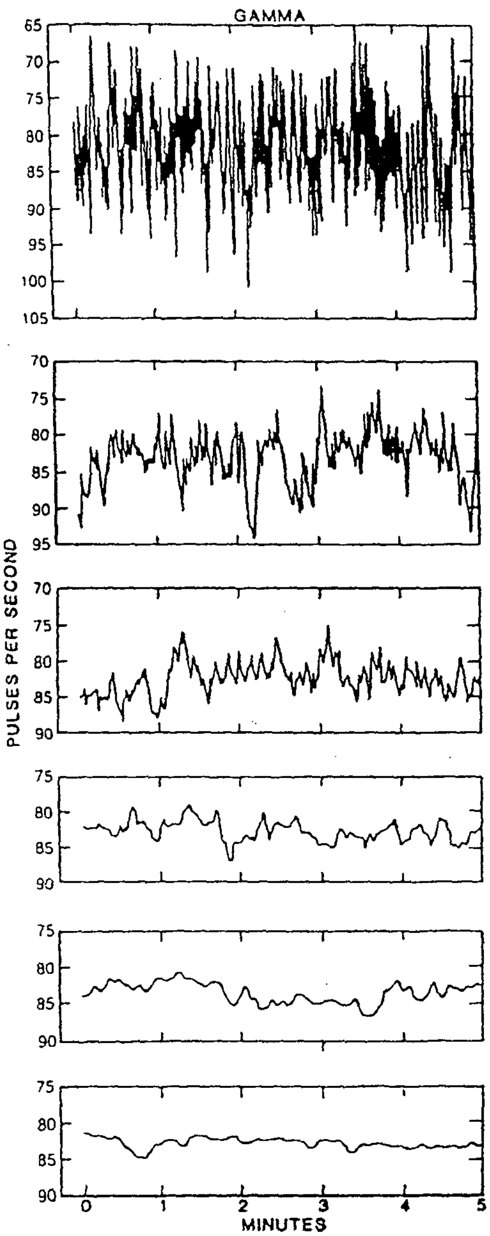
6. Interferences

6.1 Most extraneous effects on gamma logs are caused by logging too fast, instrument problems, borehole conditions, and geologic conditions.

6.2 Logging too fast can significantly degrade the quality of gamma logs. Gamma counts originating at a given depth need to be averaged over a time interval such that the natural statistical variation in the rate of gamma photon emission is negligible (see Fig. 3).

6.3 Instrument problems include electrical leakage of cable and grounding problems, degradation of detector efficiency attributed to loss of crystal transparency (fogging) or fractures or breaks in the crystal, and mechanical damage causing separation of crystal and photomultiplier tube.

6.4 Borehole conditions include changes in borehole diameter (especially in the fluid-filled portion); casing type and number; radioactive elements in drilling fluid in the borehole, or in cement or slurry behind casing; and steel casing or cement in the annulus around casing, and thickness of the annulus.



TIME CONSTANT	MEAN	STANDARD DEVIATION
1 second	Not calculated	
3 seconds	83.0	4.7
5 seconds	82.9	2.5
10 seconds	83.1	1.5
15 seconds	83.8	1.4
20 seconds	83.0	0.8

NOTE 1—The fluctuations in gamma activity in counts per second is shown to vary by progressively smaller amounts as the averaging period (time constant) is increased from 1 to 20 s.

FIG. 3 Example of Natural Statistical Fluctuation of Gamma Counts From a Test Source of Given Strength

6.5 Geologic conditions include high levels of radiation which can degrade the efficiency of gamma counting through the dead time effect, energy level of emitted gammas, formation density, and lithologic bed geometry.

7. Apparatus

7.1 A geophysical logging system has been described in the general guide (the Apparatus section of Guide D 5753).

7.2 Gamma logs are collected with probes using scintillation detectors.

7.2.1 The most common gamma detectors are sodium iodide (NaI).

7.2.2 Other gamma detectors include cesium iodide (CsI) and bismuth germanate (BGO).

7.3 Gamma probes generate nuclear counts as pulses of voltage that are amplified and clipped to a uniform amplitude.

7.3.1 Gamma probes used for geotechnical applications typically can be logged inside of a 2-in. (5-cm) diameter monitoring well.

7.4 The volume of investigation and depth of investigation are determined by the density of the material near the probe, which controls the average distance a gamma photon can travel before being absorbed.

7.4.1 The volume of investigation for gamma logs is generally considered spherical with a radius of 0.5 to 1.0 ft (15 to 30 cm) from the center of the detector in typical geological formations. The volume becomes elongated when detector length exceeds approximately 0.5 ft (15 cm).

7.4.2 The depth of investigation for gamma logs is generally considered to be 0.5 to 1.0 ft (15 to 30 cm).

7.5 Vertical resolution of gamma logs is determined by the size of the volume from which gammas can reach a nuclear detector suspended in the borehole. In typical geological formations surrounding a fluid-filled borehole, this is a roughly spherical volume about 1 to 2 ft (30 to 60 cm) in diameter. Excessive logging speed can decrease vertical resolution.

7.6 Measurement resolution of gamma probes is determined by the counting efficiency of the nuclear detector being used in the probe. Typical measurement resolution is 1 cps.

7.7 A variety of gamma logging equipment is available for geotechnical investigations. It is not practical to list all of the sources of potentially acceptable equipment.

8. Calibration and Standardization of Gamma Logs

8.1 *General*:

8.1.1 National Institute of Standards and Technology (NIST) calibration and standardization procedures do not exist for gamma logging.

8.1.2 Gamma logs can be used in a qualitative (for example, comparative) or quantitative (for example, estimating radioisotope concentration) manner depending upon the project objectives.

8.1.3 Gamma calibration and standardization methods and frequency shall be sufficient to meet project objectives.

8.1.3.1 Calibration and standardization should be performed each time a gamma probe is suspected to be damaged, modified, repaired, and at periodic intervals.

8.2 Calibration is the process of establishing values for gamma response associated with specific levels of radioisotope concentration in the sampled volume and is accomplished with a representative physical model. Calibration data values related to the physical properties (for example, radioisotope concentration) may be recorded in units (for example, cps), that can be converted to units of radioactive element concentration (for example, ppm Radium-226 or percent Uranium-238 equivalents).

8.2.1 Calibration is performed by recording gamma log response in cps in boreholes centered within volumes containing known homogenous concentrations of radioactivity elements.

8.2.2 Calibration volumes should be designed to contain material as close as possible to that in the environment where the logs are to be obtained to allow for effects such as gamma energy level, formation density, and activity of daughter isotopes on the calibration process.

8.3 Standardization is the process of checking logging response to show evidence of repeatability and consistency, and to ensure that logging probes with different detector efficiencies measure the same amount of gamma activity in the same formation. The response in cps of every gamma detector is different for the same radioactive environment.

8.3.1 Calibration ensures standardization.

8.3.2 The American Petroleum Institute maintains a borehole in Houston, Texas, where two formations have been fabricated to provide homogeneous levels of gamma activity so that probes can be standardized on the basis of the response in these boreholes. 1 API gamma unit is 1/200th of the full scale response in the representative shale model in this borehole (see Guide D 5753).

8.3.3 For geotechnical applications, gamma logs should be presented in API units for standardization.

8.3.4 A representative borehole may be used to periodically check gamma probe response providing the borehole and surrounding environment does not change with time or their effects on gamma response can be documented.

8.3.5 A small radioactive source(s) (thorium-treated lantern mantles, small bottles of potassium chloride, laboratory radioactive test sources, or sleeves containing natural radioisotopes (phosphate sands, etc.)) placed over the gamma detector can be used to check calibration if the sources have been related to a calibration facility.

8.4 Gamma log output needs to be corrected for dead time when logging in formations with unusually large count rates, such as uranium-rich pegmatites or phosphatic sands, and areas contaminated with radioactive waste.

8.4.1 Dead time corrections are usually negligible under typical logging conditions when measured gamma counts are less than a few hundred counts per second.

8.4.2 Dead time corrections are estimated by comparing the gamma log response under the influence of two similar radioactive sources. The measured count rate would approximately double over that with one source when both sources are placed in the sample volume of the logging tool. The dead time causes the count rates to be slightly less than double. Dead time is given by the formula:

$$\text{Dead Time} = t_0 = 2(N_1 + N_2 - N_{12})/(N_{12}(N_1 + N_2)) \quad (1)$$

$$\text{Corrected count rate} = N^* = N/(1 - N\,t_0)$$

...re:

N_1, N_2 = the count rates measured using each of the two similar sources,

N_{12} = the count rate obtained using both of the similar sources in counts per second,

t_0 = the dead time correction in seconds,

N = the measured count rate in a formation in counts per second, and

N^* = the count rate after correction for the dead time effect.

t_0 is usually found to be a few microseconds for most gamma logging equipment.

9. Procedure

9.1 See the Procedure section of Guide D 5753 for planning a logging program, data formats, personnel qualifications, field documentation, and header documentation.

9.1.1 Document gamma specific information (for example, crystal size, type, and location).

9.2 Identify gamma logging objectives. Select appropriate equipment to meet objectives.

9.3 Gamma logs are commonly run with other logging measurements in combination probes for correlation purposes. This is most often done by equipping other classes of logging probes (electric, indication, neutron porosity, etc.) with gamma detectors (see Fig. 4).

9.3.1 Detector location on the probe needs to be appropriate meet the project objectives. Long combination probe strings with the gamma detector located at a significant distance from the bottom of the probe may be inappropriate. Gamma detection position on the logging probe is especially important in shallow boreholes where over drilling the borehole is not possible.

9.3.2 Gamma probes are usually run free-hanging where the probe lies against one side of the borehole that is, as a mandrel. However, gamma detectors are sometimes included with combination probes that are run centralized or decentralized in the borehole. Gamma response may be somewhat different depending upon the method used (for example, free-hanging or centralized) in a given geologic environment.

9.3.3 Gamma equipment decontamination is addressed according to project specifications (see Practice D 5088 for non-radioactive waste sites and Practice D 5608 for low level radioactive waste sites).

9.4 Select when the gamma probe is to be run in the logging sequence (see 8.2.2.1 of Guide D 5753).

9.4.1 Gamma probes are run after or in combination with any television camera and fluid property probes to insure that there is minimum disturbance to the borehole fluid that can degrade those logs.

9.4.2 Gamma probes are run before any probe utilizing nuclear sources and more expensive centralized probes to ensure borehole stability possible.

9.4.3 Whenever possible, gamma probes should be run open hole or through the least amount of completion material to minimize well construction effects and to provide a base line for comparing subsequent logs.

9.5 Gamma probe operation is typically checked before the start of each run to insure that equipment is operating and that nuclear counters are producing output.

9.5.1 Gamma operation may be checked by placing a small radioactive source over the gamma detector. Common materials, such as thorium-treated lantern mantles, small bottles of potassium chloride, laboratory radioactive test sources, or sleeves containing natural radioisotopes (phosphatic sands, etc.), are frequently used.

9.6 Select and document the depth reference point.

9.6.1 The selected depth reference needs to be stable and accessible (for example, top of borehole casing).

9.7 Determine and document probe zero reference point (for example, top of probe or cablehead) and depth offset to gamma measurement point.

9.7.1 The measurement point of the gamma logging probe is the distance along the probe corresponding with the center of the crystal within the logging tool; this position is not visible unless the position is marked on the outside of the tool or the operator has information specifying that position with respect to a prominent reference point on the probe housing.

9.7.2 Position the probe zero reference point to the depth reference point (ground level, top of casing, etc.) and initialize depth recording/display systems.

9.8 Select horizontal and vertical scales for log display to meet project objectives.

9.8.1 Preferred horizontal scale divisions are multiples of two or five inches, such that the log value is easily determined on the plot (for example, 0 to 100, 0 to 200, 50 to 150, etc.).

9.8.2 Preferred vertical scales are multiples of two or five, such that depth can be easily determined on a log plot (for example, 1/5, 1/10...1/100, etc.).

9.9 Select digitizing interval (or sample rate if applicable) to meet project objectives (see 8.3.1.2 of Guide D 5753).

9.9.1 Digitizing interval needs to be at least as small as the vertical resolution of the gamma probe, that is typically about 1 ft (30 cm).

9.9.2 Typically, this interval is no larger than 0.5 ft (15 cm) to ensure that the optimum vertical resolution is achieved.

9.9.3 Even though field plots may be generated with smoothing, the rawest (non-filtered) form of the data should be recorded.

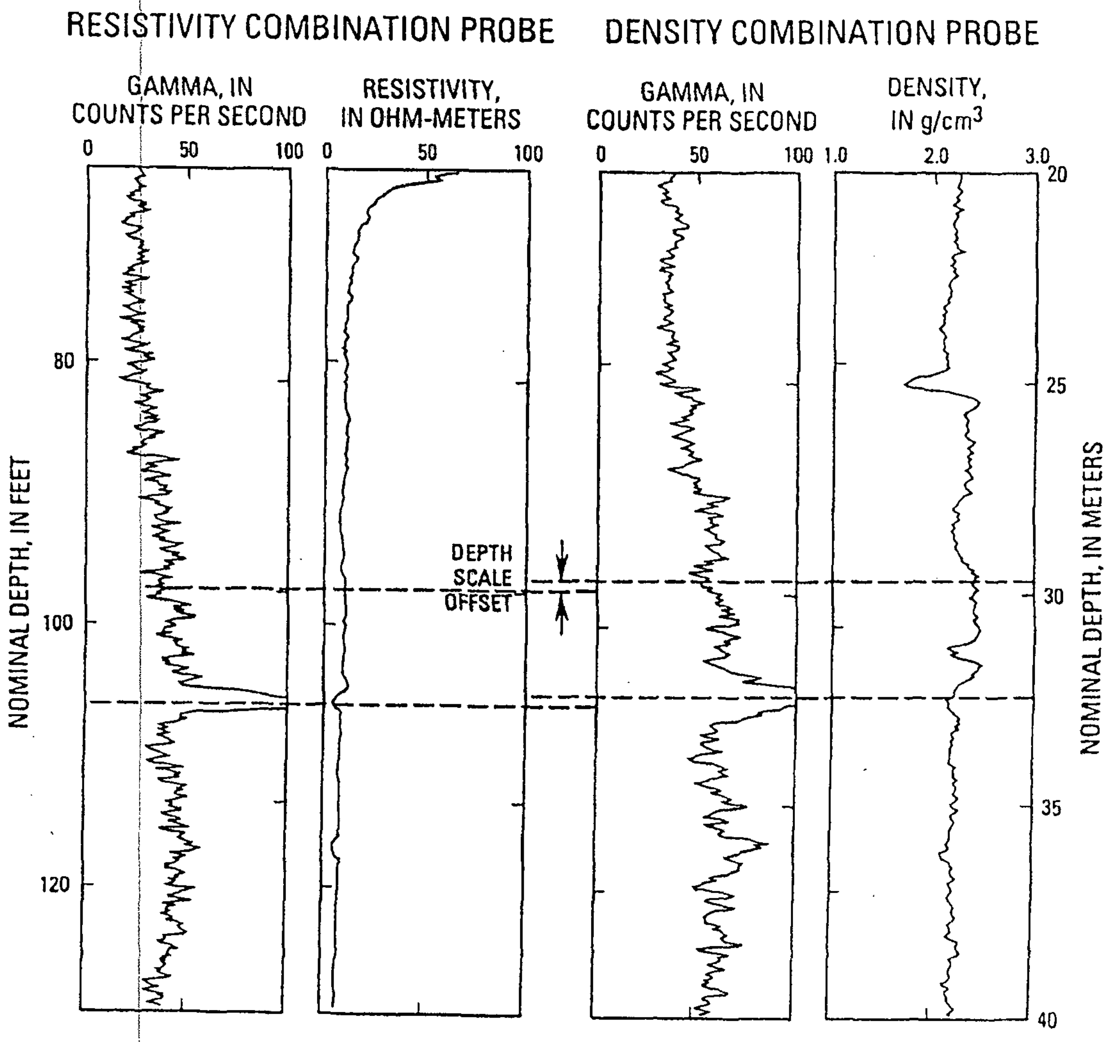
9.10 The gamma probe is lowered to the bottom of the borehole.

9.10.1 Gamma counts should be monitored as the probe is lowered because knowledge of the average count rates produced by the formation is important in determining proper logging speed. Gamma value range is also needed to determine proper horizontal scale and with some instrumentation, to determine sensitivity/gain settings.

9.10.2 Selection of probe speed while lowering is based on knowledge of borehole depth, stability, and other conditions; tension on the measuring wheel and smoothness of probe descent should be monitored to ensure that depth errors are not being introduced.

9.11 Select logging speed.

9.11.1 Logging speed should be determined by the application of the data acquired to meet project objectives.



NOTE 1—This figure shows a small depth offset that should be removed by adjusting the depth scale on one of the logs; note that the average count rates for the two different gamma detectors differ as a result of different detector efficiencies.

FIG. 4 Example of Gamma Logs From Gamma Detectors in Two Different Logging Tools (Electrical Resistivity on Density)

9.11.2 Typical gamma logging speed is approximately 20 n (6 m/min), but slower speeds may be needed if forma- on gamma activity is low.

9.11.3 Proper logging speed is indicated by gamma logs that show distinct beds, which correlate with other information such as core descriptions or driller's logs, and where there is relatively little random fluctuation within beds (see Fig. 1).

9.11.4 If the operator is concerned about whether logging speed is affecting the quality of the gamma log, the operator should repeat a representative section of the log (representative of the geologic variation in the borehole) using the same speed; if the log reproduces interpreted bed boundaries that agree with other log and geologic data and the initial run, then the logging speed is adequate. If there are significant changes in the interpreted bed boundaries or if bed boundaries (lithologic contacts) are not indicated, the operator should try logging at a reduced speed.

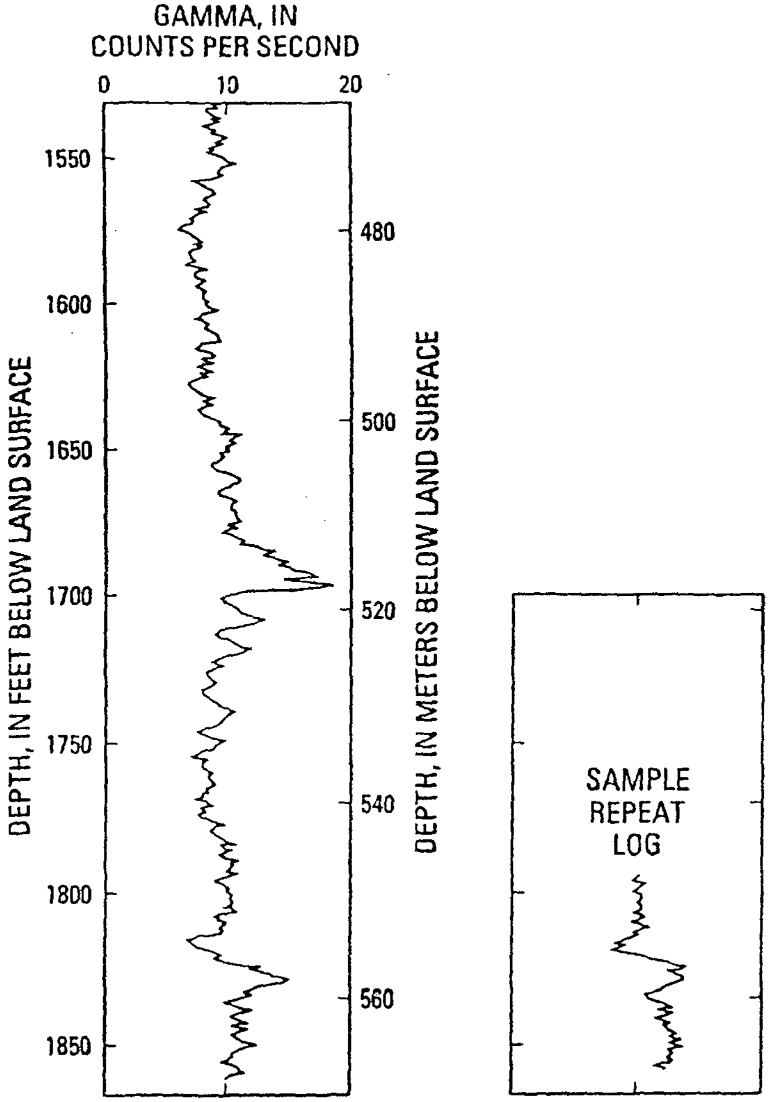
9.11.5 In situations where gamma activity is extremely low, such as in many basalts and some carbonate and quartzite formations, the operator can estimate the maximum logging speed from the formula:

$$S_f < 0.50G \quad \text{or} \quad S_m < 0.15G \tag{2}$$

where:

S_f = the logging speed in feet per minute,
S_m = the logging speed in metres per minute, and
G = the average measured gamma activity of the interval or intervals of interest in counts per second.

This formula gives the logging speed required to ensure that the standard nuclear statistical error is less than about 5 %. In some situations, the available time and budget and the length of borehole to be logged may indicate that a trade-off be made between statistical errors and log resolution; an effective trade-off for a given situation can be made by experimenting



NOTE 1—In this figure, experimentation with logging speed demonstrates that a 10 ft (m) per minute logging speed generates useful and repeatable gamma logs with statistical errors somewhat greater than 5 %, but where beds can be effectively detected.

FIG. 5 Example of a Gamma Log From a Basalt Formation of Very Low Gamma Activity

with repeat logging runs over representative intervals containing bed contacts (see Fig. 5).

9.12 Collect gamma log data while the probe is moving up the borehole; data collection while logging upward ensures that the probe is retrieved smoothly and continuously.

9.12.1 In unstable boreholes, it is sometimes advantageous to collect data both while probe is being lowered and being pulled up the borehole.

9.13 When the probe reaches the top of the borehole:

9.13.1 Check depth reference and document after survey depth error (ASDE).

9.13.2 Determine if ASDE meets project objectives.

9.13.3 Typical tolerance for ASDE is ±0.4 per 100-ft interval logged (±0.4 m per 100-m).

9.13.4 Typical depth tolerance for repeat logs is within 0.4 %.

9.14 Selected borehole intervals should be repeated (that is, relogged) under similar logging parameters as the initial log. Repeat logs verify that the gamma electronics are functioning correctly, and that the logging speed (effect of nuclear statistical fluctuations) is adequate for project objectives. The interval repeated should have enough variability, if possible, to check repeatability and resolution; also note that nuclear statistical noise is most likely to affect intervals with relatively low gamma count rates.

9.14.1 Repeat logs should be compared with the original log to ensure correct operation of the probe prior to ending a logging event.

9.14.2 Repeat sections may not repeat exactly because of the statistical nature of nuclear activity that introduces some random fluctuation into the measured count rate. Individual log values should typically repeat within one standard deviation, and the character and shape of the logs should be similar. Note that the importance of high count rates to reduce the statistical variations between log runs.

9.14.3 Repeat sections may not repeat exactly due to a different orientation of the logging probe on the repeat run or changes in the borehole between logging runs (see Section 6, Interferences).

9.15 Evaluate the quality of field logs and compare logs with drilling and completion information.

9.16 Gamma logs are usually smoothed by filtering (in hardware or software) with an N-point averaging window (for example, running average, weighted average, etc.) to minimize the effects of statistical variation caused by radioactive decay. The window width:

$$(N-1)\Delta z \qquad (3)$$

where:

N = the number of points, and
Δz = the digitizing interval, which should correspond with the vertical resolution, which is typically about 1 ft (30 cm) in most geological formations.

9.16.1 Larger filters are frequently applied to gamma logs for presentation purposes (compression of the vertical scale); however, this filtering generally results in loss of some log information.

9.16.2 The rawest form of the gamma data and the filtered data should be saved.

9.17 Post-acquisitions calibration checks may be required to meet the objectives of the logging program to verify gamma log standardization and dead time correction.

10. Interpretation of Results

10.1 See the Log Interpretation section of Guide D 5753 for procedures on log interpretation.

10.2 A valid gamma log is important to establish the distribution of lithology and bedding within a borehole for correlation purposes, for different logs run in the same borehole (see Fig. 4), and for the extrapolation of results between boreholes (see Fig. 2).

10.2.1 Except at sites contaminated by radioactive waste, the measured gamma photons originate from the radioactive decay of naturally-occurring isotopes of Potassium-40 and daughter products of Uranium-238 and Thorium-232 (see Fig. 6).

10.2.2 Gamma logs can be analyzed individually (that is, borehole lithology).

10.2.3 Gamma logs can be analyzed as part of a suite to take advantage of the synergistic nature of log data.

10.3 The gamma log should be depth correlated with the other geophysical logs as the first step to interpretation. This is especially important for logs that use the gamma data for depth adjustment.

10.3.1 The gamma log data may be filtered, edited, combined, and merged with other log values.

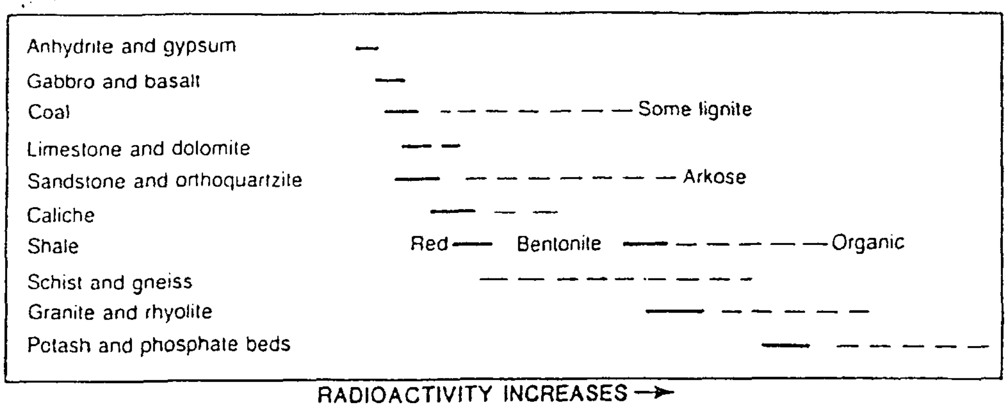


FIG. 6 Range of Relative Gamma Activity of Common Rocks

10.3.2 Final log headers are filled out and attached to the

10.3.3 The gamma log may be plotted at different scales for the purpose of interpreting, summarizing, and presenting the final data.

10.4 Other pertinent information, including borehole construction (casing size), drilling history (hole size, drill method, penetration rate, core loss, fluid loss, etc.), and geologic information should be integrated with the gamma log data.

10.4.1 Many of the borehole effects on the gamma log, such as correction for attenuation of steel casing and borehole fluid, can be normalized with empirical data to facilitate interpretation. This is especially important in comparing gamma logs from boreholes logged with different completion designs.

10.4.2 It is also possible to normalize the gamma log for well construction if it is possible to log a similar borehole prior to completion and again after a similar scheme.

10.5 Gamma logs commonly are the primary indicator of geologic structure and stratigraphy to be used as a guide in installing well screens, positioning cement plugs, bentonite seals or packers, etc.

10.5.1 When gamma logs are used as indicators of bed boundaries, the bed contact is usually identified as the point where the log measures half of the total change in amplitude across the bed contact (see Fig. 5).

10.6 Gamma logs obtained for depth correlation on logging ns using different probes may not produce the same count s at each depth because of differences in detector efficien-es and probe designs.

10.7 Gamma logs may be applied to correlate lithology between boreholes based upon the characteristic gamma activity of specific beds or formations (See Fig. 6). Gamma logs can be used to determine the continuity of lithology, strike, and dip of beds between boreholes, and to infer the existence of faults and other discontinuities.

10.8 The primary application of gamma logs for geotechnical applications assumes a correlation between gamma activity and the proportion of fine-grained material in the formation. The gamma log may be used to calculate a clay volume or percentage. This assumption is frequently not valid (for example, phosphatic sands, arkosic sands, non-sedimentary environments, areas of natural radioactive mineralization, etc.) and should be tested in the project area. This testing may consist of cross plots, principal component analysis, and other multivariate statistical techniques. The application of gamma log analysis in the estimation of clay fraction may also be complicated by the presence of more than one clay type, each of which has a distinctly different level of gamma activity.

10.9 Gamma logs can be used to detect the presence of radioisotopes in borehole tracer studies, calibrated in units of radioisotope concentration to assess the degree of radioisotope contamination at radioactive waste sites, and used to locate source rocks in natural radium and radon hazard assessment studies.

11. Report

11.1 The Report section of Guide D 5753 should be consulted for requirements of the report.

11.2 Providers of gamma logs shall describe the components of the gamma logging system, the principles of the methods used, methods and results of calibration and standardization, performance verification (repeat sections, ASDE, correlation with other logs and key features such as bottom of steel casing, etc.), and uniqueness of interpretation.

11.3 Information on the software and algorithms used should be documented.

11.4 Any deviations from this guide should be documented.

11.5 Presentation of gamma logs should be designed to meet project objectives. At a minimum, depth (y-axis) and units of measurement (x-axis) scales should be clearly marked. There may be a difference between presentations of data collected in the field versus in the final report. Any scale "wraps" should be clearly marked (see Fig. 1).

11.5.1 Gamma logs are typically displayed with linear scales in counts per second or API units (see Fig. 1).

11.5.2 The digital data should be provided in ASCII format and include depth referenced gamma values and all pertinent header and calibration information; for example, Log ASCII Standard format (LAS).

11.5.3 Field plots typically are generated at the time of logging or immediately upon completion of data acquisition. These plots may be delivered in the field or may be discarded at some point later in the project. They are not typically included in the report.

11.5.4 Final log plots are typically generated post acquisition. They consist of the filtered and edited gamma data combined and merged with logical combinations of other log data. Final log plots are typically plotted in an industry standard format such as API format and may be included in the report.

11.5.5 Summary log plots may be generated (typically at reduced scales) to incorporate other logs, relevant data, and interpretations. These plots are generally included in the report.

12. Keywords

12.1 borehole geophysics; dead time correction; gamma log; natural gamma log; nuclear statistics; radioisotope; well construction; well logging

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Appendix H SPT Hammer Energy Study

APPENDIX H
SPT HAMMER ENERGY STUDY

- SPT Hammer Energy Study Report

GRL Dynamic Measurements and Analyses
engineers, inc.

July 20, 2006

Schnabel Engineering, Inc.
1 West Cary Street
Richmond, VA 23220

Attention: Mr. Jim Seli

Re: Summary Report for SPT Energy Measurements
Calvert Cliffs Project
Calvert County, MD

GRL Job No. 064054

Dear Mr. Seli:

This report summarizes the results from the Standard Penetration Test (SPT) energy measurements performed for five drilling rigs, at the above referenced project. Graphical and tabular summaries of the dynamic test results are included with this report. The field testing was performed during our site visits between June 19 and 27, 2006.

The purposes of the SPT energy measurements were to provide energy transfer efficiency for the SPT N values obtained from five drill rigs and drillers. To meet this objective, a PAK Model Pile Driving Analyzer® (PDA) was used to acquire and process the dynamic test data. Additional information regarding the testing equipment and analytical procedures is included in Appendix A.

Soil Information

The reported soil profile consisted of varying layers of silty sands, silts and clays typical of alluvial deposits for this region. A detailed discussion of the subsurface conditions is beyond the scope of this report. The reader is referred to the proper geotechnical investigation report for further details.

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California 661.259.2977 | Colorado 303-666-6127 | Florida 407.826.9539 | Illinois 847.670.7720 | North Carolina 704.593.0992 | Ohio 216.292.3076

Test Sequence

As directed by Schnabel Engineering, GRL was requested to obtain SPT energy measurements for five drill rigs at various depths from a single boring for each rig. Energy measurements for each rig were to be obtained at intervals of 15 feet to a boring depth of 300 feet and then at intervals of 20 feet between 300 and 400 feet. If necessary due to indications of poor quality dynamic test data or changes in the drilling procedure energy measurements were to be obtained at the next available sample depth. Therefore, GRL performed energy measurements at intervals of 15 feet sampling depths with the total number of samples collected varying between 6 and 26 depending upon the boring depth. The largest number of samples were collected for Boring B401 which was a 400 foot boring and the smallest number of samples collected was for Boring B744 which was a 100 foot boring. All SPT samples were driven for a total of 3 six-inch increments, or 1.5 feet.

DYNAMIC TESTING ANALYSES AND RESULTS

Energy Transfer Measurements

A PAK model Pile Driving Analyzer was used to take measurements of strain and acceleration. The strain and acceleration measurements were taken on the 2 ft long N3, NWJ or AWJ rod located directly below the automatic hammer. The strain and acceleration signal were conditioned and converted to force and velocities by the PDA. The PDA interprets the measured dynamic data according to the Case Method equation. The dynamic test data was evaluated for maximum force and velocity at the gage location. These quantities are presented in the summaries of the dynamic test results in Appendix B.

Force and velocity records from the PDA were also viewed graphically on an LCD screen to evaluate data quality. All force and velocity records were also digitally stored for subsequent laboratory analysis.

The maximum energy transferred to the gage location was calculated using the Case Method equations as required by ASTM D4633. Therefore the transferred energy, EFV, is calculated by integrating both the force and velocity records over time as follows:

$$EFV = \int F(t)V(t)dt$$

Where: $F(t)$ = the force at time t
$V(t)$ = the velocity at time t

The integration begins at the time the hammer impacts the rod and continues to the end of the record.

Discussion of Test Results

Tables 1 through 5 contain a summary of the average energy transfer calculated using the EFV equation and the energy transfer ratio (ETR = EFV/PE, where PE is potential energy of the SPT hammer) for each drilling rig and SPT sample with dynamic measurements. A summary of the dynamic measurements of the energy transfer to the drill rods using the EFV equation for each drill rig is provided in the table below.

Borehole and Drill Rig	Avg EFV (ft-lbs)	Avg ETR (%)	Range of EFV (ft-lbs)	Range of ETR (%)
B401 / Failing 1500 Truck	274	78	235 - 309	67 - 88
B403 / CME 550X ATV	293	84	255 - 321	73 - 92
B404 / CME 750 ATV	304	87	274 - 316	78 - 90
B409 / CME 75 Truck	293	84	243 - 315	69 - 90
B744 / Diedrich D50 ATV	282	81	257 - 294	73 - 84

Conclusions

Based upon the dynamic test data obtained, the following conclusions are presented:

1 - Loose connections in the drill string were sometimes observed in the force and velocity records. However, energy transfer values calculated using the EFV equation are not adversely affected by the connectors and therefore are considered a better indication of transferred energy.

2 - Dynamic measurements of the transferred energy to the drill rods using the EFV equation ranged from 235 to 321 ft-lbs for all five drill rigs. This corresponds to a transfer efficiency ranging from 67 to 92% of the SPT hammer energy of 350 ft-lbs.

3 - The average transferred energy (EFV) and energy transfer ratio (ETR) for each drill rig tested was as follows:

B401 - Failing 1500, Average EFV = 274 ft-lbs, Average ETR = 78%
B403 - CME 550X ATV, Average EFV = 293 ft-lbs, Average ETR = 84%
B404 - CME 750 ATV, Average EFV = 304 ft-lbs, Average ETR = 87%
B409 - CME 75 Truck, Average EFV = 293 ft-lbs, Average ETR = 84%
B744 - Diedrich D50 ATV, Average EFV = 282 ft-lbs, Average ETR = 81%

We appreciate the opportunity to be of assistance on this project. Please do not hesitate to contact us if you have any questions regarding this report, or if we may be of further service.

Respectfully,
GRL Engineers, Inc.

Scott D. Webster, P.E.

Wondem Teferra, P.E.

SDW:WT:dms

TABLE 1: Summary of SPT Energy Measurements
Borehole B401 - Failing 1500 Truck
Calvert Cliffs, MD

Sample No.	Test Date	Reported Sample Depth (feet)	Reported Rod Length (feet)	Reported Blow Count (blows/6")	SPT Field N Value	Avg. Energy Transferred FV Method (ft-lbs)	Energy Transfer Efficiency1 (%)	Blow per Minute (bpm)
B401-15	6/19/2006	13.5 - 15	19	2-4-4	8	242	69.1	42
B401-20	6/19/2006	18.5 -20	24	2-3-6	9	235	67.1	42
B401-30	6/19/2006	28.5 - 30	34	4-7-16	23	261	74.6	42
B401-45	6/19/2006	43.5 - 45	49	16-50/5"	50/5"	277	79.1	43
B401-60	6/20/2006	58.5 - 60	64	7-14-50	64	262	74.9	43
B401-75	6/20/2006	73.5 - 75	79	16-50/5"	50/5"	276	78.9	43
B401-90	6/20/2006	88.5 - 90	94	9-12-17	29	262	74.9	43
B401-105	6/20/2006	103.5 - 105	109	5-9-22	31	272	77.7	42
B401-120	6/20/2006	118.5 - 120	124	5-9-12	21	260	74.3	43
B401-135	6/20/2006	133.5 - 135	139	7-9-11	20	286	81.7	43
B401-150	6/20/2006	148.5 - 150	154	8-10-12	22	273	78.0	43
B401-170	6/21/2006	168.5 - 170	174	8-10-15	25	281	80.3	43
B401-180	6/21/2006	178.5 - 180	184	4-10-11	21	270	77.1	43
B401-195	6/21/2006	193.5 - 195	199	6-9-17	26	281	80.3	43
B401-210	6/21/2006	208.5 - 210	214	6-10-16	26	276	78.9	43
B401-225	6/22/2006	223.5 - 225	229	9-13-18	31	284	81.1	43
B401-240	6/22/2006	238.5 - 240	244	8-11-21	32	278	79.4	42
B401-255	6/22/2006	253.5 - 255	259	8-11-19	30	275	78.6	42
B401-270	6/23/2006	268.5 - 270	274	7-12-18	30	289	82.6	43
B401-286	6/23/2006	284.5 - 286	290	11-13-17	30	309	88.3	43
B401-300	6/26/2006	298.5 - 300	304	9-14-18	32	282	80.6	43
B401-320	6/27/2006	318.5 - 320	324	18-26-35	61	280	80.0	43
B401-340	6/27/2006	338.5 - 340	344	8-12-29	41	281	80.3	43
B401-360	6/27/2006	358.5 - 360	364	30-50/5"	50/5"	274	78.3	43
B401-380	6/28/2006	378.5 - 380	384	16-21-36	57	280	80.0	42
B401-400	6/28/2006	400 - 401.5	405	11-15-29	44	283	80.9	43

Notes: 1 - Energy transfer efficiency is the energy calculated by the FV method divided by the SPT hammer potential energy of 140 lbs times 2.5 foot drop height or 350 ft-lbs.

TABLE 2: Summary of SPT Energy Measurements
Borehole B403 - CME 550X ATV
Calvert Cliffs, MD

Sample No.	Test Date	Reported Sample Depth (feet)	Reported Rod Length (feet)	Reported Blow Count (blows/6")	SPT Field N Value	Avg. Energy Transferred FV Method (ft-lbs)	Energy Transfer Efficiency1 (%)	Blow per Minute (bpm)
B403-15	6/20/2006	13.5 - 15	19	3-5-6	11	277	79.1	55
B403-30	6/20/2006	28.5 - 30	34	2-50/5"	50/5"	304	86.9	54
B403-45	6/21/2006	43.5 - 45	49	4-4-7	11	320	91.4	55
B403-60	6/21/2006	58.5 - 60	64	2-3-4	7	321	91.7	54
B403-75	6/21/2006	73.5 - 75	79	6-7-12	19	299	85.4	54
B403-90	6/21/2006	88.5 - 90	94	6-6-10	16	291	83.1	54
B403-105	6/21/2006	103.5 - 105	109	4-6-9	15	277	79.1	54
B403-120	6/21/2006	118.5 - 120	124	6-9-17	26	289	82.6	54
B403-135	6/21/2006	133.5 - 135	139	6-8-11	19	277	79.1	53
B403-150	6/21/2006	148.5 - 150	154	7-9-12	21	304	86.9	55
B403-165	6/22/2006	163.5 - 165	169	5-8-12	20	255	72.9	55
B403-180	6/22/2006	178.5 - 180	184	6-10-20	30	275	78.6	54
B403-200	6/22/2006	198.5 - 200	204	7-9-14	23	317	90.6	55

Notes: 1 - Energy transfer efficiency is the energy calculated by the FV method divided by the SPT hammer potential energy of 140 lbs times 2.5 foot drop height or 350 ft-lbs.

TABLE 3: Summary of SPT Energy Measurements
Borehole B404 - CME 750 ATV
Calvert Cliffs, MD

Sample No.	Test Date	Reported Sample Depth (feet)	Reported Rod Length (feet)	Reported Blow Count (blows/6")	SPT Field N Value	Avg. Energy Transferred FV Method (ft-lbs)	Energy Transfer Efficiency1 (%)	Blow per Minute (bpm)
B404-15	6/22/2006	15 - 16.5	21	4-5-6	11	274	78.3	48
B404-30	6/22/2006	30 - 31.5	36	40-50/3"	50/3"	314	89.7	56
B404-45	6/22/2006	45 - 46.5	51	48-32-28	60	316	90.3	52
B404-60	6/22/2006	60 - 61.5	66	4-5-7	12	308	88.0	54
B404-75	6/23/2006	75 - 76.5	81	4-9-21	30	303	86.6	53
B404-90	6/23/2006	90 - 91.5	96	5-8-11	19	304	86.9	55
B404-105	6/23/2006	105 - 106.5	111	7-12-15	27	308	88.0	56
B404-120	6/23/2006	120 - 121.5	126	5-8-10	18	306	87.4	55
B404-135	6/26/2006	135 - 136.5	141	6-9-10	19	303	86.6	52
B404-150	6/26/2006	150 - 151.5	156	6-8-12	20	308	88.0	55
B404-165	6/26/2006	165 - 166.5	170	7-9-9	18	295	84.3	48
B404-180	6/26/2006	180 - 181.5	186	6-14-20	34	307	87.7	54
B404-195	6/27/2006	195 - 196.5	201	4-8-13	21	312	89.1	56

Notes: 1 - Energy transfer efficiency is the energy calculated by the FV method divided by the SPT hammer potential energy of 140 lbs times 2.5 foot drop height or 350 ft-lbs.

TABLE 4: Summary of SPT Energy Measurements
Borehole B409 - CME 75 Truck
Calvert Cliffs, MD

Sample No.	Test Date	Reported Sample Depth (feet)	Reported Rod Length (feet)	Reported Blow Count (blows/6")	SPT Field N Value	Avg. Energy Transferred FV Method (ft-lbs)	Energy Transfer Efficiency1 (%)	Blow per Minute (bpm)
B409-15	6/22/2006	15 - 16.5	19	1-4-3	7	288	82.3	56
B409-30	6/22/2006	30 - 31.5	34	18-50/5"	50/5"	289	82.6	55
B409-47	6/22/2006	47.5 - 49	53	4-5-5	10	243	69.4	56
B409-60	6/22/2006	60 - 61.5	65	2-3-2	5	296	84.6	---
B409-75	6/22/2006	75 - 76.5	81	5-7-13	20	298	85.1	56
B409-90	6/23/2006	90 - 91.5	96	5-7-9	16	288	82.3	54
B409-105	6/23/2006	105 - 106.5	111	4-5-8	13	315	90.0	55
B409-120	6/26/2006	120 - 121.5	126	4-5-5	10	302	86.3	54
B409-135	6/27/2006	135 - 136.5	141	4-6-9	15	307	87.7	55
B409-150	6/27/2006	148.5 - 150	154	7-8-10	18	301	86.0	56

Notes: 1 - Energy transfer efficiency is the energy calculated by the FV method divided by the SPT hammer potential energy of 140 lbs times 2.5 foot drop height or 350 ft-lbs.

TABLE 5: Summary of SPT Energy Measurements
Borehole B744 - Diedrich D50 ATV
Calvert Cliffs, MD

Sample No.	Test Date	Reported Sample Depth (feet)	Reported Rod Length (feet)	Reported Blow Count (blows/6")	SPT Field N Value	Avg. Energy Transferred FV Method (ft-lbs)	Energy Transfer Efficiency1 (%)	Blow per Minute (bpm)
B744-15	6/20/2006	15 - 16.5	19	3-3-3	6	257	73.4	51
B744-30	6/20/2006	30 - 31.5	34	2-2-2	4	277	79.1	51
B744-45	6/20/2006	43.5 - 45	49	5-7-9	16	291	83.1	51
B744-60	6/20/2006	60 - 61.5	64	4-6-7	13	293	83.7	51
B744-75	6/21/2006	75 - 76.5	79	8-11-35	46	294	84.0	52
B744-90	6/21/2006	90 - 91.5	94	5-8-11	19	280	80.0	52

Notes: 1 - *Energy transfer efficiency is the energy calculated by the FV method divided by the SPT* hammer potential energy of 140 lbs times 2.5 foot drop height or 350 ft-lbs.

Appendix A

An Introduction into SPT Dynamic Pile Testing

APPENDIX A
AN INTRODUCTION INTO SPT DYNAMIC PILE TESTING

The following has been written by GRL Engineers, Inc. and may only be copied with its written permission.

1. BACKGROUND

The Standard Penetration Test is frequently conducted as an in-situ assessment of soil strength. This test requires that a 140 lb weight is dropped 30 inches onto a drive rod at whose bottom a sampler is usually installed. The sampler is driven for 18 inches; the number of blows required for the last 12 inches of driving is the so-called N-value. The N-value may be used as a strength indicator for foundation design or as a means of assessing the liquefaction potential of soils.

Obviously, the SPT hammer efficiency is an important consideration when using the N-values for design purposes. Measurements have indicated that the energy in the drive rod is sometimes only 30% and and may reach 90% of the potential or rated energy of the SPT hammer (E-rated = 0.35 kip-ft or 0.475 kJ). The type of hammer used to drive the rod is the main reason for these variations. On the average, the energy in the drive rod is 60% of the standard rated energy.

Because of the variability of energy, methods based on N-values are considered unreliable. However, measurements during SPT testing using the Case Method can be done on a routine basis and these measurements yield the transferred energy values. With measured energy, EMX, known, an adjustment of the measured N-value, N_m, can be made as follows.

$$N_{60} = N_m [E_m / (0.6E_r)] \tag{1}$$

Thus, if the measured energy value is equal to the normally expected transferred energy of 60% of E-rated then the adjusted and measured N-values are identical. On the other hand, if the measured energy is only 30% then the adjusted blow count will be reduced by 50%.

2. DYNAMIC TESTING AND ANALYSIS METHODS APPLIED TO SPT

The Case Method of dynamic pile testing, named after the Case Institute of Technology where it was developed between 1964 and 1975, requires that a substantial ram mass (e.g. a pile driving hammer) impacts the pile top such that the pile undergoes at least a small permanent set. Thus, the method is also referred to as a "High Strain Method". The Case Method requires dynamic measurements on the pile or shaft under the ram impact and then a calculation of various quantities. Conveniently, for SPT applications, the measurements and analyses are done by a single piece of equipment: the SPT Analyzer. The Pile Driving Analyzer® (PDA) is also suitable to perform these measurements and data processing.

A related analysis method is the "Wave Equation Analysis" which calculates a relationship between bearing capacity, pile stresses, transferred energy and field blow count. The GRLWEAP™ program performs this analysis and provides a complete set of helpful information and input data. This program can be used very effectively to simulate the SPT driving process.

3. MEASUREMENTS

GRL uses equipment manufactured by Pile Dynamics, Inc. The system includes either an SPT-Analyzer™ (SPTA) or a Pile Driving Analyzer® (PDA), an instrumented rod section and two accelerometers. SPT energy testing is very closely related to and borrows procedures from dynamic pile testing. Those interested in the basis of the SPT energy testing method may obtain extensive literature on dynamic pile testing from GRL Engineers, Inc.

3.1 SPT Analyzer or Pile Driving Analyzer

The basis for the results calculated by the SPTA or PDA are strain and acceleration measured in an instrumented rod section. These signals are converted to rod top force, F(t), and rod top velocity, v(t). The SPTA or PDA conditions, calibrates and displays these signals and immediately computes average pile force and velocity thereby eliminating bending effects. The product of these two measurements is then integrated over time which yields the energy transferred to the instrumented section as a function of time (see Section 4.1).

For convenience and accuracy, strain measurements are usually taken on an instrumented section of SPT drive rod. Ideally, the section properties of the instrumented rod and those of the drive rod are the same, however, using subs, other sections can also be utilized.

For the instrumented section, PDI provides a force calibration in such a way that the output of the instrumented rod is directly calculated without the need for an accurate elastic modulus or cross sectional area of the rod section.

The acceleration measurements are often demanding in the SPT environment, because of high frequency and high acceleration motion components. An experienced measurement engineer, therefore, has to evaluate the quality of this data before final conclusions are drawn from the numerical results calculated by SPTA or PDA.

SPTA or PDA records are taken while the standard N-value is acquired in the conventional manner. This then allows a direct correlation between N-value and average transferred energy.

3.2 HPA

The SPT hammer's ram velocity may be directly obtained using radar technology in the Hammer Performance Analyzer™. The impact velocity results can be automatically processed with a PC or recorded on a strip chart. HPA measurements yield a hammer kinetic energy, but not the energy transferred to the drive rod.

4 RECORD EVALUATION BY SPTA OR PDA

4.1 HAMMER PERFORMANCE

The PDA calculates the energy transferred to the pile top from:

$$E(t) = \int_0^t F(\tau)v(\tau)\,d\tau \qquad (2)$$

The maximum of the E(t) curve is often called **ENTHRU or EMX;** it is the most important quantity for an overall evaluation of the performance of a hammer and driving system. **EMX** allows for a classification of the hammer's performance when presented as, e_T, the rated transfer efficiency, also called energy transfer ratio (**ETR**) or global efficiency.

$$e_T = EMX/E_R \qquad (3)$$

where E_R is the hammer manufacturer's rated energy value or 0.35 kip-ft (0.475 kJ) in the case of the SPT hammer.

Often in the SPT literature one finds also reference to the EF2 energy. This evaluation is based on assumed proportionality between force and velocity (see also Section 5):

$$v(t) = F(t) / Z \qquad (4)$$

where Z = EA/c is the pile impedance, E is the elastic modulus, A is the cross sectional area and c is the speed of the stress wave in the pile material..

Combining equations 2 and 4 leads to

$$EF(t) = \int_0^t F(\tau)^2 / Z\,d\tau \qquad (5)$$

The EF2 transferred energy value is the EF-value at the time t = 2L/c, where L is the drive rod length and c is the stress wave speed in steel (16,800 ft/s or 5,124 m/s). Since the force is easier to measure than both force and velocity, Equation 5 is preferred by some test engineers. However, the EF method is fraught with errors and certain correction factors have to be applied to make it approximately correct. Among the error sources are the following:

- Proportionality is often violated prior to time 2L/c. The proportionality between force and velocity in a downward traveling wave only holds if the wave does not encounter a disturbance prior to reflecting off the pile toe. Such disturbances include a change in cross sectional area, an open or loose splice or joint, or resistance along the shaft.

- Using only one force measurement precludes a data quality check based on the proportionality between force and velocity. Thus, a force measurement that is for some reason in error may not be detectable, which will lead to errors in the EF2 value. Data quality checks will be discussed further in Section 5.

The use if EF2 is therefore not recommended but it is often included in result presentations for the sake of completeness.

4.2 STRESSES

During SPT monitoring, it is also of interest to monitor compressive stresses at both the top of the drive rod and at its bottom.

At the pile top (location of sensors) the maximum compression stress averaged over the rod's cross section, **CSX**, is directly obtained from the measurements. Note that this stress value refers to the instrumented section. If the rod has a different cross sectional area then the stress in the rod will be different from CSX.

The SPTA or PDA can also calculate, in an approximate manner, the force at the rod bottom, **CFB**. To obtain the corresponding stress, this force value should be divided by the appropriate cross sectional area, e.g. by the rod area just above the sampler or by the sampler area itself. Of course, non-uniform stress components as they might occur at the sampler tip due to a sloping rock are not considered in this calculation.

5. DATA QUALITY CHECKS

Quality data is the first and foremost requirement for accurate dynamic testing results. It is therefore important that the measurement engineer performing SPTA or PDA tests has the experience necessary to recognize measurement problems and take appropriate corrective action should problems develop. Fortunately, dynamic pile testing allows for certain data quality checks because two independent measurements are taken that have to conform to the so-called proportionality relationship.

As long as there is only a wave traveling in one direction, as is the case during impact when only a downward traveling wave exists in the rod, force and velocity measured at its top are proportional

$$F = v\,Z \qquad (5)$$

where Z is again the pile impedance, Z = EA/c. This relationship can also be expressed in terms of stress

$$\sigma = F/A = v\,(E/c) \qquad (6)$$

or strain

$$\epsilon = \sigma/E = v\,/\,c \qquad (7)$$

This means that the early portion of strain times wave speed must be equal to the velocity unless the proportionality is affected by high friction near the pile top or by a pile cross sectional change not far below the sensors. Checking the proportionality is an excellent means of assuring meaningful measurements but is only truly meaningful for perfectly uniform rods. Open or loose splices, for example, will lead to a non-proportionality. For SPT rods it is fortunate that usually no soil resistance acts along the shaft and for that reason, proportionality can exist until the stress wave returns from sampler top or rod bottom unless connectors are not sufficiently tightened or have a significant mass.

Velocity data quality can also be checked by looking at the final displacement, DFN, which is calculated from the acceleration by double integration. If the calculated final displacement is much higher or lower than indicated by the N-value, the accelerometer attachment may be loose or the sensor may be faulty. If major drift in the velocity is observed, the EMX value may be in error, even though proportionality from impact to time 2L/c exists. In this case, it may be useful to evaluate the energy transferred to the drill rod at time 2L/c, which is calculated by the PDA or SPTA as the E2E quantity.

Appendix B:

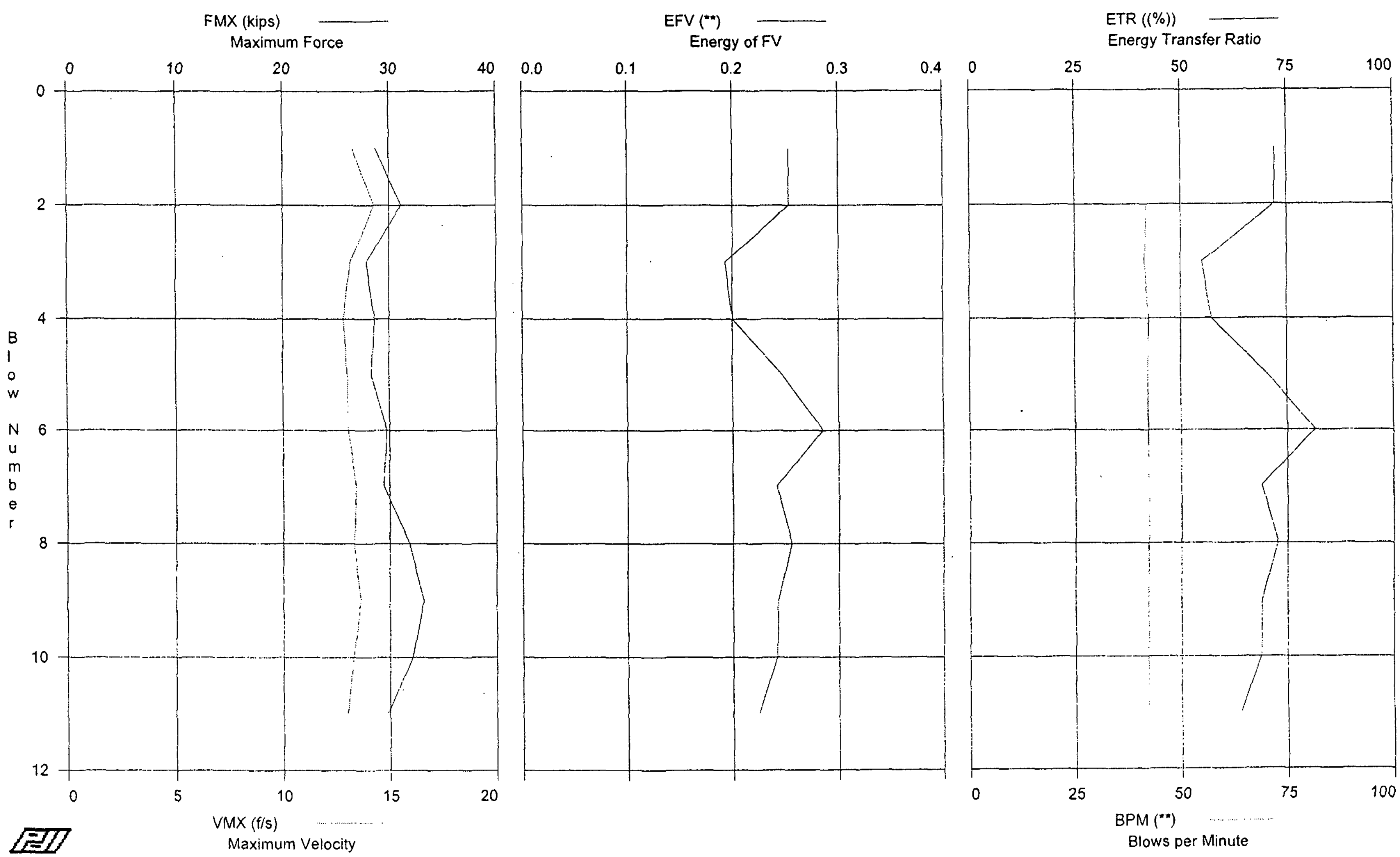
SPT Energy Measurement

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 19-Jun-2006

SPT, Calvert Cliffs - B401-15



SPT, Calvert Cliffs - B401-15
N3 rod
OP: KB
Test date: 19-Jun-2006

AR: 2.30 in^2
LE: 19.0 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	29	13.3	0.253	72.3	**	0.253	0.142	2.90	0.64
2	0.00	AV1	31	14.3	0.253	72.2	41.9	0.253	0.148	2.58	0.62
3	0.00	AV1	28	13.2	0.193	55.0	41.5	0.193	0.123	1.87	0.68
4	0.00	AV1	29	12.8	0.200	57.2	42.4	0.200	0.128	1.77	0.65
5	0.00	AV1	28	13.0	0.247	70.6	42.3	0.247	0.143	2.04	0.63
6	0.00	AV1	30	13.1	0.285	81.5	42.2	0.285	0.144	1.92	0.60
7	0.00	AV1	29	13.4	0.241	69.0	42.3	0.241	0.143	1.93	0.59
8	0.00	AV1	32	13.3	0.255	72.7	42.3	0.255	0.155	1.88	0.60
9	0.00	AV1	33	13.6	0.242	69.0	42.1	0.242	0.156	1.85	0.56
10	0.00	AV1	32	13.3	0.241	68.8	42.2	0.241	0.152	1.81	0.63
11	0.00	AV1	30	13.0	0.224	64.1	42.1	0.224	0.143	1.78	0.59

Time Summary

Drive 15 seconds 3:33:14 PM - 3:33:29 PM (6/19/2006) BN 1 - 11

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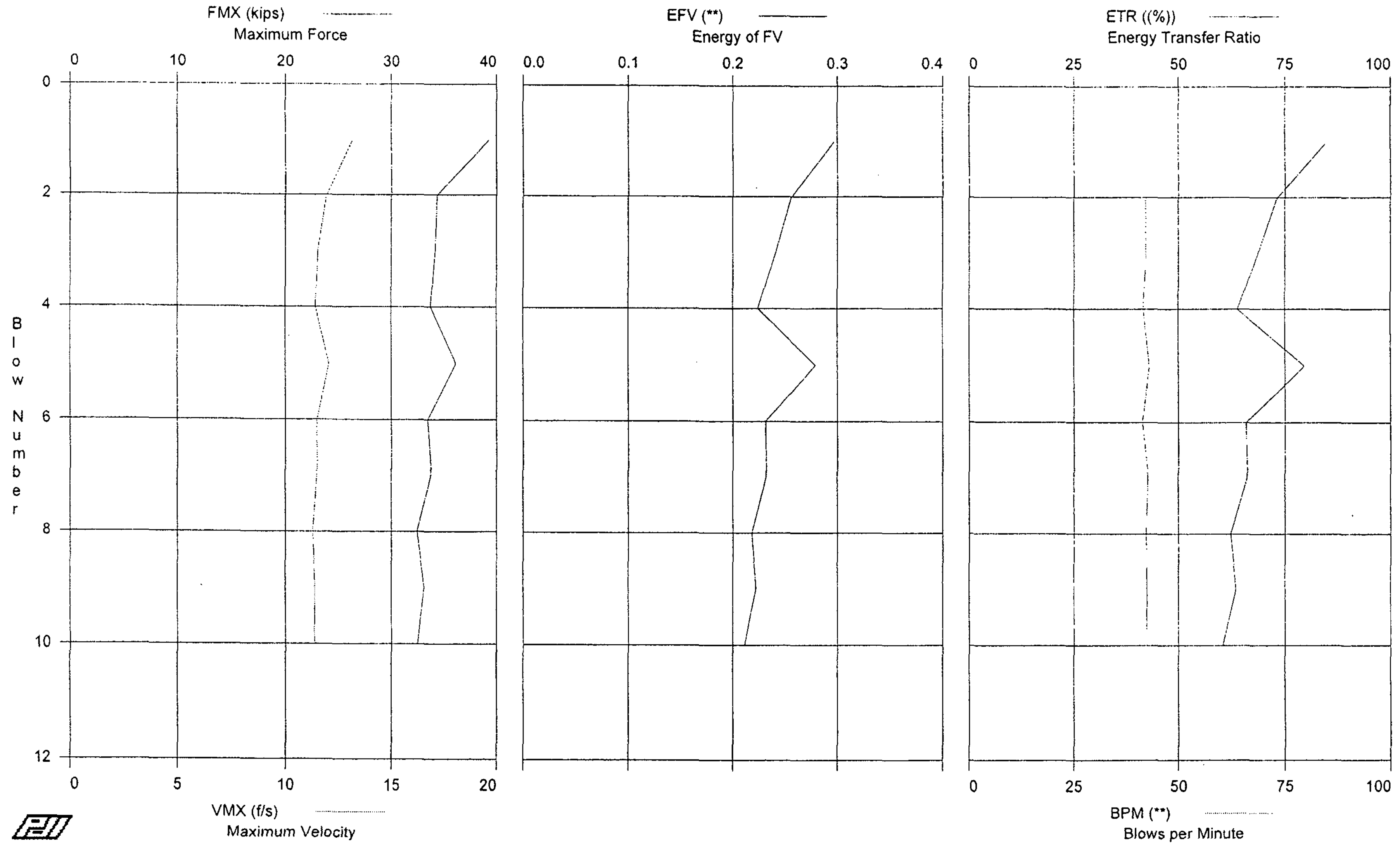
GRL Engineers, Inc. - Case Method Results

Test date: 19-Jun-2006

SPT, Calvert Cliffs - B401-20



SPT, Calvert Cliffs - B401-20
N3 rod
OP: KB
Test date: 19-Jun-2006

AR: 2.30 in^2
LE: 24.0 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	39	13.2	0.297	84.9	**	0.297	0.193	2.70	0.78
2	0.00	AV1	34	11.9	0.256	73.2	42.1	0.256	0.165	2.03	0.73
3	0.00	AV1	34	11.5	0.241	68.7	42.3	0.241	0.152	1.68	0.74
4	0.00	AV1	34	11.4	0.224	63.9	41.7	0.224	0.142	1.34	0.73
5	0.00	AV1	36	12.0	0.279	79.6	43.0	0.279	0.178	1.73	0.74
6	0.00	AV1	33	11.5	0.231	65.9	41.4	0.231	0.146	1.30	0.72
7	0.00	AV1	34	11.5	0.232	66.2	42.8	0.232	0.149	1.22	0.73
8	0.00	AV1	32	11.3	0.218	62.2	42.3	0.218	0.138	1.17	0.71
9	0.00	AV1	33	11.4	0.222	63.5	42.5	0.222	0.144	1.13	0.72
10	0.00	AV1	33	11.3	0.211	60.4	42.4	0.211	0.134	1.14	0.71
		Average	34	11.7	0.241	68.8	42.3	0.241	0.154	1.54	0.73

Total number of blows analyzed: 10

Time Summary

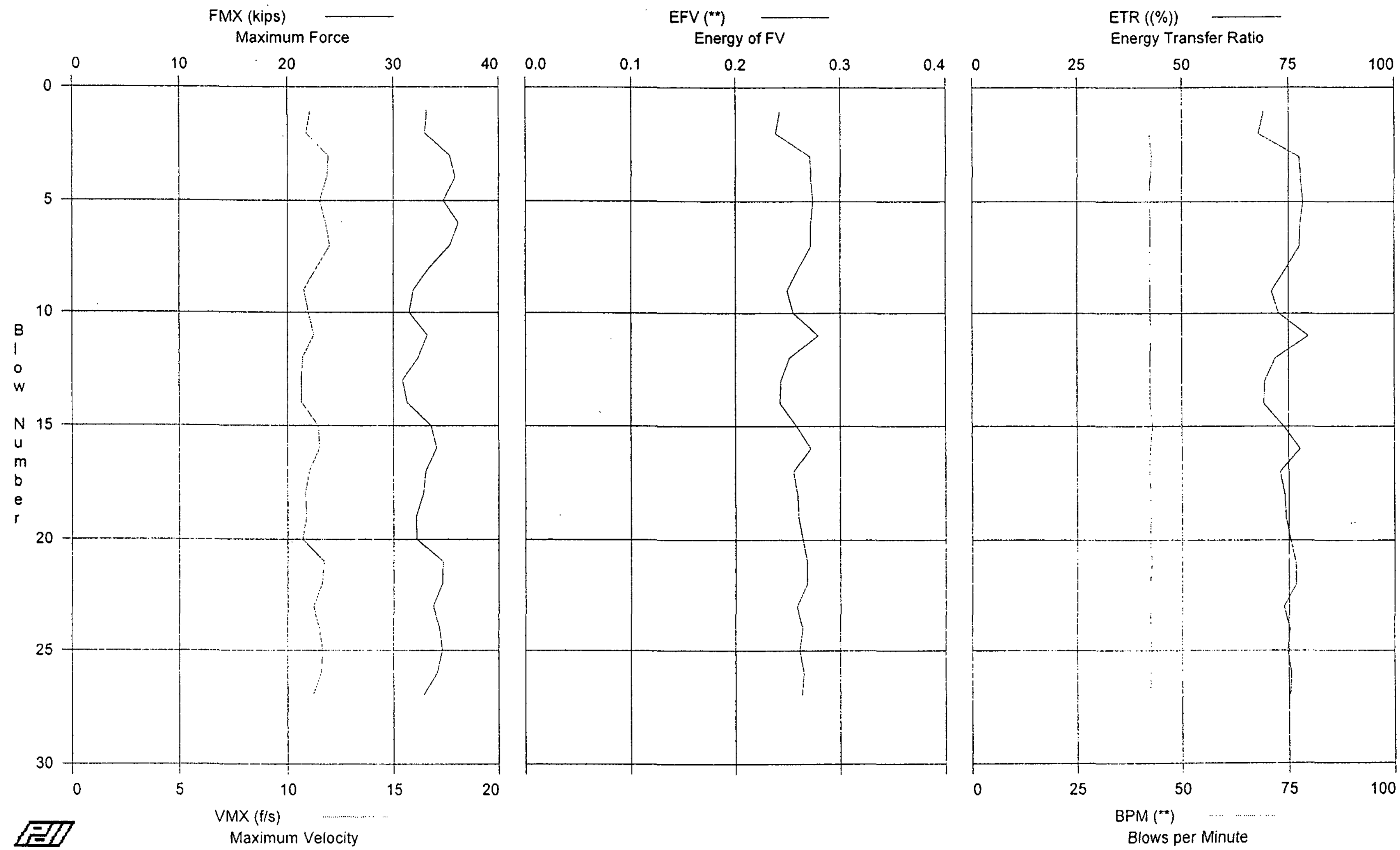
Drive 13 seconds 3:46:12 PM - 3:46:25 PM (6/19/2006) BN 1 - 10

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 19-Jun-2006

SPT, Calvert Cliffs - B401-30



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-30 N3 rod
OP: KB Test date: 19-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 34.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	33.17	11.07	0.242	69.3	**	0.242	0.156	1.35	0.64
2	0.00	AV1	32.96	10.86	0.238	67.9	42.2	0.238	0.152	1.49	0.58
3	0.00	AV1	35.35	11.90	0.271	77.4	42.8	0.271	0.181	1.70	0.59
4	0.00	AV1	35.83	11.82	0.272	77.9	42.5	0.272	0.179	1.98	0.61
5	0.00	AV1	34.73	11.51	0.274	78.4	42.4	0.274	0.175	1.14	0.56
6	0.00	AV1	36.15	11.76	0.272	77.7	42.5	0.272	0.181	0.82	0.63
7	0.00	AV1	35.35	11.97	0.272	77.6	42.4	0.272	0.178	0.92	0.62
8	0.00	AV1	33.37	11.36	0.260	74.3	42.3	0.260	0.164	1.05	0.63
9	0.00	AV1	31.87	10.76	0.249	71.0	42.4	0.249	0.156	1.04	0.58
10	0.00	AV1	31.50	10.98	0.255	72.7	42.4	0.255	0.161	0.82	0.64
11	0.00	AV1	33.20	11.23	0.279	79.7	42.6	0.279	0.171	0.94	0.65
12	0.00	AV1	32.35	10.70	0.251	71.8	42.4	0.251	0.158	0.65	0.57
13	0.00	AV1	30.87	10.65	0.243	69.4	42.5	0.243	0.152	0.66	0.63
14	0.00	AV1	31.30	10.66	0.242	69.1	42.4	0.242	0.152	0.58	0.59
15	0.00	AV1	33.56	11.43	0.258	73.9	43.0	0.258	0.164	0.60	0.64
16	0.00	AV1	34.08	11.49	0.272	77.7	42.4	0.272	0.173	0.72	0.63
17	0.00	AV1	33.06	11.01	0.255	73.0	42.2	0.255	0.161	0.81	0.57
18	0.00	AV1	32.83	10.81	0.259	74.1	42.6	0.259	0.163	0.68	0.57
19	0.00	AV1	32.14	10.88	0.260	74.3	42.6	0.260	0.163	0.61	0.63
20	0.00	AV1	32.19	10.69	0.264	75.4	42.3	0.264	0.160	0.67	0.60
21	0.00	AV1	34.70	11.70	0.268	76.6	42.8	0.268	0.176	0.69	0.65
22	0.00	AV1	34.64	11.60	0.268	76.7	42.4	0.268	0.174	0.70	0.61
23	0.00	AV1	33.73	11.21	0.258	73.8	42.4	0.258	0.164	0.69	0.58
24	0.00	AV1	34.36	11.47	0.264	75.3	42.6	0.264	0.171	0.70	0.58
25	0.00	AV1	34.63	11.64	0.261	74.7	42.7	0.261	0.170	0.74	0.59
26	0.00	AV1	34.13	11.55	0.265	75.6	42.5	0.265	0.167	0.65	0.56
27	0.00	AV1	32.86	11.19	0.263	75.3	42.4	0.263	0.164	0.66	0.62
		Average	33.51	11.26	0.261	74.5	42.5	0.261	0.166	0.89	0.61

Total number of blows analyzed: 27

Time Summary

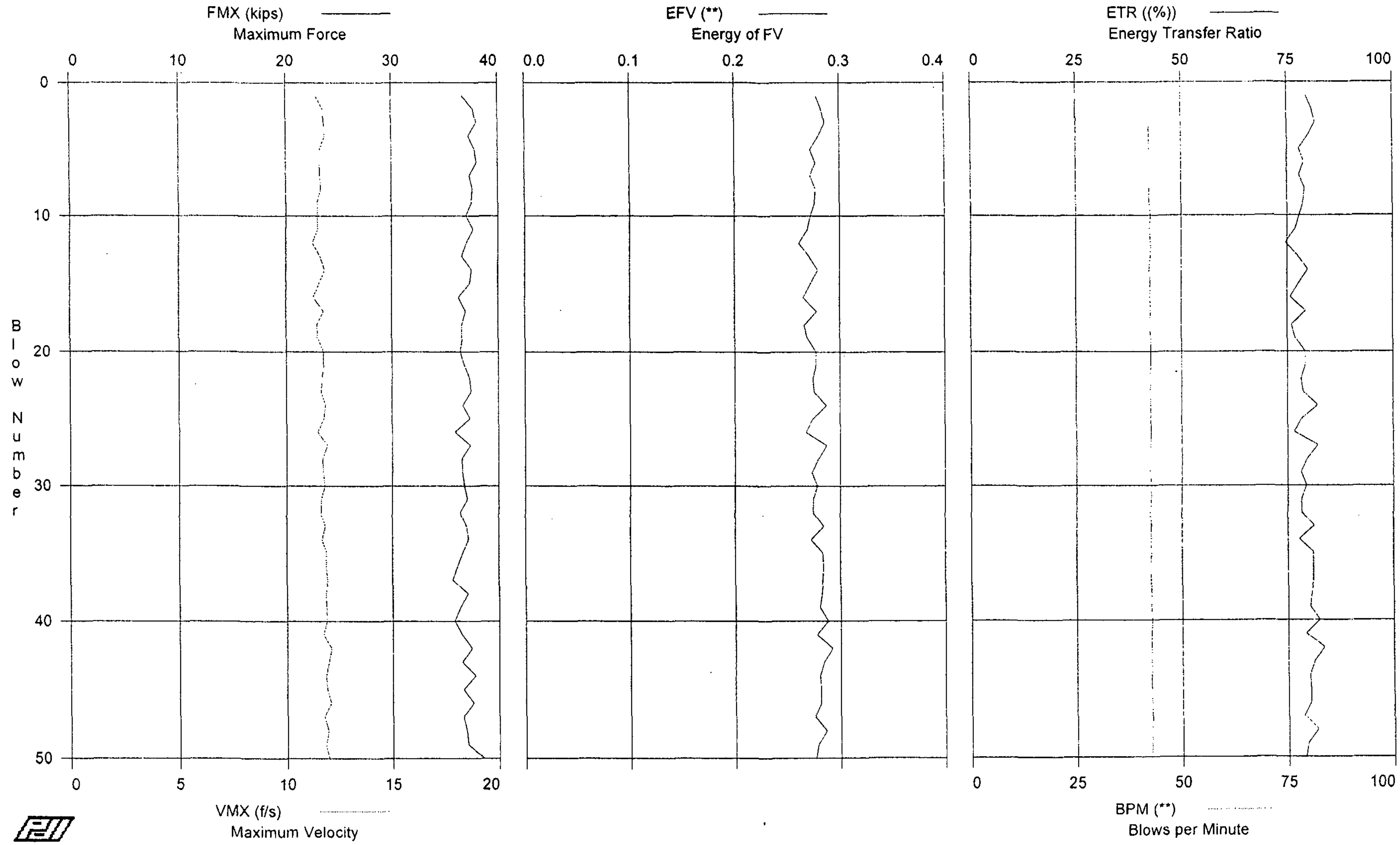
Drive 37 seconds 4:10:06 PM - 4:10:43 PM (6/19/2006) BN 1 - 27

