ATTACHMENT C

Observation Well Logs

Development Records

Slug Test Data

Volume 1 of 1

ATTACHMENT C

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Appendix C-1 Observation Well Logs

List of OW Logs included in this Appendix C-1

OW-308L	OW-420U	OW-931U
OW-308U	OW-438L	OW-932L
OW-332L	OW-438U	OW-932U
OW-332La	OW-910L	OW-933L
OW-332U	OW-910U	OW-933U
OW-348L	OW-928L	OW-934L
OW-348U	OW-928U	OW-934U
OW-349L	OW-929L	
OW-349U	OW-929U	
OW-408L	OW-930L	
OW-408U	OW-930U	

Appendix C-2 Well Development Records
Appendix C-3 Slug Test Charts

1.0 OBSERVATION WELLS

1.1 Geotechnical Borings to Plan Well Installation

Geotechnical borings were drilled near each of the proposed observation well (OW) cluster locations to obtain the information necessary for Bechtel to determine the depth(s) and locations for the OW installation. The logs for these geotechnical borings, which have comparable numbers to the corresponding observation wells, are found in Attachment B of the report.

Following Bechtel's review of the geotechnical borings, the observation wells were installed approximately 5 to 20 feet from the geotechnical boring with a deeper screen interval on one side of the boring and the shallow screen interval on the opposite side. The observation wells were installed using either hollow stem auger or mud rotary drilling methods in accordance with the Specification and following Bechtel's directions for depth and other details. Diagrams of the wells are provided in Appendix C-1 of this attachment. The wells consist of PVC screen and riser pipe, sand filter pack, bentonite chips or pellets, and cement bentonite grout. Protective steel well stick-up covers were placed around the above ground surface stick-up well and concrete pads were placed at the surface as noted in the Specification.

1.2 Well Installation

Twenty-eight observation wells of the thirty proposed observation wells were installed throughout the site as part of this project. Proposed wells OW-420L and OW-931L were not installed per Bechtel direction in the field, as a result of lower sands not being present. The observation wells were installed per Section 6.0 of the Specification. One replacement observation well (OW-332La) was installed after it was discovered that the original well (OW-332L) had collapsed at a depth of approximately six feet. Observation well OW-332L was abandoned on February 7, 2007, prior to the installation of well OW-332La. The well was abandoned in general accordance with Texas Administrative Code Title 16, Part 4 Chapter 76 Rule 1004 (16 TAC 76.1004). Well OW-332L was grouted by pumping a specified grout mix through a 1-inch PVC tremie pipe which was lowered to the bottom of the observation well. The tremie pipe was pulled toward the surface during grouting to assure a consistent application of grout throughout the well length. The well location was grouted to the existing surface elevation.

Soil borings for installation of all observation wells were advanced using either hollow stem auger or mud rotary drilling to make a nominal eight-inch borehole diameter. The borings were advanced to depths specified by Bechtel's field representative.

As discussed in Section 1.1, the observation wells were installed in separate borings near the geotechnical borings as instructed by Bechtel. The lithology shown on the Observation Well Logs is based on a description of material obtained from cuttings. Due to the method of obtaining the sample for classification, there may be some differences in lithology from the nearby soil boring. Well screen placement was based on the hydrogeologic condition observed in each geotechnical boring at the time of installation.

The designated depth was reached at each boring location to allow the installation of a two-inch well. The well installation included a sump, 0.20-inch slotted PVC screen and riser casing, which were connected together and placed in the open soil boring. A sand filter pack was placed around the sump and screen to at least two feet above the top of the screened interval. A two- to three-foot bentonite seal was placed above the sand filter pack. The annulus was then grouted from the top of the bentonite seal to the

ground surface at each boring to assure no surface water or rain could directly penetrate into the observation well. The grout-mix specified in Section 5.12 of the Specification was used.

The depth of the screened interval, length of the screen and general well configuration were designated in the field for each well by a Bechtel's field representative. Since the ground surface elevations at the well sites were not determined until after the well pads were placed, the top of the PVC casing elevation less the casing stickup above ground surface as measured at the time of installation was used to back-calculate the ground surface elevations shown on the observation well logs. All water depth measurements are referenced to the top of the PVC casing. The elevation of the top of the casing was also used along with measurements of the well sections to calculate OW elevations for the well monitoring intervals. Well construction details for all 28 wells are included in Appendix C-1 herein.

The wells were capped with a lockable steel well cover extending approximately two feet above grade. A concrete pad, two feet square and six inches thick, was placed around each well cover according to the Specification, and installation was observed by a hydrogeologist.

1.3 Well Development

Upon installation, each observation well was developed by air lifting and bailing. The development procedure approved by Bechtel was first to bail until the water shows minimal sediment, then air lift to remove at least a minimum of five standing well volumes of water, cycling through the pump on and off to create a surging effect. A well was considered developed when the removed water was reasonably clear of suspended sediment and relatively clear to sight. Ground water level and total depth of the OW were measured before and after water development.

The wells were developed satisfactorily using the planned procedure. Well development records are included in Appendix C-2 herein according to ASTM D 5092-04e1, South Texas COL geotechnical work plan, and Bechtel's Engineering Specifications for Subsurface Investigation.

2.0 FIELD PERMEABILITY TESTS

2.1 Slug Tests

Field permeability testing was conducted in each observation well (except OW-332La) using procedures described in Section 8 of ASTM D 4044-96(2002). This procedure is commonly termed the "slug test" method. Slug testing involves establishing a static ground water level, lowering a solid weighted cylinder into the well to cause an increase of ground water level in the well and monitoring the time rate for the well ground water level to return to the pre-test static level. This method is commonly called the "slug-in" method. After stabilization, the slug is rapidly removed to create a lowering of the water level in the well, and the time rate for water to recover to the pre-test ground water static level is recorded. This method is commonly called the "slug-out" method. Electronic transducers and data loggers are used for measuring the ground water levels and times during the test.

Results of the slug testing are presented in Table C-2, Slug Test Data Summary. Charts (graphs) of the water surface versus time during the slug tests are in Appendix C-3. The slug test data is presented as required in Section 9 of ASTM D 4044-96(2002). The rising head and falling head solutions are presented in three different methods – Butler, KGS, and Bouwer-Rice.

2.1.1 Butler Solution Model

The Butler solution predicts the theoretical change in ground water level in the test well. Butler (1998) extended the Hvorslev (1951) solution for a single-well slug test in a homogeneous, anisotropic confined aquifer to include inertial effects in the test well. The solution accounts for oscillatory ground water level response sometimes observed in aquifers of high hydraulic conductivity. Butler (2002) amended the method to incorporate frictional loss in small-diameter wells.

Assumptions :

- aquifer has infinite areal extent,
- aquifer is homogeneous and of uniform thickness,
- test well is partially penetrating,
- aquifer is confined,
- flow is quasi-steady state, and
- volume of water, V, is injected into or discharged from the well instantaneously.

2.1.2 KGS Model

The KGS Model analyzes data from multiwell slug tests assuming no wellbore storage in observation wells. The solution simulates water-level response at the test and observation wells and includes a skin zone of finite thickness enveloping the test well. For fully penetrating wells in a confined aquifer, the KGS Model is equivalent to the Cooper et al. (1967) solution. For partially penetrating wells in a confined aquifer without wellbore skin, the KGS Model and the Dougherty-Babu (1984) solution are identical.

Assumptions :

- aquifer has infinite areal extent,
- aquifer is homogeneous and of uniform thickness,
- aquifer potentiometric surface is initially horizontal,
- test and observation wells are fully or partially penetrating,
- aquifer is confined,
- flow is unsteady,
- water is released instantaneously from storage with decline of hydraulic head, and
- volume of water, V, is injected into or discharged from the well instantaneously.

2.1.3 Bouwer-Rice Model

The Bouwer-Rice solution method employs a quasi-steady state model that ignores elastic storage in the aquifer. If the test well is screened across the water table, one may apply an optional correction for the effective porosity of the filter pack. When the test well is fully submerged (i.e., screened below the ground water table) or the aquifer is confined, the correction is unnecessary.

Assumptions

- aquifer has infinite areal extent,
- aquifer is homogeneous and of uniform thickness,
- test well is fully or partially penetrating,
- aquifer is unconfined,
- flow to well is quasi-steady-state (storage is negligible), and

- volume of water, V, is injected into or discharged from the well instantaneously.

2.2 Slug Test Results Discussion

Results for the slug tests performed were obtained using AQTESOLV Pro version 4.02. Each rising and falling slug test was evaluated using three separate slug test methodologies. These solutions may vary in applicability depending on the lithology at the particular well location. Each solution was obtained using the automated best fit provided by the AQTESOLV program. However, several solutions were modified from the best fit using the visual curve match function to provide a more reasonable curve match.

Variability of K values at individual wells is evident between different methods; however, considering the variability of the site lithology, thickness of the aquifer and well constructions (potential skin effects) it appears that the test results are relatively consistent with each other (within an order of magnitude).

3.0 WATER LEVEL MEASUREMENTS

A MACTEC representative collected water level measurements from each installed observation well on December 28, 2006. Wells were opened and ground water was allowed to equilibrate to the atmosphere prior to water levels being collected. Observation well OW-332La was not monitored as part of this effort as this well was not installed until February 9, 2007. Measurements were made using an electric water level meter and referenced to the notched top of the casing. Water levels recorded are in Table C-3, included in Attachment C, herein.

ATTACHMENT C

Tables C-1 through C-3

TABLE C-1
OBSERVATION WELL CONSTRUCTION DETAILS SUMMARY
STP COL PROJECT
MACTEC ENGINEERING AND CONSULTING, INC.
PROJECT # 5050-06-0496

WELL ID	Well Diameter (inches)	Drilling Method	Boring Diameter (inches)	Concrete Pad Elevation (feet, msl)	Top of Notch Elevation (feet, msl)	Top of Bentonite Seal (feet, bgs)	Top of Sand (feet, bgs)	Screened Interval (feet, bgs)	Screen Length (feet)	Sump Length (feet)	Total Well Depth (feet, bgs)
OW-308L	2	MR	8	29.87	31.76	78	82	88-98	10	1.1	97.1
OW-308U	2	MR	8	29.88	31.80	28	32	38-48	10	1.1	47.1
OW-332L(1)	2	MR	8	30.24	31.85	84	88	92.1-102.1	10	1.1	103.2
OW-332La	2	MR	8	30.01	32.08	84	87	92-102	10	1.1	103.1
OW-332U	2	MR	8	30.24	32.10	27	31	35-45	10	1.1	46.1
OW-348L	2	MR	8	30.08	31.86	60	64	68.2-78.2	10	0.9	79.1
OW-348U	2	MR	8	30.51	32.28	21	24	28-38	10	1.1	39.1
OW-349L	2	MR	8	29.41	31.03	61	65	70-80	10	1.1	81.1
OW-349U	2	MR	8	29.40	31.29	27	31	35-45	10	1.1	46.1
OW-408L	2	MR/RC	8	31.73	33.76	62	66	70.2-80.2	10	1.1	81.3
OW-408U	2	HSA	8	31.50	33.57	24.1	28	32-42	10	1.1	43.1
OW-420U	2	MR	8	32.25	33.79	31	34	38-48	10	1.1	49.1
OW-436L	2	MR	8	30.11	31.57	85	89	93-103	10	1.1	104.1
OW-436U	2	MR	8	30.53	32.16	23	26	30-40	10	1.0	41.0
OW-910L	2	MR	8	30.75	32.46	74	77	81-91	10	1.1	92.1
OW-910U	2	MR	8	30.69	32.32	18	21	25-35	10	1.1	36.1
OW-928L	2	MR	8	29.81	31.56	103	106	110-120	10	1.1	121.1
OW-928U	2	MR	8	30.02	31.69	21.5	24.5	28.5-38.5	10	1.1	39.6
OW-929L	2	MR	8	36.93	38.63	79.5	83	87-97	10	1.1	98.1
OW-929U	2	MR	8	36.91	38.71	42	45	49-59	10	1.1	60.1
OW-930L	2	MR	8	26.21	27.98	88	91	95-105	10	1.5	106.5
OW-930U	2	MR	8	25.62	27.33	18	21	25-35	10	1.1	36.1
OW-931U	2	MR	7	30.53	32.10	18	21	25-35	10	1.0	36.0
OW-932L	2	MR	8	31.09	32.79	61.5	64.5	68.5-78.5	10	1.1	79.6
OW-932U	2	MR	8	31.35	32.83	21.5	24.5	28.5-38.5	10	1.1	39.6
OW-933L	2	MR	8	28.74	30.45	68	72	76-86	10	1.1	87.1
OW-933U	2	MR	8	28.87	30.62	20	23	26-36	10	1.1	37.1
OW-934L	2	MR	7	29.04	30.94	82	85	89-99	10	1.0	100.0
OW-934U	2	MR	8	28.54	30.39	22	26	30-40	10	1.1	41.1

NOTES:
(1) Well was found to be collapsed. Replacement well, OW-332La, was drilled to replace OW-332L.
HSA Hollow stem auger
MR Mud rotary drilling
RC Rock core bit
bgs Below ground surface
msl Mean sea level
Sump length includes sump and plug length

Prepared By/Date MJD 4/3/07
Checked By/Date KAW 4/3/07

TABLE C-2
SLUG TEST DATA SUMMARY
STP COL PROJECT
MACTEC ENGINEERING AND CONSULTING, INC.
PROJECT # 5050-06-0496

WELL ID	Monitoring Well Dimension Data											Aquifer Data			Slug Test Type			Slug Test Solution (feet/day)					
	Well Diameter (inches)	Drilling Method	Boring Diameter (inches)	Concrete Pad Elevation (feet, msl)	Top of Notch Elevation (feet, msl)	Top of Bentonite Seal (feet, bgs)	Top of Sand (feet, bgs)	Screened Interval (feet, bgs)	Screen Length (feet)	Sump Length (feet)	Total Well Depth (feet, bgs)	Static Water Level (feet, bgs)	Well Penetration Depth (feet, bgs)	Saturated Thickness (feet, bgs)	Test Type	Rising Head Initial Displacement (feet)	Falling Head Initial Displacement (feet)	Rising Head			Falling Head		
																		Butler	KGS	Bouwer-Rice	Butler	KGS	Bouwer-Rice
OW-308L	2	MR	8	29.87	31.78	78	82	86-96	10	1.1	97.1	16.07	27	31	B, R, F	8.87	13.13	64.12	66.69	65	72	72.93	55.64
OW-308U	2	MR	8	29.88	31.80	28	32	36-46	10	1.1	47.1	8.36	28	26	B, R, F	9.778	6.791	70.09	63.93	62.63	63.97	61.54	68.26
OW-332L	2	MR	8	30.24	31.85	84	88	92.1-102.1	10	1.1	103.2	16.15	18.5	35	B, R, F	8.847	11.47	52.96	54.23	33.28	49.41	49.41	55.2
OW-332U	2	MR	8	30.24	32.10	27	31	35-45	10	1.1	46.1	8.69	16.5	20.5	B, R, F	5.767	5.748	37.32	36.26	26.95	19.3	18.33	11.29
OW-348L	2	MR	8	30.08	31.86	60	64	68.2-78.2	10	0.9	79.1	16.15	13	23	B, R, F	5.755	8.578	58.12	45.62	43.94	75.94	60.64	39.45
OW-348U	2	MR	8	30.51	32.28	21	24	28-38	10	1.1	39.1	8.84	19	25	B, R, F	5.889	8.016	118.6	83.03	87.67	68.06	71.42	84.94
OW-349L	2	MR	8	29.41	31.03	61	65	70-80	10	1.1	81.1	15.22	13	15	B, R, F	14.9	7.603	63.25	50.56	35.12	42.81	40.47	52.4
OW-349U	2	MR	8	29.40	31.29	27	31	35-45	10	1.1	46.1	8.03	28.7	30.7	B, R, F	6.488	6.212	30.74	60.24	42.98	71.38	55.58	52.82
OW-408L	2	MR/RC	8	31.73	33.76	62	66	70.2-80.2	10	1.1	81.3	18.11	11.5	15	B, R, F	10.84	7.342	47.96	72.51	37.54	70.31	67.66	50.37
OW-408U	2	HSA	8	31.50	33.57	24.1	28	32-42	10	1.1	43.1	10.18	13.5	15.5	B, R, F	9.342	9.499	16.85	11.06	10.94	22.4	31.48	28.44
OW-420U	2	MR	8	32.25	33.79	31	34	38-48	10	1.1	49.1	10.43	48	25	B, R	6.37	ND	23.15	32.9	44.74	ND	ND	ND
OW-438L	2	MR	8	30.11	31.57	85	89	93-103	10	1.1	104.1	15.82	11	17	B, R, F	5.526	8.968	17.11	27.13	9.849	15.1	27.47	13.77
OW-438U	2	MR	8	30.53	32.18	23	26	30-40	10	1	41	8.85	18	19.5	B, R, F	8.457	5.486	37.95	39.4	26.1	64.66	53.06	24.12
OW-910L	2	MR	8	30.75	32.48	74	77	81-91	10	1.1	92.1	16.71	11.5	5	B, R, F	7.792	9.991	2.552	0.3244	0.5645	2.156	0.9391	0.4684
OW-910U	2	MR	8	30.69	32.32	18	21	25-35	10	1.1	36.1	9.18	16.5	25	B, R, F	8.539	8.502	25.94	28.91	20.82	63.52	47.41	48.26
OW-928L	2	MR	8	29.81	31.56	103	106	110-120	10	1.1	121.1	16.05	11.5	15	B, R, F	10.71	11.92	18.69	11.2	7.444	30.23	23.6	20.64
OW-928U	2	MR	8	30.02	31.69	21.5	24.5	28.5-38.5	10	1.1	39.6	8.63	15	20	B, R, F	8.001	7.679	18.85	31.5	8.268	19.02	15.91	16.01
OW-929L	2	MR	8	36.93	38.63	79.5	83	87-97	10	1.1	98.1	23.47	13.5	45	B, R, F	11.97	8.292	55.91	53.85	29.05	58.93	72.56	58.98
OW-929U	2	MR	8	36.91	38.71	42	45	49-59	10	1.1	60.1	12.92	10	5	B, R, F	12.44	11.85	14.31	3.224	3.648	16.07	11.5	2.423
OW-930L	2	MR	8	26.21	27.98	88	91	95-105	10	1.5	106.5	15.15	27	40	B, R, F	10.66	6.697	40.45	36.58	26.92	24.3	15.09	18.92
OW-930U	2	MR	8	25.62	27.33	18	21	25-35	10	1.1	36.1	8.82	16	23.9	B, R, F	8.47	8.612	54.63	22.71	31.73	79.61	47.12	47.71
OW-931U	2	MR	7	30.53	32.10	18	21	25-35	10	1	36	10.20	16	29.5	B, R, F	4.668	5.216	34.39	23.45	19.99	68.08	71.64	48.58
OW-932L	2	MR	8	31.09	32.79	61.5	64.5	68.5-78.5	10	1.1	79.6	7.23	14.2	14.5	B, R, F	5.11	9.546	24.34	23.25	17.73	22.25	22.25	24.89
OW-932U	2	MR	8	31.35	32.83	21.5	24.5	28.5-38.5	10	1.1	39.6	9.16	20	21.2	B, R, F	9.407	8.981	20.74	12.8	13.57	32.48	15.65	22.12
OW-933L	2	MR	8	28.74	30.45	68	72	76-86	10	1.1	87.1	14.60	5	5	B, R, F	17.68	8.602	214.3	50.89	63.29	191.2	214.3	64.3
OW-933U	2	MR	8	28.87	30.62	20	23	26-36	10	1.1	37.1	7.08	14	19.5	B, R, F	18.99	9.413	64.32	9.58	3.104	8.335	5.276	2.763
OW-934L	2	MR	7	29.04	30.94	82	85	89-99	10	1	100	17.21	32	32.8	B, R, F	3.263	7.671	77.6	131.3	34.97	126.6	126.6	31.72
OW-934U	2	MR	8	28.54	30.39	22	26	30-40	10	1.1	41.1	10.65	15.5	17.5	B, R, F	12.1	9.956	51.93	31.62	32.87	48.76	96.64	40.28

NOTES: Static water levels recorded prior to running the slug test.
Displacement values have been corrected to reflect total displacement (from time 0).
Slug was composed of two separate slugs tied together;
Dimension of Slug A: 9.09 pounds, diameter = 1.6 inches, length = 5.5 feet
Dimension of Slug B: 8.41 pounds, diameter = 1.6 inches, length = 5.5 feet
Well Penetration Depth is the depth of screened interval from the top of the aquifer

ND	No data available, data not recovered from datalogger
NA	Not applicable, no slug test conducted
MR	Mud rotary drilling
RC	Rock core bit
bgs	Below ground surface
msl	Mean sea level
B	Background Test
R	Rising Head Test
F	Falling Head Test

Prepared By/Date MJD 4/3/07

Checked By/Date KAW 4/3/07

TABLE C-3
WATER LEVEL DATA SUMMARY SHEET
STP COL PROJECT
MACTEC ENGINEERING AND CONSULTING, INC.
PROJECT # 5050-06-0496

WELL ID	Concrete Pad Elevation (feet, msl)	Top of Notch Elevation (feet, msl)	Depth to Water, 12/28/06 (feet, btoc)	Groundwater Elevation (feet, msl)	Water Level Meter Make and Model	Water Level Meter Serial No.
OW-308L	29.87	31.76	16.06	15.70	Solinst Model 101	41882
OW-308U	29.88	31.60	7.78	24.02	Solinst Model 101	41882
OW-332L[1]	30.24	31.85	15.22	16.63	Solinst Model 101	41882
OW-332La	30.01	32.08	NA	NA	NA	NA
OW-332U	30.24	32.10	8.01	24.09	Solinst Model 101	41882
OW-348L	30.08	31.86	16.16	15.70	Solinst Model 101	41882
OW-348U	30.51	32.28	8.09	24.19	Solinst Model 101	41882
OW-349L	29.41	31.03	15.22	15.81	Solinst Model 101	41882
OW-349U	29.40	31.29	7.28	24.01	Solinst Model 101	41882
OW-408L	31.73	33.76	18.05	15.71	Solinst Model 101	41882
OW-408U	31.50	33.57	9.71	23.86	Solinst Model 101	41882
OW-420U	32.25	33.79	9.98	23.81	Solinst Model 101	41882
OW-438L	30.11	31.57	15.85	15.72	Solinst Model 101	41882
OW-438U	30.53	32.18	8.45	23.73	Solinst Model 101	41882
OW-910L	30.75	32.48	16.62	15.86	Solinst Model 101	41882
OW-910U	30.69	32.32	9.11	23.21	Solinst Model 101	41882
OW-928L	29.81	31.56	15.75	15.81	Solinst Model 101	41882
OW-928U	30.02	31.69	8.18	23.51	Solinst Model 101	41882
OW-929L	36.93	38.63	23.47	15.16	Solinst Model 101	41882
OW-929U	36.91	38.71	12.92	25.79	Solinst Model 101	41882
OW-930L	26.21	27.98	14.90	13.08	Solinst Model 101	41882
OW-930U	25.62	27.33	7.92	19.41	Solinst Model 101	41882
OW-931U	30.53	32.10	9.82	22.28	Solinst Model 101	41882
OW-932L	31.09	32.79	17.23	14.87	Solinst Model 101	41882
OW-932U	31.35	32.83	8.52	24.27	Solinst Model 101	41882
OW-933L	28.74	30.45	14.60	18.23	Solinst Model 101	41882
OW-933U	28.87	30.62	6.44	24.01	Solinst Model 101	41882
OW-934L	29.04	30.94	17.07	13.55	Solinst Model 101	41882
OW-934U	28.54	30.39	10.22	20.72	Solinst Model 101	41882

NOTES:
(1) Well was found to be collapsed. Replacement well, OW-332La, was drilled to replace OW-332L.
bgs Below ground surface
DTW Depth to Water
btoc Below Top of Casing
msl Mean sea level
NA Not Applicable

Prepared By/Date MJD 4/3/07

Checked By/Date KAW 4/3/07

Appendix C-1

Observation Well Logs

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-308-L	
Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location Unit 3 - Reactor Building N 363196.43 E 2943374.36		Total Depth 99 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 29.87 feet	Ground Water Depth 16.08 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 31.78 feet	No. of Samples 0	Date Started 11/13/06
	Borehole Inclination 0	Logged by M. H. Niemann	Date Completed 11/22/06

Reviewed by / Date MND 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–20									CH	Cuttings appear to be CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations Screen placements based on information from geotechnical boring	
10–20										Cuttings appear to be reddish brown; CLAY (CH); some fine calcareous nodules		
16									∇		12/28/06: Water level measured after development	
20–30									SM	Cuttings appear to be reddish brown; silt; SAND (SM)		
30–40									SP	Cuttings appear to be reddish brown; SAND (SP); fine		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-308-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be reddish brown; SAND (SP); fine		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50										Cuttings appear to be reddish brown; SAND (SP); fine		
51												
52												
53												
54												
55												
56												
57												
58												
59												
60									CL-ML	Cuttings appear to be gray transistioning into reddish brown; clay; SILT (CL-ML); some clay		
61												
62												
63												
64												
65												
66												
67												
68												
69												
70									CH	Cuttings appear to be reddish brown; sand; CLAY (CH); some sand		
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-308-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80									SP	Cuttings appear to be reddish brown; SAND (SP); fine to coarse sand		
81												
82												
83												
84												
85												
86												
87												
88												
89												
90									SP	Cuttings appear to be reddish brown; clay; gravel; SAND (SP); coarse sand		
91												
92												
93												
94												
95												
96												
97												
98												
99										Boring Terminated at 99-feet	Wash hole and ream to 8 inch diameter	
100												
101												
102												
103												
104												
105												
106												
107												
108												
109												
110												
111												
112												
113												
114												
115												
116												
117												
118												
119												
120												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-308-U

Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location Unit 3 - Reactor Building N 363195.64 E 2943354.04		Total Depth 49 feet
Drilling Contractor and Rig BEST / Falling 1500	Elevation at Boring 29.88 feet	Ground Water Depth 4.5 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 31.8 feet	No. of Samples 0	Date Started 11/14/06
	Borehole Inclination 0	Logged by M. H. Niemann	Date Completed 11/27/06

Reviewed by / Date MJD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–10									SP	Cuttings appear to be SAND (SP). Grades into dark gray; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations 12/28/06: Water level measured after development Screen placements based on information from geotechnical boring	
10–20									CH	Cuttings appear to be dark gray transistioning into reddish brown; CLAY (CH)		
20–30									SC	Cuttings appear to be reddish brown; clay; SAND (SC); some calcareous nodules. Increase sand with depth.		
30–40									SP	Cuttings appear to be brown to reddish brown; SAND (SP)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-308-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be brown; SAND (SP); fine		
41												
42												
43												
44												
45												
46												
47												
48												
49										Boring Terminated at 49-feet	Wash hole and ream to 8 inch diameter	
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number
MACTEC
STP COL : 5050-06-0496

SOIL LOG - Boring No. OW-332-L

Type and Diameter of Boring: Wash Rotary / 8 inch	Boring Location: Proposed Power Block N 363739.87 E 2943610.91		Total Depth: 105 feet
Drilling Contractor and Rig: BEST / Failing 1500	Elevation at boring: 30.24 feet	Ground Water Depth	Depth to Bedrock
Sampling Method: No sampling	Sample Driving Hammer/Drop: 140 lbs / 30 inches	No. of Samples: 0	Date Started: 11/21/06
	Borehole Inclination: 0	Logged by: M. Fraychineaud	Date Completed: 12/1/06

Reviewed by / Date: HC 5/4/07
Reviewed by / Date: KAW 4/27/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	Instrument
0–30									CH	Cuttings appear to be CLAY (CH)	***OW-332L COLLAPSED. PLEASE SEE REPLACEMENT WELL OW-332La*** OW-332L was drilled to 105 feet on 12/01/06 and found collapsed 2/2007. OW-332L was abandoned 2/7/2007. Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations. Screen placements based on information from geotechnical boring	
30–40									SP	Cuttings appear to be SAND (SP)		

Project Name : Job Number

MACTEC

STP COL : 5050-06-0496

SOIL LOG - Boring No. OW-332-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	Instrument
40									SP	Cuttings appear to be SAND (SP)		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50									CH	Cuttings appear to be CLAY (CH)		
51												
52												
53												
54												
55												
56												
57												
58												
59												
60									SC	Cuttings appear to be clay; SAND(SC)		
61												
62												
63												
64												
65												
66												
67												
68												
69												
70									SM	Cuttings appear to be silt; SAND (SM)		
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

MACTEC

STP COL : 5050-06-0496

SOIL LOG - Boring No. OW-332-L

Depth (feet)	Sample	Sample Type & No.	Unconnected Blows/6 Inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	Instrument
80									SP	Cuttings appear to be SAND (SP)		
81												
82												
83												
84												
85												
86												
87												
88												
89												
90										Cuttings appear to be SAND (SP)		
91												
92												
93												
94												
95												
96												
97												
98												
99												
100										Cuttings appear to be SAND (SP)		
101												
102												
103												
104												
105										Boring Terminated at 105-feet	Wash hole and ream to 8 inch diameter	
106												
107												
108												
109												
110												
111												
112												
113												
114												
115												
116												
117												
118												
119												
120												

Project Name : Job Number
MACTEC
STP COL : 5050-06-0496

SOIL LOG - Boring No. OW-332-La

Type and Diameter of Boring: Wash Rotary / 8 inch	Boring Location: Proposed Power Block, N 363739.87 E 2943610.91		Total Depth: 105 feet
Drilling Contractor and Rig: BEST / Failing 1500	Elevation at boring: 30.01 feet	Ground Water Depth	Depth to Bedrock
Sampling Method: No sampling	Sample Driving Hammer/Drop: NA / NA	No. of Samples: 0	Date Started: 2/7/07
	Borehole Inclination: 0	Logged by: M. H. Niemann	Date Completed: 2/9/07

Reviewed by / Date: HC 5/4/07
Reviewed by / Date: KAW 4/27/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	Instrument
0									CH	Cuttings appear to be CLAY (CH)	***REPLACEMENT FOR OW-332L*** OW-332L was drilled to 105 feet on 12/01/06 and found collapsed 2/2007. OW-332L was abandoned 2/7/2007.	
1												
2												
3												
4												
5												
6											Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations. Screen placements based on information from geotechnical boring.	
7												
8												
9												
10										Cuttings appear to be CLAY (CH)		
11												
12												
13												
14												
15												
16											12/28/06: Water level measured after development	
17												
18												
19												
20										Cuttings appear to be CLAY (CH)		
21												
22												
23												
24												
25												
26												
27												
28												
29												
30									SP	Cuttings appear to be SAND (SP)		
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

Project Name : Job Number

MACTEC

STP COL : 5050-06-0496

SOIL LOG - Boring No. OW-332-La

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	Instrument
40									SP	Cuttings appear to be SAND (SP)		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50									CH	Cuttings appear to be CLAY (CH)		
51												
52												
53												
54												
55												
56												
57												
58												
59												
60									SC	Cuttings appear to be clay; SAND(SC)		
61												
62												
63												
64												
65												
66												
67												
68												
69												
70									SM	Cuttings appear to be silt; SAND (SM)		
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

MACTEC

STP COL ; 5050-06-0496

SOIL LOG - Boring No. OW-332-La

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	Instrument
80									SP	Cuttings appear to be SAND (SP)		
81												
82												
83												
84												
85												
86												
87												
88												
89												
90										Cuttings appear to be SAND (SP)		
91												
92												
93												
94												
95												
96												
97												
98												
99												
100										Cuttings appear to be SAND (SP)		
101												
102												
103												
104												
105										Boring Terminated at 105-feet	Wash hole and ream to 8 inch diameter	
106												
107												
108												
109												
110												
111												
112												
113												
114												
115												
116												
117												
118												
119												
120												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-332-U

Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location Proposed Power Block N 363739.21 E 2943591.02		Total Depth 48 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 30.24 feet	Ground Water Depth 8.01 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 32.1 feet	No. of Samples 0	Date Started 11/3/06
	Borehole Inclination 0	Logged by R. Clark	Date Completed 11/21/06

Reviewed by / Date MDD 4/3/07
Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–19									CH	Cuttings appear to be CLAY (CH)	Screen placements based on information from geotechnical boring 12/28/06: Water level measured after development	
20–40									SP	Cuttings appear to change to SAND (SP) Cuttings appear to be SAND (SP)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-332-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be SAND (SP)		
41												
42												
43												
44												
45												
46												
47												
48										Boring Teminated at 48-feet	Wash hole and ream to 8 inch diameter	
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-348-L

Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location Fire Water Tank N 362685.92 E 2943014.48		Total Depth 81 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 30.08 feet	Ground Water Depth 16.16 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 31.86 feet	No. of Samples 0	Date Started 11/2/06
	Borehole Inclination 0	Logged by R. Clark	Date Completed 11/21/06

Reviewed by / Date MJD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–5									CH	Cuttings appear to be CLAY (CH); Wood material observed in first 5-feet of cuttings (possible Fill).	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
5–27									CH	Cuttings appear to be CLAY (CH) Cuttings appear to be CLAY (CH) Cuttings appear to be CLAY (CH)	Screen placements based on information from geotechnical boring	
27–40									SP	Cuttings appear to change to SAND (SP) Cuttings appear to be SAND (SP)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-348-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40												
41									SP	Cuttings appear to be SAND (SP)		
42												
43												
44												
45												
46												
47												
48												
49												
50												
51										Cuttings appear to be SAND (SP)		
52												
53												
54												
55												
56												
57												
58												
59												
60												
61												
62												
63												
64									CH	Cuttings appear to change to CLAY (CH)		
65												
66												
67												
68												
69												
70												
71										Cuttings appear to be CLAY (CH)		
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-348-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80									CH			
81										Boring Terminated at 81-feet		
82												
83												
84												
85												
86												
87												
88												
89												
90												
91												
92												
93												
94												
95												
96												
97												
98												
99												
100												
101												
102												
103												
104												
105												
106												
107												
108												
109												
110												
111												
112												
113												
114												
115												
116												
117												
118												
119												
120												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-348-U

Type and Diameter of Boring: Wash Rotary / 8 inch	Boring Location: Fire Water Tank, N 362685.23 E 2942994.44		Total Depth: 42 feet
Drilling Contractor and Rig: BEST / Failing 1500	Elevation at Boring: 30.51 feet	Ground Water Depth: 8.09 feet	Depth to Bedrock:
Sampling Method: No sampling	Elevation at Well: 32.28 feet	No. of Samples: 0	Date Started: 11/2/06
	Borehole Inclination: 0	Logged by: R. Clark	Date Completed: 11/21/06

Reviewed by / Date: MJD 4/5/07

Reviewed by / Date: KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–23									CH	Cuttings appear to be CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
8									∇		12/28/06: Water level measured after development	
10–23										Cuttings appear to be CLAY (CH)		
20–23										Cuttings appear to be CLAY (CH)		
24–40									SP	Cuttings appear to be SAND (SP)	Screen placements based on information from geotechnical boring	
30–40										Cuttings appear to be SAND (SP)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-348-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP			
41												
42										Boring Terminated at 42-feet	Wash hole and ream to 8 inch diameter	
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-349-L

Type and Diameter of Boring Rotary Wash / 8 inch	Boring Location Heavy Haul Road N 362901.84 E 2943602.97		Total Depth 83 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 29.41 feet	Ground Water Depth 15.22 feet	Depth to Bedrock
Sampling Method No Sampling	Elevation at Well 31.03 feet	No. of Samples 0	Date Started 11/4/06
	Borehole Inclination 0	Logged by R. Clark	Date Completed 11/4/06

Reviewed by / Date MJD 4/3/07
Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0									CH	Cuttings appear to be a CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
1												
2												
3												
4												
5											Screen placements based on information from geotechnical boring	
6												
7												
8												
9												
10										Cuttings appear to be a CLAY (CH)		
11												
12												
13												
14												
15									∇		12/28/06: Water level measured after development	
16												
17												
18												
19												
20										Cuttings appear to be a CLAY (CH)		
21												
22												
23												
24									SP			
25												
26												
27												
28												
29												
30										Cuttings appear to be a SAND (SP)		
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-349-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40										Cuttings appear to be a SAND (SP)		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50										Cuttings appear to be a SAND (SP)		
51												
52												
53												
54												
55												
56												
57												
58												
59												
60										Cuttings appear to be a SAND (SP)		
61												
62												
63												
64												
65												
66												
67												
68												
69												
70										Cuttings appear to be a SAND (SP)		
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-349-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80												
81									SP	Cuttings appear to be a SAND (SP)		
82												
83										Boring Terminated at 83-feet	Wash hole and ream to 8 inch diameter	
84												
85												
86												
87												
88												
89												
90												
91												
92												
93												
94												
95												
96												
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117												
118												
119												
120												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-349-U	
Type and Diameter of Boring Rotary Wash / 8 inch	Boring Location Heavy Haul Road N 362902.4 E 2943582.28		Total Depth 48 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 29.4 feet	Ground Water Depth 7.28 feet	Depth to Bedrock
Sampling Method No Sampling	Elevation at Well 31.29 feet	No. of Samples 0	Date Started 11/7/06
	Borehole Inclination 0	Logged by R. Clark	Date Completed 11/27/06

Reviewed by / Date MDD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0									CH	Cuttings appear to be a CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
1												
2												
3												
4												
5											Screen placements based on information from geotechnical boring	
6												
7									▽		12/28/06: Water level measured after development	
8												
9												
10										Cuttings appear to be a CLAY (CH)		
11												
12												
13												
14												
15												
16												
17												
18												
19												
20										Cuttings appear to be a CLAY (CH)		
21												
22												
23												
24												
25												
26												
27												
28												
29												
30									SP	Cuttings appear to be a SAND (SP)		
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-349-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be a SAND (SP)		
41												
42												
43												
44												
45												
46												
47												
48										Boring Termintated at 48-feet	Wash hole and ream to 8 inch diameter	
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
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68												
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72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-408-L

Type and Diameter of Boring: Wash Rotary / 6.5 inch	Boring Location: Unit 4 - Reactor Building, N 363196.18 E 2942472.54		Total Depth: 82 feet
Drilling Contractor and Rig: BEST / Failing 1500	Elevation at Boring: 31.73 feet	Ground Water Depth: 18.05 feet	Depth to Bedrock
Sampling Method: No sampling	Elevation at Well: 33.76 feet	No. of Samples: 0	Date Started: 10/31/06
	Borehole Inclination: 0	Logged by: R. Clark	Date Completed: 11/20/06

Reviewed by / Date: MDD 4/3/07

Reviewed by / Date: KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–23									CH	Cuttings appear to be dark red; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
											Screen placements based on information from geotechnical boring	
10–23										Cuttings appear to be red-brown; CLAY (CH)		
18									∇		12/28/06: Water level measured after development	
24–40									SP	Cuttings appear to be SAND (SP)		
35–40										Cuttings appear to be SAND (SP); fine-grained		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-408-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be SAND (SP); fine-grained		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
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70												
71												
72												
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74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-408-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80									SP			
81												
82										Boring Terminated at 82-feet	Wash hole and ream to 8 inch diameter	
83												
84												
85												
86												
87												
88												
89												
90												
91												
92												
93												
94												
95												
96												
97												
98												
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113												
114												
115												
116												
117												
118												
119												
120												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-408-U	
Type and Diameter of Boring Hollow Stem Auger / 8 inch		Boring Location Unit 4 - Reactor Building N 363194.01 E 2942456.01	Total Depth 43.5 feet
Drilling Contractor and Rig BEST / CME 45		Elevation at Boring 31.5 feet	Ground Water Depth 9.71 feet	Depth to Bedrock
Sampling Method No sampling		Elevation at Well 33.57 feet	No. of Samples 0	Date Started 11/1/06
		Borehole Inclination 0	Logged by R. Clark	Date Completed 11/20/06

Reviewed by / Date MJD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–38									CH	Cuttings appear to be CLAY (CH); high plasticity	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
											Screen placements based on information from geotechnical boring	
										Cuttings appear to be CLAY (CH); high plasticity	12/28/06: Water level measured after development	
										Cuttings appear to be silt; CLAY (CH)		
										Cuttings appear to be silt; CLAY (CH)		
										Cuttings are CLAY (CH)		
38–40									SP	Cuttings appear to be SAND (SP)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-408-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP			
41												
42												
43												
44										Boring Terminated at 43.5-feet	Wash hole and ream to 8 inch diameter	
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
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68												
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71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-420-U

Type and Diameter of Boring: Rotary Wash / 8 inch	Boring Location: Heavy Haul Road, N 362902.15 E 2942018.94		Total Depth: 51 feet
Drilling Contractor and Rig: BEST / Failing 1500	Elevation at Boring: 32.25 feet	Ground Water Depth: 9.98 feet	Depth to Bedrock
Sampling Method: No Sampling	Elevation at Well: 33.79 feet	No. of Samples: 0	Date Started: 11/7/06
	Borehole Inclination: 0	Logged by: R. Clark	Date Completed: 11/20/06

Reviewed by / Date MJD 4/2/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–9									CH	Cuttings appear to be a CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations Screen placements based on information from geotechnical boring	
10–29									CH	Cuttings appear to be a CLAY (CH) Cuttings appear to be a CLAY (CH)	12/28/06: Water level measured after development	
30–40									SP	Cuttings appear to be a SAND (SP)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-420-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be a SAND (SP)		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50										Cuttings appear to be a SAND (SP)		
51										Boring Terminated at 51-feet	Wash hole and ream to 8 inch diameter	
52												
53												
54												
55												
56												
57												
58												
59												
60												
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-438-L	
Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location Maintenance Shop N 363790.77 E 2942045.09		Total Depth 105 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 30.11 feet	Ground Water Depth 15.85 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 31.57 feet	No. of Samples 0	Date Started 11/21/06
	Borehole Inclination 0	Logged by M. H. Niemann	Date Completed 12/1/06

Reviewed by / Date MD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0									CH	Cuttings appear to be dark gray; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
1												
2												
3												
4												
5											Screen placements based on information from geotechnical boring	
6												
7												
8												
9												
10										Cuttings appear to be reddish brown; CLAY (CH)		
11												
12												
13												
14												
15												
16									▼		12/28/06: Water level measured after development	
17												
18												
19												
20									SP	Cuttings appear to be reddish brown; silt; SAND (SP)		
21												
22												
23												
24												
25												
26												
27												
28												
29												
30										Cuttings appear to be brown; silt; SAND (SP); fine sand		
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-438-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be brown; silt; SAND (SP); fine sand		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50										Cuttings appear to be brown; silt; SAND (SP); fine sand. Grades into reddish brown; gravel; CLAY (CH); some gravel		
51												
52												
53												
54												
55												
56												
57												
58												
59												
60									CH	Cuttings appear to be reddish gray; CLAY (CH); calcareous nodules observed		
61												
62												
63												
64												
65												
66												
67												
68												
69												
70										Cuttings appear to be reddish gray; CLAY (CH); calcareous nodules observed		
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-438-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80												
81									SP	Cuttings appear to be brown; SAND (SP); little to no silt; fine to coarse sand		
82												
83												
84												
85												
86												
87												
88												
89												
90												
91										Cuttings appear to be brown; SAND (SP); fine to coarse sand		
92												
93												
94												
95												
96												
97												
98												
99												
100												
101										Cuttings appear to be brown; SAND (SP); fine to coarse sand		
102												
103												
104												
105												
106										Boring Terminated at 105-feet	Wash hole and ream to 8 inch diameter	
107												
108												
109												
110												
111												
112												
113												
114												
115												
116												
117												
118												
119												
120												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-438-U

Type and Diameter of Boring: Wash Rotary / 8 inch	Boring Location: Maintenance Shop, N 363792.04 E 2942025.17		Total Depth: 42 feet
Drilling Contractor and Rig: BEST / Failing 1500	Elevation at Boring: 30.53 feet	Ground Water Depth: 8.45 feet	Depth to Bedrock
Sampling Method: No sampling	Elevation at Well: 32.18 feet	No. of Samples: 0	Date Started: 11/20/06
	Borehole Inclination: 0	Logged by: A. Osorio	Date Completed: 12/1/06

Reviewed by / Date: MJD 4/3/07

Reviewed by / Date: KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–28									CH	Surface Grass (Approximately 4 inches) Cuttings appear to be black to gray; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations Screen placements based on information from geotechnical boring 12/28/06: Water level measured after development	
8										∇ Color changes to brown		
11										Cuttings appear to be brown; silt; CLAY (CH)		
20–28										Cuttings appear to be brown; CLAY (CH)		
28–40									SP	Cuttings appear to be brown; SAND (SP)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-438-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be brown; SAND (SP)		
41												
42										Boring Terminated at 42-feet	Wash hole and ream to 8 inch diameter	
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
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78												
79												
80												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-910-L	
Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location UHS Basin N 363363.45 E 2941266.45		Total Depth 94 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 30.75 feet	Ground Water Depth 16.62 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 32.48 feet	No. of Samples 0	Date Started 12/18/06
	Borehole Inclination 0	Logged by M. H. Niemann	Date Completed 12/20/06

Reviewed by / Date MTD 4/5/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–21									CH	Cuttings appear to be dark gray; CLAY (CH) to 5-feet; grades to gray to light gray; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
											Screen placements based on information from geotechnical boring	
10–21										Cuttings appear to be gray; CLAY (CH) to 11-feet; changes to reddish brown; silt; CLAY (CH)		
16									∇		12/28/06: Water level measured after development	
20–21										Cuttings appear to be reddish brown; silt; CLAY (CH)		
22–40									SP	Cuttings appear to change to brown; silt; SAND (SP); fine grained		
30–40										Cuttings appear to be brown; silt; SAND (SP); fine grained		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-910-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be brown; silt; SAND (SP); fine grained		
41												
42												
43												
44												
45												
46												
47									CH	Cuttings appear to change to CLAY (CH)		
48												
49												
50										Cuttings appear to be CLAY (CH)		
51												
52												
53												
54												
55												
56												
57												
58												
59												
60										Cuttings appear to be greenish gray to gray; CLAY (CH)		
61												
62												
63												
64												
65												
66												
67												
68												
69												
70										Cuttings appear to be greenish gray; CLAY (CH); calcareous nodules		
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-910-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80												
81									CH	Cuttings appear to be greenish gray; CLAY (CH); calcareous nodules		
82												
83									SP	Cuttings appear to change to silt; SAND (SP); fine grained		
84												
85												
86												
87												
88												
89												
90												
91										Cuttings appear to change to silt; SAND (SP); fine grained		
92									CH	Cuttings appear to change to CLAY (CH)		
93												
94												
95										Boring Terminated at 94-feet	Wash hole and ream to 8 inch diameter	
96												
97												
98												
99												
100												
101												
102												
103												
104												
105												
106												
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119												
120												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-910-U	
Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location UHS Basin N 363362.02 E 2941246.57		Total Depth 38 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 30.69 feet	Ground Water Depth 9.11 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 32.32 feet	No. of Samples 0	Date Started 12/16/06
	Borehole Inclination 0	Logged by M. H. Niemann	Date Completed 12/20/06

Reviewed by / Date MTD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–8									CH	Cuttings appear to be dark gray; CLAY (CH) to 8-feet. Grades to light gray and reddish brown; CLAY (CH) and silt; CLAY (CH); some calcareous nodules	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
5–8											Screen placements based on information from geotechnical boring	
9									∇		12/28/06: Water level measured after development	
10–21										Cuttings appear to be reddish brown; silt; CLAY (CH); calcareous nodules Cuttings appear to be reddish brown; silt; CLAY (CH)		
22–38									SP	Cuttings appear to change to brown; silt; SAND (SP); fine grained Cuttings appear to be brown; silt; SAND (SP); fine grained		
38–40										Boring Terminated at 38-feet	Wash hole and ream to 8 inch diameter	

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-928-L	
Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location Northwest of Power Block N 364932.3 E 2940376.21		Total Depth 123 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 29.81 feet	Ground Water Depth 15.75 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 31.56 feet	No. of Samples 0	Date Started 12/15/06
	Borehole Inclination 0	Logged by M. H. Niemann	Date Completed 12/19/06

Reviewed by / Date MTD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–27									CH	Cuttings appear to be gray to yellowish brown; gravel; CLAY (CH); fine gravel/calcareous nodules. Grades to yellowish gray to reddish brown; silt; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
											Screen placements based on information from geotechnical boring	
										Cuttings appear to be reddish brown; silt; CLAY (CH)		
									▼		12/28/06: Water level measured after development	
										Cuttings appear to be reddish brown; silt; CLAY (CH)		
27–40									SP	Cuttings appear to change to reddish brown; SAND (SP); silt; fine grained		
										Cuttings appear to be reddish brown; silt; SAND (SP); fine grained		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-928-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40												
41									SP	Cuttings appear to be reddish brown; silt; SAND (SP); fine grained		
42												
43									CH	Cuttings appear to change to reddish brown; silt; CLAY (CH); few fine calcareous nodules		
44												
45												
46												
47												
48												
49												
50												
51										Cuttings appear to be reddish brown; silt; CLAY (CH)		
52												
53												
54												
55												
56												
57												
58												
59												
60												
61										Cuttings appear to be reddish brown; silt; CLAY (CH)		
62												
63												
64												
65												
66												
67												
68												
69												
70												
71										Cuttings appear to be reddish brown mottling with gray; silt; CLAY (CH)		
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-928-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80									CH	Cuttings appear to be reddish brown; silt; CLAY (CH)		
81												
82												
83									SP	Cuttings appear to be silt; SAND (SP)		
84												
85												
86												
87												
88												
89												
90										Cuttings appear to be silt; SAND (SP)		
91												
92												
93												
94									CH	Cuttings appear to be CLAY (CH)		
95												
96												
97												
98												
99									SP	Cuttings appear to change to silt; SAND (SP)		
100												
101												
102												
103												
104												
105												
106												
107												
108												
109												
110										Cuttings appear to be silt; SAND (SP)		
111												
112												
113												
114												
115												
116												
117												
118												
119												
120												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-928-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/8 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
120									SP	Cuttings appear to be silt; SAND (SP)		
121												
122												
123										Boring Terminated at 123-feet	Wash hole and ream to 8 inch diameter	
124												
125												
126												
127												
128												
129												
130												
131												
132												
133												
134												
135												
136												
137												
138												
139												
140												
141												
142												
143												
144												
145												
146												
147												
148												
149												
150												
151												
152												
153												
154												
155												
156												
157												
158												
159												
160												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-928-U	
Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location Northwest of Power Block N 364933.86 E 2940356.48		Total Depth 41.5 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 30.02 feet	Ground Water Depth 8.18 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 31.69 feet	No. of Samples 0	Date Started 12/16/06
	Borehole Inclination 0	Logged by M. H. Niemann	Date Completed 12/19/06

Reviewed by / Date MJD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–8									CH	Cuttings appear to be dark gray; CLAY (CH) grading to a gray and reddish brown; silt; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations Screen placements based on information from geotechnical boring	
8									∇		12/28/06: Water level measured after development	
10–21										Cuttings appear to be reddish brown; silt; CLAY (CH) Cuttings appear to be reddish brown; silt; CLAY (CH)		
23–40									SP	Cuttings appear to be brown; silt; SAND (SP)		

Project Name : Job Number

STP COL ; 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-928-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be brown; silt; SAND (SP)		
41												
42										Boring Terminated at 41.5-feet	Wash hole and ream to 8 inch diameter	
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
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67												
68												
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71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-929-L	
Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location Northeast of Power Block N 364671.5 E 2945497.78		Total Depth 100 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 36.93 feet	Ground Water Depth 23.47 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 38.63 feet	No. of Samples 0	Date Started 12/12/06
	Borehole Inclination 0	Logged by M. H. Niemann	Date Completed 12/30/06

Reviewed by / Date MJD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–39									CH	Cuttings appear to be reddish brown; sand; CLAY (CH); some sand	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
40										Cuttings appear to be reddish brown; CLAY (CH) grading to dark gray; CLAY (CH)	Screen placements based on information from geotechnical boring	
21–23										Cuttings appear to be reddish brown; CLAY (CH)		
23									▽		12/28/06: Water level measured after development	
30–40										Cuttings appear to be reddish brown and gray; CLAY (CH)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-929-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									CH	Cuttings appear to be reddish brown and gray; sand; CLAY (CH); some sand		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50										Cuttings appear to be reddish brown and gray; sand; CLAY (CH); some sand		
51												
52												
53									SP	Cuttings appear to change to silt; SAND (SP)		
54												
55												
56												
57												
58												
59												
60									CH	Cuttings appear to change to CLAY (CH)		
61												
62												
63												
64												
65												
66												
67												
68												
69												
70										Cuttings appear to be reddish brown; CLAY (CH)		
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-929-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80									CH	Cuttings appear to be reddish brown; CLAY (CH)		
81												
82									SP	Cuttings appear to change to reddish brown; silt; SAND (SP)		
83												
84												
85												
86												
87												
88												
89												
90										Cuttings appear to change to reddish brown; silt; SAND (SP)		
91												
92												
93												
94												
95												
96												
97												
98												
99									CH	Cuttings appear to change to reddish brown; CLAY (CH)		
100										Boring Terminated at 100-feet	Wash hole and ream to 8 inch diameter	
101												
102												
103												
104												
105												
106												
107												
108												
109												
110												
111												
112												
113												
114												
115												
116												
117												
118												
119												
120												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-929-U

Type and Diameter of Boring: Wash Rotary / 8 inch	Boring Location: Northeast of Power Block N 364672.34 E 2945477.58		Total Depth: 62 feet
Drilling Contractor and Rig: BEST / Failing 1500	Elevation at Boring: 36.91 feet	Ground Water Depth: 12.92 feet	Depth to Bedrock
Sampling Method: No sampling	Elevation at Well: 38.71 feet	No. of Samples: 0	Date Started: 12/13/06
	Borehole Inclination: 0	Logged by: M. H. Niemann	Date Completed: 12/15/06

Reviewed by / Date MJD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–14									CH	Cuttings appear to be grayish green to gray; sand; CLAY (CH); some sand	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
6–14											Screen placements based on information from geotechnical boring	
11–14										Cuttings appear to be gray and reddish brown; CLAY (CH) transitioning into dark gray; CLAY (CH) and reddish brown; CLAY (CH)		
13									∇		12/28/06: Water level measured after development	
21–31										Cuttings appear to be reddish brown and gray; CLAY (CH); calcareous nodules		
31–40										Cuttings appear to be reddish brown and gray; CLAY (CH)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-929-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									CH	Cuttings appear to be reddish brown and gray; CLAY (CH)		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50										Cuttings appear to be reddish brown and gray; CLAY (CH)		
51												
52									SP	Cuttings appear to change to SAND (SP)		
53												
54												
55												
56												
57												
58												
59									CH	Cuttings appear to change to reddish brown; CLAY (CH)		
60												
61												
62										Boring Terminated at 62-feet	Wash hole and ream to 8 inch diameter	
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-930-L	
Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location: Southeast of Unit 1 & 2 ECR/UHS N 360214.45 E 2949525.96		Total Depth 108 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 26.21 feet	Ground Water Depth 14.9 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 27.98 feet	No. of Samples 0	Date Started 12/11/06
	Borehole Inclination 0	Logged by C. Bruce	Date Completed 12/18/06

Reviewed by / Date MJD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–18									CH	Cuttings appear to be very dark greenish gray (GLEY 1 3/5GY); silt; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations Screen placements based on information from geotechnical boring	
15									▽	Cuttings appear to be yellowish red (5YR 5/8); silt; CLAY (CH)	12/28/06: Water level measured after development	
18–40									SM	Cuttings appear to be yellowish red (5YR 5/8); silt; SAND (SM) Cuttings appear to be strong brown (7.5YR 4/6); silt; SAND (SM)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-930-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SM	Cuttings appear to be strong brown (7.5YR 4/6); silt; SAND (SM)		
41												
42												
43												
44												
45												
46									CH	Cuttings appear to be strong brown (7.5YR 5/8); silt; CLAY (CH)		
47												
48												
49												
50												
51												
52												
53												
54												
55										Cuttings appear to be strong brown (7.5YR 5/8); silt; CLAY (CH); trace of angular calcium carbonate fragments		
56												
57												
58												
59												
60												
61												
62												
63												
64									SM	Cuttings appear to be strong brown (7.5YR 5/8); silt; SAND (SM)		
65												
66												
67												
68												
69												
70										Cuttings appear to be strong brown (7.5YR 5/8); silt; SAND (SM)		
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-930-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80									SM	Cuttings appear to be strong brown (7.5YR 5/6); silt; SAND (SM); sand is coarsening with depth		
81												
82												
83												
84												
85												
86												
87												
88												
89												
90										Cuttings appear to be strong brown (7.5YR 5/6); silt; SAND (SM); sand is coarsening with depth		
91												
92												
93												
94												
95												
96												
97												
98												
99												
100										Cuttings appear to be dark yellowish brown; silt; gravel; SAND (SM); trace of gravel and coarse sand		
101												
102												
103												
104												
105												
106												
107												
108										Cuttings appear to be dark yellowish brown; silt; gravel; SAND (SM); trace of gravel and coarse sand		
109										Boring Terminated at 108-feet	Wash hole and ream to 8 inch diameter	
110												
111												
112												
113												
114												
115												
116												
117												
118												
119												
120												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-930-U	
Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location Southeast of Unit 1 & 2 ECR/UHS N 360209.72 E 2949506.58		Total Depth 38 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 25.62 feet	Ground Water Depth 7.92 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 27.33 feet	No. of Samples 0	Date Started 12/11/06
	Borehole Inclination 0	Logged by M. H. Niemann	Date Completed 12/18/06

Reviewed by / Date MDD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–18									CH	Cuttings appear to be dark gray; CLAY (CH) Cuttings appear to be dark gray; CLAY (CH) to 15-feet; transistioning into reddish brown; CLAY (CH) to 18-feet	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations Screen placements based on information from geotechnical boring 12/28/06: Water level measured after development	
18–38									SM	Cuttings appear to change to brown; silt; SAND (SM); fine grained Cuttings appear to be brown; silt; SAND (SM); fine grained Cuttings appear to be brown; silt; SAND (SM); fine grained		
38–40										Boring Terminated at 38-feet	Wash hole and ream to 8 inch diameter	

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-931-U	
Type and Diameter of Boring Wash Rotary / 7 inch	Boring Location Southwest of Power Block N 361979.42 E 2939520.36		Total Depth 38 feet
Drilling Contractor and Rig BEST / Holemaster 1500	Elevation at Boring 30.53 feet	Ground Water Depth 9.82 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 32.1 feet	No. of Samples 0	Date Started 12/8/06
	Borehole Inclination 0	Logged by D. Heslep	Date Completed 12/15/06

Reviewed by / Date MJD 4/5/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–20									CH	Cuttings appear to be dark gray; silt; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
5–20										Cuttings appear to be reddish orange; silt; sand; CLAY (CH); some sand	Screen placements based on information from geotechnical boring	
10–20									∇	Cuttings appear to be reddish orange; silt; sand; CLAY (CH); some sand	12/28/06: Water level measured after development	
20–38									SP	Cuttings appear to change to reddish orange; SAND (SP)		
30–38										Cuttings appear to change to reddish orange; SAND (SP)		
38–40										Boring Terminated at 38-feet	Wash hole and ream to 8 inch diameter	

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-932-L

Type and Diameter of Boring: Wash Rotary / 8 inch	Boring Location: South of Power Block, N 361899.37 E 2942115.9		Total Depth: 81.5 feet
Drilling Contractor and Rig: BEST / Failing 1500	Elevation at Boring: 31.09 feet	Ground Water Depth: 17.23 feet	Depth to Bedrock
Sampling Method: No sampling	Elevation at Well: 32.79 feet	No. of Samples: 0	Date Started: 12/14/06
	Borehole Inclination: 0	Logged by: M. H. Niemann	Date Completed: 12/19/06

Reviewed by / Date MHD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–24									CH	Cuttings appear to be dark gray; CLAY (CH); grading into light gray and reddish brown; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
											Screen placements based on information from geotechnical boring	
										Cuttings appear to be reddish brown; CLAY (CH); few fine calcareous nodules		
17									▽		12/28/06: Water level measured after development	
25–40									SP	Cuttings appear to change to; silt; SAND (SP); fine grained		
										Cuttings appear to be brown; silt; SAND (SP); fine grained		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-932-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be brown; silt; SAND (SP); fine grained		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50										Cuttings appear to be brown; silt; SAND (SP); fine grained		
51												
52												
53												
54												
55									CH	Cuttings appear to change to reddish brown; CLAY (CH) grading to gray; CLAY (CH) below 58-feet		
56												
57												
58												
59												
60										Cuttings appear to be gray; CLAY (CH)		
61												
62												
63												
64												
65												
66												
67									SP	Cuttings appear to change to silt; SAND (SP); fine grained		
68												
69												
70										Cuttings appear to be a silty SAND (SP); fine grained		
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-932-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80									SP			
81												
82										Boring Terminated at 81.5-feet	Wash hole and ream to 8 inch diameter	
83												
84												
85												
86												
87												
88												
89												
90												
91												
92												
93												
94												
95												
96												
97												
98												
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101												
102												
103												
104												
105												
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107												
108												
109												
110												
111												
112												
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120												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-932-U	
Type and Diameter of Boring Wash Rotary / 8 inch	Boring Location South of Power Block N 361898.53 E 2942097.29		Total Depth 41.5 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 31.35 feet	Ground Water Depth 8.52 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 32.83 feet	No. of Samples 0	Date Started 12/14/06
	Borehole Inclination 0	Logged by M. H. Niemann	Date Completed 12/19/06

Reviewed by / Date MJD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–26									CH	Cuttings appear to be dark gray; CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations Screen placements based on information from geotechnical boring 12/28/06: Water level measured after development	
26–40									SP	Cuttings appear to change to silt; SAND (SP); fine grained Cuttings appear to be silt; SAND (SP); fine grained		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-932-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP			
41												
42										Boring Terminated at 41.5-feet	Wash hole and ream to 8 inch diameter	
43												
44												
45												
46												
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78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-933-L

Type and Diameter of Boring: Mud Rotary / 8 inch	Boring Location: South of Power Block, N 361898.05 E 2943515.01		Total Depth: 88 feet
Drilling Contractor and Rig: BEST / Failing 1500	Elevation at Boring: 28.74 feet	Ground Water Depth: 14.6 feet	Depth to Bedrock
Sampling Method: No sampling	Elevation at Well: 30.45 feet	No. of Samples: 0	Date Started: 11/8/06
	Borehole Inclination: 0	Logged by: R. Clark	Date Completed: 11/28/06

Reviewed by / Date: MJD 4/3/07

Reviewed by / Date: KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–20									CH	Cuttings from appear to be CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations Screen placements based on information from geotechnical boring 12/28/06: Water level measured after development	
20–30									CL-ML	Cuttings from appear to be silt; CLAY (CL-ML)		
30–40									SP	Cuttings from appear to be SAND (SP)		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-933-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings from appear to be SAND (SP)		
41												
42												
43												
44												
45												
46												
47												
48												
49												
50										Cuttings from appear to be SAND (SP)		
51												
52												
53												
54												
55												
56												
57												
58												
59												
60										Cuttings from appear to be SAND (SP)		
61												
62												
63												
64												
65												
66												
67												
68												
69												
70										Cuttings from appear to be SAND (SP)		
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-933-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80									SP	Cuttings from appear to be SAND (SP)		
81												
82												
83												
84												
85												
86												
87												
88										Boring Terminated at 88-feet	Wash hole and ream to 8 inch diameter	
89												
90												
91												
92												
93												
94												
95												
96												
97												
98												
99												
100												
101												
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109												
110												
111												
112												
113												
114												
115												
116												
117												
118												
119												
120												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-933-U

Type and Diameter of Boring: Mud Rotary / 8 inch	Boring Location: South of Power Block, N 361897.65 E 2943494.66		Total Depth: 38 feet
Drilling Contractor and Rig: BEST / Failing 1500	Elevation at Boring: 28.87 feet	Ground Water Depth: 6.44 feet	Depth to Bedrock
Sampling Method: No sampling	Elevation at Well: 30.62 feet	No. of Samples: 0	Date Started: 11/13/06
	Borehole Inclination: 0	Logged by: R. Clark	Date Completed: 11/28/06

Reviewed by / Date: MJD 4/3/07

Reviewed by / Date: KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–25									CH	Cuttings from appear to be CLAY (CH)	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations. Screen placements based on information from geotechnical boring. 12/28/06: Water level measured after development	
26–38									SP	Cuttings from appear to be SAND (SP)		
38–40										Boring Terminated at 38-feet	Wash hole and ream to 8 inch diameter	

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-934-L

Type and Diameter of Boring: Wash Rotary / 7 inch	Boring Location: Northeast of Unit 1 & 2 ECR/UHS N 362082.08 E 2948254.12		Total Depth: 102 feet
Drilling Contractor and Rig: BEST / Holemaster 1500	Elevation at Boring: 29.04 feet	Ground Water Depth: 17.07 feet	Depth to Bedrock
Sampling Method: No sampling	Elevation at Well: 30.94 feet	No. of Samples: 0	Date Started: 12/9/06
	Borehole Inclination: 0	Logged by: D. Heslep	Date Completed: 12/15/06

Reviewed by / Date: MJD 4/5/07

Reviewed by / Date: KAW 4/13/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–22									CH	Cuttings appear to be dark gray to reddish brown; silt; sand; CLAY (CH); some sand; calcareous nodules	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations	
										Cuttings appear to be reddish brown; silt; sand; CLAY (CH); some sand; calcareous nodules	Screen placements based on information from geotechnical boring	
										Cuttings appear to be reddish dark gray; silt; sand; CLAY (CH); some sand; calcareous nodules		
17									∇		12/28/06: Water level measured after development	
										Cuttings appear to be reddish dark gray; silt; sand; CLAY (CH); some sand; calcareous nodules		
22–40									SP	Cuttings appear to change to reddish brown; silt; clay; SAND (SP); some silt; some clay; fine to very fine grained		
										Cuttings appear to be reddish brown; silt; clay; SAND (SP); some silt; some clay; fine to very fine grained		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-934-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be reddish brown; silt; clay; SAND (SP); some silt; some clay; fine to very fine grained		
41												
42												
43												
44												
45												
46												
47												
48												
49									CH	Cuttings appear to change to reddish brown to tan and light gray; silt; sand; CLAY (CH); some sand		
50												
51										Cuttings appear to be tan to light gray; silt; sand; CLAY (CH); some sand; very fine grained		
52												
53												
54												
55												
56												
57												
58												
59												
60												
61										Cuttings appear to be tan to light gray; silt; sand; CLAY (CH); some sand; very fine grained		
62												
63									SP	Cuttings appear to change to reddish tan; SAND (SP); very fine grained		
64												
65												
66												
67												
68												
69												
70												
71										Cuttings appear to be reddish tan; SAND (SP); very fine grained		
72												
73												
74												
75									CH	Cuttings appear to change to tan; sand; silt; CLAY (CH); very fine grained; some silt		
76												
77												
78												
79												
80												

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-934-L

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
80									CH	Cuttings appear to be tan; sand; silt; CLAY (CH); very fine grained; some silt		
81												
82												
83												
84												
85												
86												
87												
88												
89												
90										Cuttings appear to be tan; sand; silt; CLAY (CH); very fine grained; some silt		
91												
92									SP	Cuttings appear to change to tan; silt; SAND (SP); very fine grained; some silt		
93												
94												
95												
96												
97												
98												
99												
100										Cuttings appear to be tan; silt; SAND (SP); very fine grained; some silt		
101												
102										Boring Terminated at 102-feet	Wash hole and ream to 8 inch diameter	
103												
104												
105												
106												
107												
108												
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120												

Project Name : Job Number STP COL : 5050-06-0496	MACTEC	WELL LOG SOIL - Well No. OW-934-U	
Type and Diameter of Boring Mud Rotary / 8 inch	Boring Location NE of Unit 1 & 2 ECR/UHS N 362079.87 E 2948234.2		Total Depth 43 feet
Drilling Contractor and Rig BEST / Failing 1500	Elevation at Boring 28.54 feet	Ground Water Depth 10.22 feet	Depth to Bedrock
Sampling Method No sampling	Elevation at Well 30.39 feet	No. of Samples 0	Date Started 11/21/06
	Borehole Inclination 0	Logged by M. Fraychineaud	Date Completed 12/1/06

Reviewed by / Date MJD 4/3/07

Reviewed by / Date KAW 4/3/07

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
0–26									CH	Cuttings appear to be black (Gley1 25/N); silt; CLAY (CH); moist; little silt; high plasticity Cuttings appear to be yellowish red (5YR 5/6); silt; CLAY (CH); moist; little silt; high plasticity; some pebbles and calcareous nodules	Descriptions based on observations of Rotary Wash cuttings; rig geologist and driller's observations Screen placements based on information from geotechnical boring 12/28/06: Water level measured after development	
26–40									SP	Cuttings appear to be reddish yellow (5YR 6/6); silt; SAND (SP); fine; some silt; trace mafic minerals		

Project Name : Job Number

STP COL : 5050-06-0496

MACTEC

WELL LOG SOIL - Well No. OW-934-U

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/8 inches	Recovery (inches)	Water Content	Grain Size	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks	WELL
40									SP	Cuttings appear to be reddish yellow (5YR 6/6); silt; SAND (SP); fine; some silt; trace mafic minerals		
41												
42												
43										Boring Terminated at 43-feet	Wash hole and ream to 8 inch diameter	
44												
45												
46												
47												
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52												
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Appendix C-2

Well Development Records

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-332-U	Developed by:	ML/Niemann
Date Developed:	11-21-06	Development start time:	2:20p
Date Drilled:	11-3-06	Development stop time:	3:30p
Casing Diameter:	2 in	Water Level (start)(b):	8.35 ft
Length of Screened Interval:	10' ft	Water Level (end):	8.50 ft
Top of Screened Interval:	35.0 bgs ft	Calculated well volume (0.163 gal/ft*)(~~b-a~~):	6.22 gal
Well depth from construction log(a):	45.0 bgs ft (Total 46.0)	Minimum volume to be removed:	31.1 gal
Well Depth (start):	(a) 46.51 ft (1.72' stickup)	Actual volume removed:	190 gal
Well Depth (end):	47.55 ft	Disposal method of removed water:	infiltrate surrounding ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used: Ingersoll Rand 185 air compressor w/ 3/8" OD flexible hose, and 1" OD tremie pipe

1.75" size blast to attach to tremie pipe

Description of appearance of water at start:

brown to reddish brown color (sediment filled) after surging, dk reddish brown

Description of appearance of water at end:

pale brown to clear

water runs clear out of hose

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-348-U	Developed by:	Best M H Newman
Date Developed:	11-21-06	Development start time:	8:10 am
Date Drilled:	11-2-06	Development stop time:	9:45AM
Casing Diameter:	2 in	Water Level (start)(b):	8.7 - S.U. ft
Length of Screened Interval:	10' ft	Water Level (end):	~~24~~ 8.09 ft
Top of Screened Interval:	28.0 bgs ft	Calculated well volume (0.163 gal/ft*)(b-a):	4.98 gal
Well depth from construction log(a):	38.0 bgs ft	Minimum volume to be removed:	24 gal
Well Depth (start):	~~40.71~~ 41.71 - S.U. ft	Actual volume removed:	160 gal
Well Depth (end):	41.95 - S.U. ft	Disposal method of removed water:	infiltration

bottom of screened interval

Checked twice to make sure

1.7 stick up

* for 2 inch well casing = $[(((2inch)/(12inch/ft))^2)*3.14]/4 * 7.46\ gal/ft^3 = 0.163\ gal/ft$

Description of equipment used: Ingersoll Rand 185 air compressor, 3/8" flex hose for air flow - 1" OD tremie pipe w/ hose clamped on top for water flow

Description of appearance of water at start: Start development @ 32' mid screen. surged after 20 gallons — brown, no sand in bucket

Description of appearance of water at end: significantly more clear than after 20 gal. removed. Opaque, very light brown in white bucket but mostly clear in cupped hands.

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-348-L	Developed by:	Matt F.
Date Developed:	11.21.06	Development start time:	10:28AM
Date Drilled:	11.2.06	Development stop time:	11:35AM
Casing Diameter:	2 in	Water Level (start)(b):	16.4 - s.u.[1] ft
Length of Screened Interval:	10 ft	Water Level (end):	16.13 - s.u.[1] ft
Top of Screened Interval:	68.3 bgs ft	Calculated well volume (0.163 gal/ft*)~~(b-a)~~:	10.4 gal
Well depth from construction log(a):	78.3 bgs ft	Minimum volume to be removed:	52 gal
Well Depth (start):	81.35 - s.u.[1] ft	Actual volume removed:	115 gal
Well Depth (end):	81.3 - s.u.[1] ft	Disposal method of removed water:	Ground Surface.

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

[1] s.u. = stick up of PVC casing from ground surface = ~ 1.9 feet

Description of equipment used: Ingersoll-Rand 185 air compressor; 3/8" flex hose for air flow; 1" O.D. PVC tremie pipe w/hose attachment for discharge water.

Description of appearance of water at start: Start development @ 45' bgs. Removed 30 gal and then surged well. Installed tremie to approx. 78' bgs. Water was (for approx 10 mins).

Description of appearance of water at end: Slightly opaque but generally clear.

1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number: OW-408U

Date Developed: 11/20/06

Date Drilled: 11.1.06

Casing Diameter: 2 in

Length of Screened Interval: 10' ft

Top of Screened Interval: 32' bgs ft

~~Well depth from construction log(a)~~: 42' bgs ft

Well Depth (start): (a) 34.85 ft

Well Depth (end): 44.29 - 1.80 ft

Developed by: M H Nieman + BGSF

Development start time: 1:45 pm

Development stop time: 2:55 pm

Water Level (start)(b): ~~17.55~~ 10.64 ft

Water Level (end): 10.26 ft

Calculated well volume (0.163 gal/ft*)(~~b-a~~): 4.03 / 5.90 gal

Minimum volume to be removed: 20.17 / 26 gal

Actual volume removed: ~~15~~ 70 gal

Disposal method of removed water: infiltrate - pour on ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163$ gal/ft

Description of equipment used: Ingersoll-Rand 185 air compressor
1" OD Thermoplastic + 3/8" flexible tubing (for air flow)
4" hose clamped to top for air out flow

Description of appearance of water at start: Couple cups of sand in bottom of first bucket can but it in ~~the~~ removed water. - will surge well after 2nd 6 buckets removed -

Description of appearance of water at end: water was very cloudy w/ sediment after surging - cleared up after several buckets (5 gallons each)

12/30/06

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-408L	Developed by:	MH Nierman
Date Developed:	11.20.06	Development start time:	3:10 pm
Date Drilled:	10.31.06	Development stop time:	4:40
Casing Diameter:	2" in	Water Level (start)(b):	17.85 ft
Length of Screened Interval:	10' ft	Water Level (end):	18.46 ft STickup
Top of Screened Interval:	70.2 bgs ft	Calculated well volume (0.163 gal/ft*)(~~b-a~~):	10.65 gal
Well depth from construction log(a):	80.2 bgs ft	Minimum volume to be removed:	53.23 gal
Well Depth (start):	(a) 83.16 ft	Actual volume removed:	85 gal
Well Depth (end):	83.16 ft	Disposal method of removed water:	infiltration on ground

bottom of screen 1.5.07

Strip 1.82'

* for 2 inch well casing = $[(((2inch)/(12inch/ft))^2)*3.14]/4 * 7.46\ gal/ft^3 = 0.163\ gal/ft$

Description of equipment used: Ingersoll Rand 185 air compressor
1" OD tremie pipe w/ hose clamped to top for extra airflow
3/8" SS tube pump/tubing (for airflow)

Description of appearance of water at start: cloudy, brown - having them surge after 35 gallons removed

Description of appearance of water at end:
Clear

1.5.07

75
85

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-420-U	Developed by:	M.H. Niemann Bert +
Date Developed:	11.20.06	Development start time:	10:22
Date Drilled:	11.7.06	Development stop time:	11:30
Casing Diameter:	2" in	Water Level (start)(b):	10.21 ft
Length of Screened Interval:	10' ft	Water Level (end):	10.37 ft
Top of Screened Interval:	38' bgs ft	Calculated well volume (0.163 gal/ft*)(b-a):	6.56 gal
~~Well depth from construction log~~(a):	48' bottom screened interval ft	Minimum volume to be removed:	33 gal
Well Depth (start):	50.51 w/ stickup 49 ft	Actual volume removed:	70 mw 11/20/06 gal
Well Depth (end):	50.51 ft	Disposal method of removed water:	on ground to infiltrate naturally

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163$ gal/ft

Description of equipment used: 1" 3/8" OD tremie pipe
Ingersoll-Rand air compressor 185
3/8" flexible poly hose

Description of appearance of water at start: Sediment filled (mud brown-red color) after ~ 20 g, start to clean up (lt brn)

Description of appearance of water at end: Clear - no visible sediment in water coming from hose

1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW - 308 - U		Developed by:	A. Osorio	
Date Developed:	11/27/06		Development start time:	10:00 AM	
Date Drilled:	11/14/2006		Development stop time:	11:10 AM	
Casing Diameter:	2"	in	Water Level (start)(b):	8.29	ft
Length of Screened Interval:	10	ft	Water Level (end):	8.53	ft
Top of Screened Interval:	36	ft	Calculated well volume (0.163 gal/ft*)(b-a):	6.15	gal
Well depth from construction log(a):	46	ft	Minimum volume to be removed:	30.7	gal
Well Depth (start):	48.91	ft	Actual volume removed:	125	gal
Well Depth (end):	48.90	ft	Disposal method of removed water:	Infiltration	

* for 2 inch well casing = $[(((2inch)/(12inch/ft))^2)*3.14]/4 * 7.46\ gal/ft^3 = 0.163\ gal/ft$

Description of equipment used:

Ingersoll-Rand 185 Compressor with
3/4" of PVC
1" of PVC + water level meter

Description of appearance of water at start:

cloudy, dark brown color

Description of appearance of water at end:

clear; no trace of fine

11/15/07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number: OW-308-L

Developed by: MH Nierman

Date Developed: 11/22/06

Development start time: 10:10a

Date Drilled: 11/13/06

Development stop time: 11:30a

Casing Diameter: 2 in

Water Level (start)(b): 17.31 ft

Length of Screened Interval: 10 ft

Water Level (end): ~~15~~ 15.9 ft (measured 11/28/06)

Top of Screened Interval: 86 ft

Calculated well volume (0.163 gal/ft)(~~b-a~~): 13.0 gal

Well depth from construction log(a): 97.12 ft (w/ stickup = 97.25)

Minimum volume to be removed: 65.0 gal

Well Depth (start): 93.92 ft (stickup = 1.93')

Actual volume removed: 190 gal

Well Depth (end): 97.78 ft (measured 11/28/06)

Disposal method of removed water: infiltrate into surrounding ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used: Ingersoll Rand 185 (air compressor) 3/8" OD flexible hose, + 1" OD tremie pipe

Description of appearance of water at start: dk reddish brown, sediment filled water

after surging – dk brown, clear sediment filled

Description of appearance of water at end: tinted but no fines – morning clear

1.5.07

15.33

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-332-L	Developed by:	MH Niemann
Date Developed:	11/22/06	Development start time:	7:50a
Date Drilled:	11/3/06	Development stop time:	9:25a
Casing Diameter:	2 in	Water Level (start)(b):	17.15 ft
Length of Screened Interval:	10 ft	Water Level (end):	16.61 ft
Top of Screened Interval:	92.1 ft	Calculated well volume (0.163 gal/ft*)(~~b-a~~):	13.86 gal
Well depth from construction log(a):	103.25 ft (Sticking 1.45')	Minimum volume to be removed:	69.32 gal
Well Depth (start)(a):	102.02 ft (WS 12/5/06)	Actual volume removed:	150.0 gal
Well Depth (end):	104.6 ft	Disposal method of removed water:	infiltrate surrounding ground

* for 2 inch well casing = $[(((2inch)/(12inch/ft))^2)*3.14]/4 * 7.46\ gal/ft^3 = 0.163\ gal/ft$

Description of equipment used: Ingersoll Rand 185 air compressor, 3/8" OD flexible hose + 1" OD iron pipe 1.75" surge block + iron pipe for surging

Description of appearance of water at start: dark reddish brown, sediment-filled

Description of appearance of water at end: after surging – back to dark brown, sediment filled
clean recovery, v. pale brown tint (no fines)

WS 12.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	DW-349-U	Developed by:	A. Osorio
Date Developed:	11-27-06	Development start time:	12:43 pm
Date Drilled:	11-7-06	Development stop time:	
Casing Diameter:	2" in	Water Level (start)(b):	7.86 ft
Length of Screened Interval:	10 ft	Water Level (end):	7.98 ft
Top of Screened Interval:	35 ft	Calculated well volume (0.163 gal/ft*) ~~(b-a)~~:	6.05 gal
Well depth from construction log(a):	45 ft	Minimum volume to be removed:	30.27 gal
Well Depth (start):	47.93 ft (including 2' stickup)	Actual volume removed:	185 gal
Well Depth (end):	47.90 ft (including 2' stickup)	Disposal method of removed water:	Infil/Fontana

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used:

Ingersoll-Rand 185 Compressor with 3/4" ø PVC for pumping of well
1" ø PVC for surging of well
Water level meter

Description of appearance of water at start:

Cloudy, dark brown, trace of fines

Description of appearance of water at end:

Clear, no fines traces

UK 1-5-07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number: OW-349-L

Developed by: M H Niemann

Date Developed: 11.27.06 - 11/28/06

Development start time: 3:10p

Date Drilled: 11.4.06

Development stop time: 9:53p

Casing Diameter: 2 in

Water Level (start)(b): 15.18 ft

Length of Screened Interval: 10 ft

Water Level (end): 15.49 ft

Top of Screened Interval: 70 ft

Calculated well volume = (0.163 gal/ft*)(b-a): 10.73 gal

Well depth from construction log(a): 80 ft

81.03 w/sump + stickup 82.67

Minimum volume to be removed: 53.67 gal

stickup = 1.64'

Well Depth (start): 78.3 ft

Actual volume removed: 200 gal

Well Depth (end): 81.67 ft

Disposal method of removed water: Infiltration of surrounding ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163$ gal/ft

Description of equipment used: 185 Ingersoll Rand air compressor, 3/8" OD flexible hose, 1" ID hernie pipe + 1.75" surge block + 1" hernie pipe (for surging block)

Description of appearance of water at start: mud - dk brown - reddish brown, full of sediment

after surging - some appearance, dk brown

Description of appearance of water at end: running clear - slight tint of water but no fines

1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number: OW-438U

Developed by: MH Wiemann

Initial Development - 11/28/06 + surging

Date Developed: 12/1/06

Development start time: 9:10

Date Drilled: 11/20/06

Development stop time: 10:30

Casing Diameter: 2 in

Water Level (start)(b): 8.81 ft

Length of Screened Interval: 10 ft

Water Level (end): 8.65 ft

Top of Screened Interval: 30 ft

Calculated well volume (0.163 gal/ft*)(~~b-a~~): 5.64 gal

Well depth from construction log(a): 41.12 ft w/ stickup = 42.82, stickup = 1.7'

Minimum volume to be removed: 28.18 gal

Well Depth (start)(a): 43.39 ft

Actual volume removed: 1.25 gal

Well Depth (end): 43.48 ft

Disposal method of removed water: infiltrate surrounding ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used: 185 Ingersoll Rand air compressor, 3/8" OD flexible air hose, 1" OD tremie pipe + 1.75" surge block and tremie pipe (for well surging)

Description of appearance of water at start: Muddy brown, full of fine sand sediment

Description of appearance of water at end: pale tinted brown, no fines, nearly clear

NOTE: 25 gallons initially removed on 11/28/06
100 gallons removed on 12/1/06

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-438L	Developed by:	MH/Dickerson
Date Developed:	12/1/06	Development start time:	10:33a
Date Drilled:	11/2/06	Development stop time:	1:20p
Casing Diameter:	2 in	Water Level (start)(b):	16.95 ft
Length of Screened Interval:	10 ft	Water Level (end):	15.91 ft
Top of Screened Interval:	93 ft	Calculated well volume* (0.163 gal/ft)(~~b-a~~):	~~16.97~~ 14.2 gal UW 1-5-07
Well depth from construction log(a):	104.12 ft w/ stickup = 105.72	Minimum volume to be removed:	~~84.8~~ 71.0 gal UW 1-5-07
Well Depth (start):	103.52 ft stickup = 1.6'	Actual volume removed:	200 gal
Well Depth (end):	104.62 ft	Disposal method of removed water:	infiltrate surrounding

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used: 185 Ingersoll Rand air compressor, 3/8" OD flexible air hose, 1" OD thermoplastic + 1.75" screen blocks and threaded pipe (for well scouring)

Description of appearance of water at start: dk brown, full of sediment after surging, same appearance as development start

Description of appearance of water at end: Pale tinted water, no foam, minimal clouds

UW 1-5-07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-9100	Developed by:	M+N Romano
Date Developed:	12/20/06	Development start time:	9:40
Date Drilled:	12/16/06	Development stop time:	11:05
Casing Diameter:	2 in	Water Level (start)(b):	9.5 ft
Length of Screened Interval:	10 ft	Water Level (end):	9.62 ft
Top of Screened Interval:	25 ft	Calculated well volume (0.163 gal/ft)(b-a):	~~4.66~~ 4.34 gal
Well depth from construction log(a):	36.12 ft	Minimum volume to be removed:	~~23.32~~ 21.7 gal
Well Depth (start):	34.7 ft (stickup = ~2')	Actual volume removed:	160 gal
Well Depth (end):	35.95 ft	Disposal method of removed water:	infiltration in surrounding ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used: Ingersoll Rand 185 cfm compressor, 3/8" air hose, 1" Romanie pipe, and 1.25" steel block + Romanie pipe

Description of appearance of water at start: brown + full of sediment + fines

Description of appearance of water at end: pale tint + no fines

1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-910C	Developed by:	MHN/Jeanman
Date Developed:	12/20/06	Development start time:	7:48
Date Drilled:	12/18/06	Development stop time:	9:34
Casing Diameter:	2 in	Water Level (start)(b):	21.75 ft
Length of Screened Interval:	10 ft	Water Level (end):	21.7 ft
Top of Screened Interval:	81 ft	Calculated well volume (0.163 gal/ft)~~(b-a)~~:	11.79 gal
Well depth from construction log(a):	92.12 ft +2 = 94.12	Minimum volume to be removed:	58.98 gal
Well Depth (start):	91.45 ft (shrinkage ≈ 2')	Actual volume removed:	110 gal
Well Depth (end):	92.5 ft (MW 12/20/06)	Disposal method of removed water:	Infiltration on the surrounding ground

* for 2 inch well casing = [((2inch)/(12inch/ft))^2)*3.14]/4 * 7.46 gal/ft^3 =0.163 gal/ft

Description of equipment used: Ingersoll Rand 185 air compressor 3/8" air hose, 1" Metric pipe and 1.25" Surge block + metric pipe

Description of appearance of water at start: brown + full of sediment + fines

Description of appearance of water at end: pale tint, no fines

MHN 12.20.06

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW1-928U	Developed by:	MH Nieneman
Date Developed:	12/19/06	Development start time:	9:46
Date Drilled:	12/16/06	Development stop time:	10:50
Casing Diameter:	2" in	Water Level (start)(b):	8.61 ft
Length of Screened Interval:	10' ft	Water Level (end):	8.61 ft
Top of Screened Interval:	28.5 ft	Calculated well volume (0.163 gal/ft*)(b-a):	5.36 gal
Well depth from construction log(a):	39.62 ft +1.9 = 41.52	Minimum volume to be removed:	26.8 gal
	Stickup = 1.9		
Well Depth (start):	40.6 ft	Actual volume removed:	100 gal
Well Depth (end):	41.12 ft	Disposal method of removed water:	infiltration of surrounding gravel

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used: Ingersoll Rand 185 air compressor, 3/8" air hose, 1" trenca pipe and 1.25" surge block & trenca pipe

Description of appearance of water at start: brown + full of sediment + fines

Description of appearance of water at end: Slightly tinted + no fines

MN 1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-928 L	Developed by:	MH Niemann
Date Developed:	12/19/06	Development start time:	8:00
Date Drilled:	12/15/06	Development stop time:	9:35
Casing Diameter:	2" in	Water Level (start)(b):	16.0 ft
Length of Screened Interval:	10' ft	Water Level (end):	16.12 ft
Top of Screened Interval:	110 ft	Calculated well volume (0.163 gal/ft*)(b-a):	17.44 gal
Well depth from construction log(a):	121.12 ft + 1.9 = 123 oz	Minimum volume to be removed:	87.22 gal
Well Depth (start):	122.61 ft (Stickup = 1.9)	Actual volume removed:	170 gal
Well Depth (end):	129.0 ft	Disposal method of removed water:	infiltration of surrounding ground

* for 2 inch well casing = $[(((2inch)/(12inch/ft))^2)*3.14]/4 * 7.46\ gal/ft^3 = 0.163\ gal/ft$

Description of equipment used: Ingersoll Rand 185 air compressor, 3/8" air hose, 1" thermo pipe and 1.25" surge block & thermo pipe

Description of appearance of water at start: brown & full of sediment & fines

Description of appearance of water at end: slight cloudy, no fines

1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-929U	Developed by:	Bart / c Frice
Date Developed:	12/15/06	Development start time:	10:30
Date Drilled:	12/13/06	Development stop time:	12:15
Casing Diameter:	2 in	Water Level (start)(b):	14.65 ft
Length of Screened Interval:	10 ft	Water Level (end):	14.64 (AMS 12/16/06) ft
Top of Screened Interval:	49 ft	Calculated well volume (0.163 gal/ft *)(~~b-a~~):	7.74 gal
Well depth from construction log(a):	60.12 (+2 stickup) ft	Minimum volume to be removed:	38.68 (AMS 12/16/06) gal
Well Depth (start):	61.10 ft	Actual volume removed:	135 gal
Well Depth (end):	61.10 ft	Disposal method of removed water:	ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used:

Surge Block / Air Lift / 1 inch pipe

Description of appearance of water at start:

Very Turbid Some Fine sand

Description of appearance of water at end:

Cloudy Trace of silt

1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-929L	Developed by:	Best / C. Bruce
Date Developed:	12/15/06	Development start time:	0913
Date Drilled:	12/12/06	Development stop time:	10:22
Casing Diameter:	2 in	Water Level (start)(b):	23.47 ft (TOC)
Length of Screened Interval:	10 ft	Water Level (end):	23.48 ft
Top of Screened Interval:	87 ft	Calculated well volume (0.163 gal/ft*)(b-a):	12.50 ~~62.4~~ gal
Well depth from construction log(a):	98.12 (17' stick up) ft (bgs)	Minimum volume to be removed:	62.51 gal
Well Depth (start):	99.92 ft (TOC)	Actual volume removed:	100 gal
Well Depth (end):	99.93 ft	Disposal method of removed water:	ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used:

Air lift / 1 inch pipe surge block (2")

Description of appearance of water at start:

Init: Slightly cloudy no sand or silt, after 15 gallons very turbid

Description of appearance of water at end:

100 gallons: Slightly cloudy no fines or sand

12/15/07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-930J	Developed by:	Best/C. Bruce
Date Developed:	12/18/06	Development start time:	13:45
Date Drilled:	12/11/06	Development stop time:	15:30
Casing Diameter:	2" in	Water Level (start)(b):	8.80 ft
Length of Screened Interval:	10 ft	Water Level (end):	8.85 ft
Top of Screened Interval:	25 ft	Calculated well volume (0.163 gal/ft*)~~(b-a)~~:	4.78 gal
Well depth from construction log(a):	36.12 (+ 2' stick up)	Minimum volume to be removed:	23.90 gal
Well Depth (start):	37.70 ft	Actual volume removed:	200 gal
Well Depth (end):	34.70 ft	Disposal method of removed water:	ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used:

Airlift pump system / Surge Block

Description of appearance of water at start: Very Turbid with Sand and Silt

Description of appearance of water at end: Cloudy Trace of silt

1-5-07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OOO-G35-L	Developed by:	Best / [illegible]
Date Developed:	12/18/06	Development start time:	CHB 12/18/06 ~~07:45~~ 12:30
Date Drilled:	12/11/06	Development stop time:	13:30
Casing Diameter:	2 in	Water Level (start)(b):	15.90 ft
Length of Screened Interval:	10 ft	Water Level (end):	15.32 ft
Top of Screened Interval:	95 ft	Calculated well volume (0.163 gal/ft)~~(b-a)~~:	15.05 gal
Well depth from construction log(a):	106.5 (bgs) (+1.7) ft	Minimum volume to be removed:	75.22 gal
Well Depth (start):	97.4 ft	Actual volume removed:	150 gal
Well Depth (end):	104.61 (TOC) ft	Disposal method of removed water:	Ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used:

Airlift pump system / Surge Block

Description of appearance of water at start: Very Turbid with Sand and Silt

Description of appearance of water at end: Cloudy with a Trace of Silt

[illegible] 1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	DW - 931 W	Developed by:	Best / Bruce
Date Developed:	12/15/06	Development start time:	13:35
Date Drilled:	12/8/06	Development stop time:	15:30
Casing Diameter:	2 in	Water Level (start)(b):	10.25 ft
Length of Screened Interval:	10 ft	Water Level (end):	10.26 ft
Top of Screened Interval:	25 ft	Calculated well volume (0.163 gal/ft*)(b-a):	CAB 12/20/06 ~~4.47~~ 4.52 gal
Well depth from construction log(a):	36 (+2' stickup) ft	Minimum volume to be removed:	CAB 12/20/06 ~~22.3~~ 22.6 gal
Well Depth (start):	37.65 ft	Actual volume removed:	150 gal
Well Depth (end):	38.00 ft	Disposal method of removed water:	ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used:

Air lift / 1" pipe surge Block

Description of appearance of water at start:

Very Turbid with Sand and silt

Description of appearance of water at end:

Cloudy Trace of silt

WL 15.0ft

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-932U	Developed by:	MHNiemann
Date Developed:	12/19/06	Development start time:	1:55
Date Drilled:	12/14/06	Development stop time:	3:05
Casing Diameter:	2 in	Water Level (start)(b):	9.22 ft
Length of Screened Interval:	10 ft	Water Level (end):	9.21 ft
Top of Screened Interval:	28.5 ft	Calculated well volume (0.163 gal/ft*)~~(b-a)~~:	5.26 gal
Well depth from construction log(a):	39.62 ft + 1.9 = 41.52	Minimum volume to be removed:	26.3 gal
Well Depth (start):	39.2 ft (stick-up = 1.9')	Actual volume removed:	100 gal
Well Depth (end):	40.4 ft	Disposal method of removed water:	Inch Obstein of Skimmerding ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used: Ingersoll Rand 185 air compressor, 3/8" air hose, 1" thermopipe + 1.25" surge block and thermopipe

Description of appearance of water at start: brown + full of sediment + fines

Description of appearance of water at end: pale tint + no fines

12/19 1:50

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-932 L	Developed by:	MH/Hamann NW 11/19/06
Date Developed:	12/19/06	Development start time:	11:30
Date Drilled:	12/14/06 NW 12/19/06	Development stop time:	1:50
Casing Diameter:	2 in	Water Level (start)(b):	18.75 ft
Length of Screened Interval:	10' ft	Water Level (end):	17.59 ft
Top of Screened Interval:	68.5 ft	Calculated well volume (0.163 gal/ft*)(~~b-a~~):	10.25 gal
Well depth from construction log(a):	79.62 ft + 2.0 = 81.62	Minimum volume to be removed:	51.2 gal
	Stickup = 2.0		
Well Depth (start):	78.0 ft	Actual volume removed:	130 gal
Well Depth (end):	80.22 ft	Disposal method of removed water:	infiltration of surrounding ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used: Ingersoll Rand 185 air compressor, 3/4" air hose, 1" shank pipe and 1.25" sump block + trunnion pipe

Description of appearance of water at start: brown + full of sediment + fines

Description of appearance of water at end: pale tint + no fines

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	DW-933-U	Developed by:	MH/Niemann
Date Developed:	11/28/06	Development start time:	1:50p
Date Drilled:	11/13/06	Development stop time:	3:55p
Casing Diameter:	2 in	Water Level (start)(b):	6.92 ft
Length of Screened Interval:	10 ft	Water Level (end):	7.28 ft
Top of Screened Interval:	26 ft	Calculated well volume (0.163 gal/ft)(a-b):	4.92 gal
Well depth from construction log(a):	37.12 ft	Minimum volume to be removed:	24.6 gal
Well Depth (start):	36.5 ft (38.84 w/stickup) (stickup = 1.72')	Actual volume removed:	135 gal
Well Depth (end):	38.75 ft	Disposal method of removed water:	Infiltrate surrounding ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used: 185 Ingersoll Rand air compressor 3/8" OD flexible air hose, 1" OD tremie pipe + 1.75" surge block + tremie pipe.

Description of appearance of water at start: dark brown to medium brown, filled w/ sediment + fines after surging, water settles as it did in the beginning

Description of appearance of water at end: v. slightly tinted, no fines, minimal clay

1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-933-L	Developed by:	MH Vietnam
Date Developed:	11/28/06	Development start time:	10:25a
Date Drilled:	11/8/06	Development stop time:	1:40p
Casing Diameter:	2 in	Water Level (start)(b):	15.33 ft
Length of Screened Interval:	10 ft	Water Level (end):	14.8 ft
Top of Screened Interval:	76 ft	Calculated well volume (0.163 gal/ft ~~(b-a)~~):	11.7 gal
Well depth from construction log(a):	86 (87.12 total) ft	Minimum volume to be removed:	58.5 gal
Well Depth (start):	83.15 ft (88.83 w/stickup; 1.71' stickup)	Actual volume removed:	180 gal
Well Depth (end):	88.8 ft (mw 11/29/06)	Disposal method of removed water:	infiltrate surrounding ground

* for 2 inch well casing = $[(((2inch)/(12inch/ft))^2)*3.14]/4 * 7.46\ gal/ft^3 = 0.163\ gal/ft$

Description of equipment used: 185 Ingersoll Rand air compressor, 3/8" OD flexible air hose, 1" OD trenie pipe + 1.75" surge block + trenie pipe

Description of appearance of water at start: dark to medium reddish brown, full of sediment – starts to clarify in 2 gal, after surging, water resembles water at start

Description of appearance of water at end: V. slightly tinted, no fines, running clear

MH 1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-934U	Developed by:	MH Wiemann
Date Developed:	12/1/06	Development start time:	2:15p
Date Drilled:	11/21/06	Development stop time:	3:55p
Casing Diameter:	2 in	Water Level (start)(b):	10.69 ft
Length of Screened Interval:	10 ft	Water Level (end):	10.91 ft
Top of Screened Interval:	30 ft	Calculated well volume (0.163 gal/ft*)~~(b-a)~~:	5.22 gal
Well depth from construction log(a):	41.15 ft w/ screen = 43.75' screen = 1.6'	Minimum volume to be removed:	26.13 gal
Well Depth (start):	40.75 ft	Actual volume removed:	115 gal
Well Depth (end):	42.43 ft	Disposal method of removed water:	infiltrate ground surface around well

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used: 185 Ingersoll Rand air compressor, 3/8" OD flexible air hose, 1" OD tremie pipe + 1.75" surge block and tremie pipe

Description of appearance of water at start: dark brown, full of sediment after surging, some appearance

Description of appearance of water at end: morning clear, v. pale tint, no fines

WS 1.5.07

MACTEC

WELL DEVLOPMENT

Project Name: **STP COL Subsurface Investigation**

MACTEC Project Number: 5050-06-0496

Well Number:	OW-934L	Developed by:	Best / C. Brook
Date Developed:	12/15/06	Development start time:	08:20 12/18/06; 15:56 12/15/06; 17:00 12/15/06
Date Drilled:	12/07/06	Development stop time:	09:20 12/18/06
Casing Diameter:	2 in	Water Level (start)(b):	23.06 ft
Length of Screened Interval:	10 ft	Water Level (end):	17.26 ft
Top of Screened Interval:	89 ft	Calculated well volume (0.163 gal/ft * (b-a)):	12.70; ~~11.04~~ CHG 12/19/06 gal
Well depth from construction log(a):	99 (+2 stick up) ft	Minimum volume to be removed:	~~11.04~~ CHG 12/15/06 ~~63.59~~ gal
Well Depth (start):	98.75 ft	Actual volume removed:	160 gal
Well Depth (end):	100.30 ft	Disposal method of removed water:	ground

* for 2 inch well casing = $[(((2\text{inch})/(12\text{inch/ft}))^2)*3.14]/4 * 7.46\ \text{gal/ft}^3 = 0.163\ \text{gal/ft}$

Description of equipment used:

Surge Block / Air lift (1 inch pipe)

Description of appearance of water at start:

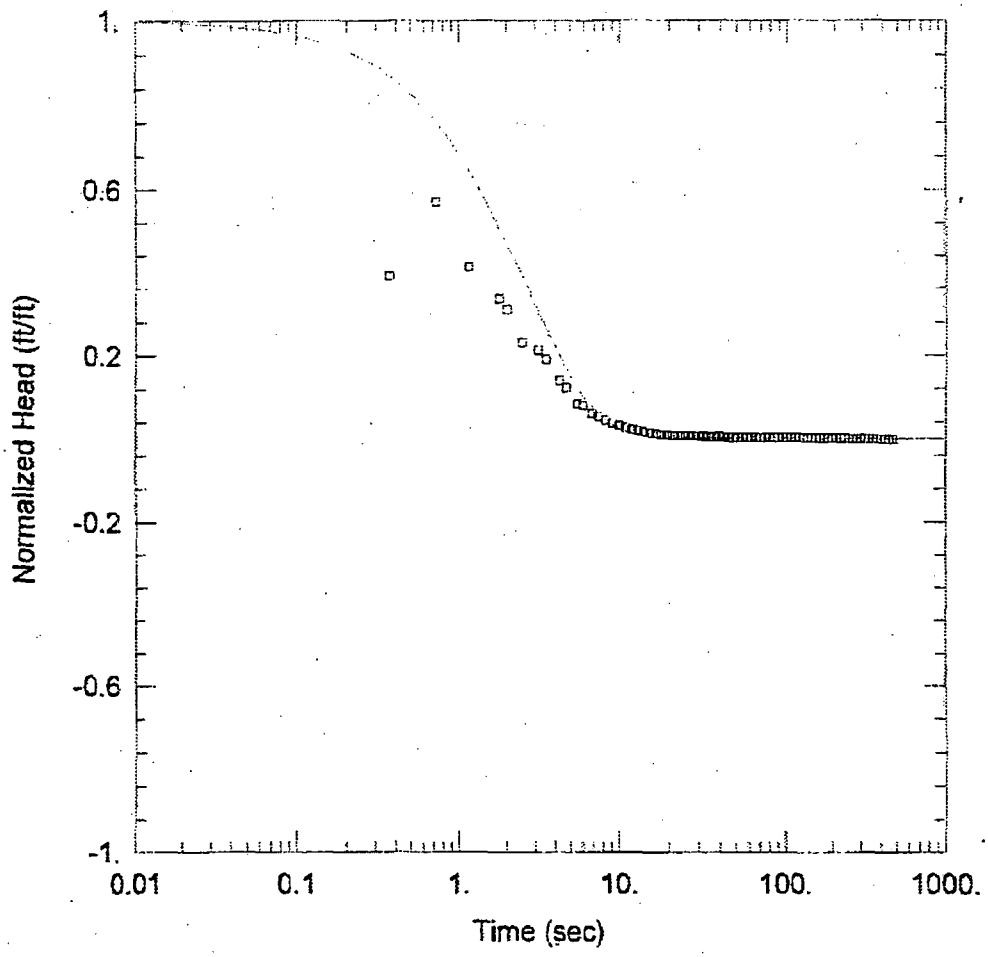
Very Turbid Sand, Silt

Description of appearance of water at end: Cloudy Trace of Silt

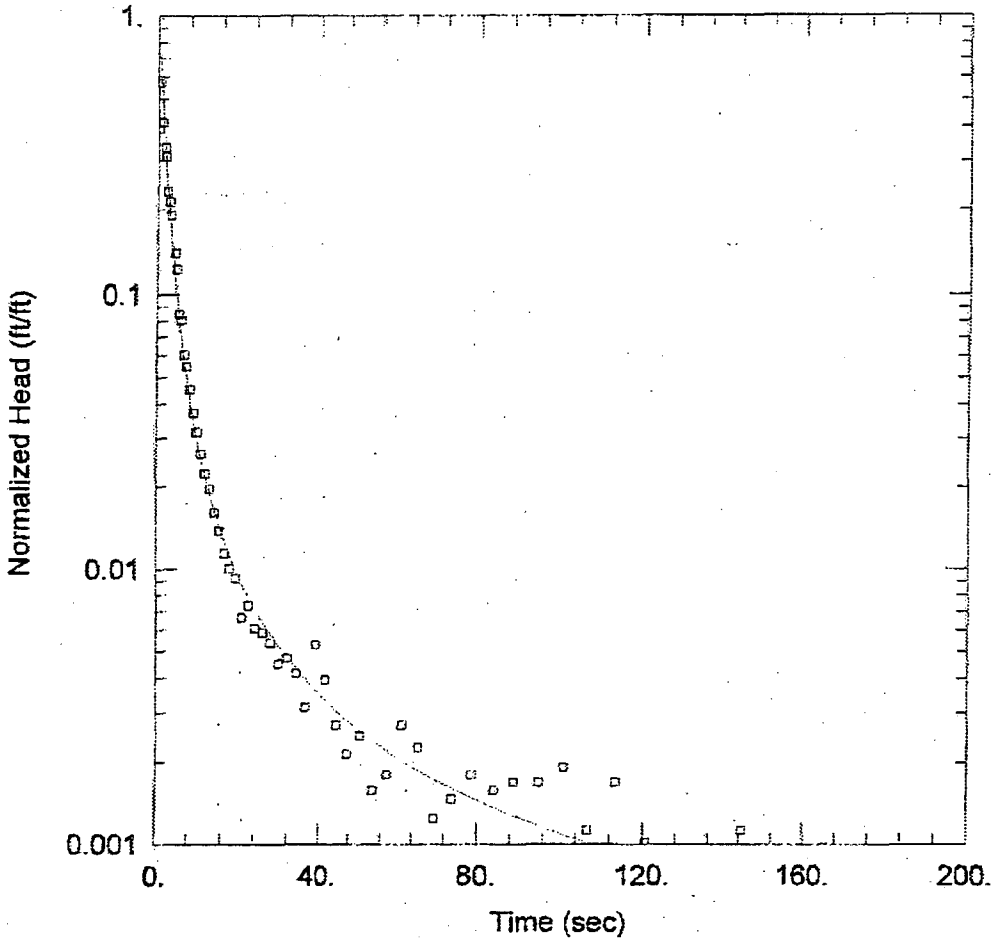
1.5 OK

Appendix C-3

Slug Test Charts



OW-308 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 31. ft	Anisotropy Ratio (Kz/Kr): 0.01479
WELL DATA (OW-308 L)	
Initial Displacement: 8.87 ft	Static Water Column Height: 80.58 ft
Total Well Penetration Depth: 27. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 64.12 ft/day	Le = 0.1 ft



OW-308 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 31. ft

WELL DATA (OW-308 L)

Initial Displacement: 8.87 ft
Total Well Penetration Depth: 27. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 80.58 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

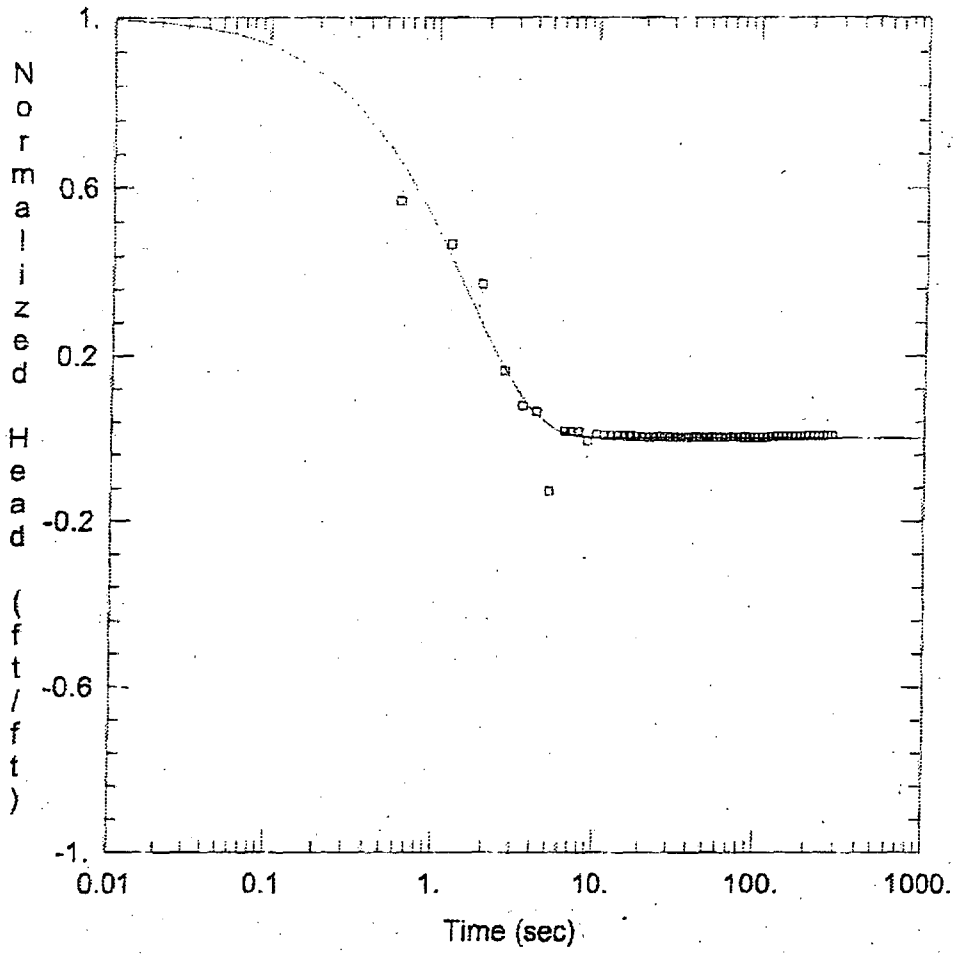
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 66.69 ft/day
Kz/Kr = 0.01479

Ss = 2.081E-5 ft^{-1}



OW-308 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 31. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-308 L)

Initial Displacement: 13.13 ft

Total Well Penetration Depth: 27. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 80.58 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

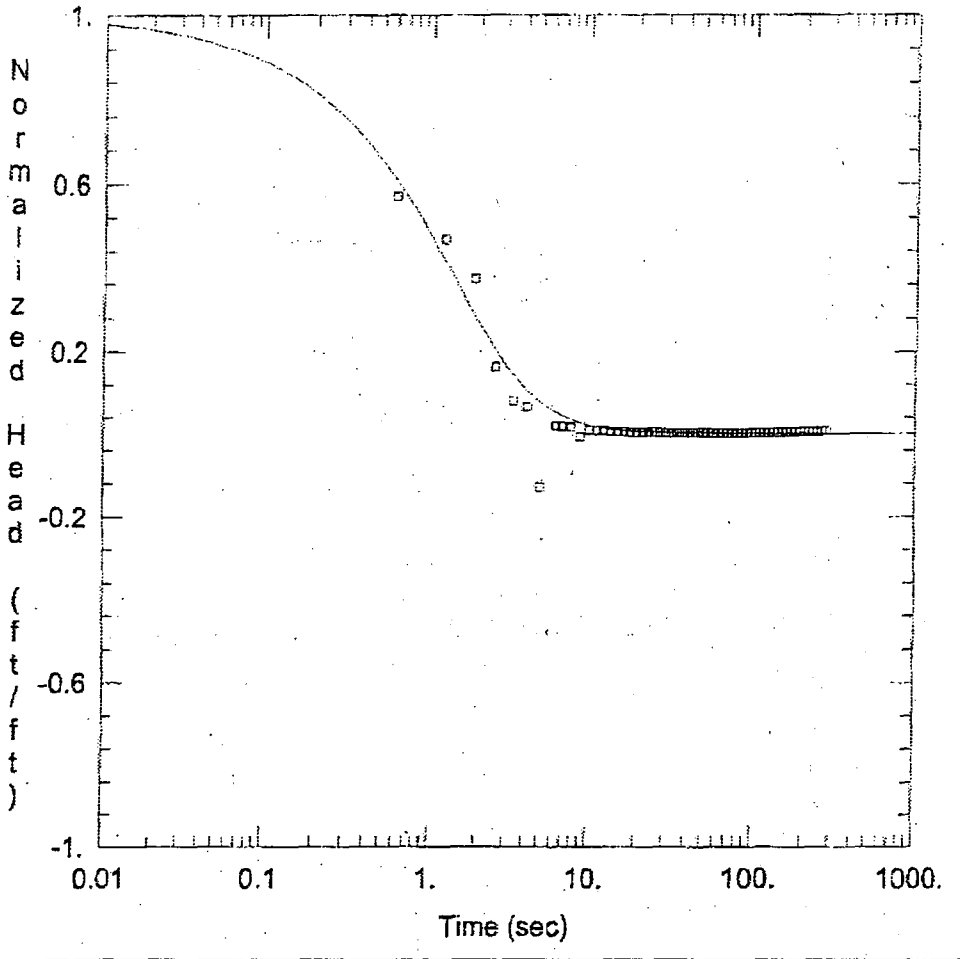
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 72. ft/day

Le = 0.1 ft



OW-308 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 31. ft

WELL DATA (OW-308 L)

Initial Displacement: 13.13 ft
Total Well Penetration Depth: 27. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 80.58 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

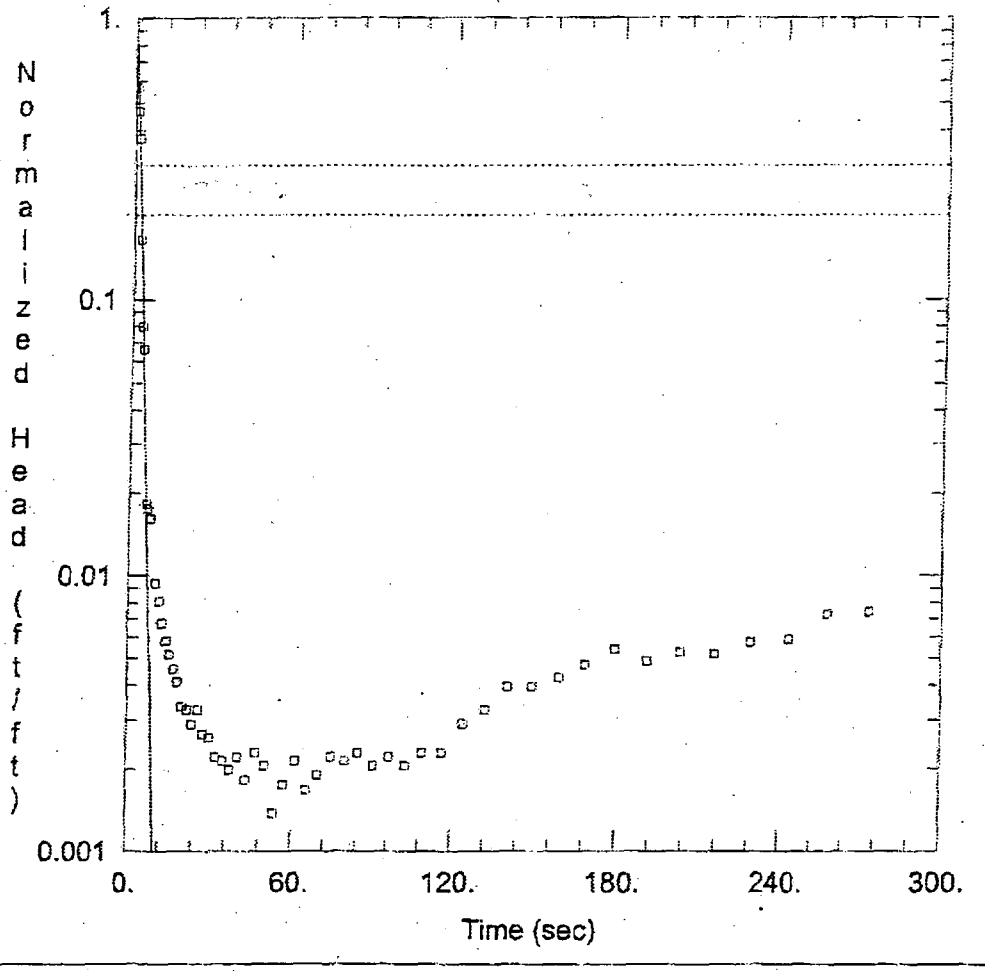
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 72.93 ft/day
Kz/Kr = 0.03162

Ss = 1.474E-5 ft^{-1}



OW-308 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 31. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-308 L)

Initial Displacement: 13.13 ft

Total Well Penetration Depth: 27. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 80.58 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

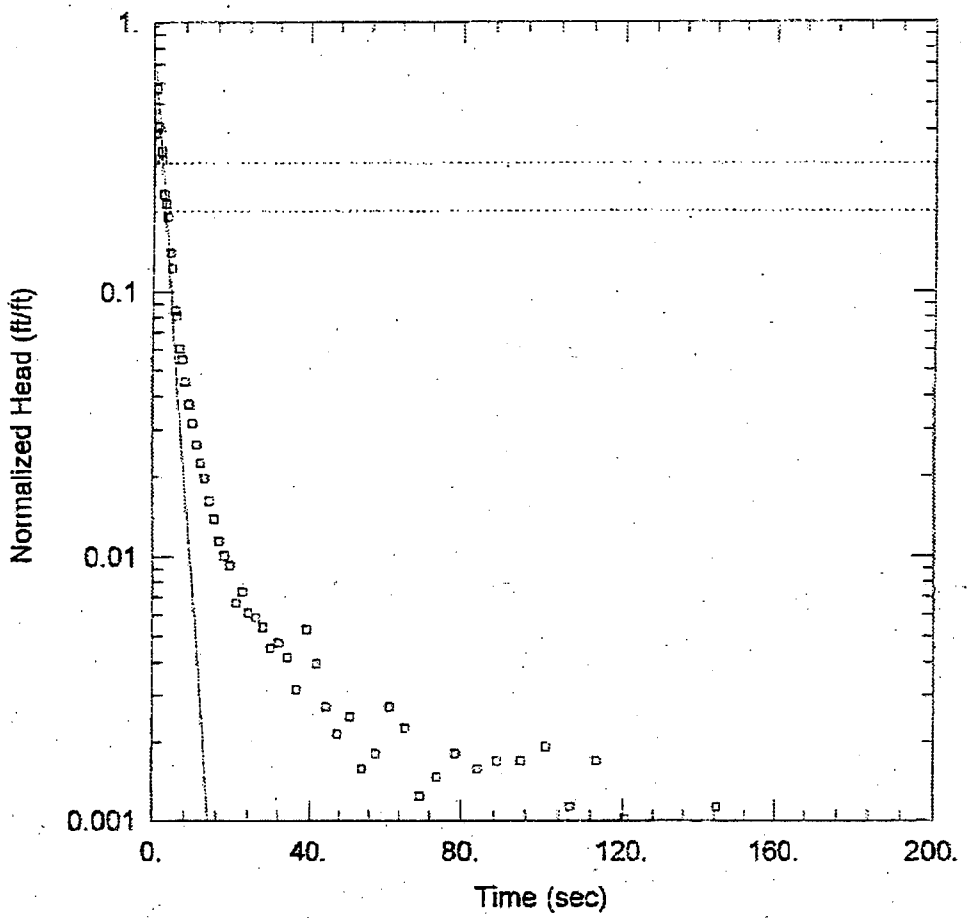
SOLUTION

Aquifer Model: Confined

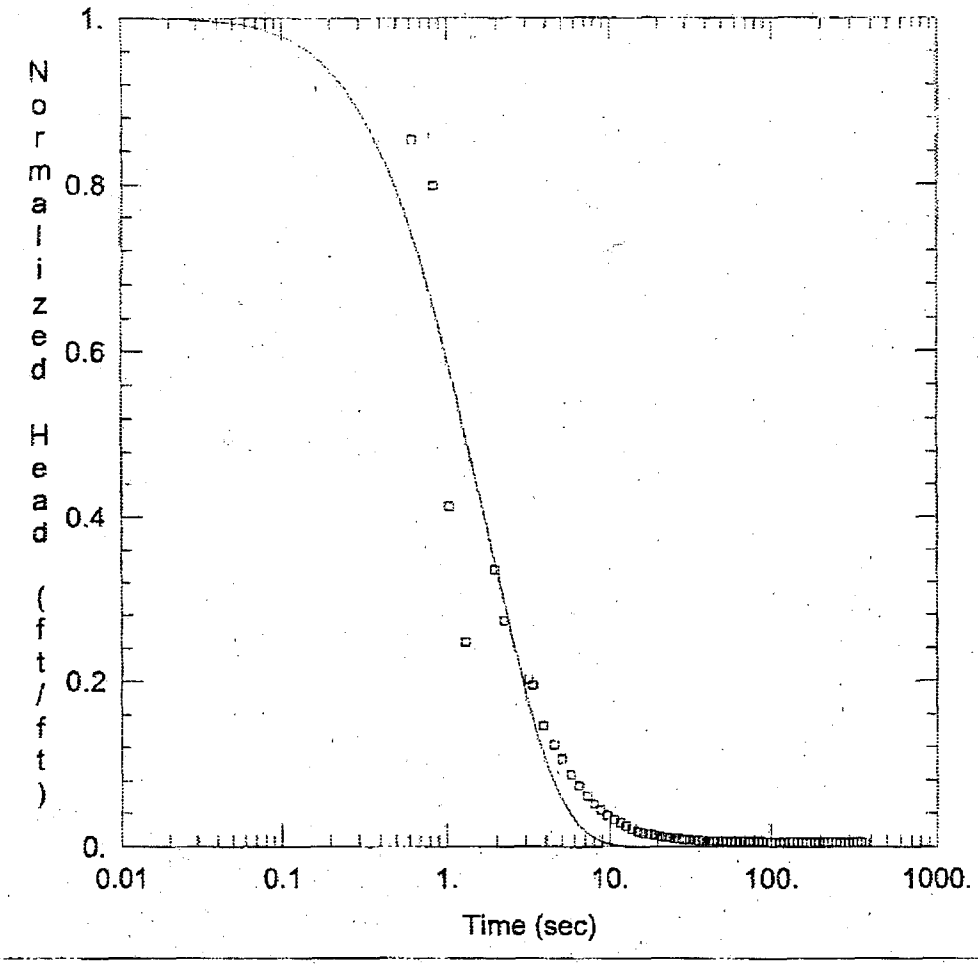
Solution Method: Bouwer-Rice

K = 55.64 ft/day

y0 = 12.85 ft



OW-308 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 31. ft	Anisotropy Ratio (Kz/Kr): 0.01479
WELL DATA (OW-308 L)	
Initial Displacement: 8.87 ft	Static Water Column Height: 80.58 ft
Total Well Penetration Depth: 27. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 65. ft/day	y0 = 7.189 ft



OW-308 U RISING HEAD TEST

Data Set: C:\...\OW-308 U RISING HEAD TEST.aqt
Date: 04/03/07 Time: 08:33:56

AQUIFER DATA

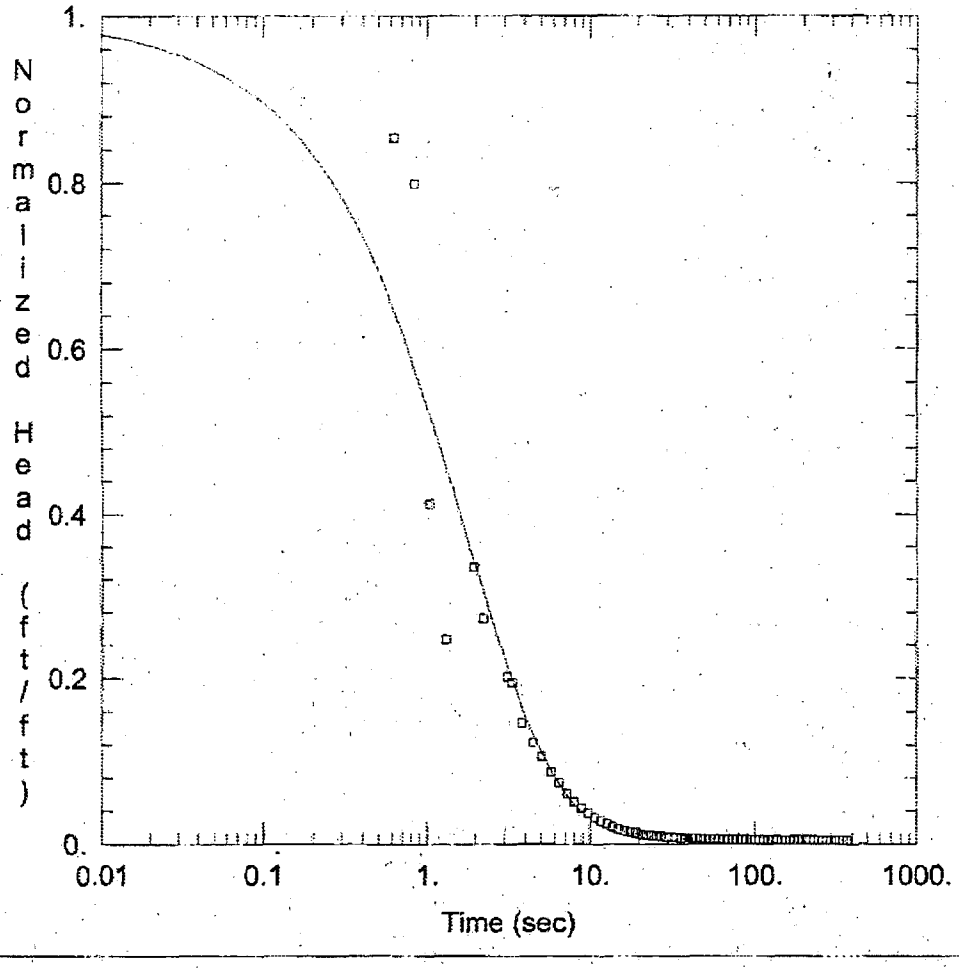
Saturated Thickness: 26. ft Anisotropy Ratio (Kz/Kr): 0.8128

WELL DATA (OW-308 U)

Initial Displacement: 9.778 ft
Total Well Penetration Depth: 28. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 40.54 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler
K = 70.09 ft/day
Le = 5.428 ft



OW-308 U RISING HEAD TEST

Data Set: C:\...\OW-308 U RISING HEAD TEST.aqt
Date: 04/03/07 Time: 08:33:16

AQUIFER DATA

Saturated Thickness: 26. ft

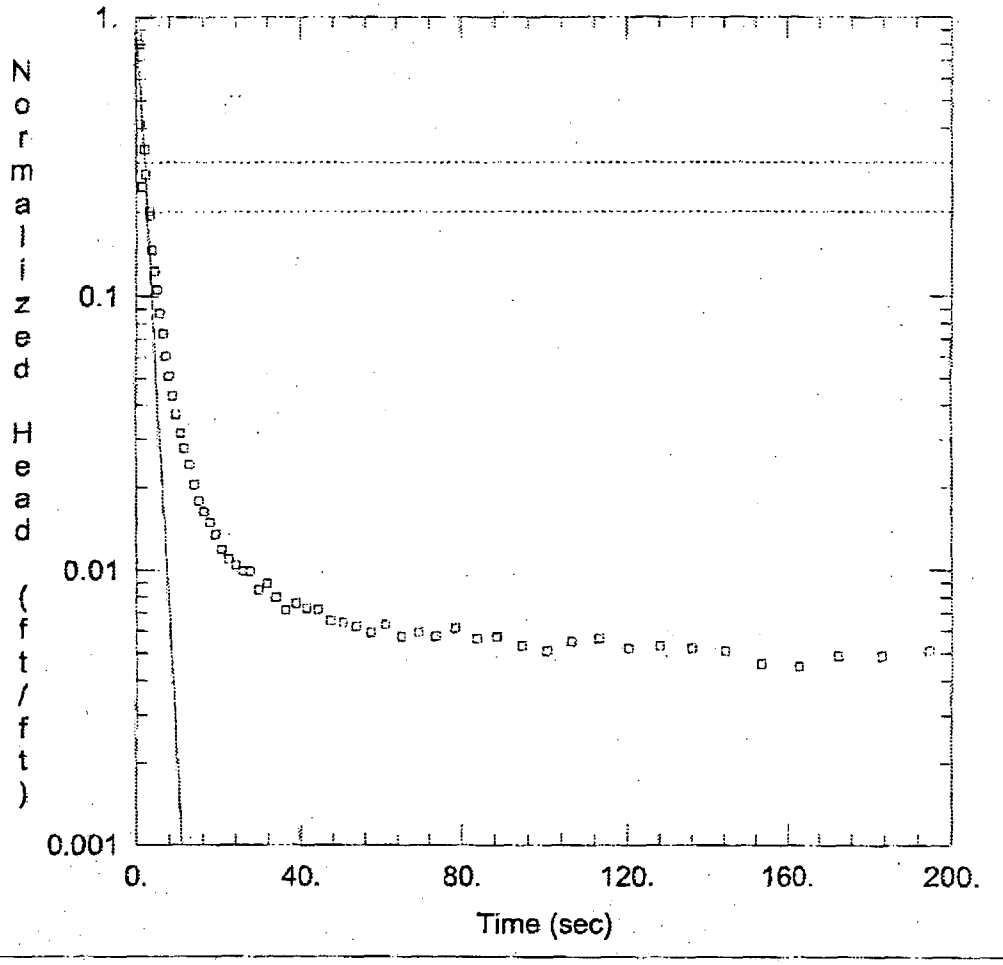
WELL DATA (OW-308 U)

Initial Displacement: 9.778 ft
Total Well Penetration Depth: 28. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 40.54 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 63.93 ft/day
Kz/Kr = 0.8128
Ss = 5.821E-5 ft^{-1}



OW-308 U RISING HEAD TEST

Data Set: C:\...\OW-308 U RISING HEAD TEST.aqt
Date: 04/03/07 Time: 08:32:10

AQUIFER DATA

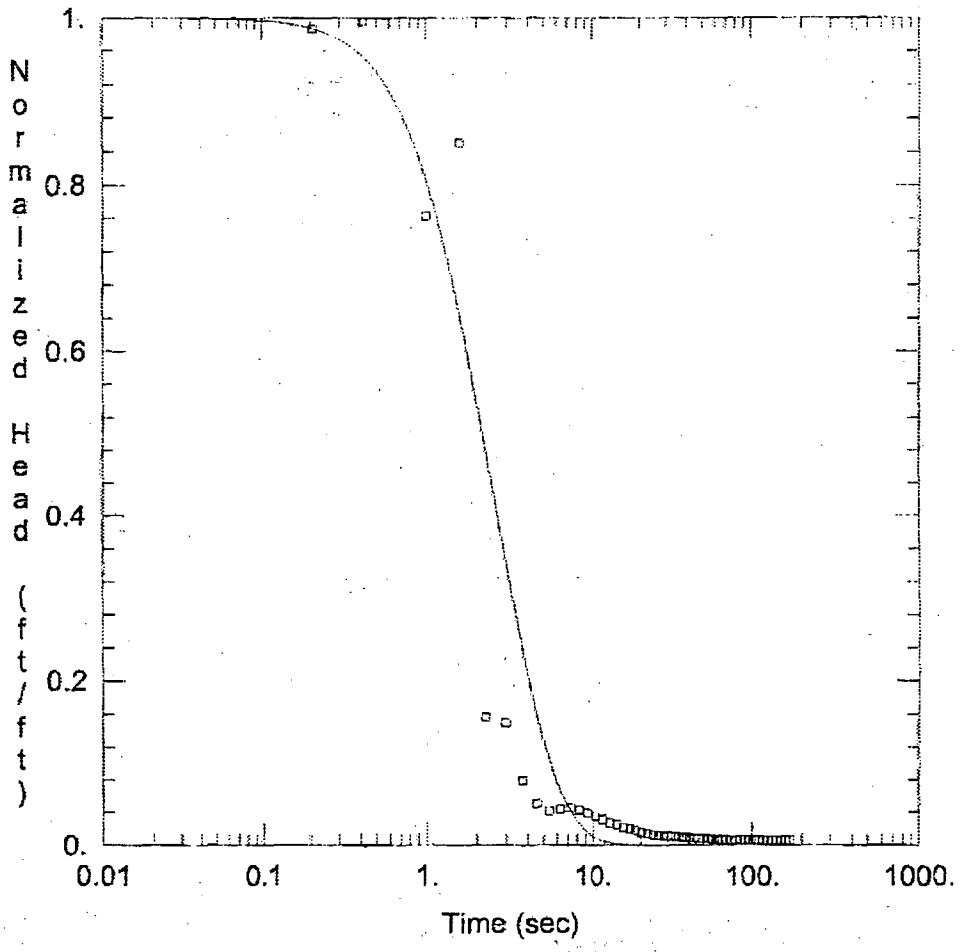
Saturated Thickness: 26. ft Anisotropy Ratio (Kz/Kr): 0.8128

WELL DATA (OW-308 U)

Initial Displacement: 9.778 ft
Total Well Penetration Depth: 28. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 40.54 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 62.63 ft/day
y0 = 10.51 ft



OW-308 U FALLING HEAD TEST

Data Set: C:\...\OW-308 U FALLING HEAD TEST.aqt
Date: 04/03/07 Time: 08:29:58

AQUIFER DATA

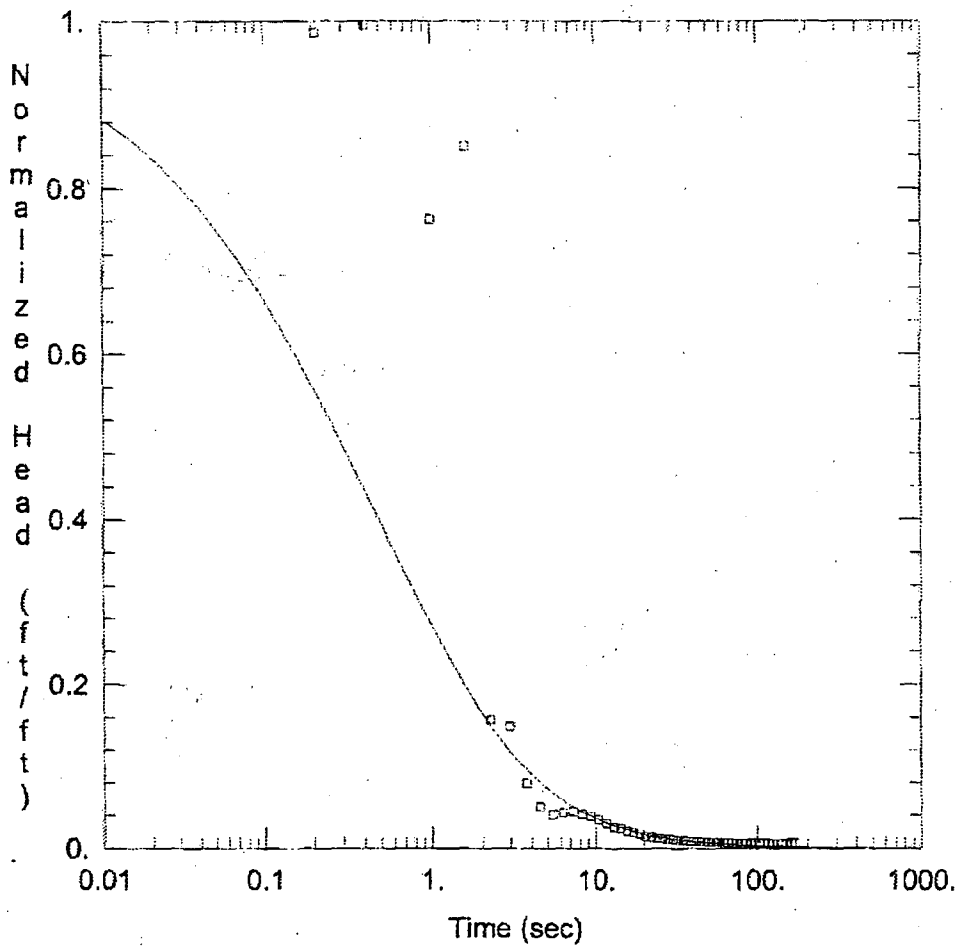
Saturated Thickness: 26. ft Anisotropy Ratio (Kz/Kr): 0.03758

WELL DATA (OW-308 U)

Initial Displacement: 6.791 ft
Total Well Penetration Depth: 28. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 40.54 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Confined
K = 63.97 ft/day
Solution Method: Butler
Le = 45.58 ft



OW-308 U FALLING HEAD TEST

Data Set: C:\...\OW-308 U FALLING HEAD TEST.aqt
Date: 04/03/07 Time: 08:29:16

AQUIFER DATA

Saturated Thickness: 26. ft

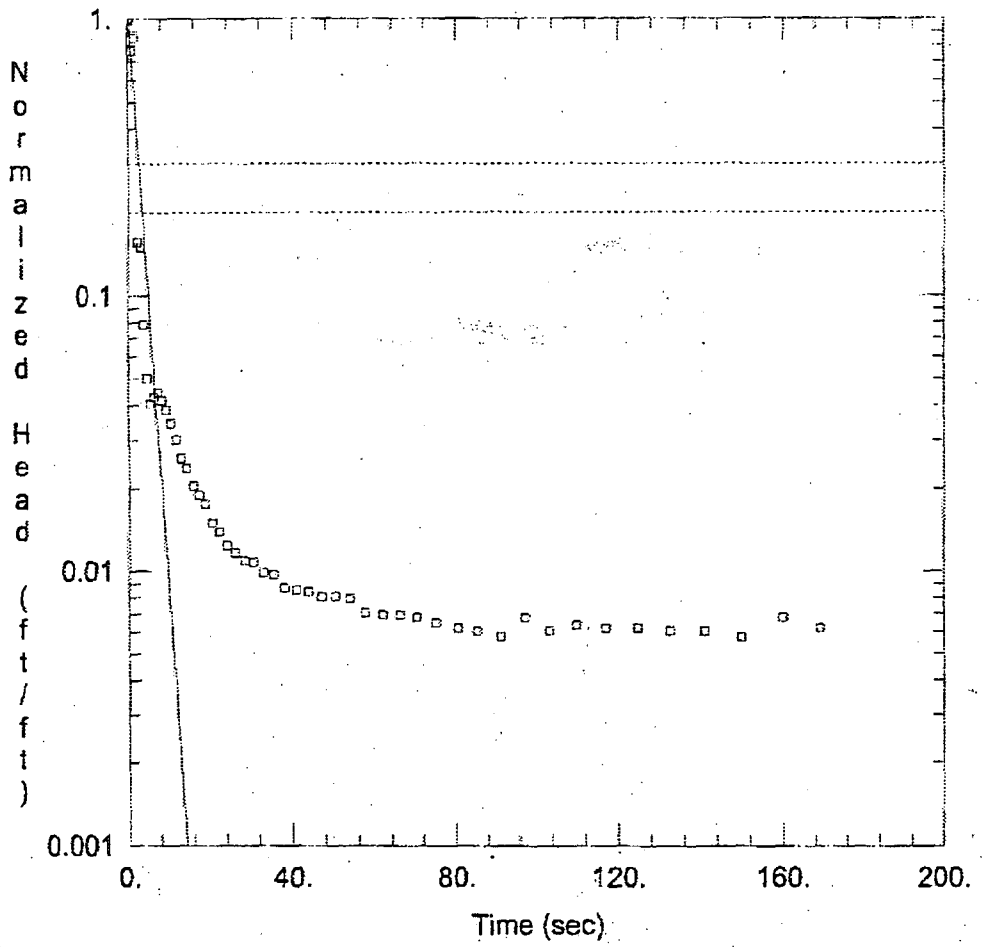
WELL DATA (OW-308 U)

Initial Displacement: 6.791 ft
Total Well Penetration Depth: 28. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 40.54 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 61.54 ft/day
Kz/Kr = 0.03758
Ss = 0.003463 ft^{-1}



OW-308 U FALLING HEAD TEST

Data Set: C:\...\OW-308 U FALLING HEAD TEST.aqt
Date: 04/03/07 Time: 08:25:09

AQUIFER DATA

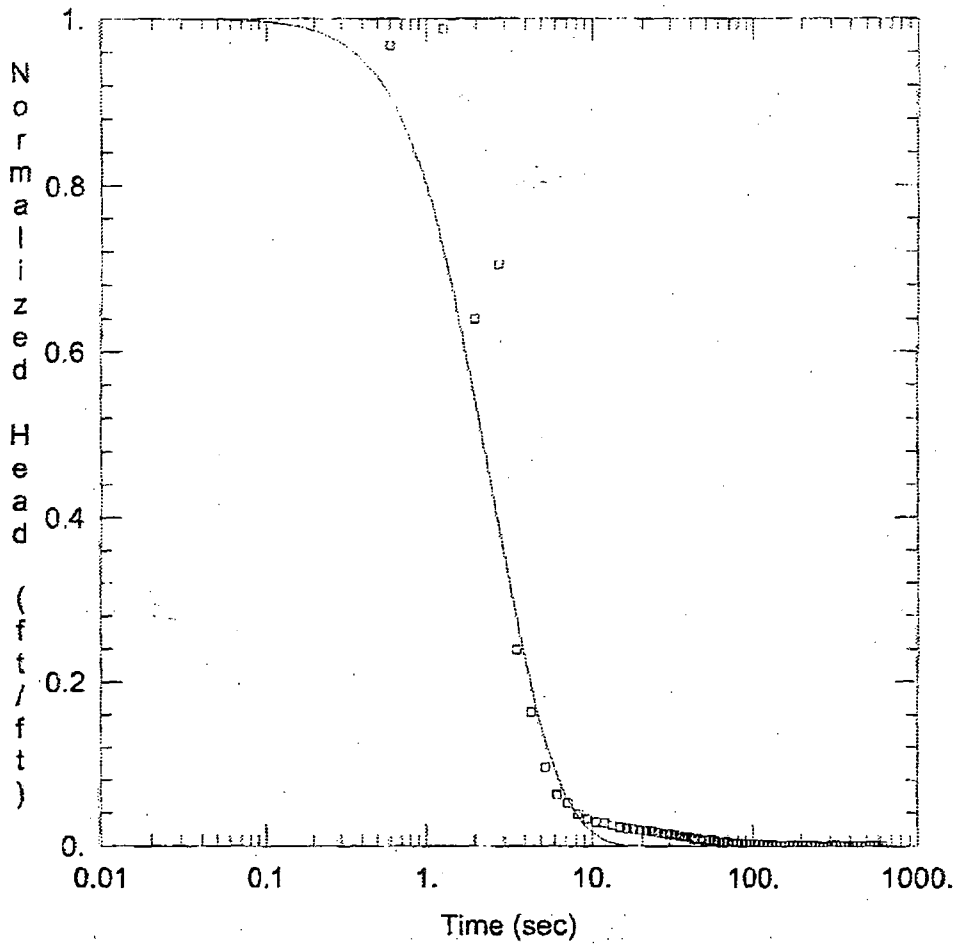
Saturated Thickness: 26. ft Anisotropy Ratio (Kz/Kr): 0.03758

WELL DATA (OW-308 U)

Initial Displacement: 6.791 ft Static Water Column Height: 40.54 ft
Total Well Penetration Depth: 28. ft Screen Length: 10. ft
Casing Radius: 0.08333 ft Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice
K = 68.26 ft/day y0 = 7.641 ft



OW-332 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.04786

WELL DATA (New Well)

Initial Displacement: 8.847 ft

Total Well Penetration Depth: 18.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 87.75 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

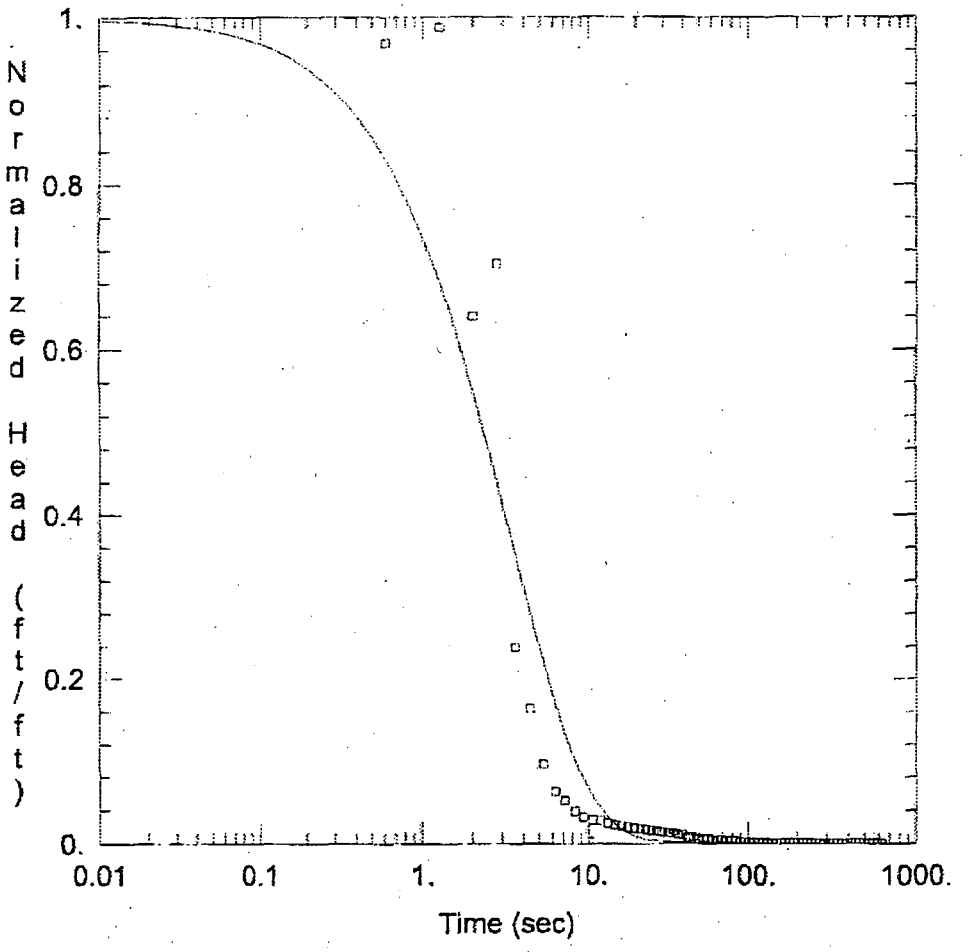
SOLUTION

Aquifer Model: Confined

K = 52.96 ft/day

Solution Method: Butler

Le = 40.28 ft



OW-332 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 35. ft

WELL DATA (New Well)

Initial Displacement: 8.847 ft
Total Well Penetration Depth: 18.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 87.75 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

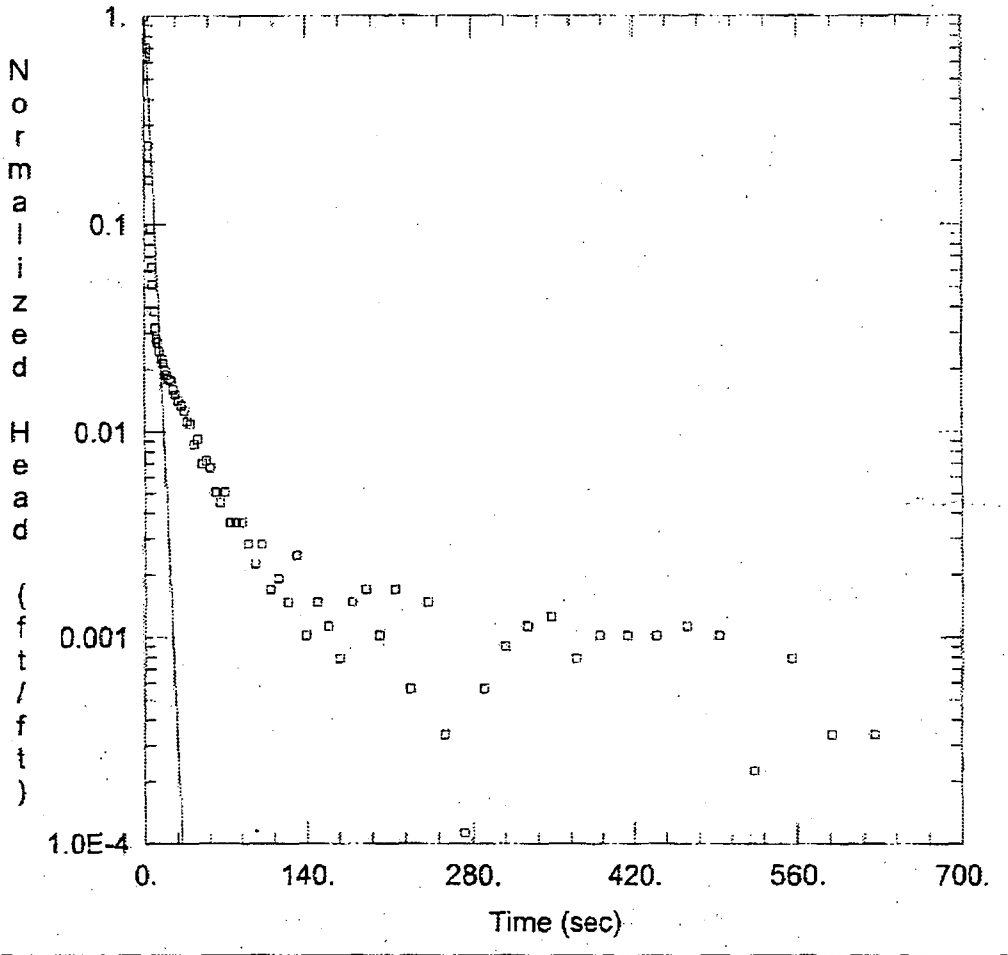
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 54.23 ft/day
Kz/Kr = 0.04786

Ss = 3.169E-12 ft^{-1}



OW-332 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.04786

WELL DATA (New Well)

Initial Displacement: 8.847 ft

Total Well Penetration Depth: 18.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 87.75 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

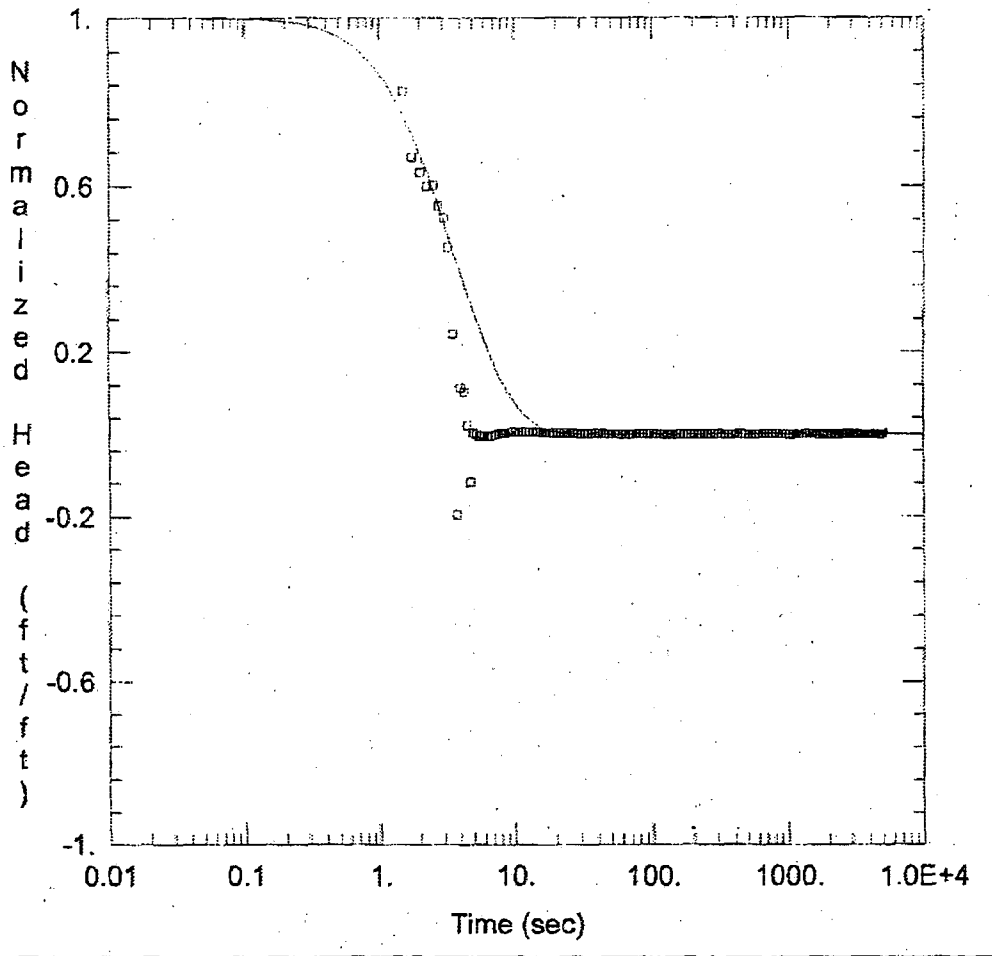
SOLUTION

Aquifer Model: Confined

K = 33.28 ft/day

Solution Method: Bouwer-Rice

y0 = 12.5 ft



OW-332 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.001035

WELL DATA (OW-322 L)

Initial Displacement: 11.47 ft

Total Well Penetration Depth: 18.5 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 87.75 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

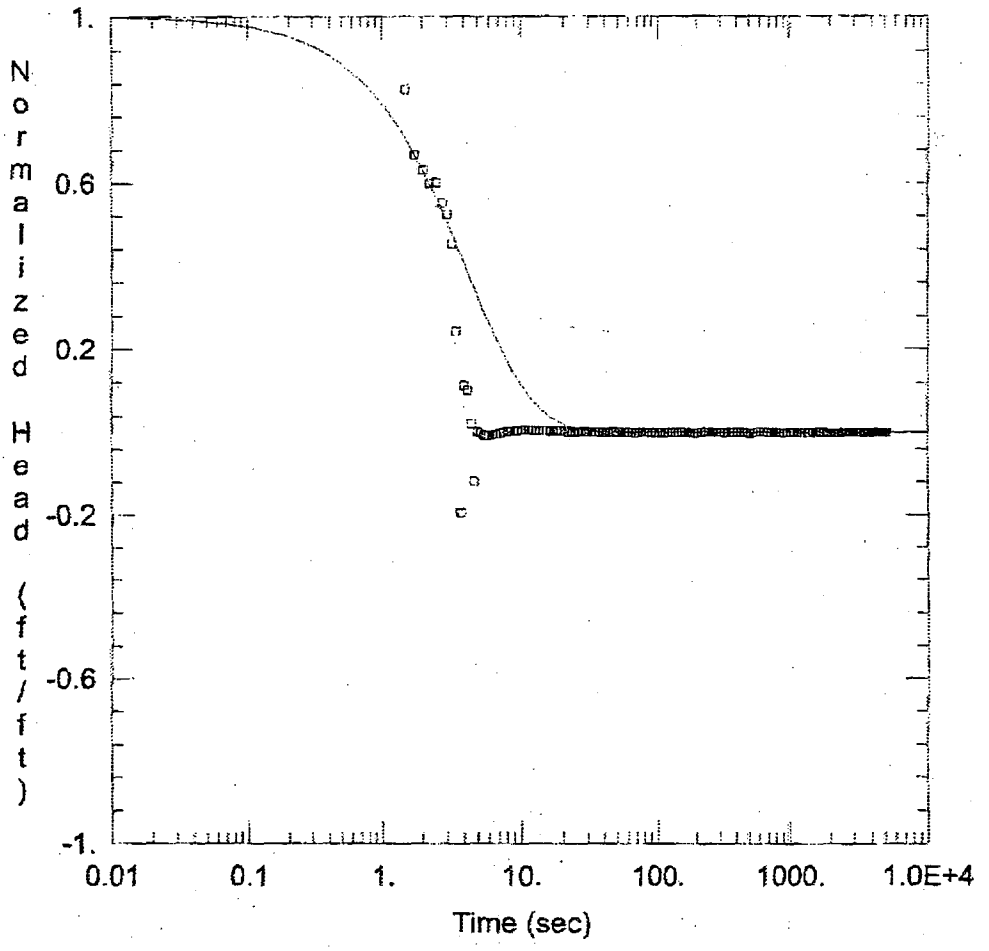
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 49.41 ft/day

Le = 63.67 ft



OW-332 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 35. ft

WELL DATA (OW-322 L)

Initial Displacement: 11.47 ft
Total Well Penetration Depth: 18.5 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 87.75 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

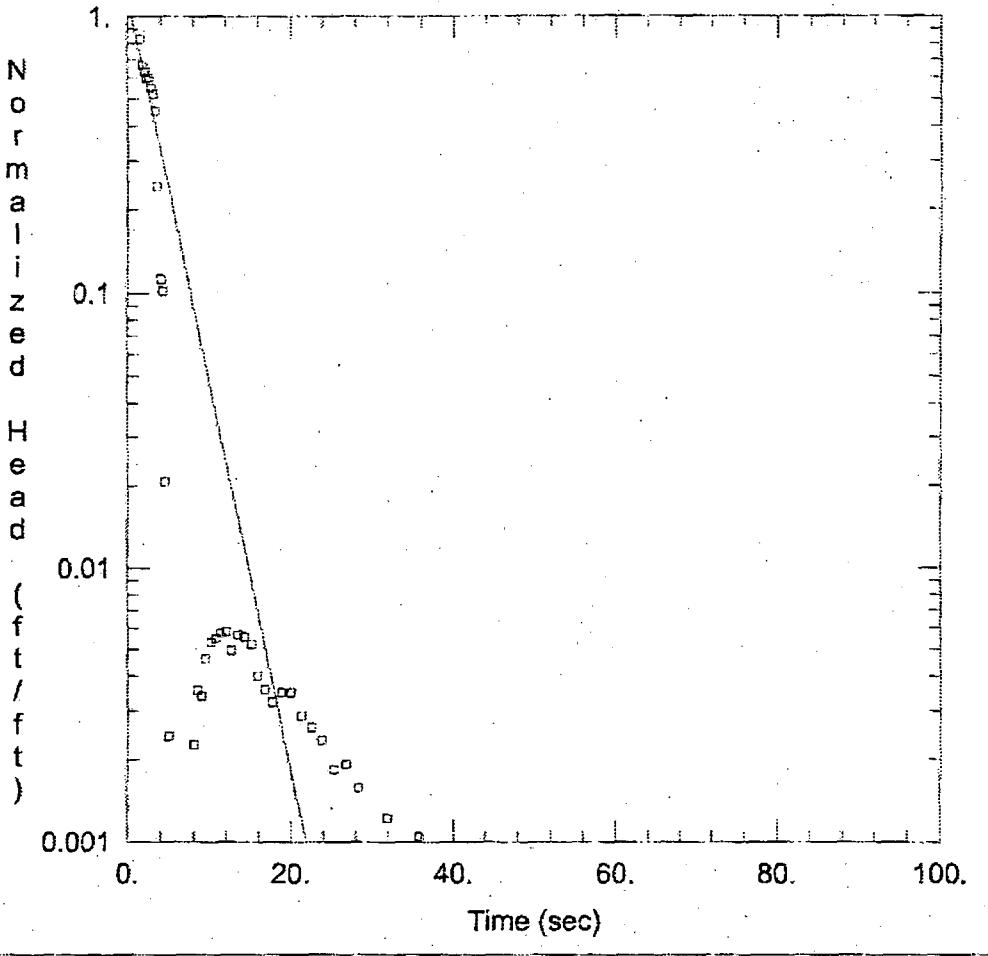
SOLUTION

Aquifer Model: Confined

Kr = 49.41 ft/day
Kz/Kr = 0.001035

Solution Method: KGS Model

Ss = 1.131E-11 ft^{-1}



OW-332 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.001035

WELL DATA (OW-322 L)

Initial Displacement: 11.47 ft

Total Well Penetration Depth: 18.5 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 87.75 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

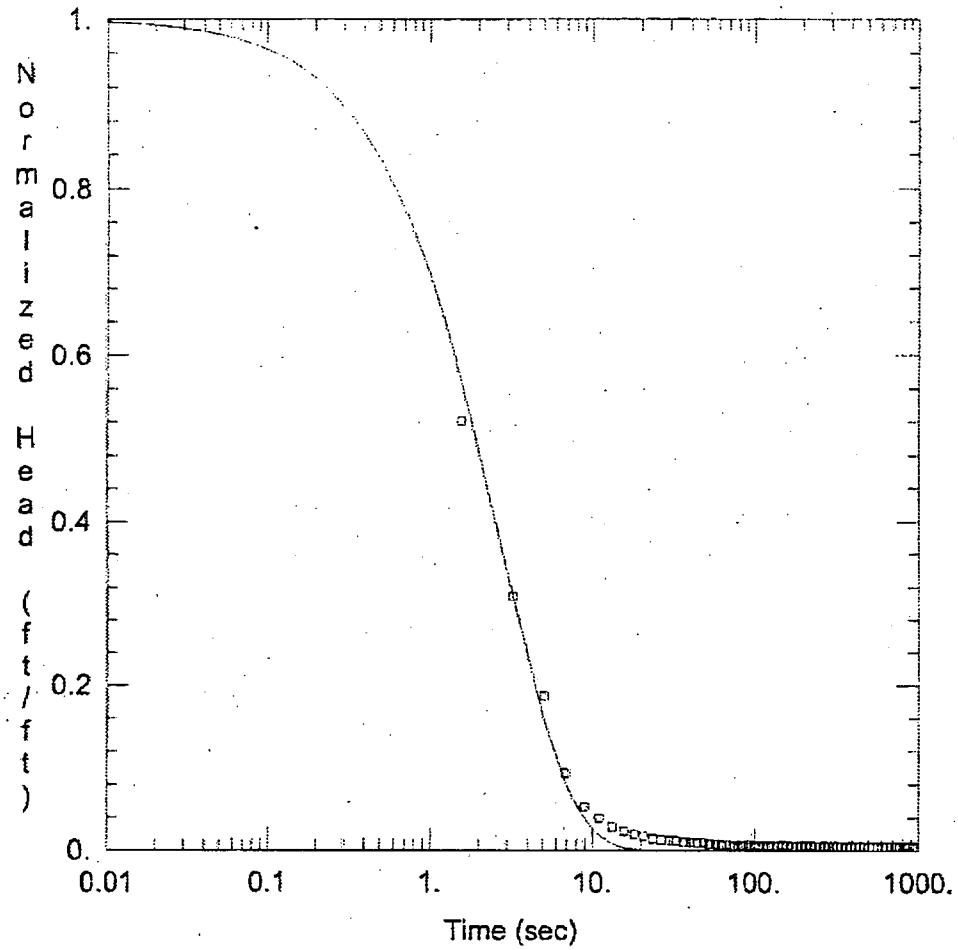
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 55.2 ft/day

y0 = 13.38 ft



OW-332 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 20.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-322 U)

Initial Displacement: 5.767 ft

Total Well Penetration Depth: 16.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 38.73 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

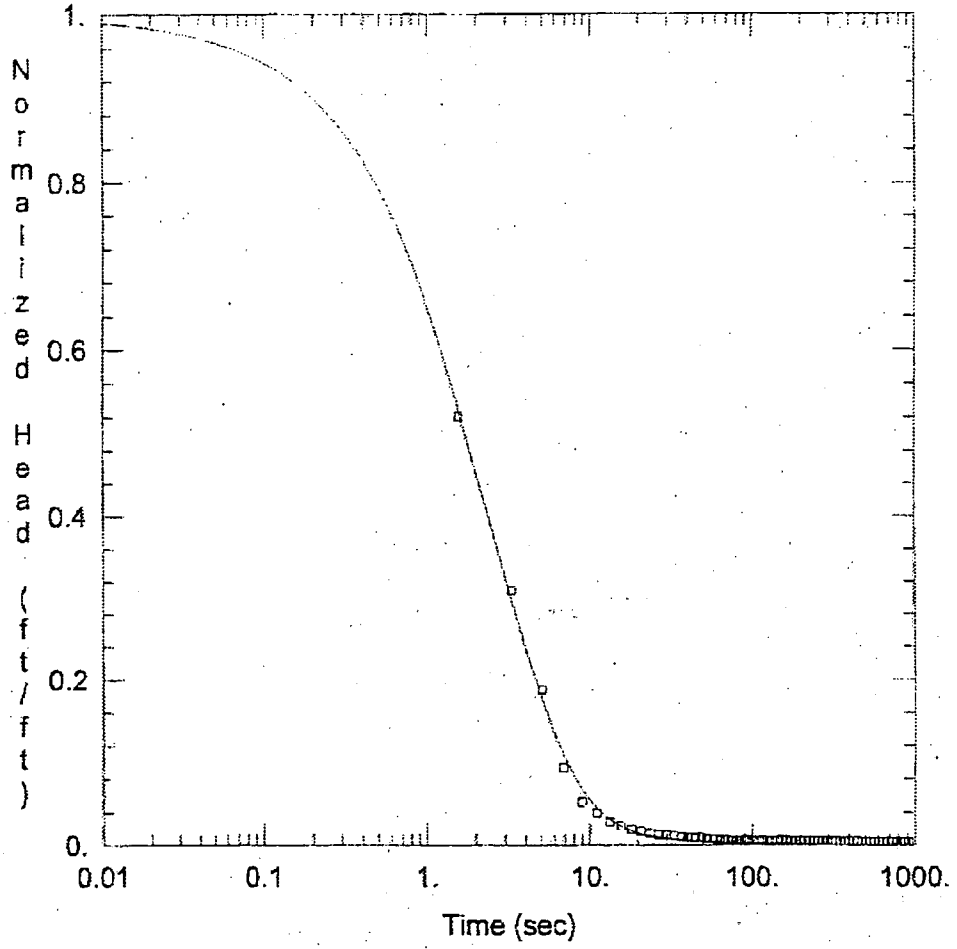
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 37.32 ft/day

Le = 0.1 ft



OW-332 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 20.5 ft

WELL DATA (OW-322 U)

Initial Displacement: 5.767 ft
Total Well Penetration Depth: 16.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 38.73 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

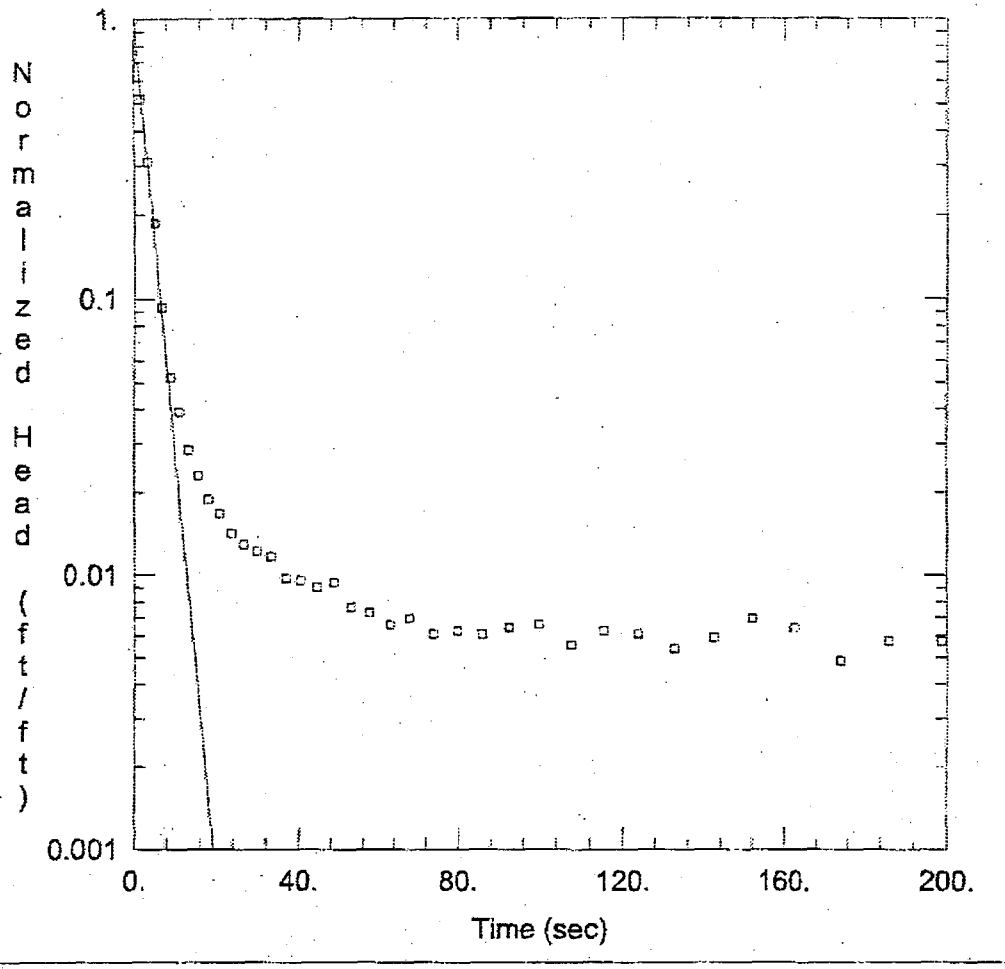
SOLUTION

Aquifer Model: Confined

Kr = 36.26 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 4.444E-6 ft^{-1}



OW-332 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 20.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-322 U)

Initial Displacement: 5.767 ft

Total Well Penetration Depth: 16.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 38.73 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

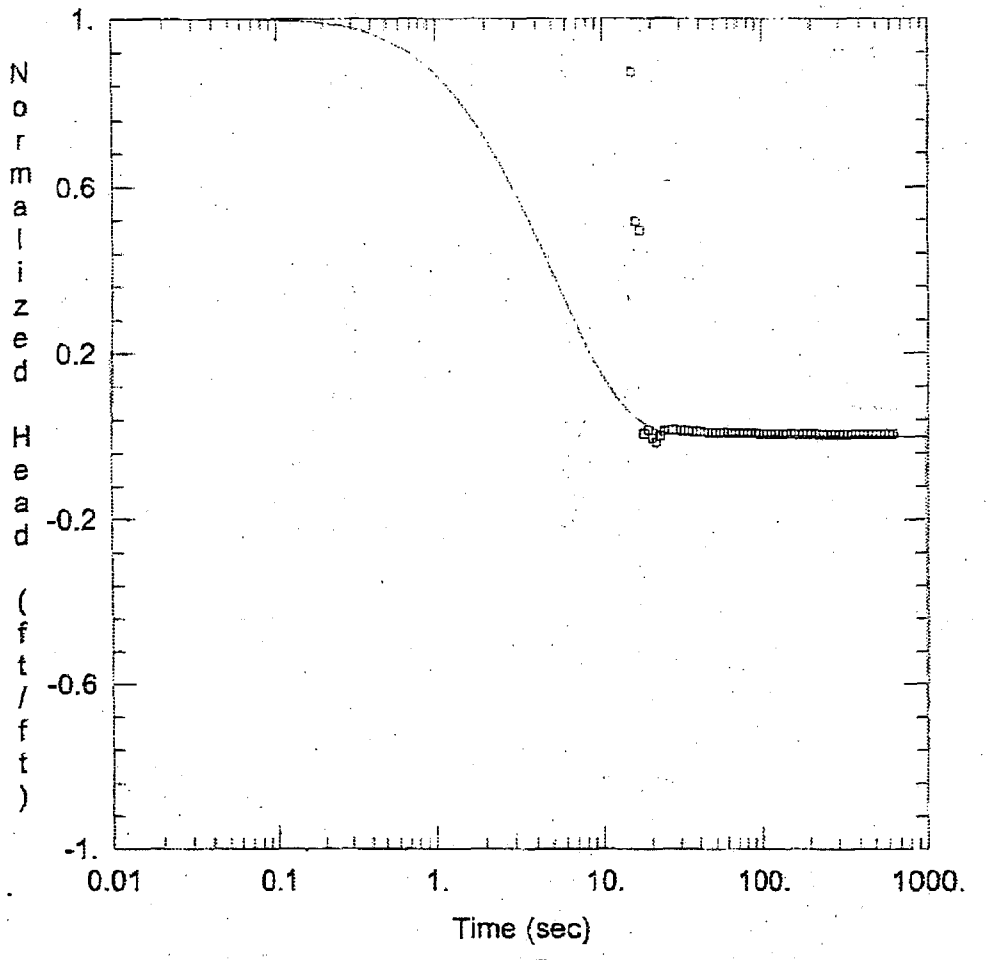
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 26.95 ft/day

y0 = 5.654 ft



OW-332 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 20.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-322 U)

Initial Displacement: 5.748 ft

Total Well Penetration Depth: 16.5 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 38.73 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

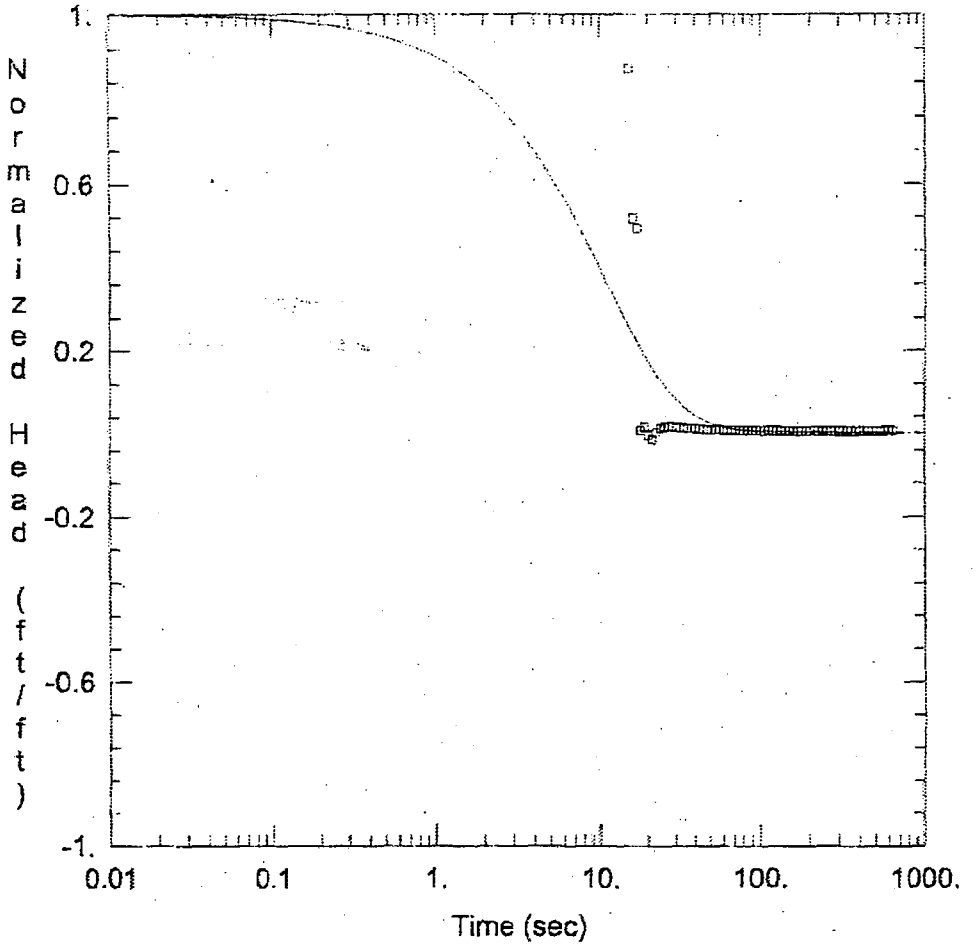
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 19.3 ft/day

Le = 48. ft



OW-332 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 20.5 ft

WELL DATA (OW-322 U)

Initial Displacement: 5.748 ft
Total Well Penetration Depth: 16.5 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 38.73 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

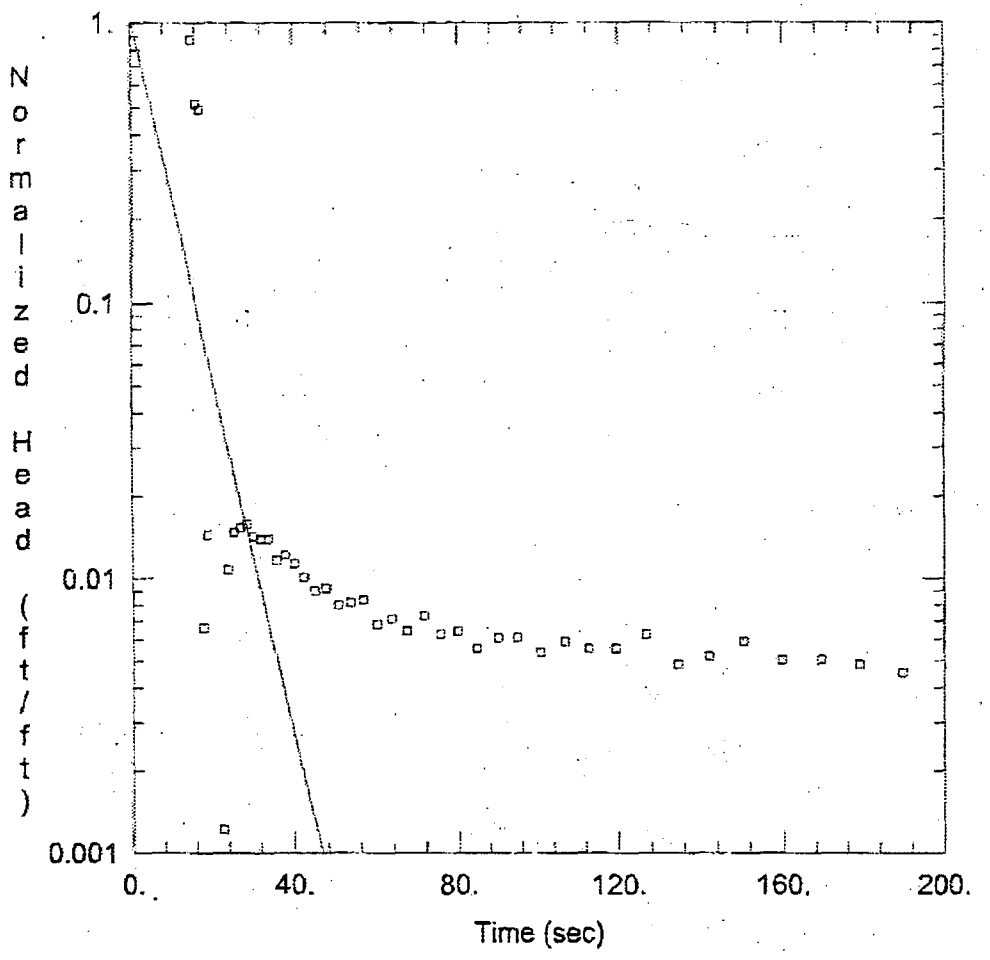
SOLUTION

Aquifer Model: Confined

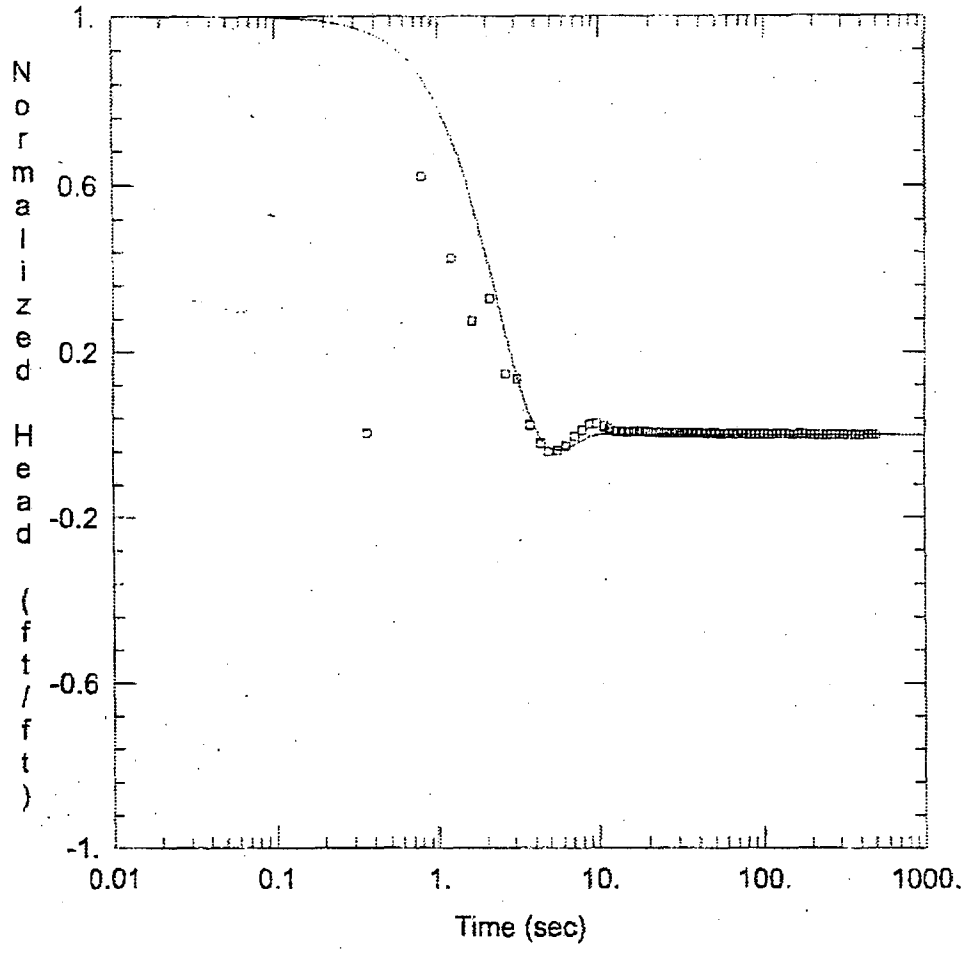
Kr = 18.33 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 4.878E-12 ft^{-1}



OW-332 U FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 20.5 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-322 U)	
Initial Displacement: 5.748 ft	Static Water Column Height: 38.73 ft
Total Well Penetration Depth: 16.5 ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 11.29 ft/day	y0 = 6.077 ft



OW-348 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 23. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-348 L)

Initial Displacement: 5.755 ft

Total Well Penetration Depth: 13. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 65. ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

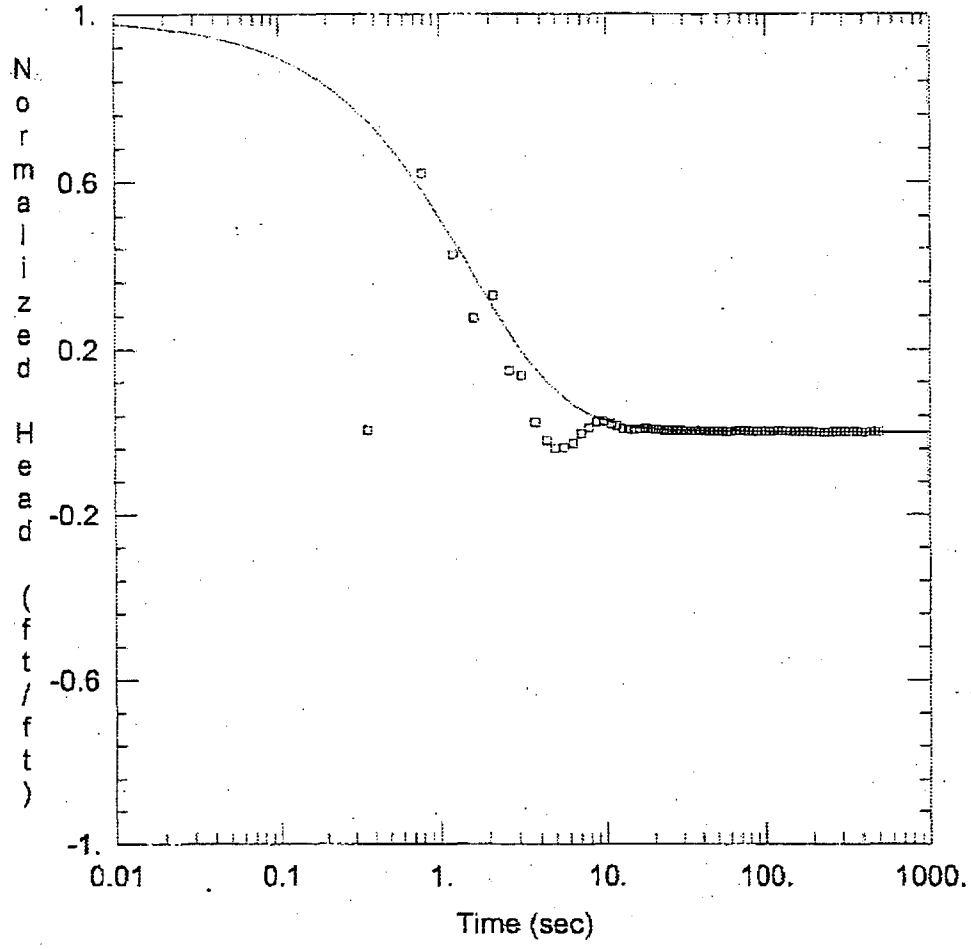
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 58.12 ft/day

Le = 49.29 ft



OW-348 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 23. ft

WELL DATA (OW-348 L)

Initial Displacement: 5.755 ft
Total Well Penetration Depth: 13. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 65. ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

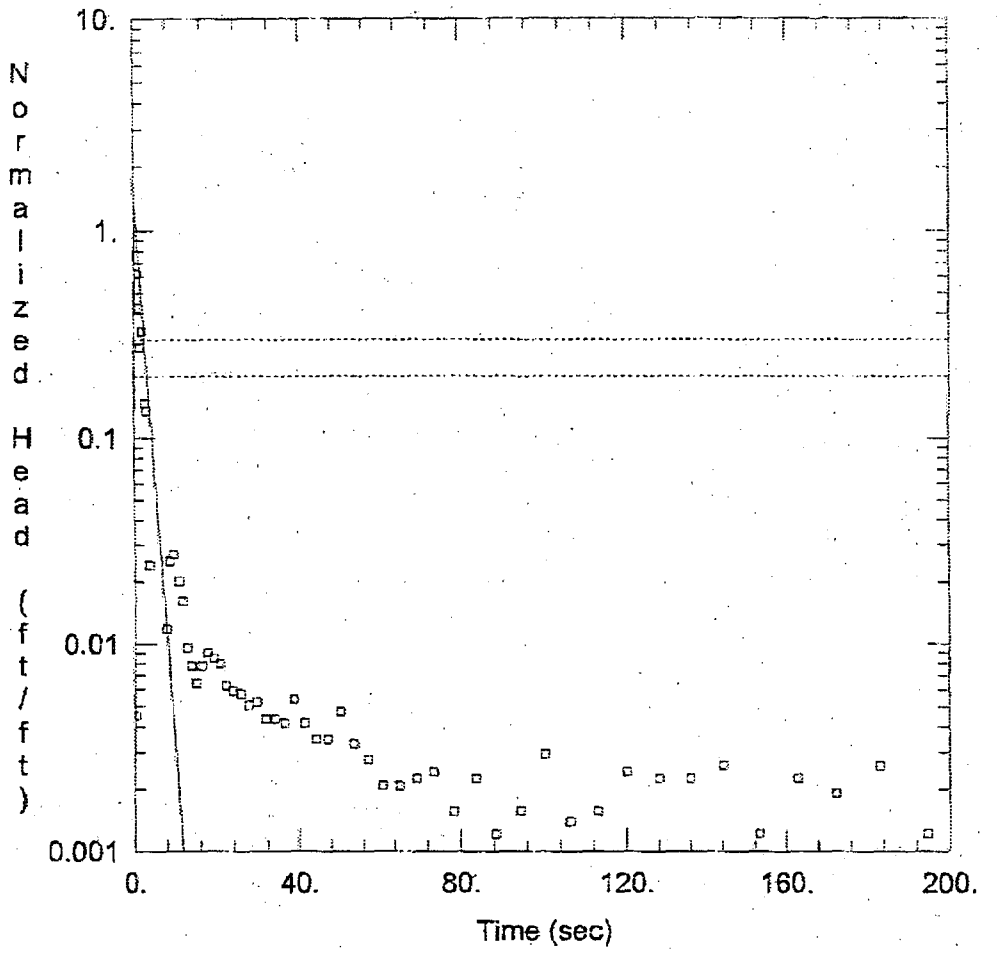
SOLUTION

Aquifer Model: Confined

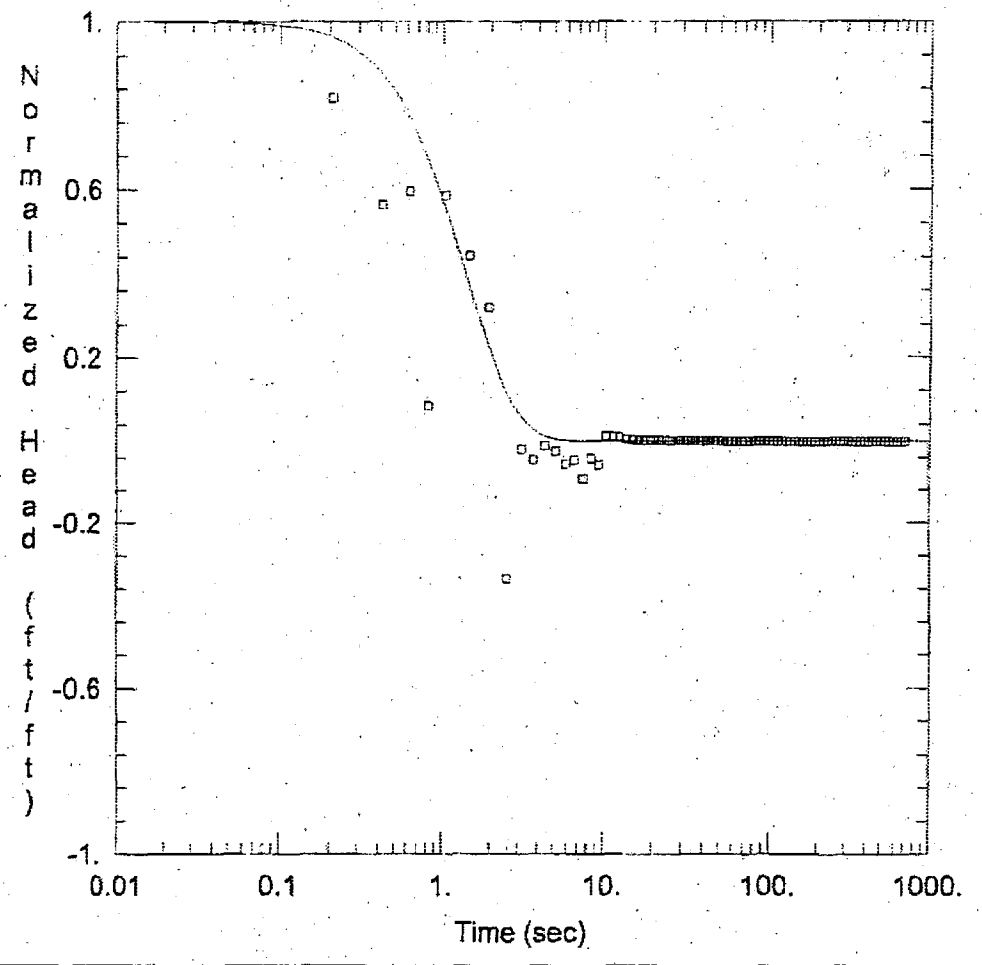
Solution Method: KGS Model

Kr = 45.62 ft/day
Kz/Kr = 1.

Ss = 4.348E-5 ft^{-1}



OW-348 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 23. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-348 L)	
Initial Displacement: 5.755 ft	Static Water Column Height: 65. ft
Total Well Penetration Depth: 13. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 43.94 ft/day	y0 = 8.844 ft



OW-348 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-348 L)

Initial Displacement: 8.578 ft

Total Well Penetration Depth: 13. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 65. ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

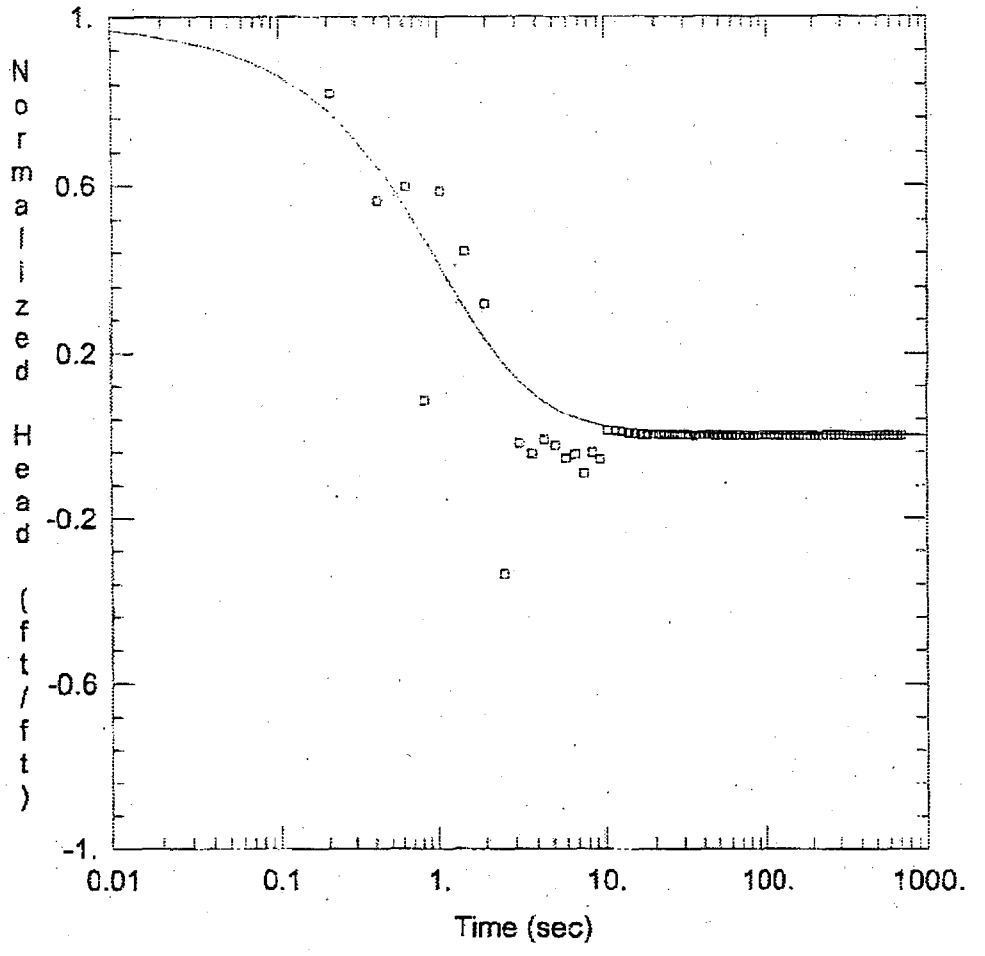
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 75.94 ft/day

Le = 15.1 ft



OW-348 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

WELL DATA (OW-348 L)

Initial Displacement: 8.578 ft
Total Well Penetration Depth: 13. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 65. ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

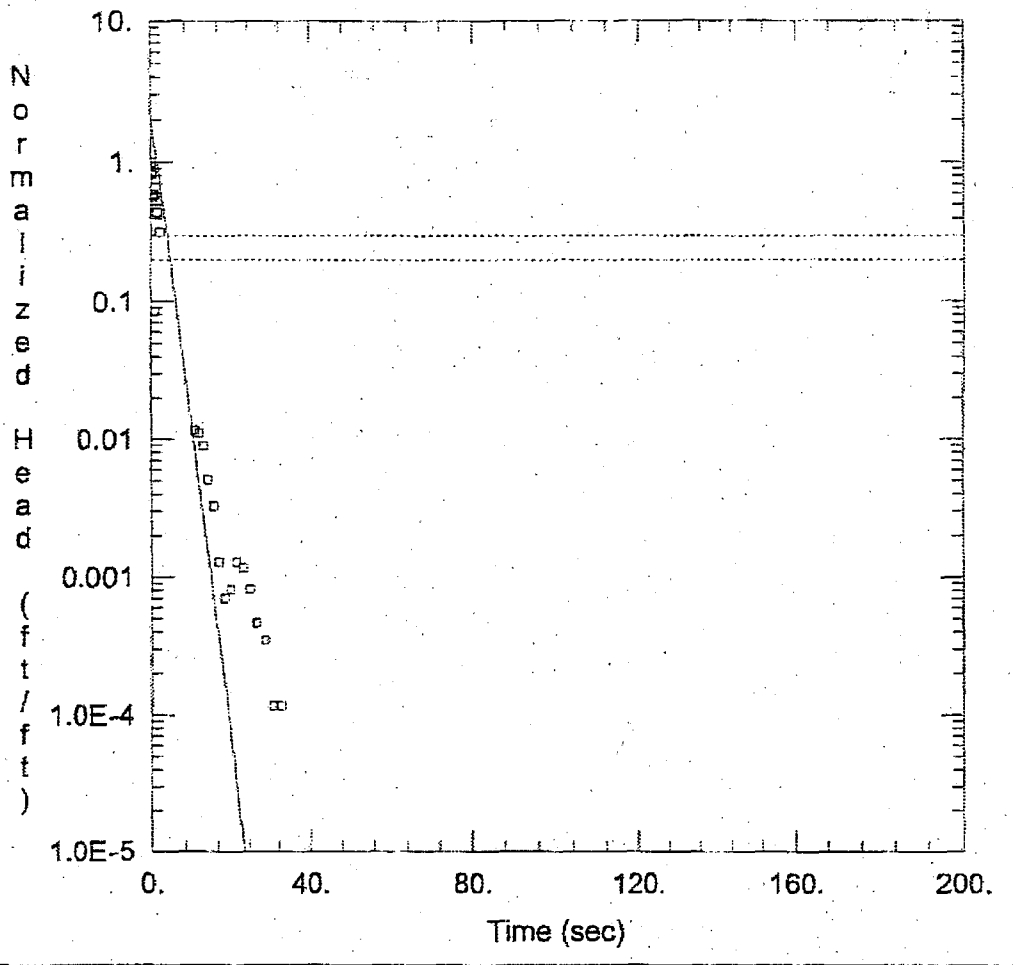
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 60.64 ft/day
Kz/Kr = 1.

Ss = 6.667E-5 ft^{-1}



OW-348 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-348 L)

Initial Displacement: 8.578 ft

Total Well Penetration Depth: 13. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 65. ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

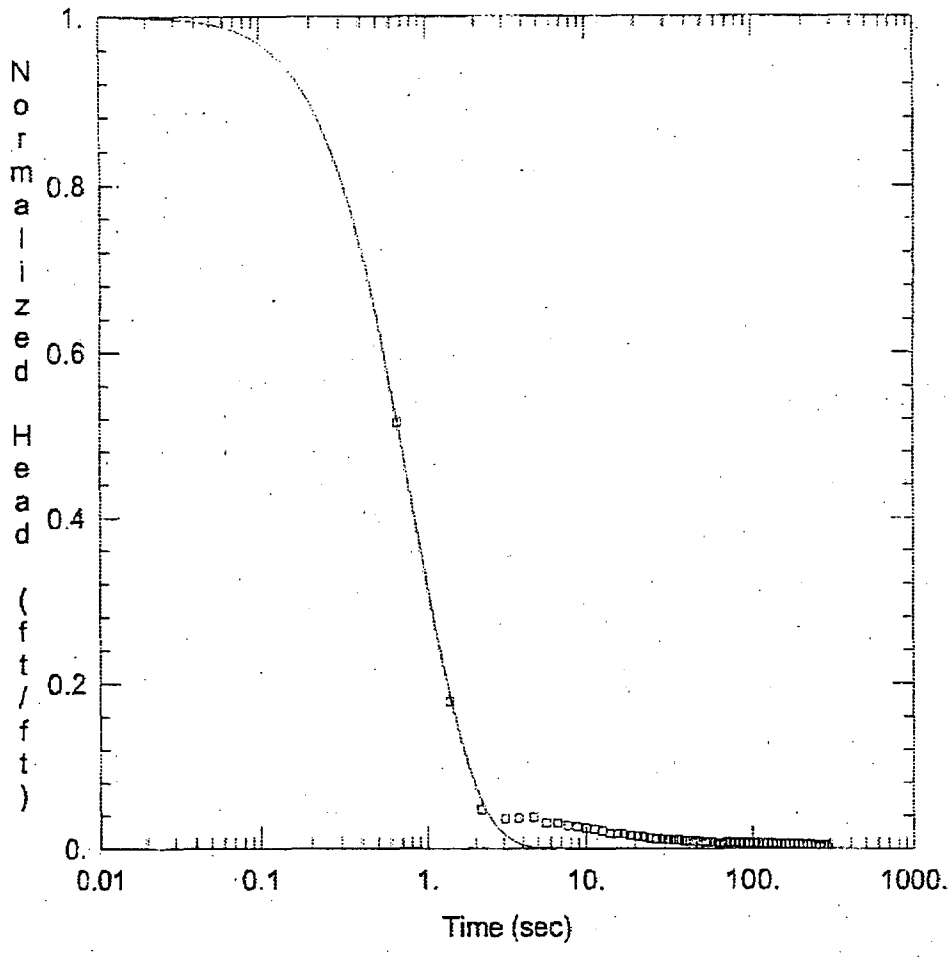
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 39.45 ft/day

y0 = 18.08 ft



OW-348 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 25. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-348 U)

Initial Displacement: 5.889 ft

Total Well Penetration Depth: 19. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 32.68 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

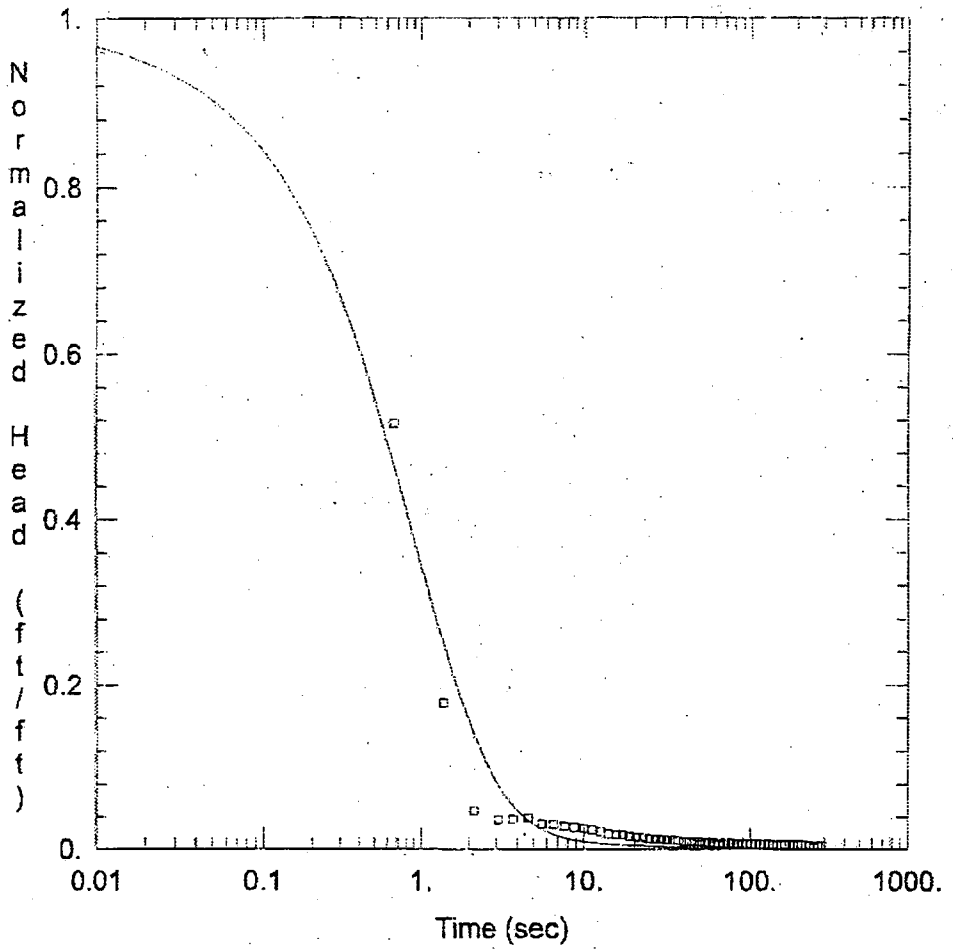
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 118.6 ft/day

Le = 4.062 ft



OW-348 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 25. ft

WELL DATA (OW-348 U)

Initial Displacement: 5.889 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 32.68 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

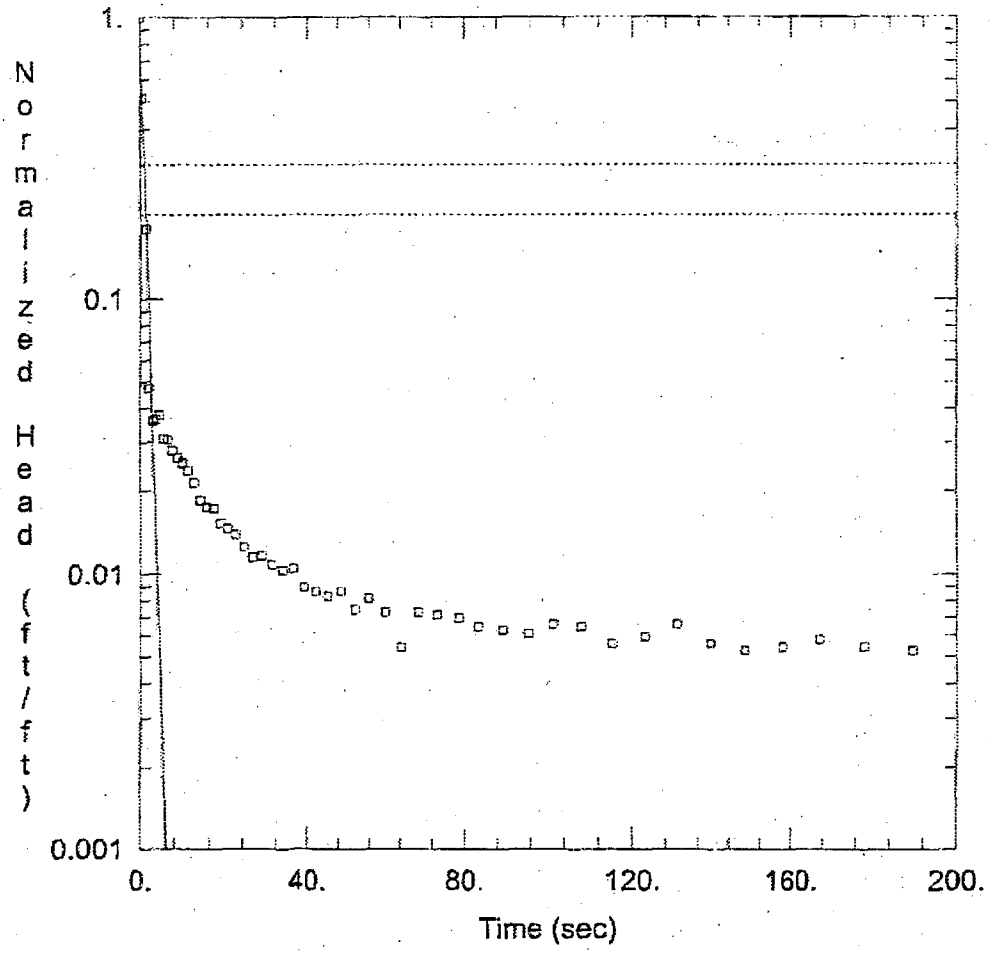
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 83.03 ft/day
Kz/Kr = 1.

Ss = 4.0E-5 ft^{-1}



OW-348 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 25. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-348 U)

Initial Displacement: 5.889 ft

Total Well Penetration Depth: 19. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 32.68 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

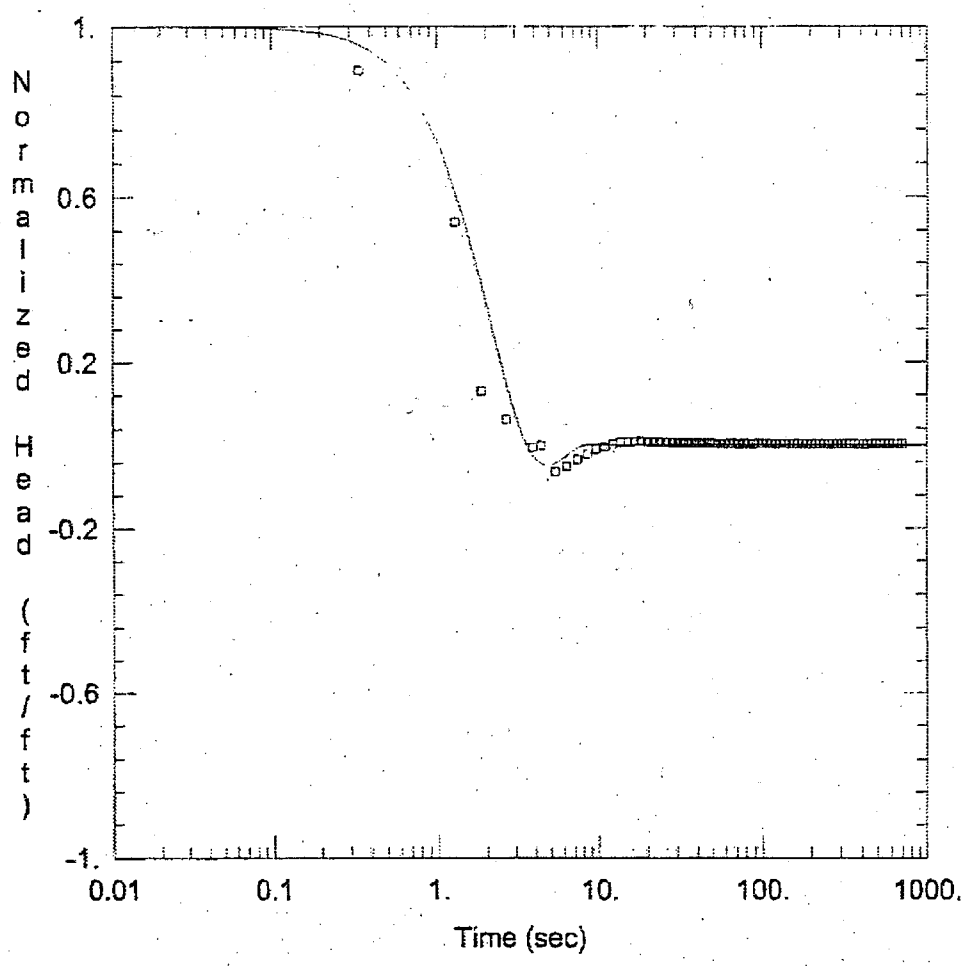
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 87.67 ft/day

y0 = 5.951 ft



OW-348 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 25. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-348 U)

Initial Displacement: 8.016 ft

Total Well Penetration Depth: 19. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 32.68 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

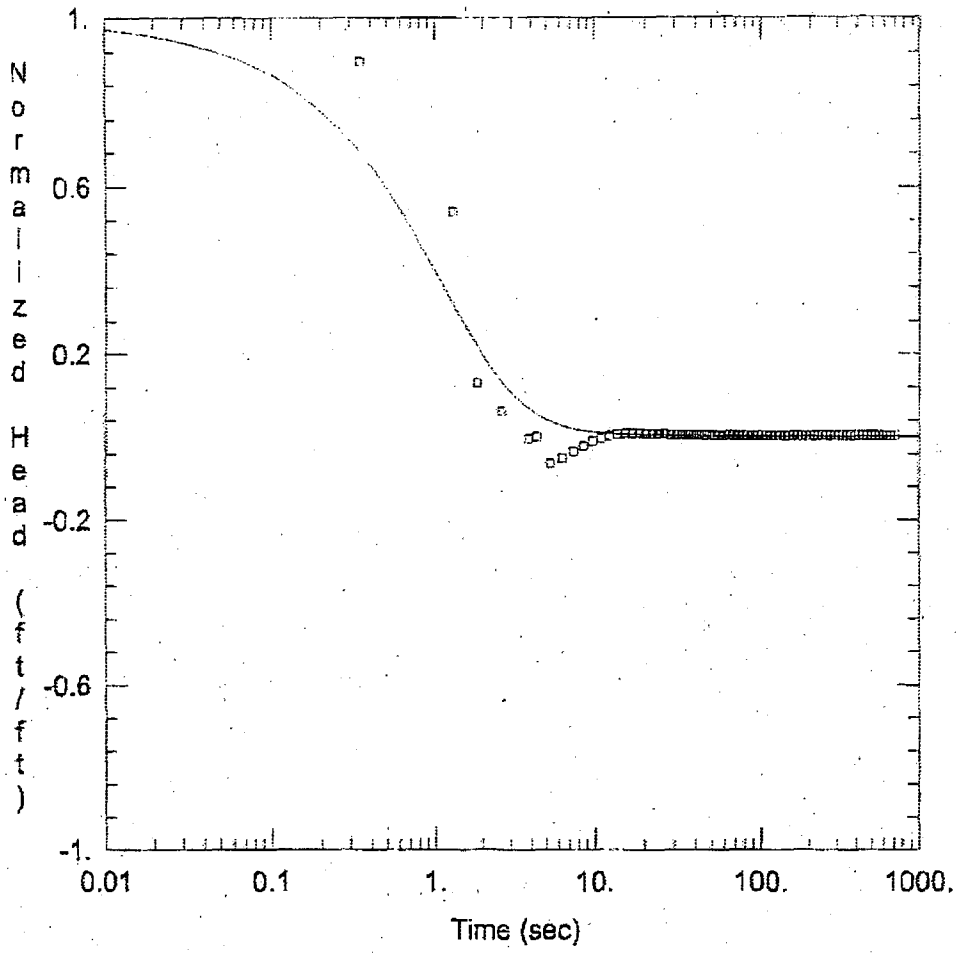
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 68.06 ft/day

Le = 38.2 ft



OW-348 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 25. ft

WELL DATA (OW-348 U)

Initial Displacement: 8.016 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 32.68 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

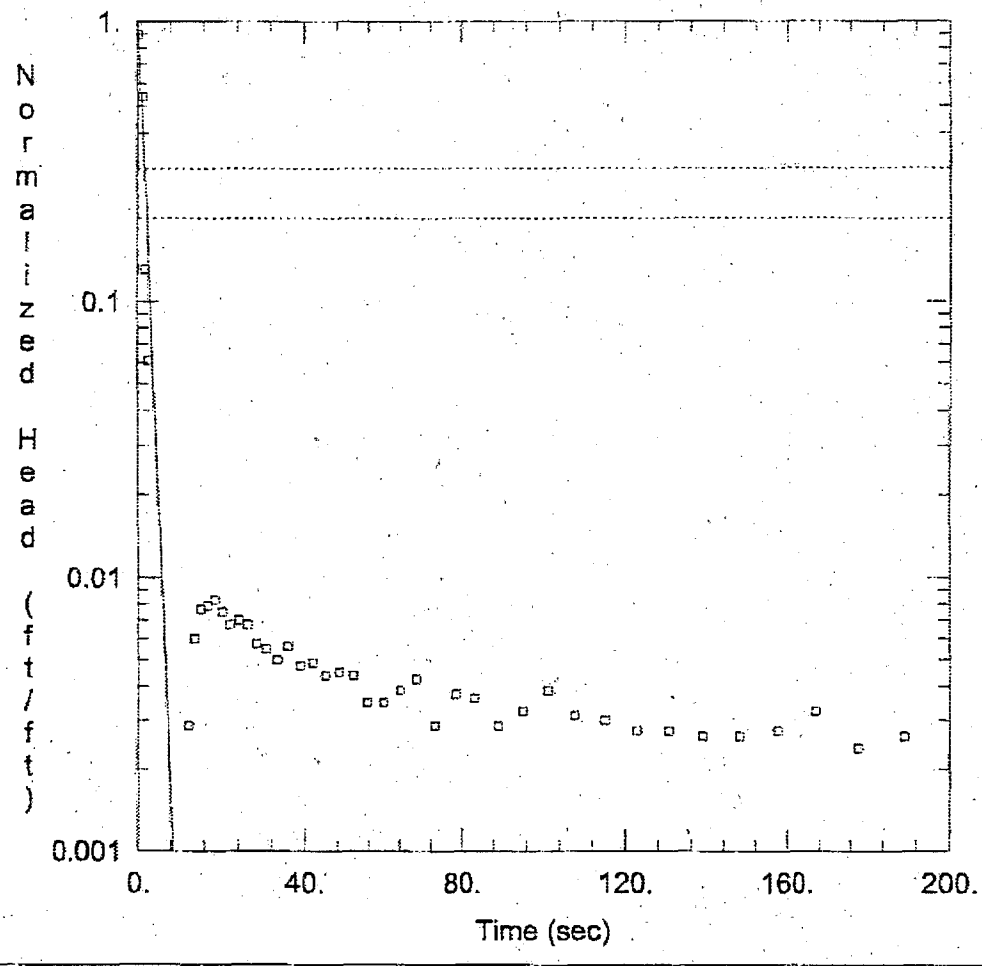
SOLUTION

Aquifer Model: Confined

Kr = 71.42 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 3.069E-5 ft^{-1}



OW-348 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 25. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-348 U)

Initial Displacement: 8.016 ft

Total Well Penetration Depth: 19. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 32.68 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

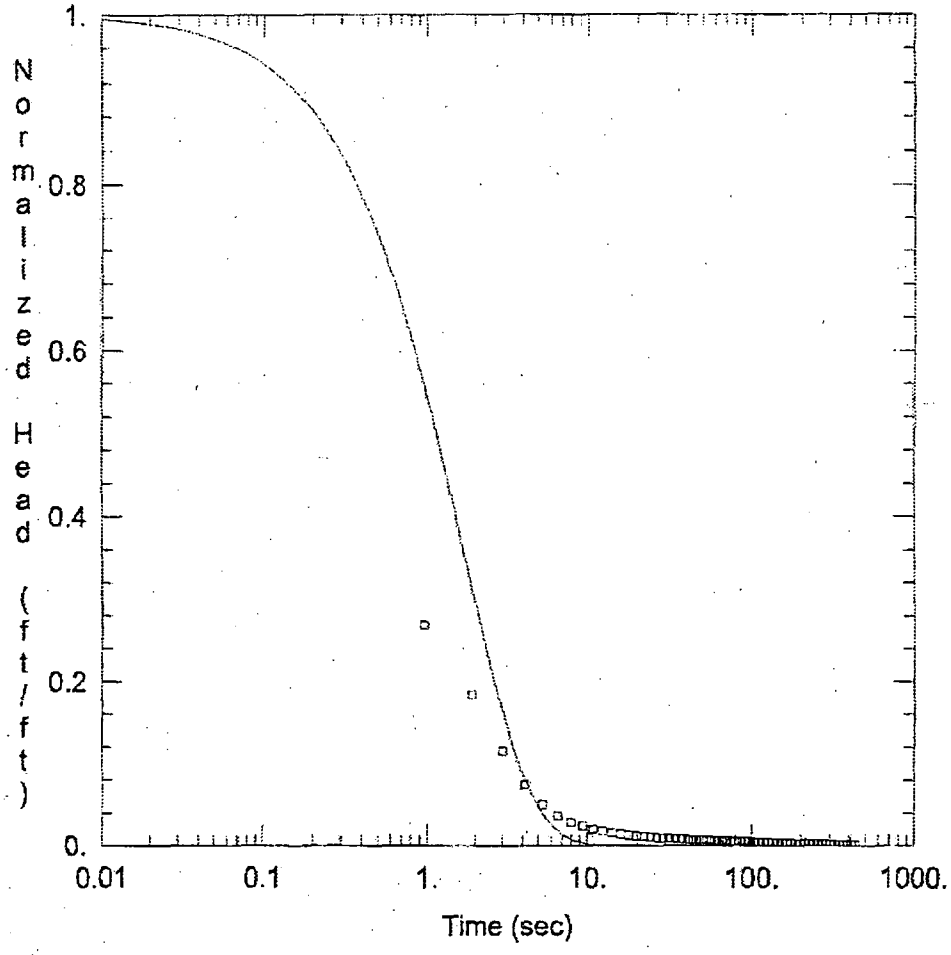
SOLUTION

Aquifer Model: Confined

K = 64.94 ft/day

Solution Method: Bouwer-Rice

y0 = 10.1 ft



OW-349 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-349 L)

Initial Displacement: 14.9 ft

Total Well Penetration Depth: 13. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 66.33 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

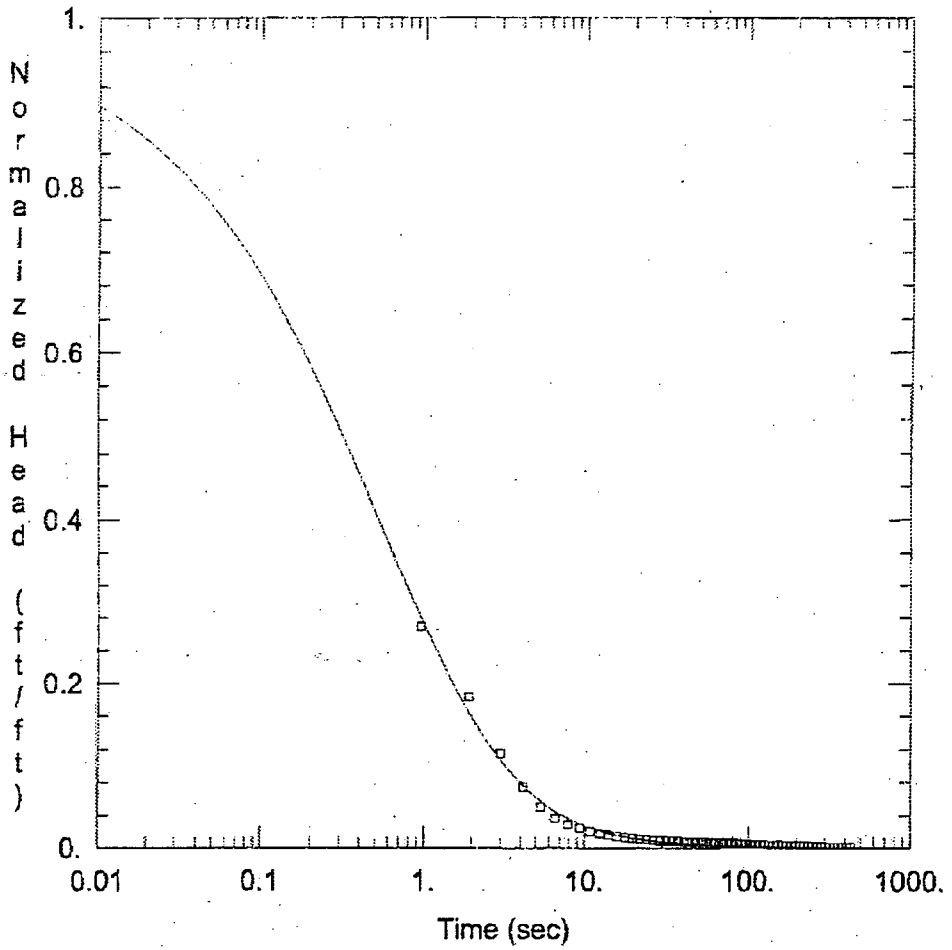
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 63.25 ft/day

Le = 0.1 ft



OW-349 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

WELL DATA (OW-349 L)

Initial Displacement: 14.9 ft
Total Well Penetration Depth: 13. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 66.33 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

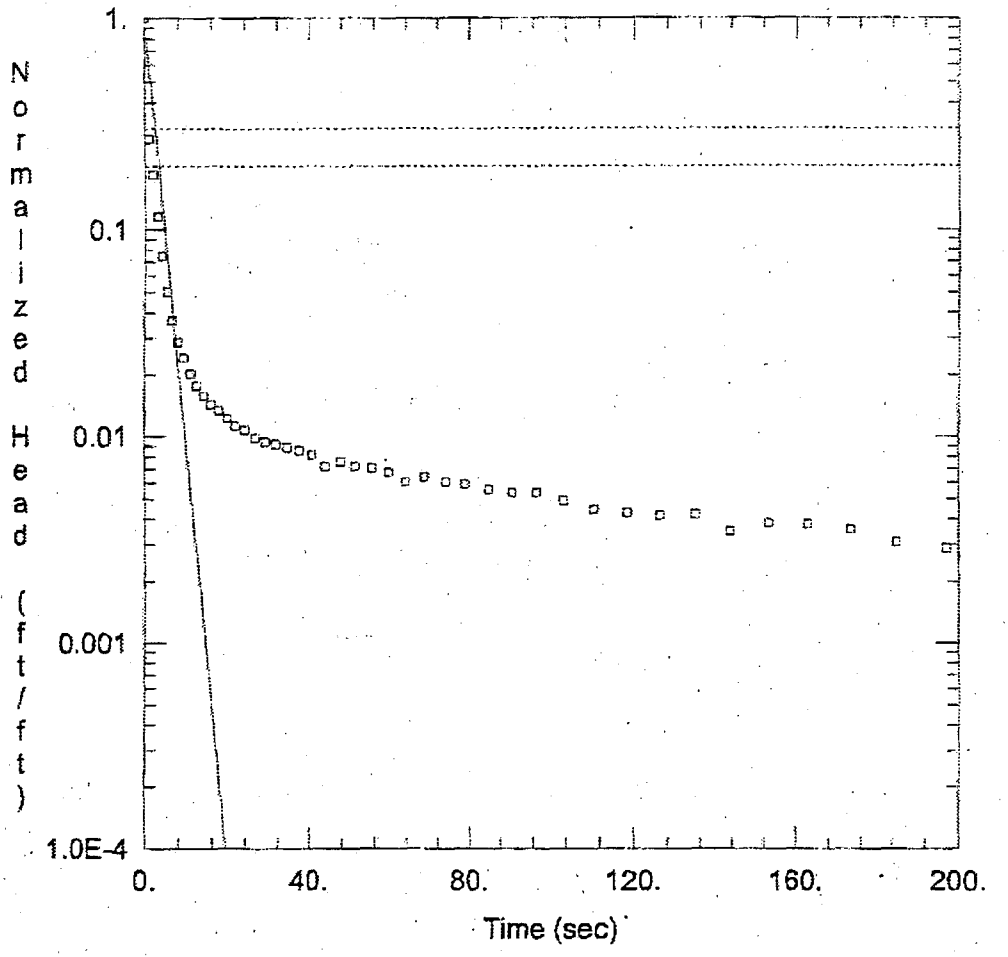
SOLUTION

Aquifer Model: Confined

Kr = 50.56 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 0.001543 ft^{-1}



OW-349 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-349 L)

Initial Displacement: 14.9 ft

Total Well Penetration Depth: 13. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 66.33 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

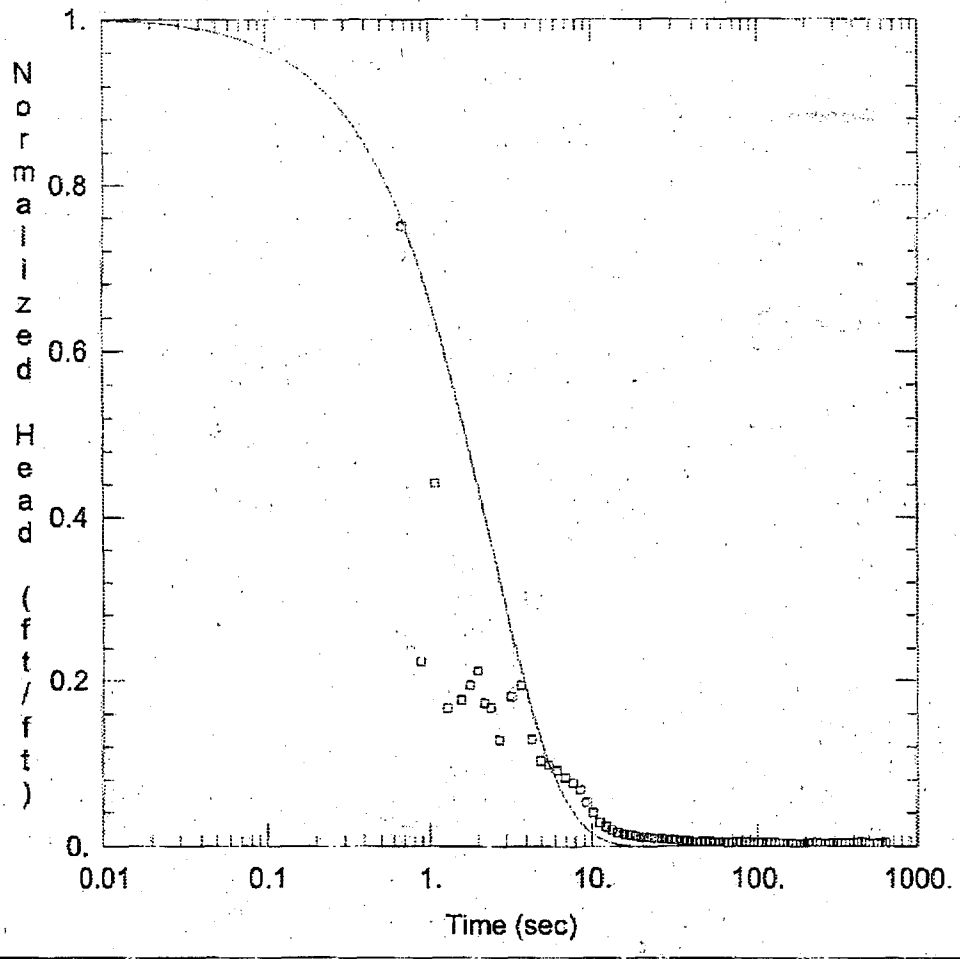
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 35.12 ft/day

y0 = 14.24 ft



OW-349 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-349 L)

Initial Displacement: 7.603 ft

Total Well Penetration Depth: 13. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 66.33 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

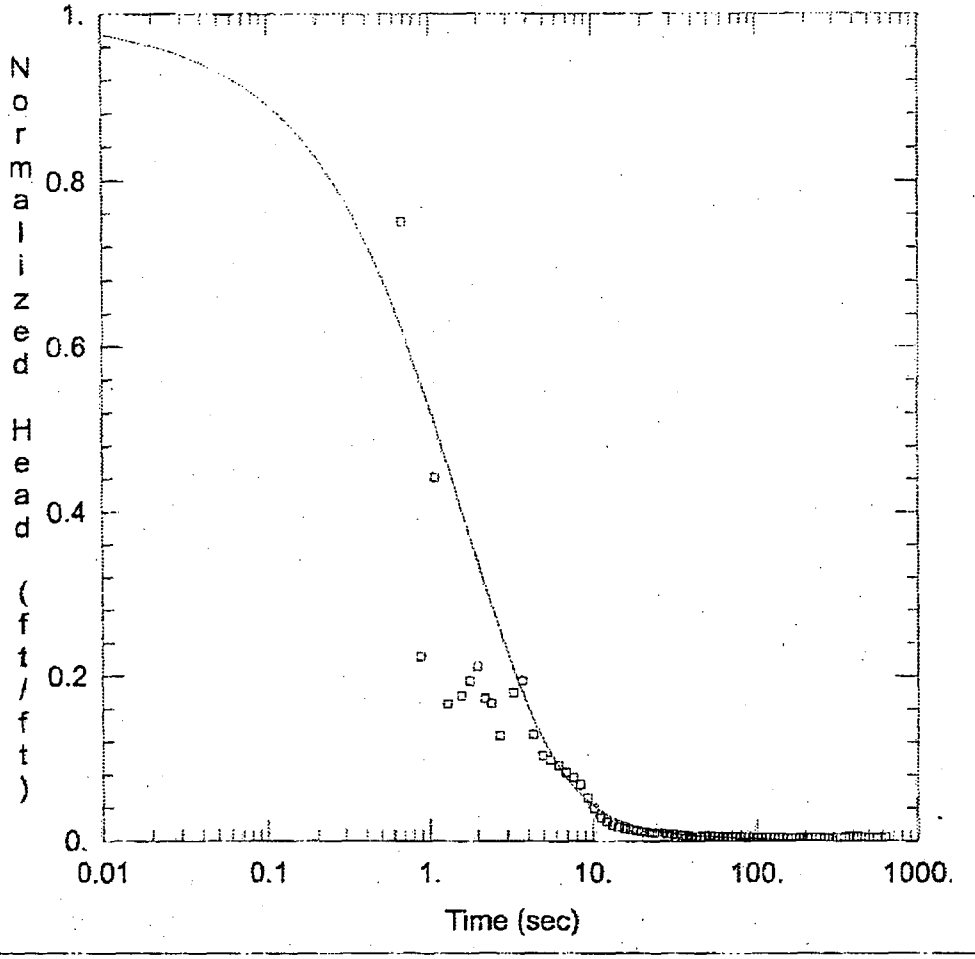
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 42.81 ft/day

Le = 1. ft



OW-349 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

WELL DATA (OW-349 L)

Initial Displacement: 7.603 ft
Total Well Penetration Depth: 13. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 66.33 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

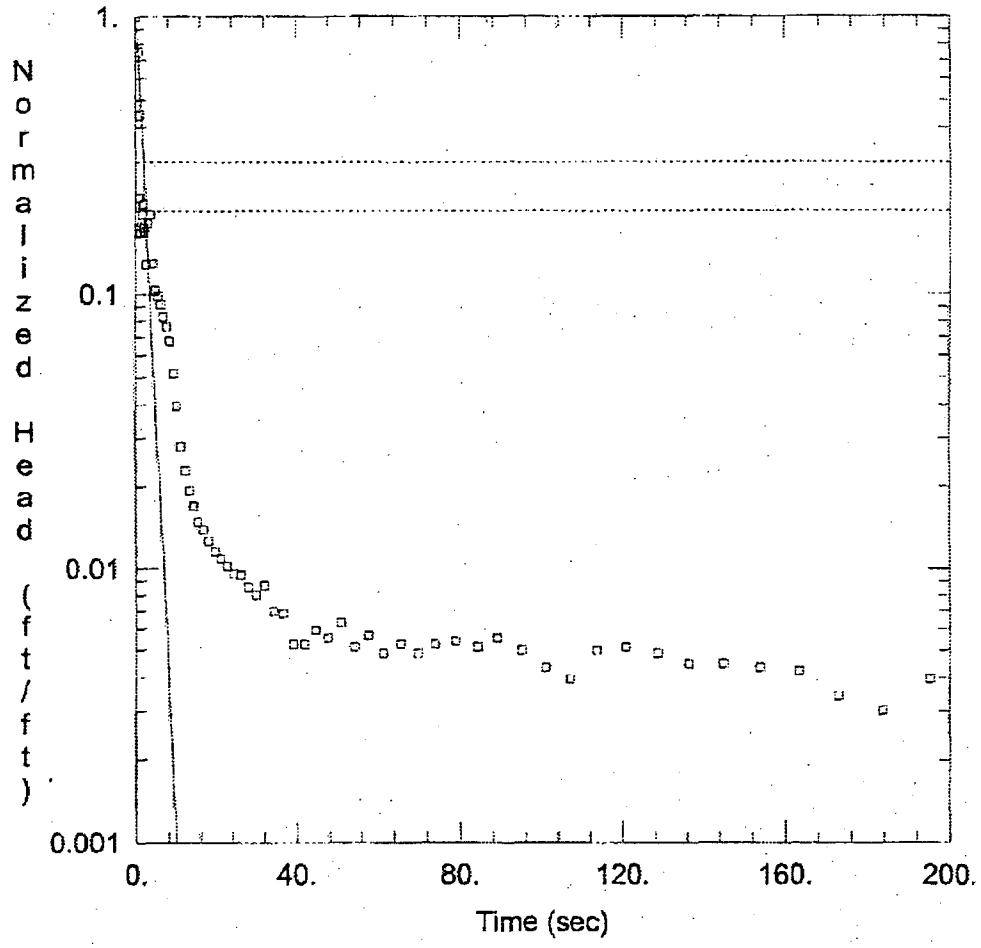
SOLUTION

Aquifer Model: Confined

Kr = 40.47 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 6.667E-5 ft^{-1}



OW-349 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-349 L)

Initial Displacement: 7.603 ft

Total Well Penetration Depth: 13. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 66.33 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

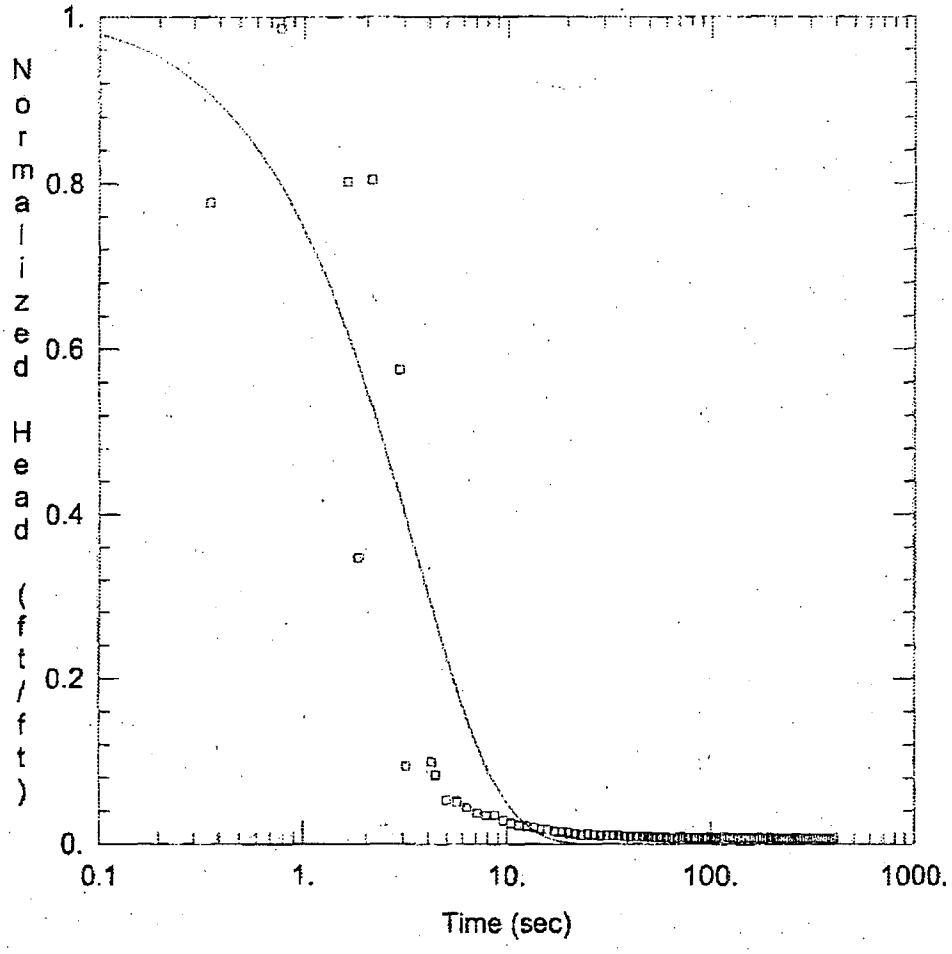
SOLUTION

Aquifer Model: Confined

K = 52.4 ft/day

Solution Method: Bouwer-Rice

y0 = 9.103 ft



OW-349 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 30.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-349 U)

Initial Displacement: 6.488 ft

Total Well Penetration Depth: 28.7 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 39.97 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

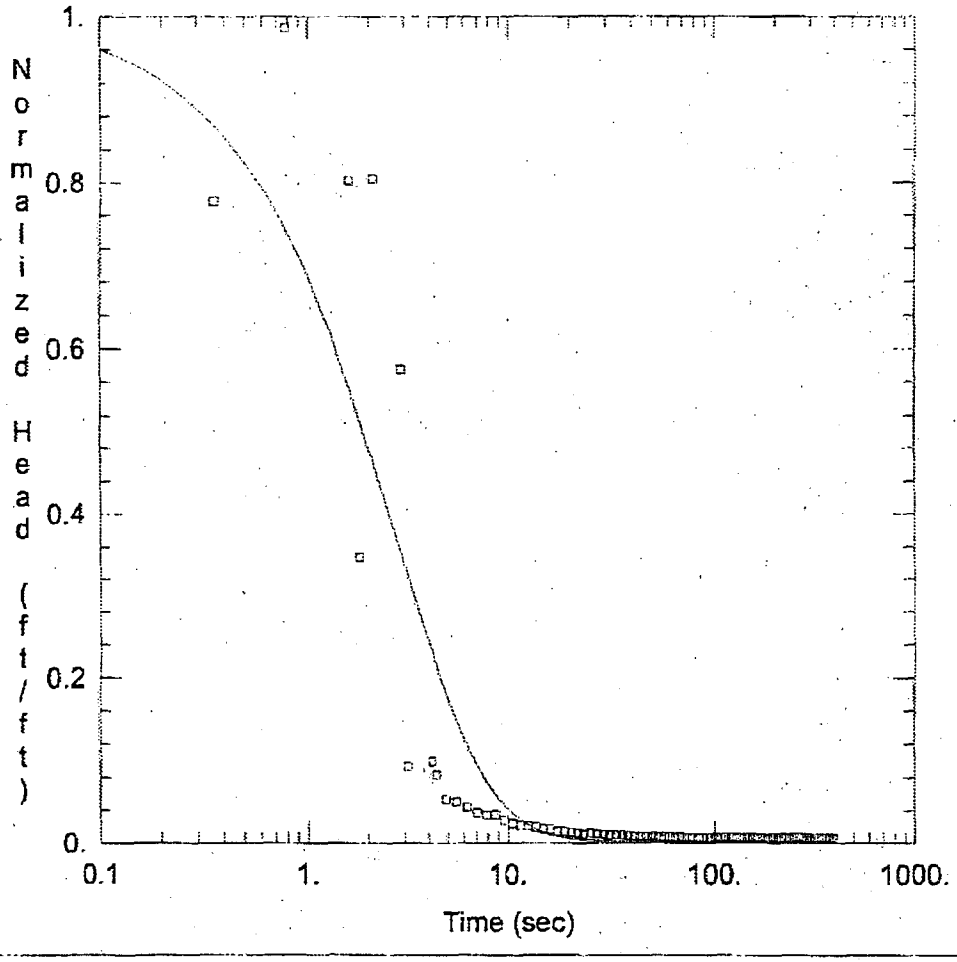
SOLUTION

Aquifer Model: Confined

K = 30.74 ft/day

Solution Method: Butler

Le = 3.53 ft



OW-349 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 30.7 ft

WELL DATA (OW-349 U)

Initial Displacement: 6.488 ft
Total Well Penetration Depth: 28.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.97 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

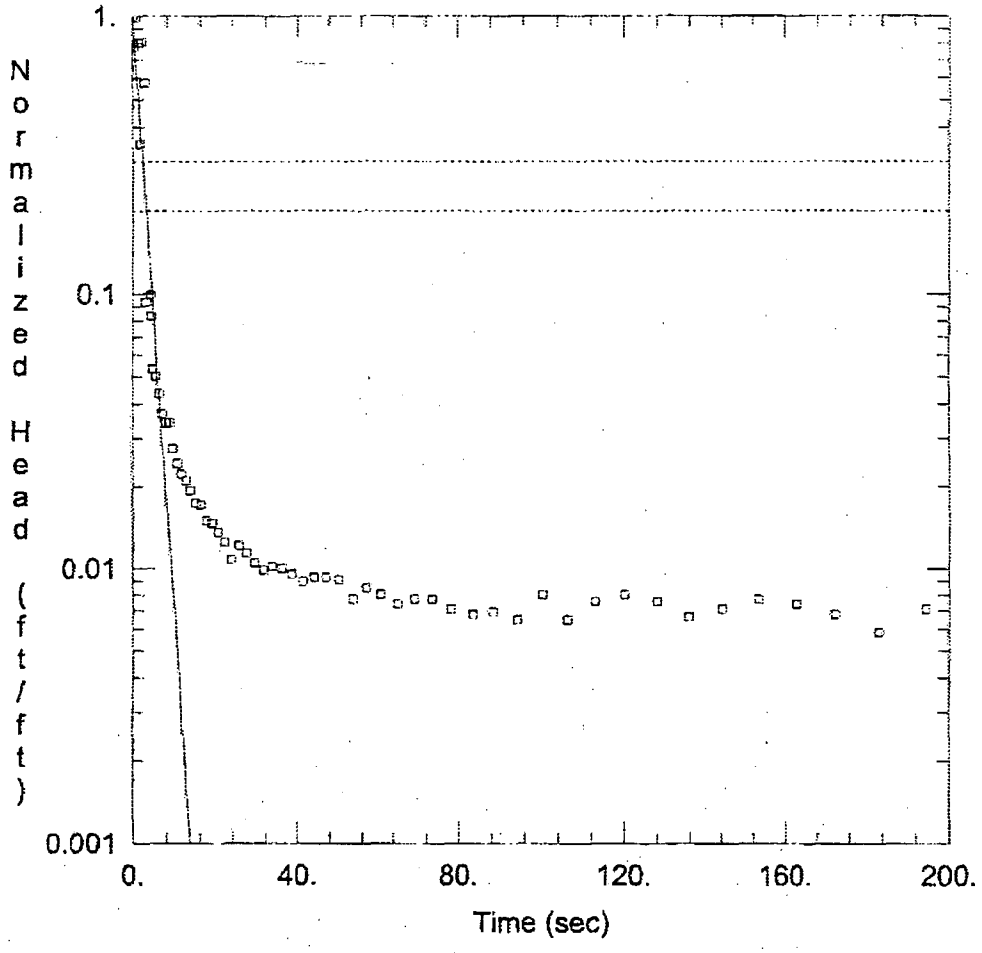
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 60.24 ft/day
Kz/Kr = 1.

Ss = 3.257E-12 ft^{-1}



OW-349 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 30.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-349 U)

Initial Displacement: 6.488 ft

Total Well Penetration Depth: 28.7 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 39.97 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

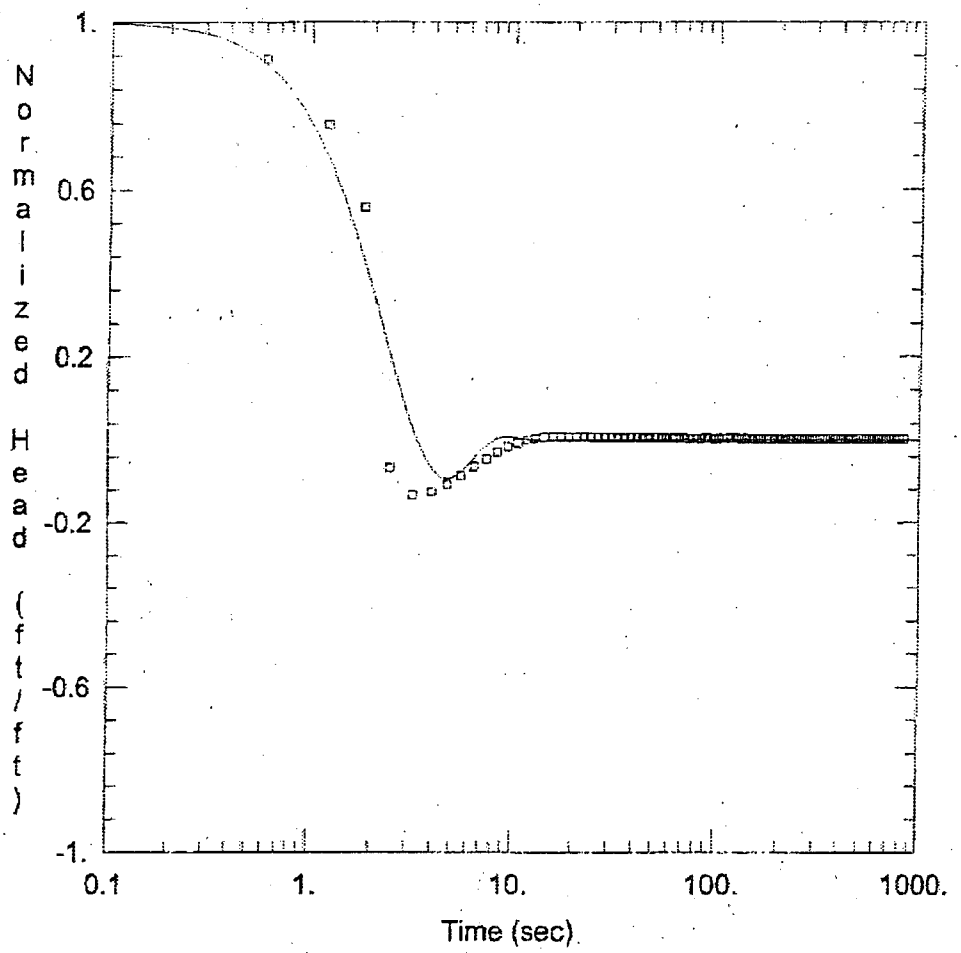
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 42.98 ft/day

y0 = 6.488 ft



OW-349 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 33.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-349 U)

Initial Displacement: 6.212 ft

Total Well Penetration Depth: 28.7 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 39.97 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

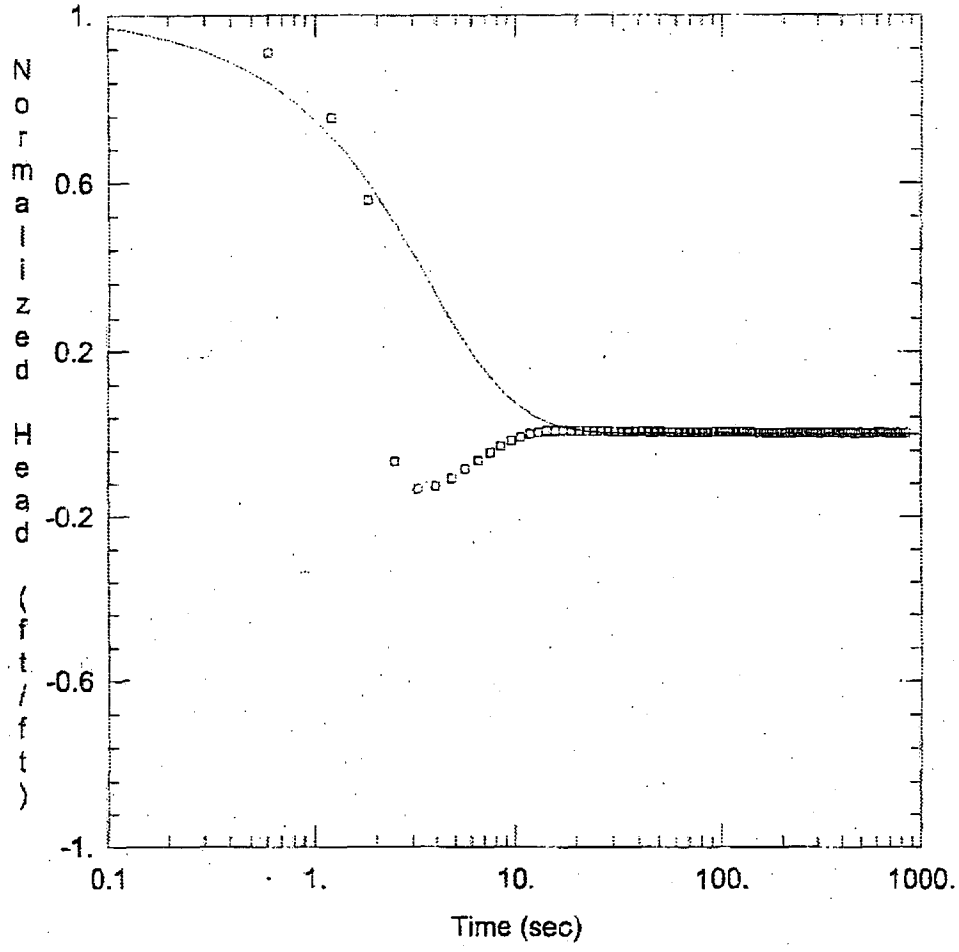
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 71.38 ft/day

Le = 46.23 ft



OW-349 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 33.7 ft

WELL DATA (OW-349 U)

Initial Displacement: 6.212 ft
Total Well Penetration Depth: 28.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.97 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

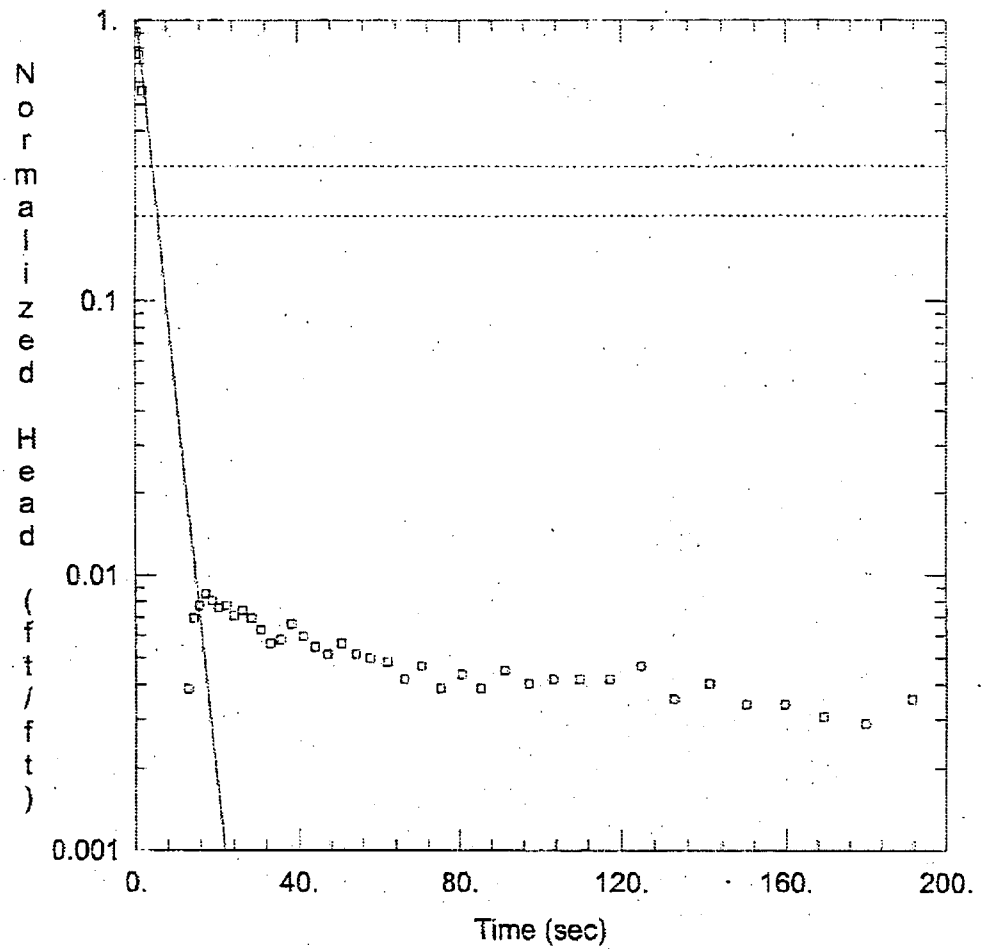
SOLUTION

Aquifer Model: Confined

Kr = 55.58 ft/day
Kz/Kr = 0.002371

Solution Method: KGS Model

Ss = 2.384E-10 ft^{-1}



OW-349 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 33.7 ft

Anisotropy Ratio (Kz/Kr): 0.002371

WELL DATA (OW-349 U)

Initial Displacement: 6.212 ft

Total Well Penetration Depth: 28.7 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 39.97 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

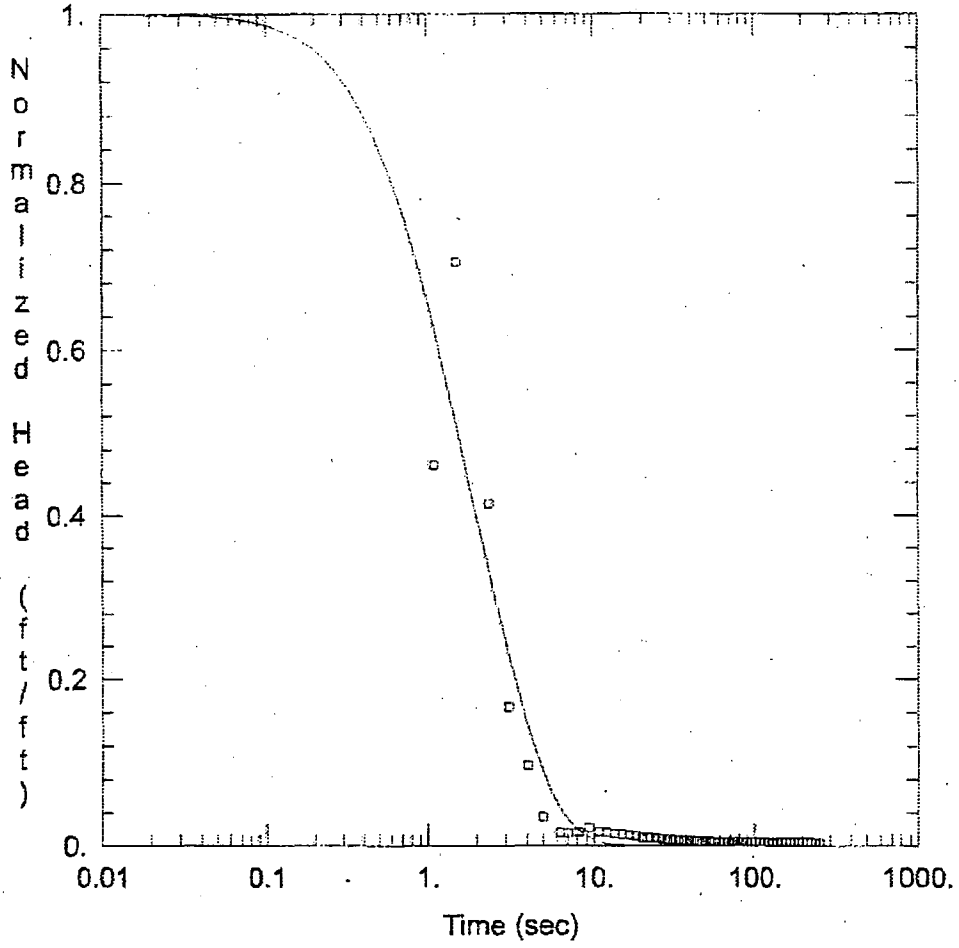
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 52.82 ft/day

y0 = 7.374 ft



OW-408 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-408 L)

Initial Displacement: 10.84 ft

Total Well Penetration Depth: 11.5 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 64.95 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

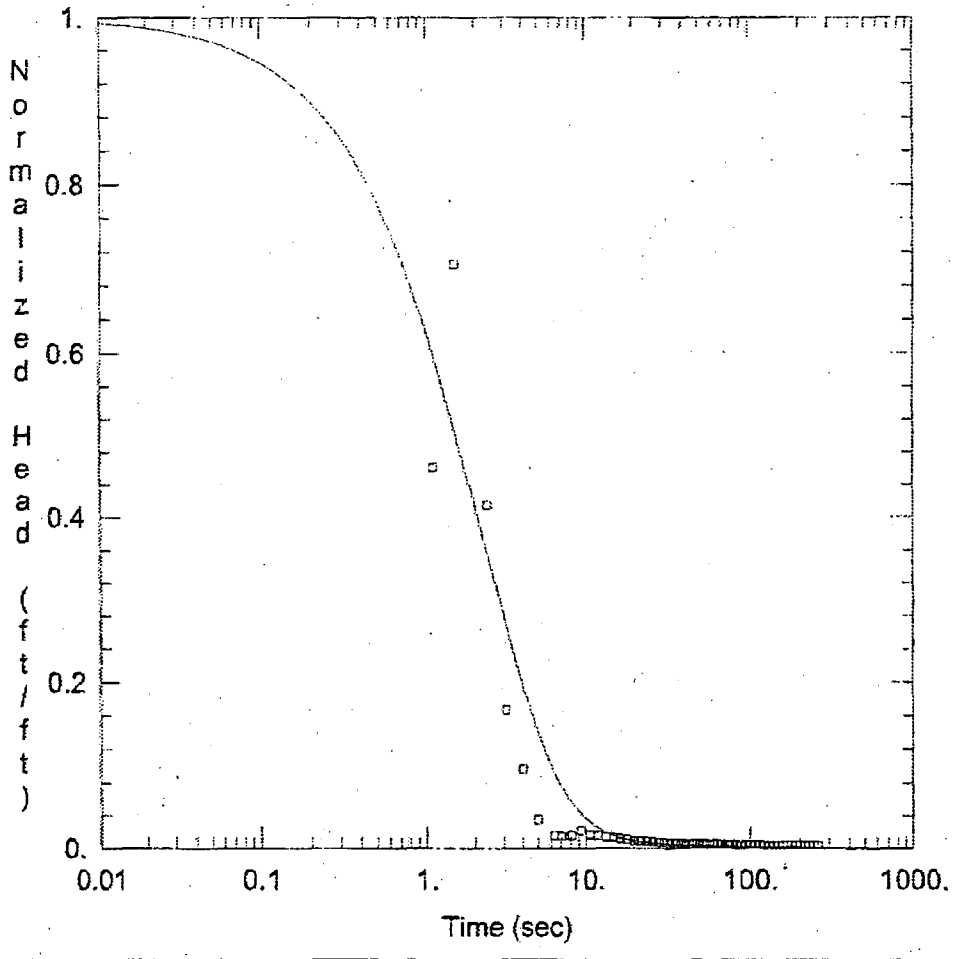
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 47.96 ft/day

Le = 10.08 ft



OW-408 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

WELL DATA (OW-408 L)

Initial Displacement: 10.84 ft
Total Well Penetration Depth: 11.5 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 64.95 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

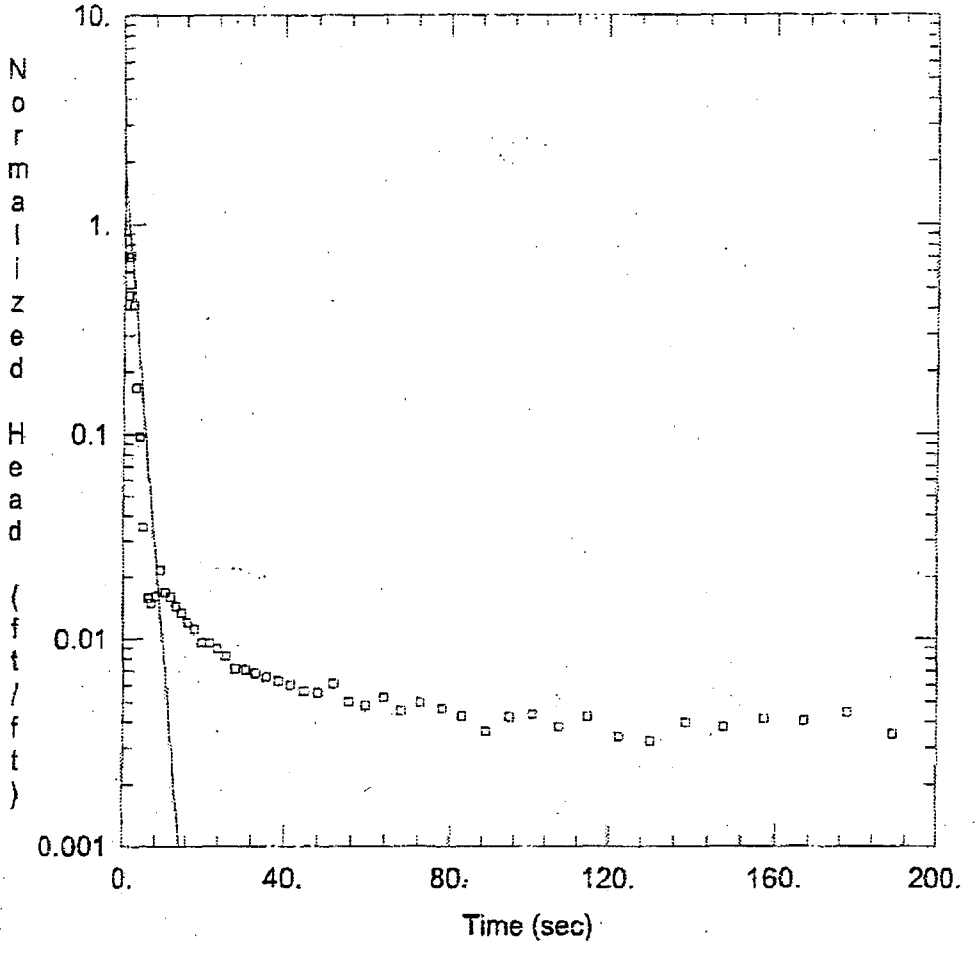
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 72.51 ft/day
Kz/Kr = 0.09886

Ss = 3.265E-8 ft^{-1}



OW-408 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-408 L)

Initial Displacement: 10.84 ft

Total Well Penetration Depth: 11.5 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 64.95 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

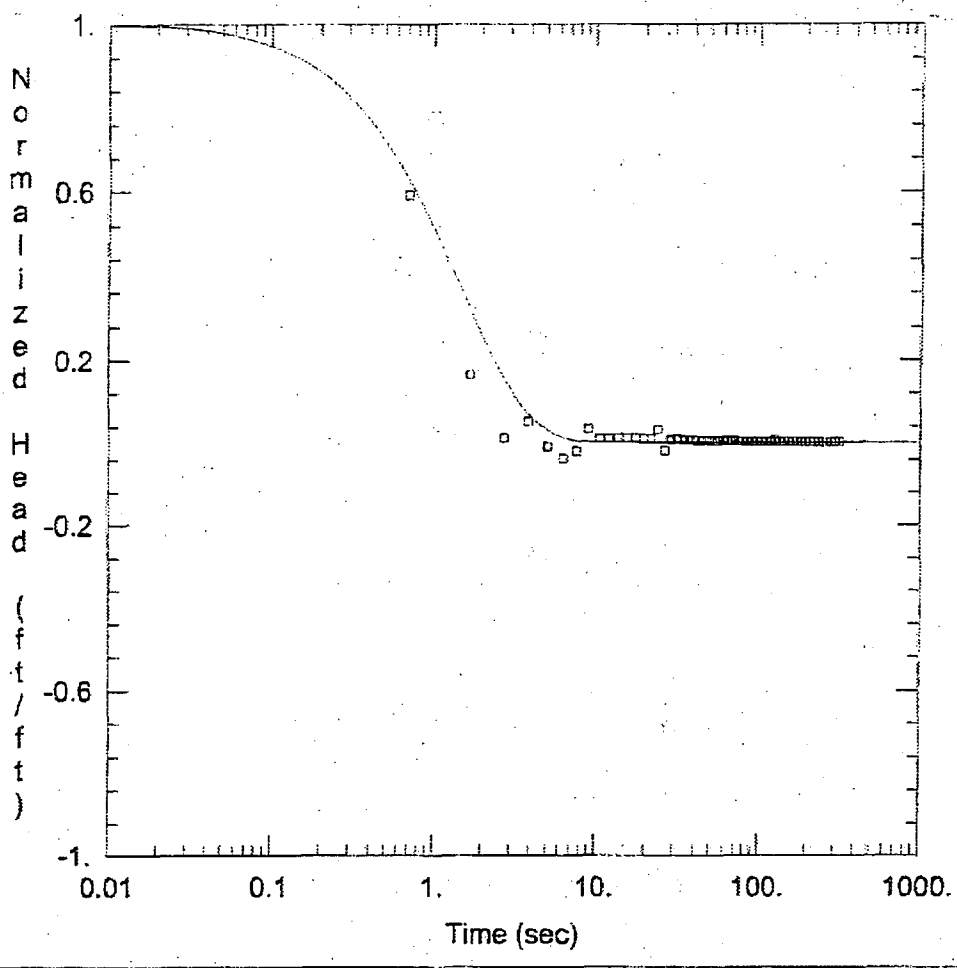
SOLUTION

Aquifer Model: Confined

K = 37.54 ft/day

Solution Method: Bouwer-Rice

y0 = 20.36 ft



OW-408 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-408 L)

Initial Displacement: 7.342 ft

Total Well Penetration Depth: 11.5 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 64.95 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

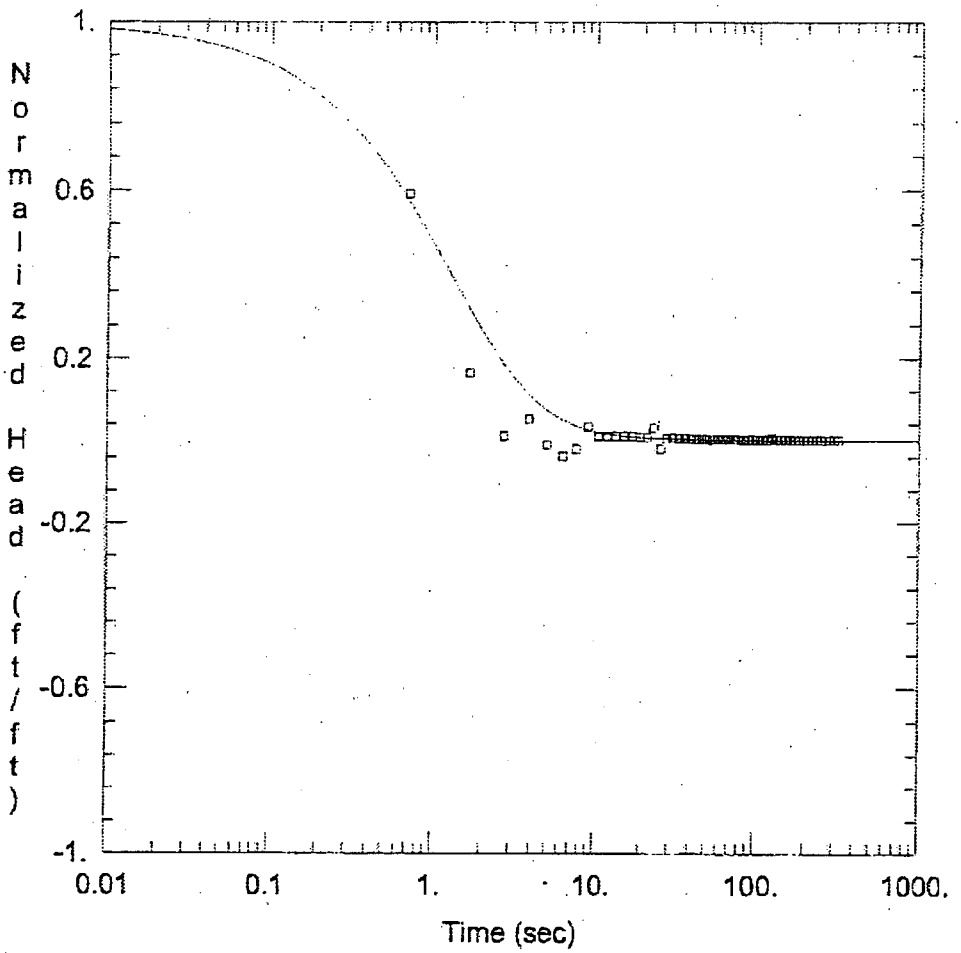
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 70.31 ft/day

Le = 1. ft



OW-408 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

WELL DATA (OW-408 L)

Initial Displacement: 7.342 ft
Total Well Penetration Depth: 11.5 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 64.95 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

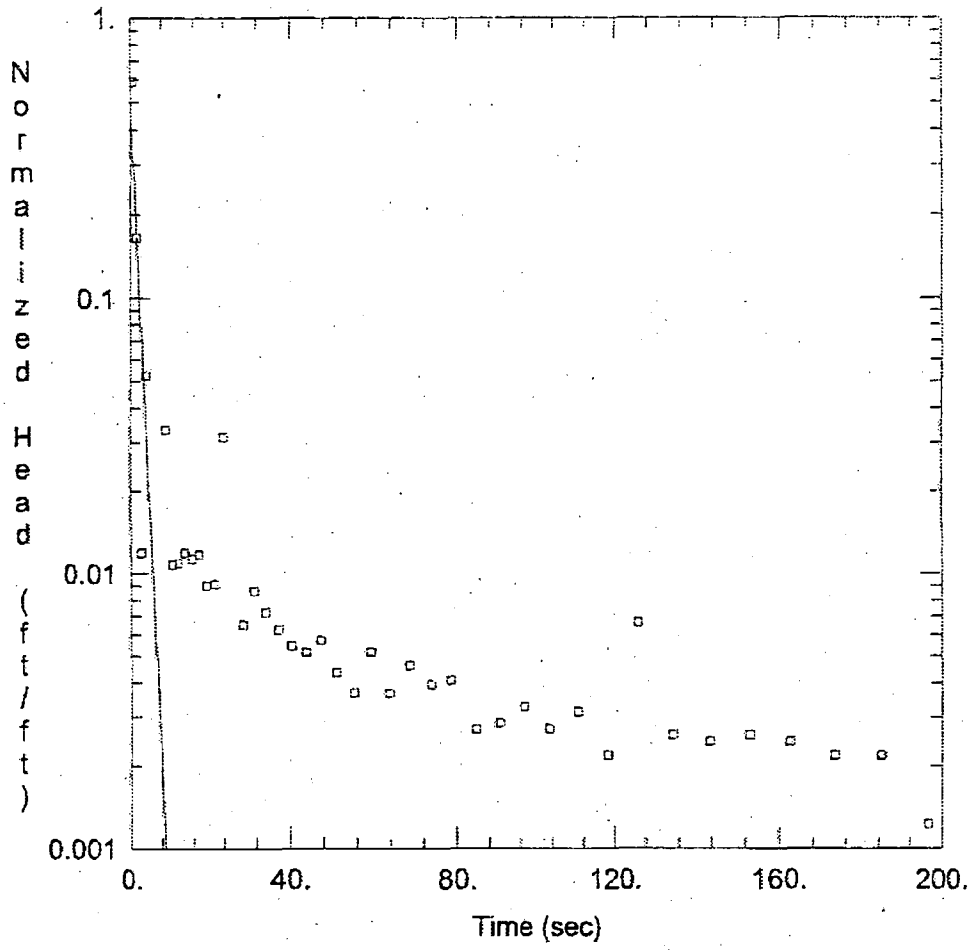
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 67.66 ft/day
Kz/Kr = 1.

Ss = 8.393E-6 ft^{-1}



OW-408 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-408 L)

Initial Displacement: 7.342 ft

Total Well Penetration Depth: 11.5 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 64.95 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

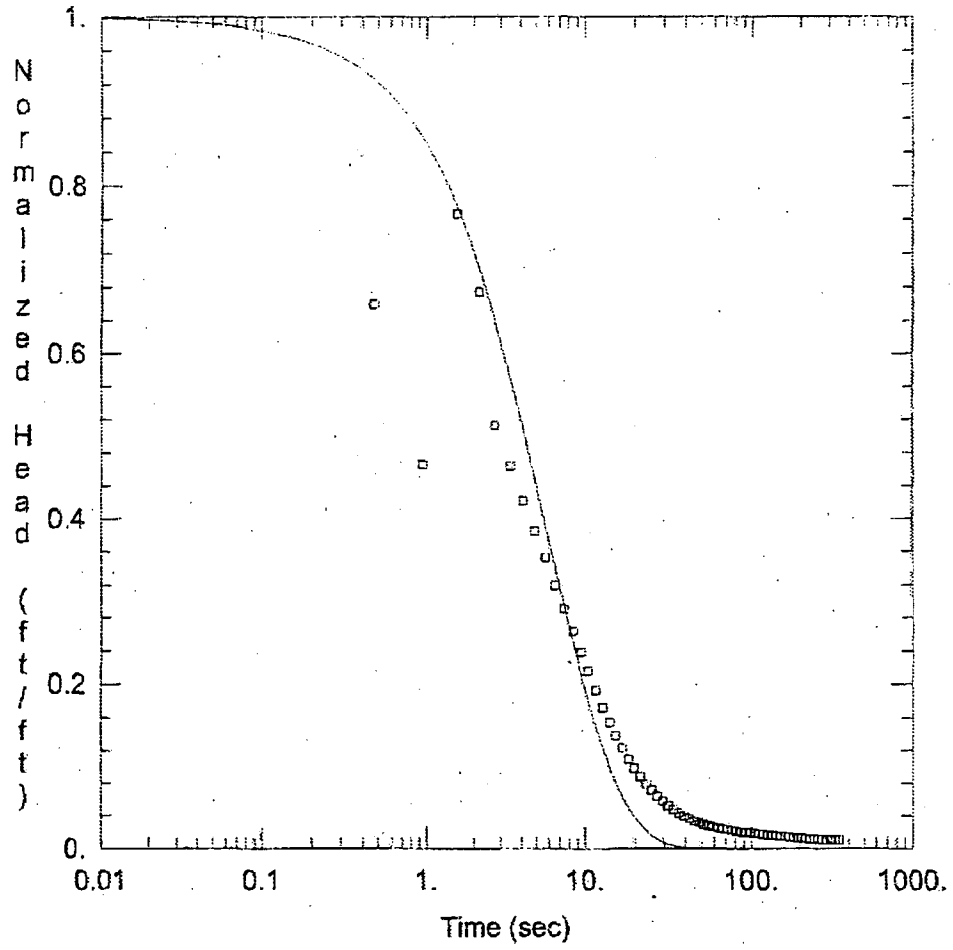
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 50.37 ft/day

y0 = 3.948 ft



OW-408 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-408 U)

Initial Displacement: 9.342 ft

Total Well Penetration Depth: 13.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 34.17 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

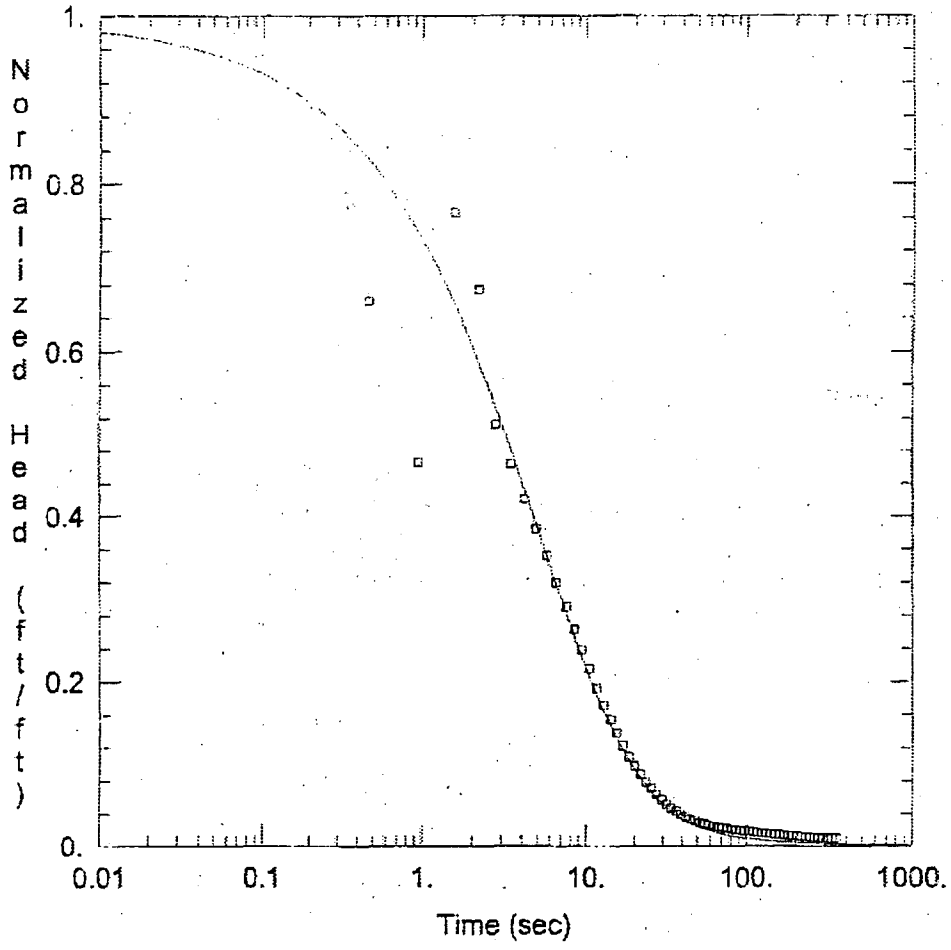
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 16.86 ft/day

Le = 0.1 ft



OW-408 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15.5 ft

WELL DATA (OW-408 U)

Initial Displacement: 9.342 ft
Total Well Penetration Depth: 13.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 34.17 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

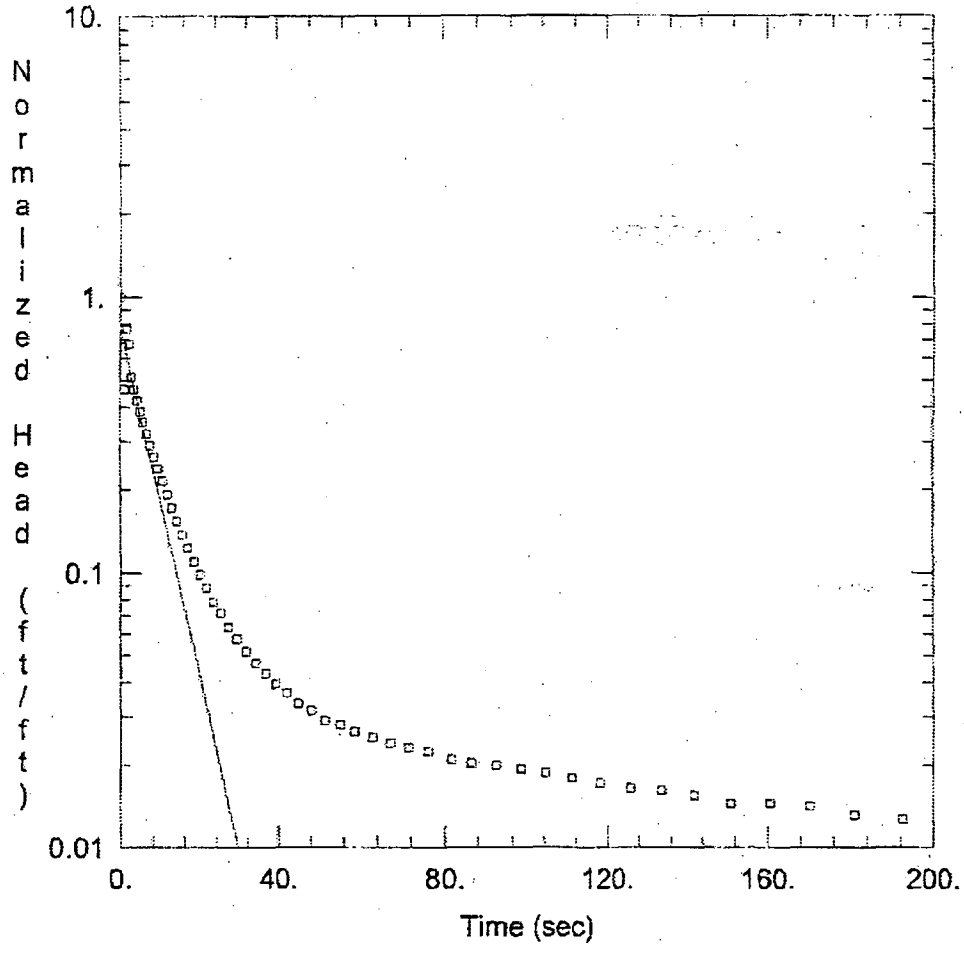
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 11.06 ft/day
Kz/Kr = 1.

Ss = 0.0002017 ft^{-1}



OW-408 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-408 U)

Initial Displacement: 9.342 ft

Total Well Penetration Depth: 13.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 34.17 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

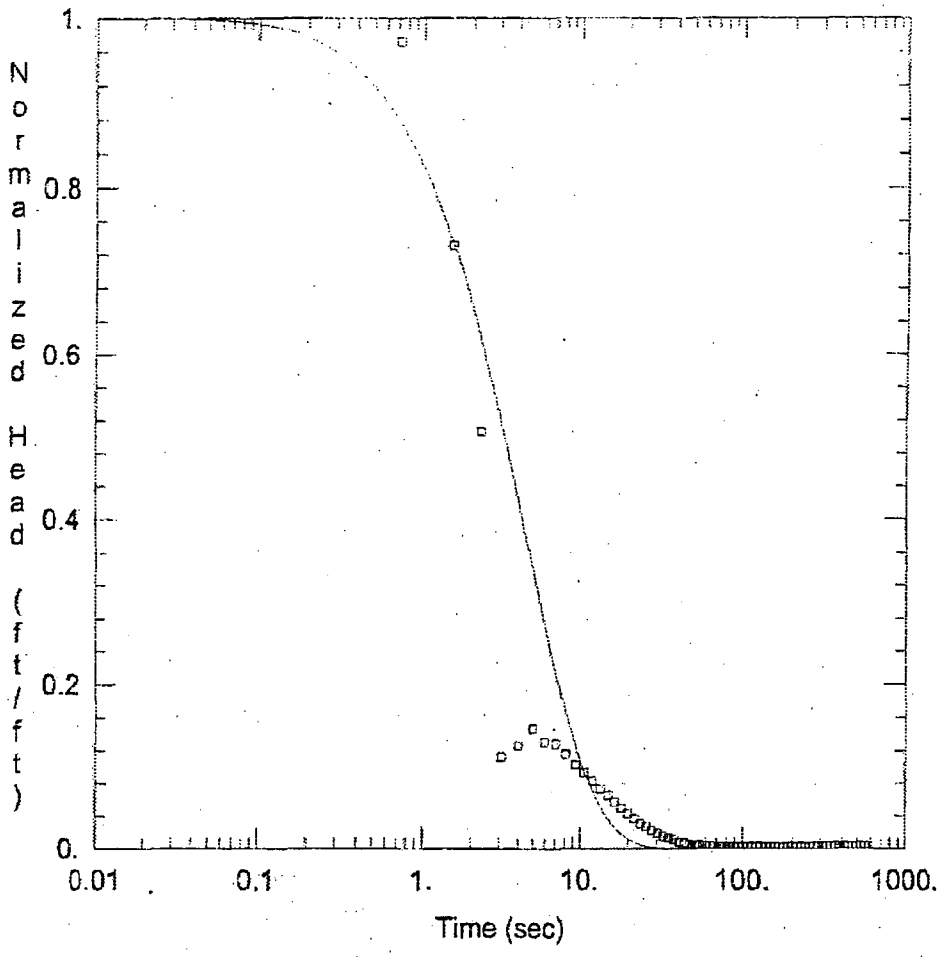
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 10.94 ft/day

y0 = 7.185 ft



OW-408 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-408 U)

Initial Displacement: 9.499 ft

Total Well Penetration Depth: 13.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 34.17 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

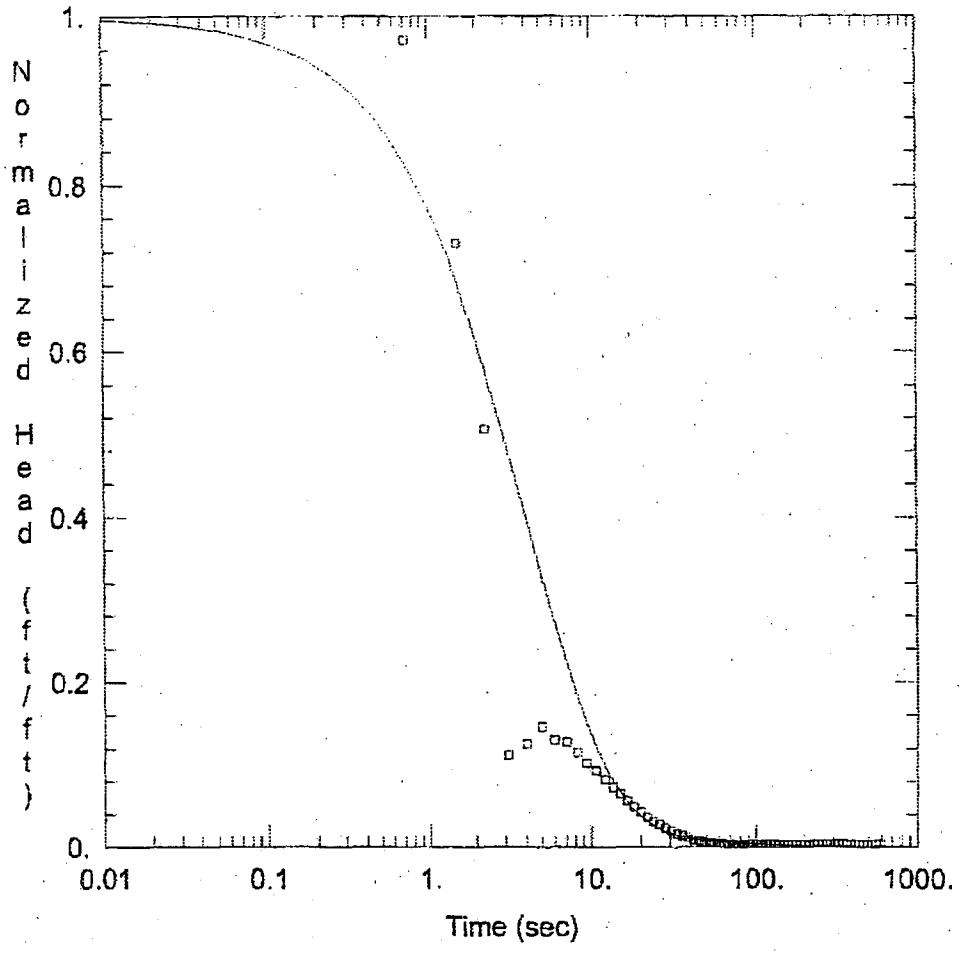
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 22.4 ft/day

Le = 17.38 ft



OW-408 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15.5 ft

WELL DATA (OW-408 U)

Initial Displacement: 9.499 ft
Total Well Penetration Depth: 13.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 34.17 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

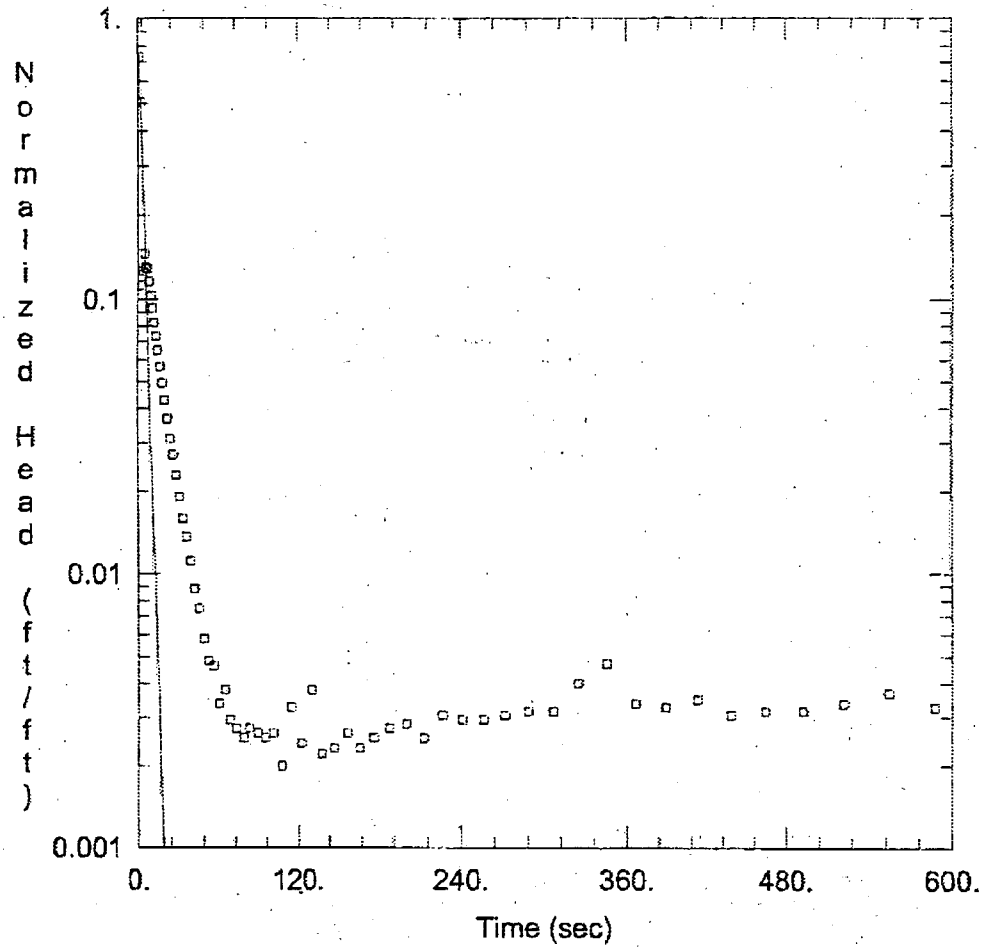
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 31.48 ft/day
Kz/Kr = 1.

Ss = 1.106E-7 ft^{-1}



OW-408 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-408 U)

Initial Displacement: 9.499 ft

Total Well Penetration Depth: 13.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 34.17 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

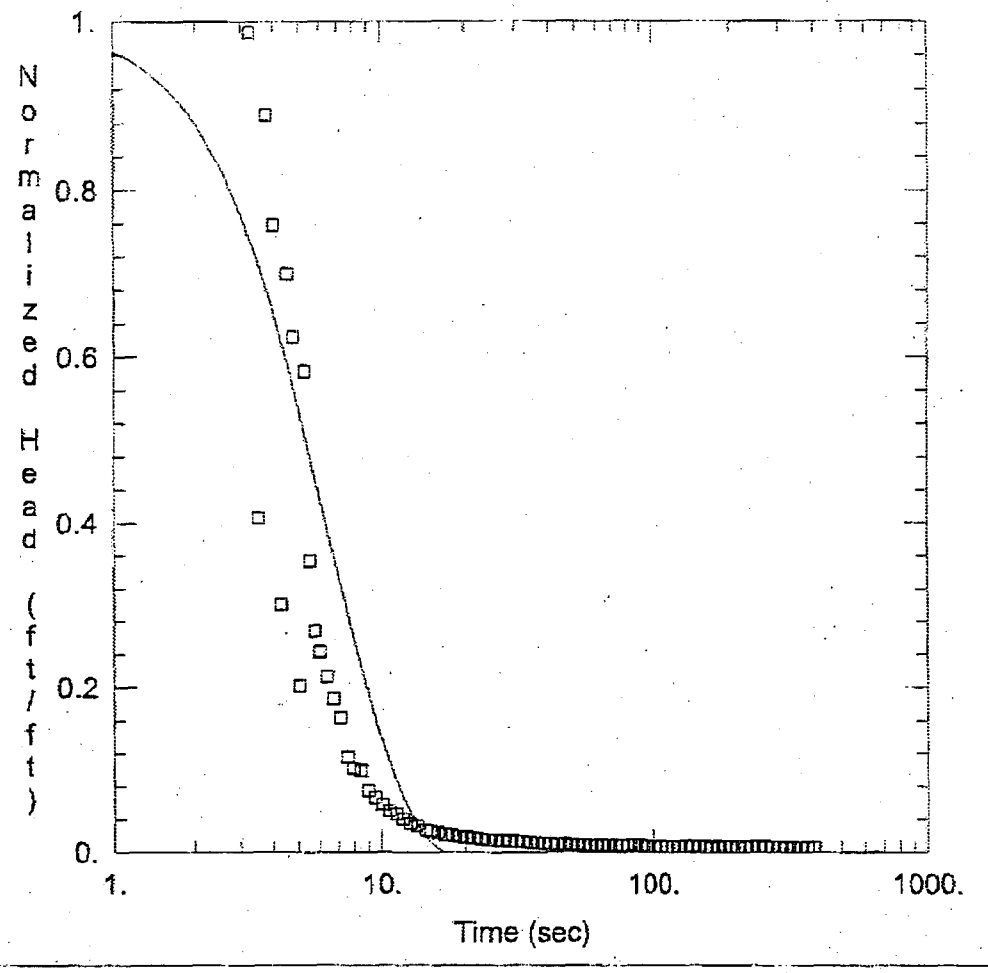
SOLUTION

Aquifer Model: Confined

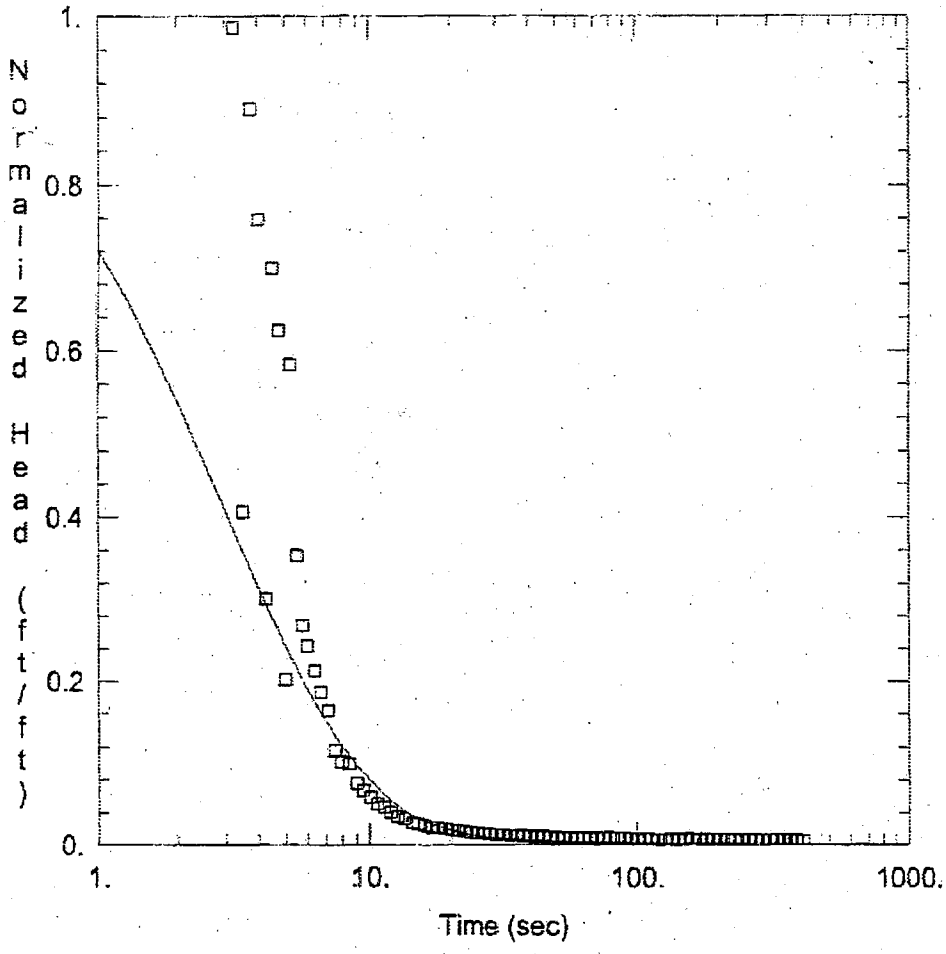
Solution Method: Bouwer-Rice

K = 28.44 ft/day

y0 = 10.46 ft



OW-420 U RISING HEAD	
AQUIFER DATA	
Saturated Thickness: 25.2 ft	Anisotropy Ratio (Kz/Kr): 0.4519
WELL DATA (OW-420 U)	
Initial Displacement: 6.37 ft	Static Water Column Height: 39.88 ft
Total Well Penetration Depth: 48. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 23.15 ft/day	Le = 381.2 ft



OW-420 U RISING HEAD

AQUIFER DATA

Saturated Thickness: 25.2 ft

WELL DATA (OW-420 U)

Initial Displacement: 6.37 ft
Total Well Penetration Depth: 48. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.88 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

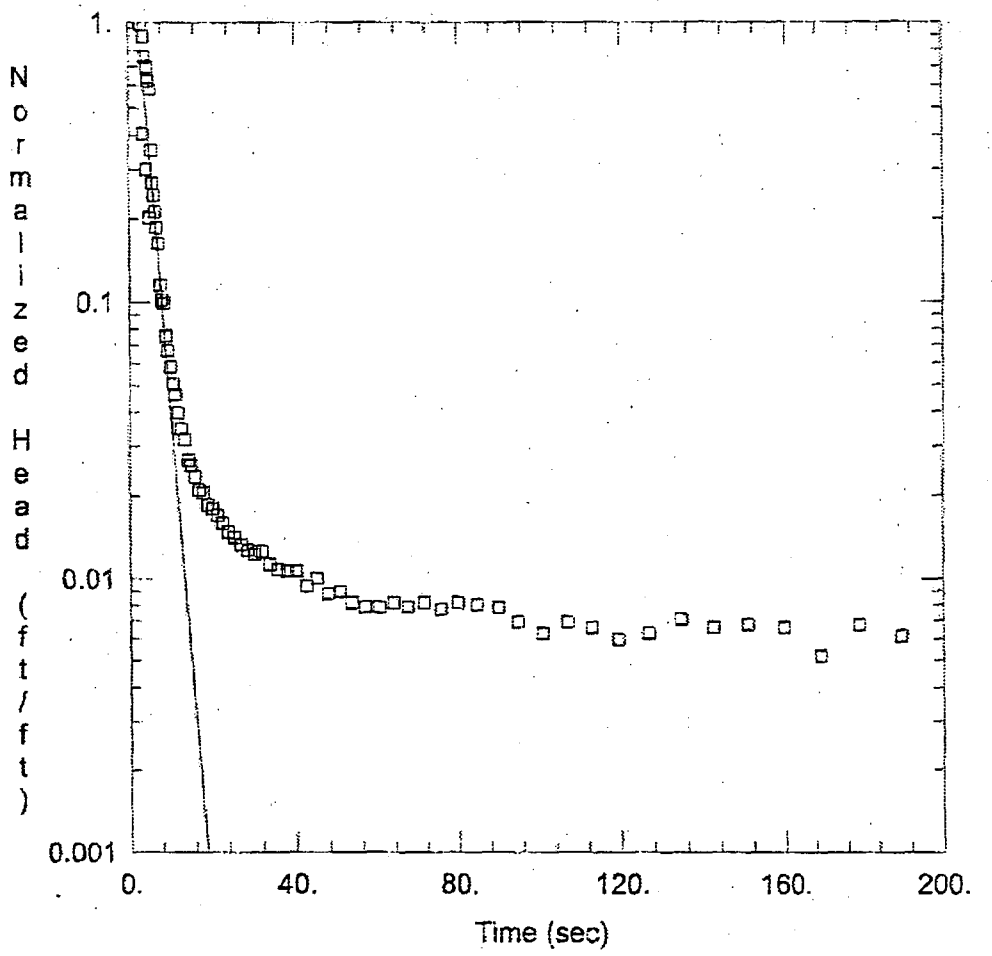
SOLUTION

Aquifer Model: Confined

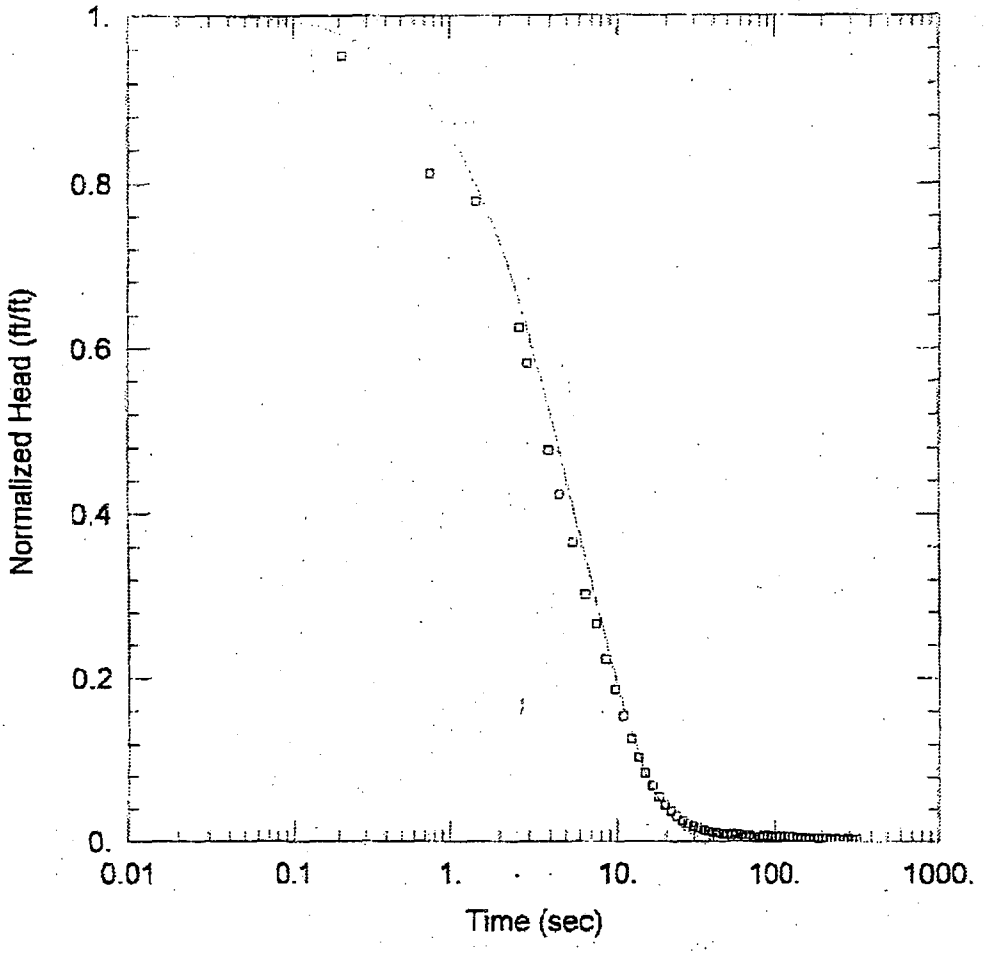
Kr = 32.9 ft/day
Kz/Kr = 0.4519

Solution Method: KGS Model

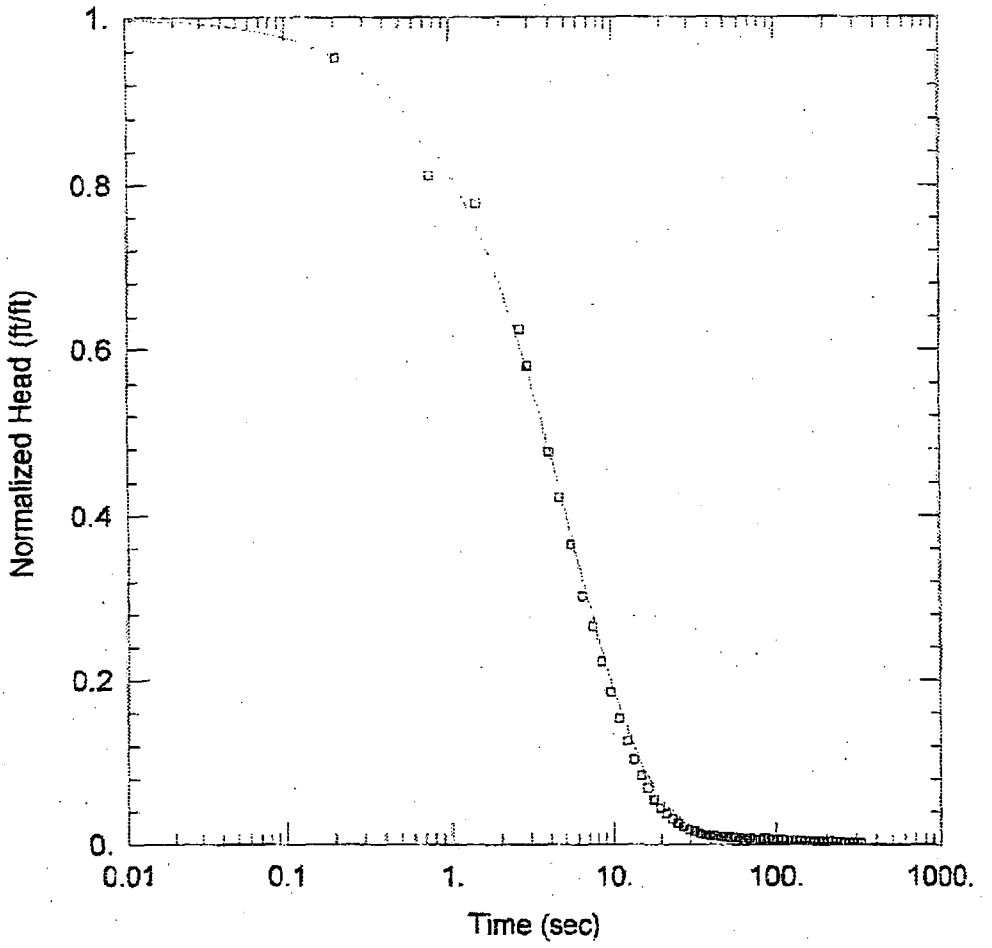
Ss = 8.987E-7 ft^{-1}



OW-420 U RISING HEAD	
AQUIFER DATA	
Saturated Thickness: 25. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-420 U)	
Initial Displacement: 6.37 ft	Static Water Column Height: 39.88 ft
Total Well Penetration Depth: 48. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 44.74 ft/day	y0 = 18.78 ft



OW-438 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 17. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-438 L)	
Initial Displacement: 5.526 ft	Static Water Column Height: 88.49 ft
Total Well Penetration Depth: 11. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 17.11 ft/day	Le = 13.8 ft



OW-438 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 17. ft

WELL DATA (OW-438 L)

Initial Displacement: 5.526 ft
Total Well Penetration Depth: 11. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 88.49 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

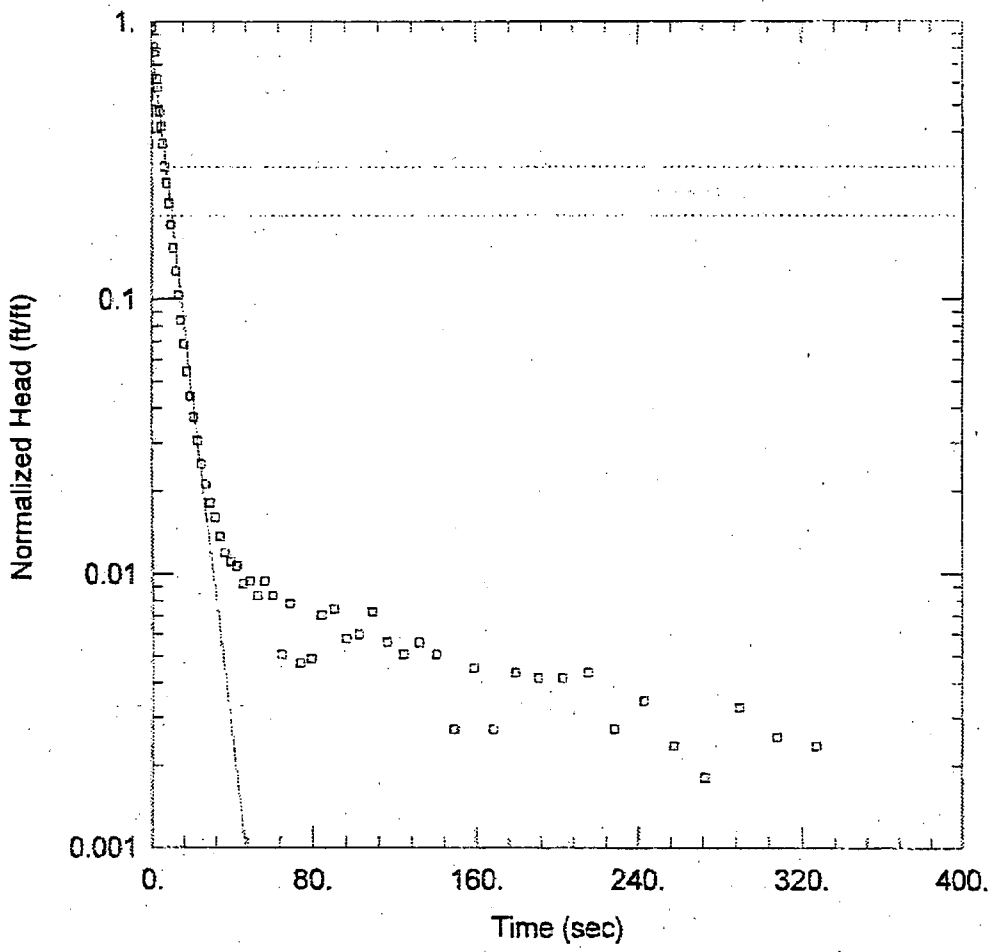
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 27.13 ft/day
Kz/Kr = 1.