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 19-Jun-2006

SPT, Calvert Cliffs - B401-45



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-45
N3 rod
OP: KB
Test date: 19-Jun-2006

AR: 2.30 in^2
LE: 49.0 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	36.67	11.43	0.278	79.5	**	0.278	0.187	0.91	0.61
2	0.00	AV1	37.68	11.77	0.283	80.9	42.3	0.283	0.182	0.55	0.63
3	0.00	AV1	37.98	11.79	0.286	81.6	42.4	0.286	0.187	0.56	0.69
4	0.00	AV1	37.23	11.83	0.280	80.0	42.5	0.280	0.179	0.44	0.60
5	0.00	AV1	37.81	11.58	0.272	77.8	42.5	0.272	0.174	0.54	0.64
6	0.00	AV1	38.01	11.57	0.277	79.0	42.6	0.277	0.180	0.39	0.64
7	0.00	AV1	37.30	11.62	0.272	77.8	42.7	0.272	0.175	0.29	0.67
8	0.00	AV1	37.60	11.66	0.277	79.2	42.6	0.277	0.178	0.49	0.68
9	0.00	AV1	37.50	11.49	0.276	78.8	42.5	0.276	0.176	0.34	0.63
10	0.00	AV1	36.97	11.47	0.272	77.8	42.8	0.272	0.173	0.37	0.64
11	0.00	AV1	37.66	11.49	0.269	76.9	42.6	0.269	0.174	0.37	0.66
12	0.00	AV1	37.00	11.25	0.261	74.6	42.8	0.261	0.168	0.29	0.63
13	0.00	AV1	36.59	11.61	0.271	77.5	42.7	0.271	0.172	0.42	0.60
14	0.00	AV1	37.50	11.82	0.279	79.9	42.4	0.279	0.182	0.40	0.63
15	0.00	AV1	37.33	11.56	0.272	77.7	42.7	0.272	0.178	0.38	0.67
16	0.00	AV1	36.24	11.28	0.265	75.7	42.6	0.265	0.170	0.35	0.61
17	0.00	AV1	36.95	11.77	0.278	79.4	42.8	0.278	0.177	0.43	0.63
18	0.00	AV1	36.59	11.45	0.266	76.1	42.5	0.266	0.171	0.32	0.62
19	0.00	AV1	36.57	11.48	0.269	76.9	42.8	0.269	0.173	0.39	0.61
20	0.00	AV1	36.39	11.75	0.277	79.2	42.7	0.277	0.177	0.55	0.70
21	0.00	AV1	36.77	11.76	0.277	79.2	42.8	0.277	0.176	0.57	0.62
22	0.00	AV1	37.28	11.67	0.274	78.1	42.6	0.274	0.174	0.44	0.64
23	0.00	AV1	37.40	11.64	0.275	78.6	42.7	0.275	0.176	0.41	0.63
24	0.00	AV1	36.62	11.84	0.287	82.1	42.7	0.287	0.180	0.57	0.69
25	0.00	AV1	37.30	11.77	0.274	78.4	42.8	0.274	0.176	0.36	0.64
26	0.00	AV1	35.86	11.45	0.267	76.4	42.7	0.267	0.168	0.41	0.60
27	0.00	AV1	37.30	11.92	0.287	82.1	42.6	0.287	0.183	0.48	0.65
28	0.00	AV1	36.52	11.68	0.279	79.6	42.6	0.279	0.178	0.36	0.60
29	0.00	AV1	36.59	11.72	0.273	78.1	42.5	0.273	0.175	0.39	0.64
30	0.00	AV1	36.75	11.79	0.278	79.3	42.9	0.278	0.176	0.43	0.62
31	0.00	AV1	37.02	11.63	0.274	78.2	42.7	0.274	0.175	0.40	0.65
32	0.00	AV1	36.34	11.60	0.274	78.2	42.6	0.274	0.174	0.43	0.61
33	0.00	AV1	36.92	11.82	0.284	81.2	42.8	0.284	0.180	0.48	0.68
34	0.00	AV1	37.13	11.66	0.272	77.6	42.6	0.272	0.173	0.30	0.64
35	0.00	AV1	36.59	11.87	0.283	81.0	42.8	0.283	0.176	0.37	0.65
36	0.00	AV1	36.09	11.85	0.284	81.0	42.6	0.284	0.175	0.42	0.69
37	0.00	AV1	35.63	11.93	0.283	81.0	42.8	0.283	0.171	0.51	0.60
38	0.00	AV1	37.05	11.82	0.282	80.5	42.7	0.282	0.179	0.37	0.64
39	0.00	AV1	36.34	11.86	0.280	80.1	42.6	0.280	0.174	0.49	0.65
40	0.00	AV1	35.79	11.87	0.288	82.3	42.9	0.288	0.179	0.48	0.70
41	0.00	AV1	36.49	11.71	0.277	79.1	42.7	0.277	0.175	0.51	0.60
42	0.00	AV1	37.40	12.07	0.292	83.5	42.7	0.292	0.182	0.62	0.66
43	0.00	AV1	36.52	11.96	0.284	81.2	42.8	0.284	0.178	0.67	0.63
44	0.00	AV1	37.76	11.83	0.280	80.1	42.7	0.280	0.179	0.55	0.65
45	0.00	AV1	36.62	11.88	0.281	80.3	42.7	0.281	0.175	0.68	0.62
46	0.00	AV1	37.58	12.06	0.281	80.3	42.8	0.281	0.178	0.51	0.64
47	0.00	AV1	36.59	11.73	0.275	78.7	42.9	0.275	0.172	0.32	0.61
48	0.00	AV1	36.90	11.93	0.286	81.8	42.7	0.286	0.178	0.48	0.62
49	0.00	AV1	37.02	11.80	0.278	79.5	42.8	0.278	0.174	0.36	0.61
50	0.00	AV1	38.51	11.95	0.276	79.0	42.6	0.276	0.178	0.23	0.67
		Average	36.97	11.71	0.277	79.3	42.7	0.277	0.176	0.45	0.64

Total number of blows analyzed: 50

Time Summary

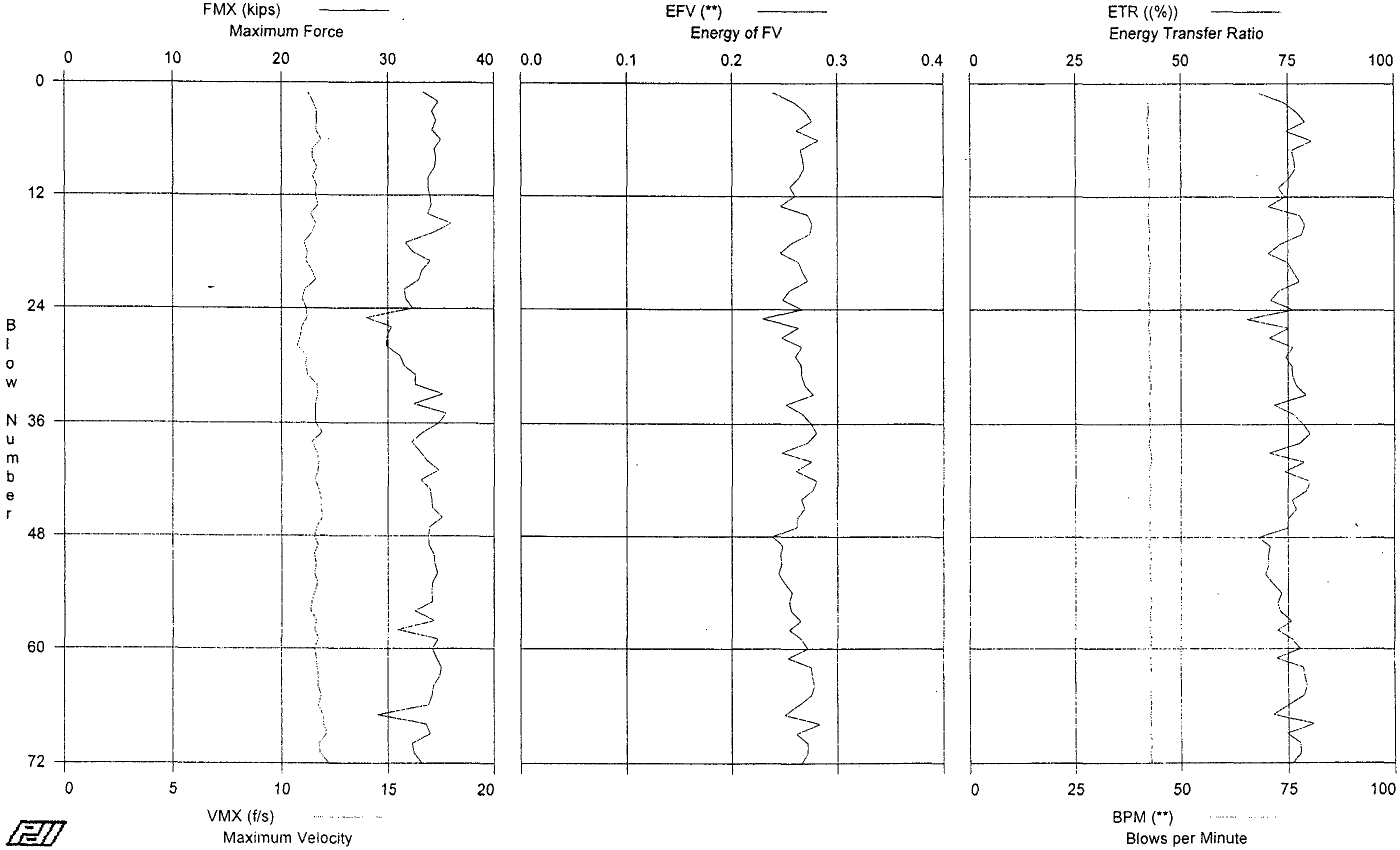
Drive 1 minute 8 seconds 4:44:37 PM - 4:45:45 PM (6/19/2006) BN 1 - 50

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

Test date: 20-Jun-2006

SPT, Calvert Cliffs - B401-60



SPT, Calvert Cliffs - B401-60 N3 rod
OP: KB Test date: 20-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 64.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	33.31	11.23	0.239	68.4	**	0.239	0.153	1.14	0.64
2	0.00	AV1	34.78	11.48	0.259	74.1	42.4	0.259	0.166	1.03	0.60
3	0.00	AV1	34.14	11.65	0.270	77.2	42.6	0.270	0.169	1.20	0.63
4	0.00	AV1	34.55	11.66	0.276	79.0	42.0	0.276	0.174	1.14	0.58
5	0.00	AV1	34.17	11.62	0.261	74.6	42.6	0.261	0.164	0.97	0.60
6	0.00	AV1	34.98	11.86	0.282	80.6	42.4	0.282	0.178	0.76	0.53
7	0.00	AV1	34.37	11.45	0.265	75.8	42.5	0.265	0.166	0.66	0.57
8	0.00	AV1	34.52	11.46	0.267	76.4	42.1	0.267	0.169	0.71	0.60
9	0.00	AV1	34.37	11.67	0.268	76.6	42.6	0.268	0.167	0.82	0.61
10	0.00	AV1	33.79	11.44	0.263	75.1	42.6	0.263	0.165	0.65	0.44
11	0.00	AV1	33.76	11.65	0.255	72.8	42.6	0.255	0.095	0.77	0.61
12	0.00	AV1	33.97	11.60	0.260	74.3	42.7	0.260	0.157	0.91	0.52
13	0.00	AV1	34.09	11.72	0.246	70.4	42.4	0.246	0.145	0.75	0.49
14	0.00	AV1	33.76	11.37	0.272	77.8	42.3	0.272	0.172	0.77	0.73
15	0.00	AV1	35.96	11.61	0.276	78.9	42.6	0.276	0.173	0.91	0.63
16	0.00	AV1	34.17	11.42	0.274	78.1	42.8	0.274	0.172	0.81	0.60
17	0.00	AV1	31.64	11.06	0.256	73.2	42.5	0.256	0.156	0.78	0.71
18	0.00	AV1	32.35	11.22	0.246	70.3	42.3	0.246	0.152	0.47	0.61
19	0.00	AV1	34.02	11.15	0.263	75.0	42.9	0.263	0.164	0.73	0.59
20	0.00	AV1	33.21	11.42	0.267	76.3	42.6	0.267	0.163	0.81	0.58
21	0.00	AV1	32.93	11.61	0.272	77.7	42.7	0.272	0.161	0.80	0.60
22	0.00	AV1	31.54	11.10	0.255	72.8	42.7	0.255	0.154	0.65	0.63
23	0.00	AV1	31.69	10.97	0.248	70.9	42.4	0.248	0.143	0.81	0.49
24	0.00	AV1	32.35	11.16	0.267	76.3	42.7	0.267	0.163	0.75	0.61
25	0.00	AV1	27.93	11.21	0.229	65.3	42.6	0.229	0.079	0.67	0.55
26	0.00	AV1	30.33	10.96	0.263	75.1	42.3	0.263	0.158	0.63	0.60
27	0.00	AV1	29.87	10.88	0.247	70.6	42.9	0.247	0.140	0.67	0.53
28	0.00	AV1	29.82	10.73	0.266	76.1	42.6	0.266	0.159	0.59	0.56
29	0.00	AV1	31.14	11.16	0.260	74.4	42.6	0.260	0.149	0.47	0.59
30	0.00	AV1	31.49	11.15	0.266	75.9	43.0	0.266	0.157	0.54	0.55
31	0.00	AV1	32.58	11.22	0.266	76.0	42.4	0.266	0.163	0.55	0.58
32	0.00	AV1	32.55	11.66	0.269	76.9	43.0	0.269	0.167	0.38	0.44
33	0.00	AV1	35.18	11.70	0.277	79.2	42.6	0.277	0.166	0.33	0.57
34	0.00	AV1	32.40	11.61	0.251	71.6	42.5	0.251	0.146	0.37	0.53
35	0.00	AV1	35.48	11.60	0.267	76.2	42.9	0.267	0.161	0.36	0.58
36	0.00	AV1	34.78	11.61	0.275	78.5	42.5	0.275	0.166	0.48	0.57
37	0.00	AV1	33.26	11.89	0.280	80.1	42.9	0.280	0.170	0.44	0.54
38	0.00	AV1	32.20	11.42	0.271	77.5	42.3	0.271	0.164	0.46	0.54
39	0.00	AV1	33.01	11.65	0.247	70.5	42.9	0.247	0.149	0.40	0.59
40	0.00	AV1	33.69	11.73	0.275	78.7	43.0	0.275	0.167	0.42	0.61
41	0.00	AV1	34.78	11.70	0.260	74.1	42.3	0.260	0.159	0.37	0.58
42	0.00	AV1	33.06	11.56	0.280	80.1	42.6	0.280	0.175	0.33	0.55
43	0.00	AV1	33.99	11.75	0.277	79.3	42.9	0.277	0.173	0.40	0.58
44	0.00	AV1	34.12	11.85	0.266	76.0	42.6	0.266	0.164	0.27	0.60
45	0.00	AV1	34.19	11.86	0.269	76.9	42.9	0.269	0.167	0.31	0.62
46	0.00	AV1	35.10	11.93	0.262	75.0	42.8	0.262	0.165	0.24	0.59
47	0.00	AV1	33.97	11.67	0.262	74.9	42.6	0.262	0.162	0.29	0.63
48	0.00	AV1	33.81	11.53	0.238	68.1	42.8	0.238	0.144	0.21	0.59
49	0.00	AV1	33.87	11.71	0.248	70.8	42.4	0.248	0.155	0.29	0.66
50	0.00	AV1	34.32	11.53	0.246	70.4	43.0	0.246	0.154	0.24	0.60
51	0.00	AV1	34.42	11.63	0.247	70.5	42.7	0.247	0.156	0.23	0.63
52	0.00	AV1	34.65	11.54	0.244	69.7	42.7	0.244	0.152	0.17	0.63
53	0.00	AV1	34.17	11.69	0.250	71.4	42.9	0.250	0.155	0.25	0.62
54	0.00	AV1	34.09	11.56	0.257	73.4	42.8	0.257	0.159	0.33	0.59
55	0.00	AV1	34.17	11.42	0.254	72.5	43.0	0.254	0.155	0.33	0.58
56	0.00	AV1	32.47	11.36	0.256	73.2	42.8	0.256	0.160	0.31	0.60
57	0.00	AV1	34.32	11.62	0.265	75.7	42.7	0.265	0.165	0.29	0.57
58	0.00	AV1	30.83	11.54	0.254	72.5	42.5	0.254	0.147	0.32	0.56
59	0.00	AV1	34.72	11.74	0.266	76.0	43.0	0.266	0.167	0.30	0.63
60	0.00	AV1	34.17	11.56	0.272	77.8	42.8	0.272	0.169	0.34	0.56
61	0.00	AV1	34.57	11.62	0.253	72.2	42.8	0.253	0.154	0.24	0.58

SPT, Calvert Cliffs - B401-60 N3 rod
OP: KB Test date: 20-Jun-2006

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
62	0.00	AV1	35.00	11.66	0.275	78.5	43.0	0.275	0.173	0.17	0.60
63	0.00	AV1	34.85	11.72	0.276	78.9	42.7	0.276	0.172	0.31	0.58
64	0.00	AV1	34.27	11.70	0.278	79.3	42.8	0.278	0.171	0.34	0.56
65	0.00	AV1	34.14	11.86	0.275	78.6	42.7	0.275	0.169	0.39	0.62
66	0.00	AV1	33.81	11.72	0.263	75.1	43.0	0.263	0.159	0.24	0.59
67	0.00	AV1	28.99	11.93	0.250	71.5	42.7	0.250	0.142	0.41	0.47
68	0.00	AV1	33.59	11.97	0.283	80.9	42.9	0.283	0.173	0.38	0.60
69	0.00	AV1	33.99	12.11	0.261	74.7	42.8	0.261	0.151	0.39	0.58
70	0.00	AV1	32.25	11.73	0.272	77.7	43.1	0.272	0.162	0.45	0.51
71	0.00	AV1	32.45	11.80	0.272	77.8	42.7	0.272	0.161	0.43	0.63
72	0.00	AV1	33.18	12.19	0.266	76.0	43.0	0.266	0.154	0.50	0.53
		Average	33.39	11.55	0.263	75.1	42.7	0.263	0.159	0.52	0.58

Total number of blows analyzed: 72

Time Summary

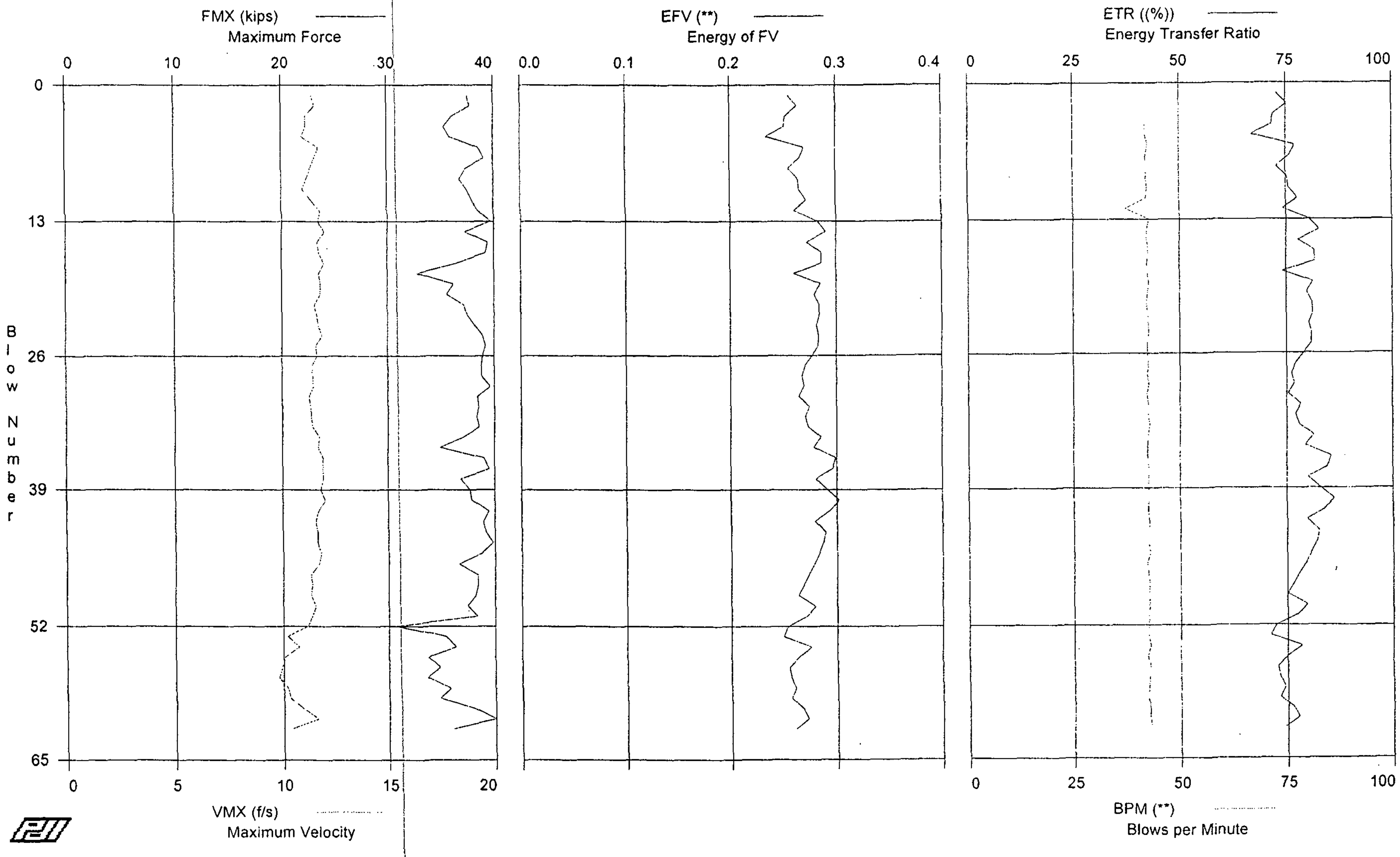
Drive 1 minute 40 seconds 8:39:47 AM - 8:41:27 AM (6/20/2006) BN 1 - 72

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 20-Jun-2006

SPT, Calvert Cliffs - B401-75



SPT, Calvert Cliffs - B401-75 N3 rod
OP: KB Test date: 20-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 79.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	37.60	11.47	0.255	72.8	**	0.255	0.164	1.05	0.66
2	0.00	AV1	37.78	11.59	0.263	75.3	42.2	0.263	0.167	1.08	0.70
3	0.00	AV1	36.11	11.16	0.252	71.9	**	0.252	0.153	0.74	0.61
4	0.00	AV1	35.36	11.19	0.251	71.7	42.0	0.251	0.153	0.93	0.42
5	0.00	AV1	35.91	10.99	0.234	66.9	42.1	0.234	0.145	0.66	0.41
6	0.00	AV1	38.62	11.79	0.270	77.1	42.7	0.270	0.166	1.02	0.63
7	0.00	AV1	39.15	11.60	0.266	75.9	42.3	0.266	0.168	0.67	0.65
8	0.00	AV1	37.40	11.39	0.255	72.8	42.4	0.255	0.159	0.49	0.64
9	0.00	AV1	36.80	11.20	0.264	75.3	42.2	0.264	0.164	0.40	0.63
10	0.00	AV1	37.50	11.01	0.265	75.6	42.5	0.265	0.161	0.35	0.61
11	0.00	AV1	38.01	11.42	0.272	77.7	42.3	0.272	0.169	0.47	0.66
12	0.00	AV1	38.51	11.85	0.260	74.2	37.4	0.260	0.153	0.38	0.61
13	0.00	AV1	39.68	11.71	0.282	80.5	42.8	0.282	0.170	0.47	0.61
14	0.00	AV1	37.25	12.02	0.290	82.8	42.3	0.290	0.164	0.48	0.61
15	0.00	AV1	39.45	11.70	0.272	77.8	42.3	0.272	0.160	0.44	0.49
16	0.00	AV1	39.22	11.78	0.286	81.7	42.7	0.286	0.163	0.55	0.60
17	0.00	AV1	36.44	12.02	0.286	81.8	42.5	0.286	0.158	0.46	0.64
18	0.00	AV1	32.73	11.74	0.259	74.0	42.3	0.259	0.132	0.51	0.37
19	0.00	AV1	36.19	11.85	0.285	81.3	42.7	0.285	0.163	0.47	0.66
20	0.00	AV1	35.53	11.82	0.279	79.8	42.6	0.279	0.159	0.44	0.68
21	0.00	AV1	37.20	11.56	0.284	81.1	42.3	0.284	0.158	0.54	0.80
22	0.00	AV1	37.48	11.67	0.284	81.3	42.6	0.284	0.157	0.47	0.56
23	0.00	AV1	38.19	11.74	0.281	80.3	42.6	0.281	0.164	0.51	0.61
24	0.00	AV1	38.92	11.91	0.283	80.9	42.7	0.283	0.164	0.60	0.66
25	0.00	AV1	39.20	11.62	0.283	80.9	42.4	0.283	0.164	0.58	0.62
26	0.00	AV1	38.92	11.68	0.277	79.1	42.5	0.277	0.166	0.59	0.68
27	0.00	AV1	38.82	11.43	0.270	77.2	42.7	0.270	0.161	0.44	0.62
28	0.00	AV1	38.82	11.45	0.267	76.2	42.3	0.267	0.163	0.46	0.66
29	0.00	AV1	39.63	11.50	0.269	76.9	42.7	0.269	0.163	0.53	0.60
30	0.00	AV1	38.44	11.30	0.264	75.4	42.3	0.264	0.162	0.41	0.62
31	0.00	AV1	38.51	11.36	0.274	78.4	42.7	0.274	0.162	0.49	0.59
32	0.00	AV1	38.34	11.37	0.270	77.1	42.5	0.270	0.163	0.40	0.68
33	0.00	AV1	38.56	11.45	0.273	78.0	42.9	0.273	0.167	0.46	0.70
34	0.00	AV1	37.05	11.77	0.285	81.4	42.6	0.285	0.160	0.43	0.69
35	0.00	AV1	34.83	11.71	0.278	79.3	42.5	0.278	0.154	0.41	0.61
36	0.00	AV1	39.05	11.95	0.299	85.6	42.5	0.299	0.164	0.65	0.64
37	0.00	AV1	39.47	11.91	0.296	84.7	42.7	0.296	0.167	0.61	0.67
38	0.00	AV1	36.80	11.94	0.280	80.0	42.6	0.280	0.159	0.52	0.69
39	0.00	AV1	37.71	11.82	0.291	83.0	42.6	0.291	0.160	0.53	0.65
40	0.00	AV1	37.86	12.02	0.302	86.3	42.6	0.302	0.161	0.56	0.64
41	0.00	AV1	39.45	11.69	0.293	83.8	42.4	0.293	0.163	0.53	0.63
42	0.00	AV1	38.92	11.58	0.279	79.7	42.8	0.279	0.167	0.46	0.65
43	0.00	AV1	39.15	11.66	0.289	82.6	42.6	0.289	0.170	0.46	0.71
44	0.00	AV1	39.83	11.65	0.287	82.1	42.6	0.287	0.166	0.41	0.49
45	0.00	AV1	38.74	11.82	0.283	80.8	42.9	0.283	0.168	0.44	0.71
46	0.00	AV1	36.59	11.70	0.278	79.5	42.3	0.278	0.163	0.44	0.64
47	0.00	AV1	38.36	11.33	0.273	77.9	42.5	0.273	0.165	0.50	0.62
48	0.00	AV1	38.39	11.39	0.268	76.6	42.8	0.268	0.162	0.41	0.64
49	0.00	AV1	38.16	11.33	0.263	75.1	42.6	0.263	0.162	0.52	0.68
50	0.00	AV1	37.40	11.56	0.279	79.8	42.8	0.279	0.167	0.66	0.67
51	0.00	AV1	38.31	11.38	0.271	77.4	42.6	0.271	0.162	0.61	0.69
52	0.00	AV1	30.66	11.15	0.253	72.4	42.6	0.253	0.144	0.65	0.63
53	0.00	AV1	35.36	10.20	0.249	71.0	42.5	0.249	0.149	0.40	0.62
54	0.00	AV1	36.29	10.77	0.275	78.4	43.0	0.275	0.156	0.68	0.62
55	0.00	AV1	33.66	10.08	0.263	75.1	42.4	0.263	0.150	0.69	0.83
56	0.00	AV1	34.78	9.92	0.254	72.6	42.9	0.254	0.150	0.38	0.64
57	0.00	AV1	33.59	9.78	0.256	73.2	42.7	0.256	0.151	0.44	0.60
58	0.00	AV1	35.79	10.21	0.260	74.3	42.5	0.260	0.154	0.55	0.65
59	0.00	AV1	34.75	10.30	0.256	73.2	42.4	0.256	0.150	0.49	0.70
60	0.00	AV1	37.98	10.90	0.267	76.3	42.7	0.267	0.161	0.65	0.66
61	0.00	AV1	40.01	11.64	0.272	77.7	42.8	0.272	0.168	0.72	0.69

SPT, Calvert Cliffs - B401-75
N3 rod
OP: KB
Test date: 20-Jun-2006

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
62	0.00	AV1	36.01	10.40	0.260	74.4	43.2	0.260	0.150	0.56	0.65
		Average	37.44	11.40	0.272	77.8	42.5	0.272	0.160	0.55	0.63

Total number of blows analyzed: 62

Time Summary

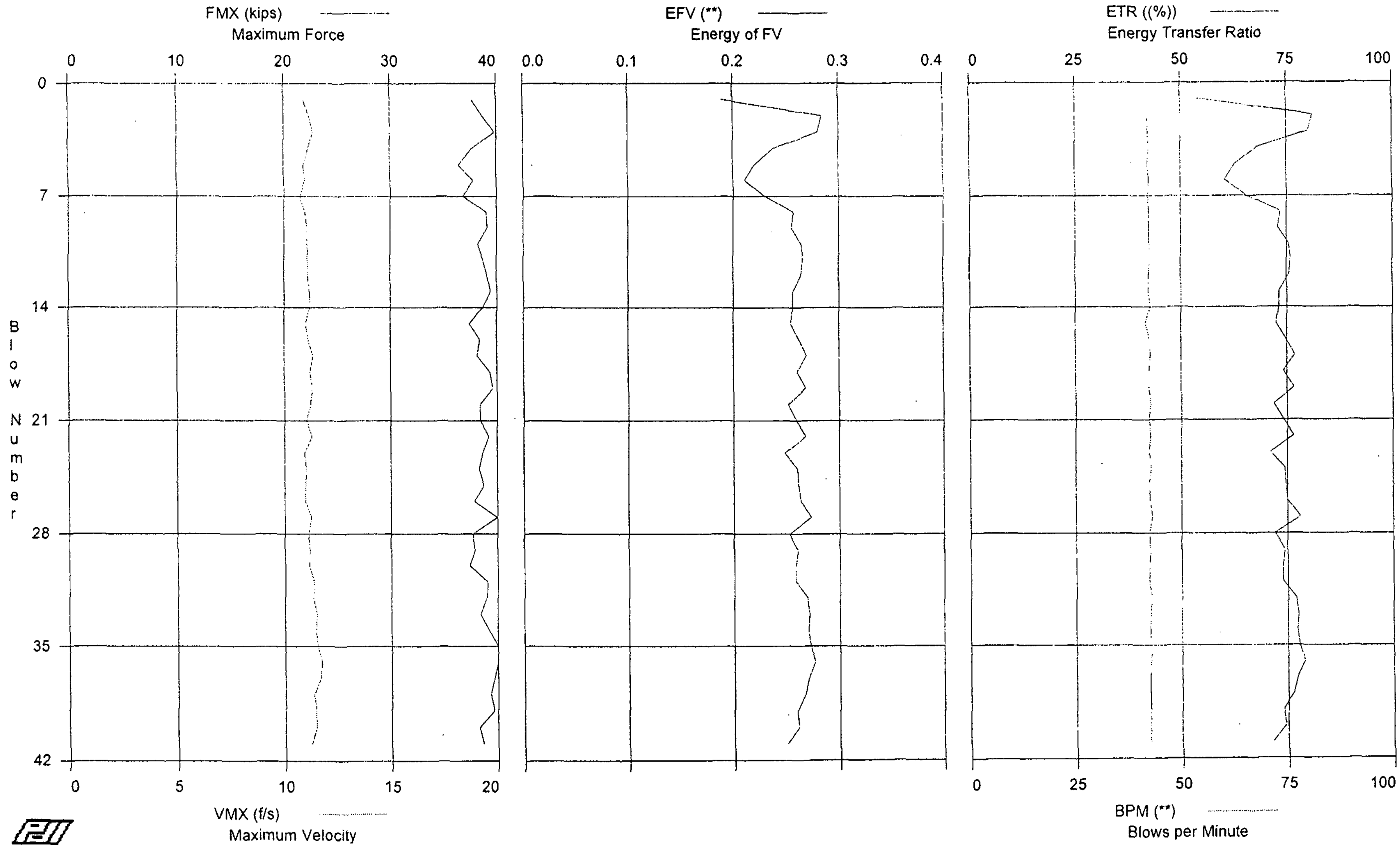
Drive 1 minute 41 seconds 9:39:22 AM - 9:41:03 AM (6/20/2006) BN 1 - 62

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 20-Jun-2006

SPT, Calvert Cliffs - B401-90



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-90
N3 rod
OP: KB
Test date: 20-Jun-2006

AR: 2.30 in^2
LE: 94.0 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute

EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	37.68	10.92	0.189	53.9	**	0.189	0.075	1.15	0.48
2	0.00	AV1	38.69	11.19	0.284	81.2	42.3	0.284	0.169	1.62	0.60
3	0.00	AV1	39.83	11.37	0.280	80.1	42.2	0.280	0.164	1.34	0.59
4	0.00	AV1	37.68	11.15	0.238	68.1	42.6	0.238	0.149	0.60	0.65
5	0.00	AV1	36.44	10.93	0.220	62.8	42.2	0.220	0.137	0.63	0.67
6	0.00	AV1	37.81	10.98	0.211	60.4	42.6	0.211	0.135	0.62	0.64
7	0.00	AV1	36.80	10.73	0.229	65.4	42.1	0.229	0.145	0.64	0.65
8	0.00	AV1	39.02	10.98	0.257	73.6	42.6	0.257	0.164	0.88	0.59
9	0.00	AV1	39.12	11.07	0.255	72.9	42.6	0.255	0.164	0.83	0.60
10	0.00	AV1	38.19	11.07	0.264	75.4	42.5	0.264	0.165	0.55	0.64
11	0.00	AV1	38.74	11.10	0.266	75.9	42.6	0.266	0.169	0.69	0.87
12	0.00	AV1	39.12	11.12	0.264	75.5	42.5	0.264	0.168	0.76	0.61
13	0.00	AV1	39.40	11.18	0.256	73.1	42.2	0.256	0.158	0.80	0.57
14	0.00	AV1	38.64	11.20	0.256	73.0	42.7	0.256	0.163	0.64	0.64
15	0.00	AV1	37.40	11.00	0.254	72.5	41.7	0.254	0.160	0.66	0.84
16	0.00	AV1	38.41	11.12	0.262	74.7	42.6	0.262	0.167	0.60	0.63
17	0.00	AV1	38.11	11.34	0.269	76.9	42.7	0.269	0.170	0.73	0.67
18	0.00	AV1	39.32	11.20	0.260	74.1	42.4	0.260	0.160	0.73	0.60
19	0.00	AV1	39.60	11.31	0.268	76.7	42.3	0.268	0.173	0.66	0.62
20	0.00	AV1	38.36	11.21	0.251	71.8	42.7	0.251	0.156	0.62	0.59
21	0.00	AV1	38.41	11.02	0.259	74.1	42.3	0.259	0.165	0.58	0.61
22	0.00	AV1	39.20	11.30	0.268	76.5	42.7	0.268	0.170	0.69	0.67
23	0.00	AV1	38.62	10.93	0.248	70.9	42.4	0.248	0.155	0.54	0.59
24	0.00	AV1	38.29	11.01	0.260	74.4	42.8	0.260	0.167	0.56	0.67
25	0.00	AV1	38.74	10.97	0.261	74.7	42.3	0.261	0.167	0.50	0.56
26	0.00	AV1	37.81	10.96	0.263	75.0	42.5	0.263	0.169	0.57	0.85
27	0.00	AV1	39.96	11.24	0.273	78.0	43.0	0.273	0.175	0.57	0.57
28	0.00	AV1	37.66	11.10	0.252	72.0	42.3	0.252	0.159	0.53	0.84
29	0.00	AV1	37.86	11.18	0.260	74.3	42.6	0.260	0.166	0.58	0.65
30	0.00	AV1	37.35	11.13	0.258	73.8	42.3	0.258	0.164	0.52	0.51
31	0.00	AV1	39.02	11.35	0.258	73.8	42.3	0.258	0.165	0.55	0.61
32	0.00	AV1	38.94	11.33	0.269	76.9	42.8	0.269	0.170	0.61	0.65
33	0.00	AV1	38.36	11.49	0.271	77.5	42.7	0.271	0.174	0.58	0.71
34	0.00	AV1	39.15	11.44	0.270	77.2	42.5	0.270	0.175	0.51	0.60
35	0.00	AV1	40.26	11.51	0.272	77.7	42.6	0.272	0.177	0.50	0.60
36	0.00	AV1	40.16	11.70	0.276	79.0	42.7	0.276	0.181	0.53	0.63
37	0.00	AV1	39.65	11.65	0.270	77.2	42.4	0.270	0.170	0.79	0.69
38	0.00	AV1	39.27	11.34	0.267	76.3	42.5	0.267	0.171	0.50	0.55
39	0.00	AV1	39.63	11.44	0.259	73.9	42.5	0.259	0.160	0.77	0.65
40	0.00	AV1	38.26	11.46	0.261	74.5	42.6	0.261	0.165	0.57	0.67
41	0.00	AV1	38.64	11.22	0.250	71.4	42.6	0.250	0.158	0.50	0.66
		Average	38.62	11.19	0.258	73.6	42.5	0.258	0.162	0.68	0.64

Total number of blows analyzed: 41

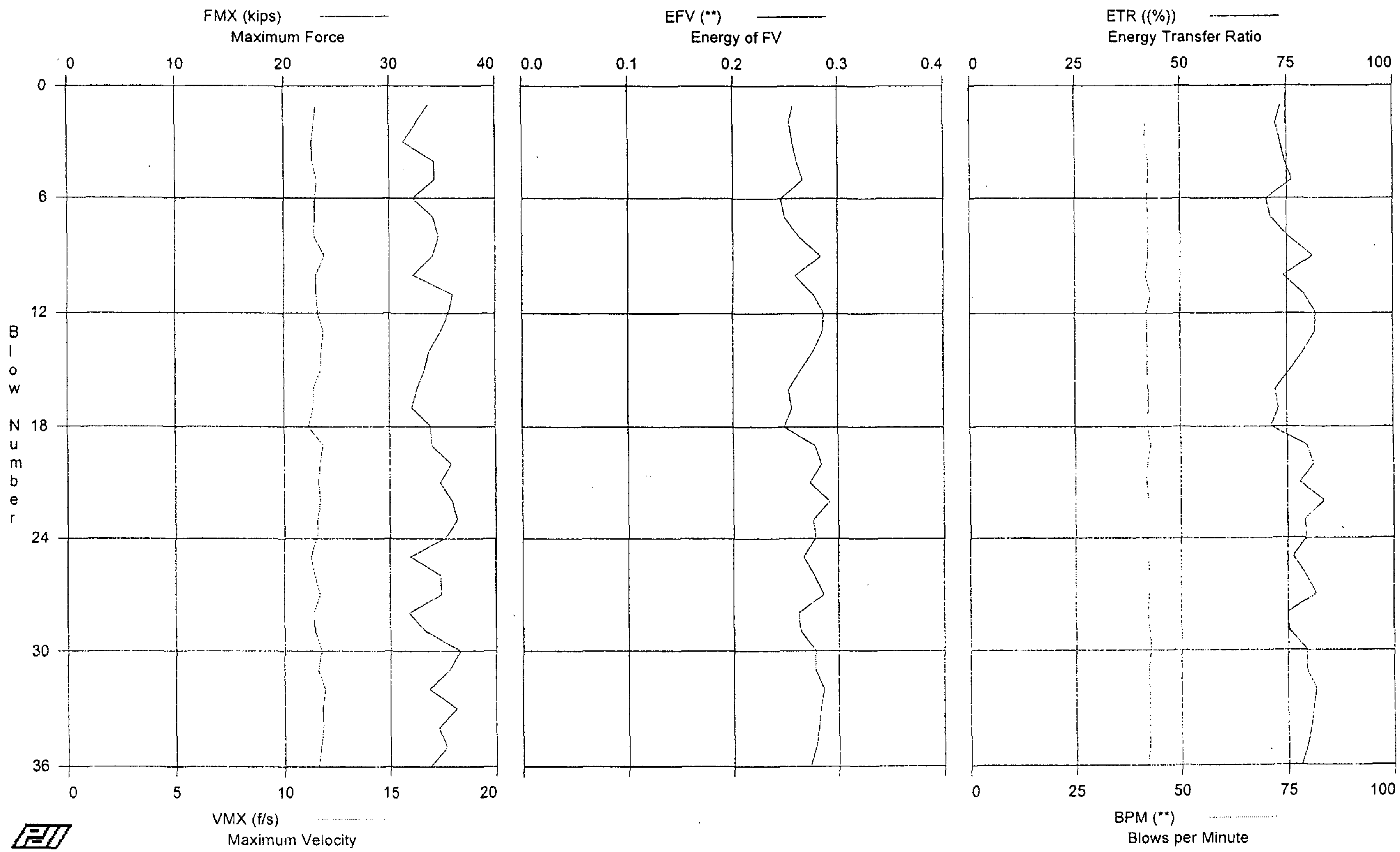
Time Summary

Drive 56 seconds 10:19:22 AM - 10:20:18 AM (6/20/2006) BN 1 - 41

GRL Engineers, Inc. - Case Method Results

Test date: 20-Jun-2006

SPT, Calvert Cliffs - B401-105



SPT, Calvert Cliffs - B401-105 N3 rod
OP: KB Test date: 20-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 109.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	33.74	11.55	0.258	73.8	**	0.258	0.150	0.96	0.56
2	0.00	AV1	32.55	11.44	0.254	72.5	42.0	0.254	0.152	1.14	0.70
3	0.00	AV1	31.35	11.31	0.257	73.4	41.7	0.257	0.153	1.02	0.68
4	0.00	AV1	34.22	11.34	0.261	74.5	42.6	0.261	0.160	1.03	0.56
5	0.00	AV1	34.28	11.55	0.267	76.2	42.4	0.267	0.162	1.21	0.54
6	0.00	AV1	32.22	11.47	0.246	70.2	42.2	0.246	0.141	1.01	0.66
7	0.00	AV1	34.17	11.47	0.250	71.3	42.6	0.250	0.152	1.06	0.71
8	0.00	AV1	34.65	11.42	0.263	75.3	42.6	0.263	0.164	0.91	0.74
9	0.00	AV1	34.07	11.89	0.284	81.0	42.6	0.284	0.168	1.07	0.66
10	0.00	AV1	32.20	11.50	0.259	74.1	41.9	0.259	0.152	0.95	0.70
11	0.00	AV1	35.99	11.52	0.277	79.1	43.1	0.277	0.179	0.95	0.74
12	0.00	AV1	35.60	11.61	0.287	81.9	42.1	0.287	0.181	0.90	0.74
13	0.00	AV1	34.79	11.87	0.285	81.4	42.2	0.285	0.166	0.92	0.55
14	0.00	AV1	33.71	11.75	0.276	78.8	42.3	0.276	0.160	1.05	0.65
15	0.00	AV1	33.26	11.72	0.264	75.6	42.2	0.264	0.152	0.87	0.66
16	0.00	AV1	32.60	11.39	0.253	72.2	42.4	0.253	0.148	0.68	0.53
17	0.00	AV1	32.11	11.38	0.256	73.0	42.5	0.256	0.151	0.79	0.70
18	0.00	AV1	33.93	11.16	0.249	71.2	42.3	0.249	0.150	0.78	0.58
19	0.00	AV1	33.94	11.82	0.278	79.6	43.0	0.278	0.171	0.73	0.70
20	0.00	AV1	35.79	11.68	0.284	81.1	42.2	0.284	0.179	0.85	0.56
21	0.00	AV1	34.72	11.60	0.273	77.9	42.0	0.273	0.169	0.63	0.71
22	0.00	AV1	35.89	11.70	0.292	83.6	42.4	0.292	0.179	0.64	0.70
23	0.00	AV1	36.34	11.56	0.276	79.0	42.4	0.276	0.176	0.60	0.56
24	0.00	AV1	35.15	11.52	0.278	79.3	42.4	0.278	0.173	0.60	0.75
25	0.00	AV1	31.93	11.26	0.267	76.2	42.3	0.267	0.158	0.58	0.70
26	0.00	AV1	34.76	11.44	0.277	79.2	42.6	0.277	0.166	0.45	0.55
27	0.00	AV1	34.83	11.68	0.286	81.7	42.5	0.286	0.174	0.66	0.74
28	0.00	AV1	31.79	11.39	0.262	74.9	42.2	0.262	0.155	0.68	0.70
29	0.00	AV1	33.40	11.42	0.264	75.4	42.6	0.264	0.156	0.19	0.65
30	0.00	AV1	36.59	11.72	0.278	79.4	42.8	0.278	0.179	0.12	0.73
31	0.00	AV1	35.61	11.57	0.278	79.4	42.5	0.278	0.174	0.50	0.55
32	0.00	AV1	33.70	11.89	0.286	81.6	42.5	0.286	0.171	0.38	0.70
33	0.00	AV1	36.24	11.78	0.283	80.9	42.5	0.283	0.175	0.68	0.58
34	0.00	AV1	34.57	11.81	0.281	80.4	42.6	0.281	0.168	0.72	0.54
35	0.00	AV1	35.28	11.67	0.278	79.4	42.5	0.278	0.172	0.46	0.54
36	0.00	AV1	33.76	11.57	0.273	78.0	42.1	0.273	0.165	0.55	0.68
		Average	34.16	11.57	0.271	77.3	42.4	0.271	0.164	0.76	0.65

Total number of blows analyzed: 36

Time Summary

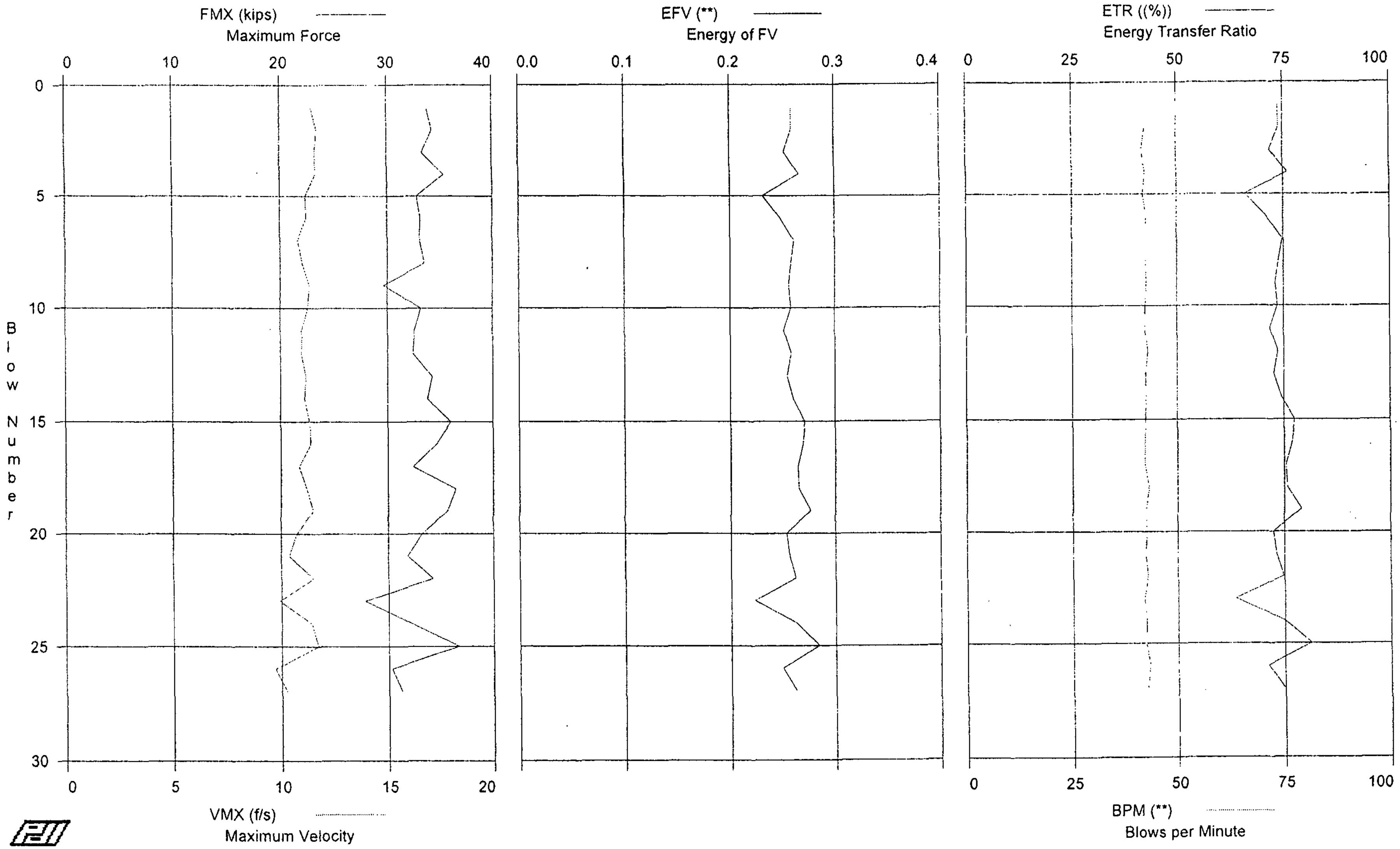
Drive 50 seconds 11:56:02 AM - 11:56:52 AM (6/20/2006) BN 1 - 36

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 20-Jun-2006

SPT, Calvert Cliffs - B401-120



SPT, Calvert Cliffs - B401-120
N3 rod
OP: KB
Test date: 20-Jun-2006

AR: 2.30 in^2
LE: 124.0 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	33.81	11.48	0.259	73.9	**	0.259	0.168	1.13	0.73
2	0.00	AV1	34.29	11.73	0.259	74.0	42.5	0.259	0.157	0.96	0.73
3	0.00	AV1	33.35	11.64	0.252	71.9	41.8	0.252	0.138	1.17	0.71
4	0.00	AV1	35.38	11.65	0.266	76.0	42.4	0.266	0.171	1.09	0.60
5	0.00	AV1	32.80	11.17	0.231	66.0	41.9	0.231	0.143	0.81	0.68
6	0.00	AV1	33.16	11.23	0.248	71.0	42.8	0.248	0.154	0.80	0.72
7	0.00	AV1	33.06	10.81	0.261	74.7	42.6	0.261	0.165	0.95	0.76
8	0.00	AV1	33.50	11.02	0.258	73.8	42.6	0.258	0.166	0.90	0.56
9	0.00	AV1	29.62	11.35	0.256	73.1	42.7	0.256	0.153	0.96	0.55
10	0.00	AV1	33.18	11.27	0.258	73.6	42.4	0.258	0.157	0.85	0.59
11	0.00	AV1	32.55	10.98	0.251	71.8	42.3	0.251	0.159	1.06	0.74
12	0.00	AV1	32.40	10.97	0.258	73.6	43.0	0.258	0.159	0.82	0.55
13	0.00	AV1	34.22	11.18	0.254	72.7	42.5	0.254	0.162	0.90	0.59
14	0.00	AV1	33.76	11.11	0.260	74.4	42.6	0.260	0.167	0.93	0.56
15	0.00	AV1	35.96	11.35	0.271	77.5	42.5	0.271	0.175	0.90	0.60
16	0.00	AV1	34.57	11.38	0.269	76.8	42.2	0.269	0.174	0.84	0.59
17	0.00	AV1	32.35	10.83	0.264	75.4	42.3	0.264	0.165	0.99	0.59
18	0.00	AV1	36.39	11.20	0.265	75.7	43.2	0.265	0.169	1.00	0.62
19	0.00	AV1	35.61	11.50	0.276	79.0	42.5	0.276	0.183	1.01	0.58
20	0.00	AV1	33.21	10.72	0.253	72.4	42.6	0.253	0.160	0.89	0.60
21	0.00	AV1	31.84	10.38	0.256	73.1	42.4	0.256	0.162	0.89	0.63
22	0.00	AV1	34.26	11.50	0.262	74.8	42.9	0.262	0.165	1.15	0.56
23	0.00	AV1	27.75	9.90	0.222	63.4	42.0	0.222	0.123	0.76	0.69
24	0.00	AV1	32.18	11.39	0.262	74.9	42.5	0.262	0.156	0.94	0.52
25	0.00	AV1	36.62	11.70	0.284	81.2	42.3	0.284	0.187	0.86	0.65
26	0.00	AV1	30.28	9.70	0.249	71.1	43.3	0.249	0.155	0.81	0.59
27	0.00	AV1	31.24	10.24	0.262	74.8	42.7	0.262	0.167	0.79	0.57
		Average	33.23	11.09	0.258	73.7	42.5	0.258	0.161	0.93	0.62

Total number of blows analyzed: 27

Time Summary

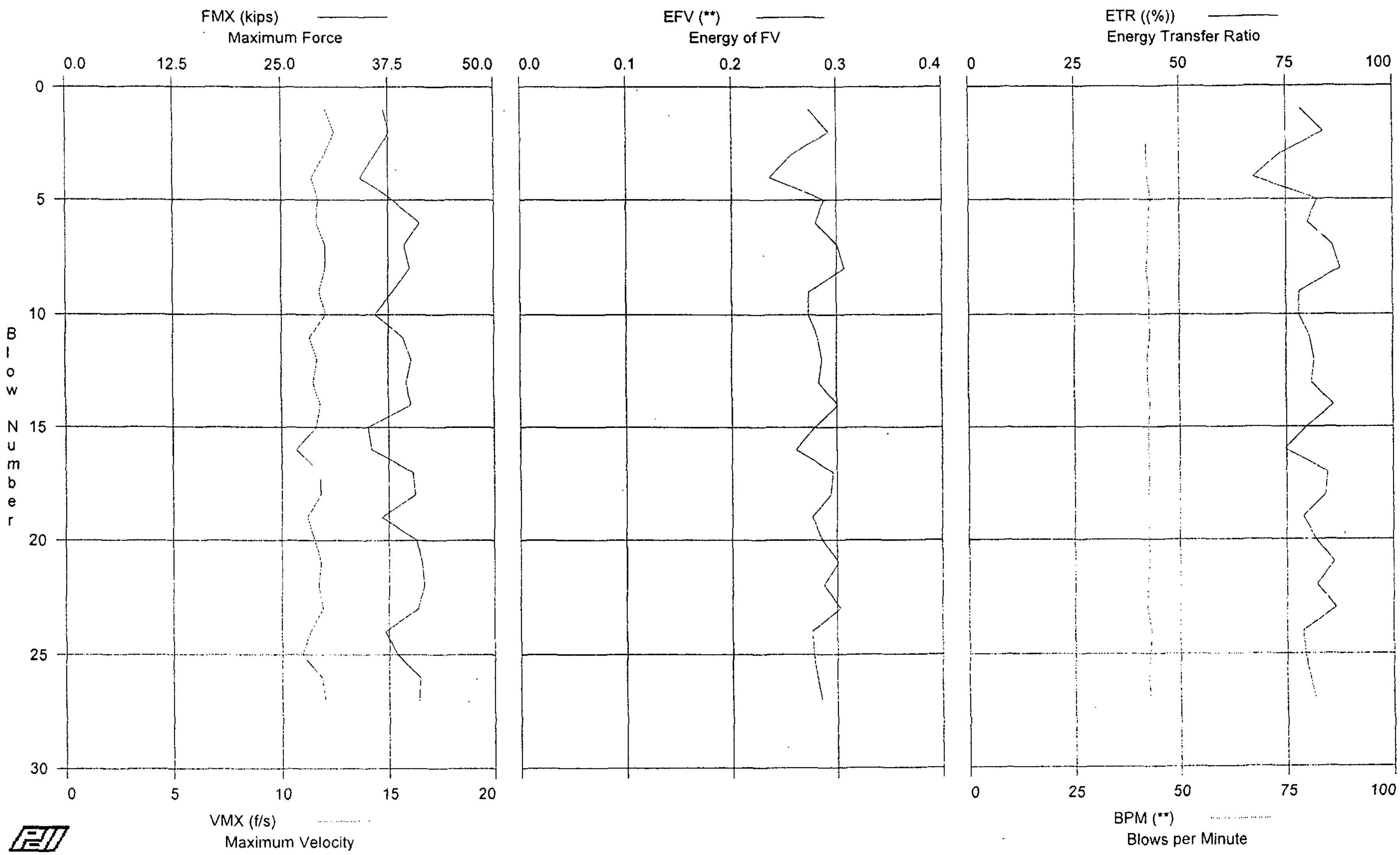
Drive 37 seconds 1:20:37 PM - 1:21:14 PM (6/20/2006) BN 1 - 27

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 20-Jun-2006

SPT, Calvert Cliffs - B401-135



SPT, Calvert Cliffs - B401-135 N3 rod
OP: KB Test date: 20-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 139.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	36.95	12.07	0.274	78.4	**	0.274	0.171	1.47	0.67
2	0.00	AV1	37.60	12.47	0.293	83.8	42.4	0.293	0.181	1.44	0.62
3	0.00	AV1	35.91	12.01	0.257	73.5	42.2	0.257	0.160	1.11	0.58
4	0.00	AV1	34.19	11.40	0.236	67.4	42.5	0.236	0.144	1.00	0.63
5	0.00	AV1	37.98	11.70	0.288	82.3	43.2	0.288	0.178	1.10	0.73
6	0.00	AV1	41.17	11.63	0.280	80.0	42.6	0.280	0.184	1.06	0.66
7	0.00	AV1	39.35	12.02	0.301	85.9	42.5	0.301	0.186	1.25	0.59
8	0.00	AV1	40.03	12.04	0.307	87.7	42.2	0.307	0.192	1.15	0.74
9	0.00	AV1	38.01	11.76	0.274	78.2	42.9	0.274	0.176	1.04	0.59
10	0.00	AV1	35.86	12.04	0.273	77.9	42.7	0.273	0.168	1.15	0.62
11	0.00	AV1	39.22	11.31	0.282	80.5	43.0	0.282	0.183	1.09	0.61
12	0.00	AV1	40.18	11.66	0.286	81.6	42.3	0.286	0.185	0.91	0.71
13	0.00	AV1	39.63	11.47	0.283	80.9	42.6	0.283	0.186	0.97	0.62
14	0.00	AV1	40.13	11.79	0.301	86.0	42.9	0.301	0.189	1.08	0.71
15	0.00	AV1	35.08	11.61	0.279	79.7	42.6	0.279	0.173	0.92	0.59
16	0.00	AV1	35.48	10.67	0.261	74.6	42.5	0.261	0.168	0.90	0.75
17	0.00	AV1	40.33	11.77	0.296	84.5	42.8	0.296	0.191	1.09	0.74
18	0.00	AV1	40.59	11.80	0.294	84.1	42.5	0.294	0.188	0.97	0.69
19	0.00	AV1	36.59	11.15	0.276	78.9	42.6	0.276	0.177	0.96	0.58
20	0.00	AV1	40.79	11.53	0.286	81.9	42.7	0.286	0.189	0.95	0.64
21	0.00	AV1	41.37	11.80	0.301	86.0	42.8	0.301	0.191	0.98	0.66
22	0.00	AV1	41.65	11.68	0.287	81.9	42.3	0.287	0.189	0.86	0.67
23	0.00	AV1	40.94	11.90	0.303	86.6	42.2	0.303	0.194	0.91	0.61
24	0.00	AV1	37.07	11.32	0.276	78.8	43.2	0.276	0.177	0.70	0.59
25	0.00	AV1	38.41	10.92	0.277	79.2	42.8	0.277	0.181	0.79	0.69
26	0.00	AV1	41.17	11.83	0.281	80.4	42.6	0.281	0.186	0.84	0.70
27	0.00	AV1	41.02	11.99	0.285	81.5	42.9	0.285	0.187	0.77	0.66
		Average	38.77	11.68	0.283	80.8	42.6	0.283	0.181	1.02	0.65

Total number of blows analyzed: 27

Time Summary

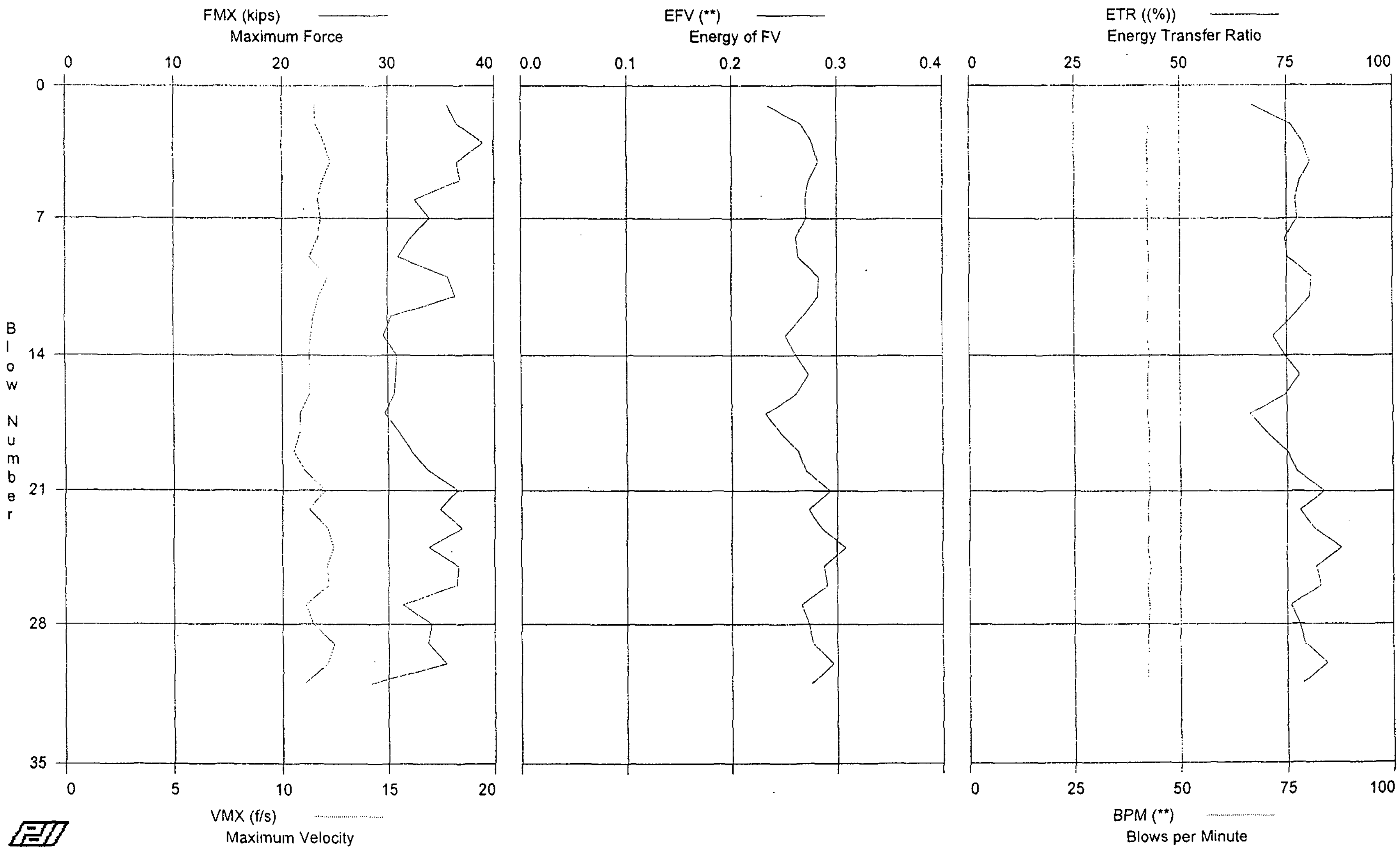
Drive 37 seconds 3:05:57 PM - 3:06:34 PM (6/20/2006) BN 1 - 27

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

Test date: 20-Jun-2006

SPT, Calvert Cliffs - B401-150



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-150
N3 Rod
OP: KB
Test date: 20-Jun-2006

AR: 2.30 in^2
LE: 154.0 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	35.58	11.55	0.234	66.9	**	0.234	0.150	0.94	0.61
2	0.00	AV1	36.54	11.58	0.266	75.9	42.7	0.266	0.165	1.08	0.60
3	0.00	AV1	39.05	12.01	0.277	79.0	42.4	0.277	0.178	1.11	0.64
4	0.00	AV1	36.49	12.25	0.282	80.5	42.5	0.282	0.173	0.94	0.55
5	0.00	AV1	36.77	11.88	0.273	77.9	42.3	0.273	0.165	0.87	0.60
6	0.00	AV1	32.54	11.68	0.270	77.0	42.3	0.270	0.157	1.04	0.55
7	0.00	AV1	33.93	11.82	0.271	77.5	42.6	0.271	0.165	0.93	0.63
8	0.00	AV1	32.16	11.69	0.261	74.6	42.4	0.261	0.154	0.82	0.56
9	0.00	AV1	30.95	11.27	0.263	75.2	42.7	0.263	0.152	0.90	0.59
10	0.00	AV1	35.66	12.15	0.283	80.9	42.5	0.283	0.173	1.00	0.63
11	0.00	AV1	36.34	11.73	0.282	80.4	42.7	0.282	0.180	0.91	0.58
12	0.00	AV1	30.38	11.49	0.268	76.5	42.4	0.268	0.156	0.79	0.54
13	0.00	AV1	29.56	11.35	0.251	71.8	42.3	0.251	0.149	0.74	0.50
14	0.00	AV1	30.81	11.27	0.261	74.6	42.9	0.261	0.156	0.66	0.53
15	0.00	AV1	30.76	11.31	0.273	78.0	42.4	0.273	0.156	0.75	0.56
16	0.00	AV1	30.58	11.28	0.261	74.6	42.4	0.261	0.154	0.68	0.52
17	0.00	AV1	29.66	10.84	0.232	66.3	42.3	0.232	0.135	0.71	0.59
18	0.00	AV1	31.00	10.82	0.246	70.3	42.7	0.246	0.147	0.66	0.56
19	0.00	AV1	32.20	10.55	0.263	75.2	42.6	0.263	0.157	0.88	0.64
20	0.00	AV1	33.72	11.01	0.270	77.3	42.6	0.270	0.163	0.91	0.58
21	0.00	AV1	36.51	11.99	0.293	83.7	42.7	0.293	0.177	0.92	0.58
22	0.00	AV1	34.85	11.25	0.273	78.0	42.3	0.273	0.170	0.94	0.60
23	0.00	AV1	36.94	12.10	0.285	81.5	42.6	0.285	0.180	0.99	0.57
24	0.00	AV1	33.83	12.41	0.308	87.9	42.3	0.308	0.169	1.15	0.56
25	0.00	AV1	36.60	12.08	0.287	81.9	43.0	0.287	0.178	0.97	0.62
26	0.00	AV1	36.39	12.15	0.290	82.8	42.2	0.290	0.181	0.85	0.60
27	0.00	AV1	31.34	11.09	0.266	75.9	42.7	0.266	0.159	0.88	0.61
28	0.00	AV1	34.06	11.43	0.273	77.9	42.5	0.273	0.167	0.74	0.57
29	0.00	AV1	33.74	12.42	0.277	79.2	42.5	0.277	0.163	0.95	0.55
30	0.00	AV1	35.42	12.07	0.296	84.4	42.4	0.296	0.179	0.84	0.58
31	0.00	AV1	28.32	11.04	0.275	78.6	42.3	0.275	0.152	0.81	0.52
		Average	33.63	11.60	0.271	77.5	42.5	0.271	0.163	0.88	0.58

Total number of blows analyzed: 31

Time Summary

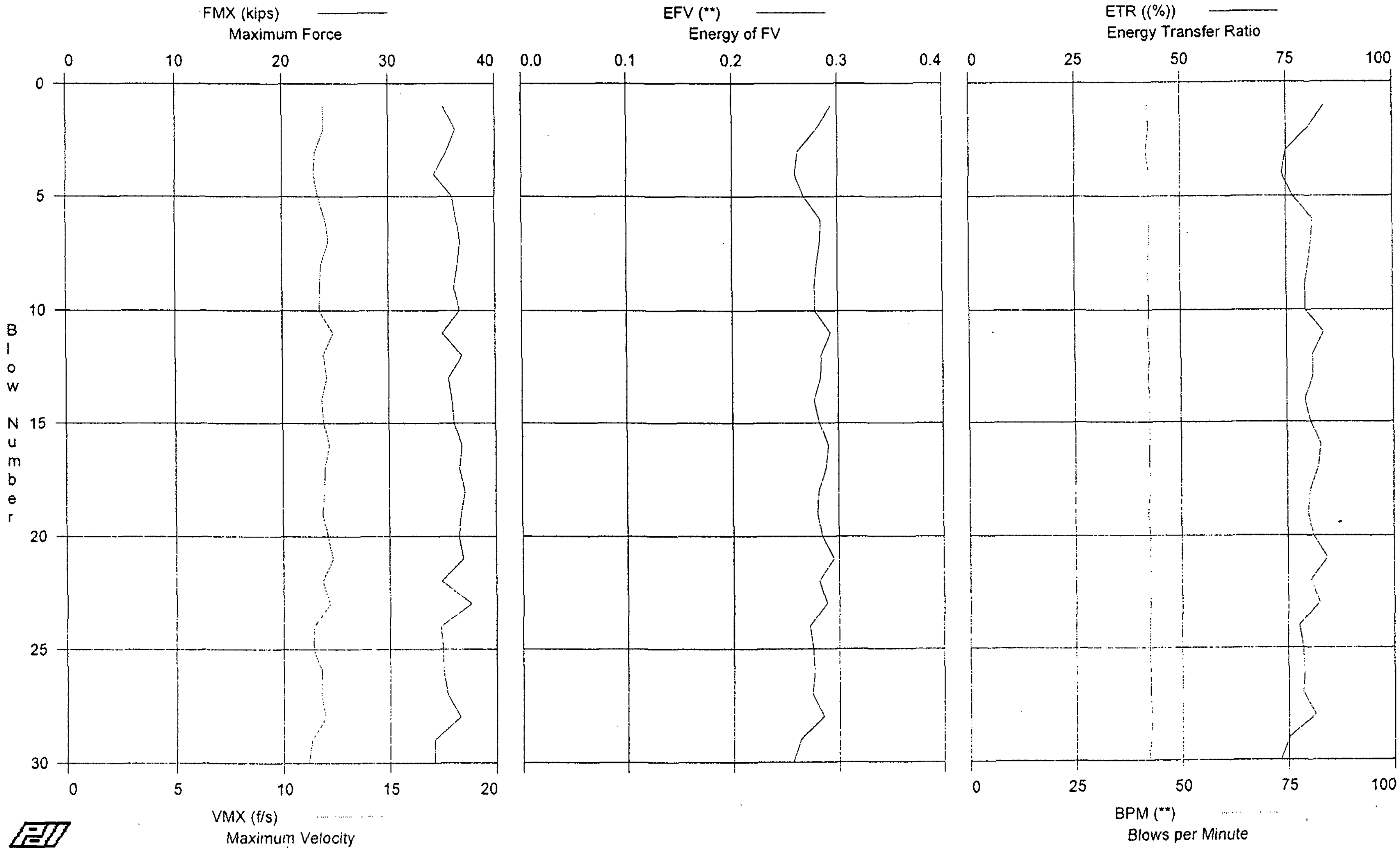
Drive 42 seconds 4:37:18 PM - 4:38:00 PM (6/20/2006) BN 1 - 31