Ss = 2.481E-8 ft^{-1}



OW-438 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 17. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-438 L)

Initial Displacement: 5.526 ft

Total Well Penetration Depth: 11. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 88.49 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

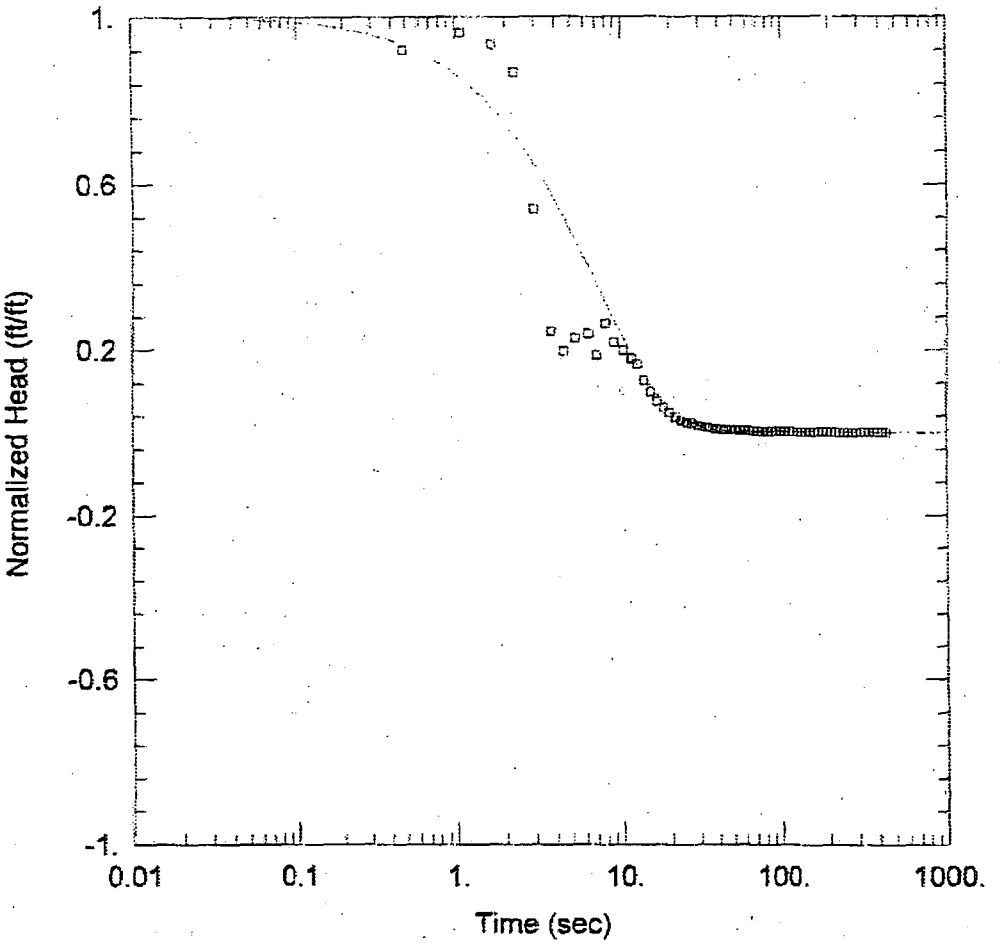
SOLUTION

Aquifer Model: Confined

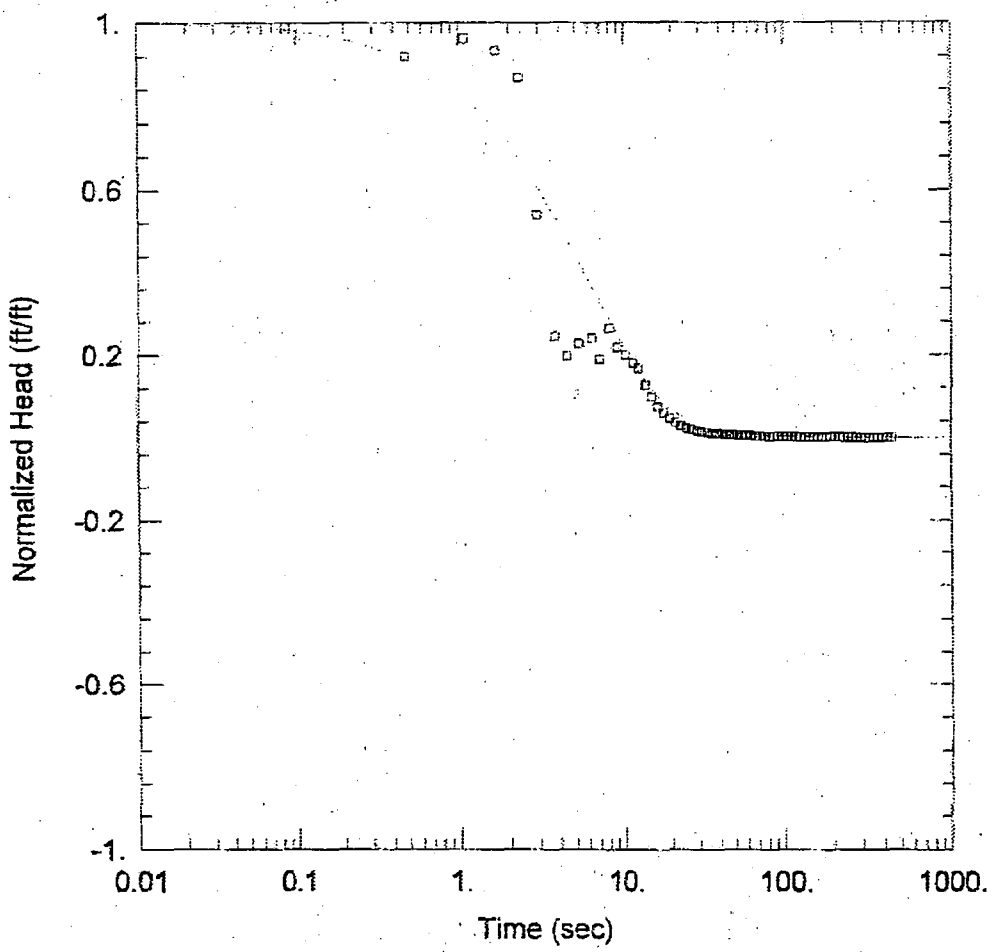
Solution Method: Bouwer-Rice

K = 9.849 ft/day

y0 = 4.555 ft



OW-438 L FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 17. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-438 L)	
Initial Displacement: 8.968 ft	Static Water Column Height: 88.49 ft
Total Well Penetration Depth: 11. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 15.1 ft/day	Le = 1. ft



OW-438 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 17. ft

WELL DATA (OW-438 L)

Initial Displacement: 8.968 ft
Total Well Penetration Depth: 11. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 88.49 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

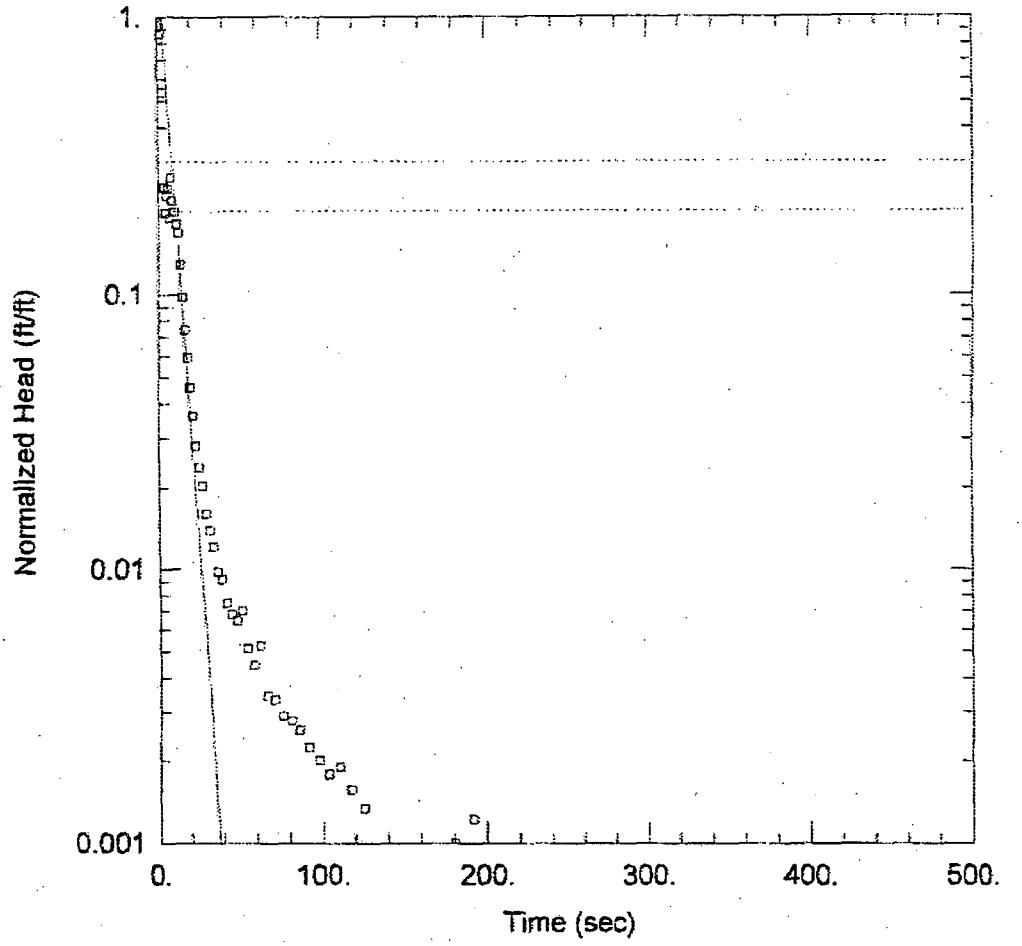
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 27.47 ft/day
Kz/Kr = 1.

Ss = 3.123E-9 ft^{-1}



OW-438 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 17. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-438 L)

Initial Displacement: 8.968 ft

Total Well Penetration Depth: 11. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 88.49 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

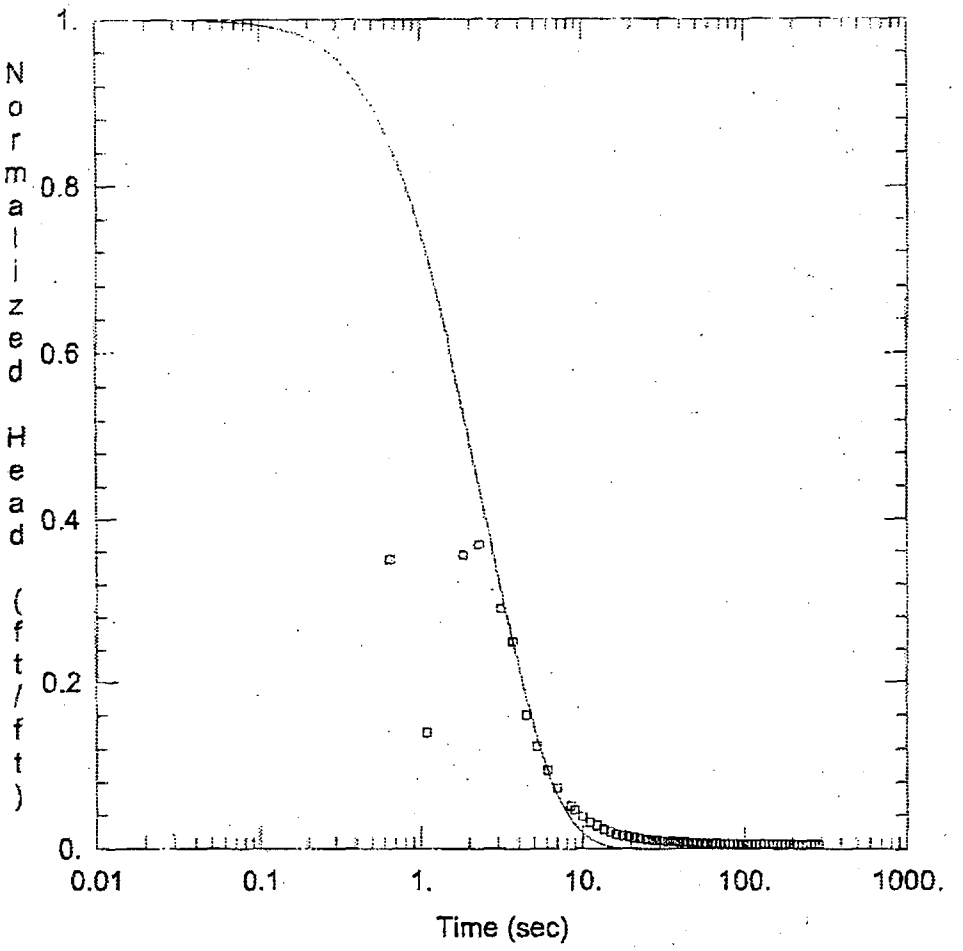
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 13.77 ft/day

y0 = 15.09 ft



OW-438 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 19.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-438 U)

Initial Displacement: 8.457 ft

Total Well Penetration Depth: 18. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 34.58 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

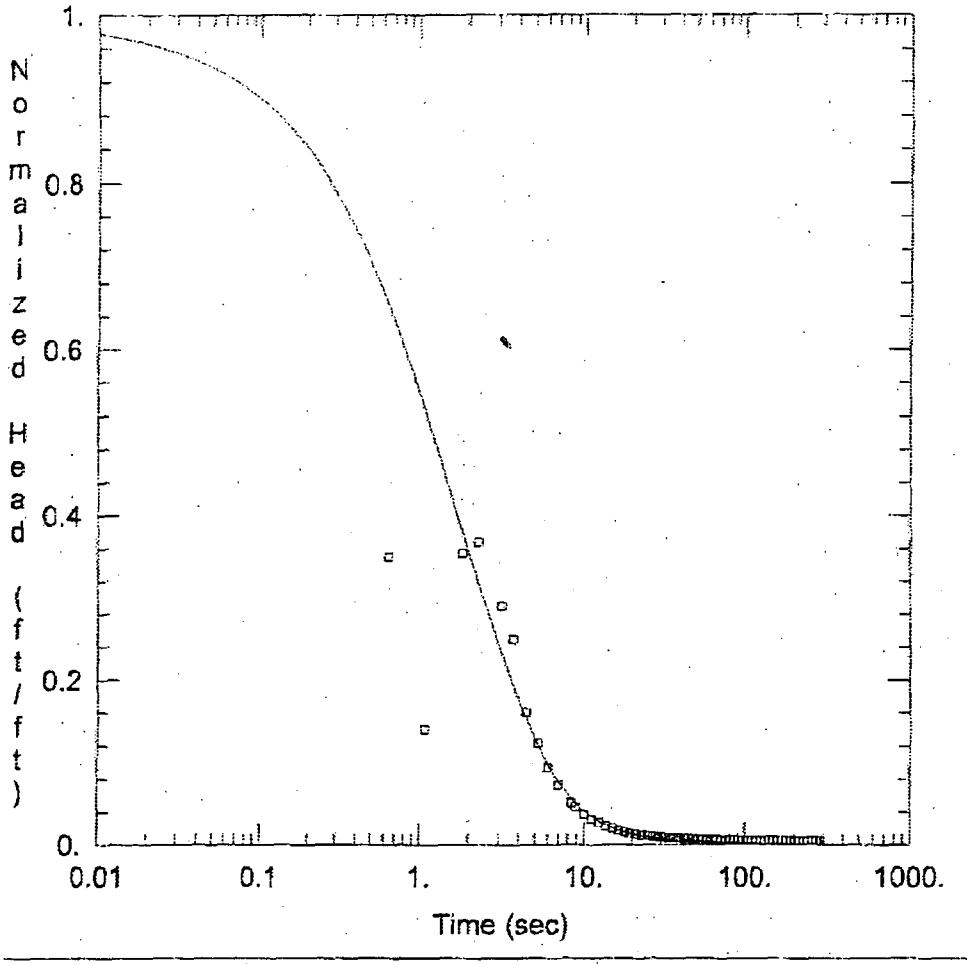
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 37.95 ft/day

Le = 20.89 ft



OW-438 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 19.5 ft

WELL DATA (OW-438 U)

Initial Displacement: 8.457 ft
Total Well Penetration Depth: 18. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.58 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

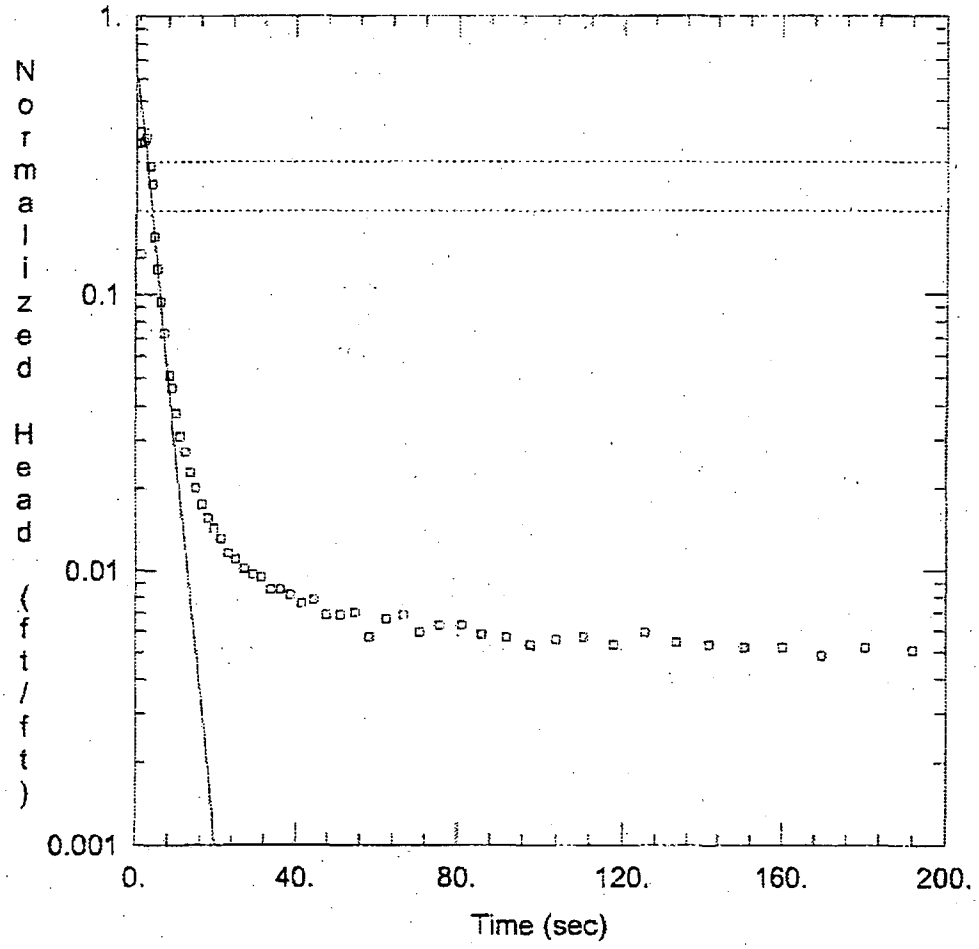
SOLUTION

Aquifer Model: Confined

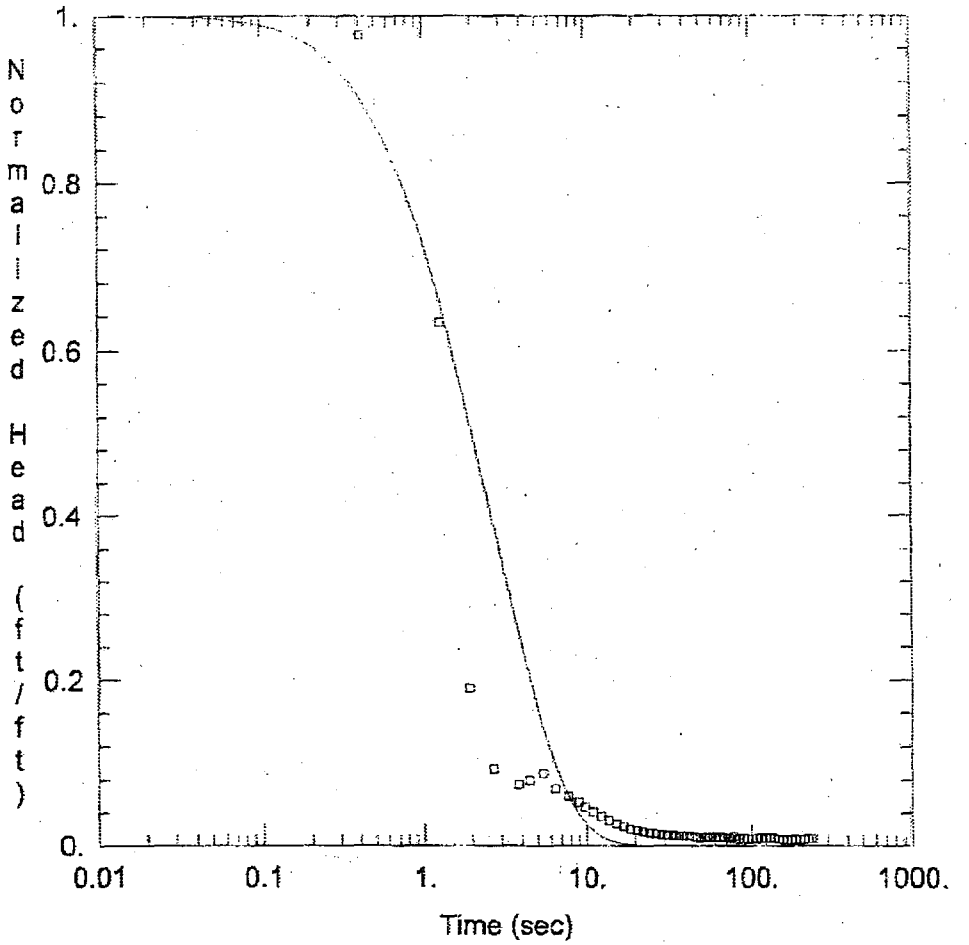
Solution Method: KGS Model

Kr = 39.4 ft/day
Kz/Kr = 1.

Ss = 5.128E-5 ft^{-1}



OW-438 U RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 19.5 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-438 U)	
Initial Displacement: 8.457 ft	Static Water Column Height: 34.58 ft
Total Well Penetration Depth: 18. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 26.1 ft/day	y0 = 5.672 ft



OW-438 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 19.5 ft

Anisotropy Ratio (Kz/Kr): 0.004571

WELL DATA (OW-438 U)

Initial Displacement: 5.486 ft
Total Well Penetration Depth: 18. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.58 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

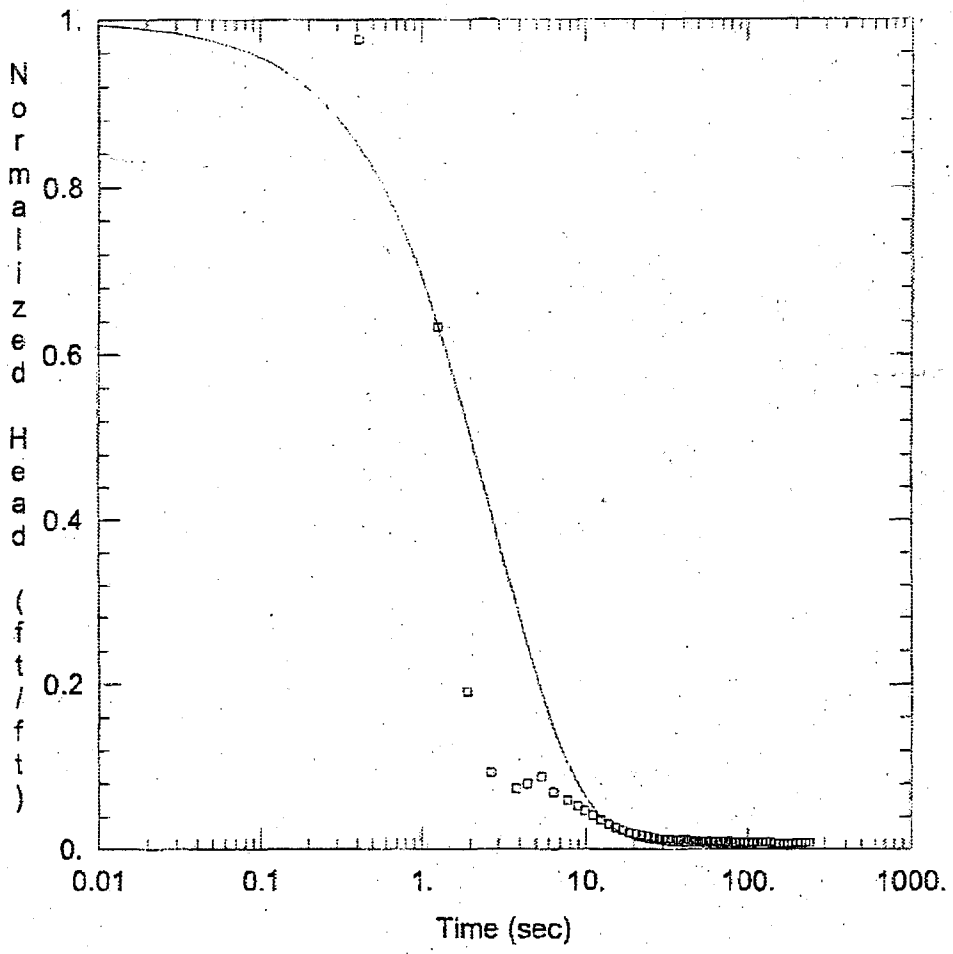
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 64.66 ft/day

Le = 11. ft



OW-438 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 19.5 ft

WELL DATA (OW-438 U)

Initial Displacement: 5.486 ft
Total Well Penetration Depth: 18. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.58 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

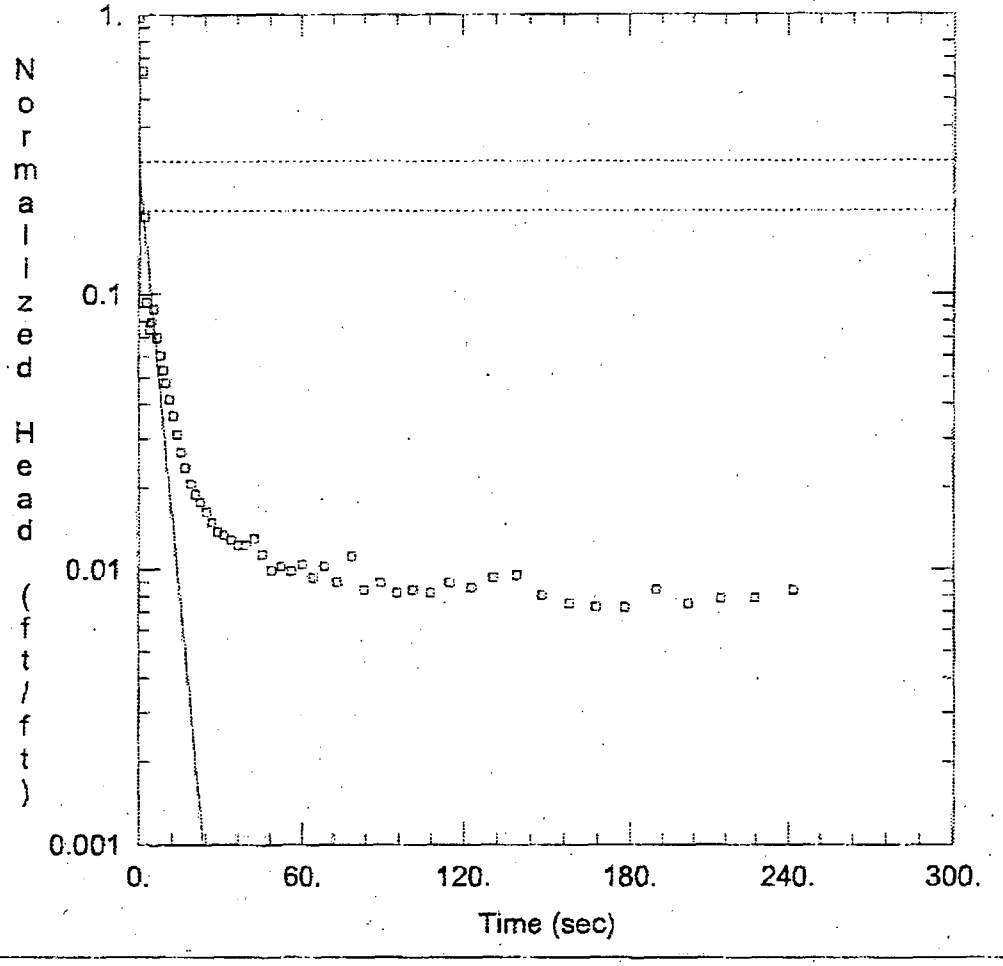
SOLUTION

Aquifer Model: Confined

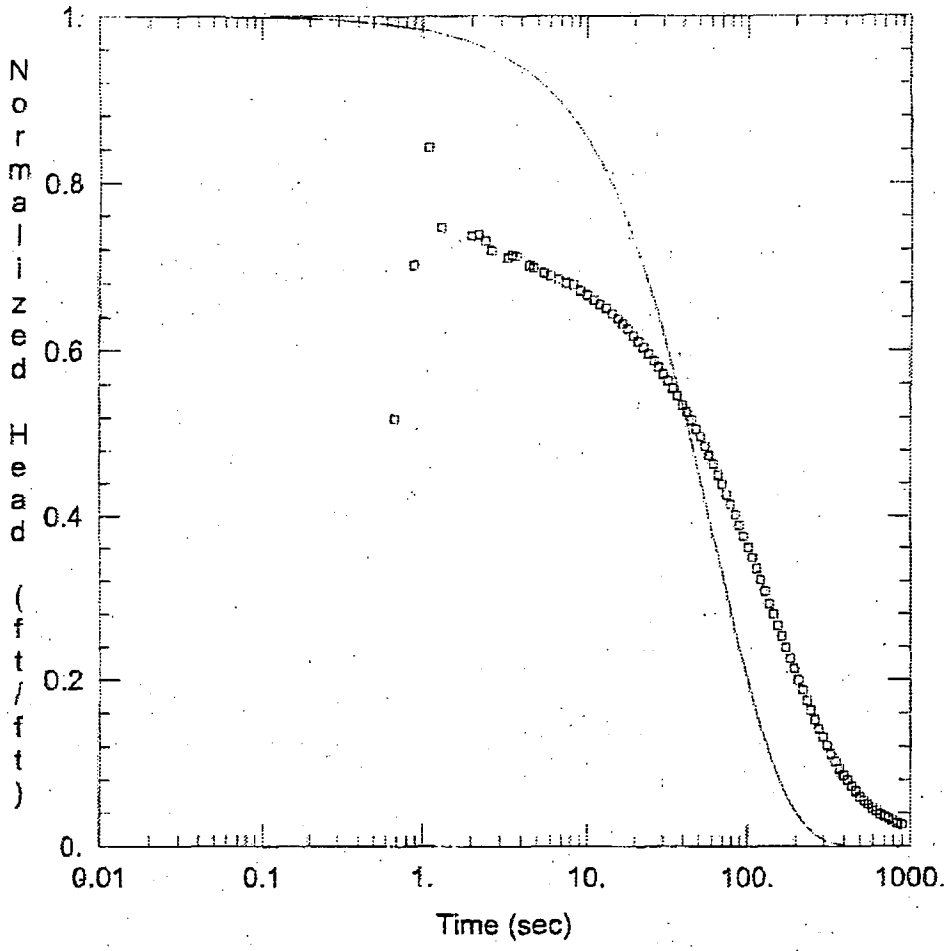
Solution Method: KGS Model

Kr = 53.06 ft/day
Kz/Kr = 0.004571

Ss = 2.283E-7 ft^{-1}



OW-438 U FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 19.5 ft	Anisotropy Ratio (Kz/Kr): 0.1905
WELL DATA (OW-438 U)	
Initial Displacement: 5.486 ft	Static Water Column Height: 34.58 ft
Total Well Penetration Depth: 18. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 24.12 ft/day	y0 = 1.513 ft



OW-910 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-910 L)

Initial Displacement: 7.792 ft

Total Well Penetration Depth: 11.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 74.8 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

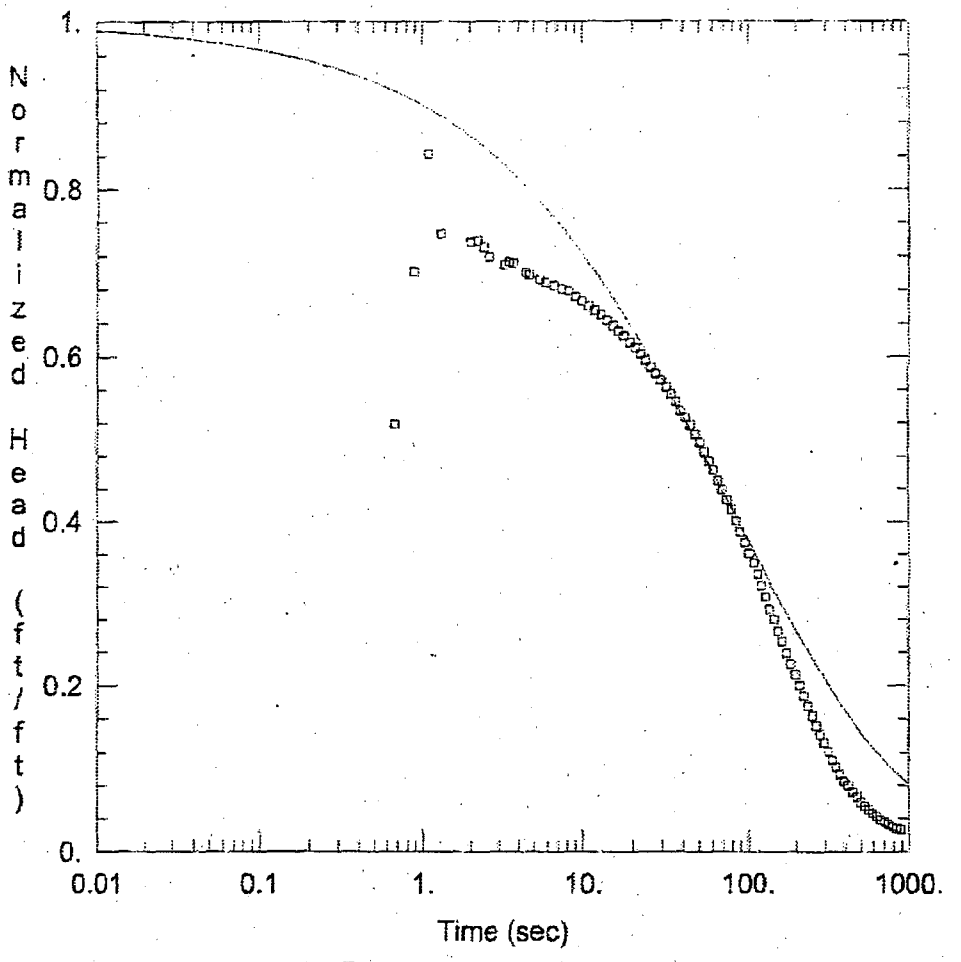
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 2.552 ft/day

Le = 10.96 ft



OW-910 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

WELL DATA (OW-910 L)

Initial Displacement: 7.792 ft
Total Well Penetration Depth: 11.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 74.8 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

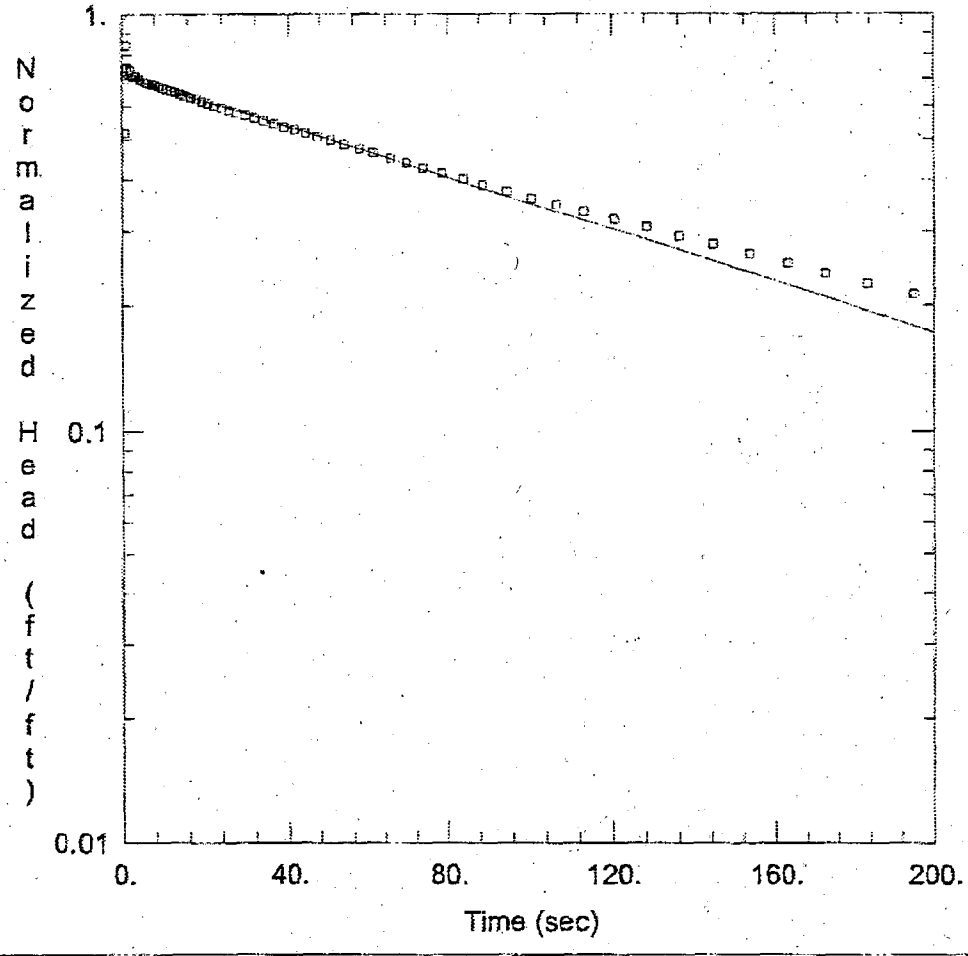
SOLUTION

Aquifer Model: Confined

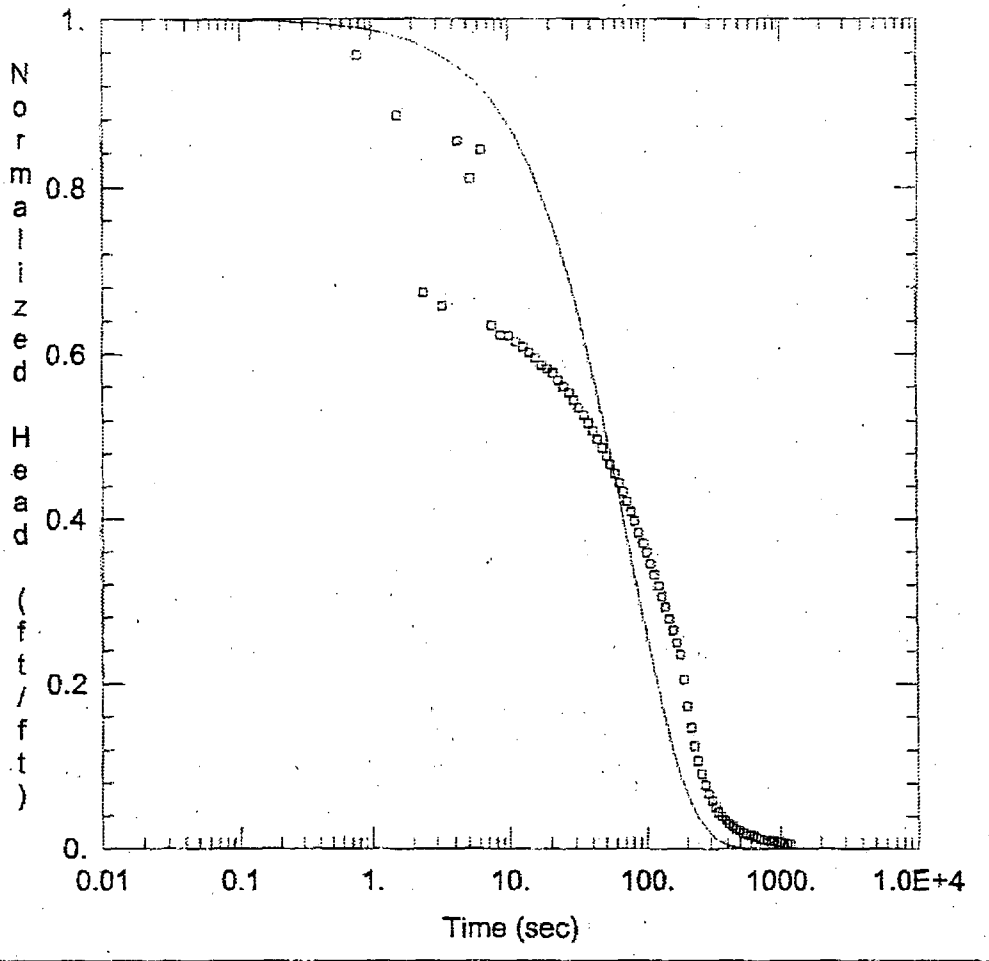
Solution Method: KGS Model

Kr = 0.3244 ft/day
Kz/Kr = 1.

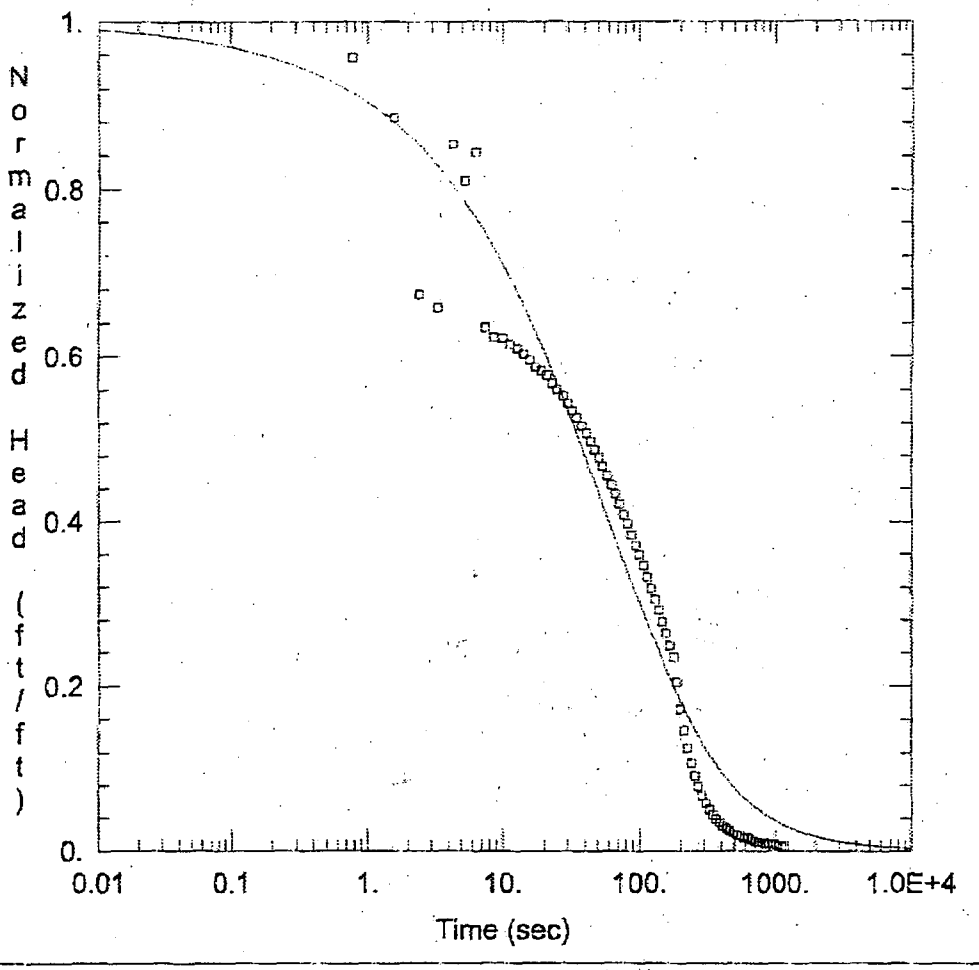
Ss = 0.009989 ft^{-1}



OW-910 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 5. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-910 L)	
Initial Displacement: 7.792 ft	Static Water Column Height: 74.8 ft
Total Well Penetration Depth: 11.5 ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 0.5645 ft/day	y0 = 5.55 ft



OW-910 L FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 5. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-910 L)	
Initial Displacement: 9.991 ft	Static Water Column Height: 74.8 ft
Total Well Penetration Depth: 11.5 ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 2.156 ft/day	Le = 0.1 ft



OW-910 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

WELL DATA (OW-910 L)

Initial Displacement: 9.991 ft
Total Well Penetration Depth: 11.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 74.8 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

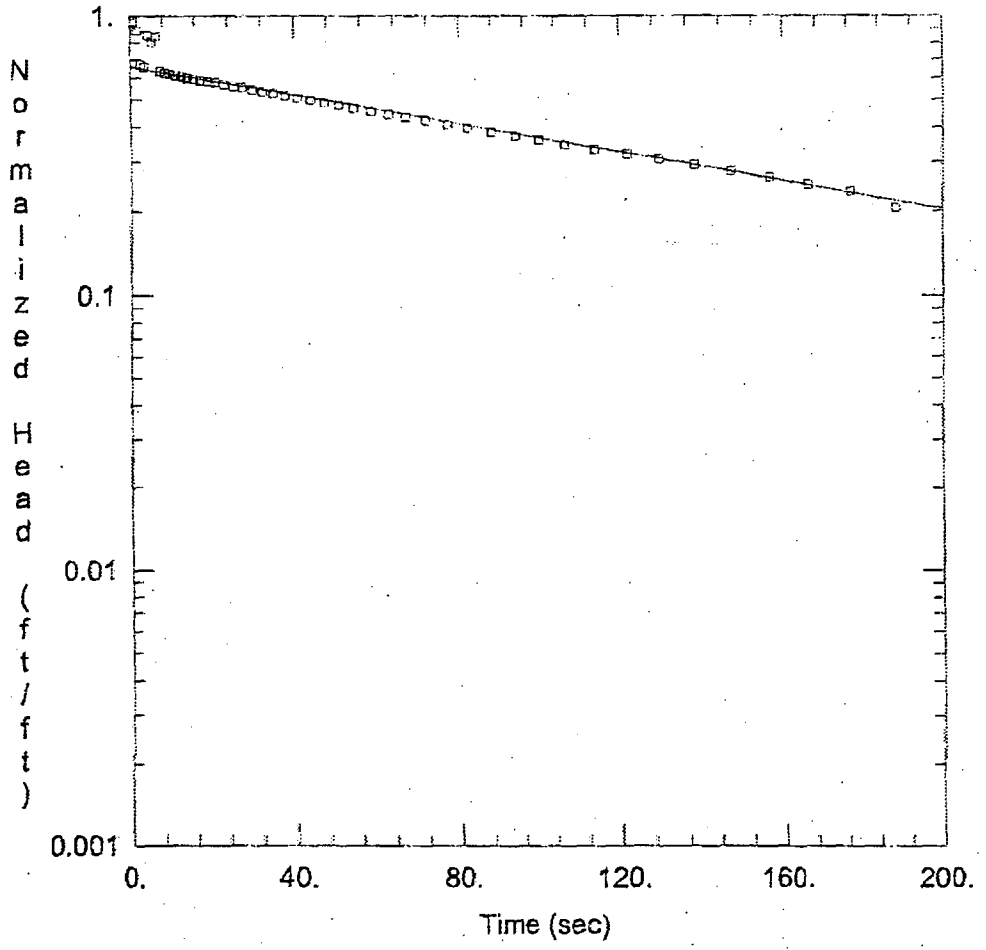
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.9391 ft/day
Kz/Kr = 1.

Ss = 0.00287 ft^{-1}



OW-910 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-910 L)

Initial Displacement: 9.991 ft

Total Well Penetration Depth: 11.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 74.8 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

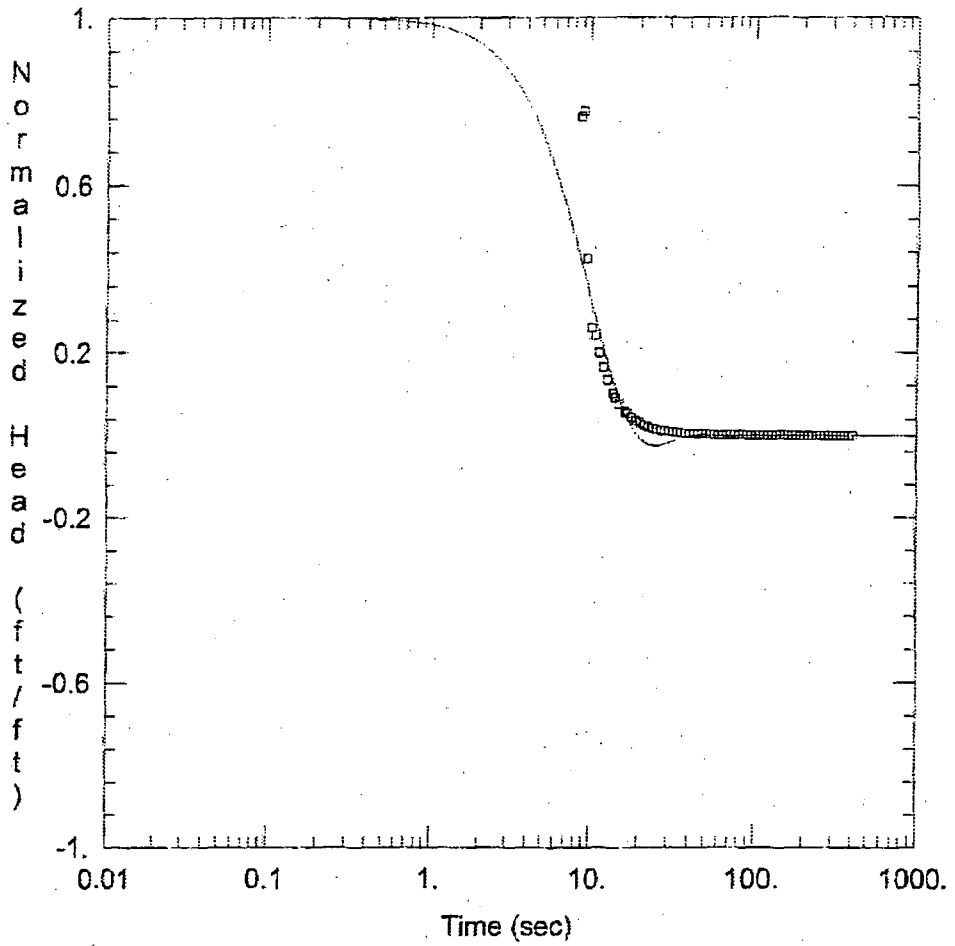
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.4684 ft/day

y0 = 6.589 ft



OW-910 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 25. ft

Anisotropy Ratio (Kz/Kr): 0.001189

WELL DATA (OW-910 U)

Initial Displacement: 8.539 ft

Total Well Penetration Depth: 16.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 26.75 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

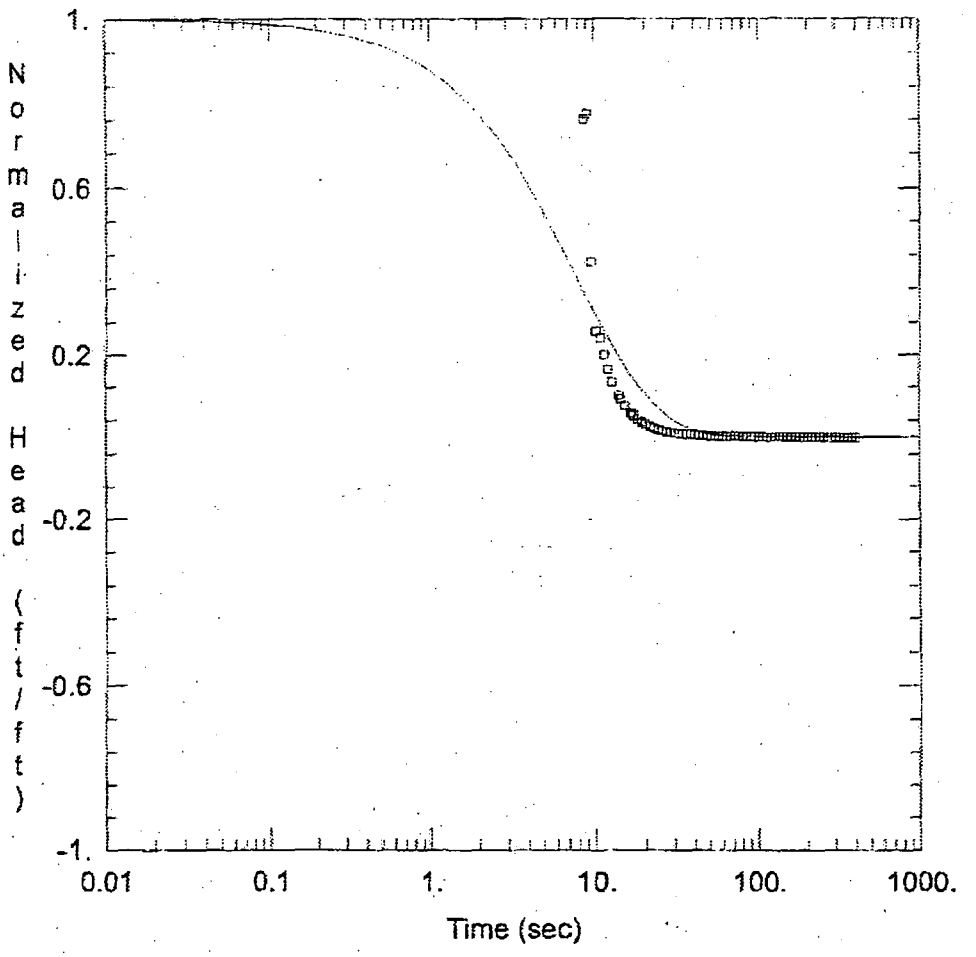
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 25.94 ft/day

Le = 861.6 ft



OW-910 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 25. ft

WELL DATA (OW-910 U)

Initial Displacement: 8.539 ft
Total Well Penetration Depth: 16.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 26.75 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

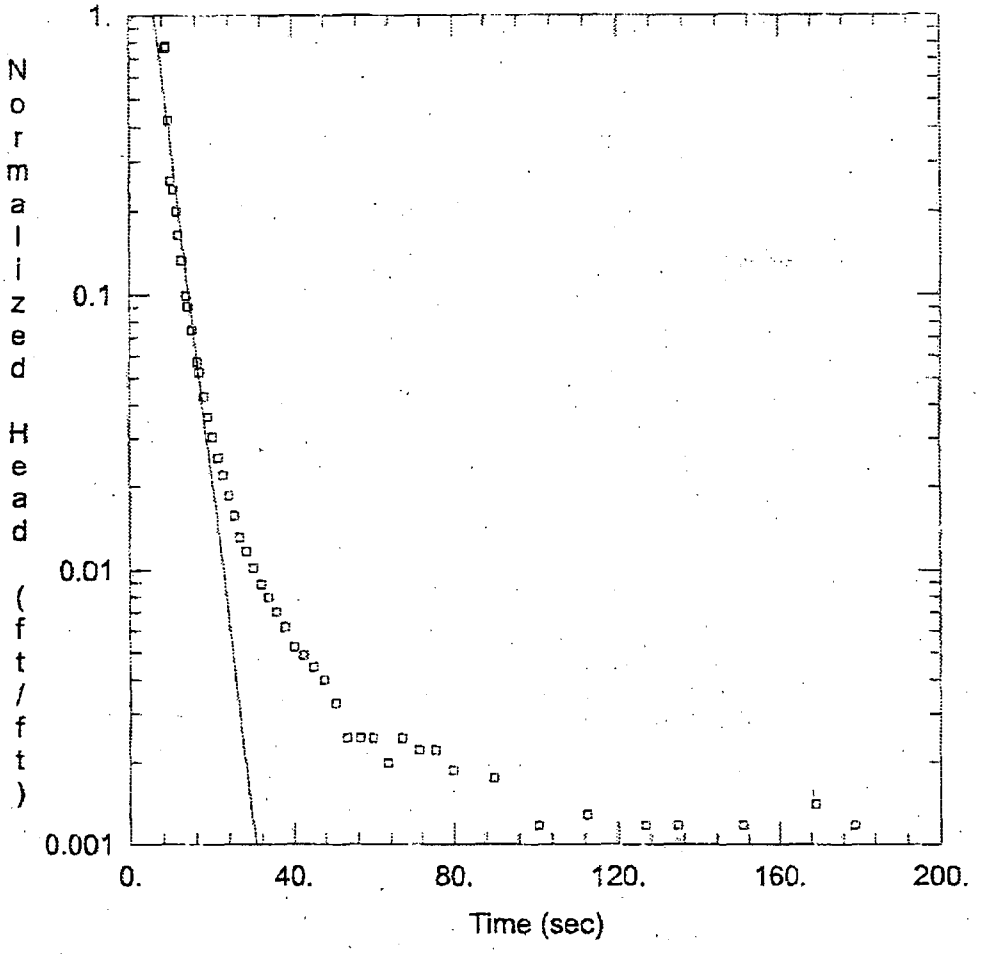
SOLUTION

Aquifer Model: Confined

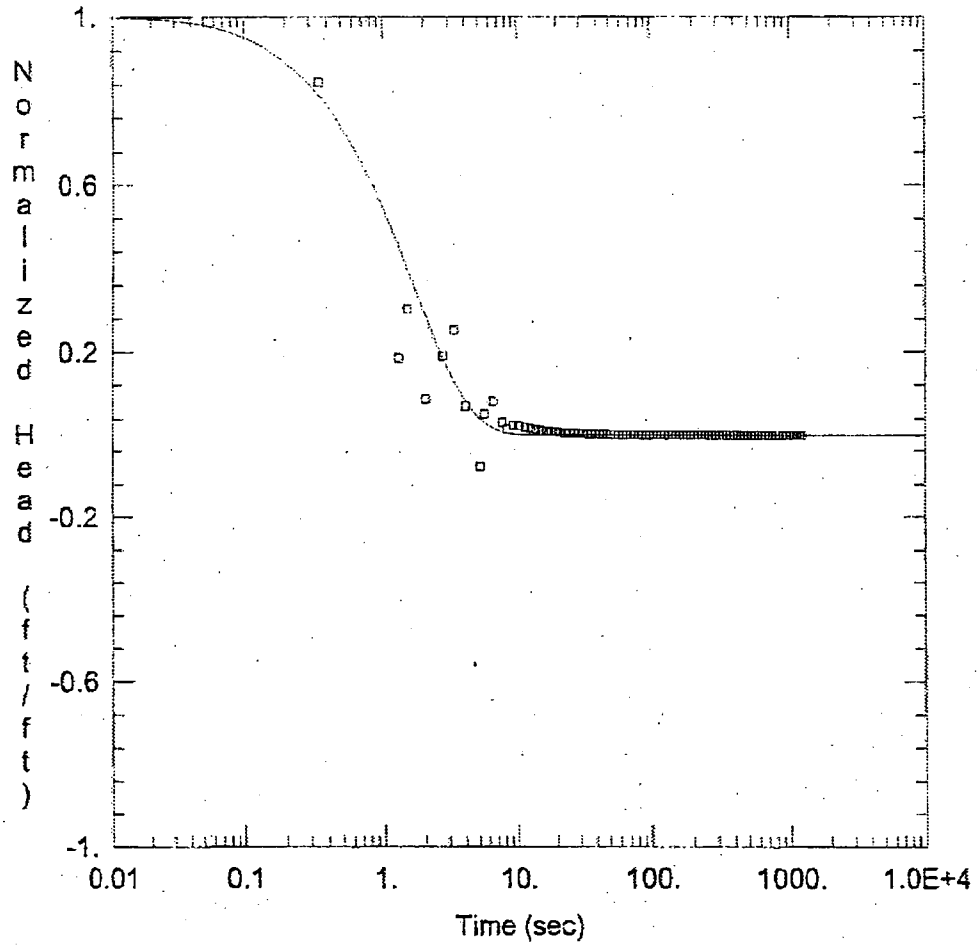
Solution Method: KGS Model

Kr = 28.91 ft/day
Kz/Kr = 0.001189

Ss = 4.0E-12 ft^{-1}



OW-910 U RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 25. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-910 U)	
Initial Displacement: 8.539 ft	Static Water Column Height: 26.75 ft
Total Well Penetration Depth: 16.5 ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 20.82 ft/day	y0 = 48.65 ft



OW-910 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 25. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-910 U)

Initial Displacement: 8.502 ft

Total Well Penetration Depth: 16.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 26.75 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

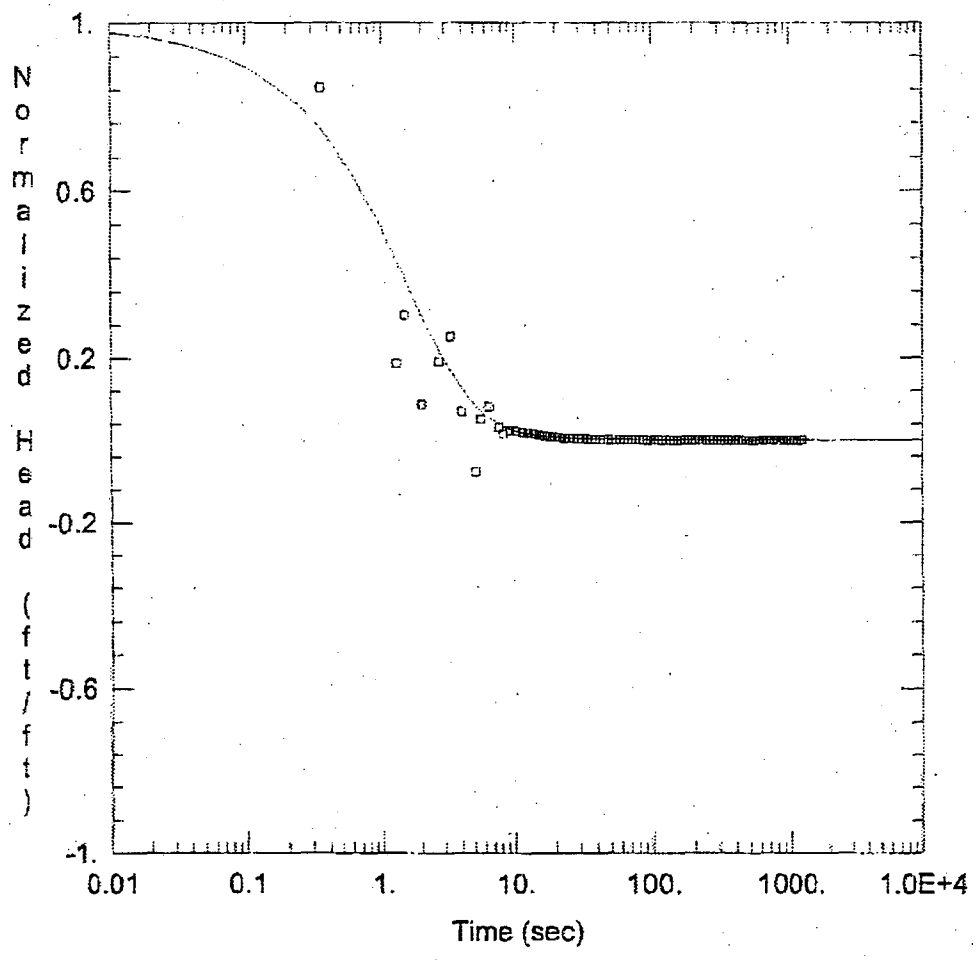
SOLUTION

Aquifer Model: Confined

K = 63.52 ft/day

Solution Method: Butler

Le = 1. ft



OW-910 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 25. ft

WELL DATA (OW-910 U)

Initial Displacement: 8.502 ft
Total Well Penetration Depth: 16.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 26.75 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

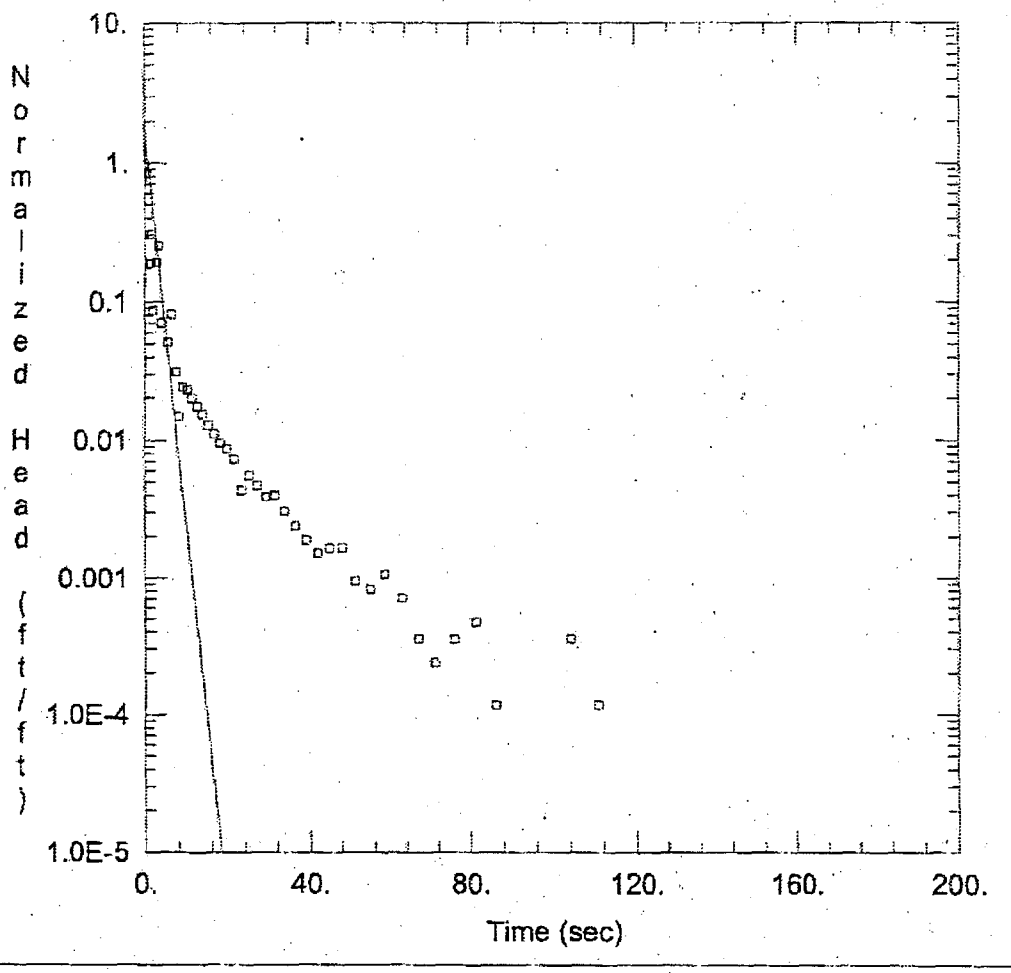
SOLUTION

Aquifer Model: Confined

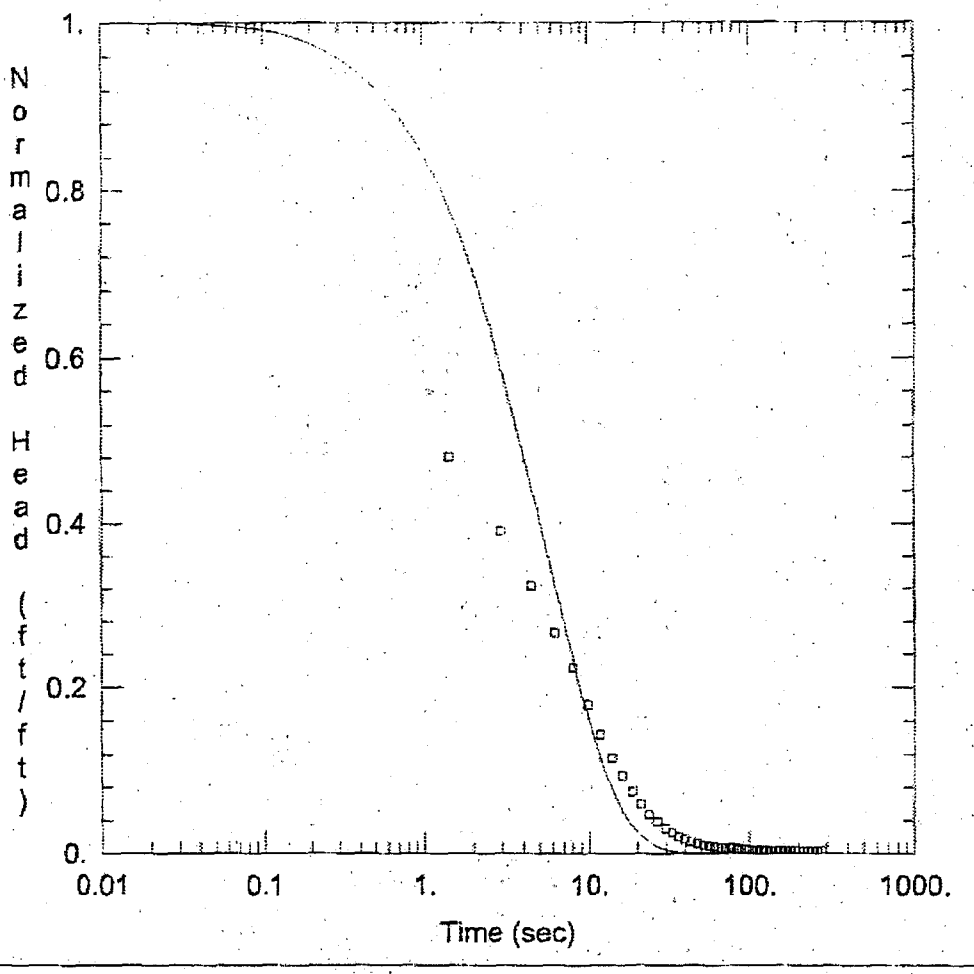
Solution Method: KGS Model

Kr = 47.41 ft/day
Kz/Kr = 1.

Ss = 4.0E-5 ft^{-1}



OW-910 U FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 25. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-910 U)	
Initial Displacement: 8.502 ft	Static Water Column Height: 26.75 ft
Total Well Penetration Depth: 16.5 ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 48.26 ft/day	y0 = 13.41 ft



OW-928 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-928 L)

Initial Displacement: 10.71 ft

Total Well Penetration Depth: 11.5 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 106.8 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

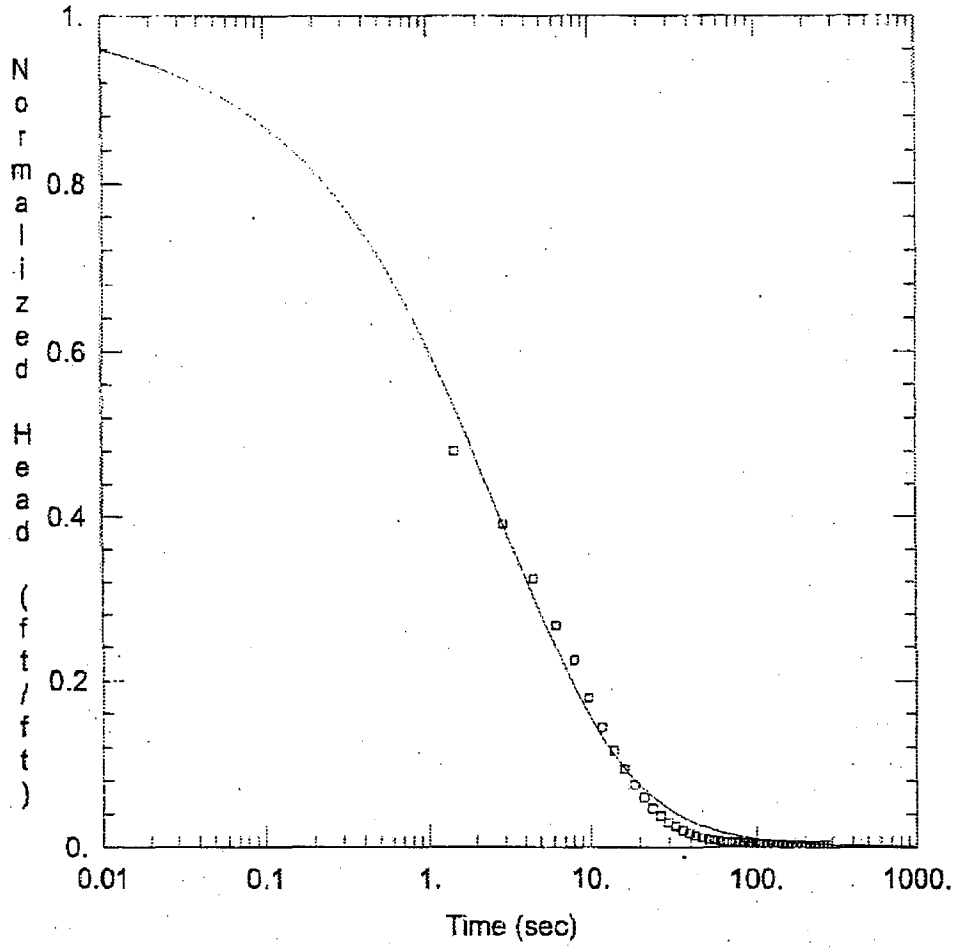
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 18.69 ft/day

Le = 11.48 ft



OW-928 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

WELL DATA (OW-928 L)

Initial Displacement: 10.71 ft
Total Well Penetration Depth: 11.5 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 106.8 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

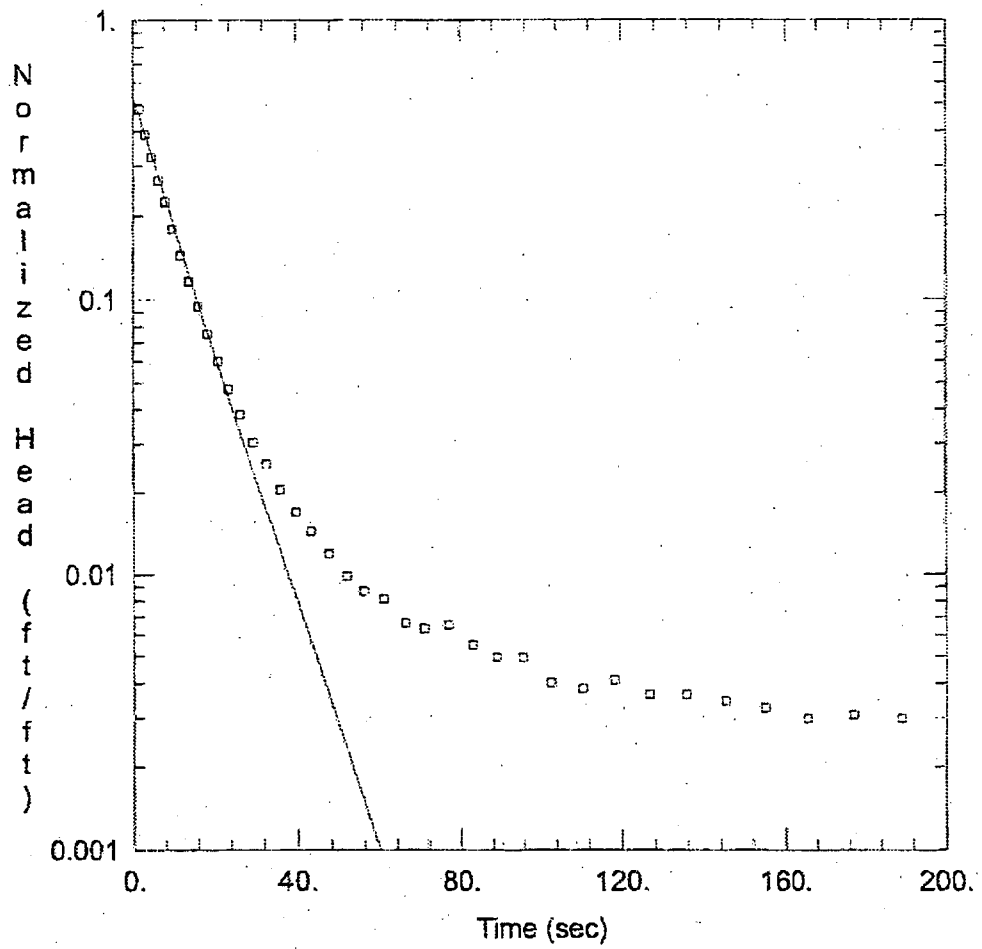
SOLUTION

Aquifer Model: Confined

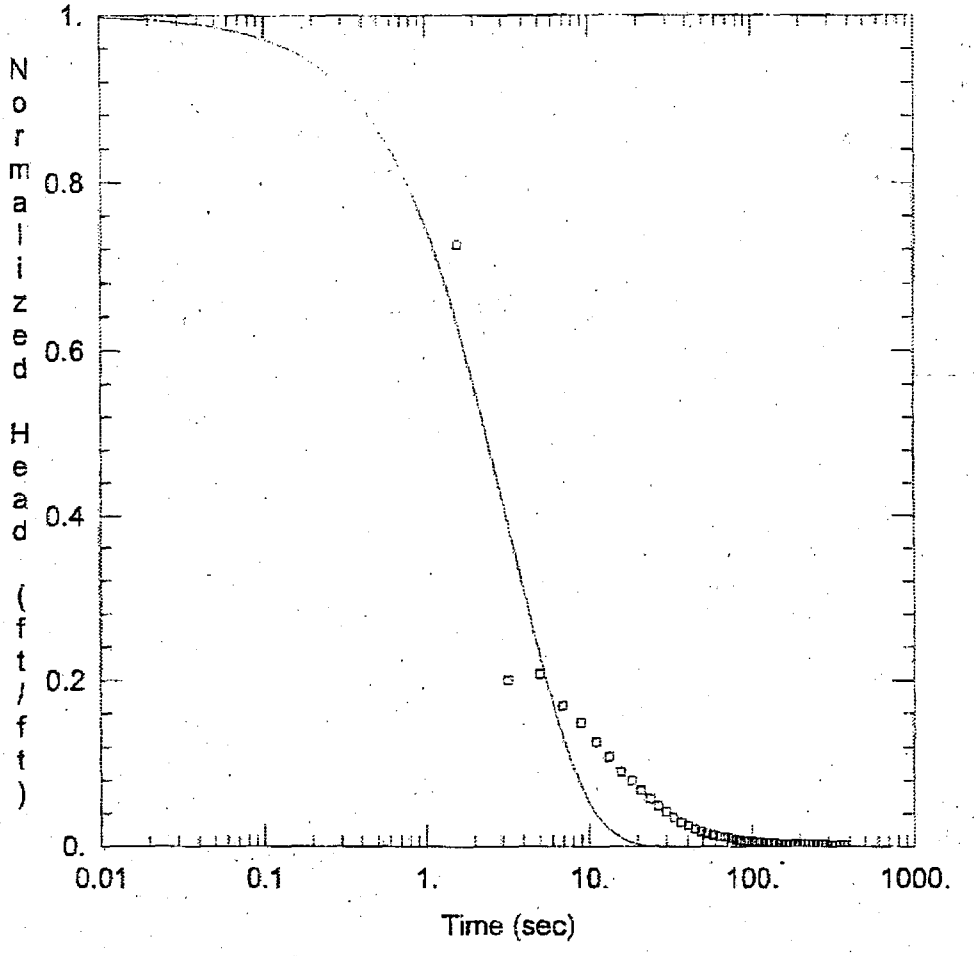
Solution Method: KGS Model

Kr = 11.2 ft/day
Kz/Kr = 1.

Ss = 0.00104 ft^{-1}



OW-928 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 15. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-928 L)	
Initial Displacement: 10.71 ft	Static Water Column Height: 106.8 ft
Total Well Penetration Depth: 11.5 ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 7.444 ft/day	y0 = 5.71 ft



OW-928 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 11.92 ft

Total Well Penetration Depth: 11.5 ft

Casing Radius: 0.08333 ft

Static Water Column Height: 106.8 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

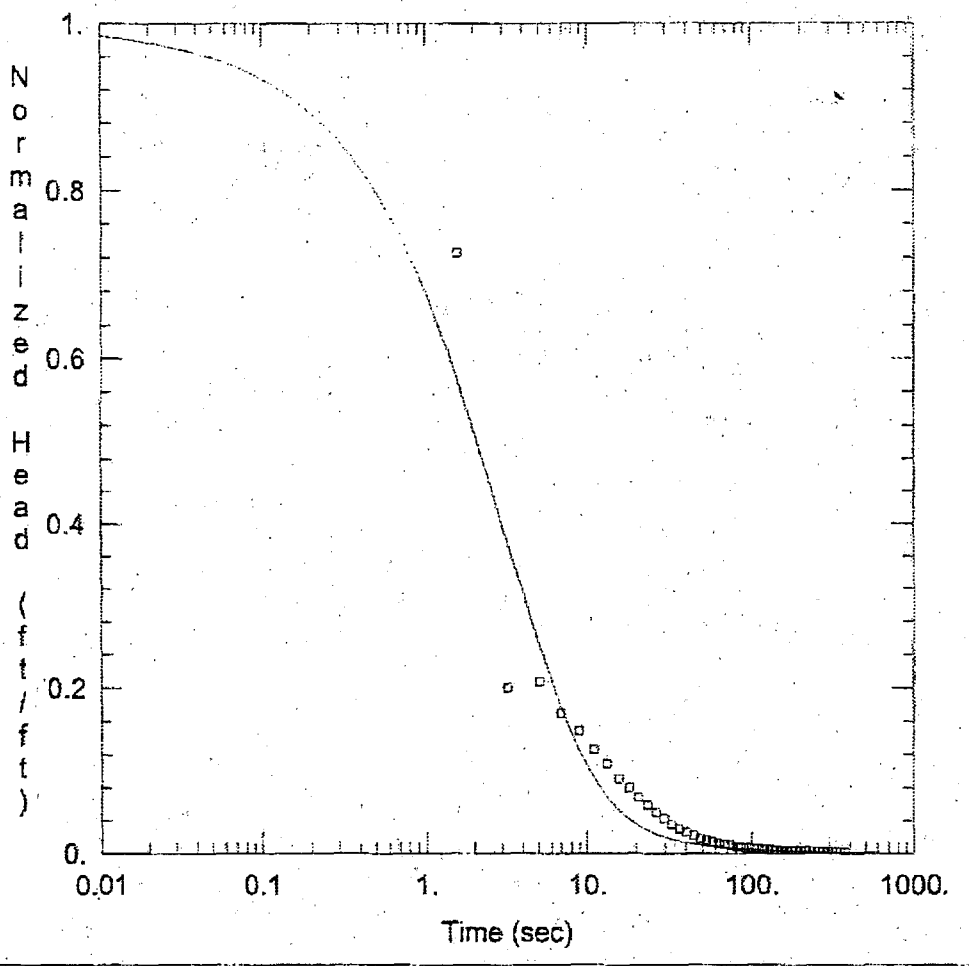
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 30.23 ft/day

Le = 0.1 ft



OW-928 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 15. ft

WELL DATA (New Well)

Initial Displacement: 11.92 ft
Total Well Penetration Depth: 11.5 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 106.8 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

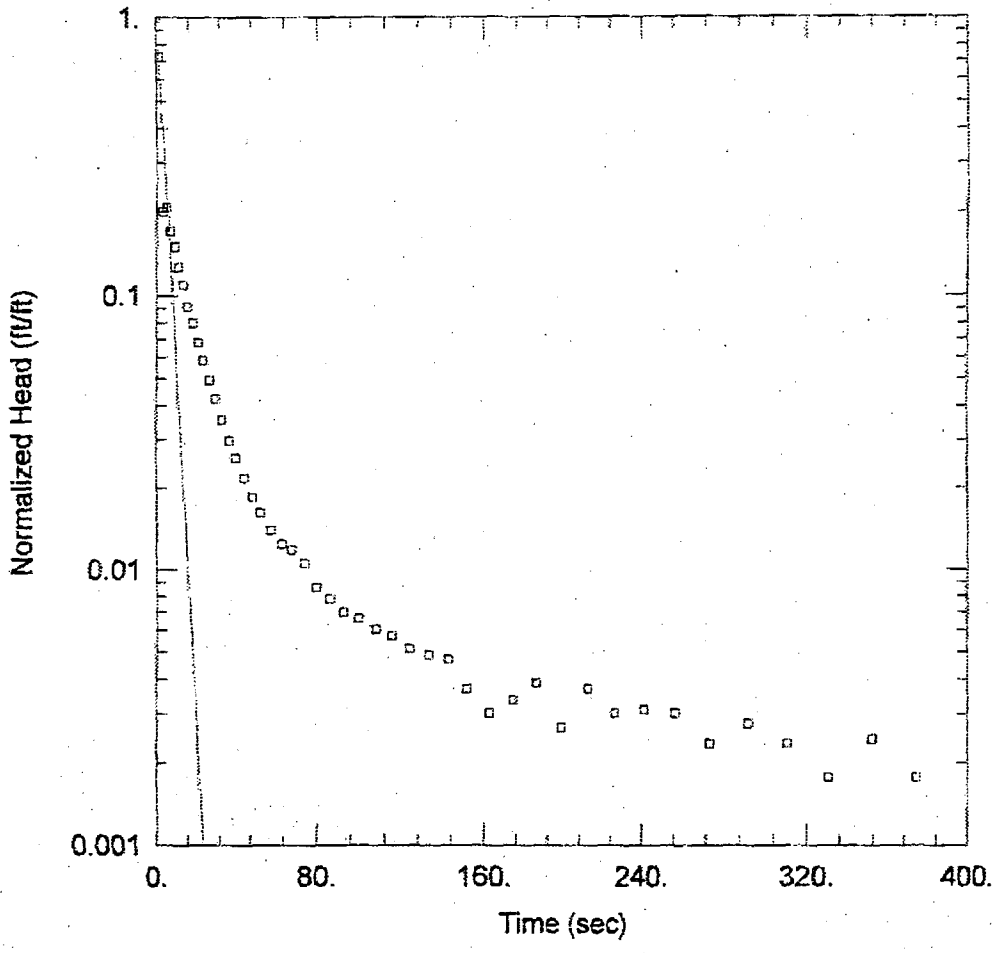
SOLUTION

Aquifer Model: Confined

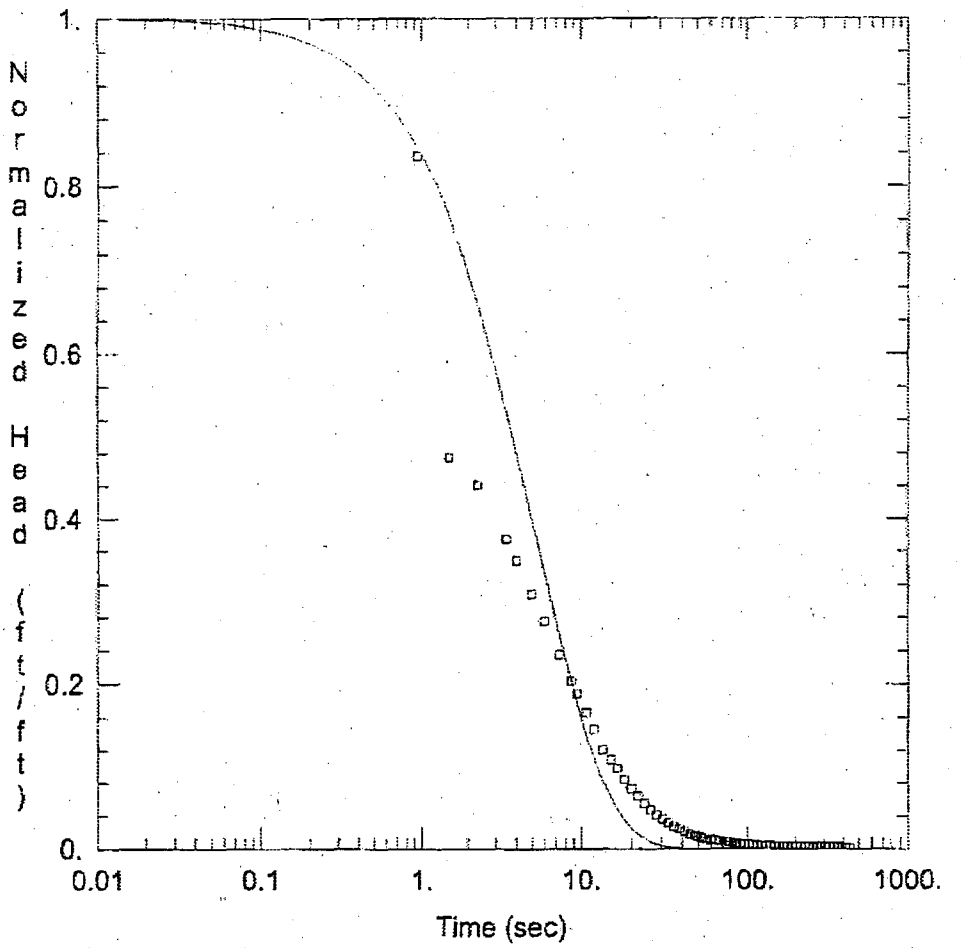
Solution Method: KGS Model

Kr = 23.6 ft/day
Kz/Kr = 1.

Ss = 4.055E-5 ft^{-1}



OW-928 L FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 15. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 11.92 ft	Static Water Column Height: 106.8 ft
Total Well Penetration Depth: 11.5 ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 20.64 ft/day	y0 = 11.89 ft



OW-928 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 20. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-928 U)

Initial Displacement: 8.001 ft

Total Well Penetration Depth: 15. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 32.08 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

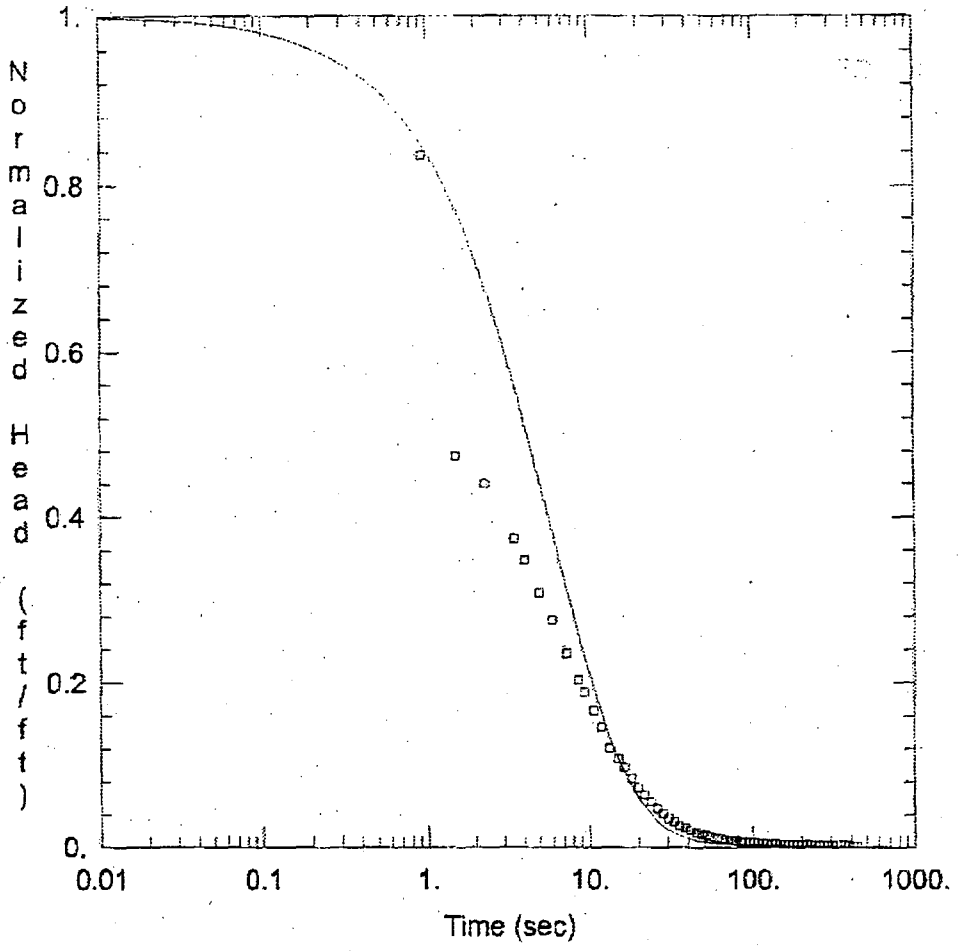
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 18.85 ft/day

Le = 5.495 ft



OW-928 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 20. ft

WELL DATA (OW-928 U)

Initial Displacement: 8.001 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.0833 ft

Static Water Column Height: 32.08 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

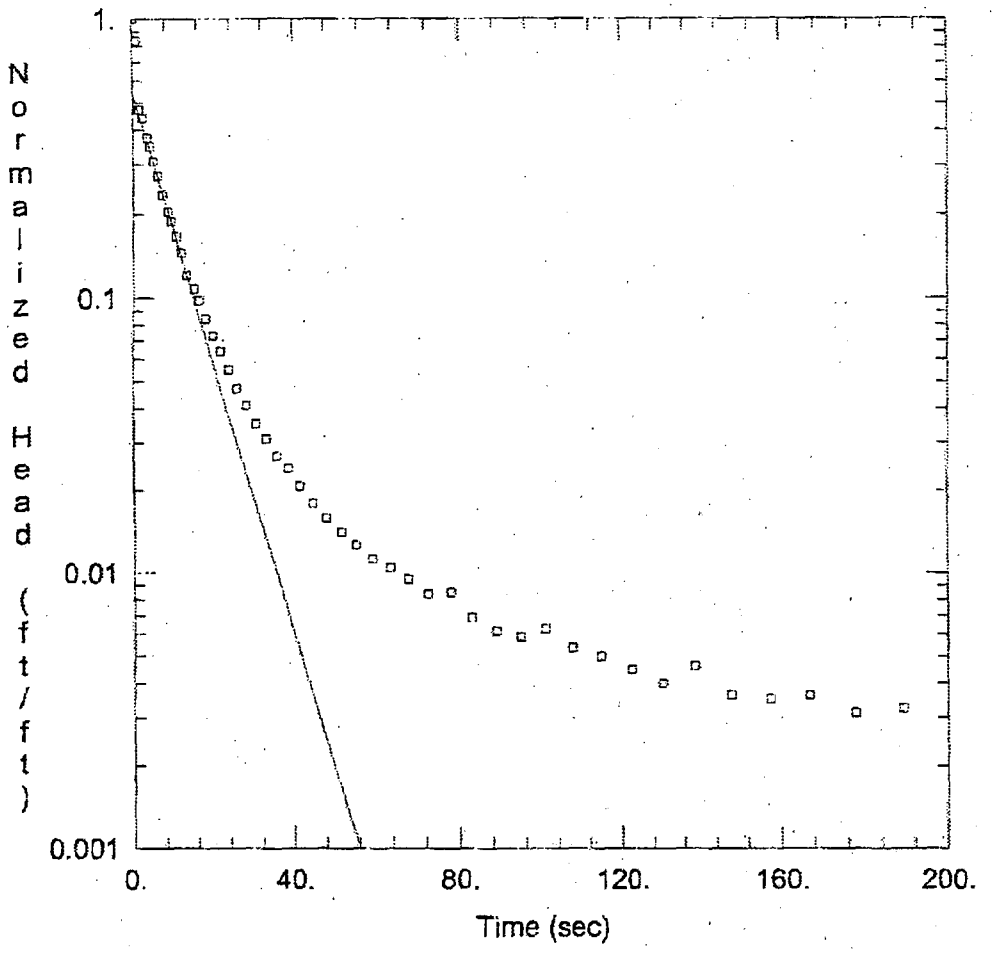
SOLUTION

Aquifer Model: Confined

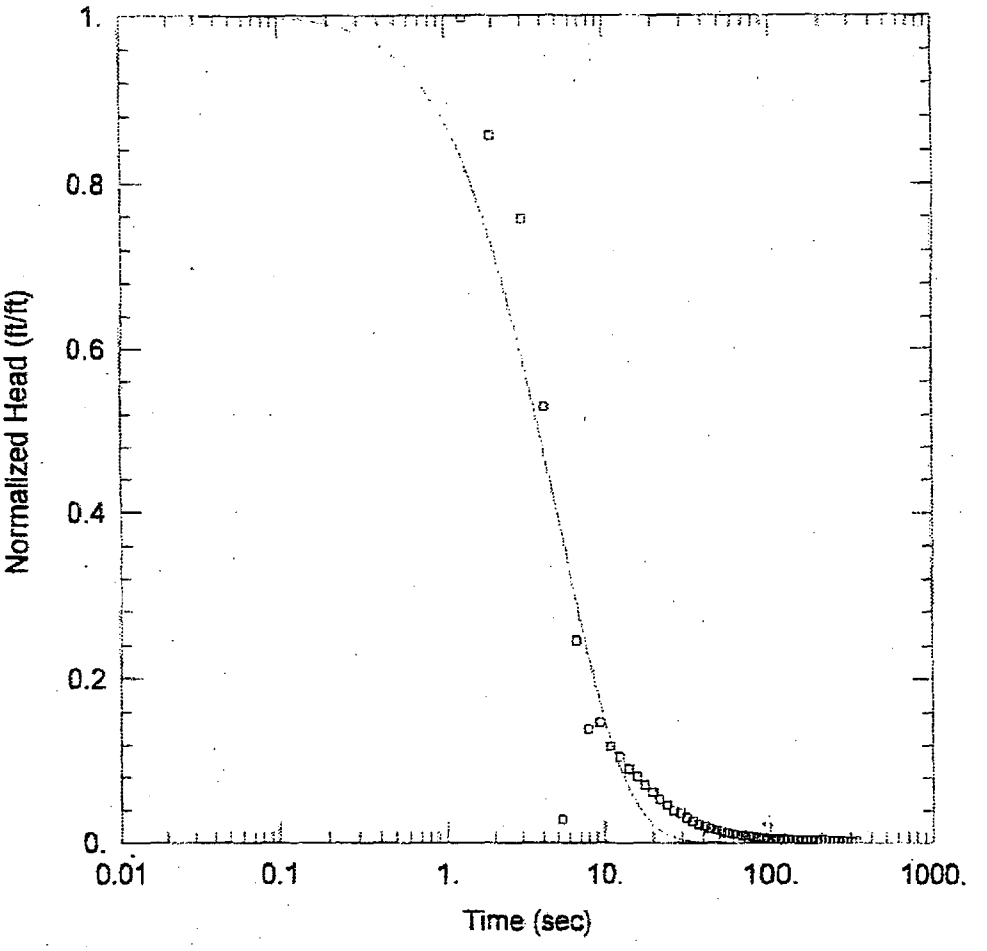
Solution Method: KGS Model

Kr = 31.5 ft/day
Kz/Kr = 1.

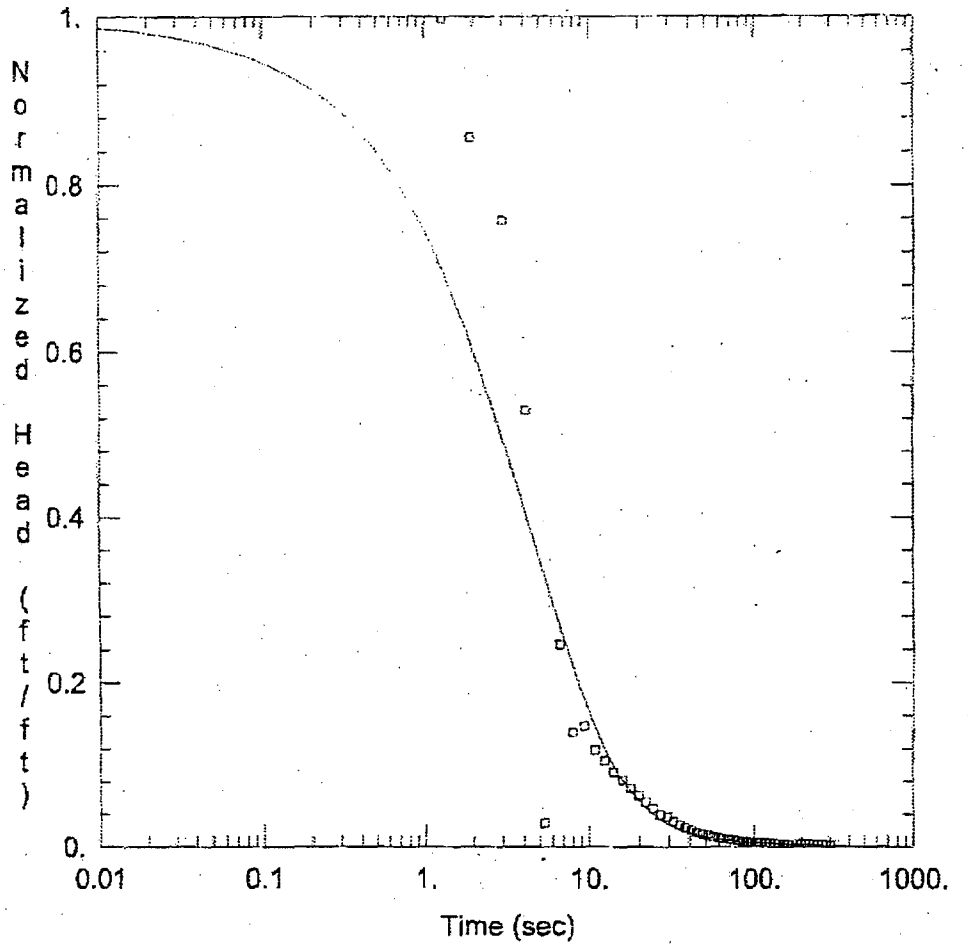
Ss = 1.094E-11 ft^{-1}



OW-928 U RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 20. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-928 U)	
Initial Displacement: 8.001 ft	Static Water Column Height: 32.08 ft
Total Well Penetration Depth: 15. ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 8.268 ft/day	y0 = 4.286 ft



OW-928 U FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 20. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-928 U)	
Initial Displacement: 7.679 ft	Static Water Column Height: 32.08 ft
Total Well Penetration Depth: 15. ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 19.02 ft/day	Le = 47.86 ft



OW-928 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 20. ft

WELL DATA (OW-928 U)

Initial Displacement: 7.679 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.0833 ft

Static Water Column Height: 32.08 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

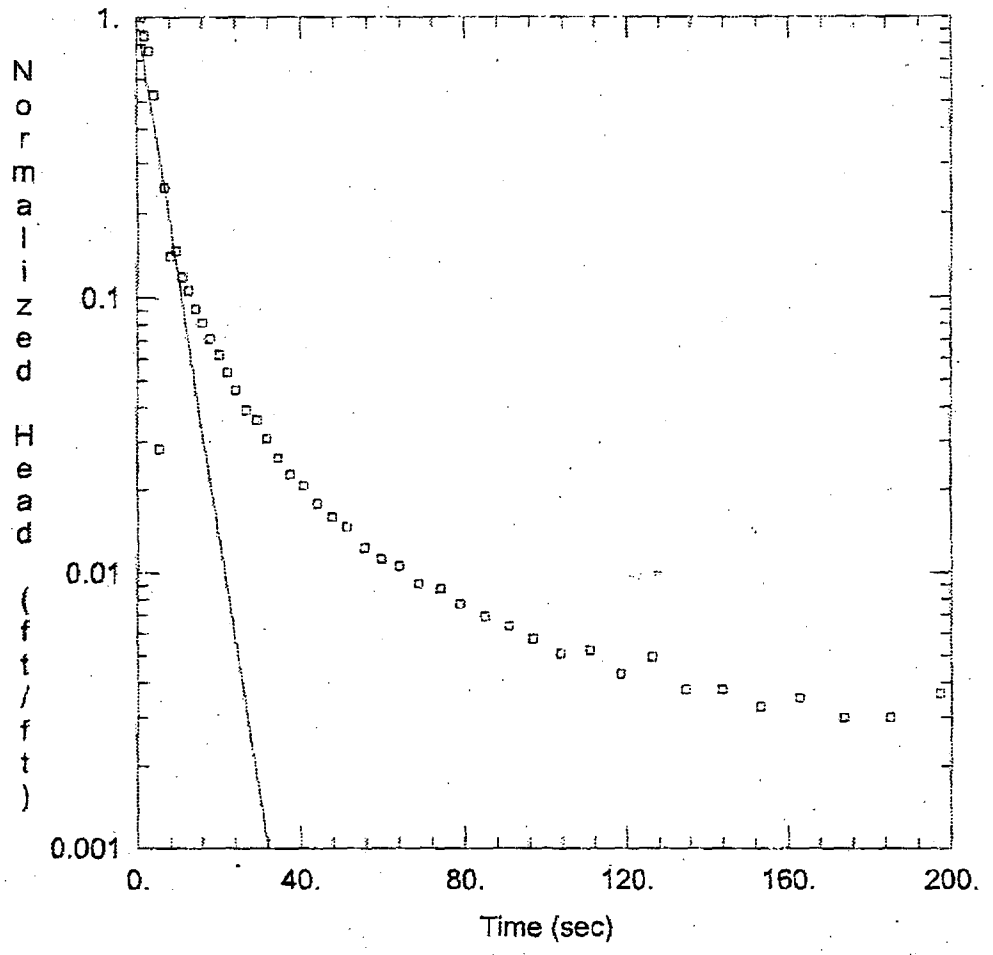
SOLUTION

Aquifer Model: Confined

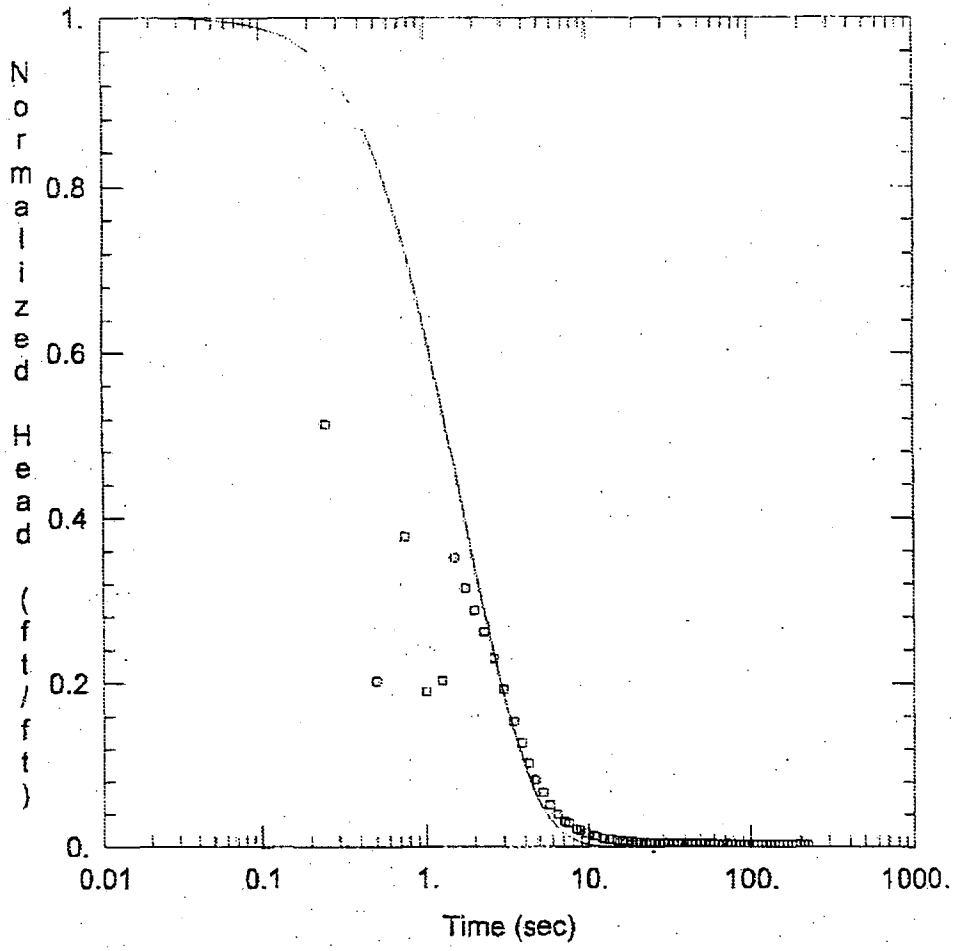
Kr = 15.91 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 5.0E-5 ft^{-1}



OW-928 U FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 20. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-928 U)	
Initial Displacement: 7.679 ft	Static Water Column Height: 32.08 ft
Total Well Penetration Depth: 15. ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 16.01 ft/day	y0 = 7.815 ft



OW-929 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 45. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-929 L)

Initial Displacement: 11.97 ft

Total Well Penetration Depth: 13.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 76.46 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

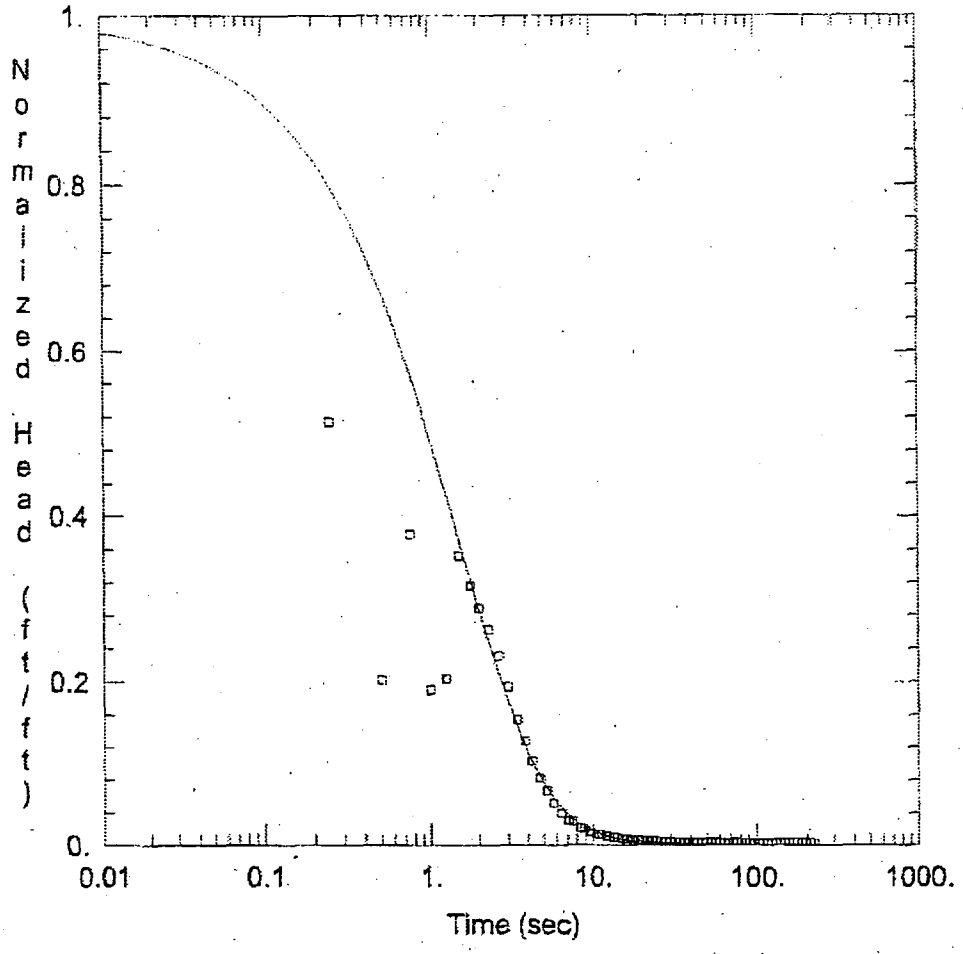
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 55.91 ft/day

Le = 11.73 ft



OW-929 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 45. ft

WELL DATA (OW-929 L)

Initial Displacement: 11.97 ft
Total Well Penetration Depth: 13.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 76.46 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

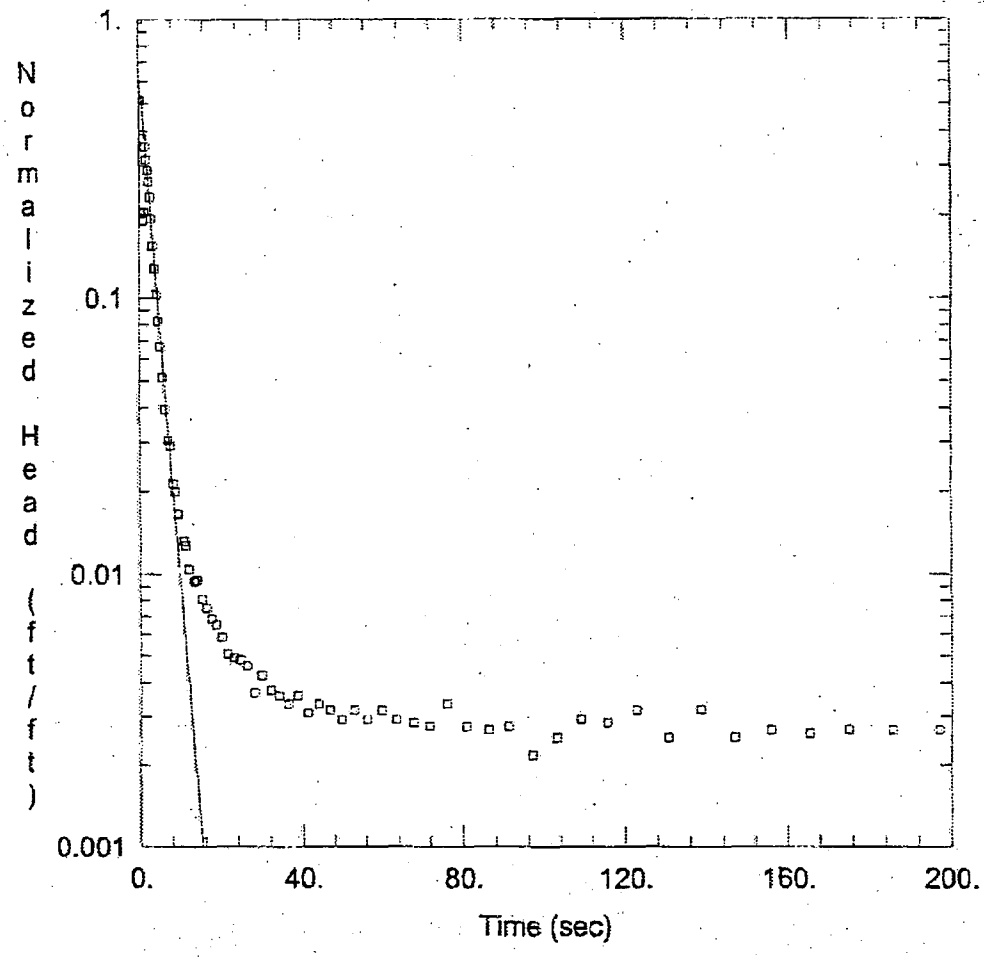
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 53.85 ft/day
Kz/Kr = 1.

Ss = 2.222E-5 ft^{-1}



OW-929 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 45. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-929 L)

Initial Displacement: 11.97 ft

Total Well Penetration Depth: 13.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 76.46 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

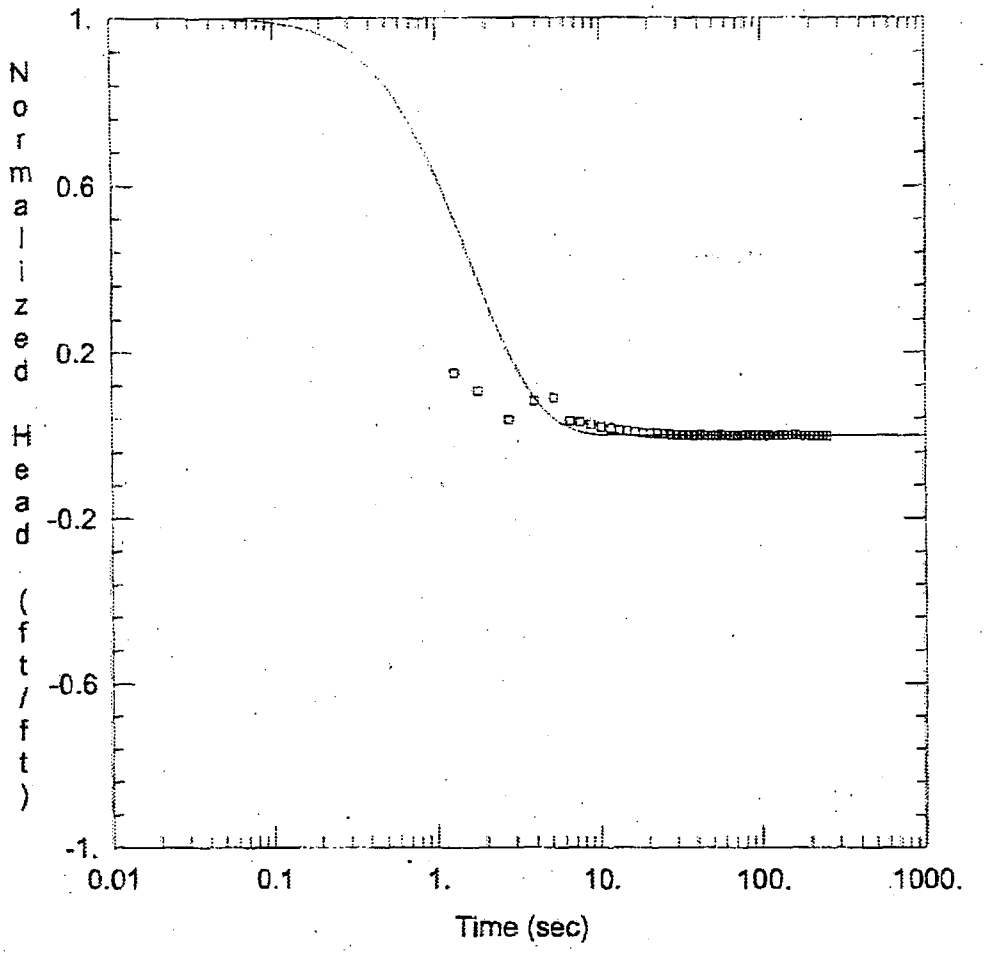
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 29.05 ft/day

y0 = 8.095 ft



OW-929 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 45. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-929 L)

Initial Displacement: 8.292 ft

Total Well Penetration Depth: 13.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 76.46 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

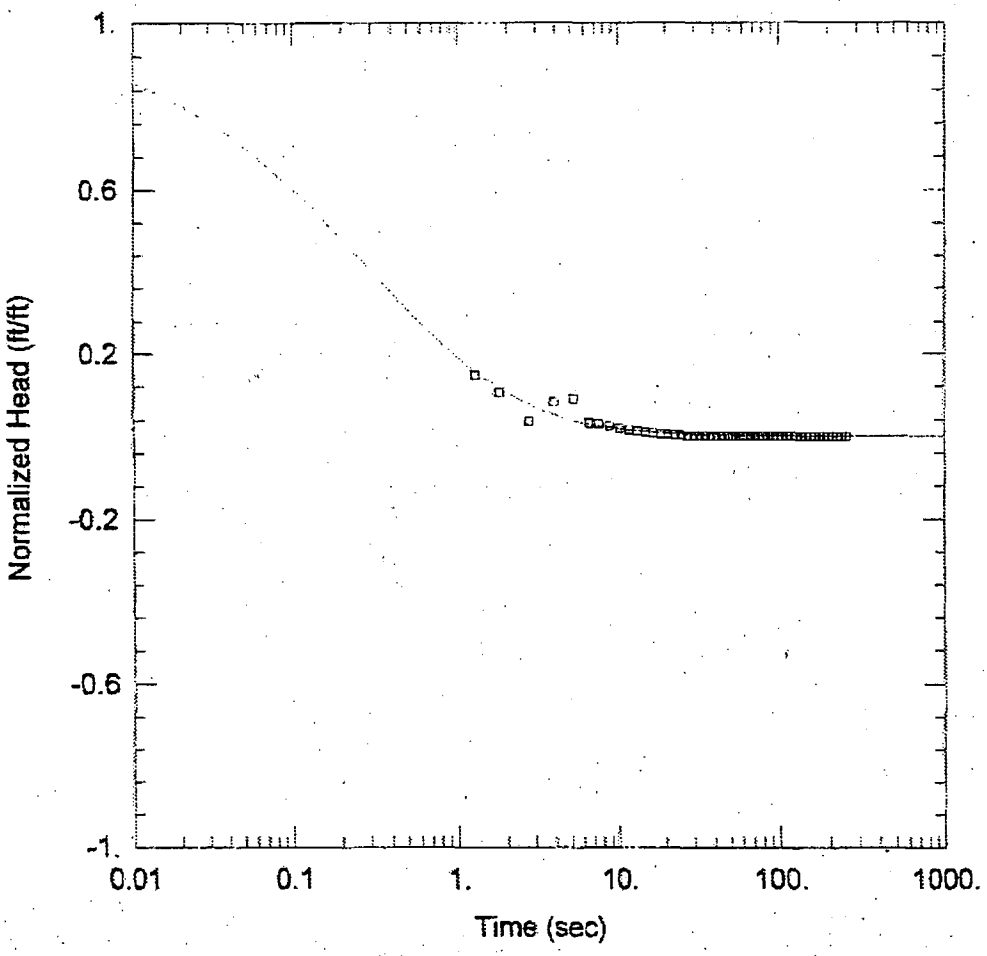
SOLUTION

Aquifer Model: Confined

K = 58.93 ft/day

Solution Method: Butler

Le = 12.71 ft



OW-929 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 45. ft

WELL DATA (OW-929 L)

Initial Displacement: 8.292 ft
Total Well Penetration Depth: 13.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 76.46 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

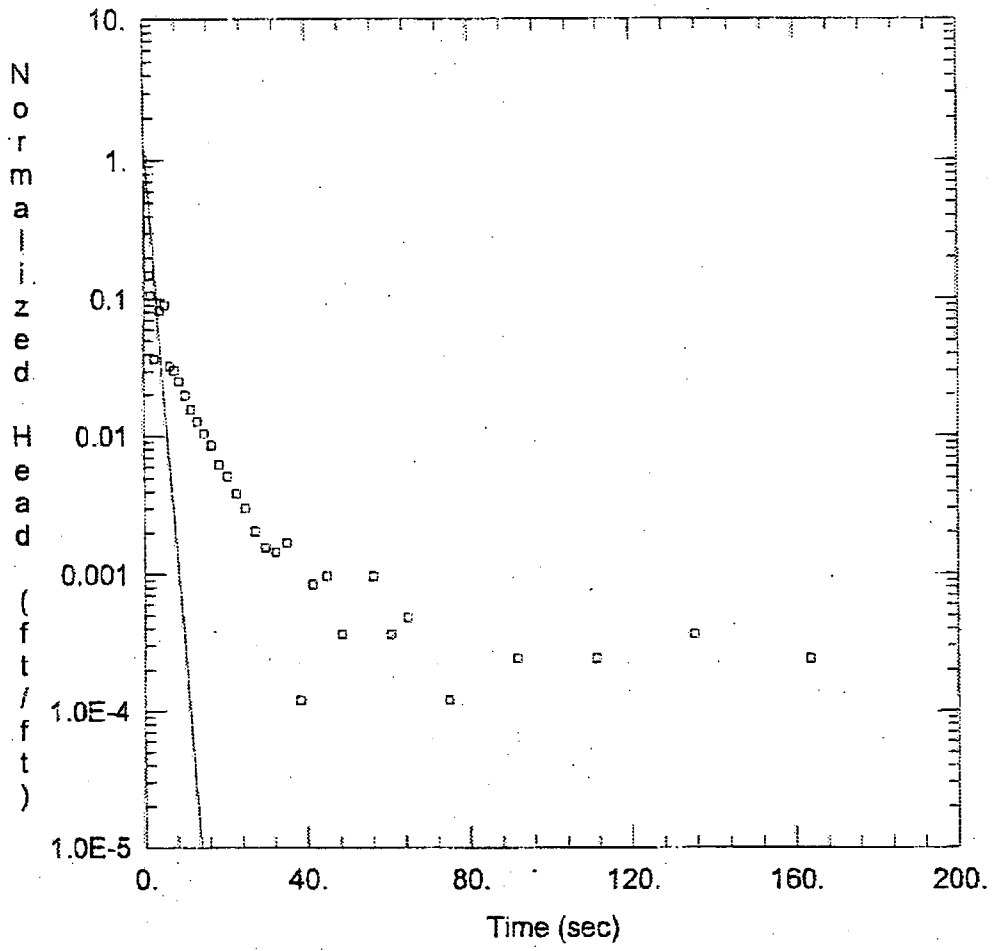
SOLUTION

Aquifer Model: Confined

Kr = 72.56 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 0.002222 ft^{-1}



OW-929 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 45. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-929 L)

Initial Displacement: 8.292 ft

Total Well Penetration Depth: 13.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 76.46 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

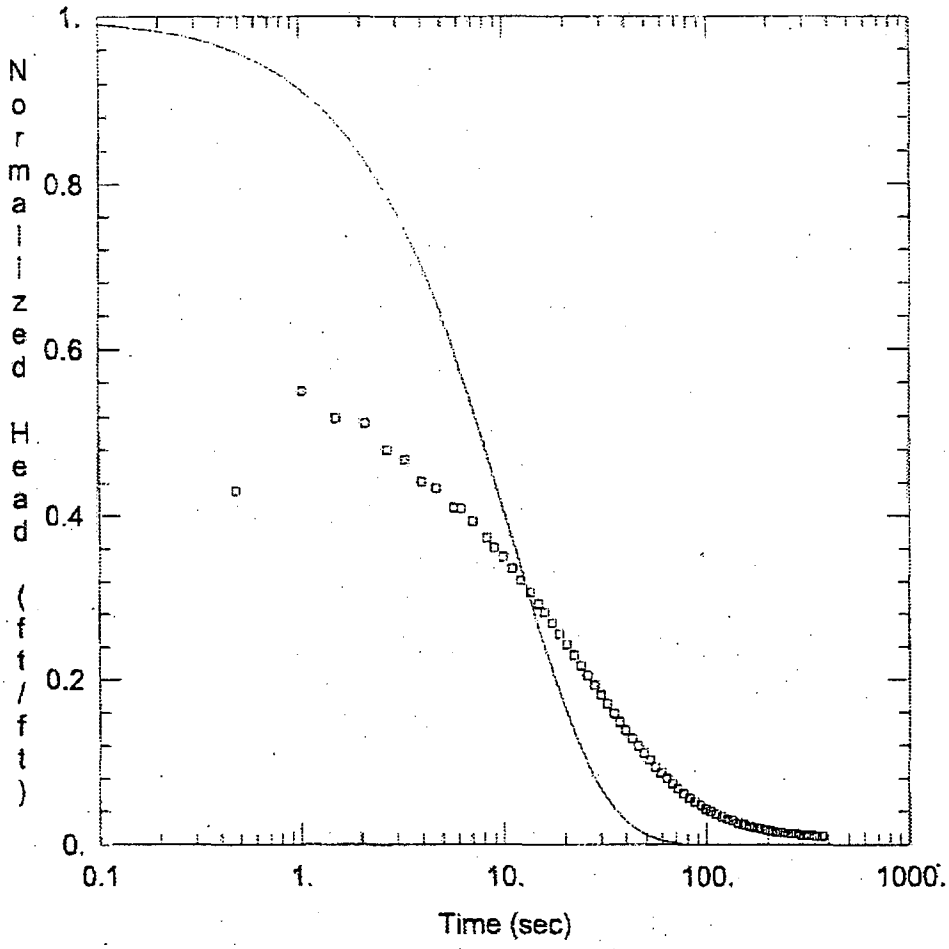
SOLUTION

Aquifer Model: Confined

K = 58.98 ft/day

Solution Method: Bouwer-Rice

y0 = 11.84 ft



OW-929 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-929 U)

Initial Displacement: 12.44 ft

Total Well Penetration Depth: 10. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 48.18 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

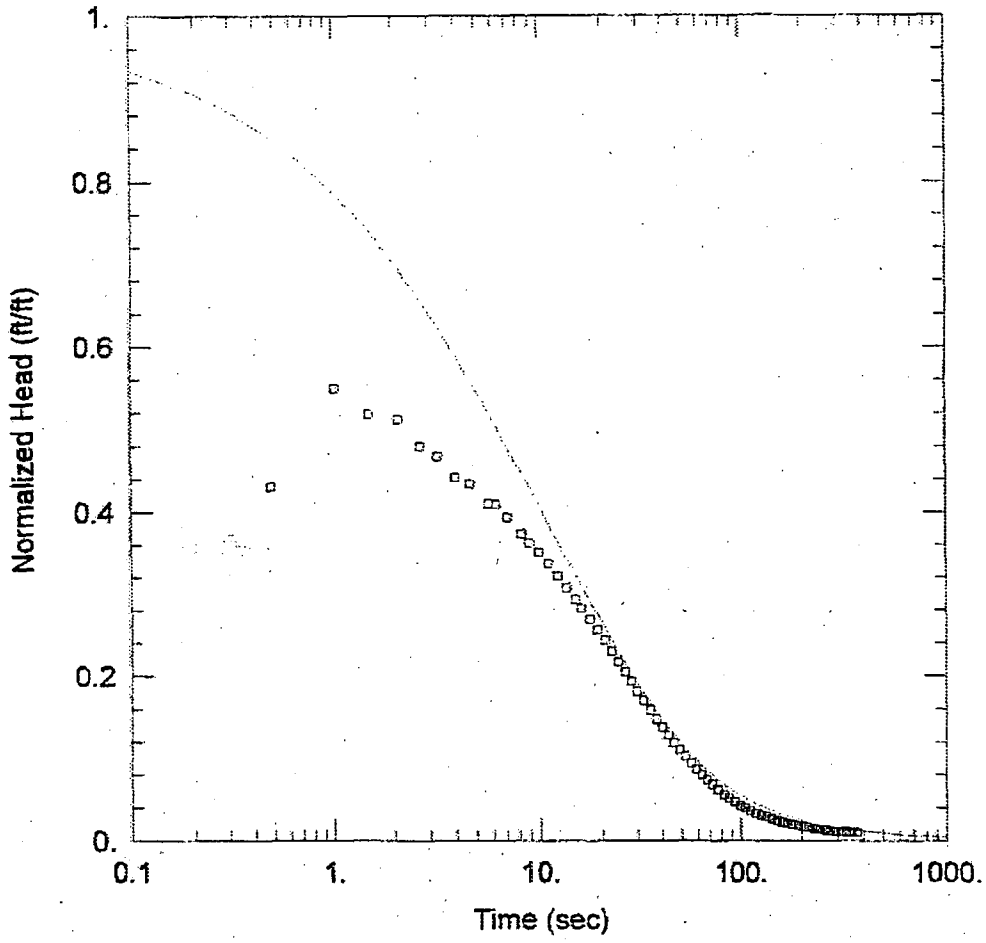
SOLUTION

Aquifer Model: Confined

K = 14.31 ft/day

Solution Method: Butler

Le = 0.1 ft



OW-929 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 11.85 ft

WELL DATA (OW-929 U)

Initial Displacement: 12.44 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.0833 ft

Static Water Column Height: 48.18 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

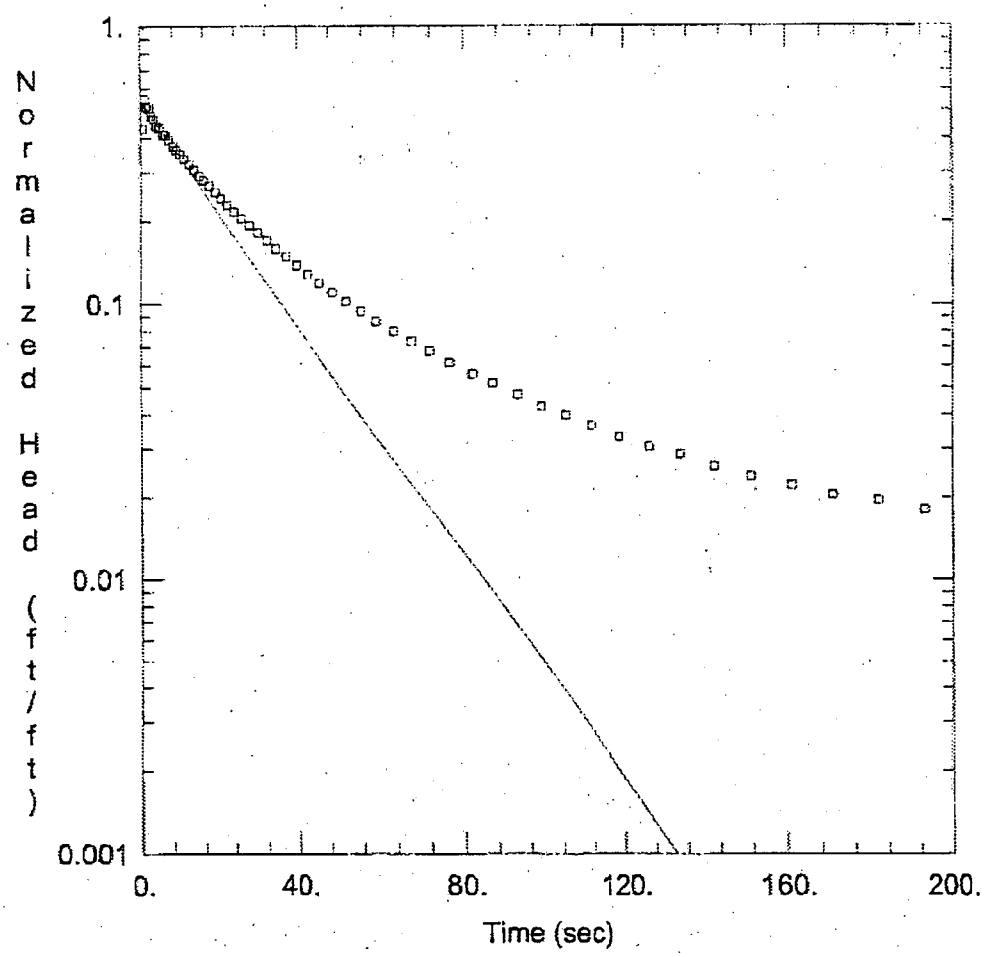
SOLUTION

Aquifer Model: Confined

Kr = 3.224 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 0.0009578 ft^{-1}



OW-929 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-929 U)

Initial Displacement: 12.44 ft

Total Well Penetration Depth: 10. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 48.18 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

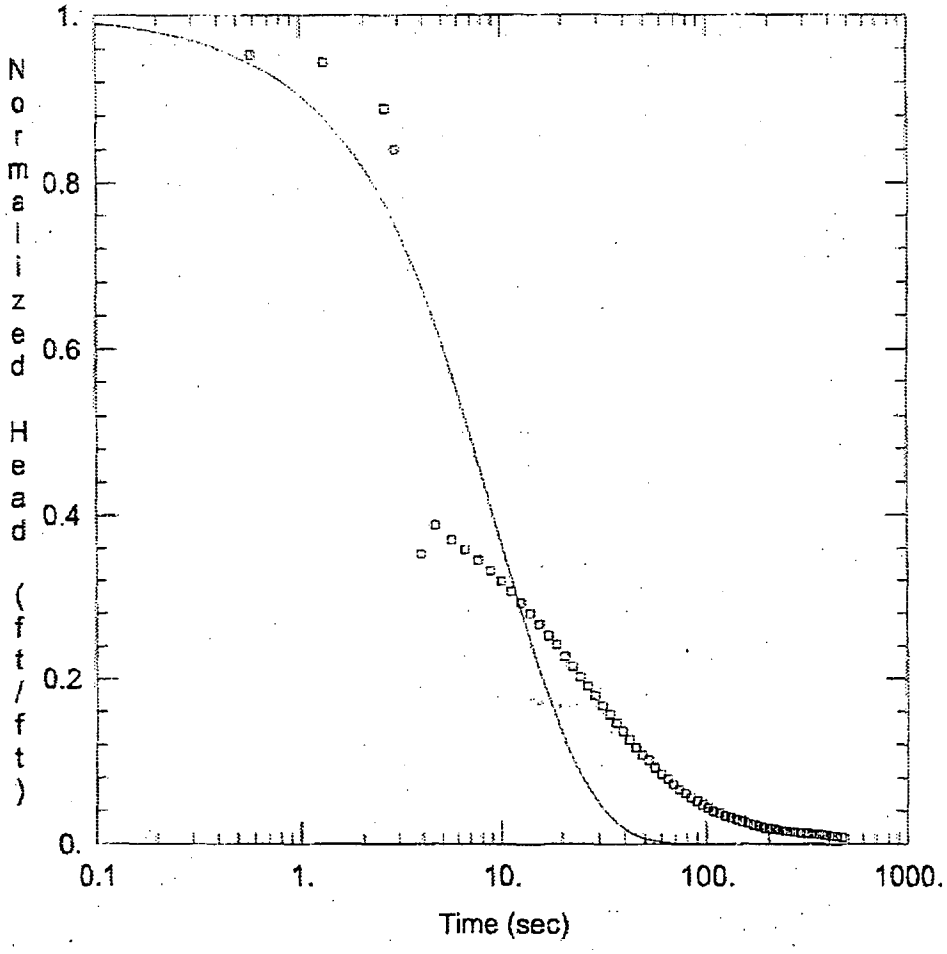
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 3.648 ft/day

y0 = 6.787 ft



OW-929 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-929 U)

Initial Displacement: 11.85 ft

Total Well Penetration Depth: 10. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 48.18 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

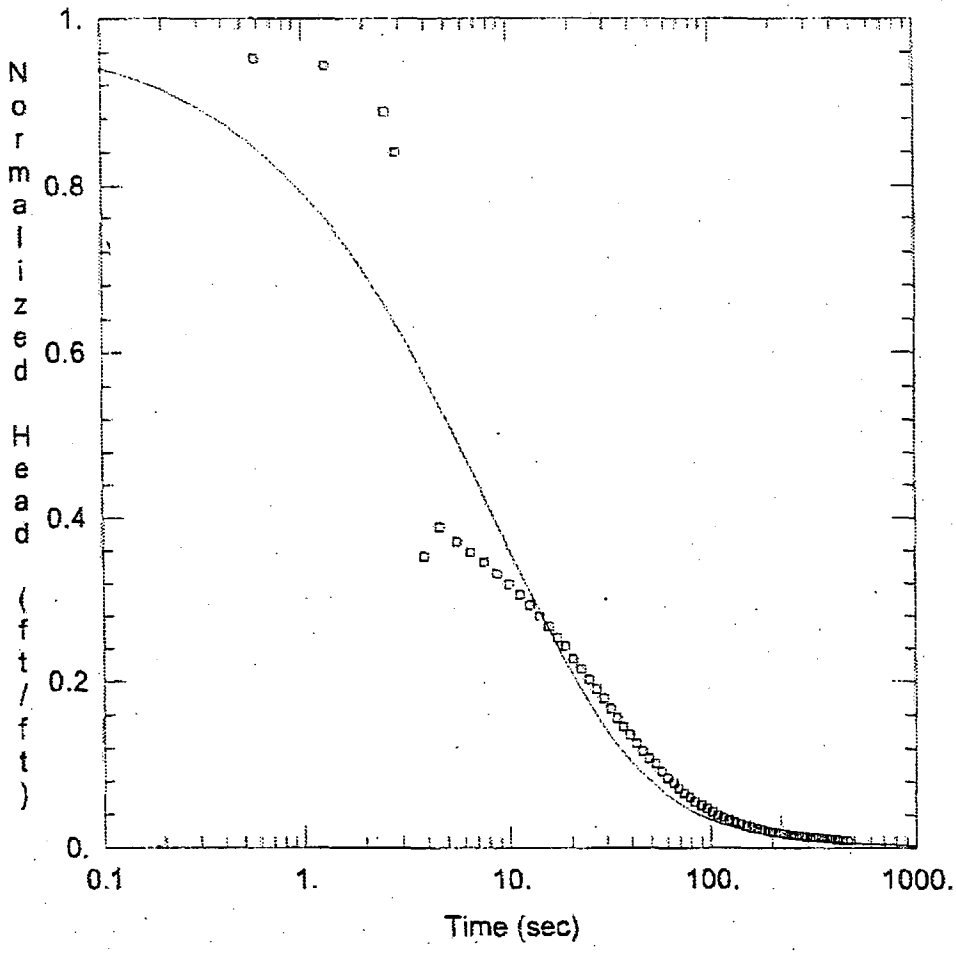
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 16.07 ft/day

Le = 0.1 ft



OW-929 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

WELL DATA (OW-929 U)

Initial Displacement: 11.85 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 48.18 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

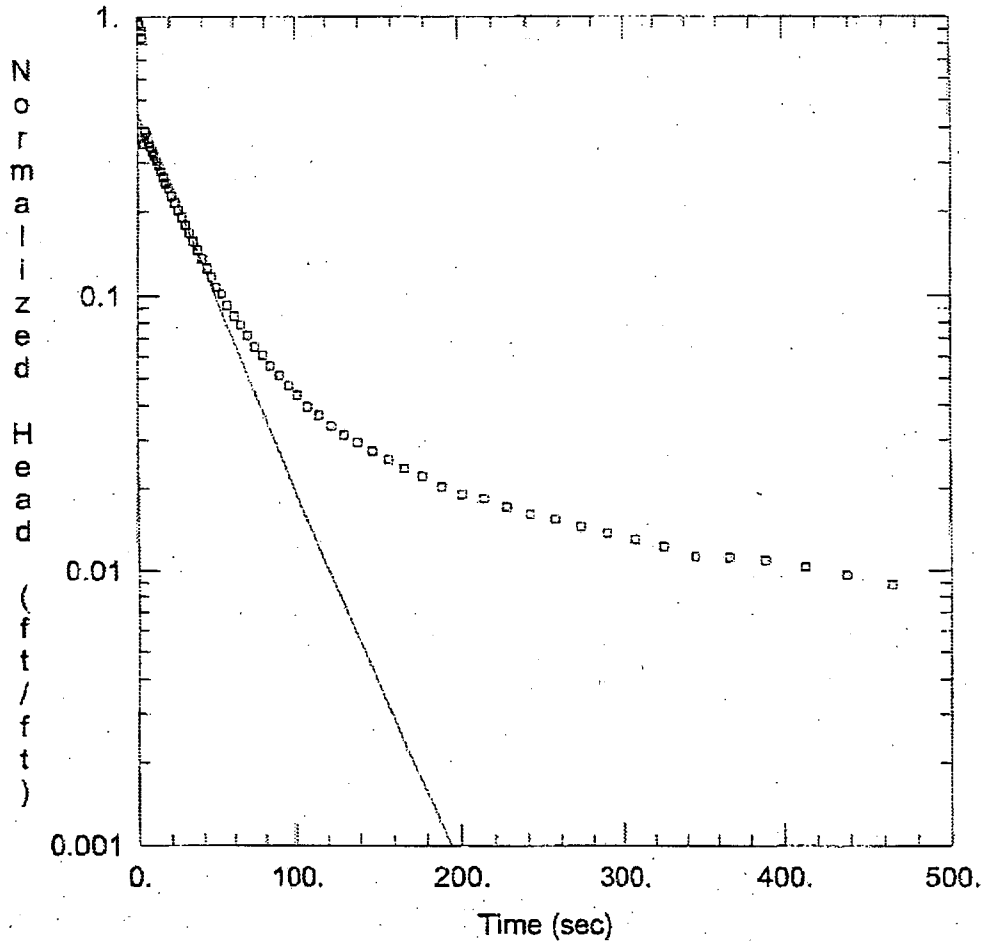
SOLUTION

Aquifer Model: Confined

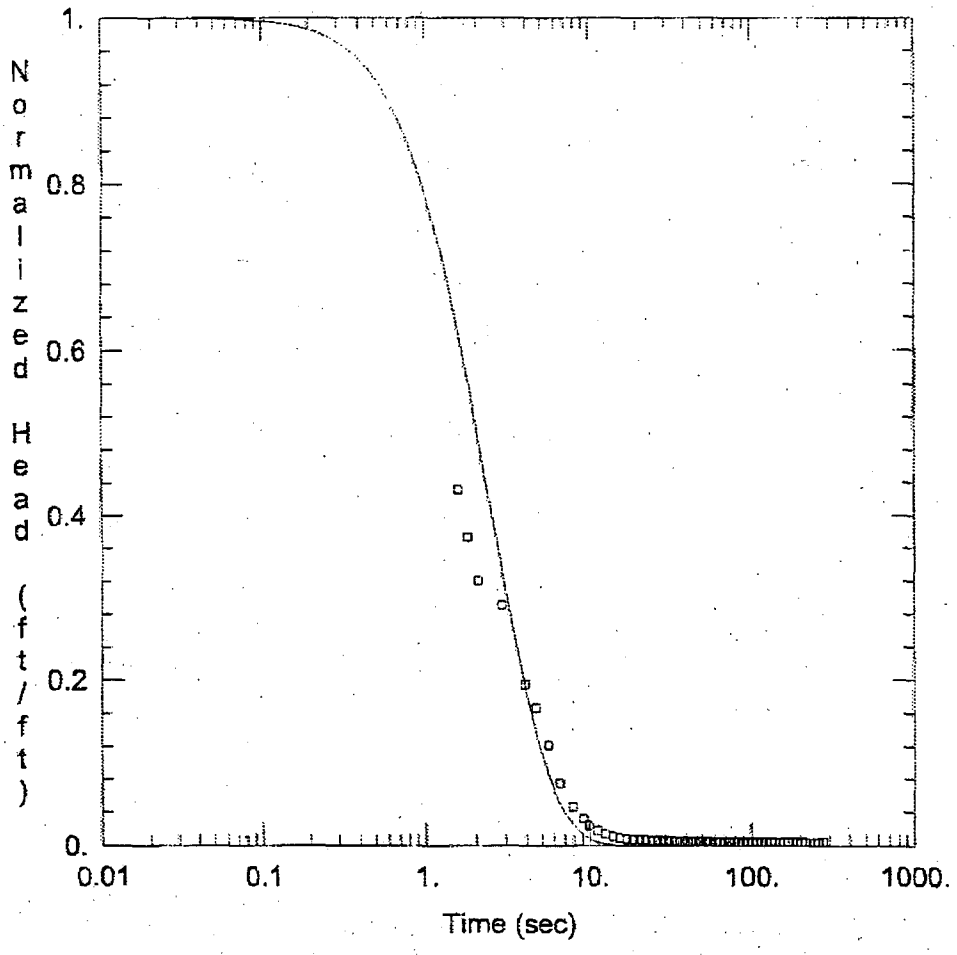
Kr = 11.5 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 0.000698 ft^{-1}



OW-929 U FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 5. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-929 U)	
Initial Displacement: 11.85 ft	Static Water Column Height: 48.18 ft
Total Well Penetration Depth: 10. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 2.423 ft/day	y0 = 5.303 ft



OW-930 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-930 L)

Initial Displacement: 10.66 ft

Total Well Penetration Depth: 27. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 89.35 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

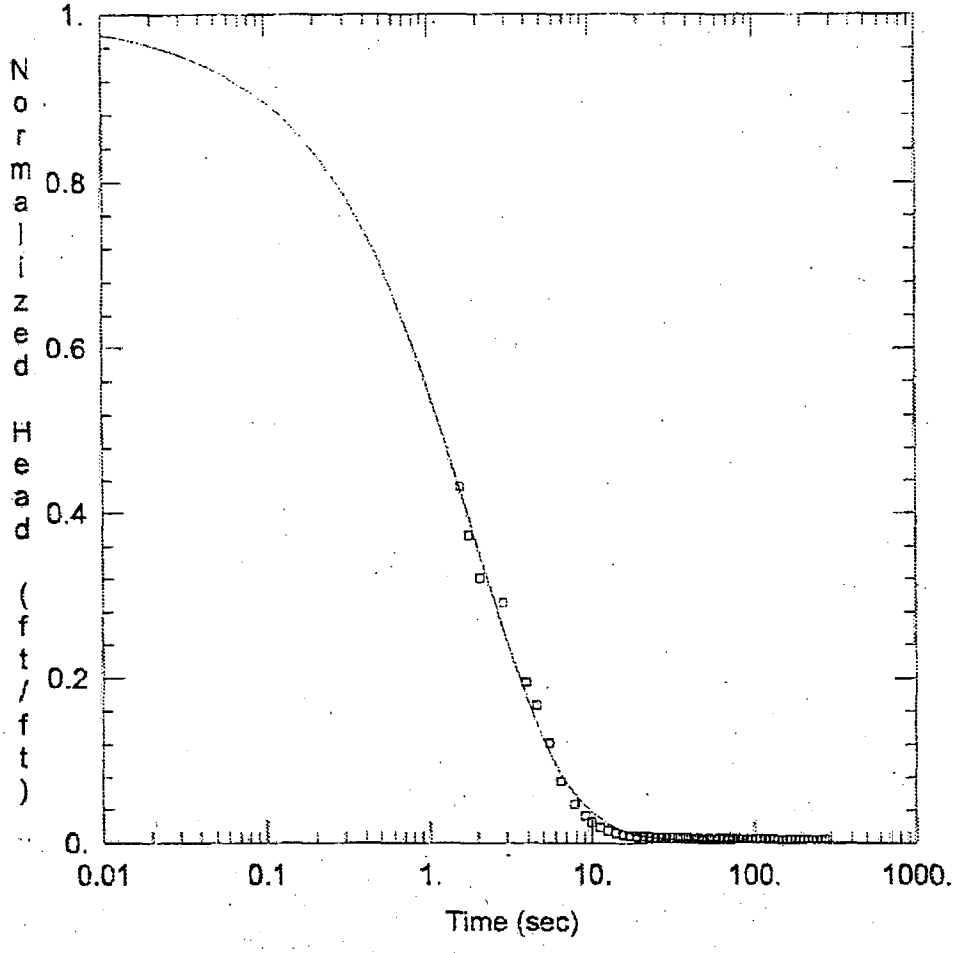
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 40.45 ft/day

Le = 39.81 ft



OW-930 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 40. ft

WELL DATA (OW-930 L)

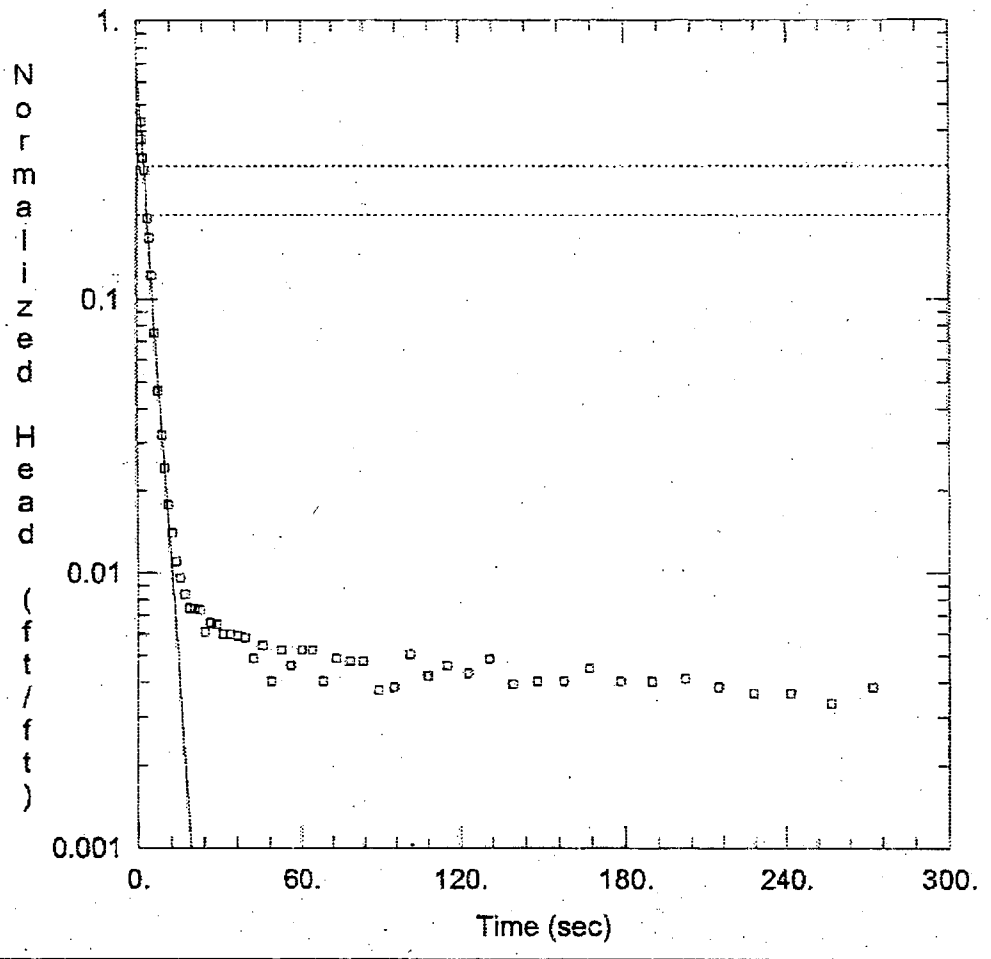
Initial Displacement: 10.66 ft
Total Well Penetration Depth: 27. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 89.35 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Confined
Kr = 36.58 ft/day
Kz/Kr = 1.

Solution Method: KGS Model
Ss = 7.267E-5 ft^{-1}



OW-930 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-930 L)

Initial Displacement: 10.66 ft

Total Well Penetration Depth: 27. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 89.35 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

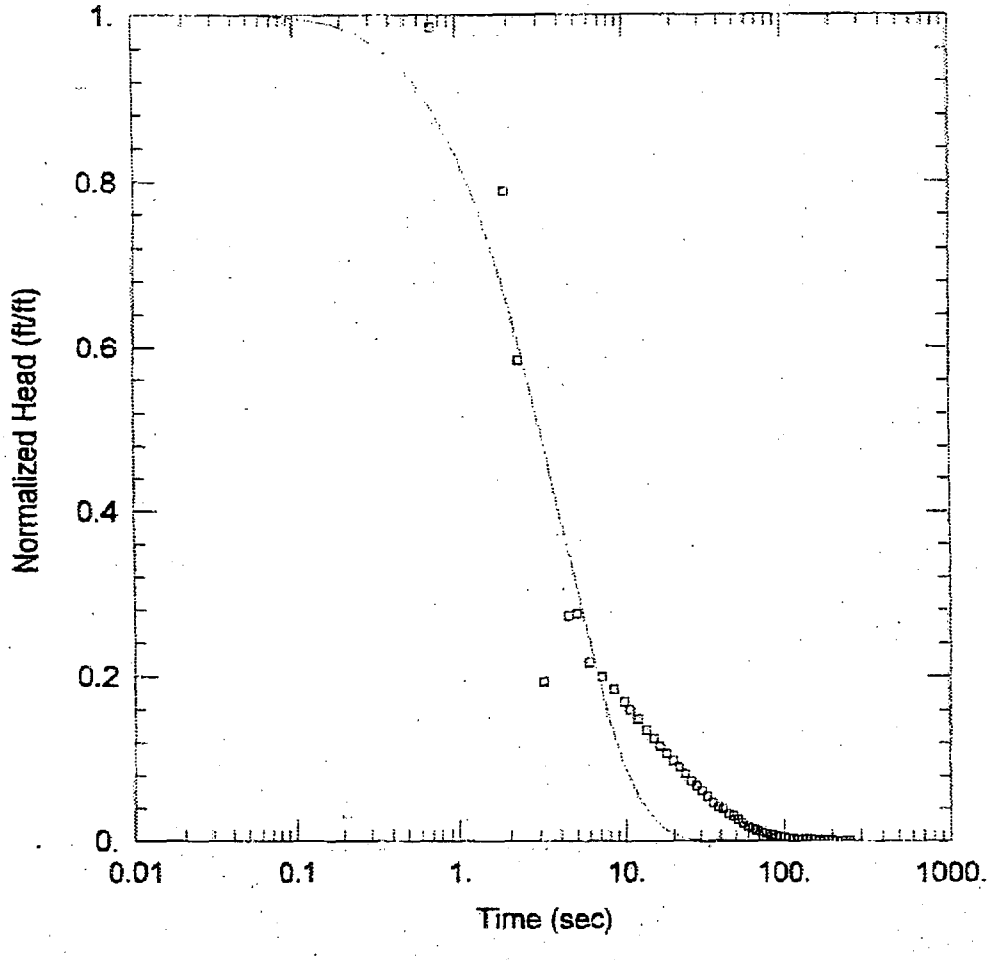
SOLUTION

Aquifer Model: Confined

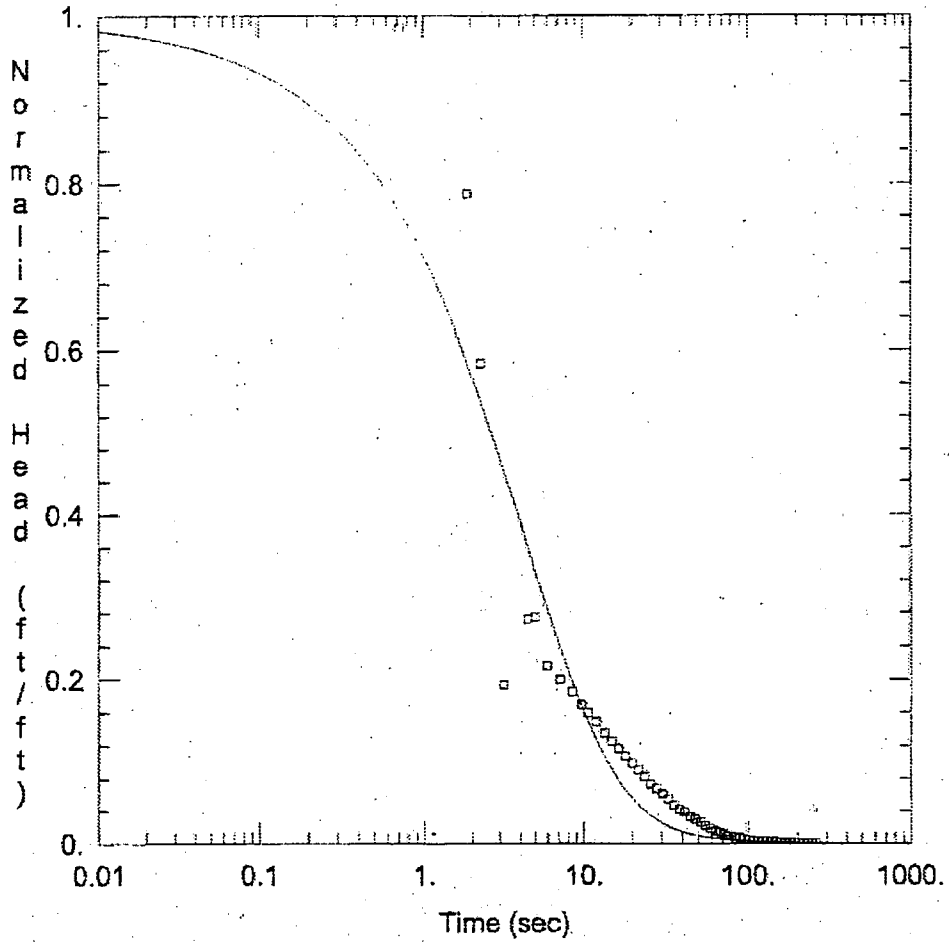
K = 26.92 ft/day

Solution Method: Bouwer-Rice

y0 = 7.557 ft



OW-930 L FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 40. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-930 L)	
Initial Displacement: 6.697 ft Total Well Penetration Depth: 27. ft Casing Radius: 0.08333 ft	Static Water Column Height: 89.35 ft Screen Length: 10. ft Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 24.3 ft/day	Le = 30.24 ft



OW-930 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 40. ft

WELL DATA (OW-930 L)

Initial Displacement: 6.697 ft
Total Well Penetration Depth: 27. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 89.35 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

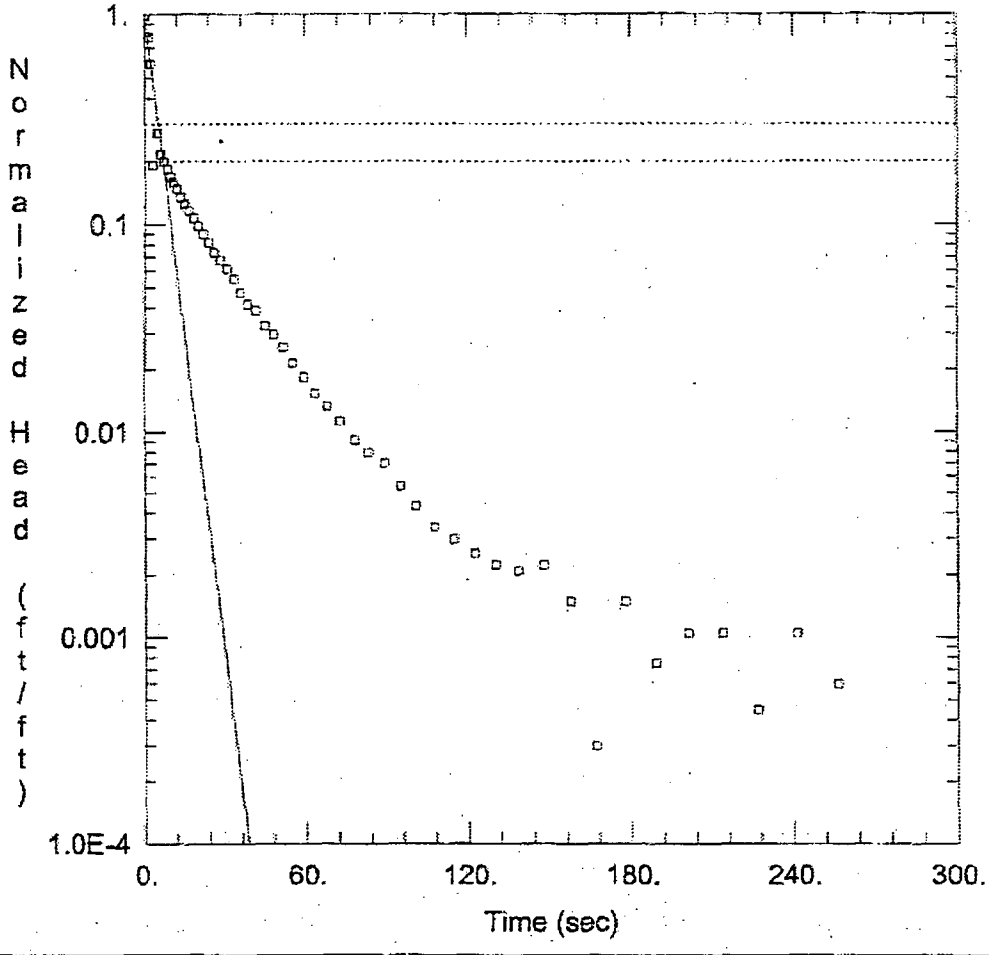
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 15.09 ft/day
Kz/Kr = 1.

Ss = 0.0001143 ft^{-1}



OW-930 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-930 L)

Initial Displacement: 6.697 ft

Total Well Penetration Depth: 27. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 89.35 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

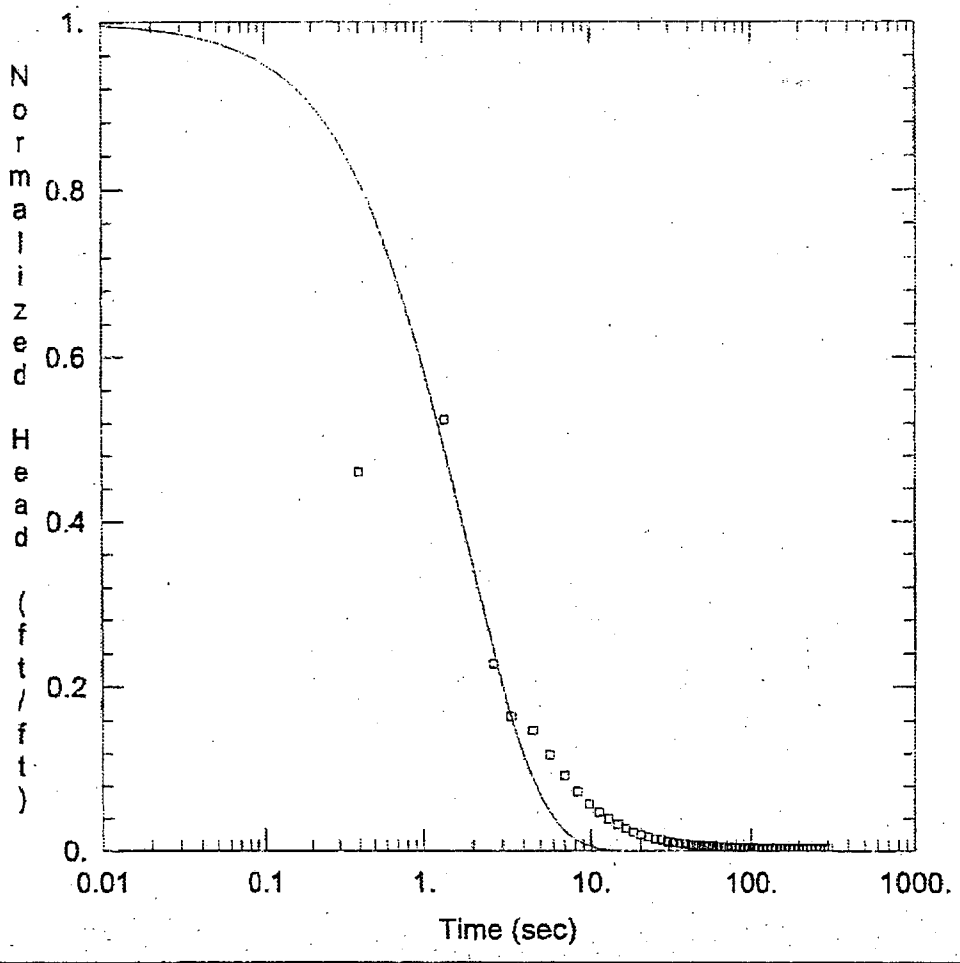
SOLUTION

Aquifer Model: Confined

K = 18.92 ft/day

Solution Method: Bouwer-Rice

y0 = 6.904 ft



OW-930 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 23.9 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-930 U)

Initial Displacement: 8.47 ft

Total Well Penetration Depth: 16. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 25.83 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

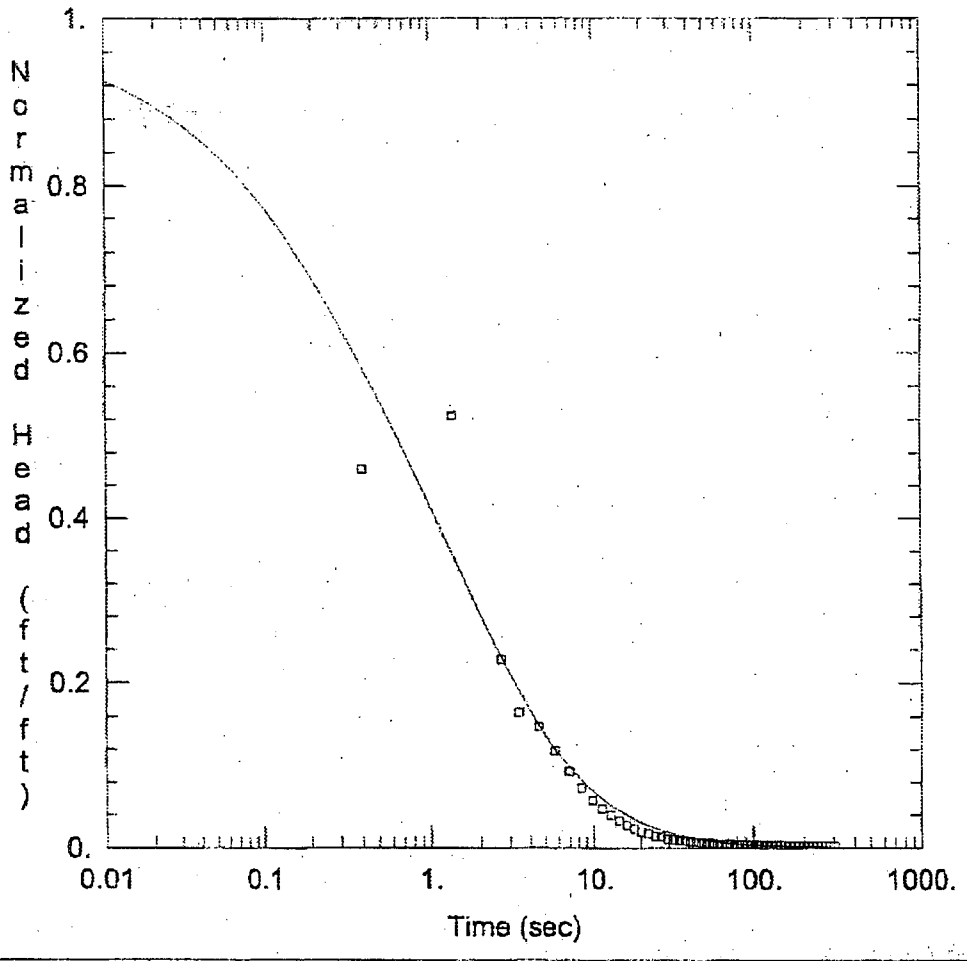
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 54.63 ft/day

Le = 0.1 ft



OW-930 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 23.9 ft

WELL DATA (OW-930 U)

Initial Displacement: 8.47 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 25.83 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

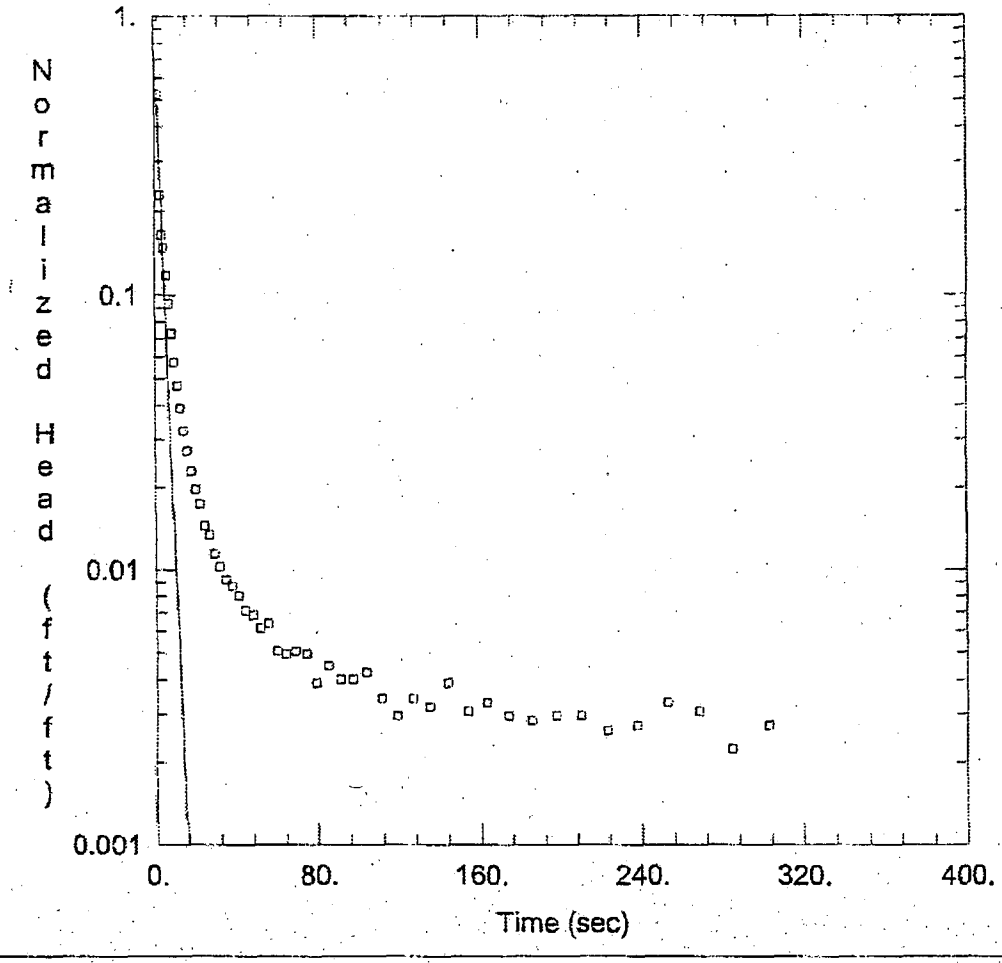
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 22.71 ft/day
Kz/Kr = 1.

Ss = 0.001841 ft^{-1}



OW-930 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 23.9 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-930 U)

Initial Displacement: 8.47 ft

Total Well Penetration Depth: 16. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 25.83 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

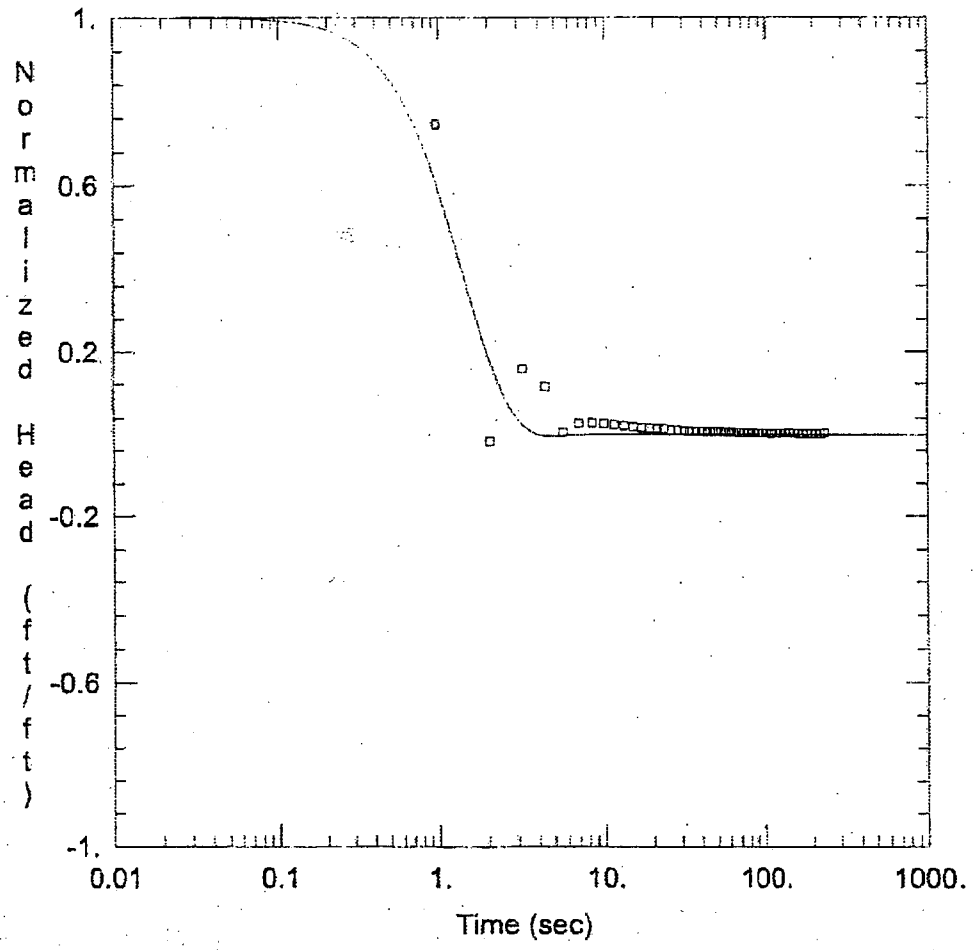
SOLUTION

Aquifer Model: Confined

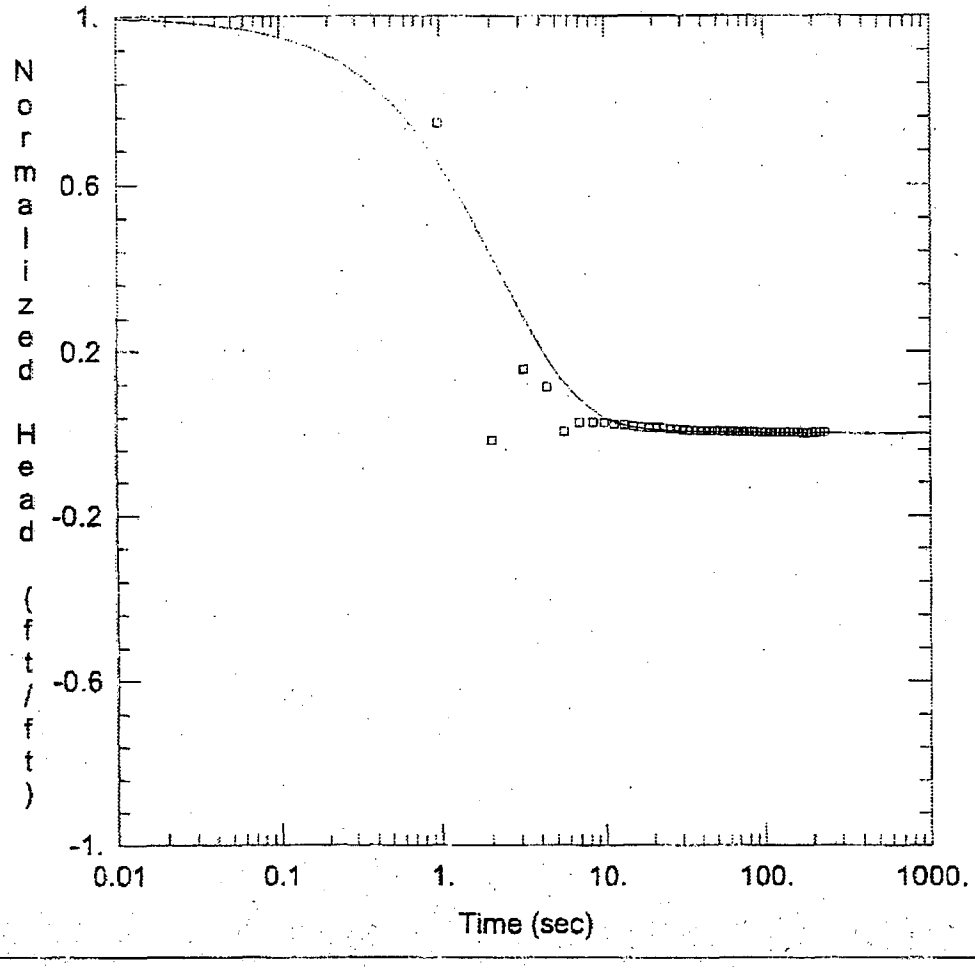
Solution Method: Bouwer-Rice

K = 31.73 ft/day

y0 = 7.021 ft



OW-930 U FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 23.9 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-930 U)	
Initial Displacement: 8.612 ft	Static Water Column Height: 25.83 ft
Total Well Penetration Depth: 16. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 79.61 ft/day	Le = 17.83 ft



OW-930 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 23.9 ft

WELL DATA (OW-930 U)

Initial Displacement: 8.612 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 25.83 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

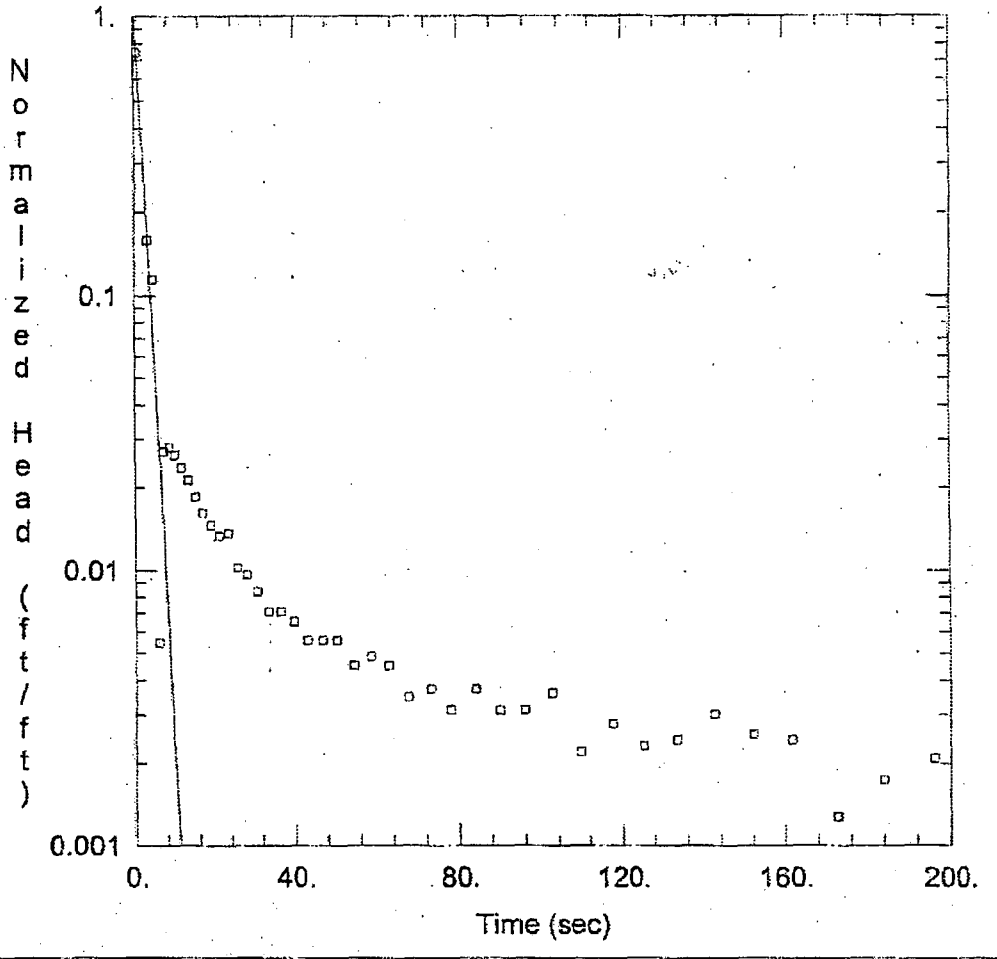
SOLUTION

Aquifer Model: Confined

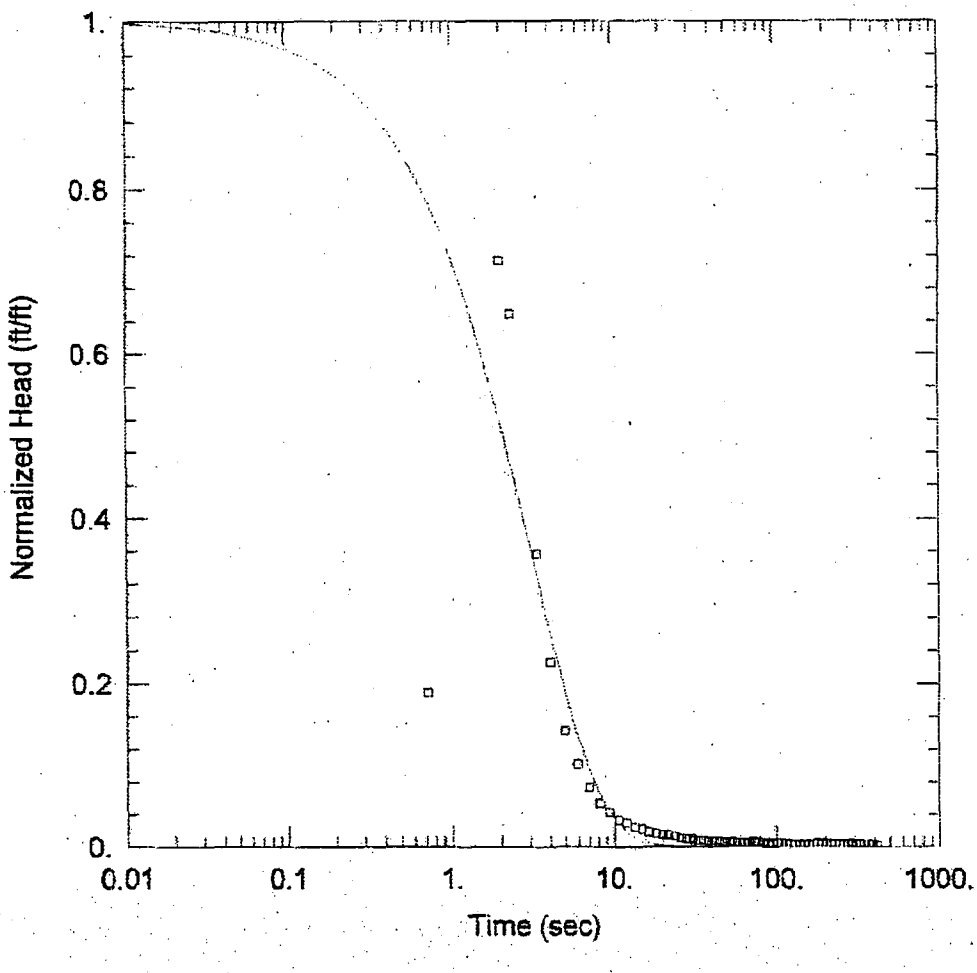
Kr = 47.12 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

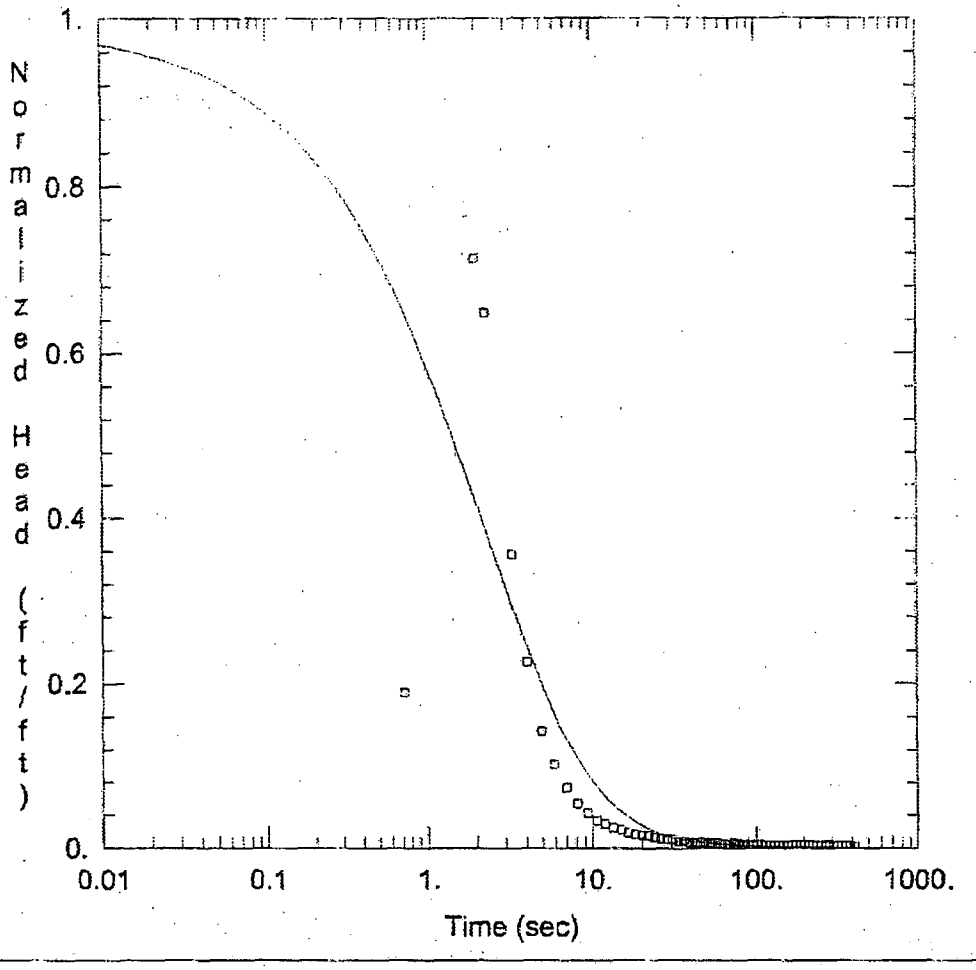
Ss = 1.468E-7 ft^{-1}



OW-930 U FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 23.9 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-930 U)	
Initial Displacement: 8.612 ft	Static Water Column Height: 25.83 ft
Total Well Penetration Depth: 16. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 47.71 ft/day	y0 = 10.64 ft



OW-931 U RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 29.5 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-931 U)	
Initial Displacement: 4.668 ft	Static Water Column Height: 27.82 ft
Total Well Penetration Depth: 16. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 34.39 ft/day	Le = 0.1 ft



OW-931 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 29.5 ft

WELL DATA (OW-931 U)

Initial Displacement: 4.668 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.82 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

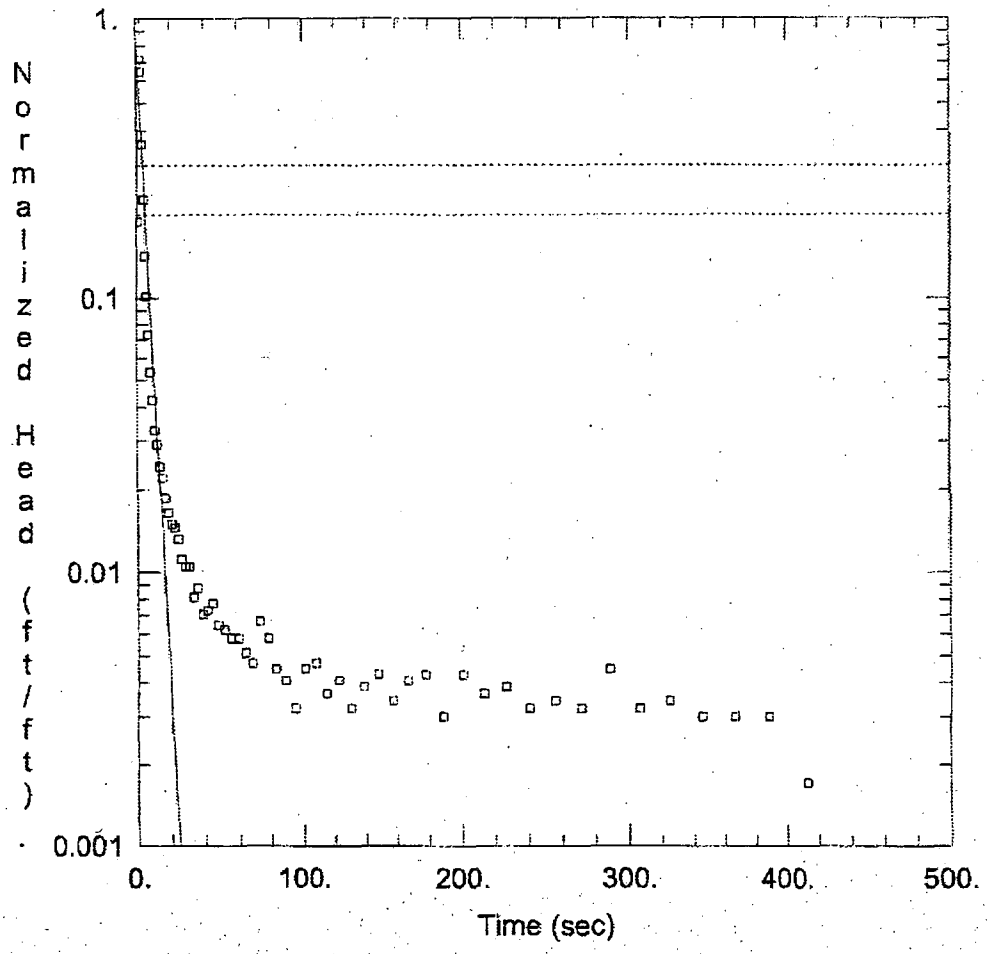
SOLUTION

Aquifer Model: Confined

Kr = 23.45 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 0.0002309 ft^{-1}



OW-931 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 29.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-931 U)

Initial Displacement: 4.668 ft

Total Well Penetration Depth: 16. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 27.82 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

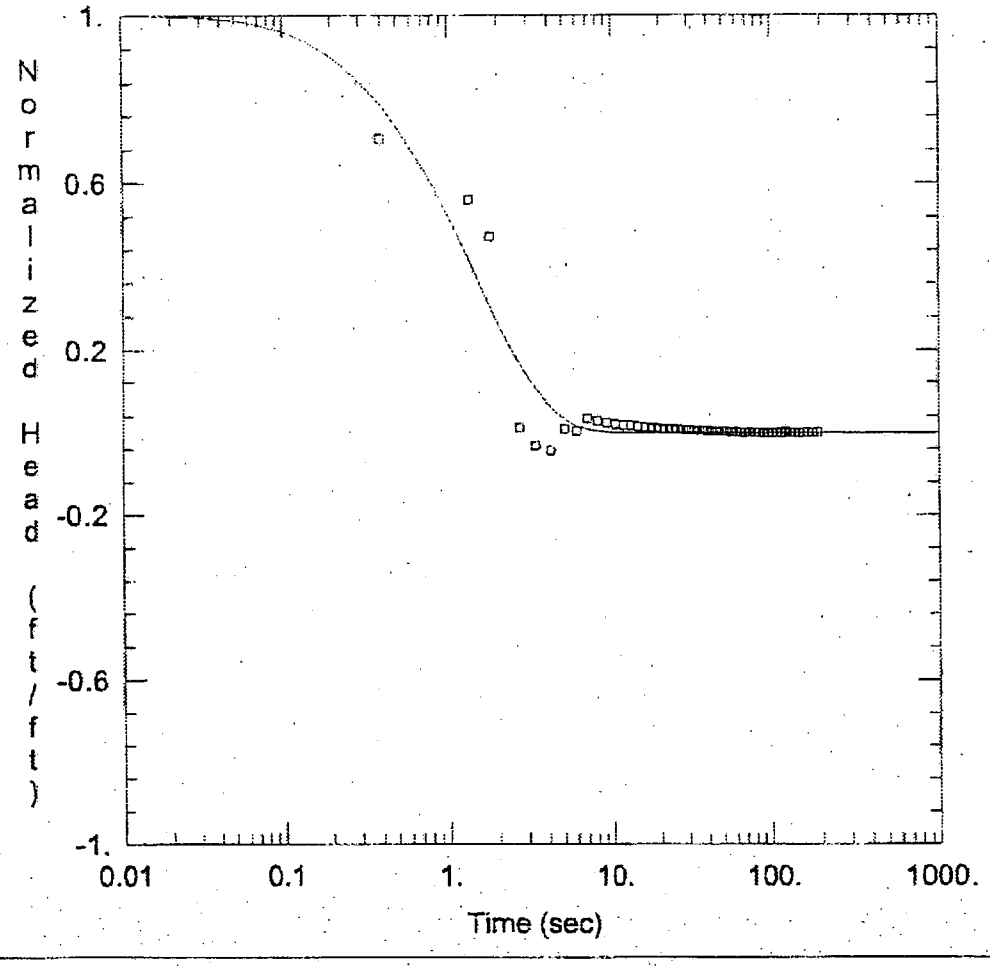
SOLUTION

Aquifer Model: Confined

K = 19.99 ft/day

Solution Method: Bouwer-Rice

y0 = 3.815 ft



OW-931 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 29.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-931 U)

Initial Displacement: 5.216 ft

Total Well Penetration Depth: 16. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 27.82 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

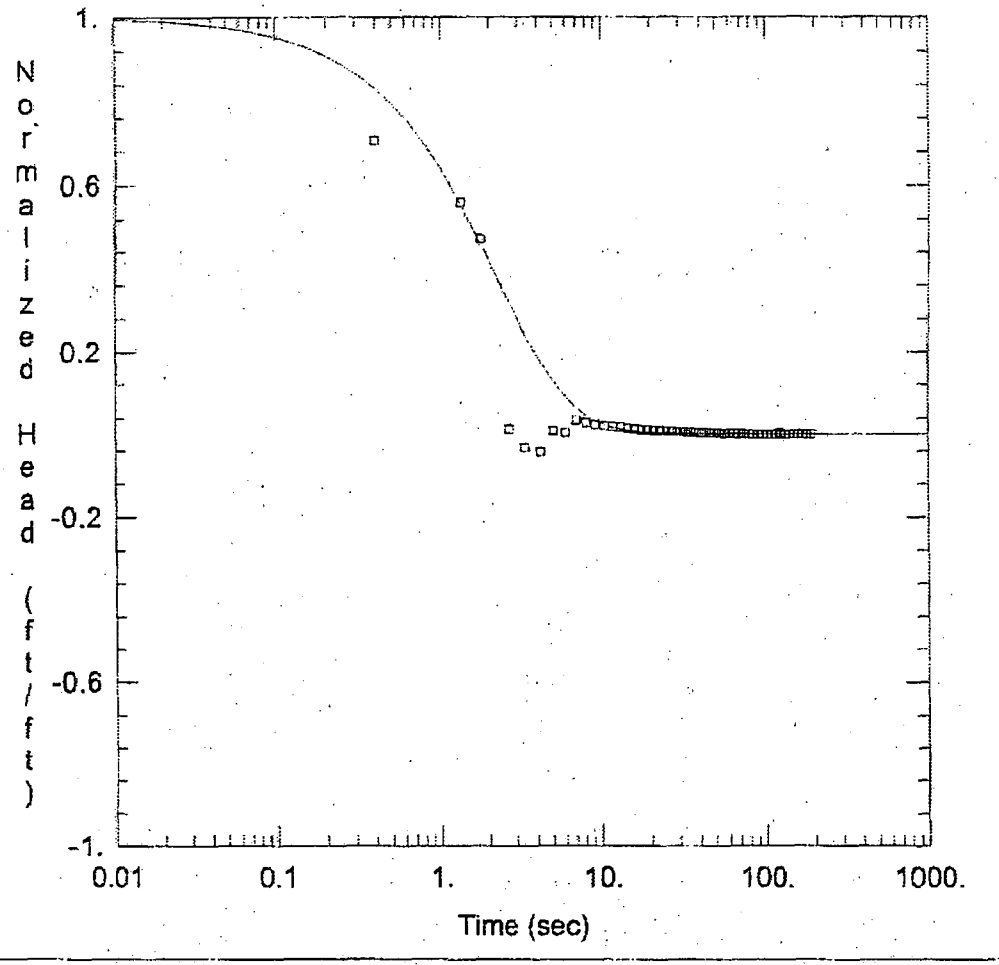
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 68.08 ft/day

Le = 2.125 ft



OW-931 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 29.5 ft

WELL DATA (OW-931 U)

Initial Displacement: 5.216 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.82 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

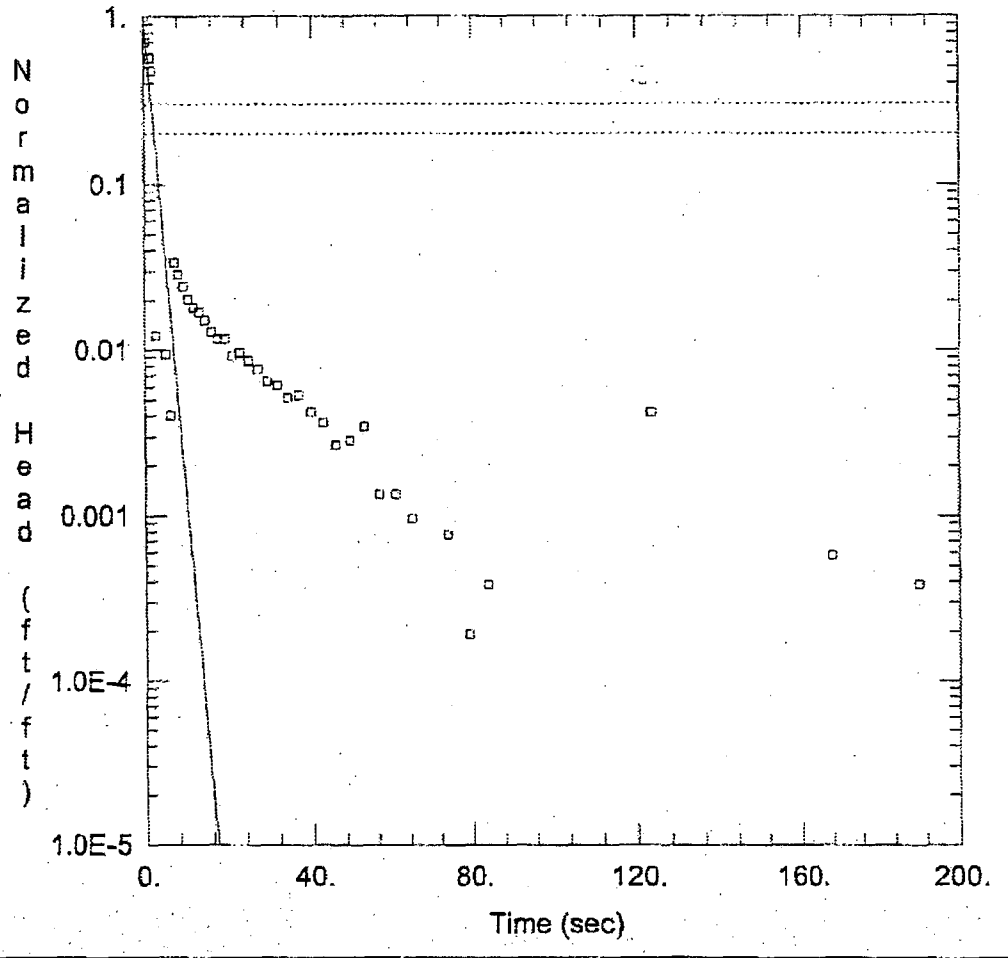
SOLUTION

Aquifer Model: Confined

Kr = 71.64 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 3.39E-12 ft^{-1}



OW-931 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 29.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-931 U)

Initial Displacement: 5.216 ft

Total Well Penetration Depth: 16. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 27.82 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

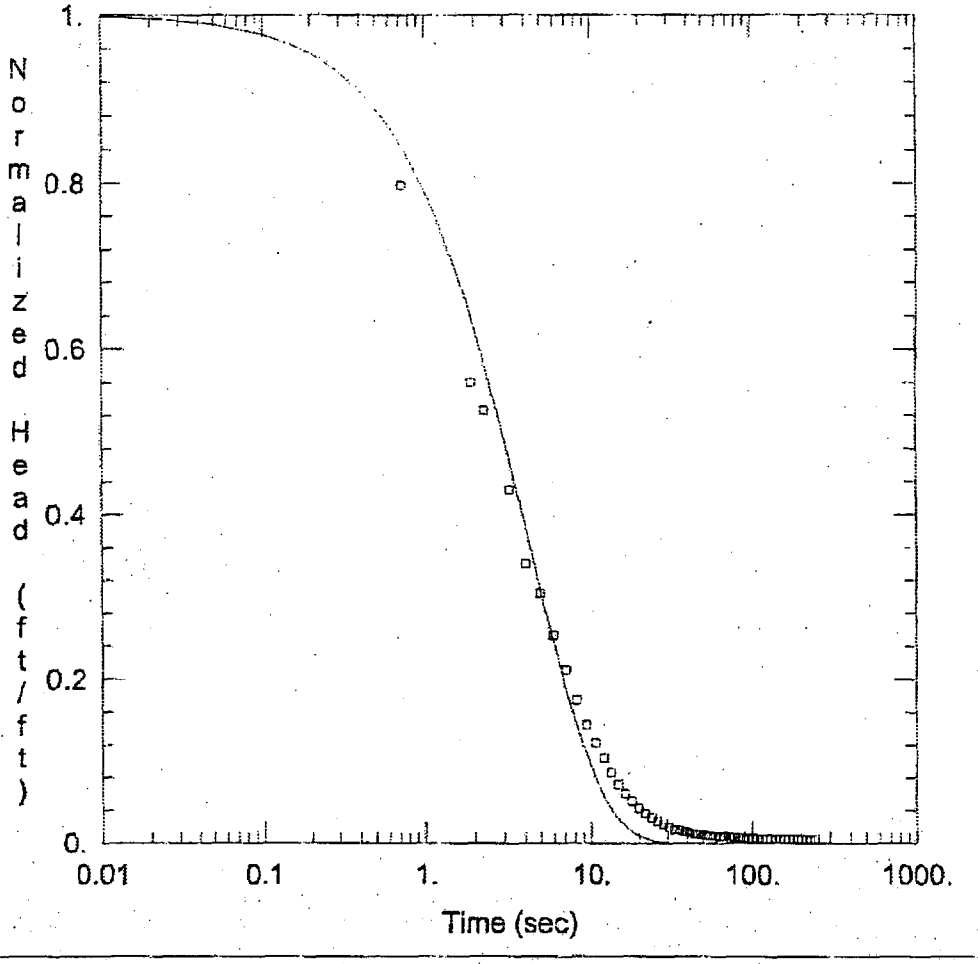
SOLUTION

Aquifer Model: Confined

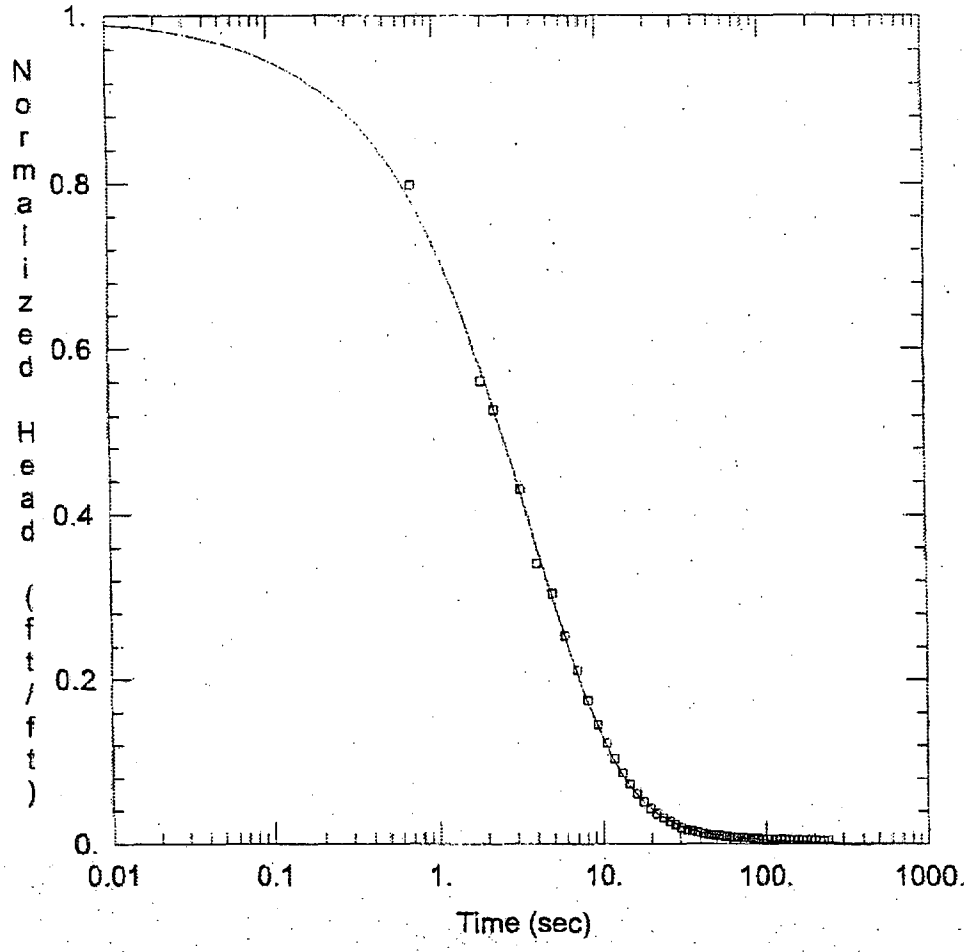
Solution Method: Bouwer-Rice

K = 48.58 ft/day

y0 = 5.267 ft



OW-932 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 14.5 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-932 L)	
Initial Displacement: 5.11 ft	Static Water Column Height: 62.32 ft
Total Well Penetration Depth: 14.2 ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 24.34 ft/day	Le = 0.1 ft



OW-932 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 14.5 ft

WELL DATA (OW-932 L)

Initial Displacement: 5.11 ft
Total Well Penetration Depth: 14.2 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 62.32 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

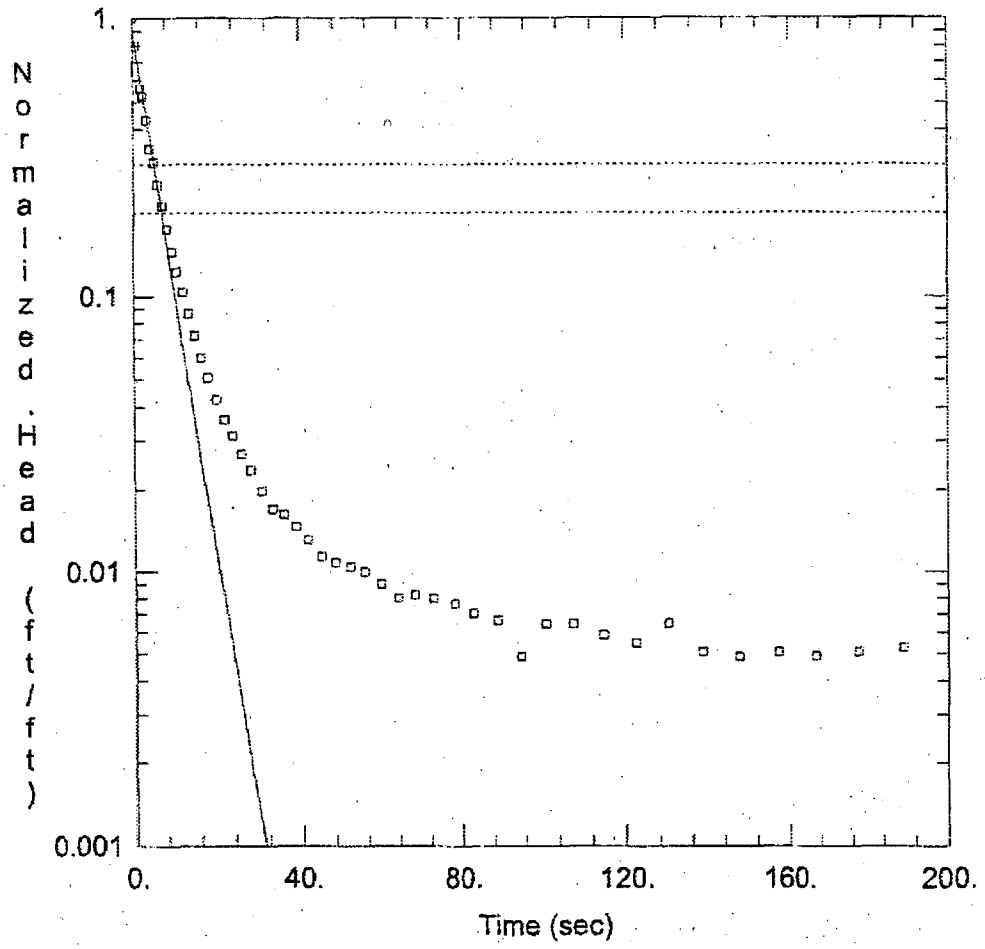
SOLUTION

Aquifer Model: Confined

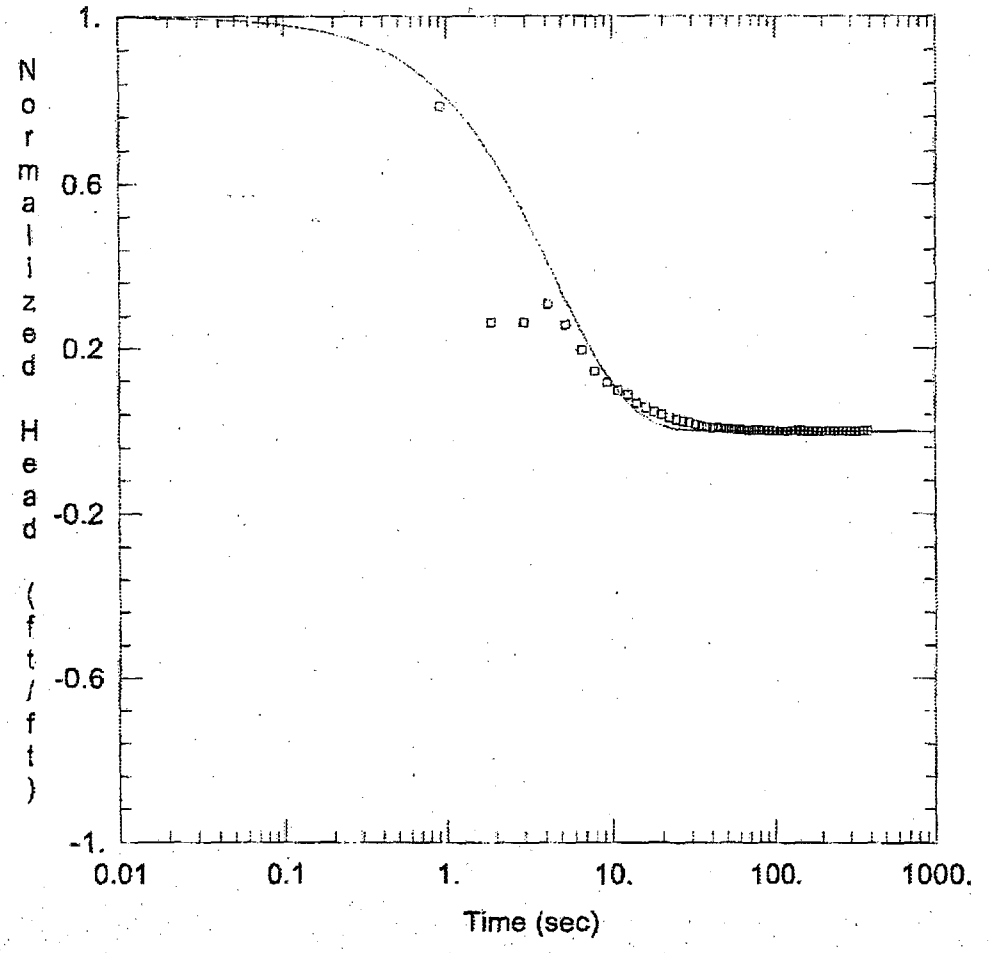
Solution Method: KGS Model

Kr = 23.25 ft/day
Kz/Kr = 1.

Ss = 1.74E-5 ft^{-1}



OW-932 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 14.5 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-932 L)	
Initial Displacement: 5.11 ft	Static Water Column Height: 62.32 ft
Total Well Penetration Depth: 14.2 ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 17.73 ft/day	y0 = 4.767 ft



OW-932 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 14.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-932 L)

Initial Displacement: 9.546 ft

Total Well Penetration Depth: 14.2 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 62.32 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

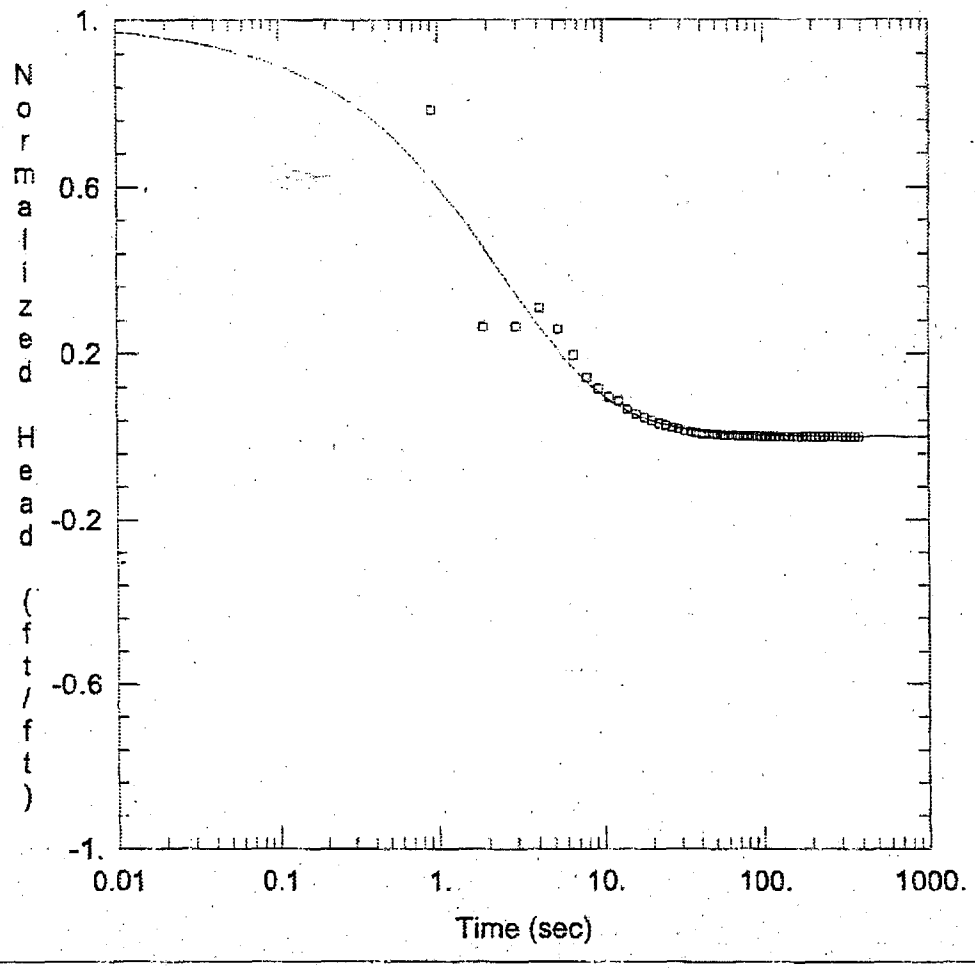
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 22.25 ft/day

Le = 0.1 ft



OW-932 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 14.5 ft

WELL DATA (OW-932 L)

Initial Displacement: 9.546 ft
Total Well Penetration Depth: 14.2 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 62.32 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

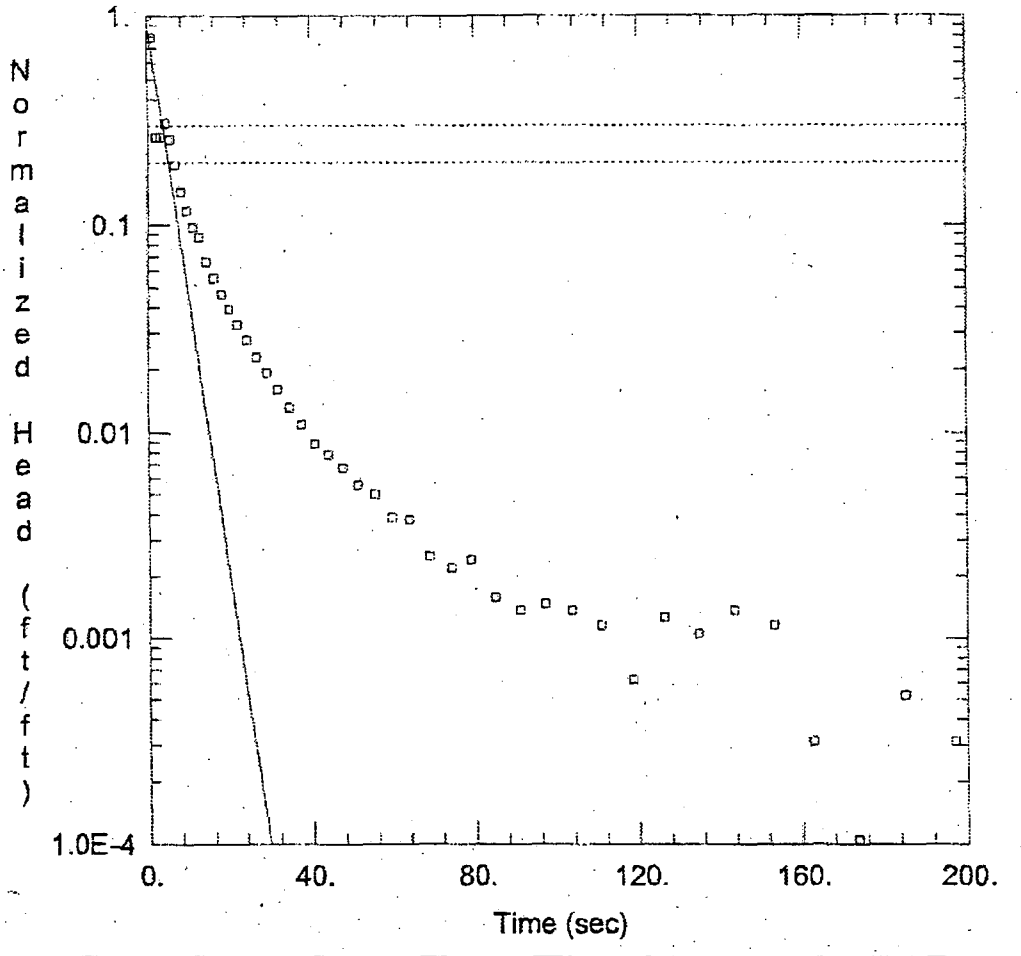
SOLUTION

Aquifer Model: Confined

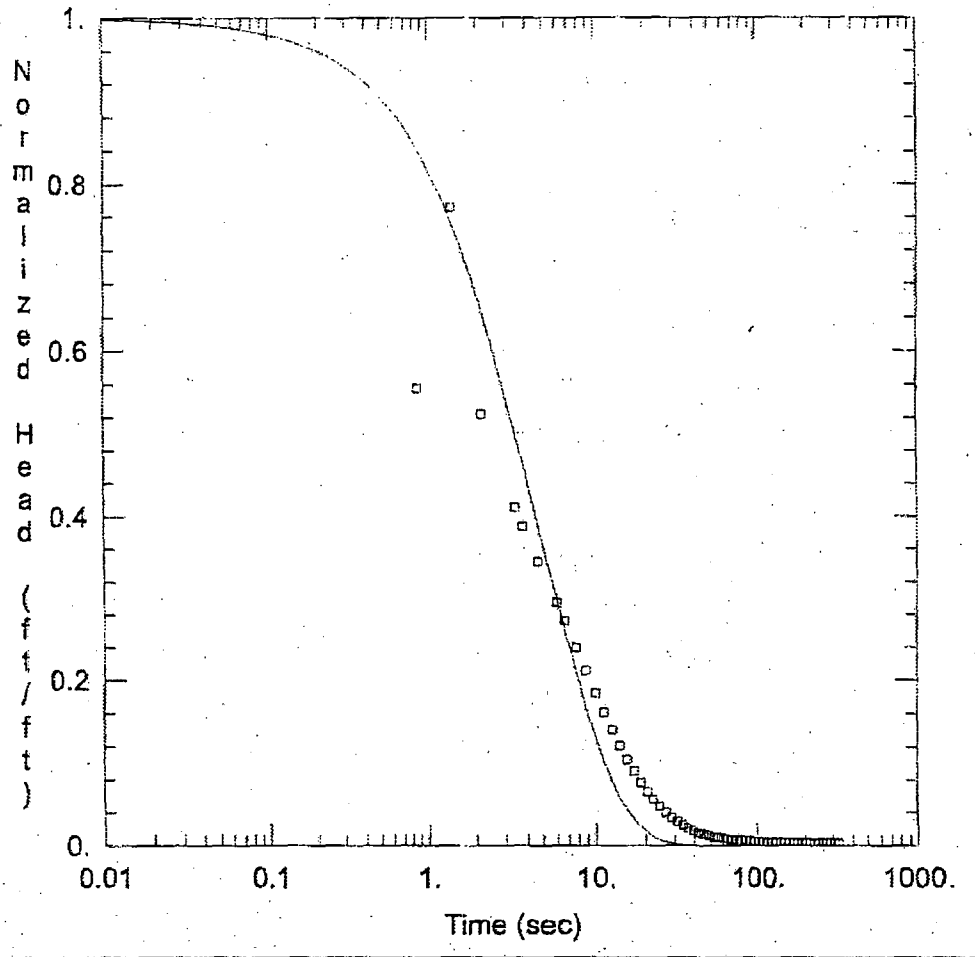
Kr = 22.25 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

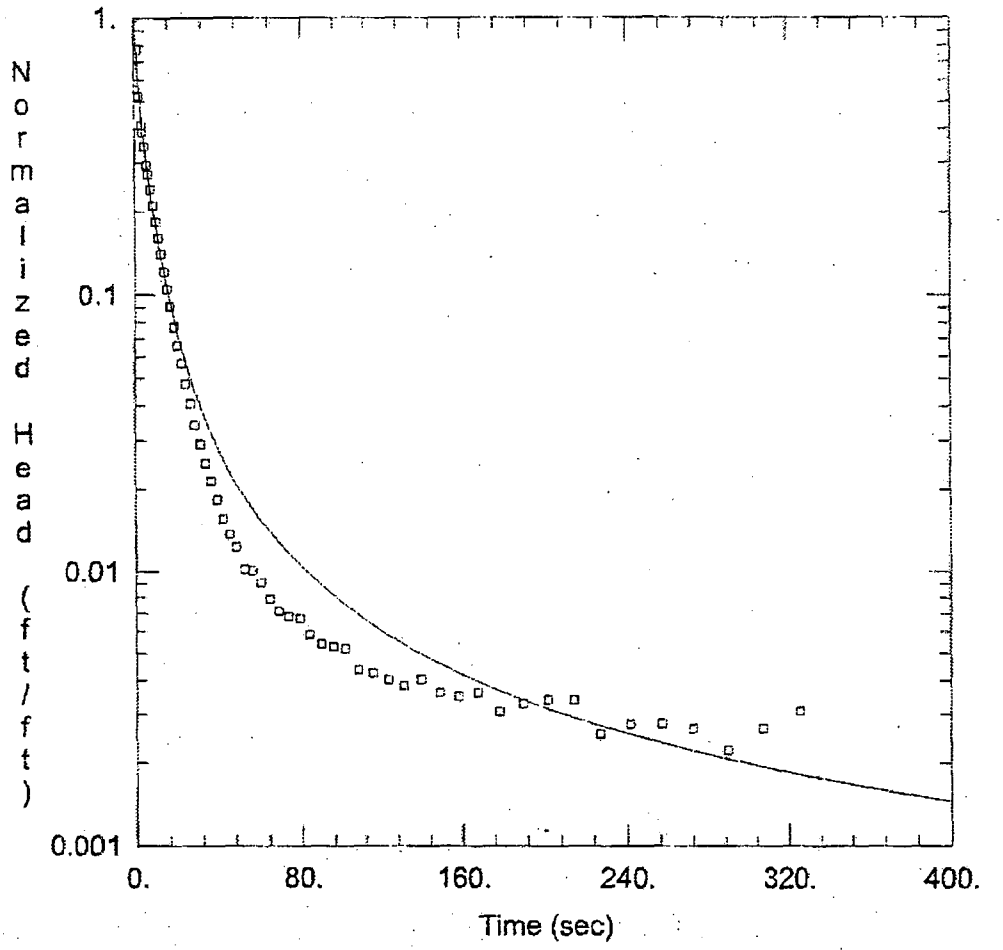
Ss = 0.000219 ft^{-1}



OW-932 L FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 14.5 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-932 L)	
Initial Displacement: 9.546 ft	Static Water Column Height: 62.32 ft
Total Well Penetration Depth: 14.2 ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 24.89 ft/day	y0 = 8.883 ft



OW-932 U RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 21.2 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-932 U)	
Initial Displacement: 9.407 ft	Static Water Column Height: 30.93 ft
Total Well Penetration Depth: 20. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 20.74 ft/day	Le = 0.1 ft



OW-932 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 21.2 ft

WELL DATA (OW-932 U)

Initial Displacement: 9.407 ft
Total Well Penetration Depth: 20. ft
Casing Radius: 0.06333 ft

Static Water Column Height: 30.93 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

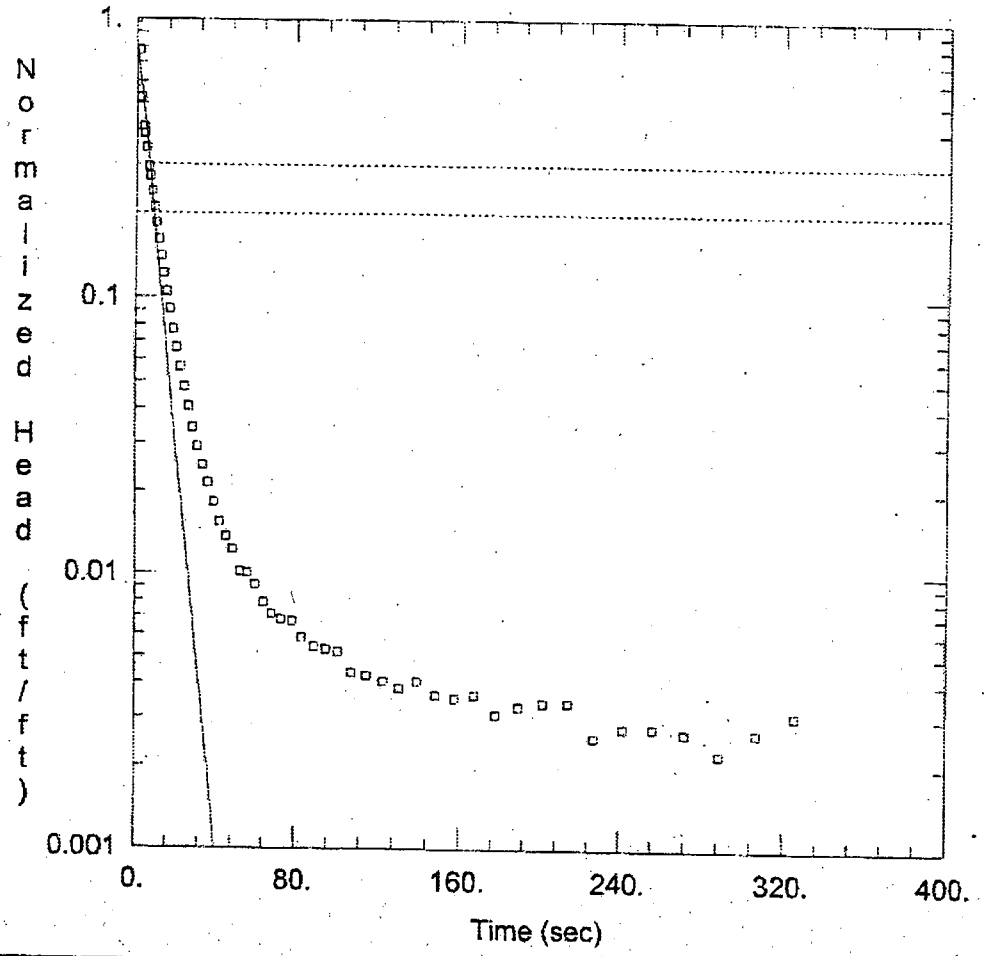
SOLUTION

Aquifer Model: Confined

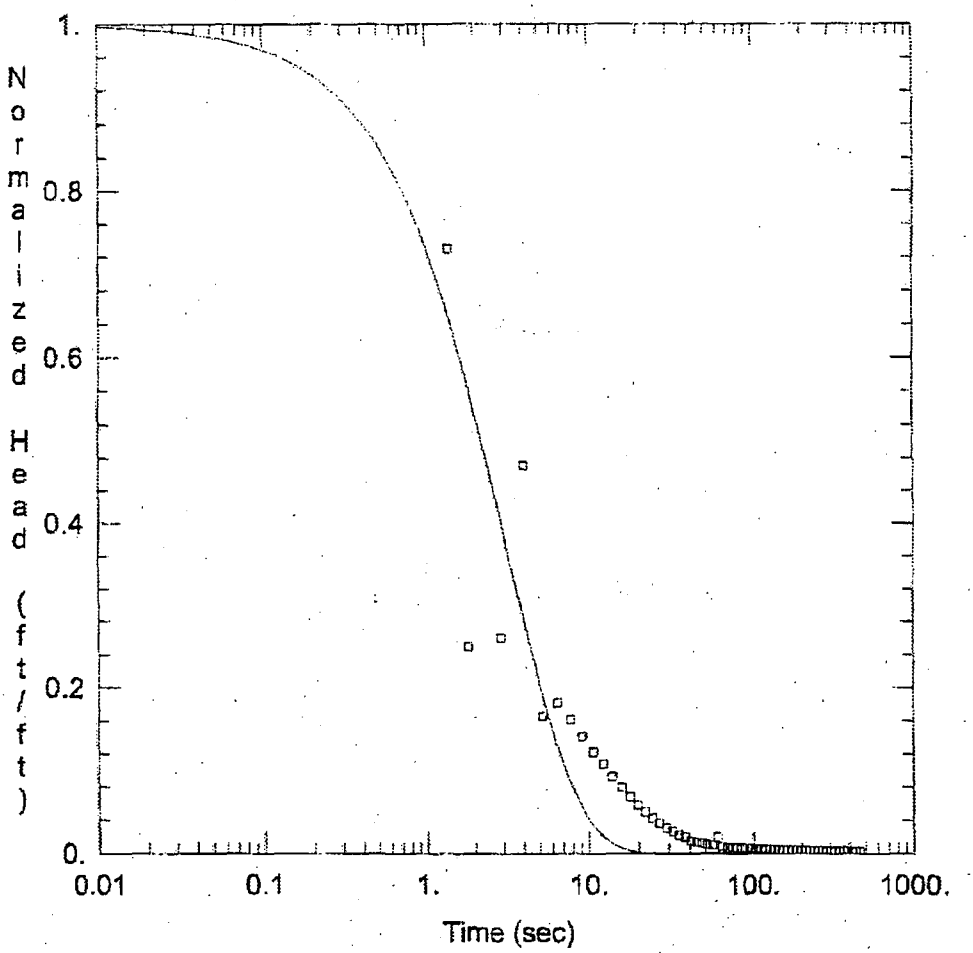
Solution Method: KGS Model

Kr = 12.8 ft/day
Kz/Kr = 1.

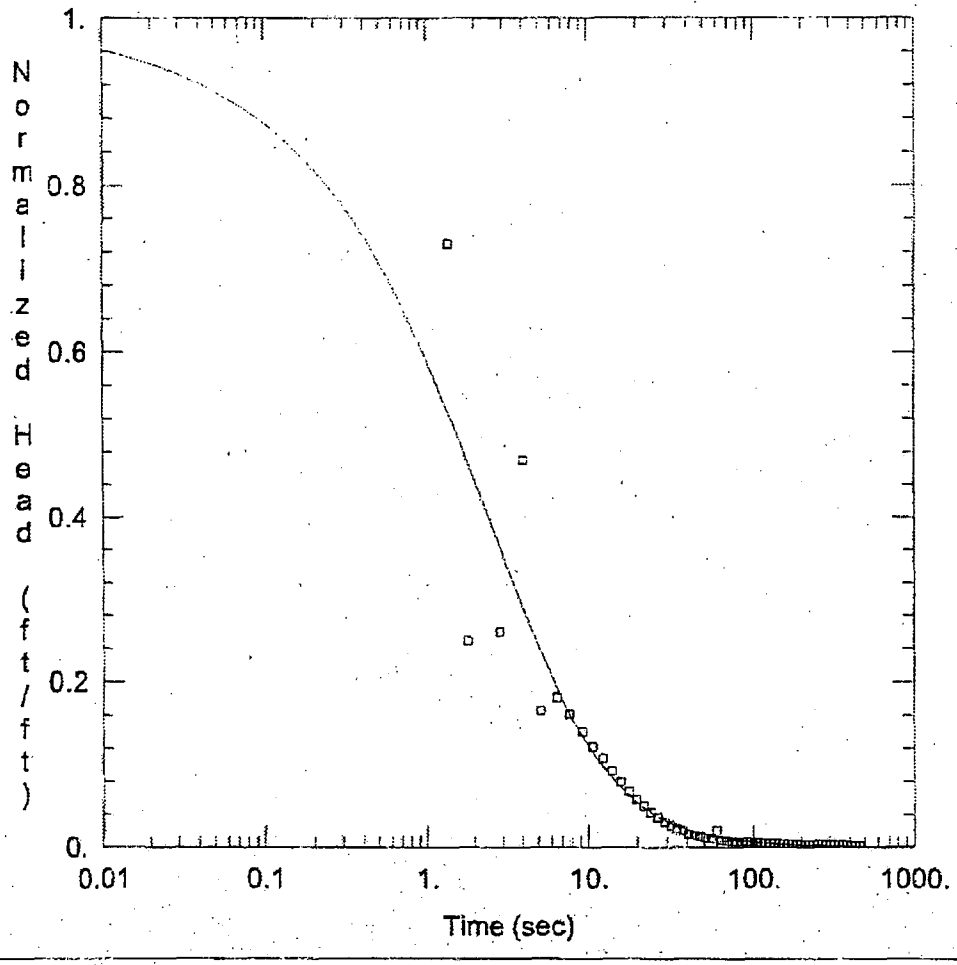
Ss = 0.0002813 ft^{-1}



OW-932 U RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 21.2 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-932 U)	
Initial Displacement: 9.407 ft Total Well Penetration Depth: 20. ft Casing Radius: 0.08333 ft	Static Water Column Height: 30.93 ft Screen Length: 10. ft Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined K = 13.57 ft/day	Solution Method: Bouwer-Rice y0 = 7.865 ft



OW-932 U FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 21.2 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-932 U)	
Initial Displacement: 8.981 ft	Static Water Column Height: 30.93 ft
Total Well Penetration Depth: 20. ft	Screen Length: 10. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 32.48 ft/day	Le = 0.1 ft



OW-932 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 21.2 ft

WELL DATA (OW-932 U)

Initial Displacement: 8.981 ft
Total Well Penetration Depth: 20. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 30.93 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

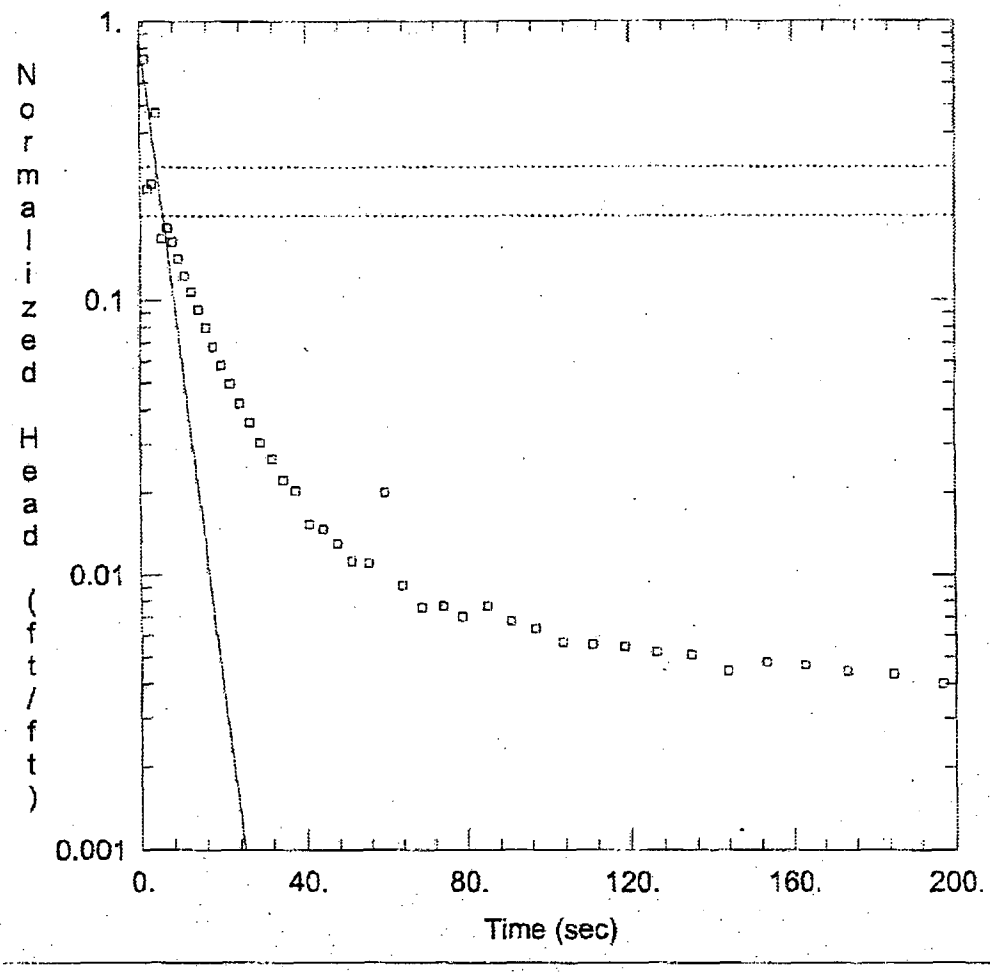
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 15.65 ft/day
Kz/Kr = 1.

Ss = 0.0006107 ft^{-1}



OW-932 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 21.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-932 U)

Initial Displacement: 8.981 ft

Total Well Penetration Depth: 20. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 30.93 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

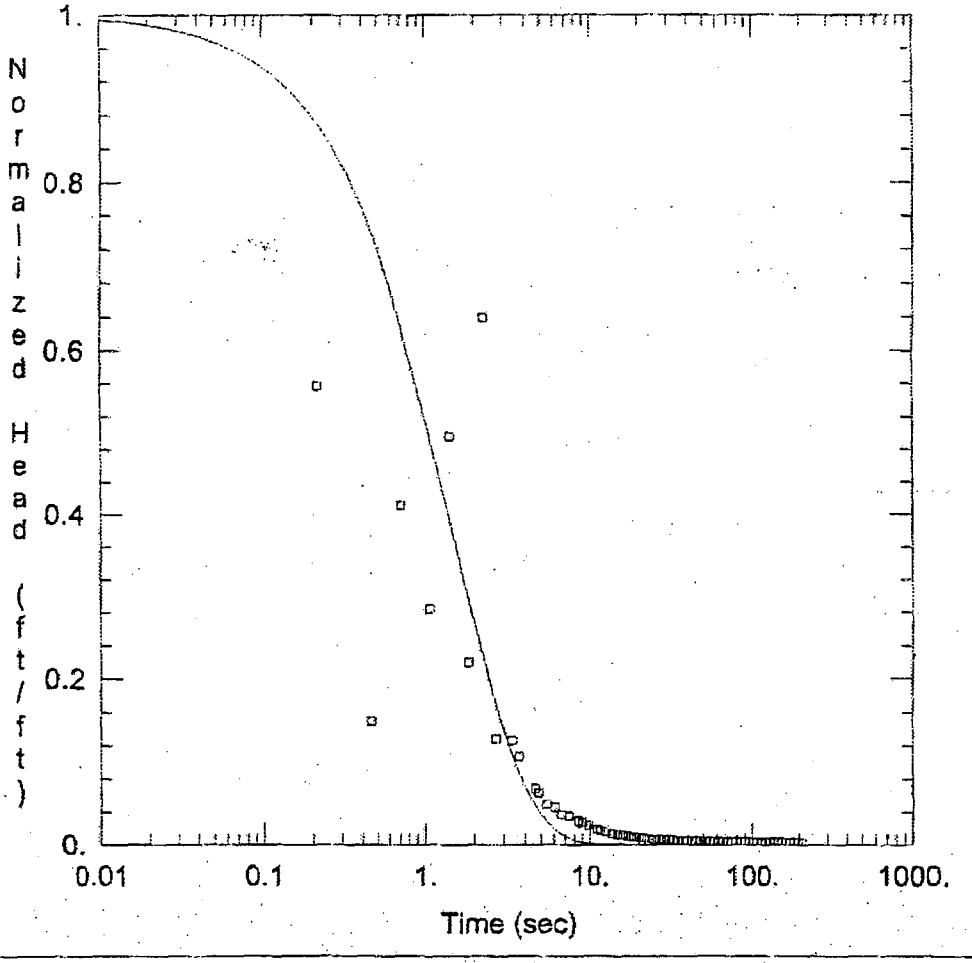
SOLUTION

Aquifer Model: Confined

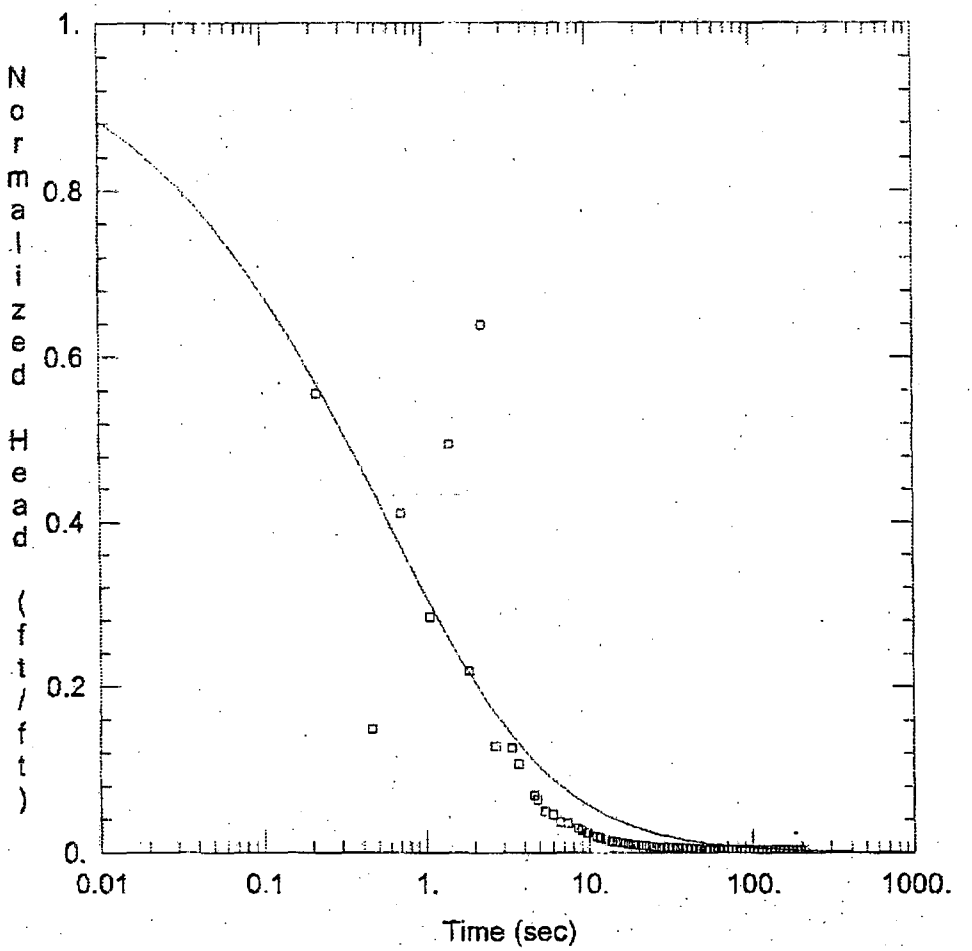
Solution Method: Bouwer-Rice

K = 22.12 ft/day

y0 = 8.036 ft



OW-933 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 5. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-933 L)	
Initial Displacement: 17.68 ft	Static Water Column Height: 74.2 ft
Total Well Penetration Depth: 5. ft	Screen Length: 5. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 214.3 ft/day	Le = 0.1 ft



OW-933 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

WELL DATA (OW-933 L)

Initial Displacement: 17.68 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 74.2 ft
Screen Length: 5. ft
Well Radius: 0.3333 ft

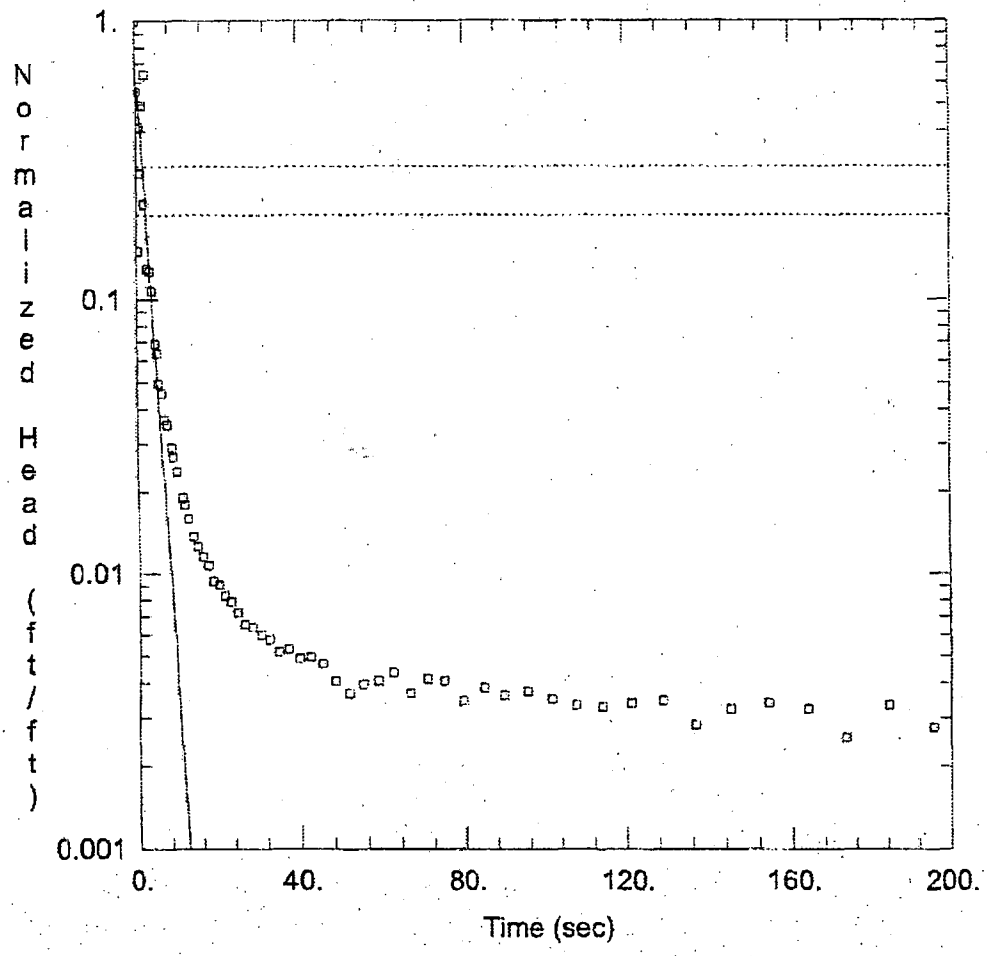
SOLUTION

Aquifer Model: Confined

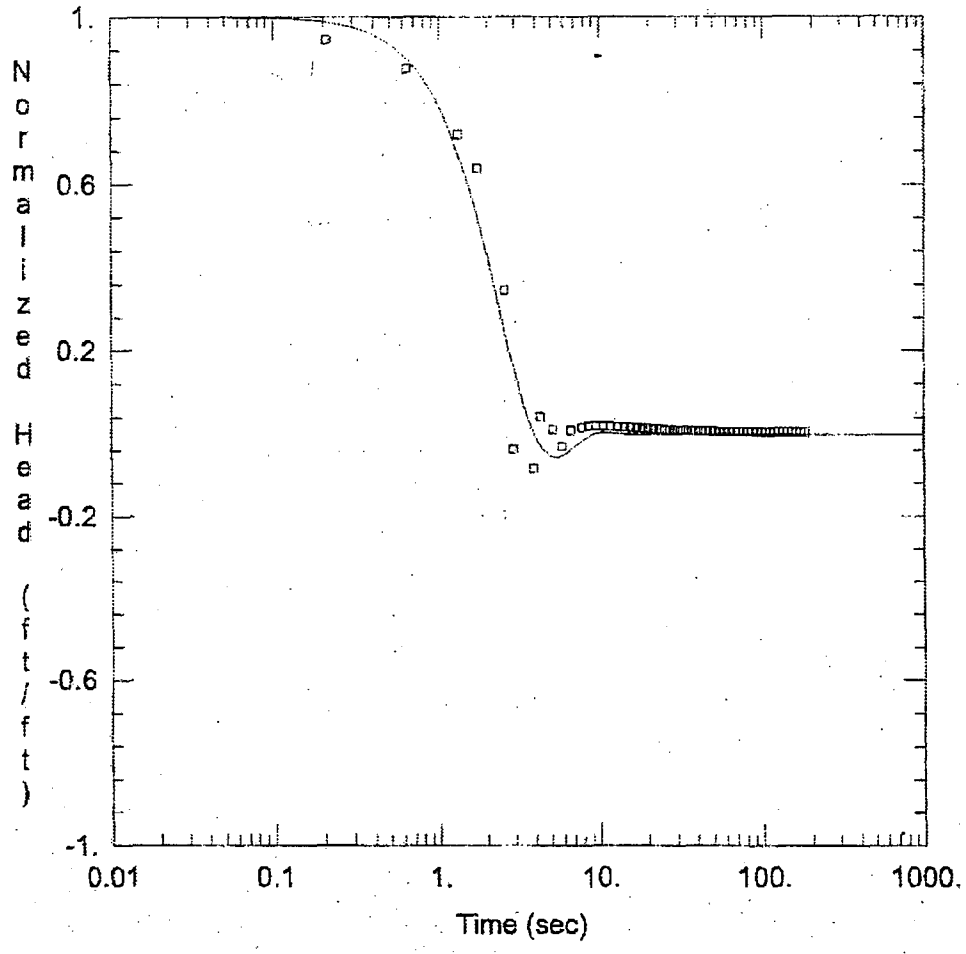
Solution Method: KGS Model

Kr = 50.89 ft/day
Kz/Kr = 1.

Ss = 0.009086 ft^{-1}



OW-933 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 5. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-933 L)	
Initial Displacement: 17.68 ft	Static Water Column Height: 74.2 ft
Total Well Penetration Depth: 5. ft	Screen Length: 5. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 63.29 ft/day	y0 = 12.52 ft



OW-933 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-933 L)

Initial Displacement: 8.602 ft

Total Well Penetration Depth: 5. ft

Casing Radius: 0.08333 ft

Static Water Column Height: 74.2 ft

Screen Length: 5. ft

Well Radius: 0.3333 ft

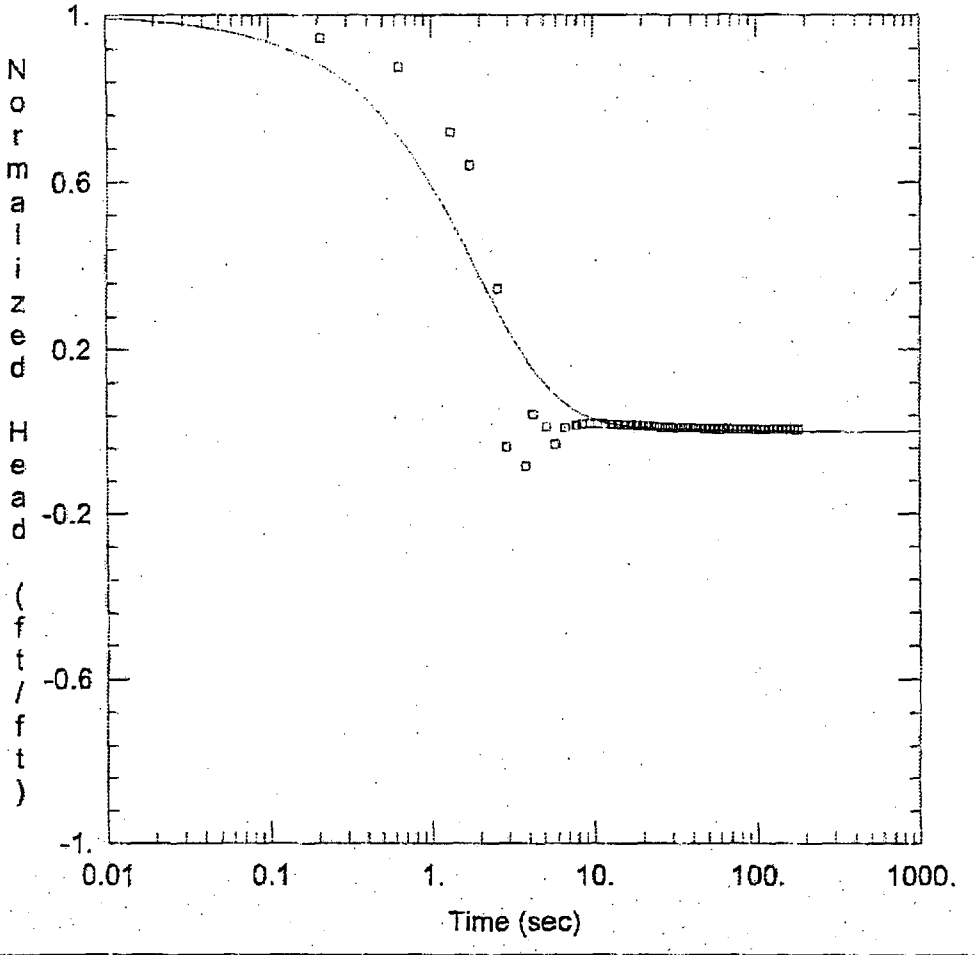
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 191.2 ft/day

Le = 51.43 ft



OW-933 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 5. ft

WELL DATA (OW-933 L)

Initial Displacement: 8.602 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 74.2 ft
Screen Length: 5. ft
Well Radius: 0.3333 ft

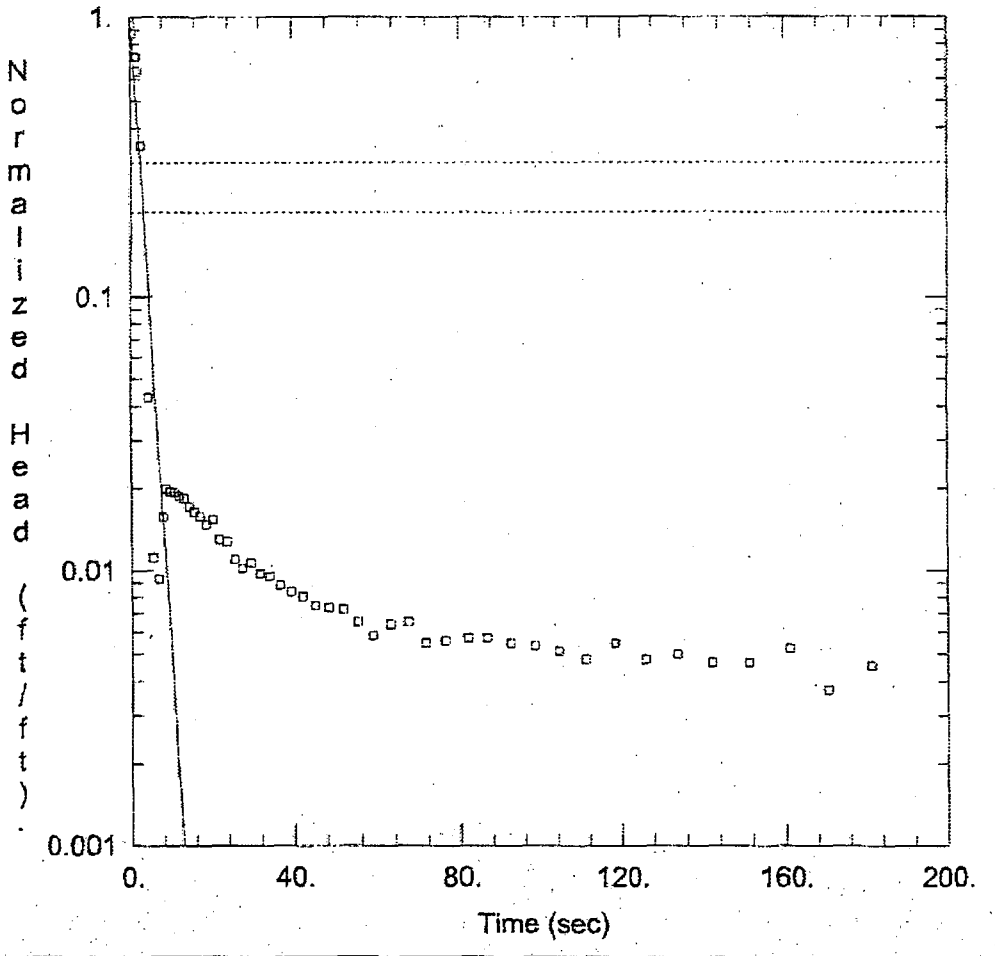
SOLUTION

Aquifer Model: Confined

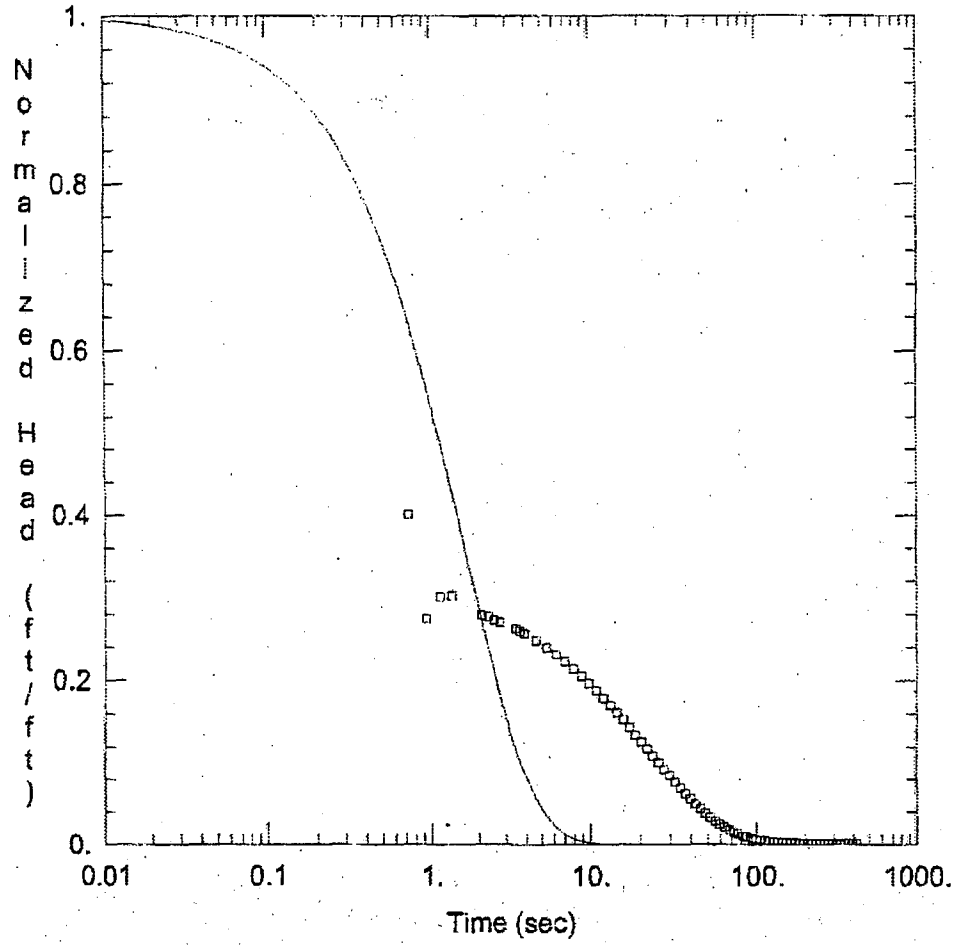
Kr = 214.3 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 3.554E-8 ft^{-1}



OW-933 L FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 5. ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-933 L)	
Initial Displacement: 8.602 ft	Static Water Column Height: 74.2 ft
Total Well Penetration Depth: 5. ft	Screen Length: 5. ft
Casing Radius: 0.08333 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 64.3 ft/day	y0 = 9.039 ft



OW-933 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 19.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-933 U)

Initial Displacement: 18.99 ft

Total Well Penetration Depth: 14. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 31.67 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

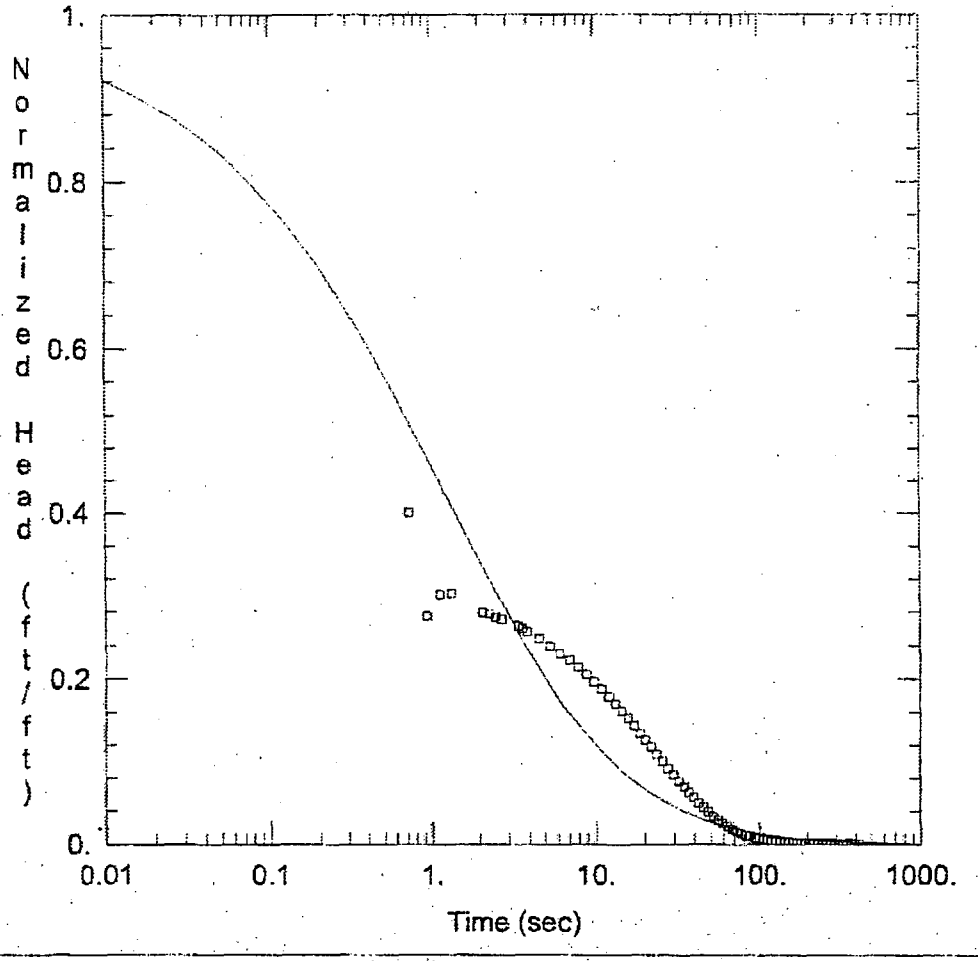
SOLUTION

Aquifer Model: Confined

K = 64.32 ft/day

Solution Method: Butler

Le = 0.1 ft



OW-933 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 19.5 ft

WELL DATA (OW-933 U)

Initial Displacement: 18.99 ft
Total Well Penetration Depth: 14. ft
Casing Radius: 0.0833 ft

Static Water Column Height: 31.67 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

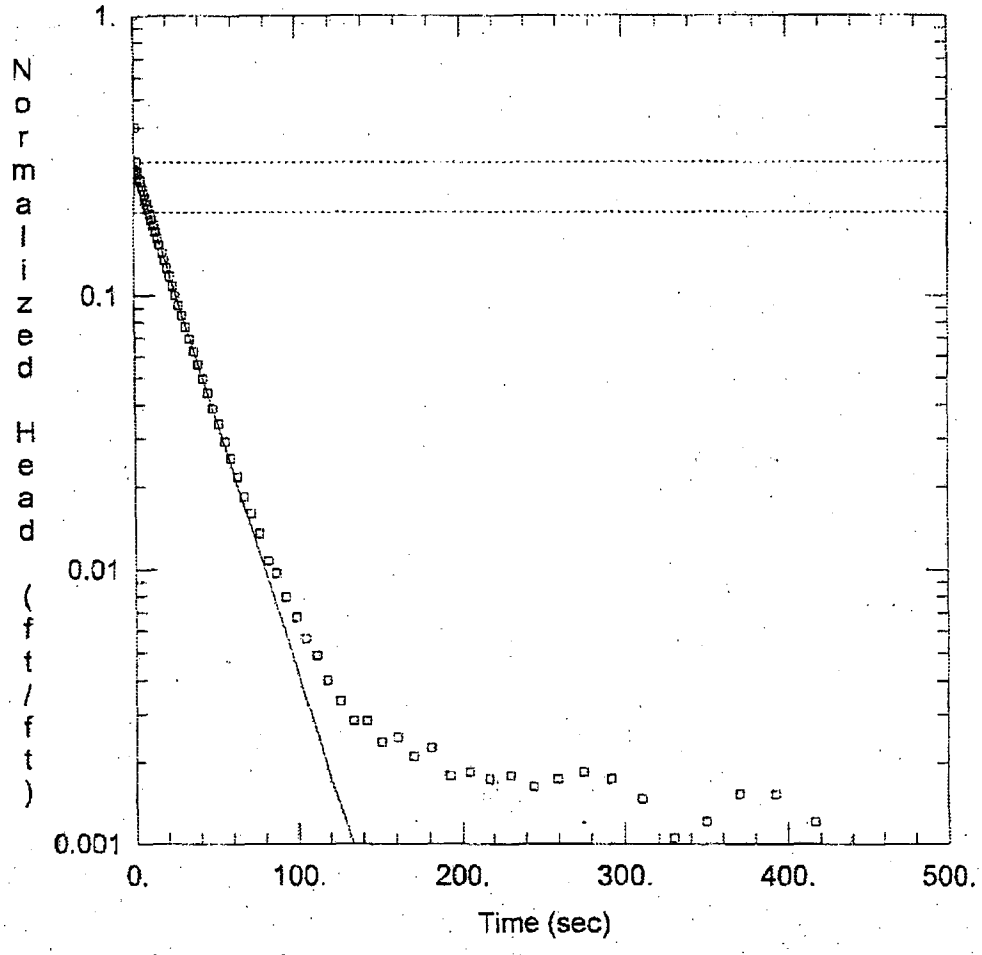
SOLUTION

Aquifer Model: Confined

Kr = 9.58 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 0.005128 ft^{-1}



OW-933 U RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 19.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-933 U)

Initial Displacement: 18.99 ft

Total Well Penetration Depth: 14. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 31.67 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

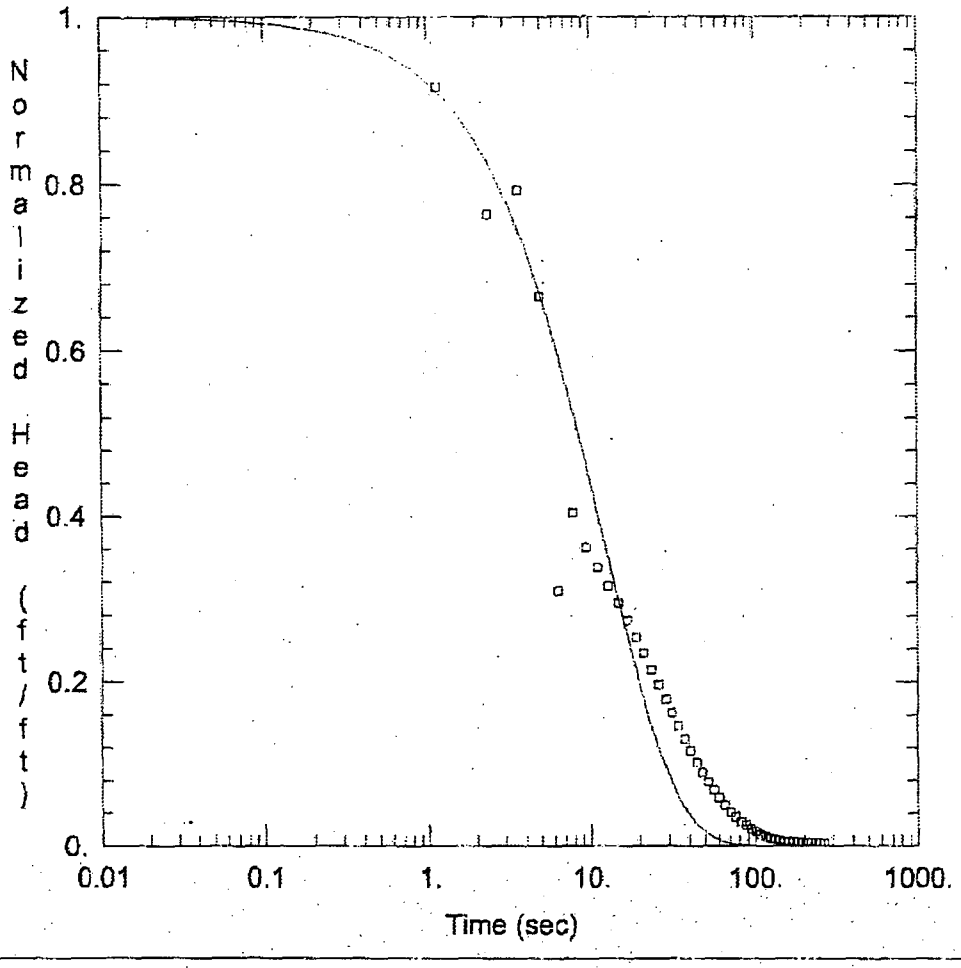
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 3.104 ft/day

y0 = 5.768 ft



OW-933 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 19.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-933 U)

Initial Displacement: 9.413 ft

Total Well Penetration Depth: 14. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 31.67 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

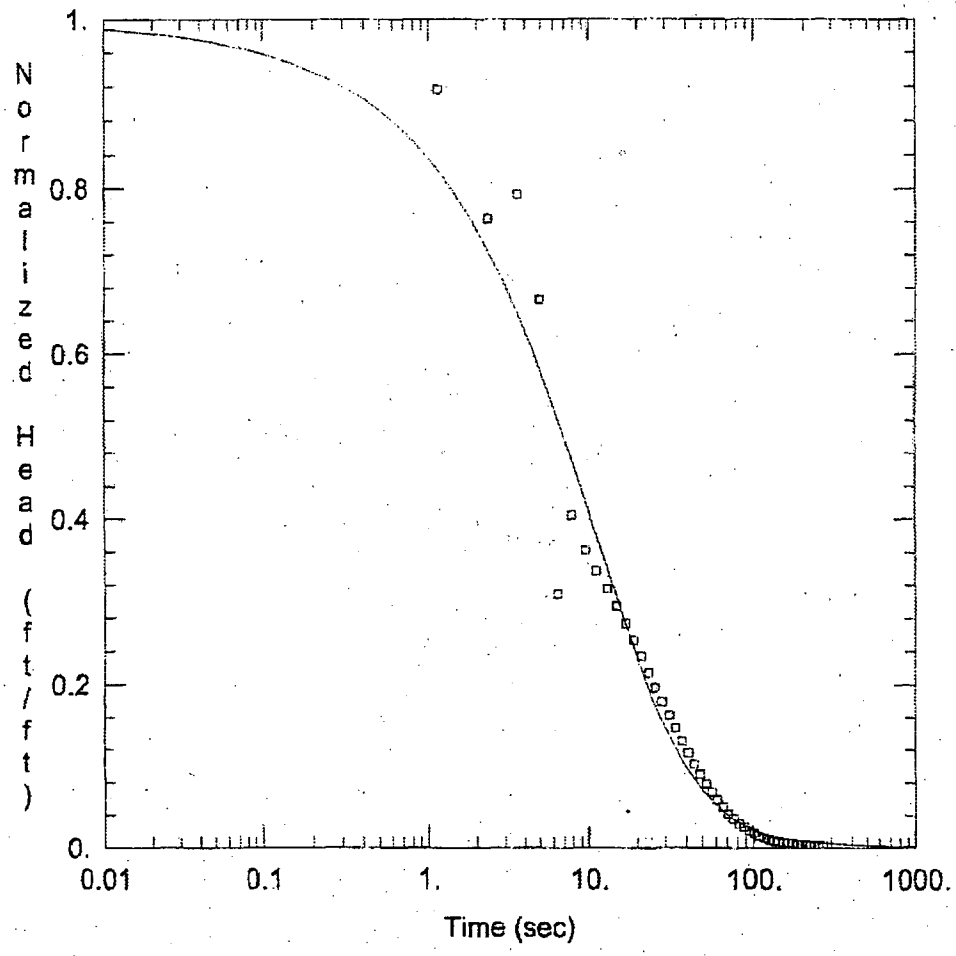
SOLUTION

Aquifer Model: Confined

K = 8.335 ft/day

Solution Method: Butler

Le = 0.1 ft



OW-933 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 19.5 ft

WELL DATA (OW-933 U)

Initial Displacement: 9.413 ft
Total Well Penetration Depth: 14. ft
Casing Radius: 0.0833 ft

Static Water Column Height: 31.67 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

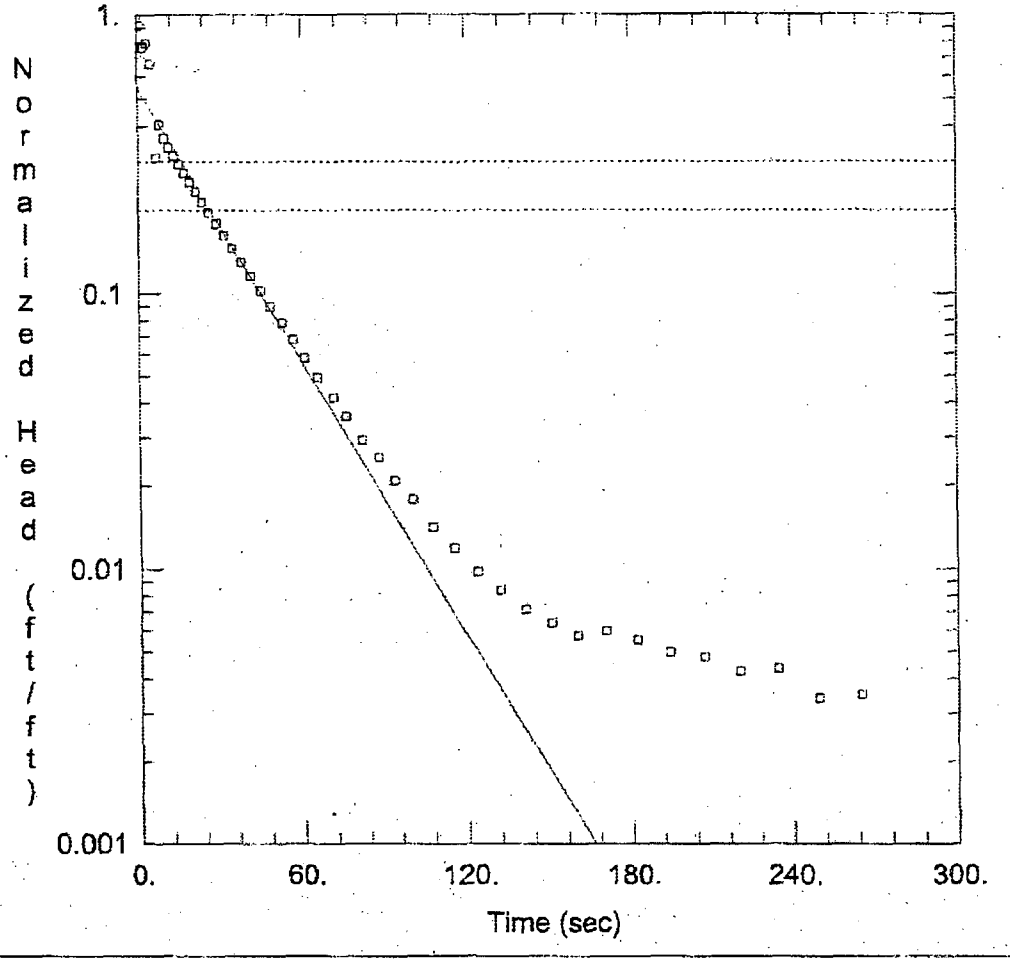
SOLUTION

Aquifer Model: Confined

Kr = 5.276 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 0.0001649 ft^{-1}



OW-933 U FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 19.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-933 U)

Initial Displacement: 9.413 ft

Total Well Penetration Depth: 14. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 31.67 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

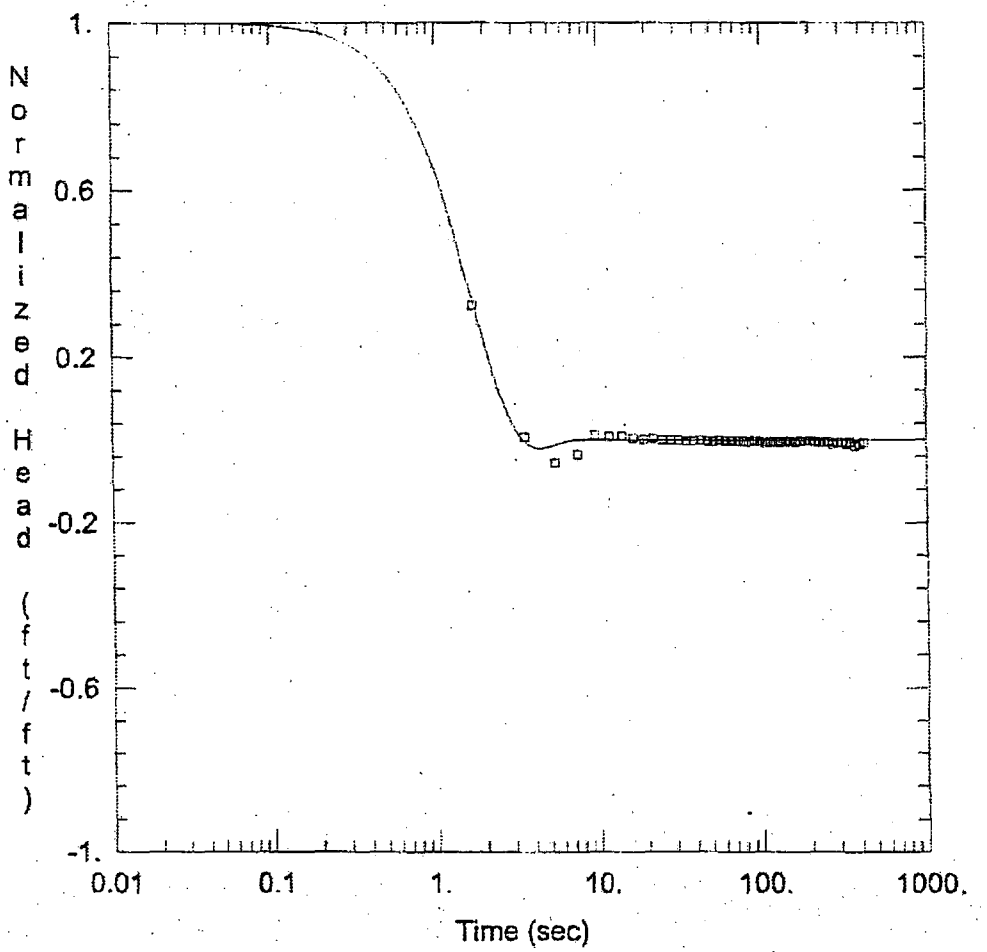
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 2.763 ft/day

y0 = 5.158 ft



OW-934 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 32.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 3.263 ft

Total Well Penetration Depth: 32. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 82.6 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

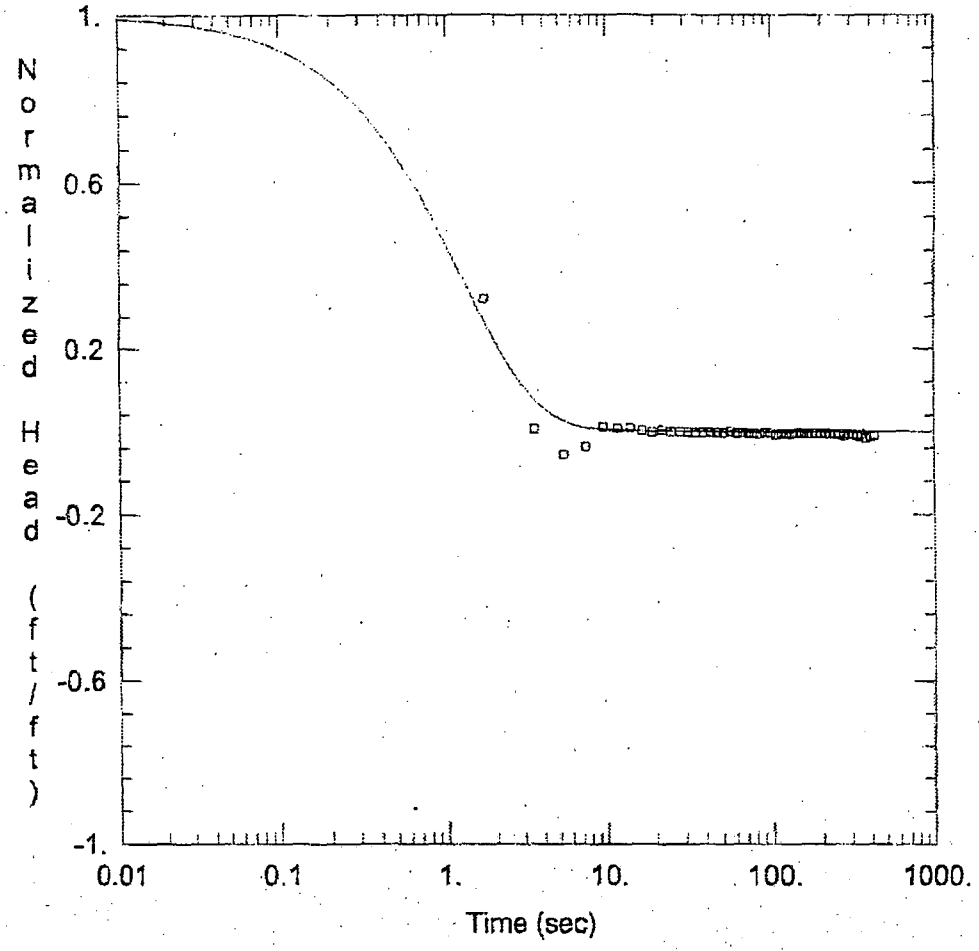
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 77.6 ft/day

Le = 24.28 ft



OW-934 L RISING HEAD TEST

AQUIFER DATA

Saturated Thickness: 32.8 ft

WELL DATA (New Well)

Initial Displacement: 3.263 ft
Total Well Penetration Depth: 32. ft
Casing Radius: 0.0833 ft

Static Water Column Height: 82.6 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

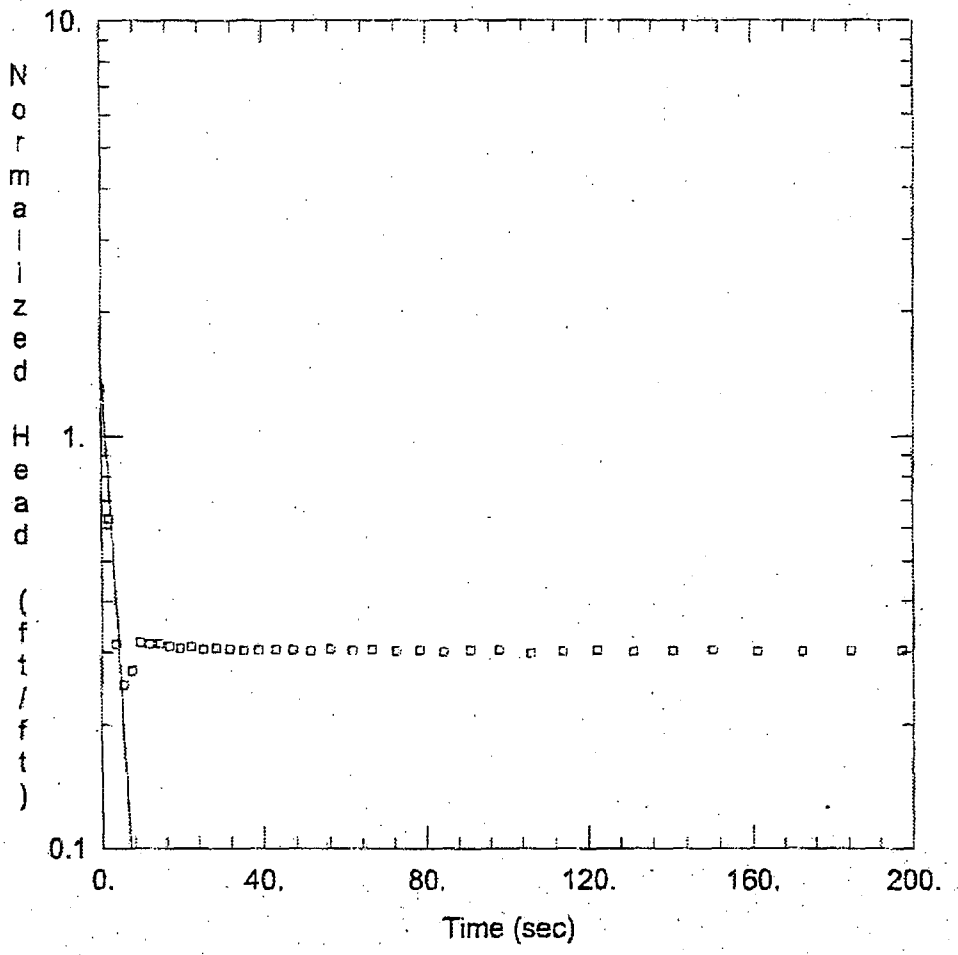
SOLUTION

Aquifer Model: Confined

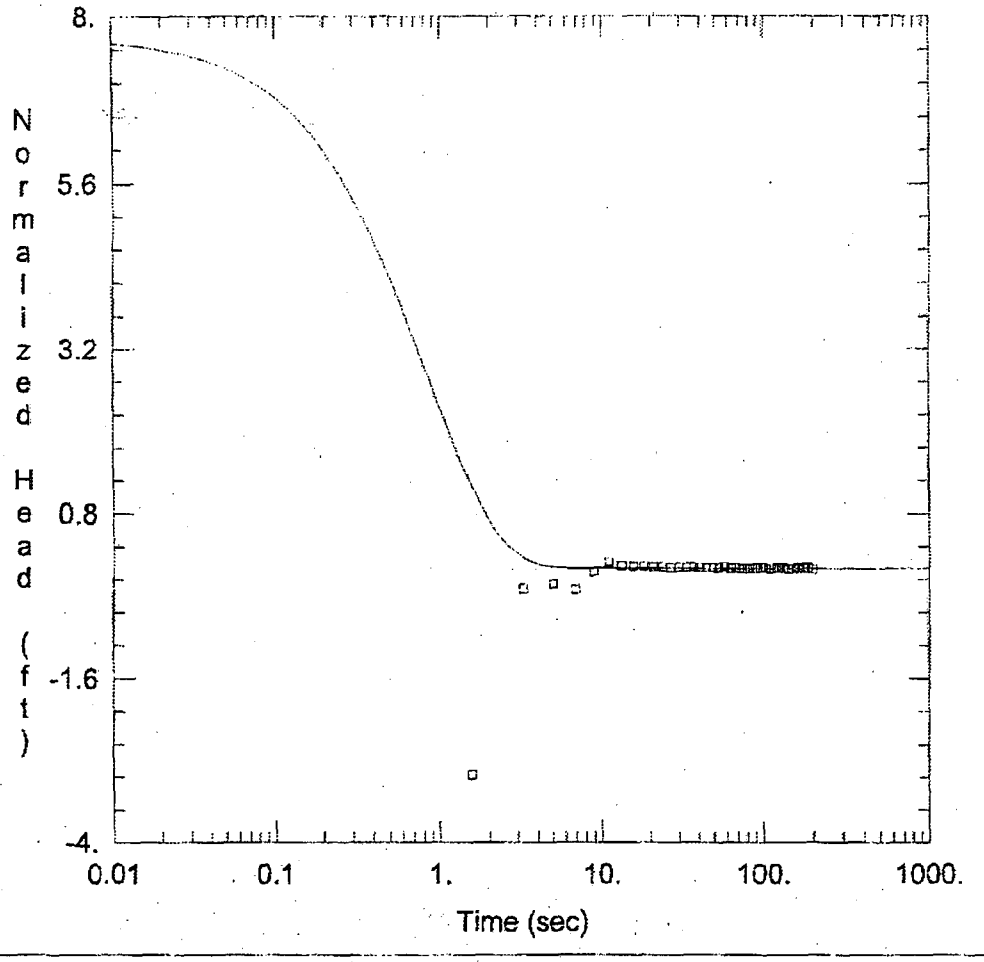
Solution Method: KGS Model

Kr = 131.3 ft/day
Kz/Kr = 1.

Ss = 3.049E-12 ft^{-1}



OW-934 L RISING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 32.8 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 3.263 ft	Static Water Column Height: 82.6 ft
Total Well Penetration Depth: 32. ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 34.97 ft/day	y0 = 4.926 ft



OW-934 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 32.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-934 L)

Initial Displacement: 7.671 ft

Total Well Penetration Depth: 32. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 82.6 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

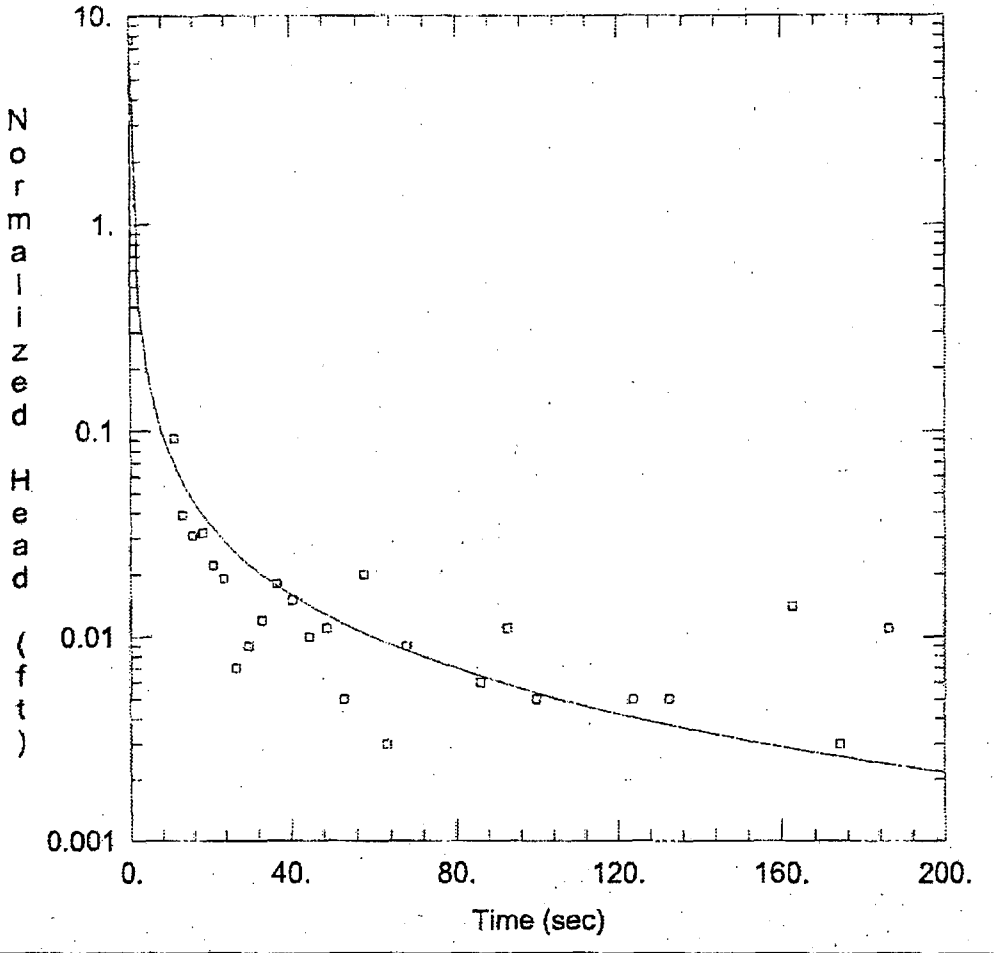
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 126.6 ft/day

Le = 0.1 ft



OW-934 L FALLING HEAD TEST

AQUIFER DATA

Saturated Thickness: 32.8 ft

WELL DATA (OW-934 L)

Initial Displacement: 7.671 ft
Total Well Penetration Depth: 32. ft
Casing Radius: 0.0833 ft

Static Water Column Height: 82.6 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

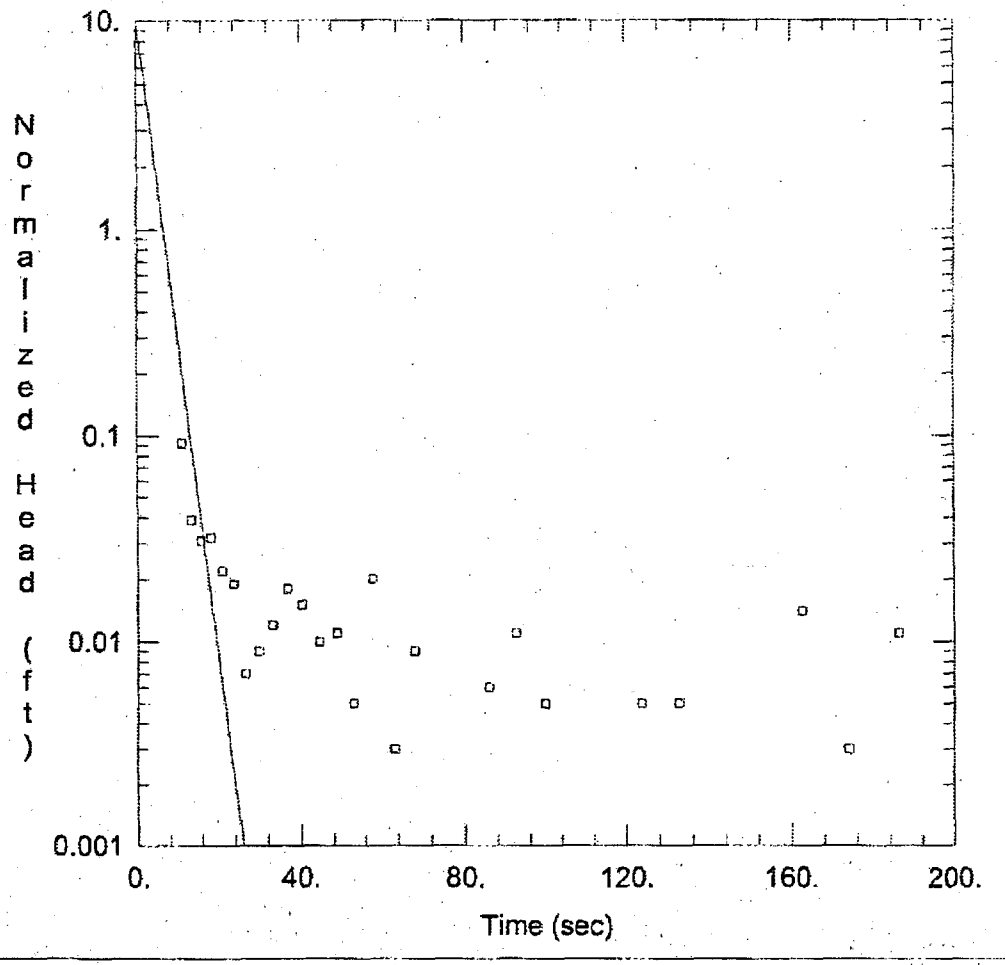
SOLUTION

Aquifer Model: Confined

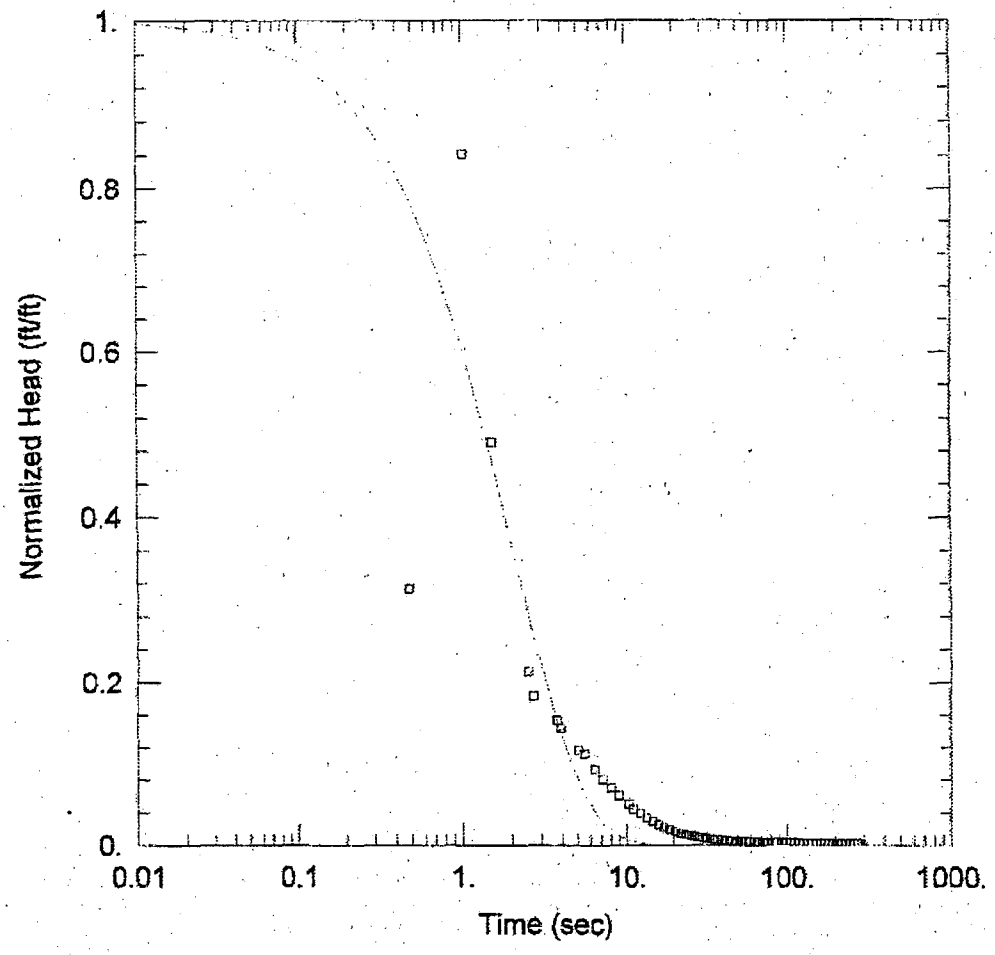
Kr = 126.6 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

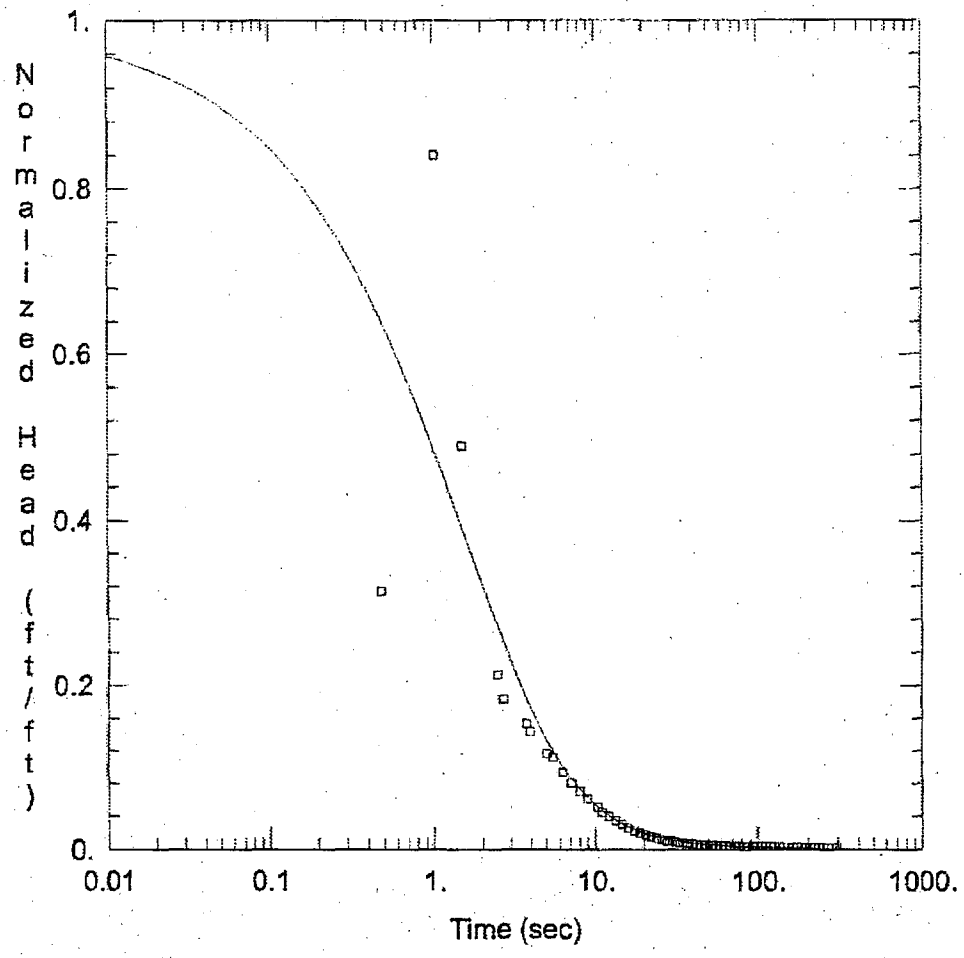
Ss = 0.003049 ft^{-1}



OW-934 L FALLING HEAD TEST	
AQUIFER DATA	
Saturated Thickness: 32.8 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-934 L)	
Initial Displacement: 7.671 ft	Static Water Column Height: 82.6 ft
Total Well Penetration Depth: 32. ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 31.72 ft/day	y0 = 9.903 ft



OW-934 U RISING HEAD	
AQUIFER DATA	
Saturated Thickness: 17.5 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-934 U)	
Initial Displacement: 12.1 ft	Static Water Column Height: 31.55 ft
Total Well Penetration Depth: 15.5 ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Butler
K = 51.93 ft/day	Le = 0.1 ft



OW-934 U RISING HEAD

AQUIFER DATA

Saturated Thickness: 17.5 ft

WELL DATA (OW-934 U)

Initial Displacement: 12.1 ft
Total Well Penetration Depth: 15.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 31.55 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

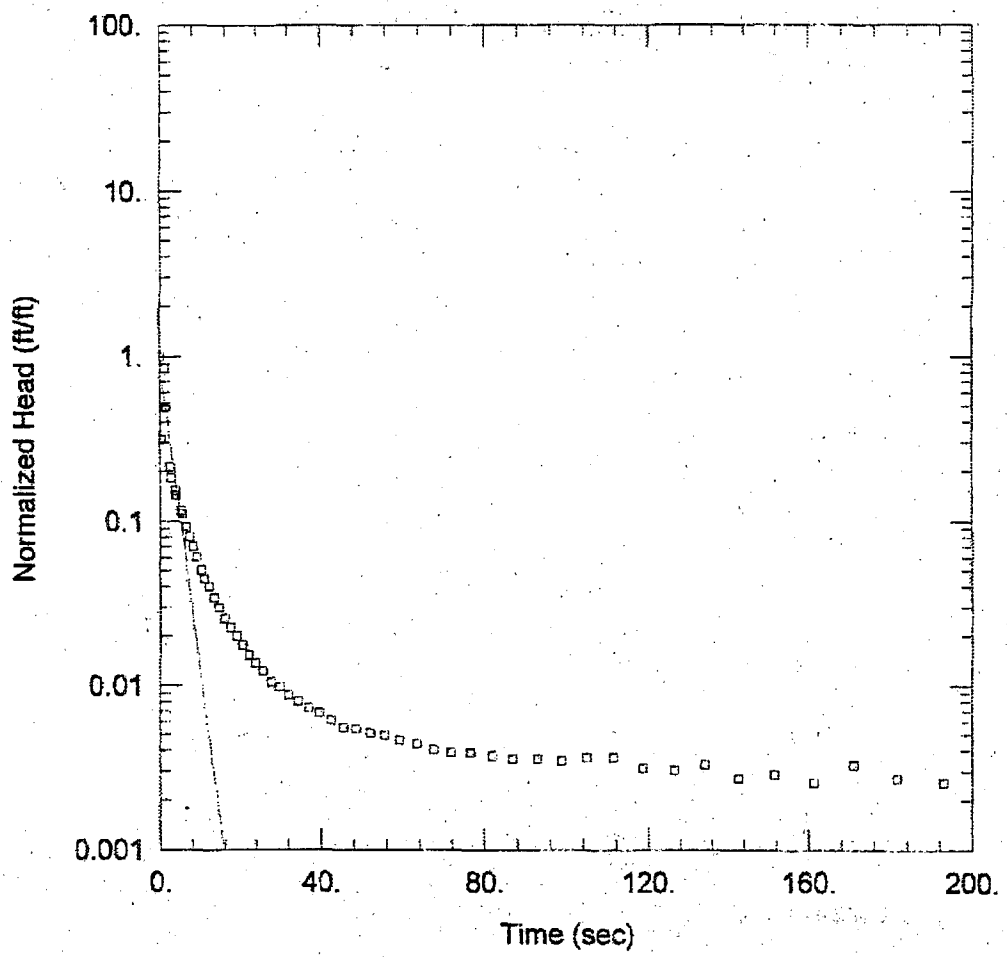
SOLUTION

Aquifer Model: Confined

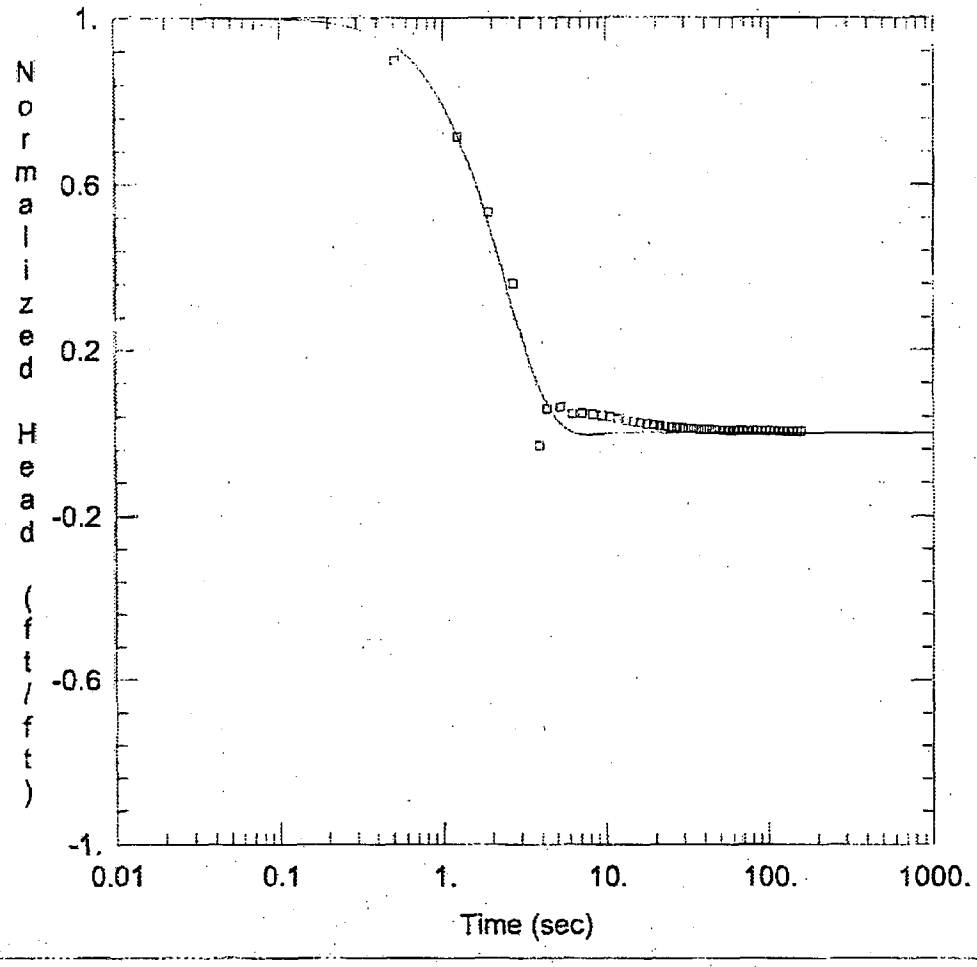
Kr = 31.62 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 0.0003359 ft^{-1}



OW-934 U RISING HEAD	
AQUIFER DATA	
Saturated Thickness: 17.5 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (OW-934 U)	
Initial Displacement: 12.1 ft	Static Water Column Height: 31.55 ft
Total Well Penetration Depth: 15.5 ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 32.87 ft/day	y0 = 10.32 ft



OW-934 U FALLING HEAD

AQUIFER DATA

Saturated Thickness: 17.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 9.956 ft

Total Well Penetration Depth: 15.5 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 31.55 ft

Screen Length: 10. ft

Well Radius: 0.3333 ft

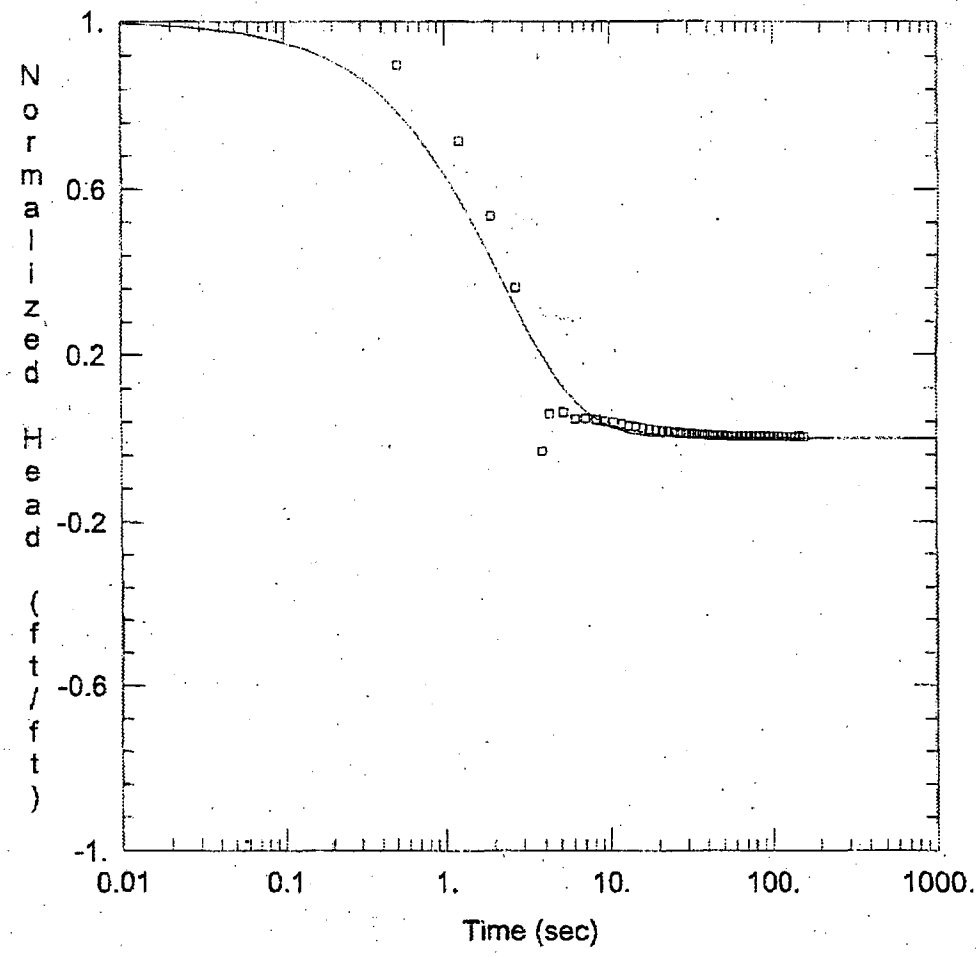
SOLUTION

Aquifer Model: Confined

Solution Method: Butler

K = 48.76 ft/day

Le = 47.81 ft



OW-934 U FALLING HEAD

AQUIFER DATA

Saturated Thickness: 17.5 ft

WELL DATA (New Well)

Initial Displacement: 9.956 ft
Total Well Penetration Depth: 15.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 31.55 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

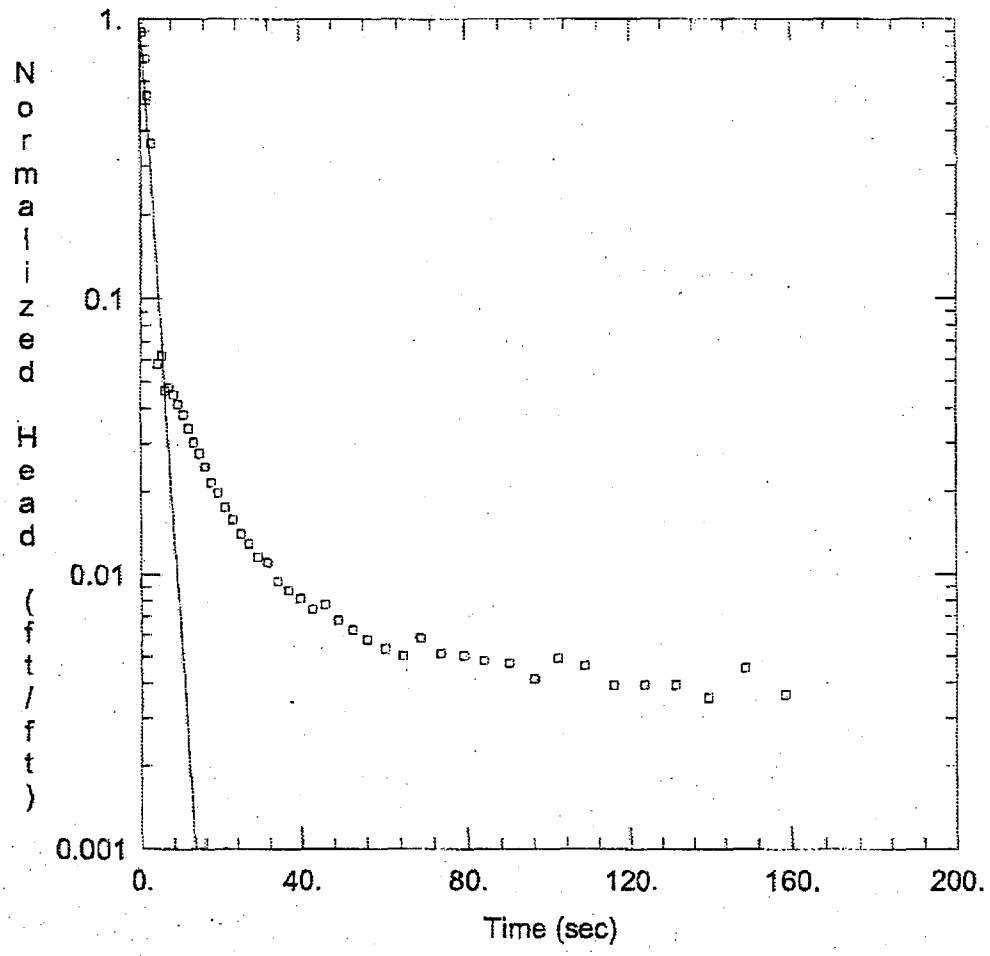
SOLUTION

Aquifer Model: Confined

Kr = 96.64 ft/day
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 5.714E-12 ft^{-1}



OW-934 U FALLING HEAD	
AQUIFER DATA	
Saturated Thickness: 17.5 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 9.956 ft	Static Water Column Height: 31.55 ft
Total Well Penetration Depth: 15.5 ft	Screen Length: 10. ft
Casing Radius: 0.0833 ft	Well Radius: 0.3333 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 40.28 ft/day	y0 = 10.59 ft

ATTACHMENT D

CONE PENETROMETER TEST RESULTS

CONSISTS OF:

Gregg Report dated February 5, 2007
Revised: April 3, 2007

Volume 1 of 1

ATTACHMENT D

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C-309	26	C-410	36	C-909	46
C-310	27	C-411	37	C-916	47
				C-917	48
				C-918	49

CPT Graphic Logs – Correlated SPT

CPT	Page	CPT	Page	CPT	Page
C-301	50	C-401	60	C-901	70
C-302	51	C-402	61	C-902	71
C-303	52	C-403	62	C-903	72
C-304	53	C-404	63	C-904	73
C-305s	54	C-406s	64	C-905	74
C-306s	55	C-407s	65	C-906	75
C-307s	56	C-408	66	C-907	76
C-308	57	C-409	67	C-908	77
C-309	58	C-410	68	C-909	78
C-310	59	C-411	69	C-916	79
				C-917	80
				C-918	81

CPT Graphic Logs – Correlated Shear Wave Velocity

CPT	Page
C-305s	82
C-306s	83
C-307s	84
C-406s	85
C-407s	86

Pore Pressure Dissipation Tests.....Page 87

Shear Wave Velocity Calculations

CPT	Page
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C-306s	107
C-307s	108
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Calibration Records and CD with CPT Data.....Follows page 121

GREGG IN SITU, INC.

GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

February 5, 2007

MACTEC
Attn: Michael D. Sufnarski
2801 Yorkmout Road, Suite 100
Charlotte, North Carolina 28208

Subject: CPT Site Investigation
South Texas Project
Bay City, Texas
GREGG Project Number: 06-109SC

Dear Mr. Sufnarski:

The following report presents the results of GREGG Drilling & Testing's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☒
2	Pore Pressure Dissipation Tests	(PPD)	☒
3	Seismic Cone Penetration Tests	(SCPTU)	☒
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	UVIF Cone Penetration Tests	(UVIFCPTU)	☐
6	Groundwater Sampling	(GWS)	☐
7	Soil Sampling	(SS)	☐
8	Vapor Sampling	(VS)	☐
9	Vane Shear Testing	(VST)	☐
10	SPT Energy Calibration	(SPTE)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (925) 313-5800.

Sincerely,
GREGG Drilling & Testing, Inc.

Peter Robertson
Technical Operations

1112 Pasture Lane • Columbia, South Carolina 29201 • (803) 253-7633 • FAX (803) 253-7634
OTHER OFFICES: LOS ANGELES • SAN FRANCISCO • HOUSTON
www.greggdrilling.com

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Cone Penetration Test Sounding Summary

-Table 1-

CPT Sounding Identification	Date	Termination Depth (Feet)	Depth of Groundwater Samples (Feet)	Depth of Soil Samples (Feet)	Depth of Pore Pressure Dissipation Tests (Feet)
C-301	12/01/06	50.0	-	-	-
C-302	11/29/06	36.1	-	-	-
C-303	12/01/06	50.0	-	-	-
C-304	12/15/06	100.1	-	-	30.0, 74.8
C-305s	12/16/06	97.1	-	-	38.1, 67.1, 92.0
C-306s	11/30/06	66.3	-	-	28.1, 56.1
C-307s	12/14/06	95.1	-	-	74.0
C-308	12/15/06	79.4	-	-	31.0, 70.0
C-309	12/14/06	100.1	-	-	-
C-310	12/12/06	100.1	-	-	26.1
C-401	12/01/06	50.0	-	-	-
C-402	12/01/06	50.0	-	-	-
C-403	12/01/06	50.0	-	-	-
C-404	12/19/06	37.6	-	-	30.0
C-406s	12/13/06	93.3	-	-	29.2, 58.4, 71.4
C-407s	12/12/06	98.3	-	-	-
C-408	12/06/06	100.2	-	-	27.4, 70.2
C-409	12/02/06	92.0	-	-	-
C-410	12/05/06	92.0	-	-	29.0, 83.3
C-411	12/02/06	50.0	-	-	-
C-901	12/17/06	98.1	-	-	-
C-902	12/17/06	90.1	-	-	-
C-903	12/28/06	93.2	-	-	-
C-904	12/20/06	90.1	-	-	-
C-905	12/13/07	50.0	-	-	-
C-906	12/18/06	50.0	-	-	-
C-907	12/16/06	50.0	-	-	-
C-908	12/16/06	50.0	-	-	-
C-909	12/02/06	40.0	-	-	-
C-916	12/17/06	39.0	-	-	-
C-917	12/19/06	50.0	-	-	-
C-918	12/18/06	50.0	-	-	-

Cone Penetration Testing Procedure (CPT)

Gregg In Situ, Inc. carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT*. The soundings were conducted using a 20 ton capacity cone with a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.79.

The cone takes measurements of cone bearing (q_c), sleeve friction (f_s) and penetration pore water pressure (u_2) at 5-cm intervals during penetration to provide a nearly continuous hydrogeologic log. CPT data reduction and interpretation is performed in real time facilitating on-site decision making. The above mentioned parameters are stored on disk for further analysis and reference. All CPT soundings are performed in accordance with revised (2002) ASTM standards (D 5778-95).

The cone also contains a porous filter element located directly behind the cone tip (u_2), *Figure CPT*. It consists of porous plastic and is 5.0mm thick. The filter element is used to obtain penetration pore pressure as the cone is advanced as well as Pore Pressure Dissipation Tests (PPDT's) during appropriate pauses in penetration. It should be noted that prior to penetration, the element is fully saturated with silicon oil under vacuum pressure to ensure accurate and fast dissipation.

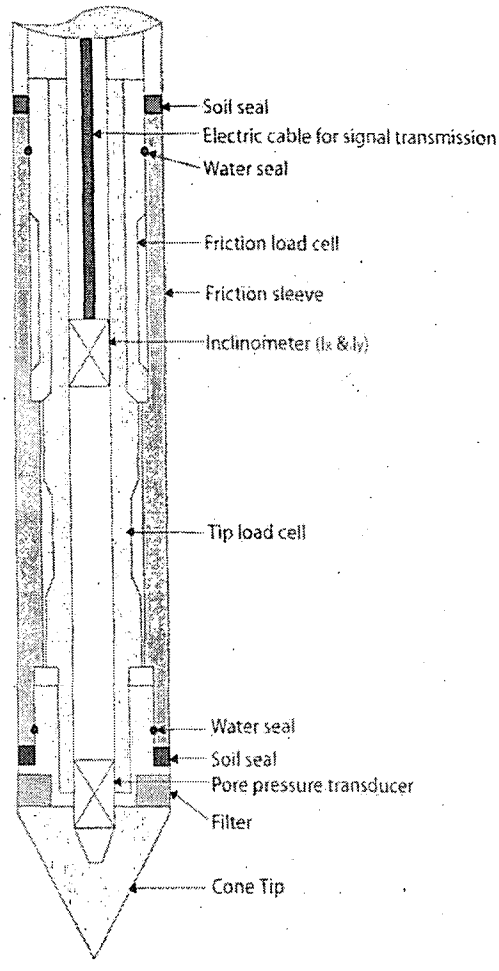


Figure CPT

When the soundings are complete, the test holes are grouted using a Gregg In Situ support rig. The grouting procedures generally consist of pushing a hollow CPT rod with a "knock out" plug to the termination depth of the test hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.

Cone Penetration Test Data & Interpretation

Soil behavior type and stratigraphic interpretation is based on relationships between cone bearing (q_c), sleeve friction (f_s), and pore water pressure (u_2). The friction ratio (R_f) is a calculated parameter defined by $100f_s/q_c$ and is used to infer soil behavior type. Generally:

Cohesive soils (clays)

- High friction ratio (R_f) due to small cone bearing (q_c)
- Generate large excess pore water pressures (u_2)

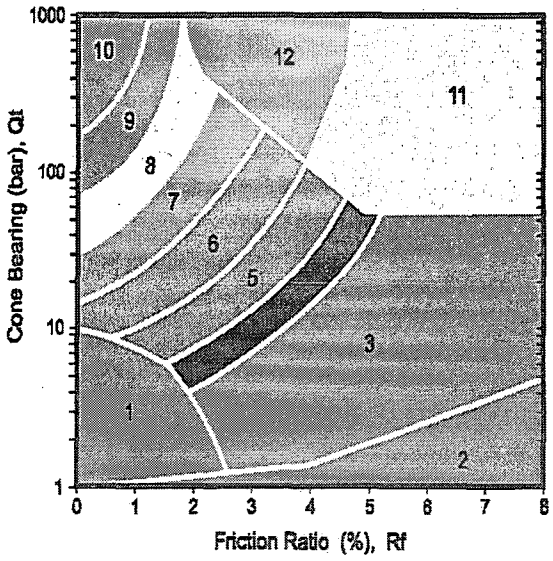
Cohesionless soils (sands)

- Low friction ratio (R_f) due to large cone bearing (q_c)
- Generate very little excess pore water pressures (u_2)

A complete set of baseline readings are taken prior to and at the completion of each sounding to determine temperature shifts and any zero load offsets. Corrections for temperature shifts and zero load offsets can be extremely important, especially when the recorded loads are relatively small. In sandy soils, however, these corrections are generally negligible.

The cone penetration test data collected from your site is presented in graphical form in Appendix CPT. The data includes CPT logs of measured soil parameters, computer calculations of interpreted soil behavior types (SBT), and additional geotechnical parameters. A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Soil interpretation for this project was conducted using recent correlations developed by Robertson, 1990, *Figure SBT*. Note that it is not always possible to clearly identify a soil type based solely on q_c, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type.



ZONE	Qt/N	SBT
1	2	Sensitive, fine grained
2	1	Organic materials
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	Gravely sand to sand
11	1	Very stiff fine grained*
12	2	Sand to clayey sand*

*over consolidated or cemented

Figure SBT

Gregg In Situ Interpretations as of June 30, 2004 (Release 1.22A)

Gregg In Situ'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. Gregg In Situ 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 Gregg In Situ 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 Gregg In Situ 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). The user must evaluate the site specific soil conditions and characteristics to properly apply the appropriate interpretation method.

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 in one format:

File Type	Typical Extensions	Description
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*	
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*	

Interpreted Parameter	Description	Equation	Ref
AvgGamma	Averaged Gamma Counts (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} GAMMA$ *n=1 when interpretations are done at each point*	
SBT	Soil Behavior Type as defined by Robertson and Campanella	See Figure 1	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
k	Coefficient of permeability (assigned to each SBT zone)		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	
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	
E. Stress σ_v'	Effective vertical overburden stress at Mid Layer Depth	$Estress = Tstress - u_{eq}$	
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
$N_{60}Ic$	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) $(N_1)_{60cs}Ic = a + ß((N_1)_{60}Ic)$ 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%: a = 0, ß=1.0 FC = 35% a = 5.0, ß=1.2 5% < FC < 35% $a = \exp[1.76 - (190/FC^2)]$ $ß = [0.99 + (FC^{1.5}/1000)]$	10 10 5

Interpreted Parameter	Description	Equation	Ref
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
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
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* $1.64 < Ic < 2.36$ *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
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
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
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

Interpreted Parameter	Description	Equation	Ref
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: $\sigma'_m = \frac{1}{3} \cdot (\sigma'_v + \sigma'_h + \sigma'_h)$ 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
Su	Undrained shear strength - N_{kt} is user selectable	$Su = \frac{qt - \sigma_v}{N_{kt}}$	1, 5
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

The following parameters are not presented but may be interpreted for use in liquefaction analysis. Further detailed interpretation may be completed by using the Liquefaction Spreadsheet following the committee recommendations of the NCEER. This Spreadsheet is available for purchase. A promotional document is presented in the Interpretations directory on the Data Disk with this report.

Interpreted Parameter	Description	Equation	Ref
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
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

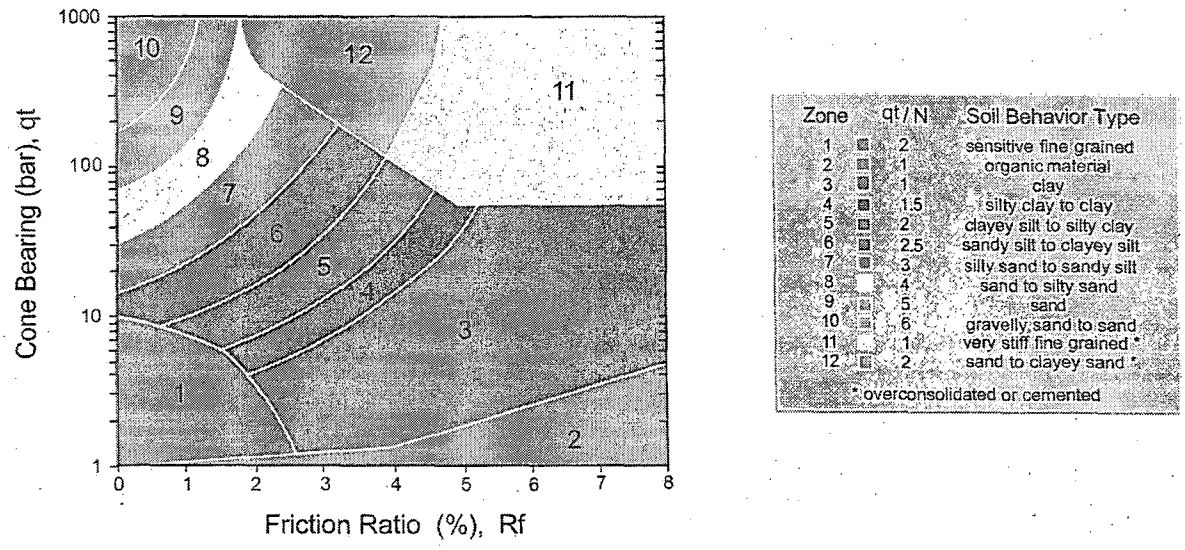


Figure 1 Non-Normalized Behavior Type Classification Chart

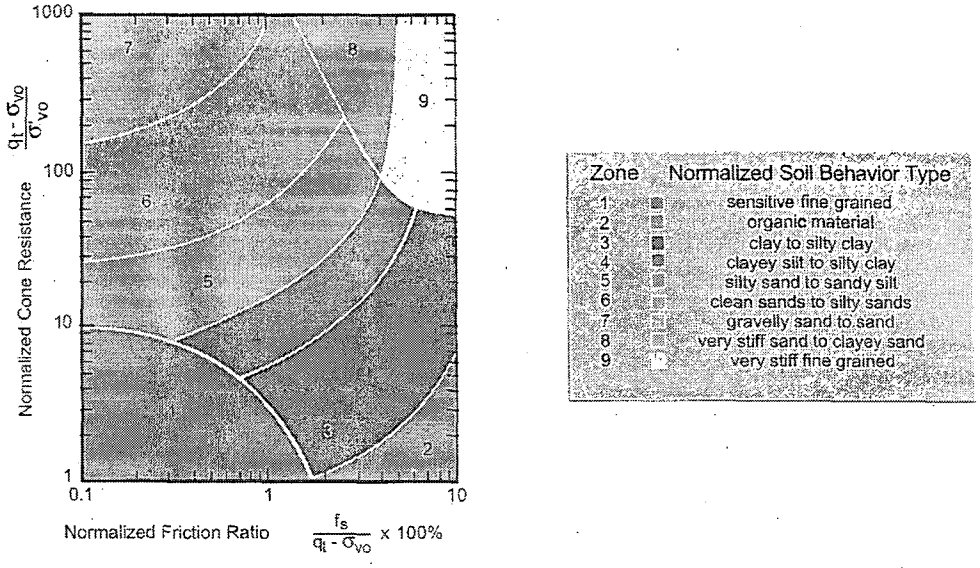


Figure 2 Normalized Behavior Type Classification Chart

Table 2 References

No.	References
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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.

Pore Pressure Dissipation Tests (PPDT)

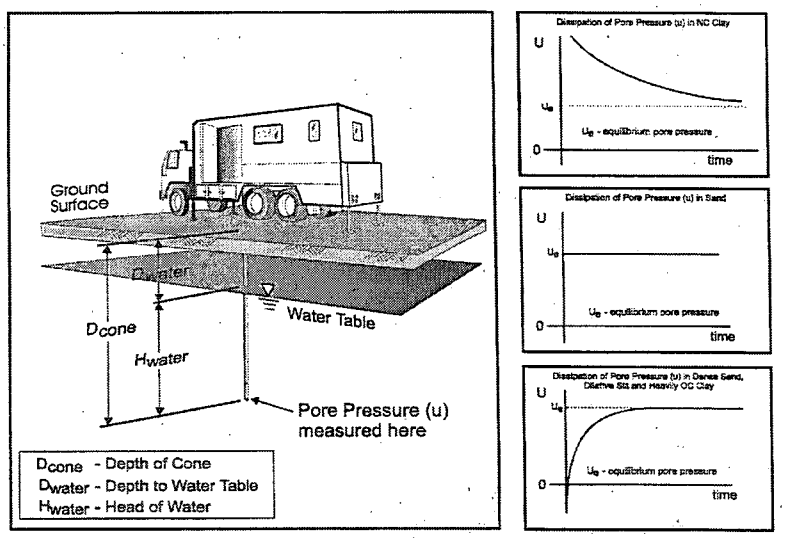
Pore Pressure Dissipation Tests (PPDT's) conducted at various intervals measured hydrostatic water pressures and determined the approximate depth of the ground water table. A PPDT is conducted when the cone is halted at specific intervals determined by the field representative. The variation of the penetration pore pressure (u) with time is measured behind the tip of the cone and recorded by a computer system.
Pore pressure dissipation data can be interpreted to provide estimates of:

- Equilibrium piezometric pressure
- Phreatic Surface
- In situ horizontal coefficient of consolidation (c_h)
- In situ horizontal coefficient of permeability (k_h)

In order to correctly interpret the equilibrium piezometric pressure and/or the phreatic surface, the pore pressure must be monitored until such time as there is no variation in pore pressure with time, *Figure PPDT*. This time is commonly referred to as t_{100}, the point at which 100% of the excess pore pressure has dissipated.

A complete reference on pore pressure dissipation tests is presented by Robertson et al. 1992.

A summary of the pore pressure dissipation tests is summarized in Table 1.



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 PPDT

Seismic Cone Penetrometer Testing
(SCPTu)

Gregg In Situ, Inc. uses a modified CPT cone that contains a built in seismometer to measure compression and shear wave velocities in addition to the standard piezocone parameters (q_c, f_s, and u_2). Therefore, four independent readings are compiled with depth in a single sounding. The standard CPT parameters are recorded continuously while the seismic test is usually performed at 5-foot intervals.

Gregg generates shear waves by striking a seismic beam coupled to the ground surface by a hydraulic cylinder under the CPT rig, *Figure SCPTu*. Compression waves are generated by striking an auger in the ground. The sledgehammer that strikes the beam/auger acts as a trigger, initiating the recording of the seismic wave trace. Before measurements are taken, the rods are decoupled from the CPT rig to prevent energy transmission down the rods.

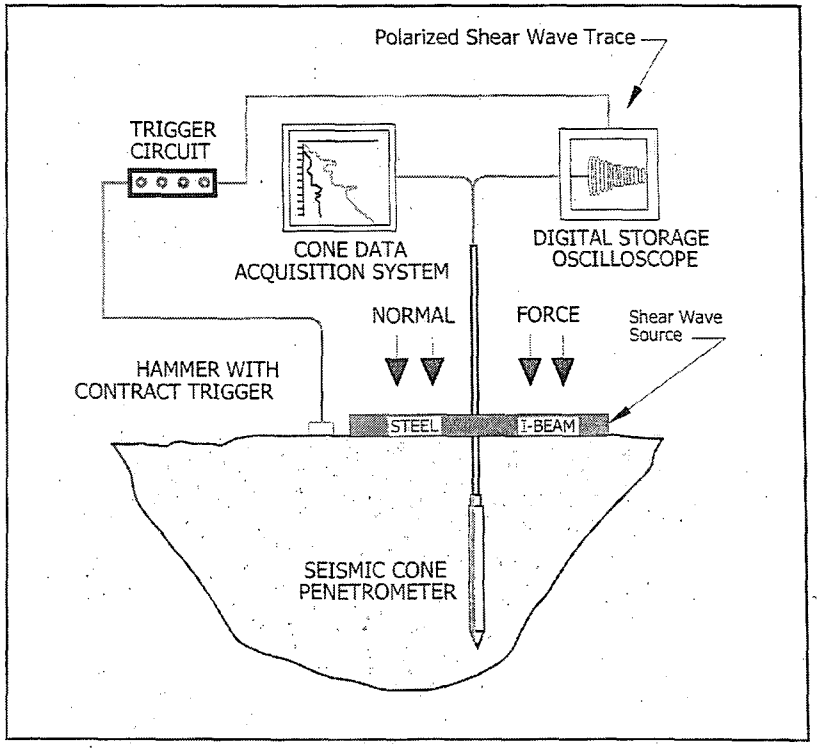


Figure SCPTu

Geophones in the body of the piezocone recognize the arriving waves generated at the ground surface, *Figure Seismic*. Any waves received by the geophones on the cone penetrometer are sent back up to the truck to be displayed on an oscilloscope. On site software then plots the wave amplitude versus time to calculate wave velocities.

At least two waves are recorded for each test depth so the operator can check consistency of the waveforms. Shear wave data is sampled at a frequency of 20 kHz (20,000 samples per second) and compression wave data is sampled at 50 kHz (50,000 samples per second). To maintain a desired signal resolution, the input sensitivity (gain) is increased with depth.

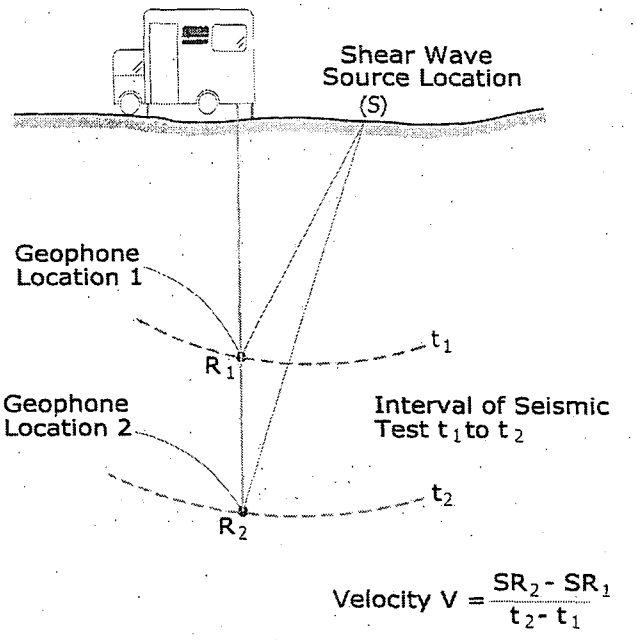


Figure Seismic

Offset distances of the beam from the cone and the location of the geophone are all taken into account in calculations.

The shear wave velocity (V_s) provides information about small-strain stiffness while the penetration data provides information about large-strain strength. From interval shear wave velocity (V_s) and the mass density (ρ) of a soil layer, the dynamic shear modulus (G_o) of the soil can be calculated in a specific depth interval. The dynamic shear modulus (G_0) is a key parameter for the analysis of soil behavior in response to dynamic loading from earthquakes, vibrating machine foundations, waves and wind.

A summary of the data collected including the depth and location identification is displayed in Table 1 and graphical formats and can be found with the corresponding CPT plot.

For a detailed reference on seismic CPT, refer to Robertson et. al., 1986.

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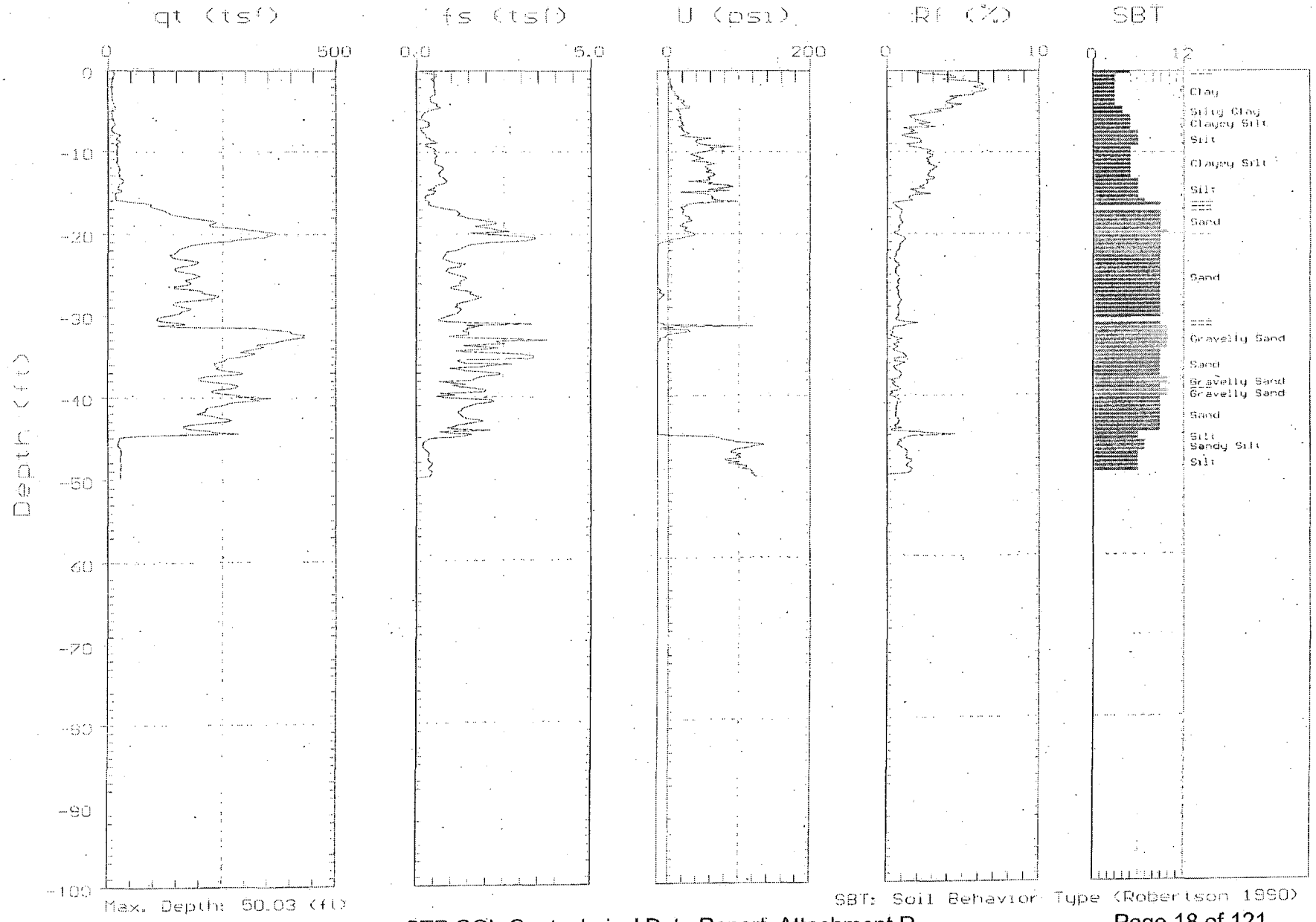
Copies of ASTM Standards are available through www.astm.org

GREGG

MACTEC

Site: N=362772.55 E=2943448.74 Operator: R.AGUILLAR
Location: C-301ELEV=27.37' Date: 12/01/06 13:25

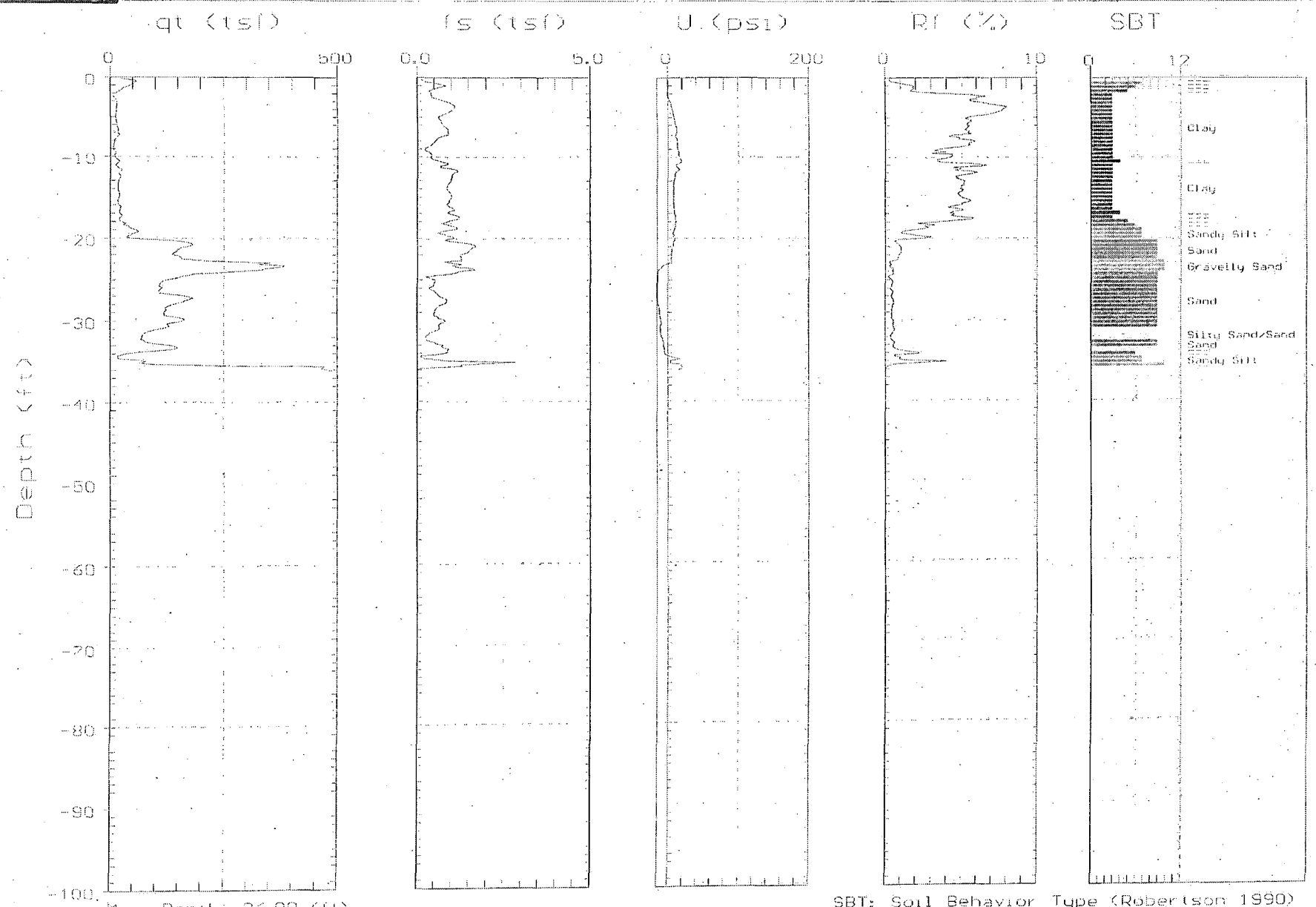


Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

GREGG

MACTEC

Site:N=362824.38 E=2943502.25 Operator:R.AGUILLAR
Location:C-302ELEV=28.72 Date:11/29/06 12:54

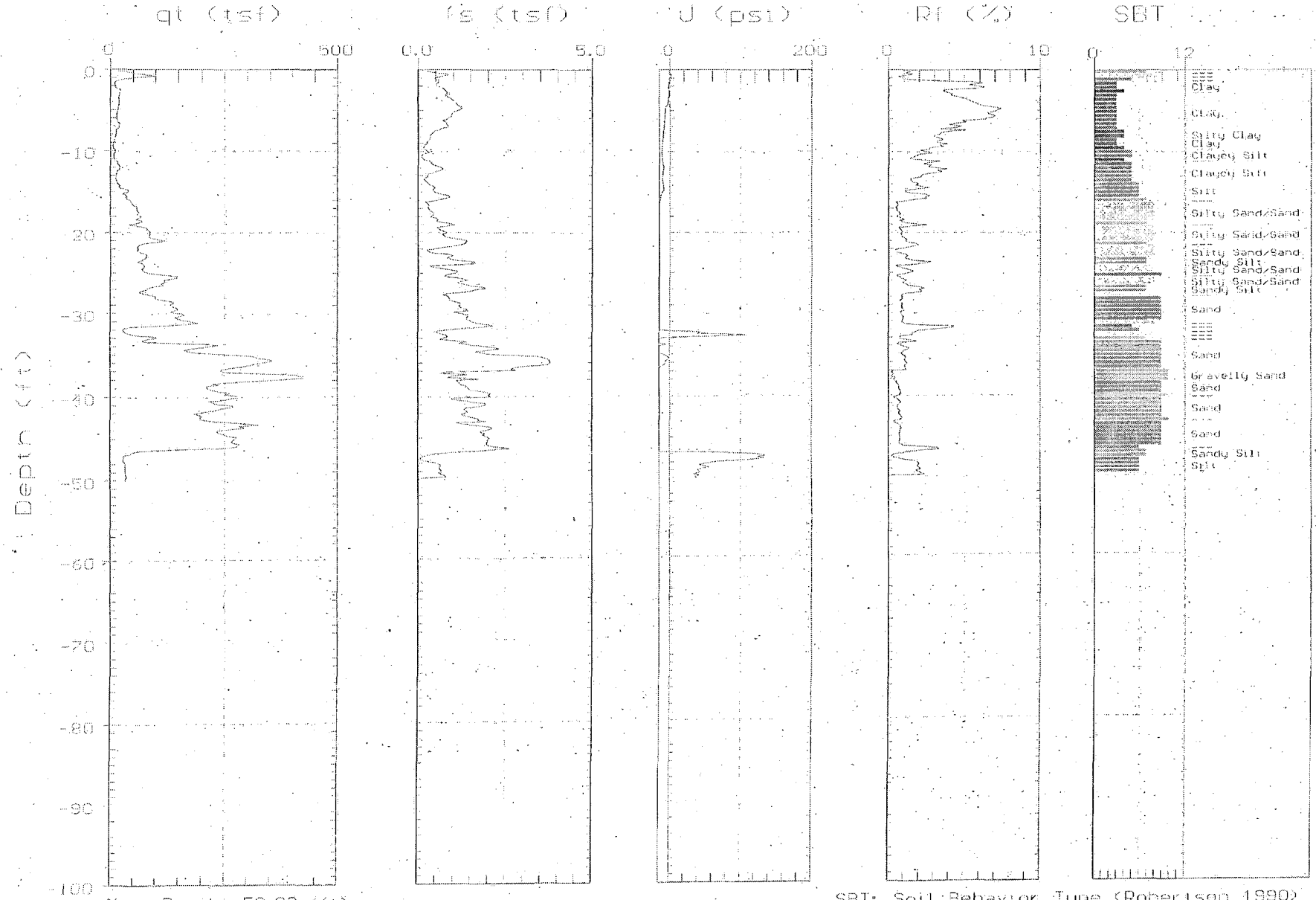


Max. Depth: 36.09 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG MACTEC

Site: N=362823.77 E=2943190.19 Operator: R.AGUILLAR
Location: C-303ELEV=30.19 Date: 12/01/06 12:02



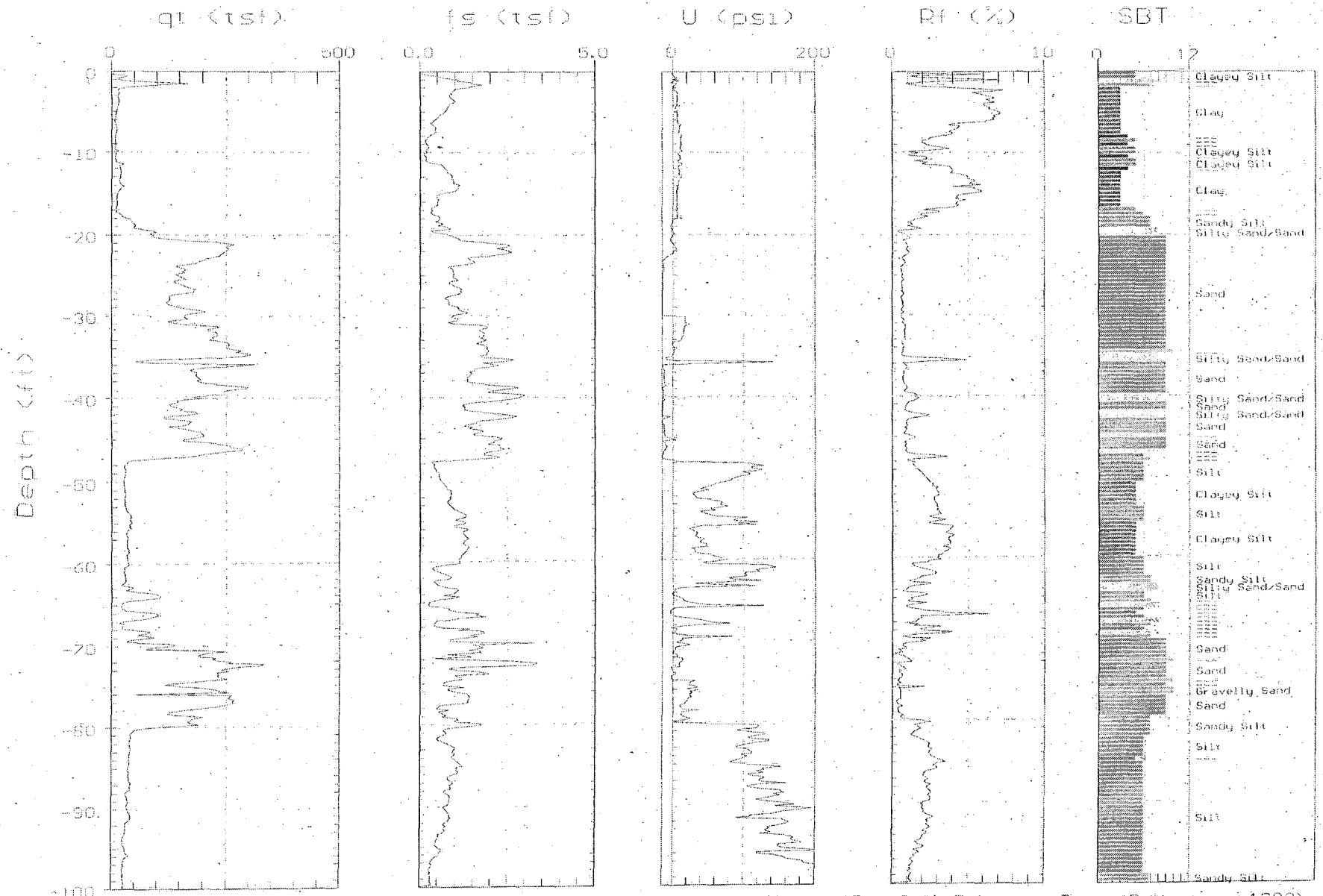
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362910.77 E=2943394.73 Operator: R.AGUILLAR
Location: C-304ELEV=29.39 Date: 12/15/06 12:01



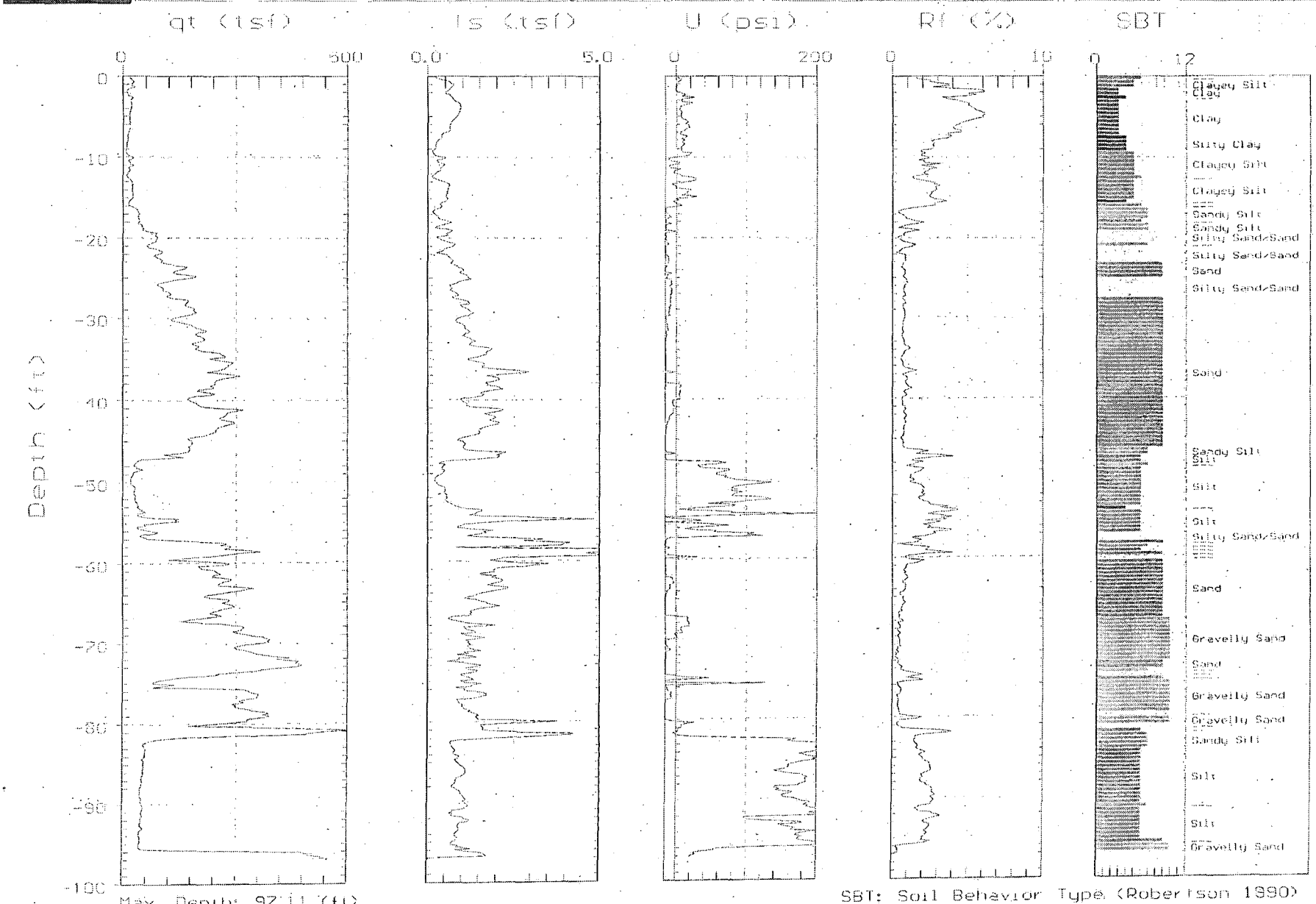
Max. Depth: 100.06 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363126.80 E=2943174.06 Operator: R.AGUILLAR
Location: C-305sELEV=30.88 Date: 12/16/06 06:14



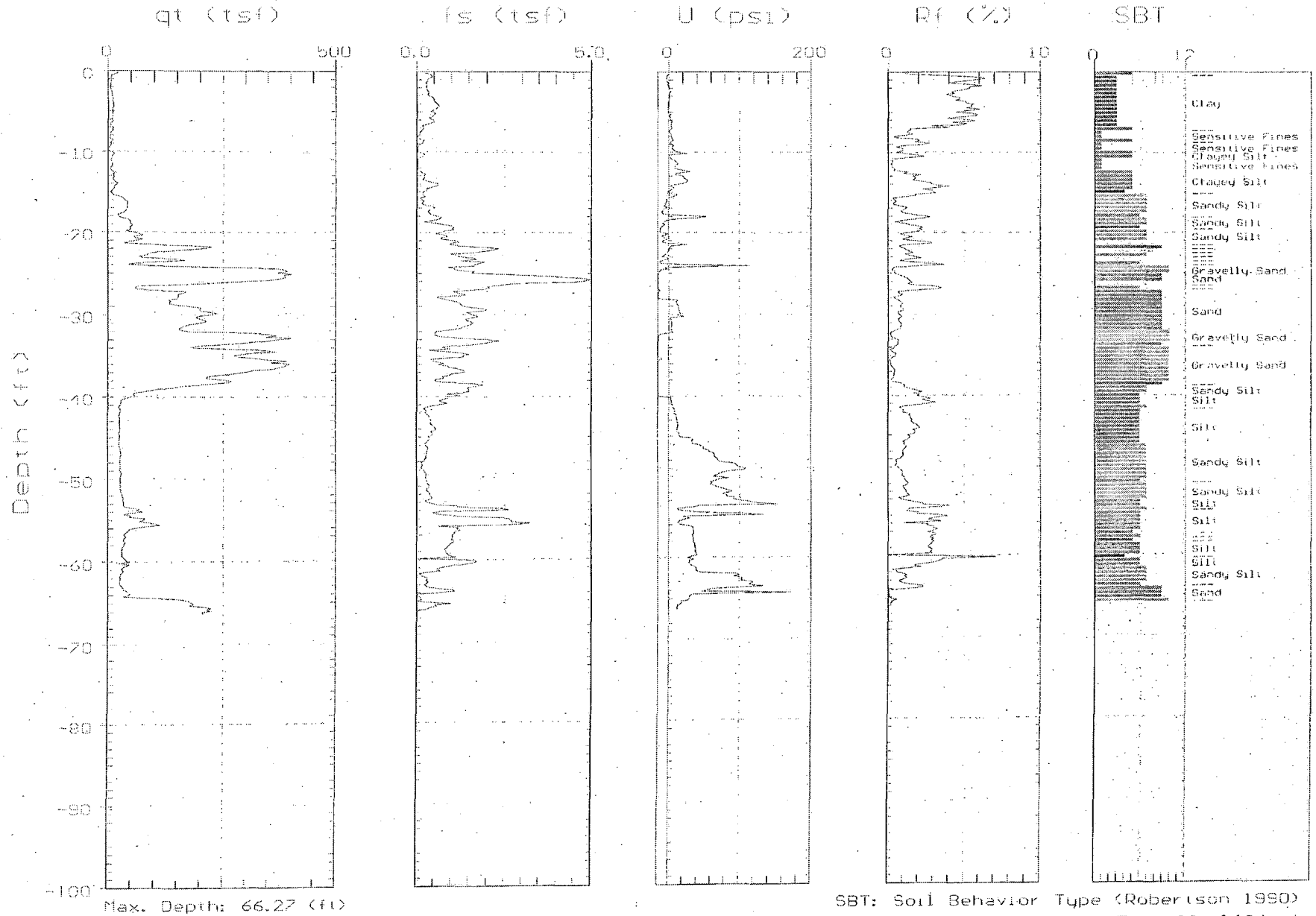
Max. Depth: 97.11 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363483.22 E=2943296.00 Operator: R.AGUILAR
Location: C-306sELEV=29.68 Date: 11/30/06 06:37



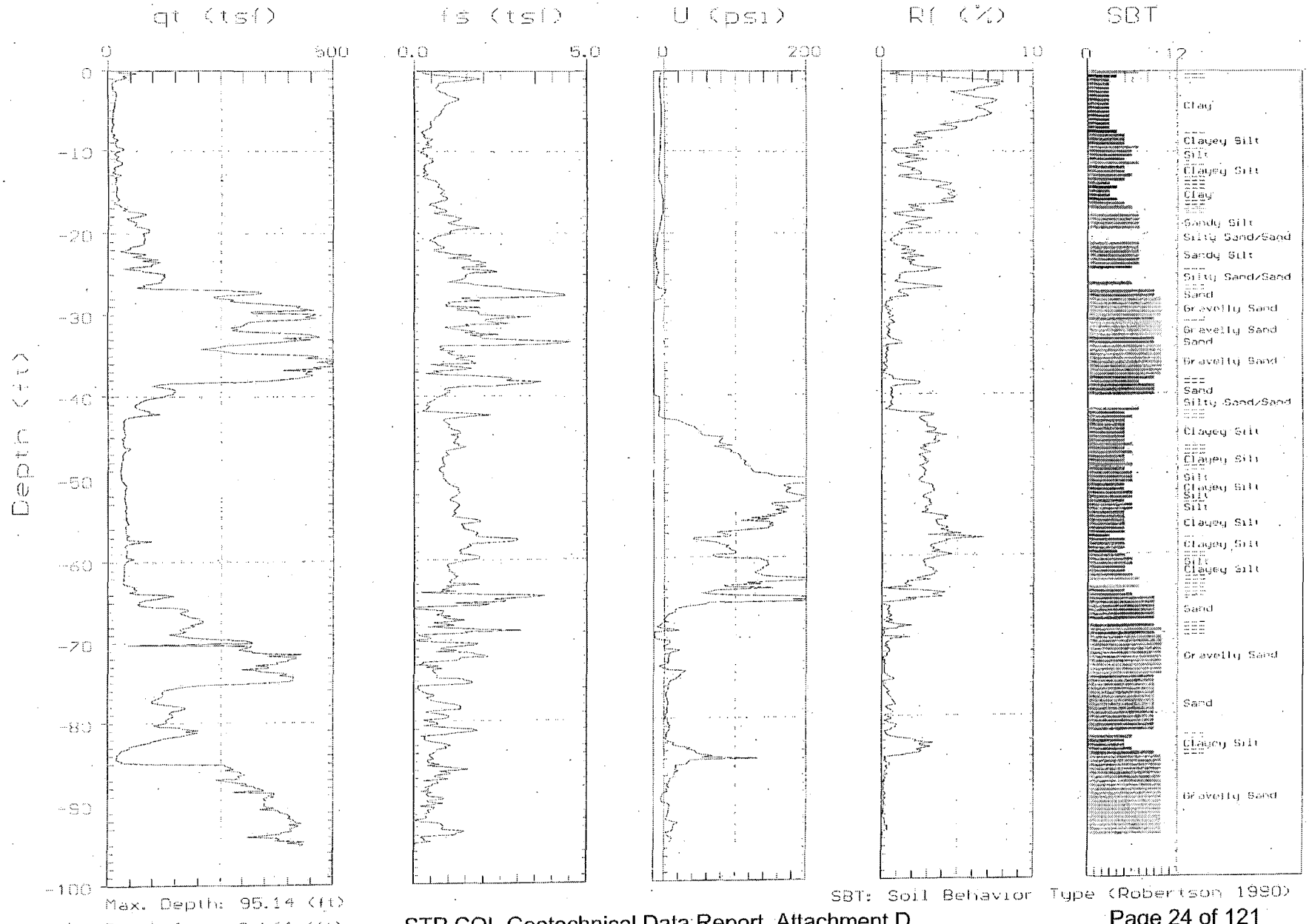
Max. Depth: 66.27 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

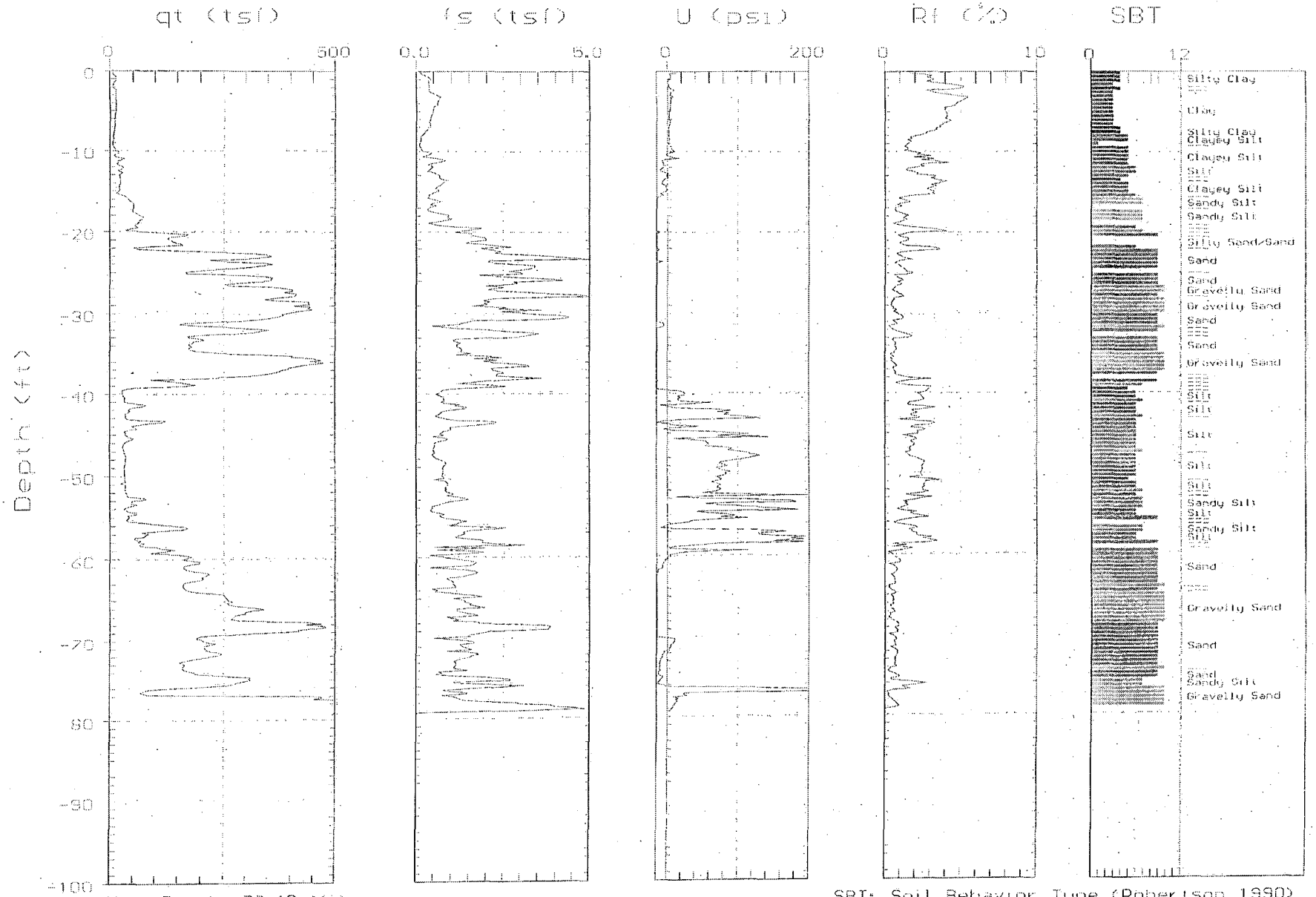
Site:N=363573.00 E=294340/.68 Operator:R.AGUILLAR
Location:C-30/sELEV=30.02 Date:12/14/06 0/:52



GREGG

MACTEC

Site:N=363711.62 E=2943481.16 Operator:R.AGUILAR
Location:C-308ELEV=29.89 Date:12/15/05 06:06



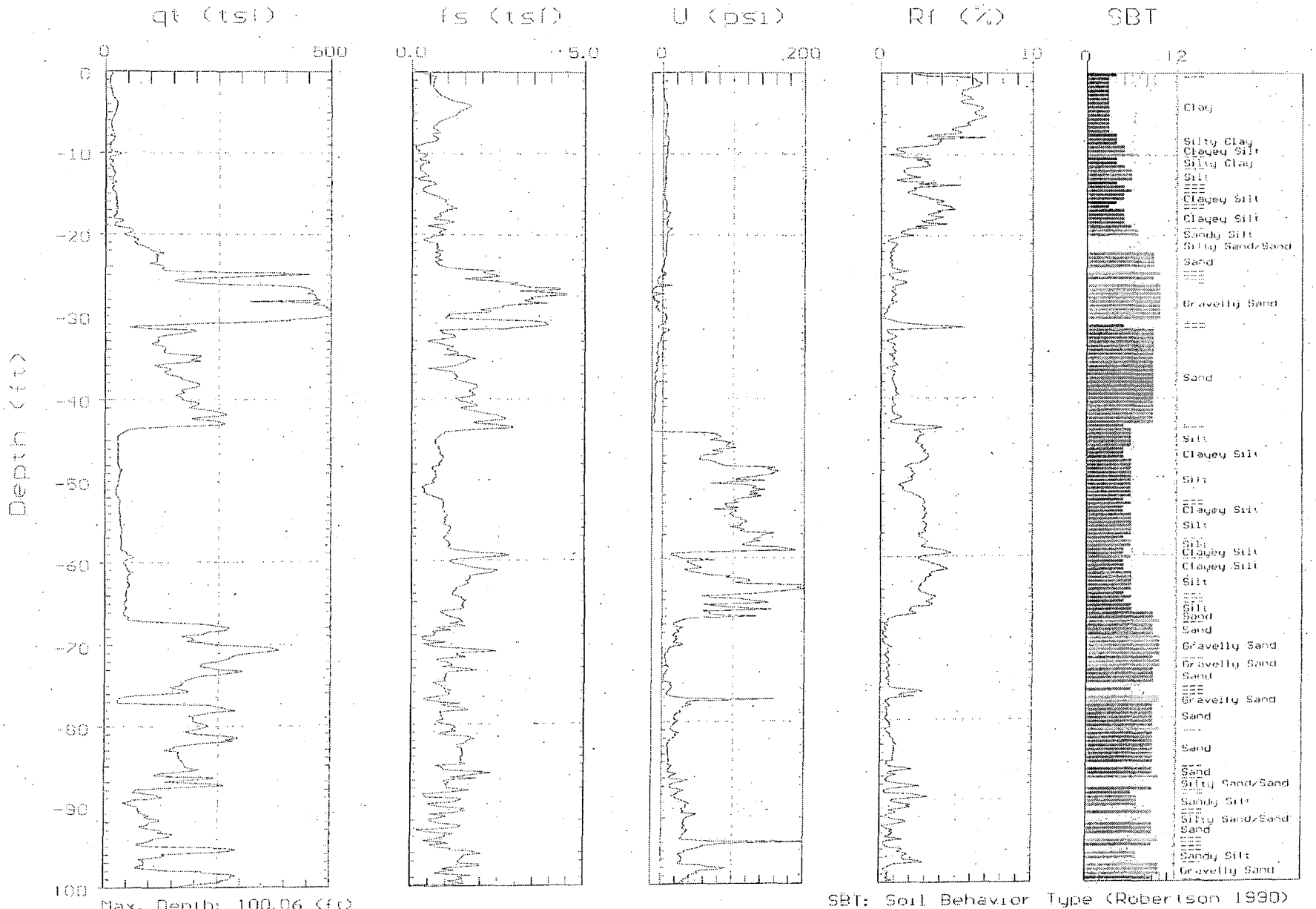
Max. Depth: 79.40 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363680.96 E=2943037.71 Operator: R.AGUILLAR
Location: C-309ELEV=30.69 Date: 12/14/06 12:47



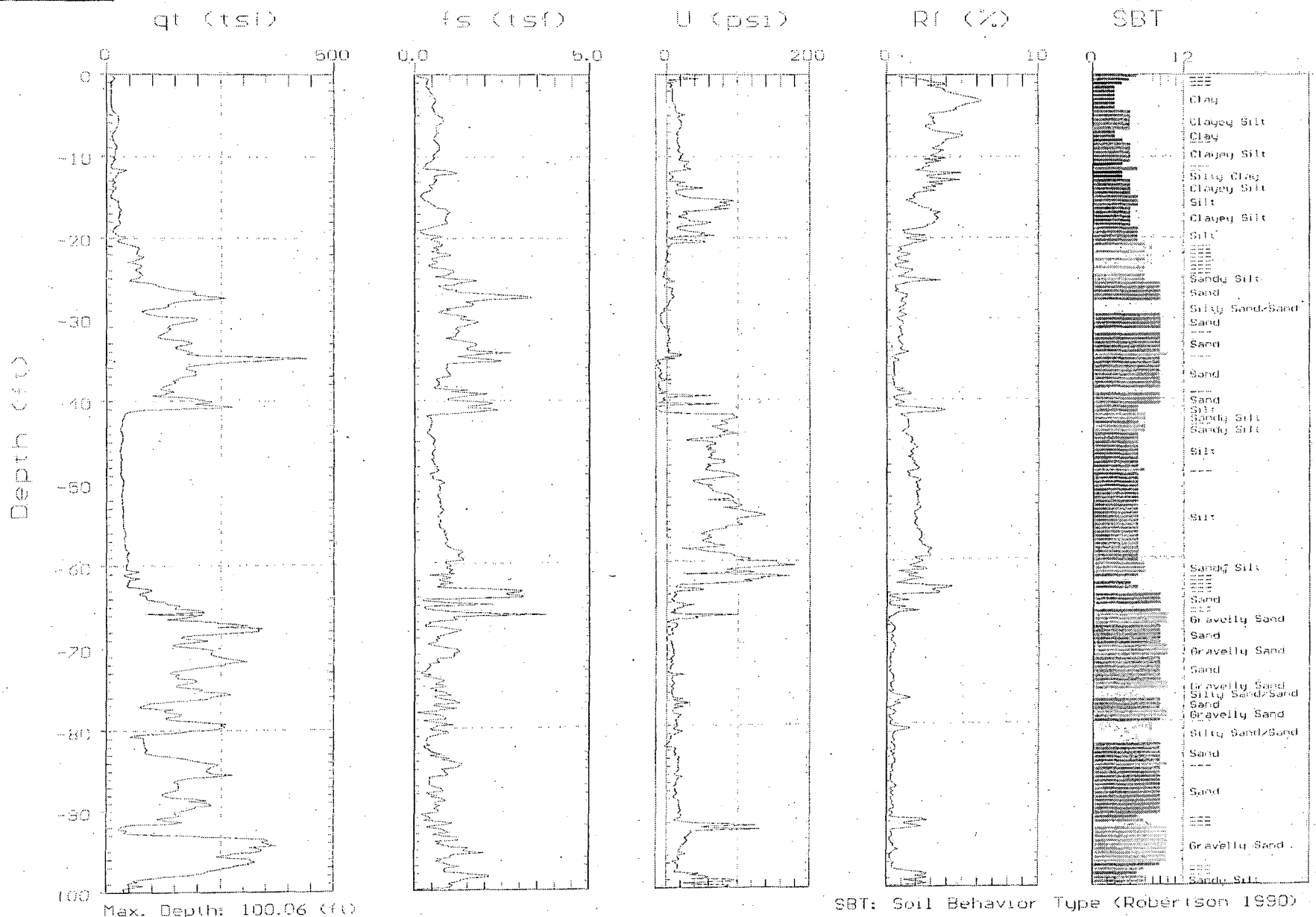
Max. Depth: 100.06 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363792.39 E=2943037.94 Operator: R.AGUILLOR
Location: C-310 ELEV=31.38 Date: 12/12/06 09:17



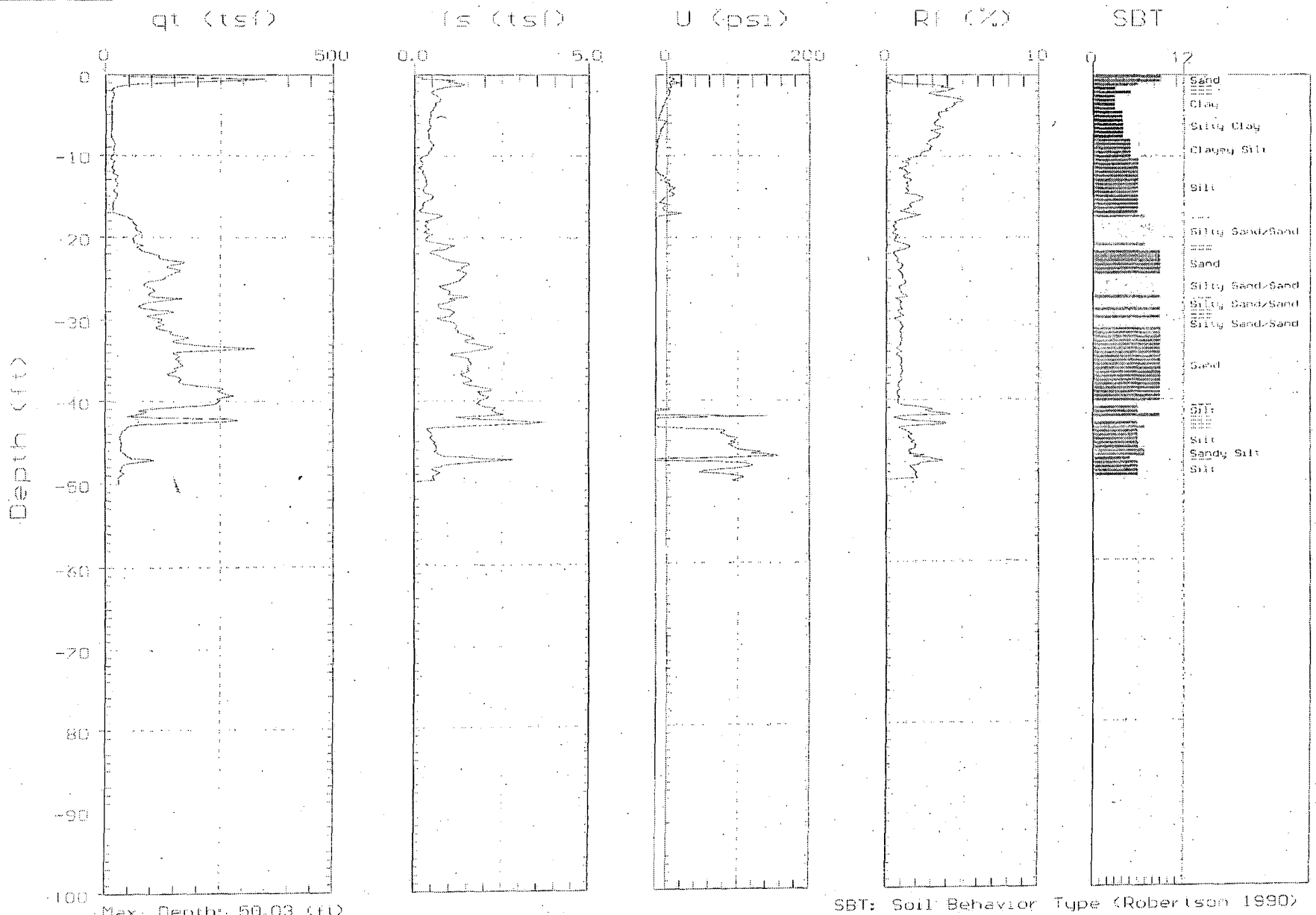
Max. Depth: 100.06 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362772.46 E=2942547.21 Operator: R.AGUILLAR
Location: C-401 ELEV=31.08 Date: 12/01/06 08:27



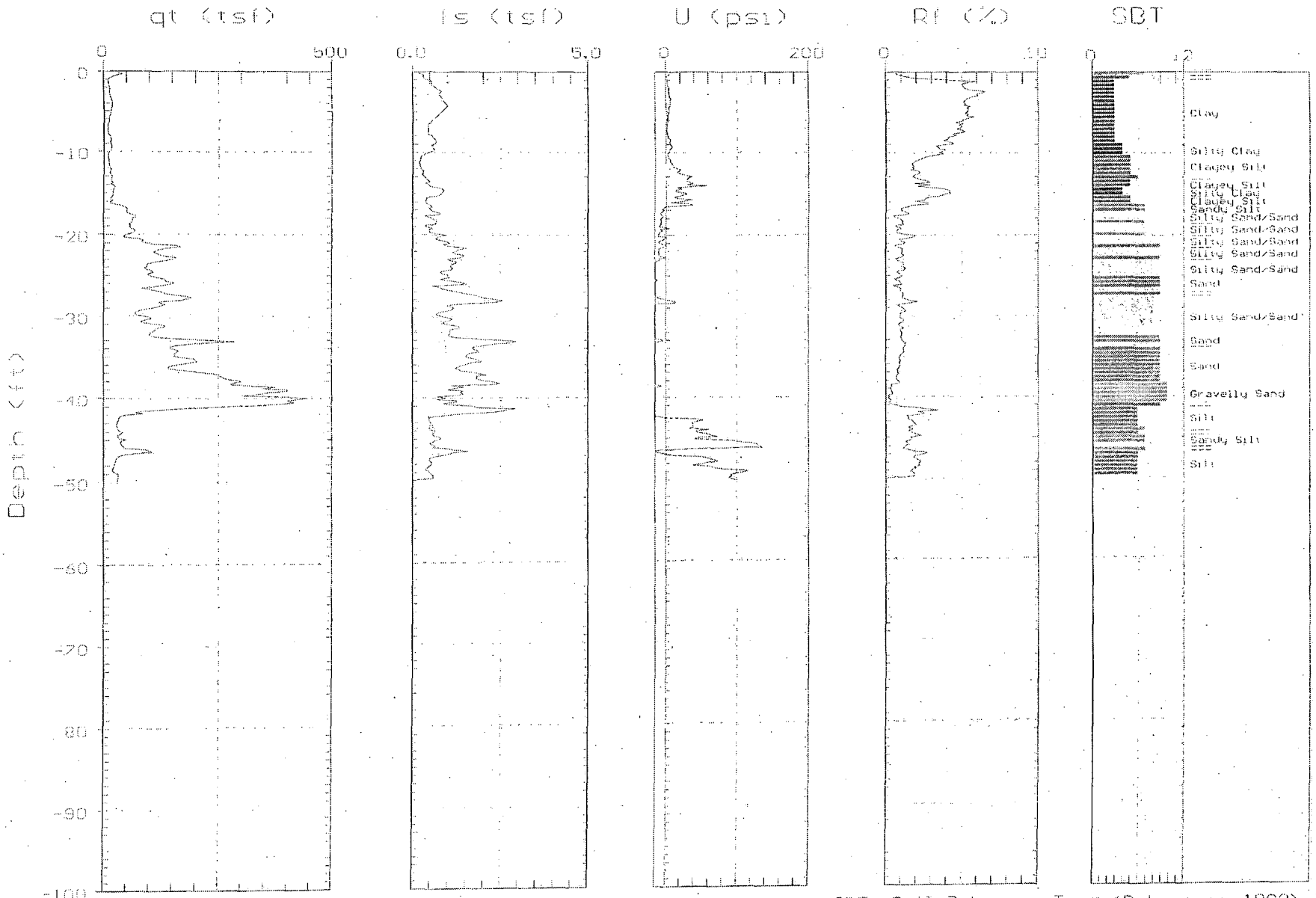
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=362824.68 E=2942600.77 Operator:R.AGUILLAR
Location:C-402ELEV=30.82 Date:12/01/06 09:24



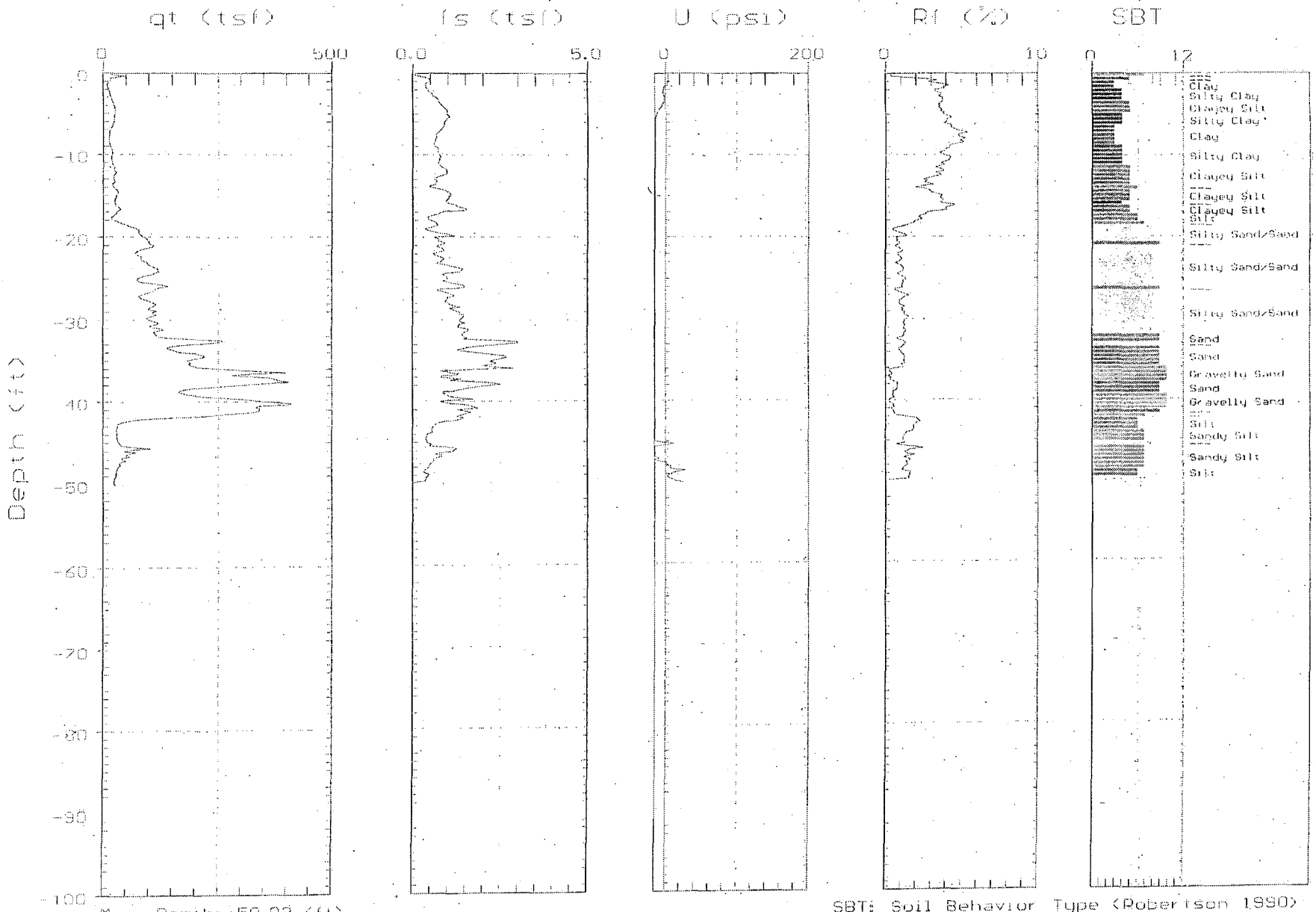
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362825.36 E=2942289.73 Operator: R.AGUILLAR
Location: C-403 ELEV=31.59 Date: 12/01/06 07:04



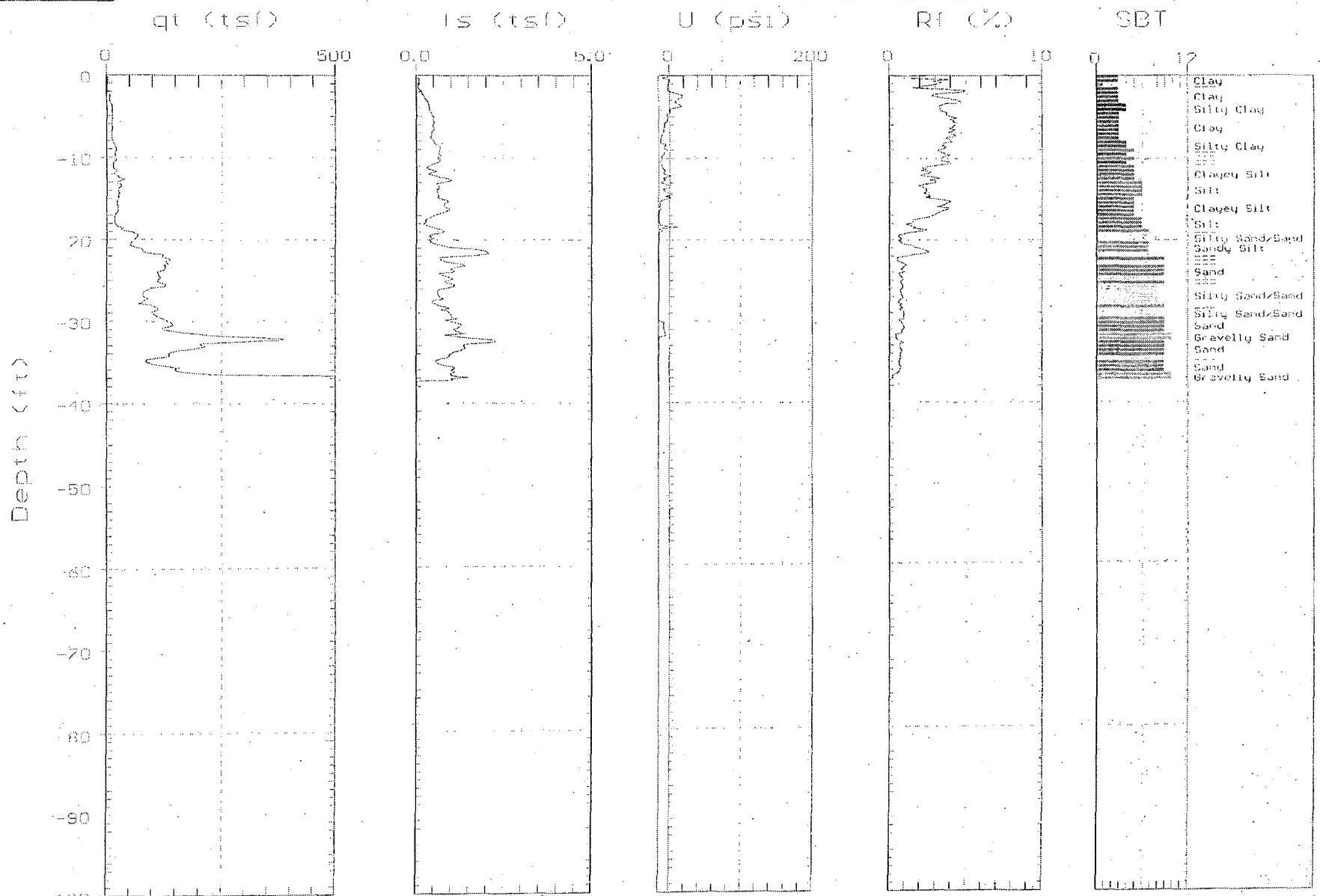
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362912.73 E=2942499.09 Operator: R.AGUILLAR
Location: C-404ELEV=31.38 Date: 12/19/06 06:32



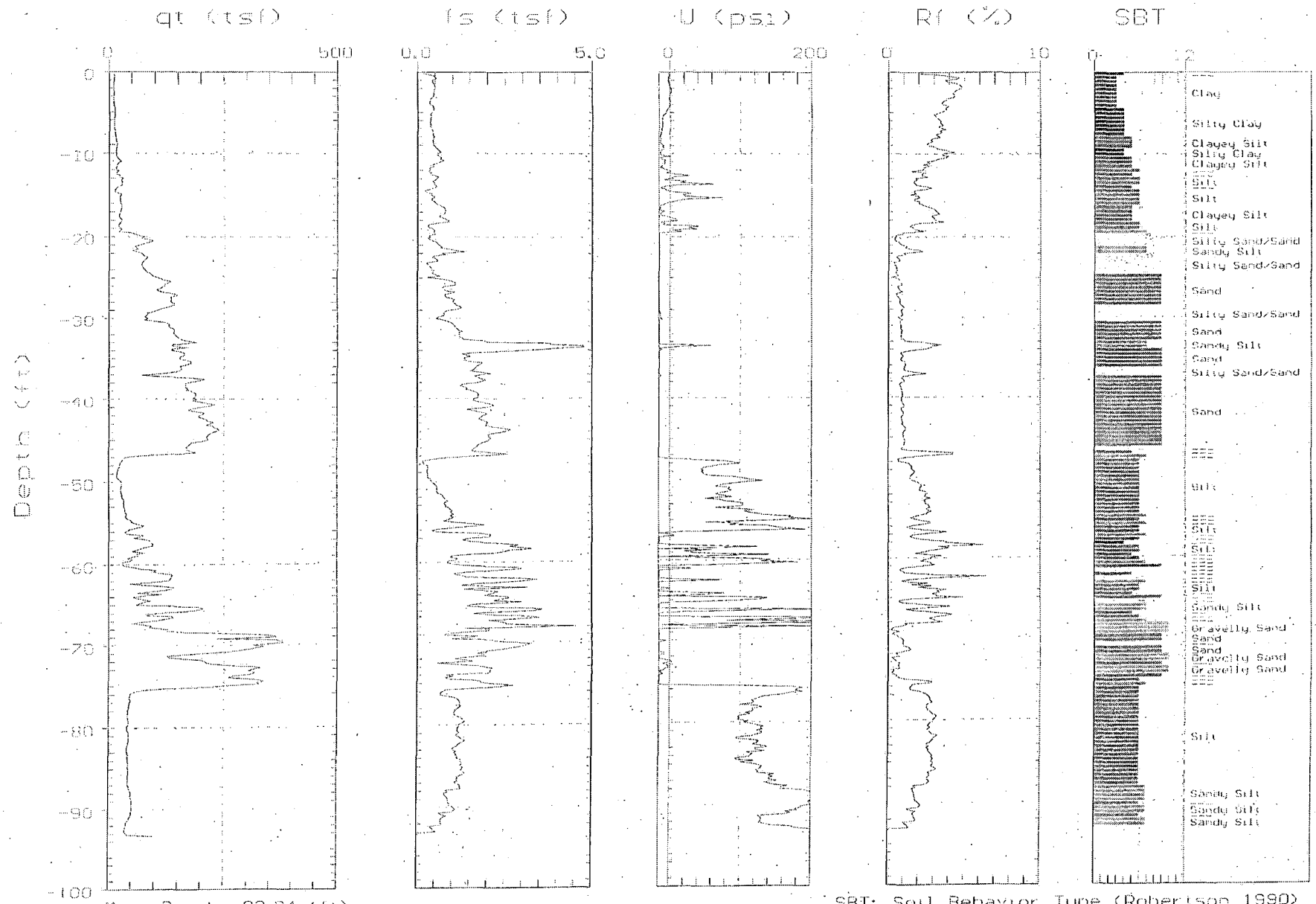
Max. Depth: 37.57 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363481.68 E=2942400.33 Operator:R.AGUILLAR
Location:C-406sELEV=31.05 Date:12/13/06 08:15

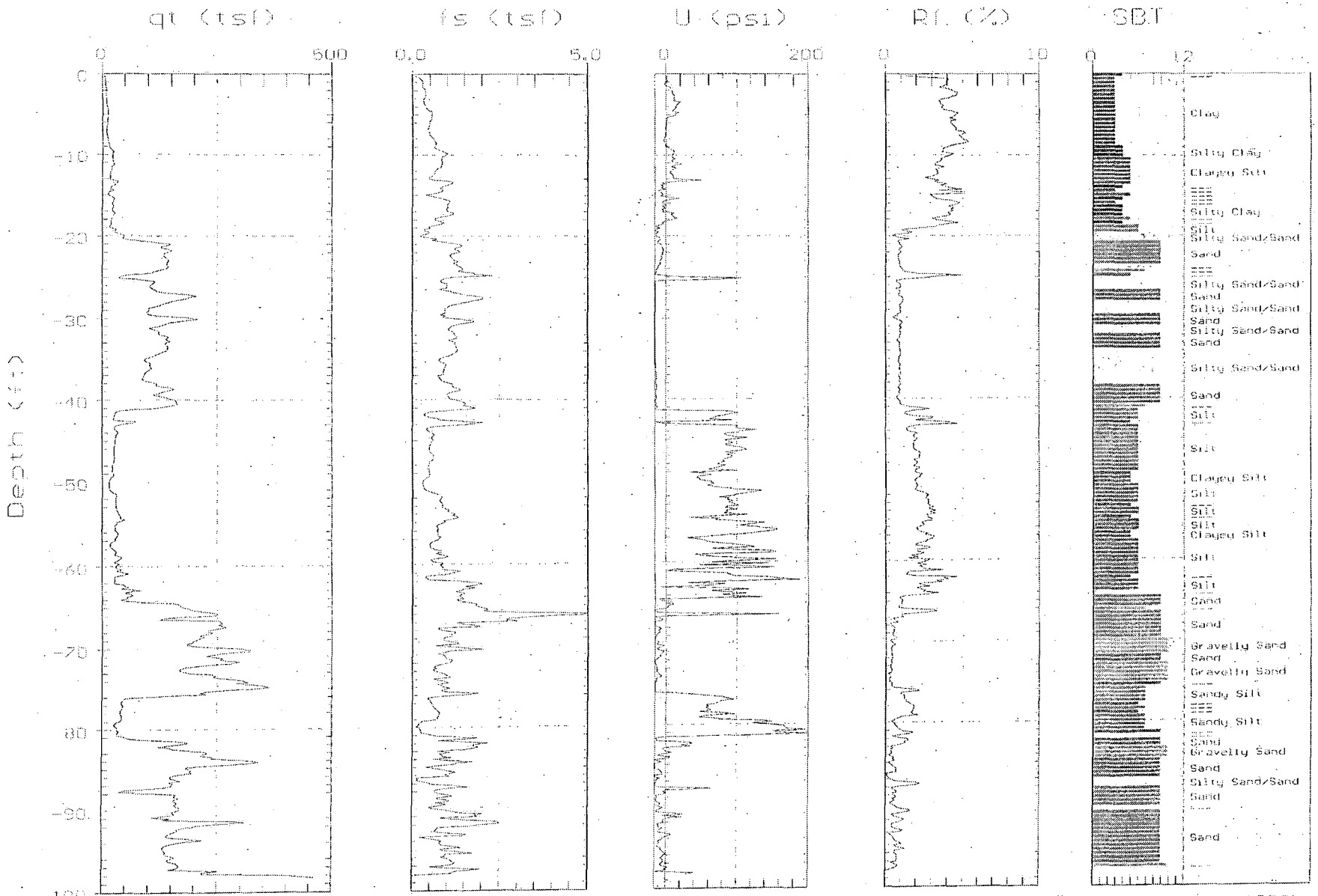


Max. Depth: 92.34 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG MACTEC

Site: N=363570.38 E=2942507.31 Operator: R.AGUILAR
Location: C-407sELEV=30.79 Date: 12/12/06 06:11



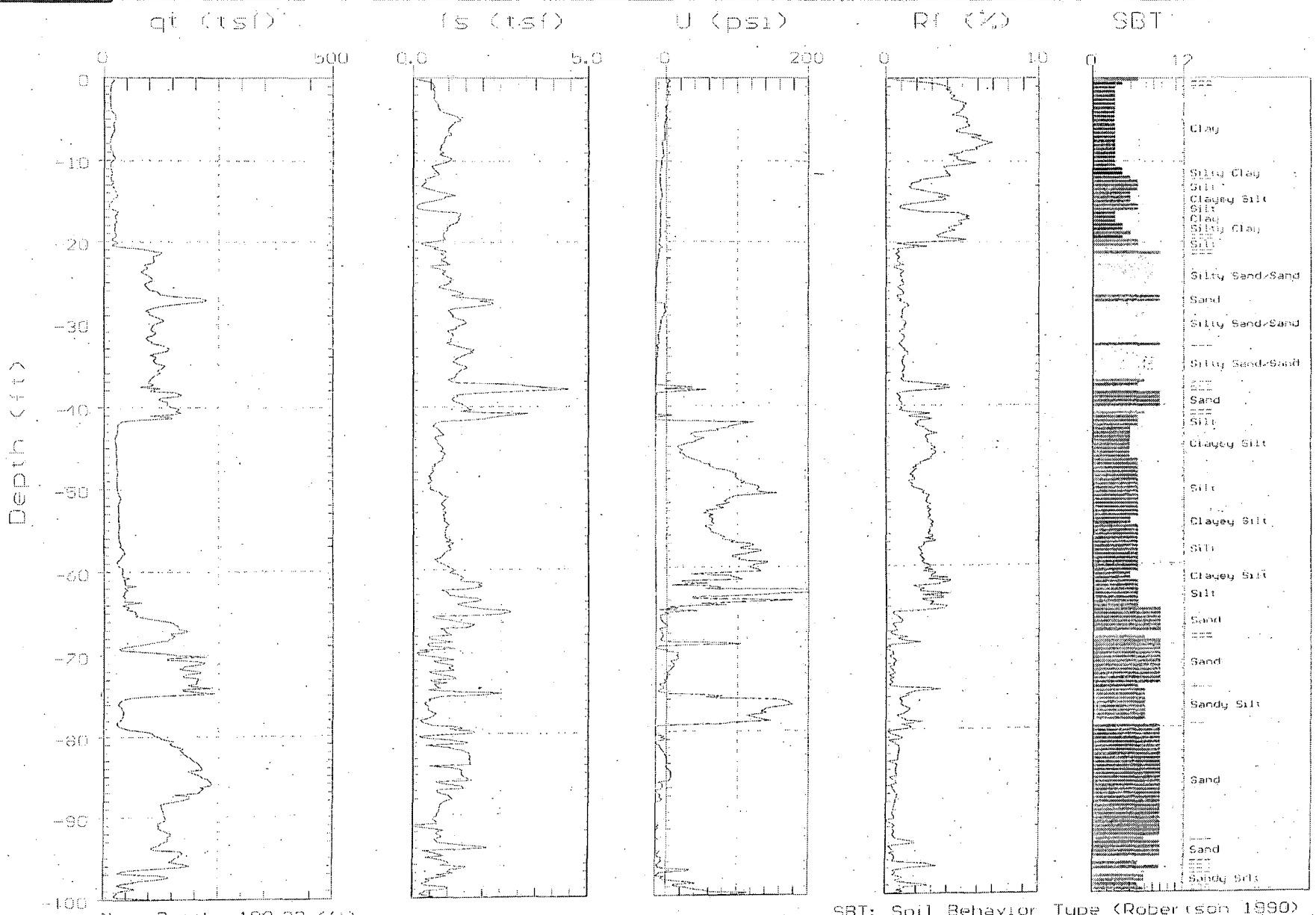
Max. Depth: 98.26 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363710.02 E=2942579.59 Operator: R.AGUILLAR
Location: C-408ELEV=31.70 Date: 12/06/06 06:51



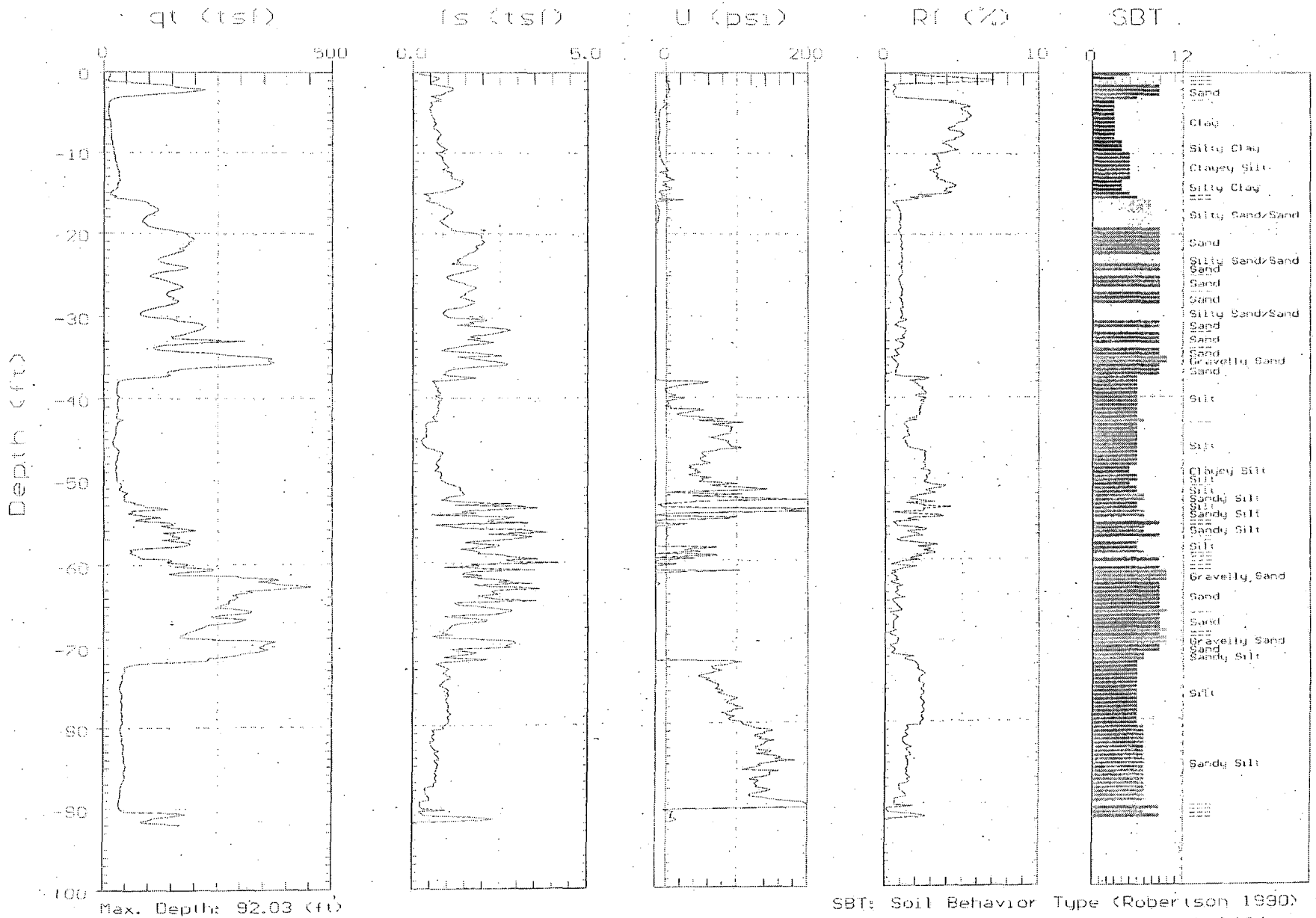
Max. Depth: 100.23 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363678.81 E=2942142.10 Operator:R.AGUILLAR
Location:C-409ELEV=27.93 Date:12/02/06 12:36



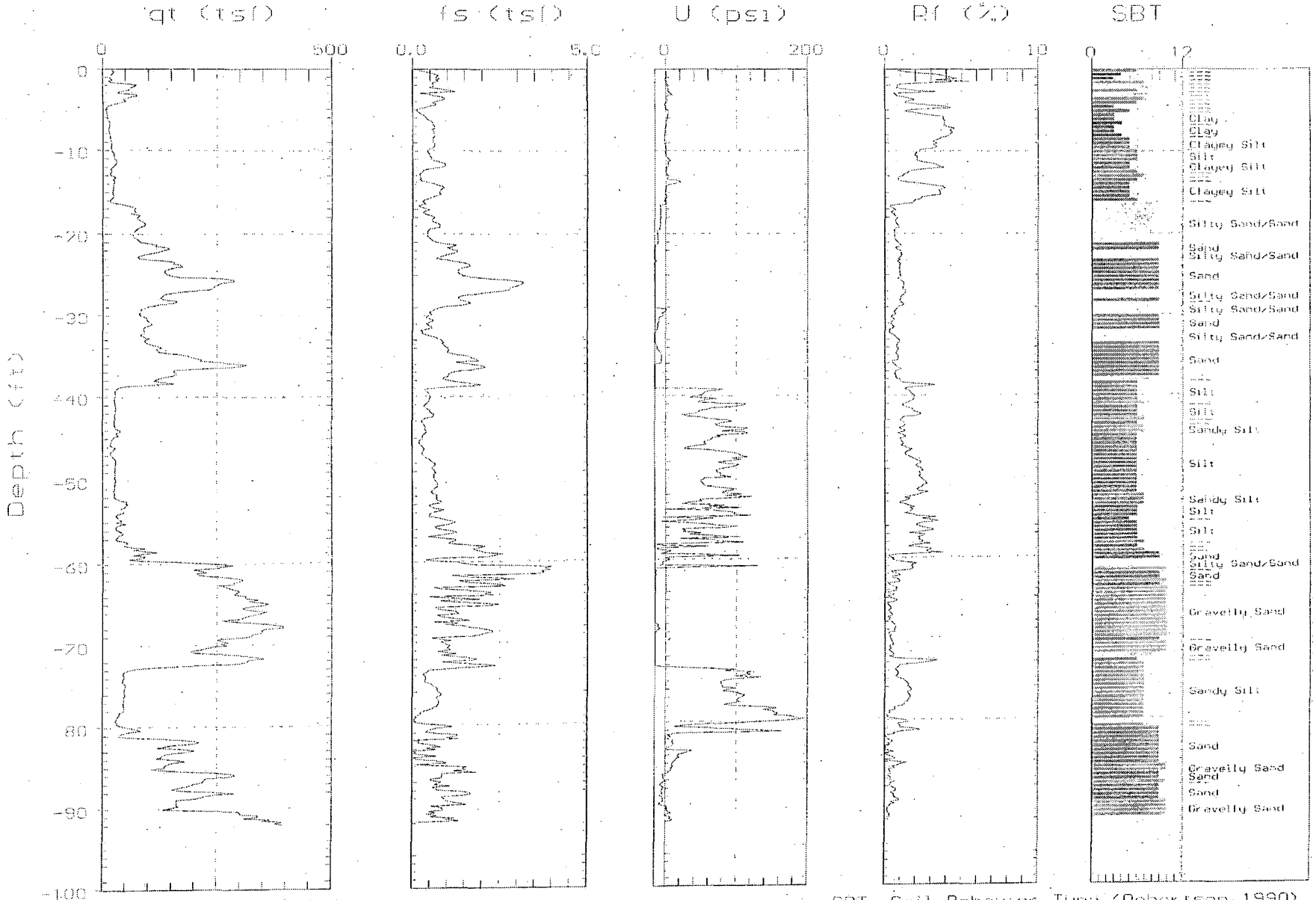
Max. Depth: 92.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363788.88 E=2942140.63 Operator: R.AGUILLAR
Location: C-410 ELEV=28.93 Date: 12/05/06 12:44



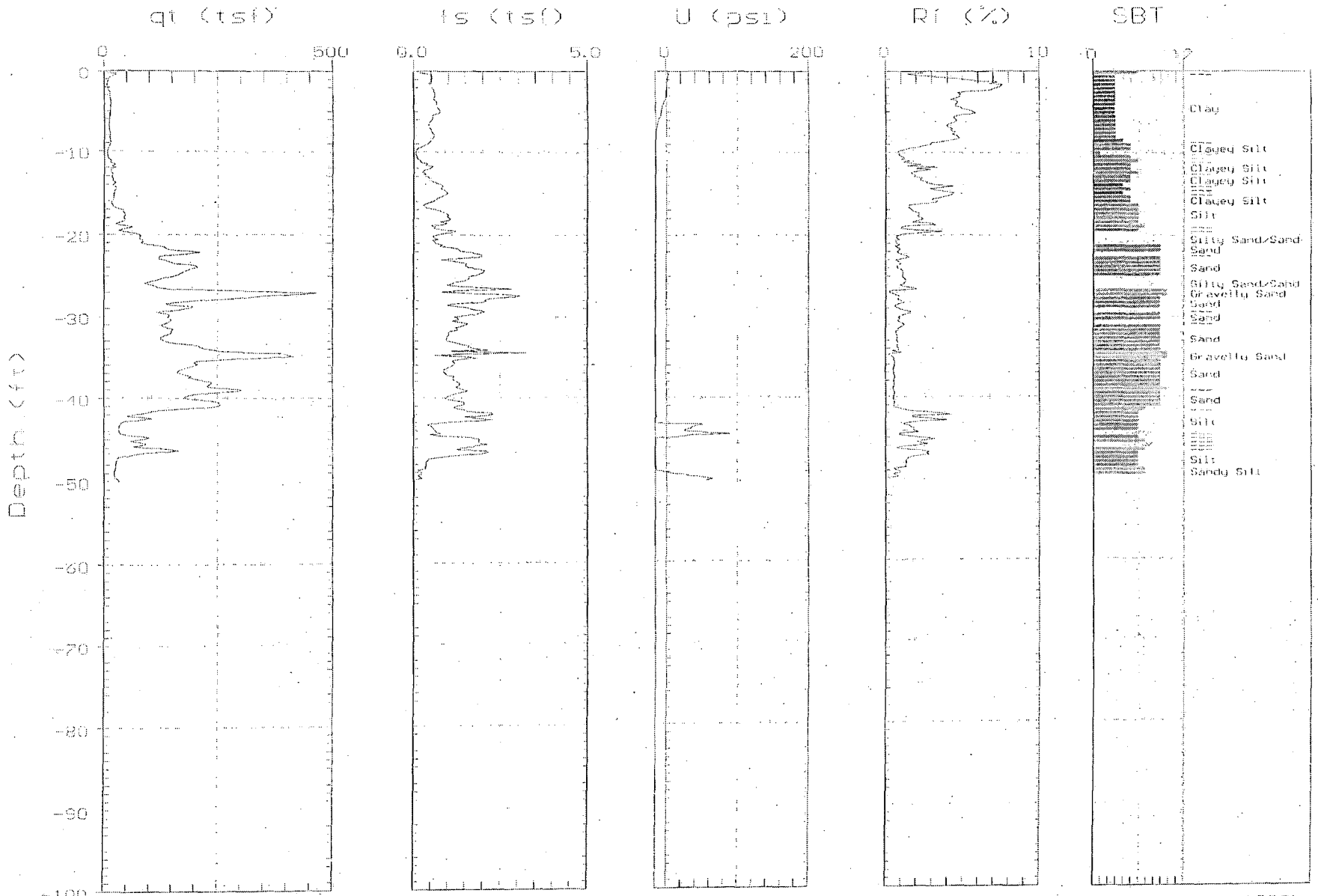
Max. Depth: 92.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362902.74 E=2942803.77 Operator: R.AGUILLAR
Location: C-411ELEV=31.10 Date: 12/02/06 06:37



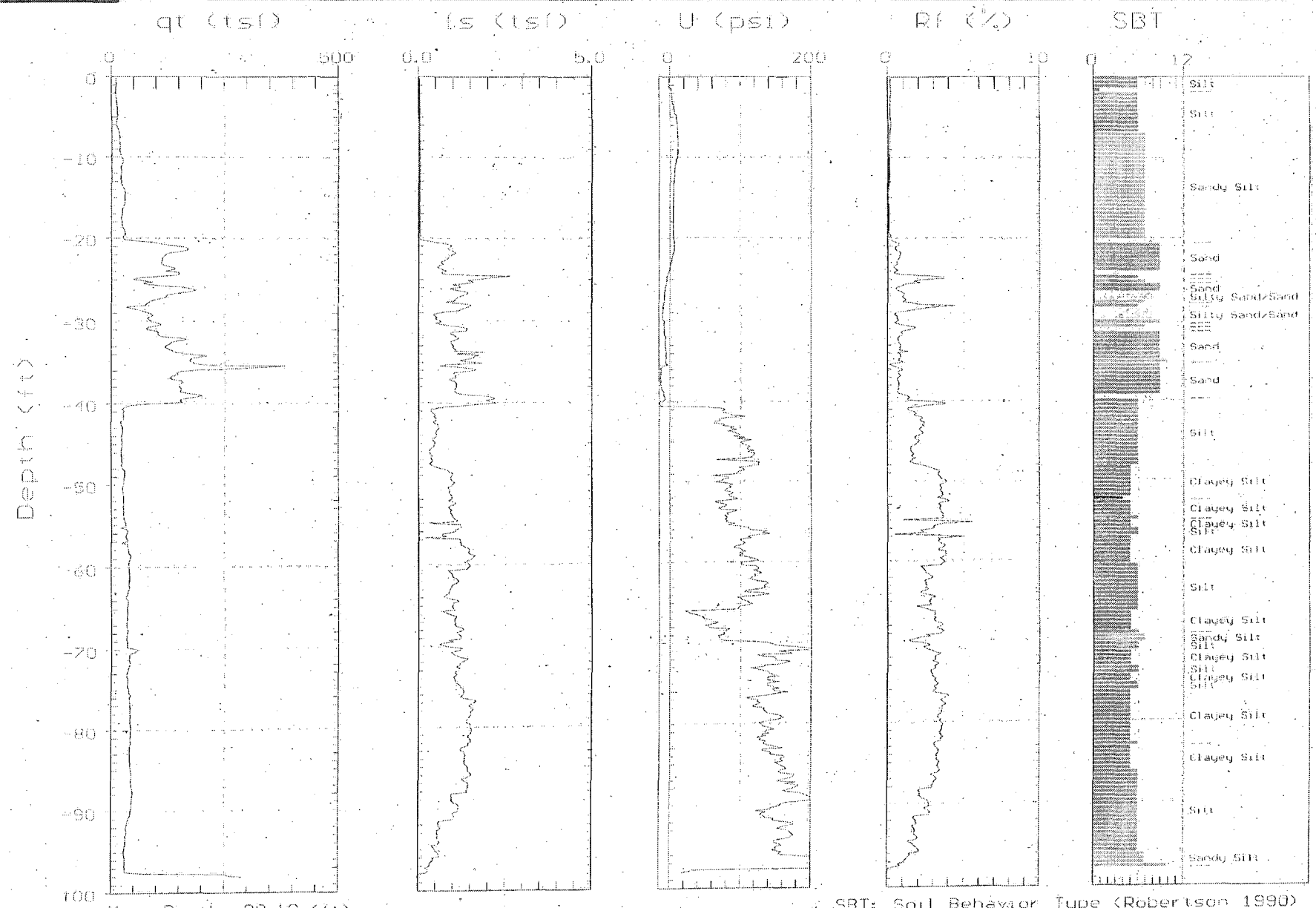
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363539.44 E=2941694.20 Operator: R.AGUILLAR
Location: C-901ELEV=29.57 Date: 12/17/06 08:28



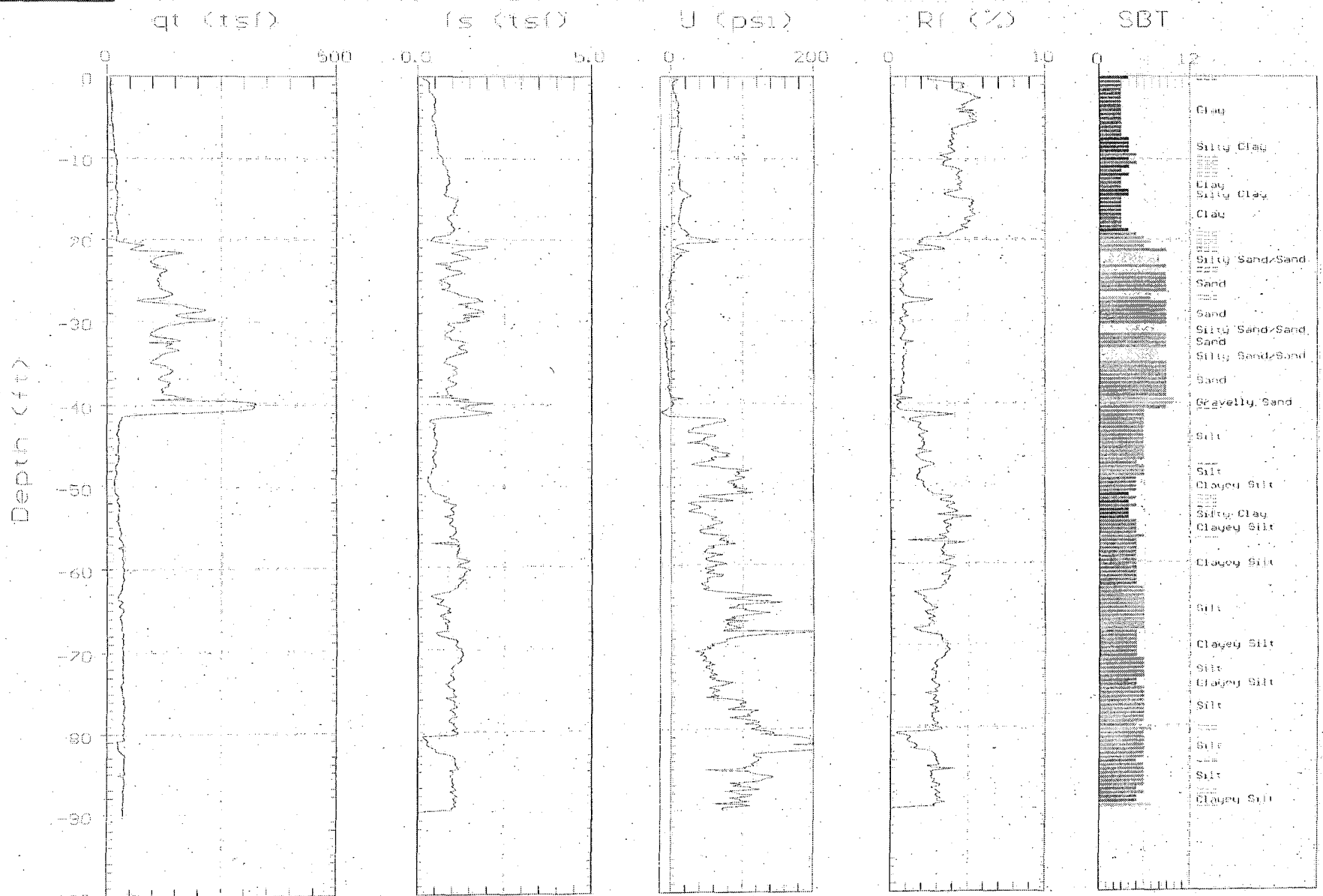
Max. Depth: 98.10 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363448.19 E=2941623.82 Operator:R.AGUILLAR
Location:C-902ELEV=28.94 Date:12/17/06 12:00



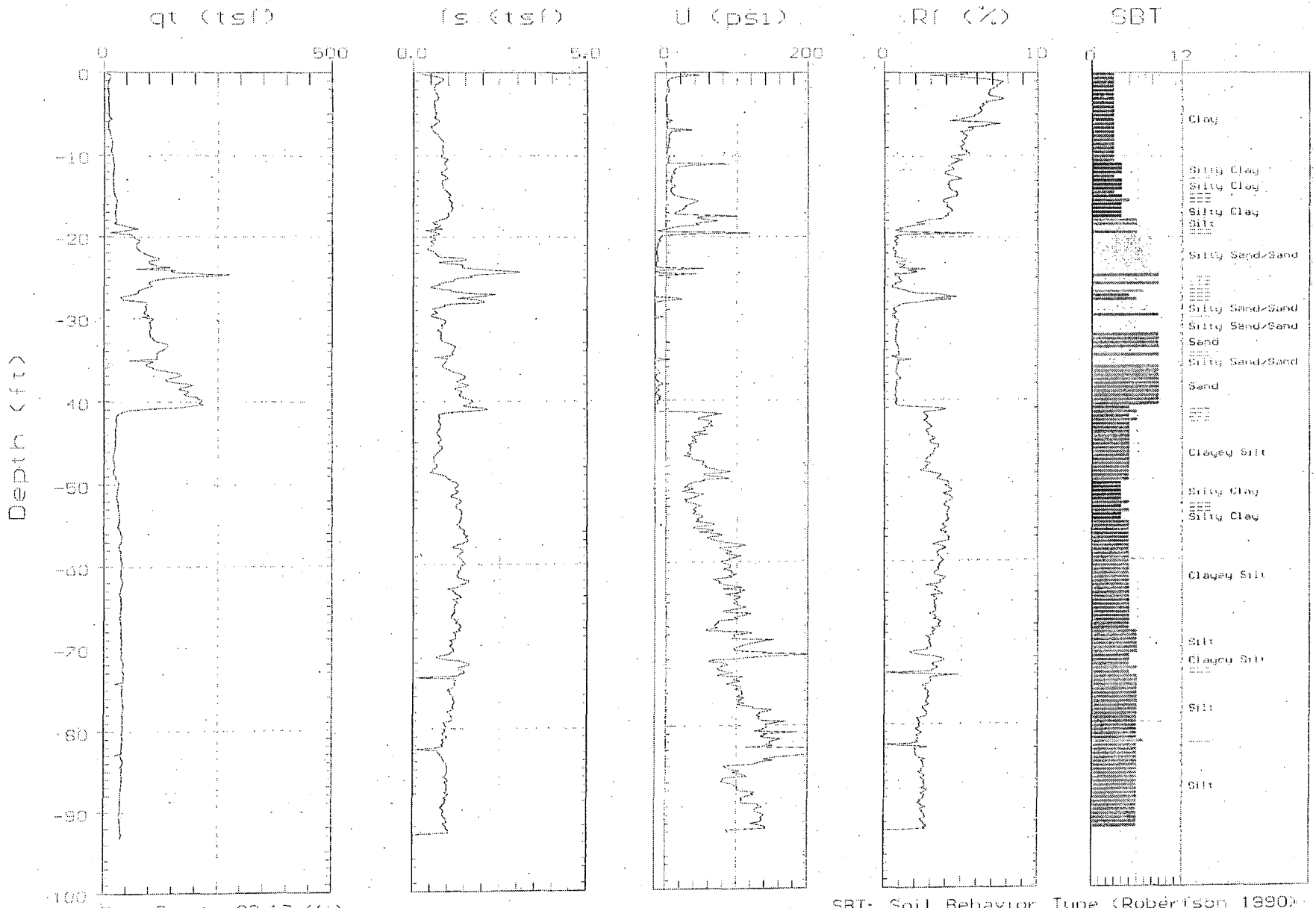
Max. Depth: 90.06 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363466.93 E=2941498.80 Operator: R.AGUILLAR
Location: C-903ELEV=29.22 Date: 12/18/06 06:42



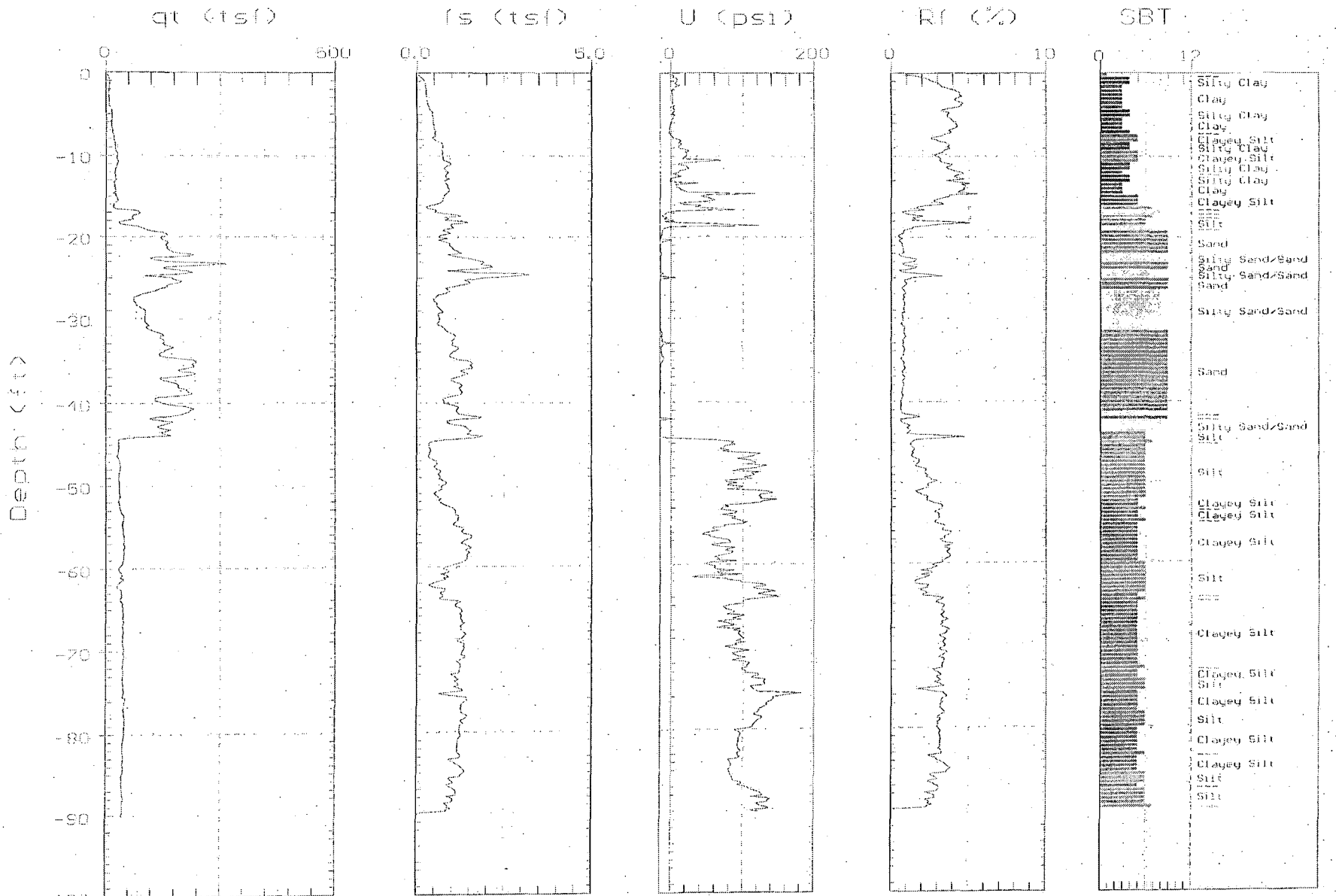
Max. Depth: 93.17 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363392.47 E=2941651.23 Operator: R.NGUILLAR
Location: C-90+ELEV=24.17 Date: 12/20/06 05:40



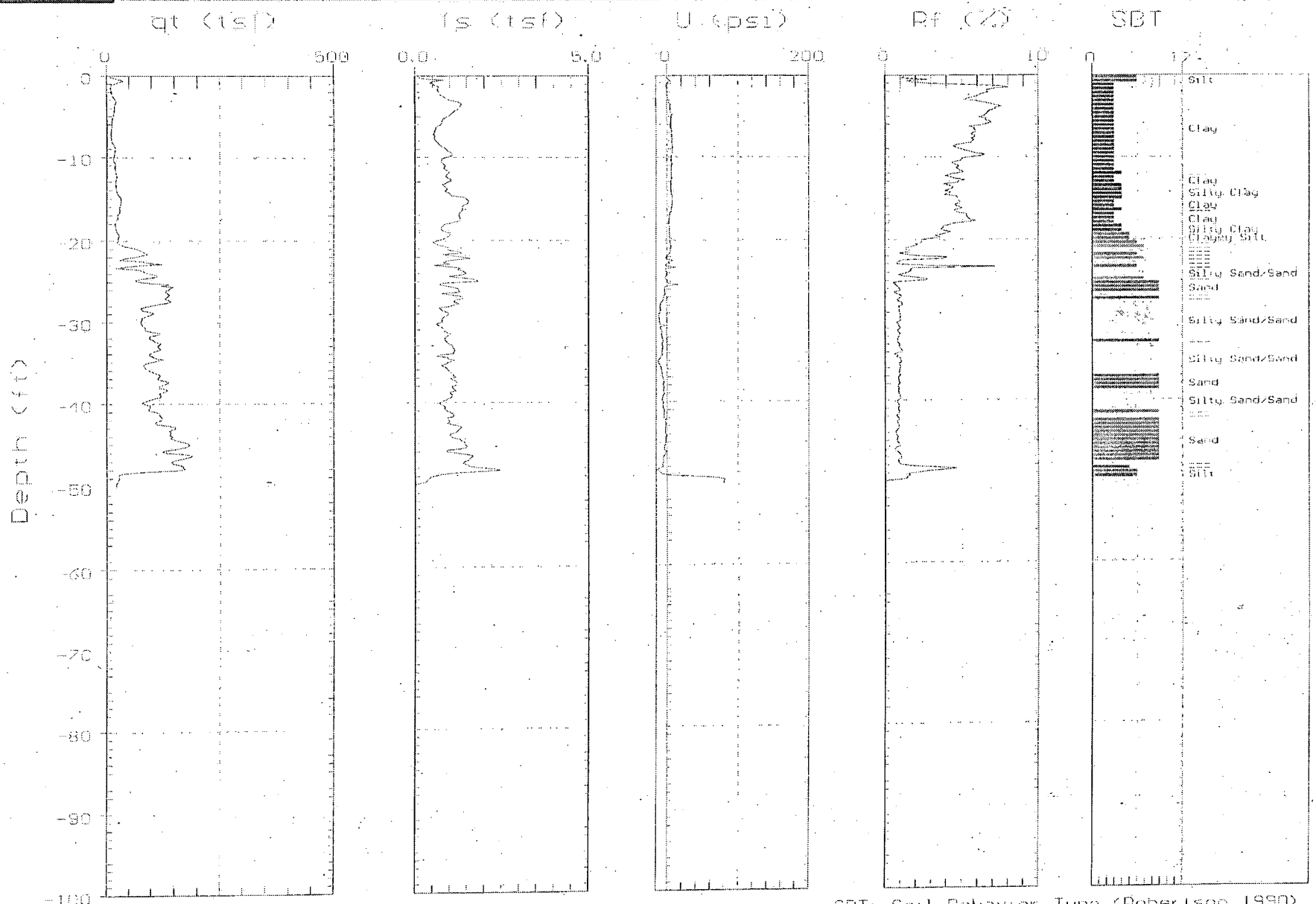
Max. Depth: 90.06 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363298.98 E=2941713.69 Operator: R.AGUILLAR
Location: C-905ELEV=31.21 Date: 12/13/06 14:28



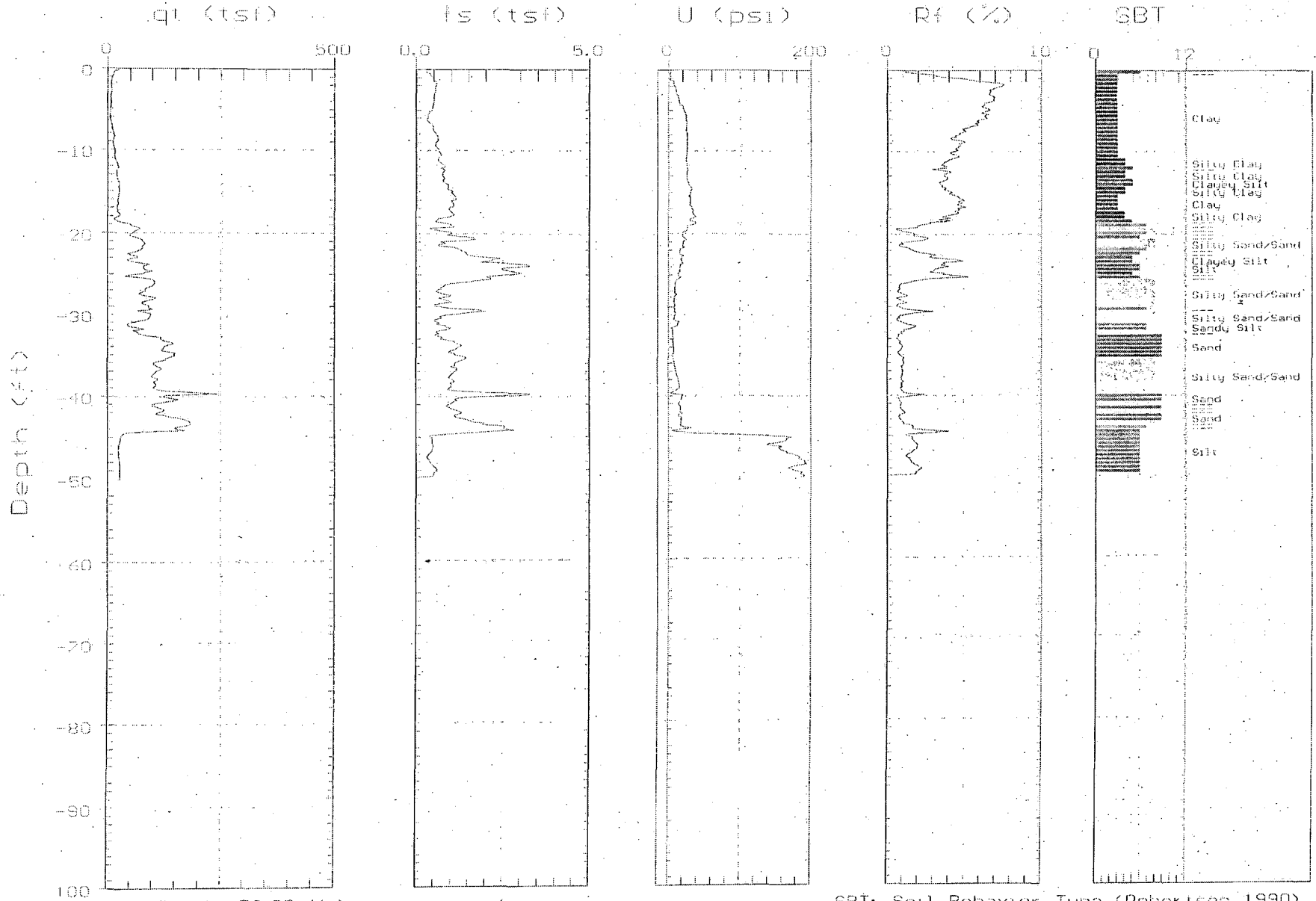
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363212.72 E=2941758.97 Operator:R.AGUILLAR
Location:C-906ELEV=30.19 Date:12/18/06 12:40



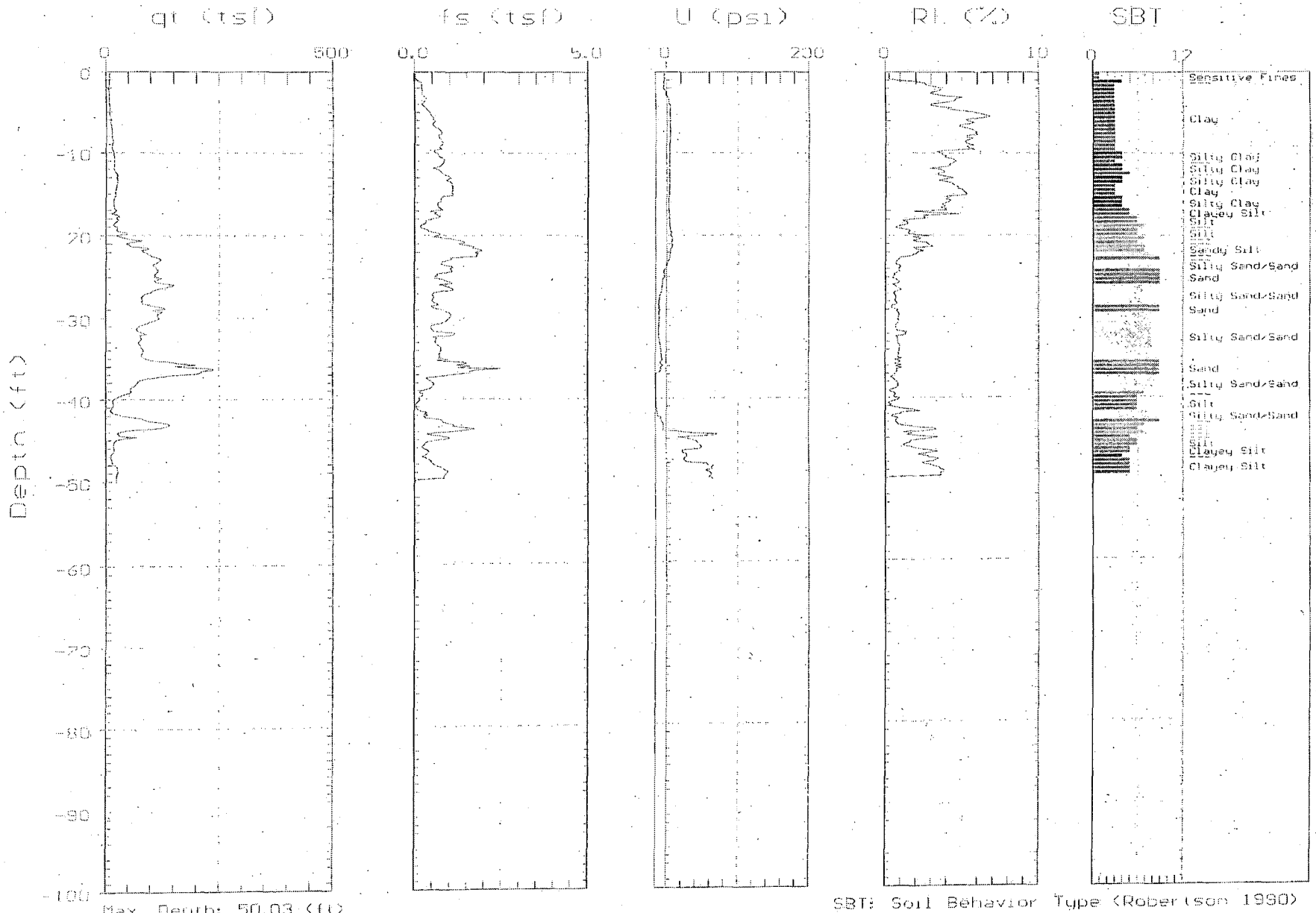
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363219.02 E=2941968.73 Operator: R.AGUILLAR
Location: C-907ELEV=28.53 Date: 12/16/06 13:57



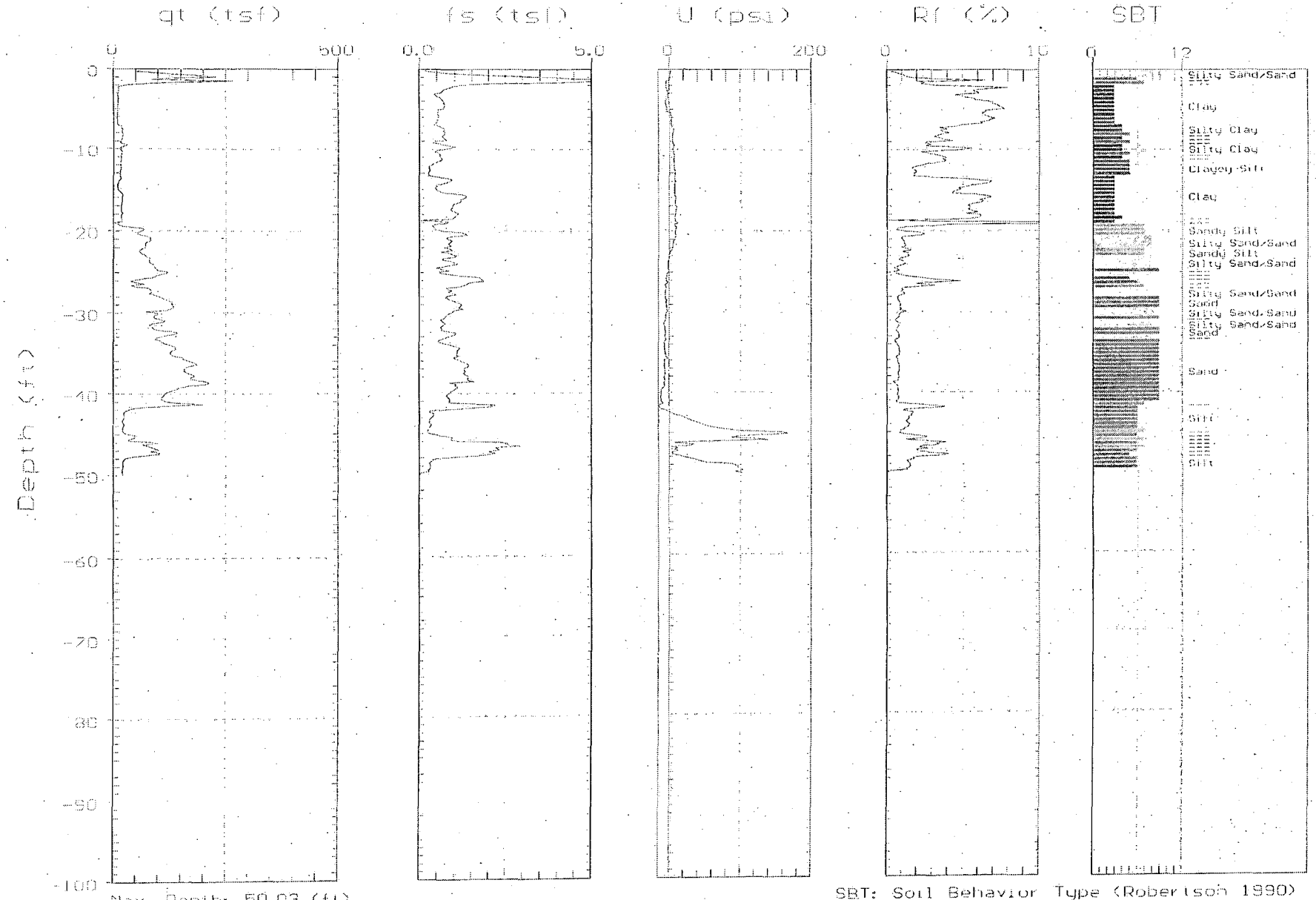
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363219.72 E=2942082.33 Operator:R.AGUILLAR
Location:C-908ELEV=30.89 Date:12/16/06 13:11



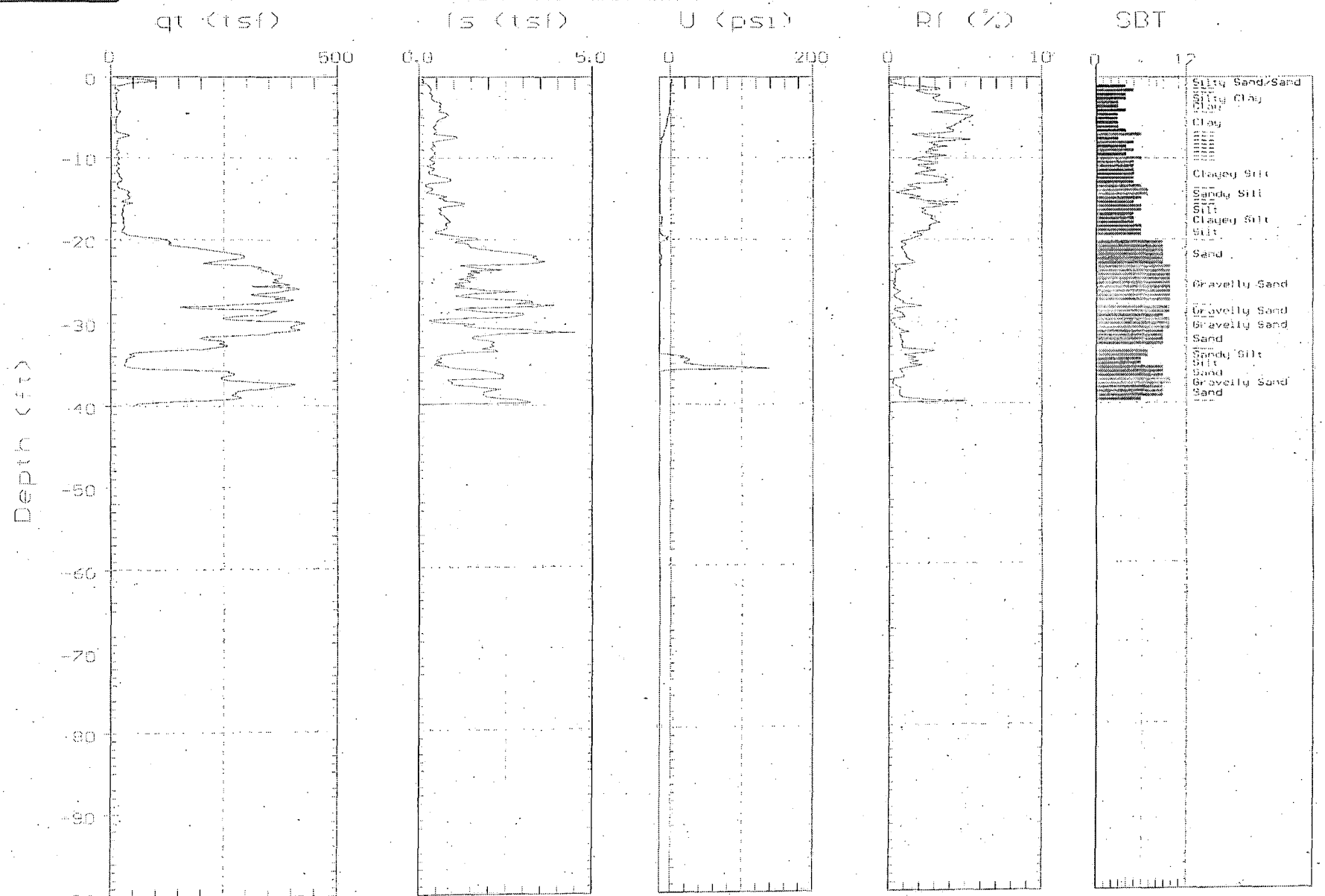
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363464.25 E=2943948.29 Operator:R.AGUILLAR
Location:C-909ELEV=30.22 Date:12/02/06 08:08



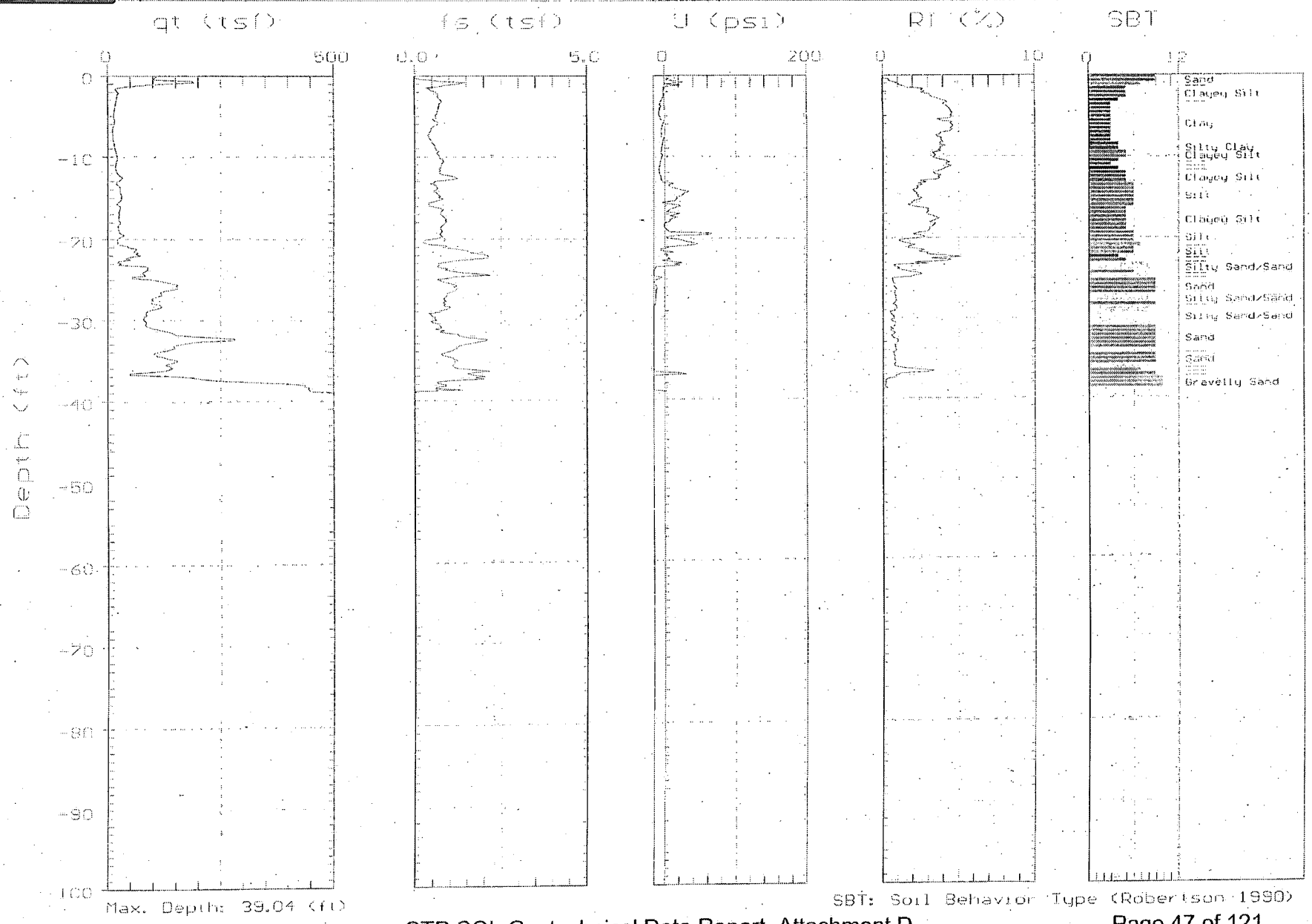
Max. Depth: 40.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363217.32 E=2941280.50 Operator: R.AGUILLAR
Location: C-916ELEV=31.41 Date: 12/17/06 06:18



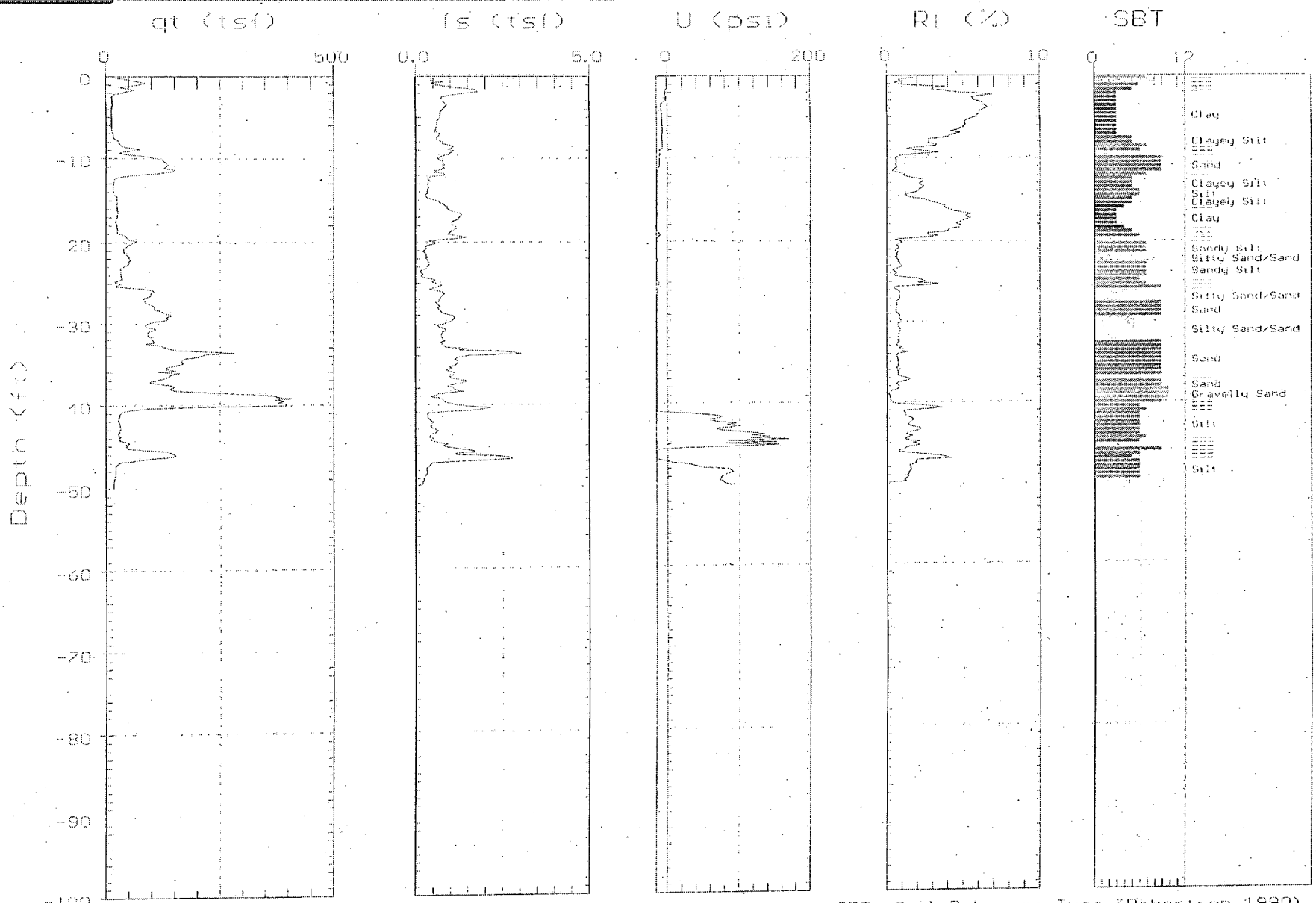
Max. Depth: 39.04 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363281.30 E=2942122.51 Operator:R.AGUILLAR
Location:C-917FLEV=30.65 Date:12/19/06 11:03



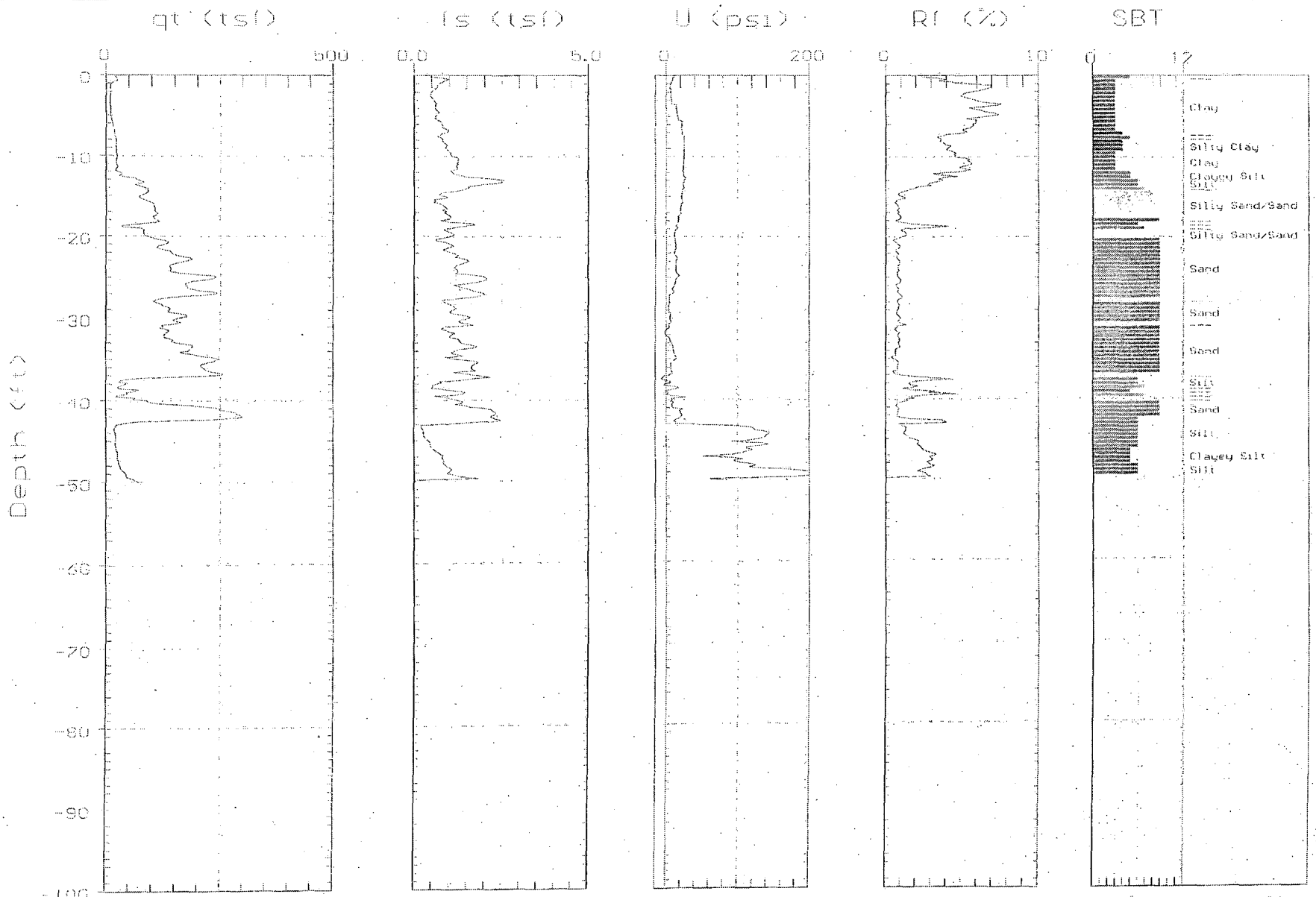
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363484.09 E=2942118.30 Operator:R.AGUILLOR
Location:C-918ELEV=25.36 Date:12/18/06 10:33



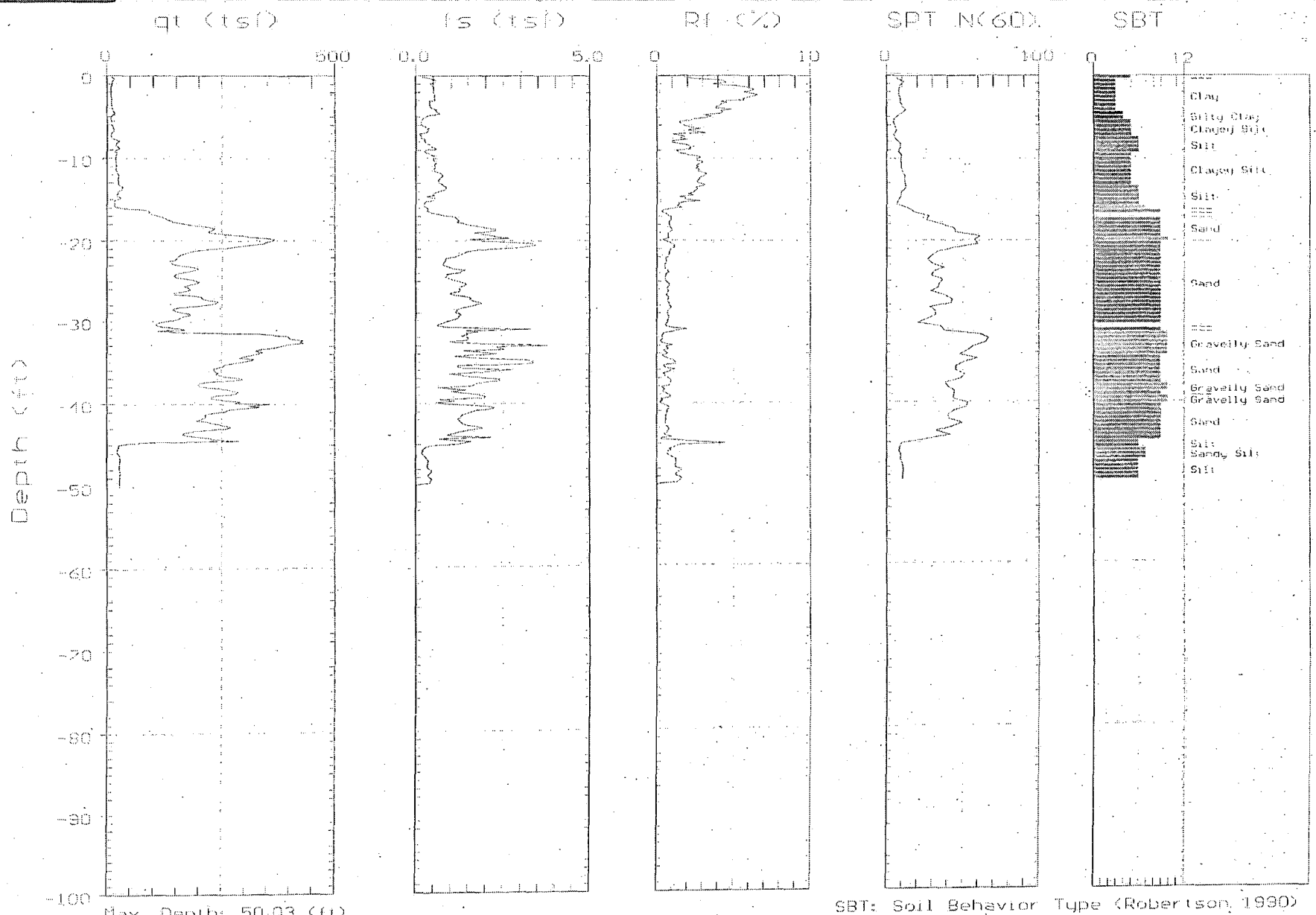
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362772.55 E=2943448.74 Operator: R.AGUILAR
Location: C-301ELEV=27.37 Date: 12/01/06 13:20

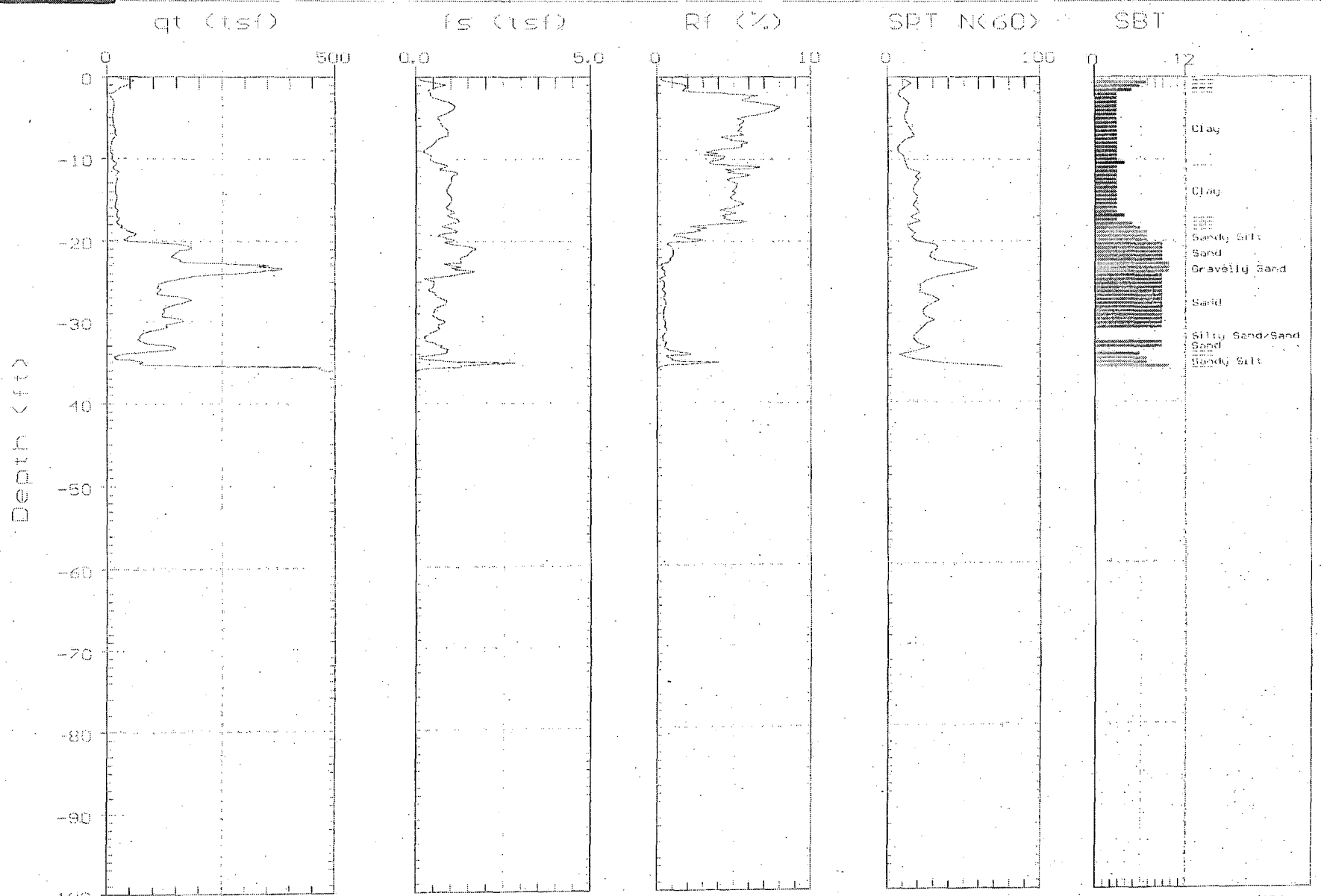


Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

GREGG

MACTEC

Site: N=362824.38 E=2943502.25 Operator: R.AGUILLAR
Location: C-302ELEV=28.22 Date: 11/29/06 12:54