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

Test date: 21-Jun-2006

SPT, Calvert Cliffs - B401-170



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-170 N3 rod
OP: KB Test date: 21-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 174.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	35.14	11.96	0.294	84.0	42.3	0.294	0.169	0.91	0.56
2	0.00	AV1	36.24	11.95	0.280	80.1	42.4	0.280	0.172	0.93	0.59
3	0.00	AV1	35.41	11.56	0.262	74.9	41.8	0.262	0.159	0.80	0.60
4	0.00	AV1	34.26	11.48	0.259	74.0	42.6	0.259	0.155	0.83	0.74
5	0.00	AV1	35.97	11.70	0.268	76.6	42.6	0.268	0.166	1.01	0.56
6	0.00	AV1	36.34	12.04	0.284	81.2	42.6	0.284	0.175	1.08	0.59
7	0.00	AV1	36.70	12.18	0.283	80.7	42.7	0.283	0.178	0.89	0.65
8	0.00	AV1	36.47	11.84	0.280	80.1	42.3	0.280	0.172	0.90	0.60
9	0.00	AV1	36.13	11.80	0.278	79.4	42.3	0.278	0.170	0.78	0.62
10	0.00	AV1	36.62	11.74	0.278	79.4	42.5	0.278	0.171	0.86	0.56
11	0.00	AV1	35.02	12.39	0.293	83.7	42.3	0.293	0.176	0.95	0.63
12	0.00	AV1	36.88	11.94	0.284	81.1	42.6	0.284	0.174	0.96	0.61
13	0.00	AV1	35.55	12.07	0.283	81.0	42.2	0.283	0.168	0.98	0.61
14	0.00	AV1	35.90	11.84	0.277	79.2	42.6	0.277	0.167	0.90	0.62
15	0.00	AV1	36.10	11.95	0.282	80.5	42.6	0.282	0.170	0.94	0.64
16	0.00	AV1	36.80	12.18	0.290	82.8	42.5	0.290	0.176	0.94	0.61
17	0.00	AV1	36.55	11.98	0.288	82.2	42.5	0.288	0.173	0.90	0.59
18	0.00	AV1	37.09	11.96	0.281	80.3	42.6	0.281	0.175	0.81	0.61
19	0.00	AV1	36.72	11.88	0.280	79.9	42.2	0.280	0.172	0.87	0.62
20	0.00	AV1	36.46	12.10	0.284	81.0	42.5	0.284	0.178	0.88	0.67
21	0.00	AV1	36.90	12.33	0.295	84.3	42.6	0.295	0.177	0.73	0.58
22	0.00	AV1	34.83	11.85	0.281	80.4	42.7	0.281	0.166	0.83	0.56
23	0.00	AV1	37.60	12.17	0.288	82.3	42.4	0.288	0.182	0.87	0.66
24	0.00	AV1	34.73	11.44	0.272	77.6	42.6	0.272	0.163	0.82	0.58
25	0.00	AV1	34.94	11.41	0.275	78.6	42.4	0.275	0.165	0.62	0.58
26	0.00	AV1	34.94	11.80	0.276	78.7	42.6	0.276	0.168	0.68	0.63
27	0.00	AV1	35.33	11.76	0.274	78.4	42.4	0.274	0.168	0.57	0.58
28	0.00	AV1	36.55	11.96	0.285	81.3	42.8	0.285	0.174	0.63	0.61
29	0.00	AV1	34.12	11.33	0.263	75.2	42.6	0.263	0.158	0.62	0.58
30	0.00	AV1	34.16	11.18	0.256	73.1	42.1	0.256	0.156	0.59	0.62
		Average	35.88	11.86	0.279	79.7	42.5	0.279	0.170	0.84	0.61

Total number of blows analyzed: 30

Time Summary

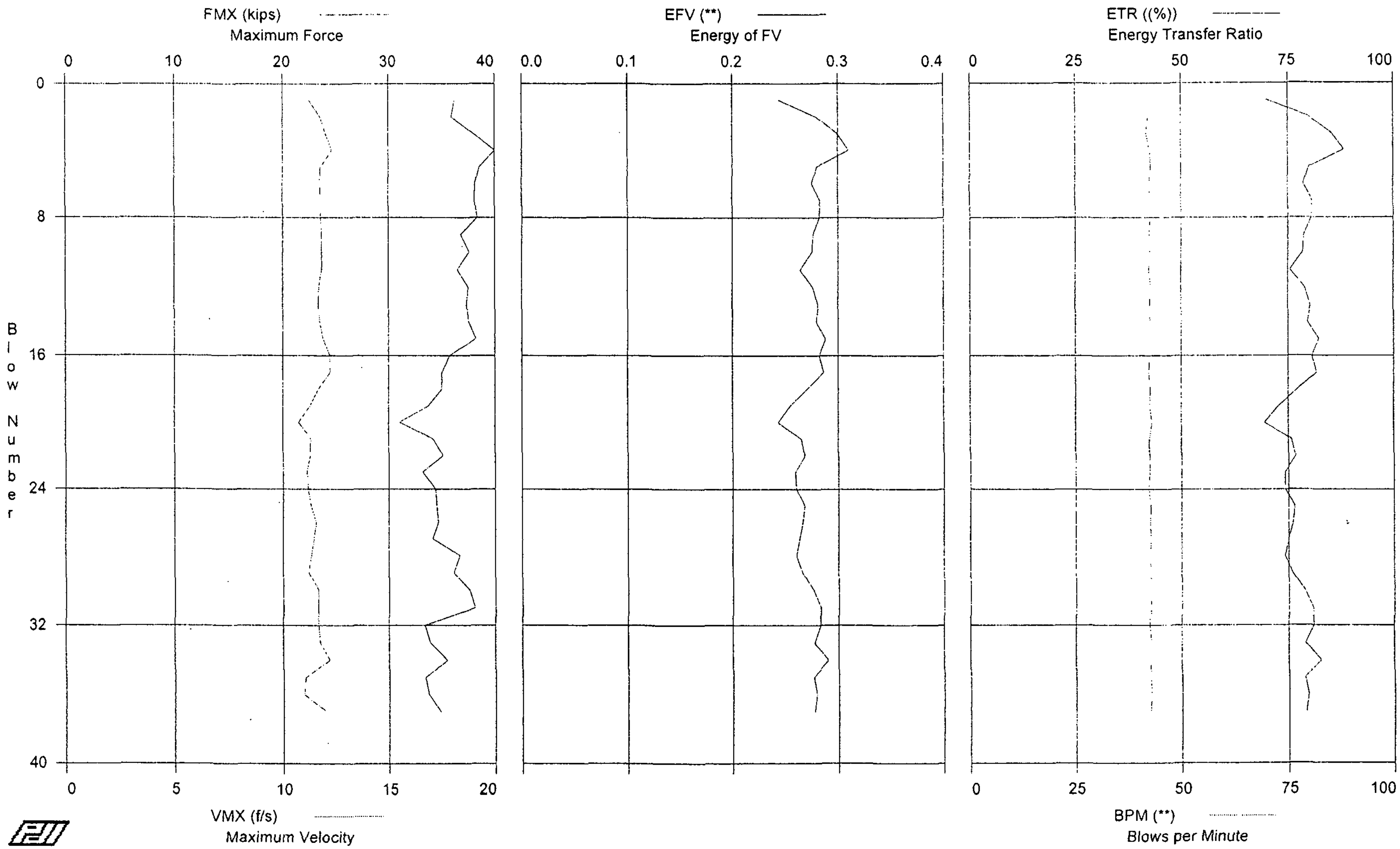
Drive 41 seconds 9:43:13 AM - 9:43:54 AM (6/21/2006) BN 1 - 30

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

Test date: 21-Jun-2006

SPT, Calvert Cliffs - B401-180



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-180 N3 rod
OP: KB Test date: 21-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 184.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	36.23	11.28	0.244	69.9	**	0.244	0.158	0.26	0.70
2	0.00	AV1	35.93	11.79	0.279	79.7	42.3	0.279	0.173	0.75	0.66
3	0.00	AV1	38.00	12.04	0.299	85.4	41.8	0.299	0.184	0.98	0.60
4	0.00	AV1	40.20	12.33	0.310	88.4	42.6	0.310	0.203	1.09	0.68
5	0.00	AV1	38.58	11.78	0.280	80.1	42.9	0.280	0.184	0.81	0.66
6	0.00	AV1	38.18	11.77	0.275	78.7	42.6	0.275	0.181	1.15	0.70
7	0.00	AV1	38.11	11.83	0.283	80.8	42.8	0.283	0.184	0.78	0.73
8	0.00	AV1	38.37	11.79	0.282	80.6	42.8	0.282	0.184	0.73	0.62
9	0.00	AV1	36.80	11.85	0.276	78.8	42.6	0.276	0.172	0.65	0.59
10	0.00	AV1	37.60	11.83	0.275	78.5	42.7	0.275	0.177	0.73	0.65
11	0.00	AV1	36.49	11.85	0.264	75.5	42.5	0.264	0.165	0.56	0.63
12	0.00	AV1	37.51	11.72	0.276	79.0	42.9	0.276	0.179	0.78	0.71
13	0.00	AV1	37.35	11.69	0.281	80.3	42.7	0.281	0.182	0.72	0.62
14	0.00	AV1	37.52	11.75	0.279	79.6	42.6	0.279	0.179	0.53	0.69
15	0.00	AV1	38.24	11.91	0.288	82.3	42.6	0.288	0.185	0.44	0.65
16	0.00	AV1	35.74	12.23	0.282	80.7	42.6	0.282	0.171	0.31	0.59
17	0.00	AV1	35.02	12.24	0.286	81.8	42.4	0.286	0.175	0.40	0.66
18	0.00	AV1	34.98	11.69	0.270	77.1	42.8	0.270	0.165	0.47	0.58
19	0.00	AV1	33.72	11.29	0.254	72.6	42.6	0.254	0.155	0.35	0.56
20	0.00	AV1	31.05	10.76	0.243	69.4	43.1	0.243	0.140	0.37	0.62
21	0.00	AV1	34.15	11.34	0.265	75.8	42.5	0.265	0.159	0.49	0.65
22	0.00	AV1	35.08	11.30	0.268	76.7	42.5	0.268	0.166	0.41	0.65
23	0.00	AV1	33.16	11.13	0.259	74.1	42.6	0.259	0.156	0.46	0.65
24	0.00	AV1	34.35	11.18	0.260	74.2	42.3	0.260	0.162	0.47	0.63
25	0.00	AV1	34.47	11.33	0.268	76.4	42.8	0.268	0.165	0.49	0.62
26	0.00	AV1	34.64	11.56	0.266	76.0	42.6	0.266	0.166	0.44	0.64
27	0.00	AV1	34.11	11.47	0.263	75.0	42.8	0.263	0.162	0.45	0.66
28	0.00	AV1	36.67	11.36	0.260	74.1	42.6	0.260	0.167	0.58	0.63
29	0.00	AV1	36.09	11.22	0.266	75.9	42.7	0.266	0.171	0.53	0.70
30	0.00	AV1	37.57	11.67	0.276	78.8	42.5	0.276	0.179	0.43	0.64
31	0.00	AV1	38.08	11.65	0.283	80.7	42.8	0.283	0.182	0.54	0.69
32	0.00	AV1	33.36	11.69	0.283	81.0	42.4	0.283	0.170	0.64	0.58
33	0.00	AV1	33.85	11.75	0.277	79.0	42.9	0.277	0.164	0.52	0.63
34	0.00	AV1	35.48	12.19	0.290	82.8	42.8	0.290	0.176	0.43	0.62
35	0.00	AV1	33.36	11.04	0.276	78.8	42.6	0.276	0.167	0.52	0.66
36	0.00	AV1	33.70	10.97	0.279	79.6	42.9	0.279	0.169	0.52	0.65
37	0.00	AV1	34.81	12.04	0.277	79.1	42.6	0.277	0.168	0.51	0.58
		Average	35.91	11.63	0.274	78.3	42.6	0.274	0.171	0.57	0.64

Total number of blows analyzed: 37

Time Summary

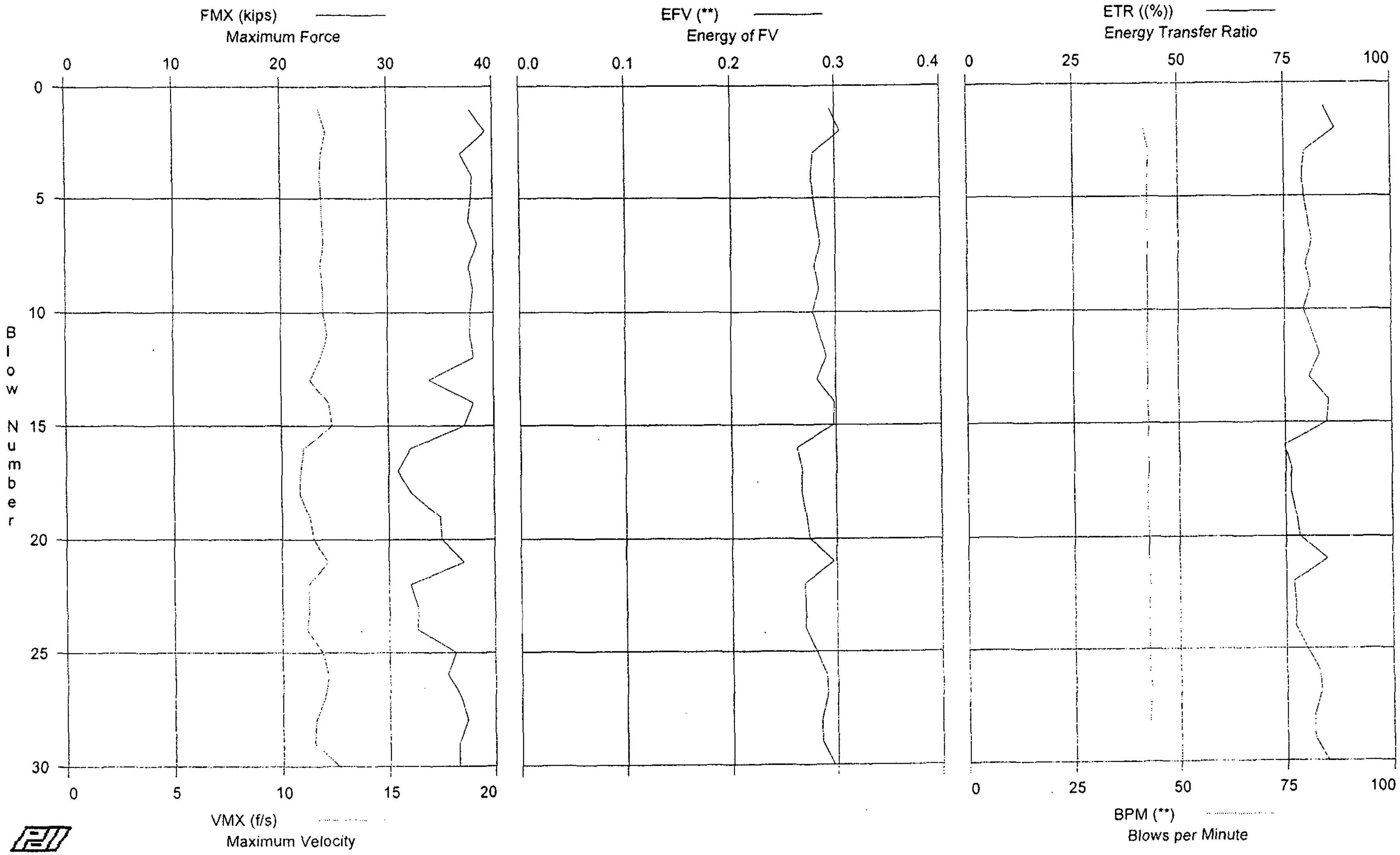
Drive 51 seconds 11:39:11 AM - 11:40:02 AM (6/21/2006) BN 1 - 37

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

Test date: 21-Jun-2006

SPT, Calvert Cliffs - B401-195



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-195 AW rod
OP: KB Test date: 21-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 199.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	37.82	11.80	0.295	84.3	**	0.295	0.193	0.73	0.72
2	0.00	AV1	39.31	12.14	0.305	87.1	42.0	0.305	0.202	0.27	0.69
3	0.00	AV1	36.95	11.92	0.279	79.8	43.1	0.279	0.178	0.66	0.63
4	0.00	AV1	38.04	11.84	0.277	79.2	42.8	0.277	0.184	0.60	0.67
5	0.00	AV1	37.90	11.90	0.279	79.6	42.7	0.279	0.180	0.85	0.68
6	0.00	AV1	37.66	11.94	0.282	80.5	42.5	0.282	0.185	0.84	0.71
7	0.00	AV1	38.47	11.98	0.285	81.3	42.7	0.285	0.186	1.00	0.67
8	0.00	AV1	37.67	11.85	0.280	80.0	42.8	0.280	0.180	1.01	0.65
9	0.00	AV1	38.04	11.94	0.284	81.1	42.7	0.284	0.183	0.99	0.64
10	0.00	AV1	37.78	11.95	0.278	79.4	42.8	0.278	0.181	0.94	0.64
11	0.00	AV1	37.81	12.17	0.285	81.6	42.7	0.285	0.183	0.82	0.63
12	0.00	AV1	38.10	11.85	0.291	83.2	42.6	0.291	0.186	0.95	0.67
13	0.00	AV1	33.87	11.36	0.282	80.7	42.7	0.282	0.171	0.95	0.69
14	0.00	AV1	38.05	12.20	0.298	85.2	42.6	0.298	0.187	0.94	0.65
15	0.00	AV1	37.17	12.36	0.297	84.7	42.8	0.297	0.183	0.77	0.61
16	0.00	AV1	32.01	11.02	0.262	74.8	42.5	0.262	0.159	0.75	0.62
17	0.00	AV1	30.82	10.86	0.267	76.3	42.7	0.267	0.160	0.85	0.68
18	0.00	AV1	32.24	10.85	0.267	76.3	42.6	0.267	0.162	0.70	0.65
19	0.00	AV1	34.81	11.27	0.271	77.4	42.6	0.271	0.169	0.72	0.64
20	0.00	AV1	34.95	11.47	0.274	78.2	42.7	0.274	0.170	0.53	0.64
21	0.00	AV1	37.10	12.14	0.297	84.8	42.7	0.297	0.186	0.61	0.69
22	0.00	AV1	32.00	11.23	0.269	76.8	42.9	0.269	0.161	0.41	0.65
23	0.00	AV1	32.70	11.25	0.270	77.3	42.7	0.270	0.164	0.55	0.63
24	0.00	AV1	32.65	11.14	0.270	77.2	42.8	0.270	0.164	0.58	0.61
25	0.00	AV1	36.24	11.87	0.280	79.9	42.7	0.280	0.175	0.55	0.62
26	0.00	AV1	35.43	12.11	0.289	82.7	42.8	0.289	0.184	0.64	0.72
27	0.00	AV1	36.75	11.95	0.290	83.0	43.1	0.290	0.186	0.71	0.74
28	0.00	AV1	37.38	11.54	0.285	81.5	42.7	0.285	0.178	0.79	0.68
29	0.00	AV1	36.51	11.46	0.285	81.5	42.6	0.285	0.179	0.46	0.71
30	0.00	AV1	36.53	12.59	0.296	84.6	42.6	0.296	0.182	0.54	0.65
		Average	36.09	11.73	0.282	80.7	42.7	0.282	0.178	0.72	0.66

Total number of blows analyzed: 30

Time Summary

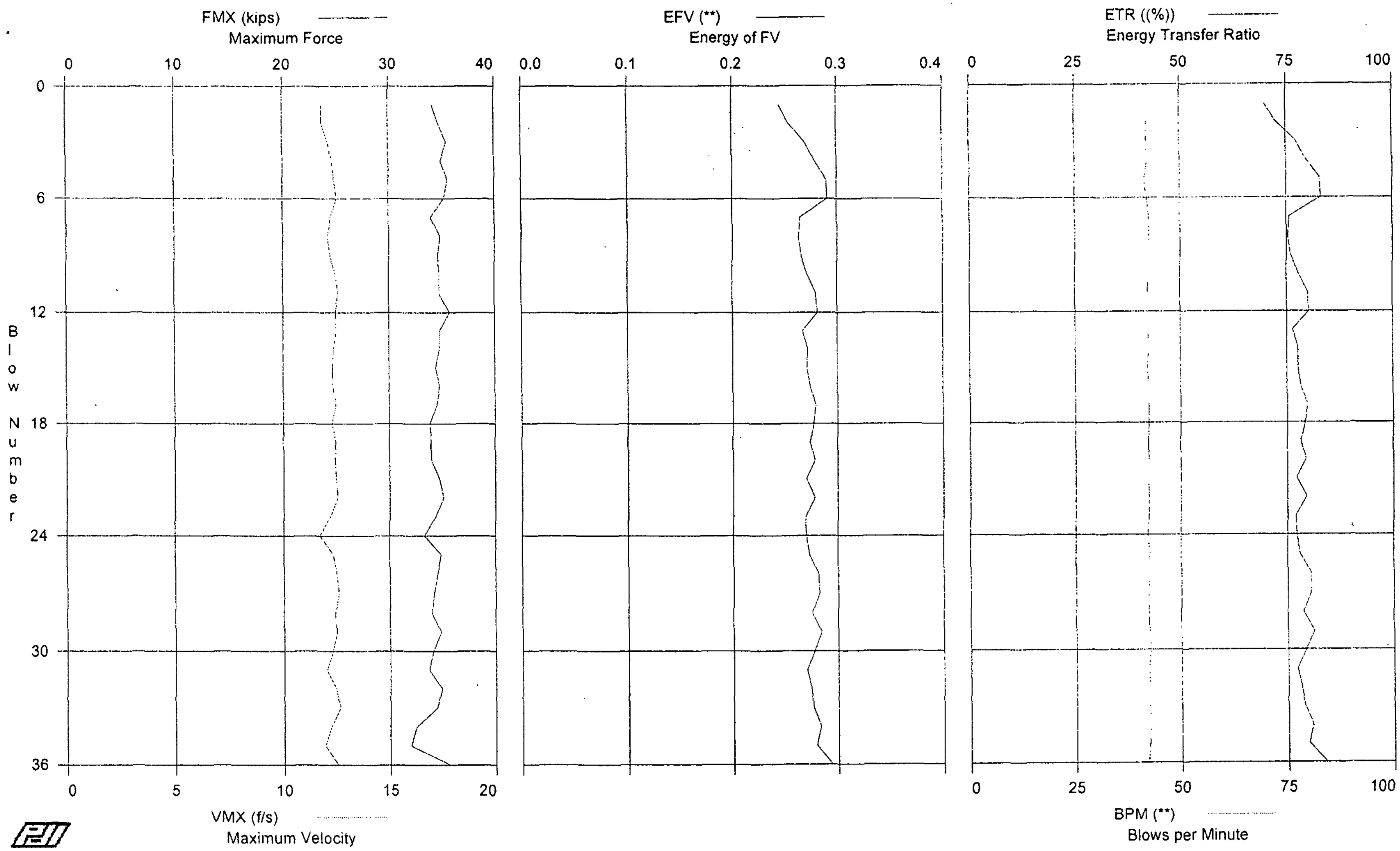
Drive 40 seconds 1:19:30 PM - 1:20:10 PM (6/21/2006) BN 1 - 30

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 21-Jun-2006

SPT, Calvert Cliffs - B401-210



SPT, Calvert Cliffs - B401-210 N3 rod
OP: KB Test date: 21-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 214.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	34.17	11.83	0.245	69.9	**	0.245	0.157	0.99	0.58
2	0.00	AV1	34.76	11.85	0.254	72.6	42.3	0.254	0.162	0.92	0.63
3	0.00	AV1	35.50	12.14	0.270	77.3	42.3	0.270	0.168	0.91	0.56
4	0.00	AV1	34.91	12.30	0.279	79.6	42.4	0.279	0.170	0.96	0.59
5	0.00	AV1	35.58	12.42	0.290	82.9	41.7	0.290	0.177	0.98	0.60
6	0.00	AV1	35.24	12.54	0.291	83.2	42.2	0.291	0.176	0.96	0.55
7	0.00	AV1	33.97	12.25	0.265	75.7	42.7	0.265	0.162	0.98	0.60
8	0.00	AV1	34.87	12.10	0.263	75.2	42.7	0.263	0.164	0.87	0.58
9	0.00	AV1	34.63	12.22	0.266	75.9	42.5	0.266	0.162	0.94	0.55
10	0.00	AV1	34.80	12.47	0.272	77.8	42.6	0.272	0.168	0.84	0.56
11	0.00	AV1	34.79	12.60	0.280	80.0	42.4	0.280	0.172	0.83	0.57
12	0.00	AV1	35.70	12.45	0.281	80.2	42.4	0.281	0.174	0.81	0.58
13	0.00	AV1	34.80	12.49	0.267	76.3	42.3	0.267	0.166	0.84	0.54
14	0.00	AV1	34.76	12.36	0.272	77.6	42.6	0.272	0.167	0.85	0.54
15	0.00	AV1	34.42	12.31	0.271	77.6	42.2	0.271	0.167	0.83	0.55
16	0.00	AV1	34.80	12.34	0.274	78.2	42.6	0.274	0.170	0.67	0.57
17	0.00	AV1	34.51	12.45	0.279	79.7	42.6	0.279	0.167	0.82	0.57
18	0.00	AV1	33.81	12.28	0.277	79.2	42.4	0.277	0.165	0.75	0.50
19	0.00	AV1	33.96	12.46	0.274	78.2	42.6	0.274	0.163	0.71	0.54
20	0.00	AV1	33.96	12.40	0.278	79.4	42.4	0.278	0.165	0.91	0.51
21	0.00	AV1	34.71	12.47	0.270	77.1	42.3	0.270	0.166	0.88	0.54
22	0.00	AV1	35.09	12.52	0.278	79.5	42.5	0.278	0.173	0.81	0.61
23	0.00	AV1	34.31	12.17	0.269	76.9	42.5	0.269	0.163	0.88	0.54
24	0.00	AV1	33.30	11.69	0.270	77.2	42.2	0.270	0.160	0.88	0.52
25	0.00	AV1	34.84	12.32	0.273	77.9	42.7	0.273	0.167	0.75	0.59
26	0.00	AV1	34.51	12.46	0.281	80.4	42.6	0.281	0.168	0.76	0.54
27	0.00	AV1	34.17	12.56	0.282	80.4	42.3	0.282	0.169	0.86	0.51
28	0.00	AV1	33.96	12.40	0.275	78.6	42.4	0.275	0.166	0.83	0.52
29	0.00	AV1	34.81	12.47	0.284	81.2	42.5	0.284	0.170	0.88	0.58
30	0.00	AV1	34.06	12.28	0.277	79.2	42.7	0.277	0.168	0.73	0.57
31	0.00	AV1	33.65	11.99	0.270	77.2	42.4	0.270	0.162	0.65	0.57
32	0.00	AV1	34.90	12.43	0.274	78.1	42.6	0.274	0.169	0.69	0.54
33	0.00	AV1	34.41	12.62	0.276	78.9	42.5	0.276	0.168	0.68	0.57
34	0.00	AV1	32.48	12.19	0.283	80.8	42.6	0.283	0.165	0.80	0.55
35	0.00	AV1	31.95	11.90	0.279	79.8	42.5	0.279	0.163	0.77	0.51
36	0.00	AV1	35.65	12.53	0.294	84.0	42.2	0.294	0.177	0.68	0.55
		Average	34.47	12.31	0.275	78.4	42.4	0.275	0.167	0.83	0.56

Total number of blows analyzed: 36

Time Summary

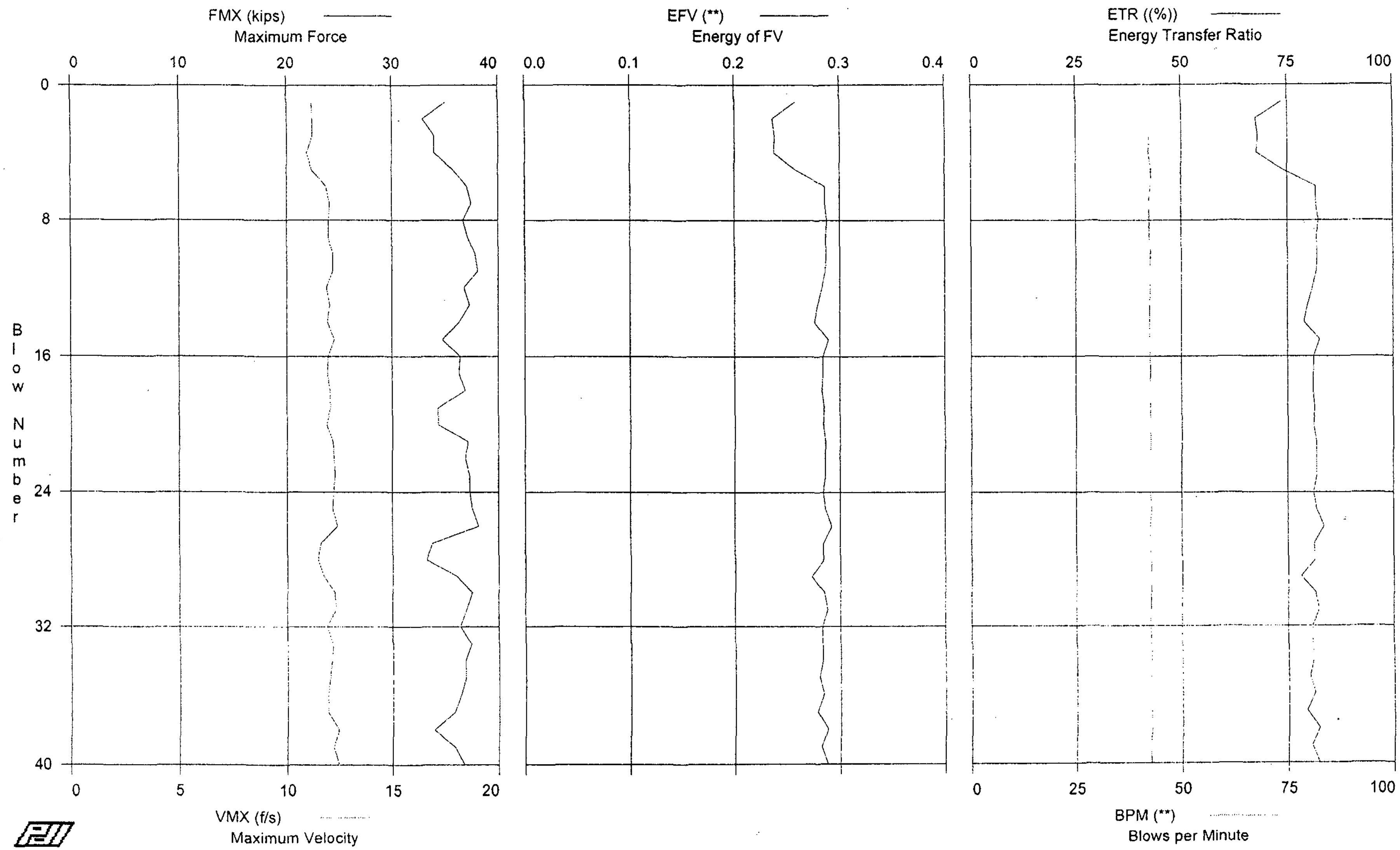
Drive 50 seconds 4:58:56 PM - 4:59:46 PM (6/21/2006) BN 1 - 36

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B401-225



SPT, Calvert Cliffs - B401-225 N3 rod
OP: KB Test date: 22-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 229.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	35.07	11.17	0.258	73.6	**	0.258	0.164	1.21	0.67
2	0.00	AV1	32.89	11.21	0.236	67.5	**	0.236	0.143	0.77	0.63
3	0.00	AV1	33.97	11.22	0.238	68.0	42.5	0.238	0.148	0.75	0.65
4	0.00	AV1	33.97	10.94	0.237	67.7	42.2	0.237	0.150	0.69	0.61
5	0.00	AV1	35.76	11.19	0.258	73.9	42.9	0.258	0.162	0.74	0.59
6	0.00	AV1	37.06	11.85	0.286	81.8	42.8	0.286	0.181	0.72	0.63
7	0.00	AV1	37.49	12.03	0.286	81.8	42.4	0.286	0.183	0.78	0.61
8	0.00	AV1	36.70	11.99	0.288	82.3	42.6	0.288	0.183	0.74	0.68
9	0.00	AV1	37.15	11.98	0.287	81.9	42.5	0.287	0.183	0.67	0.58
10	0.00	AV1	37.82	12.18	0.287	82.0	42.8	0.287	0.182	0.59	0.61
11	0.00	AV1	38.08	12.18	0.286	81.8	42.6	0.286	0.187	0.76	0.62
12	0.00	AV1	36.77	11.87	0.283	80.9	42.7	0.283	0.180	0.68	0.59
13	0.00	AV1	37.32	12.03	0.279	79.8	42.5	0.279	0.180	0.70	0.64
14	0.00	AV1	36.33	11.93	0.276	78.9	42.5	0.276	0.175	0.69	0.66
15	0.00	AV1	34.71	12.25	0.289	82.6	42.6	0.289	0.175	0.83	0.64
16	0.00	AV1	36.42	11.95	0.284	81.2	42.6	0.284	0.176	0.60	0.58
17	0.00	AV1	36.29	11.93	0.284	81.0	42.8	0.284	0.175	0.75	0.63
18	0.00	AV1	36.90	12.05	0.283	81.0	42.6	0.283	0.177	0.68	0.61
19	0.00	AV1	34.32	12.06	0.285	81.4	42.7	0.285	0.169	0.62	0.60
20	0.00	AV1	34.30	11.86	0.284	81.1	42.6	0.284	0.167	0.57	0.60
21	0.00	AV1	37.10	12.16	0.286	81.7	42.7	0.286	0.182	0.55	0.65
22	0.00	AV1	36.89	12.23	0.286	81.8	42.6	0.286	0.182	0.50	0.64
23	0.00	AV1	37.28	12.27	0.286	81.8	42.6	0.286	0.180	0.63	0.62
24	0.00	AV1	37.29	12.21	0.284	81.0	42.6	0.284	0.180	0.64	0.60
25	0.00	AV1	37.53	12.15	0.286	81.8	42.9	0.286	0.183	0.43	0.62
26	0.00	AV1	38.11	12.38	0.292	83.5	42.6	0.292	0.185	0.44	0.62
27	0.00	AV1	33.78	11.60	0.284	81.2	42.6	0.284	0.167	0.75	0.55
28	0.00	AV1	33.17	11.45	0.284	81.3	42.8	0.284	0.166	0.55	0.56
29	0.00	AV1	36.04	11.72	0.273	78.0	42.6	0.273	0.169	0.35	0.60
30	0.00	AV1	37.51	12.24	0.285	81.5	42.8	0.285	0.181	0.38	0.64
31	0.00	AV1	36.98	12.31	0.288	82.4	42.7	0.288	0.184	0.33	0.65
32	0.00	AV1	36.37	11.88	0.283	80.7	42.6	0.283	0.174	0.54	0.59
33	0.00	AV1	37.38	12.14	0.283	80.8	42.8	0.283	0.178	0.69	0.60
34	0.00	AV1	36.81	12.09	0.283	80.9	42.7	0.283	0.181	0.66	0.59
35	0.00	AV1	36.86	12.00	0.280	80.0	42.6	0.280	0.177	0.39	0.62
36	0.00	AV1	36.42	11.91	0.284	81.2	42.6	0.284	0.176	0.34	0.58
37	0.00	AV1	35.80	11.91	0.278	79.3	42.7	0.278	0.172	0.30	0.61
38	0.00	AV1	33.88	12.42	0.288	82.2	42.8	0.288	0.169	0.40	0.60
39	0.00	AV1	35.89	12.20	0.282	80.5	42.6	0.282	0.172	0.35	0.61
40	0.00	AV1	36.76	12.44	0.288	82.3	42.7	0.288	0.179	0.38	0.58
		Average	36.18	11.94	0.279	79.8	42.6	0.279	0.174	0.60	0.61

Total number of blows analyzed: 40

Time Summary

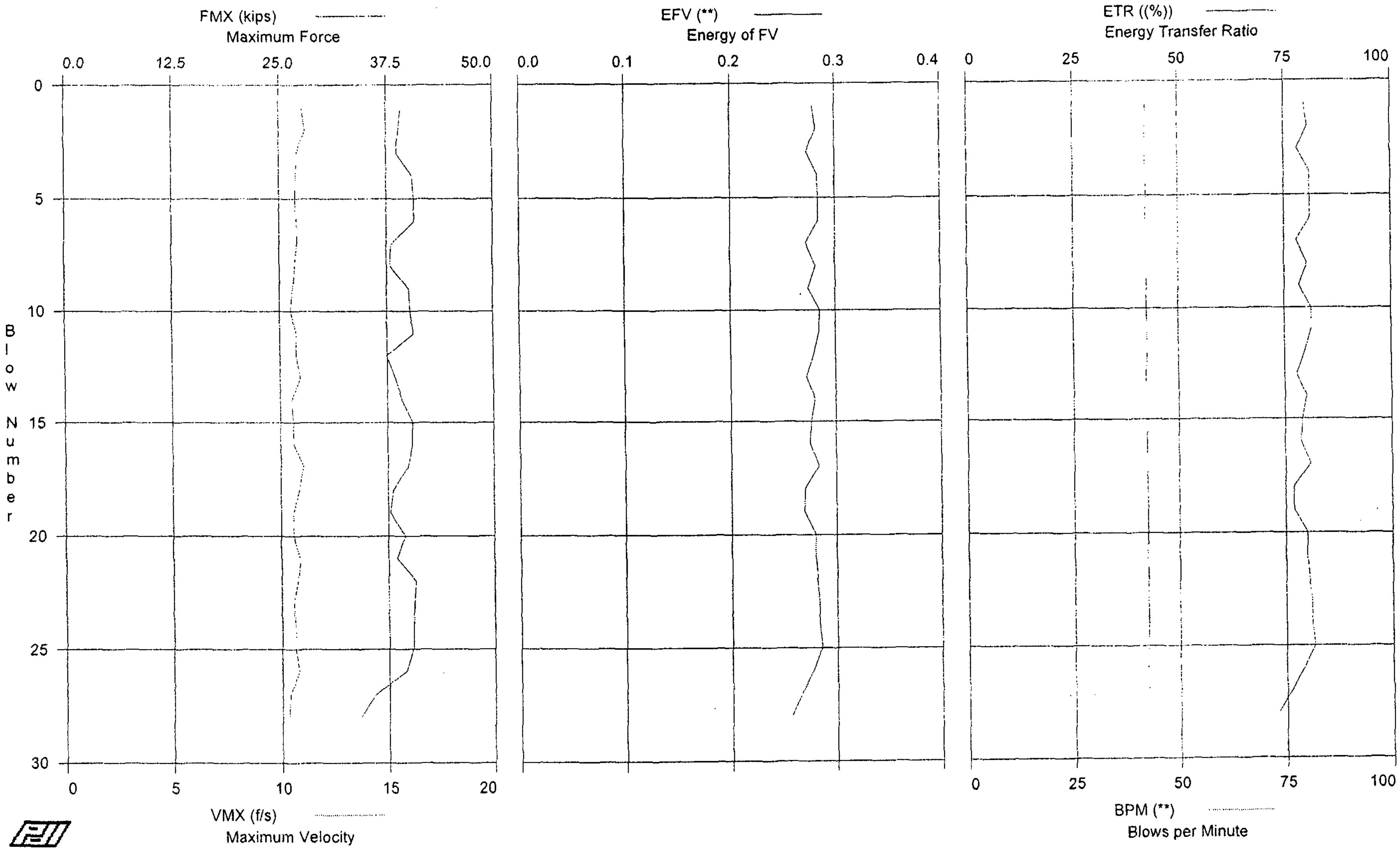
Drive 1 minute 12 seconds 11:09:17 AM - 11:10:29 AM (6/22/2006) BN 1 - 40

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B401-240



SPT, Calvert Cliffs - B401-240 N3 rod
OP: KB Test date: 22-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 244.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	39.26	11.08	0.279	79.7	42.5	0.279	0.246	0.56	0.88
2	0.00	AV1	38.92	11.22	0.282	80.6	42.3	0.282	0.246	0.61	0.87
3	0.00	AV1	38.68	10.82	0.273	78.1	42.1	0.273	0.242	0.65	0.89
4	0.00	AV1	40.49	10.79	0.283	81.0	42.4	0.283	0.252	0.69	0.94
5	0.00	AV1	40.65	10.73	0.284	81.0	42.4	0.284	0.259	0.57	0.94
6	0.00	AV1	40.74	10.80	0.284	81.1	42.2	0.284	0.258	0.47	0.93
7	0.00	AV1	38.02	10.85	0.272	77.8	42.4	0.272	0.237	0.59	0.87
8	0.00	AV1	37.91	10.72	0.281	80.3	42.3	0.281	0.244	0.55	0.88
9	0.00	AV1	40.10	10.61	0.274	78.3	42.5	0.274	0.247	0.43	0.93
10	0.00	AV1	40.20	10.51	0.285	81.3	42.4	0.285	0.258	0.36	0.95
11	0.00	AV1	40.59	10.77	0.284	81.2	42.6	0.284	0.255	0.34	0.94
12	0.00	AV1	37.39	10.75	0.279	79.7	42.6	0.279	0.243	0.41	0.86
13	0.00	AV1	38.42	10.96	0.272	77.7	42.3	0.272	0.237	0.33	0.87
14	0.00	AV1	39.19	10.53	0.280	80.0	42.4	0.280	0.250	0.42	0.92
15	0.00	AV1	40.38	10.59	0.276	79.0	42.4	0.276	0.252	0.31	0.94
16	0.00	AV1	40.39	10.63	0.275	78.7	42.4	0.275	0.253	0.26	0.94
17	0.00	AV1	39.79	11.07	0.283	80.8	42.4	0.283	0.249	0.25	0.89
18	0.00	AV1	38.11	10.86	0.270	77.0	42.5	0.270	0.235	0.52	0.87
19	0.00	AV1	37.71	10.59	0.269	76.8	42.5	0.269	0.235	0.74	0.88
20	0.00	AV1	39.43	10.59	0.280	80.0	42.5	0.280	0.253	0.59	0.92
21	0.00	AV1	38.48	10.89	0.280	79.9	42.4	0.280	0.244	0.30	0.88
22	0.00	AV1	40.69	10.77	0.281	80.3	42.4	0.281	0.257	0.20	0.94
23	0.00	AV1	40.45	10.56	0.283	80.9	42.5	0.283	0.259	0.17	0.95
24	0.00	AV1	40.35	10.64	0.283	81.0	42.5	0.283	0.256	0.30	0.94
25	0.00	AV1	40.29	10.64	0.285	81.5	42.3	0.285	0.257	0.44	0.94
26	0.00	AV1	39.50	10.79	0.277	79.2	42.3	0.277	0.250	0.33	0.90
27	0.00	AV1	35.85	10.37	0.266	76.1	42.3	0.266	0.232	0.29	0.85
28	0.00	AV1	34.11	10.32	0.256	73.1	42.4	0.256	0.222	0.20	0.82
		Average	39.15	10.73	0.278	79.4	42.4	0.278	0.247	0.42	0.90

Total number of blows analyzed: 28

Time Summary

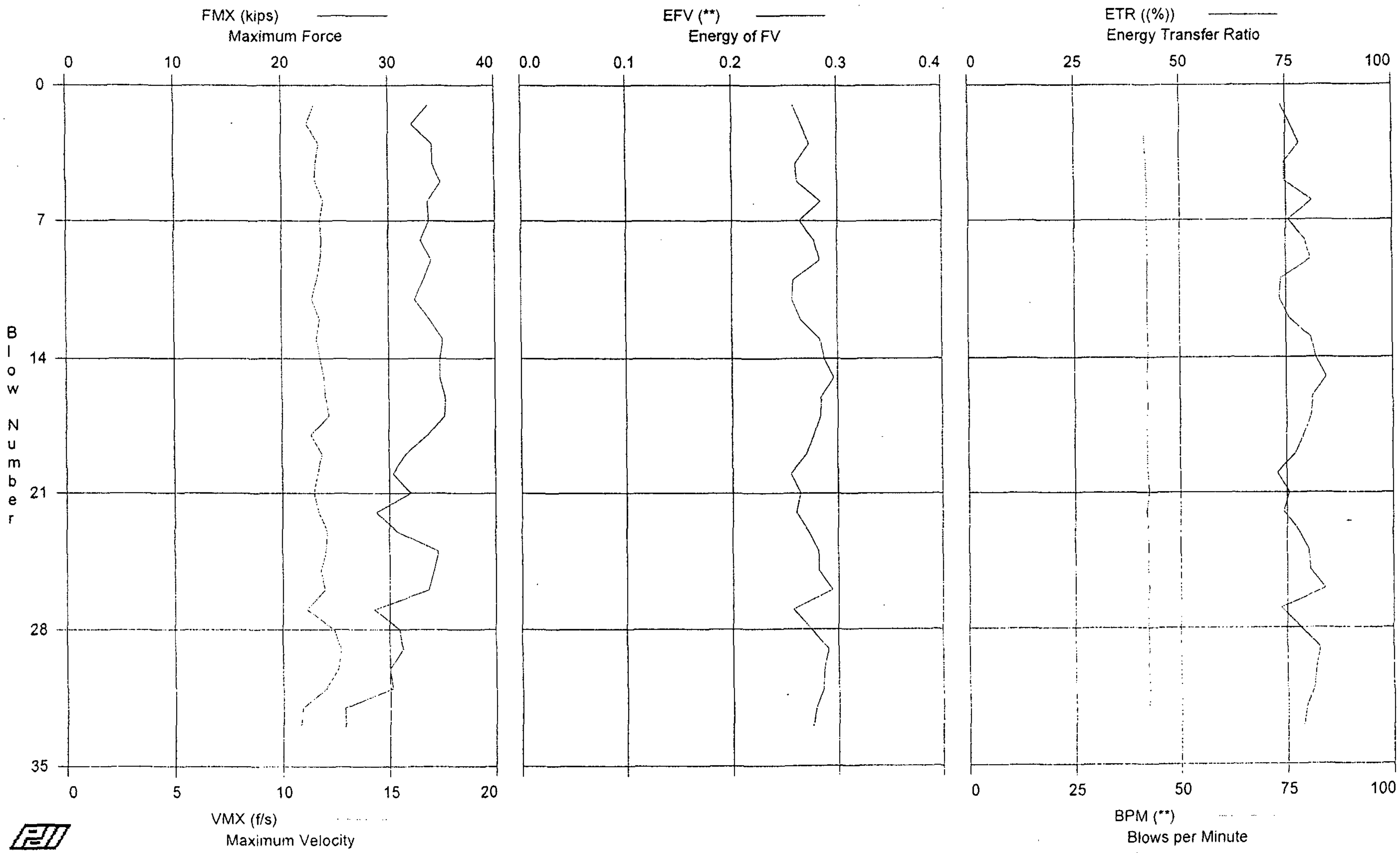
Drive 38 seconds 1:46:35 PM - 1:47:13 PM (6/22/2006) BN 1 - 28

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B401-255



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-255 N3

OP: KB Test date: 22-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 259.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	33.74	11.53	0.258	73.8	**	0.258	0.189	0.38	0.63
2	0.00	AV1	32.18	11.19	0.266	76.0	42.0	0.266	0.191	1.05	0.56
3	0.00	AV1	34.12	11.78	0.274	78.2	41.8	0.274	0.197	0.97	0.56
4	0.00	AV1	34.17	11.64	0.261	74.6	42.3	0.261	0.191	1.20	0.59
5	0.00	AV1	34.88	11.57	0.262	74.7	42.1	0.262	0.194	1.12	0.59
6	0.00	AV1	33.67	11.95	0.284	81.2	42.3	0.284	0.200	1.20	0.58
7	0.00	AV1	33.77	11.78	0.264	75.5	42.0	0.264	0.192	0.95	0.61
8	0.00	AV1	33.03	11.89	0.278	79.5	42.4	0.278	0.200	1.10	0.64
9	0.00	AV1	33.97	11.83	0.283	80.7	42.3	0.283	0.202	1.03	0.65
10	0.00	AV1	33.26	11.67	0.258	73.8	42.2	0.258	0.185	0.73	0.56
11	0.00	AV1	32.45	11.42	0.257	73.4	42.3	0.257	0.184	0.80	0.54
12	0.00	AV1	33.84	11.80	0.265	75.8	42.2	0.265	0.194	-0.09	0.62
13	0.00	AV1	35.06	11.64	0.283	80.9	42.5	0.283	0.202	0.84	0.63
14	0.00	AV1	34.78	11.80	0.287	81.9	42.3	0.287	0.208	0.88	0.67
15	0.00	AV1	34.78	11.98	0.296	84.5	42.1	0.296	0.207	0.79	0.64
16	0.00	AV1	35.28	12.03	0.284	81.2	42.3	0.284	0.207	0.69	0.66
17	0.00	AV1	35.18	12.19	0.283	80.7	42.1	0.283	0.199	0.65	0.62
18	0.00	AV1	33.62	11.37	0.277	79.1	42.2	0.277	0.199	0.74	0.58
19	0.00	AV1	31.54	11.87	0.270	77.1	42.2	0.270	0.189	0.55	0.51
20	0.00	AV1	30.31	11.66	0.255	72.7	42.2	0.255	0.180	0.51	0.52
21	0.00	AV1	32.00	11.49	0.264	75.5	42.5	0.264	0.186	0.59	0.58
22	0.00	AV1	28.71	11.70	0.260	74.2	41.9	0.260	0.169	0.62	0.50
23	0.00	AV1	30.74	12.11	0.272	77.8	42.4	0.272	0.185	0.64	0.53
24	0.00	AV1	34.58	12.03	0.281	80.2	42.4	0.281	0.204	0.61	0.63
25	0.00	AV1	34.12	11.79	0.281	80.4	42.1	0.281	0.203	0.44	0.62
26	0.00	AV1	33.64	11.97	0.294	84.0	42.5	0.294	0.205	0.42	0.62
27	0.00	AV1	28.51	11.13	0.257	73.5	42.1	0.257	0.175	0.41	0.51
28	0.00	AV1	30.94	12.40	0.274	78.2	42.4	0.274	0.185	0.48	0.57
29	0.00	AV1	31.22	12.71	0.290	82.8	42.5	0.290	0.193	0.57	0.57
30	0.00	AV1	30.00	12.58	0.286	81.8	42.2	0.286	0.188	0.45	0.50
31	0.00	AV1	30.25	12.02	0.285	81.3	42.6	0.285	0.189	0.39	0.54
32	0.00	AV1	25.73	10.90	0.278	79.4	42.3	0.278	0.177	0.39	0.56
33	0.00	AV1	25.83	10.82	0.275	78.7	42.1	0.275	0.177	0.45	0.56
		Average	32.42	11.77	0.274	78.3	42.2	0.274	0.192	0.68	0.58

Total number of blows analyzed: 33

Time Summary

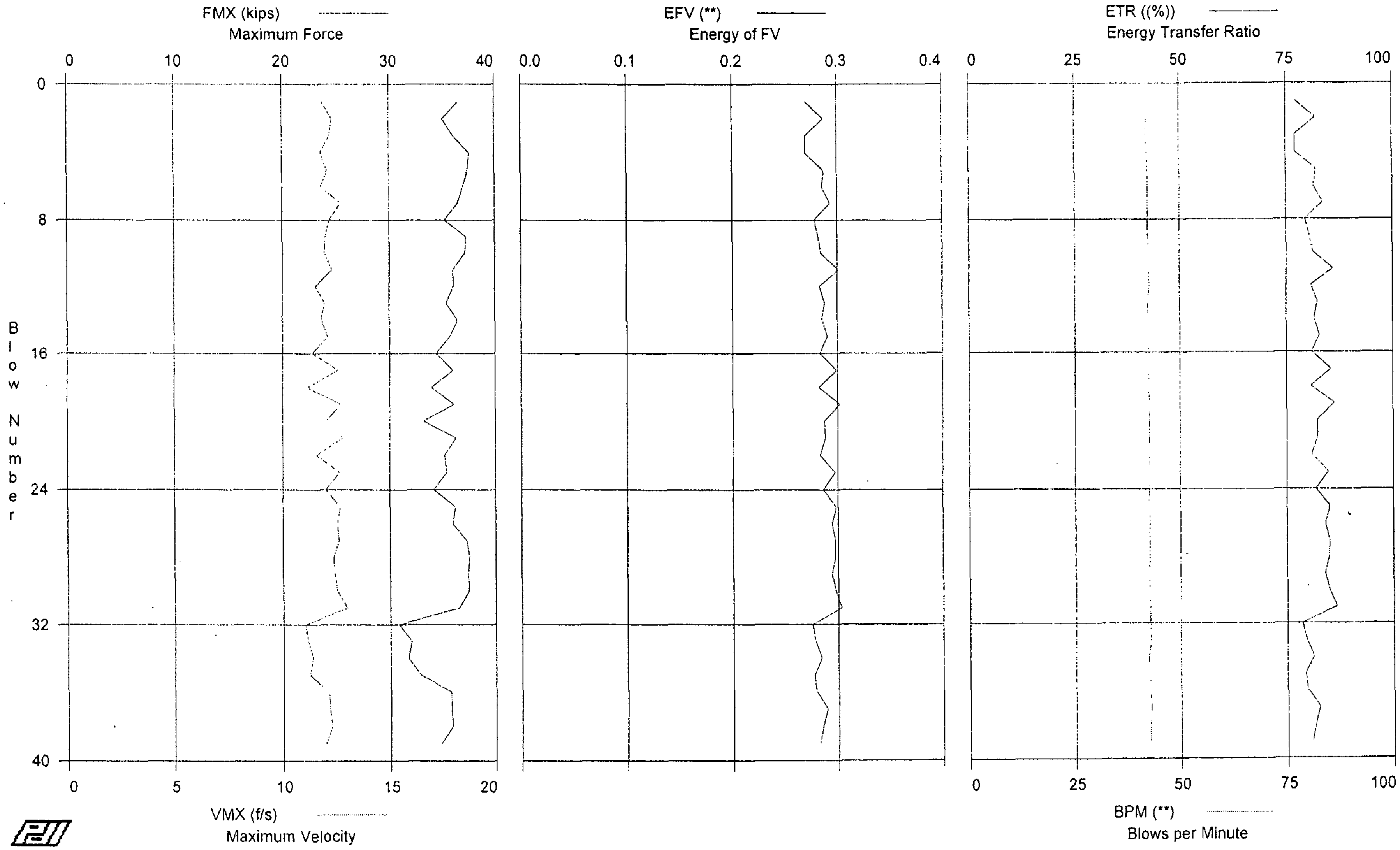
Drive 45 seconds 4:41:37 PM - 4:42:22 PM (6/22/2006) BN 1 - 33

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 23-Jun-2006

SPT, Calvert Cliffs - B401-270



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-270
N3
OP: KB
Test date: 23-Jun-2006

AR: 2.30 in^2
LE: 274.0 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	36.61	11.85	0.270	77.1	**	0.270	0.213	0.53	0.64
2	0.00	AV1	35.06	12.34	0.287	82.0	42.2	0.287	0.220	0.68	0.53
3	0.00	AV1	36.10	12.22	0.270	77.2	42.1	0.270	0.208	0.48	0.59
4	0.00	AV1	37.63	11.78	0.270	77.2	42.4	0.270	0.212	0.70	0.63
5	0.00	AV1	37.46	12.10	0.287	82.1	42.5	0.287	0.224	0.70	0.60
6	0.00	AV1	36.99	11.80	0.285	81.3	42.6	0.285	0.220	0.68	0.58
7	0.00	AV1	36.48	12.71	0.293	83.7	42.5	0.293	0.220	0.57	0.61
8	0.00	AV1	35.23	12.19	0.278	79.4	42.6	0.278	0.209	0.68	0.54
9	0.00	AV1	37.29	12.02	0.282	80.6	42.6	0.282	0.217	0.73	0.60
10	0.00	AV1	37.15	11.95	0.284	81.2	42.6	0.284	0.219	1.02	0.59
11	0.00	AV1	36.01	12.31	0.301	86.0	42.6	0.301	0.220	0.96	0.57
12	0.00	AV1	36.08	11.54	0.283	80.7	42.8	0.283	0.217	0.87	0.60
13	0.00	AV1	35.38	11.98	0.288	82.3	42.6	0.288	0.214	0.83	0.59
14	0.00	AV1	36.46	11.80	0.285	81.6	42.6	0.285	0.216	0.95	0.57
15	0.00	AV1	35.70	12.10	0.290	82.7	42.6	0.290	0.217	0.91	0.56
16	0.00	AV1	34.44	11.39	0.283	81.0	42.6	0.283	0.215	0.91	0.57
17	0.00	AV1	36.00	12.57	0.299	85.4	42.7	0.299	0.219	0.85	0.58
18	0.00	AV1	33.97	11.15	0.282	80.7	42.6	0.282	0.213	0.85	0.61
19	0.00	AV1	36.12	12.70	0.302	86.3	42.8	0.302	0.217	0.85	0.59
20	0.00	AV1	33.17	12.01	0.287	82.1	42.7	0.287	0.208	0.79	0.60
21	0.00	AV1	36.24	12.79	0.288	82.2	42.7	0.288	0.216	0.81	0.60
22	0.00	AV1	35.18	11.56	0.283	80.8	42.6	0.283	0.213	0.81	0.59
23	0.00	AV1	35.40	12.64	0.297	84.8	42.9	0.297	0.217	0.83	0.54
24	0.00	AV1	34.17	12.00	0.286	81.8	42.7	0.286	0.211	0.72	0.57
25	0.00	AV1	36.19	12.67	0.298	85.2	42.6	0.298	0.221	0.73	0.57
26	0.00	AV1	35.95	12.52	0.294	84.0	42.7	0.294	0.222	0.59	0.56
27	0.00	AV1	37.28	12.61	0.297	85.0	42.7	0.297	0.227	0.71	0.65
28	0.00	AV1	37.54	12.35	0.297	84.9	42.7	0.297	0.228	0.66	0.63
29	0.00	AV1	37.40	12.40	0.294	84.0	42.6	0.294	0.221	0.70	0.58
30	0.00	AV1	37.47	12.51	0.297	84.8	42.6	0.297	0.223	0.72	0.60
31	0.00	AV1	36.52	12.98	0.303	86.7	42.7	0.303	0.222	0.51	0.56
32	0.00	AV1	30.81	11.02	0.275	78.5	42.8	0.275	0.199	0.50	0.60
33	0.00	AV1	32.02	11.15	0.278	79.5	42.9	0.278	0.204	0.46	0.56
34	0.00	AV1	31.69	11.38	0.284	81.2	42.4	0.284	0.204	0.71	0.65
35	0.00	AV1	32.91	11.23	0.277	79.2	42.7	0.277	0.201	0.71	0.57
36	0.00	AV1	35.72	12.10	0.279	79.7	42.6	0.279	0.209	0.77	0.56
37	0.00	AV1	35.75	12.14	0.289	82.5	42.9	0.289	0.217	0.47	0.62
38	0.00	AV1	35.89	12.24	0.285	81.6	42.7	0.285	0.214	0.64	0.61
39	0.00	AV1	34.78	11.96	0.282	80.7	42.7	0.282	0.211	0.40	0.56
		Average	35.60	12.07	0.287	82.0	42.6	0.287	0.215	0.72	0.59

Total number of blows analyzed: 39

Time Summary

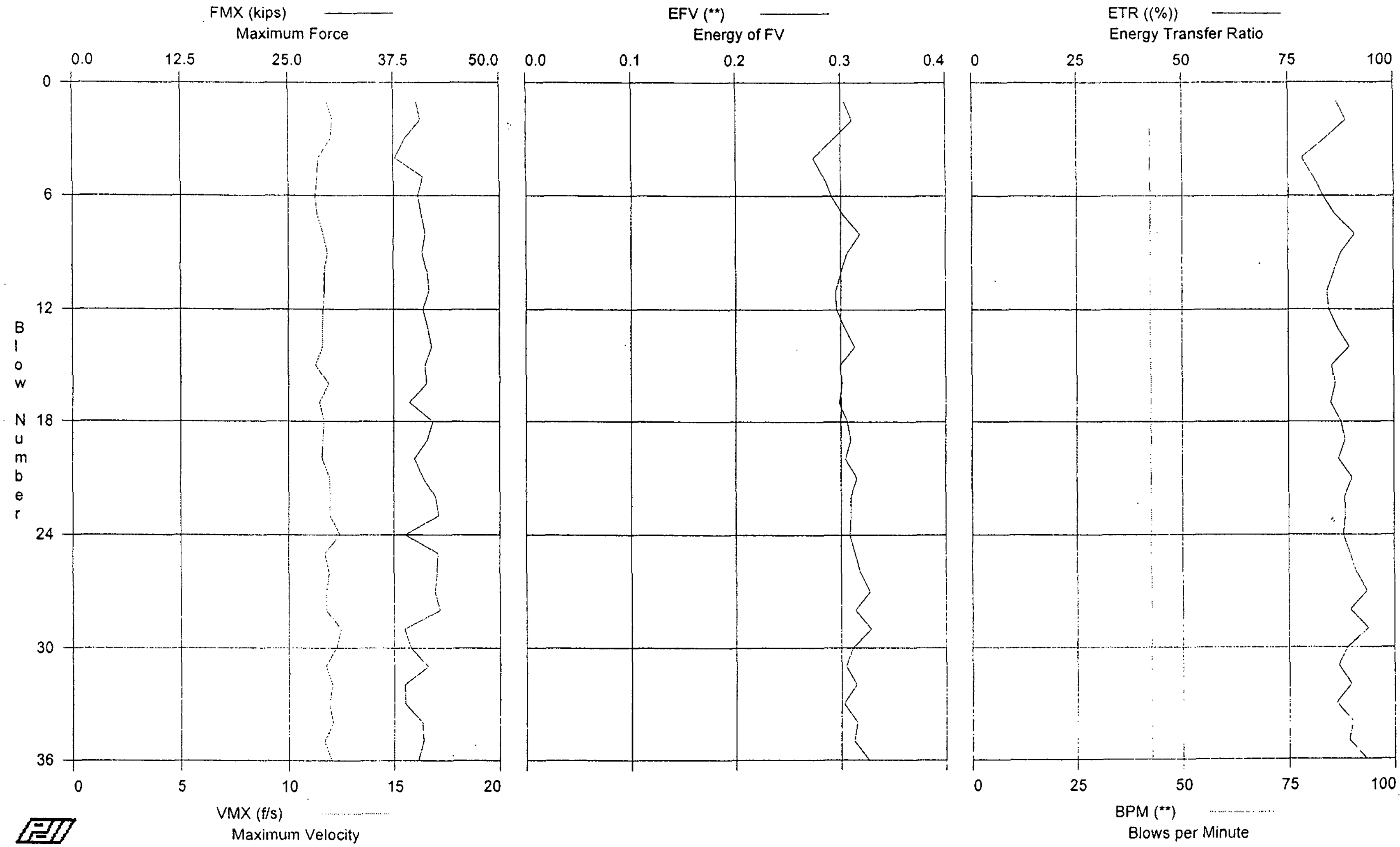
Drive 53 seconds 9:22:04 AM - 9:22:57 AM (6/23/2006) BN 1 - 39

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

Test date: 23-Jun-2006

SPT, Calvert Cliffs - B401-286



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-286 N3
OP: KB Test date: 23-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 290.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	40.16	11.81	0.303	86.6	**	0.303	0.217	0.67	0.69
2	0.00	AV1	40.64	12.10	0.311	88.8	42.3	0.311	0.223	0.80	0.75
3	0.00	AV1	38.82	12.00	0.293	83.8	42.6	0.293	0.203	0.67	0.65
4	0.00	AV1	37.71	11.44	0.274	78.4	42.5	0.274	0.192	0.63	0.67
5	0.00	AV1	40.97	11.39	0.284	81.1	42.3	0.284	0.212	0.82	0.73
6	0.00	AV1	40.33	11.27	0.291	83.3	42.6	0.291	0.212	0.76	0.75
7	0.00	AV1	40.76	11.38	0.302	86.2	42.6	0.302	0.219	0.81	0.88
8	0.00	AV1	41.24	11.64	0.318	90.8	42.5	0.318	0.223	0.94	0.88
9	0.00	AV1	40.87	11.88	0.306	87.5	42.7	0.306	0.223	0.79	0.70
10	0.00	AV1	41.45	11.71	0.300	85.9	42.5	0.300	0.213	0.86	0.73
11	0.00	AV1	41.65	11.71	0.295	84.3	42.6	0.295	0.228	0.71	0.78
12	0.00	AV1	40.94	11.65	0.296	84.7	42.6	0.296	0.225	0.71	0.74
13	0.00	AV1	41.55	11.62	0.304	86.8	42.5	0.304	0.221	0.87	0.73
14	0.00	AV1	41.95	11.62	0.313	89.5	42.6	0.313	0.232	0.73	0.78
15	0.00	AV1	41.22	11.31	0.299	85.4	42.7	0.299	0.221	0.71	0.77
16	0.00	AV1	41.35	11.90	0.301	86.1	42.7	0.301	0.218	0.87	0.68
17	0.00	AV1	39.32	11.47	0.298	85.1	42.7	0.298	0.220	0.93	0.85
18	0.00	AV1	42.08	11.68	0.306	87.5	42.5	0.306	0.228	0.99	0.75
19	0.00	AV1	41.45	11.63	0.309	88.4	42.7	0.309	0.228	0.89	0.77
20	0.00	AV1	39.93	11.59	0.304	86.9	42.5	0.304	0.226	0.89	0.85
21	0.00	AV1	40.94	11.94	0.315	90.1	42.7	0.315	0.222	1.04	0.74
22	0.00	AV1	42.36	11.97	0.309	88.3	42.6	0.309	0.233	1.12	0.79
23	0.00	AV1	42.74	11.95	0.309	88.4	42.7	0.309	0.233	0.91	0.77
24	0.00	AV1	38.79	12.43	0.308	88.0	42.6	0.308	0.209	0.99	0.68
25	0.00	AV1	42.66	11.70	0.313	89.5	42.6	0.313	0.233	0.96	0.76
26	0.00	AV1	42.56	11.90	0.318	91.0	42.7	0.318	0.230	1.07	0.75
27	0.00	AV1	42.28	11.77	0.327	93.4	42.7	0.327	0.231	1.00	0.75
28	0.00	AV1	42.86	11.77	0.313	89.5	42.7	0.313	0.234	0.90	0.78
29	0.00	AV1	38.69	12.47	0.328	93.8	42.5	0.328	0.217	1.08	0.67
30	0.00	AV1	39.50	12.24	0.311	88.9	42.8	0.311	0.207	1.02	0.67
31	0.00	AV1	41.45	11.74	0.304	86.8	42.6	0.304	0.221	0.95	0.77
32	0.00	AV1	38.72	12.05	0.314	89.7	42.6	0.314	0.209	1.05	0.66
33	0.00	AV1	38.77	11.89	0.302	86.3	42.7	0.302	0.205	0.83	0.81
34	0.00	AV1	40.79	12.08	0.315	90.1	42.7	0.315	0.212	1.06	0.69
35	0.00	AV1	40.94	11.69	0.312	89.2	42.6	0.312	0.230	0.85	0.87
36	0.00	AV1	40.33	12.02	0.326	93.2	42.7	0.326	0.215	0.85	0.66
		Average	40.80	11.79	0.306	87.6	42.6	0.306	0.220	0.88	0.75

Total number of blows analyzed: 36

Time Summary

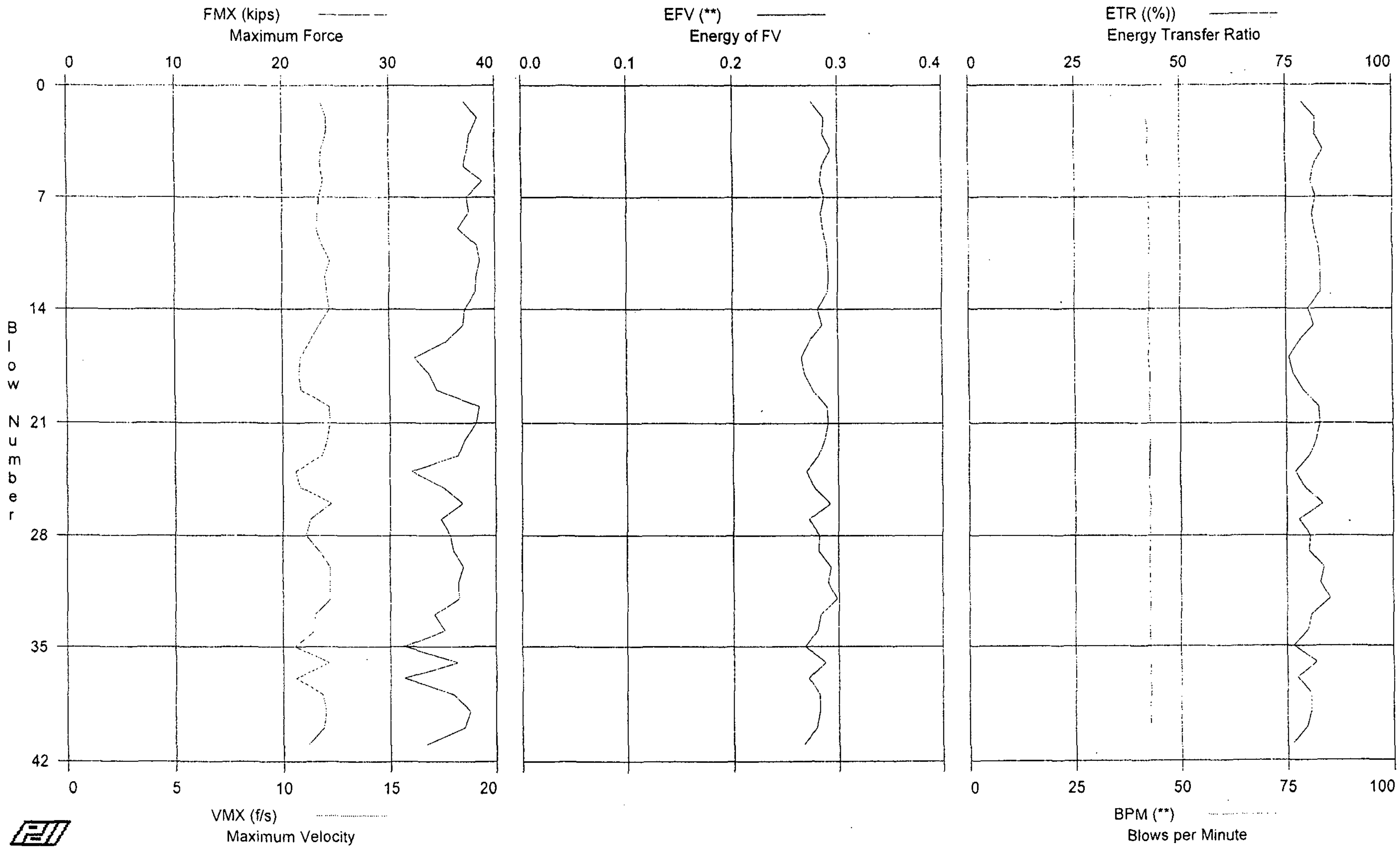
Drive 54 seconds 12:21:59 PM - 12:22:53 PM (6/23/2006) BN 1 - 36

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

Test date: 26-Jun-2006

SPT, Calvert Cliffs - B401-300



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-300 N3

OP: KB Test date: 26-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3

LE: 304.0 ft EM: 30,000 ksi

WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	37.11	11.81	0.275	78.6	**	0.275	0.192	1.03	0.62
2	0.00	AV1	38.37	12.09	0.287	81.9	42.0	0.287	0.205	0.85	0.63
3	0.00	AV1	37.66	12.09	0.286	81.8	42.6	0.286	0.201	0.85	0.60
4	0.00	AV1	37.43	11.84	0.294	83.9	42.3	0.294	0.199	0.98	0.58
5	0.00	AV1	37.04	11.78	0.285	81.6	42.5	0.285	0.194	0.76	0.66
6	0.00	AV1	38.81	11.91	0.283	80.8	42.6	0.283	0.196	0.92	0.63
7	0.00	AV1	37.33	11.71	0.287	81.9	42.5	0.287	0.201	0.90	0.59
8	0.00	AV1	37.52	11.65	0.284	81.1	42.8	0.284	0.193	0.93	0.66
9	0.00	AV1	36.52	11.61	0.286	81.6	42.6	0.286	0.194	0.88	0.67
10	0.00	AV1	38.23	11.84	0.289	82.5	42.8	0.289	0.201	0.93	0.62
11	0.00	AV1	38.56	12.23	0.290	82.9	42.5	0.290	0.200	0.86	0.68
12	0.00	AV1	38.21	11.98	0.291	83.1	42.7	0.291	0.200	0.84	0.63
13	0.00	AV1	38.13	12.10	0.290	83.0	42.7	0.290	0.200	0.88	0.70
14	0.00	AV1	37.18	12.23	0.281	80.2	42.7	0.281	0.190	0.84	0.63
15	0.00	AV1	36.99	11.74	0.285	81.5	42.4	0.285	0.194	0.80	0.61
16	0.00	AV1	35.32	11.28	0.273	78.0	42.8	0.273	0.184	0.71	0.61
17	0.00	AV1	32.30	10.84	0.265	75.7	42.3	0.265	0.171	0.79	0.63
18	0.00	AV1	33.70	10.76	0.268	76.6	42.9	0.268	0.181	0.65	0.65
19	0.00	AV1	34.45	10.86	0.276	78.9	42.8	0.276	0.181	0.87	0.63
20	0.00	AV1	38.47	12.17	0.289	82.5	42.6	0.289	0.200	0.85	0.63
21	0.00	AV1	38.16	12.20	0.290	82.8	42.8	0.290	0.199	0.88	0.60
22	0.00	AV1	37.10	12.07	0.287	81.9	42.7	0.287	0.197	0.88	0.58
23	0.00	AV1	36.43	11.85	0.281	80.4	42.7	0.281	0.188	0.78	0.63
24	0.00	AV1	32.02	10.61	0.270	77.1	42.8	0.270	0.173	0.89	0.66
25	0.00	AV1	35.02	10.79	0.277	79.2	42.5	0.277	0.184	0.89	0.69
26	0.00	AV1	36.85	12.25	0.292	83.4	42.9	0.292	0.188	0.96	0.61
27	0.00	AV1	34.76	11.26	0.272	77.8	42.5	0.272	0.177	0.87	0.64
28	0.00	AV1	35.67	11.07	0.282	80.5	42.9	0.282	0.190	0.79	0.69
29	0.00	AV1	35.99	11.68	0.281	80.2	42.7	0.281	0.182	0.66	0.64
30	0.00	AV1	36.95	12.22	0.293	83.8	42.6	0.293	0.188	0.86	0.62
31	0.00	AV1	36.44	12.19	0.290	82.9	42.8	0.290	0.188	0.85	0.62
32	0.00	AV1	36.49	12.20	0.298	85.1	42.8	0.298	0.190	0.92	0.58
33	0.00	AV1	34.16	11.48	0.283	80.8	42.6	0.283	0.181	0.76	0.65
34	0.00	AV1	35.14	11.50	0.280	79.9	42.7	0.280	0.184	0.55	0.63
35	0.00	AV1	31.29	10.52	0.268	76.6	42.8	0.268	0.169	0.78	0.59
36	0.00	AV1	36.36	12.13	0.287	81.9	42.8	0.287	0.190	0.79	0.66
37	0.00	AV1	31.23	10.56	0.271	77.3	42.6	0.271	0.173	0.57	0.63
38	0.00	AV1	35.99	11.85	0.282	80.6	42.9	0.282	0.185	0.71	0.62
39	0.00	AV1	37.56	12.01	0.282	80.7	42.6	0.282	0.193	0.51	0.61
40	0.00	AV1	37.01	11.89	0.279	79.6	42.8	0.279	0.187	0.68	0.67
~~41~~	~~0.00~~	~~AV1~~	~~33.36~~	~~11.18~~	~~0.267~~	~~76.3~~	~~42.9~~	~~0.267~~	~~0.175~~	~~0.43~~	~~0.64~~
		Average	36.18	11.66	0.282	80.7	42.7	0.282	0.189	0.81	0.63