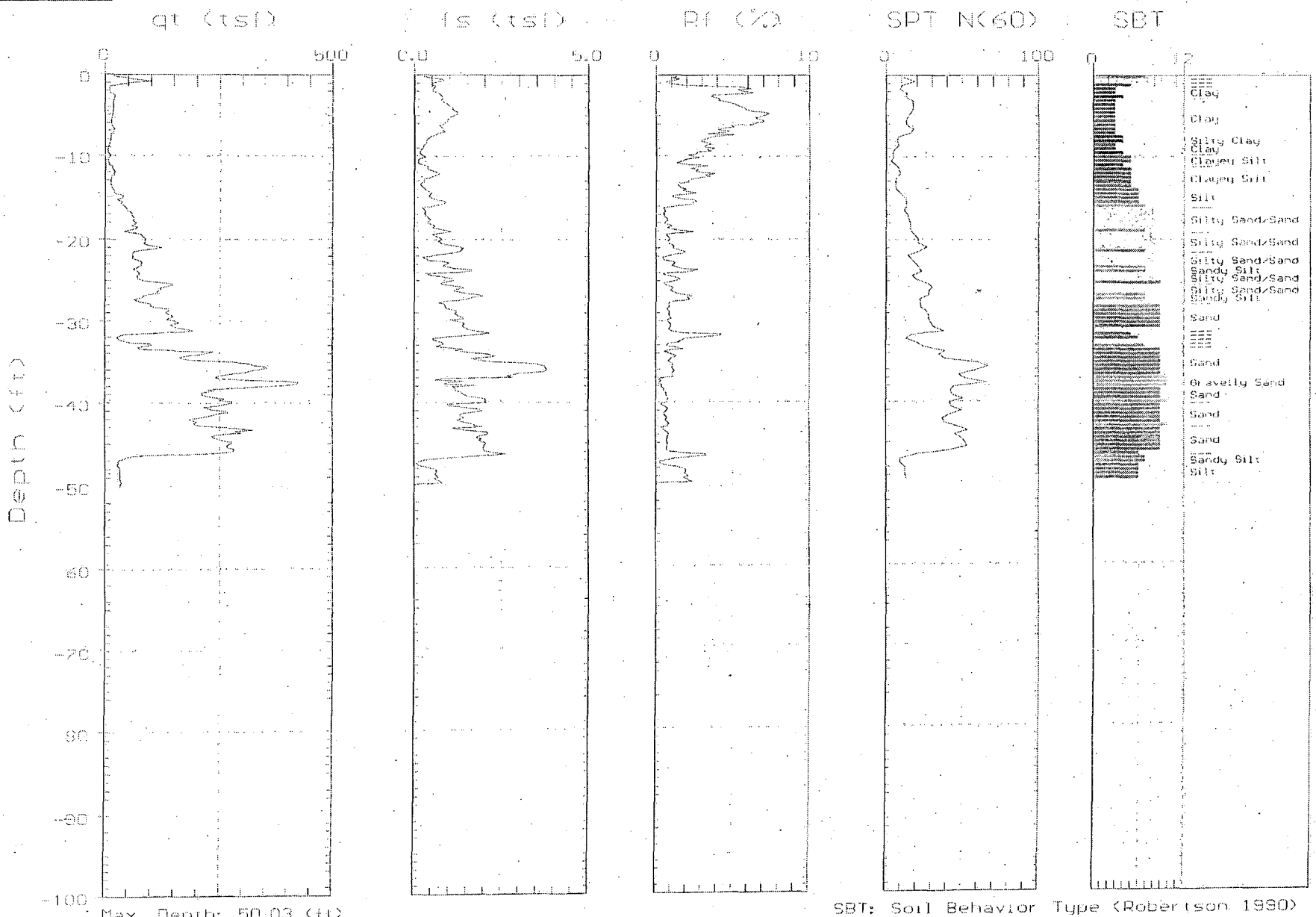
Max. Depth: 36.09 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362823.77 E=2943190.19 Operator: R.AGUILLAR
Location: C-303F1 ELEV=30.19 Date: 12/01/06 12:02



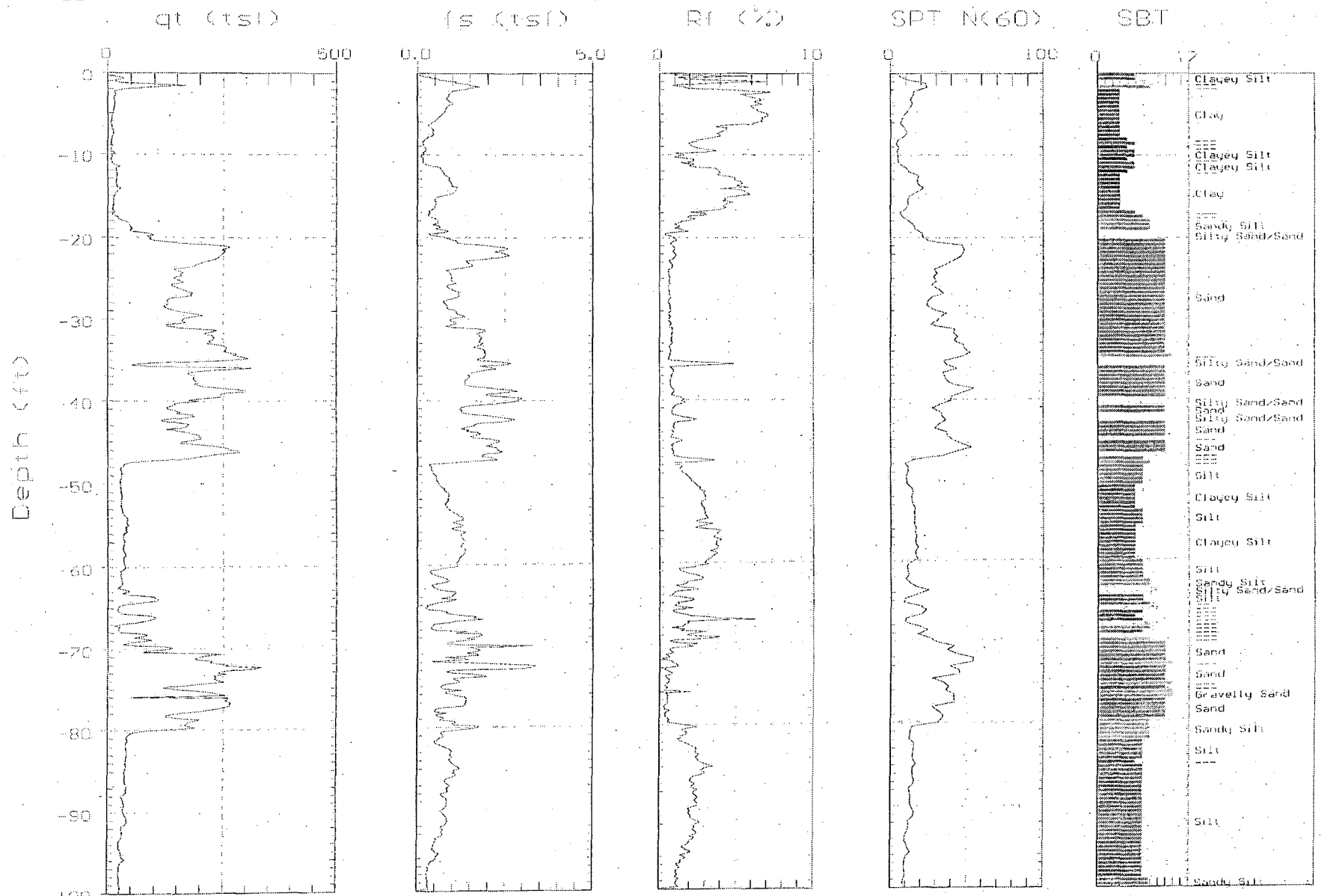
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362910.77 E=2943394.73 Operator: R.AGUILLAR
Location: C-304ELEV=29.39 Date: 12/15/06 12:01



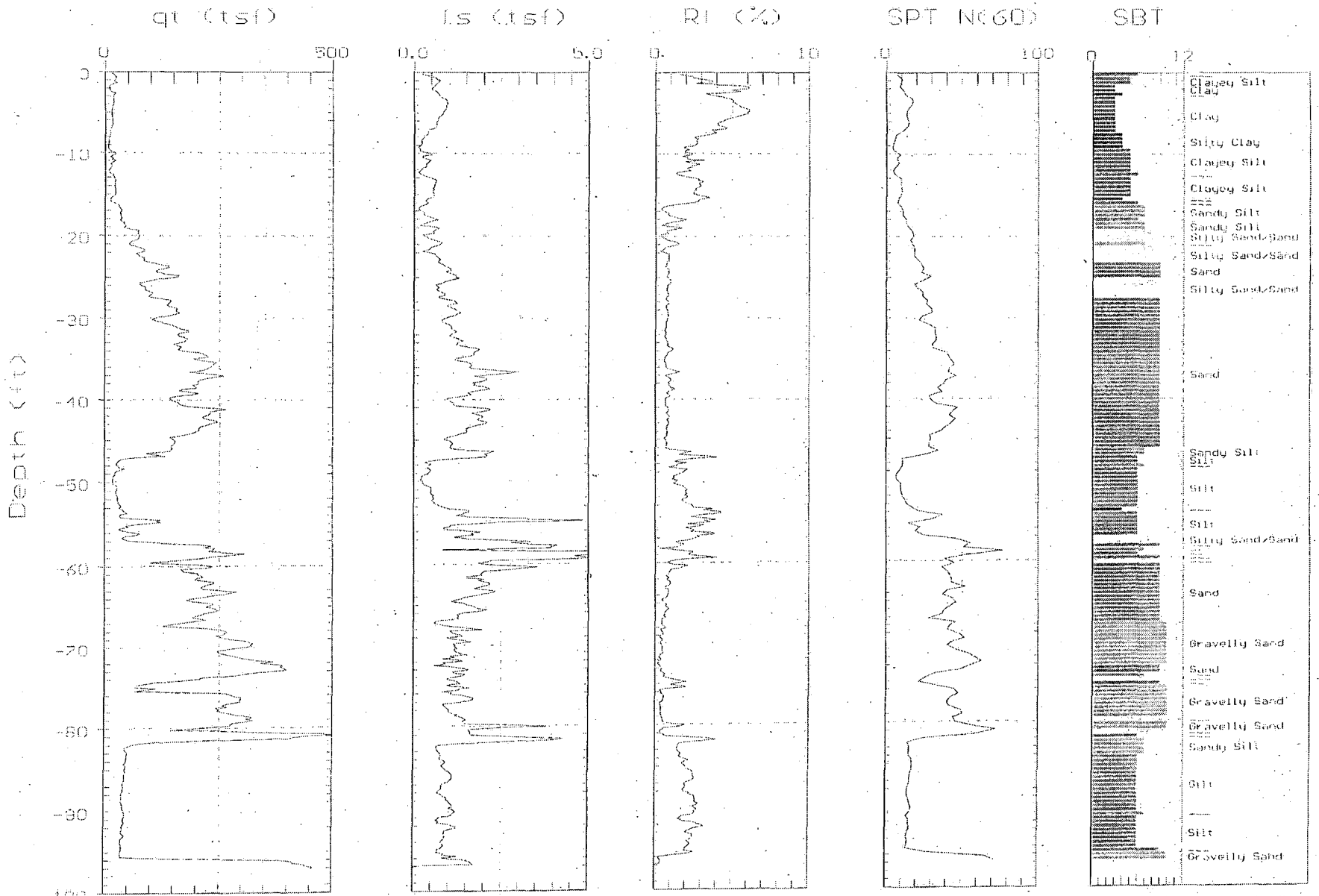
Max. Depth: 100.06 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson, 1990)

GREGG

MACTEC

Site: N=363126.80 E=2913174.06 Operator: R.AGUILLAR
Location: C-305s ELEV=30.88 Date: 12/16/06 06:14



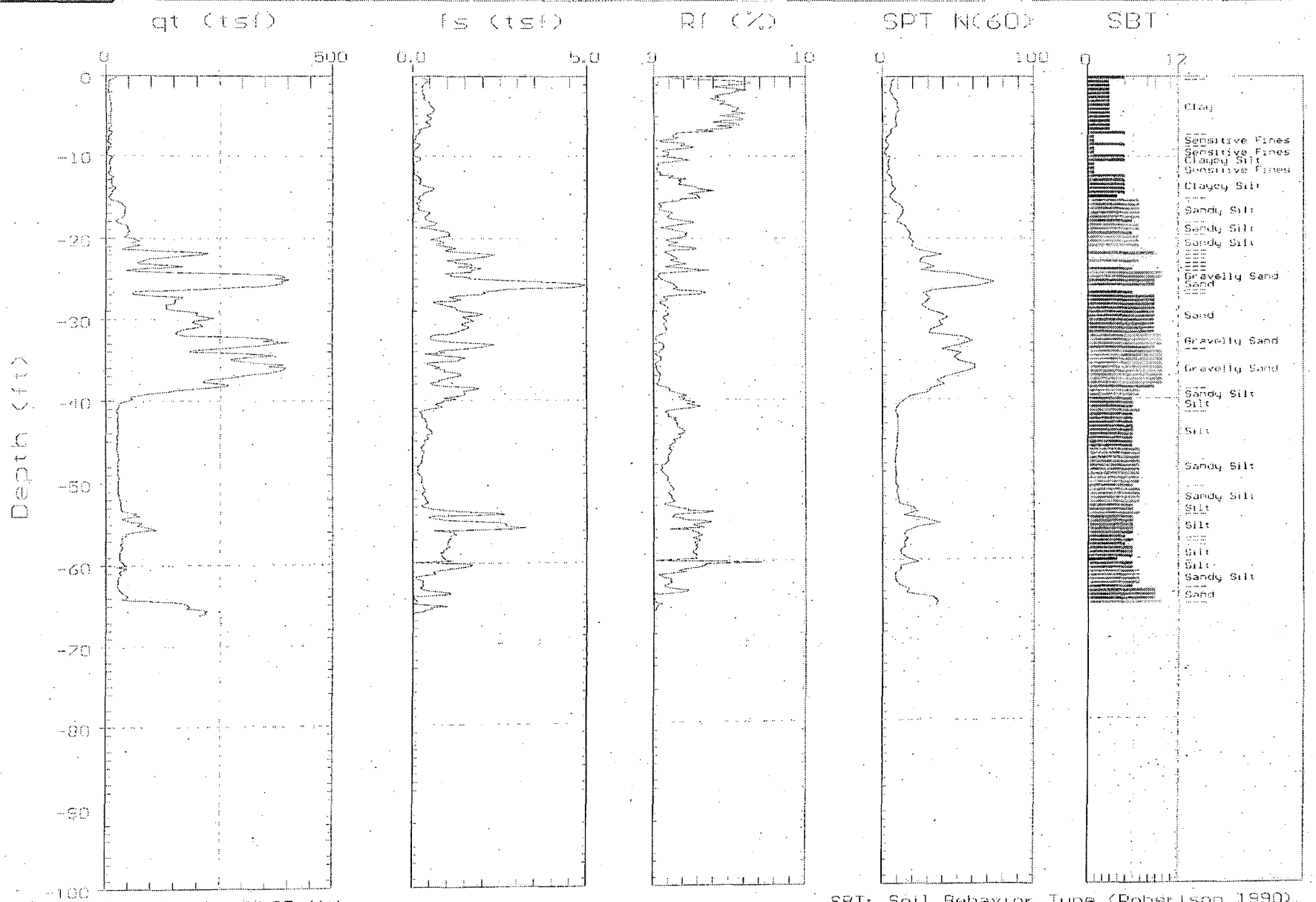
Max. Depth: 97.11 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363183.22 E=2943296.00 Operator: R.AGUILLAR
Location: C-306sELEV=29.68 Date: 11/30/06 06:37



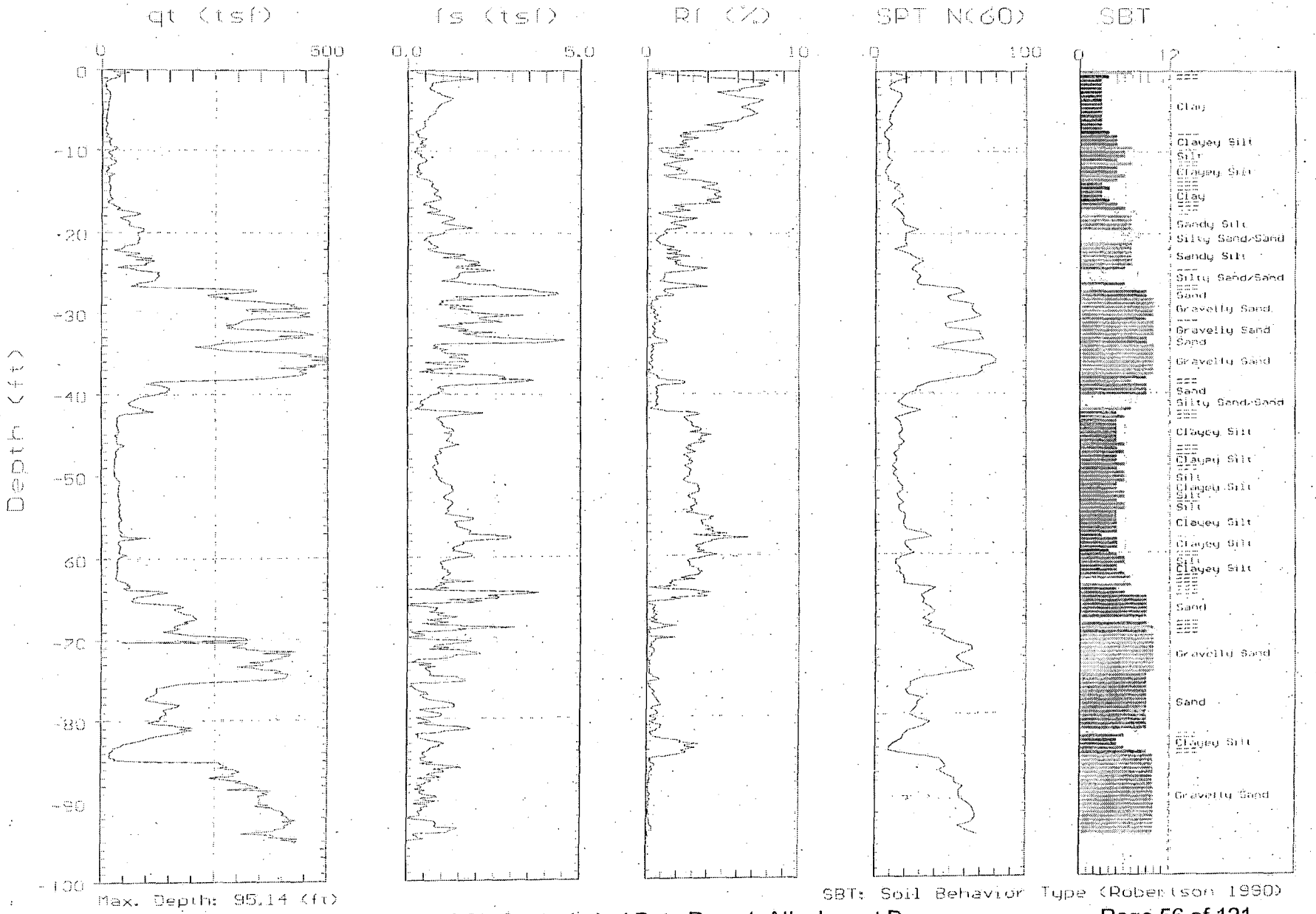
Max. Depth: 66.27 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363573.00 E=2941307.68 Operator:R.AGUILLAR
Location:C-307sELEV=30.02 Date:12/14/06 07:52



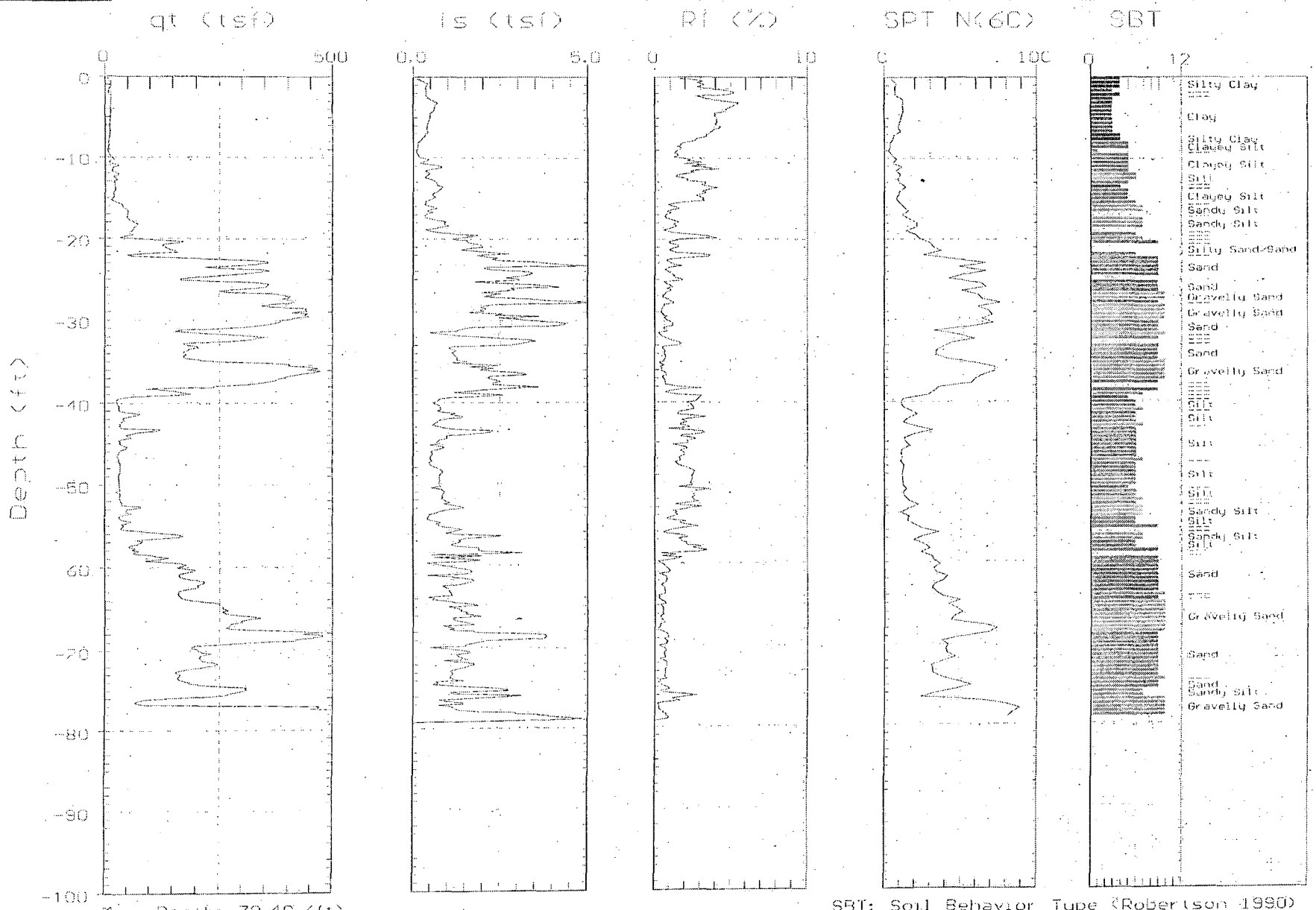
Max. Depth: 95.14 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363711.62 E=2943481.16 Operator:R.AGUILLAR
Location:C-308ELEV=29.89 Date:12/15/06 06:06



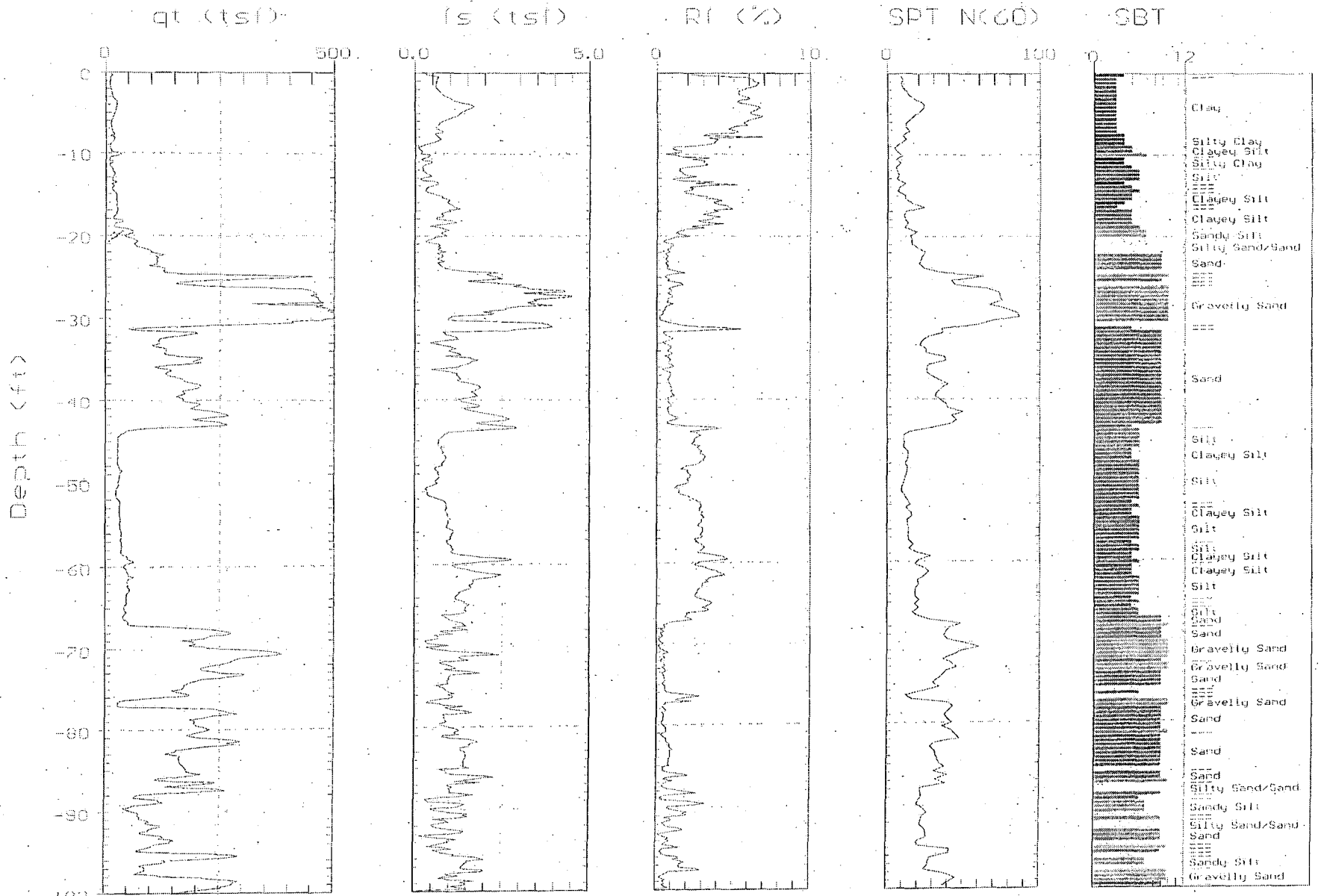
Max. Depth: 79.40 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363680.96 E=2943037.71 Operator: R.AGUILLAR
Location: C-309FLEV=30.69 Date: 12/14/06 12:47



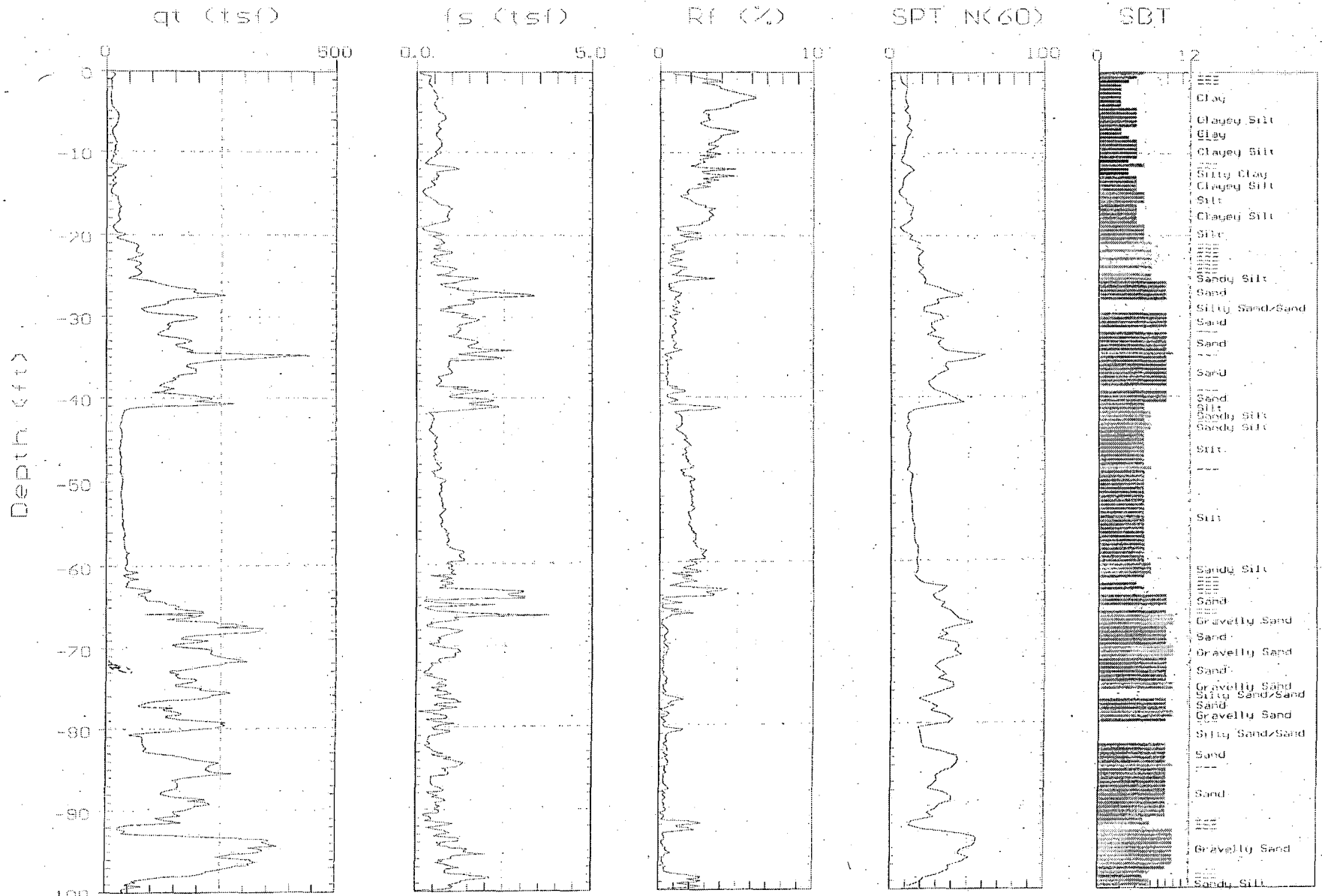
Max. Depth: 100.06 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363792.39 E=2943037.94 Operator: R.AGUILAR
Location: C-310ELEV=31.38 Date: 12/12/06 09:17



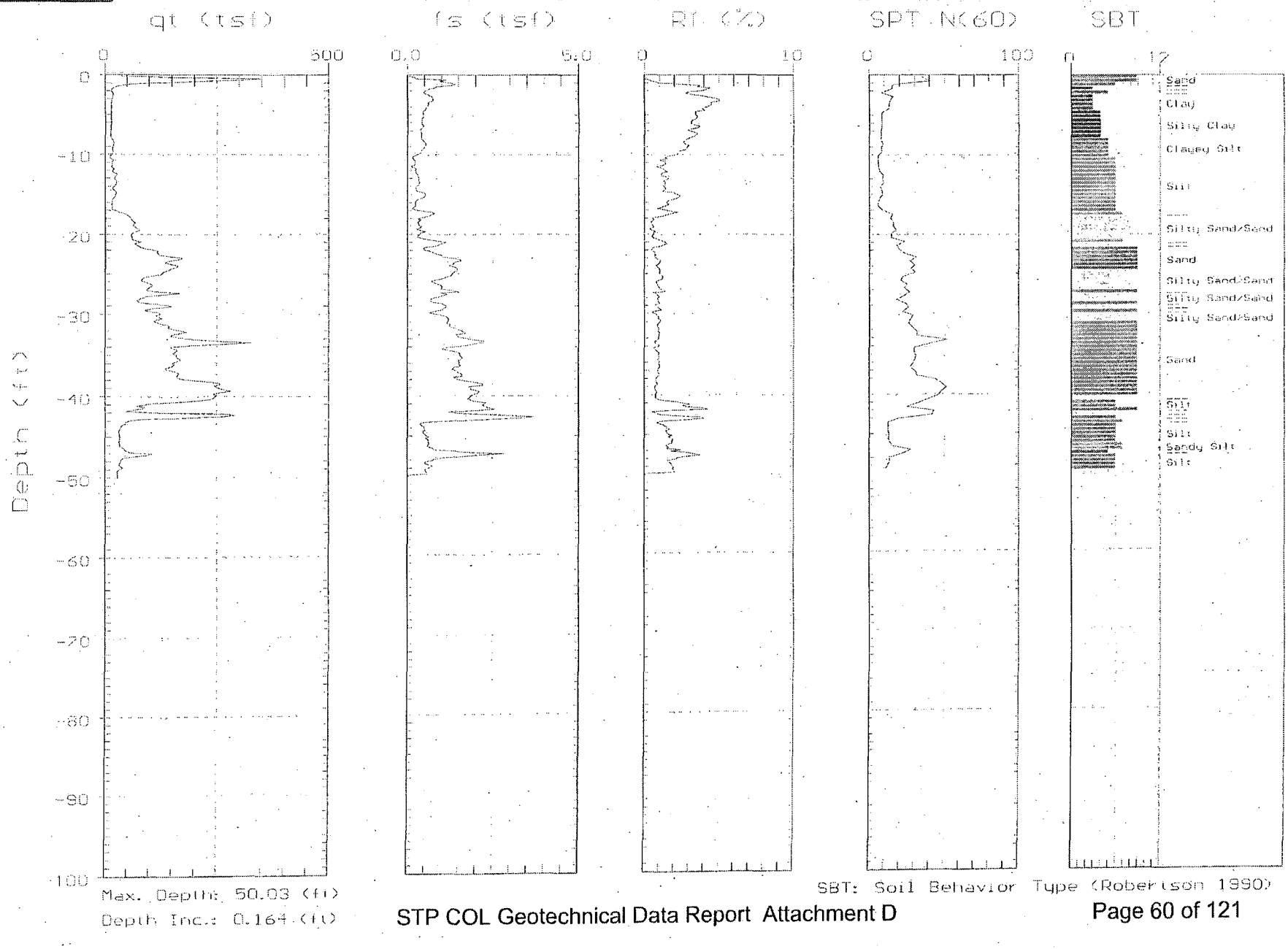
Max. Depth: 100.06 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362772.46 E=2942547.21 Operator: R.AGUILLAR
Location: C-401 ELEV=31.08 Date: 12/01/06 08:27



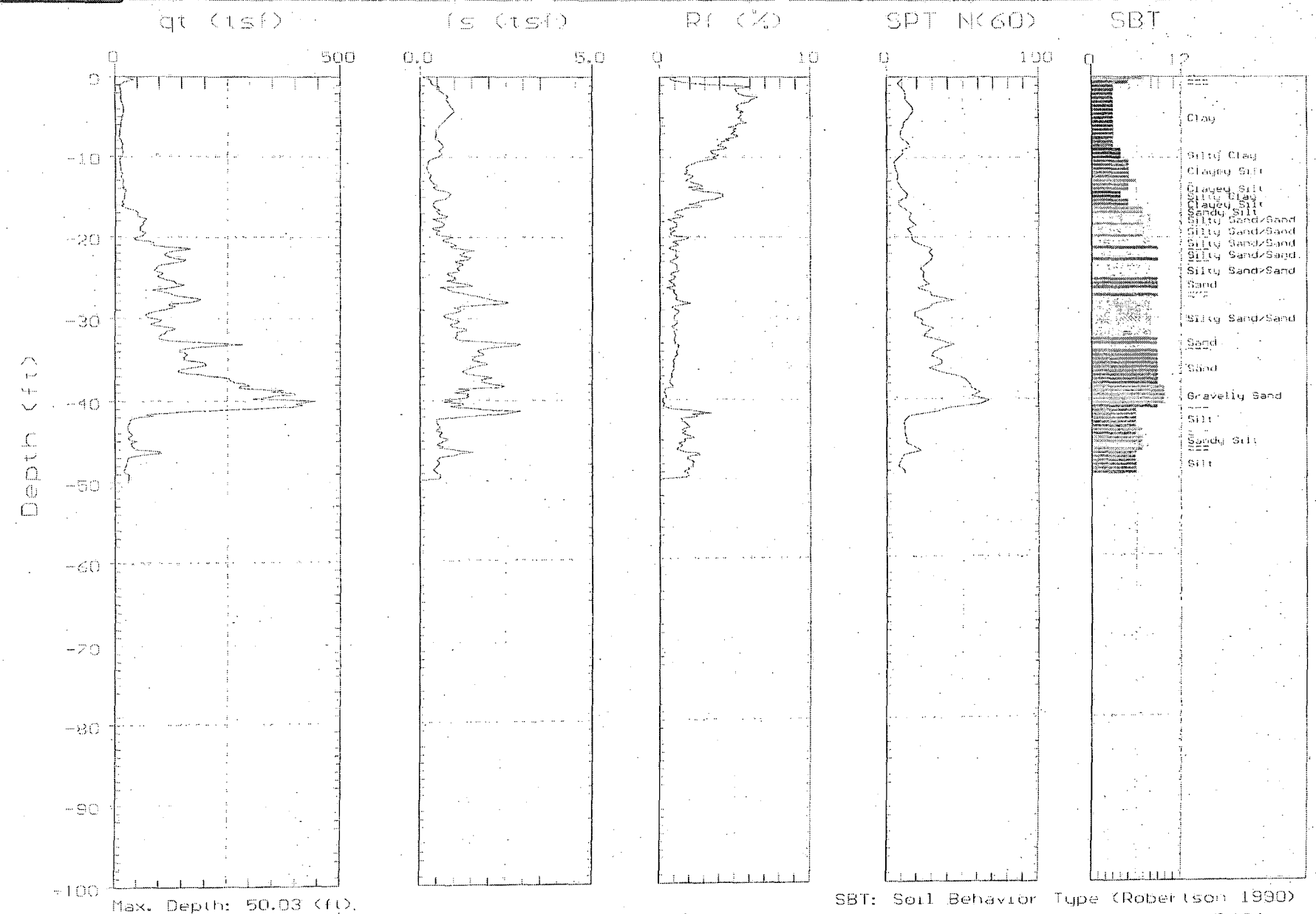
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362824.68 E=2942600.77 Operator: R.AGUILLAR
Location: C-402ELEV=30.82 Date: 12/01/06 09:24



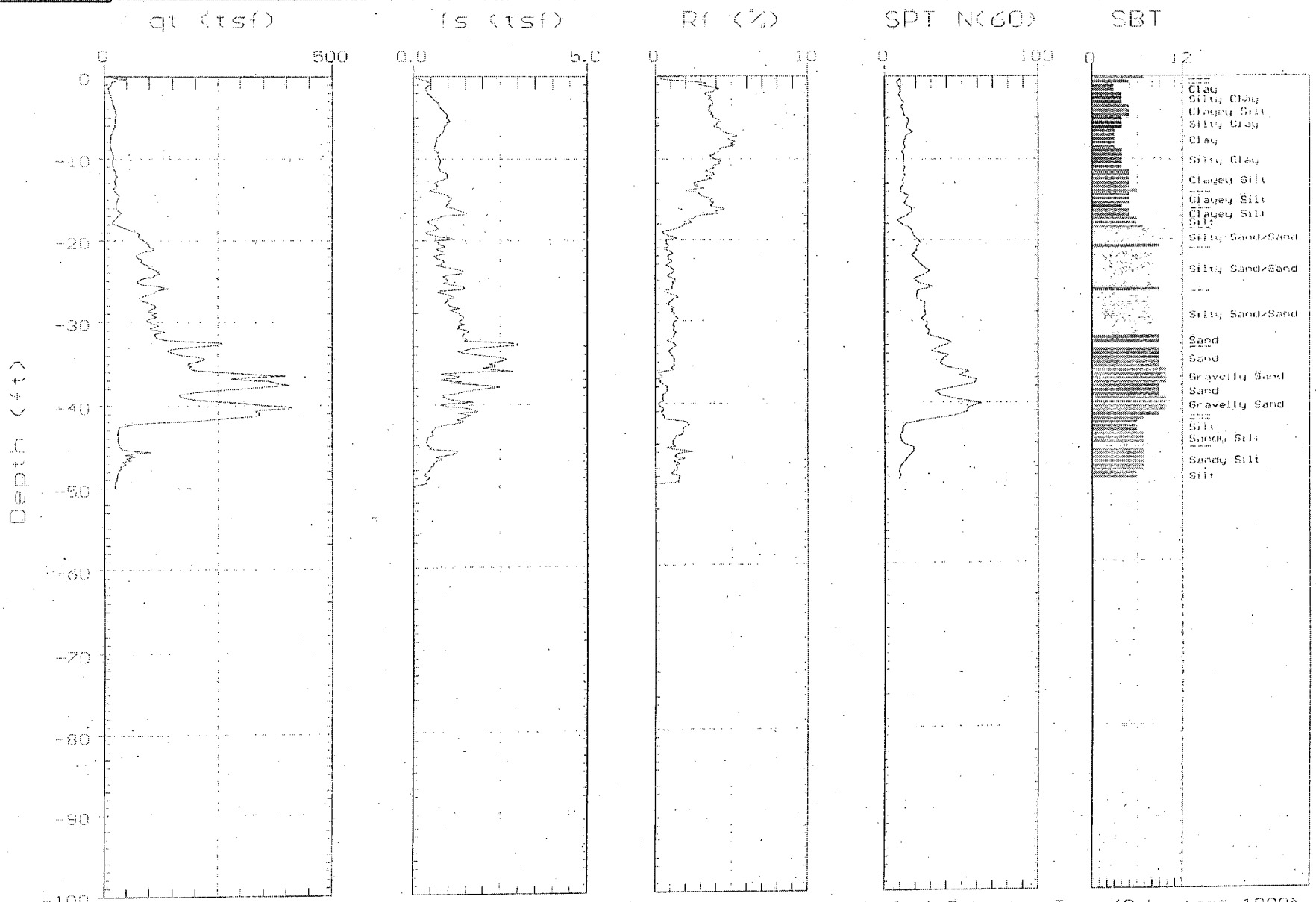
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362825.36 E=2942289.23 Operator: R.ODUELLAR
Location: C-403ELEV=31.59 Date: 12/01/06 07:04

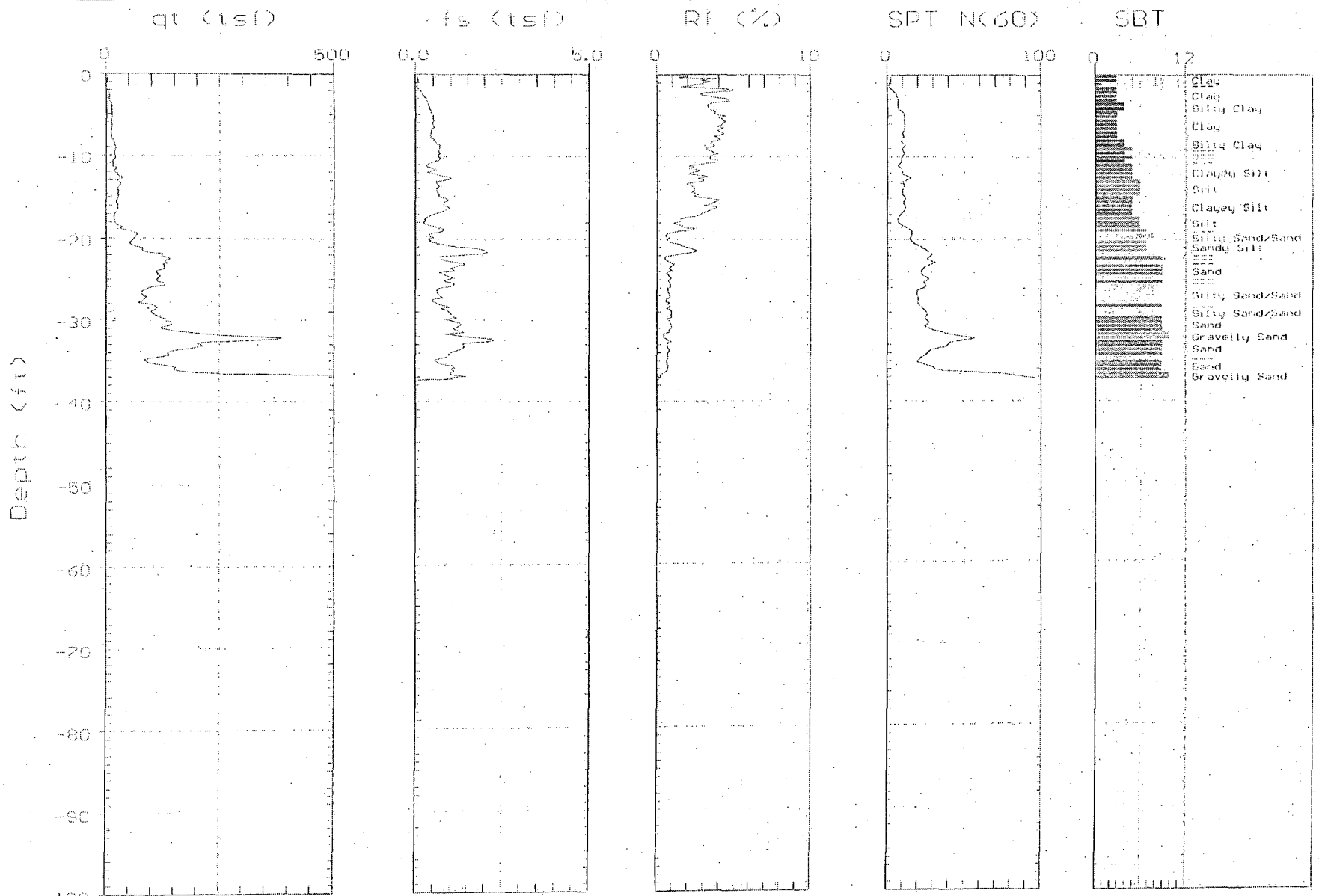


Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG MACTEC

Site: N=362912.73 E=2912499.09 Operator: R.AGUILLAR
Location: C-404ELEV=31.38 Date: 12/19/06 06:37



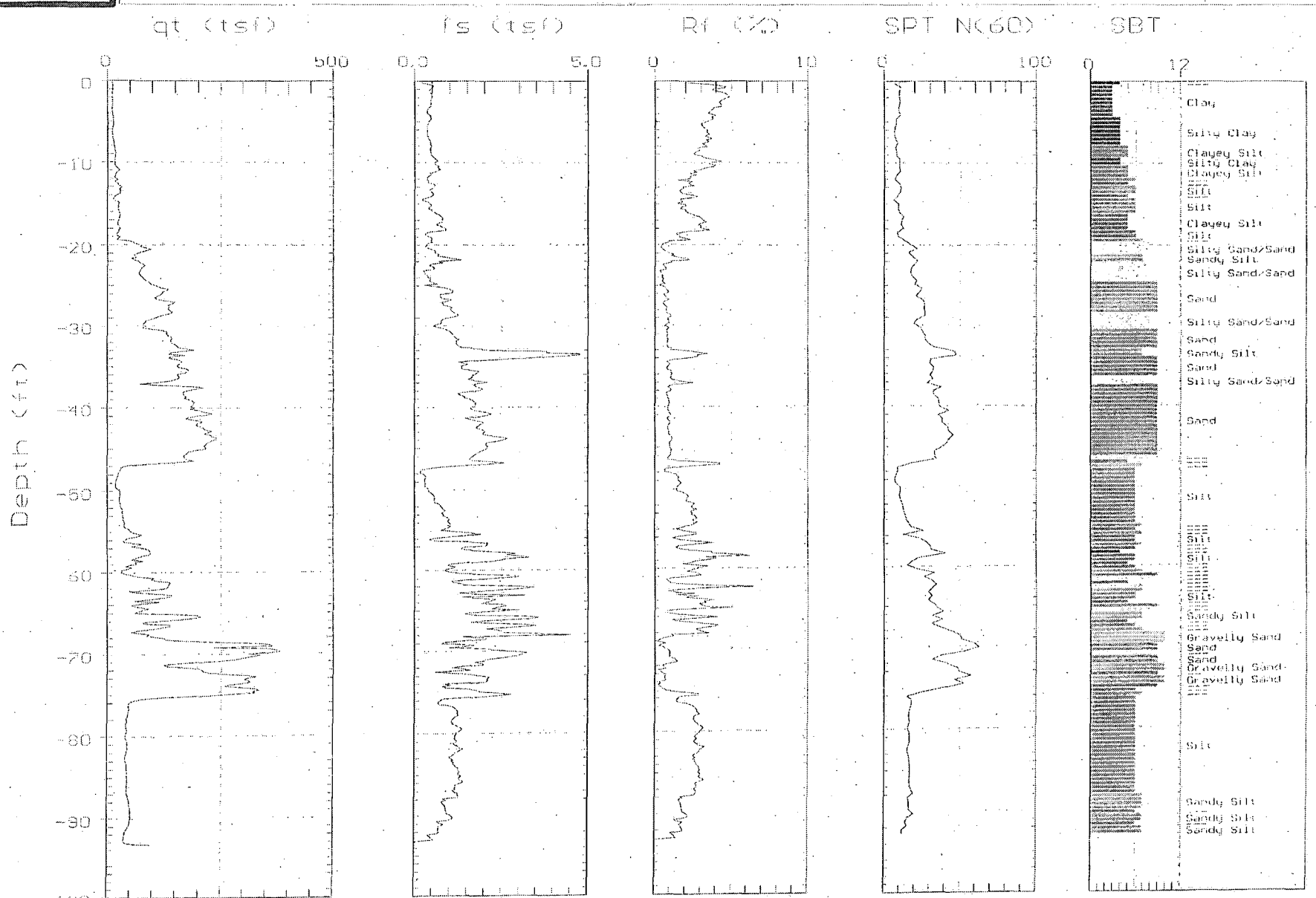
Max. Depth: 37.57 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363481.68 E=2942400.33 Operator: R.AGUILLAR
Location: C-406sELEV=31.05 Date: 12/13/06 08:15



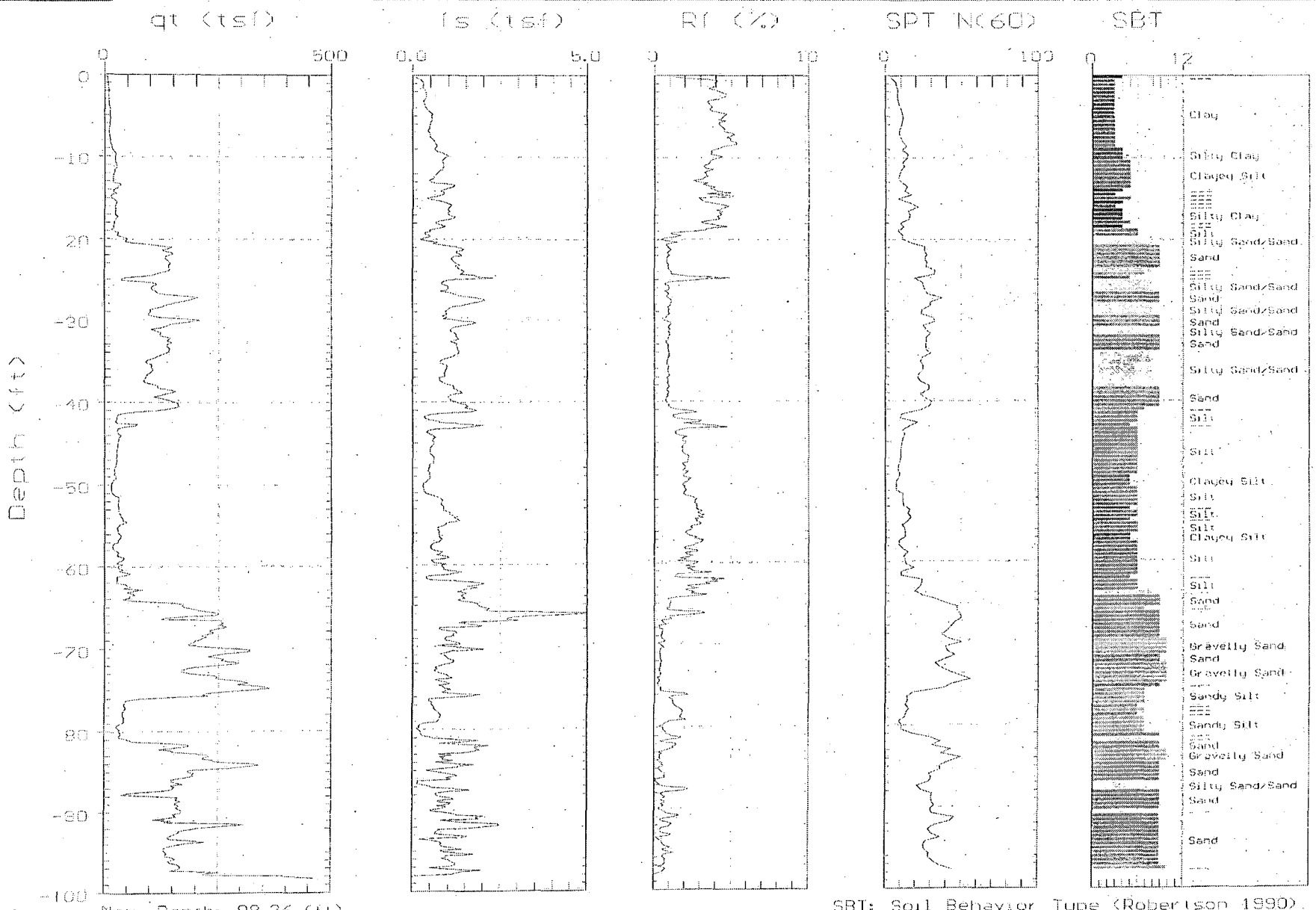
Max. Depth: 93.34 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363570.38 E=2942502.31 Operator:R.AGUILLAR
Location:C-407sELEV=30.79 Date:12/12/06 06:11



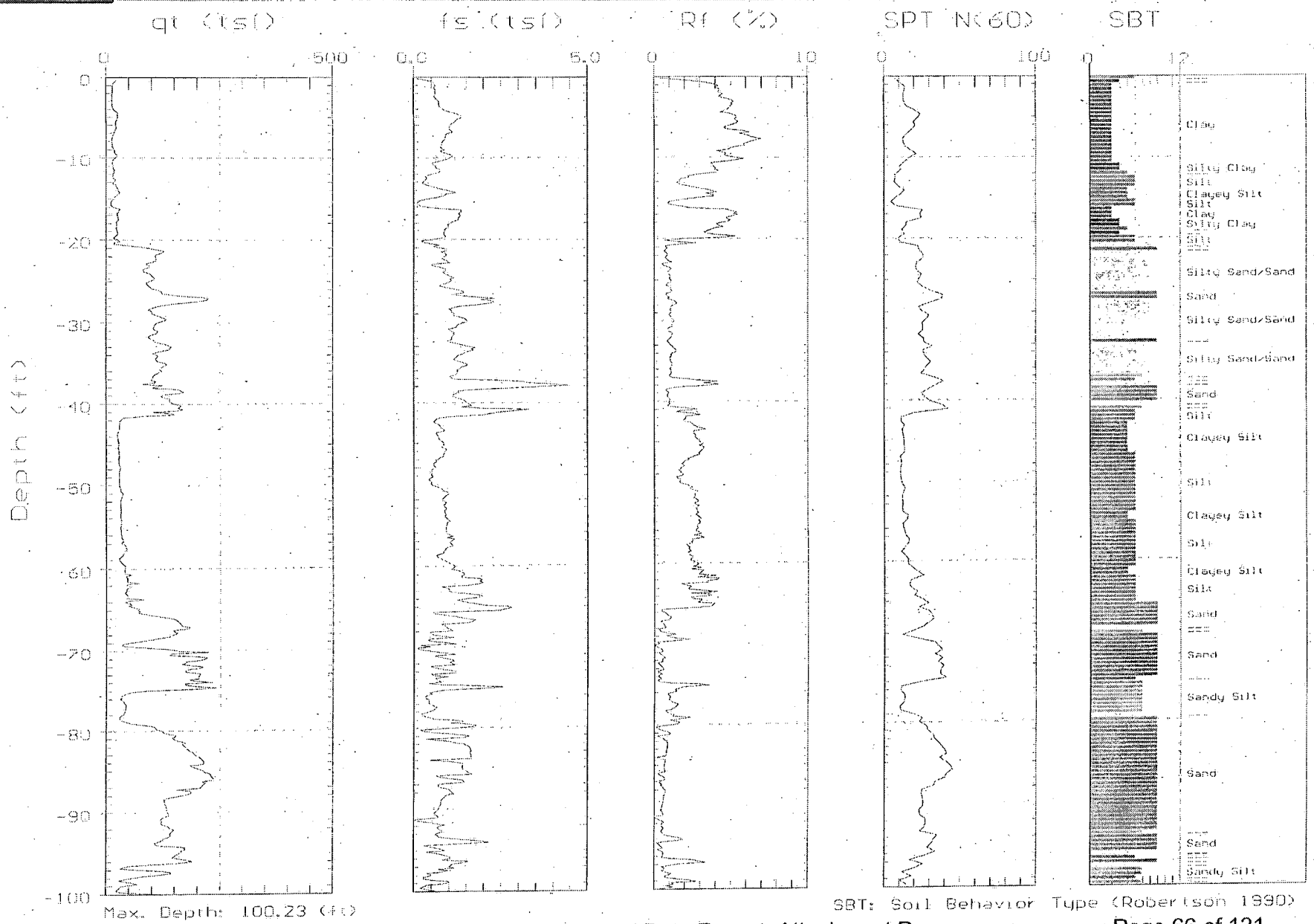
Max. Depth: 98.26 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363710.02 E=2942579.59 Operator: R.AGUILLAR
Location: C-408ELEV=31.70 Date: 12/06/06 06:51



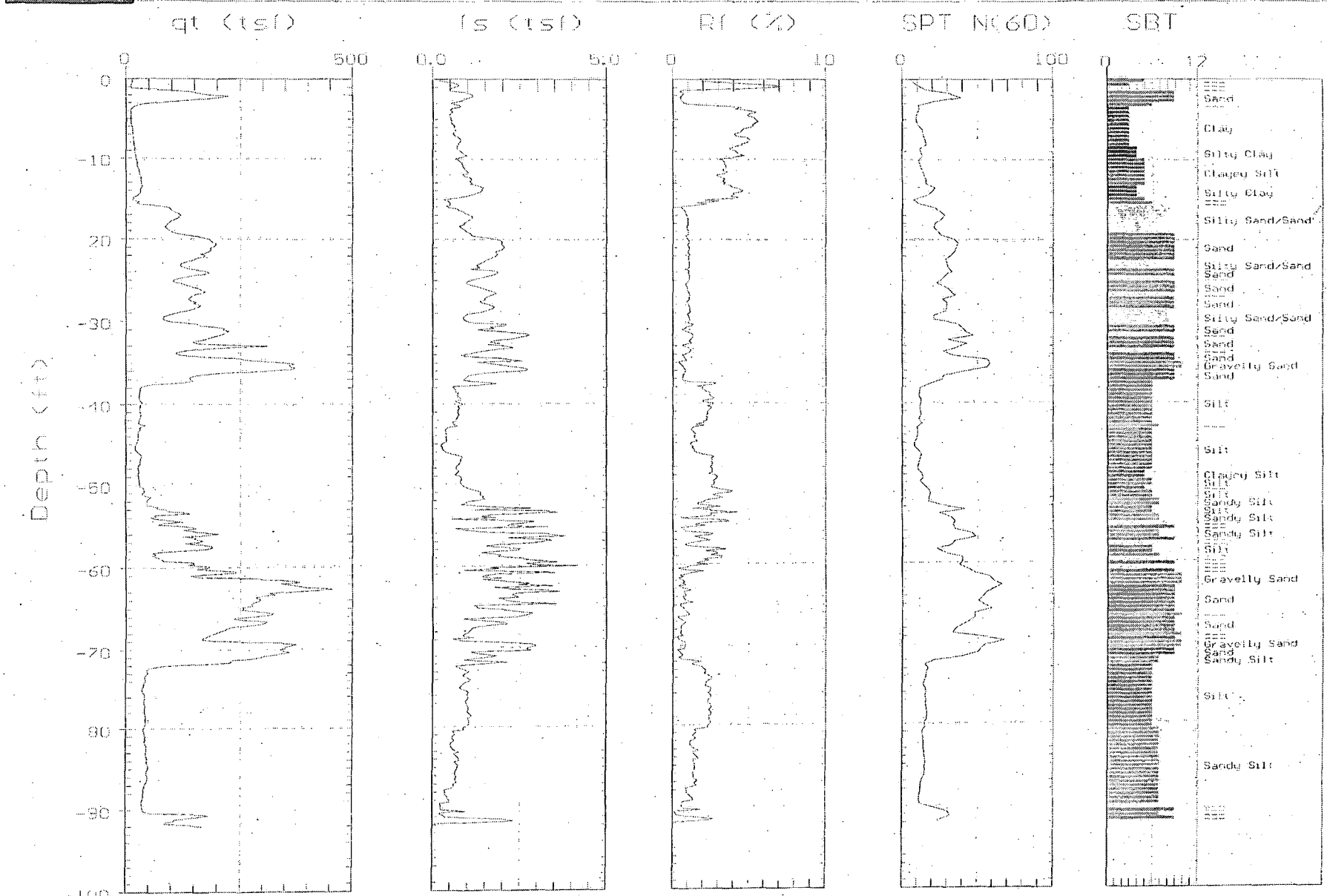
Max. Depth: 100.23 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363678.81 E=2942142.10 Operator: R.AGUILLAR
Location: C-409ELEV=27.93 Date: 12/02/06 12:36



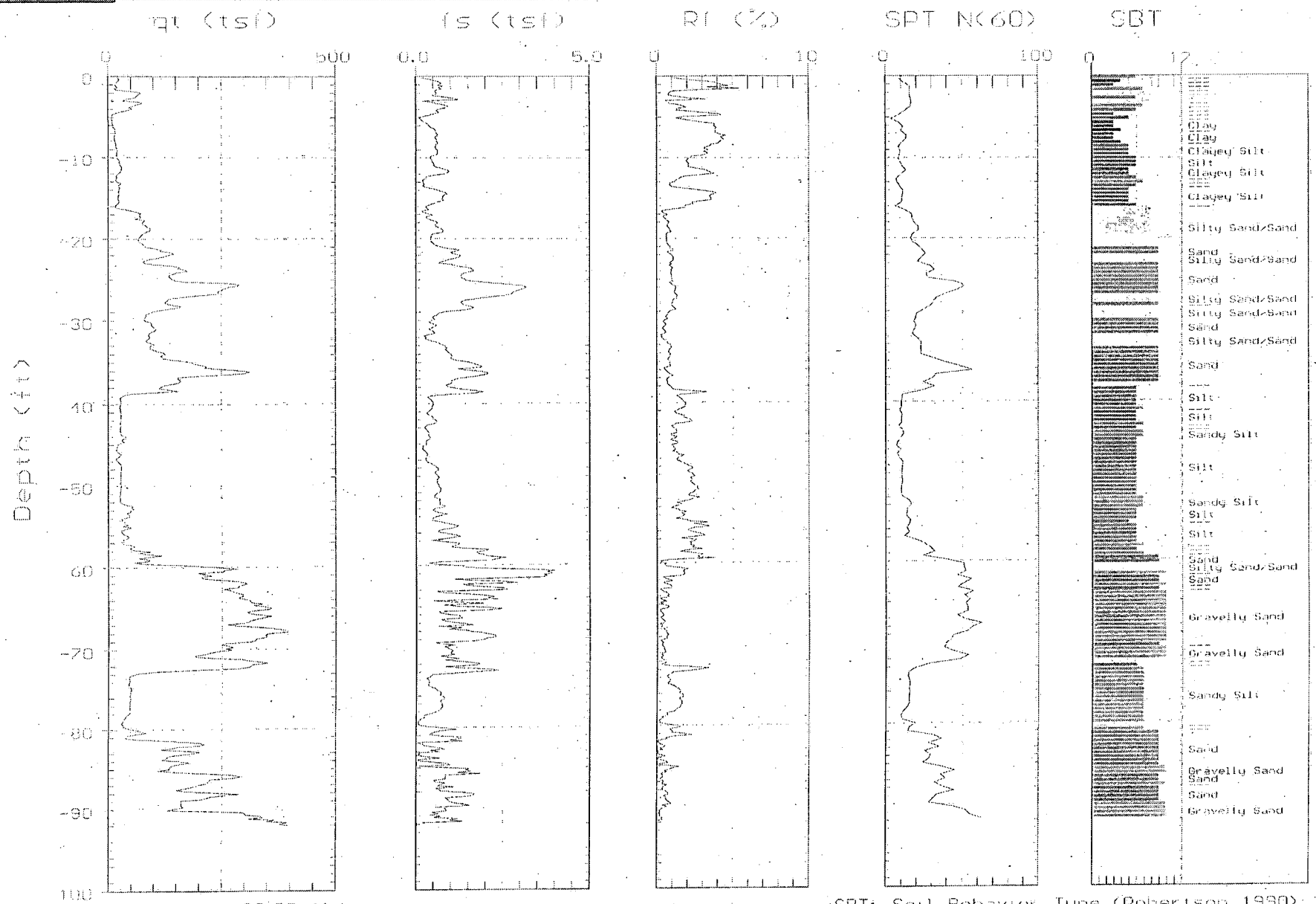
Max. Depth: 92.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363788.88 E=2942140.63 . Operator: R.AGUILLAR
Location: C-410ELEV=28.93 Date: 12/05/06 12:44



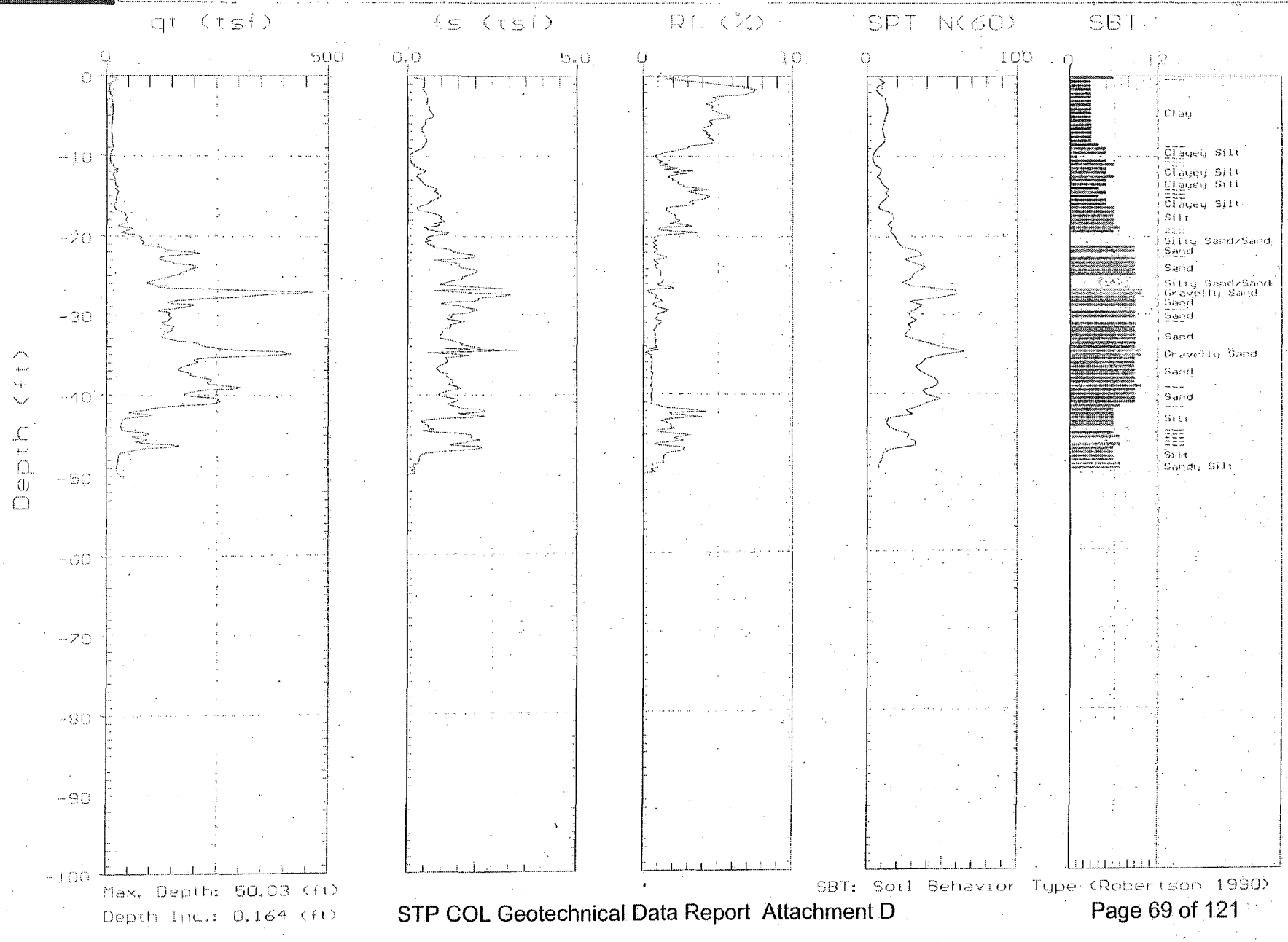
Max. Depth: 92.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=362902.74 E=2942803.77 Operator: R.AGUILLAR
Location: C-411ELEV=31.10 Date: 12/02/06 06:37



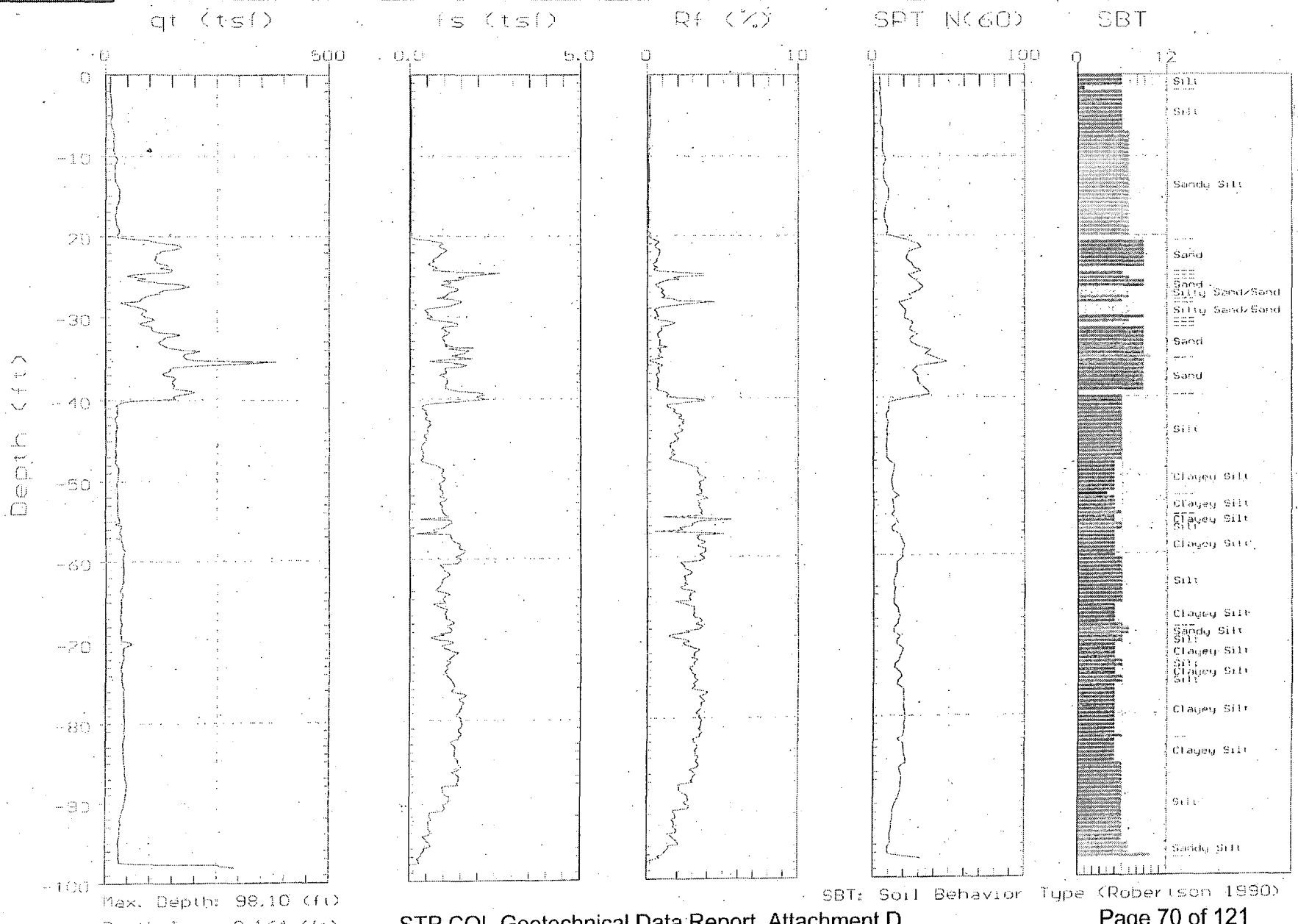
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

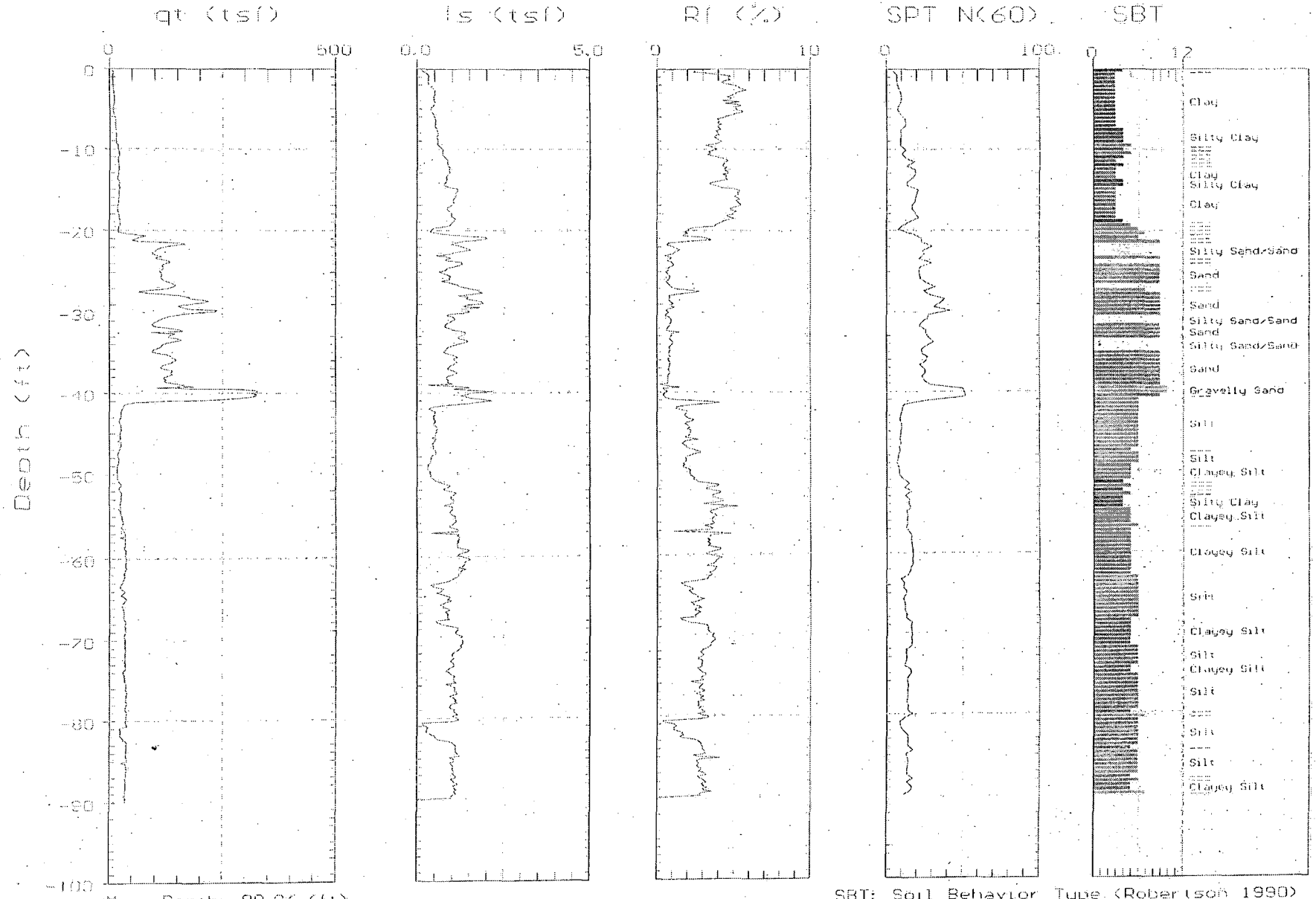
Site: N=363539.44 E=2941694.20 Operator: R.AGUILLAR
Location: C-901 ELEV=29.57 Date: 12/17/06 08:28



GREGG

MACTEC

Site: N=363448.19 E=2941623.82 Operator: R.AGUILLAR
Location: C-902ELEV=28.94 Date: 12/17/06 12:00



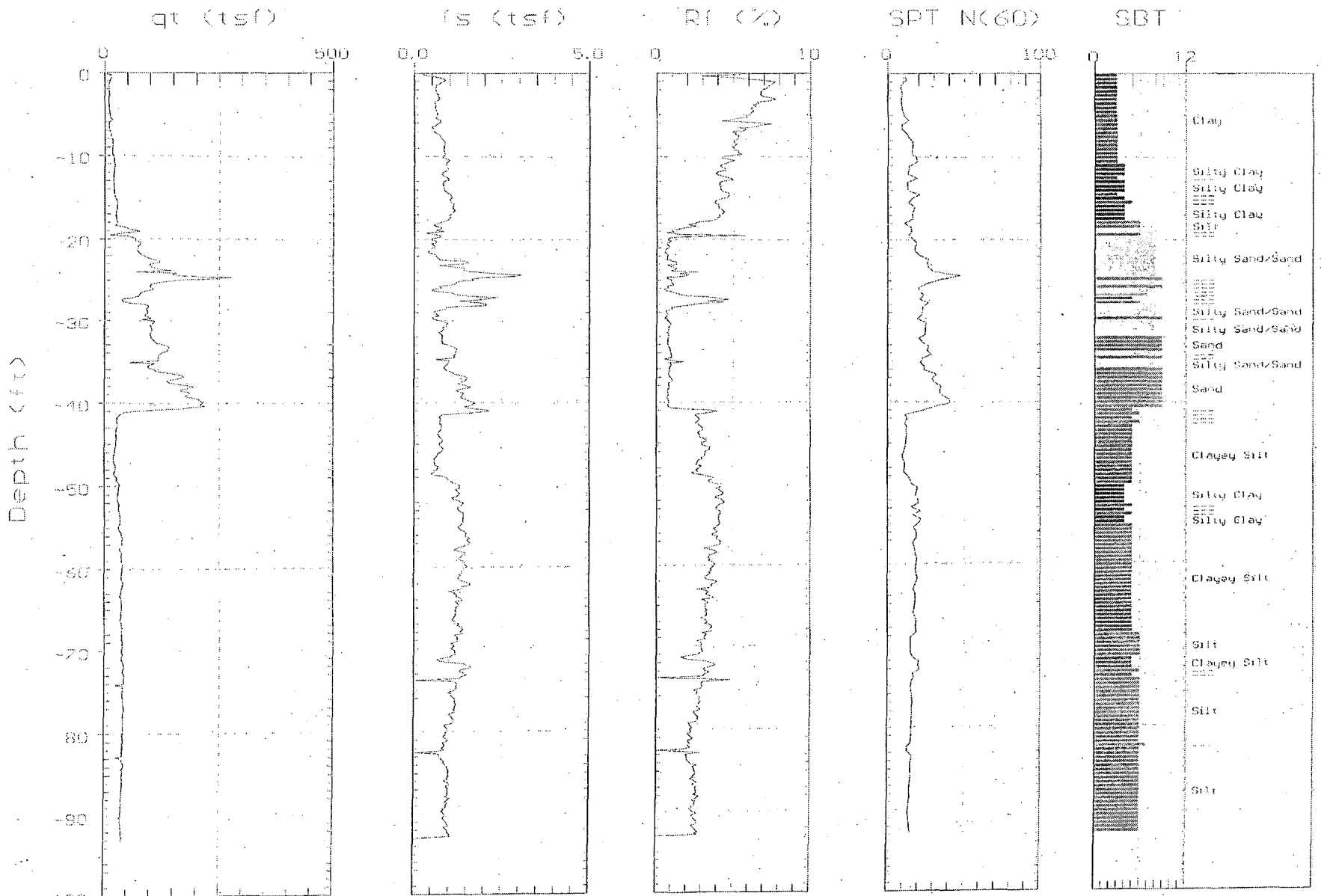
Max. Depth: 90.06 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363466.93 E=2941498.80 Operator: R.AGUILAR
Location: C-903ELEV=29.22 Date: 12/18/06 06:42



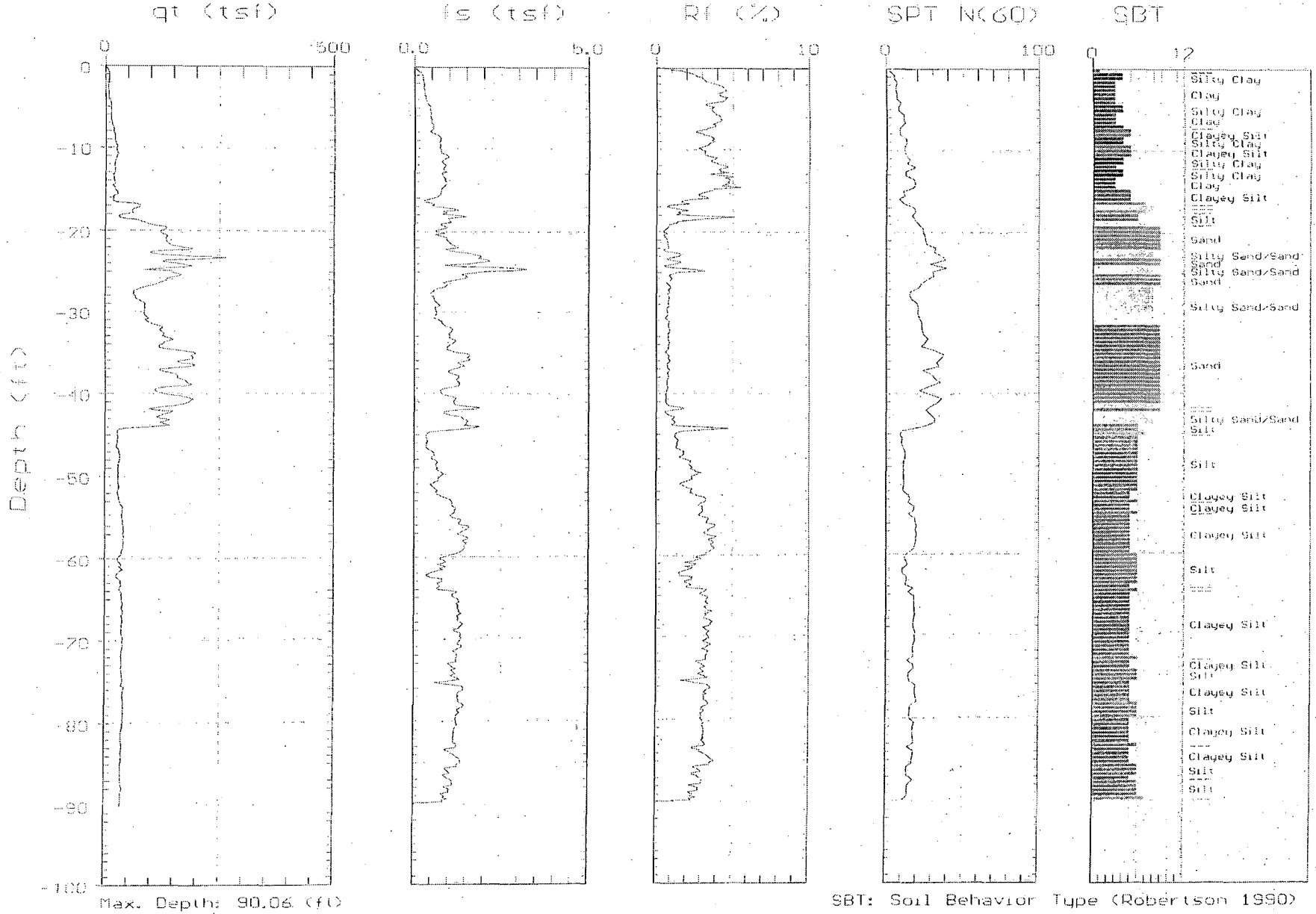
Max. Depth: 93.17 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363392.47 E=2941651.23 Operator: R.AGUILLAR
Location: C-904ELEV=24.17 Date: 12/20/06 05:40



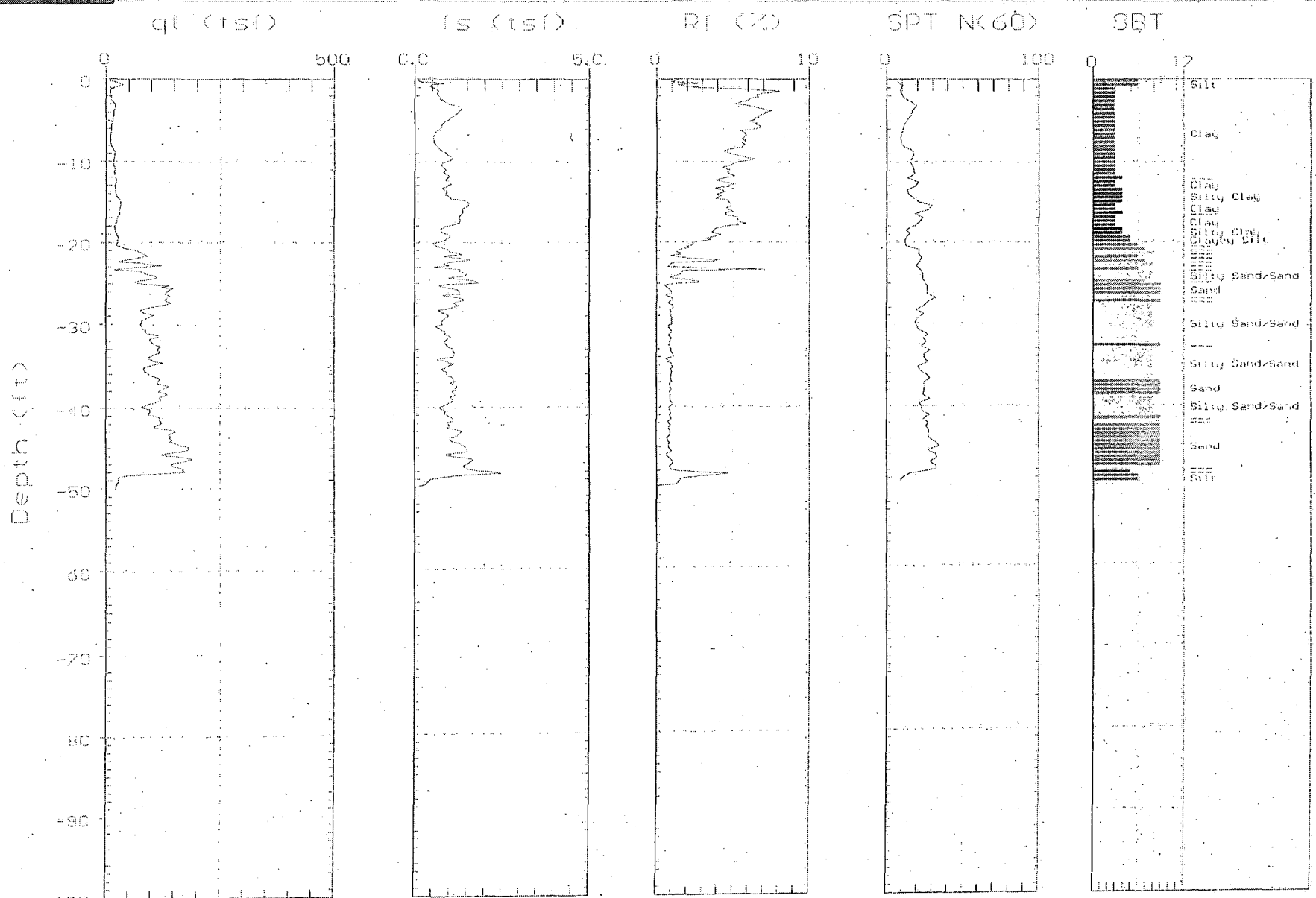
Max. Depth: 90.06 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363298.98 E=2941713.69 Operator: R.AGUILLAR
Location: C-905EL EV=31.21 Date: 12/13/06 14:28



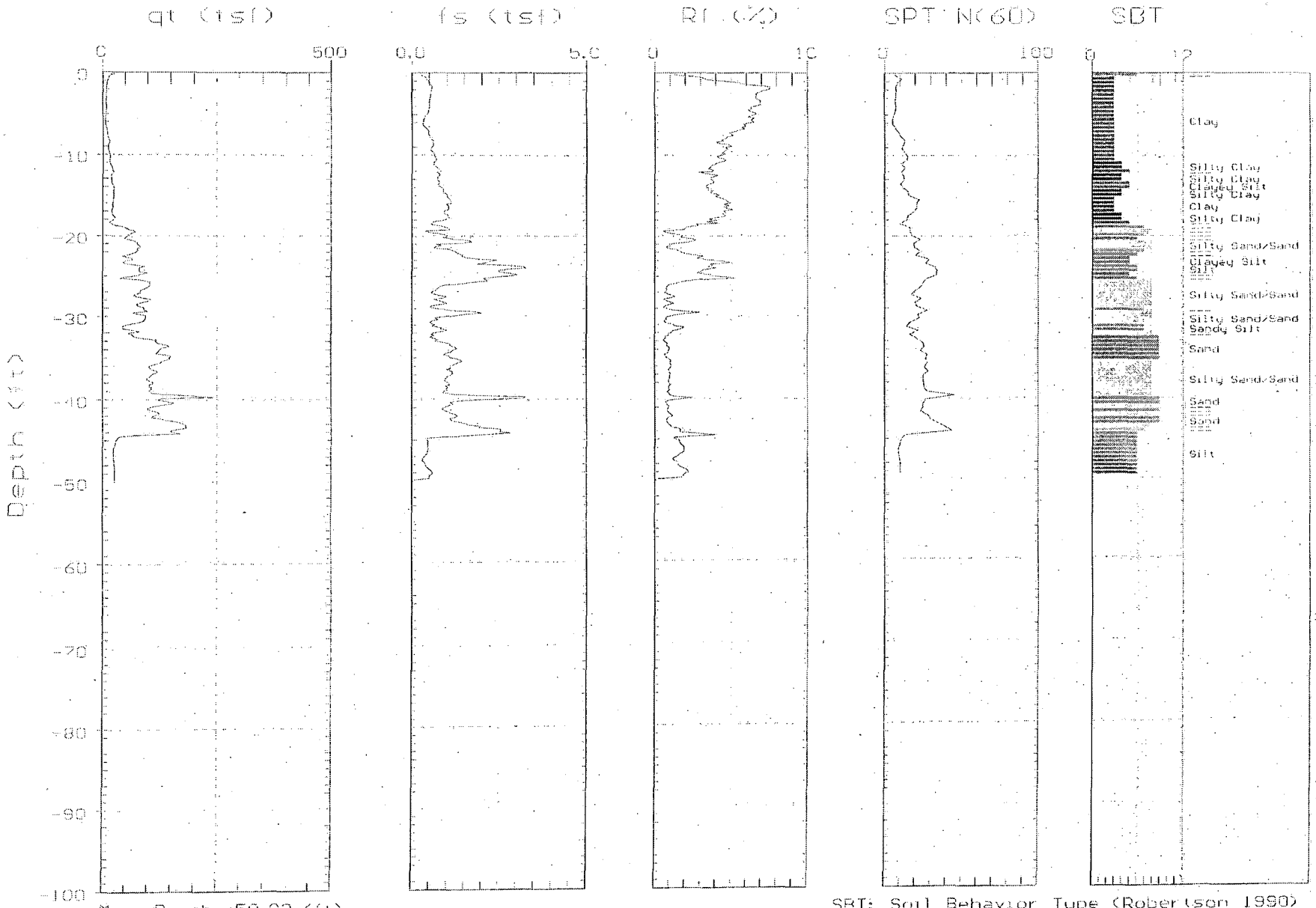
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363212.72 E=2941758.97 Operator: R.AGUILLAR
Location: C-906 ELEV=30.19 Date: 12/18/06 12:40



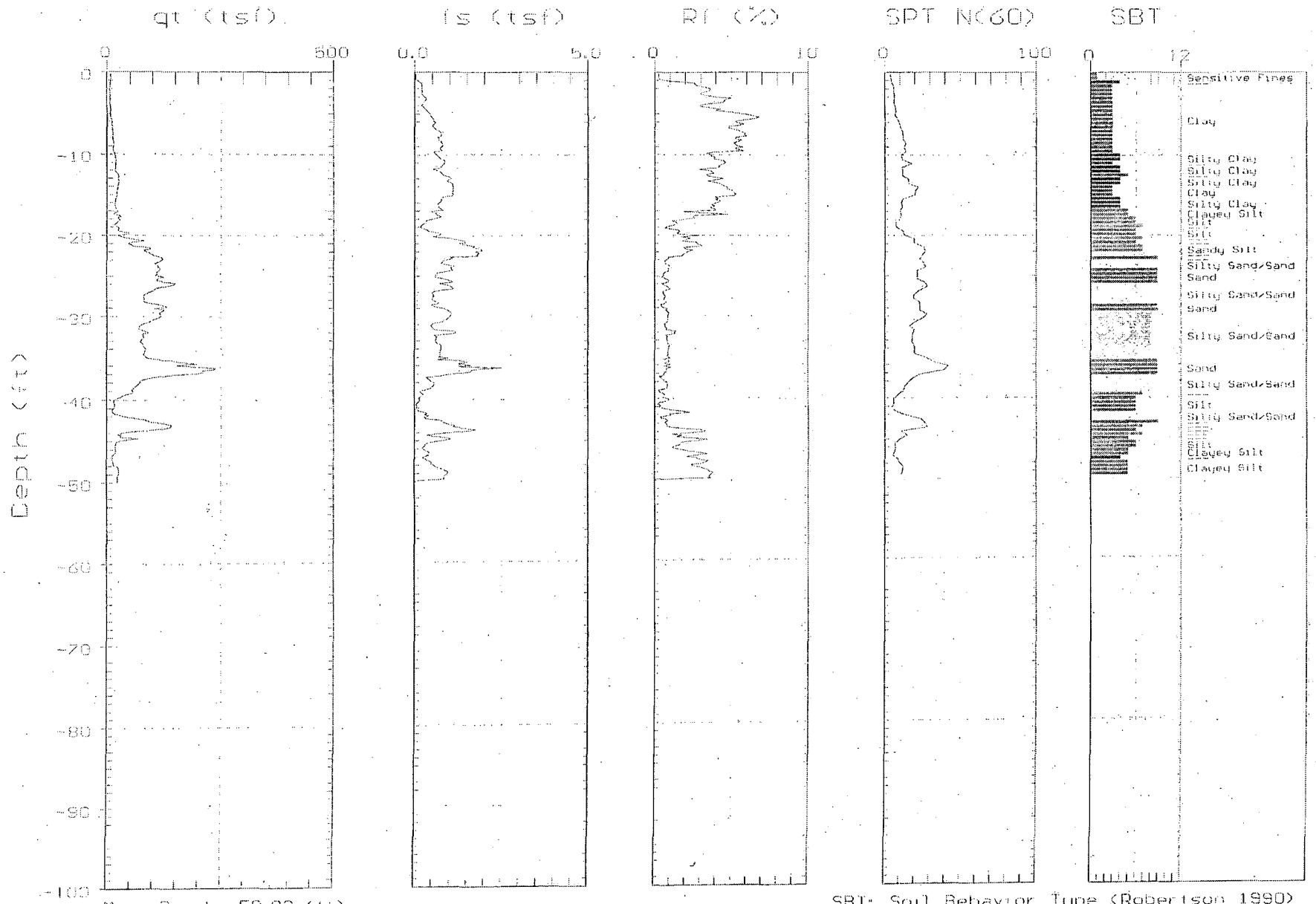
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363219.02 E=2941968.73 Operator: R.AGUILLAR
Location: C-907 ELEV=28.53 Date: 12/16/06 13:57



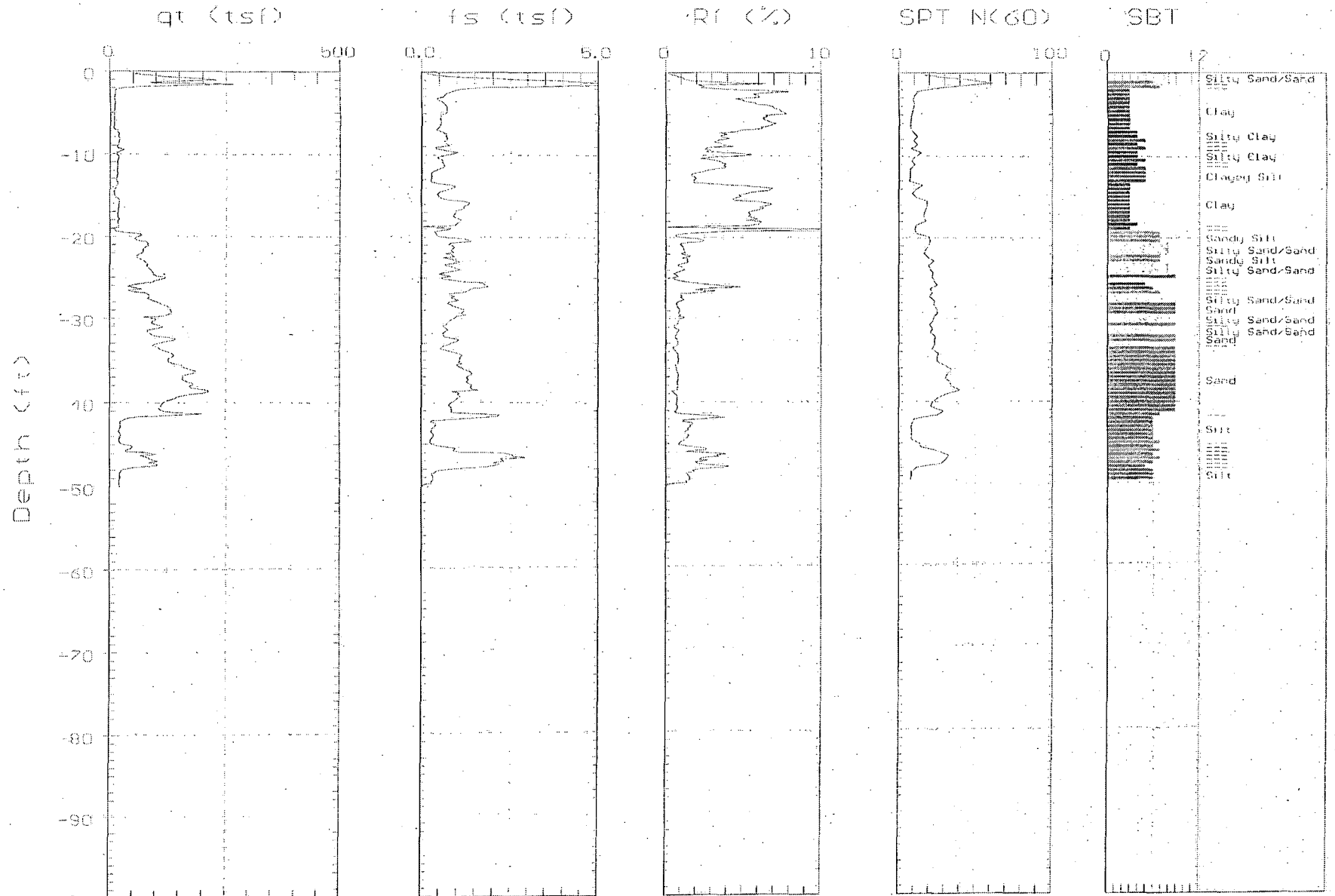
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site:N=363219.72 E=2942082.33 Operator:R.AGUILLAR
Location:C-908ELEV=30.89 Date:12/16/06 13:11



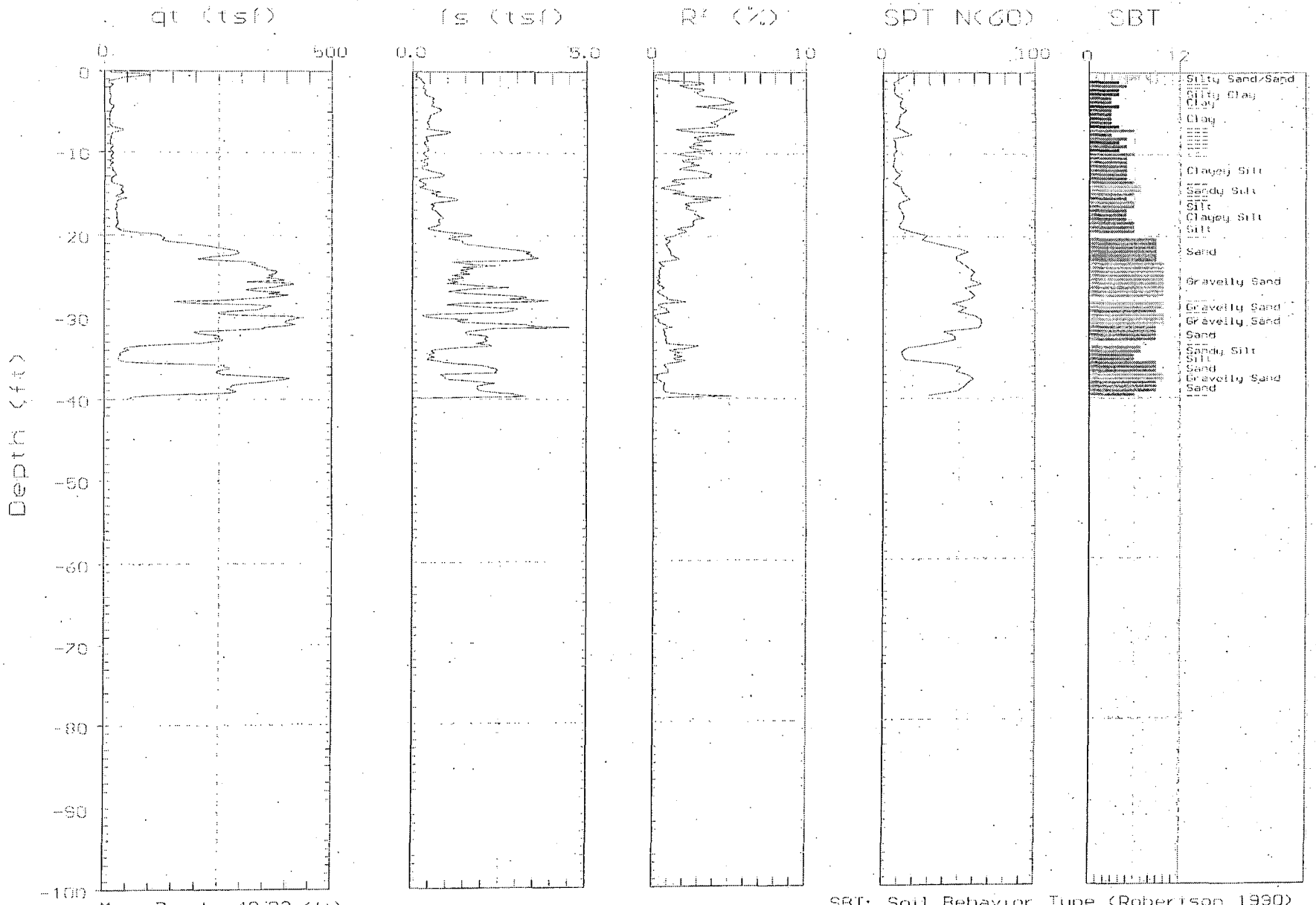
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363464.25 E=2943948.29 Operator: R.AGUILLAR
Location: C-909ELEV=30.22 Date: 12/02/06 08:08



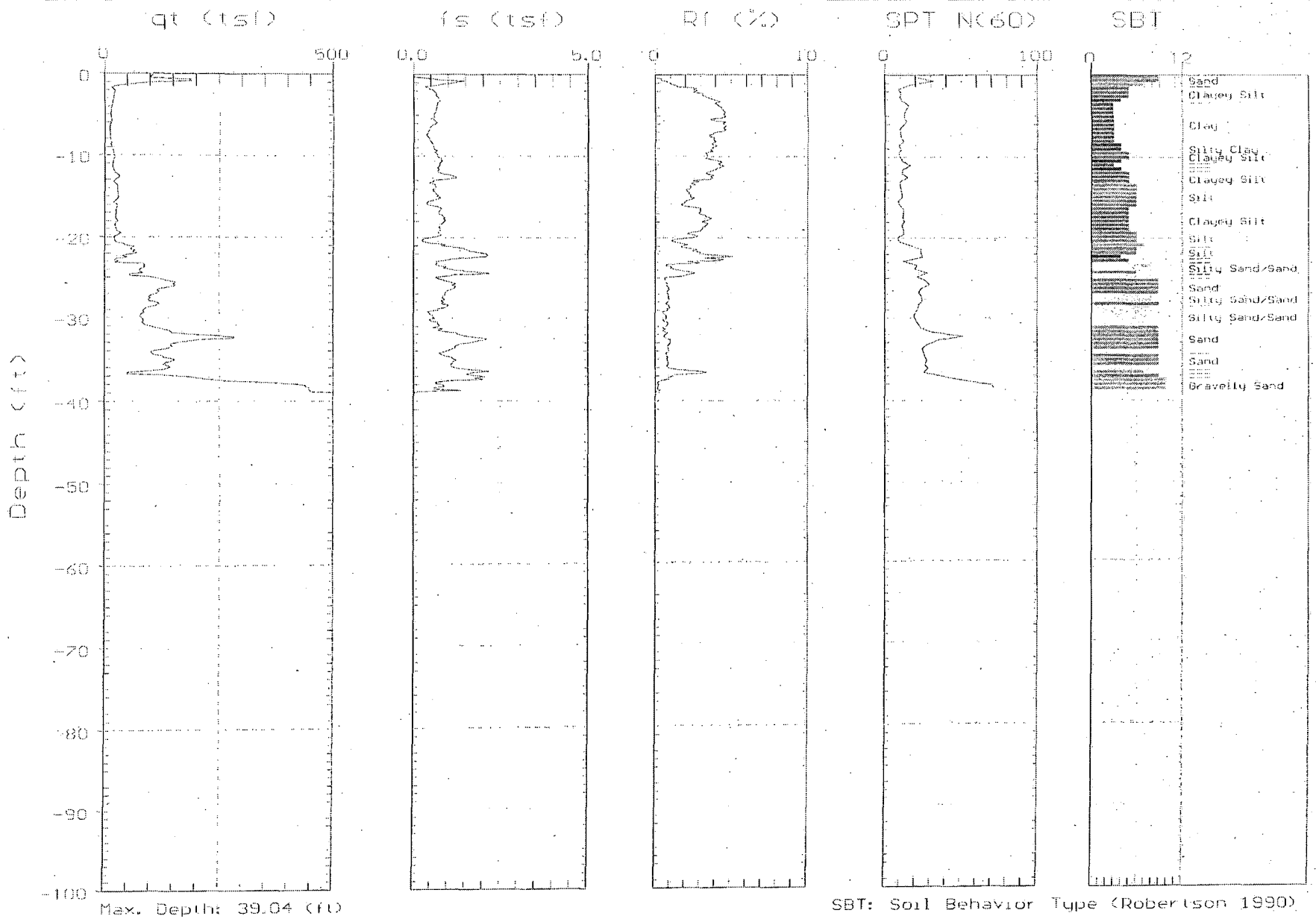
Max. Depth: 40.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363217.32 E=2942280.50 Operator: R.AGUILLAR
Location: C-916ELEV=31.41 Date: 12/17/06 06:18



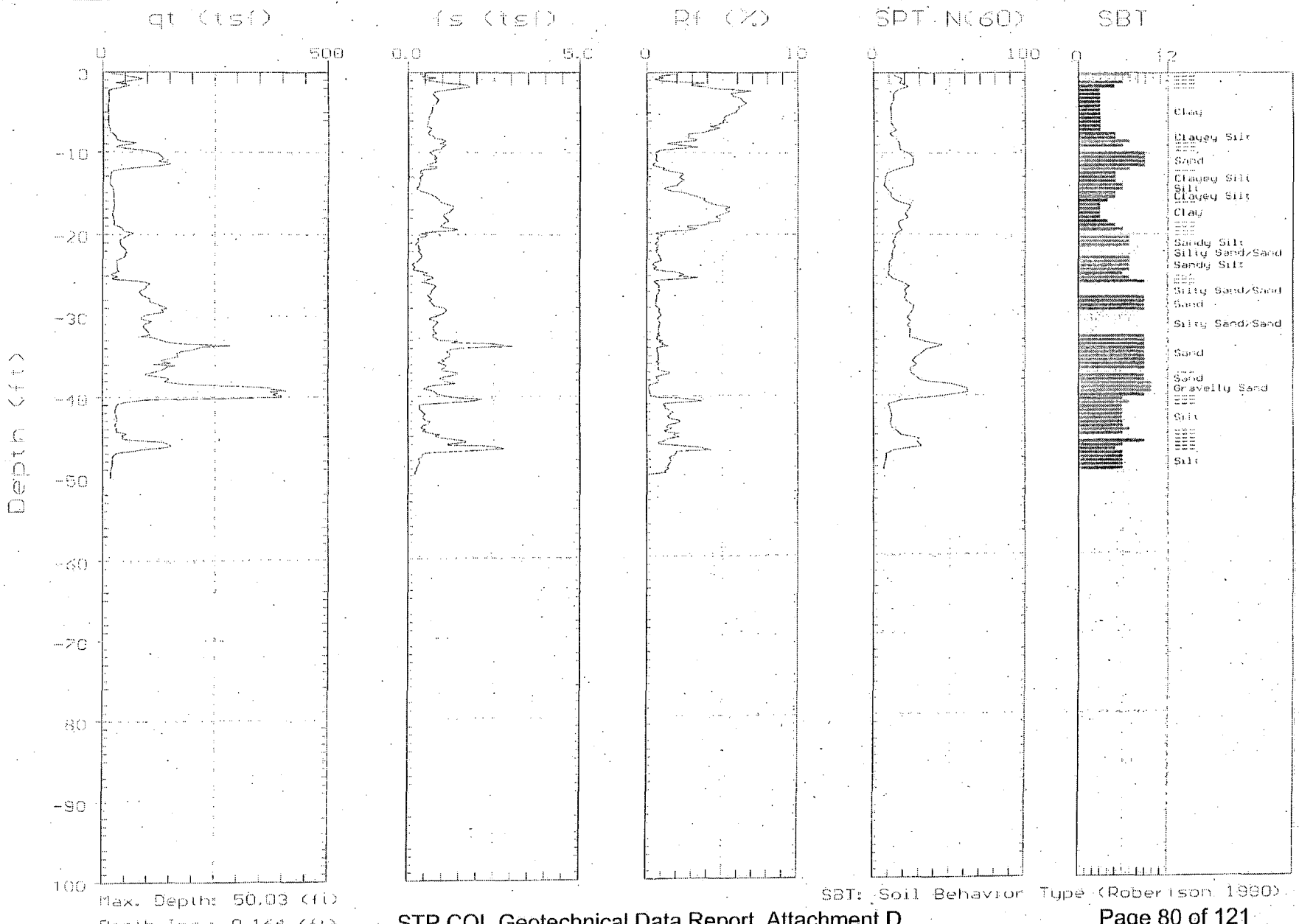
Max. Depth: 39.04 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363281.30 E=2912122.51 Operator: R.AGUILLAR
Location: C-91/ELEV-30.65 Date: 12/19/06 11:03



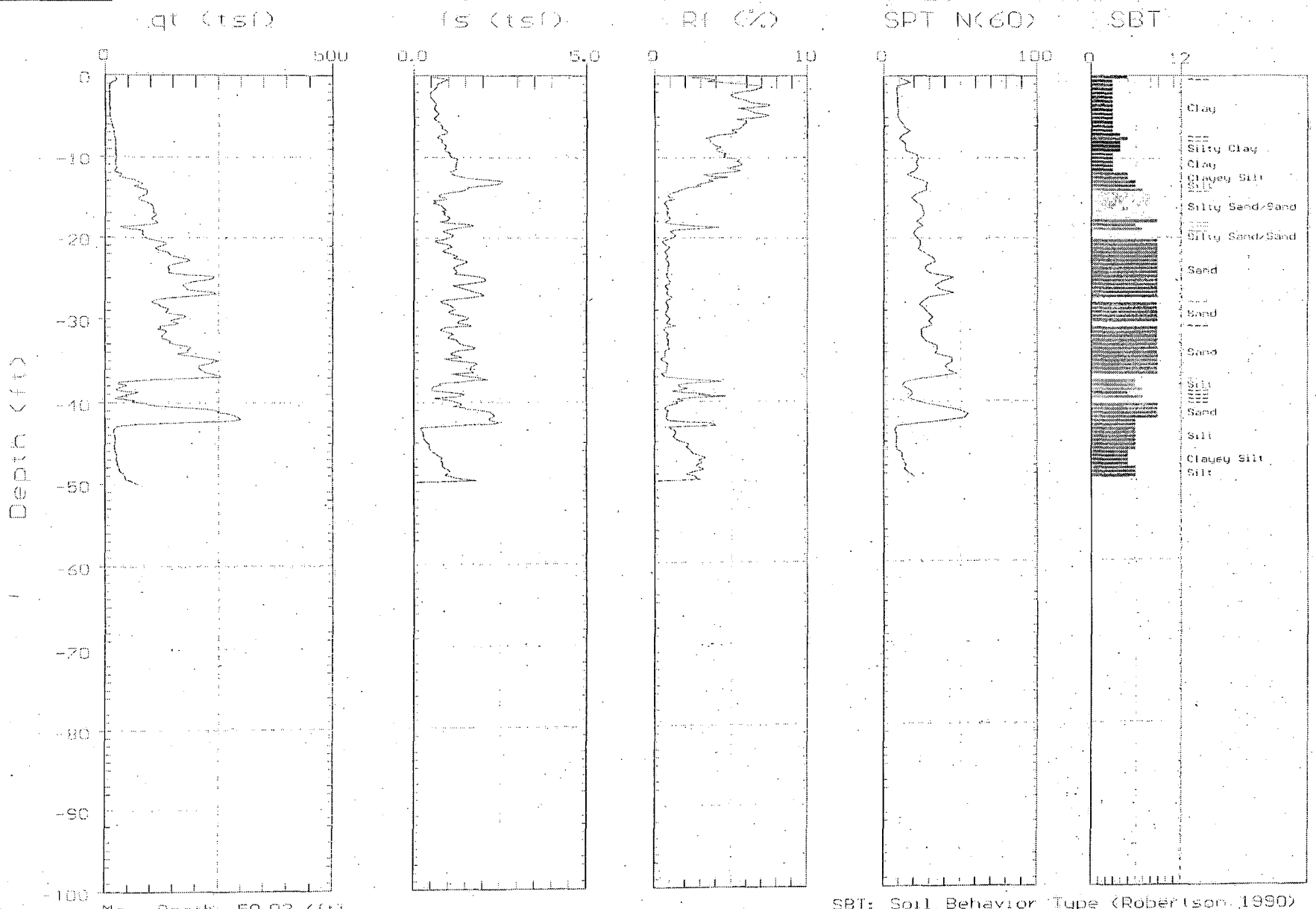
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363484.09 E=2942118.30 Operator: R.AGUILLAR
Location: C-918ELEV=25.36 Date: 12/18/06 10:33



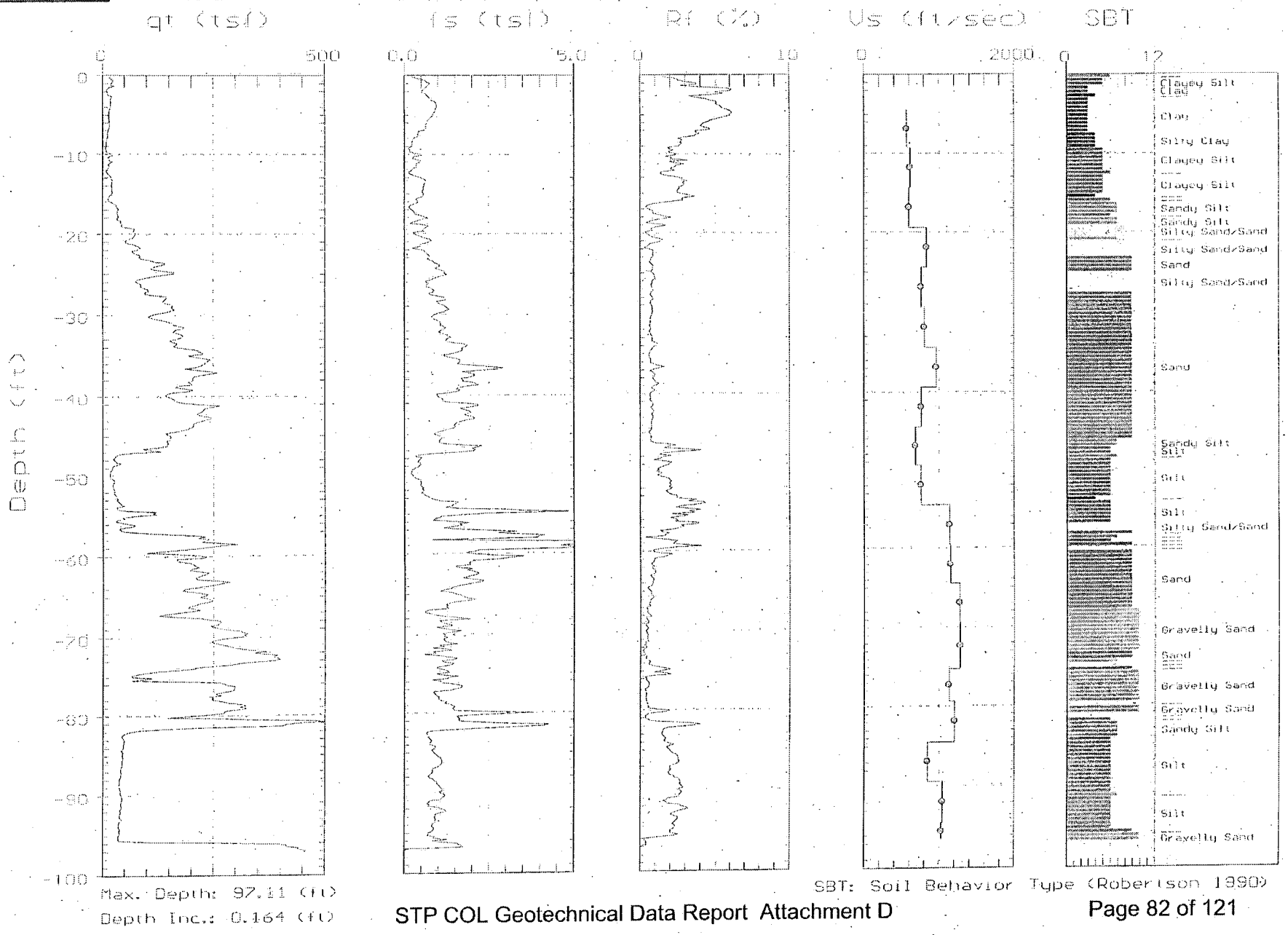
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363126.80 E=2943174.06 Operator: R.AGUILLAR
Location: C-305s ELEV=30.88 Date: 12/16/06 06:14



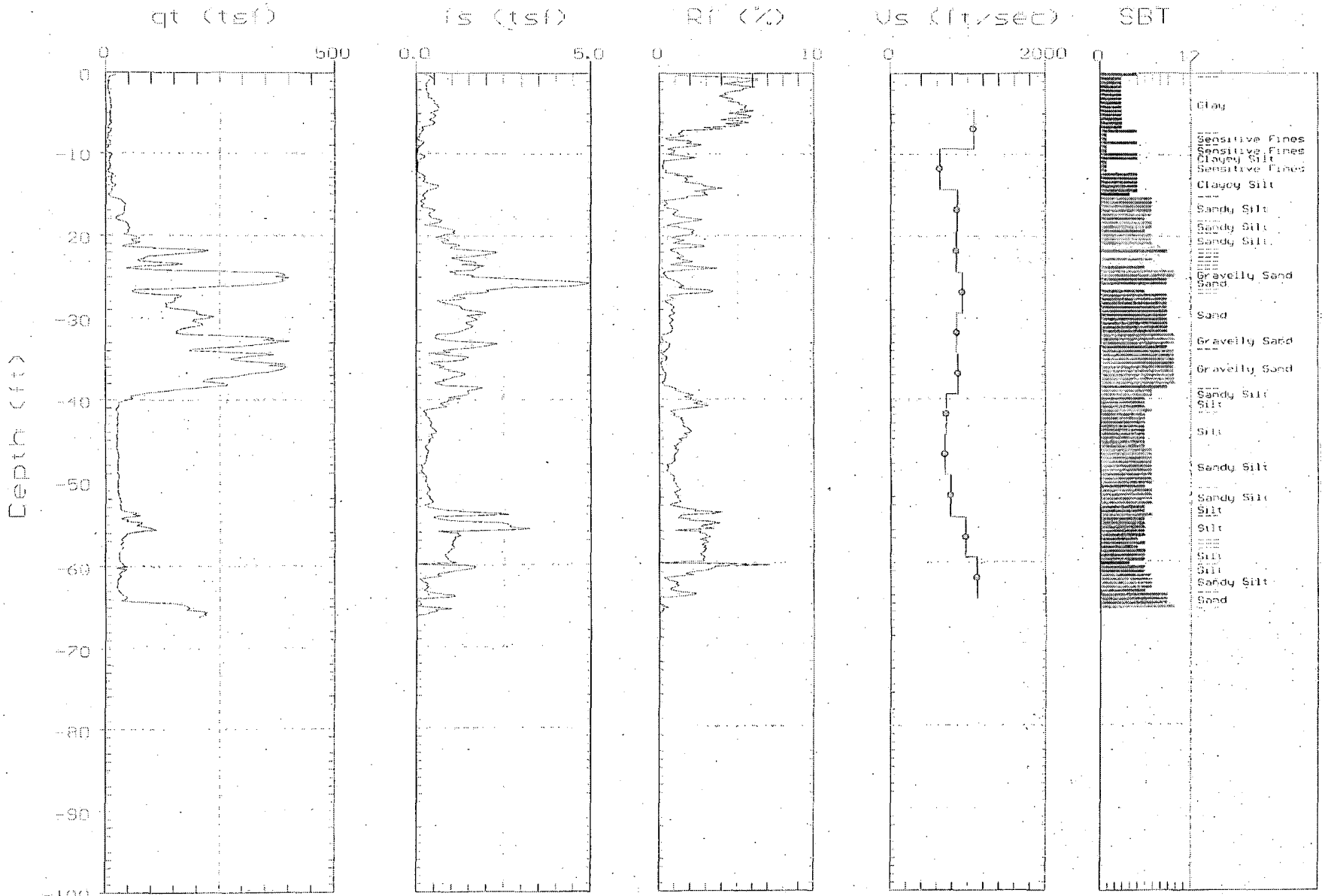
Max. Depth: 97.11 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363483.22 E=2943296.00 Operator: R.AGUILLAR
Location: C-306sELEV=29.68 Date: 11/30/06 06:37



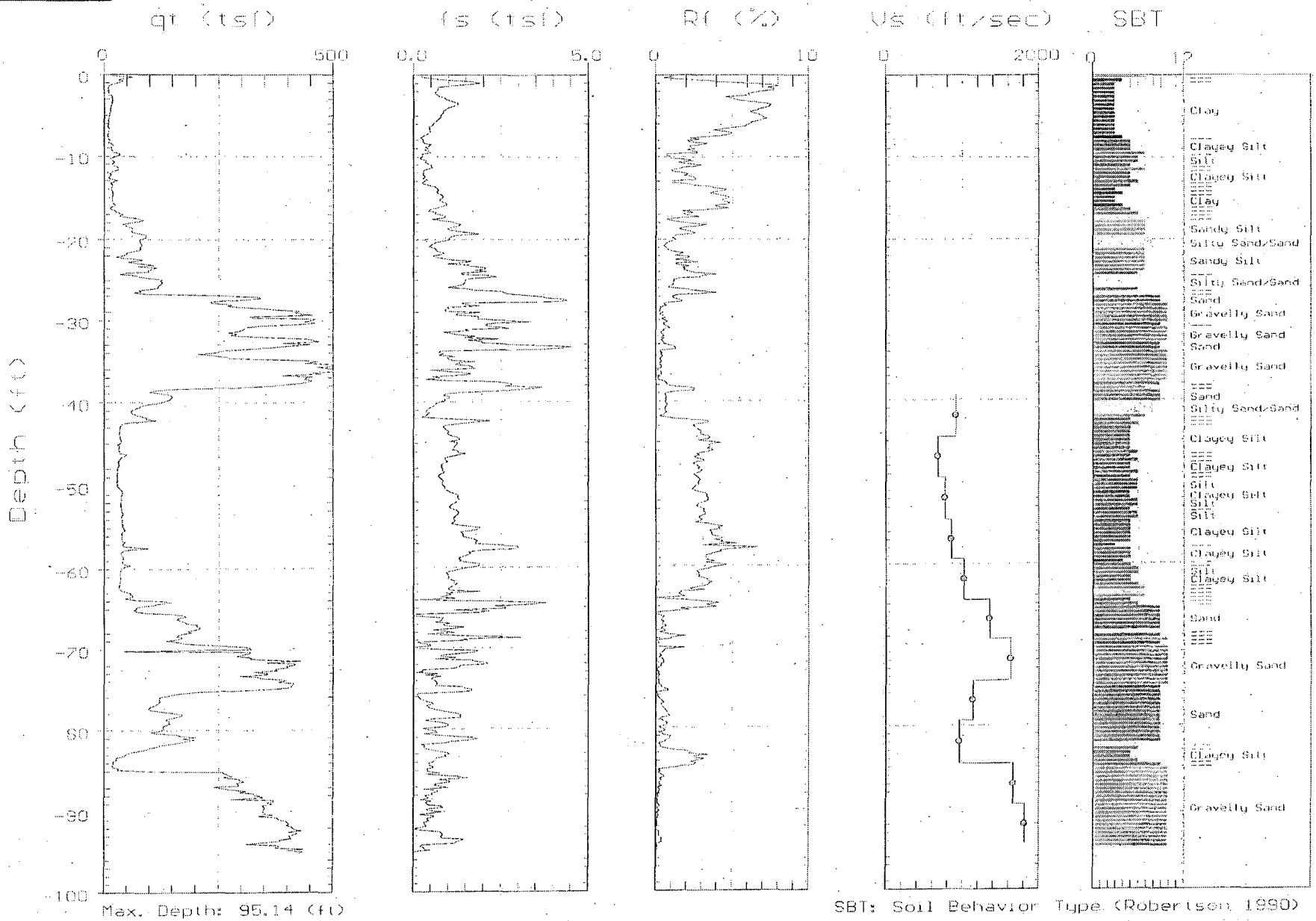
Max. Depth: 66.27 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363573.00 E=2913407.68 Operator: R.AGUILLAR
Location: C-307sELEV=30.02 Date: 12/14/06 07:52

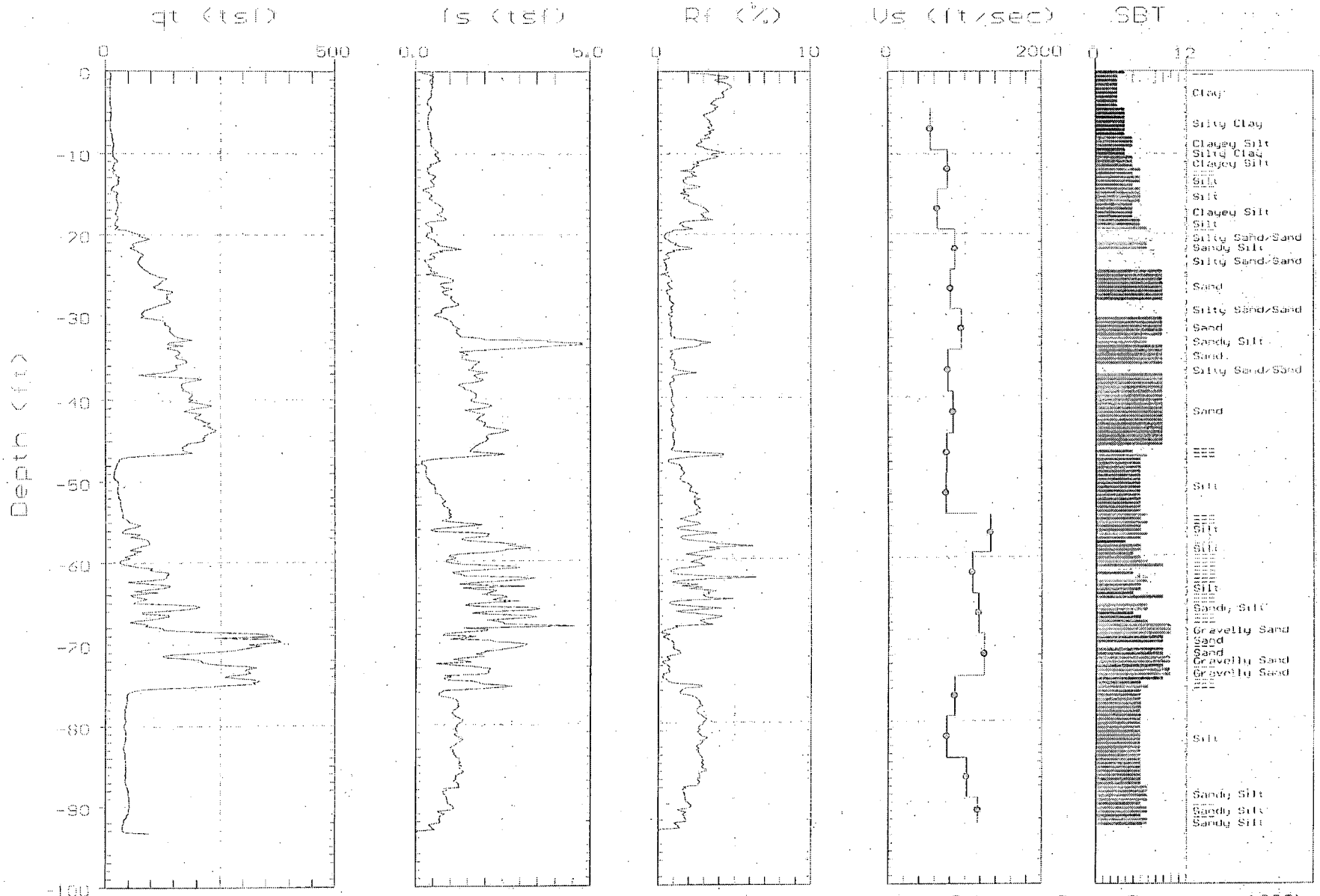


Max. Depth: 95.14 (ft)
Depth Inc.: 0.164 (ft)

GREGG

MACTEC

Site: N=363481.68 E=2942400.33 Operator: R.AGUILLAR
Location: C-406sELEV=31.05 Date: 12/13/06 08:15



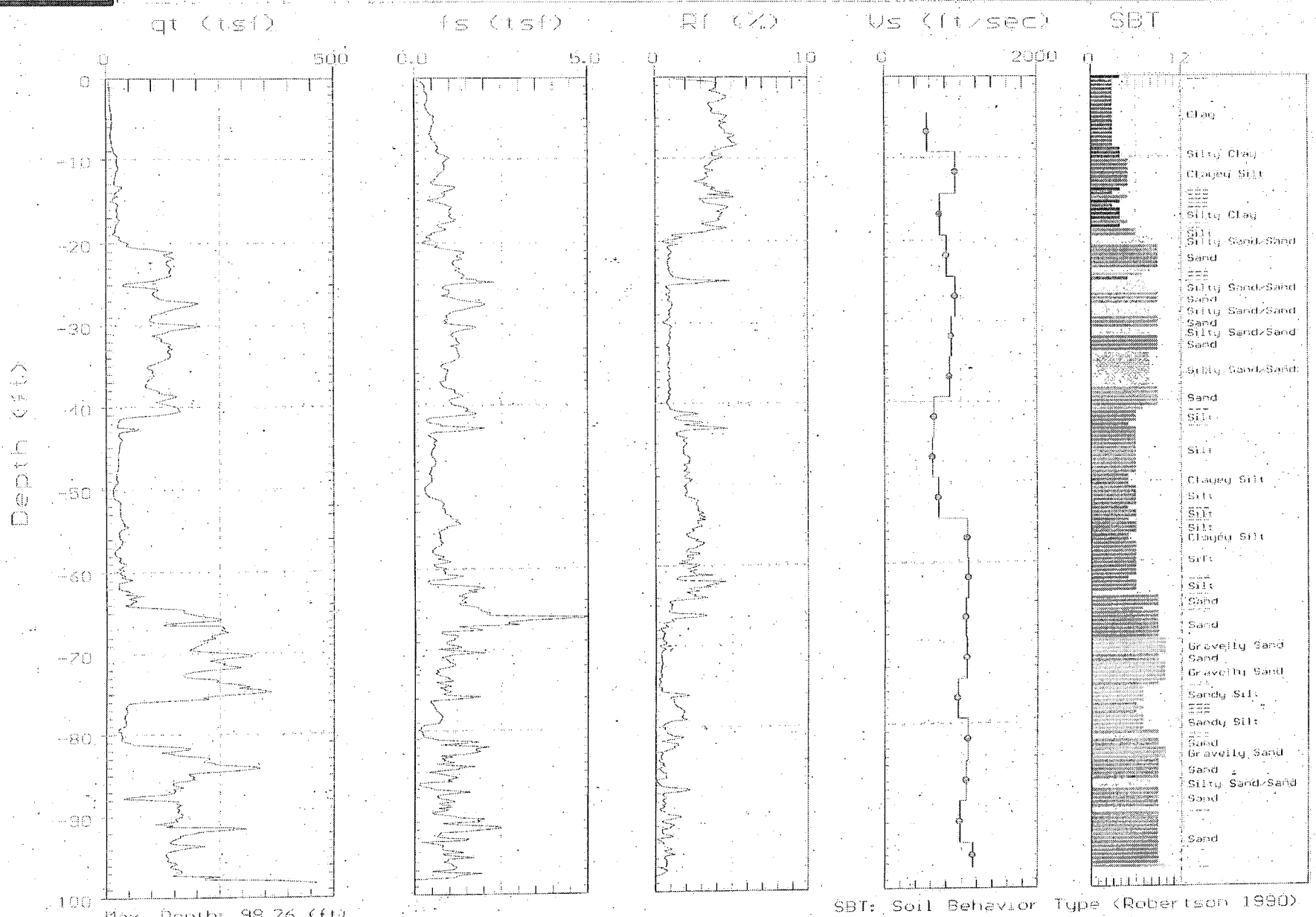
Max. Depth: 93.34 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

MACTEC

Site: N=363570.38 E=2942507.31 Operator: R.AGUILAR
Location: C-407 FLEV=30.79 Date: 12/12/06 06:11



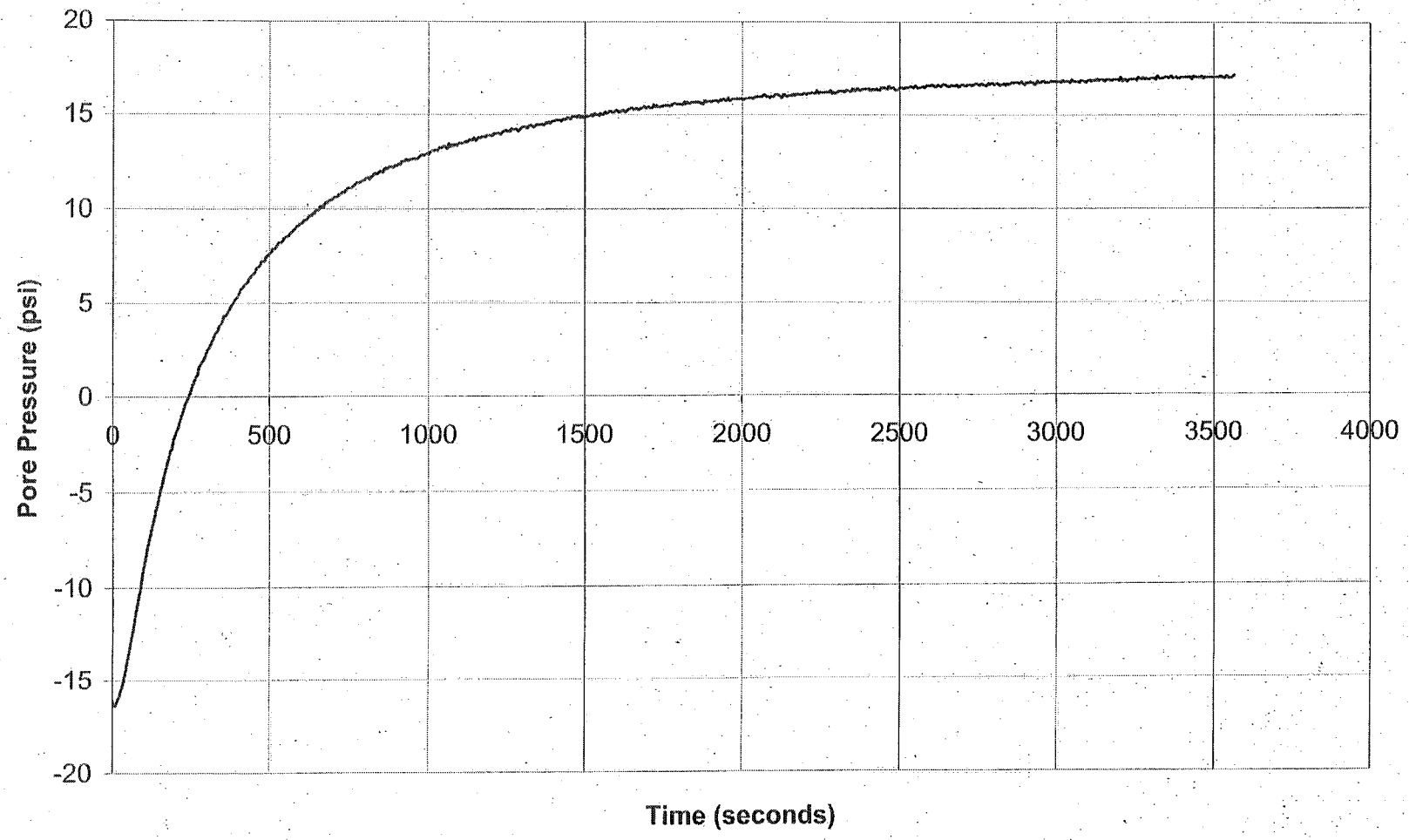
Max. Depth: 98.26 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

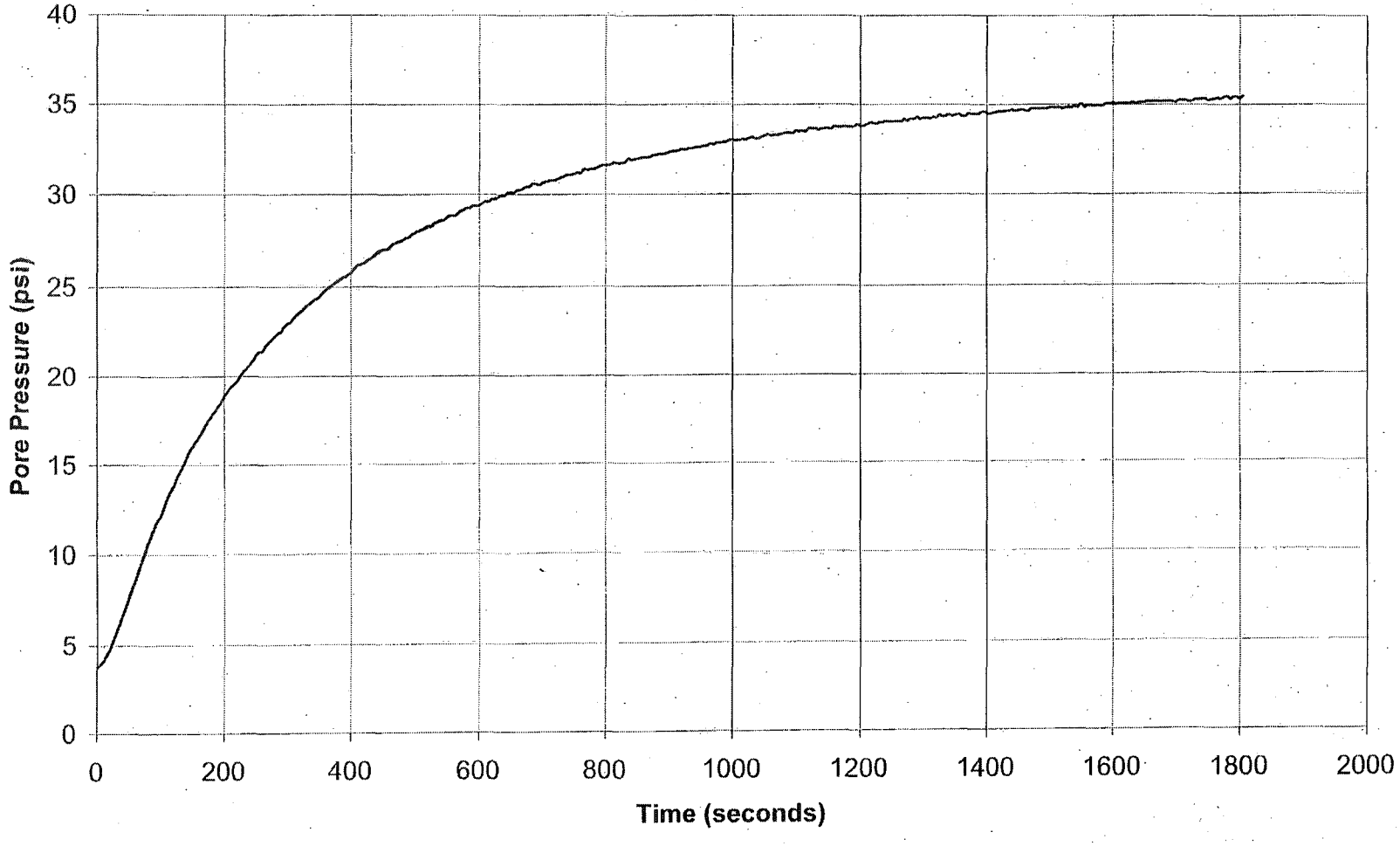
Sounding: c-304
Depth: 30.02
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

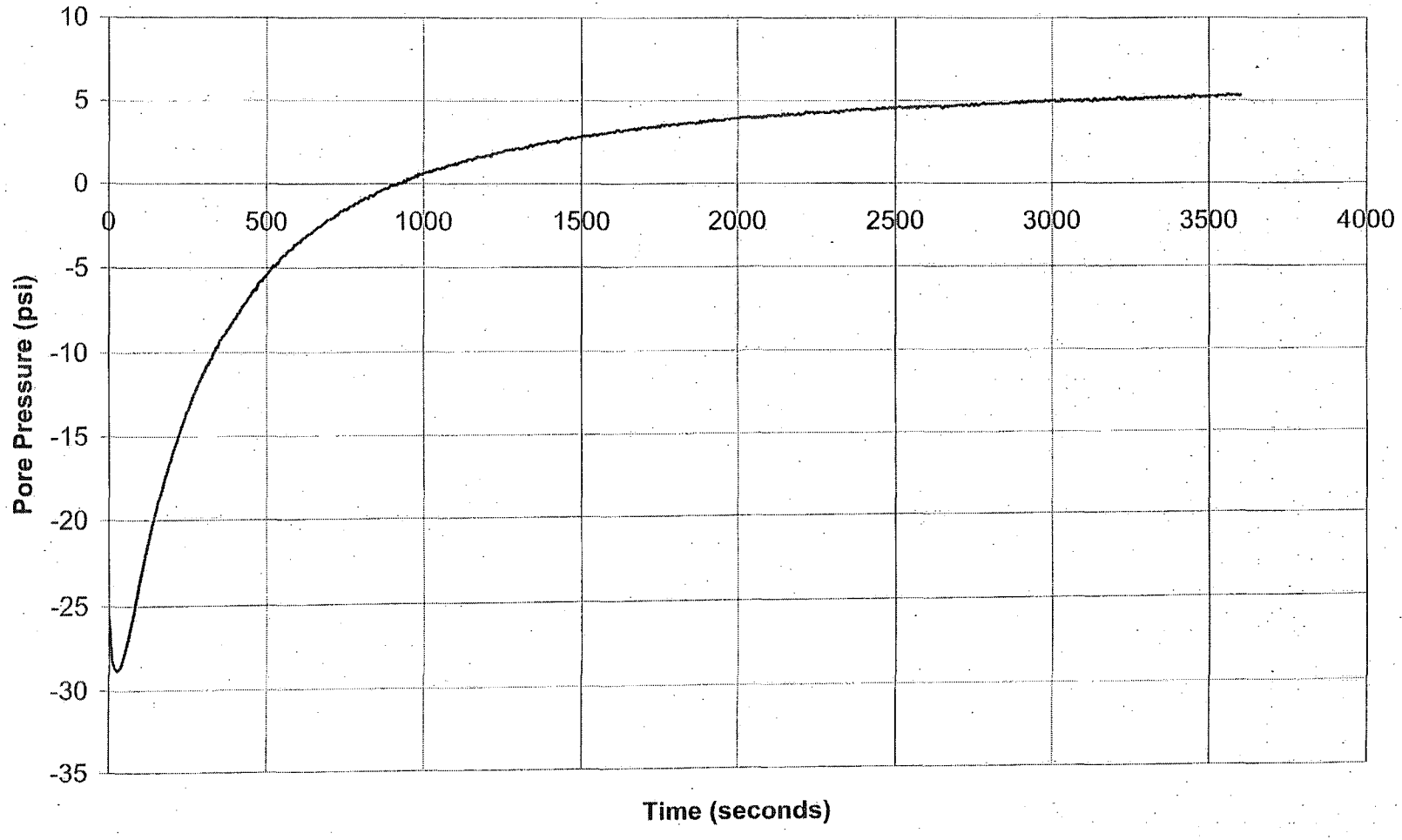
Sounding: c-304
Depth: 74.803
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

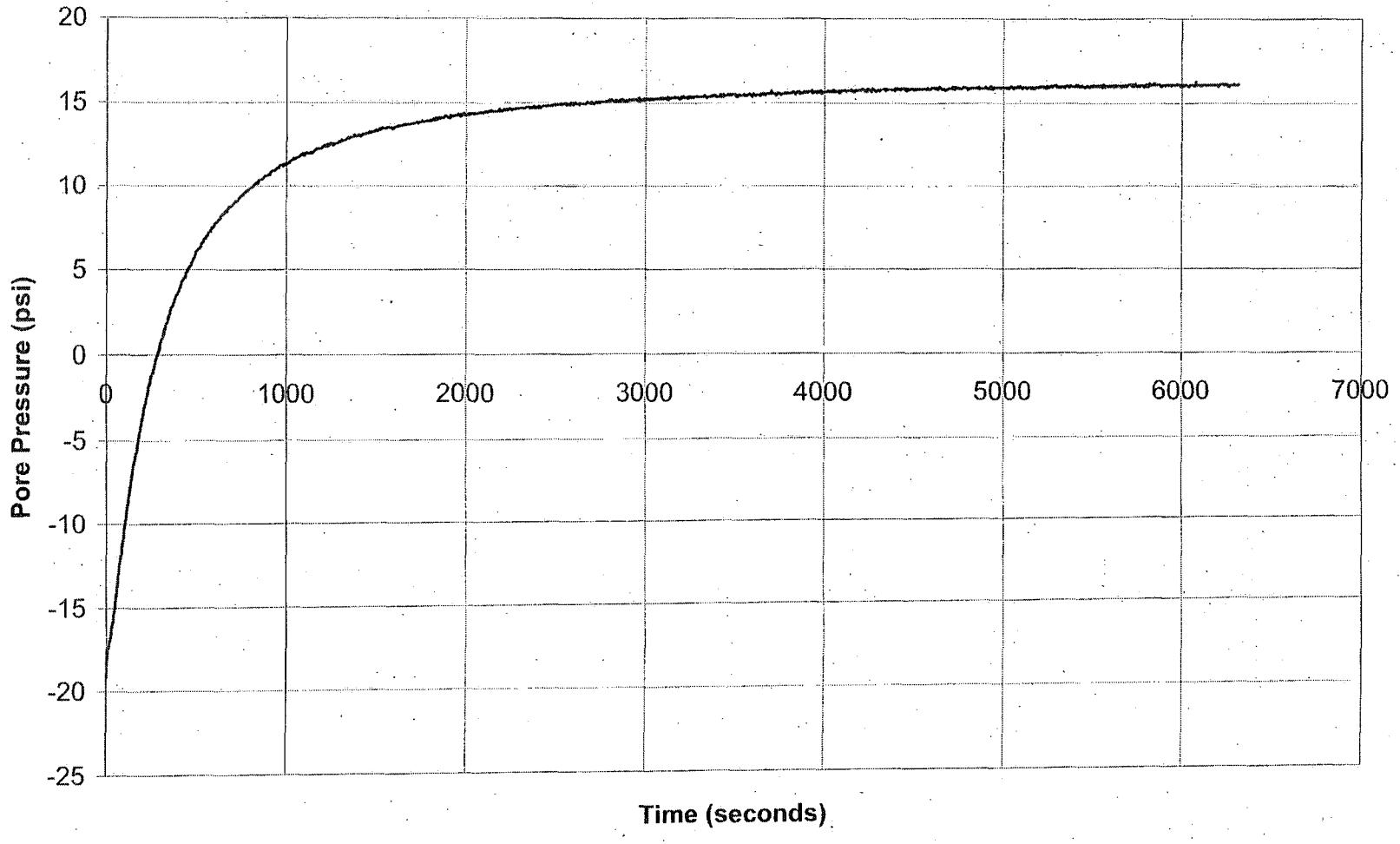
Sounding: c-305s
Depth: 38.058
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

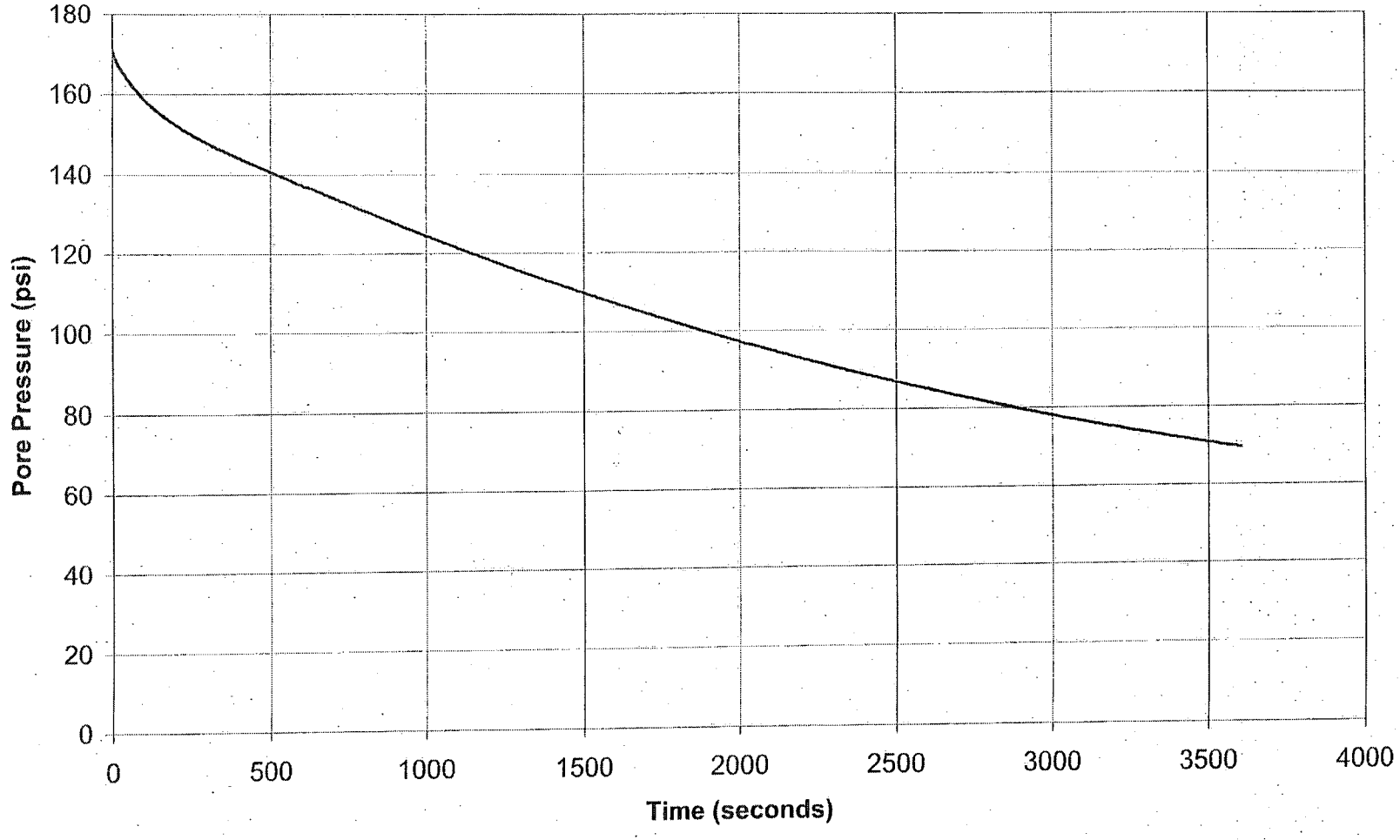
Sounding: c-305s
Depth: 67.093
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

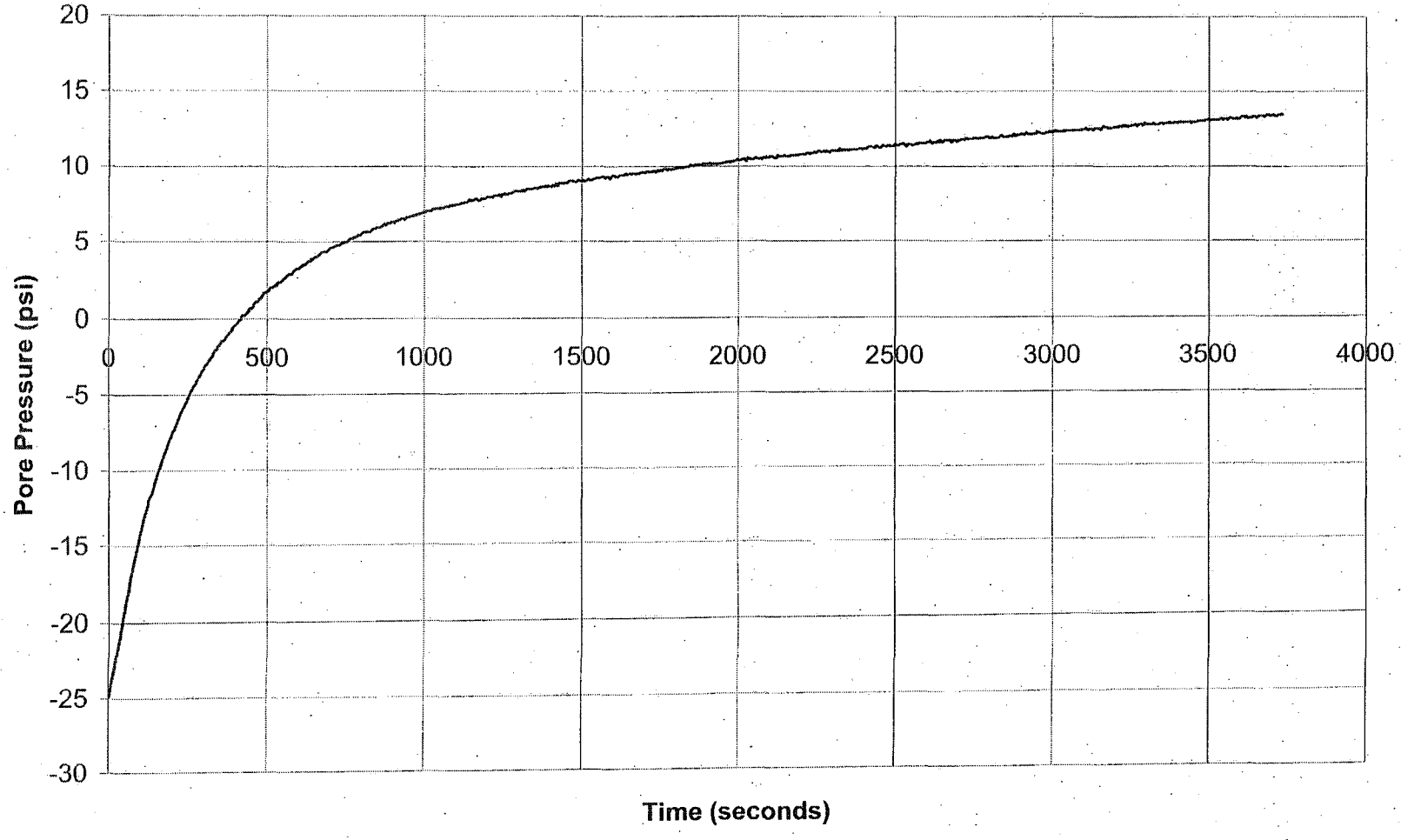
Sounding: c-305s
Depth: 92.027
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