Total number of blows analyzed: 41

Time Summary

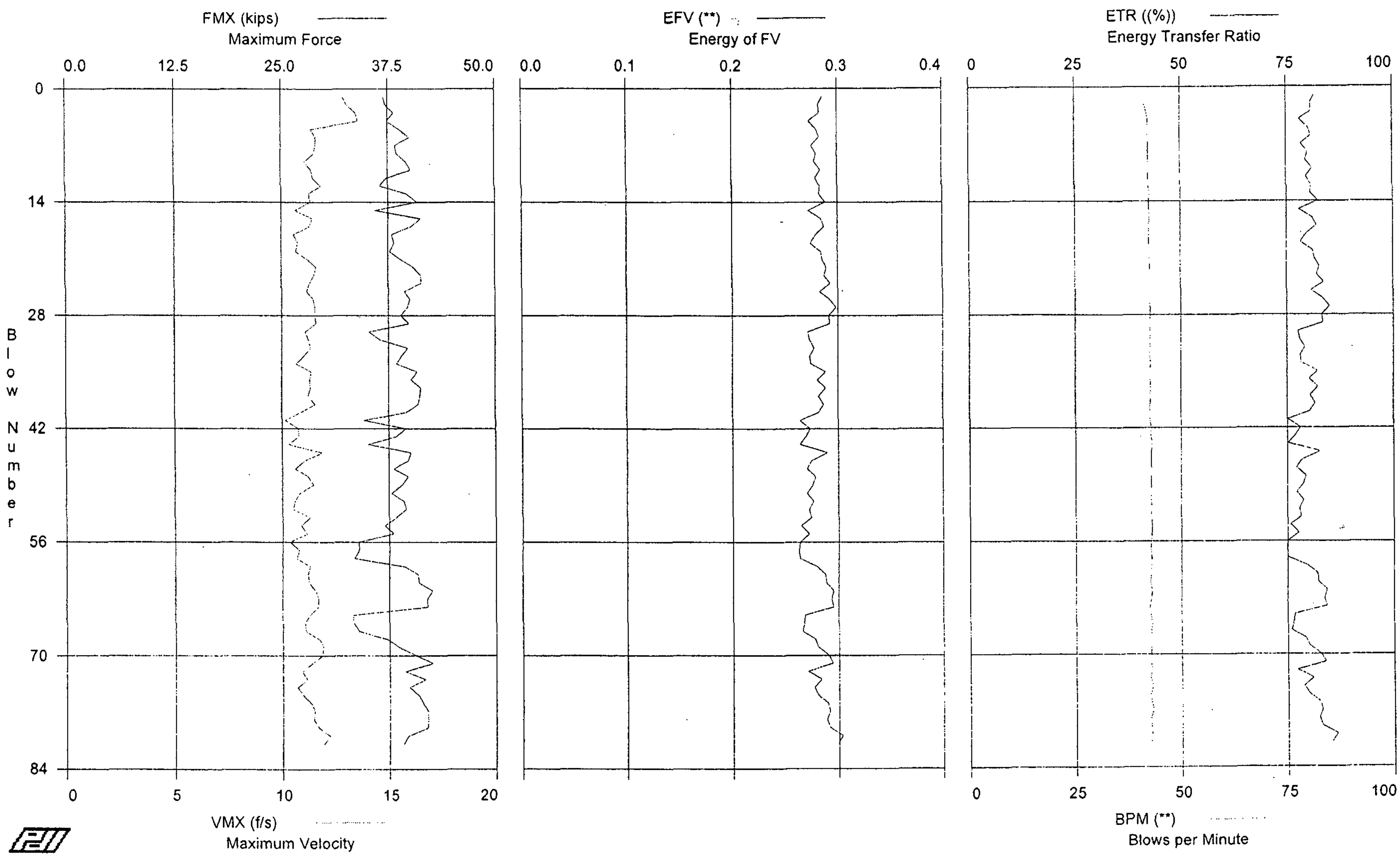
Drive 56 seconds 3:33:30 PM - 3:34:26 PM (6/26/2006) BN 1 - 41

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B401-320

Test date: 27-Jun-2006



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-320 N3
OP: KB Test date: 27-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 324.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	36.95	12.90	0.286	81.7	**	0.286	0.227	0.84	0.71
2	0.00	AV1	37.20	13.07	0.282	80.7	41.5	0.282	0.230	0.69	0.70
3	0.00	AV1	38.18	13.52	0.283	80.9	42.1	0.283	0.232	0.61	0.70
4	0.00	AV1	37.38	13.61	0.273	78.0	42.5	0.273	0.227	0.54	0.68
5	0.00	AV1	38.83	11.42	0.280	80.1	42.3	0.280	0.238	0.61	0.83
6	0.00	AV1	40.03	11.66	0.283	80.8	42.3	0.283	0.243	1.00	0.85
7	0.00	AV1	38.33	11.63	0.275	78.4	42.5	0.275	0.236	0.55	0.81
8	0.00	AV1	38.59	11.57	0.280	80.0	42.4	0.280	0.250	0.67	0.82
9	0.00	AV1	39.63	11.11	0.278	79.5	42.5	0.278	0.242	0.65	0.86
10	0.00	AV1	40.19	11.44	0.284	81.1	42.6	0.284	0.246	0.37	0.87
11	0.00	AV1	37.34	11.52	0.279	79.7	42.4	0.279	0.232	0.67	0.81
12	0.00	AV1	36.49	11.89	0.283	80.7	42.3	0.283	0.230	0.72	0.75
13	0.00	AV1	39.64	11.29	0.282	80.6	42.6	0.282	0.250	0.72	0.87
14	0.00	AV1	40.89	11.38	0.288	82.4	42.5	0.288	0.264	0.49	0.88
15	0.00	AV1	35.95	10.66	0.272	77.8	42.5	0.272	0.239	0.76	0.83
16	0.00	AV1	41.31	11.46	0.284	81.0	42.6	0.284	0.253	0.07	0.90
17	0.00	AV1	40.16	11.33	0.287	82.1	42.5	0.287	0.253	0.59	0.88
18	0.00	AV1	37.88	10.57	0.279	79.7	42.6	0.279	0.250	0.54	0.85
19	0.00	AV1	38.20	10.78	0.274	78.2	42.4	0.274	0.249	0.67	0.85
20	0.00	AV1	37.66	10.67	0.284	81.2	42.7	0.284	0.245	0.61	0.85
21	0.00	AV1	38.99	11.23	0.285	81.5	42.5	0.285	0.247	0.85	0.83
22	0.00	AV1	40.48	11.65	0.289	82.7	42.8	0.289	0.255	0.80	0.86
23	0.00	AV1	41.35	11.55	0.287	82.1	42.6	0.287	0.258	0.57	0.86
24	0.00	AV1	41.33	11.34	0.293	83.7	42.6	0.293	0.260	0.54	0.86
25	0.00	AV1	39.35	11.17	0.282	80.6	42.6	0.282	0.249	0.54	0.88
26	0.00	AV1	40.01	11.49	0.292	83.4	42.5	0.292	0.266	0.52	0.86
27	0.00	AV1	39.73	11.56	0.298	85.1	42.7	0.298	0.260	0.28	0.83
28	0.00	AV1	38.97	11.57	0.291	83.2	42.8	0.291	0.254	0.46	0.82
29	0.00	AV1	39.92	11.61	0.292	83.5	42.5	0.292	0.252	0.44	0.85
30	0.00	AV1	35.18	11.11	0.271	77.5	42.7	0.271	0.226	0.36	0.79
31	0.00	AV1	36.47	11.27	0.273	77.9	42.6	0.273	0.228	0.66	0.80
32	0.00	AV1	39.77	11.35	0.277	79.2	42.7	0.277	0.246	0.64	0.86
33	0.00	AV1	39.02	11.05	0.273	78.0	42.5	0.273	0.239	0.53	0.83
34	0.00	AV1	38.42	10.66	0.274	78.3	42.8	0.274	0.238	0.64	0.84
35	0.00	AV1	40.85	11.39	0.288	82.2	42.6	0.288	0.253	0.69	0.88
36	0.00	AV1	40.12	11.32	0.280	80.1	42.6	0.280	0.249	0.60	0.88
37	0.00	AV1	41.28	11.37	0.288	82.2	42.8	0.288	0.254	0.84	0.88
38	0.00	AV1	41.16	11.24	0.281	80.3	42.8	0.281	0.251	0.55	0.88
39	0.00	AV1	40.97	11.58	0.286	81.6	42.7	0.286	0.253	0.55	0.88
40	0.00	AV1	39.59	10.90	0.281	80.2	42.6	0.281	0.256	0.49	0.85
~~41~~	~~0.00~~	~~AV1~~	~~34.46~~	~~10.14~~	~~0.263~~	~~75.1~~	~~42.6~~	~~0.263~~	~~0.233~~	~~-0.23~~	~~0.84~~
42	0.00	AV1	39.50	10.77	0.273	78.1	42.8	0.273	0.242	0.28	0.86
43	0.00	AV1	38.35	10.78	0.269	76.8	42.8	0.269	0.238	0.50	0.86
44	0.00	AV1	35.00	10.29	0.263	75.2	43.1	0.263	0.228	0.68	0.82
45	0.00	AV1	40.07	11.89	0.289	82.7	42.9	0.289	0.251	0.79	0.83
46	0.00	AV1	39.72	11.05	0.274	78.4	42.9	0.274	0.246	0.41	0.87
47	0.00	AV1	38.01	10.61	0.270	77.0	42.9	0.270	0.238	0.21	0.83
48	0.00	AV1	39.74	11.22	0.278	79.3	42.9	0.278	0.249	0.43	0.81
49	0.00	AV1	39.03	11.48	0.275	78.7	42.9	0.275	0.246	0.22	0.81
50	0.00	AV1	37.76	10.82	0.270	77.1	42.8	0.270	0.241	0.35	0.83
51	0.00	AV1	39.24	10.60	0.276	78.8	42.8	0.276	0.256	0.36	0.89
52	0.00	AV1	39.53	10.53	0.272	77.8	43.0	0.272	0.237	-0.22	0.85
53	0.00	AV1	38.30	11.30	0.274	78.3	42.8	0.274	0.237	0.54	0.82
54	0.00	AV1	36.92	10.87	0.264	75.5	43.0	0.264	0.235	0.46	0.79
55	0.00	AV1	37.99	11.16	0.272	77.6	42.9	0.272	0.244	0.02	0.83
56	0.00	AV1	33.93	10.35	0.263	75.0	42.8	0.263	0.223	0.41	0.76
57	0.00	AV1	33.97	10.79	0.262	74.9	42.6	0.262	0.223	0.46	0.76
58	0.00	AV1	33.42	10.67	0.263	75.1	42.9	0.263	0.225	0.07	0.76
59	0.00	AV1	39.28	11.31	0.279	79.6	42.7	0.279	0.252	0.33	0.85
60	0.00	AV1	40.84	11.20	0.287	82.0	42.8	0.287	0.257	0.39	0.84
61	0.00	AV1	40.98	11.26	0.288	82.2	42.5	0.288	0.256	0.24	0.88

SPT, Calvert Cliffs - B401-320 N3
OP: KB Test date: 27-Jun-2006

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
62	0.00	AV1	42.51	11.57	0.295	84.3	43.0	0.295	0.262	0.32	0.86
63	0.00	AV1	41.90	11.70	0.293	83.6	42.9	0.293	0.263	0.20	0.85
64	0.00	AV1	41.97	11.68	0.295	84.4	42.4	0.295	0.282	0.26	0.86
65	0.00	AV1	33.31	11.31	0.268	76.7	42.6	0.268	0.218	0.29	0.73
66	0.00	AV1	33.32	11.03	0.267	76.4	43.0	0.267	0.217	0.27	0.73
67	0.00	AV1	33.89	11.08	0.265	75.8	42.7	0.265	0.223	0.32	0.76
68	0.00	AV1	37.17	11.73	0.277	79.2	42.9	0.277	0.241	0.24	0.78
69	0.00	AV1	38.59	11.91	0.280	80.1	42.8	0.280	0.237	0.21	0.76
70	0.00	AV1	40.55	11.85	0.290	82.8	42.7	0.290	0.252	0.31	0.80
71	0.00	AV1	42.51	11.38	0.294	84.0	42.6	0.294	0.259	0.13	0.86
72	0.00	AV1	39.28	10.91	0.270	77.1	42.9	0.270	0.240	0.09	0.84
73	0.00	AV1	41.65	11.14	0.283	81.0	42.6	0.283	0.248	0.34	0.87
74	0.00	AV1	39.81	10.69	0.276	78.7	43.1	0.276	0.237	0.32	0.86
75	0.00	AV1	40.94	10.97	0.280	80.0	42.6	0.280	0.259	0.15	0.89
76	0.00	AV1	41.40	11.35	0.289	82.4	42.7	0.289	0.279	0.18	0.90
77	0.00	AV1	41.94	11.50	0.291	83.1	43.2	0.291	0.266	0.20	0.88
78	0.00	AV1	41.96	11.45	0.288	82.3	42.6	0.288	0.254	0.20	0.86
79	0.00	AV1	41.89	11.71	0.291	83.1	42.7	0.291	0.255	0.25	0.85
80	0.00	AV1	39.63	12.23	0.303	86.7	42.9	0.303	0.246	0.26	0.77
81	0.00	AV1	39.12	11.92	0.299	85.3	42.7	0.299	0.246	0.27	0.77
		Average	38.93	11.33	0.280	80.1	42.7	0.280	0.245	0.44	0.83

Total number of blows analyzed: 81

Time Summary

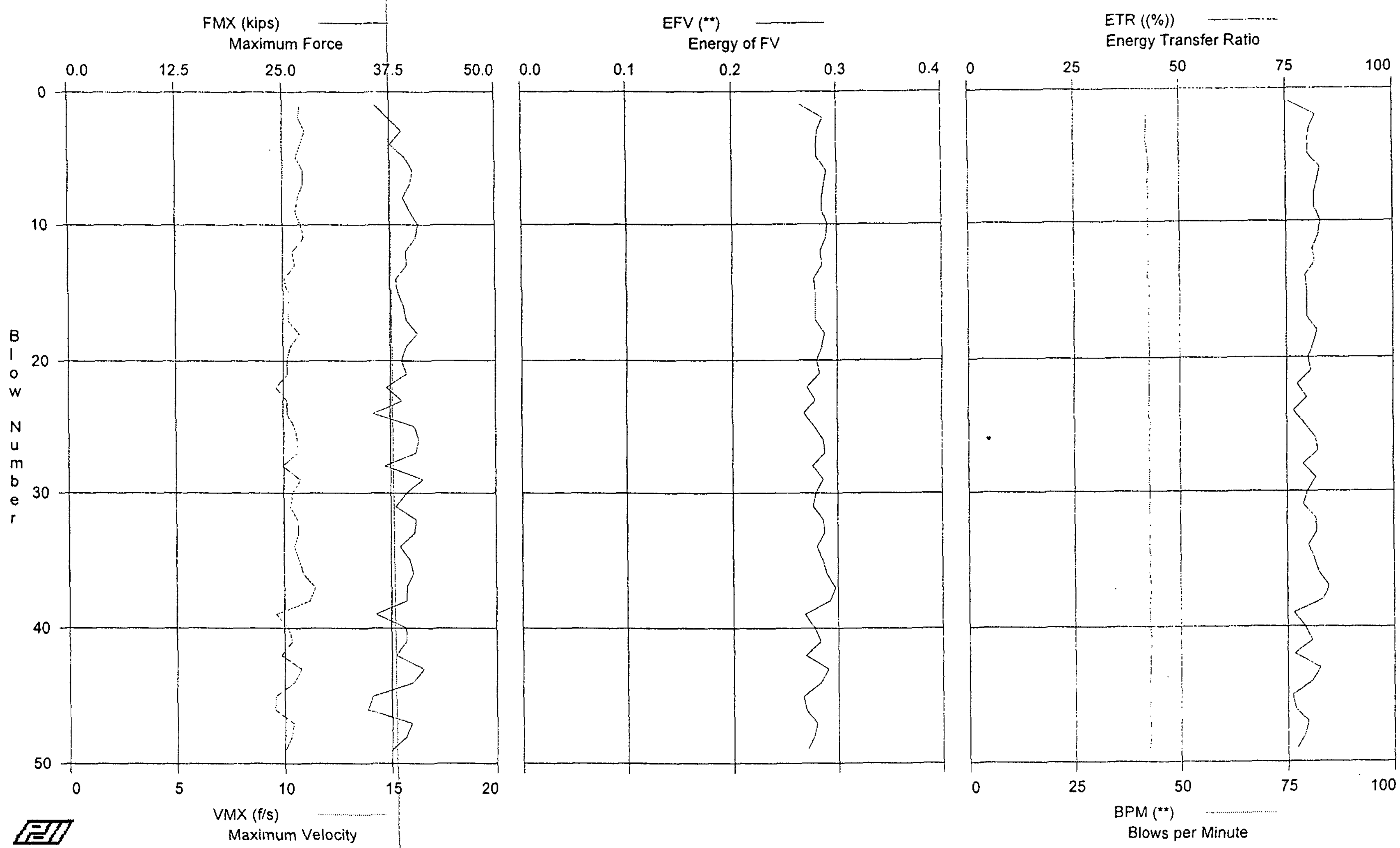
Drive 1 minute 52 seconds 9:15:39 AM - 9:17:31 AM (6/27/2006) BN 1 - 81

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 27-Jun-2006

SPT, Calvert Cliffs - B401-340



GRL Engineers, Inc.
Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-340 N3
OP: KB Test date: 27-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 344.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force EMX: Max Transferred Energy
VMX: Maximum Velocity EF2: Energy of F^2
EFV: Energy of FV DFN: Final Displacement
ETR: Energy Transfer Ratio FVP: Force/Velocity proportionality
BPM: Blows per Minute

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	35.74	10.82	0.265	75.6	**	0.265	0.246	0.54	0.80
2	0.00	AV1	37.35	10.76	0.287	82.0	42.3	0.287	0.265	0.63	0.86
3	0.00	AV1	38.93	11.05	0.282	80.7	42.3	0.282	0.266	0.82	0.87
4	0.00	AV1	37.61	10.88	0.281	80.1	42.2	0.281	0.256	0.86	0.86
5	0.00	AV1	39.29	10.63	0.281	80.2	42.6	0.281	0.268	0.69	0.90
6	0.00	AV1	40.19	10.94	0.290	83.0	42.8	0.290	0.276	0.74	0.90
7	0.00	AV1	39.92	10.95	0.288	82.4	42.5	0.288	0.276	0.76	0.90
8	0.00	AV1	39.07	10.72	0.286	81.6	42.8	0.286	0.275	0.72	0.89
9	0.00	AV1	39.90	10.61	0.286	81.7	42.5	0.286	0.273	0.56	0.93
10	0.00	AV1	40.85	10.83	0.291	83.1	42.6	0.291	0.281	0.70	0.94
11	0.00	AV1	40.48	10.96	0.289	82.6	42.5	0.289	0.276	0.60	0.92
12	0.00	AV1	39.34	10.43	0.284	81.1	42.6	0.284	0.269	0.78	0.90
13	0.00	AV1	39.49	10.56	0.286	81.8	42.7	0.286	0.275	0.48	0.91
14	0.00	AV1	38.21	10.08	0.278	79.5	42.4	0.278	0.264	0.52	0.94
15	0.00	AV1	38.37	10.24	0.279	79.8	42.9	0.279	0.266	0.58	0.91
16	0.00	AV1	39.06	10.27	0.279	79.8	42.5	0.279	0.268	0.67	0.91
17	0.00	AV1	39.38	10.24	0.279	79.8	42.7	0.279	0.265	0.74	0.92
18	0.00	AV1	40.72	10.77	0.288	82.3	42.6	0.288	0.278	0.58	0.94
19	0.00	AV1	39.33	10.31	0.285	81.3	42.8	0.285	0.271	0.66	0.90
20	0.00	AV1	38.79	10.17	0.280	80.1	42.7	0.280	0.267	0.68	0.95
21	0.00	AV1	39.38	10.20	0.283	80.8	42.6	0.283	0.268	0.63	0.93
22	0.00	AV1	37.03	9.66	0.271	77.5	42.7	0.271	0.258	0.68	0.94
23	0.00	AV1	38.87	10.19	0.279	79.7	42.7	0.279	0.268	0.69	0.91
24	0.00	AV1	35.41	10.18	0.268	76.7	42.6	0.268	0.248	0.69	0.86
25	0.00	AV1	40.26	10.51	0.277	79.1	42.9	0.277	0.267	0.62	0.95
26	0.00	AV1	40.78	10.61	0.286	81.8	42.7	0.286	0.273	0.54	0.96
27	0.00	AV1	40.46	10.65	0.288	82.4	42.6	0.288	0.275	0.61	0.94
28	0.00	AV1	36.80	9.96	0.276	78.8	42.8	0.276	0.256	0.82	0.91
29	0.00	AV1	41.25	10.76	0.286	81.8	42.6	0.286	0.273	0.64	0.95
30	0.00	AV1	39.34	10.42	0.279	79.8	42.8	0.279	0.267	0.42	0.93
31	0.00	AV1	38.01	10.29	0.276	78.8	42.6	0.276	0.258	0.45	0.91
32	0.00	AV1	40.45	10.63	0.286	81.8	42.8	0.286	0.272	0.48	0.93
33	0.00	AV1	40.19	10.66	0.287	82.0	42.8	0.287	0.274	0.41	0.92
34	0.00	AV1	38.56	10.48	0.280	80.1	42.6	0.280	0.263	0.61	0.90
35	0.00	AV1	39.73	10.70	0.285	81.4	42.9	0.285	0.271	0.38	0.92
36	0.00	AV1	40.10	10.88	0.289	82.4	42.6	0.289	0.272	0.44	0.91
37	0.00	AV1	39.33	11.43	0.297	84.8	43.1	0.297	0.269	0.50	0.86
38	0.00	AV1	39.26	11.18	0.292	83.4	42.7	0.292	0.270	0.43	0.85
39	0.00	AV1	35.64	9.62	0.268	76.5	42.7	0.268	0.248	0.71	0.92
40	0.00	AV1	39.24	10.19	0.277	79.1	42.6	0.277	0.263	0.71	0.95
41	0.00	AV1	39.21	10.35	0.283	80.8	43.1	0.283	0.267	0.55	0.91
42	0.00	AV1	37.96	9.82	0.268	76.5	42.8	0.268	0.254	0.63	0.96
43	0.00	AV1	41.28	10.77	0.290	82.7	42.8	0.290	0.270	0.54	0.95
44	0.00	AV1	39.94	10.43	0.283	80.8	42.6	0.283	0.266	0.56	0.95
45	0.00	AV1	35.19	9.57	0.266	76.1	42.6	0.266	0.245	0.53	0.91
46	0.00	AV1	34.64	9.54	0.269	76.9	42.7	0.269	0.251	0.40	0.90
47	0.00	AV1	39.78	10.40	0.279	79.8	42.7	0.279	0.261	0.55	0.95
48	0.00	AV1	39.15	10.30	0.276	79.0	42.9	0.276	0.262	0.34	0.94
49	0.00	AV1	37.46	10.03	0.270	77.3	42.5	0.270	0.254	0.34	0.93
		Average	38.91	10.46	0.281	80.3	42.7	0.281	0.266	0.60	0.91

Total number of blows analyzed: 49

Time Summary

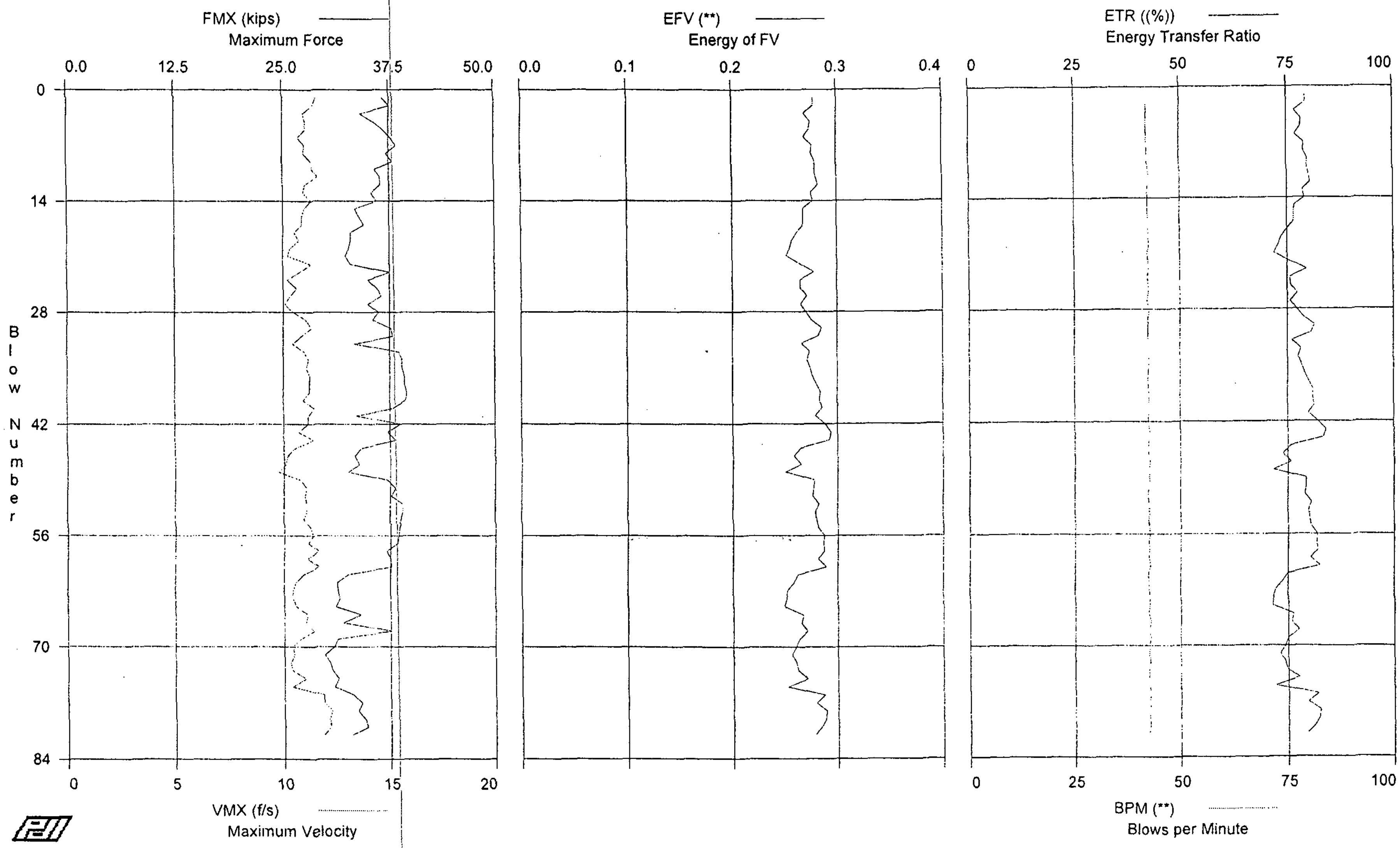
Drive 1 minute 7 seconds 11:19:19 AM - 11:20:26 AM (6/27/2006) BN 1 - 49

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B401-360

Test date: 27-Jun-2006



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-360 N3
OP: KB Test date: 27-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 364.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	36.61	11.56	0.278	79.5	**	0.278	0.261	0.46	0.78
2	0.00	AV1	37.51	11.40	0.278	79.3	42.2	0.278	0.228	0.56	0.81
3	0.00	AV1	34.08	10.96	0.269	76.8	42.3	0.269	0.257	0.47	0.77
4	0.00	AV1	35.64	11.05	0.275	78.5	42.2	0.275	0.262	0.50	0.80
5	0.00	AV1	36.80	11.07	0.274	78.3	42.3	0.274	0.228	0.64	0.82
6	0.00	AV1	37.70	10.72	0.269	77.0	42.3	0.269	0.270	0.70	0.87
7	0.00	AV1	38.37	11.03	0.277	79.1	42.3	0.277	0.274	0.54	0.86
8	0.00	AV1	37.17	10.97	0.276	78.9	42.4	0.276	0.270	0.50	0.84
9	0.00	AV1	37.96	11.32	0.280	80.0	42.3	0.280	0.270	0.50	0.83
10	0.00	AV1	35.72	11.37	0.279	79.8	42.6	0.279	0.261	0.51	0.78
11	0.00	AV1	36.42	11.63	0.280	80.1	42.6	0.280	0.260	0.48	0.78
12	0.00	AV1	36.40	11.02	0.282	80.4	42.6	0.282	0.268	0.57	0.81
13	0.00	AV1	35.33	10.94	0.275	78.6	42.3	0.275	0.261	0.41	0.80
14	0.00	AV1	35.94	11.31	0.277	79.1	42.4	0.277	0.260	0.48	0.79
15	0.00	AV1	33.41	11.00	0.268	76.7	42.4	0.268	0.242	0.49	0.75
16	0.00	AV1	33.93	10.88	0.268	76.5	42.6	0.268	0.248	0.51	0.77
17	0.00	AV1	34.47	10.89	0.268	76.6	42.6	0.268	0.251	0.68	0.78
18	0.00	AV1	32.91	10.52	0.262	74.9	42.5	0.262	0.240	0.58	0.78
19	0.00	AV1	32.88	10.73	0.257	73.5	42.6	0.257	0.236	0.49	0.76
20	0.00	AV1	32.67	10.34	0.255	72.9	42.8	0.255	0.234	0.46	0.78
21	0.00	AV1	32.28	10.23	0.252	72.0	42.3	0.252	0.229	0.51	0.78
22	0.00	AV1	32.91	11.32	0.265	75.6	42.5	0.265	0.239	0.46	0.72
23	0.00	AV1	37.49	10.77	0.278	79.6	42.7	0.278	0.273	0.53	0.86
24	0.00	AV1	34.88	10.19	0.265	75.6	42.4	0.265	0.257	0.40	0.85
25	0.00	AV1	35.98	10.63	0.265	75.8	42.7	0.265	0.256	0.51	0.84
26	0.00	AV1	36.44	10.31	0.271	77.3	42.4	0.271	0.265	0.48	0.88
27	0.00	AV1	34.83	10.08	0.265	75.6	42.2	0.265	0.256	0.16	0.86
28	0.00	AV1	36.17	10.43	0.270	77.2	42.8	0.270	0.262	0.36	0.86
29	0.00	AV1	35.43	11.06	0.275	78.7	42.5	0.275	0.256	0.49	0.79
30	0.00	AV1	37.60	11.32	0.285	81.4	42.6	0.285	0.268	0.23	0.82
31	0.00	AV1	37.86	10.85	0.282	80.6	42.4	0.282	0.270	0.43	0.87
32	0.00	AV1	33.26	10.43	0.266	76.0	42.6	0.266	0.249	0.63	0.79
33	0.00	AV1	38.62	10.99	0.274	78.2	42.6	0.274	0.269	0.60	0.87
34	0.00	AV1	38.97	11.16	0.271	77.5	42.5	0.271	0.267	0.41	0.86
35	0.00	AV1	38.99	11.06	0.274	78.3	42.6	0.274	0.270	0.33	0.87
36	0.00	AV1	39.22	11.22	0.276	79.0	42.5	0.276	0.269	0.38	0.87
37	0.00	AV1	39.26	11.23	0.280	79.9	42.5	0.280	0.272	0.39	0.87
38	0.00	AV1	39.54	11.21	0.284	81.0	42.5	0.284	0.278	0.39	0.87
39	0.00	AV1	39.36	10.91	0.283	81.0	42.7	0.283	0.279	0.23	0.87
40	0.00	AV1	37.78	11.43	0.285	81.3	42.6	0.285	0.267	0.41	0.82
41	0.00	AV1	33.46	11.14	0.279	79.8	42.5	0.279	0.252	0.50	0.75
42	0.00	AV1	38.72	11.13	0.288	82.2	42.5	0.288	0.277	0.52	0.86
43	0.00	AV1	37.19	10.67	0.294	84.0	42.8	0.294	0.275	0.62	0.84
44	0.00	AV1	38.18	11.39	0.292	83.3	42.6	0.292	0.280	0.30	0.82
45	0.00	AV1	34.02	10.51	0.265	75.7	42.5	0.265	0.246	0.51	0.80
46	0.00	AV1	33.26	10.15	0.258	73.8	42.5	0.258	0.242	0.47	0.81
47	0.00	AV1	33.79	10.06	0.265	75.7	42.8	0.265	0.243	0.48	0.85
48	0.00	AV1	32.45	9.75	0.250	71.5	42.6	0.250	0.235	0.34	0.83
49	0.00	AV1	37.18	10.78	0.278	79.3	42.7	0.278	0.269	0.44	0.85
50	0.00	AV1	38.13	11.07	0.277	79.2	42.6	0.277	0.267	0.37	0.85
51	0.00	AV1	37.61	10.98	0.276	79.0	42.4	0.276	0.229	0.45	0.84
52	0.00	AV1	39.01	11.06	0.282	80.6	42.5	0.282	0.271	0.45	0.87
53	0.00	AV1	39.00	11.07	0.279	79.9	42.8	0.279	0.271	0.35	0.86
54	0.00	AV1	38.77	10.93	0.280	80.1	42.5	0.280	0.269	0.25	0.86
55	0.00	AV1	38.54	11.21	0.281	80.4	42.6	0.281	0.270	0.32	0.85
56	0.00	AV1	38.43	11.34	0.287	81.9	42.8	0.287	0.273	0.33	0.84
57	0.00	AV1	38.31	11.11	0.286	81.7	42.4	0.286	0.232	0.36	0.82
58	0.00	AV1	37.00	11.61	0.287	82.0	42.7	0.287	0.267	0.58	0.79
59	0.00	AV1	37.48	11.08	0.281	80.2	42.4	0.281	0.263	0.60	0.82
60	0.00	AV1	37.65	11.62	0.289	82.6	42.9	0.289	0.270	0.59	0.80
61	0.00	AV1	32.44	10.89	0.262	75.0	42.4	0.262	0.234	0.33	0.74

SPT, Calvert Cliffs - B401-360 N3
OP: KB Test date: 27-Jun-2006

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
62	0.00	AV1	31.17	10.55	0.258	73.7	42.5	0.258	0.227	0.48	0.74
63	0.00	AV1	31.29	10.42	0.252	72.1	42.6	0.252	0.223	0.34	0.75
64	0.00	AV1	31.44	10.40	0.251	71.6	42.8	0.251	0.221	0.39	0.75
65	0.00	AV1	31.01	10.58	0.249	71.2	42.6	0.249	0.222	0.34	0.73
66	0.00	AV1	33.90	11.08	0.267	76.2	42.4	0.267	0.241	0.41	0.76
67	0.00	AV1	31.82	10.99	0.265	75.8	43.0	0.265	0.237	0.39	0.71
68	0.00	AV1	37.57	11.38	0.271	77.5	42.6	0.271	0.219	0.36	0.82
69	0.00	AV1	31.23	10.75	0.263	75.0	42.9	0.263	0.232	0.37	0.72
70	0.00	AV1	30.80	10.39	0.260	74.3	42.6	0.260	0.229	0.32	0.74
71	0.00	AV1	29.72	10.47	0.256	73.2	42.5	0.256	0.222	0.38	0.70
72	0.00	AV1	30.29	10.27	0.260	74.3	42.8	0.260	0.227	0.47	0.74
73	0.00	AV1	30.59	10.37	0.262	74.7	42.6	0.262	0.233	0.51	0.73
74	0.00	AV1	31.33	11.00	0.271	77.6	42.6	0.271	0.237	0.64	0.70
75	0.00	AV1	30.83	10.39	0.252	72.0	42.6	0.252	0.227	0.44	0.73
76	0.00	AV1	33.04	11.84	0.287	82.0	42.8	0.287	0.248	0.44	0.69
77	0.00	AV1	34.07	11.84	0.279	79.6	42.6	0.279	0.247	0.47	0.71
78	0.00	AV1	33.60	12.21	0.289	82.6	42.9	0.289	0.252	0.59	0.68
79	0.00	AV1	34.41	12.10	0.288	82.4	42.6	0.288	0.255	0.47	0.70
80	0.00	AV1	34.69	12.14	0.284	81.3	42.7	0.284	0.256	0.48	0.71
81	0.00	AV1	32.84	11.82	0.278	79.4	42.4	0.278	0.241	0.56	0.69
		Average	35.37	10.96	0.273	77.9	42.6	0.273	0.253	0.46	0.80

Total number of blows analyzed: 81

Time Summary

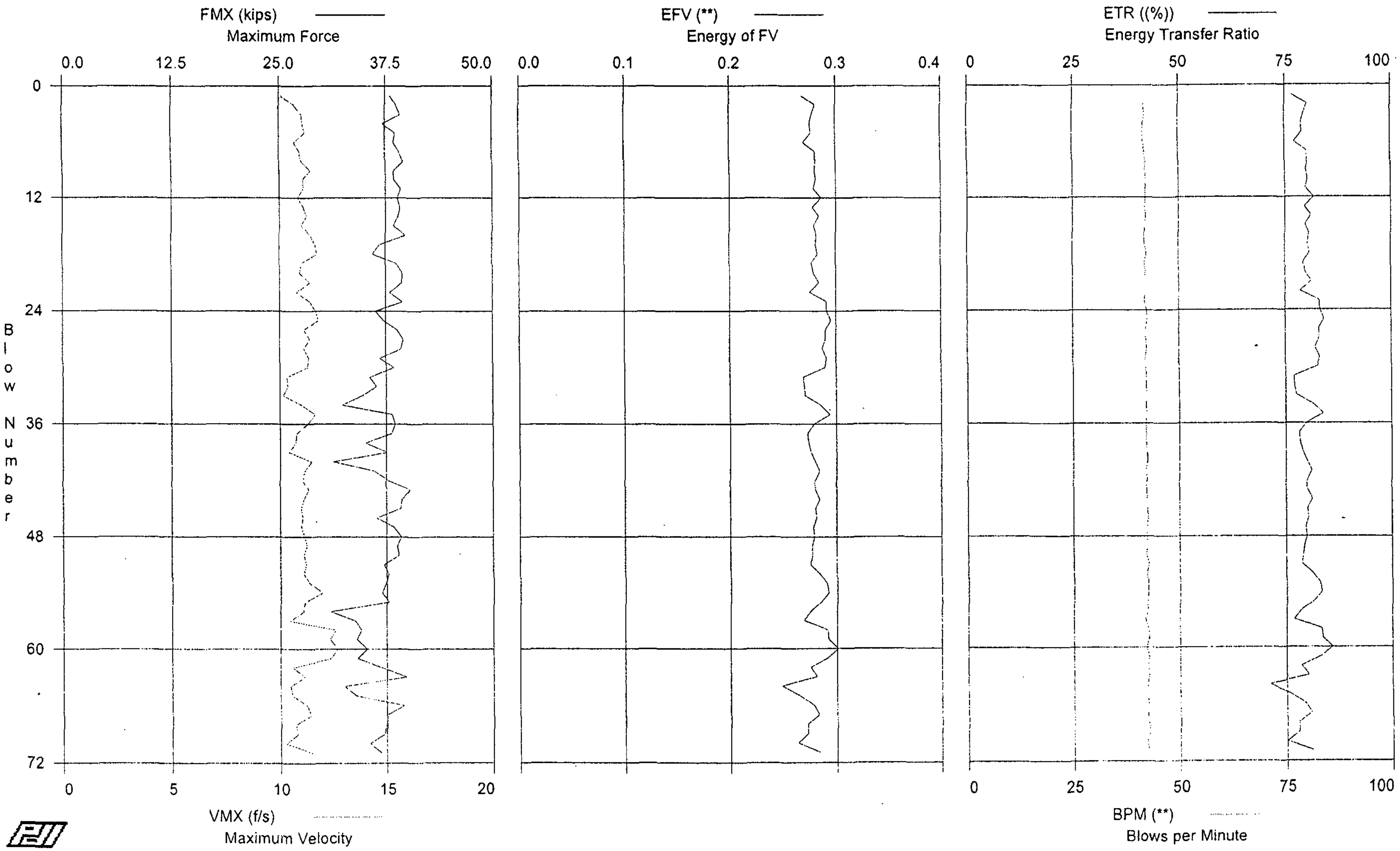
Drive 1 minute 53 seconds 3:18:27 PM - 3:20:20 PM (6/27/2006) BN 1 - 81

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 28-Jun-2006

SPT, Calvert Cliffs - B401-380



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B401-380 N3
OP: KB Test date: 28-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 384.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	38.04	10.08	0.268	76.5	**	0.268	0.249	0.53	0.93
2	0.00	AV1	38.77	10.71	0.281	80.3	41.8	0.281	0.252	0.54	0.85
3	0.00	AV1	39.30	11.07	0.278	79.5	42.1	0.278	0.251	0.52	0.83
4	0.00	AV1	37.19	11.12	0.276	78.9	41.8	0.276	0.240	0.54	0.80
5	0.00	AV1	38.67	11.22	0.277	79.1	41.6	0.277	0.254	0.57	0.81
6	0.00	AV1	38.47	10.70	0.270	77.2	41.8	0.270	0.253	0.57	0.86
7	0.00	AV1	39.12	10.97	0.281	80.2	42.0	0.281	0.258	0.65	0.88
8	0.00	AV1	39.55	11.03	0.281	80.3	42.3	0.281	0.262	0.58	0.88
9	0.00	AV1	38.44	11.46	0.280	79.9	42.0	0.280	0.255	0.41	0.83
10	0.00	AV1	38.42	11.09	0.281	80.4	42.3	0.281	0.258	0.65	0.86
11	0.00	AV1	39.26	11.11	0.279	79.8	42.2	0.279	0.257	0.41	0.88
12	0.00	AV1	38.85	10.86	0.286	81.8	42.2	0.286	0.262	0.68	0.89
13	0.00	AV1	39.19	11.12	0.278	79.5	42.1	0.278	0.254	0.65	0.88
14	0.00	AV1	38.92	11.27	0.284	81.1	42.3	0.284	0.259	0.64	0.85
15	0.00	AV1	38.37	11.03	0.279	79.7	42.1	0.279	0.254	0.64	0.86
16	0.00	AV1	39.84	11.47	0.282	80.7	42.0	0.282	0.258	0.60	0.86
17	0.00	AV1	36.79	11.68	0.281	80.3	42.0	0.281	0.244	0.58	0.78
18	0.00	AV1	35.98	11.78	0.283	80.7	42.5	0.283	0.243	0.64	0.75
19	0.00	AV1	38.74	11.02	0.277	79.3	42.0	0.277	0.257	0.58	0.87
20	0.00	AV1	39.43	10.94	0.279	79.7	42.3	0.279	0.257	0.49	0.89
21	0.00	AV1	39.34	11.42	0.284	81.1	42.1	0.284	0.256	0.55	0.86
22	0.00	AV1	37.94	10.78	0.275	78.4	42.1	0.275	0.248	0.59	0.88
23	0.00	AV1	39.45	11.44	0.291	83.0	41.9	0.291	0.269	0.45	0.86
24	0.00	AV1	36.27	11.69	0.291	83.1	42.4	0.291	0.254	0.56	0.73
25	0.00	AV1	37.20	11.83	0.295	84.2	42.6	0.295	0.258	0.58	0.77
26	0.00	AV1	38.82	11.14	0.290	82.9	42.3	0.290	0.267	0.46	0.86
27	0.00	AV1	39.52	11.43	0.290	83.0	42.3	0.290	0.262	0.56	0.85
28	0.00	AV1	39.26	11.14	0.287	82.0	42.4	0.287	0.265	0.57	0.87
29	0.00	AV1	36.79	11.38	0.291	83.1	42.1	0.291	0.258	0.48	0.80
30	0.00	AV1	38.38	11.29	0.289	82.5	42.0	0.289	0.264	0.40	0.84
31	0.00	AV1	35.52	10.31	0.269	76.9	42.4	0.269	0.241	0.42	0.84
32	0.00	AV1	36.34	10.38	0.270	77.0	42.3	0.270	0.244	0.37	0.84
33	0.00	AV1	34.68	10.16	0.271	77.4	42.4	0.271	0.244	0.52	0.82
34	0.00	AV1	32.30	11.02	0.285	81.4	42.3	0.285	0.242	0.53	0.70
35	0.00	AV1	38.19	11.65	0.294	83.9	42.3	0.294	0.258	0.45	0.80
36	0.00	AV1	38.52	11.31	0.279	79.8	42.2	0.279	0.257	0.48	0.84
37	0.00	AV1	38.10	10.78	0.273	78.1	42.3	0.273	0.252	0.38	0.84
38	0.00	AV1	35.03	10.73	0.274	78.3	42.2	0.274	0.242	0.44	0.81
39	0.00	AV1	37.61	10.41	0.276	79.0	42.4	0.276	0.252	0.54	0.89
40	0.00	AV1	31.19	11.48	0.280	79.9	42.5	0.280	0.232	0.50	0.67
41	0.00	AV1	36.03	11.15	0.284	81.1	42.1	0.284	0.251	0.33	0.76
42	0.00	AV1	37.68	11.07	0.280	80.0	42.5	0.280	0.252	0.43	0.82
43	0.00	AV1	40.24	11.34	0.280	80.0	42.2	0.280	0.257	0.45	0.88
44	0.00	AV1	39.30	11.10	0.284	81.2	42.3	0.284	0.258	0.42	0.86
45	0.00	AV1	39.15	10.97	0.280	80.1	42.4	0.280	0.254	0.51	0.89
46	0.00	AV1	36.29	11.06	0.281	80.2	42.6	0.281	0.243	0.45	0.81
47	0.00	AV1	38.37	10.99	0.278	79.6	42.4	0.278	0.251	0.55	0.85
48	0.00	AV1	39.21	11.14	0.279	79.9	42.3	0.279	0.253	0.32	0.86
49	0.00	AV1	38.72	11.26	0.277	79.3	42.4	0.277	0.251	0.36	0.85
50	0.00	AV1	38.92	11.10	0.277	79.0	42.1	0.277	0.249	0.47	0.87
51	0.00	AV1	37.15	11.21	0.275	78.7	42.7	0.275	0.238	0.41	0.82
52	0.00	AV1	37.75	11.10	0.284	81.2	42.3	0.284	0.253	0.35	0.85
53	0.00	AV1	37.34	11.35	0.290	82.8	42.5	0.290	0.247	0.58	0.82
54	0.00	AV1	36.89	11.95	0.292	83.3	42.5	0.292	0.249	0.50	0.77
55	0.00	AV1	37.73	11.14	0.285	81.5	42.3	0.285	0.250	0.22	0.81
56	0.00	AV1	30.89	11.08	0.275	78.4	42.5	0.275	0.223	0.37	0.69
57	0.00	AV1	33.82	10.45	0.269	76.8	42.0	0.269	0.232	0.30	0.80
58	0.00	AV1	34.49	12.59	0.291	83.3	42.6	0.291	0.234	0.25	0.63
59	0.00	AV1	33.97	12.34	0.292	83.5	42.8	0.292	0.233	0.33	0.62
60	0.00	AV1	35.13	12.68	0.301	85.9	42.1	0.301	0.241	0.38	0.62
61	0.00	AV1	34.02	12.38	0.291	83.1	42.8	0.291	0.236	0.35	0.63

SPT, Calvert Cliffs - B401-380 N3

OP: KB Test date: 28-Jun-2006

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
62	0.00	AV1	36.86	10.56	0.275	78.5	42.5	0.275	0.246	0.38	0.87
63	0.00	AV1	39.81	11.14	0.281	80.3	42.7	0.281	0.255	0.25	0.88
64	0.00	AV1	32.50	10.45	0.248	71.0	42.3	0.248	0.203	0.29	0.77
65	0.00	AV1	33.88	10.54	0.264	75.6	42.3	0.264	0.224	0.23	0.78
66	0.00	AV1	39.50	11.24	0.278	79.3	42.6	0.278	0.251	0.21	0.87
67	0.00	AV1	37.46	11.44	0.283	80.8	42.4	0.283	0.245	0.23	0.81
68	0.00	AV1	37.35	10.68	0.272	77.7	42.4	0.272	0.243	0.18	0.87
69	0.00	AV1	37.22	10.81	0.273	77.9	42.9	0.273	0.243	0.28	0.86
70	0.00	AV1	35.43	10.25	0.263	75.0	42.1	0.263	0.232	0.26	0.86
71	0.00	AV1	36.81	11.52	0.284	81.2	42.6	0.284	0.242	0.35	0.79
		Average	37.35	11.15	0.280	80.1	42.3	0.280	0.249	0.45	0.82

Total number of blows analyzed: 71

Time Summary

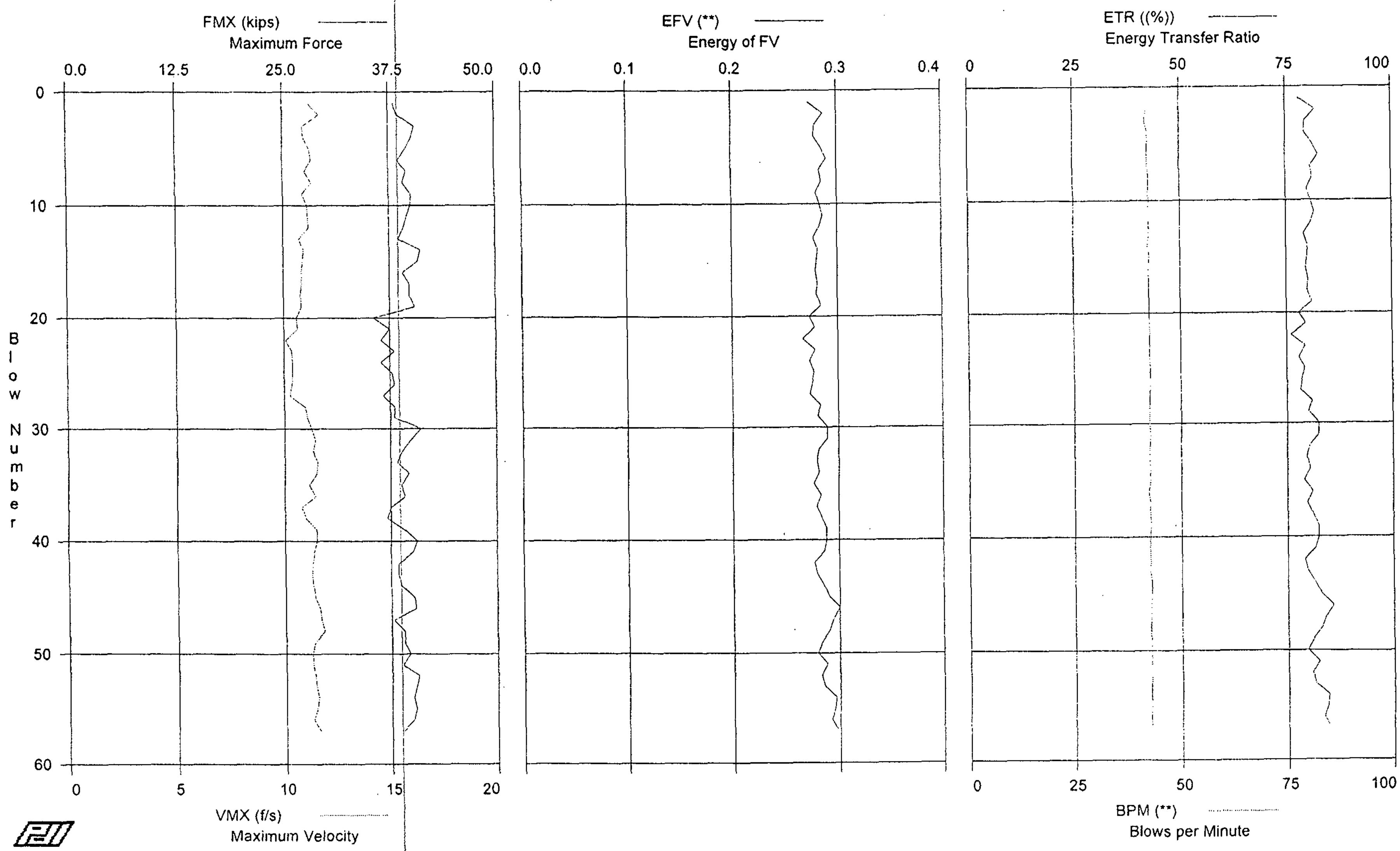
Drive 1 minute 42 seconds 8:32:41 AM - 8:34:23 AM (6/28/2006) BN 1 - 71

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 28-Jun-2006

SPT, Calvert Cliffs - B401-400



SPT, Calvert Cliffs - B401-400 N3
OP: KB Test date: 28-Jun-2006

AR: 2.30 in^2 SP: 0.492 k/ft3
LE: 405.5 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	38.11	11.28	0.273	78.0	**	0.273	0.240	0.50	0.81
2	0.00	AV1	38.52	11.74	0.287	82.1	42.2	0.287	0.243	0.61	0.81
3	0.00	AV1	40.55	10.95	0.279	79.6	41.9	0.279	0.246	0.57	0.87
4	0.00	AV1	40.20	11.02	0.278	79.4	42.6	0.278	0.248	0.55	0.87
5	0.00	AV1	39.55	11.29	0.285	81.3	42.5	0.285	0.257	0.54	0.87
6	0.00	AV1	38.58	11.38	0.290	82.8	42.5	0.290	0.249	0.52	0.83
7	0.00	AV1	39.54	11.05	0.283	81.0	42.6	0.283	0.249	0.57	0.89
8	0.00	AV1	39.11	11.38	0.285	81.3	42.8	0.285	0.253	0.43	0.85
9	0.00	AV1	40.12	10.93	0.280	80.0	42.7	0.280	0.257	0.48	0.85
10	0.00	AV1	40.00	11.15	0.283	80.8	42.7	0.283	0.258	0.50	0.87
11	0.00	AV1	39.58	11.18	0.286	81.7	42.6	0.286	0.258	0.53	0.88
12	0.00	AV1	39.20	11.23	0.283	80.9	42.7	0.283	0.256	0.60	0.87
13	0.00	AV1	38.57	10.77	0.277	79.2	42.8	0.277	0.250	0.53	0.85
14	0.00	AV1	41.15	10.97	0.281	80.2	42.5	0.281	0.261	0.53	0.93
15	0.00	AV1	40.79	10.91	0.280	79.9	42.8	0.280	0.259	0.53	0.93
16	0.00	AV1	39.03	10.86	0.279	79.7	42.5	0.279	0.254	0.51	0.86
17	0.00	AV1	39.87	10.88	0.281	80.2	42.7	0.281	0.258	0.47	0.91
18	0.00	AV1	39.86	10.81	0.280	80.0	42.8	0.280	0.259	0.54	0.86
19	0.00	AV1	40.45	10.84	0.284	81.1	42.8	0.284	0.253	0.45	0.86
20	0.00	AV1	35.52	10.61	0.273	77.9	42.7	0.273	0.235	0.48	0.83
21	0.00	AV1	37.42	10.67	0.278	79.5	42.8	0.278	0.243	0.43	0.87
22	0.00	AV1	36.39	10.07	0.266	75.9	42.8	0.266	0.232	0.41	0.86
23	0.00	AV1	37.99	10.37	0.278	79.3	42.7	0.278	0.250	0.49	0.85
24	0.00	AV1	36.39	10.42	0.273	77.9	42.8	0.273	0.236	0.45	0.87
25	0.00	AV1	37.80	10.43	0.277	79.2	42.9	0.277	0.248	0.58	0.86
26	0.00	AV1	37.96	10.38	0.275	78.6	42.9	0.275	0.247	0.43	0.86
27	0.00	AV1	36.61	10.28	0.273	78.1	42.8	0.273	0.235	0.51	0.88
28	0.00	AV1	38.03	11.01	0.283	80.9	42.8	0.283	0.242	0.42	0.86
29	0.00	AV1	37.91	11.08	0.280	80.1	42.6	0.280	0.231	0.42	0.85
30	0.00	AV1	41.04	11.28	0.289	82.5	42.6	0.289	0.256	0.41	0.90
31	0.00	AV1	39.90	11.47	0.289	82.5	42.9	0.289	0.234	0.40	0.76
32	0.00	AV1	38.90	11.37	0.281	80.3	42.7	0.281	0.230	0.56	0.78
33	0.00	AV1	38.21	11.56	0.279	79.6	42.6	0.279	0.223	0.37	0.78
34	0.00	AV1	39.63	11.52	0.281	80.4	42.6	0.281	0.228	0.28	0.85
35	0.00	AV1	38.74	11.16	0.276	78.9	42.8	0.276	0.223	0.47	0.74
36	0.00	AV1	39.20	11.47	0.283	81.0	42.4	0.283	0.227	0.46	0.85
37	0.00	AV1	37.52	10.81	0.279	79.7	42.8	0.279	0.227	0.40	0.86
38	0.00	AV1	37.00	10.99	0.283	81.0	42.6	0.283	0.226	0.47	0.80
39	0.00	AV1	39.07	11.51	0.288	82.3	42.9	0.288	0.229	0.41	0.77
40	0.00	AV1	40.59	11.52	0.288	82.3	42.6	0.288	0.233	0.41	0.77
41	0.00	AV1	40.11	11.40	0.286	81.6	42.7	0.286	0.239	0.44	0.87
42	0.00	AV1	38.37	11.31	0.276	79.0	42.7	0.276	0.225	0.38	0.84
43	0.00	AV1	38.38	11.28	0.279	79.8	42.6	0.279	0.221	0.52	0.84
44	0.00	AV1	38.74	11.34	0.285	81.5	43.0	0.285	0.227	0.51	0.79
45	0.00	AV1	40.19	11.41	0.290	82.9	42.9	0.290	0.231	0.45	0.87
46	0.00	AV1	40.40	11.64	0.300	85.8	42.8	0.300	0.235	0.43	0.73
47	0.00	AV1	37.77	11.69	0.294	84.0	42.8	0.294	0.225	0.46	0.74
48	0.00	AV1	39.07	11.85	0.290	83.0	42.7	0.290	0.226	0.45	0.76
49	0.00	AV1	39.01	11.36	0.283	81.0	42.8	0.283	0.235	0.60	0.82
50	0.00	AV1	39.64	11.26	0.279	79.7	42.8	0.279	0.239	0.38	0.88
51	0.00	AV1	38.78	11.30	0.288	82.3	42.8	0.288	0.248	0.45	0.85
52	0.00	AV1	40.64	11.38	0.282	80.7	42.9	0.282	0.248	0.40	0.88
53	0.00	AV1	40.34	11.44	0.285	81.4	42.8	0.285	0.233	0.43	0.87
54	0.00	AV1	40.06	11.54	0.296	84.5	42.7	0.296	0.229	0.57	0.74
55	0.00	AV1	40.39	11.47	0.295	84.3	42.8	0.295	0.233	0.52	0.87
56	0.00	AV1	40.03	11.32	0.292	83.5	42.7	0.292	0.251	0.36	0.81
57	0.00	AV1	38.83	11.63	0.297	84.8	42.9	0.297	0.238	0.44	0.80
		Average	39.04	11.14	0.283	80.8	42.7	0.283	0.241	0.47	0.84

Total number of blows analyzed: 57

Time Summary

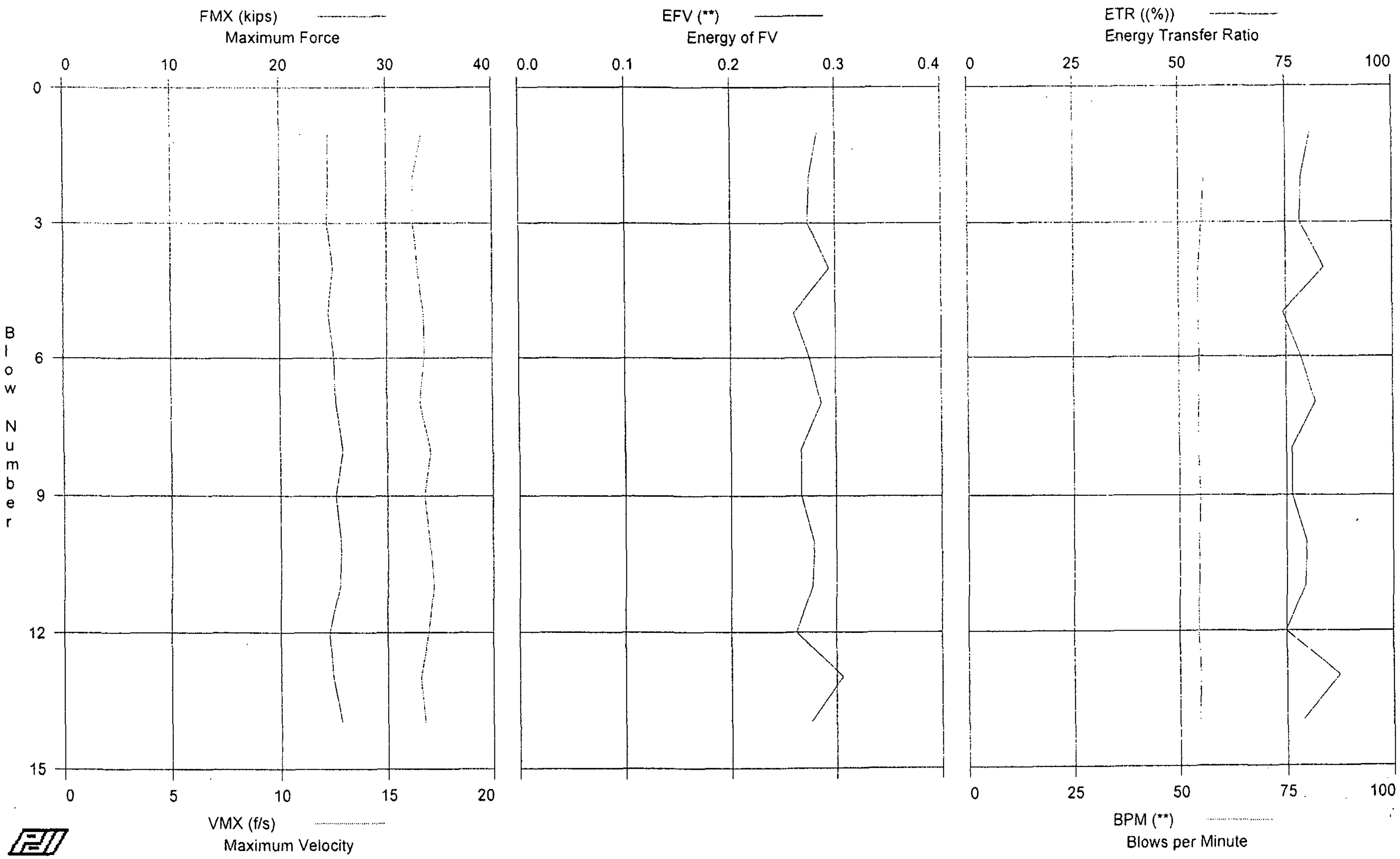
Drive 1 minute 19 seconds 11:12:01 AM - 11:13:20 AM (6/28/2006) BN 1 - 57

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

Test date: 20-Jun-2006

SPT, Calvert Cliffs - B403-15



SPT, Calvert Cliffs - B403-15 AW Rod
OP: KB Test date: 20-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 19.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	24.56	16.68	0.283	80.8	**	0.283	0.223	2.20	0.65
2	0.00	AV1	24.55	16.26	0.275	78.6	55.9	0.275	0.224	1.23	0.59
3	0.00	AV1	24.42	16.28	0.274	78.3	55.4	0.274	0.225	1.11	0.58
4	0.00	AV1	24.99	16.47	0.294	83.9	54.6	0.294	0.228	1.31	0.60
5	0.00	AV1	24.50	16.74	0.260	74.3	54.4	0.260	0.227	-0.70	0.60
6	0.00	AV1	25.04	16.79	0.275	78.5	54.8	0.275	0.228	0.79	0.61
7	0.00	AV1	25.19	16.57	0.286	81.7	54.6	0.286	0.231	0.98	0.60
8	0.00	AV1	25.83	17.05	0.267	76.3	54.4	0.267	0.234	0.08	0.62
9	0.00	AV1	25.14	16.77	0.267	76.4	54.8	0.267	0.232	0.00	0.59
10	0.00	AV1	25.63	17.01	0.279	79.6	54.6	0.279	0.233	0.39	0.63
11	0.00	AV1	25.50	17.18	0.277	79.3	54.5	0.277	0.235	0.34	0.63
12	0.00	AV1	24.54	16.95	0.262	74.9	54.4	0.262	0.227	-1.47	0.58
13	0.00	AV1	24.88	16.56	0.306	87.4	54.8	0.306	0.231	1.02	0.58
14	0.00	AV1	25.69	16.78	0.276	78.9	54.6	0.276	0.238	0.45	0.62
		Average	25.03	16.72	0.277	79.2	54.8	0.277	0.230	0.55	0.60

Total number of blows analyzed: 14

Time Summary

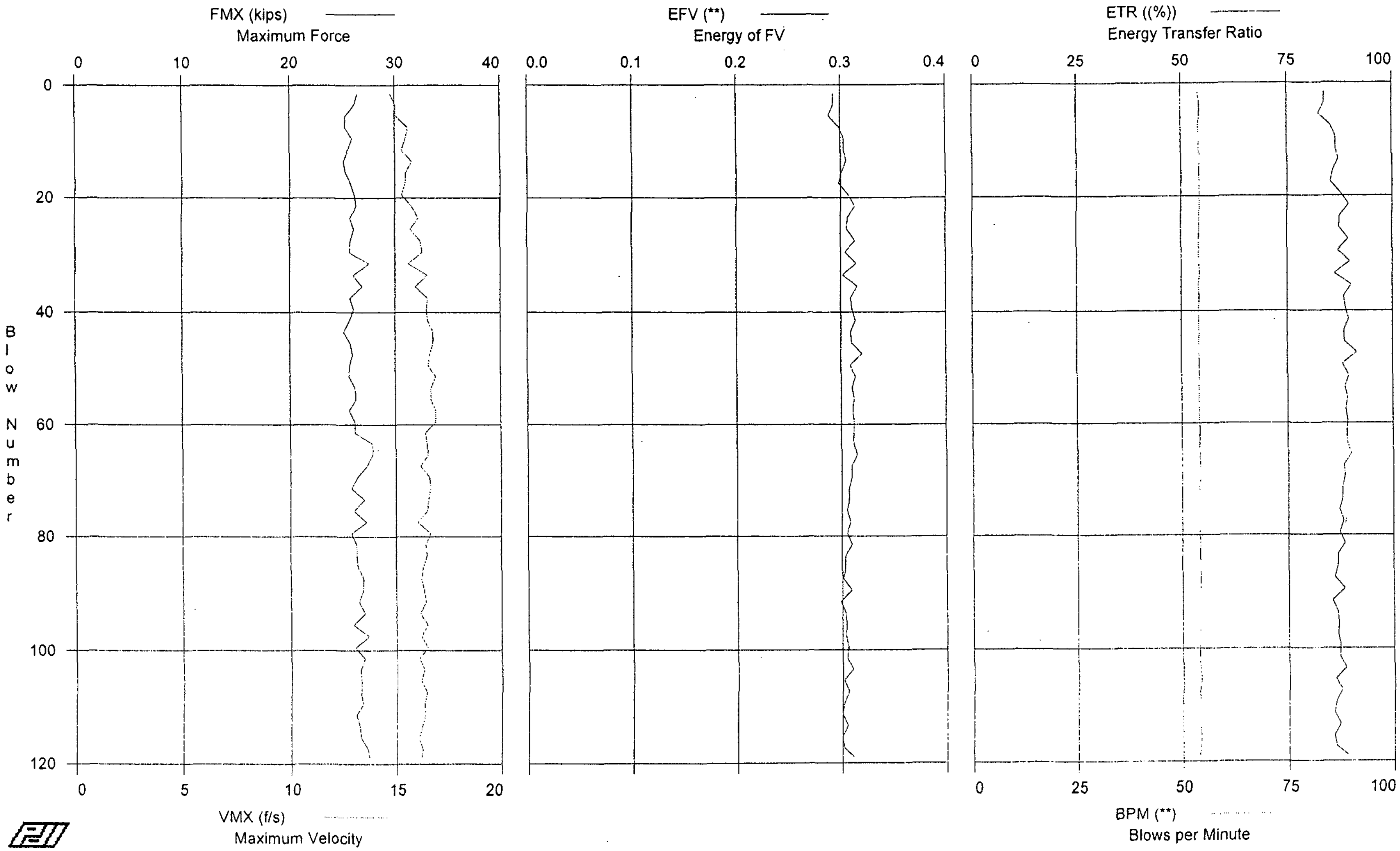
Drive 14 seconds 4:41:50 PM - 4:42:04 PM (6/20/2006) BN 1 - 14

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

Test date: 20-Jun-2006

SPT, Calvert Cliffs - B403-30



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B403-30 AW Rod
OP: KB Test date: 20-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 34.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	25.56	15.25	0.288	82.3	**	0.288	0.282	0.11	0.80
2	0.00	AV1	27.44	14.31	0.299	85.5	54.0	0.299	0.290	-0.51	0.80
3	0.00	AV1	26.52	15.02	0.280	80.0	54.3	0.280	0.286	-1.77	0.80
4	0.00	AV1	25.81	15.02	0.307	87.7	54.5	0.307	0.282	-0.59	0.75
5	0.00	AV1	25.01	15.27	0.291	83.0	54.1	0.291	0.280	-2.22	0.74
6	0.00	AV1	25.59	14.81	0.287	82.0	54.7	0.287	0.275	-2.88	0.82
7	0.00	AV1	25.47	15.35	0.295	84.4	54.1	0.295	0.275	-0.97	0.79
8	0.00	AV1	25.04	15.88	0.302	86.3	54.2	0.302	0.278	-1.08	0.74
9	0.00	AV1	25.12	15.59	0.295	84.4	54.3	0.295	0.279	-1.01	0.76
10	0.00	AV1	26.78	15.44	0.311	88.8	54.3	0.311	0.284	-0.29	0.80
11	0.00	AV1	25.61	15.13	0.300	85.6	54.5	0.300	0.274	-0.08	0.81
12	0.00	AV1	25.42	15.51	0.306	87.5	53.8	0.306	0.278	-0.58	0.72
13	0.00	AV1	25.09	15.82	0.307	87.7	54.4	0.307	0.275	-0.29	0.70
14	0.00	AV1	25.09	15.74	0.303	86.4	54.2	0.303	0.280	-0.40	0.76
15	0.00	AV1	25.04	15.76	0.305	87.1	54.4	0.305	0.277	-0.37	0.73
16	0.00	AV1	25.55	15.23	0.296	84.5	53.9	0.296	0.281	-1.13	0.74
17	0.00	AV1	25.82	15.40	0.302	86.2	54.3	0.302	0.282	-0.77	0.79
18	0.00	AV1	25.70	15.55	0.294	84.1	54.3	0.294	0.280	-0.85	0.72
19	0.00	AV1	26.97	15.50	0.316	90.1	54.0	0.316	0.286	-0.62	0.83
20	0.00	AV1	25.27	15.12	0.298	85.0	54.4	0.298	0.280	-0.55	0.70
21	0.00	AV1	26.58	15.65	0.315	90.1	54.1	0.315	0.282	-0.37	0.81
22	0.00	AV1	26.00	15.90	0.311	89.0	54.4	0.311	0.278	-0.46	0.73
23	0.00	AV1	25.35	16.43	0.306	87.4	54.2	0.306	0.280	-0.55	0.70
24	0.00	AV1	26.11	15.81	0.307	87.6	54.3	0.307	0.278	-0.78	0.68
25	0.00	AV1	26.17	15.62	0.308	87.9	54.2	0.308	0.280	-0.55	0.73
26	0.00	AV1	26.02	15.80	0.303	86.7	54.3	0.303	0.285	-0.67	0.75
27	0.00	AV1	26.86	16.02	0.315	90.1	54.2	0.315	0.283	-0.34	0.74
28	0.00	AV1	24.70	16.40	0.312	89.0	54.2	0.312	0.275	-0.02	0.67
29	0.00	AV1	26.55	15.73	0.303	86.6	53.9	0.303	0.285	-0.50	0.74
30	0.00	AV1	24.70	16.81	0.305	87.3	54.3	0.305	0.281	-0.58	0.67
31	0.00	AV1	27.54	15.59	0.315	89.9	54.2	0.315	0.289	0.01	0.73
32	0.00	AV1	27.48	15.61	0.314	89.7	54.1	0.314	0.287	0.12	0.72
33	0.00	AV1	26.35	16.47	0.295	84.2	54.3	0.295	0.282	2.42	0.74
34	0.00	AV1	25.69	16.57	0.308	88.0	54.4	0.308	0.275	-0.26	0.68
35	0.00	AV1	27.88	16.05	0.322	92.0	53.8	0.322	0.290	0.07	0.77
36	0.00	AV1	25.85	15.85	0.309	88.2	54.2	0.309	0.279	0.22	0.65
37	0.00	AV1	25.61	16.47	0.300	85.7	54.0	0.300	0.281	0.10	0.65
38	0.00	AV1	25.79	16.60	0.318	91.0	54.4	0.318	0.283	-0.86	0.70
39	0.00	AV1	26.27	16.34	0.308	88.0	54.0	0.308	0.286	-0.20	0.68
40	0.00	AV1	25.85	16.64	0.313	89.5	54.2	0.313	0.282	-0.03	0.68
~~41~~	~~0.00~~	~~AV1~~	~~24.89~~	~~16.78~~	~~0.312~~	~~89.1~~	~~54.2~~	~~0.312~~	~~0.280~~	~~0.13~~	~~0.65~~
42	0.00	AV1	26.35	16.31	0.315	90.0	54.0	0.315	0.285	0.11	0.67
43	0.00	AV1	25.27	17.10	0.312	89.2	54.4	0.312	0.279	-0.08	0.65
44	0.00	AV1	24.89	16.49	0.306	87.5	53.9	0.306	0.276	-0.07	0.61
45	0.00	AV1	26.00	16.69	0.313	89.5	54.2	0.313	0.280	-0.01	0.66
46	0.00	AV1	25.40	16.89	0.307	87.6	54.0	0.307	0.277	0.05	0.62
47	0.00	AV1	25.80	16.79	0.320	91.4	54.4	0.320	0.278	0.36	0.67
48	0.00	AV1	26.08	16.53	0.320	91.4	53.7	0.320	0.281	0.00	0.65
49	0.00	AV1	25.72	16.51	0.312	89.0	54.5	0.312	0.279	0.24	0.70
50	0.00	AV1	25.64	16.60	0.305	87.0	53.9	0.305	0.276	0.01	0.66
51	0.00	AV1	25.95	16.91	0.313	89.4	54.0	0.313	0.278	-0.04	0.65
52	0.00	AV1	25.16	16.90	0.313	89.5	54.3	0.313	0.277	0.13	0.64
53	0.00	AV1	26.57	16.43	0.308	87.9	53.8	0.308	0.283	-0.21	0.69
54	0.00	AV1	25.74	16.94	0.312	89.2	54.2	0.312	0.279	-0.18	0.64
55	0.00	AV1	26.09	16.67	0.313	89.5	54.0	0.313	0.281	0.13	0.66
56	0.00	AV1	26.43	16.66	0.311	88.9	54.0	0.311	0.281	-0.14	0.67
57	0.00	AV1	25.66	17.03	0.312	89.2	54.3	0.312	0.280	-0.18	0.68
58	0.00	AV1	25.51	16.79	0.309	88.2	54.1	0.309	0.277	-0.13	0.67
59	0.00	AV1	25.74	16.85	0.306	87.4	54.2	0.306	0.276	-0.14	0.66
60	0.00	AV1	26.53	16.95	0.318	91.0	54.0	0.318	0.279	-0.16	0.68
61	0.00	AV1	25.00	16.87	0.310	88.5	54.3	0.310	0.276	-0.06	0.68

SPT, Calvert Cliffs - B403-30 AW Rod
OP: KB Test date: 20-Jun-2006

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
62	0.00	AV1	27.33	15.94	0.313	89.4	54.2	0.313	0.284	-0.23	0.69
63	0.00	AV1	27.75	16.50	0.307	87.8	54.3	0.307	0.286	-0.10	0.72
64	0.00	AV1	27.84	16.49	0.316	90.4	54.1	0.316	0.285	-0.10	0.72
65	0.00	AV1	27.88	16.53	0.320	91.5	54.1	0.320	0.287	-0.05	0.73
66	0.00	AV1	27.64	16.49	0.309	88.3	54.0	0.309	0.284	-0.38	0.72
67	0.00	AV1	27.35	16.14	0.306	87.3	54.4	0.306	0.282	-0.07	0.70
68	0.00	AV1	27.03	16.16	0.312	89.0	54.1	0.312	0.280	0.29	0.76
69	0.00	AV1	27.11	16.24	0.311	88.9	54.0	0.311	0.281	0.03	0.68
70	0.00	AV1	25.65	16.92	0.308	87.9	54.6	0.308	0.274	-0.03	0.67
71	0.00	AV1	25.40	16.75	0.304	87.0	53.7	0.304	0.278	-0.08	0.70
72	0.00	AV1	26.10	16.51	0.310	88.5	54.3	0.310	0.281	-0.11	0.71
73	0.00	AV1	27.65	16.21	0.307	87.7	54.0	0.307	0.284	0.09	0.70
74	0.00	AV1	26.33	16.88	0.307	87.8	54.2	0.307	0.281	-0.07	0.67
75	0.00	AV1	25.31	16.72	0.306	87.3	54.0	0.306	0.275	-0.13	0.64
76	0.00	AV1	26.69	16.26	0.304	86.8	54.2	0.304	0.280	-0.17	0.76
77	0.00	AV1	27.37	15.65	0.302	86.4	54.1	0.302	0.281	-0.37	0.71
78	0.00	AV1	26.99	16.38	0.314	89.7	54.0	0.314	0.283	0.09	0.71
79	0.00	AV1	26.74	16.24	0.310	88.7	54.2	0.310	0.281	0.00	0.75
80	0.00	AV1	24.79	17.02	0.300	85.6	53.9	0.300	0.272	-0.39	0.68
81	0.00	AV1	25.14	16.77	0.312	89.1	54.3	0.312	0.276	-0.08	0.63
82	0.00	AV1	27.36	16.04	0.307	87.8	54.2	0.307	0.283	-0.22	0.73
83	0.00	AV1	26.88	16.31	0.309	88.2	54.3	0.309	0.280	-0.20	0.71
84	0.00	AV1	25.69	16.61	0.298	85.1	54.1	0.298	0.276	-0.14	0.68
85	0.00	AV1	25.68	16.50	0.300	85.8	54.3	0.300	0.272	-0.25	0.66
86	0.00	AV1	27.11	16.03	0.307	87.7	54.2	0.307	0.279	0.00	0.76
87	0.00	AV1	27.07	16.03	0.302	86.2	53.9	0.302	0.278	-0.35	0.70
88	0.00	AV1	26.70	16.31	0.299	85.4	54.5	0.299	0.278	-0.71	0.71
89	0.00	AV1	26.72	16.32	0.312	89.3	53.9	0.312	0.281	-0.30	0.73
90	0.00	AV1	26.91	16.29	0.306	87.3	54.3	0.306	0.450	-0.29	0.76
91	0.00	AV1	27.18	16.36	0.298	85.0	54.0	0.298	0.278	-0.56	0.73
92	0.00	AV1	25.72	16.43	0.299	85.5	54.2	0.299	0.275	-0.34	0.68
93	0.00	AV1	27.15	16.02	0.302	86.3	54.3	0.302	0.274	-0.22	0.71
94	0.00	AV1	26.80	16.22	0.304	86.8	54.0	0.304	0.280	-0.18	0.74
95	0.00	AV1	26.82	16.51	0.311	88.9	54.0	0.311	0.283	-0.28	0.73
96	0.00	AV1	24.97	16.45	0.297	84.9	54.3	0.297	0.273	-0.69	0.72
97	0.00	AV1	27.44	16.01	0.308	87.9	54.0	0.308	0.280	-0.06	0.72
98	0.00	AV1	27.31	16.35	0.299	85.5	54.2	0.299	0.281	-0.46	0.73
99	0.00	AV1	26.62	16.37	0.306	87.3	53.9	0.306	0.278	-0.49	0.73
100	0.00	AV1	25.55	16.57	0.305	87.3	54.1	0.305	0.271	-0.17	0.66
101	0.00	AV1	27.25	16.09	0.303	86.7	54.0	0.303	0.281	-0.09	0.74
102	0.00	AV1	26.66	16.07	0.306	87.5	54.0	0.306	0.279	-0.15	0.67
103	0.00	AV1	26.65	16.04	0.303	86.5	54.1	0.303	0.277	-0.35	0.74
104	0.00	AV1	26.36	16.54	0.316	90.4	54.0	0.316	0.277	-0.20	0.68
105	0.00	AV1	27.34	16.00	0.301	86.0	54.1	0.301	0.281	-0.30	0.72
106	0.00	AV1	25.87	16.26	0.301	85.9	54.3	0.301	0.271	-0.04	0.66
107	0.00	AV1	25.61	16.78	0.310	88.7	53.6	0.310	0.278	-0.16	0.69
108	0.00	AV1	27.53	16.04	0.302	86.4	54.1	0.302	0.281	0.19	0.74
109	0.00	AV1	27.14	16.23	0.303	86.5	54.2	0.303	0.279	-0.32	0.72
110	0.00	AV1	26.46	16.39	0.300	85.8	54.1	0.300	0.277	-0.31	0.67
111	0.00	AV1	26.95	16.11	0.300	85.8	54.0	0.300	0.277	-0.18	0.70
112	0.00	AV1	25.36	16.56	0.300	85.7	54.3	0.300	0.274	-0.64	0.67
113	0.00	AV1	27.01	16.02	0.302	86.3	54.2	0.302	0.278	-0.16	0.73
114	0.00	AV1	25.96	16.37	0.308	88.0	53.9	0.308	0.274	0.03	0.65
115	0.00	AV1	25.68	16.03	0.295	84.3	54.3	0.295	0.273	-0.53	0.65
116	0.00	AV1	27.52	16.04	0.304	87.0	54.2	0.304	0.283	-0.16	0.75
117	0.00	AV1	27.35	16.30	0.304	86.8	54.1	0.304	0.279	-0.18	0.72
118	0.00	AV1	27.18	16.15	0.300	85.8	54.1	0.300	0.281	-0.33	0.77
119	0.00	AV1	27.35	16.15	0.311	88.9	53.9	0.311	0.281	0.49	0.75
		Average	26.26	16.20	0.306	87.5	54.1	0.306	0.281	-0.26	0.71

Total number of blows analyzed: 119

Time Summary

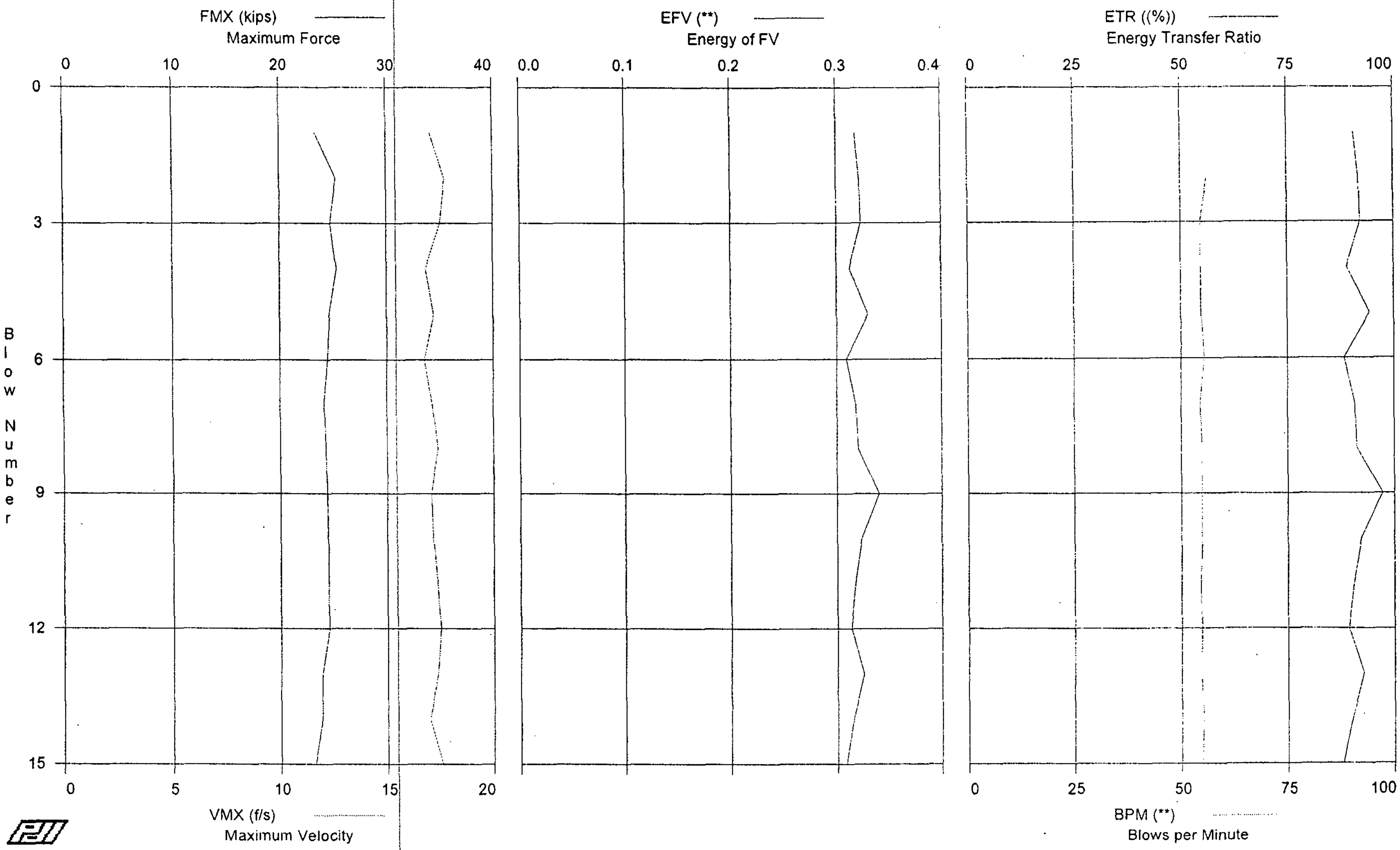
Drive 2 minutes 11 seconds 5:05:58 PM - 5:08:09 PM (6/20/2006) BN 1 - 119

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B403-45

Test date: 21-Jun-2006



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B403-45 AW Rod

OP: KB Test date: 21-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3

LE: 49.0 ft EM: 30,000 ksi

WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	23.36	17.07	0.318	90.8	**	0.318	0.263	1.78	0.53
2	0.00	AV1	25.29	17.73	0.322	91.9	56.3	0.322	0.275	1.55	0.60
3	0.00	AV1	24.72	17.51	0.323	92.2	54.6	0.323	0.272	0.52	0.54
4	0.00	AV1	25.32	16.82	0.312	89.0	54.7	0.312	0.273	1.50	0.62
5	0.00	AV1	24.62	17.21	0.330	94.4	54.8	0.330	0.271	1.41	0.56
6	0.00	AV1	24.42	16.76	0.309	88.4	55.5	0.309	0.265	0.31	0.63
7	0.00	AV1	24.10	17.12	0.318	90.8	54.5	0.318	0.261	0.76	0.58
8	0.00	AV1	24.25	17.37	0.320	91.3	54.9	0.320	0.267	1.36	0.57
9	0.00	AV1	24.35	17.05	0.340	97.3	54.8	0.340	0.267	0.62	0.60
10	0.00	AV1	24.44	17.15	0.323	92.3	54.9	0.323	0.267	1.30	0.61
11	0.00	AV1	24.46	17.33	0.317	90.5	54.5	0.317	0.272	0.10	0.54
12	0.00	AV1	24.51	17.47	0.313	89.3	54.7	0.313	0.269	-0.46	0.56
13	0.00	AV1	23.89	17.34	0.325	92.8	54.6	0.325	0.266	0.00	0.53
14	0.00	AV1	23.85	16.96	0.315	90.1	55.1	0.315	0.263	0.77	0.60
15	0.00	AV1	23.23	17.56	0.308	88.1	54.8	0.308	0.257	0.23	0.52
		Average	24.32	17.23	0.320	91.3	54.9	0.320	0.267	0.78	0.57

Total number of blows analyzed: 15

Time Summary

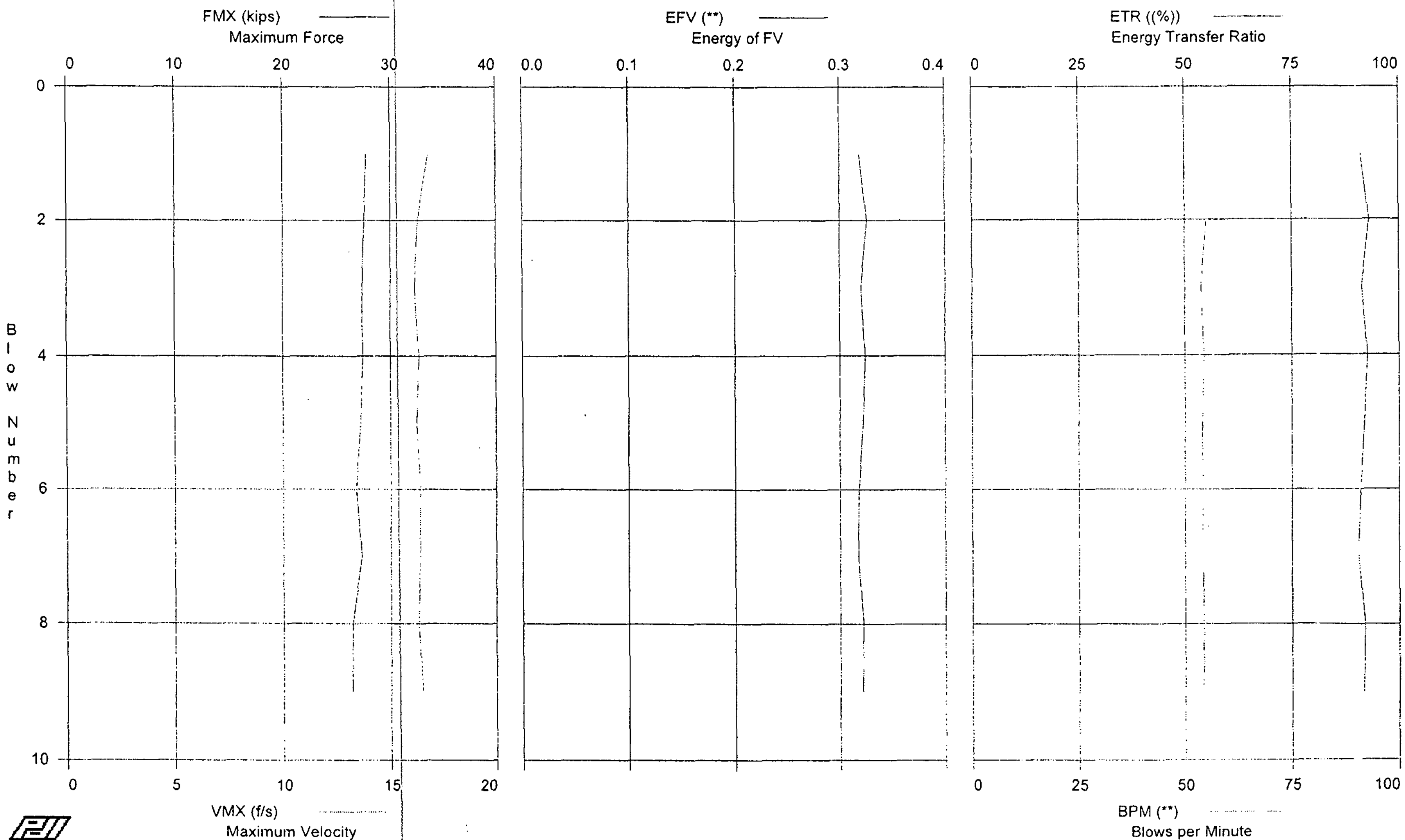
Drive 15 seconds 7:39:53 AM - 7:40:08 AM (6/21/2006) BN 1 - 15

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 21-Jun-2006

SPT, Calvert Cliffs - B403-60



Case Method Results   PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B403-60   AW Rod
OP: KB   Test date: 21-Jun-2006

AR: 1.19 in^2   SP: 0.492 k/ft3
LE: 64.0 ft   EM: 30,000 ksi
WS: 16,807.9 f/s   JC: 0.00

FMX: Maximum Force   EMX: Max Transferred Energy
VMX: Maximum Velocity   EF2: Energy of F^2
EFV: Energy of FV   DFN: Final Displacement
ETR: Energy Transfer Ratio   FVP: Force/Velocity proportionality
BPM: Blows per Minute

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	27.75	16.79	0.319	91.1	**	0.319	0.308	1.70	0.73
2	0.00	AV1	27.54	16.29	0.326	93.0	55.1	0.326	0.301	1.66	0.73
3	0.00	AV1	27.32	16.12	0.320	91.3	53.8	0.320	0.299	0.97	0.73
4	0.00	AV1	27.39	16.34	0.324	92.6	54.5	0.324	0.303	1.12	0.76
5	0.00	AV1	27.18	16.23	0.322	91.9	54.1	0.322	0.304	1.27	0.75
6	0.00	AV1	26.73	16.38	0.318	90.9	54.2	0.318	0.303	1.02	0.77
7	0.00	AV1	27.24	16.36	0.317	90.4	54.2	0.317	0.301	0.22	0.73
8	0.00	AV1	26.40	16.29	0.322	92.0	54.4	0.322	0.300	0.83	0.76
9	0.00	AV1	26.33	16.48	0.321	91.6	54.2	0.321	0.297	0.55	0.70
		Average	27.10	16.36	0.321	91.7	54.3	0.321	0.302	1.04	0.74

Total number of blows analyzed: 9

Time Summary

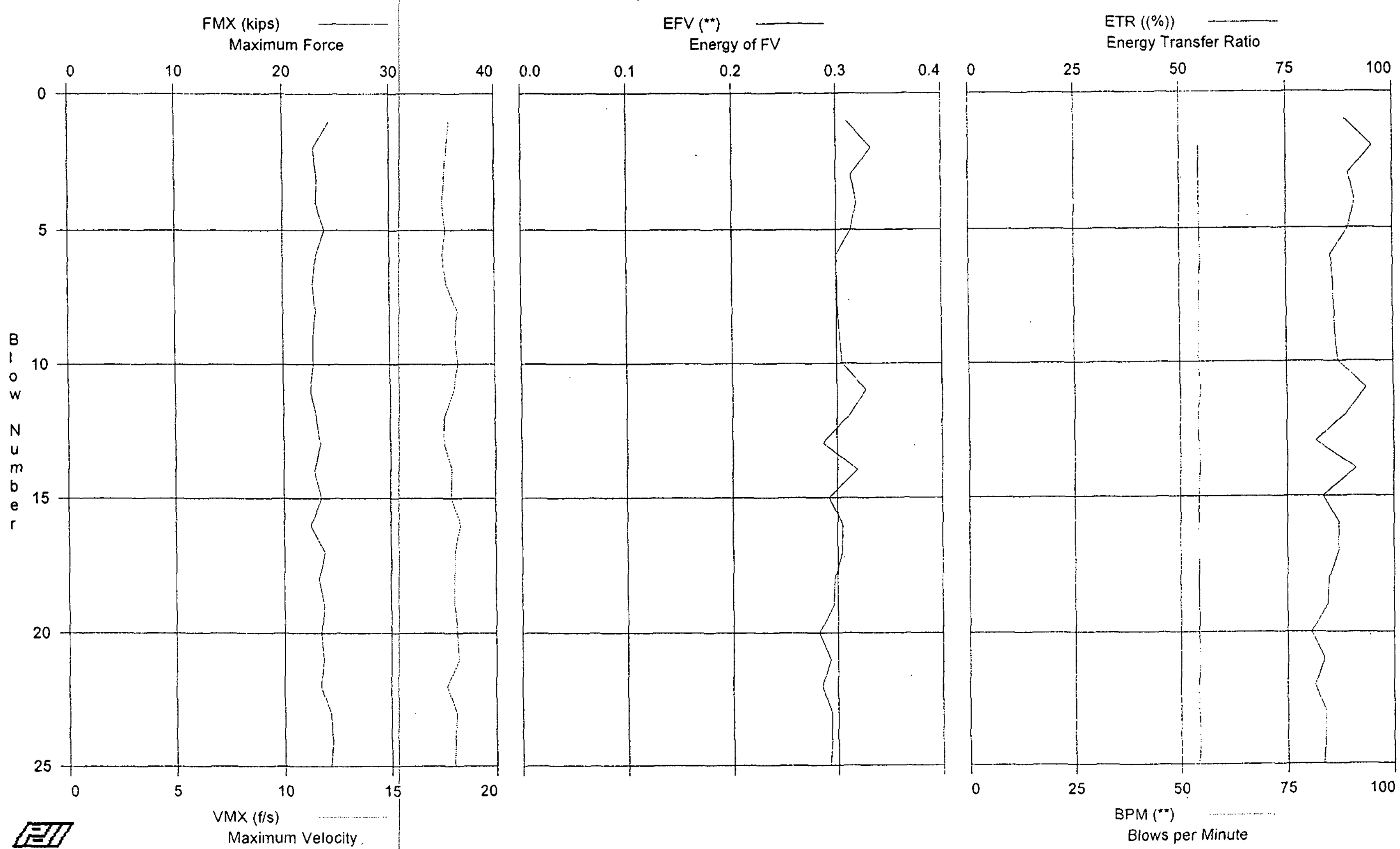
Drive 9 seconds 8:33:13 AM - 8:33:22 AM (6/21/2006) BN 1 - 9

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 21-Jun-2006

SPT, Calvert Cliffs - B403-75



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B403-75 AW rod
OP: KB Test date: 21-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 79.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	24.33	17.84	0.310	88.6	**	0.310	0.271	-0.19	0.56
2	0.00	AV1	22.86	17.71	0.333	95.2	54.5	0.333	0.271	1.57	0.50
3	0.00	AV1	23.18	17.61	0.314	89.6	54.6	0.314	0.271	-0.32	0.47
4	0.00	AV1	23.06	17.49	0.319	91.1	54.5	0.319	0.271	-0.72	0.47
5	0.00	AV1	23.87	17.67	0.314	89.7	54.7	0.314	0.269	0.16	0.54
6	0.00	AV1	23.03	17.50	0.299	85.4	54.8	0.299	0.272	-0.52	0.51
7	0.00	AV1	22.76	17.70	0.301	86.0	54.6	0.301	0.270	-0.10	0.50
8	0.00	AV1	23.02	18.20	0.301	86.1	54.4	0.301	0.273	-0.79	0.51
9	0.00	AV1	22.79	18.11	0.303	86.4	54.4	0.303	0.277	-0.19	0.50
10	0.00	AV1	22.79	18.23	0.305	87.0	54.3	0.305	0.273	-0.25	0.49
11	0.00	AV1	22.49	18.00	0.327	93.5	54.8	0.327	0.275	1.94	0.47
12	0.00	AV1	23.02	17.56	0.311	88.7	54.1	0.311	0.271	0.32	0.50
13	0.00	AV1	23.37	17.53	0.286	81.7	54.3	0.286	0.274	-1.09	0.51
14	0.00	AV1	22.83	17.92	0.319	91.1	54.6	0.319	0.272	1.43	0.48
15	0.00	AV1	23.47	17.87	0.292	83.4	54.3	0.292	0.274	-0.76	0.52
16	0.00	AV1	22.48	18.32	0.305	87.1	54.3	0.305	0.277	-0.17	0.48
17	0.00	AV1	23.72	18.02	0.304	86.9	54.2	0.304	0.277	-0.14	0.52
18	0.00	AV1	23.19	18.01	0.297	84.8	54.3	0.297	0.272	-0.47	0.48
19	0.00	AV1	23.67	18.02	0.296	84.4	54.3	0.296	0.273	-0.42	0.48
20	0.00	AV1	23.36	18.13	0.282	80.6	54.3	0.282	0.272	-1.19	0.52
21	0.00	AV1	23.58	18.21	0.293	83.6	54.4	0.293	0.276	-0.90	0.49
22	0.00	AV1	23.36	17.66	0.285	81.5	54.3	0.285	0.274	-1.18	0.50
23	0.00	AV1	24.23	18.09	0.294	84.0	54.3	0.294	0.273	-0.40	0.54
24	0.00	AV1	24.42	18.03	0.294	83.9	54.5	0.294	0.274	-0.62	0.55
25	0.00	AV1	24.20	17.98	0.292	83.4	54.2	0.292	0.273	-0.28	0.52
		Average	23.32	17.90	0.303	86.5	54.4	0.303	0.273	-0.21	0.51

Total number of blows analyzed: 25

Time Summary

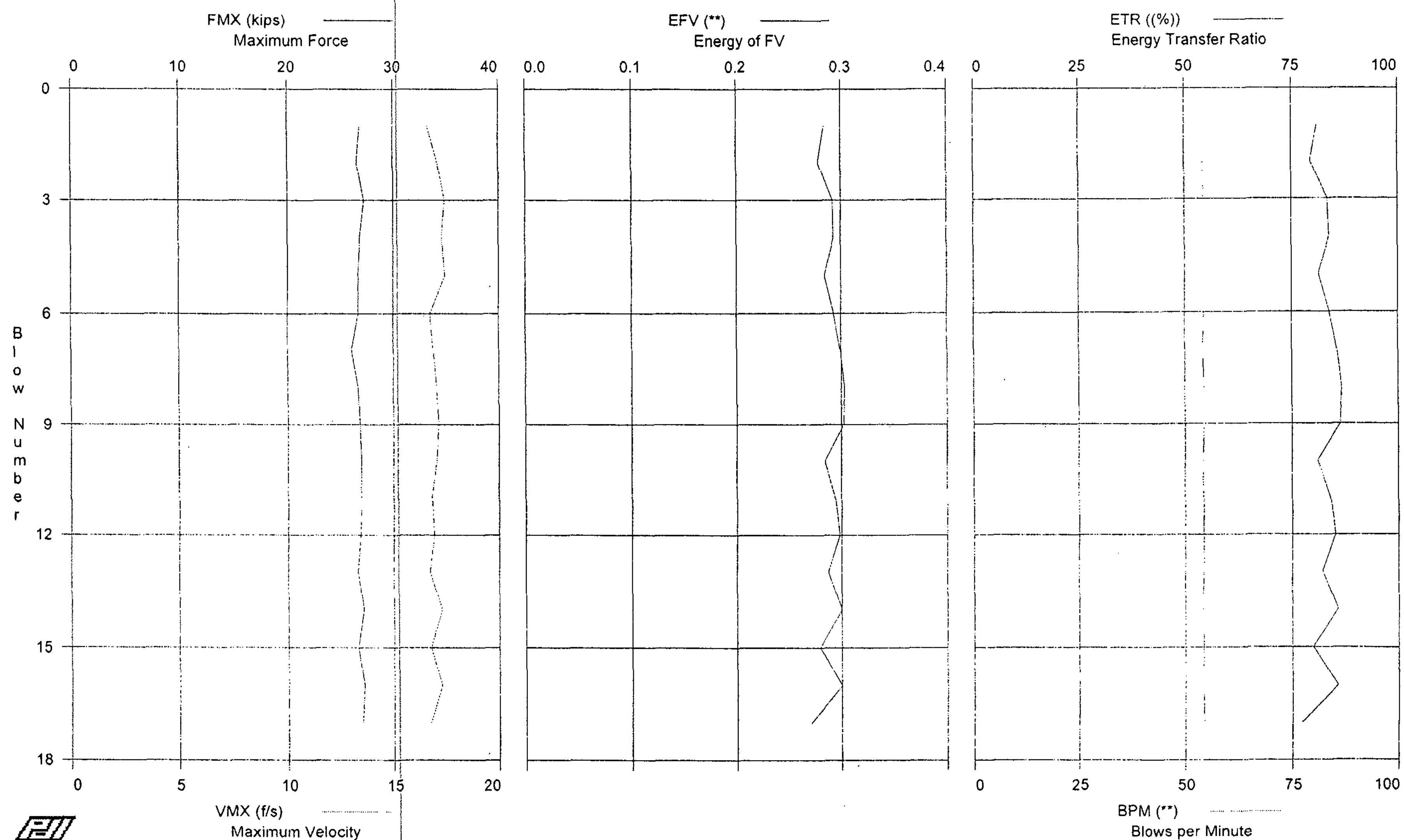
Drive 26 seconds 9:35:54 AM - 9:36:20 AM (6/21/2006) BN 1 - 25

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 21-Jun-2006

SPT, Calvert Cliffs - B403-90



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B403-90 AW rod
OP: KB Test date: 21-Jun-2006

AR: 1.19 in^2
LE: 94.0 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute

EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	26.78	16.62	0.284	81.1	**	0.284	0.303	-0.35	0.77
2	0.00	AV1	26.50	17.10	0.278	79.5	54.4	0.278	0.300	-0.77	0.74
3	0.00	AV1	27.16	17.41	0.292	83.5	54.3	0.292	0.304	-0.49	0.74
4	0.00	AV1	26.76	17.28	0.293	83.9	**	0.293	0.306	-0.31	0.74
5	0.00	AV1	26.57	17.43	0.284	81.3	**	0.284	0.303	-0.28	0.73
6	0.00	AV1	26.59	16.73	0.293	83.8	54.5	0.293	0.302	-0.10	0.72
7	0.00	AV1	25.95	16.88	0.299	85.5	54.2	0.299	0.304	0.56	0.70
8	0.00	AV1	26.59	17.03	0.303	86.7	54.4	0.303	0.307	0.71	0.74
9	0.00	AV1	26.73	17.11	0.302	86.2	54.4	0.302	0.306	0.81	0.74
10	0.00	AV1	26.88	17.03	0.284	81.0	54.2	0.284	0.303	-0.01	0.75
11	0.00	AV1	26.84	16.79	0.294	84.0	54.3	0.294	0.309	0.37	0.76
12	0.00	AV1	26.76	16.90	0.298	85.0	54.3	0.298	0.306	0.73	0.72
13	0.00	AV1	26.52	16.69	0.287	82.1	54.4	0.287	0.302	-0.06	0.76
14	0.00	AV1	27.05	17.25	0.300	85.7	54.1	0.300	0.300	-0.19	0.75
15	0.00	AV1	26.52	16.73	0.279	79.8	54.3	0.279	0.308	-0.25	0.70
16	0.00	AV1	27.09	17.23	0.300	85.6	54.2	0.300	0.304	-0.18	0.75
17	0.00	AV1	26.94	16.72	0.270	77.1	54.4	0.270	0.300	-0.59	0.77
		Average	26.72	17.00	0.291	83.0	54.3	0.291	0.304	-0.02	0.74

Total number of blows analyzed: 17

Time Summary

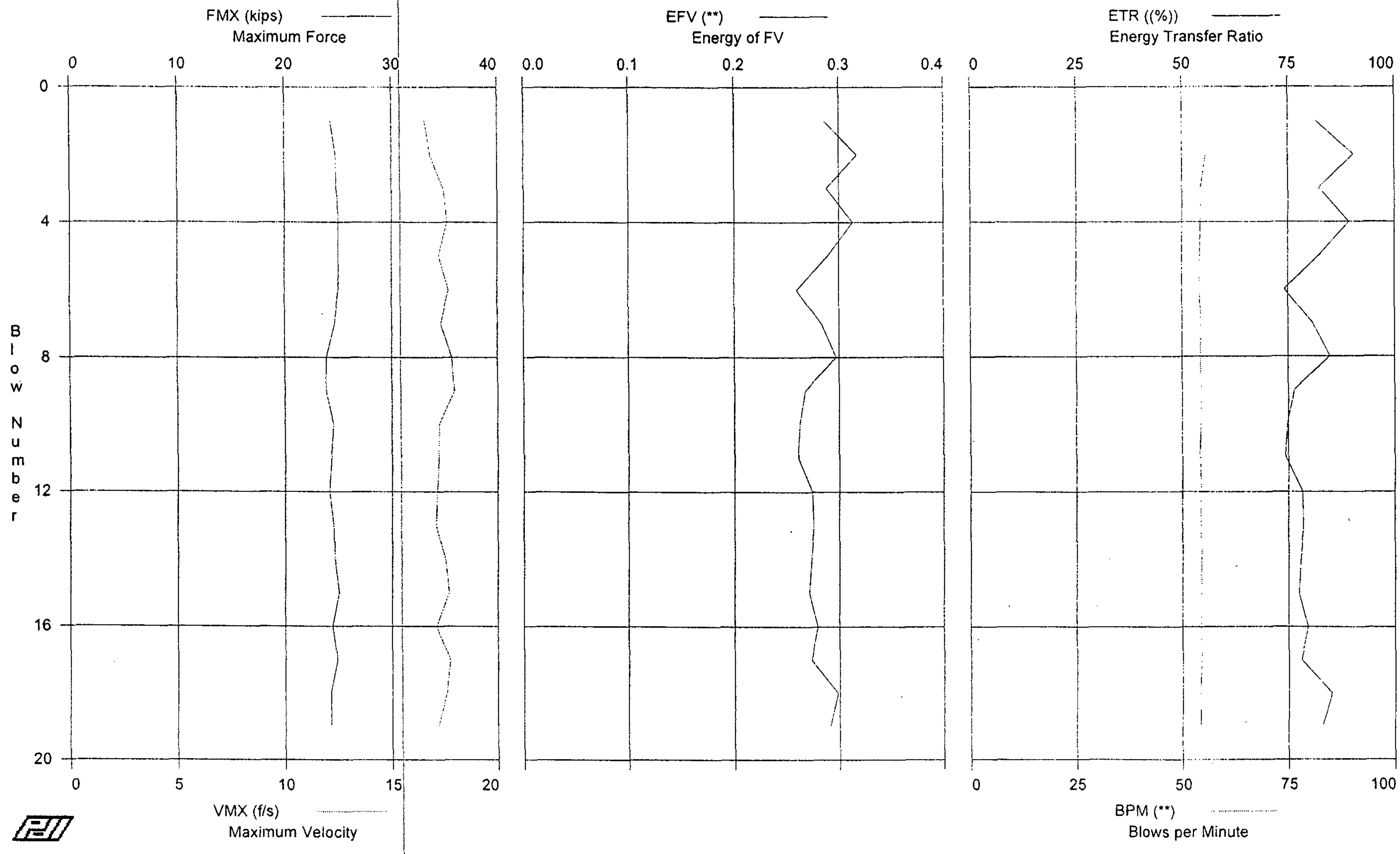
Drive 22 seconds 10:23:59 AM - 10:24:21 AM (6/21/2006) BN 1 - 17

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B403-105

Test date: 21-Jun-2006



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B403-105 AW rod
OP: KB Test date: 21-Jun-2006

AR: 1.19 in^2
LE: 109.0 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	24.25	16.55	0.286	81.6	**	0.286	0.258	0.63	0.64
2	0.00	AV1	24.74	16.82	0.317	90.5	55.6	0.317	0.261	1.18	0.70
3	0.00	AV1	24.78	17.44	0.288	82.3	54.4	0.288	0.251	0.61	0.68
4	0.00	AV1	24.97	17.61	0.313	89.4	54.3	0.313	0.255	1.36	0.57
5	0.00	AV1	24.97	17.22	0.289	82.4	54.3	0.289	0.255	0.23	0.69
6	0.00	AV1	24.95	17.68	0.259	74.1	54.2	0.259	0.248	-0.51	0.56
7	0.00	AV1	24.61	17.30	0.283	80.7	54.4	0.283	0.254	-0.60	0.54
8	0.00	AV1	23.85	17.82	0.297	84.9	54.3	0.297	0.250	-1.37	0.59
9	0.00	AV1	23.80	17.93	0.267	76.4	54.5	0.267	0.250	-0.18	0.58
10	0.00	AV1	24.48	17.22	0.262	74.8	54.4	0.262	0.248	-0.96	0.54
11	0.00	AV1	24.27	17.20	0.260	74.3	54.2	0.260	0.253	-0.14	0.54
12	0.00	AV1	24.08	17.12	0.274	78.3	54.4	0.274	0.250	-0.03	0.67
13	0.00	AV1	24.48	17.07	0.275	78.6	54.3	0.275	0.247	-0.20	0.68
14	0.00	AV1	24.59	17.51	0.273	77.9	54.5	0.273	0.255	-0.12	0.56
15	0.00	AV1	24.99	17.68	0.271	77.5	54.4	0.271	0.248	-0.15	0.56
16	0.00	AV1	24.37	17.08	0.279	79.6	54.4	0.279	0.251	0.07	0.68
17	0.00	AV1	24.82	17.73	0.273	78.0	54.4	0.273	0.251	-0.36	0.55
18	0.00	AV1	24.19	17.57	0.298	85.2	54.2	0.298	0.258	0.08	0.65
19	0.00	AV1	24.25	17.18	0.291	83.1	54.3	0.291	0.247	-0.87	0.52
		Average	24.50	17.35	0.282	80.5	54.4	0.282	0.252	-0.07	0.61

Total number of blows analyzed: 19

Time Summary

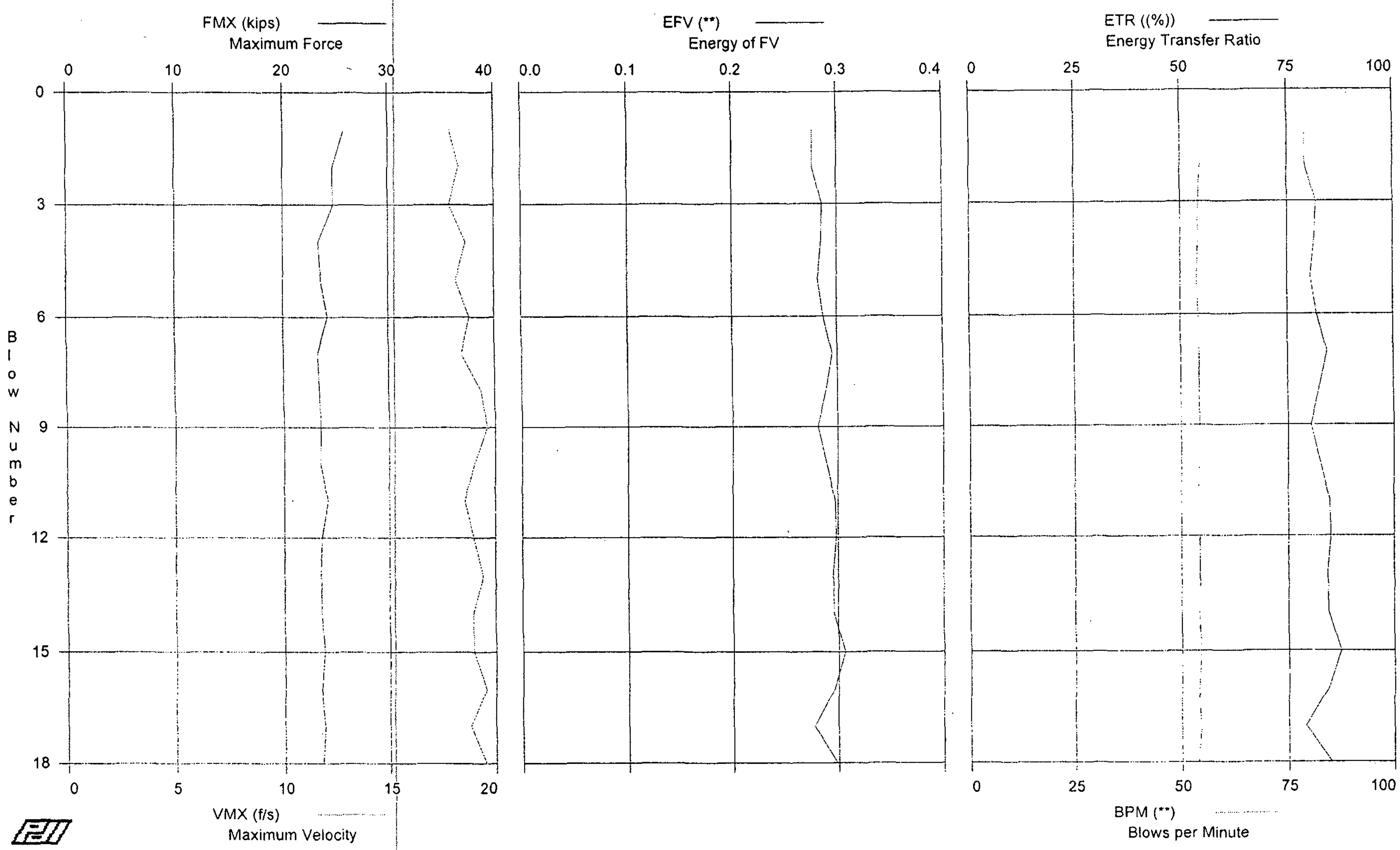
Drive 20 seconds 11:30:38 AM - 11:30:58 AM (6/21/2006) BN 1 - 19

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B403-120

Test date: 21-Jun-2006



SPT, Calvert Cliffs - B403-120
AW rod
OP: KB
Test date: 21-Jun-2006

AR: 1.19 in^2
LE: 124.0 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	25.80	17.90	0.277	79.2	**	0.277	0.279	-0.04	0.59
2	0.00	AV1	24.72	18.35	0.277	79.2	54.7	0.277	0.273	-0.30	0.54
3	0.00	AV1	24.77	17.88	0.286	81.8	54.2	0.286	0.274	-0.47	0.53
4	0.00	AV1	23.36	18.67	0.285	81.5	54.2	0.285	0.268	0.30	0.59
5	0.00	AV1	23.58	18.19	0.282	80.5	53.9	0.282	0.268	0.40	0.62
6	0.00	AV1	24.19	18.83	0.287	82.0	54.2	0.287	0.272	-0.71	0.52
7	0.00	AV1	23.23	18.42	0.295	84.4	54.3	0.295	0.266	0.61	0.60
8	0.00	AV1	23.38	19.36	0.289	82.5	54.3	0.289	0.271	-0.86	0.57
9	0.00	AV1	23.45	19.62	0.281	80.4	54.3	0.281	0.269	-0.43	0.52
10	0.00	AV1	23.41	19.02	0.289	82.6	54.2	0.289	0.266	0.50	0.59
11	0.00	AV1	24.11	18.56	0.297	84.8	54.1	0.297	0.268	0.53	0.62
12	0.00	AV1	23.52	18.97	0.298	85.1	54.3	0.298	0.271	0.19	0.59
13	0.00	AV1	23.43	19.42	0.295	84.3	54.3	0.295	0.267	0.23	0.49
14	0.00	AV1	23.51	18.94	0.296	84.5	54.1	0.296	0.270	0.52	0.59
15	0.00	AV1	23.73	18.95	0.306	87.4	54.4	0.306	0.266	1.76	0.49
16	0.00	AV1	23.45	19.55	0.296	84.5	54.0	0.296	0.270	0.26	0.47
17	0.00	AV1	23.77	18.80	0.277	79.0	54.4	0.277	0.271	-0.34	0.60
18	0.00	AV1	23.55	19.54	0.298	85.0	53.8	0.298	0.265	0.48	0.50
		Average	23.83	18.83	0.289	82.7	54.2	0.289	0.270	0.15	0.56

Total number of blows analyzed: 18

Time Summary

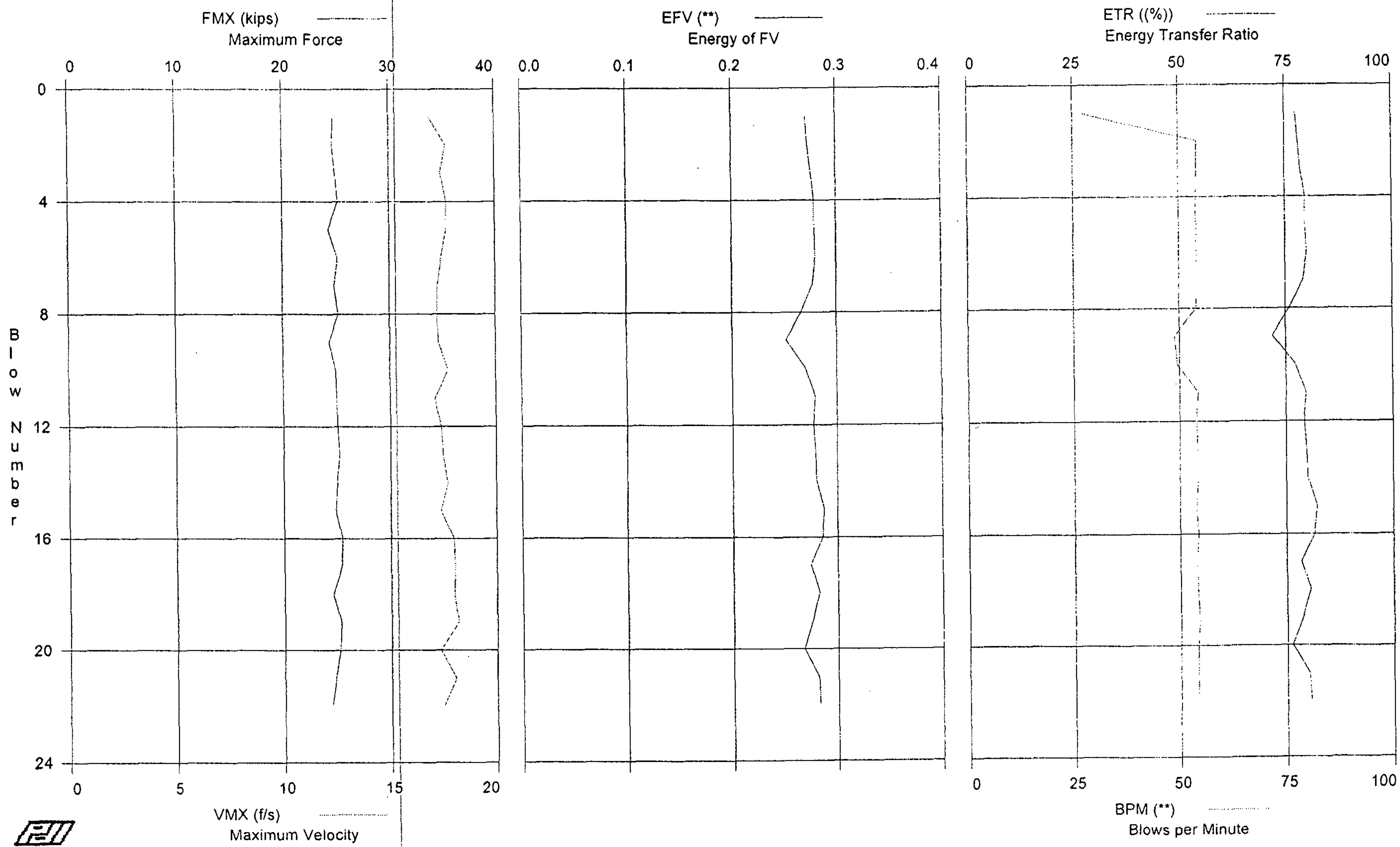
Drive 19 seconds 1:01:30 PM - 1:01:49 PM (6/21/2006) BN 1 - 18

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B403-135

Test date: 21-Jun-2006



GRL Engineers, Inc.
Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B403-135 AW rod
OP: KB Test date: 21-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 139.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	24.74	16.90	0.271	77.5	27.3	0.271	0.262	-0.47	0.57
2	0.00	AV1	24.63	17.68	0.273	78.1	54.3	0.273	0.275	-0.86	0.66
3	0.00	AV1	24.90	17.43	0.276	78.7	54.3	0.276	0.263	-0.62	0.56
4	0.00	AV1	25.14	17.70	0.279	79.7	54.1	0.279	0.265	-0.53	0.60
5	0.00	AV1	24.25	17.68	0.279	79.6	54.1	0.279	0.277	-0.96	0.65
6	0.00	AV1	25.10	17.44	0.280	80.0	54.2	0.280	0.265	-0.76	0.57
7	0.00	AV1	24.76	17.25	0.277	79.1	54.3	0.277	0.266	-0.96	0.69
8	0.00	AV1	25.15	17.24	0.266	75.9	54.1	0.266	0.264	-0.54	0.57
9	0.00	AV1	24.27	17.27	0.251	71.9	48.9	0.251	0.247	-1.11	0.59
10	0.00	AV1	24.89	17.76	0.270	77.2	49.5	0.270	0.266	-1.01	0.57
11	0.00	AV1	24.93	17.09	0.279	79.6	54.3	0.279	0.263	0.23	0.56
12	0.00	AV1	24.97	17.38	0.277	79.2	53.9	0.277	0.259	-0.40	0.55
13	0.00	AV1	25.16	17.48	0.279	79.7	54.2	0.279	0.277	-0.47	0.57
14	0.00	AV1	24.95	17.69	0.280	80.0	54.3	0.280	0.275	-0.41	0.67
15	0.00	AV1	24.78	17.36	0.287	82.1	53.9	0.287	0.272	-0.47	0.68
16	0.00	AV1	25.37	17.96	0.285	81.5	54.3	0.285	0.274	-0.55	0.56
17	0.00	AV1	25.33	18.02	0.274	78.4	53.9	0.274	0.268	-0.82	0.56
18	0.00	AV1	24.51	17.97	0.282	80.6	54.1	0.282	0.268	-0.77	0.65
19	0.00	AV1	25.21	18.16	0.275	78.7	54.4	0.275	0.264	-0.73	0.56
20	0.00	AV1	25.12	17.30	0.267	76.2	54.1	0.267	0.273	-1.12	0.69
21	0.00	AV1	24.73	18.04	0.281	80.1	54.2	0.281	0.261	-1.06	0.65
22	0.00	AV1	24.37	17.45	0.282	80.6	54.0	0.282	0.262	-0.38	0.54
		Average	24.87	17.56	0.276	78.8	52.5	0.276	0.267	-0.67	0.60

Total number of blows analyzed: 22

Time Summary

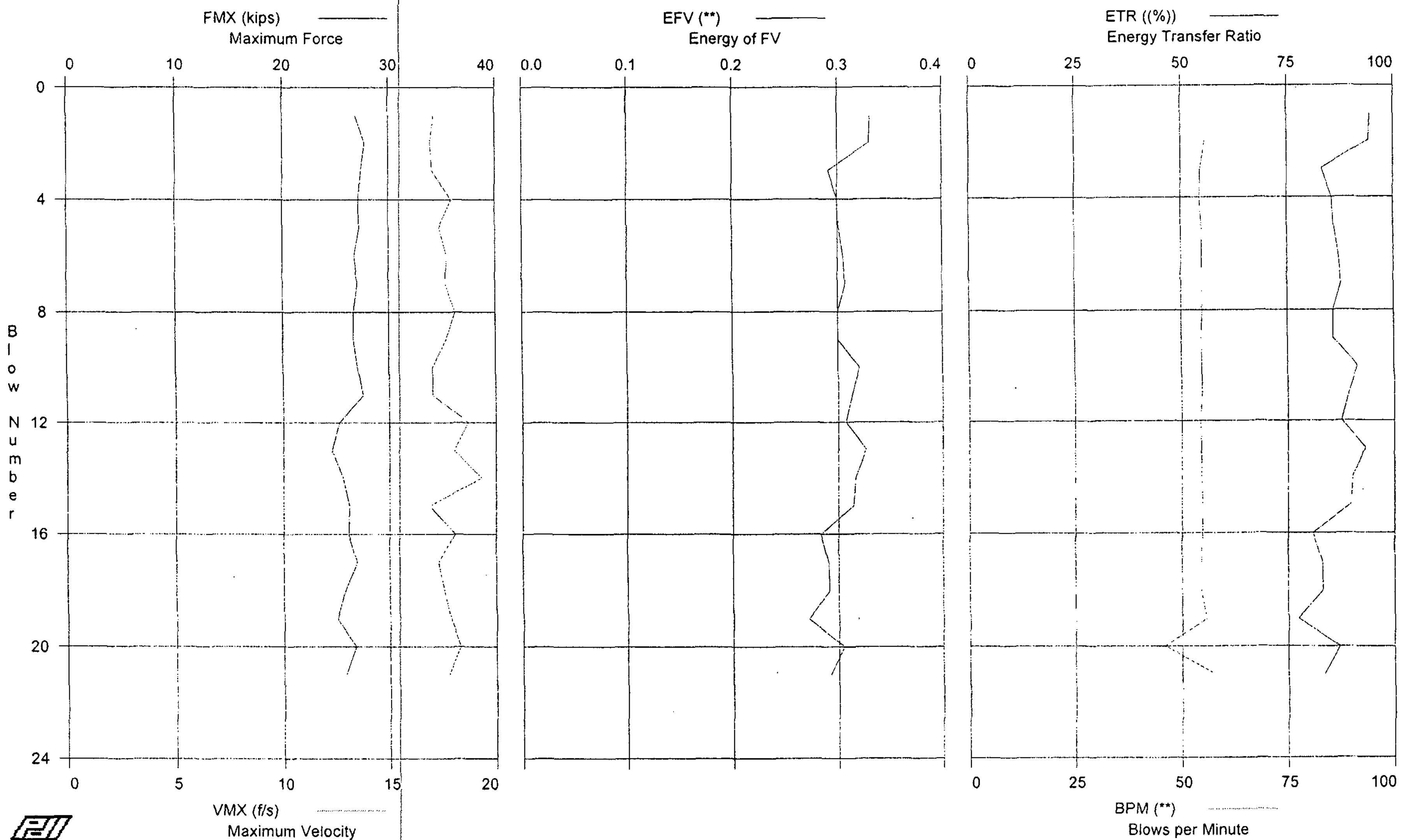
Drive 25. seconds. 2:35:09 PM - 2:35:34 PM (6/21/2006) BN 1 - 22

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 21-Jun-2006

SPT, Calvert Cliffs - B403-150



SPT, Calvert Cliffs ~ B403-150
AW rod
OP: KB
Test date: 21-Jun-2006

AR: 1.19 in^2
LE: 154.0 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	26.85	17.10	0.331	94.4	**	0.331	0.310	2.80	0.75
2	0.00	AV1	27.73	16.93	0.330	94.2	55.6	0.330	0.306	2.41	0.73
3	0.00	AV1	27.39	17.02	0.291	83.2	54.6	0.291	0.299	0.91	0.77
4	0.00	AV1	27.16	17.92	0.300	85.6	54.4	0.300	0.299	0.40	0.72
5	0.00	AV1	27.19	17.33	0.301	86.0	54.8	0.301	0.303	1.02	0.72
6	0.00	AV1	26.73	17.69	0.305	87.1	54.8	0.305	0.301	0.50	0.68
7	0.00	AV1	27.00	17.63	0.307	87.8	54.8	0.307	0.303	0.40	0.73
8	0.00	AV1	26.63	18.08	0.300	85.8	54.8	0.300	0.295	0.57	0.70
9	0.00	AV1	26.63	17.65	0.300	85.7	54.6	0.300	0.297	1.02	0.69
10	0.00	AV1	27.02	17.01	0.320	91.4	54.8	0.320	0.301	1.87	0.69
11	0.00	AV1	27.49	17.00	0.313	89.3	54.7	0.313	0.300	1.95	0.73
12	0.00	AV1	25.23	18.66	0.307	87.6	54.3	0.307	0.295	0.32	0.65
13	0.00	AV1	24.56	18.00	0.326	93.2	54.6	0.326	0.286	3.04	0.65
14	0.00	AV1	25.56	19.30	0.316	90.1	54.6	0.316	0.286	1.29	0.63
15	0.00	AV1	26.14	16.83	0.314	89.7	54.8	0.314	0.293	2.27	0.71
16	0.00	AV1	26.09	18.04	0.283	80.8	54.8	0.283	0.289	-1.53	0.69
17	0.00	AV1	26.90	17.24	0.290	83.0	54.4	0.290	0.297	1.04	0.74
18	0.00	AV1	25.74	17.52	0.291	83.2	54.4	0.291	0.290	0.04	0.68
19	0.00	AV1	24.97	17.83	0.271	77.3	55.7	0.271	0.276	-0.09	0.67
20	0.00	AV1	26.74	18.27	0.305	87.2	45.9	0.305	0.308	0.50	0.70
21	0.00	AV1	25.81	17.72	0.292	83.5	57.6	0.292	0.265	1.12	0.69
		Average	26.46	17.66	0.304	86.9	54.5	0.304	0.295	1.04	0.70

Total number of blows analyzed: 21

Time Summary

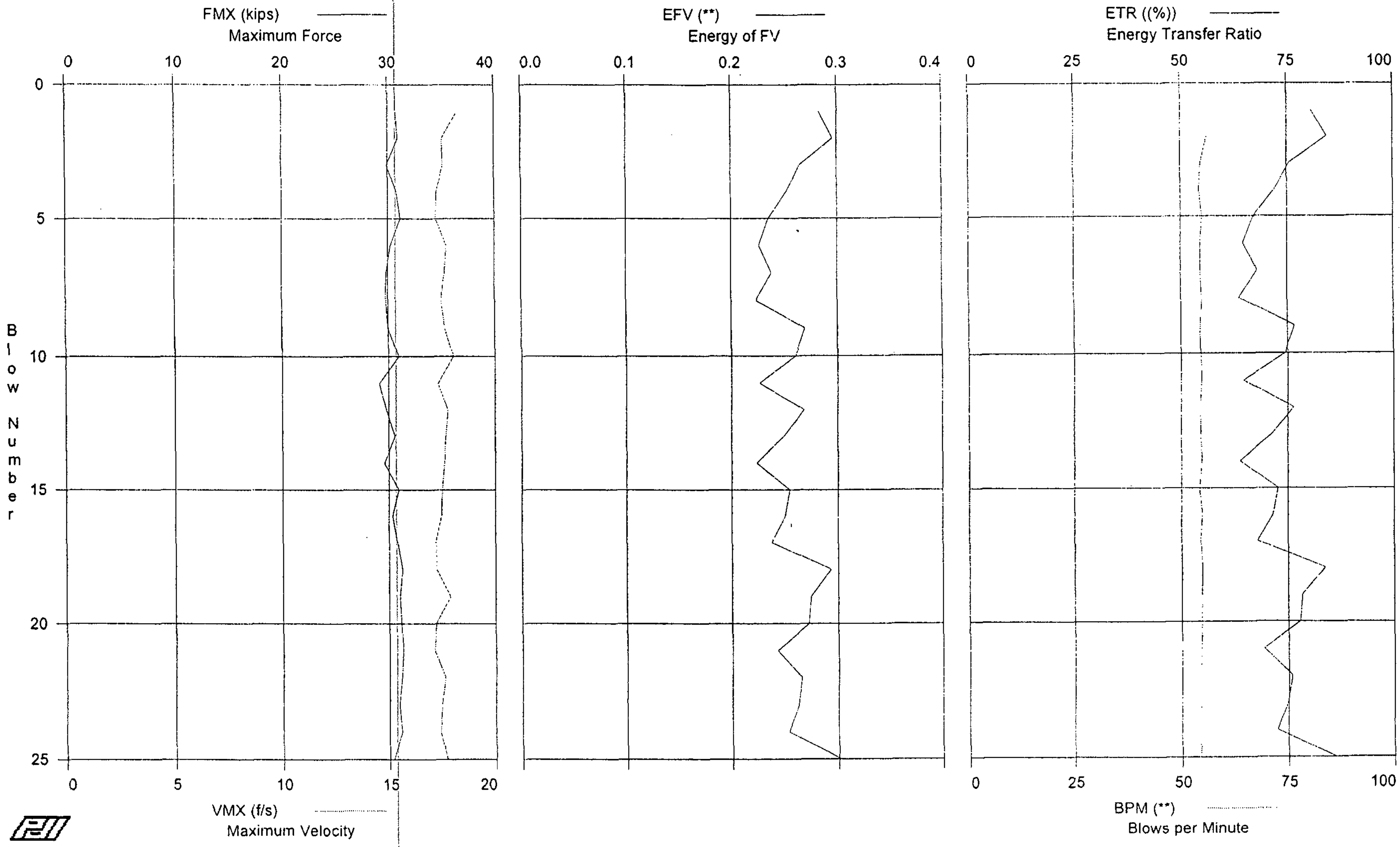
Drive 31 seconds 4:13:07 PM - 4:13:38 PM (6/21/2006) BN 1 - 21

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B403-165



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B403-165 AW rod
OP: KB Test date: 22-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 169.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	30.76	18.24	0.283	80.8	**	0.283	0.414	0.65	0.81
2	0.00	AV1	30.97	17.53	0.296	84.5	56.2	0.296	0.410	1.50	0.84
3	0.00	AV1	29.92	17.58	0.265	75.7	54.8	0.265	0.410	0.96	0.74
4	0.00	AV1	30.79	17.28	0.252	72.1	54.3	0.252	0.409	-1.42	0.74
5	0.00	AV1	31.17	17.24	0.235	67.1	55.0	0.235	0.405	-1.35	0.69
6	0.00	AV1	30.23	17.73	0.226	64.6	54.6	0.226	0.421	-4.55	0.81
7	0.00	AV1	29.81	17.64	0.238	68.0	54.6	0.238	0.406	-1.47	0.81
8	0.00	AV1	29.75	17.48	0.223	63.6	54.9	0.223	0.407	-3.04	0.74
9	0.00	AV1	29.97	17.64	0.269	76.7	54.4	0.269	0.417	1.59	0.71
10	0.00	AV1	30.96	18.02	0.260	74.4	54.6	0.260	0.419	-0.17	0.82
11	0.00	AV1	29.09	17.31	0.226	64.6	54.8	0.226	0.412	-4.31	0.80
12	0.00	AV1	29.79	17.77	0.268	76.4	54.4	0.268	0.418	-0.34	0.80
13	0.00	AV1	30.59	17.66	0.249	71.2	54.6	0.249	0.418	-3.11	0.82
14	0.00	AV1	29.54	17.59	0.223	63.7	54.8	0.223	0.412	-2.22	0.74
15	0.00	AV1	30.92	17.49	0.254	72.6	54.2	0.254	0.423	-4.97	0.84
16	0.00	AV1	30.30	17.46	0.250	71.5	54.8	0.250	0.420	-5.49	0.82
17	0.00	AV1	30.79	17.19	0.237	67.8	54.5	0.237	0.422	-3.73	0.85
18	0.00	AV1	31.23	17.22	0.293	83.8	54.7	0.293	0.421	2.42	0.74
19	0.00	AV1	30.99	17.85	0.274	78.4	54.7	0.274	0.420	-1.02	0.83
20	0.00	AV1	31.13	17.19	0.272	77.8	54.7	0.272	0.415	0.12	0.87
21	0.00	AV1	31.26	17.11	0.242	69.2	54.5	0.242	0.417	-5.00	0.73
22	0.00	AV1	31.15	17.60	0.265	75.8	54.4	0.265	0.420	-2.05	0.84
23	0.00	AV1	30.90	17.45	0.262	74.8	54.4	0.262	0.416	-3.52	0.84
24	0.00	AV1	31.16	17.39	0.253	72.4	54.5	0.253	0.418	-5.31	0.74
25	0.00	AV1	30.35	17.68	0.301	86.0	54.3	0.301	0.409	-0.87	0.82
		Average	30.54	17.53	0.257	73.3	54.7	0.257	0.415	-1.87	0.79

Total number of blows analyzed: 25

Time Summary

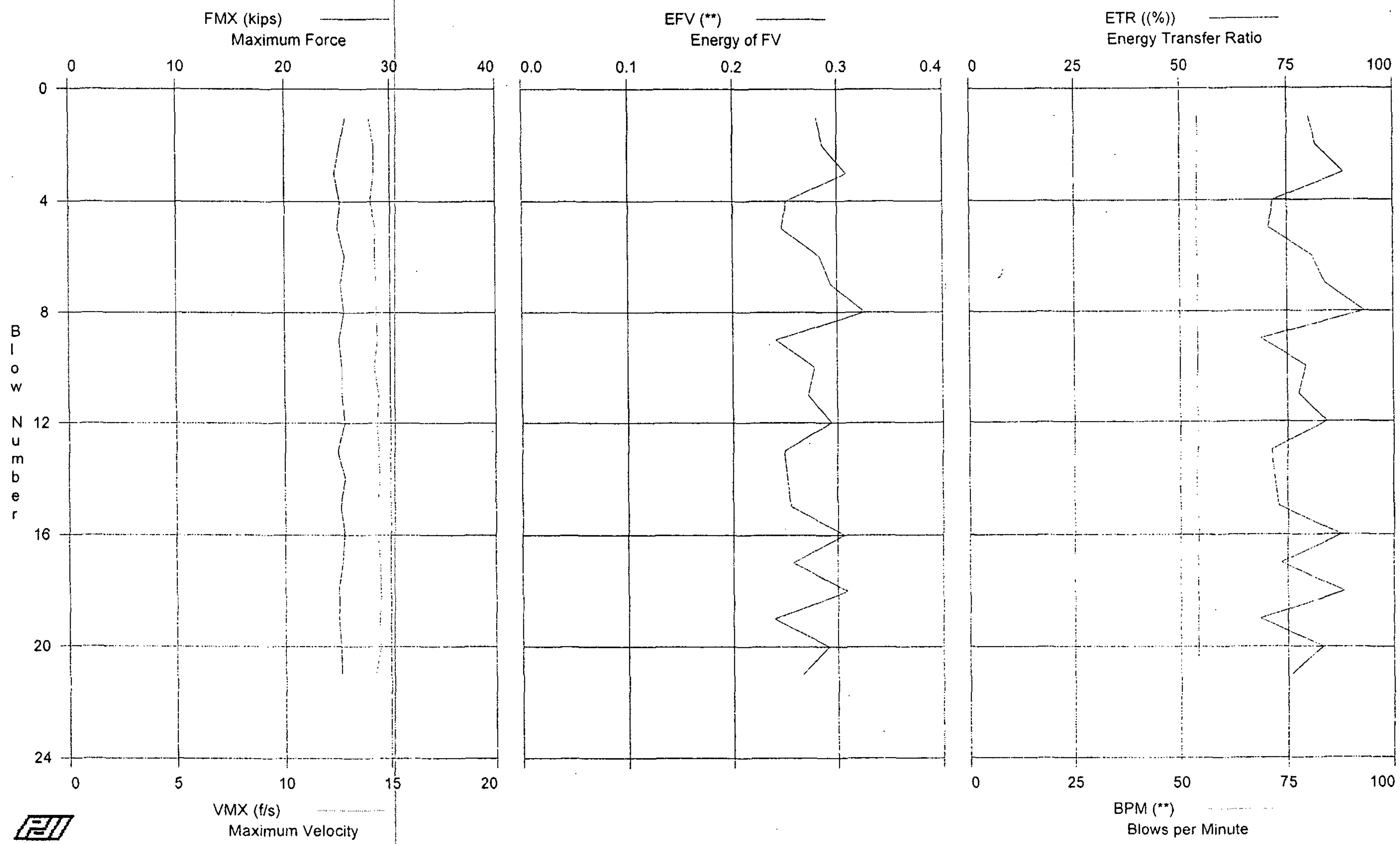
Drive 27 seconds 9:01:55 AM - 9:02:22 AM (6/22/2006) BN 1 - 25

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B403-180



SPT, Calvert Cliffs - B403-180 AW rod
OP: KB Test date: 22-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 184.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	25.66	13.95	0.280	80.1	54.1	0.280	0.292	-0.61	0.68
2	0.00	AV1	25.16	14.21	0.286	81.7	54.3	0.286	0.291	-0.91	0.72
3	0.00	AV1	24.66	14.22	0.309	88.3	54.1	0.309	0.286	-1.48	0.71
4	0.00	AV1	25.17	14.04	0.251	71.7	54.1	0.251	0.288	-1.67	0.68
5	0.00	AV1	24.95	14.27	0.247	70.6	53.9	0.247	0.290	-1.32	0.68
6	0.00	AV1	25.59	14.24	0.283	80.9	54.1	0.283	0.292	-0.76	0.68
7	0.00	AV1	25.21	14.31	0.294	84.0	54.3	0.294	0.288	-0.48	0.69
8	0.00	AV1	25.53	14.31	0.326	93.1	53.9	0.326	0.289	-0.31	0.67
9	0.00	AV1	25.05	14.36	0.241	68.8	54.1	0.241	0.289	-1.10	0.71
10	0.00	AV1	25.34	14.22	0.278	79.3	54.1	0.278	0.285	-0.62	0.68
11	0.00	AV1	25.33	14.44	0.272	77.7	53.9	0.272	0.289	-0.75	0.69
12	0.00	AV1	25.53	14.31	0.294	84.1	54.3	0.294	0.287	-0.75	0.67
13	0.00	AV1	24.89	14.40	0.249	71.2	54.1	0.249	0.288	-1.07	0.70
14	0.00	AV1	25.60	14.47	0.252	72.0	53.8	0.252	0.291	-0.81	0.73
15	0.00	AV1	25.15	14.35	0.255	72.9	54.0	0.255	0.289	-0.67	0.71
16	0.00	AV1	25.50	14.36	0.306	87.5	54.3	0.306	0.285	-0.33	0.67
17	0.00	AV1	25.33	14.47	0.257	73.4	54.1	0.257	0.287	-0.64	0.71
18	0.00	AV1	24.95	14.50	0.309	88.2	54.1	0.309	0.285	-0.25	0.70
19	0.00	AV1	24.99	14.44	0.239	68.4	54.1	0.239	0.285	-1.28	0.71
20	0.00	AV1	25.15	14.48	0.291	83.2	54.1	0.291	0.283	-0.48	0.70
21	0.00	AV1	25.22	14.24	0.266	75.9	54.0	0.266	0.283	-1.13	0.68
		Average	25.23	14.31	0.275	78.7	54.1	0.275	0.288	-0.83	0.69