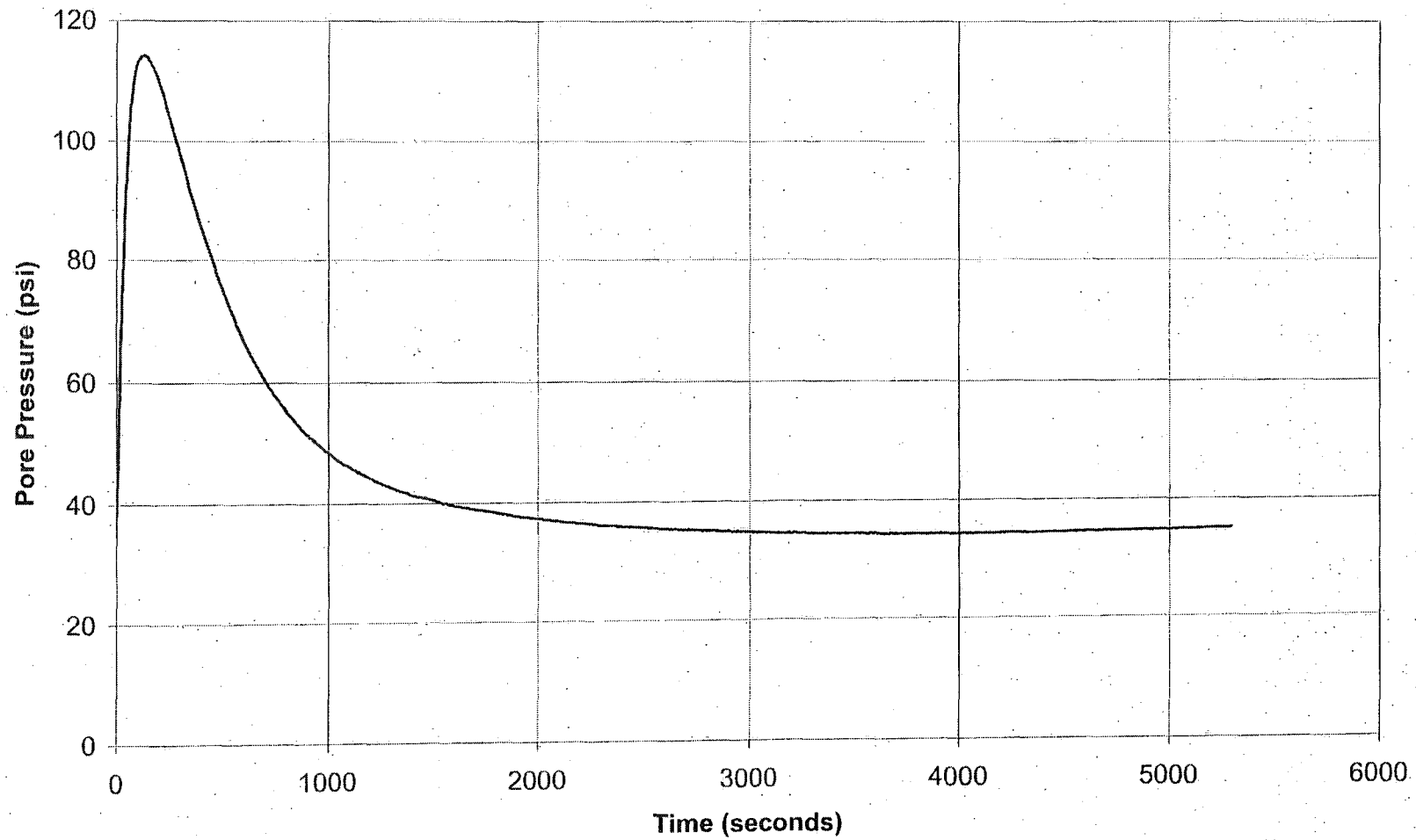
Sounding: c-306s
Depth: 28.051
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

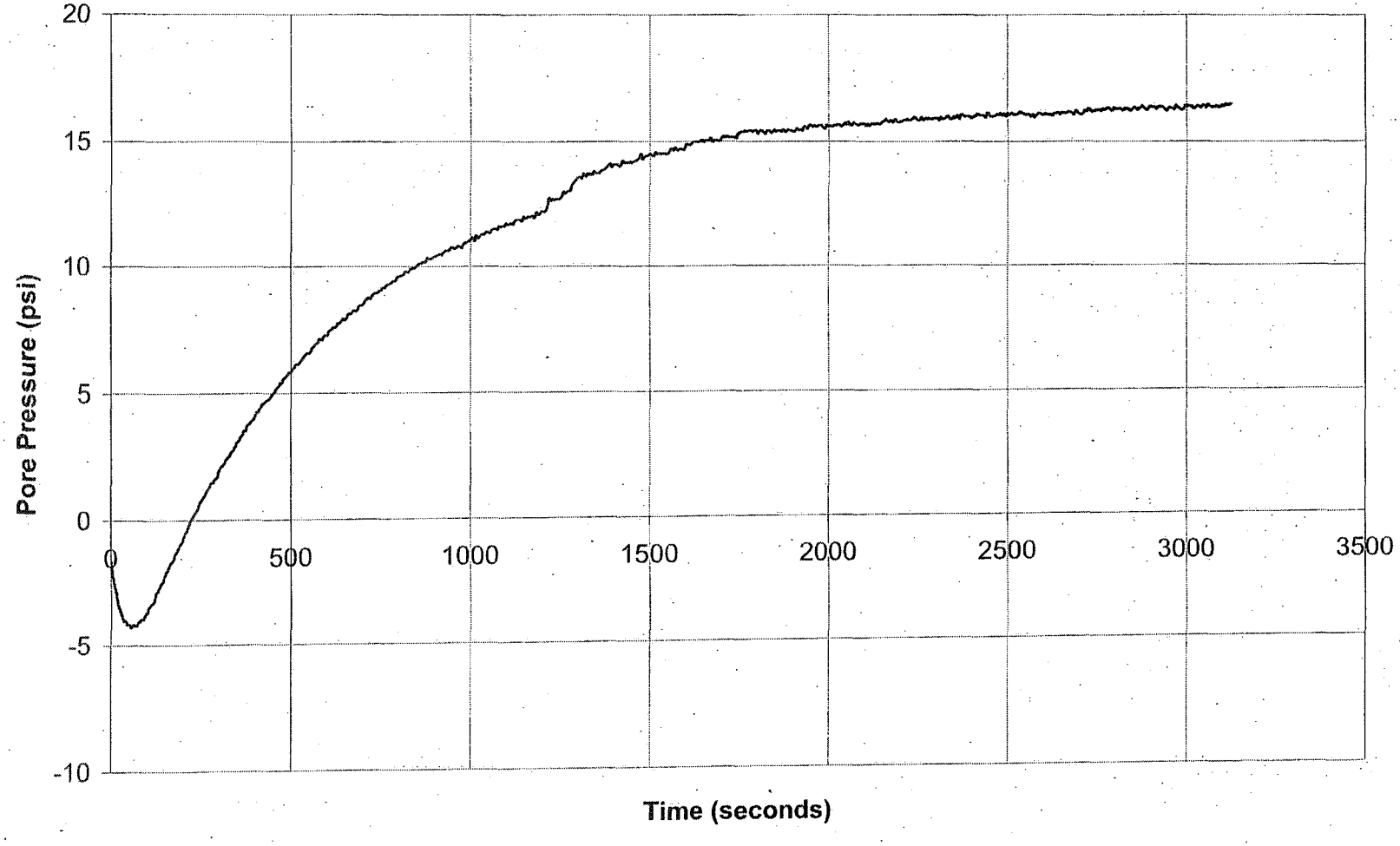
Sounding: c-306s
Depth: 56.102
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

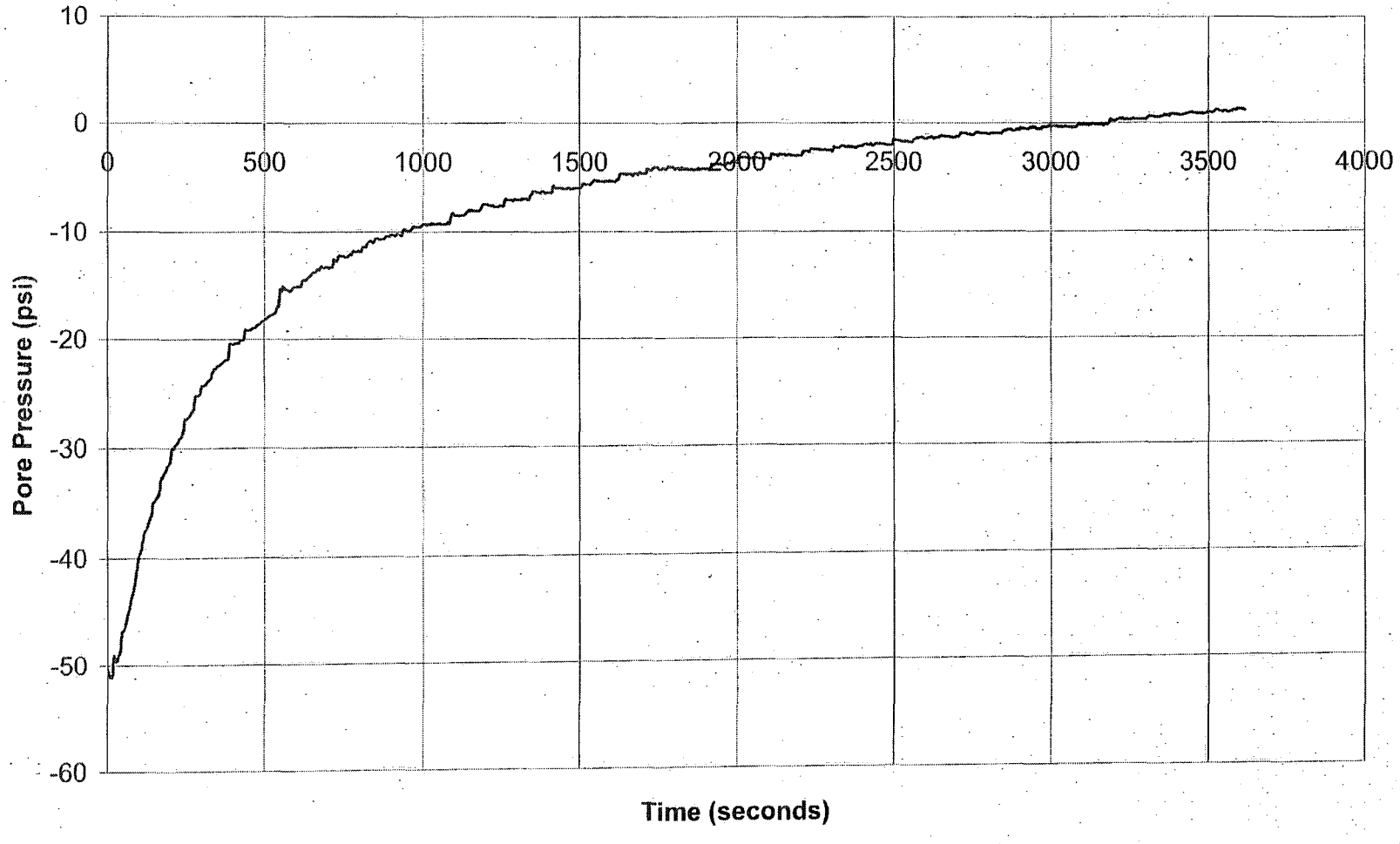
Sounding: c-307s
Depth: 73.983
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

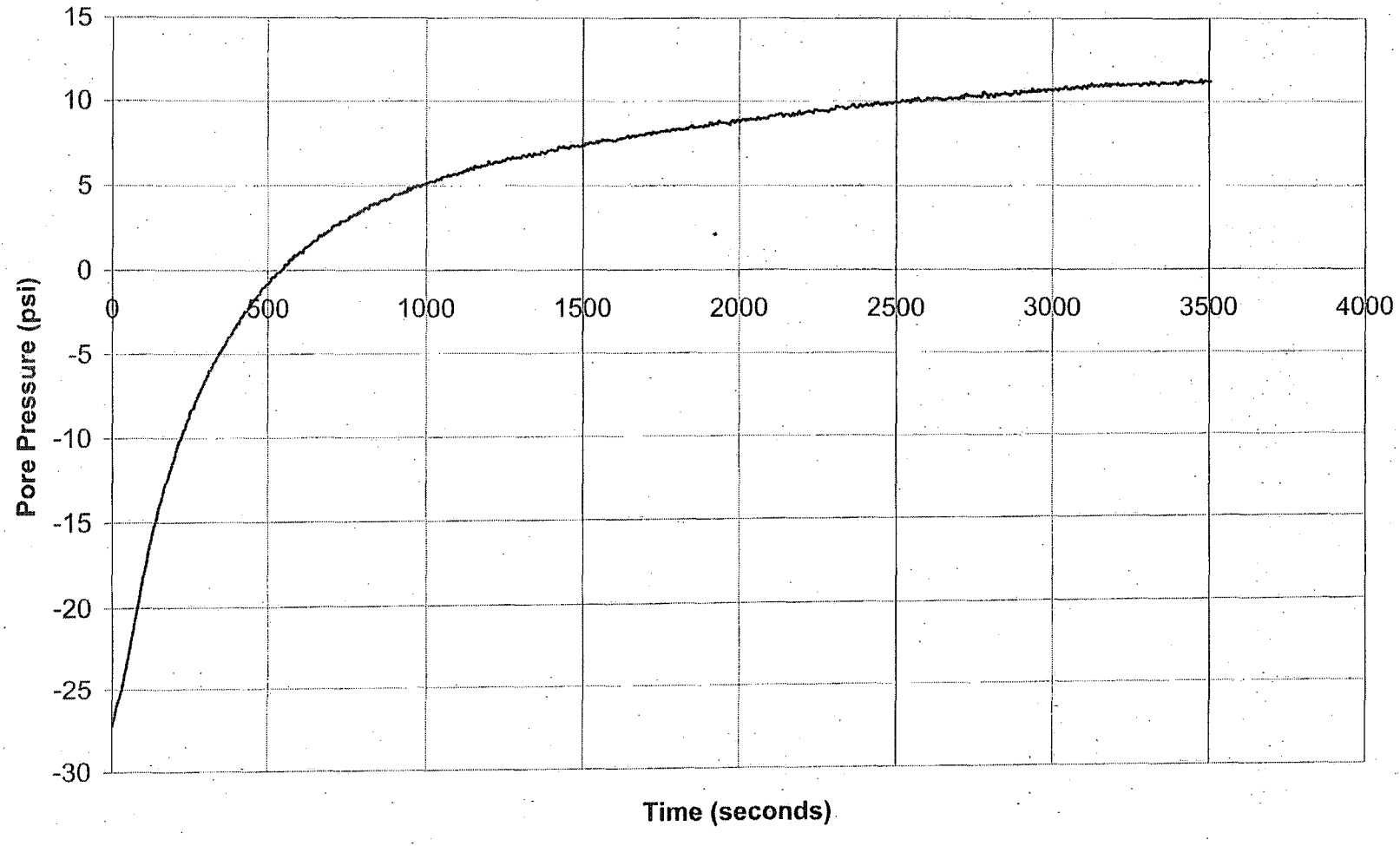
Sounding: c-308
Depth: 31.004
Site: S.-TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

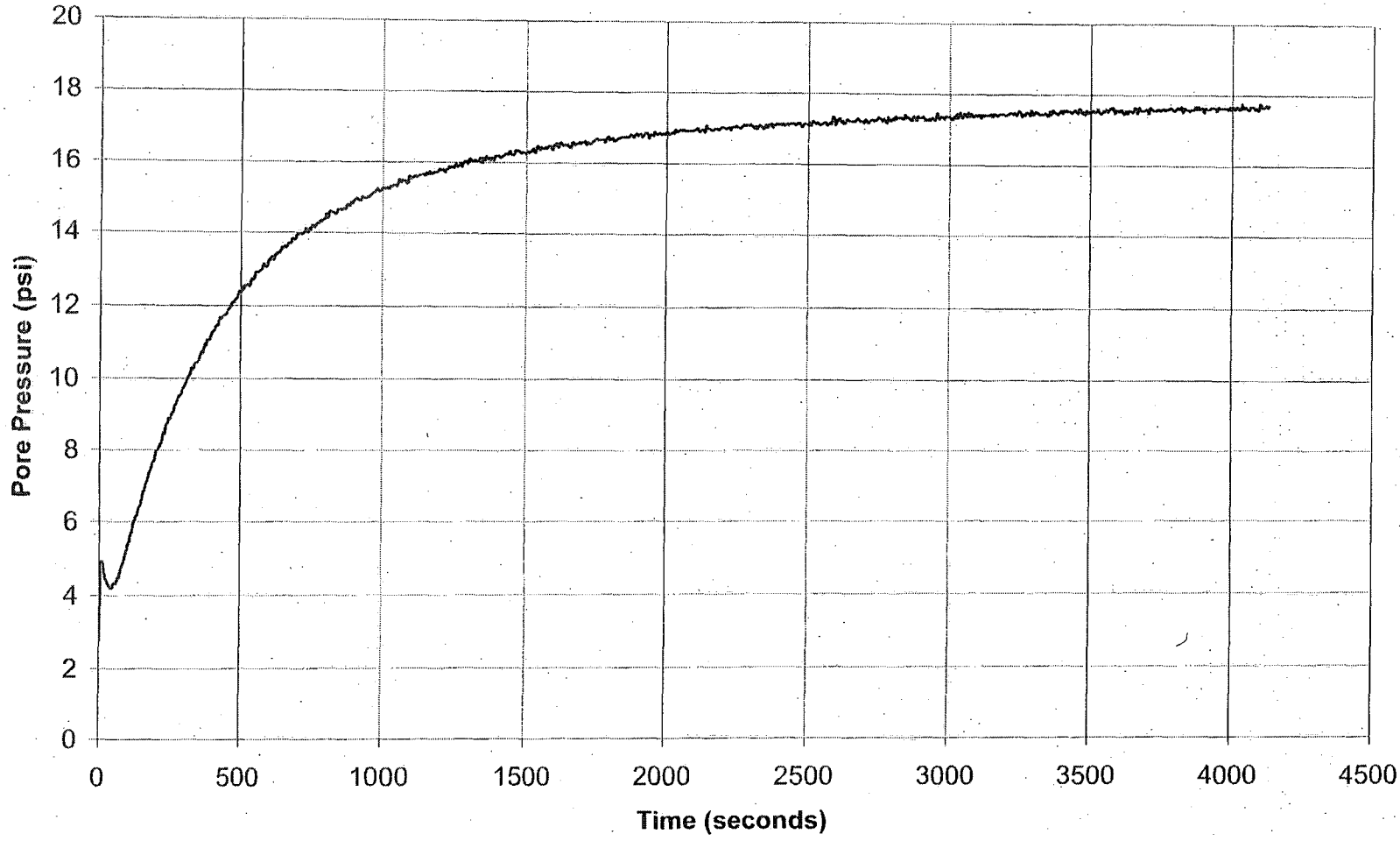
Sounding: c-308
Depth: 70.046
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

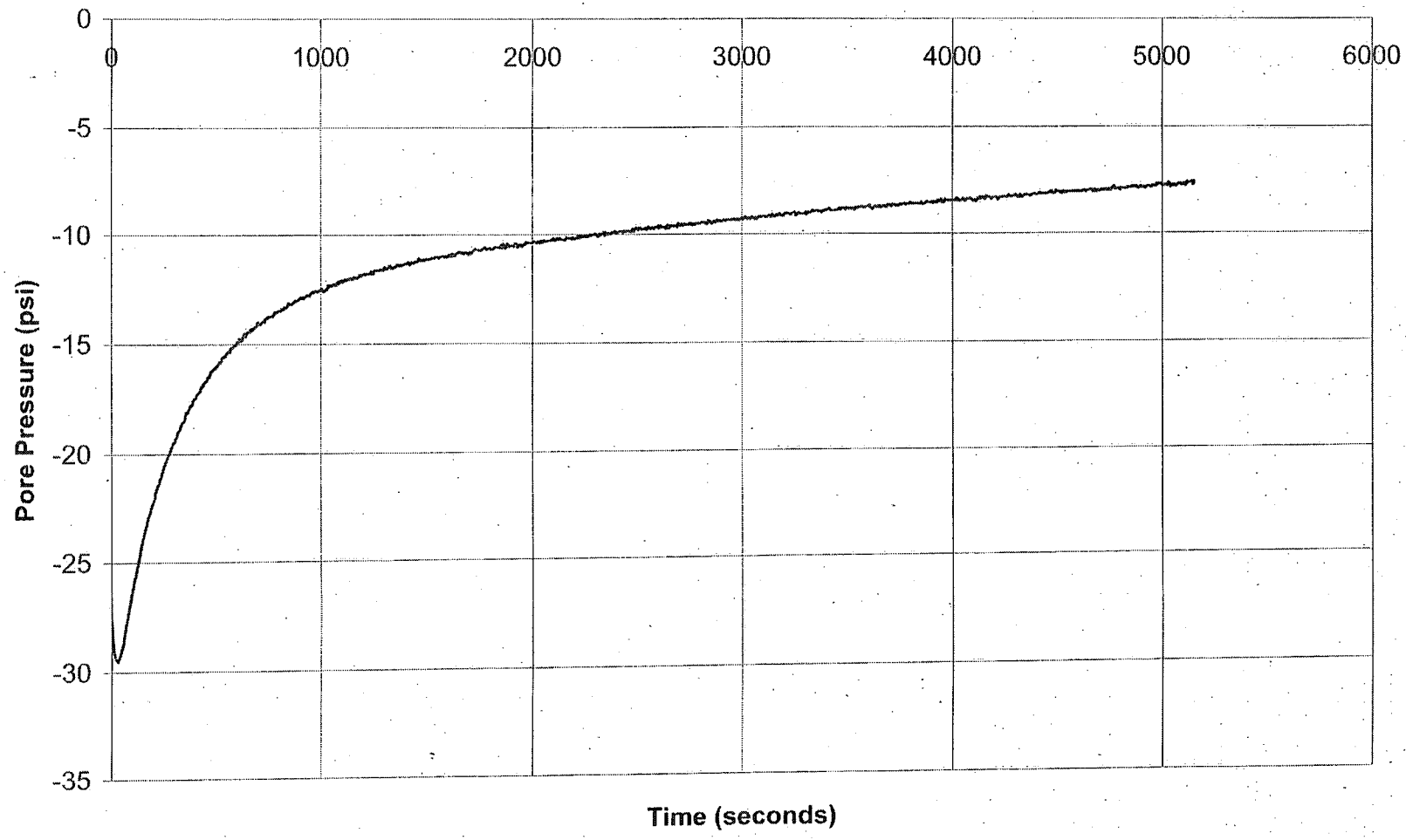
Sounding: c-310
Depth: 26.083
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

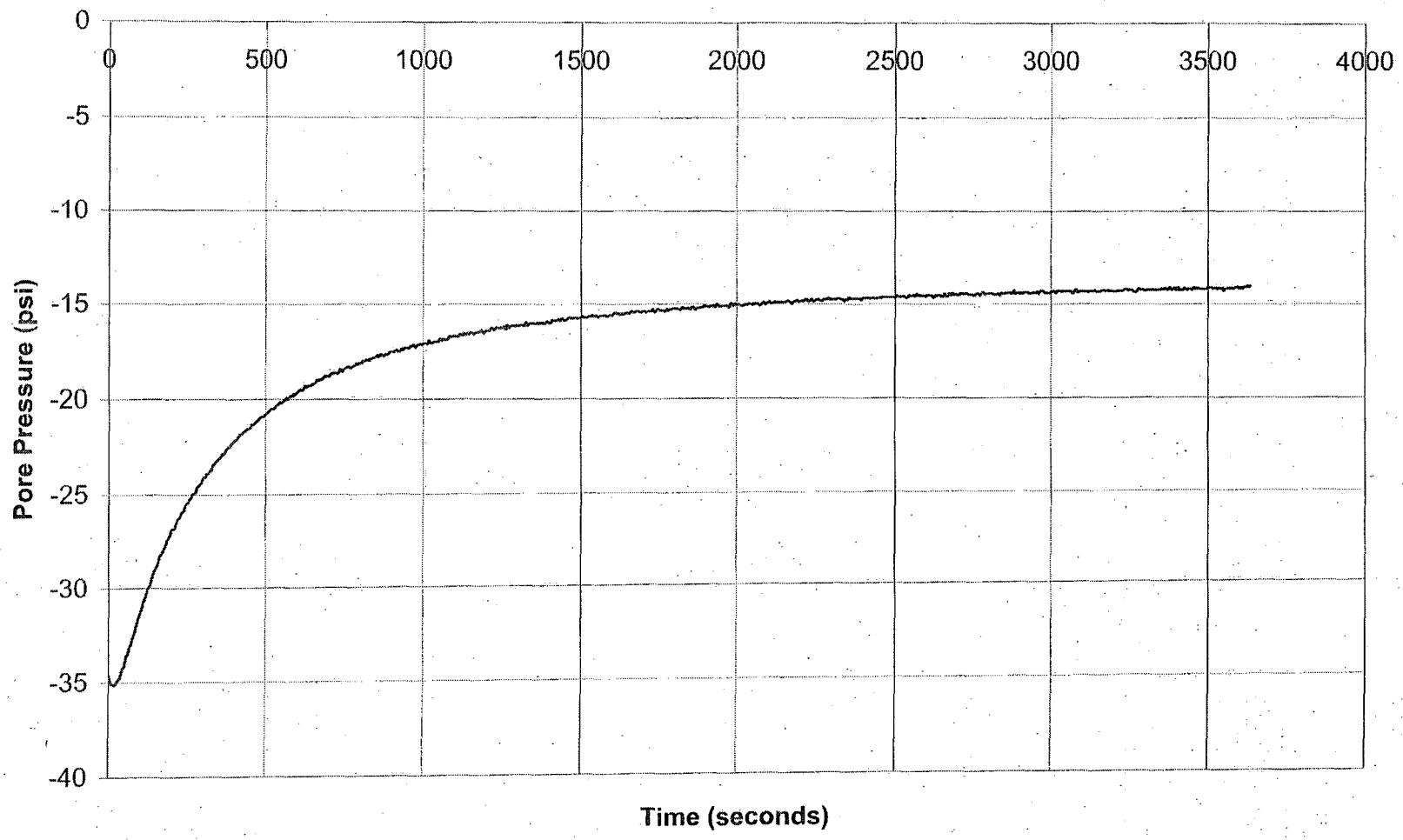
Sounding: c-404
Depth: 30.02
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

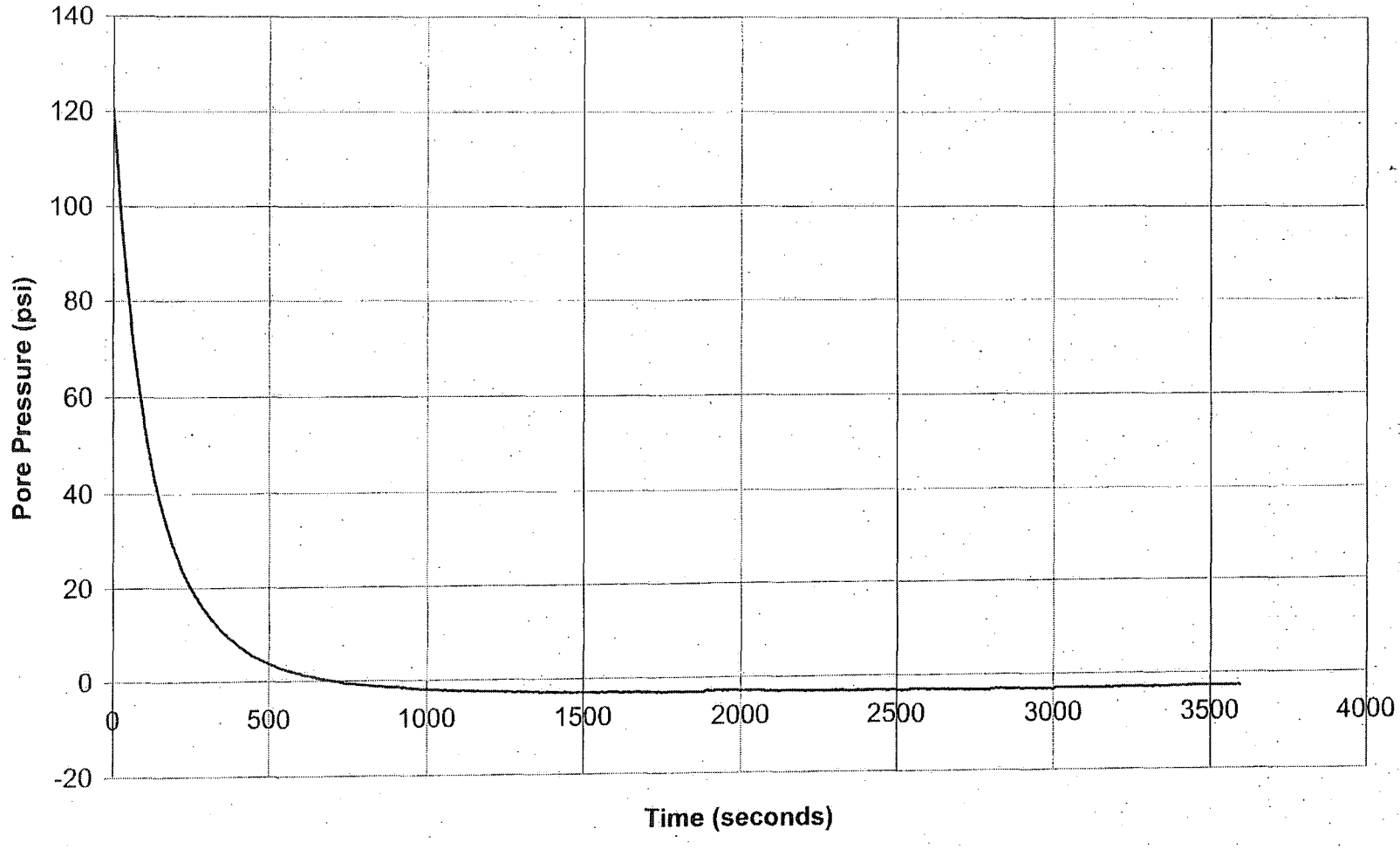
Sounding: c-406s
Depth: 29.199
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

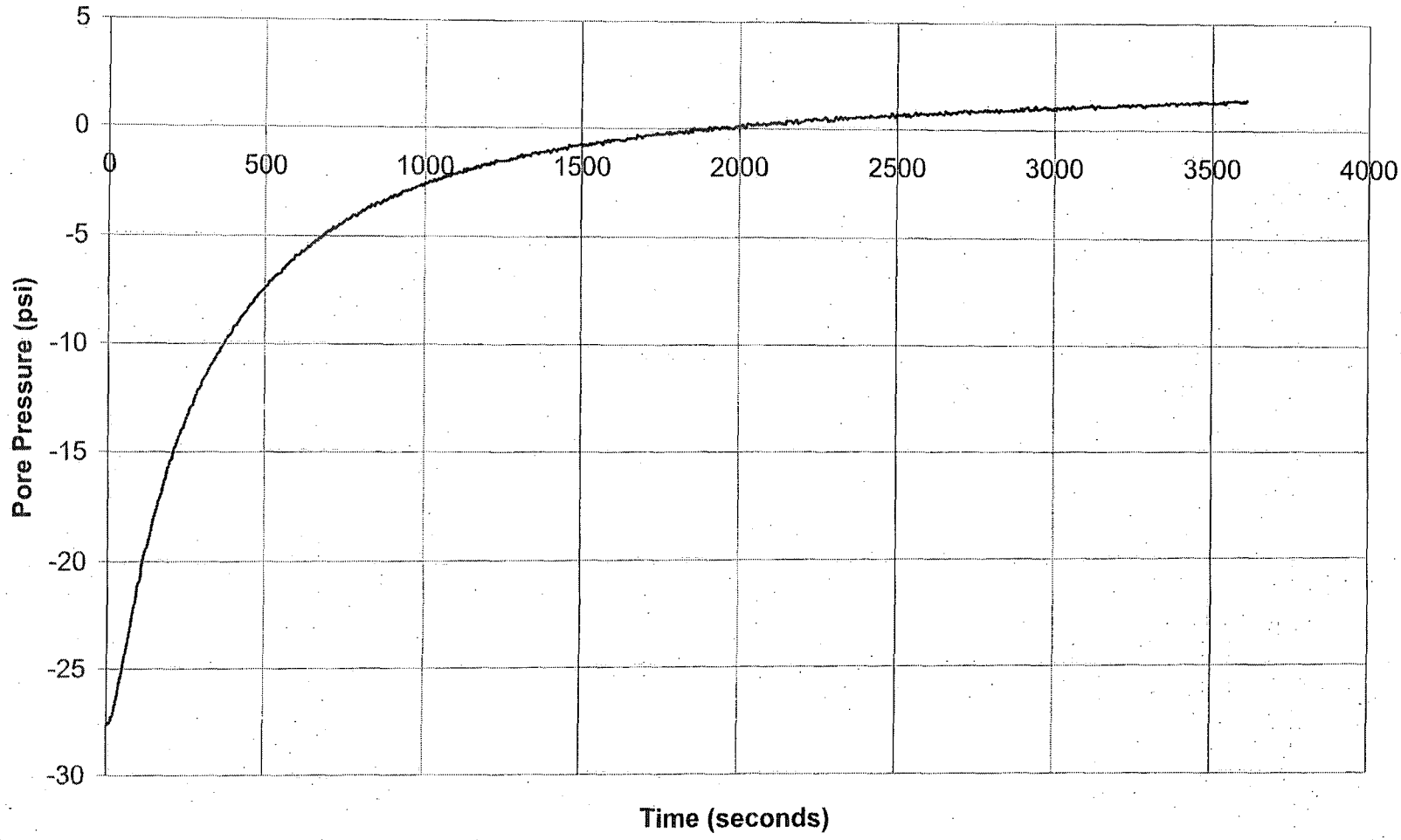
Sounding: c-406s
Depth: 58.399
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

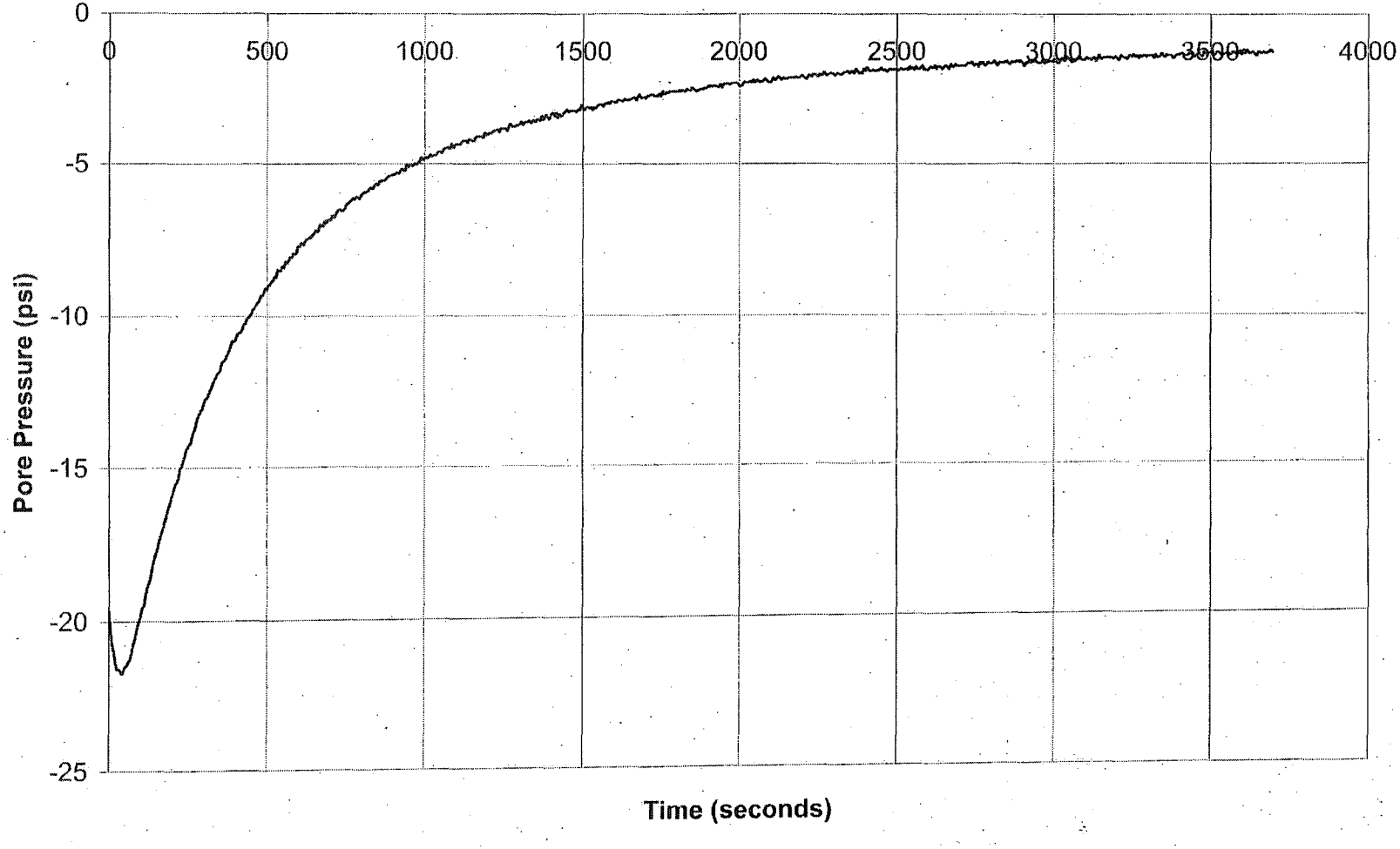
Sounding: c-406s
Depth: 71.358
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

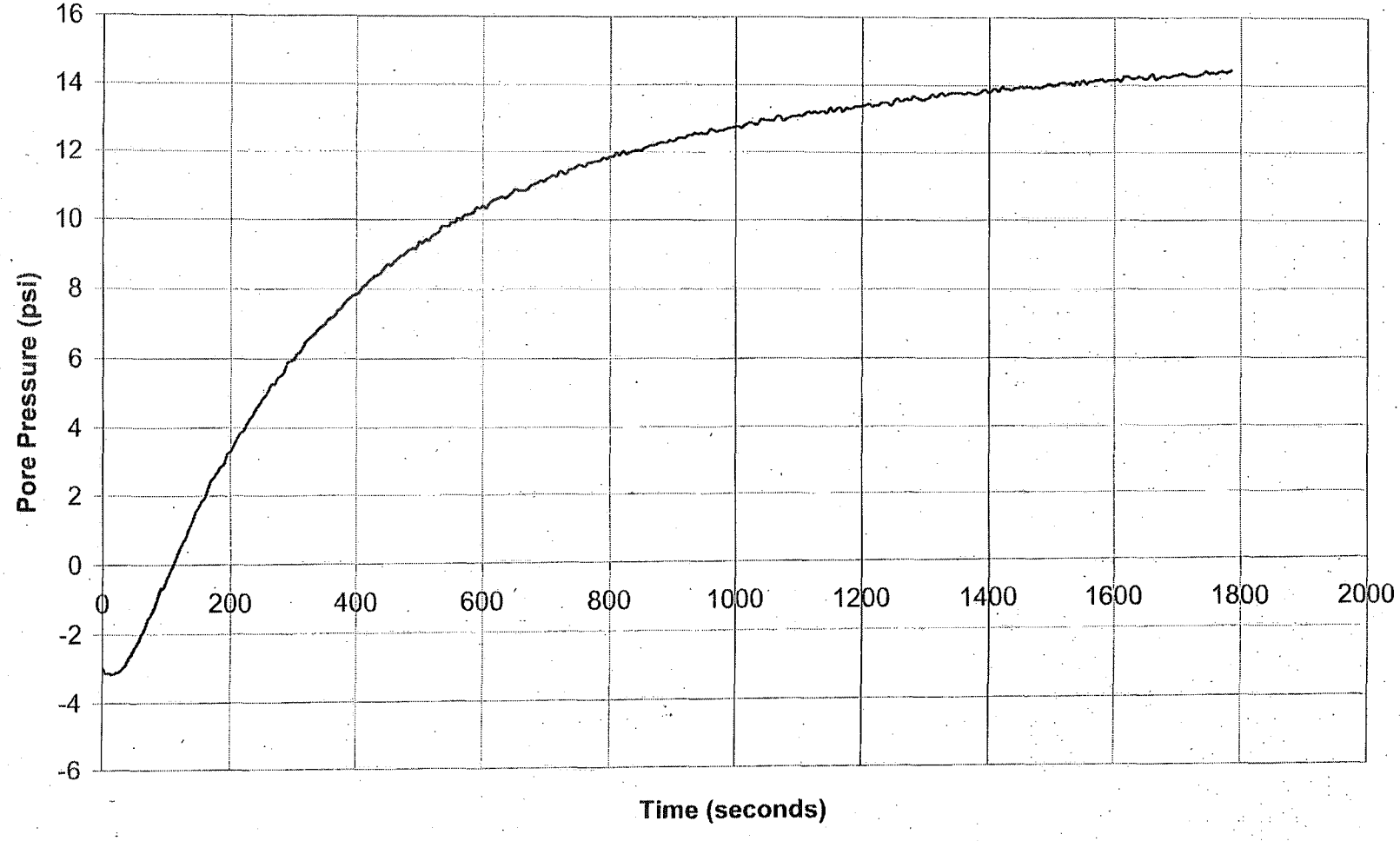
Sounding: c-408
Depth: 27.395
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

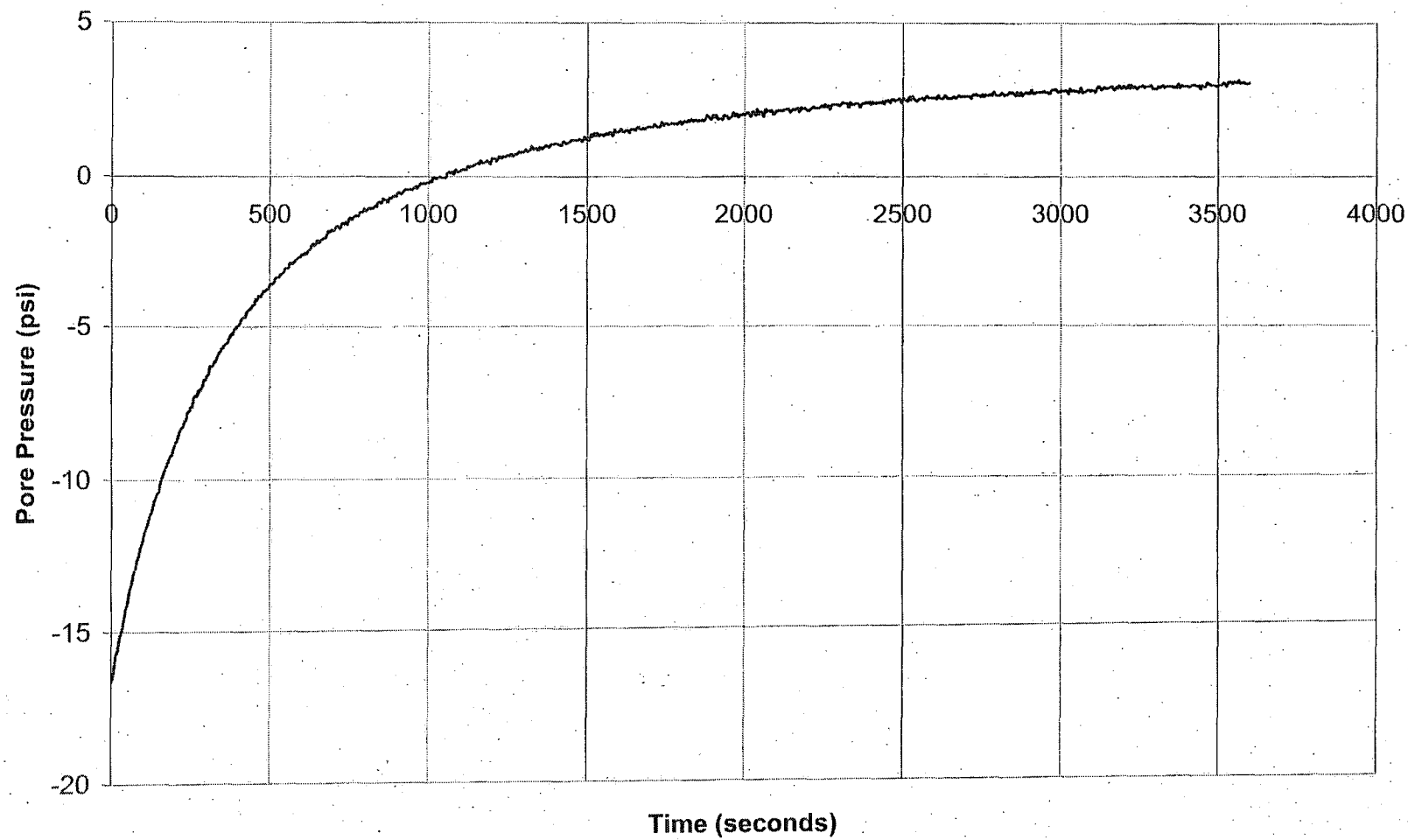
Sounding: c-408
Depth: 70.21
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

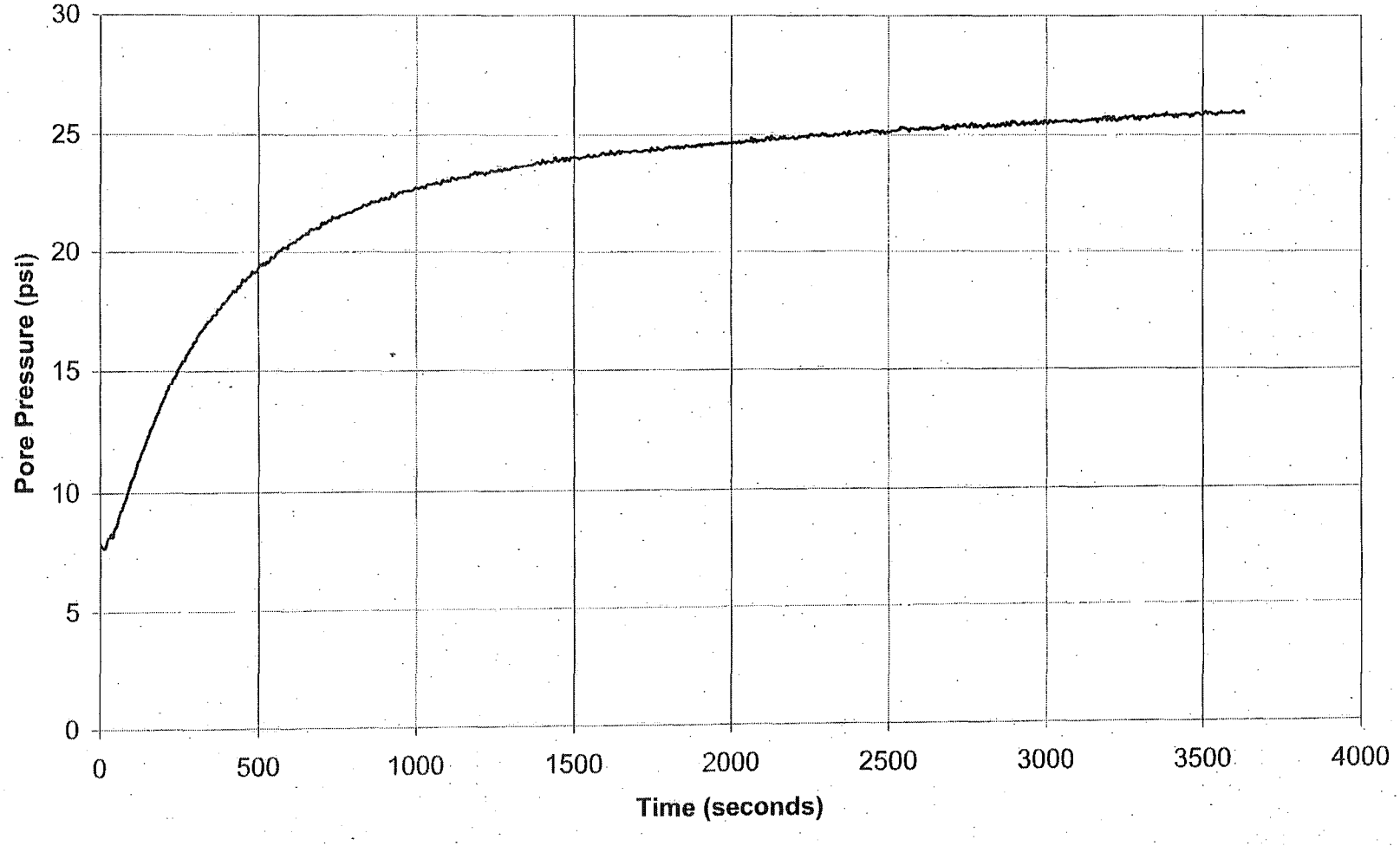
Sounding: c-410
Depth: 29.035
Site: S. TEXAS
Operator: R.AGUILLAR



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

Sounding: c-410
Depth: 83.333
Site: S. TEXAS
Operator: R.AGUILLAR



Shear Wave Velocity Calculations

S. TEXAS PROJECT
MACTEC

Geophone Offset: 0.66 Feet
Source Offset: 9.17 Feet

c-305s

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
5.09	4.43	10.18	10.18	20.4500			
10.01	9.35	13.09	2.91	25.6000	5.1500	565.4	6.89
15.09	14.43	17.10	4.00	32.1500	6.5500	611.4	11.89
20.01	19.35	21.42	4.32	39.4000	7.2500	595.4	16.89
25.10	24.44	26.10	4.69	45.0000	5.6000	836.9	21.90
30.02	29.36	30.76	4.66	51.1000	6.1000	763.3	26.90
35.10	34.44	35.64	4.89	57.1500	6.0500	807.7	31.90
40.03	39.37	40.42	4.78	62.1000	4.9500	964.7	36.91
45.11	44.45	45.39	4.97	68.6000	6.5000	764.2	41.91
50.03	49.37	50.22	4.83	75.6500	7.0500	685.0	46.91
55.12	54.46	55.22	5.01	82.2500	6.6000	758.7	51.92
60.37	59.71	60.41	5.18	86.8000	4.5500	1139.1	57.08
65.12	64.46	65.11	4.71	90.9000	4.1000	1147.8	62.09
70.05	69.39	69.99	4.88	94.7500	3.8500	1266.4	66.93
75.95	75.29	75.85	5.86	99.3500	4.6000	1273.6	72.34
80.05	79.39	79.92	4.07	102.9500	3.6000	1131.2	77.34
85.14	84.48	84.97	5.05	107.1500	4.2000	1203.3	81.93
90.06	89.40	89.87	4.89	112.9500	5.8000	843.8	86.94
95.14	94.48	94.93	5.06	117.8000	4.8500	1043.3	91.94
97.11	96.45	96.89	1.96	119.7000	1.9000	1031.3	95.47

Shear Wave Velocity Calculations

S. TEXAS PROJECT
MACTEC

Geophone Offset: 0.66 Feet
Source Offset: 9.17 Feet

c-306s

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
5.09	4.43	10.18	10.18	28.9000			
10.01	9.35	13.09	2.91	31.6000	2.7000	1078.4	6.89
15.09	14.43	17.10	4.00	37.9000	6.3000	635.7	11.89
20.01	19.35	21.42	4.32	42.9000	5.0000	863.4	16.89
25.10	24.44	26.10	4.69	48.4000	5.5000	852.1	21.90
30.02	29.36	30.76	4.66	53.4000	5.0000	931.2	26.90
35.10	34.44	35.64	4.89	59.1000	5.7000	857.2	31.90
40.03	39.37	40.42	4.78	64.5500	5.4500	876.2	36.91
45.11	44.45	45.39	4.97	71.4500	6.9000	719.9	41.91
50.03	49.37	50.22	4.83	78.3000	6.8500	705.1	46.91
55.12	54.46	55.22	5.01	84.7500	6.4500	776.4	51.92
60.04	59.38	60.08	4.86	89.7500	5.0000	971.7	56.92
65.12	64.46	65.11	5.03	94.2500	4.5000	1117.9	61.92

Shear Wave Velocity Calculations

S. TEXAS PROJECT
MACTEC

Geophone Offset: 0.66 Feet
Source Offset: 9.17 Feet

c-307s

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
5.09	4.43	10.18	10.18	23.6000			
10.01	9.35	13.09	2.91	30.4000	6.8000	428.2	6.89
15.09	14.43	17.10	4.00	35.0000	4.6000	870.6	11.89
20.01	19.35	21.42	4.32	41.3000	6.3000	685.2	16.89
25.10	24.44	26.10	4.69	46.4500	5.1500	910.0	21.90
30.18	29.52	30.91	4.81	51.8000	5.3500	899.6	26.98
35.10	34.44	35.64	4.73	56.5000	4.7000	1006.3	31.98

Shear Wave Velocity Calculations

S. TEXAS PROJECT
MACTEC

Geophone Offset: 0.66 Feet
Source Offset: 9.17 Feet

c-307s-a

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
40.03	39.37	40.42	40.42	61.3500			
45.11	44.45	45.39	4.97	66.8000	5.4500	911.4	41.91
50.03	49.37	50.22	4.83	73.9500	7.1500	675.5	46.91
55.12	54.46	55.22	5.01	80.4500	6.5000	770.4	51.92
60.04	59.38	60.08	4.86	86.1500	5.7000	852.4	56.92
65.12	64.46	65.11	5.03	91.1000	4.9500	1016.2	61.92
70.05	69.39	69.99	4.88	94.7000	3.6000	1354.3	66.93
75.13	74.47	75.03	5.04	97.8000	3.1000	1627.2	71.93
80.05	79.39	79.92	4.89	102.1000	4.3000	1136.4	76.93
85.30	84.64	85.14	5.22	107.5500	5.4500	957.2	82.02
90.22	89.56	90.03	4.89	110.5000	2.9500	1659.0	87.10
95.14	94.48	94.93	4.90	113.2000	2.7000	1813.7	92.02

Shear Wave Velocity Calculations

S. TEXAS PROJECT
MACTEC

Geophone Offset: 0.66 Feet
Source Offset: 9.17 Feet

c-406s

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
5.09	4.43	10.18	10.18	28.7000			
10.17	9.51	13.21	3.03	34.2000	5.5000	550.8	6.97
15.09	14.43	17.10	3.89	39.2500	5.0500	769.8	11.97
20.01	19.35	21.42	4.32	46.0000	6.7500	639.5	16.89
25.10	24.44	26.10	4.69	51.4000	5.4000	867.9	21.90
30.02	29.36	30.76	4.66	57.1500	5.7500	809.8	26.90
35.10	34.44	35.64	4.89	62.3000	5.1500	948.8	31.90
40.03	39.37	40.42	4.78	68.4500	6.1500	776.5	36.91
45.11	44.45	45.39	4.97	74.3500	5.9000	841.9	41.91
50.03	49.37	50.22	4.83	80.7000	6.3500	760.6	46.91
55.12	54.46	55.22	5.01	87.4000	6.7000	747.4	51.92
60.04	59.38	60.08	4.86	91.0500	3.6500	1331.1	56.92
65.12	64.46	65.11	5.03	95.6500	4.6000	1093.6	61.92
70.05	69.39	69.99	4.88	99.8000	4.1500	1174.9	66.93
75.13	74.47	75.03	5.04	103.8500	4.0500	1245.5	71.93
80.05	79.39	79.92	4.89	109.5000	5.6500	864.9	76.93
85.14	84.48	84.97	5.05	116.1500	6.6500	760.0	81.93
90.06	89.40	89.87	4.89	120.9500	4.8000	1019.6	86.94
93.34	92.68	93.13	3.26	123.7500	2.8000	1165.8	91.04

Shear Wave Velocity Calculations

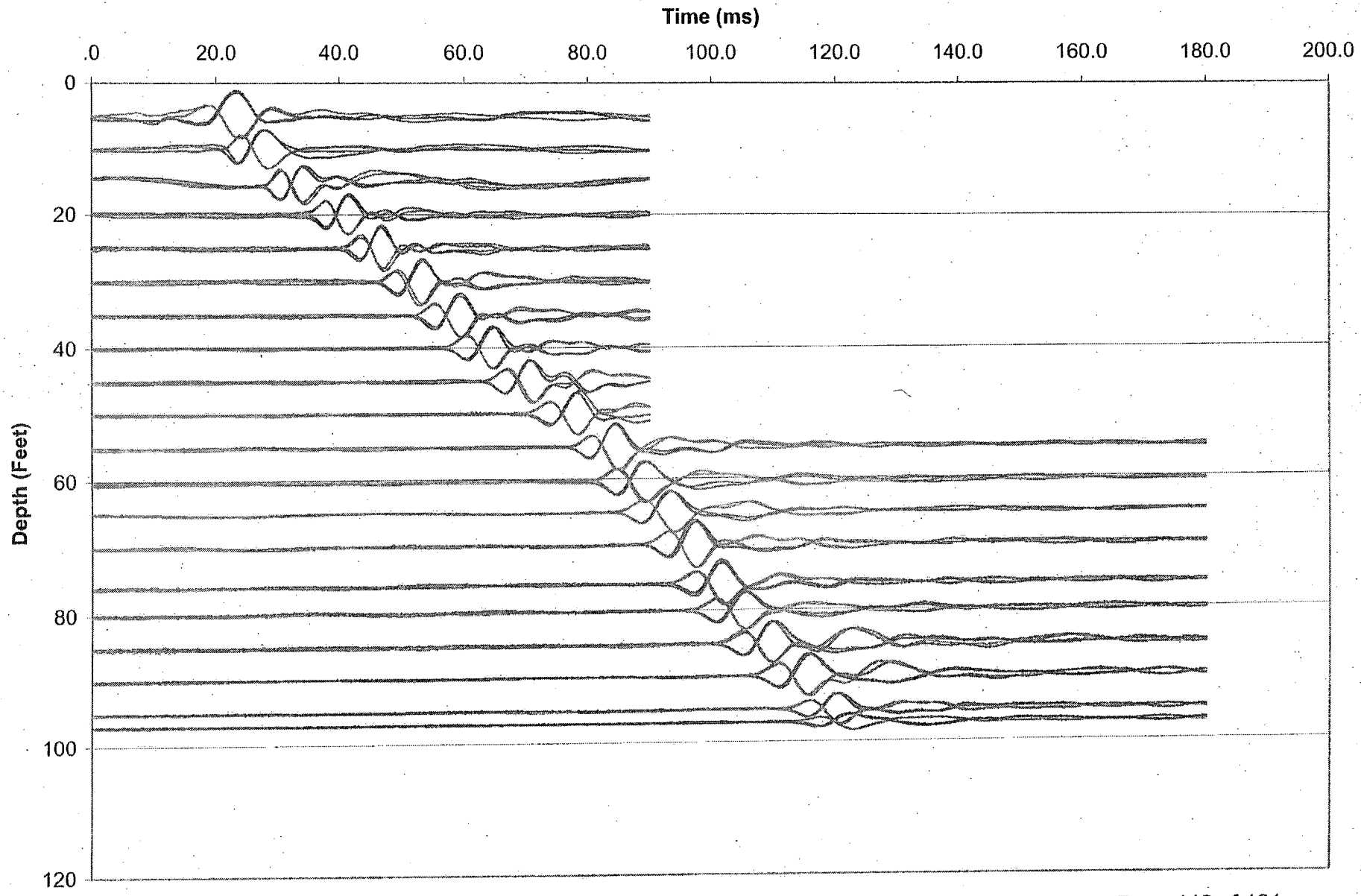
S. TEXAS PROJECT
MACTEC

Geophone Offset: 0.66 Feet
Source Offset: 9.17 Feet

c-407s

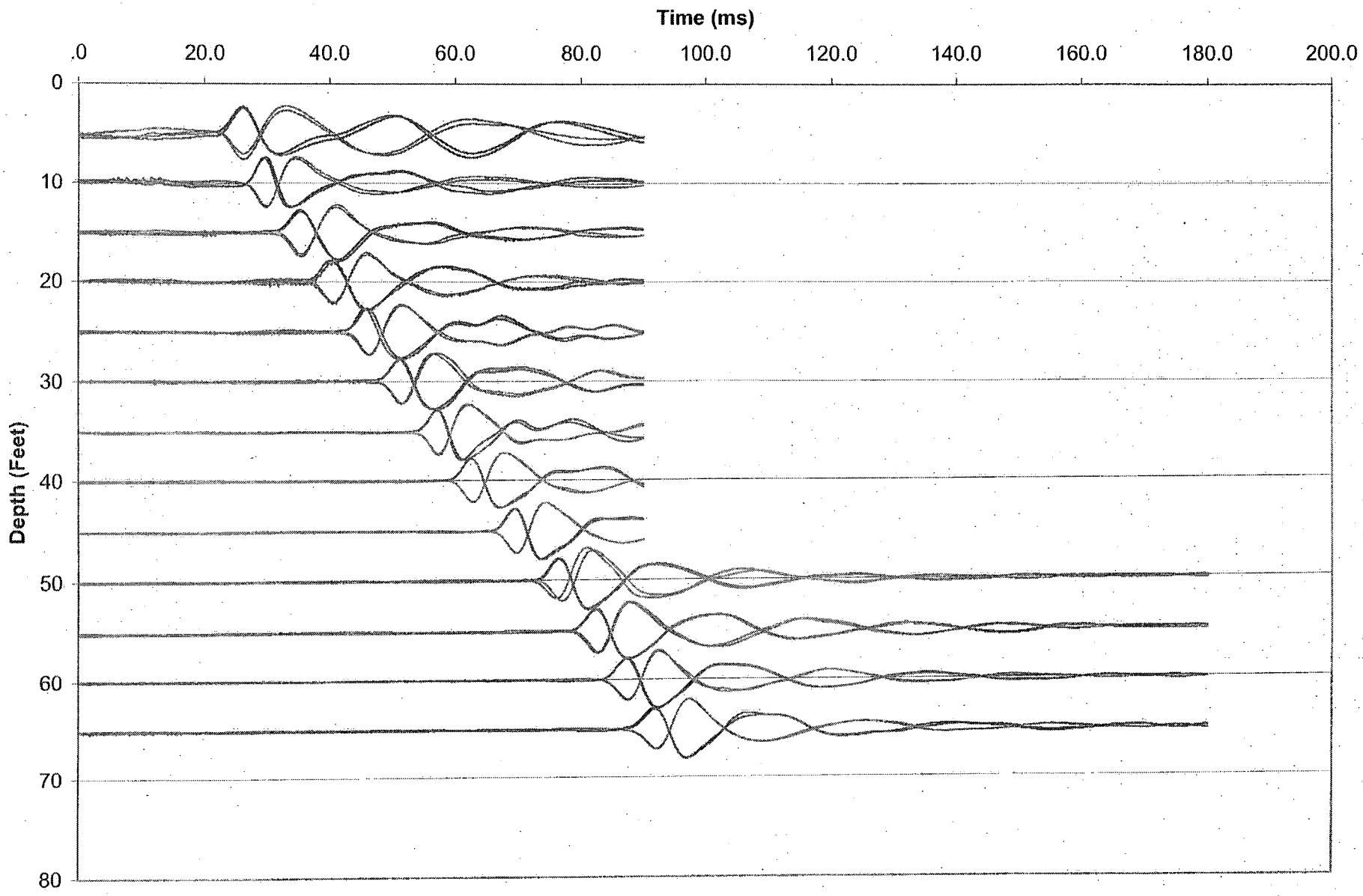
Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
5.09	4.43	10.18	10.18	29.2000			
10.01	9.35	13.09	2.91	34.4000	5.2000	560.0	6.89
15.09	14.43	17.10	4.00	38.7000	4.3000	931.4	11.89
20.01	19.35	21.42	4.32	44.6500	5.9500	725.5	16.89
25.10	24.44	26.10	4.69	50.4000	5.7500	815.0	21.90
30.02	29.36	30.76	4.66	55.4000	5.0000	931.2	26.90
35.10	34.44	35.64	4.89	60.9500	5.5500	880.4	31.90
40.03	39.37	40.42	4.78	66.5500	5.6000	852.8	36.91
45.11	44.45	45.39	4.97	74.1500	7.6000	653.6	41.91
50.03	49.37	50.22	4.83	81.8000	7.6500	631.3	46.91
55.12	54.46	55.22	5.01	88.8500	7.0500	710.3	51.92
60.04	59.38	60.08	4.86	93.3500	4.5000	1079.7	56.92
65.12	64.46	65.11	5.03	97.9500	4.6000	1093.6	61.92
70.05	69.39	69.99	4.88	102.5500	4.6000	1059.9	66.93
75.13	74.47	75.03	5.04	107.2500	4.7000	1073.3	71.93
80.05	79.39	79.92	4.89	112.3500	5.1000	958.2	76.93
85.14	84.48	84.97	5.05	117.0000	4.6500	1086.8	81.93
90.06	89.40	89.87	4.89	121.6000	4.6000	1063.9	86.94
95.14	94.48	94.93	5.06	126.7500	5.1500	982.6	91.94
98.26	97.60	98.03	3.10	129.4500	2.7000	1149.1	96.04

Waveforms for Sounding C-305s

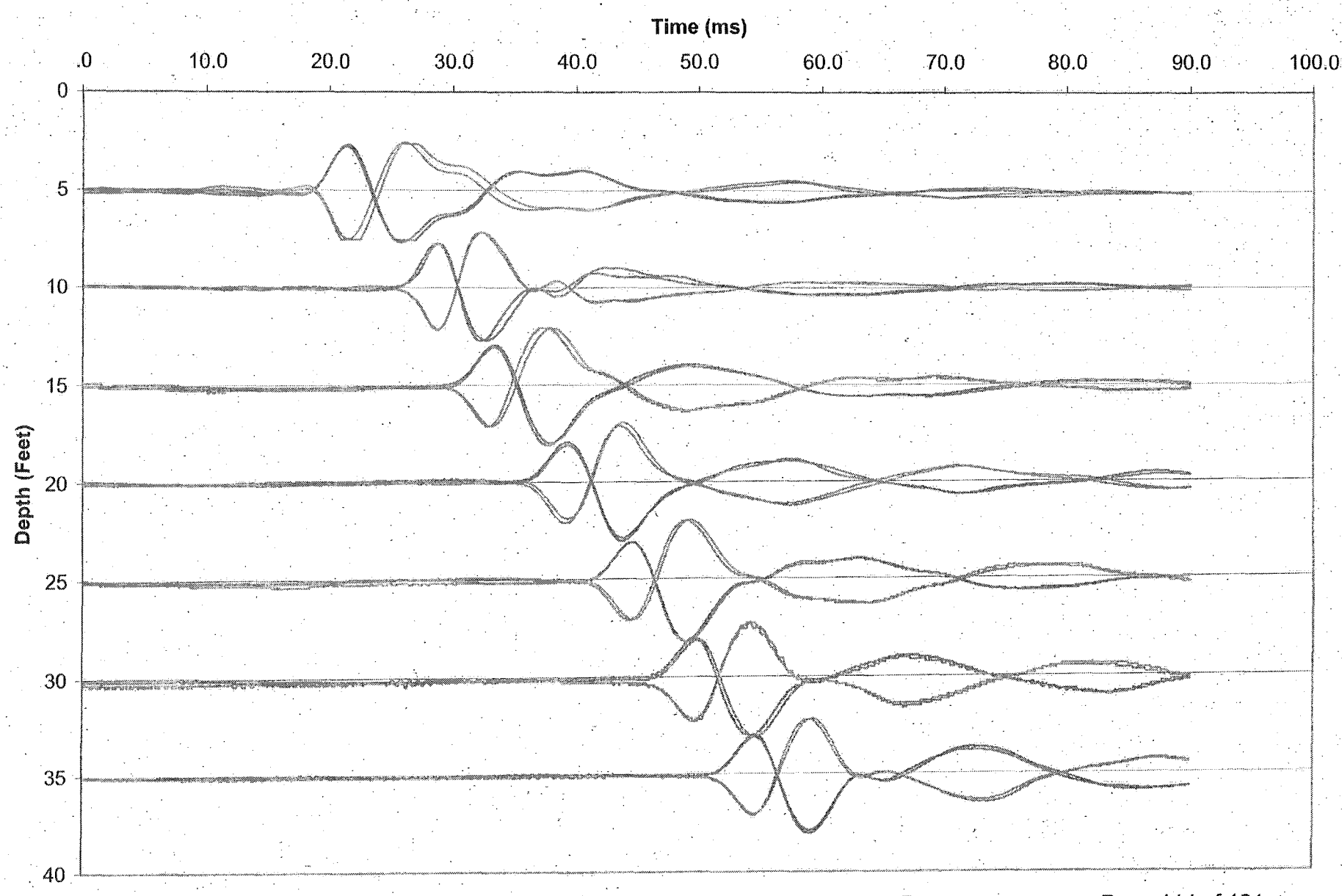


GREGG

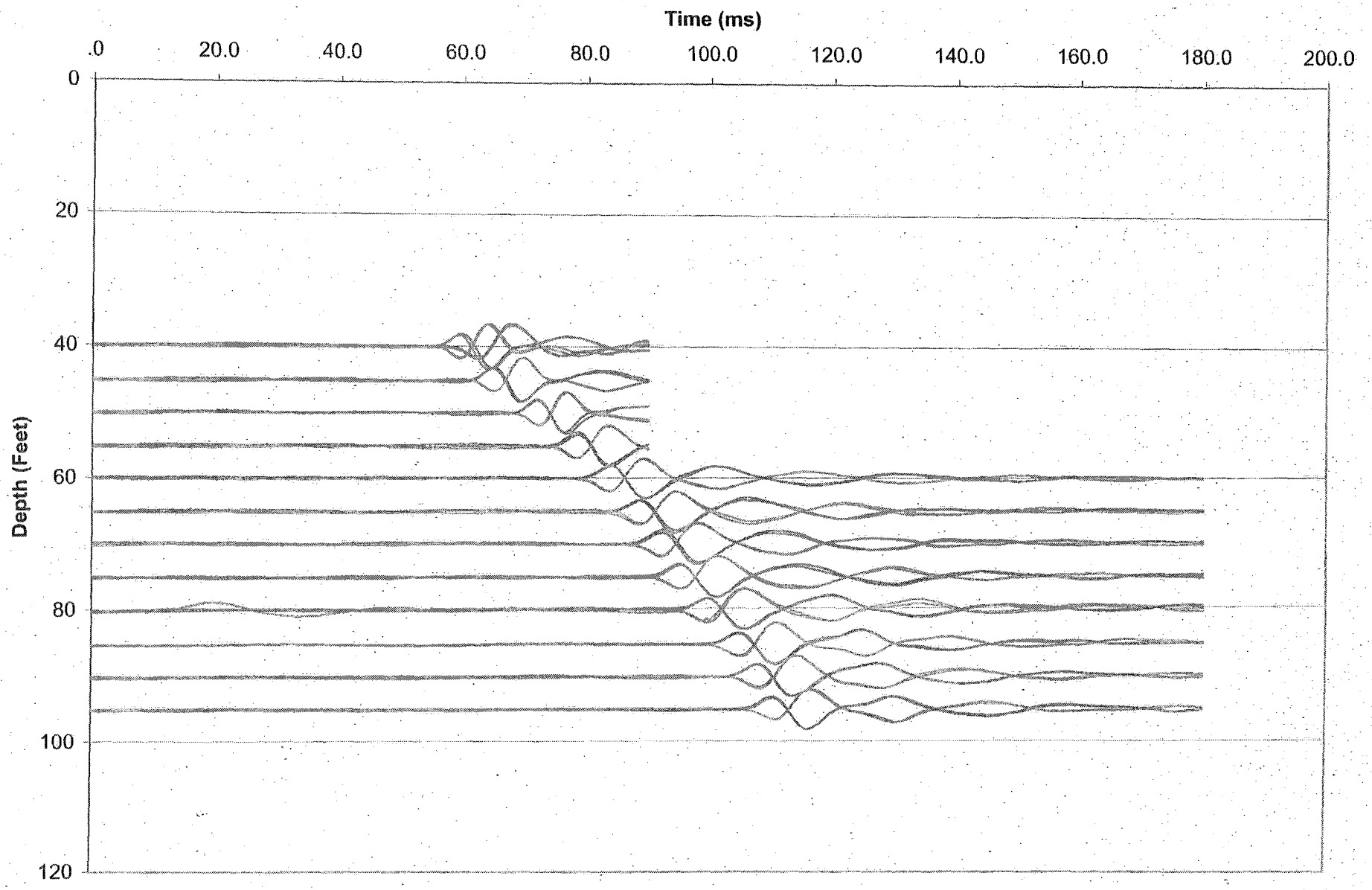
Waveforms for sounding c-306s



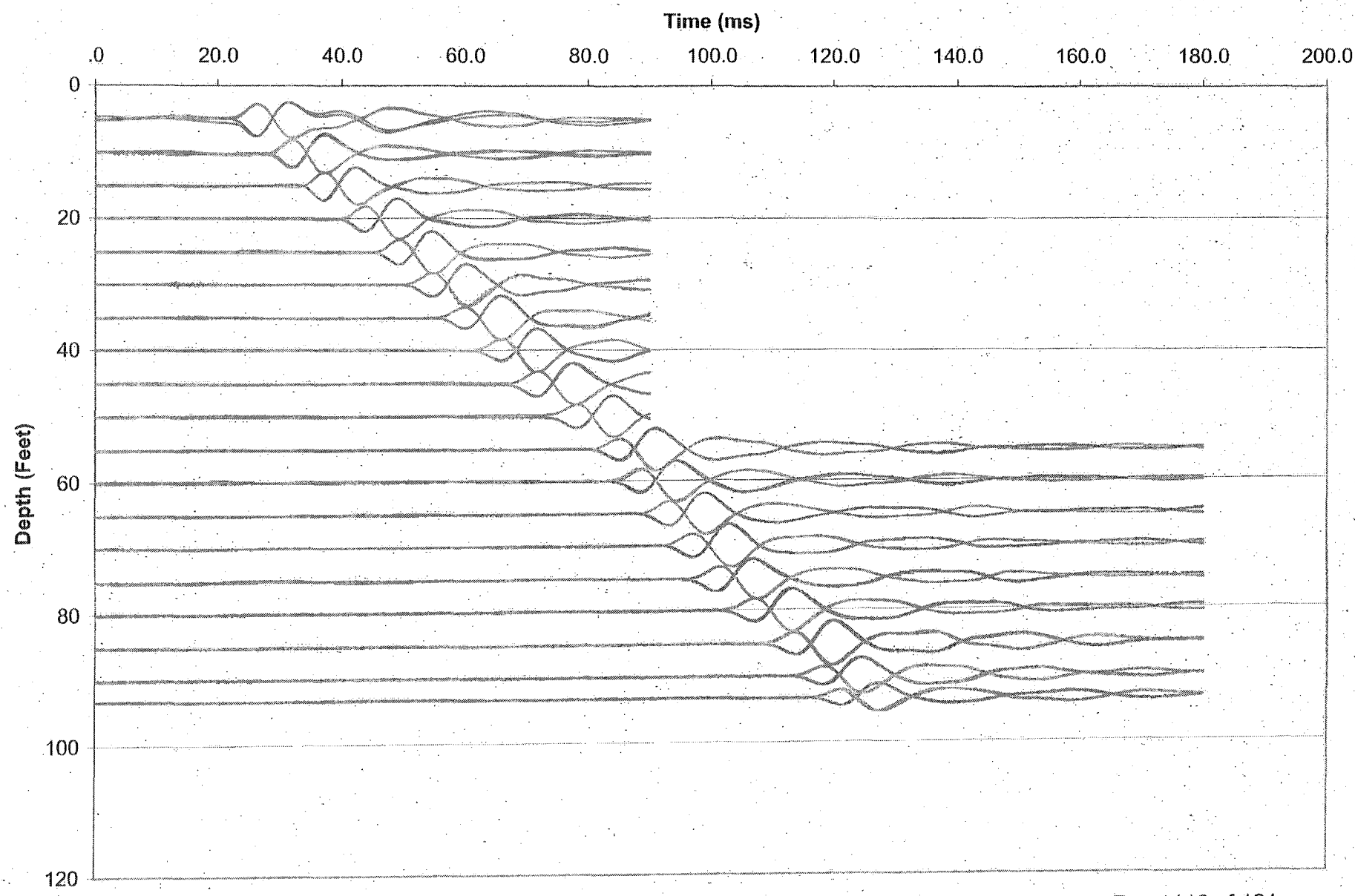
Waveforms for Sounding C-307s



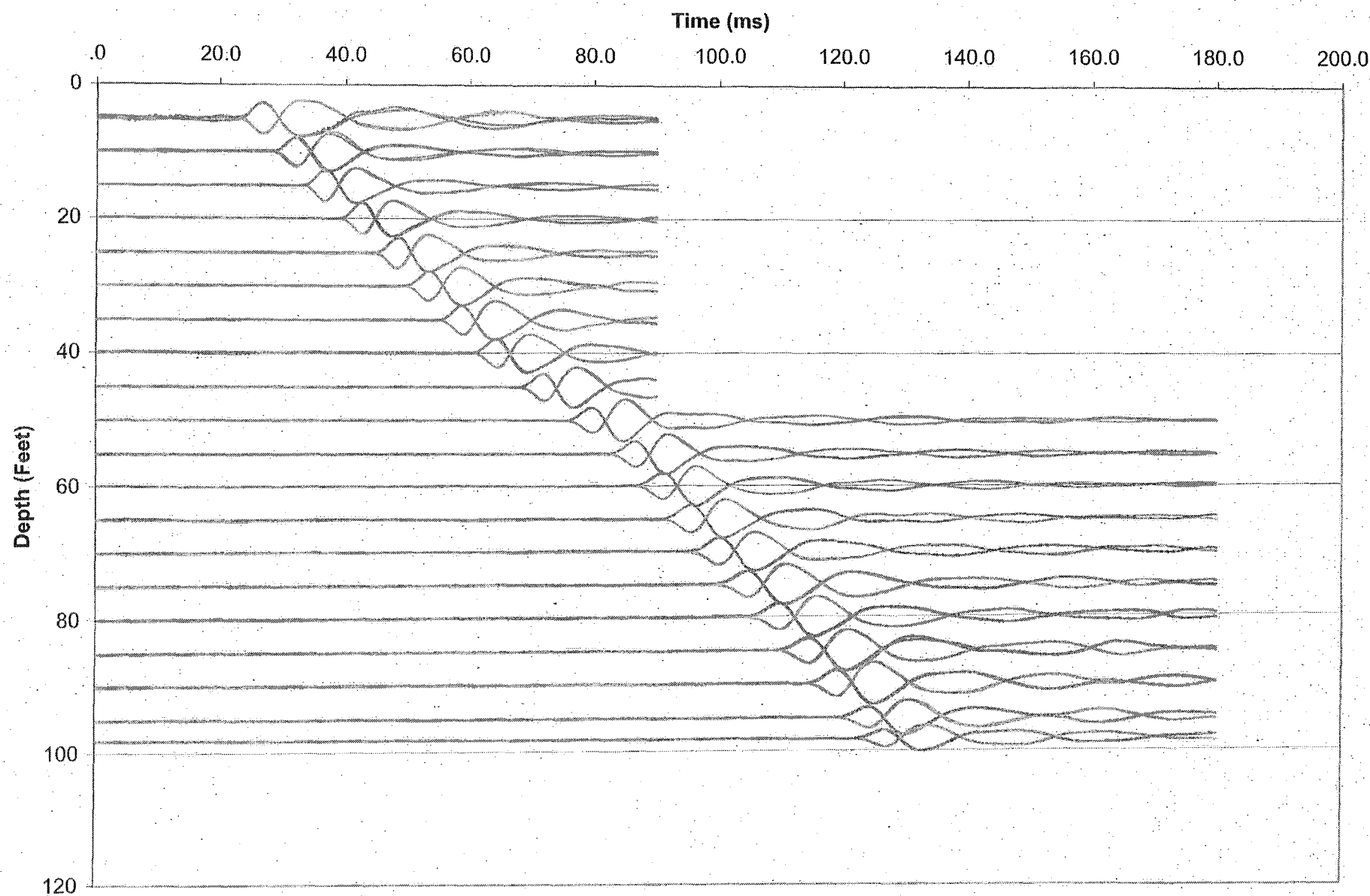
Waveforms for Sounding C-307sA



Waveforms for Sounding C-406s



Waveforms for Sounding C-407s



GREGG IN SITU
Digital File Formats

CPT Data Files

Unless otherwise requested by the client, Gregg CPT data files are named such that the first 3 characters contain the job number, the next two characters are typically CP followed by two characters indicating the sounding number. The last DOS character position is reserved for the letters a, b, c, d etc to uniquely identify multiple soundings at the same location. The CPT sounding file has the extension COR and pore pressure dissipation files have the extension PPD. As an example, for job number 99-127 the first sounding will have file names 127CP01.COR and 127CP01.PPD.

The CPT (COR) file consists of the following components:

1. Two lines of header information
2. Data records
3. End of data marker
4. Units information

Header Lines

Line 1: Columns 1-6 are blank (future use)
Columns 7-21 contain the sounding Date and Time
Columns 22-36 contain the sounding Operator

Line 2: Columns 1-16 contain the Job Location
Columns 17-31 contain the Cone ID
Columns 32-47 contain the sounding number

Data Records

The data records contain 4 or more columns of data in floating point format. A comma (and spaces) separates each data item:

Column 1:	Sounding Depth (m)
Column 2:	Tip (q_c) data uncorrected for pore pressure effects. Recorded in units selected by the operator.
Column 3:	Sleeve (f_s) data. Recorded in units selected by the operator
Column 4:	Dynamic pore pressure readings. Recorded in units selected by the operator
Column 5:	Exists only if specialty modules (Resistivity and/or UVIF) have been used

End of Data Marker

After the last line of data a line containing ASCII 26 (CTL-Z) and a newline (carriage return/ line feed) character. This is used to mark the end of data.

Units Information

The last section of the file contains information about the units that were selected for the sounding. A separator bar makes up the first line. The second line contains the type of units used for depth, q_c, f_s and u. The third line contains the conversion values required for Gregg's software to convert the recorded data to an internal set of base units (bar for q_c, bar for f_s and meters for u).

CPT Dissipation Files

CPT Dissipation files have the same naming convention as the CPT sounding files and have the extension PPD. PPD files consist of the following components:

1. Two lines of header information
2. Data records

Header Lines (same as COR file):

Line 1: Columns 1-6 are blank (future use)
Columns 7-21 contain the sounding Date and Time
Columns 22-36 contain the sounding Operator

Line 2: Columns 1-16 contain the Job Location
Columns 17-31 contain the Cone ID
Columns 32-47 contain the sounding number

Data Records

The data records immediately follow the header lines. Each data record can occupy several lines in the file and is a complete record of a dissipation test at a particular depth. Each data record starts with a line containing two values separated by spaces; the first value being an index number (not currently used by the Software) and the second being the dissipation test depth in meters. Following this line are the dissipation pore pressure values stored at 5 second intervals with a maximum of 12 entries per line. The last line of the dissipation record may not contain a full 12 entries. The data record is terminated with an ASCII 30 character (appears as a triangle in some editors).

This sequence is repeated for every dissipation test in the sounding. No marker is used to indicate end of file. Units information is not stored in this file. Users would have to check the CPT file for the units that were used.

CPT Interpretations

Gregg's CPT interpretation output files are generally delivered in two styles knows as IFP and IFI files (printable and importable). One style has page formatting (IFP) and only uses up to 132 columns across the file. This allows the file to be printed on standard office printers. The files are usually formatted for 70 lines per page with form feed characters embedded into the file. They have been designed for use with the HP laserjet lineprinter or compressed (16.7 characters/inch) fixed pitch font style. Multiple pages are required to print an entire sounding. There are multiple parts to each page (pages 1a and 1b) to accommodate all the geotechnical parameters that are output.

The Importable file type (IFI) contains the same data as the IFP files but is set up with all the columns across the file. No page formatting is done. This file is designed for importing into spreadsheet programs.

Dilatometer Data Files

The dilatometer data files are prepared as input files for the program UBCDILLY (an enhanced version of DILLY originally created by Schmertmann and Crapps, Inc of Gainesville FL). The format of the files is almost identical to that described in Report Number FHWA-PA-87-014+84-24, Volume IV (of IV), GUIDELINES FOR GEOTECHNICAL DESIGN USING THE MARCHETTI DMT – DESIGN METHODS AND EXAMPLES, prepared for the Pennsylvania Department of Transportation by Schmertmann and Crapps, Inc. of Gainesville, FL, February 1998.

The only change to the input data is that the C reading is recorded as the fourth item of the data records immediately following the B reading. The input lines are as follows:

Line 1 Company Name (80 characters)
Line 2 Job Location (80 characters)
Line 3 Job Number (20 characters)
Line 4 Dilatometer Sounding Number (20 characters)
Line 5 Dilatometer Sounding Location (80 characters)
Line 6 Sounding Date (80 characters)
Line 7 Sounding Crew Names (80 characters)
Line 8 Delta A
Delta B
Vented gauge reading (gauge zero)
Depth to groundwater table (m)
Plot Option – vertical effective stress vs depth
Plot Option – undrained shear strength vs depth
Plot Option – phi angle vs depth
Plot Option – constrained modulus vs depth
Plot Option – plot interval (cm)
Unit weight of water in tonnes/m^3

Line 9 Phi Option
OCR Option
Diameter of friction reducer (cm)
Lineal weight of push rods (kg/m)
Diameter of push rods (cm)
Ratio of soil to dilatometer friction angle
Blade thickness (mm)

Line 10 (Test Cards)
Test reading depth (m)
A value (bars)
B value (bars)
C value (bars)
Thrust (kg)
Vertical effective stress (required on first test card)
Porewater pressure if known (bars)
Unit weight of soil (tonnes/m^3)
Plasticity index of soil

This card is repeated (usually only up to the Thrust data) for each test depth.

Dilatometer Output Files

These files are generated by UBCDILLY and are not easily modified.

281-820
4139

GREGG DRILLING & TESTING INC.

facsimile

Date 11/29/2006

Time 11:45

To Mike S

From Ron Boggess 936-327-4002

Fax No.

Telephone (361)972-4657

Pages: 5
(including this cover sheet)

Subject: **Calibrations**

2811 Highway 59 South Suite 100, Livingston, TX 77351
Phone: 936-327-4002 FAX: 936-327-4017

GREGG Cone Calibration

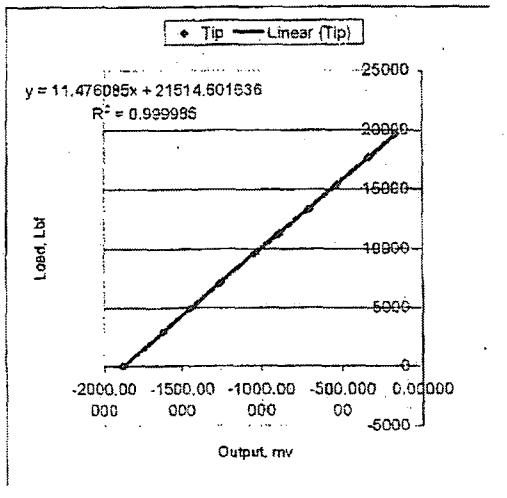
Cone ID: GDC-014 11/17/2006

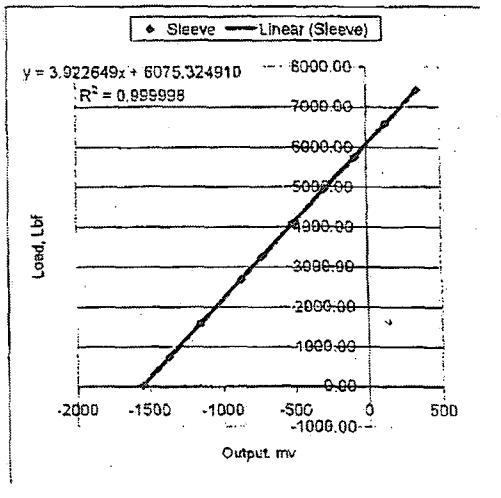
Reference: GMF Calibrator STU 100 SN 2941 8.51 Volt excitation 2093.454555 lbs/mv Pore pressure **0.4924** psi/mv

Calibrated by Applied Technical Services Inc. 5/09/2006 ATS ref.M501241-2

Tip Reference Load load (mv)	load (Lbs)	Transducer output (mv)	Indicated Load (Lbs)	Error % fs
1.63300	0	-1878.87200	-47.49	-0.237461
3.03000	2924.556013	-1619.69833	2924.51	-0.000223
4.00000	4955.206931	-1442.26600	4982.81	0.137993
5.00300	7054.941849	-1257.90933	7078.73	0.118930
6.20500	9571.274224	-1038.71667	9594.20	0.114638
7.00600	11248.13132	-892.33400	11274.10	0.129850
8.00300	13335.30551	-711.33933	13351.21	0.078529
9.00300	15428.78007	-530.01433	15432.11	0.016781
10.08500	17693.8779	-334.52367	17675.58	-0.091491
11.02600	19663.61863	-164.21000	19630.11	-0.168524

Sleeve Reference Load load (mv)	Load (Lbs)	Transducer output (mv)	Indicated Load (Lbs)	Error % fs
1.858000	0.00	-1549.301	-2.0383353	-0.05098
2.004000	728.52	-1384.237333	723.900489	-0.11554
2.407000	1572.18	-1146.478	1570.24666	-0.04839
2.940000	2686.00	-861.6383333	2695.42004	0.18561
3.217000	3267.88	-715.3573333	3269.22908	0.033863
3.613000	4096.89	-503.3366667	4100.91176	0.10053
4.018000	4944.74	-287.5266667	4947.45868	0.067975
4.414000	5773.75	-77.15633333	5772.65984	-0.0272
4.807000	6596.48	132.37	6594.56598	-0.04773
5.207000	7433.86	345.3316667	7429.93988	-0.09793





Tip

Slope = **11.476 lb/mv**

Intercept = 21514.60164 Lbf

R^2 = 0.999984649

11.4760845	21514.60164
0.01589706	17.85696597
0.99998465	26.95873468
521139.058	8
376749992	5814.187005

Sleeve

Slope = **3.923 lb/mv**

Intercept = 6075.32 Lbf

R^2 = 1.00

3.92264915	6075.32
0.00210141	1.80
0.9999977	4.03
3484484.74	8.00
56595568.2	129.94

GREGG Pore pressure calibration

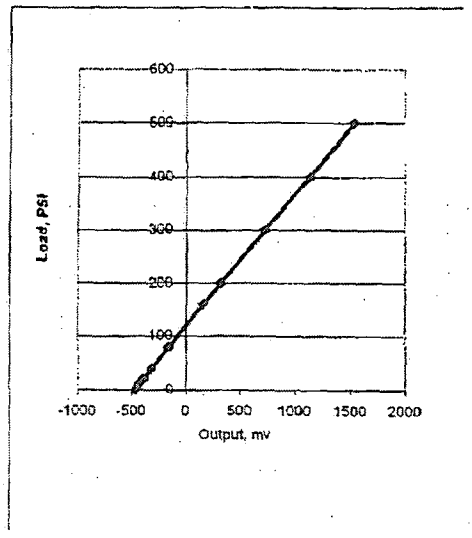
Cone No. GDC-014 Date 11/17/2006

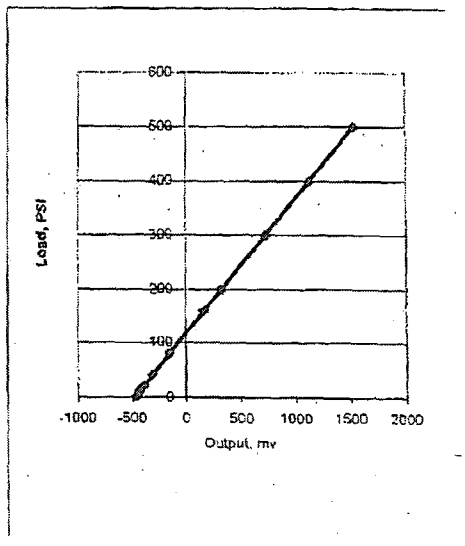
Reference: Dead Weight Pressure Calibrator SN HL-6887

Calibrated by Applied Technical Services Inc. 5/09/2006 ATS ref.M501241-1

Reference Pressure PSI	Transducer Output (mv)	Indicated Pressure PSI	Error % fs
0.00	-1975.758667	-0.2478	-0.0496
10.00	-1955.337667	9.8071	-0.0386
20.00	-1934.560333	20.0375	0.0075
40.00	-1893.564667	40.2232	0.0446
80.00	-1812.413333	80.1808	0.0362
160.00	-1650.314333	159.9957	-0.0009
200.00	-1568.857667	200.1036	0.0207
300.00	-1366.043	299.9663	-0.0067
400.00	-1162.898	399.9916	-0.0017
500.00	-959.905	499.9421	-0.0116

Reference Pressure PSI	Transducer Output (mv)	Indicated Pressure PSI	Error % fs
10.00	-1955.33767	9.8071	-0.0386
20.00	-1934.56033	20.0375	0.0075
40.00	-1893.56467	40.2232	0.0446
80.00	-1812.41333	80.1808	0.0362
160.00	-1650.31433	159.9957	-0.0009
200.00	-1568.85767	200.1036	0.0207
300.00	-1366.043	299.9663	-0.0067
400.00	-1162.898	399.9916	-0.0017
500.00	-959.905	499.9421	-0.0116
0.00	-1975.758667	-0.2478	-0.0496





Slope = **0.4924 psi/mv**
Intercept = 972.5837605 psi
R^2 = 0.999999298

Slope = **0.4924 psi/mv**
Intercept = 972.5837605 psi
R^2 = 0.999999298

GREGG Cone Calibration

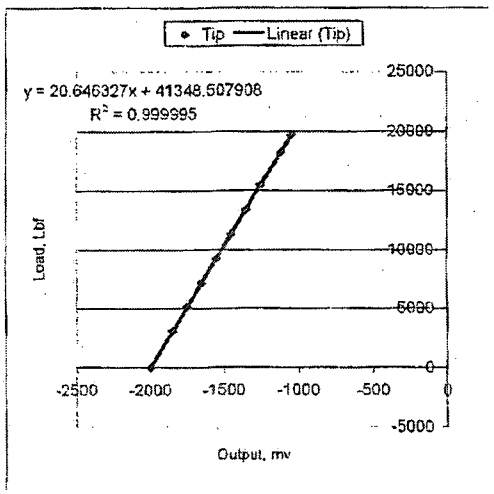
Cone ID: DAD-176 11/22/2006 Gregg Signal Hill

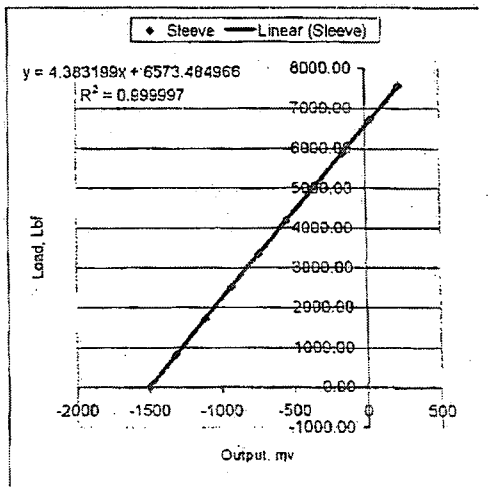
Reference: GMF Calibrator STU 100 SN 2941 6.51 Volt excitation 2093.454555 lbs/mv Pore pressure **0.2411** psi/mv

Calibrated by Applied Technical Services Inc. 5/09/2006 ATS ref.M501241-2

Tip Reference Load load (mv)	load (Lbs)	Transducer output (mv)	Indicated Load (Lbs)	Error % fs
1.60800	0	-2002.97033	-5.47	-0.027380
3.07700	3075.284741	-1854.37533	3062.47	-0.064079
4.05500	5122.683295	-1754.58267	5122.62	0.000688
5.02500	7153.334214	-1656.545	7146.84	-0.031978
6.01200	9219.573859	-1555.27767	9237.74	0.090816
7.00700	11302.58114	-1454.722	11313.64	0.056405
8.01300	13408.57642	-1352.48833	13424.59	0.080077
9.01800	15512.49825	-1251.27167	15514.34	0.009280
10.32000	18238.17608	-1119.07967	18243.62	0.027237
11.00700	19676.37936	-1051.05067	19648.17	-0.141035

Sleeve Reference Load load (mv)	Load (Lbs)	Transducer output (mv)	Indicated Load (Lbs)	Error % fs
1.607000	0.00	-1500.600333	-3.9442076	-0.09861
1.998000	818.54	-1314.112333	813.46972	-0.12878
2.424000	1710.95	-1109.288667	1711.25251	0.022504
2.804000	2505.87	-927.3526667	2508.71412	0.071225
3.204000	3343.25	-736.2388667	3346.41349	0.079164
3.608000	4189.00	-542.906	4193.81142	0.120221
4.011000	5032.68	-350.6473333	5036.52809	0.096584
4.415000	5878.42	-157.5213333	5883.03769	0.115432
4.818000	6722.08	33.188	6718.95456	-0.0782
5.222000	7567.84	225.0163333	7559.77623	-0.20155





Tip

Slope = **20.646 lb/mv**

Intercept = 41348.50791 Lbf

R^2 = 0.999995382

20.6463267	41348.50791
0.01568612	24.07723143
0.99999538	14.9056824
1732424.87	8
384919347	1777.48264

Sleeve

Slope = **4.383 lb/mv**

Intercept = 6573.48 Lbf

R^2 = 1.00

4.38319853	6573.48
0.00282967	2.39
0.99999867	4.93
2389442.17	8.00
56299347	194.38

GREGG Pore pressure calibration

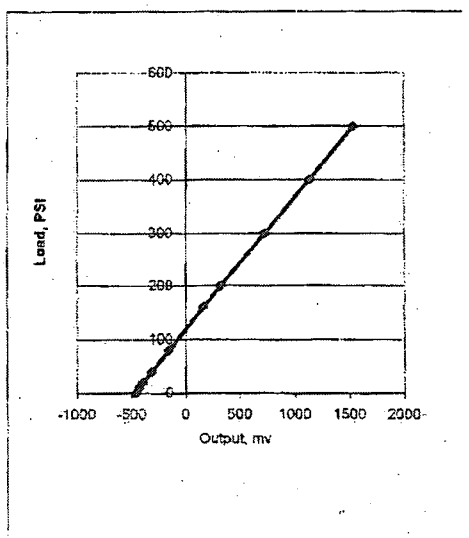
Cone No.DAD-176 Date 11/22/2006

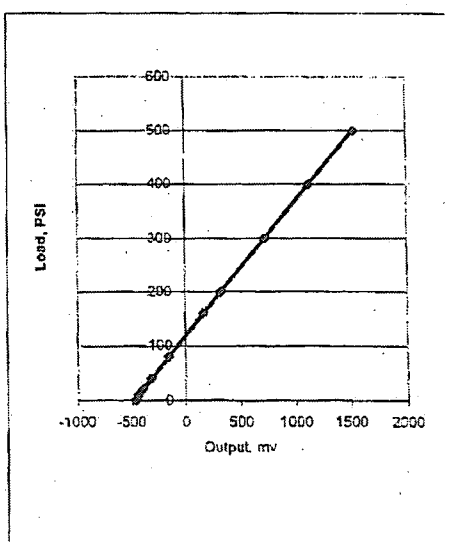
Reference: Dead Weight Pressure Calibrator SN HL-5887

Calibrated by Applied Technical Services Inc. 5/09/2006 ATS ref.M501241-1

Reference Pressure PSI	Transducer Output (mv)	Indicated Pressure PSI	Error % fs
0.00	-1933.619000	1.7716	0.3543
10.00	-1901.016333	9.6341	-0.0732
20.00	-1859.436	19.6616	-0.0677
40.00	-1776.326667	39.7042	-0.0592
80.00	-1610.641333	79.6608	-0.0678
160.00	-1279.068	159.6229	-0.0754
200.00	-1112.899333	199.6961	-0.0608
300.00	-697.5553333	299.8604	-0.0279
400.00	-282.898	399.8590	-0.0282
500.00	134.5443	500.5293	0.1059

Reference Pressure PSI	Transducer Output (mv)	Indicated Pressure PSI	Error % fs
10.00	-1901.01633	9.7773	-0.0445
20.00	-1859.436	19.8004	-0.0399
40.00	-1776.32667	39.8343	-0.0331
80.00	-1610.64133	79.7735	-0.0453
160.00	-1279.068	159.7009	-0.0598
200.00	-1112.89933	199.7566	-0.0487
300.00	-697.555333	299.8772	-0.0246
400.00	-282.898	399.8324	-0.0335
500.00	134.5443	500.4588	0.0918
0.00	-1936.64575	1.1886	0.2377





Slope = **0.2412 psi/mv**
Intercept = 468.0826107 psi
R^2 = 0.99998529

Slope = **0.2411 psi/mv**
Intercept = 468.026267 psi
R^2 = 0.999992959

PostScript Error

There has been an error in the PostScript for this print job.
Job Name:25293-401-V24-CY00-00026-AttachmentD.pdf
Details of the error are as given below.
You should report this error to your administrator or system provider.

Object in Error: image
Error: ioerror
Error Description: An error has occured while accessing a file.
Stacks:

	Operand Stack	Dictionary Stack Sample Element	Execution Stack
Latest->	(dict)	/srcH=69	(file)
		/MSx=(array)	(file)
		/srcH=69	(packedarray)
		/ =(array)	@aborted
		/eexec=eexec	(packedarray)
			@aborted
			(packedarray)
			@aborted
			(packedarray)
			(packedarray)
			@stopped
			{handleerror} if
			@exec

MACTEC

ATTACHMENT E

GEOPHYSICAL TEST RESULTS

CONSISTS OF:

Final Report Boring Geophysical Logging
Dated February 22, 2007

Volume 1 Text and Figures
Volume 2 (DVD with pdf of Vol. 1 plus electronic files)

followed by

Draft Report of Field Electrical Resistivity Test Results
Dated February 23, 2007

Volume 1 of 1

ATTACHMENT E

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Geophysical Test Data (Downhole), GEOVision Report 6533-02, Volume 2 of 2 (DVD)

Appendix E-2 Field Electrical Resistivity Test Results

Final Report

Appendix E-1

Geophysical Test Data (Downhole)

GEOVision Report 6533-02 and DVD

GEOVision
geophysical services

FINAL REPORT

BORING GEOPHYSICAL LOGGING
BORINGS B-302-DH, B-305-DHA, B-308-DH, B-319-DH, B-328-DH, B-402-DH, B-405-DH, B-408-DH, B-419-DH, AND B-428-DH

STP COL PROJECT
SOUTH TEXAS PROJECT NUCLEAR STATION

Report 6533-01 vol 1 of 2 rev a

February 22, 2007

FINAL REPORT

BORING GEOPHYSICAL LOGGING BORINGS B-302-DH, B-305-DHA, B-308-DH, B-319-DH, B-328-DH, B-402-DH, B-405-DH, B-408-DH, B-419-DH, AND B-428-DH

STP COL PROJECT
SOUTH TEXAS PROJECT NUCLEAR STATION

Report 6533-01 vol 1 of 2 rev a

February 22, 2007

Prepared for:

MACTEC Engineering and Consulting, Inc.
2801 Yorkmont Road, Suite 100
Charlotte, N. C. 28208
704-357-5570
MACTEC Job number 5050-06-0496

Prepared by

GEOVision Geophysical Services
1151 Pomona Road, Unit P
Corona, California 92882
(951) 549-1234

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APPENDICES

APPENDIX A SUSPENSION VELOCITY MEASUREMENT QUALITY ASSURANCE SUSPENSION SOURCE TO RECEIVER ANALYSIS RESULTS

APPENDIX B CALIPER, NATURAL GAMMA, RESISTIVITY, AND SPONTANEOUS POTENTIAL LOGS

APPENDIX C GEOPHYSICAL LOGGING SYSTEMS - NIST TRACEABLE CALIBRATION PROCEDURES AND CALIBRATION RECORDS

APPENDIX D BORING GEOPHYSICAL LOGGING FIELD DATA LOGS

APPENDIX E BORING GEOPHYSICAL LOGGING FIELD MEASUREMENT PROCEDURES

INTRODUCTION

Boring geophysical measurements were collected in ten uncased borings located at the South Texas Project (STP) Nuclear Power Station, located in Matagorda County, Texas. Geophysical data acquisition was performed between November 7 and December 19, 2006 by Rob Steller and Chuck Carter of **GEO***Vision*. Data analysis and report preparation was performed by Rob Steller and reviewed by John Diehl of GEOVision. The work was performed under subcontract with MACTEC Engineering and Consulting, Inc., (MACTEC) with Mike Sufnarski serving as the point of contact for MACTEC.

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 November 7 and December 19, 2006, in ten uncased borings, as detailed below. The purpose of these studies was to supplement stratigraphic information obtained during MACTEC's soil and rock sampling program and to acquire shear wave velocities and compressional wave velocities as a function of depth, as a component of the STP Combined Operating License (COL) Application Project.

BORING DESIGNATION	DATES LOGGED	ELEVATION - FEET ABOVE MSL [1] NGVD 29	COORDINATES – FEET [1] NAD 27	
			NORTHING	EASTING
B-302-DH	12/5/2006	30.01	363000.73	2943364.78
B-305-DH	NOT LOGGED	29.82	363099.59	2943364.19
B-305-DHA	12/8/2006 12/18-19/2006	29.75	363100.87	2943343.98
B-308-DH	12/7/2006	29.80	363196.49	2943363.84
B-319-DH	12/7/2006	28.39	363364.17	2943407.90
B-328-DH	11/8/2006	29.92	363660.26	2943298.12
B-402-DH	12/6/2006	30.89	362998.09	2942462.29
B-405-DH	11/7-8/2006	31.06	363098.12	2942462.95
B-408-DH	11/9/2006	31.17	363194.11	2942463.86
B-419-DH	12/4/2006	29.73	363362.12	2942506.69
B-428-DH	12/5/2006	30.90	363660.05	2942398.55

[1] Survey data provided by MACTEC

Table 1 Boring locations and logging dates

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 were analyzed and a profile of velocity versus depth was produced for both compressional and horizontally polarized shear waves.

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

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

INSTRUMENTATION

Suspension Instrumentation

Suspension soil velocity measurements were performed in all borings using the PS suspension logging system, manufactured by OYO Corporation, and their subsidiary, Robertson Geologging. This system 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
Robertson PS telemetry unit M/N 3403 S/N 160023
Robertson Micrologger II S/N 5310
OYO PS Logger Borehole Probe, includes:
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 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 digitized 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 6.3 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 are displayed as six channels with a common time scale. Data are 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 recorder or computer screen allows the operator to set the gains, filters, delay time, pulse length (energy), sample rate, and summing number to optimize the quality of the data before recording. Verification of the calibration of the Suspension PS digital recorder is performed every twelve months using a NIST traceable frequency source and counter, as outlined in Appendix C.

Caliper / Natural Gamma Instrumentation

Caliper and natural gamma data were collected using a Model 3ACS 3-leg caliper probe, serial number 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 this tool, caliper measurements were collected concurrent with measurement of natural gamma emission from the boring walls. The probe was 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.

Acoustic Televiewer / Boring Deviation Instrumentation

Boring deviation data were collected in all ten borings using a High Resolution Acoustic Televiewer probe (HiRAT), serial number 5174, manufactured by Robertson Geologging, Ltd. The probe is 7.58 feet long, and 1.9 inches in diameter.

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.

The probe contains a fluxgate magnetometer to monitor magnetic north, and all raw televiewer data are referenced to magnetic north. A three-axis accelerometer is enclosed in the probe, providing boring dip data that, when processed with the orientation data, allows boring deviation data to be obtained.

The data are presented on a computer screen for operator review during the logging run, and stored on hard disk for later processing.

MEASUREMENT PROCEDURES

Suspension Measurement Procedures

All ten borings were logged as un-cased or partially cased 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 casing, and the electronic depth counter was set to 6.6 feet, the distance between the mid-point of the receiver and the top of the probe, minus the height of the casing stick-up, 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.

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 were viewed on the computer display, checked, and recorded on disk 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 un-cased or partially cased 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, and a PVC coupling provided by MACTEC with an inside diameter traceable to NIST. The three point jig 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 and inside the PVC coupling. The measured dimensions, as displayed on the recording computer screen was recorded on the field log sheet, as well as in the digital files, and compared with the calibration jig dimensions. These files are presented in LAS 2.0 format in the boring specific sub-directories of the data directory on volume 2 of 2 (DVD-R) of this report. 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.

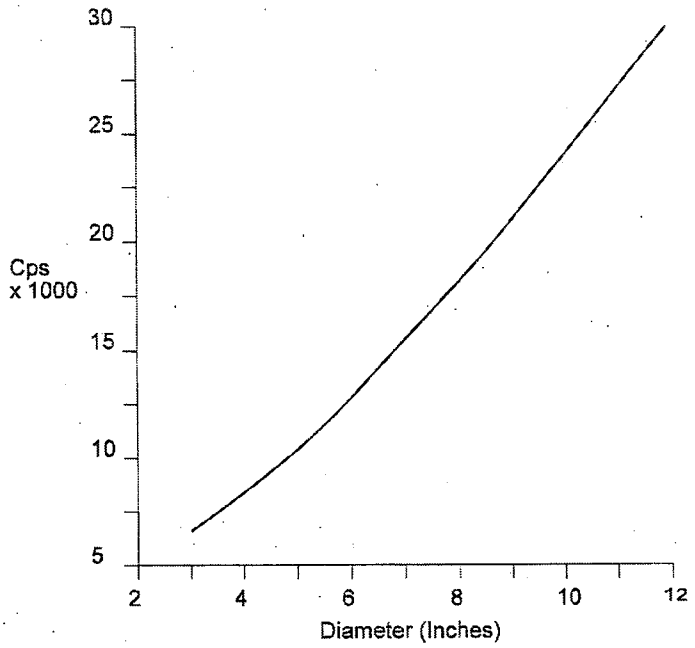


Figure 1. Example Calibration Curve for Caliper Probe

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 10 feet/minute, 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 un-cased or partially cased 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. A functional test is performed prior to each logging run by applying fixed resistance values across the probe electrodes, as well as a 100 millivolt signal across the SP electrodes, and recording the resultant output of the system. These functional checks are presented in LAS 2.0 format in the boring specific sub-directories of the data directory on volume 2 of 2 (DVD-R) of this report.

In each boring, the probe was positioned with the top of the probe at the top of the casing or mud box, and the electronic depth counter was set to 8.2 feet, the specified length of the probe, minus the height of the casing stick-up or mud box, as verified with a tape measure. When logging on 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/minute, 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.

Acoustic Televiewer / Boring Deviation Measurement Procedures

All ten borings were logged as un-cased or partially cased borings, filled with bentonite or polymer based drilling mud. Although the acoustic televiewer cannot image in the soft soils at this site, the logs were run in order to provide a deviation log for the boring. Measurements followed the **GEO***Vision* standard field procedures, as presented in Appendix E.

Prior to use, the HiRAT probe tiltmeter and compass functions were checked by comparison with a Brunton surveyors' compass.

In each boring, the HiRAT probe was positioned with the top of the probe at the top of the casing, and the electronic depth counter was set to 4.71 feet, the specified length of the probe, minus the height of the casing stick-up, as verified with a tape measure, and 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 10.0 feet/minute, collecting data continuously at 0.04 foot intervals, as summarized in Table 2.

Upon completion of the measurements, the probe zero depth indication at grade was verified prior to removal from the boring. The log was reviewed in the field, and the data processed with Robertson Geologging RGLDIP software, version 6.2, to produce a boring deviation plot and data in ASCII format. These files are presented in the boring specific sub-directories of the data directory on volume 2 of 2 (DVD-R) of this report, and summarized in Table 4.

BORING NUMBER	TOOL AND RUN NUMBER	DEPTH RANGE (FEET)	OPEN HOLE (FEET)	DEPTH TO BOTTOM OF CASING (FEET)	SAMPLE INTERVAL (FEET)	DATE LOGGED
B-302-DH	ELOG/GAMMA 1	218.0 – 37.2	218.0	20.0 AUGER	0.05	12/5/2006
B-302-DH	SUSPENSION 1	19.7 – 205.1	-	20.0 AUGER	1.6	12/5/2006
B-302-DH	CALIPER/GAMMA 1	210.0 – 0.0	-	20.0 AUGER	0.05	12/5/2006
B-302-DH	DEVIATION 1	210.0 – 2.5	-	20.0 AUGER	0.04	12/5/2006
B-305-DHA	ELOG/GAMMA 1	90.0 – 35.0	90.0	NONE	0.05	12/8/2006
B-305-DHA	SUSPENSION 1	1.6 – 77.1	-	NONE	1.6	12/8/2006
B-305-DHA	CALIPER/GAMMA 1	88.0 – 0.0	-	NONE	0.05	12/8/2006
B-305-DHA	DEVIATION 1	88.0 – 0.0	-	NONE	0.04	12/8/2006
B-305-DHA	ELOG/GAMMA 2	583.0 – 19.0	583.0	53.0 AUGER	0.05	12/18/2006
B-305-DHA	SUSPENSION 2	60.7 – 565.9	-	53.0 AUGER	1.6	12/18/2006
B-305-DHA	CALIPER/GAMMA 2	579.0 – 0.0	-	53.0 AUGER	0.05	12/18/2006
B-305-DHA	DEVIATION 2	582.5 – 0.0	-	53.0 AUGER	0.04	12/18/2006
B-305-DHA	ELOG/GAMMA 3	575.0 – 18.1	575.0	53.0 AUGER	.05	12/19/2006
B-308-DH	ELOG/GAMMA 1	215.5 – 35.0	215.5	NONE	0.05	12/7/2006
B-308-DH	SUSPENSION 1	3.3 – 201.8	-	NONE	1.6	12/7/2006
B-308-DH	CALIPER/GAMMA 1	210.0 – 0.0	-	NONE	0.05	12/7/2006
B-308-DH	DEVIATION 1	210.0 – 2.5	-	NONE	0.04	12/7/2006
B-319-DH	ELOG/GAMMA 1	215.0 – 34.5	215.0	NONE	0.05	12/7/2006
B-319-DH	SUSPENSION 1	1.6 – 201.8	-	NONE	1.6	12/7/2006
B-319-DH	CALIPER/GAMMA 1	210.0 – 0.1	-	NONE	0.05	12/7/2006
B-319-DH	DEVIATION 1	210.0 – 0.0	-	NONE	0.04	12/7/2006
B-328-DH	SUSPENSION 1	3.3 – 205.1	-	NONE	1.6	11/8/2006
B-328-DH	ELOG/GAMMA 1	217.8 – 35.0	217.8	NONE	0.05	11/8/2006
B-328-DH	CALIPER/GAMMA 1	210.0 – 0.5	-	NONE	0.05	11/8/2006
B-328-DH	DEVIATION 1	217.5– 0.0	217.5	NONE	0.04	11/8/2006
B-402-DH	ELOG/GAMMA 1	216.0 – 34.8	216.0	1.0 PVC	0.05	12/6/2006
B-402-DH	SUSPENSION 1	3.3 – 201.8	-	1.0 PVC	1.6	12/6/2006
B-402-DH	CALIPER/GAMMA 1	210.0 – 0.1	-	1.0 PVC	0.05	12/6/2006
B-402-DH	DEVIATION 1	210.0 – 0.0	-	1.0 PVC	0.04	12/6/2006
B-405-DH	SUSPENSION 1	93.5 – 607.0	-	93.0 STEEL	1.6	11/7/2006

B-405-DH	ELOG/GAMMA 1	617.6 – 20.0	617.6	93.0 STEEL	0.05	11/7/2006
B-405-DH	CALIPER/GAMMA 1	610.0 – 0.0	-	93.0 STEEL	0.05	11/7/2006
B-405-DH	DEVIATION 1	619.2 – 0.0	619.2	93.0 STEEL	0.04	11/7/2006
B-405-DH	SUSPENSION 2	21.3 – 106.6	-	20.0 AUGER	1.6	11/8/2006
B-405-DH	ELOG/GAMMA 2	120.0 – 18.5	120.0	20.0 AUGER	0.05	11/8/2006
B-405-DH	DEVIATION 2	115.0 – 0.0	-	20.0 AUGER	0.04	11/8/2006
B-405-DH	CALIPER/GAMMA 2	115.0 – 0.0	-	20.0 AUGER	0.05	11/8/2006
B-408-DH	ELOG/GAMMA 1	215.5 – 35.0	215.5	NONE	0.05	11/9/2006
B-408-DH	SUSPENSION 1	3.3 – 201.8	-	NONE	1.6	11/9/2006
B-408-DH	CALIPER/GAMMA 1	210.0 – 0.4	-	NONE	0.05	11/9/2006
B-408-DH	DEVIATION 1	210.0 – 0.0	-	NONE	0.04	11/9/2006
B-419-DH	ELOG/GAMMA 1	216.0 – 17.9	216.0	2.0 PVC	0.05	12/4/2006
B-419-DH	SUSPENSION 1	3.3 – 203.2	-	2.0 PVC	1.6	12/4/2006
B-419-DH	CALIPER/GAMMA 1	210.0 – 0.0	-	2.0 PVC	0.05	12/4/2006
B-419-DH	DEVIATION 1	210.0 – 94.0	-	2.0 PVC	0.04	12/4/2006
B-419-DH	DEVIATION 2	91.0 – 0.0	-	2.0 PVC	0.04	12/4/2006
B-428-DH	ELOG/GAMMA 1	215.0 – 34.5	215.0	NONE	0.05	12/5/2006
B-428-DH	SUSPENSION 1	1.6 – 201.8	-	NONE	1.6	12/5/2006
B-428-DH	CALIPER/GAMMA 1	210.0 – 0.0	-	NONE	0.05	12/5/2006
B-428-DH	DEVIATION 1	210.0 – 1.3	-	NONE	0.04	12/5/2006

- 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-302-DH	ELOG/GAMMA 1	218.0	215.0	39.4	39.3	-0.1
B-302-DH	SUSPENSION 1	-	-	6.6	6.4	-0.2
B-302-DH	CALIPER/GAMMA 1	-	-	5.2	5.2	0.0
B-302-DH	DEVIATION 1	-	-	3.1	3.1	0.1
B-305-DHA	ELOG/GAMMA 1	90.0	90.0	41.0	41.0	0.0
B-305-DHA	SUSPENSION 1	-	-	1.6	1.6	0.0
B-305-DHA	CALIPER/GAMMA 1	-	-	6.8	6.8	0.0
B-305-DHA	DEVIATION 1	-	-	4.7	4.7	0.0
B-305-DHA	ELOG/GAMMA 2	583.0	618.0	38.8	39.5	0.7
B-305-DHA	SUSPENSION 2	-	-	5.9	5.8	-0.1
B-305-DHA	CALIPER/GAMMA 2	-	-	4.6	4.5	-0.1
B-305-DHA	DEVIATION 2	-	-	2.5	2.5	0.0
B-305-DHA	ELOG/GAMMA 3	575.0	-	38.8	38.5	-0.3
B-308-DH	ELOG/GAMMA 1	215.5	215.0	41.0	41.1	0.1
B-308-DH	SUSPENSION 1	-	-	8.2	8.5	0.3

B-308-DH	CALIPER/GAMMA 1	-	-	6.8	6.8	0.0
B-308-DH	DEVIATION 1	-	-	4.7	4.9	0.2
B-319-DH	ELOG/GAMMA 1	215.0	215.0	41.0	NA	NA
B-319-DH	SUSPENSION 1	-	-	8.2	NA	NA
B-319-DH	CALIPER/GAMMA 1	-	-	6.8	6.9	0.1
B-319-DH	DEVIATION 1	-	-	4.7	4.8	0.1
B-328-DH	SUSPENSION 1	-	-	8.2	8.2	0.0
B-328-DH	ELOG/GAMMA 1	217.8	215.0	41.0	NA	NA
B-328-DH	CALIPER/GAMMA 1	-	-	6.8	6.8	0.0
B-328-DH	DEVIATION 1	217.5	215.0	4.7	4.7	0.0
B-402-DH	ELOG/GAMMA 1	216.0	215.0	39.6	39.6	0.0
B-402-DH	SUSPENSION 1	-	-	6.9	6.8	-0.1
B-402-DH	CALIPER/GAMMA 1	-	-	5.4	5.5	0.1
B-402-DH	DEVIATION 1	-	-	3.3	3.3	0.0
B-405-DH	SUSPENSION 1	-		6.7	6.4	-0.3
B-405-DH	ELOG/GAMMA 1	617.6	618.0	39.5	39.7	0.2
B-405-DH	CALIPER/GAMMA 1	-	-	5.3	5.4	0.1
B-405-DH	DEVIATION 1	619.2	618.0	4.2	4.0	-0.2
B-405-DH	SUSPENSION 2	-	-	6.7	6.7	0.0
B-405-DH	ELOG/GAMMA 2	120.0	120.0	39.5	39.5	0.0
B-405-DH	DEVIATION 2	-	-	3.2	3.4	0.2
B-405-DH	CALIPER/GAMMA 2	-	-	5.3	5.4	0.1
B-408-DH	ELOG/GAMMA 1	215.5	215.0	41.0	41.1	0.1
B-408-DH	SUSPENSION 1	214.5	215.0	NA	NA	NA
B-408-DH	CALIPER/GAMMA 1	-	-	6.8	6.9	0.1
B-408-DH	DEVIATION 1	-	-	4.7	4.7	0.0
B-419-DH	ELOG/GAMMA 1	216.0	215.0	39.8	40.0	0.2
B-419-DH	SUSPENSION 1	215.5	215.0	7.0	7.0	0.0
B-419-DH	CALIPER/GAMMA 1	-	-	5.6	5.6	0.0
B-419-DH	DEVIATION 1	-	-	3.5	3.4	-0.1
B-428-DH	ELOG/GAMMA 1	215.0	215.0	41.0	41.1	0.1
B-428-DH	SUSPENSION 1	215.2	215.0	6.6	NA	NA
B-428-DH	CALIPER/GAMMA 1	-	-	6.8	NA	NA
B-428-DH	DEVIATION 1	-	-	4.7	4.7	0.0

- 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 (DVD-R) 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 (DVD-R) of this report.

The P-wave velocity over the 6.3 foot interval from source to receiver 1 (S-R1) was also picked using PSLOG, and calculated and plotted in EXCEL, for quality assurance of the velocity derived from the travel time between receivers. In this analysis, the depth values as recorded were increased by 4.8 feet to correspond to the mid-point of the 6.3 foot S-R1 interval. 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 6.3 foot interval from source to receiver 1 was calculated and plotted for verification of the velocity derived from the travel time between receivers. In this analysis, the depth values were increased by 4.8 foot to correspond to the mid-point of the 6.3 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. Using Robertson Geologging Winlogger software version 1.5, build 401J, these data were combined with the resistivity, ELOG based natural gamma and spontaneous potential (SP) logs, and converted to LAS 2.0 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. Using Robertson Geologging Winlogger software version 1.5, build 401J, these data were combined with the caliper and caliper-based natural gamma logs, and converted to LAS 2.0 and PDF formats for transmittal to the client.

Acoustic Televiewer / Boring Deviation Analysis

The collected Acoustic Televiewer data were 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 as presented in the boring specific sub-directories in the data directory on volume 2 of 2 (DVD-R) of this report, and summarized in Table 4.

RESULTS

Suspension Results

Suspension R1-R2 P- and S_H-wave velocities are plotted in Figures 5, 8, 12, 15, 18, 21, 24, 28, 31 and 34 The suspension velocity data presented in these figures are presented in Tables 5 - 14 The PSLOG and EXCEL analysis files for each boring are included in the boring specific directories on volume 2 of 2 (DVD-R) 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-10 to aid in visual comparison. It should be noted that R1-R2 data are an average velocity over a 3.3 foot segment of the soil column; S-R1 data are an average over 6.3 feet, creating a significant smoothing relative to the R1-R2 plots. S-R1 data are presented in Tables A-1 through A-10, and included in the EXCEL analysis files for each boring on volume 2 of 2 (DVD-R) of this report.

Calibration procedures and records for the suspension PS measurement system are presented in Appendix C, and **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 are presented in combined log plots with resistivity and spontaneous potential as single page logs in Figures 6, 9, 10, 13, 16, 19, 22, 25, 26, 29, 32 and 35, as well as multi-page logs in Appendix B. On these plots, the following acronyms are used:

- NGAM: Natural gamma data collected with the ELOG probe.
- SP: Spontaneous (self) potential.
- CNGA: Natural gamma data collected with the caliper probe.
- CALP: Caliper (borehole diameter)
- SHN: Short normal resistivity (16 inch resistivity)
- LON: Long normal resistivity (64 inch resistivity)
- SPR: Single point resistance

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 (DVD-R) of this report.

Resistivity / Spontaneous Potential Results

Resistivity and spontaneous potential data are presented in combined log plots with caliper and natural gamma data as single page logs in Figures 6, 9, 10, 13, 16, 19, 22, 25, 26, 29, 32 and 35, 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 (DVD-R) of this report.

Acoustic Televiewer / Boring Deviation Results

Boring deviation data are presented graphically in Figures 7, 11, 14, 17, 20, 23, 27, 30, 33 and 36, and summarized in Table 4. Deviation data plots in Acrobat format and deviation data at 1.0 foot stations are presented in ASCII format in the boring specific sub-directories of the data directory on volume 2 of 2 (DVD-R) of this report.

SUMMARY

Discussion of Suspension Results

Suspension PS velocity data are ideally collected in an uncased fluid filled boring, drilled with rotary mud (rotary wash) methods. Most of the borings at this site were ideal for collection of suspension PS velocity data, though the upper 30 feet of these borings tended to be enlarged by collapse and fluid erosion.

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.

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. Only in B-405-DH is a divergence of R1 – R2 and S – R1 data observed, between 95.1 – 116.5 feet, due to the large diameter washout from 103 – 108 feet, as indicated on the caliper log. These velocity data are not presented. P-wave and S_H-wave onsets are generally clear, and later oscillations are well damped.

Discussion of Caliper / Natural Gamma Results

Caliper and natural gamma data were collected for the entire depth of each boring, as natural gamma data can be collected through PVC casing without attenuation, and through steel casing with some attenuation. The caliper logs for these borings generally show consistent gauge below 30 feet, with the exception of B-405-DH, which had a very large diameter washout between 103 – 108 feet, which corresponded with anomalous suspension PS velocity data. Natural gamma data were collected with this tool in all the borings, as well as with the ELOG probe, and the comparison between the two data sets provides an almost exact match, verifying the performance of the natural gamma measuring systems.

Discussion of Resistivity / Spontaneous Potential Results

These electrical methods provide clear demarcation of different lithologic units at this site. All three resistivity logs show the same structure, and match very closely with the structure indicated by the natural gamma logs. The electrical data are not valid above 40 feet, as the upper yoke electrode moves out of the boring fluid at this depth. The natural gamma data remains valid up into the casing, and agrees well with the caliper probe. The comparison between the two data sets provides an almost exact match, verifying the performance of the natural gamma measuring systems.

Discussion of Acoustic Televiewer / Boring Deviation Results

All ten borings were inclined at 1.5 degrees, or less, from vertical, and the maximum error in depth value was 0.3 feet in 582 ft, or 0.05 percent, as presented in Table 4. This error is less than depth errors from other causes, and no adjustment of log depth is indicated.

BORING NUMBER	MEAN DEVIATION AND AZIMUTH (DEGREES)	SURVEY DEPTH (FEET)	VERTICAL DEPTH (FEET)	DEPTH ERROR (FEET)	HORIZONTAL OFFSET (FEET)
B-302-DH	0.6 – N48.5	209.8	209.7	0.1	2.3
B-305-DHA	1.5 – N162.3	582.4	582.1	0.3	14.7
B-308-DH	0.6 – N276.4	209.9	209.9	0.0	2.1
B-319-DH	0.5 – N201.5	209.8	209.8	0.0	1.6
B-328-DH	0.3 – N37.4	217.3	217.3	0.0	1.2
B-402-DH	0.4 – N151.2	209.8	209.7	0.1	1.3
B-405-DH	0.4 – N179.0	619.1	619.0	0.1	4.4
B-408-DH	0.7 – N88.1	209.9	209.9	0.0	2.7
B-419-DH	0.7 – 216.3	209.9	209.9	0.0	2.5
B-428-DH	0.6 – N61.0	210.0	209.9	0.1	2.3

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.

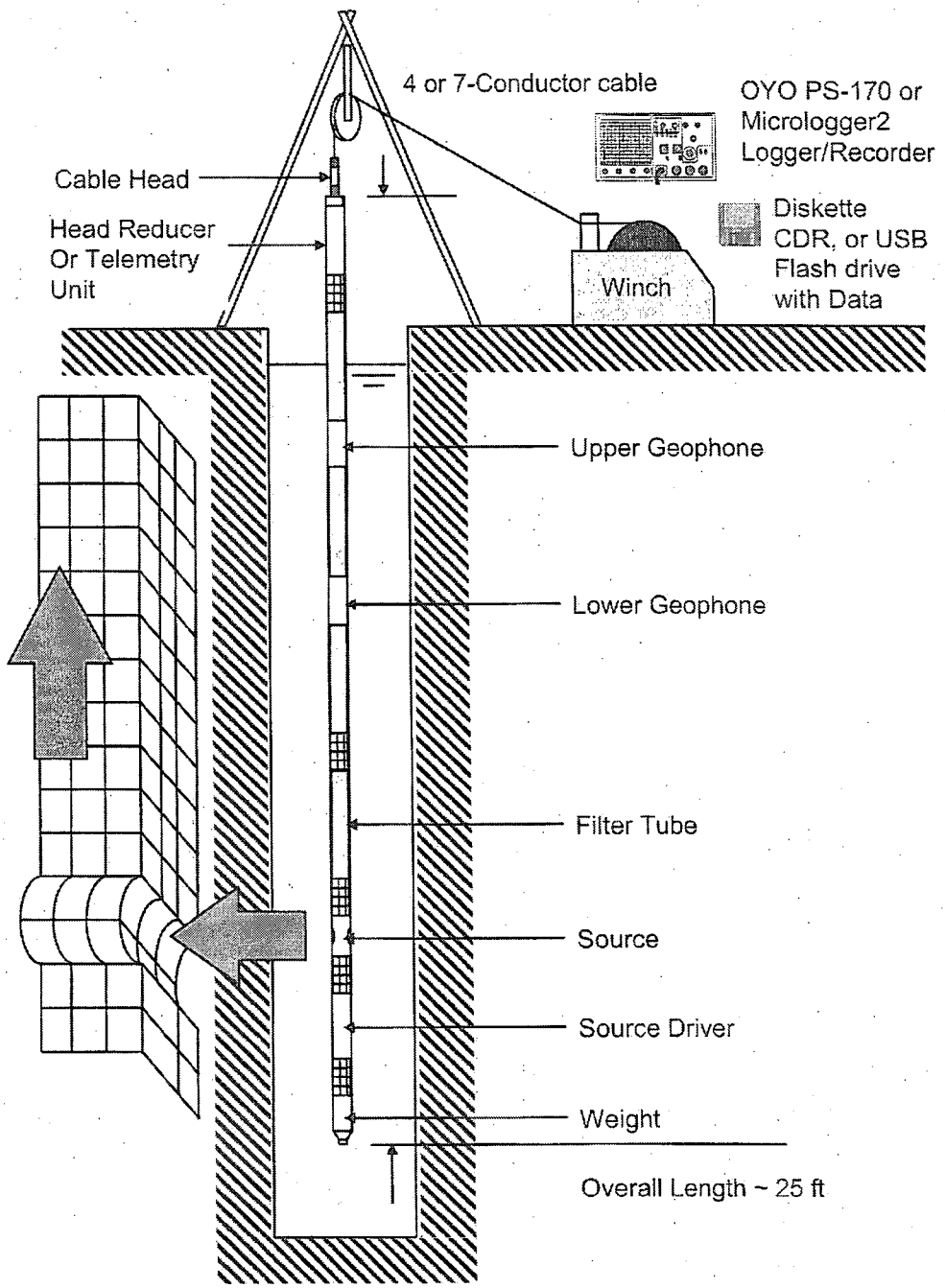


Figure 2: Concept illustration of P-S logging system

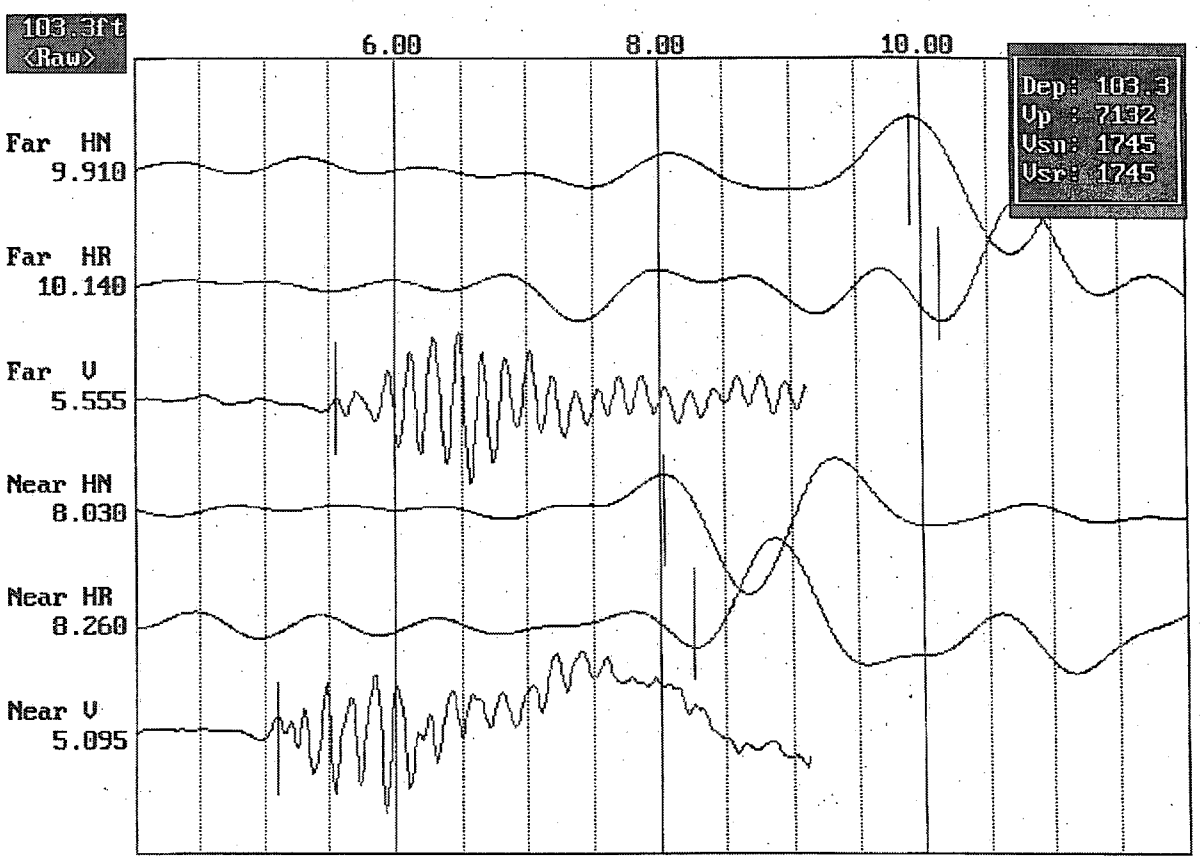


Figure 3: Example of filtered (1400 Hz lowpass) record

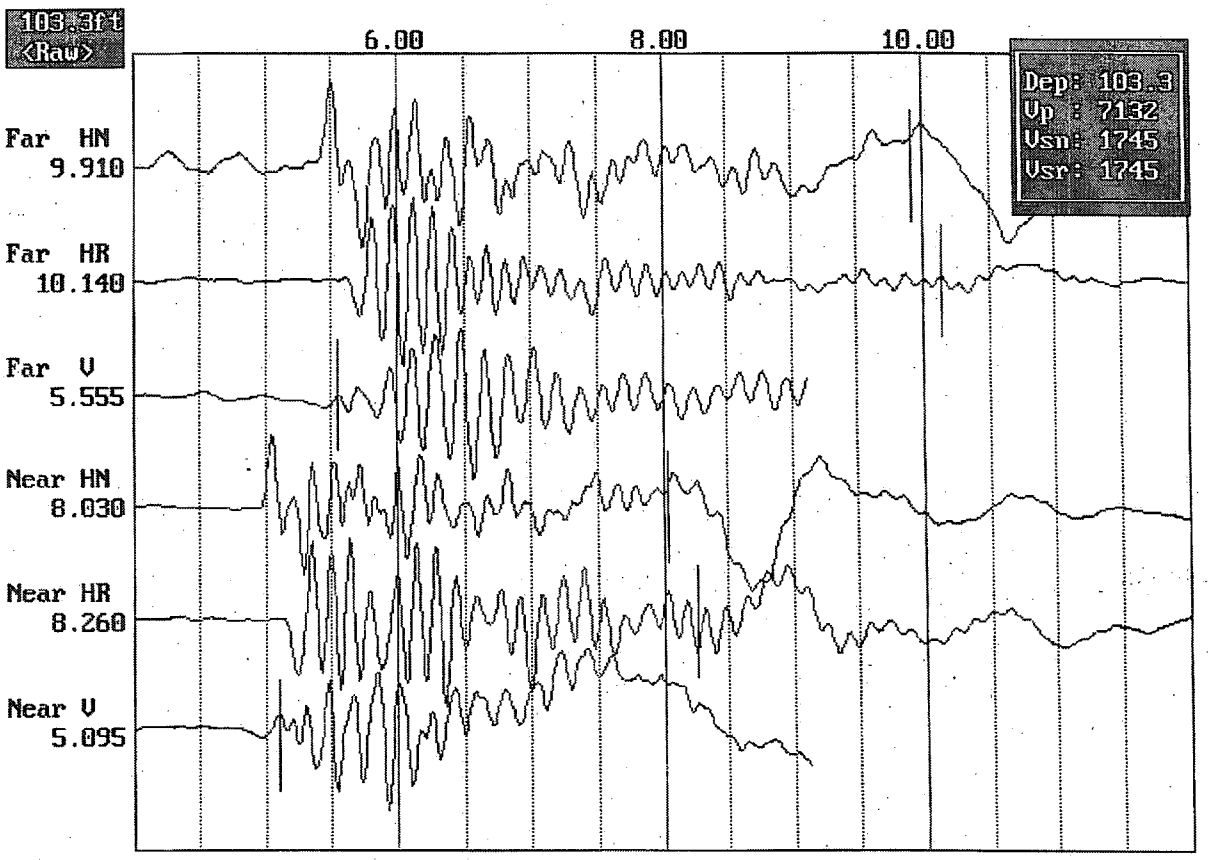


Figure 4. Example of unfiltered record

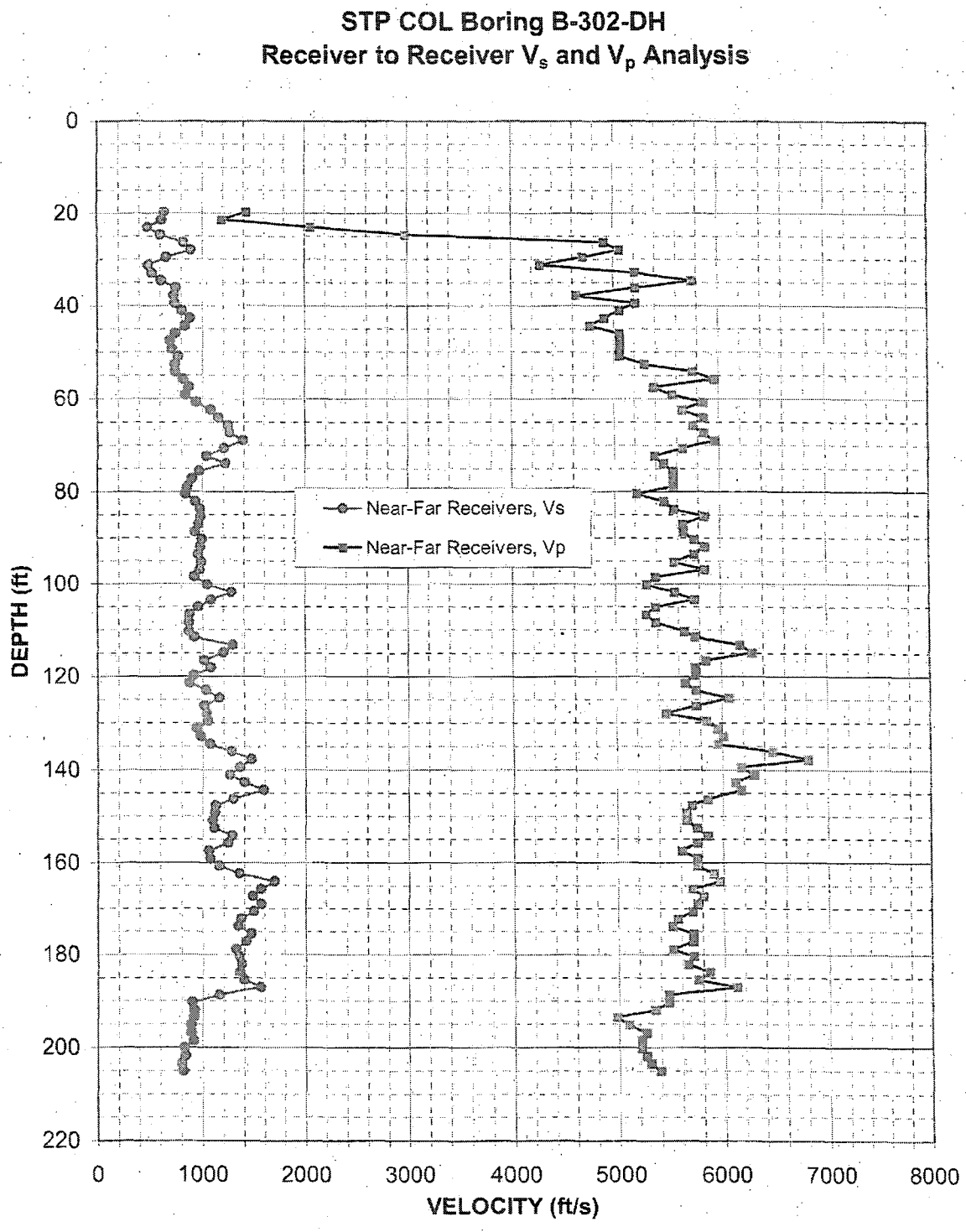


Figure 5: Boring B-302-DH, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
19.7	630	1420
21.3	610	1180
23.0	470	2060
24.6	590	2980
26.3	810	4900
27.9	880	5050
29.5	650	4690
31.2	480	4270
32.8	520	5210
34.5	600	5750
36.1	740	5210
37.7	720	4630
39.4	730	5210
41.0	790	5050
42.7	870	4900
44.3	820	4760
45.9	730	5050
47.6	680	5050
49.2	700	5050
50.9	760	5050
52.5	730	5290
54.1	730	5750
55.8	810	5950
57.4	870	5380
59.1	830	5560
60.7	930	5850
62.3	1080	5650
64.0	1150	5850
65.6	1240	5750
67.3	1260	5850
68.9	1390	5950
70.5	1200	5650
72.2	1030	5380
73.8	1220	5460
75.5	970	5560
77.1	890	5560
78.7	850	5560
80.4	830	5210
82.0	930	5460
83.7	970	5560
85.3	970	5850
86.9	960	5650
88.6	930	5650
90.2	990	5750
91.9	970	5850
93.5	950	5750
95.1	980	5560
96.8	960	5850
98.4	910	5380
100.1	1040	5290

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
101.7	1270	5560
103.4	1080	5750
105.0	950	5380
106.6	870	5290
108.3	870	5380
110.2	860	5650
111.6	910	5750
113.2	1280	6170
114.8	1190	6290
116.5	1010	5850
118.1	1070	5750
119.8	910	5750
121.4	870	5650
123.0	1030	5750
124.7	1150	6060
126.3	1010	5750
128.0	1040	5460
129.6	1050	5850
131.2	940	5950
132.9	970	6010
134.5	1060	5950
136.2	1270	6470
137.8	1470	6800
139.4	1360	6170
141.1	1250	6290
142.7	1390	6120
144.4	1590	6170
146.3	1290	5850
147.6	1120	5700
149.3	1110	5650
150.9	1090	5650
152.6	1110	5750
154.2	1280	5850
155.8	1240	5750
157.5	1060	5600
159.1	1070	5750
160.8	1150	5750
162.4	1350	5900
164.0	1690	5950
165.7	1560	5700
167.3	1480	5800
169.0	1560	5750
170.6	1490	5700
172.2	1370	5560
173.9	1330	5510
175.5	1470	5700
177.2	1410	5700
178.8	1310	5510
180.5	1350	5700
182.1	1370	5650

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
183.7	1360	5850
185.4	1390	5750
187.0	1560	6120
188.7	1160	5460
190.3	890	5460
191.9	910	5330
193.6	910	4980
195.2	880	5090
196.9	890	5250
198.5	910	5210
200.1	820	5210
201.8	830	5250
203.4	800	5290
205.1	810	5380

Table 5. Boring B-302-DH, Suspension R1-R2 depths and P- and S_H-wave velocities

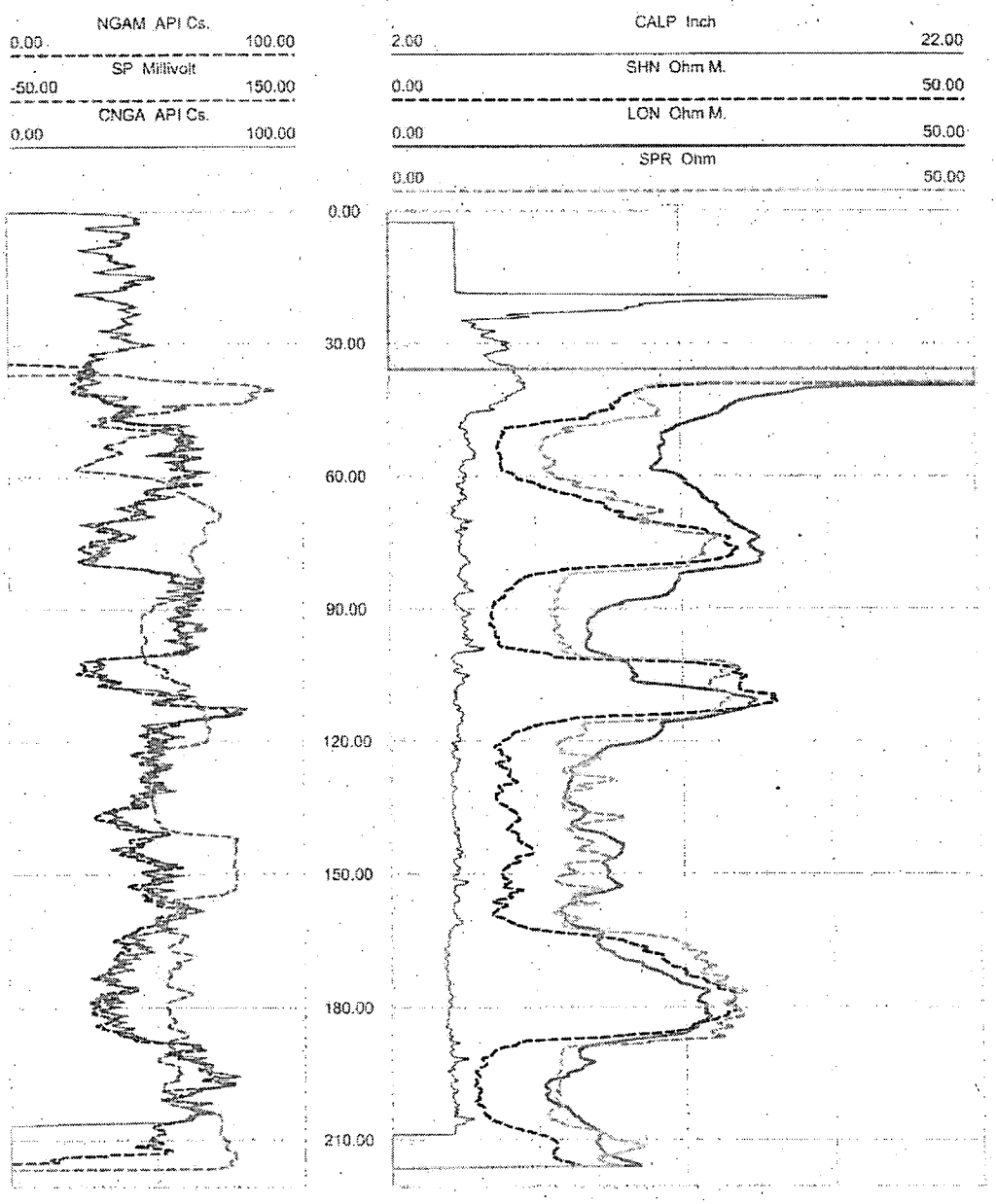


Figure 6. Boring B-302-DH, Caliper, Natural gamma, Resistivity and SP logs

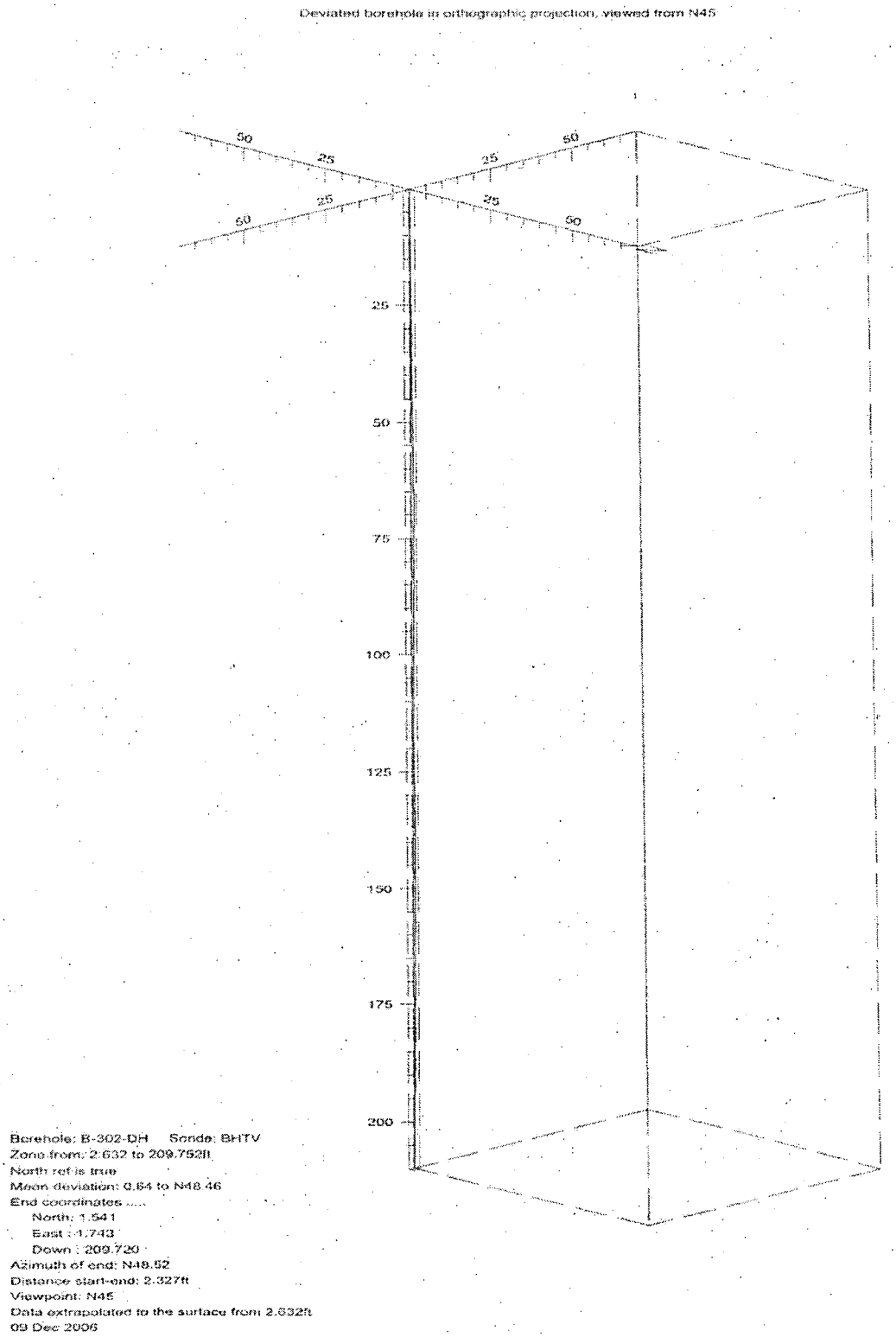


Figure 7. Boring B-302-DH, Deviation Projection (dimensions in feet)

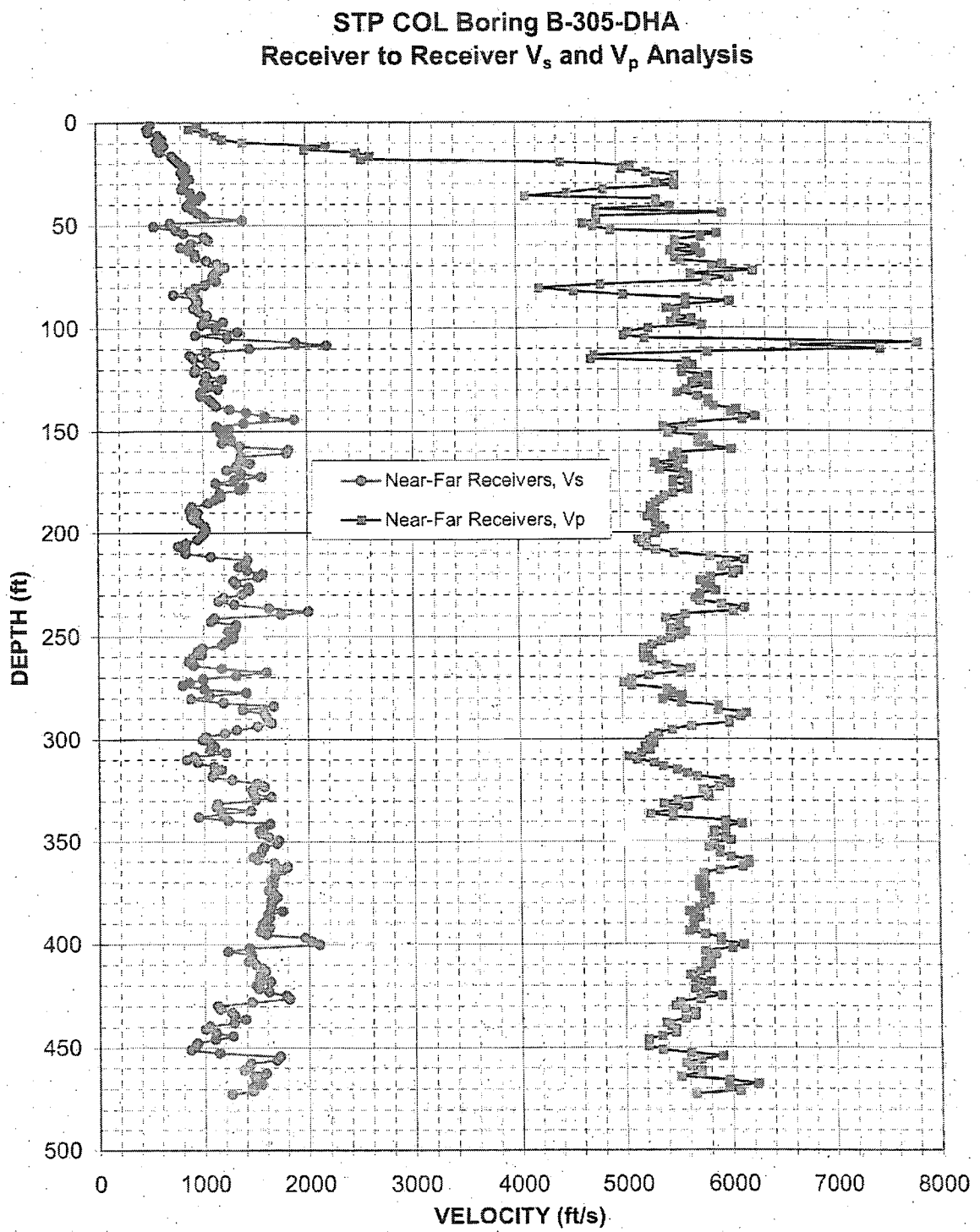


Figure 8. Boring B-305-DHA, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	500	950
3.3	470	870
4.9	480	1020
6.6	580	1130
8.2	610	1190
9.8	560	1390
11.5	640	2190
13.1	580	1980
14.8	600	2470
16.4	710	2600
18.0	740	2530
19.7	780	4440
21.3	820	5130
23.0	850	5050
24.6	810	5290
26.3	820	5560
27.9	880	5560
29.5	840	5380
31.2	820	5560
32.8	810	4870
34.5	890	4500
36.1	990	4090
37.7	960	5380
39.4	880	5380
41.0	850	5510
42.7	910	4800
44.3	960	6010
45.9	1020	4800
47.6	1390	4800
49.2	700	4660
50.9	540	4760
52.5	750	4940
54.1	830	5950
55.8	1020	5800
57.4	1060	5560
59.1	890	5560
60.7	800	5750
62.3	870	5510
64.0	930	5800
65.6	930	5560
67.3	1040	5600
68.9	1150	6010
70.5	1220	5900
72.2	1150	6290
73.8	1110	5700
75.5	1100	6060
77.1	1130	5850
78.7	1030	4830
80.4	940	4220
82.0	880	4570