Total number of blows analyzed: 21

Time Summary

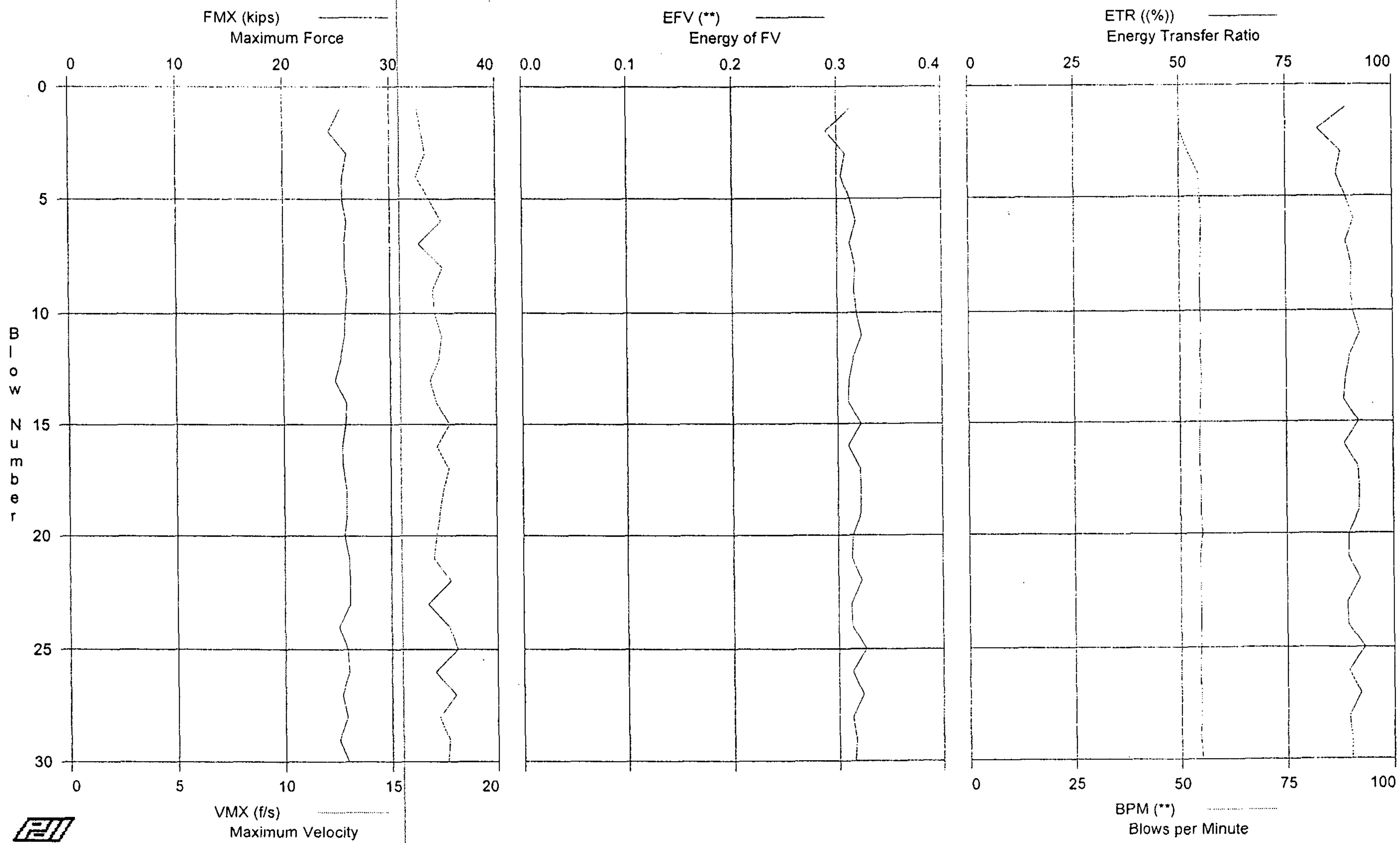
Drive 33 seconds 10:42:15 AM - 10:42:48 AM (6/22/2006) BN 1 - 21

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B403-200

Test date: 22-Jun-2006



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 17-Jul-2006

SPT, Calvert Cliffs - B403-200 AWJ
OP: KB Test date: 22-Jun-2006

AR: 1.19 in^2
LE: 204.0 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute

EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	25.35	16.30	0.313	89.5	**	0.313	0.292	1.08	0.43
2	0.00	AV1	24.25	16.47	0.289	82.5	50.0	0.289	0.259	1.16	0.41
3	0.00	AV1	25.96	16.66	0.308	88.0	52.0	0.308	0.293	1.09	0.36
4	0.00	AV1	25.55	16.23	0.304	86.9	54.6	0.304	0.285	0.99	0.44
5	0.00	AV1	25.47	16.82	0.312	89.1	54.7	0.312	0.293	0.96	0.42
6	0.00	AV1	25.87	17.42	0.318	91.0	55.0	0.318	0.297	0.93	0.43
7	0.00	AV1	25.68	16.32	0.312	89.2	55.0	0.312	0.289	0.97	0.47
8	0.00	AV1	25.68	17.47	0.317	90.4	54.8	0.317	0.288	0.74	0.46
9	0.00	AV1	25.95	17.00	0.316	90.3	54.7	0.316	0.295	0.70	0.37
10	0.00	AV1	25.73	17.08	0.318	90.7	54.8	0.318	0.294	0.58	0.43
11	0.00	AV1	25.66	17.41	0.323	92.3	54.9	0.323	0.294	0.53	0.49
12	0.00	AV1	25.30	17.29	0.315	89.9	54.7	0.315	0.282	0.70	0.40
13	0.00	AV1	24.76	16.84	0.311	88.9	55.0	0.311	0.287	0.69	0.40
14	0.00	AV1	25.85	17.16	0.310	88.5	54.8	0.310	0.285	0.64	0.43
15	0.00	AV1	25.70	17.75	0.322	91.9	54.6	0.322	0.293	0.73	0.42
16	0.00	AV1	25.40	17.15	0.310	88.6	54.5	0.310	0.278	0.69	0.40
17	0.00	AV1	25.48	17.71	0.321	91.7	54.6	0.321	0.293	0.62	0.40
18	0.00	AV1	25.81	17.45	0.322	92.0	54.9	0.322	0.290	0.67	0.46
19	0.00	AV1	25.81	17.28	0.322	91.9	54.7	0.322	0.291	0.50	0.46
20	0.00	AV1	25.57	17.12	0.314	89.6	55.0	0.314	0.276	0.54	0.42
21	0.00	AV1	26.01	16.99	0.313	89.5	54.5	0.313	0.290	0.53	0.44
22	0.00	AV1	26.06	17.79	0.322	92.1	54.7	0.322	0.293	0.59	0.42
23	0.00	AV1	26.06	16.70	0.312	89.1	54.7	0.312	0.276	0.51	0.45
24	0.00	AV1	25.02	17.71	0.313	89.4	54.7	0.313	0.276	0.47	0.37
25	0.00	AV1	25.78	18.09	0.326	93.1	54.6	0.326	0.292	0.66	0.41
26	0.00	AV1	25.96	17.04	0.313	89.5	54.4	0.313	0.288	0.52	0.45
27	0.00	AV1	25.28	18.00	0.323	92.2	54.6	0.323	0.290	0.55	0.38
28	0.00	AV1	25.76	17.23	0.313	89.6	54.7	0.313	0.289	0.67	0.41
29	0.00	AV1	24.99	17.67	0.316	90.2	54.4	0.316	0.280	0.70	0.37
30	0.00	AV1	25.83	17.60	0.315	90.1	54.8	0.315	0.274	0.90	0.41
		Average	25.59	17.19	0.315	89.9	54.5	0.315	0.287	0.72	0.42

Total number of blows analyzed: 30

Time Summary

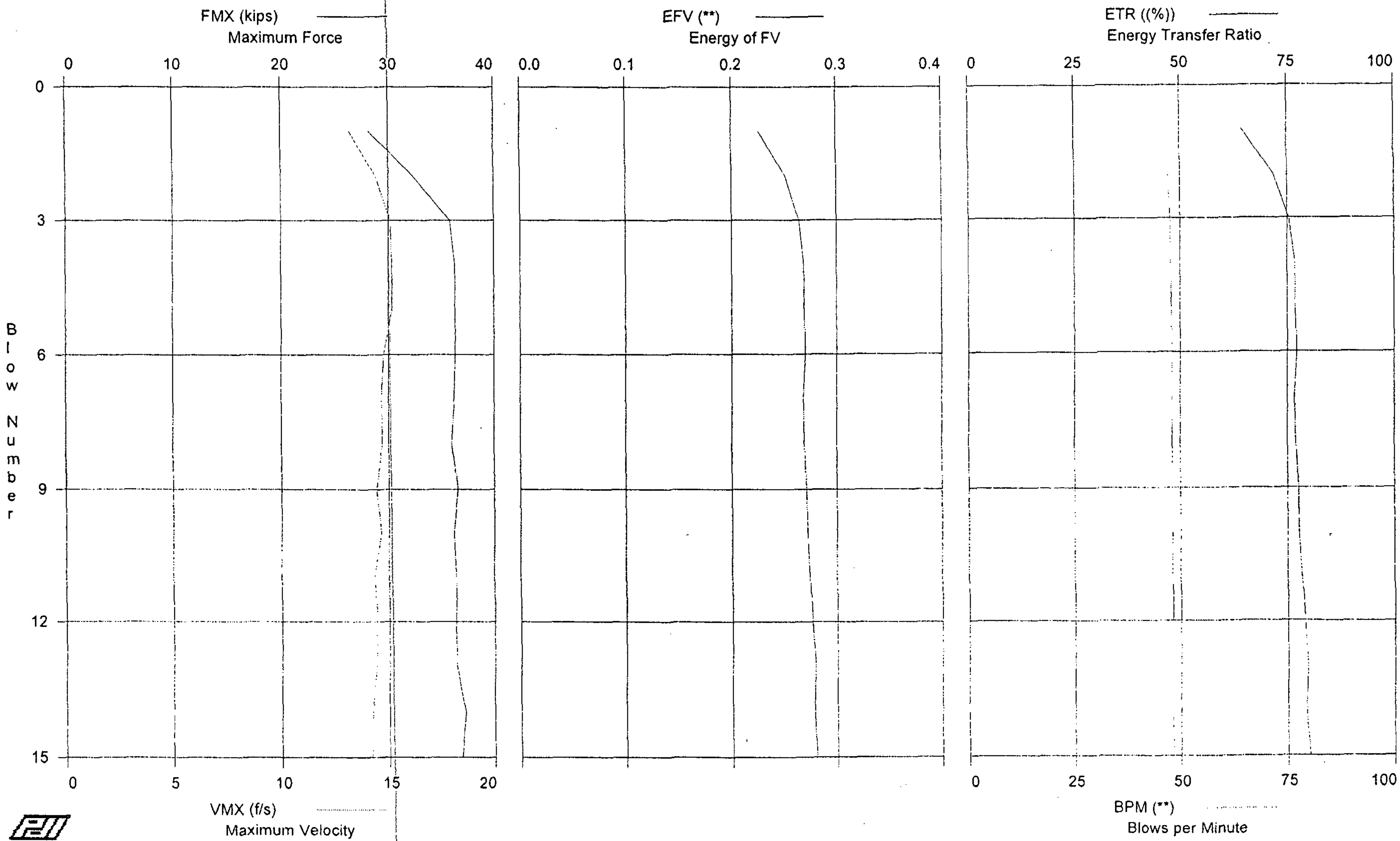
Drive 32 seconds 1:02:23 PM - 1:02:55 PM (6/22/2006) BN 1 - 30

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B404-15



SPT, Calvert Cliffs - B404-15 NWJ
OP: KB Test date: 22-Jun-2006

AR: 1.45 in^2
LE: 20.5 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL#	depth	TYPE	FMX	VMX	EFV	ETR	BPM	EMX	EF2	DFN	FVP
end	ft		kips	f/s	**	(%)	**	k-ft	k-ft	in	[]
1	0.00	AV1	28.20	13.21	0.226	64.6	**	0.226	0.245	1.84	1.24
2	0.00	AV1	32.31	14.41	0.251	71.8	47.2	0.251	0.278	1.91	1.25
3	0.00	AV1	35.83	15.08	0.264	75.4	47.7	0.264	0.299	1.79	1.17
4	0.00	AV1	36.34	15.16	0.269	76.9	47.8	0.269	0.305	1.93	1.20
5	0.00	AV1	36.34	15.16	0.269	76.8	48.0	0.269	0.307	1.73	1.23
6	0.00	AV1	36.34	14.75	0.270	77.2	48.1	0.270	0.305	1.73	1.21
7	0.00	AV1	36.19	14.65	0.268	76.6	48.0	0.268	0.305	1.65	1.18
8	0.00	AV1	36.00	14.68	0.269	77.0	48.1	0.269	0.304	1.76	1.28
9	0.00	AV1	36.56	14.42	0.271	77.6	48.0	0.271	0.308	1.67	1.16
10	0.00	AV1	36.16	14.63	0.272	77.6	48.1	0.272	0.304	1.59	1.22
11	0.00	AV1	36.38	14.32	0.274	78.3	48.1	0.274	0.309	1.51	1.29
12	0.00	AV1	36.31	14.42	0.276	79.0	48.1	0.276	0.311	1.47	1.28
13	0.00	AV1	36.40	14.38	0.279	79.6	48.0	0.279	0.312	1.48	1.25
14	0.00	AV1	37.21	14.22	0.278	79.3	48.1	0.278	0.311	1.50	1.16
15	0.00	AV1	36.86	14.16	0.280	80.1	48.3	0.280	0.310	1.46	1.19
		Average	35.56	14.51	0.268	76.5	48.0	0.268	0.301	1.67	1.22

Total number of blows analyzed: 15

Time Summary

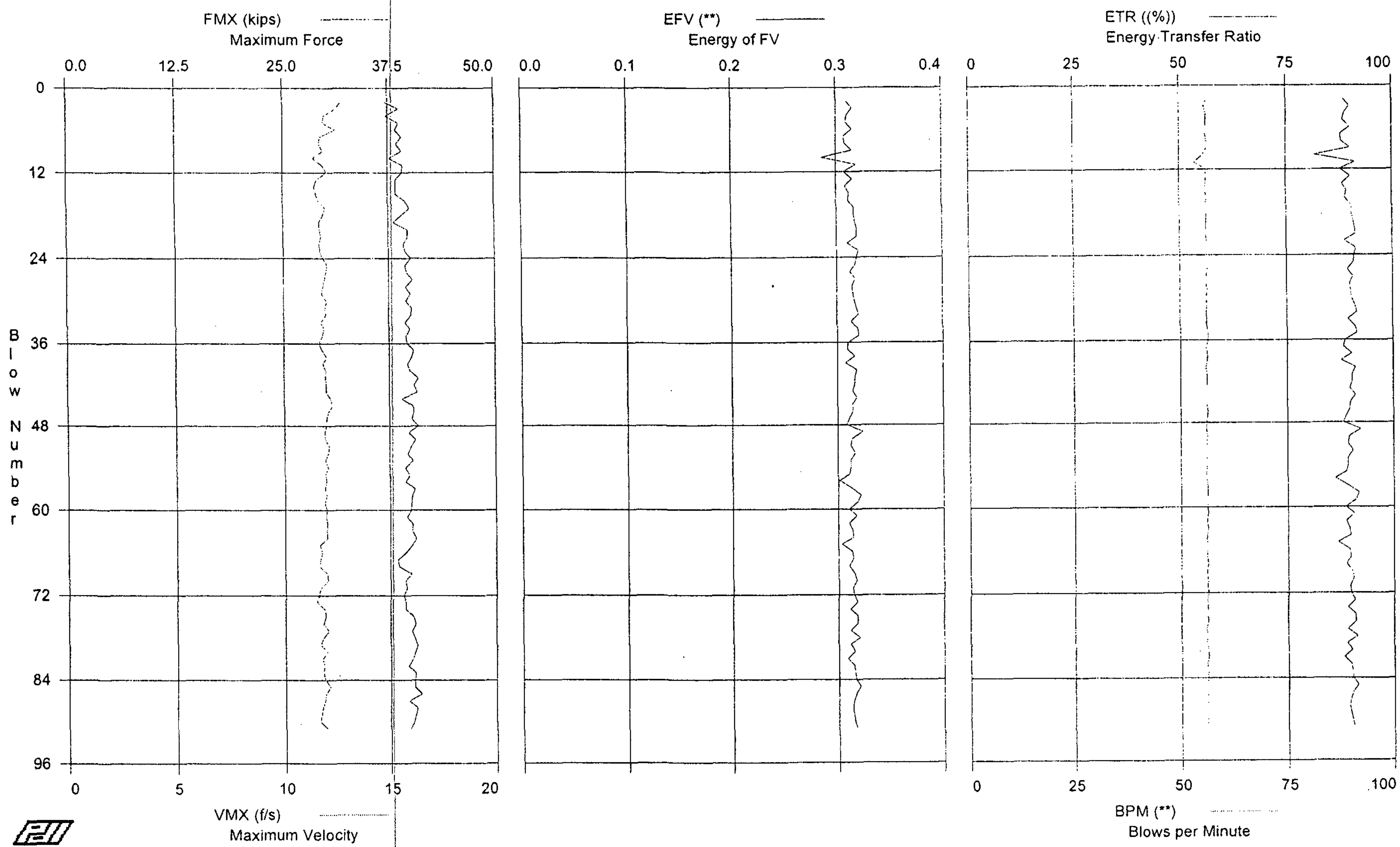
Drive 17 seconds 1:54:08 PM - 1:54:25 PM (6/22/2006) BN 1 - 15

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B404-30



GRL Engineers, Inc.

Case Method Results PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B404-30 NWJ

OP: KB Test date: 22-Jun-2006

AR: 1.45 in^2 SP: 0.492 k/ft3

LE: 35.5 ft EM: 30,000 ksi

WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force

VMX: Maximum Velocity

EFV: Energy of FV

ETR: Energy Transfer Ratio

BPM: Blows per Minute

EMX: Max Transferred Energy

EF2: Energy of F^2

DFN: Final Displacement

FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
2	0.00	AV1	37.13	12.73	0.310	88.5	56.4	0.310	0.335	1.05	1.26
3	0.00	AV1	38.76	12.49	0.315	89.9	55.7	0.315	0.336	0.90	1.17
4	0.00	AV1	37.21	11.93	0.310	88.7	56.2	0.310	0.330	1.03	1.26
5	0.00	AV1	38.76	11.91	0.309	88.2	56.2	0.309	0.334	0.80	1.21
6	0.00	AV1	38.33	12.46	0.315	90.1	56.1	0.315	0.335	1.14	1.24
7	0.00	AV1	39.09	11.76	0.307	87.8	56.1	0.307	0.334	0.85	1.19
8	0.00	AV1	38.46	11.71	0.308	87.9	56.3	0.308	0.335	0.86	1.26
9	0.00	AV1	39.13	11.90	0.315	90.1	56.4	0.315	0.335	1.03	1.19
10	0.00	AV1	37.66	11.44	0.286	81.6	55.5	0.286	0.313	0.66	1.23
11	0.00	AV1	39.25	11.89	0.319	91.3	53.5	0.319	0.339	0.85	1.22
12	0.00	AV1	39.14	12.06	0.307	87.7	56.2	0.307	0.340	1.01	1.15
13	0.00	AV1	38.41	11.61	0.315	90.1	56.2	0.315	0.340	1.05	1.30
14	0.00	AV1	38.42	11.49	0.308	88.1	56.2	0.308	0.339	0.90	1.30
15	0.00	AV1	38.42	11.58	0.312	89.2	56.1	0.312	0.343	0.84	1.30
16	0.00	AV1	39.51	11.70	0.311	88.8	56.3	0.311	0.339	0.92	1.26
17	0.00	AV1	39.94	11.98	0.316	90.3	56.2	0.316	0.341	1.17	1.21
18	0.00	AV1	39.03	11.87	0.316	90.2	56.3	0.316	0.340	0.92	1.27
19	0.00	AV1	38.04	11.68	0.317	90.6	56.1	0.317	0.338	1.13	1.27
20	0.00	AV1	39.73	11.72	0.319	91.0	56.2	0.319	0.341	0.96	1.22
21	0.00	AV1	39.76	11.78	0.319	91.3	56.1	0.319	0.338	1.00	1.23
22	0.00	AV1	39.24	11.71	0.310	88.6	56.3	0.310	0.341	0.71	1.27
23	0.00	AV1	39.40	11.69	0.320	91.4	56.3	0.320	0.341	1.05	1.26
24	0.00	AV1	40.03	11.86	0.318	90.8	56.2	0.318	0.341	0.77	1.19
25	0.00	AV1	39.38	12.05	0.317	90.7	56.3	0.317	0.333	1.06	1.17
26	0.00	AV1	39.59	11.99	0.312	89.2	56.3	0.312	0.337	0.88	1.17
27	0.00	AV1	40.27	11.92	0.317	90.6	56.1	0.317	0.343	0.88	1.21
28	0.00	AV1	39.44	11.84	0.314	89.7	56.1	0.314	0.340	0.93	1.26
29	0.00	AV1	40.02	11.80	0.315	90.0	56.3	0.315	0.340	0.97	1.26
30	0.00	AV1	39.46	12.02	0.316	90.2	56.1	0.316	0.341	0.81	1.22
31	0.00	AV1	40.15	11.94	0.318	91.0	56.2	0.318	0.343	0.77	1.24
32	0.00	AV1	40.08	11.98	0.320	91.5	56.1	0.320	0.344	0.90	1.21
33	0.00	AV1	39.41	11.77	0.313	89.3	56.2	0.313	0.343	0.61	1.29
34	0.00	AV1	39.89	11.88	0.319	91.0	56.1	0.319	0.339	0.97	1.22
35	0.00	AV1	39.44	11.81	0.320	91.4	56.3	0.320	0.342	1.06	1.25
36	0.00	AV1	39.60	11.64	0.310	88.6	56.4	0.310	0.335	0.74	1.27
37	0.00	AV1	40.32	11.80	0.309	88.2	56.0	0.309	0.339	0.56	1.22
38	0.00	AV1	40.10	12.01	0.316	90.2	56.2	0.316	0.340	0.81	1.19
39	0.00	AV1	39.62	11.82	0.307	87.6	56.2	0.307	0.342	0.68	1.27
40	0.00	AV1	39.89	11.97	0.318	91.0	55.9	0.318	0.347	0.96	1.26
41	0.00	AV1	40.85	11.93	0.316	90.2	56.2	0.316	0.346	0.66	1.26
42	0.00	AV1	40.34	11.98	0.316	90.2	56.2	0.316	0.343	0.91	1.23
43	0.00	AV1	40.72	11.97	0.314	89.6	56.1	0.314	0.346	0.66	1.21
44	0.00	AV1	38.93	12.18	0.318	90.9	56.1	0.318	0.341	0.82	1.20
45	0.00	AV1	40.24	12.25	0.314	89.8	56.1	0.314	0.345	0.51	1.25
46	0.00	AV1	40.27	12.05	0.314	89.6	56.2	0.314	0.342	0.67	1.27
47	0.00	AV1	40.03	11.98	0.311	88.8	56.2	0.311	0.341	0.61	1.26
48	0.00	AV1	40.80	11.95	0.308	88.0	55.9	0.308	0.344	0.58	1.25
49	0.00	AV1	39.70	11.88	0.323	92.2	55.9	0.323	0.346	0.81	1.25
50	0.00	AV1	40.46	11.92	0.313	89.5	56.1	0.313	0.344	0.58	1.19
51	0.00	AV1	39.95	12.10	0.312	89.1	56.0	0.312	0.337	0.79	1.16
52	0.00	AV1	39.60	12.03	0.316	90.4	56.1	0.316	0.337	0.95	1.22
53	0.00	AV1	40.16	11.90	0.312	89.2	56.0	0.312	0.341	0.78	1.24
54	0.00	AV1	39.28	12.05	0.312	89.2	56.1	0.312	0.339	0.69	1.24
55	0.00	AV1	39.83	11.91	0.311	88.8	56.0	0.311	0.341	0.57	1.18
56	0.00	AV1	39.25	11.95	0.301	86.0	55.9	0.301	0.332	0.40	1.16
57	0.00	AV1	40.40	11.87	0.312	89.1	56.2	0.312	0.343	0.67	1.25
58	0.00	AV1	40.02	11.96	0.321	91.7	56.2	0.321	0.342	0.95	1.23
59	0.00	AV1	39.95	11.86	0.318	91.0	56.1	0.318	0.339	1.17	1.17
60	0.00	AV1	39.91	11.96	0.310	88.5	56.1	0.310	0.342	0.42	1.24
61	0.00	AV1	39.44	11.92	0.317	90.6	56.2	0.317	0.341	0.81	1.26
62	0.00	AV1	40.10	11.98	0.310	88.6	55.9	0.310	0.341	0.73	1.18

SPT, Calvert Cliffs - B404-30
NWJ
OP: KB
Test date: 22-Jun-2006

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
63	0.00	AV1	40.02	11.95	0.313	89.4	56.2	0.313	0.344	0.78	1.19
64	0.00	AV1	40.54	11.98	0.314	89.8	56.0	0.314	0.342	0.62	1.33
65	0.00	AV1	40.02	11.62	0.303	86.7	56.0	0.303	0.339	0.37	1.18
66	0.00	AV1	39.30	11.74	0.313	89.4	56.1	0.313	0.337	0.69	1.21
67	0.00	AV1	38.33	11.64	0.314	89.8	55.9	0.314	0.333	0.65	1.21
68	0.00	AV1	38.54	11.62	0.310	88.7	56.3	0.310	0.331	0.58	1.21
69	0.00	AV1	39.95	11.98	0.315	90.1	55.9	0.315	0.339	0.75	1.18
70	0.00	AV1	39.16	11.97	0.317	90.5	56.2	0.317	0.334	0.76	1.16
71	0.00	AV1	39.36	11.64	0.313	89.4	55.9	0.313	0.336	0.62	1.21
72	0.00	AV1	38.97	11.57	0.314	89.7	56.2	0.314	0.333	0.70	1.19
73	0.00	AV1	39.28	11.50	0.318	90.8	56.0	0.318	0.333	0.81	1.18
74	0.00	AV1	39.30	11.87	0.311	89.0	56.2	0.311	0.339	0.44	1.30
75	0.00	AV1	40.15	11.90	0.318	90.9	56.1	0.318	0.343	0.72	1.32
76	0.00	AV1	40.42	11.79	0.318	90.9	56.2	0.318	0.340	0.85	1.35
77	0.00	AV1	39.95	12.03	0.311	89.0	55.8	0.311	0.342	0.44	1.31
78	0.00	AV1	40.30	11.77	0.320	91.3	56.1	0.320	0.340	0.93	1.34
79	0.00	AV1	40.58	11.65	0.311	88.9	55.9	0.311	0.340	0.67	1.37
80	0.00	AV1	40.29	11.94	0.315	89.9	56.1	0.315	0.341	0.52	1.33
81	0.00	AV1	40.02	11.72	0.308	88.0	56.2	0.308	0.340	0.48	1.21
82	0.00	AV1	39.52	11.81	0.314	89.7	55.9	0.314	0.341	0.62	1.32
83	0.00	AV1	40.34	11.76	0.315	90.0	56.1	0.315	0.339	0.69	1.35
84	0.00	AV1	40.26	11.86	0.316	90.2	56.0	0.316	0.343	0.73	1.33
85	0.00	AV1	40.27	12.09	0.320	91.3	56.1	0.320	0.341	0.84	1.31
86	0.00	AV1	41.05	11.89	0.316	90.2	56.1	0.316	0.346	0.75	1.35
87	0.00	AV1	39.57	11.83	0.314	89.6	56.0	0.314	0.342	0.65	1.31
88	0.00	AV1	40.59	11.75	0.313	89.3	56.1	0.313	0.340	0.69	1.24
90	0.00	AV1	40.18	11.62	0.315	90.0	56.1	0.315	0.338	0.65	1.37
91	0.00	AV1	39.76	11.98	0.317	90.5	56.1	0.317	0.339	0.71	1.30
		Average	39.62	11.88	0.314	89.6	56.1	0.314	0.339	0.78	1.24

Total number of blows analyzed: 89

Time Summary

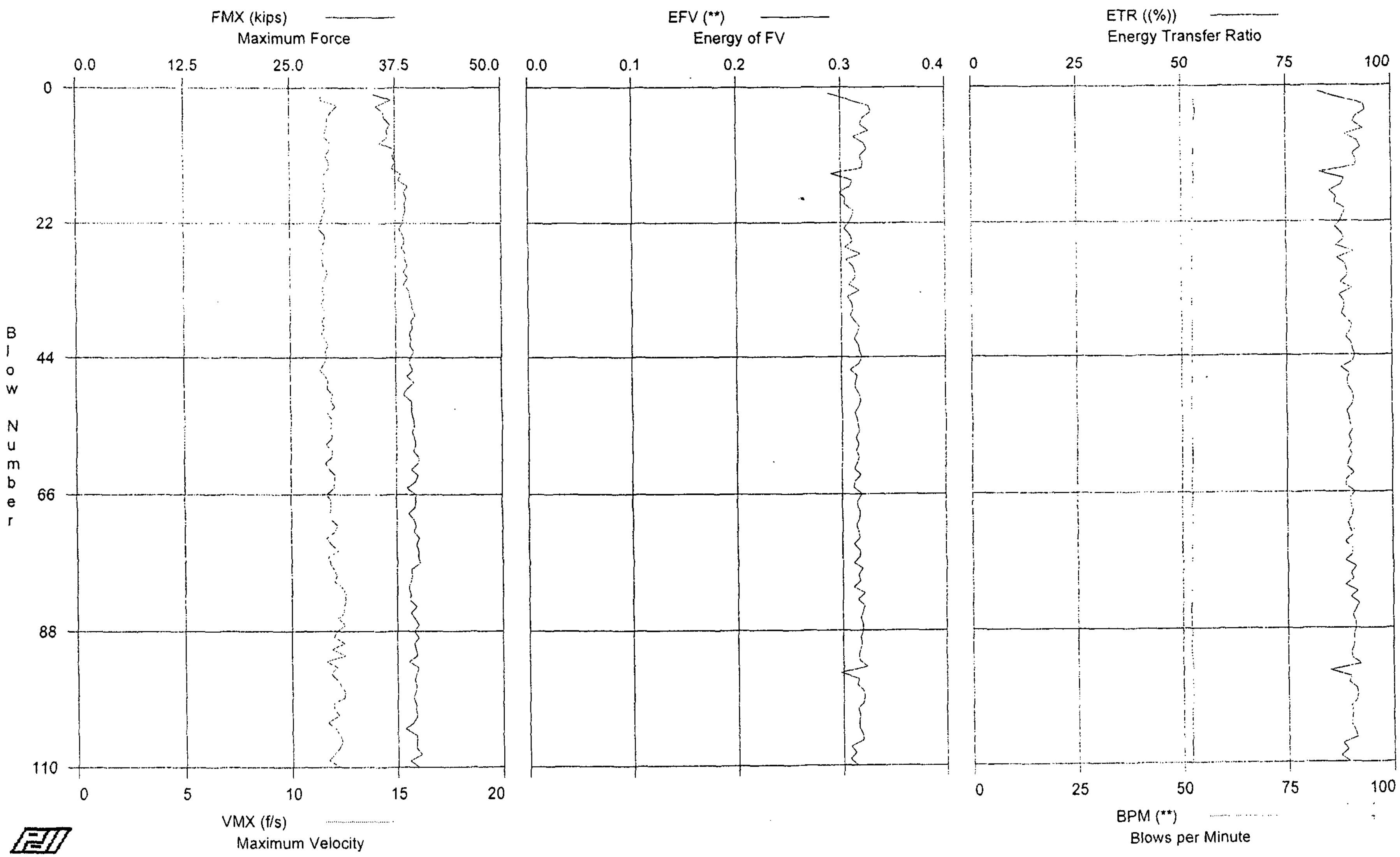
Drive 1 minute 37 seconds 2:27:51 PM - 2:29:28 PM (6/22/2006) BN 1 - 91

PDIPLOT Ver. 2005.2 - Printed: 20-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B404-45



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 20-Jul-2006

SPT, Calvert Cliffs - B404-45 NWJ
OP: KB Test date: 22-Jun-2006

AR: 1.45 in^2
LE: 50.5 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute

EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL#	depth	TYPE	FMX	VMX	EFV	ETR	BPM	EMX	EF2	DFN	FVP
end	ft		kips	f/s	**	(%)	**	k-ft	k-ft	in	[]
1	0.00	AV1	34.87	11.52	0.288	82.2	**	0.288	0.310	0.79	1.10
2	0.00	AV1	37.07	11.49	0.307	87.6	53.1	0.307	0.329	0.95	1.16
3	0.00	AV1	35.19	12.26	0.327	93.5	53.2	0.327	0.328	1.09	1.13
4	0.00	AV1	36.08	11.96	0.329	93.9	53.5	0.329	0.331	0.60	1.18
5	0.00	AV1	36.26	11.77	0.321	91.6	53.3	0.321	0.325	0.30	1.14
6	0.00	AV1	36.96	11.81	0.318	91.0	53.1	0.318	0.331	0.48	1.15
7	0.00	AV1	36.51	11.70	0.327	93.3	53.1	0.327	0.331	0.52	1.17
8	0.00	AV1	36.72	11.65	0.312	89.1	53.1	0.312	0.333	0.15	1.20
9	0.00	AV1	35.62	11.91	0.322	92.0	53.1	0.322	0.328	0.99	1.15
10	0.00	AV1	37.53	11.90	0.325	92.8	53.0	0.325	0.339	0.89	1.15
11	0.00	AV1	37.23	11.71	0.318	90.9	53.0	0.318	0.335	0.78	1.20
12	0.00	AV1	37.50	11.83	0.321	91.7	53.1	0.321	0.336	1.00	1.20
13	0.00	AV1	37.09	11.85	0.320	91.5	52.8	0.320	0.335	1.32	1.16
14	0.00	AV1	38.17	11.62	0.290	82.9	53.0	0.290	0.334	0.28	1.17
15	0.00	AV1	37.85	11.62	0.311	88.8	53.0	0.311	0.334	0.86	1.25
16	0.00	AV1	38.95	11.55	0.308	88.1	52.9	0.308	0.333	1.01	1.20
17	0.00	AV1	38.49	11.67	0.298	85.2	52.8	0.298	0.331	0.78	1.18
18	0.00	AV1	38.79	11.63	0.304	86.8	52.9	0.304	0.336	0.92	1.20
19	0.00	AV1	38.57	11.52	0.303	86.5	52.8	0.303	0.336	0.72	1.24
20	0.00	AV1	38.73	11.65	0.312	89.2	52.8	0.312	0.336	1.06	1.17
21	0.00	AV1	38.42	11.52	0.310	88.5	52.7	0.310	0.337	0.76	1.24
22	0.00	AV1	38.41	11.47	0.307	87.8	52.6	0.307	0.335	0.88	1.26
23	0.00	AV1	37.93	11.36	0.303	86.5	52.7	0.303	0.332	0.76	1.26
24	0.00	AV1	38.39	11.65	0.309	88.2	52.6	0.309	0.332	0.86	1.16
25	0.00	AV1	38.58	11.64	0.311	88.8	52.6	0.311	0.337	0.71	1.22
26	0.00	AV1	38.17	11.43	0.303	86.7	52.7	0.303	0.332	0.76	1.31
27	0.00	AV1	38.63	11.55	0.318	91.0	52.5	0.318	0.336	1.11	1.26
28	0.00	AV1	38.62	11.51	0.304	86.9	52.5	0.304	0.334	0.70	1.24
29	0.00	AV1	38.90	11.57	0.311	88.9	52.3	0.311	0.335	0.70	1.23
30	0.00	AV1	38.42	11.76	0.313	89.3	52.6	0.313	0.337	0.76	1.28
31	0.00	AV1	38.93	11.64	0.313	89.4	52.5	0.313	0.336	0.89	1.12
32	0.00	AV1	38.42	11.56	0.307	87.8	52.7	0.307	0.335	0.84	1.31
33	0.00	AV1	39.13	11.54	0.317	90.5	52.5	0.317	0.341	1.29	1.33
34	0.00	AV1	39.19	11.64	0.306	87.4	52.6	0.306	0.334	0.92	1.25
35	0.00	AV1	39.41	11.48	0.310	88.7	52.5	0.310	0.339	0.71	1.26
36	0.00	AV1	39.44	11.58	0.311	88.8	52.5	0.311	0.336	0.77	1.26
37	0.00	AV1	39.72	11.63	0.308	88.0	52.6	0.308	0.335	1.01	1.23
38	0.00	AV1	39.22	11.47	0.312	89.2	52.6	0.312	0.339	0.94	1.26
39	0.00	AV1	39.51	11.61	0.317	90.5	52.4	0.317	0.342	0.89	1.24
40	0.00	AV1	39.11	11.48	0.315	89.9	52.5	0.315	0.339	0.95	1.26
41	0.00	AV1	39.32	11.63	0.312	89.1	52.4	0.312	0.340	0.86	1.33
42	0.00	AV1	39.13	11.76	0.316	90.3	52.6	0.316	0.339	1.04	1.10
43	0.00	AV1	39.60	11.62	0.317	90.6	52.4	0.317	0.338	0.88	1.08
44	0.00	AV1	39.19	11.71	0.319	91.1	52.4	0.319	0.337	1.26	1.31
45	0.00	AV1	39.13	11.59	0.317	90.6	52.4	0.317	0.339	0.88	1.02
46	0.00	AV1	39.52	11.40	0.308	87.9	52.3	0.308	0.333	0.56	1.37
47	0.00	AV1	38.81	11.64	0.315	90.0	52.4	0.315	0.337	0.86	1.02
48	0.00	AV1	39.63	11.79	0.313	89.4	52.5	0.313	0.336	0.82	1.11
49	0.00	AV1	38.81	11.72	0.313	89.6	52.3	0.313	0.333	0.88	1.30
50	0.00	AV1	38.38	11.98	0.317	90.5	52.4	0.317	0.333	0.93	1.26
51	0.00	AV1	39.32	11.89	0.318	90.9	52.3	0.318	0.337	0.93	1.29
52	0.00	AV1	39.33	12.09	0.316	90.4	52.3	0.316	0.339	0.79	1.28
53	0.00	AV1	39.27	11.69	0.312	89.2	52.3	0.312	0.335	0.80	1.32
54	0.00	AV1	39.49	11.91	0.314	89.6	52.4	0.314	0.336	0.83	1.04
55	0.00	AV1	39.59	11.85	0.315	89.9	52.4	0.315	0.340	0.77	1.31
56	0.00	AV1	39.38	11.91	0.316	90.4	52.4	0.316	0.336	0.97	1.01
57	0.00	AV1	39.63	11.93	0.313	89.6	52.4	0.313	0.339	0.83	1.30
58	0.00	AV1	39.79	11.64	0.316	90.4	52.5	0.316	0.338	0.87	1.02
59	0.00	AV1	39.44	11.93	0.313	89.5	52.4	0.313	0.333	1.03	1.30
60	0.00	AV1	40.13	11.92	0.316	90.4	52.5	0.316	0.340	1.04	1.05
61	0.00	AV1	40.10	11.63	0.314	89.6	52.4	0.314	0.337	1.13	1.35

SPT, Calvert Cliffs - B404-45 NWJ
OP: KB Test date: 22-Jun-2006

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
62	0.00	AV1	39.25	11.80	0.312	89.2	52.4	0.312	0.335	0.93	1.31
63	0.00	AV1	40.08	12.09	0.318	90.9	52.4	0.318	0.340	1.15	1.09
64	0.00	AV1	39.70	12.04	0.312	89.0	52.3	0.312	0.336	0.78	1.12
65	0.00	AV1	38.73	12.01	0.311	88.9	52.3	0.311	0.333	1.01	1.07
66	0.00	AV1	39.75	11.67	0.319	91.1	52.4	0.319	0.338	1.23	1.34
67	0.00	AV1	39.81	11.89	0.315	89.9	52.4	0.315	0.337	1.08	1.03
68	0.00	AV1	39.70	11.87	0.315	90.1	52.3	0.315	0.338	0.80	1.31
69	0.00	AV1	38.87	11.80	0.317	90.6	52.4	0.317	0.330	1.12	1.29
70	0.00	AV1	39.44	11.82	0.316	90.2	52.4	0.316	0.338	0.86	1.31
71	0.00	AV1	39.73	12.15	0.313	89.4	52.3	0.313	0.336	1.03	1.09
72	0.00	AV1	39.54	12.08	0.315	89.9	52.4	0.315	0.336	0.99	1.05
73	0.00	AV1	40.15	11.64	0.317	90.5	52.4	0.317	0.338	1.16	1.35
74	0.00	AV1	39.83	11.86	0.311	88.8	52.4	0.311	0.336	0.94	1.02
75	0.00	AV1	40.03	12.22	0.317	90.4	52.3	0.317	0.340	1.02	1.10
76	0.00	AV1	40.00	11.72	0.317	90.4	52.4	0.317	0.338	0.89	1.34
77	0.00	AV1	40.15	11.81	0.310	88.6	52.2	0.310	0.336	0.77	1.02
78	0.00	AV1	39.17	11.98	0.319	91.2	52.1	0.319	0.339	0.89	1.28
79	0.00	AV1	39.27	12.13	0.315	89.9	52.2	0.315	0.332	1.01	1.00
80	0.00	AV1	39.06	12.01	0.317	90.7	52.2	0.317	0.338	0.81	1.28
81	0.00	AV1	38.81	12.39	0.310	88.6	52.1	0.310	0.326	0.88	0.99
82	0.00	AV1	39.08	12.52	0.321	91.6	52.1	0.321	0.335	0.95	1.01
83	0.00	AV1	39.00	12.54	0.314	89.8	52.2	0.314	0.335	0.76	1.01
84	0.00	AV1	39.83	12.48	0.321	91.8	52.0	0.321	0.337	0.94	1.00
85	0.00	AV1	39.09	12.46	0.319	91.1	51.9	0.319	0.334	0.91	1.02
86	0.00	AV1	39.57	12.18	0.317	90.4	52.1	0.317	0.339	0.75	0.98
87	0.00	AV1	40.00	12.51	0.319	91.0	52.0	0.319	0.343	0.83	1.06
88	0.00	AV1	39.44	12.12	0.319	91.1	52.0	0.319	0.338	0.81	1.00
89	0.00	AV1	40.02	11.98	0.317	90.6	52.1	0.317	0.337	0.95	0.98
90	0.00	AV1	39.51	12.48	0.318	90.7	52.1	0.318	0.339	0.84	1.05
91	0.00	AV1	39.70	11.87	0.317	90.6	52.0	0.317	0.337	0.82	1.32
92	0.00	AV1	39.83	12.53	0.315	90.0	52.0	0.315	0.340	0.79	1.07
93	0.00	AV1	38.81	11.61	0.316	90.2	52.1	0.316	0.334	0.91	0.98
94	0.00	AV1	39.95	12.14	0.323	92.3	52.2	0.323	0.342	1.08	0.98
95	0.00	AV1	39.70	11.83	0.297	84.8	52.3	0.297	0.340	0.62	1.27
96	0.00	AV1	39.51	12.10	0.315	89.9	52.1	0.315	0.334	0.78	1.00
97	0.00	AV1	39.68	12.28	0.313	89.4	52.3	0.313	0.333	0.75	1.02
98	0.00	AV1	39.57	12.48	0.319	91.2	52.2	0.319	0.335	1.08	1.05
99	0.00	AV1	39.30	12.44	0.320	91.4	52.2	0.320	0.335	1.05	1.04
100	0.00	AV1	39.70	11.95	0.319	91.1	52.3	0.319	0.337	1.03	1.31
101	0.00	AV1	39.63	12.00	0.314	89.8	52.1	0.314	0.336	0.96	1.30
102	0.00	AV1	39.79	12.21	0.316	90.3	52.0	0.316	0.338	0.99	1.01
103	0.00	AV1	39.32	11.66	0.315	90.1	52.1	0.315	0.332	1.08	1.32
104	0.00	AV1	38.36	12.04	0.315	90.0	52.0	0.315	0.328	1.10	1.25
105	0.00	AV1	39.72	12.22	0.318	90.8	52.0	0.318	0.339	1.01	1.07
106	0.00	AV1	39.68	12.35	0.319	91.2	52.0	0.319	0.335	1.29	1.07
107	0.00	AV1	39.63	12.21	0.307	87.8	51.9	0.307	0.331	0.80	1.08
108	0.00	AV1	40.27	11.96	0.312	89.1	52.0	0.312	0.336	0.80	1.32
109	0.00	AV1	38.85	11.69	0.306	87.3	52.0	0.306	0.332	0.83	1.30
110	0.00	AV1	39.89	12.20	0.313	89.4	51.9	0.313	0.334	0.81	1.07
		Average	38.96	11.86	0.314	89.7	52.4	0.314	0.335	0.88	1.17

Total number of blows analyzed: 110

Time Summary

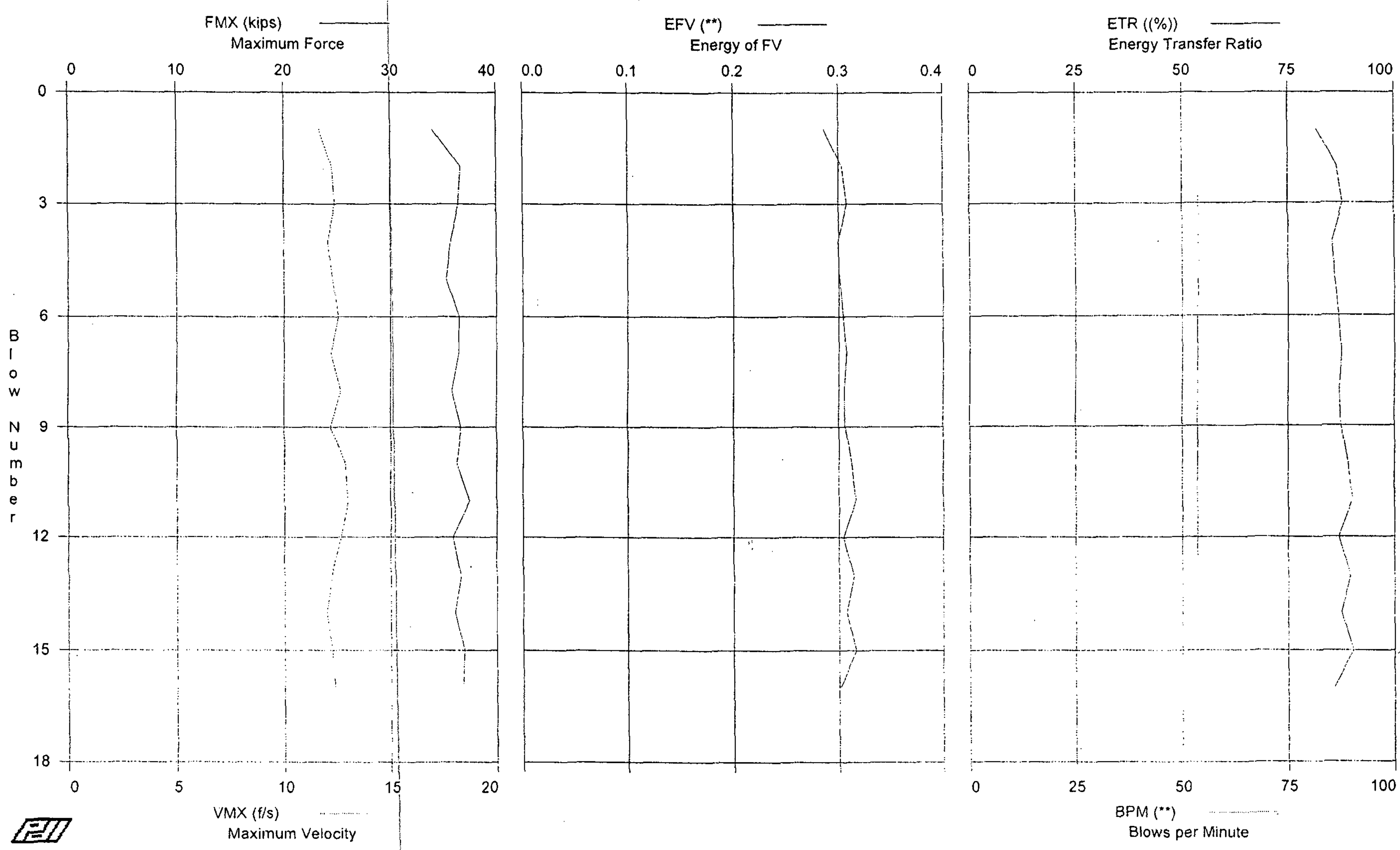
Drive 2 minutes 4 seconds 3:07:31 PM - 3:09:35 PM (6/22/2006) BN 1 - 110

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B404-60



SPT, Calvert Cliffs - B404-60 NWJ
OP: KB Test date: 22-Jun-2006

AR: 1.45 in^2 SP: 0.492 k/ft3
LE: 65.5 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	33.93	11.68	0.286	81.8	**	0.286	0.303	1.08	1.03
2	0.00	AV1	36.61	12.27	0.303	86.6	54.0	0.303	0.315	1.68	1.09
3	0.00	AV1	36.42	12.42	0.308	88.0	53.9	0.308	0.323	1.64	1.15
4	0.00	AV1	35.64	12.08	0.299	85.5	53.9	0.299	0.317	1.32	1.16
5	0.00	AV1	35.24	12.30	0.301	86.1	53.9	0.301	0.322	1.02	1.17
6	0.00	AV1	36.45	12.57	0.304	86.9	53.6	0.304	0.318	1.91	1.22
7	0.00	AV1	36.38	12.22	0.307	87.6	53.6	0.307	0.320	1.25	1.20
8	0.00	AV1	35.75	12.67	0.305	87.1	53.7	0.305	0.320	1.21	1.22
9	0.00	AV1	36.64	12.20	0.306	87.5	53.6	0.306	0.319	1.72	1.18
10	0.00	AV1	36.19	12.87	0.312	89.1	53.7	0.312	0.322	1.62	1.23
11	0.00	AV1	37.42	13.00	0.316	90.2	53.5	0.316	0.322	1.84	1.24
12	0.00	AV1	35.81	12.68	0.304	86.9	53.6	0.304	0.312	1.54	1.19
13	0.00	AV1	36.58	12.25	0.314	89.7	53.5	0.314	0.319	1.56	1.19
14	0.00	AV1	36.02	12.01	0.307	87.7	53.5	0.307	0.315	1.25	1.17
15	0.00	AV1	36.91	12.26	0.316	90.3	53.5	0.316	0.326	1.46	1.18
16	0.00	AV1	36.75	12.38	0.301	85.9	53.5	0.301	0.322	0.79	1.16
		Average	36.17	12.37	0.306	87.3	53.7	0.306	0.318	1.43	1.17

Total number of blows analyzed: 16

Time Summary

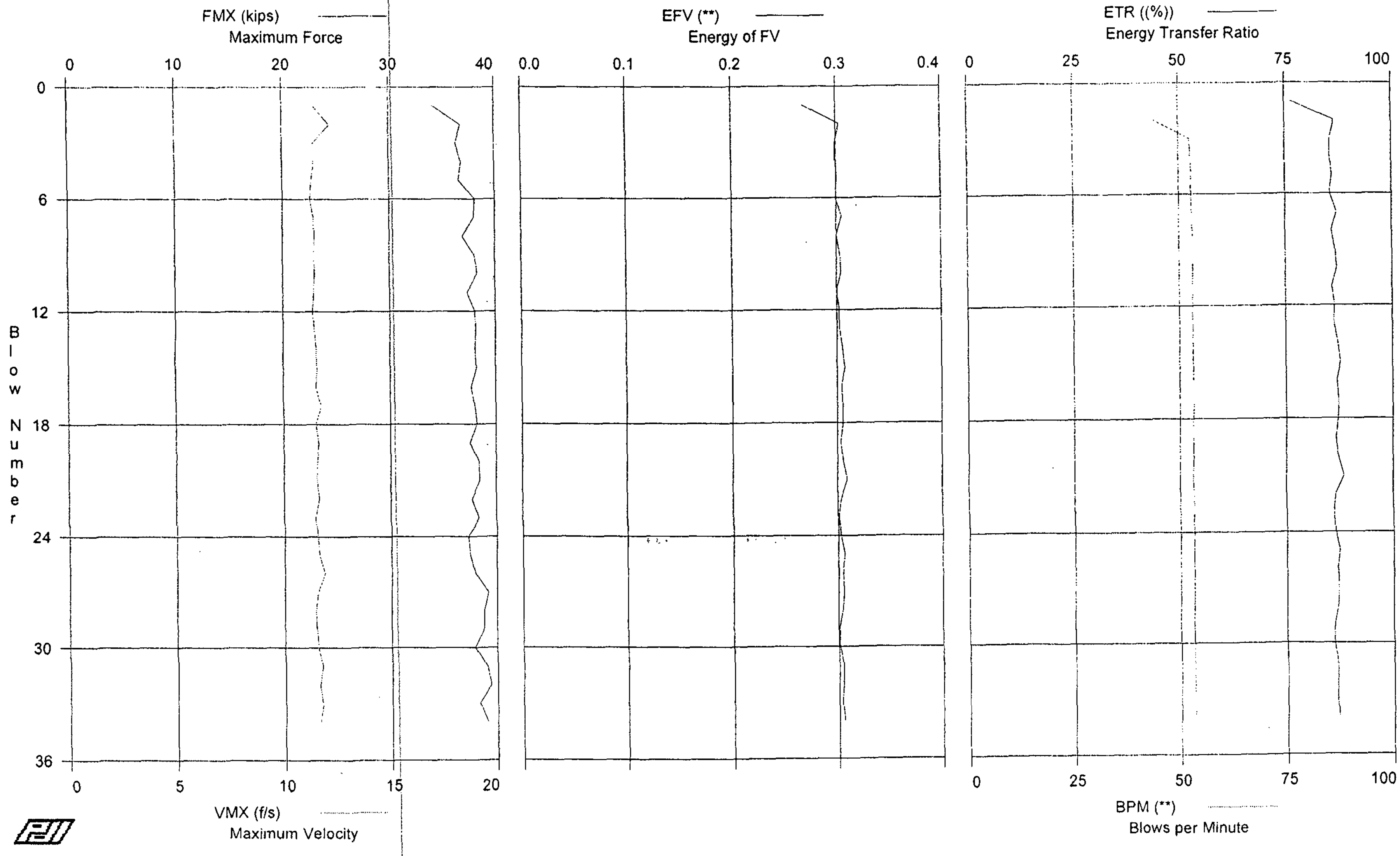
Drive 17 seconds 4:10:38 PM - 4:10:55 PM (6/22/2006) BN 1 - 16

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B404-75

Test date: 23-Jun-2006



SPT, Calvert Cliffs - B404-75 NWJ
OP: KB Test date: 23-Jun-2006

AR: 1.45 in^2 SP: 0.492 k/ft3
LE: 80.5 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	34.09	11.45	0.268	76.5	**	0.268	0.296	1.89	1.24
2	0.00	AV1	36.83	12.22	0.303	86.5	44.2	0.303	0.329	1.39	1.22
3	0.00	AV1	36.34	11.43	0.299	85.5	52.6	0.299	0.327	1.20	1.25
4	0.00	AV1	36.81	11.44	0.299	85.5	52.8	0.299	0.329	1.18	1.26
5	0.00	AV1	36.58	11.36	0.301	86.0	52.9	0.301	0.328	1.37	1.26
6	0.00	AV1	38.09	11.27	0.299	85.4	52.8	0.299	0.332	1.20	1.33
7	0.00	AV1	37.99	11.43	0.305	87.0	53.0	0.305	0.337	1.33	1.30
8	0.00	AV1	36.90	11.47	0.300	85.7	53.1	0.300	0.326	1.30	1.20
9	0.00	AV1	38.04	11.42	0.303	86.6	52.9	0.303	0.330	1.42	1.20
10	0.00	AV1	38.28	11.47	0.304	87.0	53.1	0.304	0.334	1.27	1.22
11	0.00	AV1	37.31	11.43	0.300	85.8	53.1	0.300	0.329	1.26	1.28
12	0.00	AV1	38.04	11.37	0.302	86.3	53.1	0.302	0.331	1.38	1.20
13	0.00	AV1	38.12	11.44	0.302	86.3	53.1	0.302	0.333	1.00	1.23
14	0.00	AV1	38.06	11.53	0.305	87.1	53.1	0.305	0.332	0.84	1.20
15	0.00	AV1	38.17	11.56	0.307	87.7	53.1	0.307	0.333	0.79	1.30
16	0.00	AV1	37.66	11.50	0.304	86.8	53.1	0.304	0.332	0.73	1.28
17	0.00	AV1	37.98	11.73	0.305	87.3	53.2	0.305	0.332	0.83	1.27
18	0.00	AV1	38.19	11.49	0.305	87.1	53.1	0.305	0.329	0.70	1.31
19	0.00	AV1	37.53	11.61	0.303	86.6	53.1	0.303	0.330	0.57	1.27
20	0.00	AV1	38.36	11.55	0.305	87.1	53.1	0.305	0.329	0.64	1.30
21	0.00	AV1	38.44	11.55	0.309	88.4	53.0	0.309	0.331	0.98	1.22
22	0.00	AV1	37.66	11.61	0.303	86.5	53.2	0.303	0.333	0.71	1.27
23	0.00	AV1	38.36	11.46	0.301	86.0	53.1	0.301	0.326	0.65	1.32
24	0.00	AV1	37.28	11.53	0.302	86.4	53.1	0.302	0.328	0.62	1.26
25	0.00	AV1	37.47	11.61	0.306	87.4	53.1	0.306	0.329	0.71	1.27
26	0.00	AV1	37.92	11.85	0.304	86.8	53.1	0.304	0.334	0.64	1.25
27	0.00	AV1	39.19	11.53	0.305	87.0	53.1	0.305	0.337	0.47	1.33
28	0.00	AV1	38.79	11.43	0.304	86.9	53.1	0.304	0.331	0.91	1.19
29	0.00	AV1	38.76	11.46	0.301	86.1	53.1	0.301	0.329	0.78	1.20
30	0.00	AV1	37.87	11.54	0.301	86.0	53.1	0.301	0.332	0.68	1.29
31	0.00	AV1	39.00	11.71	0.304	86.8	53.1	0.304	0.336	0.43	1.23
32	0.00	AV1	39.38	11.59	0.304	86.7	53.1	0.304	0.336	0.66	1.22
33	0.00	AV1	38.30	11.72	0.303	86.7	53.1	0.303	0.332	0.82	1.25
34	0.00	AV1	39.08	11.60	0.305	87.0	53.2	0.305	0.334	0.61	1.22
		Average	37.85	11.54	0.302	86.3	52.8	0.302	0.330	0.94	1.25

Total number of blows analyzed: 34

Time Summary

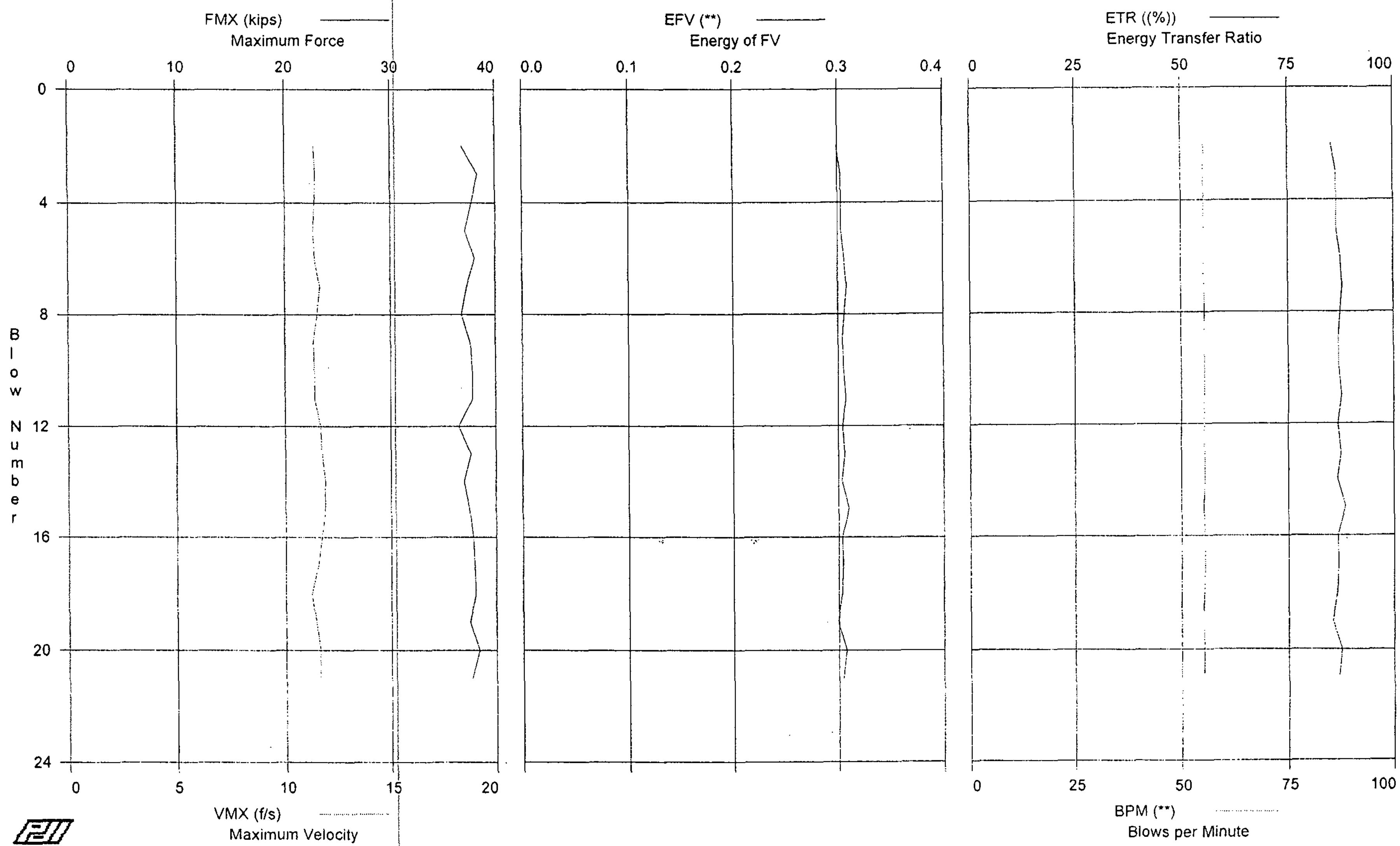
Drive 38 seconds 8:07:13 AM - 8:07:51 AM (6/23/2006) BN 1 - 34

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B404-90

Test date: 23-Jun-2006



SPT, Calvert Cliffs - B404-90 NWJ
OP: KB Test date: 23-Jun-2006

AR: 1.45 in^2 SP: 0.492 k/ft3
LE: 95.5 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
2	0.00	AV1	36.83	11.39	0.299	85.4	55.5	0.299	0.328	1.11	1.26
3	0.00	AV1	38.33	11.47	0.303	86.6	55.3	0.303	0.332	1.30	1.19
5	0.00	AV1	37.12	11.35	0.303	86.5	55.4	0.303	0.326	1.13	1.20
6	0.00	AV1	38.04	11.42	0.306	87.5	55.4	0.306	0.329	1.03	1.15
7	0.00	AV1	37.24	11.66	0.308	87.9	55.4	0.308	0.327	1.04	1.17
8	0.00	AV1	36.77	11.53	0.306	87.4	55.5	0.306	0.329	1.07	1.22
9	0.00	AV1	37.60	11.36	0.304	87.0	55.4	0.304	0.325	0.96	1.28
10	0.00	AV1	37.76	11.39	0.305	87.1	55.5	0.305	0.327	0.86	1.29
11	0.00	AV1	37.79	11.42	0.307	87.6	55.4	0.307	0.329	0.79	1.17
12	0.00	AV1	36.47	11.67	0.304	86.8	55.4	0.304	0.324	0.64	1.21
13	0.00	AV1	37.60	11.73	0.306	87.5	55.4	0.306	0.334	0.55	1.21
14	0.00	AV1	36.97	11.89	0.303	86.6	55.5	0.303	0.324	0.55	1.21
15	0.00	AV1	37.47	11.89	0.310	88.5	55.2	0.310	0.331	0.56	1.20
16	0.00	AV1	37.79	11.71	0.303	86.7	55.4	0.303	0.324	0.49	1.25
17	0.00	AV1	37.95	11.55	0.304	86.8	55.5	0.304	0.327	0.50	1.28
18	0.00	AV1	38.06	11.23	0.303	86.6	55.3	0.303	0.326	0.52	1.19
19	0.00	AV1	37.45	11.44	0.299	85.5	55.1	0.299	0.320	0.41	1.27
20	0.00	AV1	38.35	11.63	0.307	87.6	55.2	0.307	0.329	0.41	1.28
21	0.00	AV1	37.66	11.63	0.304	87.0	55.2	0.304	0.322	0.44	1.26
		Average	37.54	11.55	0.304	87.0	55.4	0.304	0.327	0.76	1.23

Total number of blows analyzed: 19

Time Summary

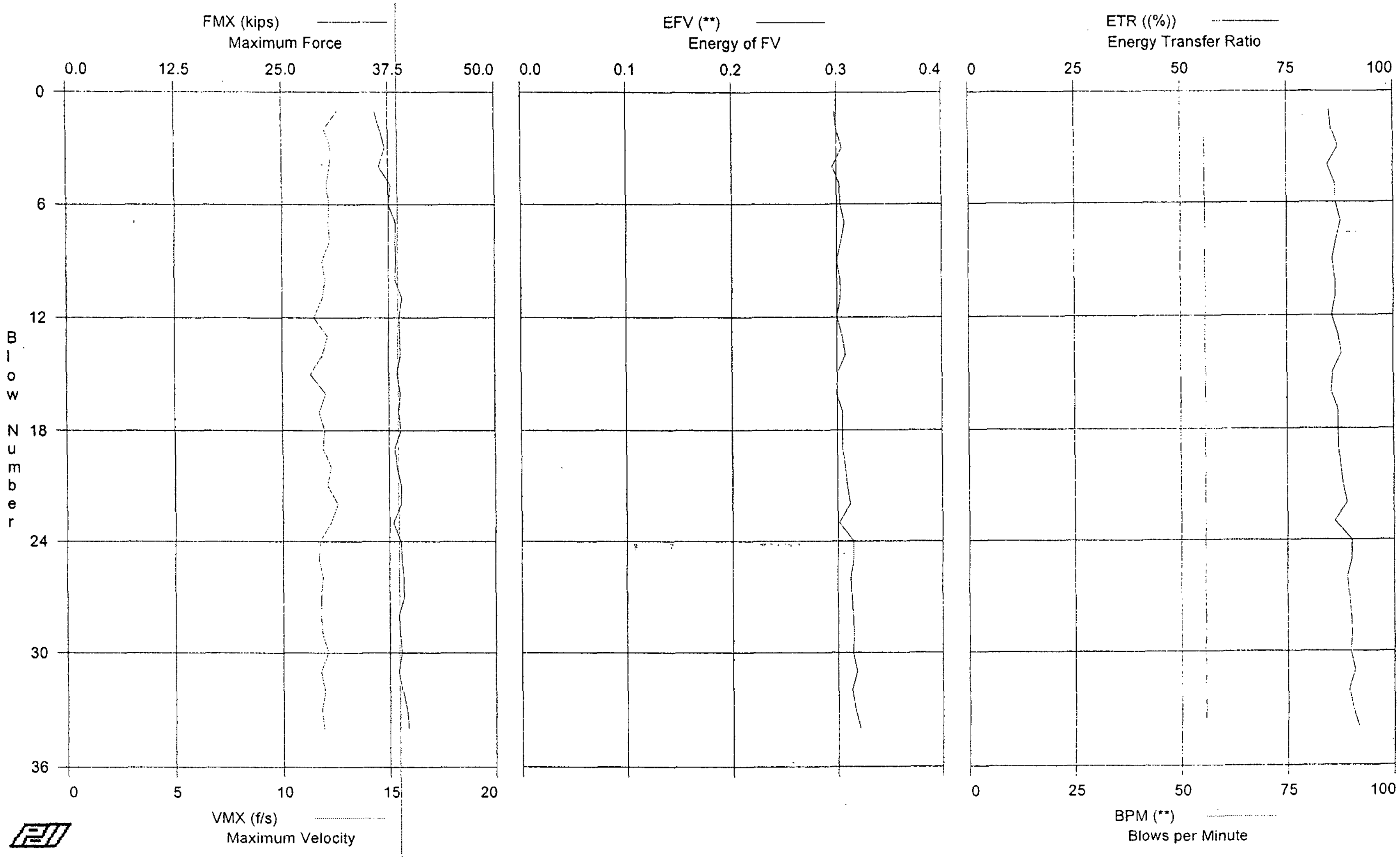
Drive 23 seconds 9:44:43 AM - 9:45:06 AM (6/23/2006) BN 1 - 21

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B404-105

Test date: 23-Jun-2006



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B404-105 NWJ
OP: KB Test date: 23-Jun-2006

AR: 1.45 in^2
LE: 110.5 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	35.96	12.66	0.298	85.2	**	0.298	0.318	1.31	1.07
2	0.00	AV1	36.56	12.02	0.300	85.6	55.6	0.300	0.322	1.15	1.20
3	0.00	AV1	37.09	12.31	0.305	87.2	55.7	0.305	0.328	0.87	1.17
4	0.00	AV1	36.40	12.24	0.296	84.7	55.7	0.296	0.321	0.86	1.17
5	0.00	AV1	37.79	12.11	0.303	86.5	55.7	0.303	0.327	0.60	1.22
6	0.00	AV1	37.45	12.22	0.303	86.6	55.7	0.303	0.327	0.87	1.20
7	0.00	AV1	38.31	12.18	0.307	87.7	55.7	0.307	0.329	0.88	1.23
8	0.00	AV1	38.26	12.24	0.304	86.7	55.9	0.304	0.328	0.89	1.23
9	0.00	AV1	38.36	11.89	0.300	85.8	55.6	0.300	0.329	0.91	1.26
10	0.00	AV1	38.23	12.02	0.303	86.4	55.8	0.303	0.326	0.84	1.25
11	0.00	AV1	39.06	11.89	0.303	86.5	55.9	0.303	0.336	0.60	1.29
12	0.00	AV1	38.69	11.49	0.300	85.7	55.8	0.300	0.330	0.70	1.32
13	0.00	AV1	38.78	12.15	0.305	87.1	55.7	0.305	0.334	0.79	1.25
14	0.00	AV1	38.87	11.89	0.308	88.0	55.8	0.308	0.335	0.87	1.28
15	0.00	AV1	38.44	11.32	0.300	85.8	55.9	0.300	0.327	0.82	1.33
16	0.00	AV1	38.82	12.04	0.299	85.4	55.7	0.299	0.333	0.43	1.26
17	0.00	AV1	38.62	11.72	0.305	87.1	55.9	0.305	0.332	0.77	1.29
18	0.00	AV1	38.89	11.99	0.305	87.1	55.8	0.305	0.334	0.68	1.27
19	0.00	AV1	38.14	11.91	0.305	87.2	55.7	0.305	0.330	0.83	1.26
20	0.00	AV1	38.38	12.26	0.307	87.6	55.8	0.307	0.333	0.66	1.23
21	0.00	AV1	38.87	12.10	0.309	88.2	55.7	0.309	0.337	0.52	1.26
22	0.00	AV1	38.90	12.60	0.312	89.1	55.8	0.312	0.340	0.53	1.21
23	0.00	AV1	37.92	12.26	0.301	86.1	55.8	0.301	0.328	0.47	1.22
24	0.00	AV1	38.81	11.74	0.315	90.1	55.6	0.315	0.334	0.81	1.30
25	0.00	AV1	38.93	11.70	0.315	90.1	55.9	0.315	0.332	1.01	1.20
26	0.00	AV1	39.19	11.88	0.312	89.1	55.7	0.312	0.338	0.59	1.30
27	0.00	AV1	39.19	11.78	0.313	89.5	55.7	0.313	0.331	0.83	1.22
28	0.00	AV1	38.55	11.76	0.314	89.9	55.7	0.314	0.332	0.78	1.23
29	0.00	AV1	38.69	11.85	0.315	90.1	55.8	0.315	0.327	0.87	1.19
30	0.00	AV1	38.90	12.11	0.314	89.8	55.6	0.314	0.337	0.39	1.22
31	0.00	AV1	38.54	11.77	0.318	90.8	55.9	0.318	0.335	0.89	1.28
32	0.00	AV1	39.00	11.95	0.313	89.5	55.6	0.313	0.336	0.53	1.28
33	0.00	AV1	39.46	11.79	0.316	90.4	55.8	0.316	0.335	0.61	1.31
34	0.00	AV1	39.68	11.91	0.321	91.8	55.6	0.321	0.340	0.73	1.31
		Average	38.40	11.99	0.307	87.8	55.7	0.307	0.331	0.76	1.24

Total number of blows analyzed: 34

Time Summary

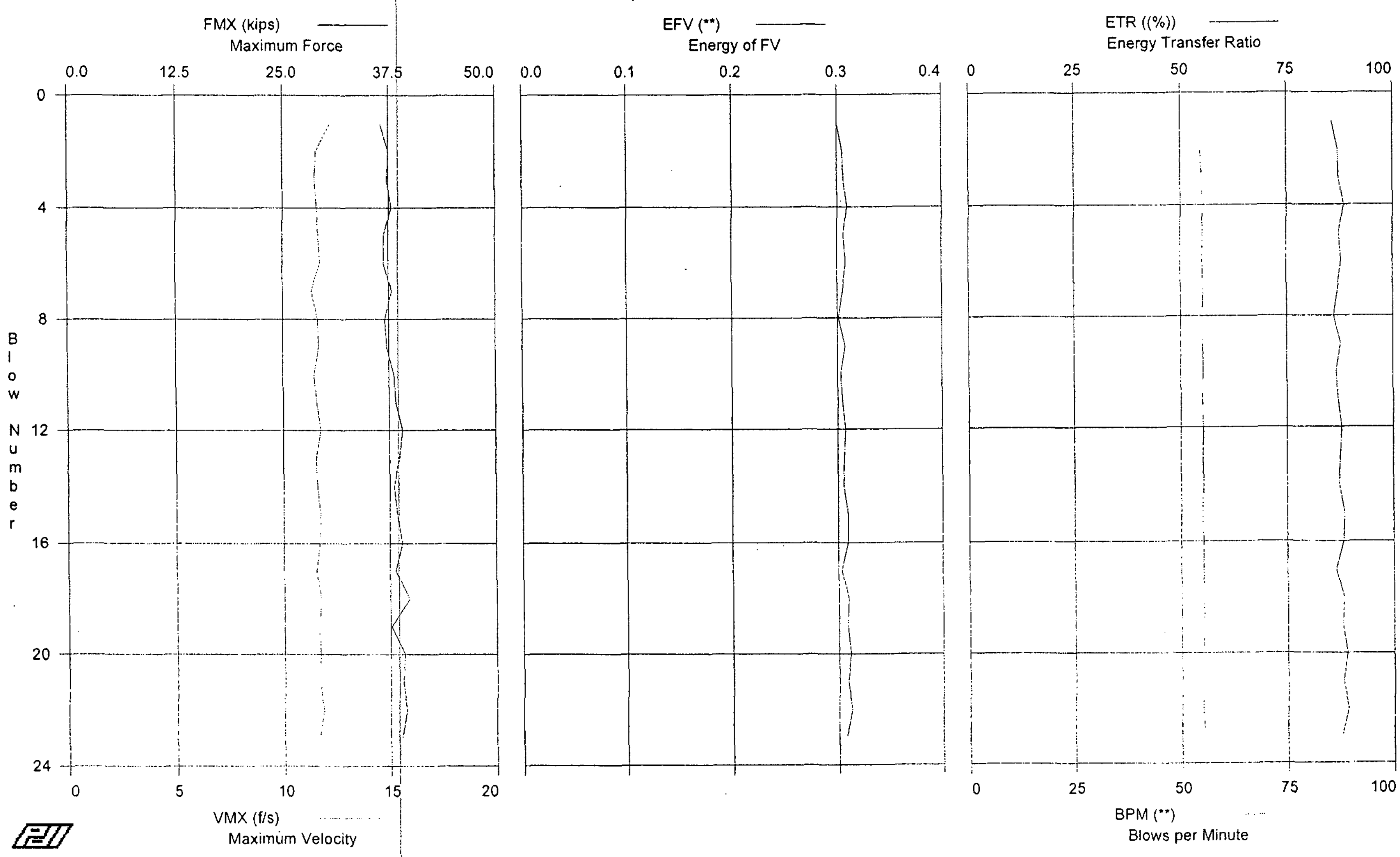
Drive 35 seconds 10:47:59 AM - 10:48:34 AM (6/23/2006) BN 1 - 34

GRL Engineers, Inc. - Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

Test date: 23-Jun-2006

SPT, Calvert Cliffs - B404-120



GRL Engineers, Inc.
Case Method Results
PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B404-120
NWJ
OP: KB
Test date: 23-Jun-2006

AR: 1.45 in^2
LE: 125.5 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	36.58	12.25	0.300	85.7	**	0.300	0.315	1.44	1.08
2	0.00	AV1	37.48	11.61	0.305	87.2	54.7	0.305	0.325	1.36	1.27
3	0.00	AV1	37.28	11.55	0.306	87.3	55.1	0.306	0.324	1.30	1.27
4	0.00	AV1	37.79	11.61	0.309	88.4	55.1	0.309	0.328	1.31	1.27
5	0.00	AV1	36.91	11.70	0.306	87.4	55.2	0.306	0.318	1.39	1.24
6	0.00	AV1	36.90	11.79	0.308	87.9	55.2	0.308	0.316	1.24	1.23
7	0.00	AV1	37.83	11.37	0.305	87.1	55.4	0.305	0.324	1.35	1.22
8	0.00	AV1	36.99	11.65	0.301	86.1	55.1	0.301	0.315	0.94	1.16
9	0.00	AV1	37.21	11.71	0.307	87.7	55.2	0.307	0.324	1.05	1.25
10	0.00	AV1	38.07	11.48	0.303	86.6	55.3	0.303	0.322	1.16	1.21
11	0.00	AV1	38.23	11.59	0.304	87.0	55.0	0.304	0.326	1.03	1.30
12	0.00	AV1	39.00	11.77	0.307	87.8	55.2	0.307	0.329	0.96	1.30
13	0.00	AV1	38.63	11.56	0.306	87.5	55.2	0.306	0.327	1.05	1.31
14	0.00	AV1	37.98	11.60	0.305	87.2	55.3	0.305	0.317	1.39	1.20
15	0.00	AV1	38.36	11.75	0.309	88.4	54.9	0.309	0.332	0.94	1.28
16	0.00	AV1	38.93	11.71	0.309	88.2	55.3	0.309	0.328	0.95	1.31
17	0.00	AV1	38.17	11.56	0.303	86.5	55.2	0.303	0.323	1.14	1.24
18	0.00	AV1	39.70	11.75	0.309	88.2	55.1	0.309	0.332	1.17	1.19
19	0.00	AV1	37.61	11.66	0.308	87.9	55.4	0.308	0.324	1.18	1.24
20	0.00	AV1	39.19	11.71	0.311	89.0	55.1	0.311	0.331	1.13	1.23
21	0.00	AV1	38.92	11.67	0.308	87.9	55.1	0.308	0.333	0.94	1.22
22	0.00	AV1	39.36	11.85	0.312	89.2	55.0	0.312	0.331	1.33	1.17
23	0.00	AV1	38.82	11.65	0.307	87.8	55.4	0.307	0.331	0.93	1.18
		Average	38.08	11.68	0.306	87.6	55.2	0.306	0.325	1.16	1.23

Total number of blows analyzed: 23

Time Summary

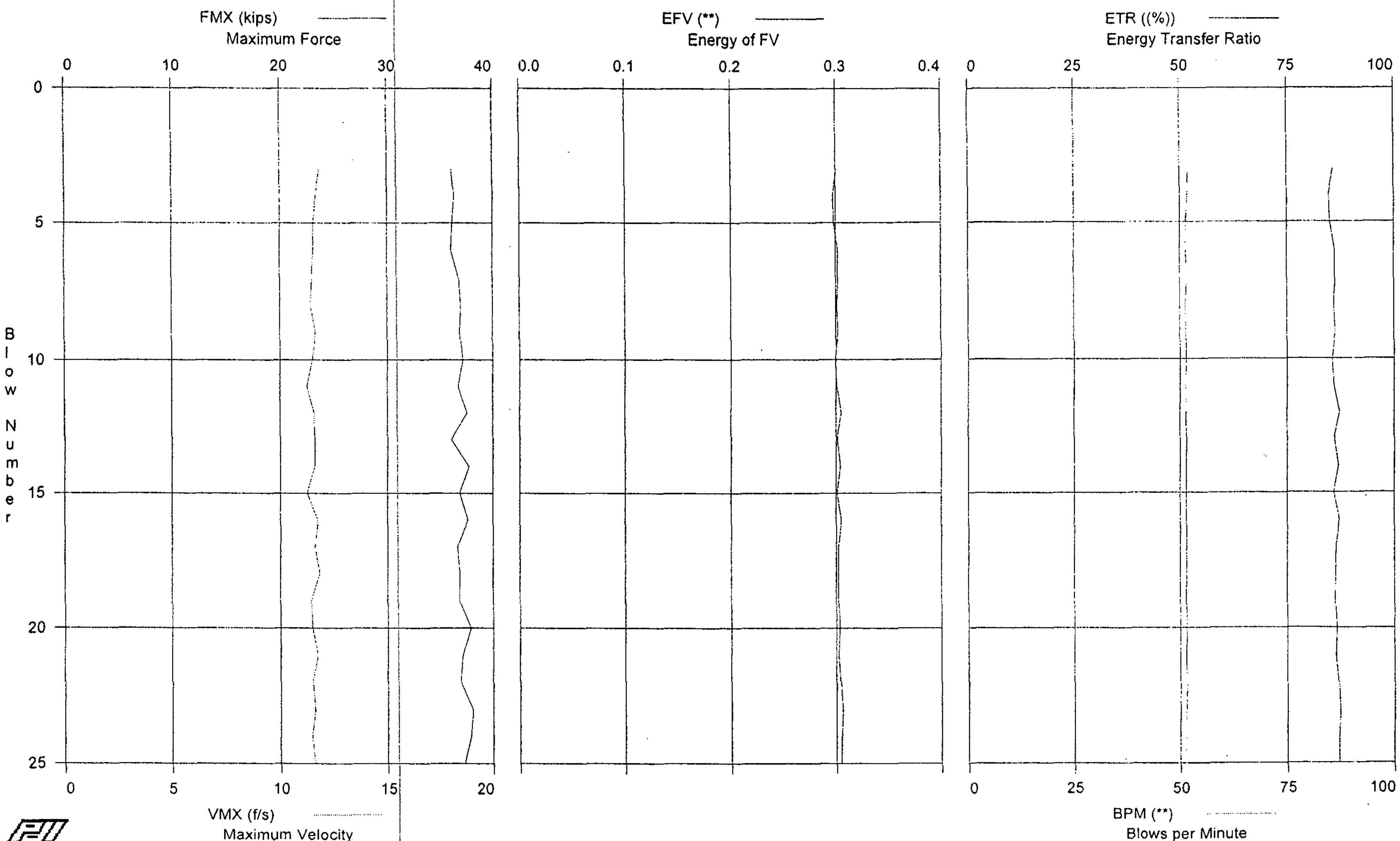
Drive 24 seconds 12:09:13 PM - 12:09:37 PM (6/23/2006) BN 1 - 23

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B404-135

Test date: 26-Jun-2006



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B404-135 NWJ

OP: KB Test date: 26-Jun-2006

AR: 1.45 in^2 SP: 0.492 k/ft3

LE: 140.5 ft EM: 30,000 ksi

WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL#	depth	TYPE	FMX	VMX	EFV	ETR	BPM	EMX	EF2	DFN	FVP
end	ft		kips	f/s	**	(%)	**	k-ft	k-ft	in	[]
3	0.00	AV1	36.10	11.84	0.301	85.9	52.0	0.301	0.315	0.90	1.17
4	0.00	AV1	36.32	11.65	0.297	84.9	51.8	0.297	0.313	0.96	1.23
5	0.00	AV1	36.13	11.53	0.298	85.1	51.4	0.298	0.316	0.97	1.23
6	0.00	AV1	36.05	11.57	0.302	86.2	51.4	0.302	0.318	1.00	1.23
7	0.00	AV1	36.77	11.49	0.302	86.3	51.6	0.302	0.316	1.19	1.26
8	0.00	AV1	36.96	11.42	0.301	86.0	51.3	0.301	0.318	1.22	1.27
9	0.00	AV1	36.86	11.66	0.302	86.3	51.5	0.302	0.319	1.29	1.24
10	0.00	AV1	37.15	11.49	0.299	85.5	51.5	0.299	0.317	0.92	1.27
11	0.00	AV1	36.70	11.26	0.301	86.0	51.3	0.301	0.316	0.99	1.20
12	0.00	AV1	37.55	11.57	0.305	87.2	51.4	0.305	0.321	1.00	1.27
13	0.00	AV1	36.00	11.61	0.301	86.0	51.5	0.301	0.311	0.92	1.22
14	0.00	AV1	37.72	11.59	0.304	87.0	51.4	0.304	0.320	0.96	1.28
15	0.00	AV1	36.83	11.26	0.301	85.9	51.5	0.301	0.315	0.88	1.28
16	0.00	AV1	37.63	11.74	0.305	87.2	51.5	0.305	0.322	0.93	1.26
17	0.00	AV1	36.58	11.60	0.302	86.4	51.5	0.302	0.315	1.00	1.24
18	0.00	AV1	36.83	11.82	0.302	86.4	51.5	0.302	0.318	1.08	1.22
19	0.00	AV1	36.77	11.43	0.302	86.2	51.4	0.302	0.317	0.86	1.27
20	0.00	AV1	37.85	11.47	0.303	86.6	51.5	0.303	0.323	1.00	1.30
21	0.00	AV1	37.07	11.72	0.302	86.3	51.4	0.302	0.314	1.19	1.24
22	0.00	AV1	36.88	11.48	0.304	86.9	51.5	0.304	0.317	1.02	1.26
23	0.00	AV1	38.06	11.61	0.306	87.3	51.4	0.306	0.324	0.89	1.29
24	0.00	AV1	37.87	11.46	0.305	87.1	51.4	0.305	0.320	0.95	1.30
25	0.00	AV1	37.26	11.61	0.305	87.2	51.4	0.305	0.316	0.95	1.26
		Average	36.95	11.56	0.302	86.3	51.5	0.302	0.317	1.00	1.25

Total number of blows analyzed: 23

Time Summary

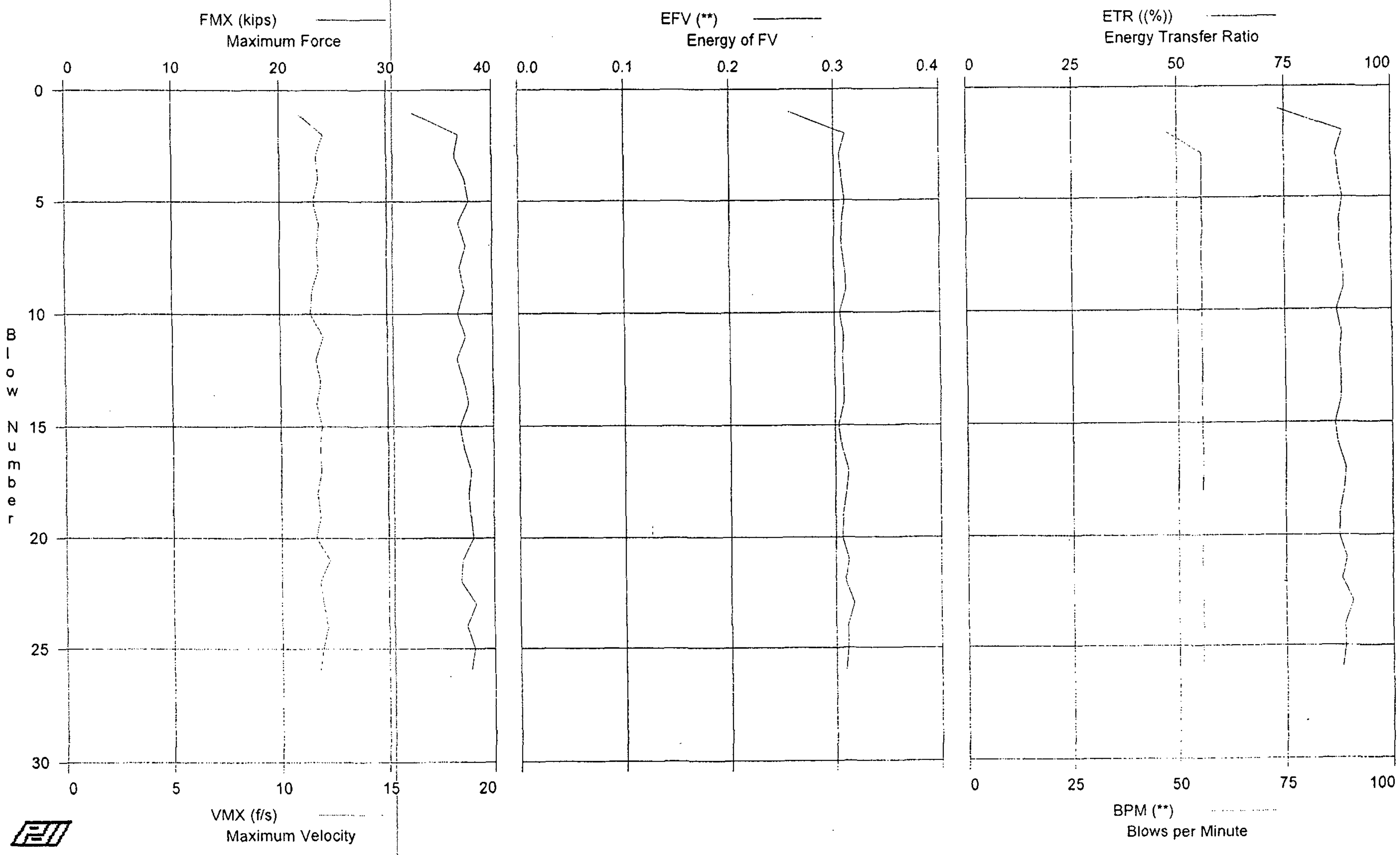
Drive 29 seconds 10:42:55 AM - 10:43:24 AM (6/26/2006) BN 1 - 25

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B404-150

Test date: 26-Jun-2006



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B404-150 NWJ
OP: KB Test date: 26-Jun-2006

AR: 1.45 in^2
LE: 155.5 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute

EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	32.39	10.82	0.257	73.5	**	0.257	0.273	0.55	1.14
2	0.00	AV1	36.90	12.03	0.311	88.7	47.1	0.311	0.327	0.83	1.21
3	0.00	AV1	36.45	11.69	0.305	87.1	55.8	0.305	0.321	0.74	1.20
4	0.00	AV1	37.40	11.79	0.307	87.6	55.7	0.307	0.325	0.77	1.24
5	0.00	AV1	37.79	11.56	0.310	88.6	55.7	0.310	0.330	1.08	1.28
6	0.00	AV1	36.77	11.79	0.307	87.7	55.8	0.307	0.324	0.77	1.22
7	0.00	AV1	37.53	11.73	0.307	87.8	55.7	0.307	0.324	0.90	1.26
8	0.00	AV1	36.94	11.78	0.310	88.6	55.7	0.310	0.329	0.99	1.23
9	0.00	AV1	37.36	11.49	0.311	88.8	55.8	0.311	0.329	1.03	1.27
10	0.00	AV1	36.75	11.41	0.305	87.1	55.7	0.305	0.319	1.05	1.26
11	0.00	AV1	37.42	11.98	0.308	88.1	55.6	0.308	0.328	0.93	1.22
12	0.00	AV1	36.64	11.64	0.307	87.7	55.7	0.307	0.323	0.93	1.24
13	0.00	AV1	37.28	11.85	0.308	88.1	55.7	0.308	0.324	0.96	1.24
14	0.00	AV1	37.66	11.65	0.308	87.9	55.5	0.308	0.321	0.98	1.27
15	0.00	AV1	36.88	11.90	0.303	86.6	55.7	0.303	0.323	0.85	1.20
16	0.00	AV1	37.21	11.79	0.306	87.3	55.7	0.306	0.326	0.74	1.23
17	0.00	AV1	37.88	11.84	0.312	89.0	55.8	0.312	0.327	0.89	1.25
18	0.00	AV1	37.64	11.68	0.310	88.6	55.6	0.310	0.328	0.98	1.26
19	0.00	AV1	37.80	11.81	0.307	87.7	55.5	0.307	0.323	0.98	1.26
20	0.00	AV1	38.04	11.59	0.306	87.4	55.6	0.306	0.323	0.92	1.29
21	0.00	AV1	37.05	12.22	0.312	89.2	55.4	0.312	0.324	1.26	1.19
22	0.00	AV1	36.91	11.77	0.309	88.2	55.7	0.309	0.319	0.97	1.23
23	0.00	AV1	38.30	11.94	0.317	90.6	55.7	0.317	0.334	1.04	1.26
24	0.00	AV1	37.40	12.11	0.311	88.8	55.7	0.311	0.325	0.88	1.21
25	0.00	AV1	38.12	11.88	0.311	88.8	55.6	0.311	0.324	0.98	1.26
26	0.00	AV1	37.79	11.74	0.309	88.2	55.5	0.309	0.323	0.97	1.26
		Average	37.17	11.75	0.307	87.6	55.3	0.307	0.323	0.92	1.24

Total number of blows analyzed: 26

Time Summary

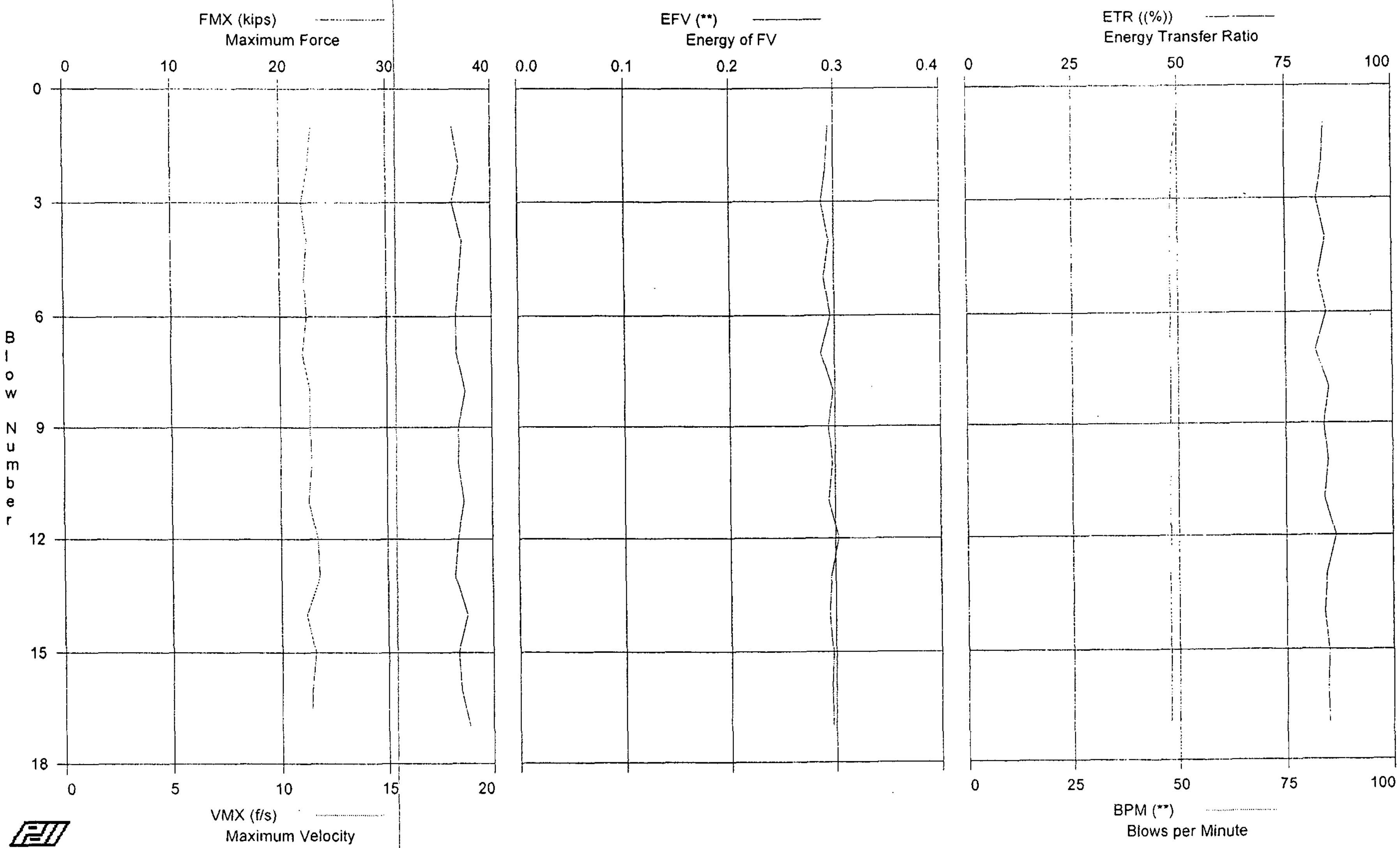
Drive 27 seconds 11:56:28 AM - 11:56:55 AM (6/26/2006) BN 1 - 26

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B404-165

Test date: 26-Jun-2006



SPT, Calvert Cliffs - B404-165 NWJ
OP: KB Test date: 26-Jun-2006

AR: 1.45 in^2 SP: 0.492 k/ft3
LE: 169.5 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	36.32	11.50	0.295	84.2	49.6	0.295	0.316	0.93	1.24
2	0.00	AV1	36.96	11.36	0.293	83.8	48.7	0.293	0.311	1.11	1.28
3	0.00	AV1	36.27	11.04	0.288	82.4	48.4	0.288	0.308	0.85	1.29
4	0.00	AV1	37.17	11.27	0.295	84.4	48.3	0.295	0.307	1.09	1.30
5	0.00	AV1	36.88	11.14	0.290	82.7	48.2	0.290	0.310	0.86	1.23
6	0.00	AV1	36.53	11.24	0.296	84.5	48.2	0.296	0.312	0.88	1.21
7	0.00	AV1	36.64	11.06	0.287	82.1	48.0	0.287	0.307	0.96	1.31
8	0.00	AV1	37.40	11.39	0.298	85.0	48.2	0.298	0.316	0.93	1.29
9	0.00	AV1	36.77	11.38	0.294	84.0	48.1	0.294	0.311	0.94	1.27
10	0.00	AV1	36.74	11.45	0.297	84.8	48.1	0.297	0.315	1.00	1.26
11	0.00	AV1	37.26	11.31	0.294	84.0	47.9	0.294	0.311	0.86	1.29
12	0.00	AV1	36.69	11.72	0.303	86.6	48.1	0.303	0.314	1.02	1.24
13	0.00	AV1	36.40	11.80	0.296	84.5	48.0	0.296	0.310	0.97	1.21
14	0.00	AV1	37.52	11.17	0.294	84.0	47.9	0.294	0.310	0.96	1.21
15	0.00	AV1	36.64	11.58	0.297	84.9	48.0	0.297	0.308	1.06	1.24
16	0.00	AV1	36.91	11.41	0.296	84.6	47.9	0.296	0.314	0.93	1.27
17	0.00	AV1	37.74	11.39	0.297	84.9	47.9	0.297	0.313	0.93	1.20
		Average	36.87	11.36	0.295	84.2	48.2	0.295	0.311	0.96	1.26

Total number of blows analyzed: 17

Time Summary

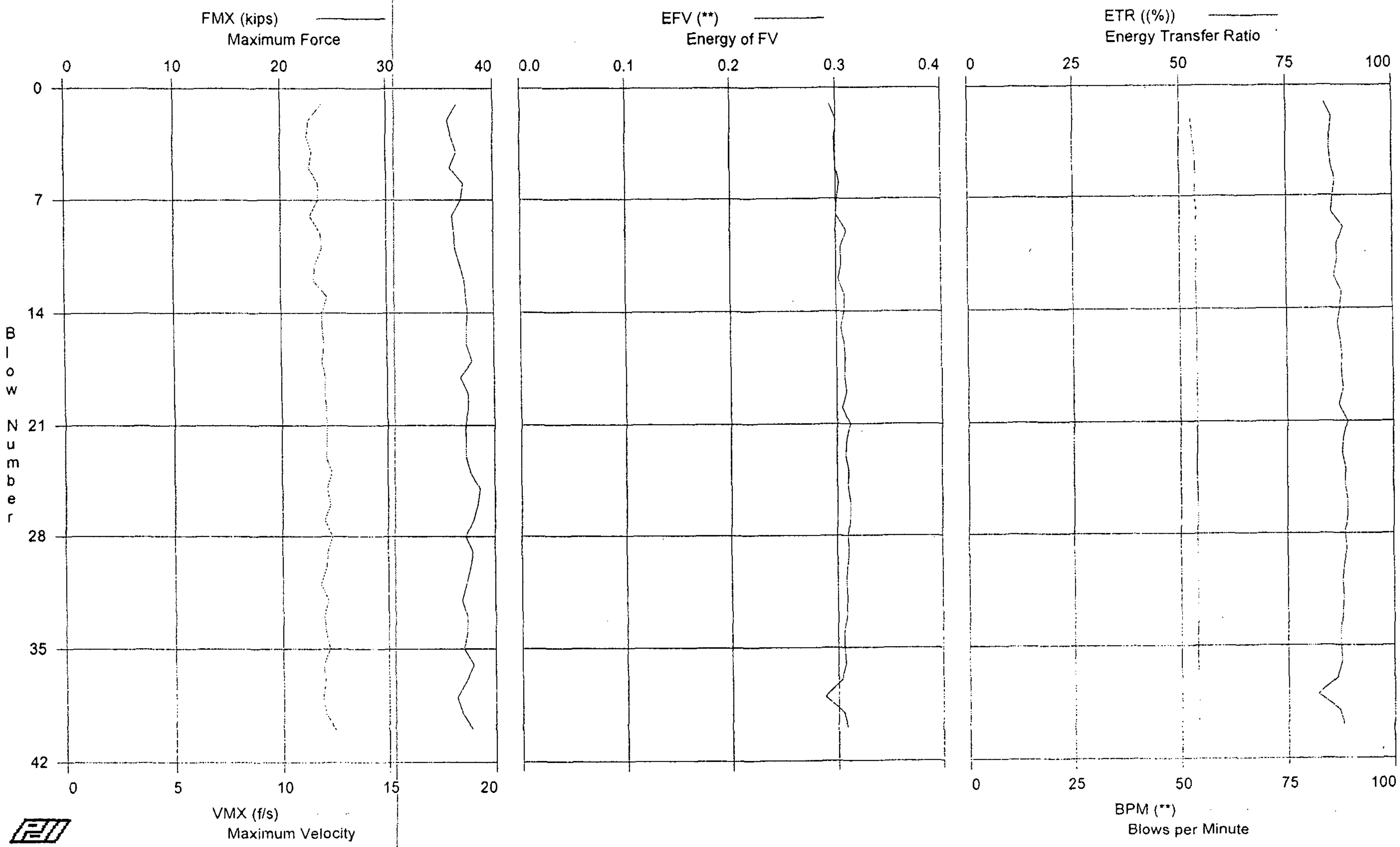
Drive 20 seconds 1:34:17 PM - 1:34:37 PM (6/26/2006) BN 1 - 17

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B404-180

Test date: 26-Jun-2006



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B404-180 NWJ
OP: KB Test date: 26-Jun-2006

AR: 1.45 in^2 SP: 0.492 k/ft3
LE: 185.5 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	36.58	11.94	0.294	83.9	**	0.294	0.315	0.88	1.15
2	0.00	AV1	35.68	11.34	0.300	85.7	52.6	0.300	0.315	0.98	1.24
3	0.00	AV1	36.07	11.26	0.299	85.5	53.0	0.299	0.320	0.87	1.25
4	0.00	AV1	36.59	11.51	0.299	85.3	53.5	0.299	0.313	0.99	1.25
5	0.00	AV1	35.94	11.38	0.300	85.7	53.8	0.300	0.315	1.06	1.24
6	0.00	AV1	37.20	11.79	0.303	86.5	53.7	0.303	0.318	0.99	1.23
7	0.00	AV1	36.97	11.76	0.301	86.0	53.4	0.301	0.316	1.08	1.23
8	0.00	AV1	36.11	11.39	0.300	85.6	53.9	0.300	0.316	0.88	1.24
9	0.00	AV1	36.29	11.87	0.310	88.5	53.7	0.310	0.319	1.02	1.20
10	0.00	AV1	36.38	11.95	0.304	86.8	53.8	0.304	0.321	0.92	1.19
11	0.00	AV1	36.85	11.63	0.305	87.0	53.9	0.305	0.320	0.79	1.24
12	0.00	AV1	37.28	11.57	0.302	86.3	53.7	0.302	0.316	0.85	1.26
13	0.00	AV1	37.40	12.19	0.308	88.1	53.9	0.308	0.321	0.85	1.21
14	0.00	AV1	37.53	11.93	0.307	87.6	53.8	0.307	0.318	0.87	1.24
15	0.00	AV1	37.40	11.94	0.304	87.0	53.8	0.304	0.316	0.80	1.23
16	0.00	AV1	37.44	12.01	0.307	87.7	53.9	0.307	0.321	0.89	1.22
17	0.00	AV1	37.96	11.92	0.308	88.1	53.8	0.308	0.322	0.72	1.25
18	0.00	AV1	36.83	12.06	0.307	87.8	54.0	0.307	0.320	0.83	1.20
19	0.00	AV1	37.53	12.04	0.309	88.2	53.8	0.309	0.324	0.73	1.22
20	0.00	AV1	37.55	12.11	0.305	87.2	53.9	0.305	0.319	0.66	1.22
21	0.00	AV1	37.28	12.10	0.312	89.2	53.9	0.312	0.326	0.76	1.19
22	0.00	AV1	37.34	12.12	0.309	88.3	53.9	0.309	0.320	0.66	1.18
23	0.00	AV1	37.34	12.08	0.308	88.0	53.8	0.308	0.322	0.69	1.19
24	0.00	AV1	37.74	12.34	0.311	88.8	53.8	0.311	0.322	0.69	1.20
25	0.00	AV1	38.60	12.10	0.310	88.6	53.9	0.310	0.328	0.57	1.25
26	0.00	AV1	38.38	12.25	0.312	89.1	53.9	0.312	0.320	0.68	1.23
27	0.00	AV1	37.98	11.99	0.312	89.0	54.0	0.312	0.319	0.74	1.25
28	0.00	AV1	37.28	12.35	0.310	88.6	53.8	0.310	0.321	0.53	1.18
29	0.00	AV1	37.93	12.14	0.311	89.0	54.0	0.311	0.318	0.64	1.23
30	0.00	AV1	37.66	12.06	0.309	88.2	54.0	0.309	0.318	0.61	1.23
31	0.00	AV1	37.29	11.80	0.308	87.9	54.0	0.308	0.320	0.60	1.20
32	0.00	AV1	36.90	12.15	0.309	88.2	53.9	0.309	0.319	0.69	1.18
33	0.00	AV1	37.34	11.94	0.308	87.9	53.9	0.308	0.315	0.60	1.23
34	0.00	AV1	37.34	12.04	0.306	87.4	53.8	0.306	0.320	0.47	1.21
35	0.00	AV1	37.02	12.20	0.306	87.5	53.8	0.306	0.319	0.55	1.18
36	0.00	AV1	37.95	11.90	0.307	87.7	53.8	0.307	0.319	0.44	1.06
37	0.00	AV1	37.21	11.98	0.303	86.7	53.9	0.303	0.313	0.49	1.06
38	0.00	AV1	36.32	11.87	0.287	81.9	53.9	0.287	0.311	0.31	1.16
39	0.00	AV1	36.86	12.00	0.305	87.1	53.9	0.305	0.313	0.49	1.21
40	0.00	AV1	37.85	12.46	0.309	88.3	53.8	0.309	0.317	0.60	1.16
		Average	37.18	11.94	0.306	87.3	53.8	0.306	0.319	0.74	1.21

Total number of blows analyzed: 40

Time Summary

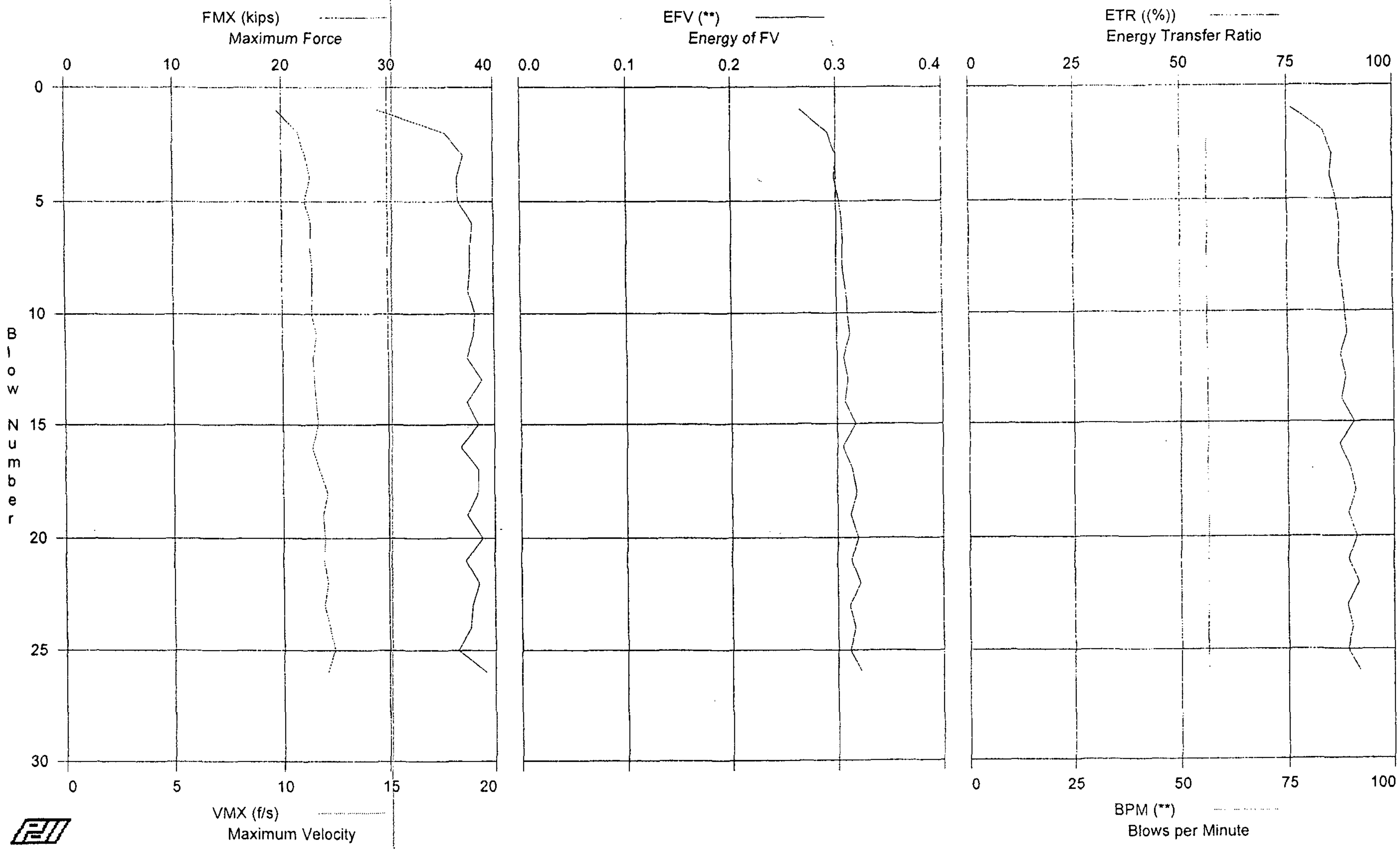
Drive 44 seconds 3:09:27 PM - 3:10:11 PM (6/26/2006) BN 1 - 40

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B404-195

Test date: 27-Jun-2006



SPT, Calvert Cliffs - B404-195
NWJ
OP: KB
Test date: 27-Jun-2006

AR: 1.45 in^2
LE: 210.5 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	29.01	9.78	0.266	75.9	**	0.266	0.275	0.11	1.17
2	0.00	AV1	35.43	10.77	0.292	83.6	56.3	0.292	0.314	0.30	1.29
3	0.00	AV1	37.20	11.10	0.300	85.7	56.4	0.300	0.324	0.34	1.32
4	0.00	AV1	36.58	11.32	0.298	85.2	56.2	0.298	0.319	0.42	1.16
5	0.00	AV1	36.70	11.06	0.303	86.6	56.2	0.303	0.333	0.56	1.30
6	0.00	AV1	37.98	11.32	0.305	87.3	56.3	0.305	0.332	0.56	1.25
7	0.00	AV1	37.79	11.30	0.306	87.3	56.2	0.306	0.334	0.74	1.27
8	0.00	AV1	37.79	11.41	0.306	87.3	56.3	0.306	0.331	0.64	1.30
9	0.00	AV1	37.60	11.41	0.309	88.2	56.3	0.309	0.332	0.69	1.27
10	0.00	AV1	38.22	11.35	0.310	88.6	56.2	0.310	0.333	0.86	1.24
11	0.00	AV1	38.04	11.59	0.312	89.1	56.1	0.312	0.335	0.88	1.29
12	0.00	AV1	37.40	11.40	0.306	87.4	56.3	0.306	0.324	0.82	1.25
13	0.00	AV1	38.81	11.46	0.310	88.7	56.2	0.310	0.336	0.71	1.33
14	0.00	AV1	37.40	11.54	0.307	87.7	56.2	0.307	0.328	0.78	1.27
15	0.00	AV1	38.47	11.64	0.317	90.6	56.4	0.317	0.337	0.87	1.30
16	0.00	AV1	36.80	11.34	0.305	87.1	56.2	0.305	0.320	0.85	1.27
17	0.00	AV1	38.49	11.69	0.314	89.8	56.2	0.314	0.331	1.05	1.29
18	0.00	AV1	38.46	12.07	0.318	91.0	56.3	0.318	0.339	0.80	1.25
19	0.00	AV1	37.37	11.84	0.312	89.2	56.3	0.312	0.324	0.84	1.24
20	0.00	AV1	38.82	11.94	0.319	91.2	56.4	0.319	0.339	0.80	1.28
21	0.00	AV1	37.26	11.91	0.313	89.3	56.3	0.313	0.329	0.64	1.22
22	0.00	AV1	38.50	12.08	0.321	91.7	56.3	0.321	0.335	0.73	1.25
23	0.00	AV1	37.85	11.91	0.311	89.0	56.3	0.311	0.330	0.65	1.24
24	0.00	AV1	37.66	12.17	0.316	90.2	56.2	0.316	0.335	0.64	1.22
25	0.00	AV1	36.45	12.38	0.311	88.9	56.2	0.311	0.322	0.60	1.16
26	0.00	AV1	39.16	12.07	0.322	92.0	56.4	0.322	0.337	0.83	1.27
		Average	37.36	11.53	0.308	88.0	56.3	0.308	0.328	0.68	1.26

Total number of blows analyzed: 26

Time Summary

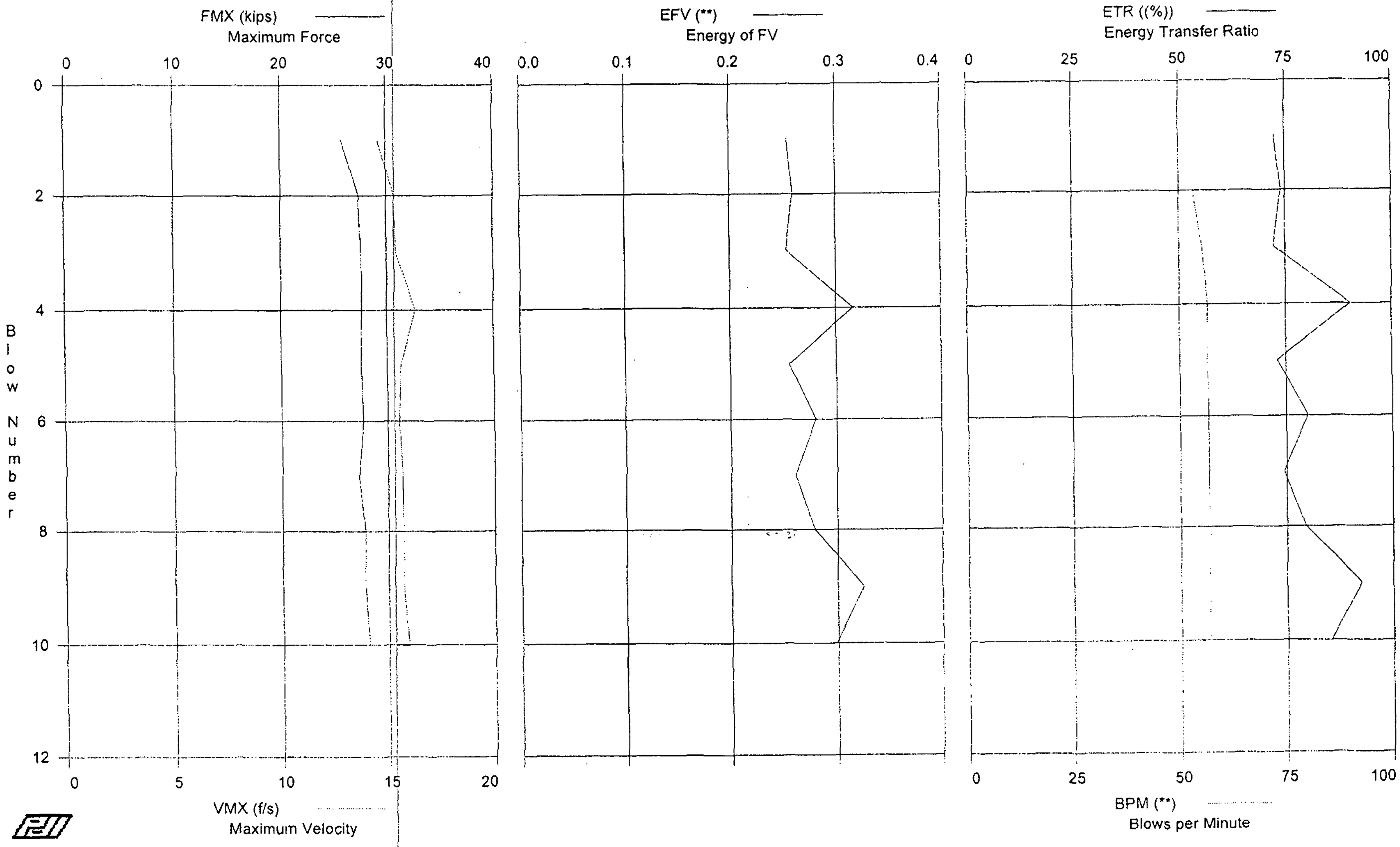
Drive 26 seconds 9:32:06 AM - 9:32:32 AM (6/27/2006) BN 1 - 26

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B409-15



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B409-15 AW rod
OP: KB Test date: 22-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 19.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL#	depth	TYPE	FMX	VMX	EFV	ETR	BPM	EMX	EF2	DFN	FVP
end	ft		kips	f/s	**	(%)	**	k-ft	k-ft	in	[]
1	0.00	AV1	25.74	14.60	0.254	72.5	**	0.254	0.256	1.43	0.80
2	0.00	AV1	27.35	15.34	0.259	74.0	53.3	0.259	0.263	-0.08	0.81
3	0.00	AV1	27.56	15.43	0.253	72.2	55.4	0.253	0.264	0.95	0.85
4	0.00	AV1	27.65	16.32	0.316	90.3	56.6	0.316	0.273	1.13	0.80
5	0.00	AV1	27.52	15.62	0.255	72.9	56.4	0.255	0.268	-0.92	0.80
6	0.00	AV1	27.67	15.53	0.280	80.0	56.7	0.280	0.267	0.61	0.80
7	0.00	AV1	27.22	15.65	0.260	74.3	56.7	0.260	0.267	0.14	0.80
8	0.00	AV1	27.78	15.71	0.278	79.4	56.8	0.278	0.267	-0.10	0.80
9	0.00	AV1	27.80	15.69	0.324	92.6	56.7	0.324	0.269	1.79	0.86
10	0.00	AV1	28.09	15.90	0.298	85.2	56.8	0.298	0.272	-0.25	0.79
		Average	27.44	15.58	0.278	79.4	56.2	0.278	0.267	0.47	0.81

Total number of blows analyzed: 10

Time Summary

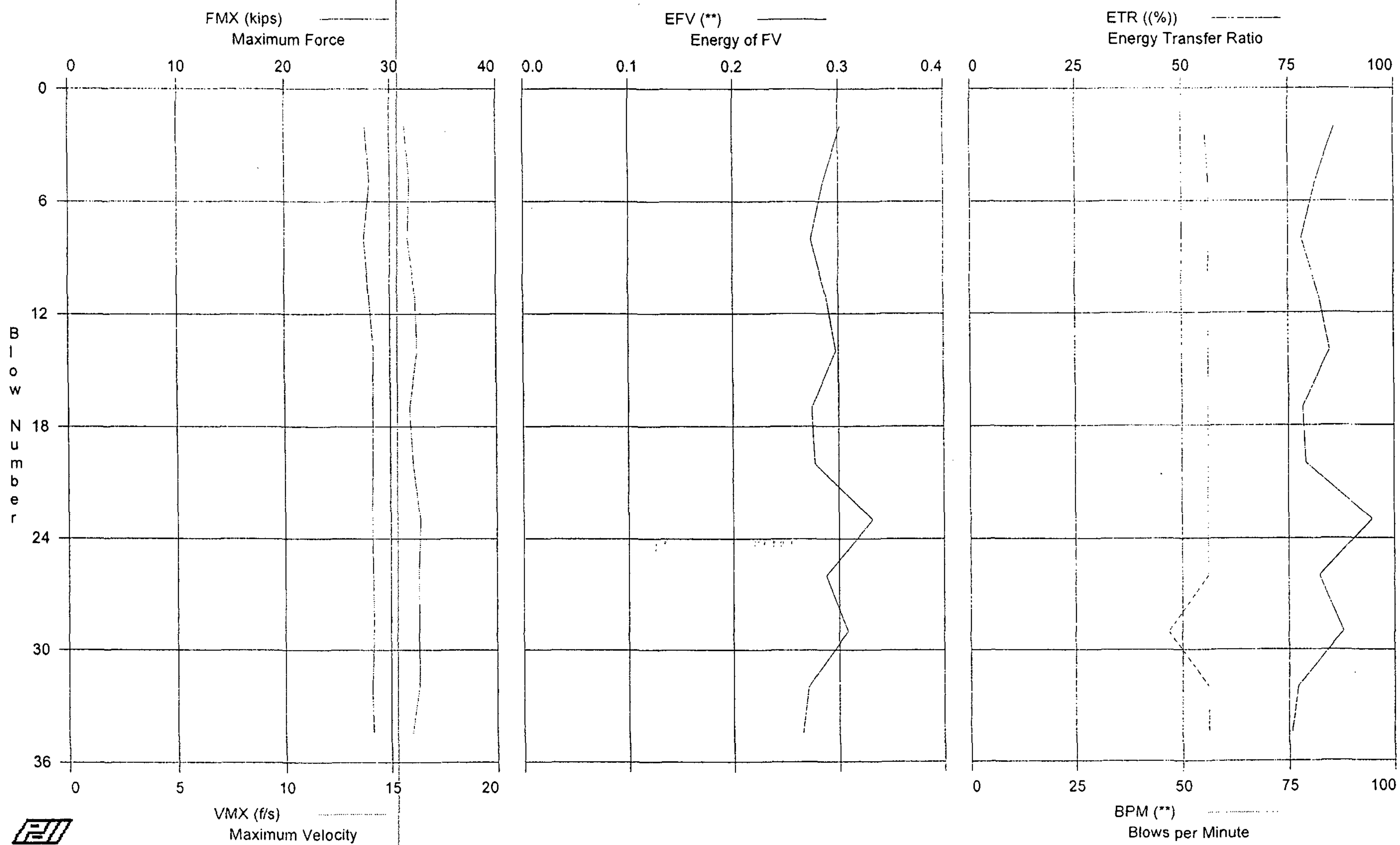
Drive 9 seconds 7:24:47 AM - 7:24:56 AM (6/22/2006) BN 1 - 10

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B409-30



GRL Engineers, Inc. Page 1 of 1
Case Method Results PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B409-30 AW rod
OP: KB Test date: 22-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 34.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL#	depth	TYPE	FMX	VMX	EFV	ETR	BPM	EMX	EF2	DFN	FVP
end	ft		kips	f/s	**	(%)	**	k-ft	k-ft	in	[]
1	0.00	AV1	27.05	15.38	0.275	78.7	**	0.275	0.298	-1.71	0.84
2	0.00	AV1	27.92	15.93	0.313	89.3	55.1	0.313	0.302	-1.25	0.75
3	0.00	AV1	28.05	15.82	0.318	90.9	56.0	0.318	0.301	-1.05	0.76
4	0.00	AV1	28.26	15.74	0.304	86.7	55.6	0.304	0.310	-2.39	0.76
5	0.00	AV1	27.90	15.84	0.264	75.4	56.8	0.264	0.301	-2.70	0.84
6	0.00	AV1	27.97	16.17	0.288	82.3	56.3	0.288	0.303	-1.77	0.76
7	0.00	AV1	27.84	15.94	0.250	71.4	55.9	0.250	0.299	-2.51	0.76
8	0.00	AV1	27.18	15.77	0.271	77.3	56.5	0.271	0.298	-2.78	0.82
9	0.00	AV1	27.52	15.79	0.300	85.7	56.5	0.300	0.296	-1.75	0.75
10	0.00	AV1	28.19	16.20	0.293	83.7	55.9	0.293	0.306	-2.17	0.76
11	0.00	AV1	28.08	15.95	0.293	83.7	55.9	0.293	0.306	-2.57	0.75
12	0.00	AV1	27.65	16.37	0.278	79.3	56.2	0.278	0.298	-3.40	0.75
13	0.00	AV1	28.42	16.48	0.303	86.4	56.2	0.303	0.309	-3.38	0.78
14	0.00	AV1	28.27	16.00	0.242	69.1	56.1	0.242	0.304	-3.19	0.75
15	0.00	AV1	28.60	16.30	0.347	99.2	56.2	0.347	0.305	-2.25	0.75
16	0.00	AV1	28.07	15.67	0.238	68.1	56.1	0.238	0.304	-3.14	0.85
17	0.00	AV1	28.48	16.07	0.339	96.9	56.0	0.339	0.308	-1.29	0.75
18	0.00	AV1	28.35	15.97	0.246	70.3	56.1	0.246	0.304	-2.85	0.76
19	0.00	AV1	28.35	16.16	0.282	80.5	56.0	0.282	0.301	-2.87	0.76
20	0.00	AV1	28.20	15.77	0.262	74.9	56.1	0.262	0.305	-2.73	0.74
21	0.00	AV1	28.41	16.23	0.288	82.2	56.1	0.288	0.305	-2.14	0.76
22	0.00	AV1	28.27	16.37	0.311	88.8	56.1	0.311	0.306	-2.10	0.77
23	0.00	AV1	27.95	16.36	0.340	97.1	56.2	0.340	0.303	-1.88	0.79
24	0.00	AV1	28.51	16.42	0.344	98.3	56.0	0.344	0.308	-1.55	0.77
25	0.00	AV1	28.24	16.16	0.298	85.3	56.1	0.298	0.303	-2.71	0.76
26	0.00	AV1	28.33	16.36	0.304	87.0	56.1	0.304	0.306	-2.17	0.76
27	0.00	AV1	28.36	16.40	0.261	74.6	56.0	0.261	0.305	-2.46	0.77
28	0.00	AV1	28.37	16.42	0.335	95.6	56.2	0.335	0.307	-2.48	0.78
29	0.00	AV1	28.35	16.21	0.293	83.8	56.1	0.293	0.305	-2.30	0.75
30	0.00	AV1	28.41	16.37	0.296	84.5	28.0	0.296	0.304	-2.28	0.75
31	0.00	AV1	28.20	16.41	0.256	73.1	56.0	0.256	0.302	-3.42	0.75
32	0.00	AV1	28.25	16.02	0.243	69.3	56.2	0.243	0.302	-3.50	0.75
33	0.00	AV1	28.12	16.52	0.312	89.0	56.1	0.312	0.303	-2.86	0.77
34	0.00	AV1	28.12	15.88	0.252	72.0	56.1	0.252	0.301	-3.74	0.75
35	0.00	AV1	28.48	16.11	0.278	79.5	56.3	0.278	0.306	-3.28	0.75
		Average	28.13	16.10	0.289	82.6	55.3	0.289	0.304	-2.47	0.77

Total number of blows analyzed: 35

Time Summary

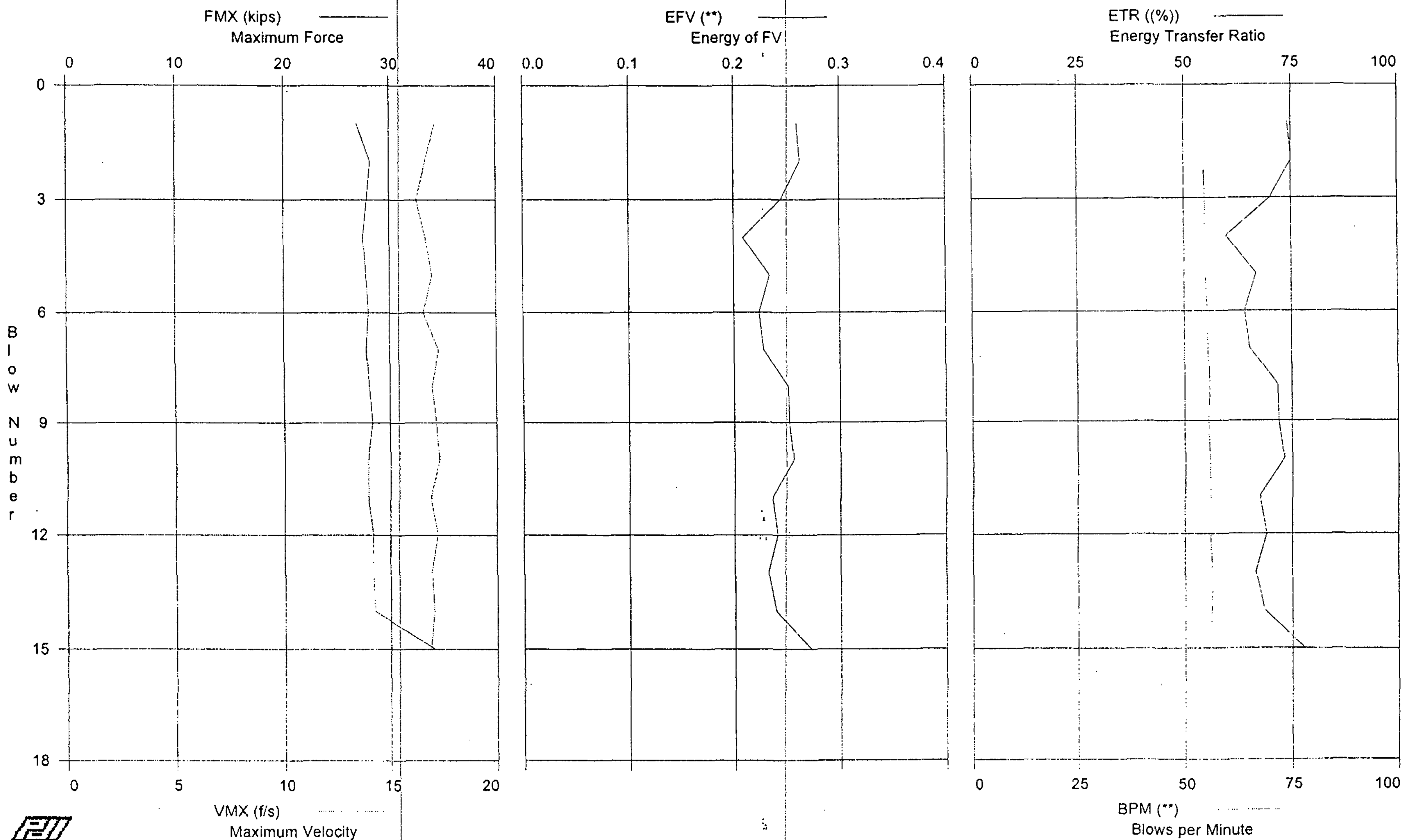
Drive 1 minute 9 seconds 8:38:28 AM - 8:39:37 AM (6/22/2006) BN 1 - 35

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 22-Jun-2006

SPT, Calvert Cliffs - B409-49



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B409-49 AW rod
OP: KB Test date: 22-Jun-2006

AR: 1.19 in^2
LE: 53.0 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL#	depth	TYPE	FMX	VMX	EFV	ETR	BPM	EMX	EF2	DFN	FVP
end	ft		kips	f/s	**	(%)	**	k-ft	k-ft	in	[]
1	0.00	AV1	26.94	17.16	0.260	74.2	**	0.260	0.312	-3.23	0.75
2	0.00	AV1	28.22	16.70	0.263	75.2	54.6	0.263	0.311	-0.31	0.74
3	0.00	AV1	27.90	16.28	0.245	70.1	54.8	0.245	0.312	-5.43	0.72
4	0.00	AV1	27.53	16.70	0.209	59.8	54.9	0.209	0.306	-9.22	0.74
5	0.00	AV1	27.79	16.99	0.234	66.7	54.9	0.234	0.310	-3.12	0.73
6	0.00	AV1	28.01	16.57	0.224	64.0	55.4	0.224	0.309	-2.33	0.73
7	0.00	AV1	27.78	17.29	0.228	65.2	55.5	0.228	0.312	-3.26	0.73
8	0.00	AV1	28.04	16.97	0.251	71.7	55.8	0.251	0.307	-5.95	0.75
9	0.00	AV1	28.33	17.15	0.252	71.9	55.5	0.252	0.305	-3.62	0.71
10	0.00	AV1	27.90	17.28	0.256	73.2	55.8	0.256	0.310	-3.00	0.75
11	0.00	AV1	27.90	16.89	0.236	67.4	55.8	0.236	0.307	-4.17	0.76
12	0.00	AV1	28.39	17.22	0.241	69.0	55.9	0.241	0.306	-4.26	0.72
13	0.00	AV1	28.33	16.92	0.232	66.4	56.3	0.232	0.311	-3.43	0.74
14	0.00	AV1	28.50	17.02	0.239	68.4	56.1	0.239	0.316	-2.59	0.74
15	0.00	AV1	34.09	16.86	0.272	77.9	56.1	0.272	0.452	-4.12	0.91
		Average	28.38	16.93	0.243	69.4	55.5	0.243	0.319	-3.87	0.75

Total number of blows analyzed: 15

Time Summary

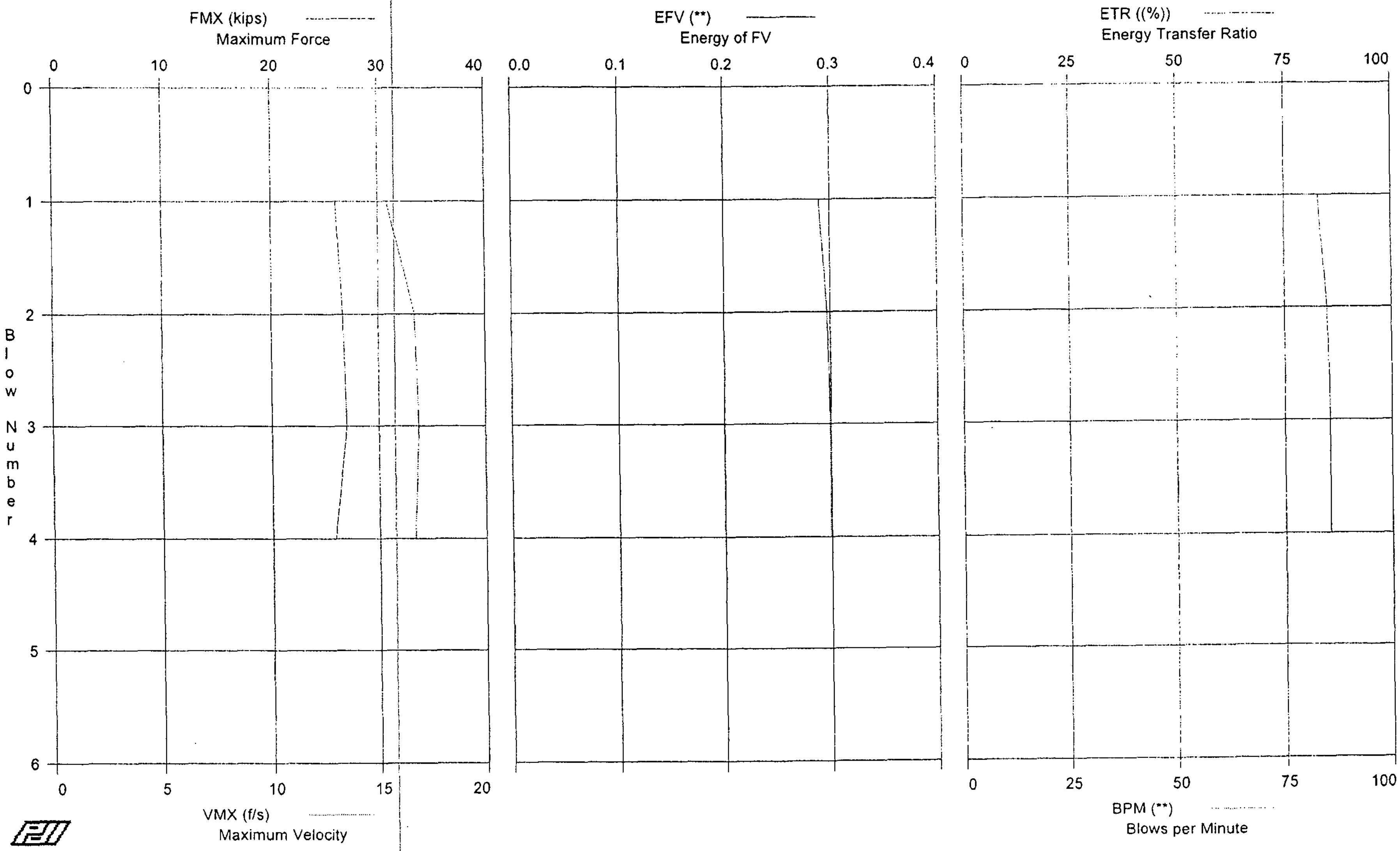
Drive 16 seconds 10:55:15 AM - 10:55:31 AM (6/22/2006) BN 1 - 15

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B409-60

Test date: 22-Jun-2006



SPT, Calvert Cliffs - B409-60 AWJ
OP: KB Test date: 22-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 65.5 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	26.05	15.41	0.290	82.9	**	0.290	0.288	2.71	0.47
2	0.00	AV1	26.68	16.71	0.297	84.9	27.3	0.297	0.288	2.83	0.38
3	0.00	AV1	26.97	16.88	0.299	85.5	**	0.299	0.291	2.08	0.38
4	0.00	AV1	25.87	16.68	0.299	85.5	28.1	0.299	0.286	1.77	0.41
		Average	26.39	16.42	0.296	84.7	27.7	0.296	0.288	2.35	0.41

Total number of blows analyzed: 4

Time Summary

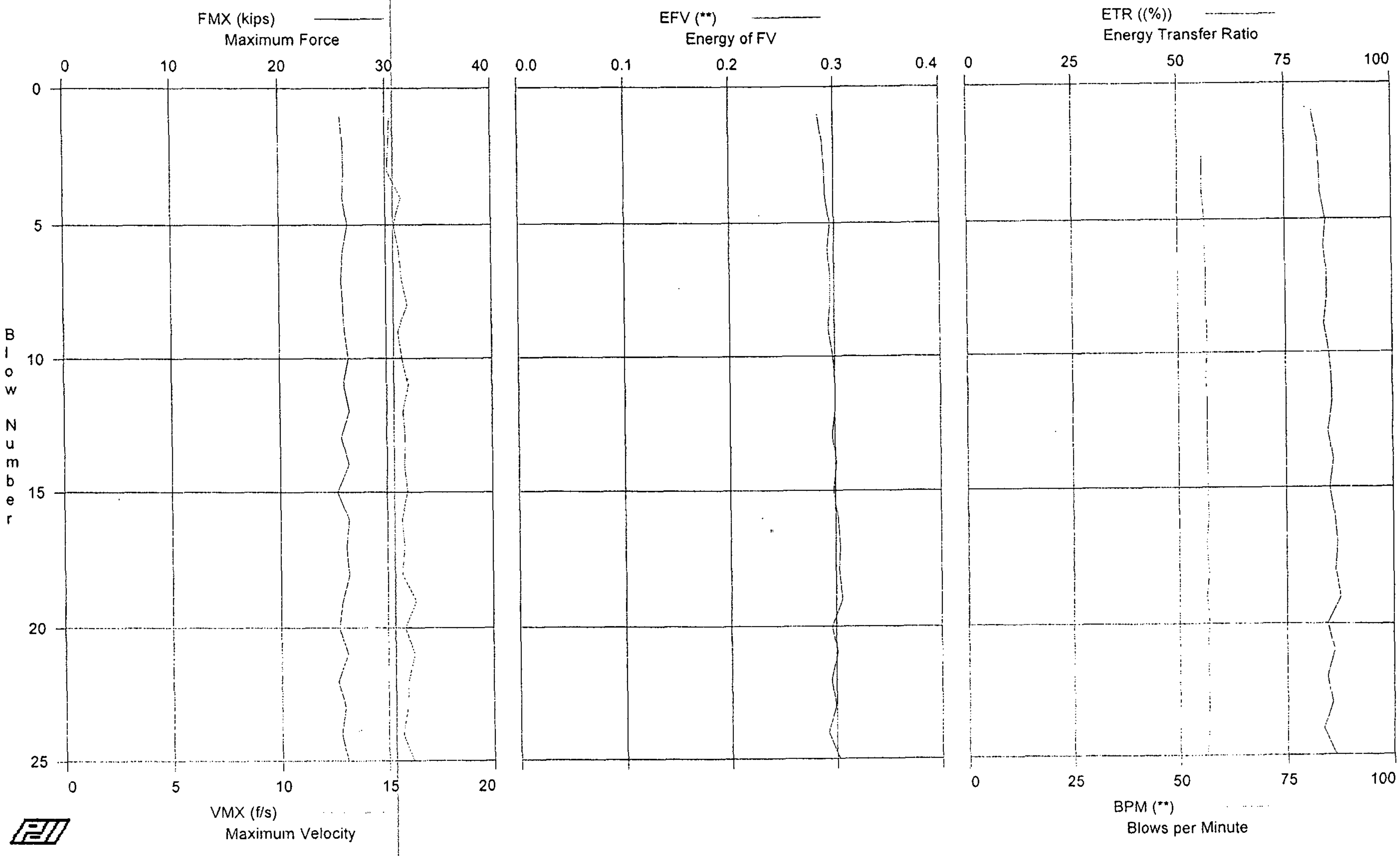
Drive 8 seconds 12:42:32 PM - 12:42:40 PM (6/22/2006) BN 1 - 4

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B409-75

Test date: 22-Jun-2006



GRL Engineers, Inc.

Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B409-75 AWJ

OP: KB Test date: 22-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3

LE: 80.5 ft EM: 30,000 ksi

WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	25.73	15.22	0.285	81.5	**	0.285	0.264	1.33	0.70
2	0.00	AV1	25.95	15.15	0.289	82.6	55.9	0.289	0.272	1.10	0.71
3	0.00	AV1	26.02	15.07	0.291	83.1	55.7	0.291	0.272	1.31	0.72
4	0.00	AV1	25.93	15.73	0.292	83.3	55.7	0.292	0.271	1.14	0.65
5	0.00	AV1	26.34	15.36	0.296	84.5	56.3	0.296	0.279	0.97	0.72
6	0.00	AV1	25.90	15.62	0.294	84.0	56.3	0.294	0.275	0.92	0.64
7	0.00	AV1	25.72	15.71	0.296	84.7	56.5	0.296	0.278	0.93	0.62
8	0.00	AV1	25.91	16.00	0.296	84.7	56.4	0.296	0.272	0.85	0.64
9	0.00	AV1	26.00	15.52	0.294	84.0	56.7	0.294	0.274	0.85	0.65
10	0.00	AV1	26.36	15.72	0.298	85.1	56.8	0.298	0.276	0.91	0.68
11	0.00	AV1	25.91	16.01	0.300	85.7	56.3	0.300	0.274	0.82	0.65
12	0.00	AV1	26.41	15.75	0.300	85.6	56.7	0.300	0.279	0.86	0.69
13	0.00	AV1	25.66	15.86	0.297	84.9	56.7	0.297	0.276	0.62	0.62
14	0.00	AV1	26.34	15.80	0.301	86.0	56.6	0.301	0.278	0.69	0.70
15	0.00	AV1	25.28	15.95	0.298	85.2	56.8	0.298	0.271	1.02	0.60
16	0.00	AV1	26.31	15.67	0.302	86.2	56.9	0.302	0.276	0.89	0.70
17	0.00	AV1	26.08	15.79	0.304	86.9	56.3	0.304	0.273	0.83	0.69
18	0.00	AV1	26.31	15.66	0.303	86.4	56.9	0.303	0.275	0.66	0.68
19	0.00	AV1	25.68	16.31	0.306	87.5	56.3	0.306	0.277	0.43	0.62
20	0.00	AV1	25.37	15.81	0.296	84.5	57.0	0.296	0.273	0.34	0.61
21	0.00	AV1	26.14	16.22	0.301	86.1	56.4	0.301	0.277	0.49	0.64
22	0.00	AV1	25.23	15.94	0.295	84.4	56.7	0.295	0.271	0.38	0.61
23	0.00	AV1	25.87	15.88	0.299	85.5	56.7	0.299	0.274	0.33	0.71
24	0.00	AV1	25.53	15.68	0.292	83.5	56.8	0.292	0.267	0.51	0.64
25	0.00	AV1	26.06	16.14	0.302	86.4	56.2	0.302	0.274	0.63	0.69
		Average	25.92	15.74	0.297	84.9	56.5	0.297	0.274	0.79	0.66

Total number of blows analyzed: 25

Time Summary

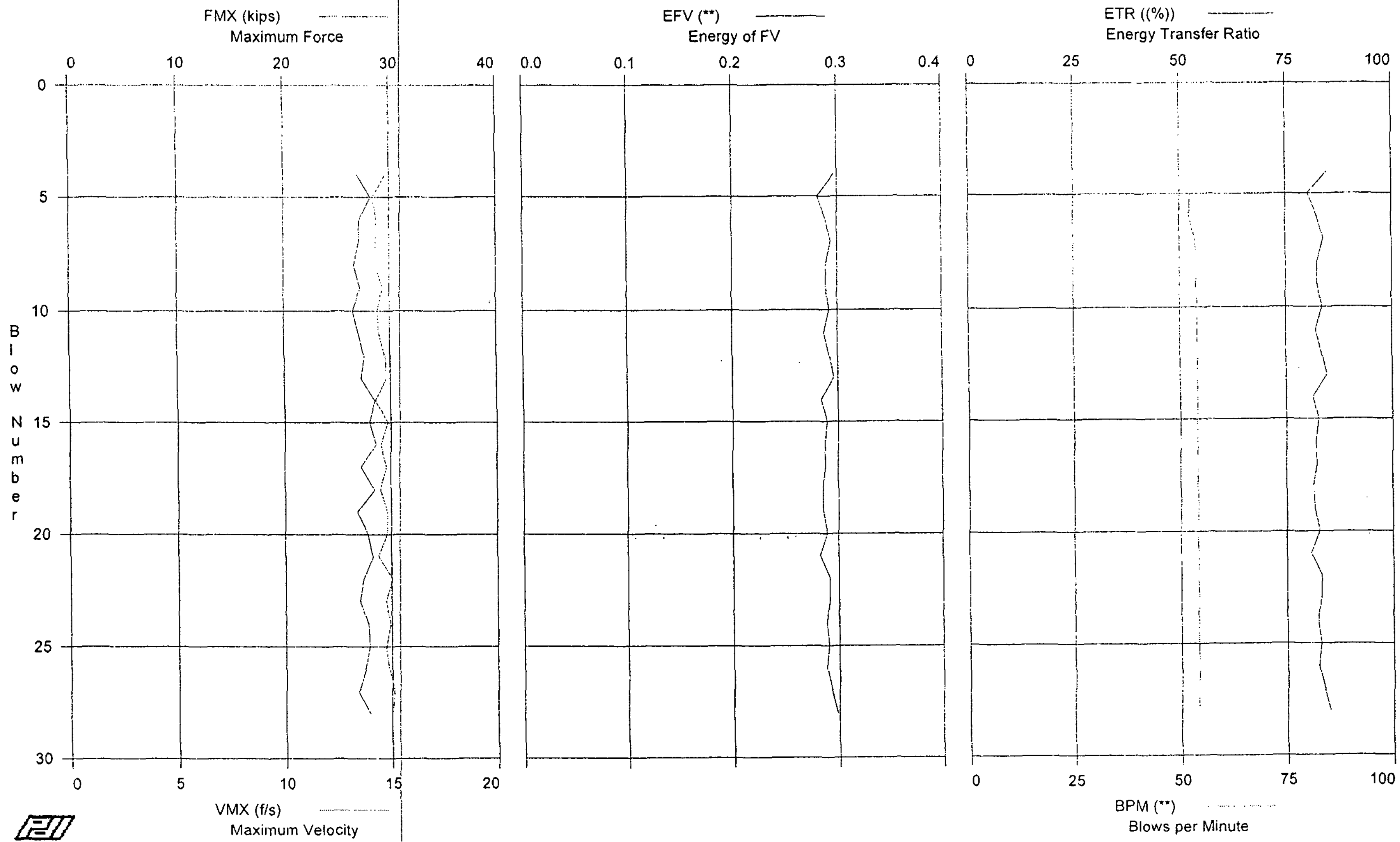
Drive 25 seconds 2:43:57 PM - 2:44:22 PM (6/22/2006) BN 1 - 25

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 23-Jun-2006

SPT, Calvert Cliffs - B409-90



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B409-90 AWJ
OP: KB Test date: 23-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 95.5 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
4	0.00	AV1	26.95	14.82	0.297	84.9	**	0.297	0.311	2.05	0.57
5	0.00	AV1	28.20	14.21	0.281	80.2	52.4	0.281	0.311	1.35	0.66
6	0.00	AV1	27.17	14.40	0.289	82.5	52.4	0.289	0.309	0.85	0.58
7	0.00	AV1	27.08	14.34	0.294	84.0	53.6	0.294	0.312	0.89	0.72
8	0.00	AV1	26.60	14.32	0.289	82.5	54.1	0.289	0.310	0.75	0.60
9	0.00	AV1	27.21	14.66	0.289	82.5	53.8	0.289	0.310	0.72	0.66
10	0.00	AV1	26.50	14.41	0.292	83.6	54.2	0.292	0.312	0.70	0.61
11	0.00	AV1	27.05	14.49	0.287	82.0	54.1	0.287	0.306	0.79	0.69
12	0.00	AV1	27.54	14.76	0.292	83.4	54.2	0.292	0.312	0.59	0.67
13	0.00	AV1	27.22	14.81	0.296	84.6	53.9	0.296	0.312	0.90	0.70
14	0.00	AV1	28.52	14.28	0.284	81.3	54.2	0.284	0.313	0.71	0.68
15	0.00	AV1	27.95	14.84	0.289	82.5	54.0	0.289	0.313	0.80	0.69
16	0.00	AV1	28.57	14.51	0.287	81.9	54.0	0.287	0.317	0.90	0.73
17	0.00	AV1	27.16	14.80	0.288	82.2	54.3	0.288	0.310	0.90	0.66
18	0.00	AV1	28.42	14.47	0.285	81.3	54.0	0.285	0.316	0.97	0.68
19	0.00	AV1	26.74	14.81	0.285	81.5	54.2	0.285	0.304	0.95	0.64
20	0.00	AV1	27.79	14.81	0.289	82.7	54.0	0.289	0.313	0.88	0.65
21	0.00	AV1	28.24	14.38	0.282	80.7	54.2	0.282	0.314	0.79	0.72
22	0.00	AV1	27.31	15.03	0.291	83.2	53.9	0.291	0.310	0.83	0.67
23	0.00	AV1	26.99	14.72	0.291	83.0	54.2	0.291	0.312	0.94	0.69
24	0.00	AV1	27.77	14.94	0.288	82.2	54.1	0.288	0.310	0.86	0.65
25	0.00	AV1	27.90	14.72	0.290	82.9	54.1	0.290	0.314	1.05	0.74
26	0.00	AV1	27.46	14.85	0.288	82.4	54.2	0.288	0.311	0.85	0.65
27	0.00	AV1	26.82	15.10	0.293	83.7	54.0	0.293	0.311	0.80	0.69
28	0.00	AV1	27.98	15.02	0.298	85.1	54.2	0.298	0.312	0.96	0.71
		Average	27.48	14.66	0.289	82.7	53.9	0.289	0.311	0.91	0.67

Total number of blows analyzed: 25

Time Summary

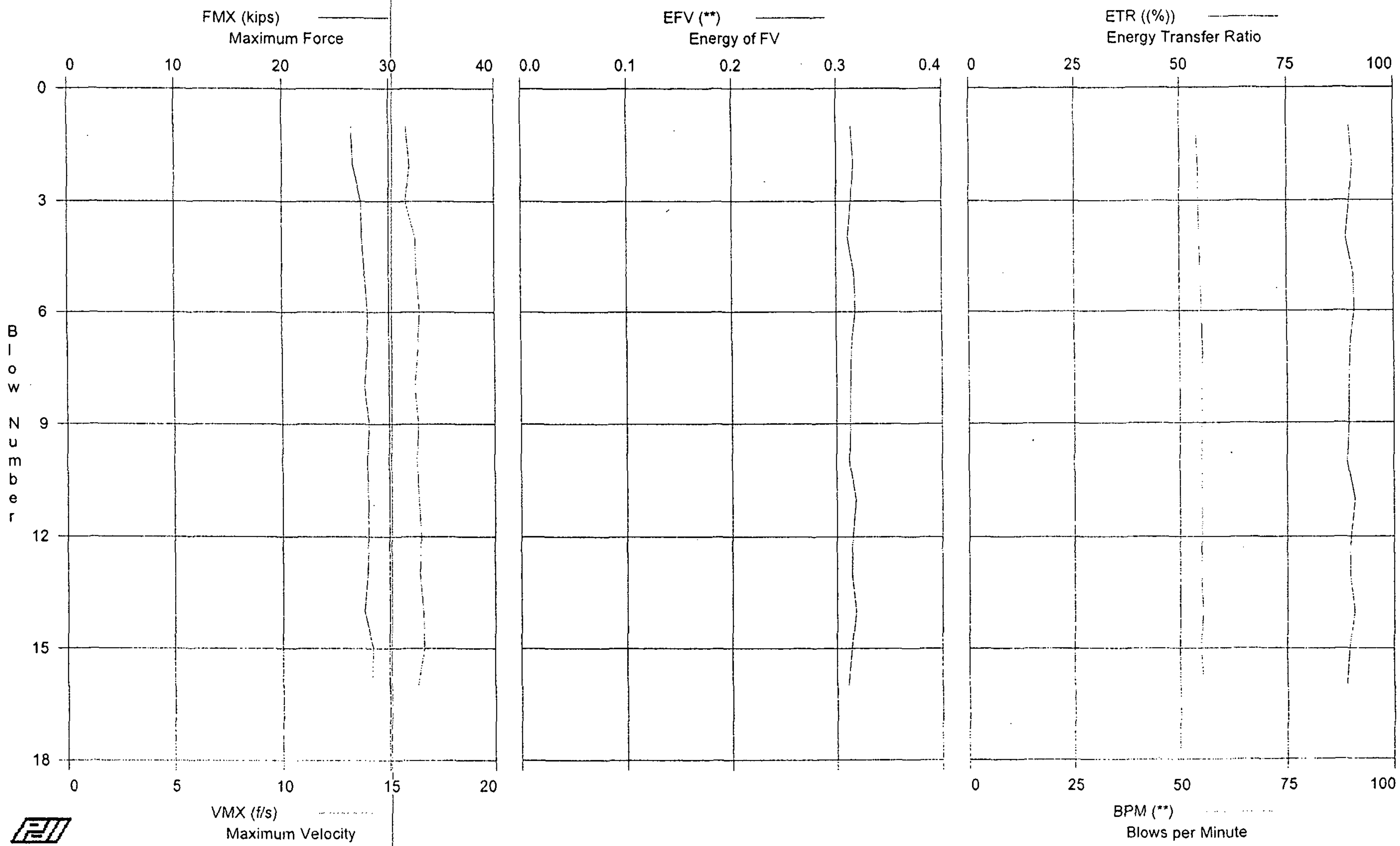
Drive 27 seconds 8:25:11 AM - 8:25:38 AM (6/23/2006) BN 4 - 28

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 23-Jun-2006

SPT, Calvert Cliffs - B409-105



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B409-105

AWJ

OP: KB

Test date: 23-Jun-2006

AR: 1.19 in^2
LE: 110.5 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute

EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	26.44	15.80	0.314	89.6	54.0	0.314	0.285	2.10	0.64
2	0.00	AV1	26.58	15.97	0.316	90.4	54.3	0.316	0.282	2.14	0.65
3	0.00	AV1	27.38	15.79	0.314	89.7	54.5	0.314	0.287	2.10	0.64
4	0.00	AV1	27.46	16.23	0.311	88.9	54.6	0.311	0.284	1.67	0.60
5	0.00	AV1	27.72	16.30	0.317	90.7	54.9	0.317	0.291	1.59	0.62
6	0.00	AV1	28.01	16.44	0.318	90.9	55.1	0.318	0.290	1.44	0.59
7	0.00	AV1	27.93	16.34	0.314	89.8	55.2	0.314	0.289	1.31	0.58
8	0.00	AV1	27.68	16.20	0.313	89.5	55.0	0.313	0.290	1.17	0.64
9	0.00	AV1	28.07	16.35	0.313	89.5	55.1	0.313	0.292	1.09	0.60
10	0.00	AV1	27.93	16.30	0.312	89.1	55.1	0.312	0.291	0.96	0.58
11	0.00	AV1	27.97	16.37	0.318	90.8	55.1	0.318	0.292	1.04	0.60
12	0.00	AV1	27.99	16.48	0.315	89.9	55.1	0.315	0.290	0.78	0.59
13	0.00	AV1	27.91	16.41	0.314	89.7	54.9	0.314	0.292	0.70	0.64
14	0.00	AV1	27.59	16.56	0.318	90.7	55.4	0.318	0.294	0.72	0.67
15	0.00	AV1	28.42	16.63	0.314	89.7	54.9	0.314	0.292	0.71	0.58
16	0.00	AV1	28.34	16.33	0.311	89.0	55.5	0.311	0.291	0.93	0.58
		Average	27.71	16.28	0.315	89.9	54.9	0.315	0.289	1.28	0.61

Total number of blows analyzed: 16

Time Summary

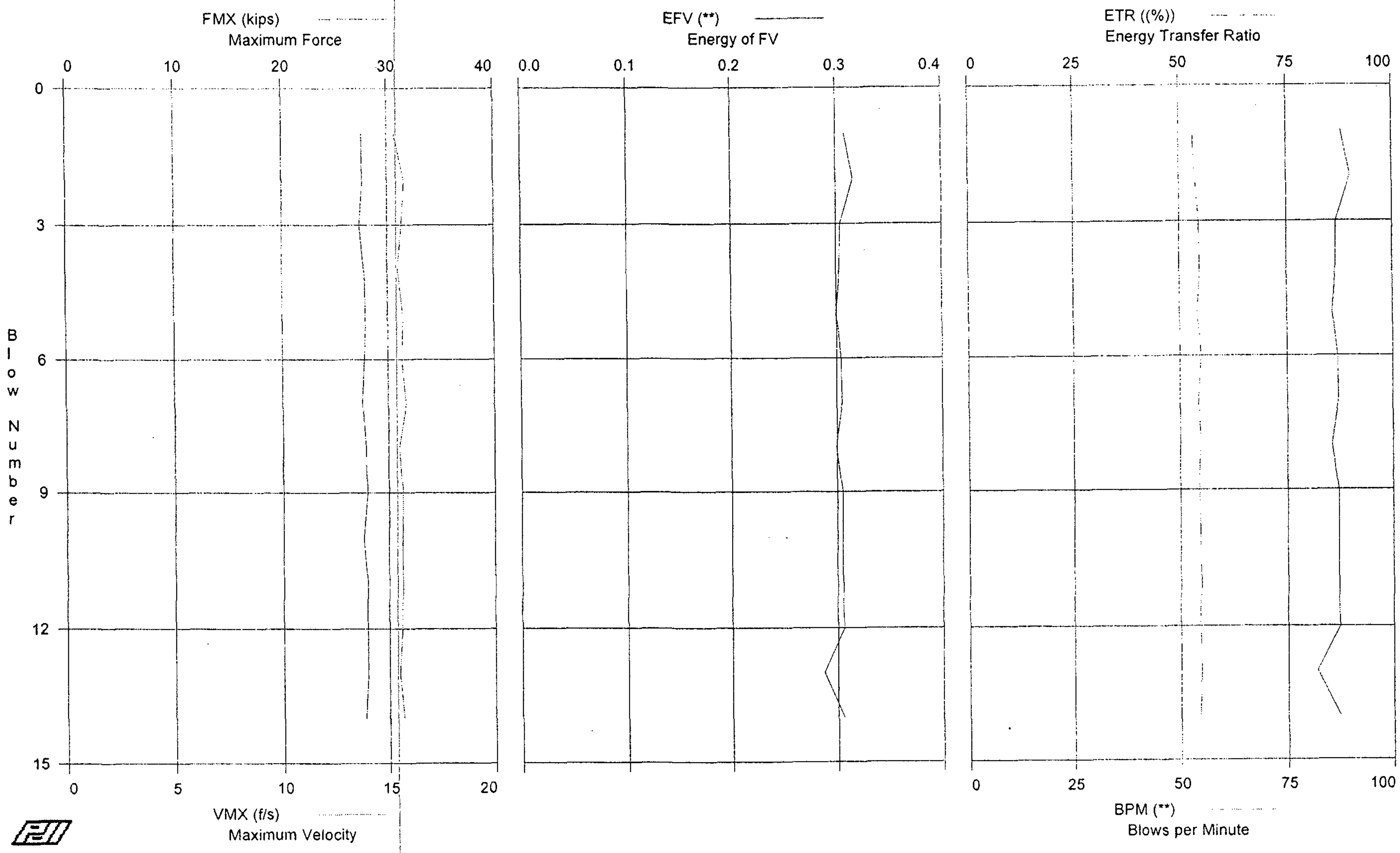
Drive 16 seconds 10:17:01 AM - 10:17:17 AM (6/23/2006) BN 1 - 16

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 26-Jun-2006

SPT, Calvert Cliffs - B409-120



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B409-120 AWJ
OP: KB Test date: 26-Jun-2006

AR: 1.19 in^2
LE: 124.0 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute

EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	27.59	15.32	0.308	88.0	53.2	0.308	0.287	0.79	0.52
2	0.00	AV1	27.65	15.78	0.316	90.2	53.6	0.316	0.295	0.80	0.53
3	0.00	AV1	27.34	15.66	0.304	86.7	54.5	0.304	0.289	0.87	0.54
4	0.00	AV1	27.78	15.48	0.303	86.6	54.7	0.303	0.291	0.88	0.52
5	0.00	AV1	27.92	15.70	0.300	85.8	54.1	0.300	0.290	0.83	0.64
6	0.00	AV1	27.73	15.63	0.304	87.0	54.9	0.304	0.294	0.87	0.53
7	0.00	AV1	27.56	15.84	0.305	87.2	54.3	0.305	0.295	0.94	0.54
8	0.00	AV1	27.84	15.49	0.299	85.6	54.7	0.299	0.287	1.16	0.62
9	0.00	AV1	27.95	15.65	0.305	87.1	54.3	0.305	0.290	0.96	0.66
10	0.00	AV1	27.60	15.62	0.305	87.1	54.6	0.305	0.292	1.11	0.55
11	0.00	AV1	27.95	15.64	0.305	87.0	54.7	0.305	0.290	1.11	0.66
12	0.00	AV1	27.93	15.59	0.306	87.3	54.5	0.306	0.292	1.04	0.65
13	0.00	AV1	27.95	15.47	0.287	81.9	54.7	0.287	0.289	0.88	0.59
14	0.00	AV1	27.75	15.67	0.306	87.3	54.4	0.306	0.290	1.22	0.54
		Average	27.75	15.61	0.304	86.8	54.4	0.304	0.291	0.96	0.58

Total number of blows analyzed: 14

Time Summary

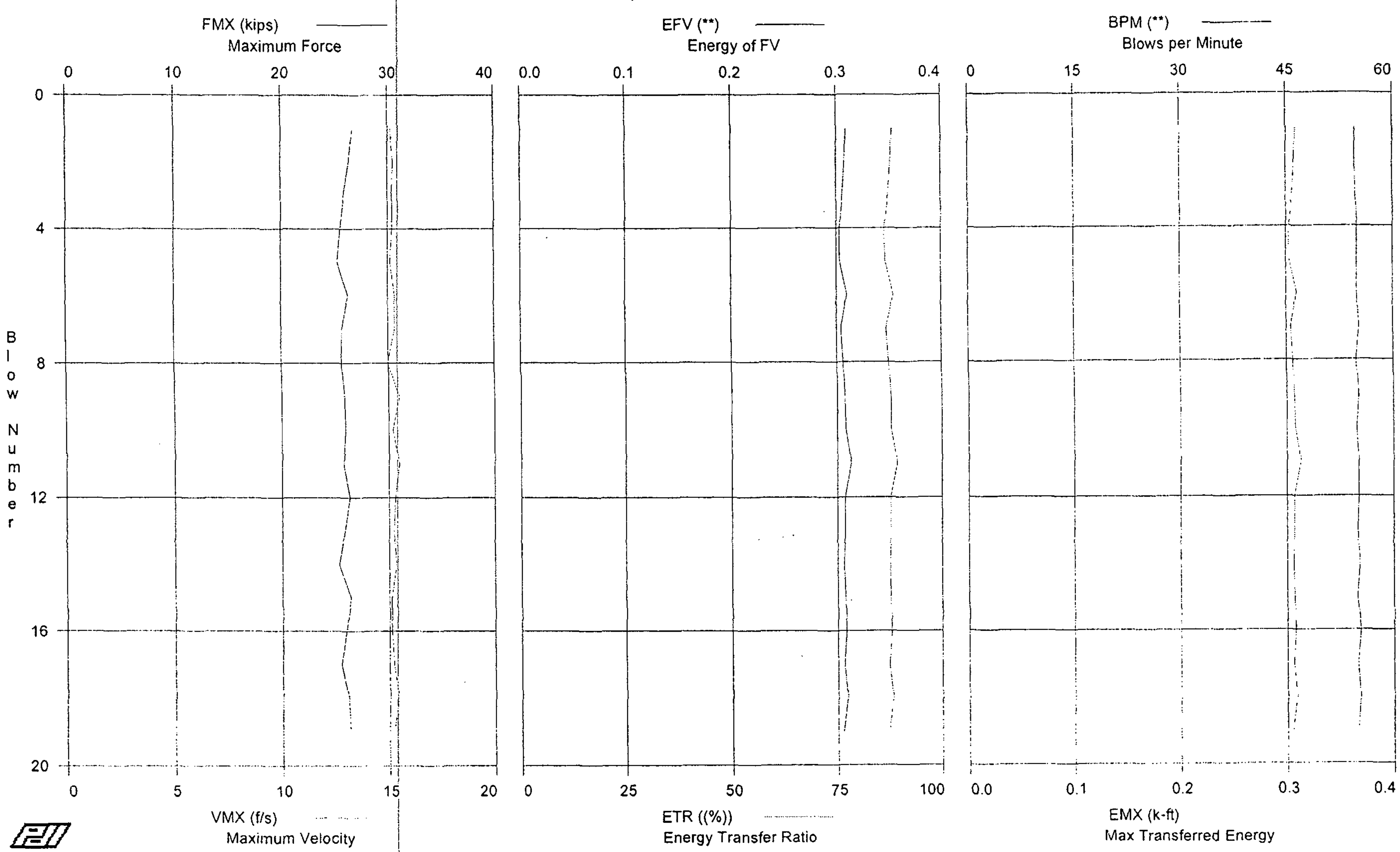
Drive 15 seconds 12:27:42 PM - 12:27:57 PM (6/26/2006) BN 1 - 14

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B409-135

Test date: 27-Jun-2006



SPT, Calvert Cliffs - B409-135 AWJ
OP: KB Test date: 27-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 140.5 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL#	depth	TYPE	FMX	VMX	EFV	ETR	BPM	EMX	EF2	DFN	FVP
end	ft		kips	f/s	**	(%)	**	k-ft	k-ft	in	[]
1	0.00	AV1	26.71	15.12	0.309	88.3	54.7	0.309	0.301	1.31	0.62
2	0.00	AV1	26.40	15.25	0.308	88.0	54.7	0.308	0.297	1.25	0.62
3	0.00	AV1	25.89	15.18	0.306	87.4	54.8	0.306	0.293	1.25	0.59
4	0.00	AV1	25.59	15.21	0.303	86.5	55.0	0.303	0.289	1.37	0.59
5	0.00	AV1	25.32	15.10	0.303	86.7	54.9	0.303	0.290	1.22	0.58
6	0.00	AV1	26.28	15.31	0.310	88.6	54.9	0.310	0.293	1.22	0.63
7	0.00	AV1	25.71	15.30	0.304	86.8	55.2	0.304	0.286	0.97	0.60
8	0.00	AV1	25.62	14.97	0.306	87.4	54.7	0.306	0.293	1.18	0.59
9	0.00	AV1	25.88	15.50	0.307	87.8	55.1	0.307	0.292	1.12	0.61
10	0.00	AV1	25.97	15.18	0.308	87.9	54.8	0.308	0.292	0.81	0.60
11	0.00	AV1	25.79	15.49	0.313	89.3	55.1	0.313	0.292	1.10	0.59
12	0.00	AV1	26.31	15.29	0.307	87.7	55.1	0.307	0.293	0.51	0.60
13	0.00	AV1	25.87	15.22	0.307	87.7	54.9	0.307	0.289	1.03	0.60
14	0.00	AV1	25.33	15.33	0.306	87.6	55.2	0.306	0.286	0.94	0.59
15	0.00	AV1	26.38	15.10	0.307	87.6	54.8	0.307	0.298	0.65	0.60
16	0.00	AV1	25.97	15.11	0.308	87.9	55.3	0.308	0.293	0.87	0.60
17	0.00	AV1	25.51	15.19	0.306	87.3	54.9	0.306	0.289	0.77	0.59
18	0.00	AV1	26.17	15.43	0.309	88.2	55.2	0.309	0.291	0.80	0.62
19	0.00	AV1	26.31	15.20	0.305	87.2	54.9	0.305	0.290	1.00	0.60
		Average	25.95	15.24	0.307	87.7	55.0	0.307	0.292	1.02	0.60

Total number of blows analyzed: 19

Time Summary

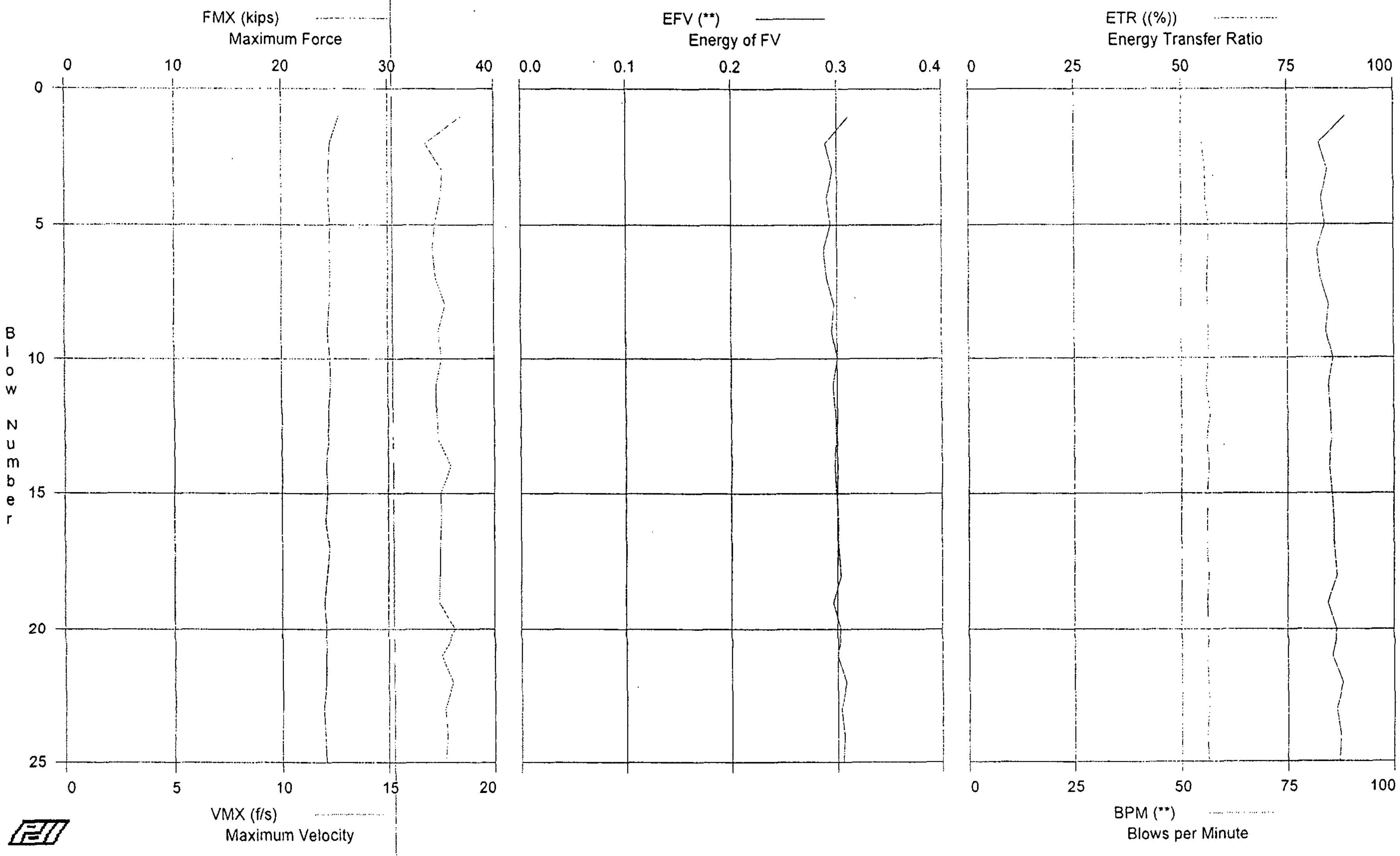
Drive 19 seconds 8:02:44 AM - 8:03:03 AM (6/27/2006) BN 1 - 19

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

SPT, Calvert Cliffs - B409-150

Test date: 27-Jun-2006



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

SPT, Calvert Cliffs - B409-150 AWJ

OP: KB Test date: 27-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 154.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL#	depth	TYPE	FMX	VMX	EFV	ETR	BPM	EMX	EF2	DFN	FVP
end	ft		kips	f/s	**	(%)	**	k-ft	k-ft	in	[]
1	0.00	AV1	25.46	18.48	0.311	88.9	**	0.311	0.287	0.78	0.42
2	0.00	AV1	24.62	16.78	0.289	82.6	55.0	0.289	0.276	0.43	0.44
3	0.00	AV1	24.50	17.59	0.296	84.6	55.8	0.296	0.266	0.71	0.37
4	0.00	AV1	24.44	17.46	0.290	83.0	55.6	0.290	0.263	0.68	0.37
5	0.00	AV1	24.63	17.22	0.294	83.9	56.5	0.294	0.264	0.76	0.36
6	0.00	AV1	24.53	17.11	0.287	82.0	56.3	0.287	0.262	0.82	0.37
7	0.00	AV1	24.63	17.25	0.290	82.8	56.1	0.290	0.263	0.81	0.36
8	0.00	AV1	24.55	17.70	0.297	84.8	56.2	0.297	0.266	0.98	0.41
9	0.00	AV1	24.38	17.38	0.295	84.2	56.5	0.295	0.265	0.80	0.37
10	0.00	AV1	24.59	17.51	0.300	85.8	56.3	0.300	0.268	0.85	0.36
11	0.00	AV1	24.65	17.27	0.296	84.7	55.8	0.296	0.267	0.71	0.43
12	0.00	AV1	24.44	17.29	0.298	85.1	56.8	0.298	0.266	0.71	0.44
13	0.00	AV1	24.44	17.35	0.299	85.4	56.0	0.299	0.267	0.71	0.37
14	0.00	AV1	24.19	17.93	0.297	84.8	56.4	0.297	0.266	0.67	0.40
15	0.00	AV1	24.35	17.46	0.299	85.6	56.1	0.299	0.268	0.67	0.43
16	0.00	AV1	24.14	17.50	0.301	86.0	56.2	0.301	0.265	0.74	0.37
17	0.00	AV1	24.48	17.43	0.301	86.0	56.0	0.301	0.271	0.66	0.37
18	0.00	AV1	24.26	17.42	0.303	86.7	56.4	0.303	0.268	0.68	0.43
19	0.00	AV1	24.02	17.40	0.296	84.6	56.1	0.296	0.268	0.67	0.37
20	0.00	AV1	24.23	18.14	0.303	86.7	56.3	0.303	0.269	0.75	0.39
21	0.00	AV1	24.14	17.49	0.300	85.6	56.0	0.300	0.264	0.76	0.38
22	0.00	AV1	24.17	18.02	0.308	88.0	56.3	0.308	0.271	0.83	0.41
23	0.00	AV1	23.89	17.63	0.303	86.5	56.4	0.303	0.268	0.85	0.40
24	0.00	AV1	24.04	17.75	0.306	87.5	56.0	0.306	0.267	0.86	0.38
25	0.00	AV1	24.18	17.67	0.305	87.2	56.4	0.305	0.268	0.91	0.44
		Average	24.40	17.53	0.299	85.3	56.2	0.299	0.268	0.75	0.39

Total number of blows analyzed: 25

Time Summary

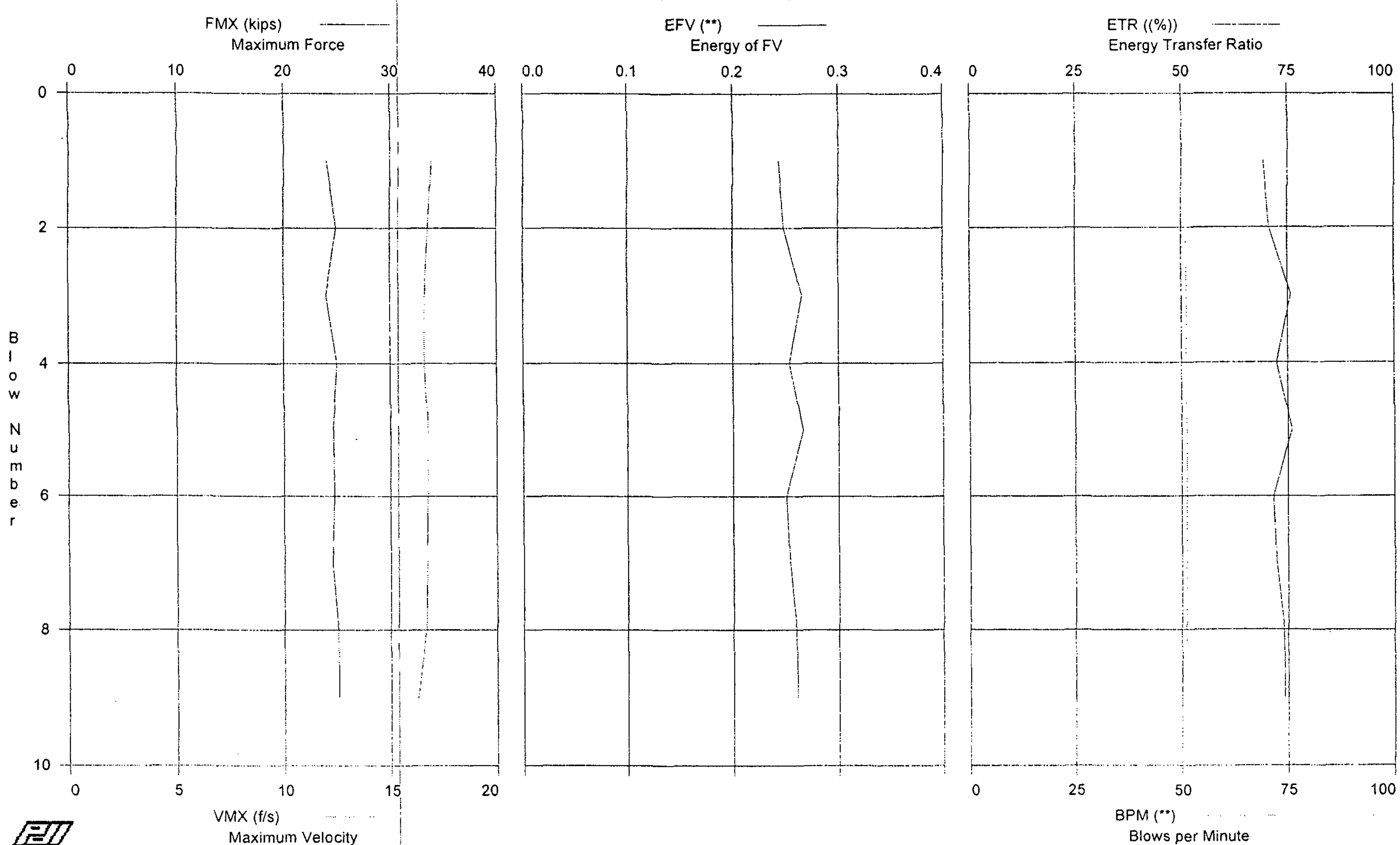
Drive 26 seconds 10:29:48 AM - 10:30:14 AM (6/27/2006) BN 1 - 25

PDIPLOT Ver. 2005.2 - *Printed: 18-Jul-2006*

GRL Engineers, Inc. - Case Method Results

Test date: 20-Jun-2006

Calvert Cliffs - B-744-15



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

Calvert Cliffs - B-744-15 SPT
OP: SDW Test date: 20-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 19.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.70

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	24.05	16.92	0.243	69.3	**	0.243	0.223	1.89	0.88
2	0.00	AV1	24.92	16.76	0.248	70.7	51.1	0.248	0.228	0.75	0.85
3	0.00	AV1	24.01	16.60	0.265	75.8	51.2	0.265	0.226	2.13	0.89
4	0.00	AV1	24.97	16.57	0.253	72.4	51.1	0.253	0.226	2.03	0.89
5	0.00	AV1	24.61	16.74	0.266	75.9	51.2	0.266	0.227	2.29	0.82
6	0.00	AV1	24.70	16.73	0.250	71.5	51.2	0.250	0.223	1.98	0.83
7	0.00	AV1	24.51	16.68	0.253	72.2	51.1	0.253	0.228	1.67	0.86
8	0.00	AV1	25.02	16.65	0.259	74.0	51.1	0.259	0.227	1.66	0.82
9	0.00	AV1	25.08	16.24	0.260	74.2	51.2	0.260	0.226	2.15	0.82
		Average	24.65	16.65	0.255	72.9	51.1	0.255	0.226	1.84	0.85

Total number of blows analyzed: 9

Time Summary

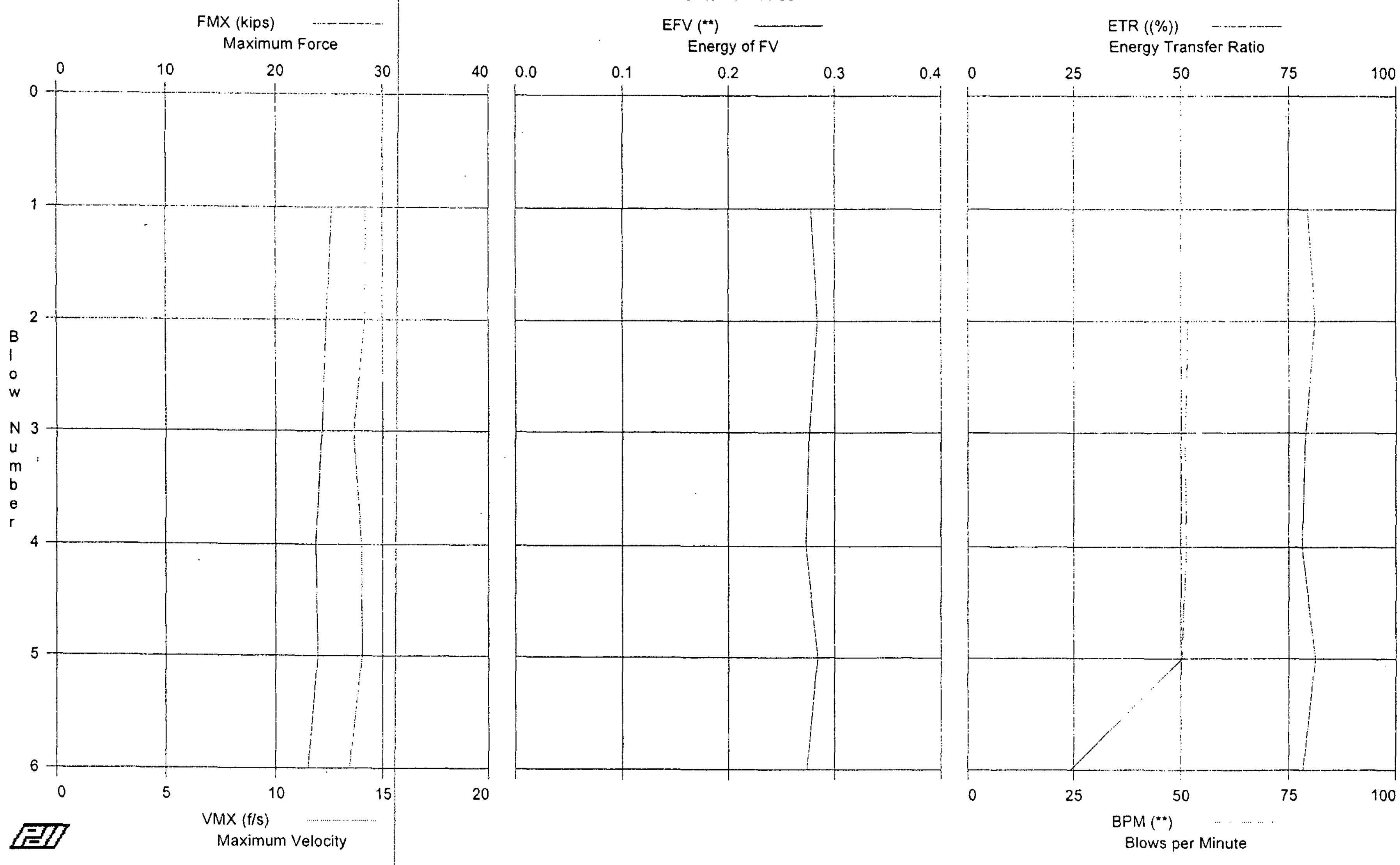
Drive 10 seconds 12:53:23 PM - 12:53:33 PM (6/20/2006) BN 1 - 9

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Calvert Cliffs - B-744-30

Test date: 20-Jun-2006



Calvert Cliffs - B-744-30 SPT
OP: SDW Test date: 20-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 34.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.70

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	25.25	14.20	0.278	79.4	**	0.278	0.263	2.07	0.84
2	0.00	AV1	24.73	14.16	0.284	81.2	51.7	0.284	0.263	3.18	0.81
3	0.00	AV1	24.29	13.61	0.276	78.8	50.9	0.276	0.261	2.22	0.78
4	0.00	AV1	23.73	14.00	0.273	78.1	51.2	0.273	0.259	1.90	0.80
5	0.00	AV1	23.92	14.02	0.284	81.2	50.2	0.284	0.268	1.94	0.76
6	0.00	AV1	23.02	13.41	0.274	78.3	24.3	0.274	0.261	1.88	0.77
		Average	24.16	13.90	0.278	79.5	45.7	0.278	0.263	2.20	0.79

Total number of blows analyzed: 6

Time Summary

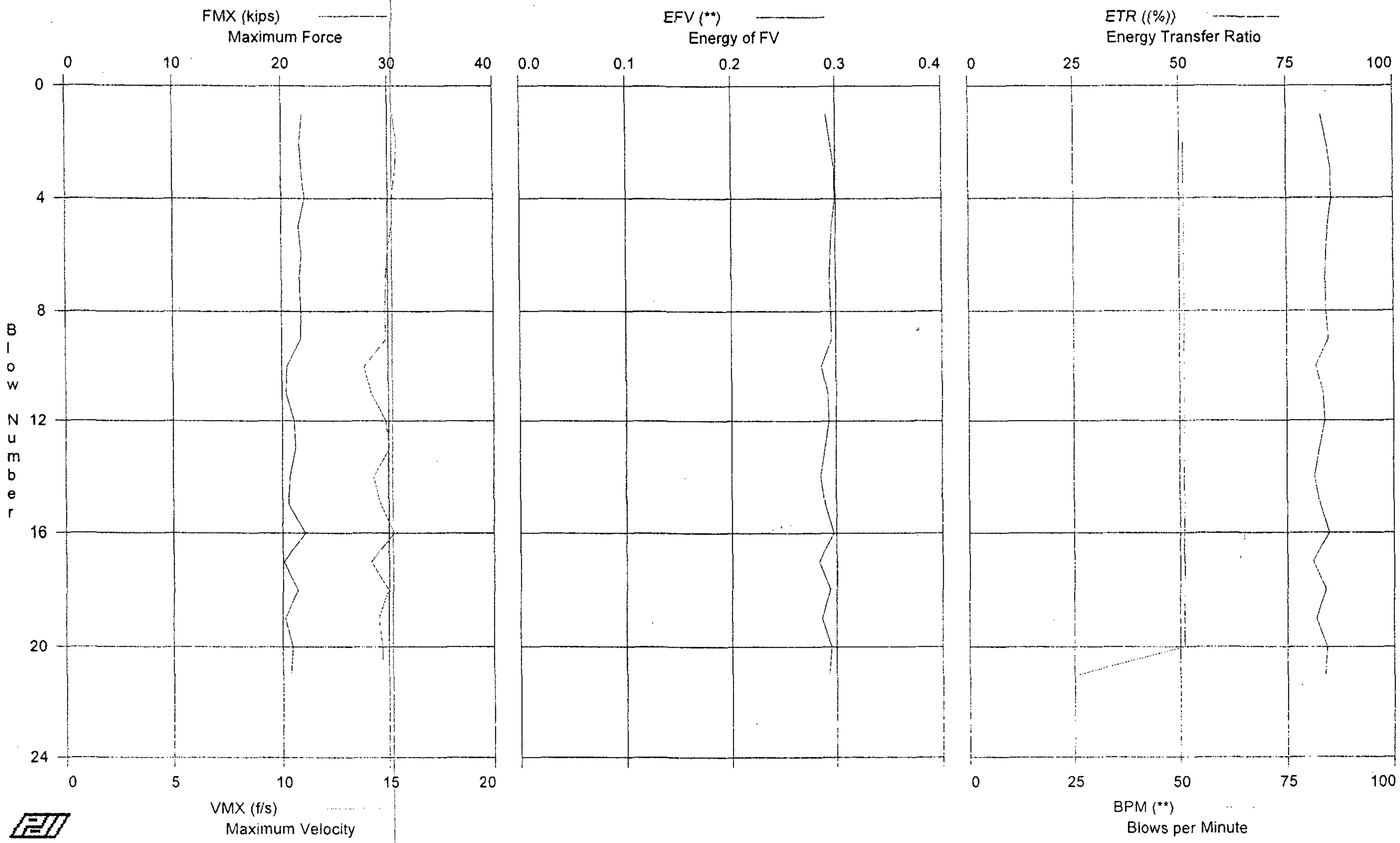
Drive 7 seconds 2:04:06 PM - 2:04:13 PM (6/20/2006) BN 1 - 6

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 20-Jun-2006

Calvert Cliffs - B-744-45



Case Method Results PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

Calvert Cliffs - B-744-45 SPT
OP: SDW Test date: 20-Jun-2006

AR: 1.19 in^2 SP: 0.492 k/ft3
LE: 49.0 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.70

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	21.99	15.25	0.291	83.0	**	0.291	0.253	1.30	0.59
2	0.00	AV1	21.71	15.43	0.295	84.3	50.9	0.295	0.256	1.07	0.58
3	0.00	AV1	21.91	15.38	0.299	85.4	50.9	0.299	0.258	1.22	0.58
4	0.00	AV1	22.17	15.19	0.299	85.5	51.1	0.299	0.257	1.20	0.67
5	0.00	AV1	21.60	15.17	0.296	84.6	51.1	0.296	0.255	0.99	0.59
6	0.00	AV1	21.88	14.95	0.295	84.3	51.0	0.295	0.257	0.82	0.67
7	0.00	AV1	21.67	14.89	0.294	84.0	51.1	0.294	0.253	0.89	0.65
8	0.00	AV1	21.81	14.83	0.295	84.2	51.1	0.295	0.252	0.86	0.61
9	0.00	AV1	21.76	14.89	0.296	84.7	51.0	0.296	0.243	0.88	0.60
10	0.00	AV1	20.49	13.85	0.286	81.8	51.1	0.286	0.239	0.74	0.70
11	0.00	AV1	20.36	14.18	0.292	83.4	51.1	0.292	0.238	0.70	0.61
12	0.00	AV1	21.09	14.85	0.293	83.8	51.0	0.293	0.247	0.43	0.58
13	0.00	AV1	21.23	15.02	0.289	82.6	51.2	0.289	0.251	0.41	0.65
14	0.00	AV1	20.72	14.29	0.285	81.4	51.0	0.285	0.244	0.78	0.68
15	0.00	AV1	20.55	14.60	0.289	82.6	51.1	0.289	0.247	0.67	0.66
16	0.00	AV1	22.11	15.25	0.297	84.7	50.9	0.297	0.249	0.95	0.63
17	0.00	AV1	20.08	14.13	0.283	81.0	51.0	0.283	0.240	0.60	0.67
18	0.00	AV1	21.38	14.95	0.294	84.0	51.1	0.294	0.247	0.78	0.59
19	0.00	AV1	20.24	14.50	0.286	81.7	50.9	0.286	0.240	0.48	0.66
20	0.00	AV1	20.94	14.67	0.295	84.2	51.0	0.295	0.246	0.49	0.67
21	0.00	AV1	20.76	14.70	0.293	83.8	26.0	0.293	0.245	0.52	0.60
		Average	21.26	14.81	0.292	83.6	49.8	0.292	0.248	0.80	0.63

Total number of blows analyzed: 21

Time Summary

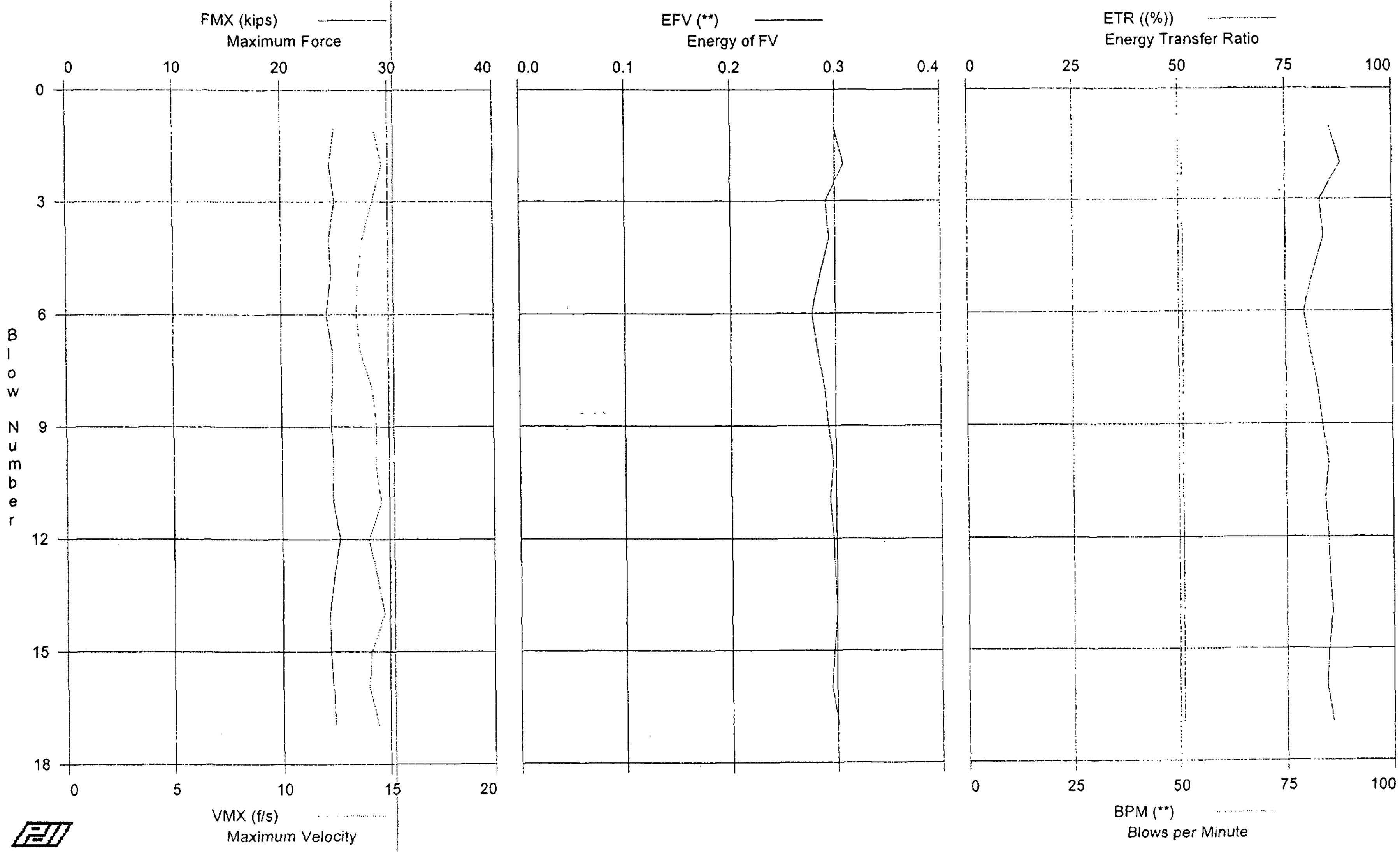
Drive 25 seconds 3:05:48 PM - 3:06:13 PM (6/20/2006) BN 1 - 21

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Calvert Cliffs - B-744-60

Test date: 20-Jun-2006



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

Calvert Cliffs - B-744-60 SPT
OP: SDW Test date: 20-Jun-2006

AR: 1.19 in^2
LE: 64.0 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.70

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	24.98	14.32	0.299	85.3	**	0.299	0.265	1.72	0.82
2	0.00	AV1	24.51	14.70	0.308	87.9	50.9	0.308	0.268	1.19	0.79
3	0.00	AV1	24.99	14.26	0.291	83.1	50.8	0.291	0.265	0.51	0.82
4	0.00	AV1	24.44	13.78	0.294	83.9	50.9	0.294	0.259	1.16	0.78
5	0.00	AV1	24.64	13.58	0.285	81.4	51.0	0.285	0.260	0.78	0.81
6	0.00	AV1	24.17	13.48	0.277	79.3	50.9	0.277	0.261	0.25	0.85
7	0.00	AV1	24.75	13.68	0.283	80.8	51.0	0.283	0.266	0.57	0.80
8	0.00	AV1	24.69	14.23	0.289	82.4	50.9	0.289	0.265	0.65	0.82
9	0.00	AV1	24.62	14.40	0.293	83.6	51.0	0.293	0.264	0.72	0.80
10	0.00	AV1	24.77	14.36	0.297	85.0	50.9	0.297	0.262	0.89	0.81
11	0.00	AV1	24.72	14.60	0.294	84.1	51.0	0.294	0.262	0.59	0.80
12	0.00	AV1	25.36	14.01	0.297	84.9	50.9	0.297	0.265	0.65	0.85
13	0.00	AV1	24.76	14.37	0.298	85.1	51.0	0.298	0.265	0.57	0.81
14	0.00	AV1	24.33	14.72	0.300	85.7	51.0	0.300	0.264	0.62	0.78
15	0.00	AV1	24.45	14.11	0.297	84.8	50.9	0.297	0.267	0.42	0.81
16	0.00	AV1	24.70	14.03	0.295	84.4	51.0	0.295	0.265	0.39	0.83
17	0.00	AV1	24.80	14.44	0.301	85.9	50.9	0.301	0.265	0.44	0.81
		Average	24.69	14.18	0.294	84.0	50.9	0.294	0.264	0.71	0.81

Total number of blows analyzed: 17

Time Summary

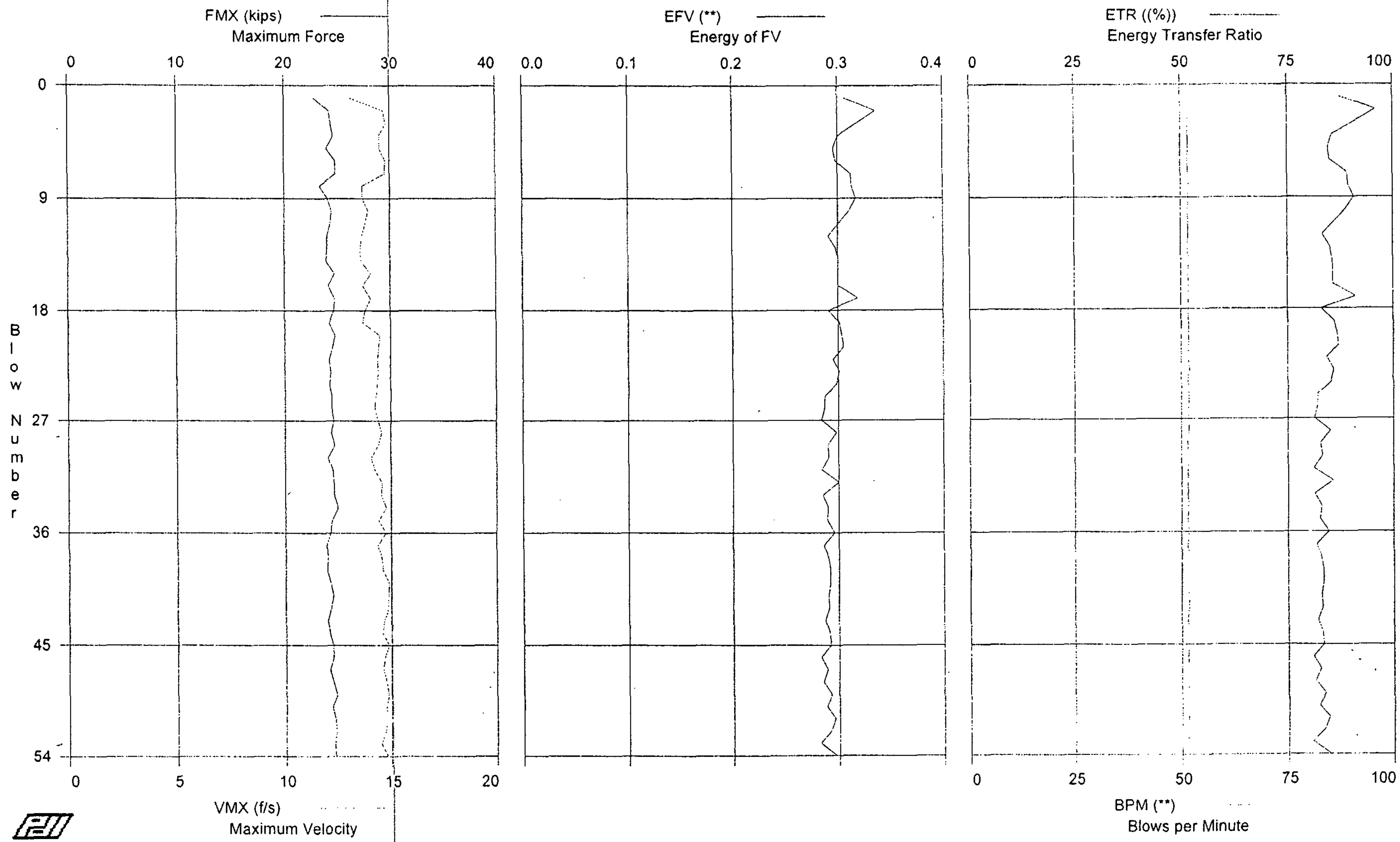
Drive 19 seconds 4:06:16 PM - 4:06:35 PM (6/20/2006) BN 1 - 17

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - Case Method Results

Test date: 21-Jun-2006

Calvert Cliffs - B-744-75



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

Calvert Cliffs - B-744-75
SPT
OP: SDW
Test date: 21-Jun-2006

AR: 1.19 in^2
SP: 0.492 k/ft3
LE: 79.0 ft
EM: 30,000 ksi
WS: 16,807.9 f/s
JC: 0.70

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute
EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	22.81	13.11	0.306	87.3	**	0.306	0.266	2.14	0.82
2	0.00	AV1	24.26	14.69	0.336	95.9	51.5	0.336	0.275	2.33	0.74
3	0.00	AV1	24.42	14.80	0.318	90.8	51.7	0.318	0.275	1.84	0.73
4	0.00	AV1	24.68	14.50	0.300	85.6	51.7	0.300	0.272	1.35	0.75
5	0.00	AV1	24.02	14.52	0.296	84.7	51.7	0.296	0.272	0.65	0.78
6	0.00	AV1	24.87	14.80	0.298	85.0	51.6	0.298	0.275	0.47	0.75
7	0.00	AV1	24.85	14.75	0.312	89.1	51.8	0.312	0.272	1.00	0.75
8	0.00	AV1	23.36	13.67	0.313	89.3	51.8	0.313	0.274	1.13	0.80
9	0.00	AV1	24.11	13.71	0.317	90.7	51.7	0.317	0.269	1.14	0.76
10	0.00	AV1	24.48	13.97	0.311	88.7	51.7	0.311	0.271	0.89	0.77
11	0.00	AV1	24.37	13.83	0.301	86.1	51.7	0.301	0.275	0.27	0.76
12	0.00	AV1	24.07	13.67	0.291	83.3	51.8	0.291	0.266	0.21	0.78
13	0.00	AV1	24.06	13.61	0.298	85.2	51.5	0.298	0.270	0.34	0.76
14	0.00	AV1	23.94	13.61	0.300	85.6	51.9	0.300	0.267	0.57	0.77
15	0.00	AV1	24.71	14.07	0.300	85.8	51.5	0.300	0.275	0.23	0.76
16	0.00	AV1	24.14	13.70	0.300	85.7	51.8	0.300	0.270	0.43	0.76
17	0.00	AV1	24.77	14.07	0.319	91.0	51.8	0.319	0.275	0.84	0.76
18	0.00	AV1	24.66	13.81	0.291	83.0	51.6	0.291	0.268	-0.32	0.79
19	0.00	AV1	24.20	13.68	0.301	85.9	51.7	0.301	0.271	0.43	0.77
20	0.00	AV1	24.76	14.48	0.303	86.6	51.8	0.303	0.274	0.40	0.74
21	0.00	AV1	24.53	14.42	0.305	87.0	51.7	0.305	0.275	0.33	0.73
22	0.00	AV1	24.19	14.38	0.295	84.2	51.5	0.295	0.272	0.05	0.72
23	0.00	AV1	24.36	14.41	0.301	85.9	51.9	0.301	0.272	0.32	0.73
24	0.00	AV1	24.23	14.35	0.298	85.3	51.5	0.298	0.273	0.21	0.73
25	0.00	AV1	24.44	14.28	0.287	82.0	51.7	0.287	0.267	-0.03	0.74
26	0.00	AV1	24.42	14.23	0.287	82.1	51.7	0.287	0.262	0.25	0.75
27	0.00	AV1	24.59	14.39	0.284	81.3	51.6	0.284	0.264	0.00	0.74
28	0.00	AV1	24.39	14.56	0.298	85.1	51.7	0.298	0.271	0.12	0.72
29	0.00	AV1	24.72	14.40	0.290	82.7	51.5	0.290	0.266	0.03	0.74
30	0.00	AV1	24.07	14.07	0.291	83.2	51.5	0.291	0.264	0.30	0.74
31	0.00	AV1	24.51	14.22	0.284	81.0	51.5	0.284	0.264	-0.30	0.75
32	0.00	AV1	24.60	14.56	0.300	85.7	51.5	0.300	0.271	0.12	0.72
33	0.00	AV1	24.63	14.53	0.285	81.3	51.5	0.285	0.270	-0.46	0.73
34	0.00	AV1	25.00	14.76	0.290	83.0	51.5	0.290	0.270	-0.38	0.74
35	0.00	AV1	24.41	14.40	0.289	82.6	51.5	0.289	0.268	-0.37	0.72
36	0.00	AV1	24.30	14.73	0.296	84.6	51.7	0.296	0.271	-0.18	0.71
37	0.00	AV1	23.91	14.36	0.286	81.8	51.5	0.286	0.267	-0.44	0.72
38	0.00	AV1	24.00	14.53	0.290	82.8	51.6	0.290	0.269	-0.25	0.72
39	0.00	AV1	23.93	14.60	0.292	83.3	51.6	0.292	0.269	-0.19	0.71
40	0.00	AV1	24.27	14.89	0.292	83.4	51.5	0.292	0.271	-0.31	0.72
41	0.00	AV1	24.52	14.86	0.290	82.9	51.6	0.290	0.272	-0.30	0.73
42	0.00	AV1	24.32	14.86	0.291	83.2	51.8	0.291	0.270	-0.17	0.72
43	0.00	AV1	24.00	14.66	0.287	82.1	51.4	0.287	0.268	-0.27	0.70
44	0.00	AV1	24.16	14.55	0.291	83.1	51.6	0.291	0.267	-0.08	0.71
45	0.00	AV1	24.47	14.87	0.292	83.4	51.6	0.292	0.268	-0.05	0.72
46	0.00	AV1	24.51	14.66	0.283	80.9	51.4	0.283	0.265	-0.24	0.74
47	0.00	AV1	24.16	14.59	0.289	82.7	51.6	0.289	0.267	-0.17	0.71
48	0.00	AV1	24.51	14.76	0.285	81.4	51.5	0.285	0.266	-0.12	0.72
49	0.00	AV1	24.85	14.85	0.293	83.8	51.6	0.293	0.272	-0.06	0.73
50	0.00	AV1	24.37	14.72	0.288	82.2	51.7	0.288	0.270	-0.28	0.72
51	0.00	AV1	24.65	14.76	0.296	84.7	51.5	0.296	0.270	-0.09	0.75
52	0.00	AV1	24.75	14.69	0.292	83.5	51.6	0.292	0.268	0.02	0.75
53	0.00	AV1	24.60	14.48	0.282	80.7	51.5	0.282	0.264	-0.47	0.75
54	0.00	AV1	24.72	14.81	0.297	84.9	51.7	0.297	0.272	-0.19	0.72
		Average	24.36	14.38	0.296	84.7	51.6	0.296	0.270	0.24	0.74

Total number of blows analyzed: 54

Time Summary

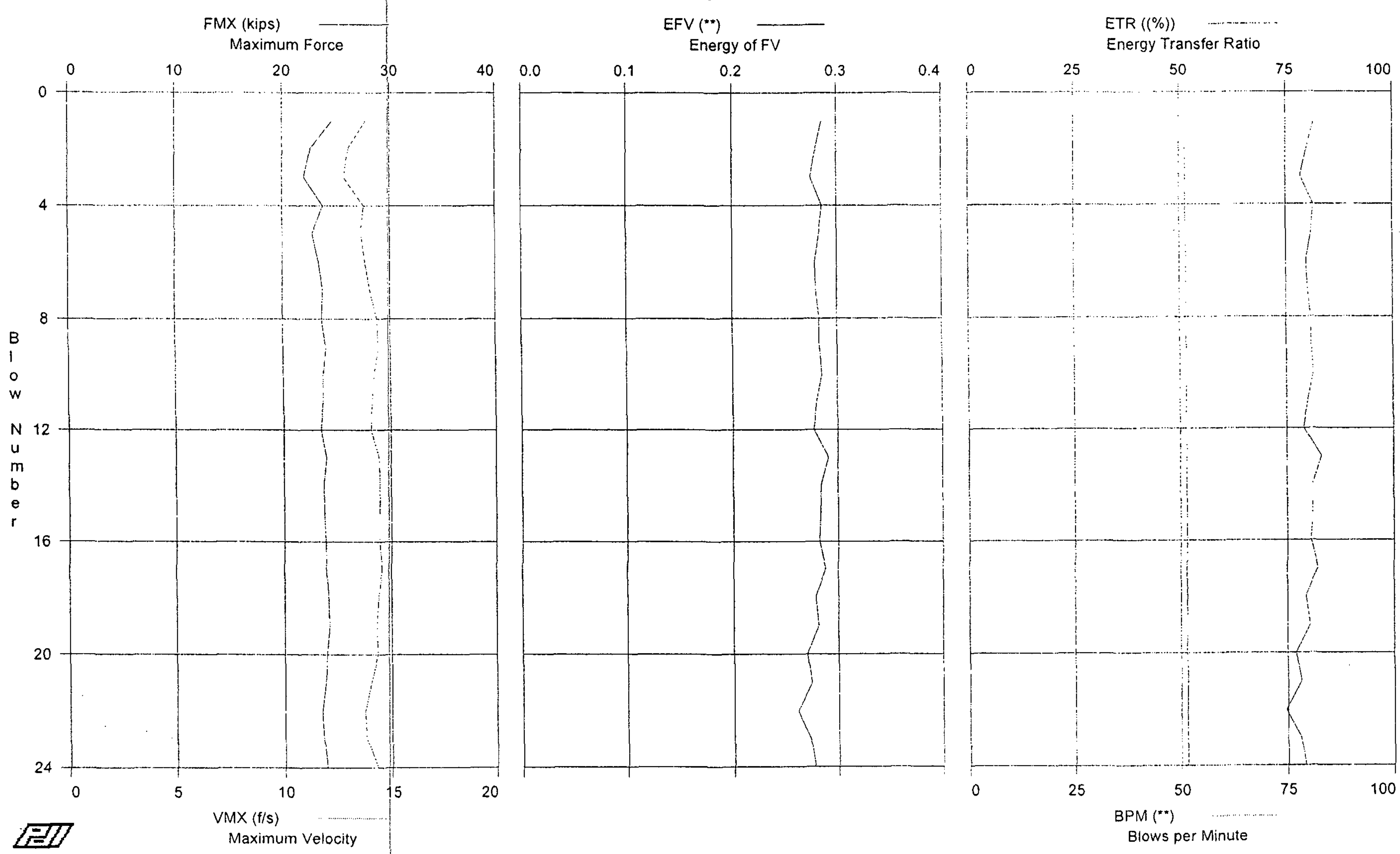
Drive 1 minute 1 second 8:05:33 AM - 8:06:34 AM (6/21/2006) BN 1 - 54

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

GRL Engineers, Inc. - *Case Method Results*

Test date: 21-Jun-2006

Calvert Cliffs - B-744-90



GRL Engineers, Inc.
Case Method Results

PDIPLOT Ver. 2005.2 - Printed: 18-Jul-2006

Calvert Cliffs - B-744-90
OP: SDW

SPT
Test date: 21-Jun-2006

AR: 1.19 in^2
LE: 94.0 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft3
EM: 30,000 ksi
JC: 0.70

FMX: Maximum Force
VMX: Maximum Velocity
EFV: Energy of FV
ETR: Energy Transfer Ratio
BPM: Blows per Minute

EMX: Max Transferred Energy
EF2: Energy of F^2
DFN: Final Displacement
FVP: Force/Velocity proportionality

BL# end	depth ft	TYPE	FMX kips	VMX f/s	EFV **	ETR (%)	BPM **	EMX k-ft	EF2 k-ft	DFN in	FVP []
1	0.00	AV1	24.69	13.89	0.286	81.8	**	0.286	0.281	0.39	0.80
2	0.00	AV1	22.60	13.09	0.280	80.0	51.4	0.280	0.271	0.62	0.77
3	0.00	AV1	22.02	12.89	0.275	78.5	51.5	0.275	0.268	0.31	0.76
4	0.00	AV1	23.80	13.80	0.286	81.6	51.4	0.286	0.267	0.90	0.77
5	0.00	AV1	22.76	13.64	0.283	81.0	51.5	0.283	0.275	0.72	0.75
6	0.00	AV1	23.35	13.84	0.279	79.8	51.5	0.279	0.277	0.56	0.73
7	0.00	AV1	23.74	14.07	0.280	80.1	51.5	0.280	0.282	0.30	0.74
8	0.00	AV1	23.64	14.36	0.283	80.9	51.6	0.283	0.282	0.22	0.73
9	0.00	AV1	24.02	14.43	0.283	80.9	51.5	0.283	0.281	0.40	0.74
10	0.00	AV1	23.72	14.21	0.285	81.3	51.6	0.285	0.278	0.36	0.75
11	0.00	AV1	23.69	14.13	0.280	80.0	51.4	0.280	0.280	0.32	0.75
12	0.00	AV1	23.45	14.05	0.277	79.0	51.6	0.277	0.275	0.28	0.72
13	0.00	AV1	23.98	14.41	0.291	83.2	51.5	0.291	0.278	0.78	0.74
14	0.00	AV1	23.73	14.46	0.284	81.1	51.5	0.284	0.275	0.46	0.72
15	0.00	AV1	23.76	14.43	0.283	81.0	51.5	0.283	0.277	0.41	0.72
16	0.00	AV1	23.87	14.41	0.282	80.6	51.5	0.282	0.279	0.12	0.73
17	0.00	AV1	23.93	14.54	0.288	82.3	51.5	0.288	0.277	0.71	0.72
18	0.00	AV1	24.11	14.36	0.278	79.3	51.4	0.278	0.274	-0.03	0.76
19	0.00	AV1	24.19	14.27	0.281	80.4	51.5	0.281	0.276	0.25	0.75
20	0.00	AV1	23.97	14.31	0.270	77.0	51.4	0.270	0.276	-0.54	0.72
21	0.00	AV1	23.80	14.00	0.274	78.2	51.5	0.274	0.273	-0.29	0.75
22	0.00	AV1	23.46	13.71	0.261	74.6	51.4	0.261	0.265	-0.28	0.78
23	0.00	AV1	23.62	13.80	0.273	78.1	51.5	0.273	0.273	-0.23	0.75
24	0.00	AV1	23.91	14.30	0.277	79.2	51.5	0.277	0.275	-0.38	0.73
		Average	23.66	14.06	0.280	80.0	51.5	0.280	0.276	0.26	0.75

Total number of blows analyzed: 24

Time Summary

Drive 27 seconds 9:11:55 AM - 9:12:22 AM (6/21/2006) BN 1 - 24