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
83.7	720	5050
85.3	930	5650
86.9	960	6060
88.6	940	5650
90.2	910	5460
91.9	970	5560
93.5	1040	5560
95.1	1020	5700
96.8	1190	5510
98.4	990	5800
100.1	1130	5290
101.7	1330	5090
103.4	930	5050
105.0	1230	5250
106.6	1890	7840
108.3	2190	6670
109.9	1450	7490
111.6	1040	5850
113.2	880	4760
114.8	910	4730
116.5	1050	5650
118.1	1110	5700
119.8	930	5600
121.4	920	5600
123.0	1030	5850
124.7	1180	5750
126.3	1010	5700
128.0	1060	5850
129.6	1150	5650
131.2	980	5560
132.9	970	5750
134.5	1060	5850
136.2	1090	5850
137.8	1130	5900
139.4	1260	6120
141.1	1420	6060
142.7	1590	6290
144.4	1880	6170
146.0	1390	5700
147.6	1130	5420
149.3	1250	5600
150.9	1170	5460
152.6	1240	5800
154.2	1270	5750
155.8	1180	5750
157.5	1350	5850
159.1	1820	6060
160.8	1800	5560
162.4	1360	5510
164.0	1360	5600

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
165.7	1450	5330
167.3	1320	5560
169.0	1220	5380
170.6	1360	5600
172.2	1560	5650
173.9	1300	5510
175.5	1120	5510
177.2	1390	5650
178.8	1350	5650
180.5	1160	5510
182.1	1170	5420
183.7	1110	5380
185.4	1040	5330
187.0	890	5290
188.7	870	5290
190.3	940	5330
191.9	880	5250
193.6	900	5330
195.2	960	5330
196.9	1010	5380
198.5	1020	5420
200.1	1000	5330
201.8	980	5250
203.4	940	5170
205.1	830	5210
206.7	760	5250
208.3	820	5330
210.0	830	5510
211.6	1070	5850
213.3	1420	6170
214.9	1400	6010
216.5	1330	5950
218.2	1420	6120
219.8	1560	6060
221.5	1520	5850
223.1	1290	5750
224.7	1310	5800
226.4	1430	5850
228.0	1440	5900
229.7	1370	5750
231.3	1190	5700
232.9	1140	5750
234.6	1290	5950
236.2	1630	6170
237.9	2010	6060
239.5	1750	5600
241.1	1100	5420
242.8	1070	5560
244.4	1310	5560
246.1	1300	5460

Table 6. Boring B-305-DHA, Suspension R1-R2 depths and P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
247.7	1230	5600
249.3	1280	5560
251.0	1280	5460
252.6	1210	5380
254.3	1170	5290
255.9	990	5210
257.6	940	5210
259.2	970	5250
260.8	890	5210
262.5	860	5290
264.1	900	5420
265.8	1170	5650
267.4	1600	5560
269.0	1310	5250
270.7	990	5090
272.3	860	5010
274.0	800	5090
275.6	1000	5420
277.2	1400	5460
278.9	1050	5560
280.5	870	5380
282.2	1180	5560
283.8	1670	5900
285.4	1370	5900
287.1	1570	6170
288.7	1590	6120
290.4	1610	6010
292.0	1650	6010
293.6	1510	5650
295.3	1310	5460
296.9	1190	5330
298.6	1010	5290
300.2	980	5250
301.8	1060	5290
303.5	1100	5210
305.1	1050	5250
306.8	1200	5170
308.4	900	5050
310.0	830	5130
311.7	930	5290
313.3	1090	5380
315.0	1160	5510
316.6	1090	5600
318.2	1070	5700
319.9	1260	5950
321.5	1500	6010
323.2	1570	5900
324.8	1460	5750
326.4	1470	5800
328.1	1640	5800

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
329.7	1490	5510
331.4	1130	5380
333.0	1110	5600
334.7	1440	5460
336.3	1170	5250
337.9	940	5460
339.6	1230	5950
341.2	1630	6120
342.9	1570	5950
344.5	1520	5850
346.1	1540	5850
347.8	1610	5950
349.4	1710	6010
351.1	1690	5850
352.7	1560	5800
354.3	1540	5900
356.0	1540	5900
357.6	1460	6010
359.3	1510	6170
360.9	1670	6170
362.5	1790	6120
364.2	1750	5900
365.8	1680	5750
367.5	1670	5750
369.1	1630	5700
370.7	1660	5750
372.4	1640	5700
374.0	1610	5750
375.7	1670	5750
377.3	1690	5800
378.9	1630	5800
380.6	1640	5750
382.2	1630	5700
383.9	1750	5600
385.5	1600	5650
387.1	1620	5700
388.8	1590	5650
390.4	1550	5650
392.1	1620	5650
393.7	1530	5600
395.3	1590	5750
397.0	1960	5900
398.6	2020	5900
400.3	2100	6120
401.9	1420	6010
403.5	1220	5750
405.2	1440	5850
406.8	1440	5800
408.5	1410	5750
410.1	1490	5800

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
411.8	1550	5750
413.4	1580	5700
415.0	1530	5600
416.7	1520	5650
418.3	1630	5800
420.0	1490	5700
421.6	1520	5650
423.2	1610	5750
424.9	1780	5900
426.5	1810	5700
428.2	1450	5510
429.8	1120	5460
431.4	1150	5560
433.1	1250	5650
434.7	1280	5650
436.4	1390	5560
438.0	1270	5380
439.6	1040	5420
441.3	1000	5460
442.9	1100	5460
444.6	1260	5330
446.2	1100	5210
447.8	920	5210
449.5	910	5210
451.1	870	5330
452.8	1130	5600
454.4	1720	5900
456.0	1680	5700
457.7	1440	5560
459.3	1420	5600
461.0	1370	5700
462.6	1580	5700
464.2	1470	5510
465.9	1520	5950
467.5	1540	6230
469.2	1450	5950
470.8	1460	6060
472.4	1250	5650

Table 6, continued. Boring B-305-DHA, Suspension R1-R2 depths and P- and S_H-wave velocities

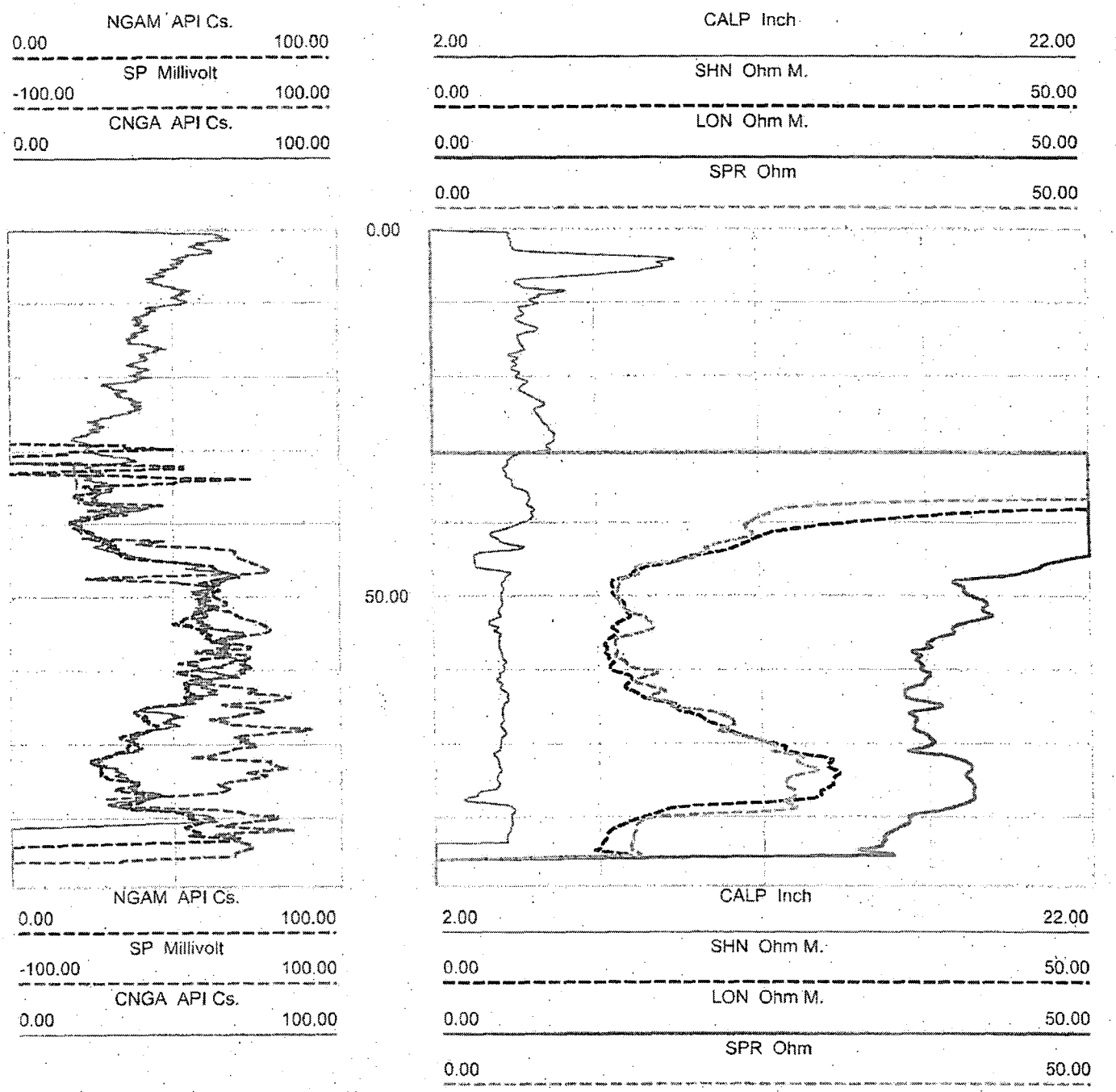


Figure 9. Boring B-305-DHA, Top Section, Caliper, Natural gamma, Resistivity and SP logs

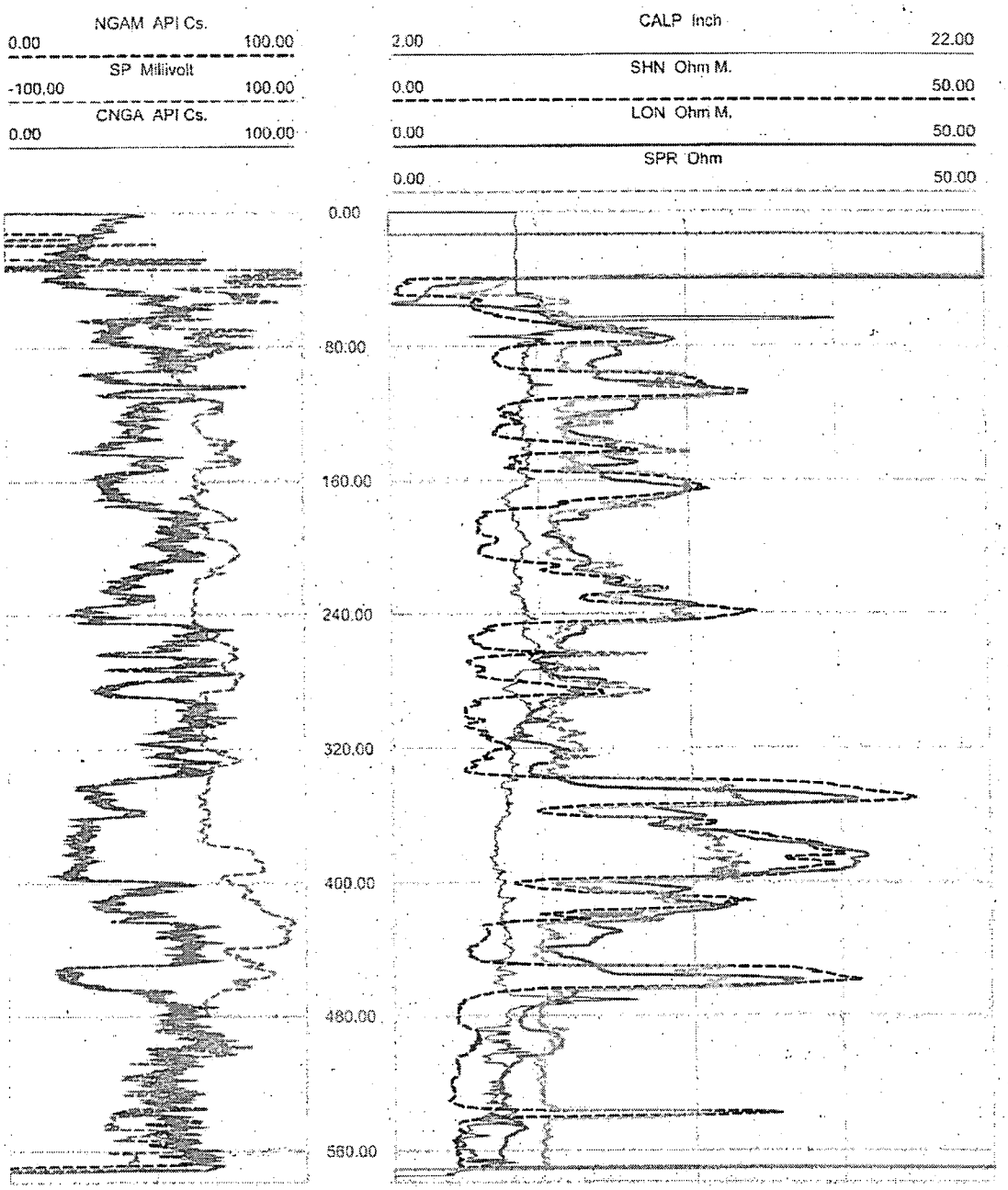
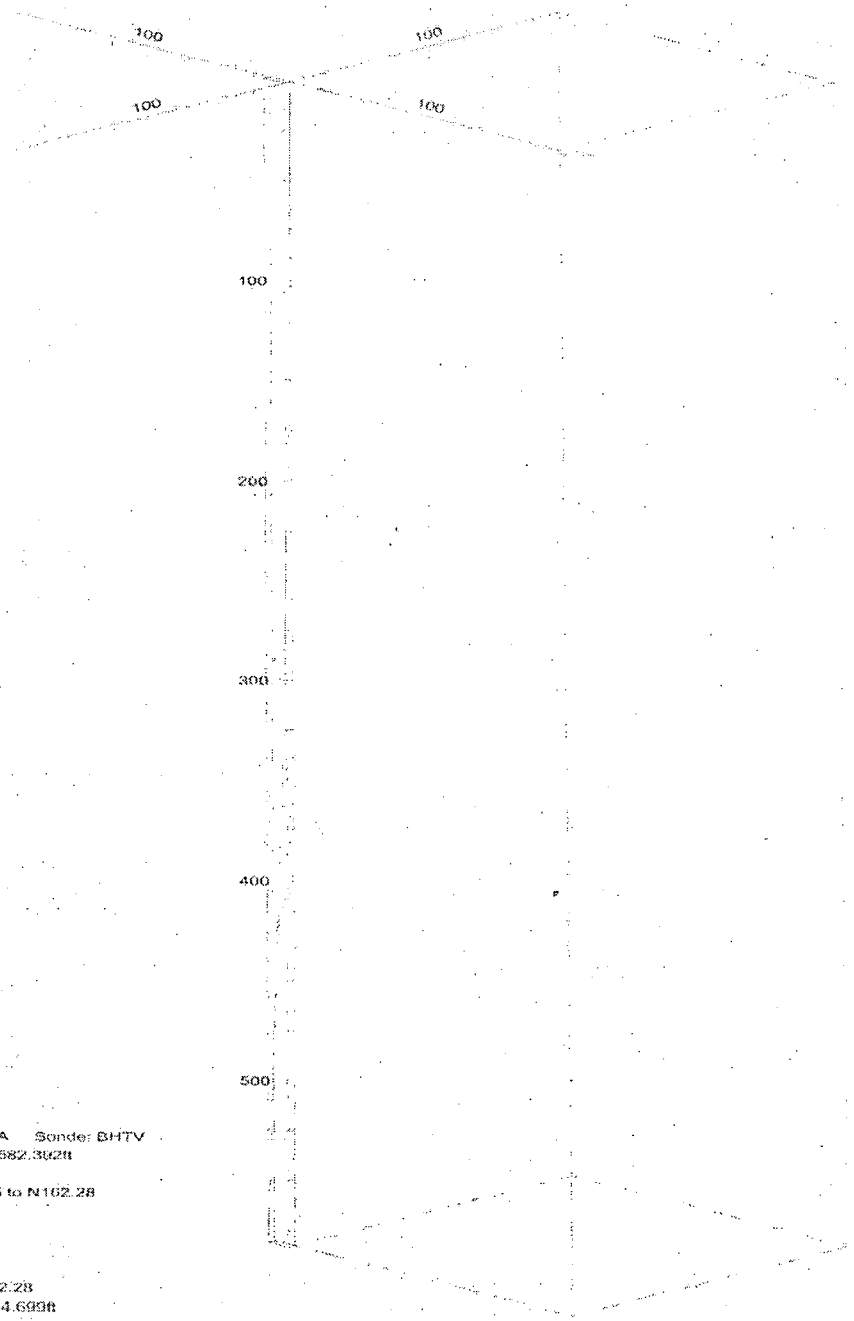


Figure 10. Boring B-305-DHA, Bottom Section, Caliper, Natural gamma, Resistivity and SP logs

Deviated borehole in orthographic projection, viewed from N45



Borehole: B-305-DHA Sonde: BHTV
Zone from: 0.072 to 582.302ft
North ref is true.
Mean deviation: 1.45 to N162.28
End coordinates .....
North: -14.001
East : 4.474
Down : 582.107
Azimuth of end: N162.28
Distance start-end: 14.699ft
Viewpoint: N45
Data extrapolated to the surface from 0.072ft
21 Feb 2007

Figure 11. Boring B-305-DHA, Deviation Projection (dimensions in feet)

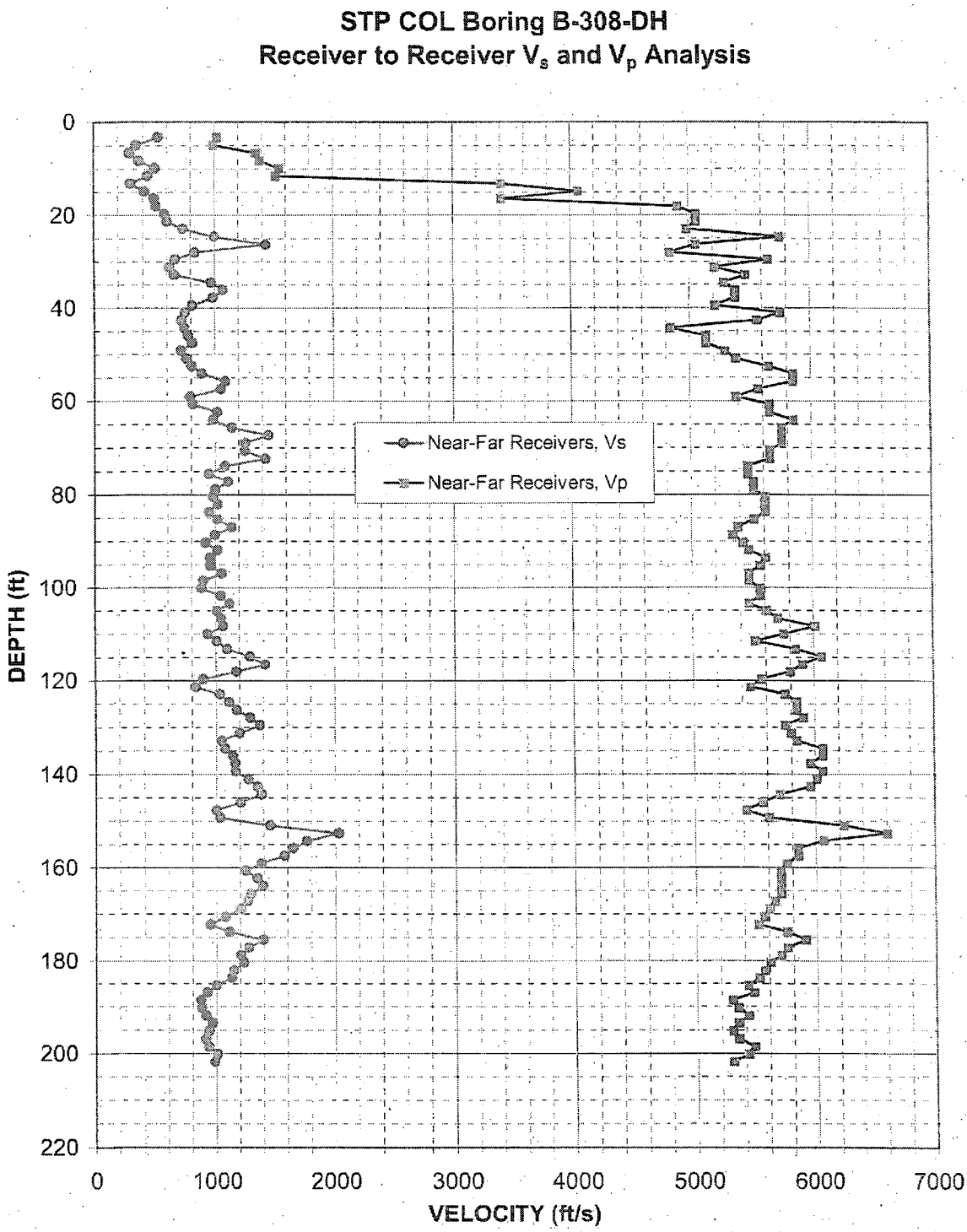


Figure 12. Boring B-308-DH, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
3.3	530	1020
4.9	340	990
6.6	290	1340
8.2	370	1380
9.8	500	1540
11.5	440	1520
13.1	300	3400
14.8	410	4070
16.4	490	3400
18.0	510	4900
19.7	580	5050
21.3	600	5050
23.0	730	4980
24.6	1000	5750
26.3	1430	5050
27.9	830	4830
29.5	670	5650
31.2	620	5210
32.8	660	5460
34.5	970	5290
36.1	1070	5380
37.7	980	5380
39.4	810	5210
41.0	750	5750
42.7	720	5560
44.3	740	4830
45.9	770	5130
47.6	810	5130
49.2	720	5290
50.9	760	5380
52.5	800	5650
54.1	880	5850
55.8	1090	5850
57.4	1050	5560
59.1	790	5380
60.7	810	5650
62.3	1020	5650
64.0	980	5850
65.6	1140	5750
67.3	1450	5750
68.9	1250	5750
70.5	1250	5650
72.2	1420	5650
73.8	1080	5460
75.5	940	5460
77.1	1110	5510
78.7	1000	5510
80.4	980	5600
82.0	1020	5600
83.7	940	5600

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
85.3	1010	5510
86.9	1130	5380
88.6	990	5330
90.2	910	5420
91.9	1010	5460
93.5	950	5600
95.1	960	5560
96.8	1050	5460
98.4	890	5460
100.1	880	5560
101.7	1040	5560
103.4	1110	5460
105.0	1010	5600
106.6	1040	5700
108.3	1060	6010
109.9	930	5750
111.6	1000	5510
113.2	1090	5850
114.8	1290	6060
116.5	1420	5900
118.1	1170	5800
119.8	890	5560
121.4	830	5460
123.0	1030	5750
124.7	1110	5850
126.3	1170	5850
128.0	1290	5900
129.6	1370	5750
131.2	1190	5800
132.9	1040	5850
134.5	1070	6060
136.2	1140	6060
137.8	1160	5950
139.4	1160	6060
141.1	1270	6010
142.7	1350	5950
144.4	1380	5700
146.0	1200	5560
147.6	1000	5420
149.3	1030	5600
150.9	1460	6230
152.6	2030	6600
154.2	1760	6060
155.8	1650	5850
157.5	1570	5850
159.1	1380	5750
160.8	1240	5700
162.4	1340	5700
164.0	1390	5700
165.7	1290	5700

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
167.3	1260	5650
169.0	1210	5600
170.6	1070	5560
172.2	940	5510
173.9	1110	5750
175.5	1390	5900
177.2	1270	5750
178.8	1200	5700
180.5	1230	5600
182.1	1140	5560
183.7	1120	5510
185.4	1000	5420
187.0	920	5460
188.7	860	5290
190.3	870	5330
191.9	910	5420
193.6	960	5330
195.2	930	5290
196.9	900	5330
198.5	930	5460
200.1	1000	5420
201.8	980	5290

Table 7. Boring B-308-DH, Suspension R1-R2 depths and P- and S_H-wave velocities

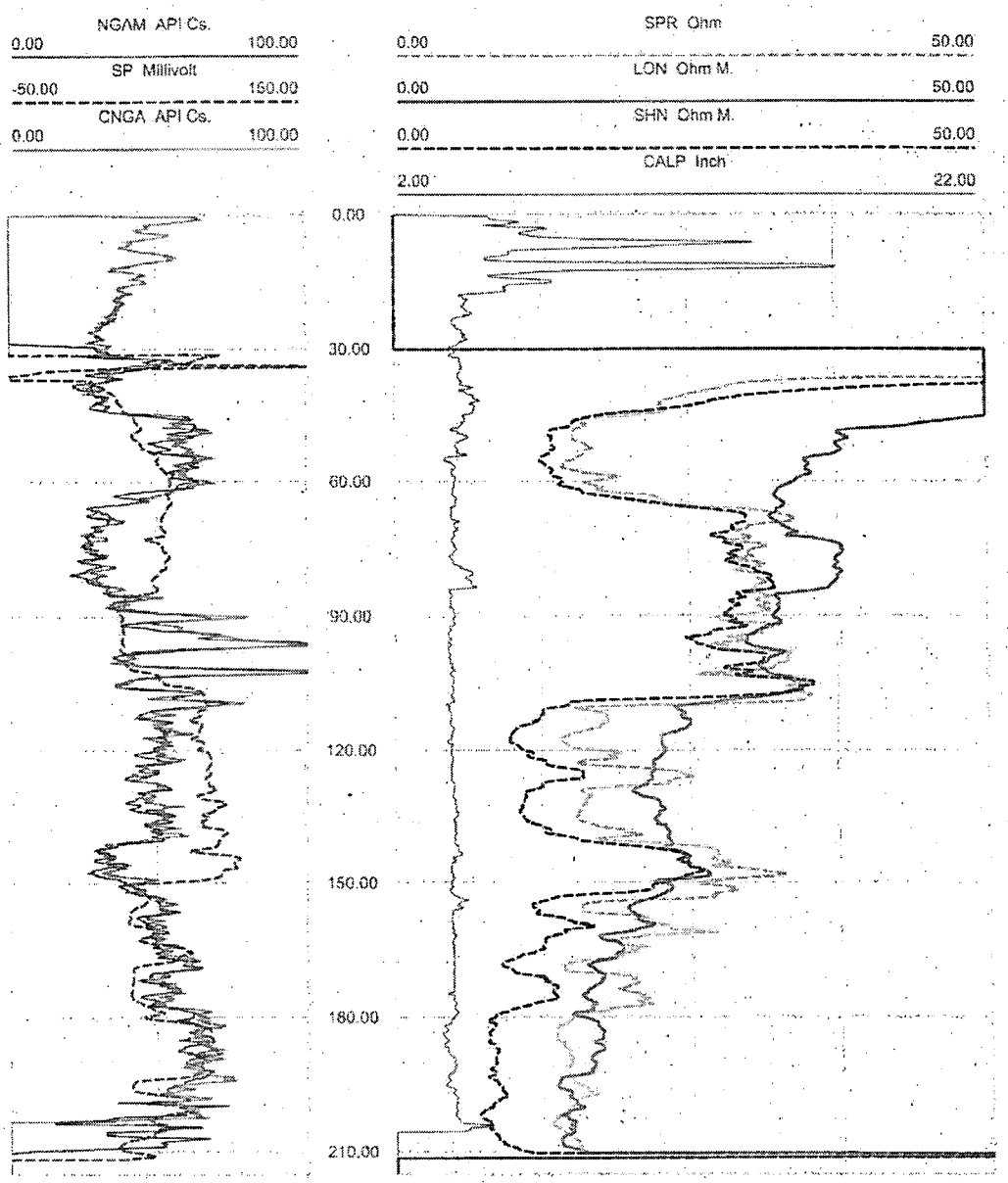


Figure 13. Boring B-308-DH, Caliper, Natural gamma, Resistivity and SP logs

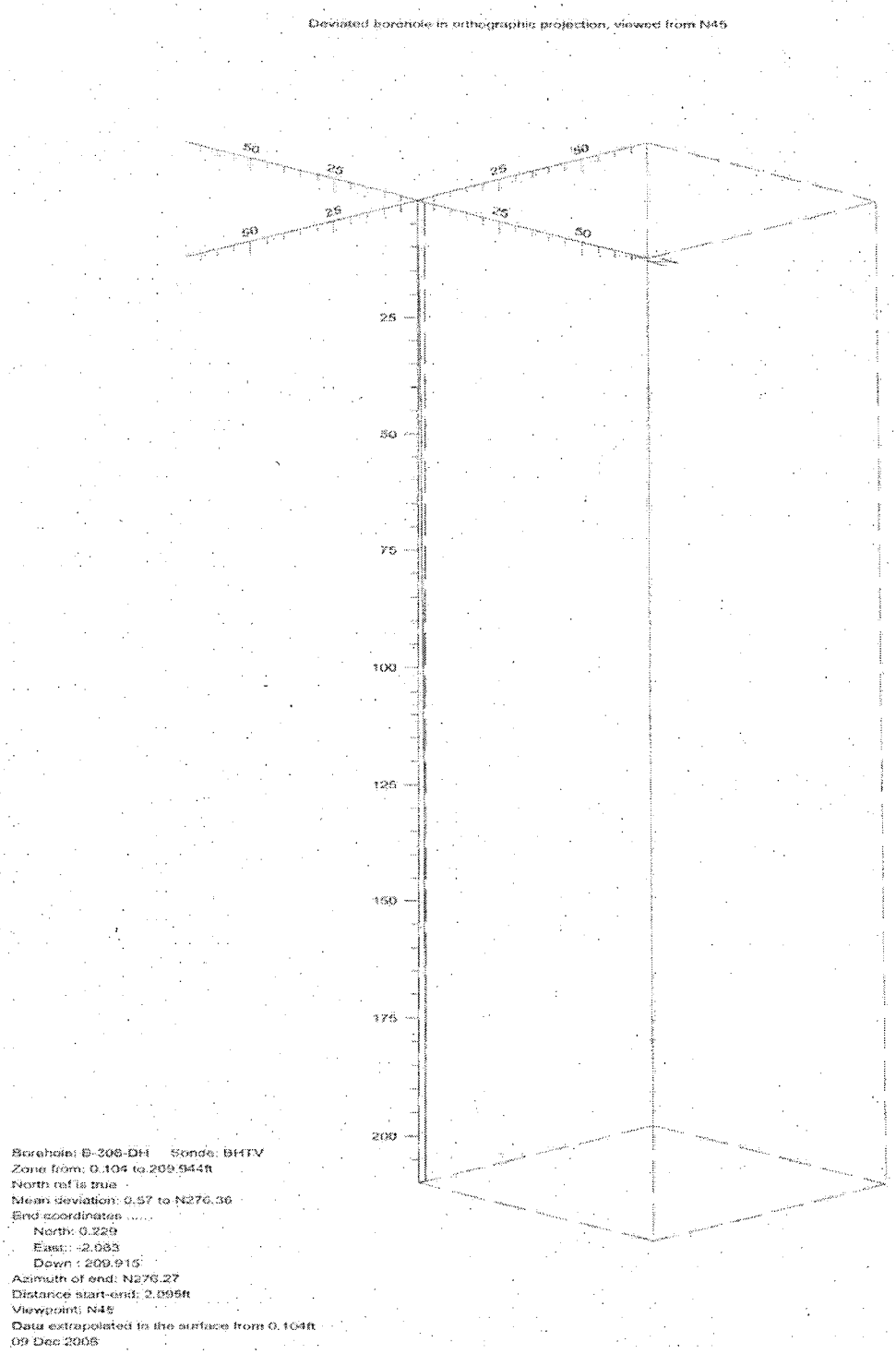


Figure 14. Boring B-308-DH, Deviation Projection (dimensions in feet)

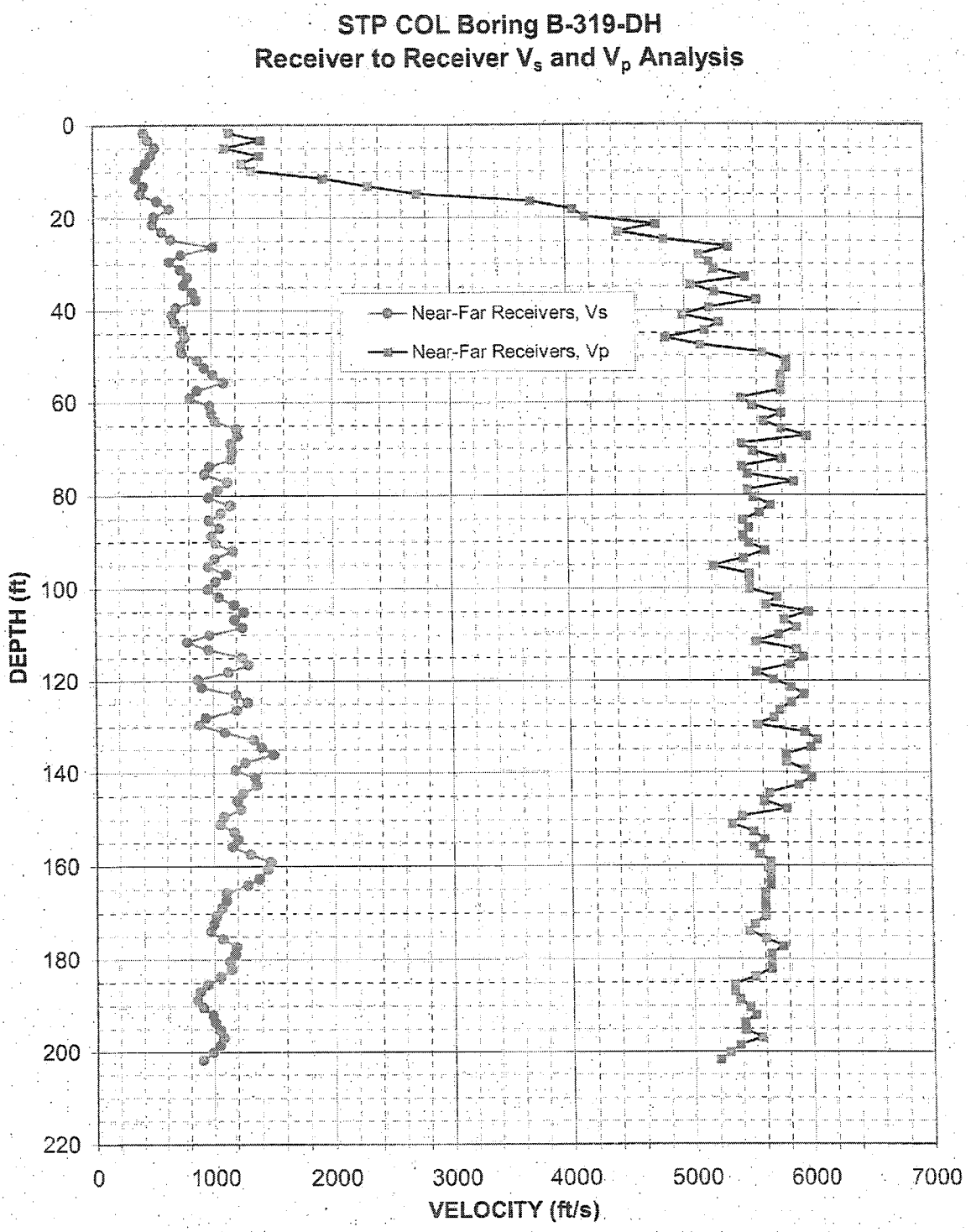


Figure 15. Boring B-319-DH, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	430	1160
3.3	460	1420
4.9	520	1120
6.6	490	1410
8.2	450	1260
9.8	390	1340
11.5	360	1940
13.1	420	2310
14.8	400	2730
16.4	540	3700
18.0	650	4070
19.7	510	4170
21.3	500	4760
23.0	580	4440
24.6	660	4830
26.3	1020	5380
27.9	740	5130
29.5	650	5210
31.2	740	5250
32.8	800	5510
34.5	760	5050
36.1	840	5250
37.7	870	5600
39.4	700	5210
41.0	660	4980
42.7	690	5290
44.3	750	5170
45.9	770	4830
47.6	730	5130
49.2	740	5650
50.9	880	5850
52.5	940	5850
54.1	1010	5800
55.8	1100	5800
57.4	870	5800
59.1	810	5460
60.7	980	5560
62.3	1000	5800
64.0	1030	5650
65.6	1210	5800
67.3	1220	6010
68.9	1160	5460
70.5	1170	5560
72.2	1160	5800
73.8	980	5460
75.5	940	5510
77.1	1130	5900
78.7	1050	5510
80.4	970	5560
82.0	1150	5700

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
83.7	1070	5600
85.3	970	5460
86.9	1060	5510
88.6	990	5460
90.2	1030	5510
91.9	1170	5650
93.5	1020	5460
95.1	960	5210
96.8	1120	5510
98.4	1030	5510
100.1	960	5510
101.7	1050	5750
103.4	1180	5650
105.0	1260	6010
106.6	1180	5800
108.3	1250	5900
109.9	970	5750
111.6	780	5560
113.2	960	5900
114.8	1240	5950
116.5	1300	5850
118.1	1130	5560
119.8	870	5700
121.4	900	5850
123.0	1190	5950
124.7	1290	5850
126.3	1200	5750
128.0	940	5700
129.6	880	5560
131.2	1100	5950
132.9	1340	6060
134.5	1400	6010
136.2	1500	5800
137.8	1260	5800
139.4	1190	5950
141.1	1350	6010
142.7	1360	5900
144.4	1240	5650
146.0	1200	5600
147.6	1230	5800
149.3	1090	5420
150.9	1050	5330
152.6	1170	5510
154.2	1200	5600
155.8	1160	5510
157.5	1310	5560
159.1	1470	5650
160.8	1450	5650
162.7	1380	5650
164.0	1280	5650

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
165.7	1100	5600
167.3	1100	5600
169.0	1060	5600
170.6	1020	5600
172.2	1000	5510
173.9	970	5460
175.5	1070	5600
177.2	1190	5750
178.8	1180	5650
180.5	1130	5650
182.1	1150	5650
183.7	1050	5510
185.4	940	5330
187.0	880	5330
188.7	850	5380
190.3	910	5460
191.9	990	5510
193.6	1010	5420
195.2	1050	5420
196.9	1080	5560
198.5	1040	5380
200.1	990	5290
201.8	900	5210

Table 8. Boring B-319-DH, Suspension R1-R2 depths and P- and S_H-wave velocities

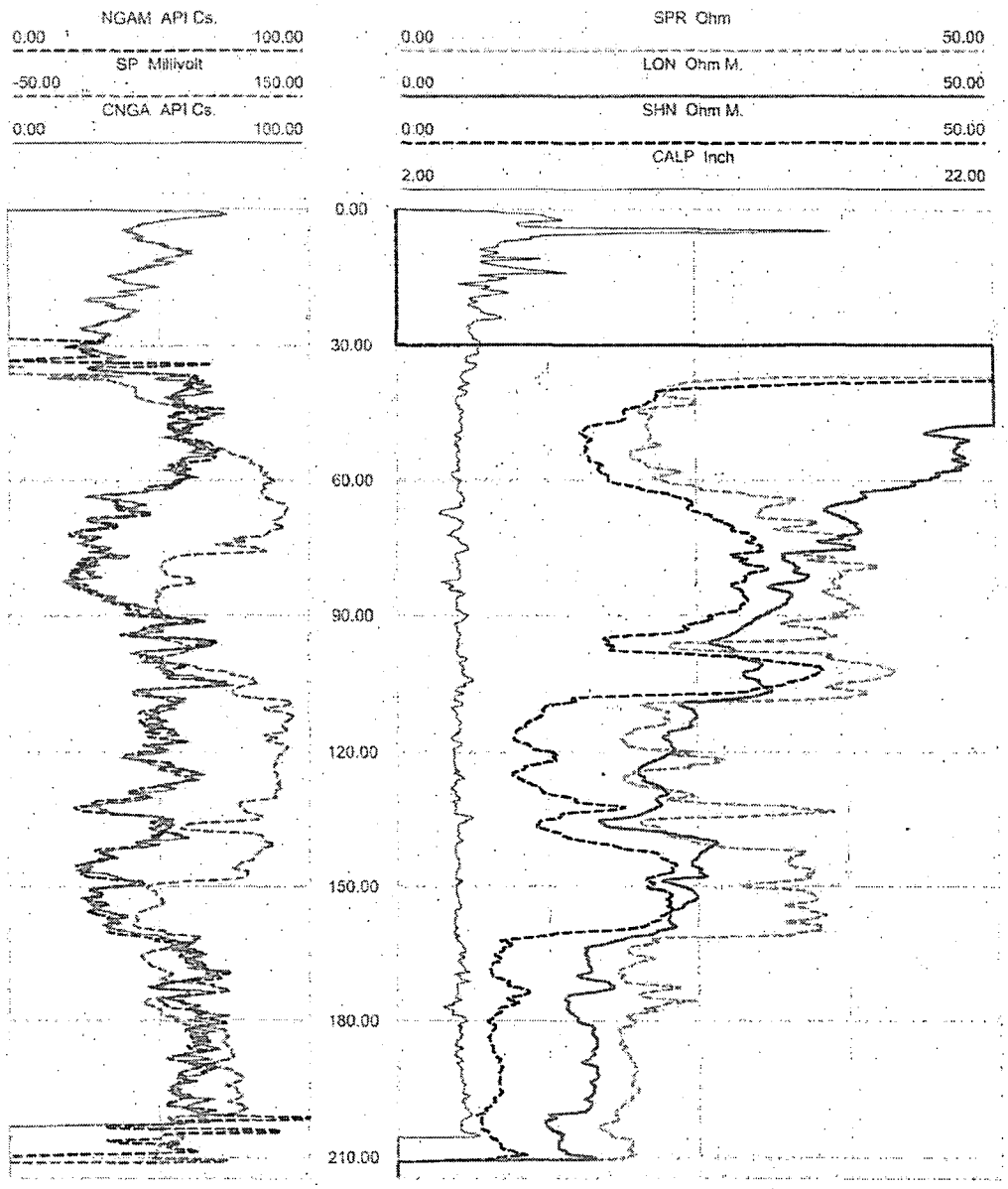
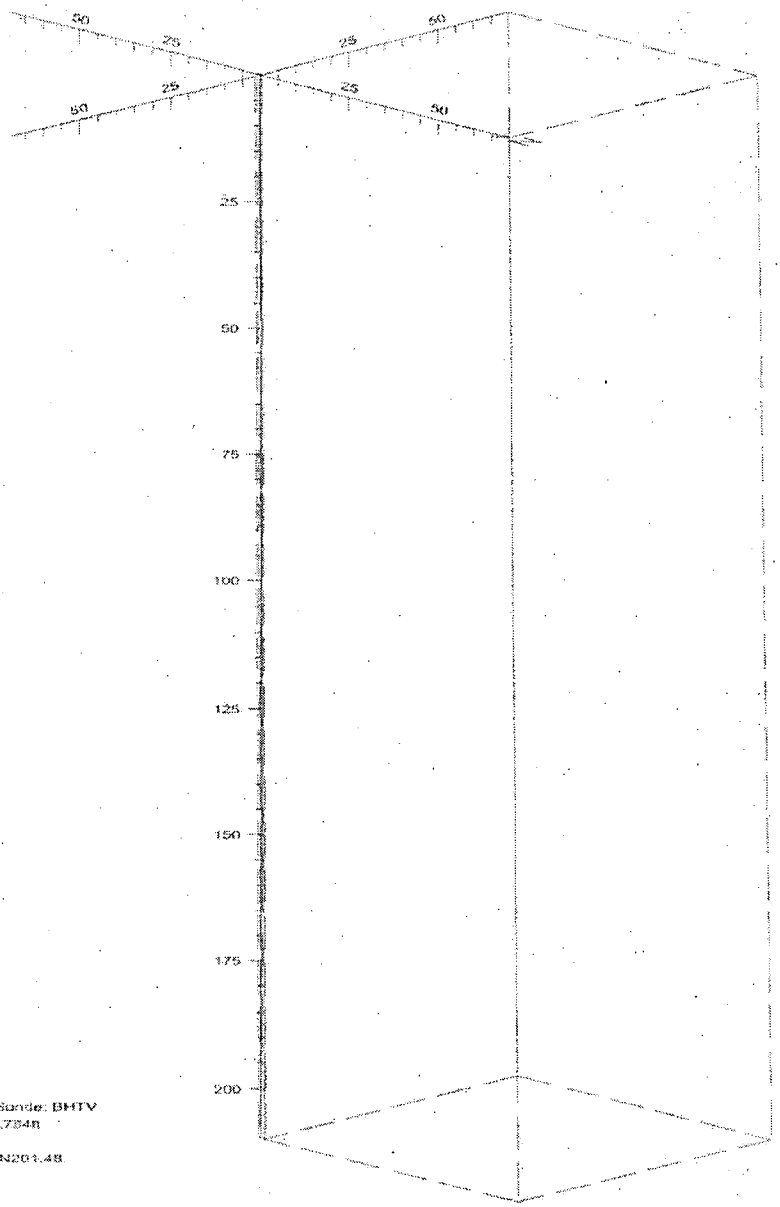


Figure 16. Boring B-319-DH, Caliper, Natural gamma, Resistivity and SP logs

Deviated borehole in orthographic projection, viewed from N45



Borehole: B-319-DH Sonde: BHTV
Zone from: 0.104 to 209.784ft
North ref is true
Mean deviation: 0.45 to N201.48
End coordinates ....
North: -1.534
East : -0.603
Down : 209.767
Azimuth of end: N201.44
Distance start-end: 1.648ft
Viewpoint: N45
Data extrapolated to the surface from 0.104ft
05 Dec 2006

Figure 17. Boring B-319-DH, Deviation Projection (dimensions in feet)

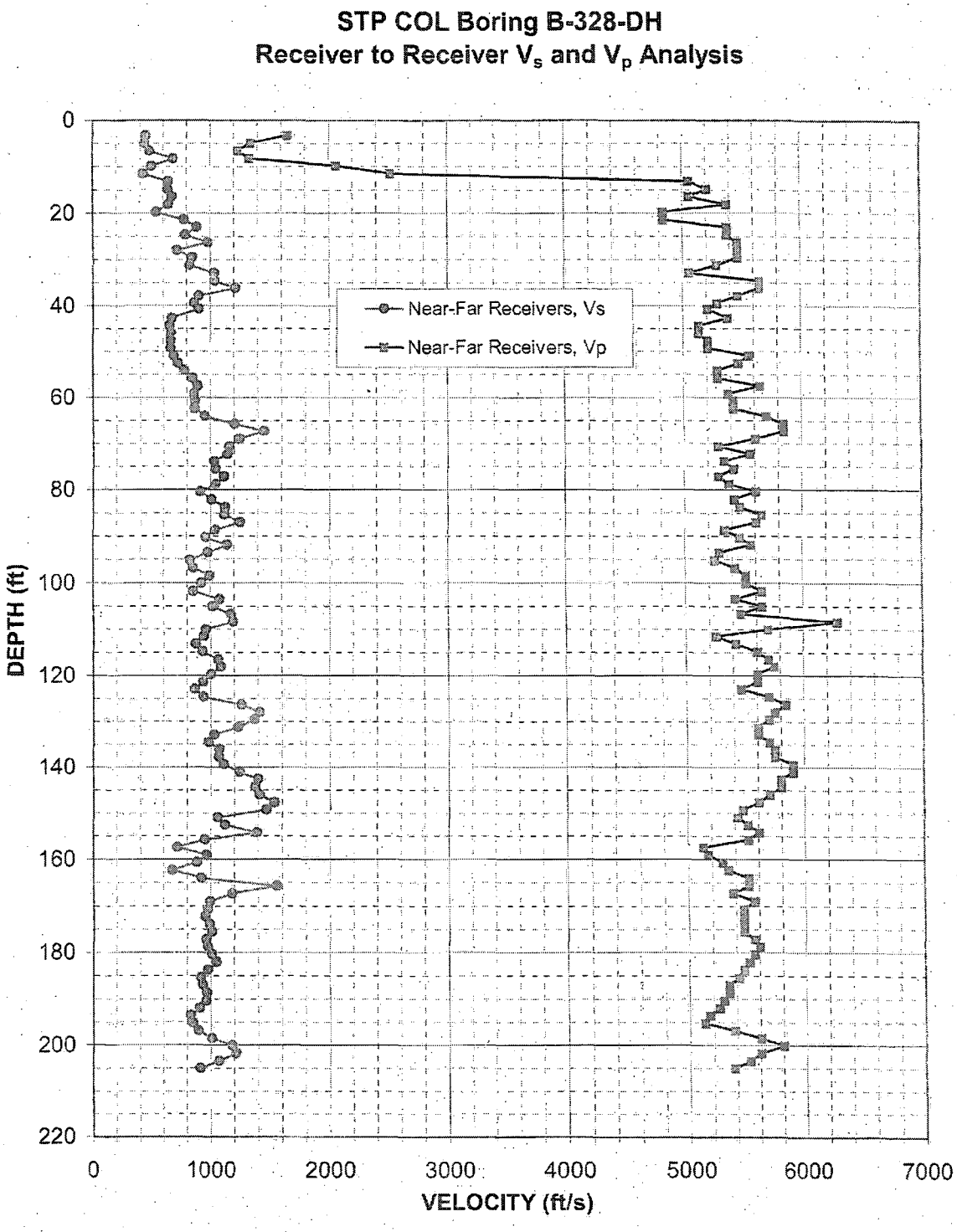


Figure 18. Boring B-328-DH, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
3.3	450	1650
4.9	440	1340
6.6	480	1240
8.2	690	1330
9.8	500	2060
11.5	430	2530
13.1	640	5050
14.8	640	5210
16.4	680	5050
18.0	640	5380
19.7	540	4830
21.3	780	4830
23.0	880	5380
24.6	790	5380
26.3	980	5460
27.9	720	5460
29.5	850	5460
31.2	830	5290
32.8	1040	5050
34.5	1040	5650
36.1	1220	5650
37.7	900	5460
39.4	860	5290
40.7	900	5210
42.7	670	5380
44.3	650	5130
45.9	670	5130
47.6	660	5210
49.2	660	5210
50.9	690	5560
52.5	730	5460
54.1	780	5290
55.8	850	5290
57.4	890	5650
59.1	860	5380
60.7	870	5420
62.3	870	5420
64.0	960	5700
65.6	1210	5850
67.3	1460	5850
68.9	1250	5600
70.5	1160	5290
72.2	1150	5560
73.8	1030	5330
75.5	1050	5420
77.1	1120	5290
78.7	1050	5380
80.4	920	5600
82.0	1010	5420
83.7	1130	5460

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
85.3	1120	5650
86.9	1250	5600
88.6	1040	5330
90.2	960	5460
91.9	1150	5560
93.5	980	5290
95.1	830	5250
96.8	850	5420
98.4	1000	5510
100.1	930	5510
101.7	850	5650
103.4	1080	5420
105.0	1020	5650
106.6	1180	5460
108.3	1190	6290
109.9	960	5700
111.6	940	5250
113.2	870	5420
114.8	940	5600
116.5	1070	5700
118.1	1090	5750
119.8	1010	5600
121.4	940	5600
123.0	870	5460
124.7	940	5700
126.3	1260	5850
128.0	1410	5750
129.6	1370	5700
131.2	1230	5600
132.9	1030	5600
134.5	980	5700
136.2	1080	5750
137.8	1070	5750
139.4	1110	5900
141.1	1250	5900
142.7	1400	5800
144.4	1380	5800
146.0	1410	5700
147.6	1540	5600
149.3	1470	5460
150.9	1060	5420
152.6	1130	5510
154.2	1390	5600
155.8	960	5510
157.5	720	5130
159.1	970	5170
160.8	890	5290
162.4	680	5330
164.0	930	5510
165.7	1560	5510

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
167.3	1180	5380
169.0	1000	5560
170.6	980	5460
172.2	960	5460
173.9	990	5460
175.5	1010	5460
177.2	960	5560
178.8	980	5600
180.5	1020	5560
182.1	1050	5510
183.7	980	5460
185.4	920	5420
187.0	940	5330
188.7	970	5330
190.3	970	5290
191.9	910	5250
193.6	830	5170
195.2	850	5130
196.9	900	5380
198.5	1010	5600
200.1	1180	5800
201.8	1220	5600
203.4	1080	5510
205.1	910	5380

Table 9. Boring B-328-DH, Suspension R1-R2 depths and P- and S_H-wave velocities

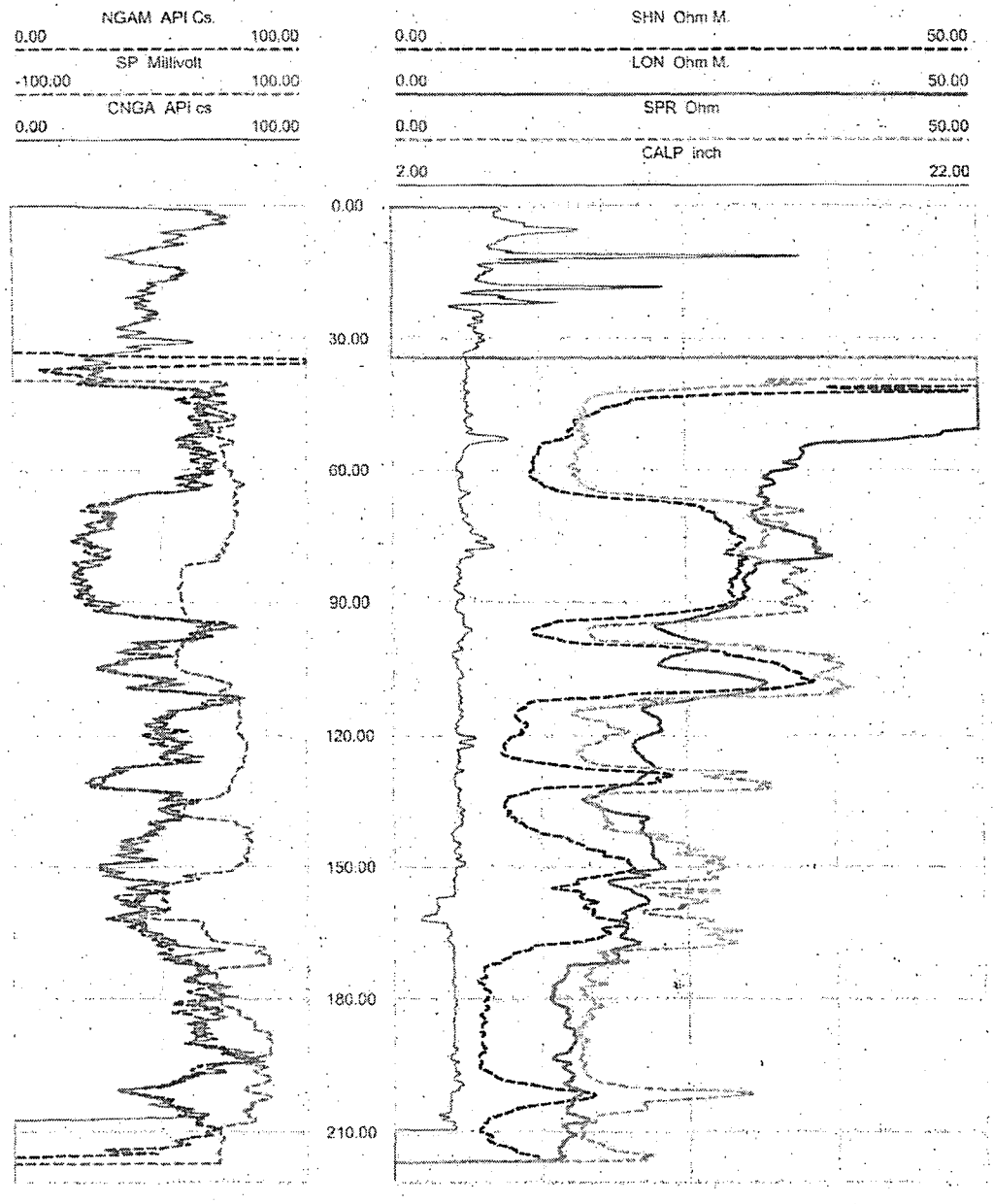
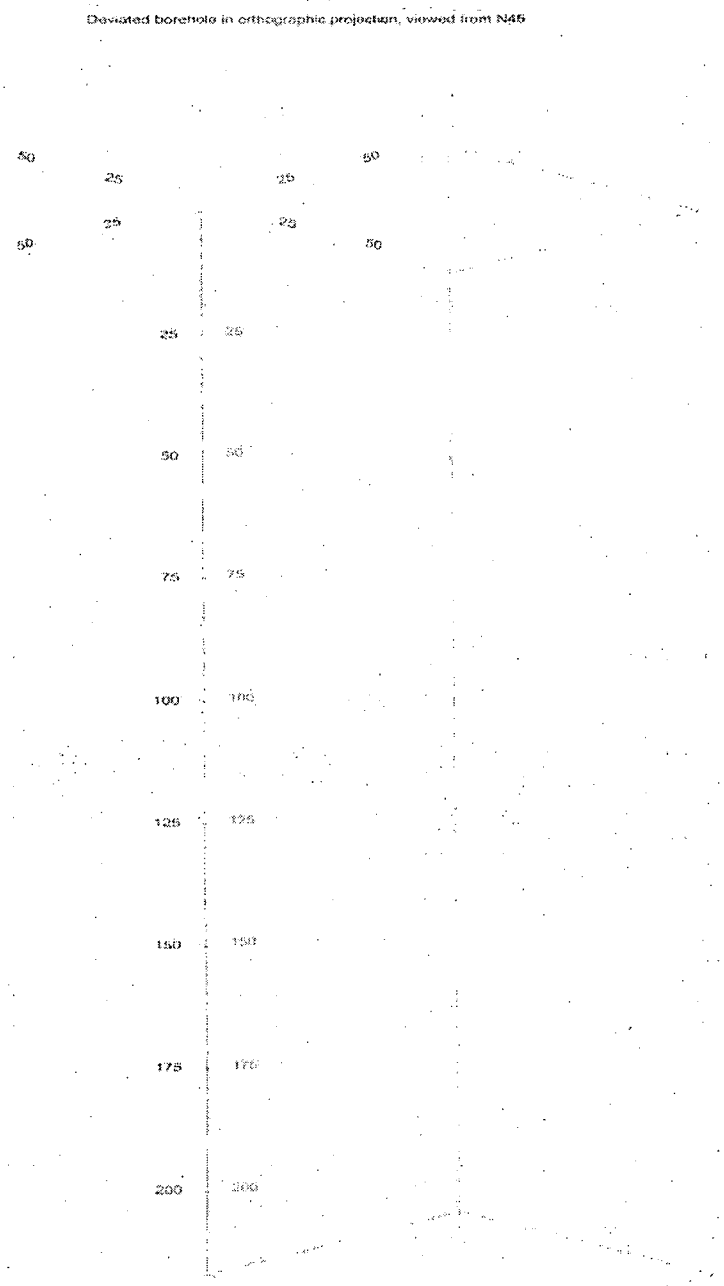


Figure 19. Boring B-328-DH, Caliper, Natural gamma, Resistivity and SP logs



Borehole: B-328-DH
Zone from: 0.032 - 217.312ft
North ref is true
Mean deviation: 0.32 to N37.38
End coordinates .....
North: 0.949
East : 0.731
Down : 217.296
Azimuth of end: N37.60
Distance start-end: 1.198ft
Viewpoint: N45
Data extrapolated to the surface from 0.032ft
15 Nov 2006

Figure 20. Boring B-328-DH, Deviation Projection (dimensions in feet)

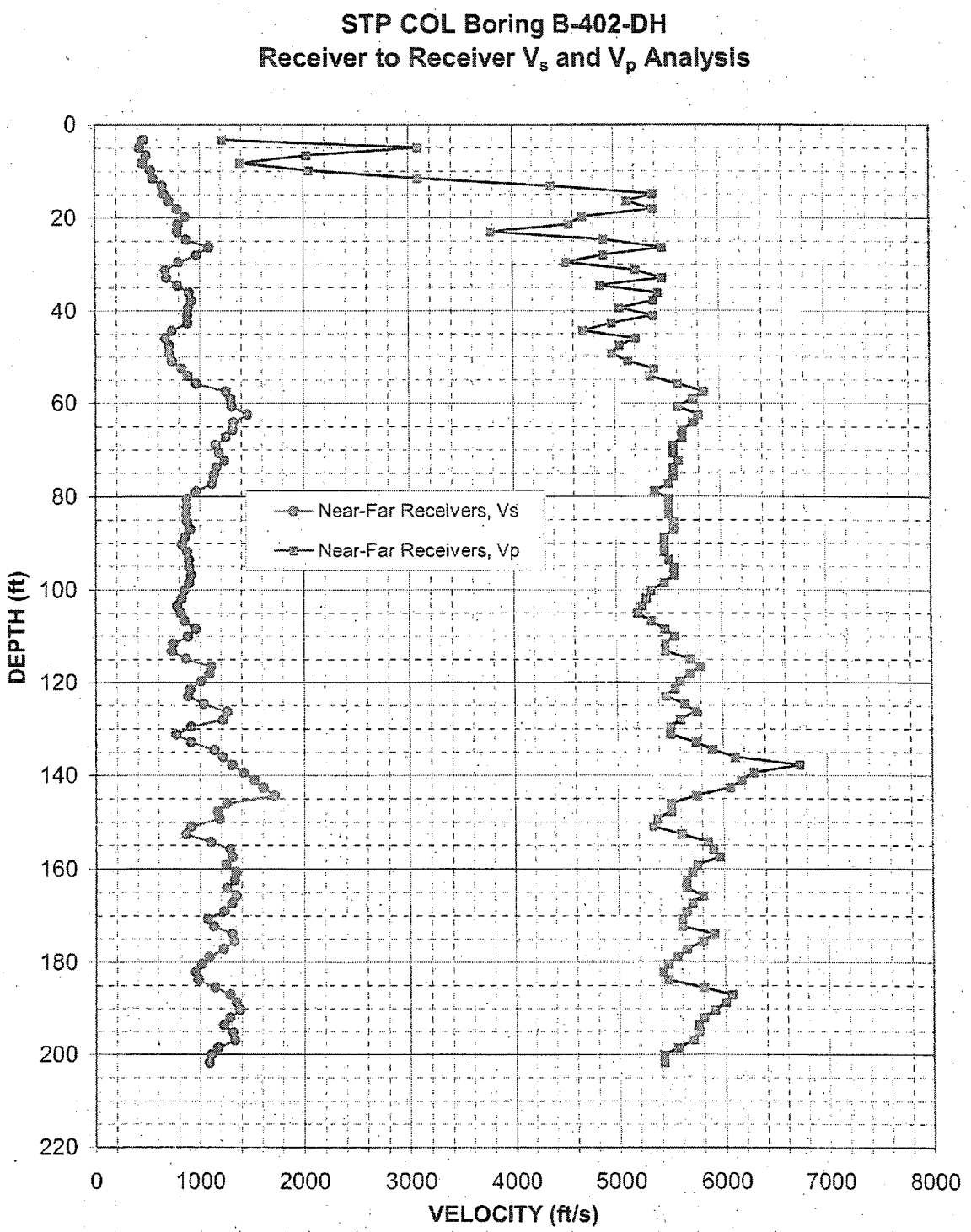


Figure 21: Boring B-402-DH, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
3.3	460	1220
4.9	420	3090
6.6	480	2030
8.2	450	1390
9.8	530	2060
11.5	550	3090
13.1	640	4390
14.8	660	5380
16.4	700	5130
18.0	780	5380
19.7	860	4690
21.3	790	4570
23.0	780	3790
24.6	870	4900
26.3	1090	5460
27.9	970	4900
29.5	800	4540
31.2	670	5210
32.8	680	5460
34.5	790	4870
36.1	900	5420
37.7	920	5380
39.4	890	5050
41.0	880	5380
42.7	880	4980
44.3	730	4690
45.9	670	5210
47.6	710	5050
49.2	710	4980
50.9	730	5130
52.5	820	5380
54.1	890	5330
55.8	970	5600
57.4	1250	5850
59.1	1300	5750
60.7	1310	5600
62.3	1460	5800
64.0	1330	5750
65.6	1320	5650
67.3	1250	5650
68.9	1150	5560
70.5	1190	5560
72.2	1240	5600
73.8	1160	5560
75.5	1130	5560
77.1	1120	5510
78.7	970	5380
80.4	870	5510
82.0	870	5510
83.7	870	5510

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
85.3	880	5560
86.9	910	5560
88.6	850	5460
90.2	830	5460
91.9	880	5460
93.5	900	5510
95.1	900	5560
96.8	920	5560
98.4	890	5460
100.1	850	5330
101.7	820	5290
103.4	780	5250
105.0	810	5210
106.6	850	5330
108.3	960	5460
109.9	880	5560
111.6	740	5460
113.2	730	5460
114.8	870	5700
116.5	1110	5800
118.1	1090	5700
119.8	1010	5600
121.4	900	5560
123.0	890	5460
124.7	1040	5650
126.3	1260	5750
128.0	1220	5600
129.6	910	5510
131.2	770	5510
132.9	910	5750
134.5	1140	5900
136.2	1220	6120
137.8	1310	6730
139.4	1420	6290
141.1	1530	6170
142.7	1610	6060
144.4	1720	5750
146.0	1260	5510
147.6	1170	5510
149.3	1190	5380
150.9	910	5330
152.6	860	5600
154.2	1110	5850
155.8	1290	5900
157.5	1310	5950
159.1	1250	5750
160.8	1350	5700
162.4	1330	5650
164.0	1260	5650
165.7	1360	5800

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
167.3	1310	5700
169.0	1230	5650
170.6	1080	5600
172.2	1130	5600
173.9	1310	5900
175.5	1330	5800
177.2	1230	5650
178.8	1090	5560
180.5	1010	5460
182.1	960	5420
183.7	980	5460
185.4	1150	5800
187.0	1290	6060
188.7	1360	6010
190.3	1390	5900
191.9	1290	5800
193.6	1230	5750
195.2	1320	5750
196.9	1330	5700
198.5	1170	5560
200.1	1110	5420
201.8	1090	5420

Table10. Boring B-402-DH, Suspension R1-R2 depths and P- and SH-wave velocities.

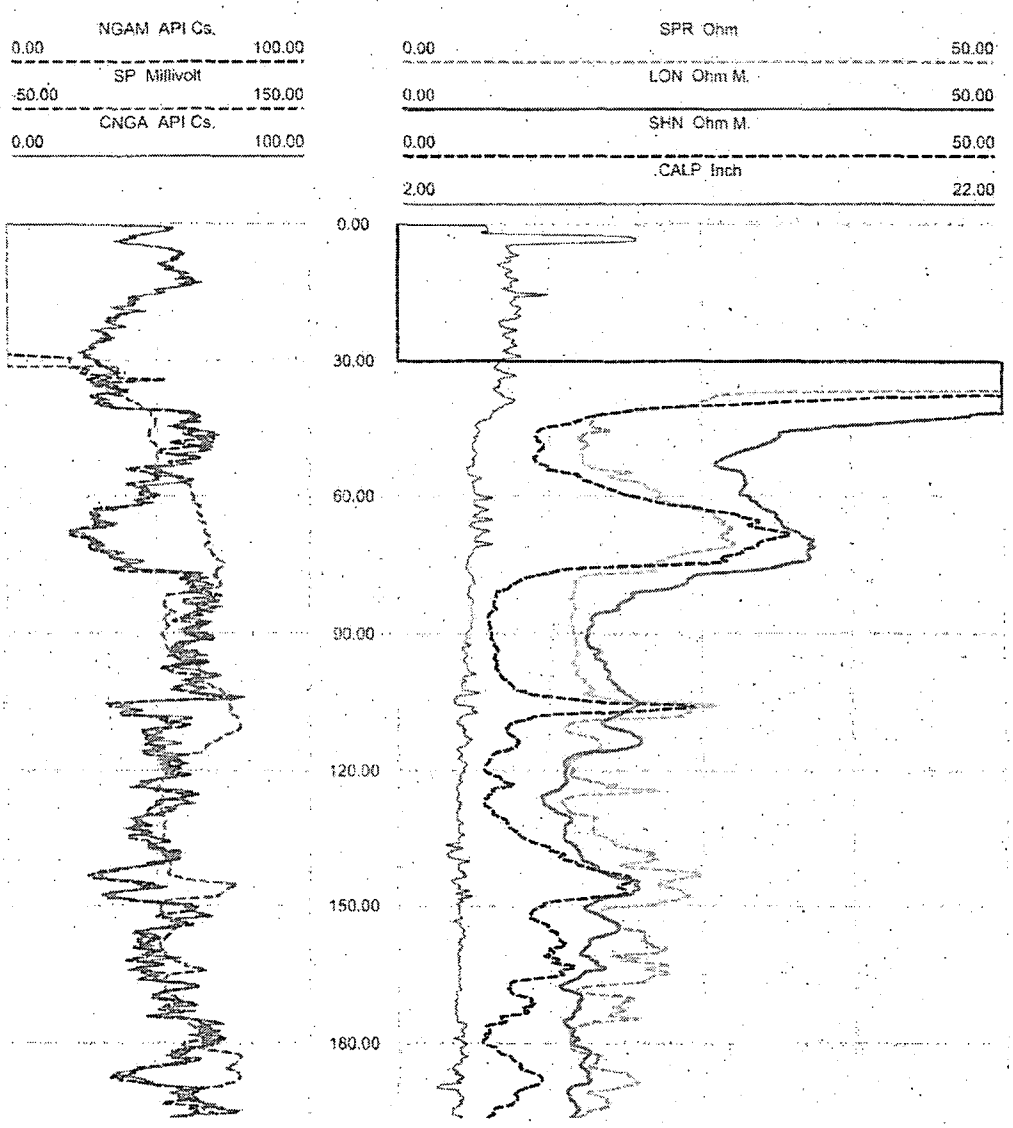


Figure 22. Boring B-402-DH, Caliper, Natural gamma, Resistivity and SP logs

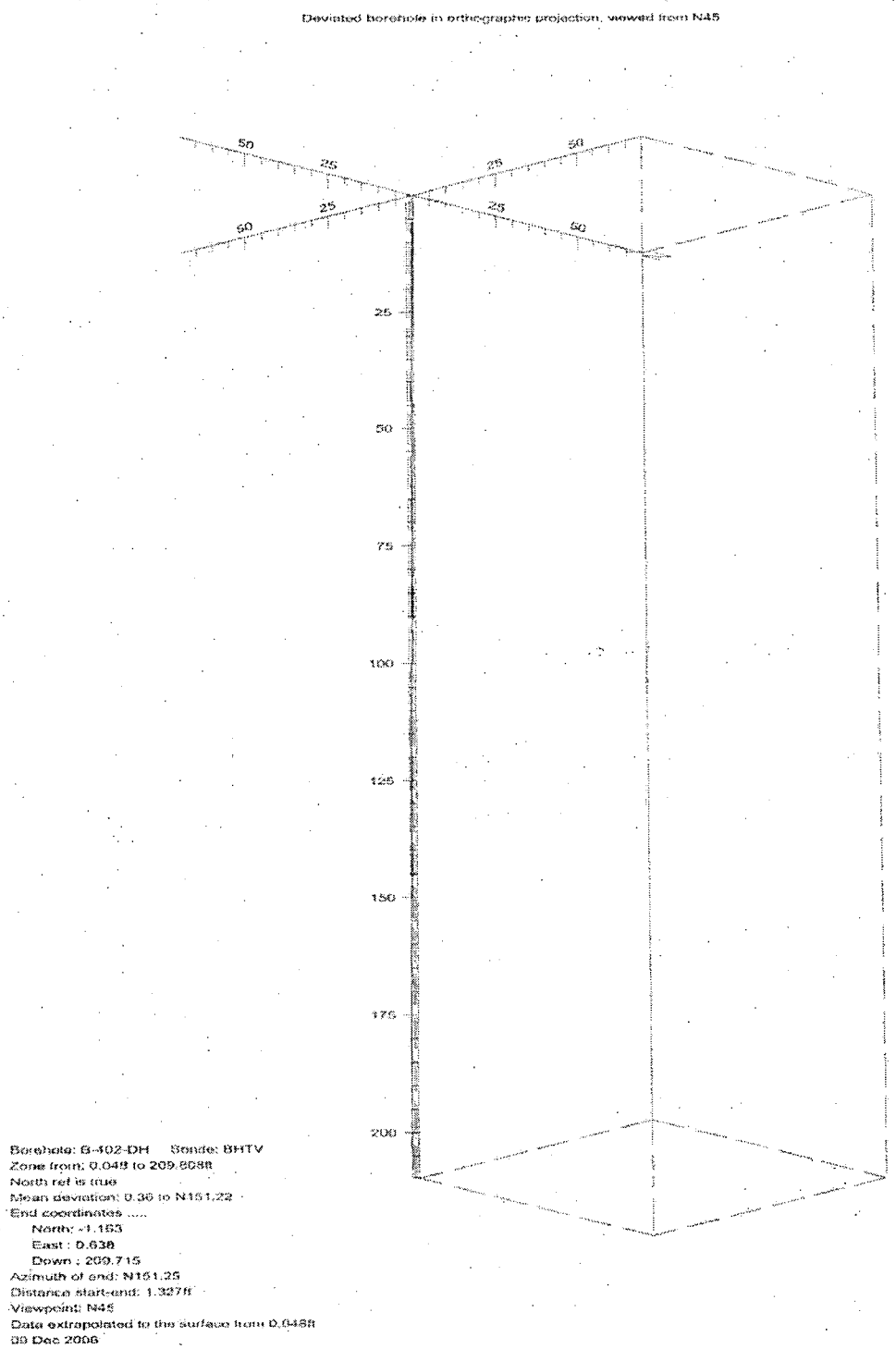


Figure 23. Boring B-402-DH, Deviation Projection (dimensions in feet)

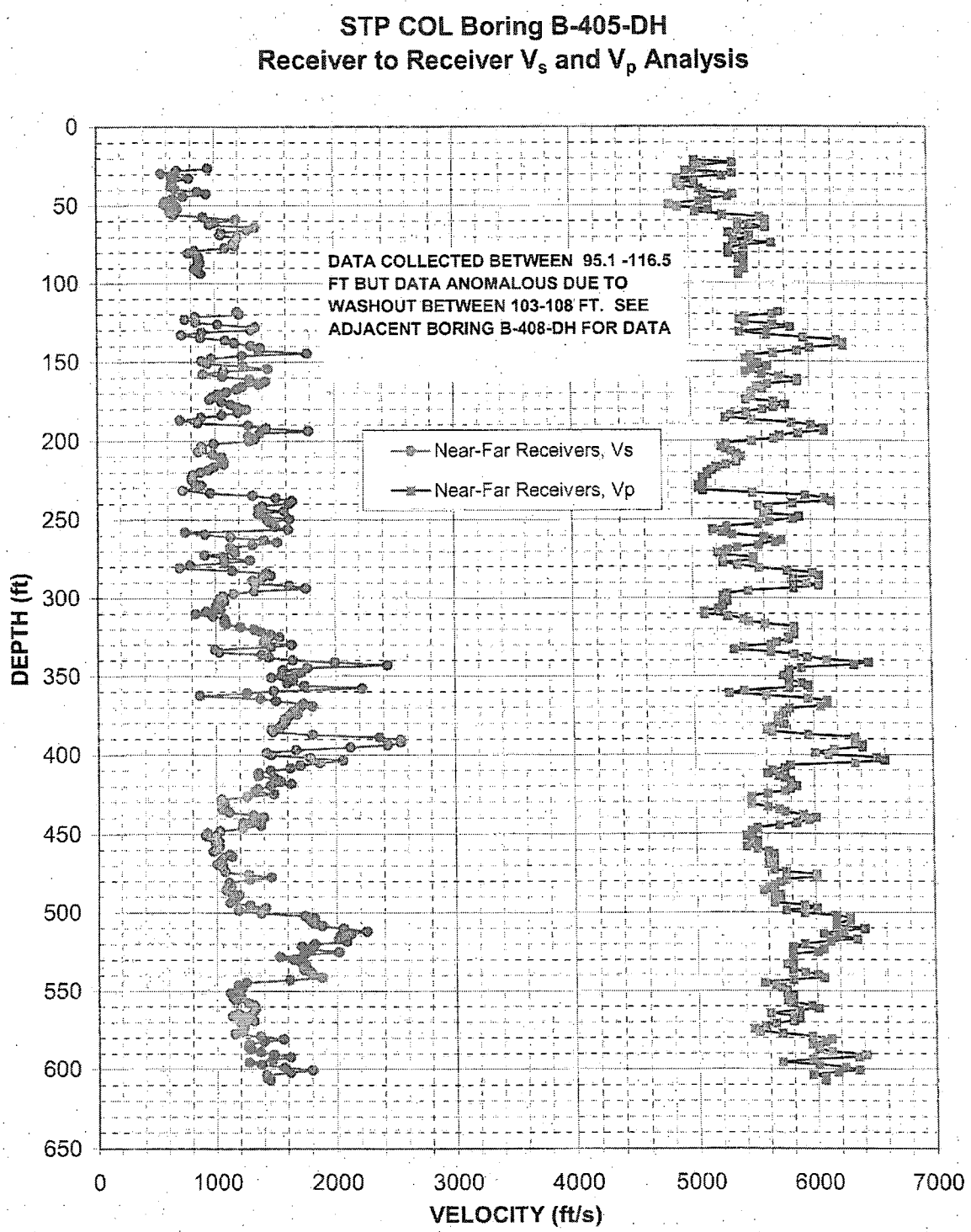


Figure 24: Boring B-405-DH, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
21.3	-	5050
23.0	-	5380
24.6	-	5130
26.3	950	5050
27.9	690	4980
29.5	550	5380
31.2	650	5290
32.8	790	4900
34.5	650	5050
36.1	640	4900
37.7	640	4940
39.4	670	5090
41.0	860	5130
42.7	940	5380
44.3	740	5330
45.9	650	5170
47.6	590	5090
49.2	580	4830
50.9	690	4900
52.5	690	5170
54.1	630	5050
55.8	660	5290
57.4	910	5600
59.1	1190	5650
60.7	1010	5420
62.3	960	5510
64.0	1350	5650
65.6	1290	5420
67.3	1060	5330
68.9	1050	5510
70.5	1200	5510
72.2	1180	5380
73.8	1170	5700
75.5	1180	5460
77.1	1090	5330
78.7	840	5330
80.4	780	5330
82.0	860	5460
83.7	870	5420
85.3	870	5460
86.9	880	5460
88.6	870	5460
90.2	840	5460
91.9	860	5420
93.5	890	5420
95.1	-	-
96.8	-	-
98.4	-	-
100.1	-	-
101.7	-	-

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
103.4	-	-
105.0	-	-
106.6	-	-
93.5	-	-
95.1	-	-
96.8	-	-
98.4	-	-
100.1	-	-
101.7	-	-
103.4	-	-
105.0	-	-
106.6	-	-
108.3	-	-
109.9	-	-
111.6	-	-
113.2	-	-
114.8	-	-
116.5	-	-
118.1	1190	5750
119.8	1210	5700
121.4	840	5460
123.0	750	5420
124.7	840	5460
126.3	1030	5700
128.0	1350	5850
129.6	1310	5650
131.2	890	5420
132.9	720	5650
134.5	880	5950
136.2	1090	6230
137.8	1170	6290
139.4	1310	6290
141.1	1390	6010
142.7	1370	5900
144.4	1780	5700
146.0	1230	5510
147.6	970	5460
149.3	890	5510
150.9	940	5560
152.6	1250	5650
154.2	1450	5510
155.8	1080	5460
157.5	900	5600
159.1	1070	5750
160.8	1290	5900
162.4	1430	5900
164.0	1370	5650
165.7	1230	5560
167.3	1190	5600
169.0	1100	5510

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
170.6	1030	5510
172.2	990	5510
173.9	960	5460
175.5	1060	5700
177.2	1140	5800
178.8	1200	5700
180.5	1270	5600
182.1	1190	5460
183.7	1060	5330
185.4	880	5290
187.0	700	5510
188.7	860	5850
190.3	1280	6010
191.9	1440	6120
193.6	1790	6120
195.2	1380	5900
196.9	1280	5750
198.5	1340	5700
200.1	1290	5510
201.8	990	5290
203.4	890	5250
205.1	890	5290
206.7	860	5330
208.3	980	5380
210.0	1060	5420
211.6	1050	5380
213.3	1080	5380
214.9	1080	5290
216.5	990	5210
218.2	940	5170
219.8	880	5130
221.5	820	5130
223.1	810	5090
224.7	810	5090
226.4	820	5090
228.0	880	5050
229.7	840	5050
231.3	730	5090
232.9	960	5510
234.6	1320	5950
236.2	1520	6120
237.9	1650	6170
239.5	1630	5850
241.1	1400	5560
242.8	1370	5650
244.4	1580	5650
246.1	1370	5600
247.7	1440	5900
249.3	1630	5850
251.0	1450	5650

Table 11. Boring B-405-DH, Suspension R1-R2 depths and P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
252.6	1490	5560
254.3	1510	5290
255.9	1620	5170
257.6	750	5250
259.2	920	5330
260.8	1130	5600
262.5	1410	5750
264.1	1530	5700
265.8	1320	5560
267.4	1130	5380
269.0	1160	5290
270.7	1170	5210
272.3	910	5250
274.0	1070	5510
275.6	1300	5510
277.2	1090	5250
278.9	790	5380
280.5	700	5560
282.2	1150	5800
283.8	1440	6010
285.4	1470	6060
287.1	1400	5850
288.7	1320	5850
290.4	1340	5950
292.0	1630	6060
293.6	1760	5850
295.3	1330	5460
296.9	1160	5290
298.6	1060	5250
300.2	1040	5250
301.8	1080	5290
303.5	1020	5250
305.1	1000	5250
306.8	1050	5210
308.4	930	5090
310.0	840	5090
311.7	980	5290
313.3	1080	5420
315.0	1080	5460
316.6	1090	5600
318.2	1210	5850
319.9	1330	5850
321.5	1380	5850
323.2	1470	5850
324.8	1540	5800
326.4	1440	5800
328.1	1410	5700
329.7	1640	5650
331.4	1470	5420
333.0	1000	5330

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
334.7	1030	5650
336.3	1390	5850
337.9	1450	5950
339.6	1650	6120
341.2	2000	6470
342.9	2430	6350
344.5	1770	5900
346.1	1560	5800
347.8	1720	5800
349.4	1560	5750
351.1	1470	5800
352.7	1650	5800
354.3	1600	5900
356.0	1750	5950
357.6	2220	5800
359.3	1490	5420
360.9	1260	5290
362.5	870	5600
364.2	1380	5950
365.8	1510	6120
367.5	1740	6120
369.1	1810	6060
370.7	1700	5800
372.4	1650	5750
374.0	1680	5750
375.7	1610	5700
377.3	1580	5700
378.9	1590	5700
380.6	1560	5750
382.2	1540	5650
383.9	1470	5600
385.5	1480	5650
387.1	1810	5950
388.8	2360	6350
390.4	2540	6350
392.1	2540	6350
393.7	2430	6410
395.3	2120	6410
397.0	1680	6170
398.6	1430	6010
400.3	1470	6120
401.9	1790	6540
403.5	2060	6600
405.2	1870	6350
406.8	1710	5800
408.5	1630	5750
410.1	1460	5650
411.8	1360	5600
413.4	1360	5700
415.0	1490	5750

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
416.7	1540	5800
418.3	1630	5800
420.0	1460	5850
421.6	1360	5800
423.2	1330	5750
424.9	1490	5600
426.5	1260	5460
428.2	1050	5460
429.8	1040	5460
431.4	1070	5460
433.1	1060	5600
434.7	1050	5700
436.4	1110	5750
438.0	1310	5900
439.6	1400	6010
441.3	1310	5950
442.9	1230	5850
444.6	1380	5700
446.2	1230	5510
447.8	1030	5460
449.5	930	5460
451.1	910	5420
452.8	970	5460
454.4	1020	5510
456.0	1000	5510
457.7	1030	5420
459.3	1020	5510
461.0	970	5600
462.6	1110	5650
464.2	1130	5650
465.9	1050	5600
467.5	1030	5650
469.2	1000	5600
470.8	1060	5650
472.4	1060	5650
474.1	1080	5750
475.7	1280	6010
477.4	1460	6010
479.0	1280	5750
480.6	1110	5700
482.3	1110	5650
483.9	1130	5600
485.6	1080	5560
487.2	1120	5650
488.9	1190	5700
490.5	1170	5700
492.1	1150	5650
493.8	1110	5650
495.4	1280	5900
497.1	1420	6010

Table 11, continued. Boring B-405-DH, Suspension R1-R2 depths and P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
498.7	1190	5750
500.3	1380	5900
502.0	1750	6170
503.6	1820	6290
505.3	1790	6290
506.9	1820	6170
508.5	1880	6170
510.2	2060	6410
511.8	2250	6230
513.5	2120	6060
515.1	2030	6170
516.7	2020	6350
518.4	2080	6120
520.0	1820	5900
521.7	1720	5800
523.3	1790	6060
524.9	2020	6010
526.6	1740	5800
528.2	1540	5800
529.9	1650	5800
531.5	1710	5800
533.1	1750	5750
534.8	1750	5800
536.4	1740	5800
538.1	1790	5900
539.7	1800	6010
541.3	1880	6060
543.0	1620	5800
544.6	1250	5560
546.3	1180	5650
547.9	1220	5700
549.5	1190	5750
551.2	1120	5750
552.8	1200	5800
554.5	1140	5750
556.1	1160	5750
557.7	1270	5800
559.4	1320	5950
561.0	1330	6010
562.7	1320	5850
564.3	1190	5600
565.9	1130	5800
567.6	1270	5850
569.2	1320	5800
570.9	1210	5650
572.5	1230	5560
574.2	1230	5460
575.8	1220	5510
577.4	1160	5700
579.1	1370	5950

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
580.7	1560	6120
582.4	1400	6060
584.0	1280	5950
585.6	1270	6010
587.3	1290	6010
588.9	1370	6120
590.6	1480	6410
592.2	1620	6350
593.8	1470	5950
595.5	1280	5700
597.1	1380	6010
598.8	1570	6230
600.4	1800	6350
602.0	1620	6170
603.7	1420	5950
605.3	1420	6060
607.0	1450	6060

Table 11, continued. Boring B-405-DH, Suspension R1-R2 depths and P- and S_H-wave velocities

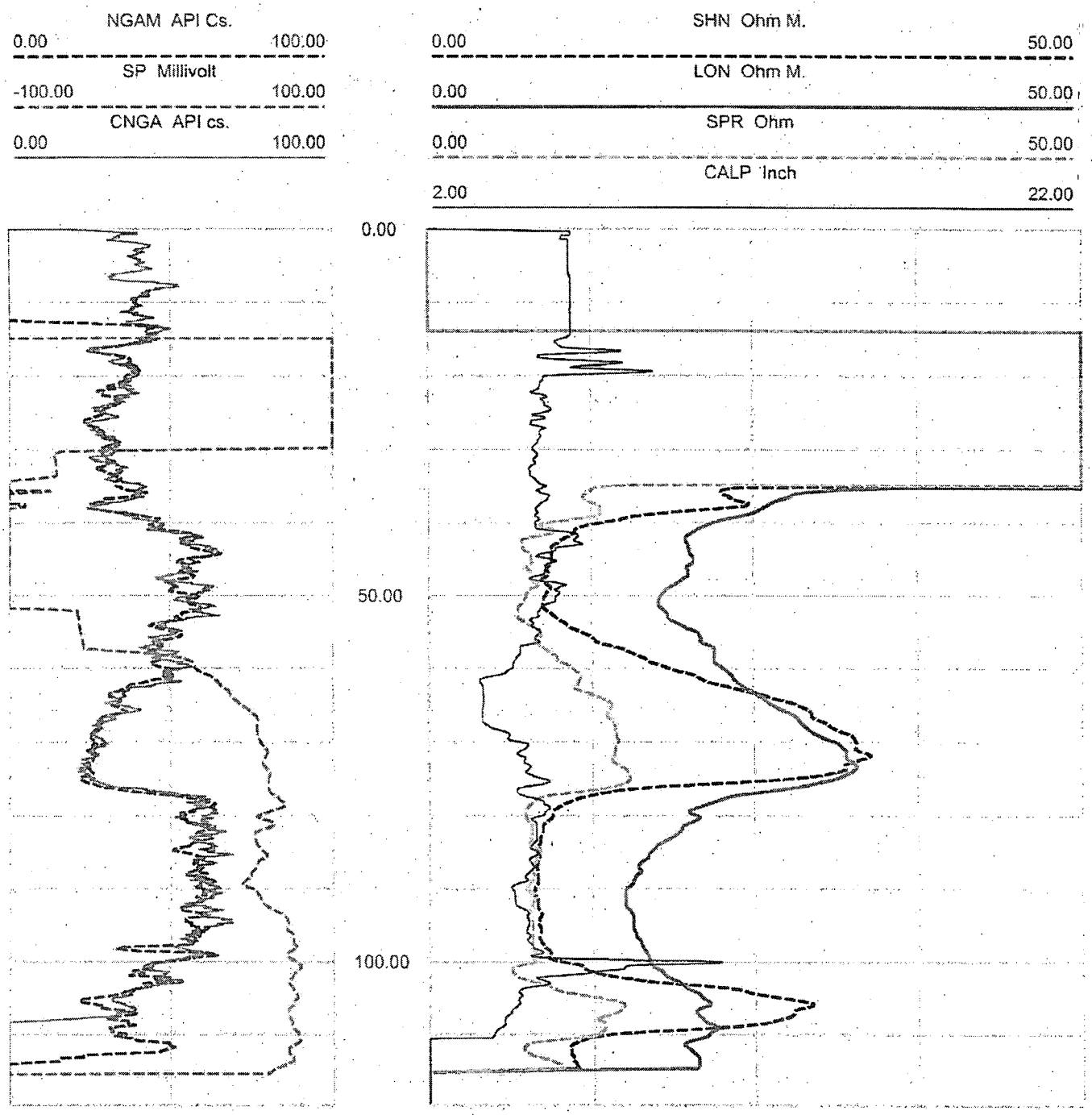


Figure 25. Boring B-405-DH upper section, Caliper, Natural gamma, Resistivity and SP logs

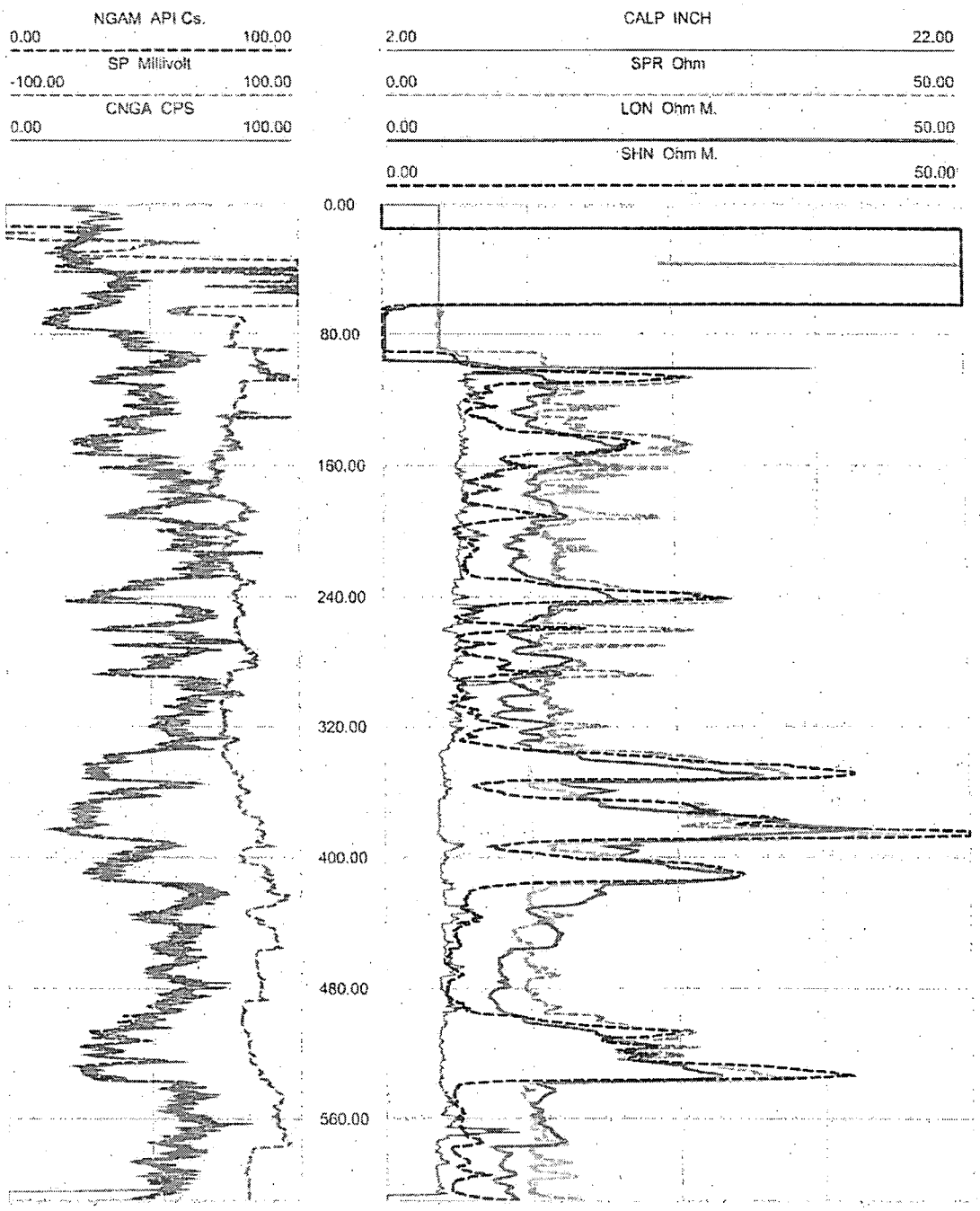


Figure 26. Boring B-405-DH lower section, Caliper, Natural gamma, Resistivity and SP logs

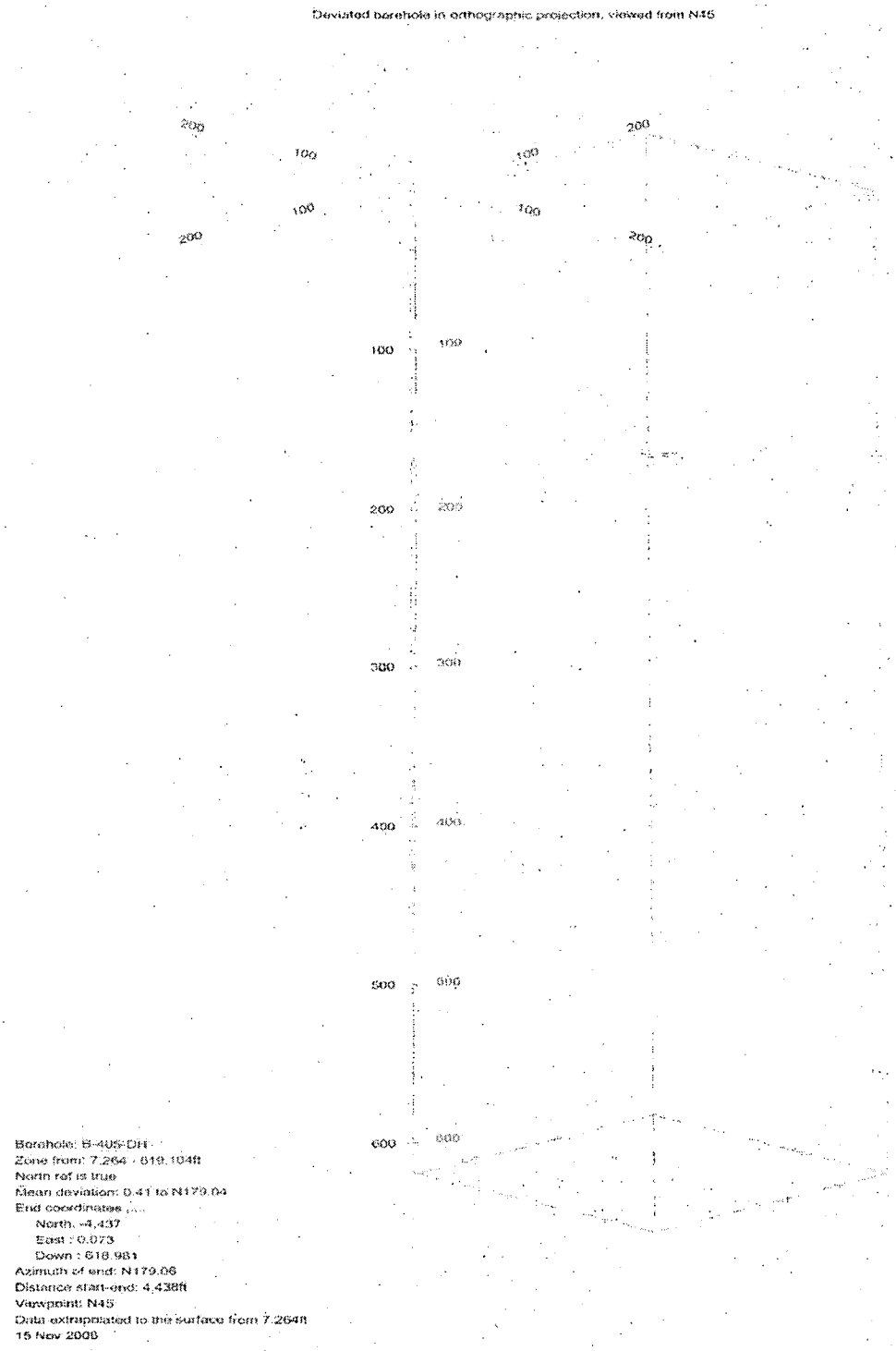


Figure 27. Boring B-405-DH, Deviation Projection (dimensions in feet)

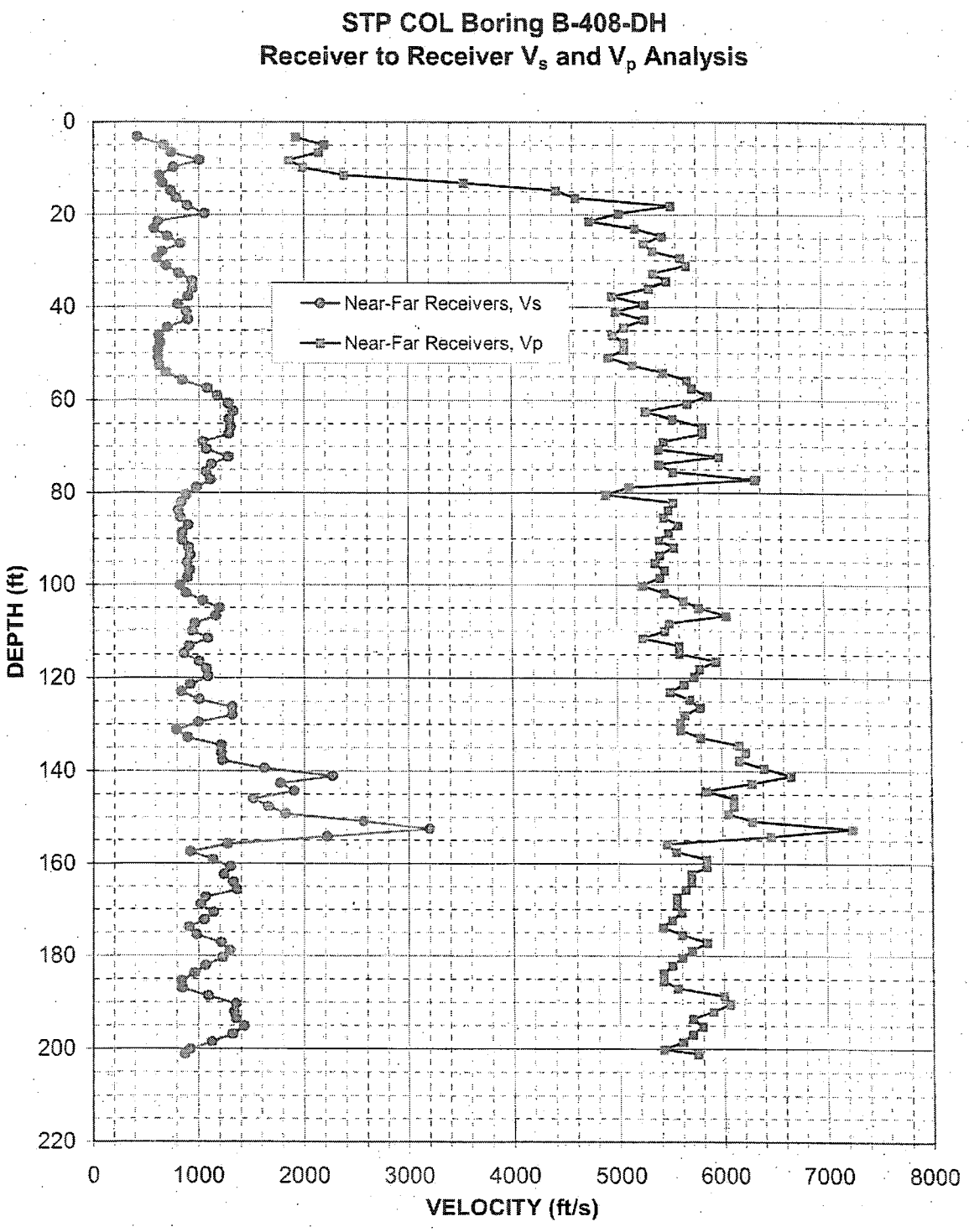


Figure 28: Boring B-408-DH, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
3.3	420	1920
4.9	670	2190
6.6	740	2140
8.2	1000	1850
9.8	760	1980
11.5	630	2380
13.1	660	3550
14.8	740	4440
16.4	790	4630
18.0	890	5560
19.7	1060	5050
21.3	620	4760
23.0	580	5210
24.6	710	5460
26.3	830	5290
27.9	660	5380
29.5	610	5650
31.2	690	5700
32.8	810	5380
34.5	940	5510
36.1	940	5330
37.7	900	4980
39.4	800	5290
41.0	890	5010
42.7	900	5290
44.3	710	5090
45.9	630	4980
47.6	640	5090
49.2	620	5090
50.9	620	4940
52.5	630	5170
54.1	690	5460
55.8	850	5700
57.4	1080	5750
59.1	1170	5900
60.7	1280	5700
62.3	1320	5290
64.0	1290	5560
65.6	1300	5850
67.3	1280	5850
68.9	1040	5460
70.5	1070	5420
72.2	1280	6010
73.8	1120	5420
75.5	1070	5560
77.1	1110	6350
78.7	980	5130
80.4	880	4900
82.0	840	5560
83.7	810	5510

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
85.3	830	5460
86.9	900	5600
88.6	850	5510
90.2	850	5420
91.9	910	5560
93.5	920	5420
95.1	900	5380
96.8	920	5460
98.4	900	5420
100.1	830	5250
101.7	890	5460
103.4	1040	5650
105.0	1200	5800
106.6	1170	6060
108.3	970	5510
109.9	940	5460
111.6	1090	5250
113.2	920	5600
114.8	870	5600
116.5	1010	5950
118.1	1070	5800
119.8	1090	5750
121.4	920	5650
123.0	840	5510
124.7	1010	5700
126.3	1320	5800
128.0	1320	5650
129.6	1000	5600
131.2	790	5600
132.9	900	5800
134.5	1210	6170
136.2	1210	6230
137.8	1220	6170
139.4	1620	6410
141.1	2270	6670
142.7	1770	6290
144.4	1900	5850
146.0	1520	6120
147.6	1660	6120
149.3	1820	6060
150.9	2560	6290
152.6	3210	7250
154.2	2220	6470
155.8	1270	5460
157.5	930	5560
159.1	1130	5850
160.8	1300	5850
162.4	1240	5700
164.0	1330	5700
165.7	1360	5650

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
167.3	1070	5560
169.0	1020	5560
170.6	1150	5600
172.2	1060	5510
173.9	920	5420
175.5	980	5600
177.2	1210	5850
178.8	1300	5700
180.5	1230	5600
182.1	1060	5510
183.7	970	5420
185.4	840	5420
187.0	850	5560
188.7	1100	6010
190.3	1360	6060
191.9	1330	5900
193.6	1360	5700
195.2	1430	5800
196.9	1320	5700
198.5	1130	5600
200.1	930	5420
201.1	880	5750

Table 12. Boring B-408-DH, Suspension R1-R2 depths and P- and S_H-wave velocities

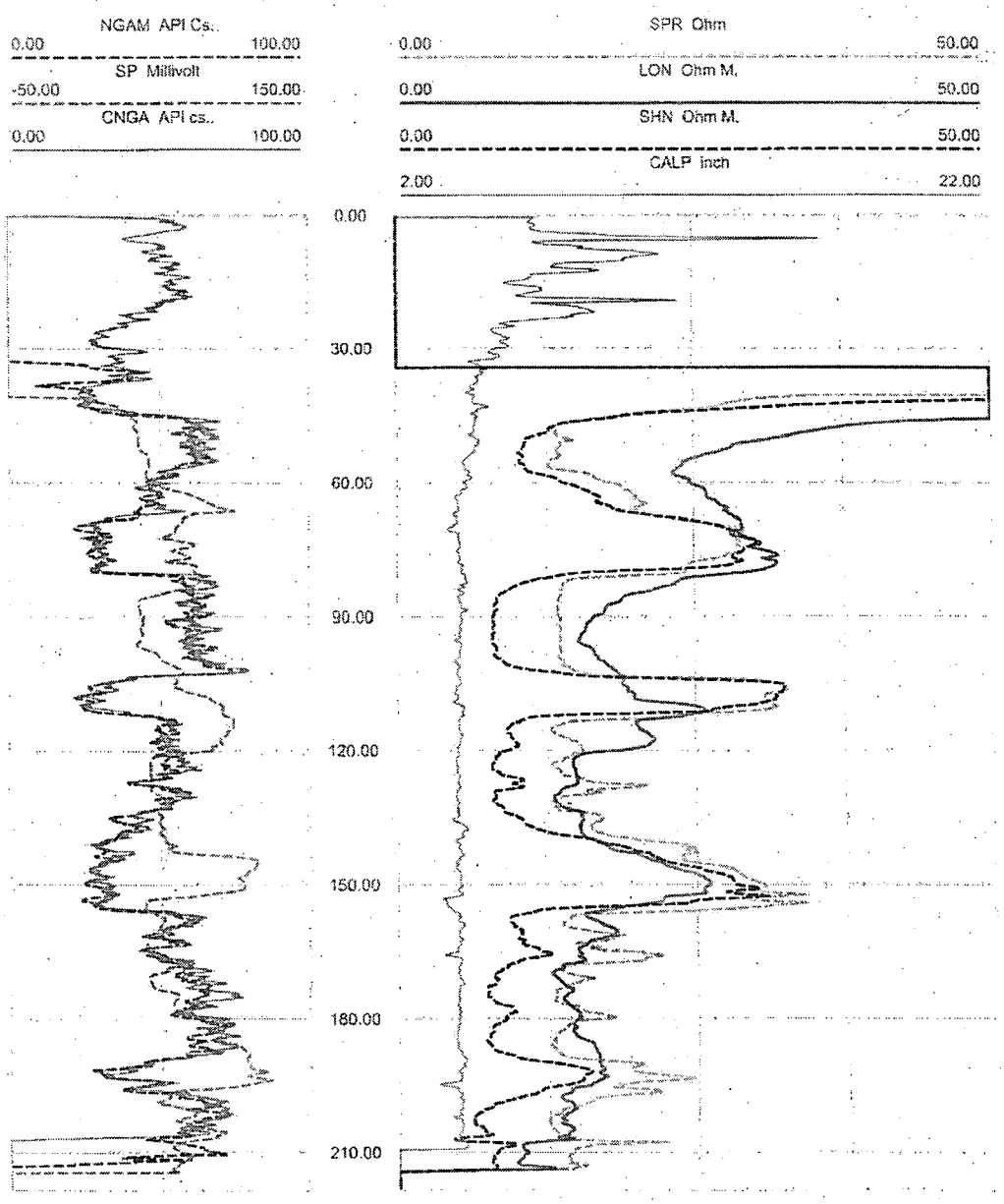


Figure 29. Boring B-408-DH, Caliper, Natural gamma, Resistivity and SP logs

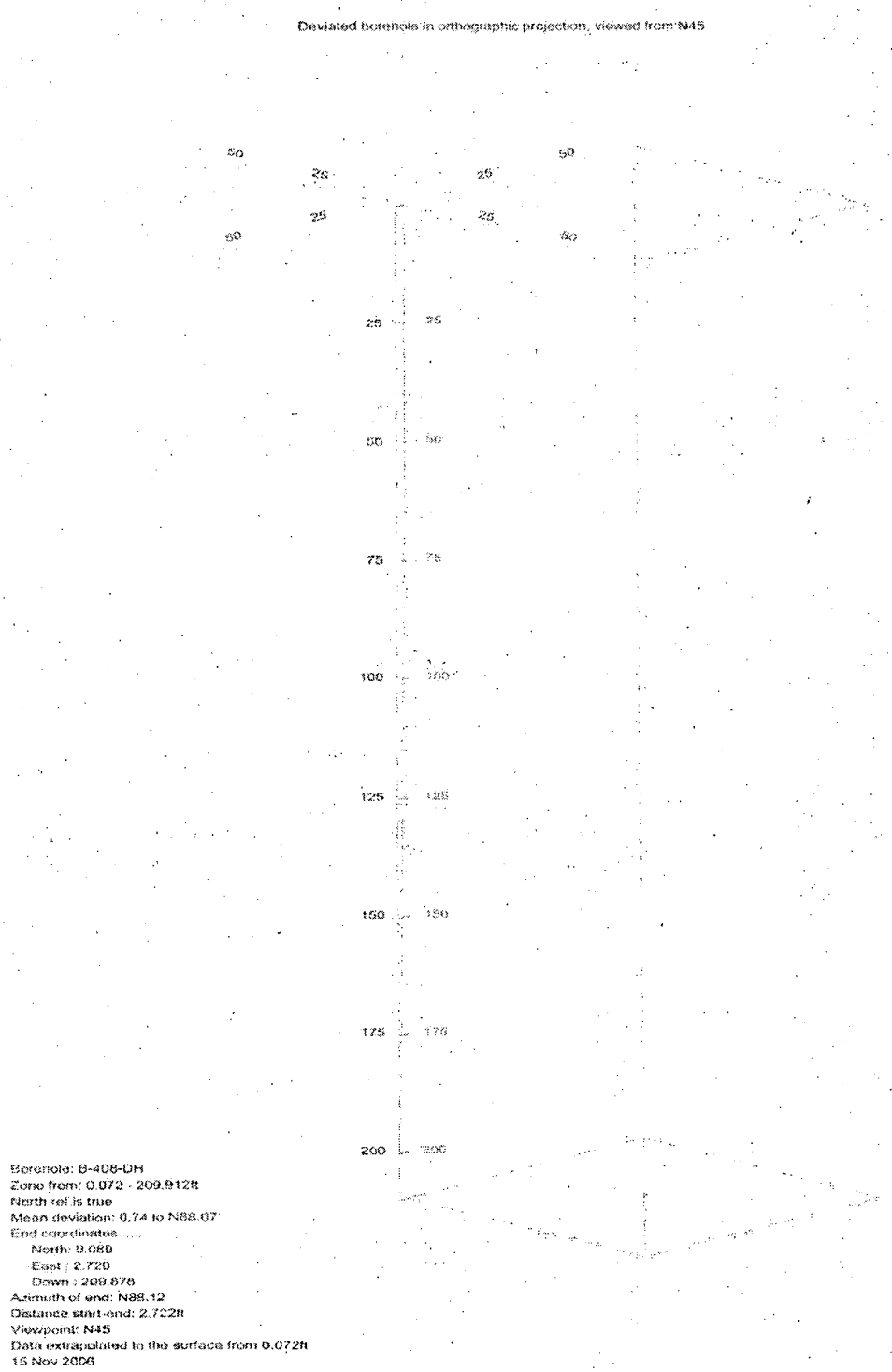


Figure 30. Boring B-408-DH, Deviation Projection (dimensions in feet)

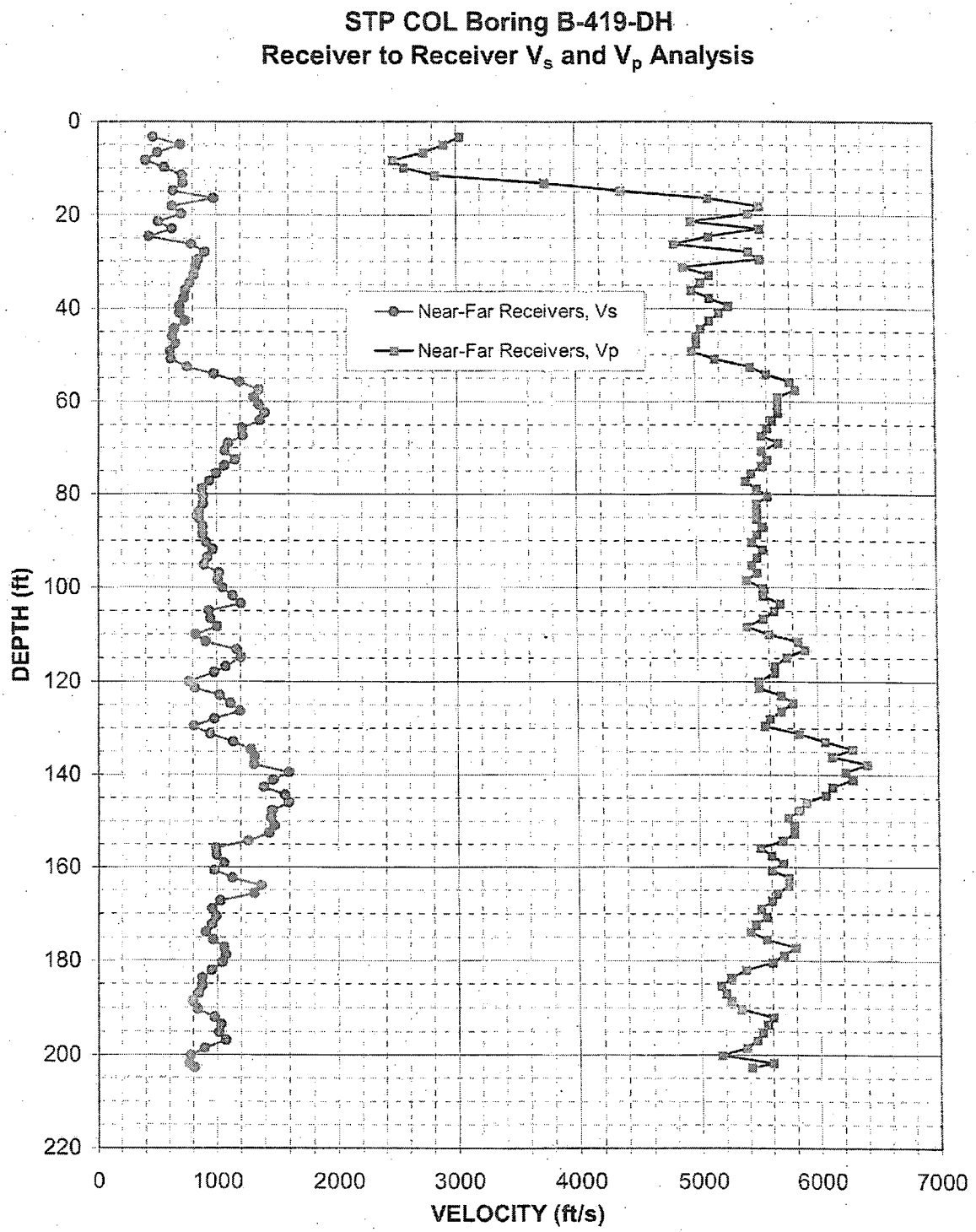


Figure 31: Boring B-419-DH, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
3.3	470	3030
4.9	700	2900
6.6	510	2730
8.2	410	2470
9.8	560	2560
11.5	720	2820
13.1	720	3750
14.8	640	4390
16.4	980	5130
18.0	630	5560
19.7	710	5460
21.3	510	4980
23.0	630	5560
24.6	440	5130
26.3	790	4830
27.9	910	5460
29.5	850	5560
31.2	830	4900
32.8	810	5130
34.5	780	5050
36.1	740	4980
37.7	730	5130
39.4	690	5290
41.0	690	5210
42.7	740	5130
44.3	650	5050
45.9	630	5010
47.6	660	5010
49.2	610	4980
50.9	620	5170
52.5	760	5460
54.1	980	5600
55.8	1190	5800
57.4	1360	5850
59.1	1310	5700
60.7	1360	5700
62.3	1410	5700
64.0	1370	5650
65.6	1220	5600
67.3	1220	5560
68.9	1100	5700
70.5	1070	5560
72.5	1160	5600
73.8	1070	5560
75.5	1000	5460
77.1	940	5420
78.7	880	5510
80.4	890	5600
82.0	890	5510
83.7	850	5510

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
85.3	850	5510
86.9	890	5560
88.6	890	5510
90.2	920	5460
91.9	970	5560
93.5	930	5510
95.1	900	5460
96.8	1020	5510
98.4	1020	5420
100.1	1050	5560
101.7	1140	5560
103.4	1210	5700
105.0	940	5650
106.6	950	5560
108.3	1010	5420
109.9	830	5600
111.6	910	5850
113.2	1170	5900
114.8	1210	5750
116.8	1080	5650
118.1	980	5650
120.1	760	5510
121.4	820	5510
123.0	1030	5700
124.7	1110	5800
126.3	1190	5700
128.0	980	5600
129.6	810	5560
131.2	940	5850
132.9	1140	6060
134.5	1290	6290
136.2	1320	6120
137.8	1310	6410
139.4	1590	6230
141.1	1470	6290
142.7	1390	6120
144.4	1560	6060
146.0	1590	5900
147.6	1460	5850
149.3	1450	5750
150.9	1480	5800
152.6	1440	5800
154.2	1260	5700
155.8	1000	5510
157.5	1000	5600
159.1	1060	5700
160.8	980	5600
162.4	1130	5750
164.0	1370	5750
165.7	1310	5650

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
167.3	1030	5600
169.0	960	5510
170.6	1000	5560
172.2	960	5460
173.9	910	5420
175.5	970	5560
177.2	1060	5800
178.8	1080	5700
180.5	1050	5600
182.1	960	5380
183.7	880	5250
185.4	880	5170
187.0	850	5210
188.7	800	5250
190.3	840	5330
191.9	980	5600
193.6	1040	5560
195.2	1020	5510
196.9	1080	5460
198.5	900	5380
200.1	780	5170
201.8	770	5600
202.8	810	5420

Table 13. Boring B-419-DH, Suspension R1-R2 depths and P- and S_H-wave velocities

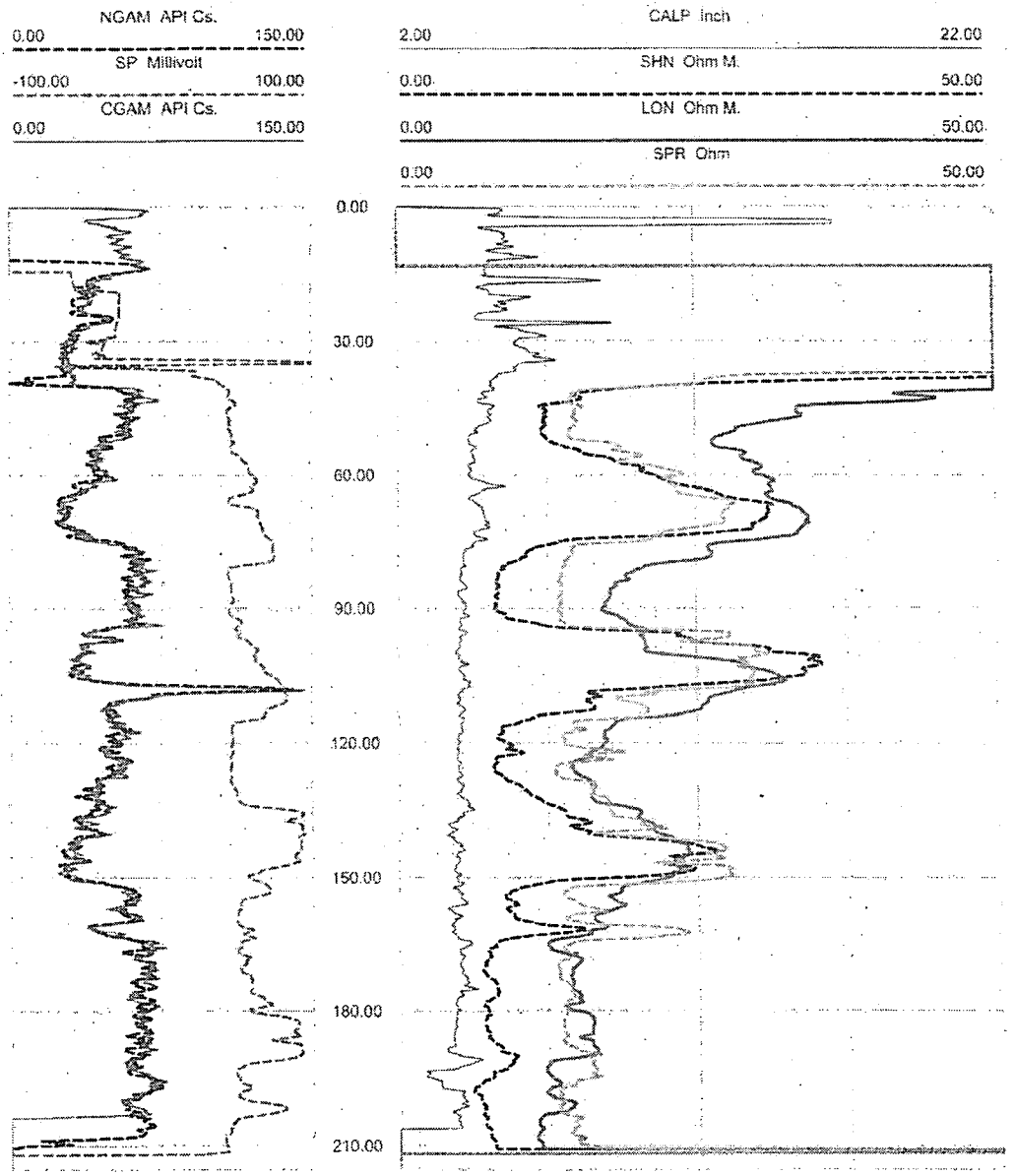
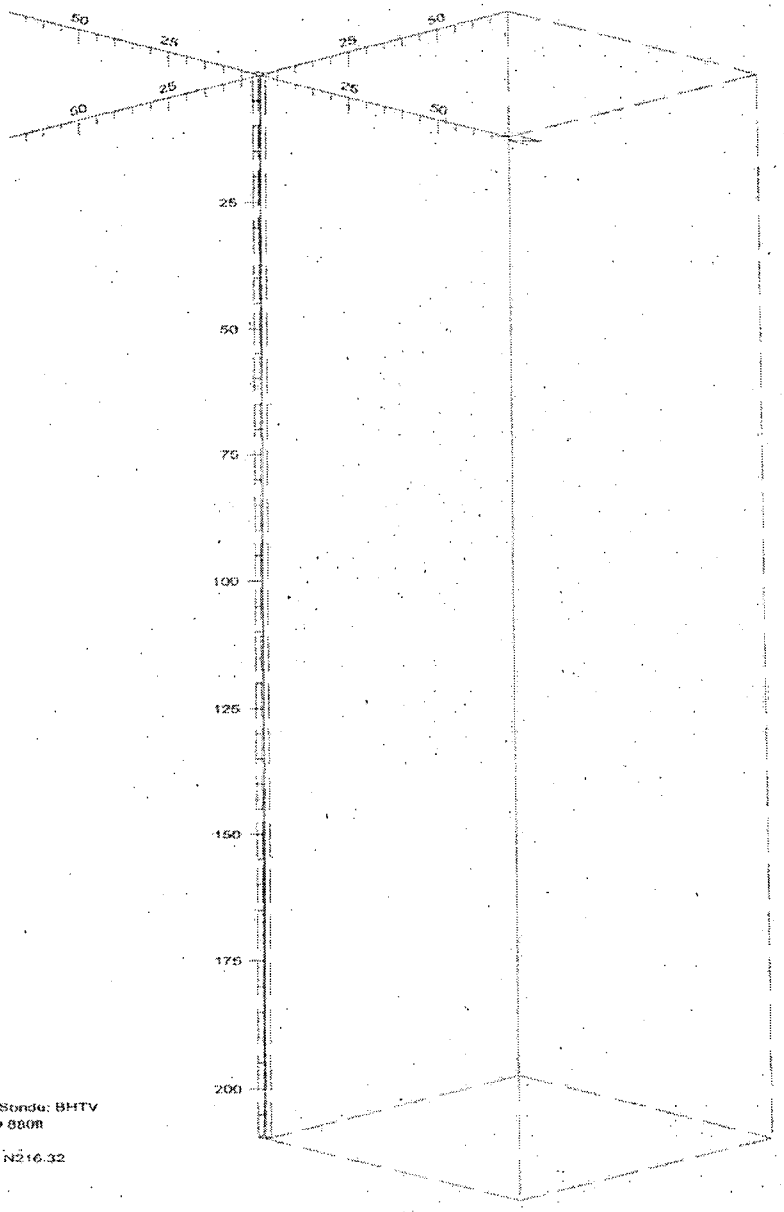


Figure 32. Boring B-419-DH, Caliper, Natural gamma, Resistivity and SP logs

Deviated borehole in orthographic projection, viewed from N45



Borehole: B-419-DH Sonde: BHTV
Zone from: 0.040 to 209.8808
North ref is true
Mean deviation: 0.68 to N216.32
End coordinates ....
North: -2.026
East : -1.481
Down : 209.854
Azimuth of end: N216.25
Distance start-end: 2.505ft
Viewpoint: N45
Data extrapolated to the surface from 0.040ft
09 Dec 2008

Figure 33. Boring B-419-DH, Deviation Projection (dimensions in feet)

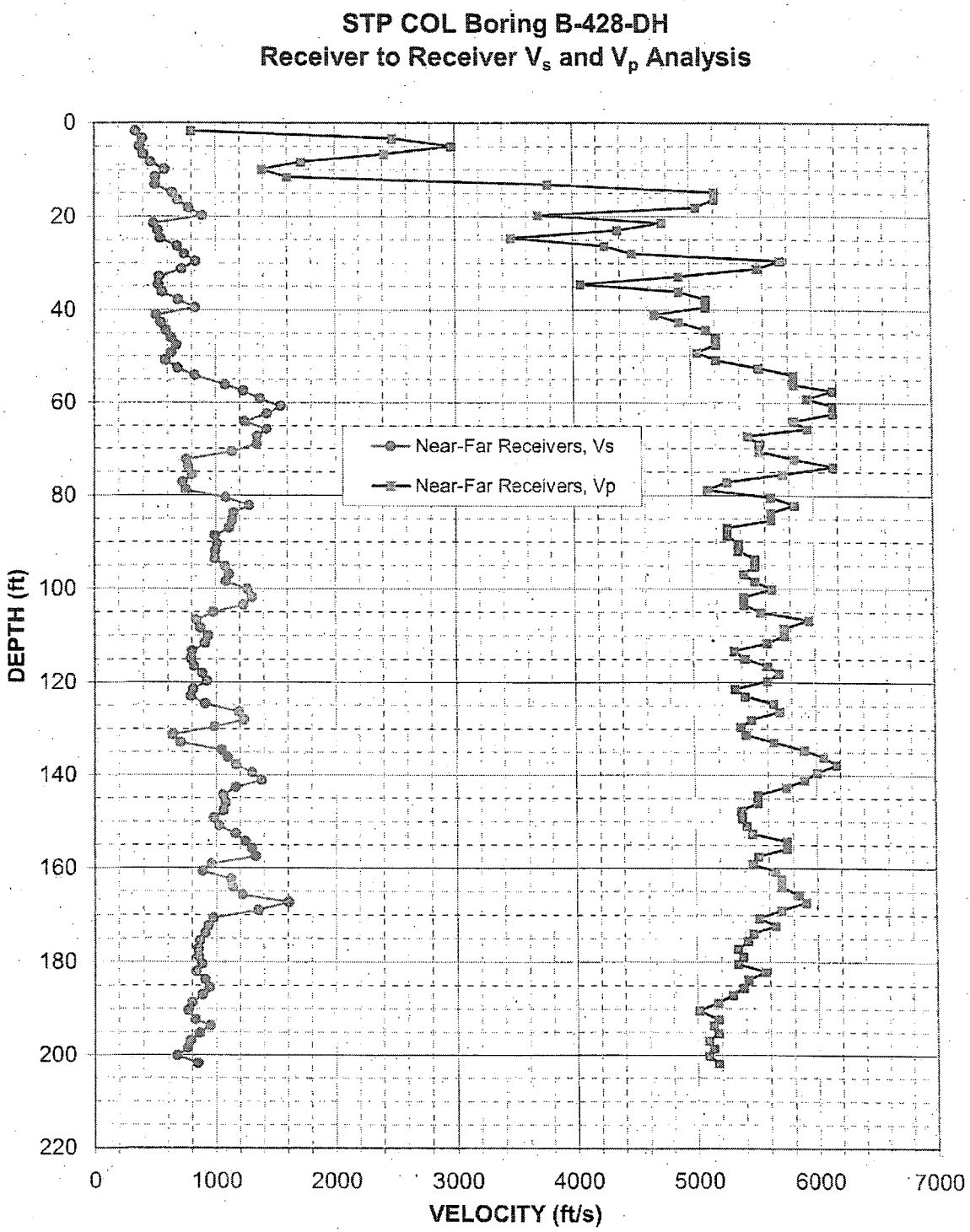


Figure 34: Boring B-428-DH, Suspension R1-R2 P- and S_H-wave velocities

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
1.6	330	790
3.3	390	2490
4.9	370	2980
6.6	400	2420
8.2	460	1720
9.8	580	1390
11.5	500	1600
13.1	500	3790
14.8	640	5210
16.4	680	5210
18.0	780	5050
19.7	890	3700
21.3	480	4760
23.0	520	4390
24.6	540	3470
26.3	680	4270
27.9	740	4500
29.5	830	5750
31.2	710	5560
32.8	530	4900
34.5	520	4070
36.1	560	4900
37.7	690	5130
39.4	830	5130
41.0	510	4690
42.7	540	4900
44.3	580	5130
45.9	630	5210
47.6	670	5210
49.2	630	5050
50.9	580	5210
52.5	680	5560
54.1	820	5850
56.1	1080	5850
57.4	1230	6170
59.1	1370	5950
60.7	1550	6170
62.3	1430	6170
64.0	1250	5850
65.6	1430	5950
67.3	1350	5460
68.9	1350	5560
70.5	1140	5560
72.2	750	5850
73.8	770	6170
75.5	800	5750
77.1	720	5290
78.7	750	5130
80.4	1080	5650
82.0	1280	5850

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
83.7	1150	5650
85.3	1140	5650
86.9	1110	5290
88.6	990	5290
90.2	1010	5380
91.9	1000	5380
93.5	990	5510
95.1	1080	5510
96.8	1110	5420
98.4	1090	5510
100.1	1270	5650
101.7	1310	5420
103.4	1230	5420
105.0	980	5560
106.6	840	5950
108.3	870	5750
109.9	940	5750
111.6	910	5600
113.2	800	5330
114.8	790	5420
116.5	820	5600
118.1	890	5700
119.8	930	5600
121.4	810	5330
123.0	790	5420
124.7	910	5650
126.3	1190	5700
128.0	1240	5460
129.6	990	5380
131.2	640	5420
132.9	700	5650
134.5	1040	5900
136.2	1100	6060
137.8	1170	6170
139.4	1300	6010
141.1	1380	5900
142.7	1170	5750
144.4	1060	5510
146.0	1080	5510
147.6	1060	5380
149.3	980	5380
150.9	1020	5420
152.6	1170	5460
154.2	1240	5750
155.8	1300	5750
157.5	1330	5510
159.1	960	5460
160.8	880	5650
162.4	1130	5700
164.0	1140	5700

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
165.7	1220	5850
167.3	1610	5900
169.0	1360	5700
170.6	980	5510
172.2	940	5650
173.9	910	5460
175.5	870	5420
177.2	850	5330
178.8	850	5380
180.5	880	5330
182.1	830	5560
183.7	910	5420
185.4	940	5380
187.0	890	5290
188.7	800	5170
190.3	770	5010
192.3	830	5170
193.6	950	5130
195.2	860	5170
196.9	790	5090
198.5	760	5130
200.1	670	5090
201.8	850	5170

Table 14. Boring B-428-DH, Suspension R1-R2 depths and P- and S_H-wave velocities

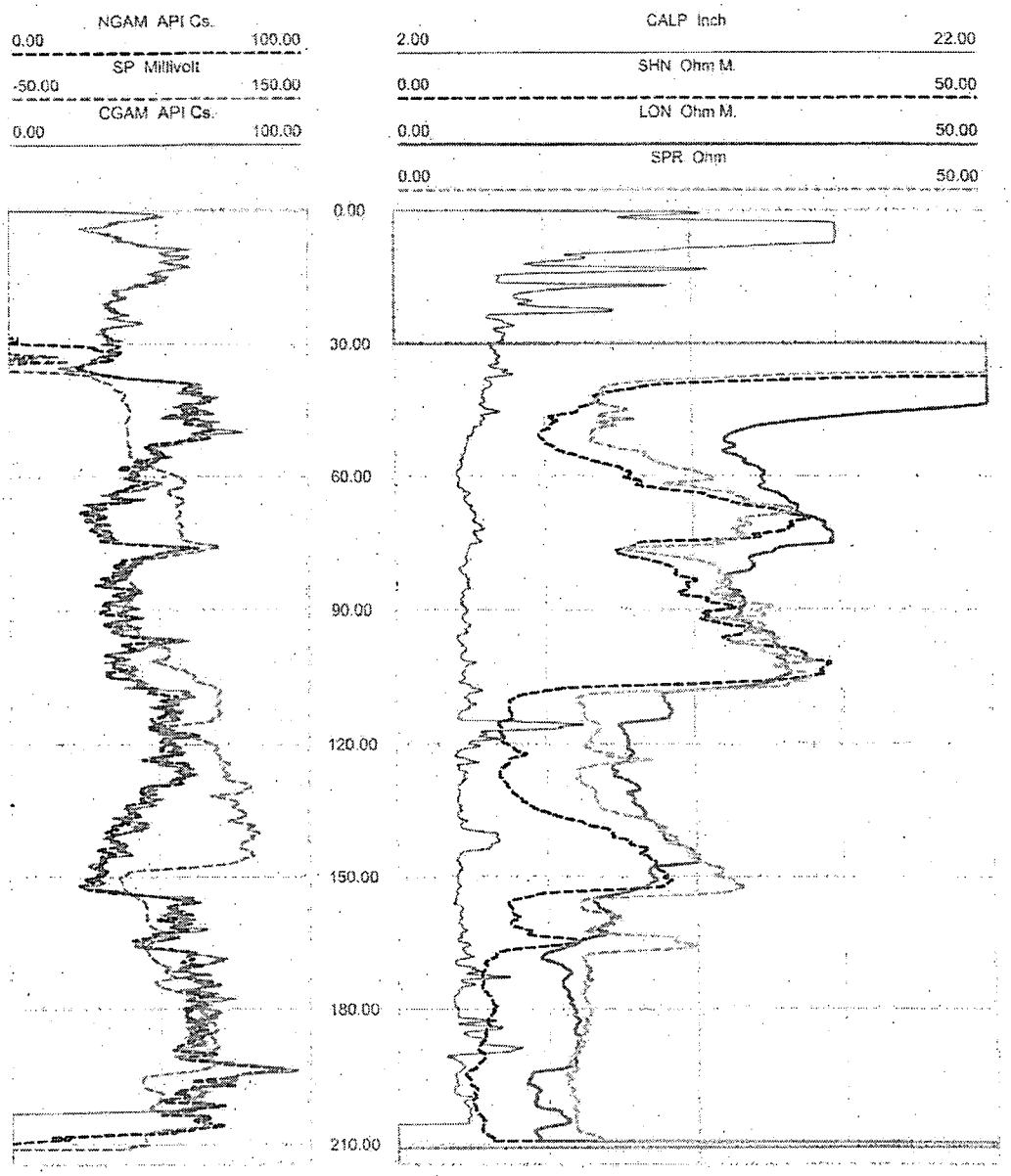
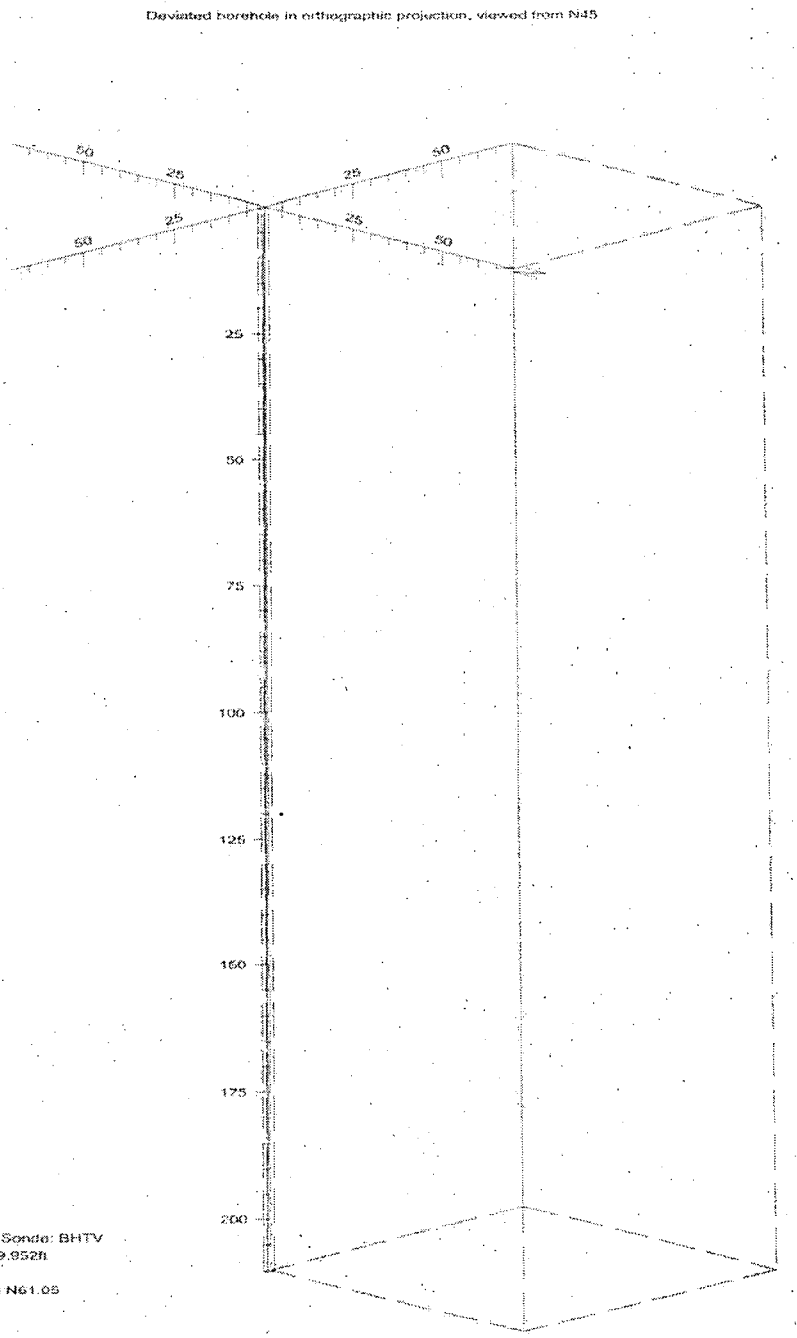


Figure 35. Boring B-428-DH, Caliper, Natural gamma, Resistivity and SP logs



Borehole: B-428-DH Sonde: BHTV
Zone from: 1.296 to 209.952ft
North ref is true
Mean deviation: 0.63 to N61.05
End coordinates ....
North: 1.122
East : 2.026
Down : 209.927
Azimuth of end: N61.03
Distance start-end: 2.316ft
Viewpoint: N45
Data extrapolated to the surface from 1.296ft
05 Dec 2006

Figure 36. Boring B-428-DH, Deviation Projection (dimensions in feet)

APPENDIX A

SUSPENSION VELOCITY MEASUREMENT QUALITY ASSURANCE SUSPENSION SOURCE TO RECEIVER ANALYSIS RESULTS

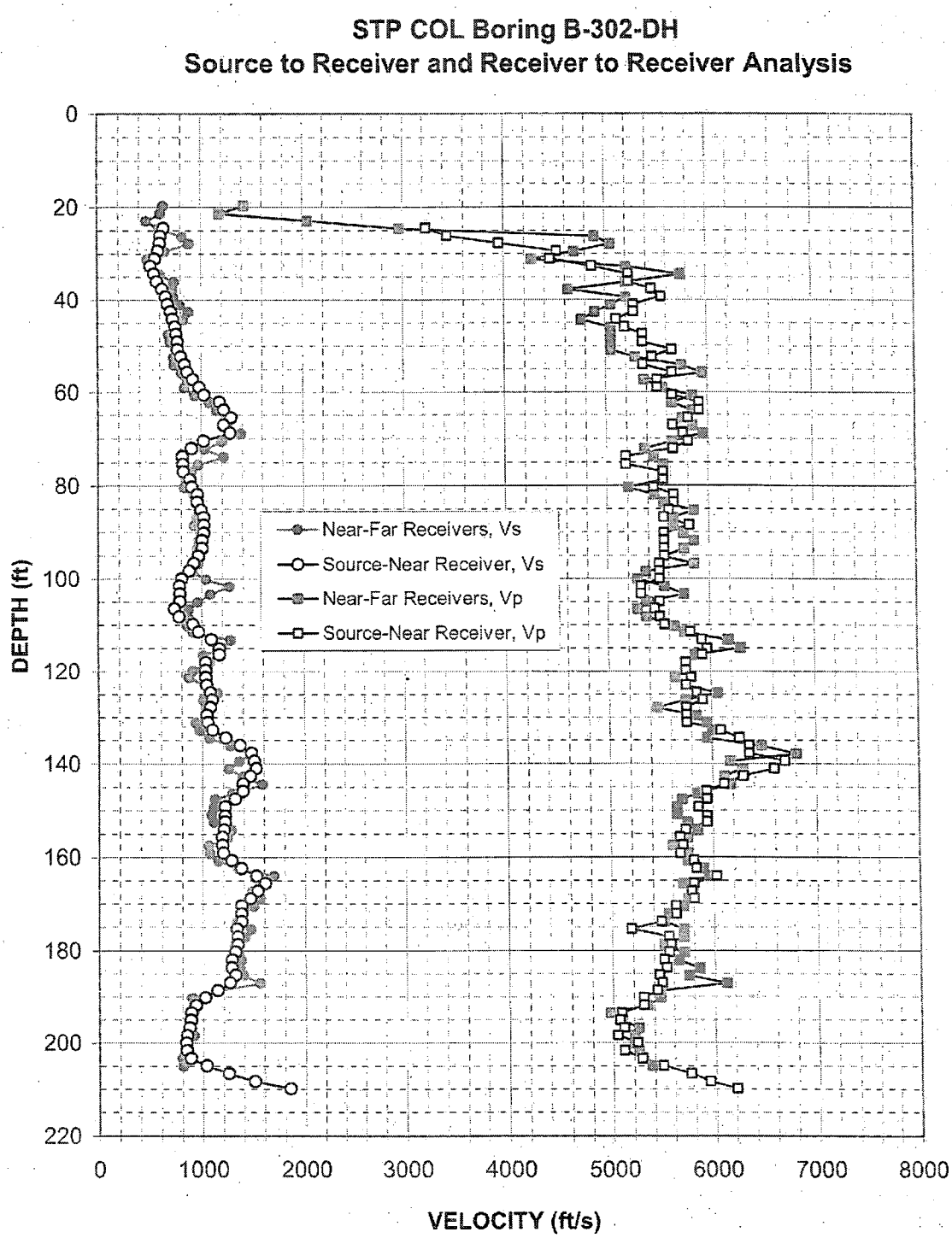


Figure A-1. Boring B-302-DH, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
24.5	640	3230
26.2	610	3440
27.8	600	3960
29.4	590	4520
31.1	560	4460
32.7	510	4870
34.4	550	5230
36.0	570	5230
37.6	620	5460
39.3	660	5550
40.9	680	5280
42.6	710	5280
44.2	730	5100
45.8	750	5190
47.5	760	5360
49.1	770	5360
50.8	770	5650
52.4	800	5460
54.0	840	5360
55.7	870	5650
57.3	920	5500
59.0	980	5500
60.6	1030	5650
62.2	1180	5920
63.9	1220	5920
65.5	1290	5810
67.2	1220	5650
68.8	1280	5750
70.5	1020	5810
72.1	910	5650
73.7	820	5190
75.4	820	5190
77.0	820	5550
78.7	890	5550
80.3	910	5460
81.9	960	5650
83.6	960	5650
85.2	990	5600
86.9	1020	5550
88.5	1020	5810
90.1	1020	5550
91.8	1000	5550
93.4	1000	5550
95.1	970	5550
96.7	920	5500
98.3	880	5500
100.0	810	5500
101.6	790	5320
103.3	790	5320
104.9	790	5500

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
106.5	740	5460
108.2	780	5500
109.8	910	5550
111.5	970	5810
113.1	1090	5920
115.1	1170	5970
116.4	1170	5920
118.0	1030	5750
119.7	1030	5750
121.3	1030	5810
122.9	1040	5750
124.6	1080	5860
126.2	1100	5920
127.9	1080	5750
129.5	1040	5750
131.1	1050	5750
132.8	1100	6090
134.4	1230	6270
136.1	1360	6360
137.7	1480	6360
139.3	1510	6700
141.0	1520	6590
142.6	1470	6300
144.3	1390	6120
145.9	1390	5940
147.6	1320	5940
149.2	1220	5860
151.2	1220	5940
152.5	1220	5940
154.1	1210	5730
155.8	1190	5680
157.4	1190	5700
159.0	1200	5680
160.7	1280	5810
162.3	1380	5830
164.0	1520	6030
165.6	1610	5810
167.2	1540	5780
168.9	1470	5810
170.5	1380	5630
172.2	1380	5630
173.8	1380	5480
175.4	1330	5190
177.1	1340	5550
178.7	1340	5580
180.4	1320	5550
182.0	1280	5500
183.6	1280	5530
185.3	1320	5460
186.9	1260	5480

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
188.6	1140	5430
190.2	1020	5300
191.8	930	5300
193.5	890	5080
195.1	880	5060
196.8	870	5100
198.4	850	5040
200.0	840	5230
201.7	840	5100
203.3	880	5280
205.0	1030	5480
206.6	1250	5750
208.2	1510	5940
209.9	1850	6210

Table A-1. Boring B-302-DH, S - R1 quality assurance analysis P- and S_H-wave data

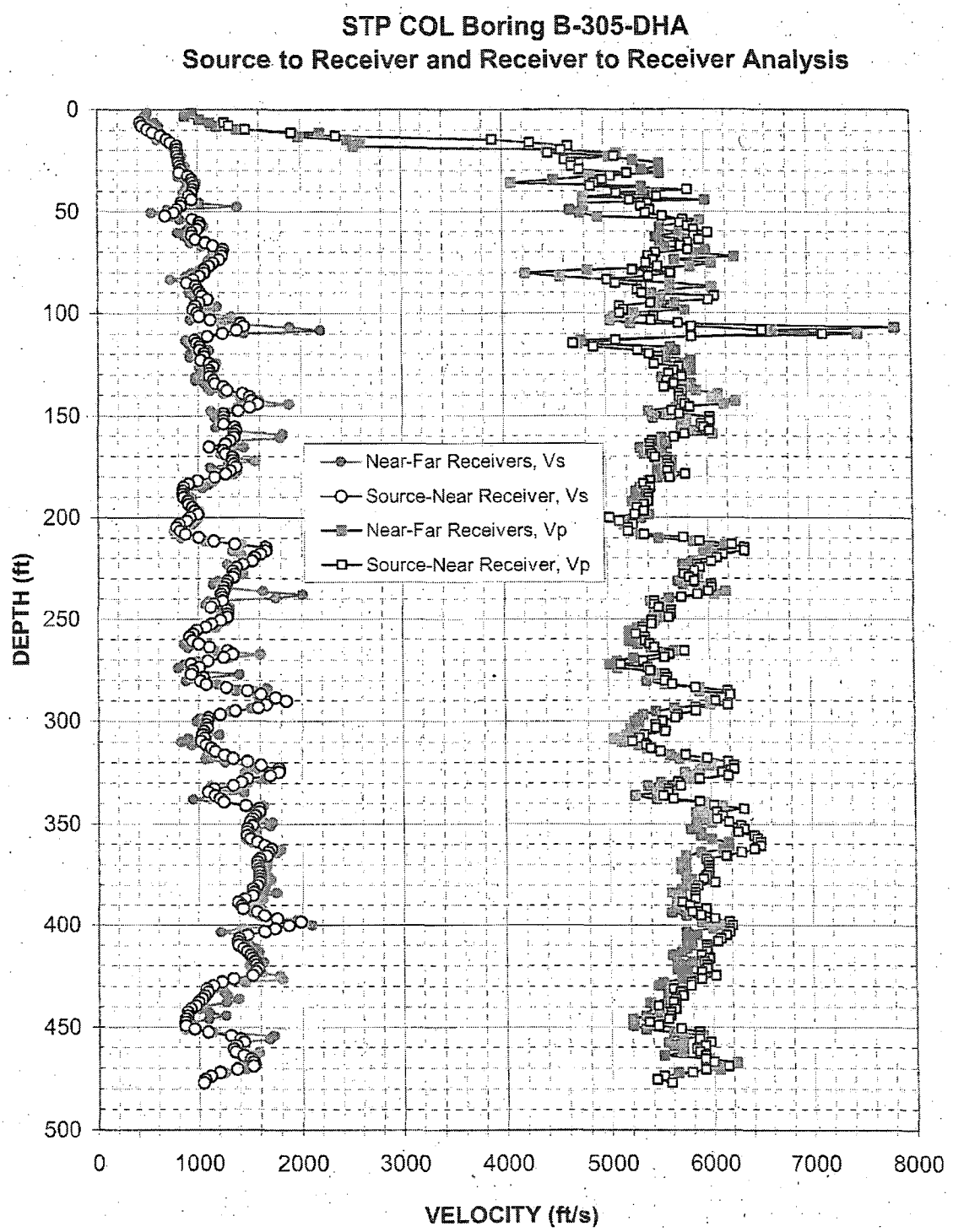


Figure A-2. Boring B-305-DHA, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.5	420	1260
8.1	440	1310
9.8	500	1470
11.4	550	1920
13.0	630	2350
14.7	690	3910
16.3	730	4280
18.0	790	4650
19.6	790	4590
21.2	790	4460
22.9	800	5100
24.5	810	4620
26.2	810	4690
27.8	830	4690
29.4	830	4760
31.1	820	5230
32.7	900	5060
34.4	940	4980
36.0	950	4910
37.6	960	4870
39.3	950	5830
40.9	940	5130
42.6	910	5530
44.2	940	5250
45.8	840	5430
47.5	830	5360
49.1	790	5460
50.8	760	5410
52.4	680	5580
54.0	950	5780
55.7	1020	5750
57.3	1020	5830
59.0	1000	5890
60.6	940	6030
62.2	940	5890
63.9	980	5940
65.5	1070	5830
67.2	1150	5750
68.8	1250	5830
70.5	1240	5500
72.1	1240	5430
73.7	1210	5480
75.4	1150	5410
77.0	1110	5530
78.7	1060	5280
80.3	1060	5650
81.9	1020	5430
83.6	950	5020
85.2	890	5100
86.9	980	5360

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
88.5	1000	5320
90.1	1020	5360
91.8	1040	6090
93.4	1090	6030
95.1	1010	5460
96.7	980	5150
98.3	950	5190
100.0	990	5150
101.6	1010	5480
103.3	1120	5460
104.9	1430	5730
106.5	1450	5860
108.2	1380	6560
109.8	1250	7150
111.5	1100	5860
113.1	970	5100
114.7	990	4690
116.4	1020	4890
118.0	1020	5320
119.7	1060	5430
121.3	1060	5530
122.9	1030	5530
124.6	1110	5480
126.2	1150	5730
127.9	1110	5680
129.5	1110	5630
131.1	1110	5750
132.8	1150	5600
134.4	1160	5680
136.1	1250	5580
137.7	1290	5750
139.3	1440	5730
141.0	1510	5730
142.6	1530	5750
144.3	1580	5780
145.9	1510	5830
147.6	1390	5650
149.2	1250	5730
150.8	1250	6030
152.5	1250	6030
154.1	1250	5940
155.8	1360	5970
157.4	1380	6030
159.0	1360	5780
160.7	1360	5680
162.3	1320	5460
164.0	1270	5430
165.6	1110	5430
167.2	1250	5430
168.9	1270	5460

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
170.5	1340	5480
172.2	1340	5600
173.8	1360	5600
175.4	1380	5630
177.1	1320	5600
178.7	1270	5780
180.4	1160	5630
182.0	1000	5430
183.6	900	5360
185.3	860	5430
186.9	850	5390
188.6	850	5410
190.2	860	5410
191.8	890	5410
193.5	900	5360
195.1	940	5300
196.8	960	5360
198.4	1000	5280
200.0	920	5020
201.7	890	5130
203.3	810	5250
205.0	790	5210
206.6	820	5210
208.2	870	5360
209.9	1000	5750
211.5	1150	5920
213.2	1360	6240
214.8	1660	6360
216.4	1660	6360
218.1	1610	6150
219.7	1550	6090
221.4	1530	6030
223.0	1440	5890
224.7	1380	5920
226.3	1340	5860
227.9	1360	5750
229.6	1340	5810
231.2	1290	5860
232.9	1270	6030
234.5	1250	6030
236.1	1250	6000
237.8	1220	5890
239.4	1240	5730
241.1	1240	5460
242.7	1150	5460
244.3	1120	5500
246.0	1290	5630
247.6	1290	5630
249.3	1290	5600
250.9	1220	5430

Table A-2. Boring B-305-DHA, S - R1 quality assurance analysis
P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
252.5	1130	5430
254.2	1070	5340
255.8	990	5340
257.5	950	5280
259.1	910	5360
260.7	940	5360
262.4	1000	5410
264.0	1110	5460
265.7	1290	5750
267.3	1340	5600
268.9	1250	5550
270.6	1100	5340
272.2	930	5130
273.9	1010	5390
275.5	940	5410
277.1	930	5550
278.8	1050	5580
280.4	1020	5550
282.1	1070	5630
283.7	1270	5860
285.3	1480	6180
287.0	1610	6210
288.6	1750	6120
290.3	1850	6060
291.9	1660	6180
293.5	1580	5860
295.2	1360	5860
296.8	1210	5680
298.5	1100	5650
300.1	1080	5530
301.8	1070	5460
303.4	1080	5460
305.0	1050	5550
306.7	1040	5340
308.3	1060	5300
310.0	1030	5230
311.6	1070	5360
313.2	1120	5410
314.9	1160	5500
316.5	1250	5750
318.2	1340	5970
319.8	1480	6180
321.4	1610	6240
323.1	1780	6240
324.7	1780	6120
326.4	1690	6180
328.0	1480	5890
329.6	1420	5680
331.3	1340	5700
332.9	1150	5580

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
334.6	1100	5580
336.2	1160	5530
337.8	1210	5630
339.5	1250	5890
341.1	1460	6030
342.8	1590	6330
344.4	1590	6060
346.0	1550	6120
347.7	1520	6060
349.3	1510	6180
351.0	1520	6300
352.6	1470	6330
354.2	1470	6270
355.9	1470	6430
357.5	1510	6460
359.2	1570	6490
360.8	1640	6490
362.4	1700	6430
364.1	1670	6300
365.7	1660	6150
367.4	1590	5940
369.0	1570	5970
370.6	1570	5970
372.3	1590	5970
373.9	1590	5970
375.6	1590	5940
377.2	1590	5920
378.9	1590	6030
380.5	1570	5860
382.1	1520	5830
383.8	1540	5830
385.4	1520	5830
387.1	1450	5830
388.7	1380	5700
390.3	1420	5780
392.0	1430	5940
393.6	1570	5810
395.3	1640	5890
396.9	1760	6030
398.5	1990	6180
400.2	1870	6210
401.8	1740	6180
403.5	1640	6180
405.1	1470	6150
406.7	1390	6090
408.4	1380	6060
410.0	1390	5940
411.7	1440	5940
413.3	1470	5940
414.9	1510	5890

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
416.6	1520	5970
418.2	1540	5920
419.9	1560	5940
421.5	1570	5940
423.1	1560	5890
424.8	1520	6030
426.4	1340	5890
428.1	1230	5780
429.7	1140	5780
431.3	1070	5600
433.0	1090	5680
434.6	1060	5700
436.3	1030	5630
437.9	1000	5600
439.5	970	5460
441.2	920	5630
442.8	890	5580
444.5	890	5580
446.1	870	5550
447.7	860	5360
449.4	860	5460
451.0	950	5680
452.7	1090	5860
454.3	1310	5860
456.0	1410	5860
457.6	1440	5970
459.2	1360	5920
460.9	1340	5830
462.5	1360	5860
464.2	1430	5920
465.8	1510	5920
467.4	1530	6000
469.1	1530	6150
470.7	1370	5920
472.4	1200	5780
474.0	1110	5500
475.6	1060	5430
477.3	1040	5580

Table A-2, continued. Boring B-305-DHA, S - R1 quality assurance analysis
P- and S_H-wave data

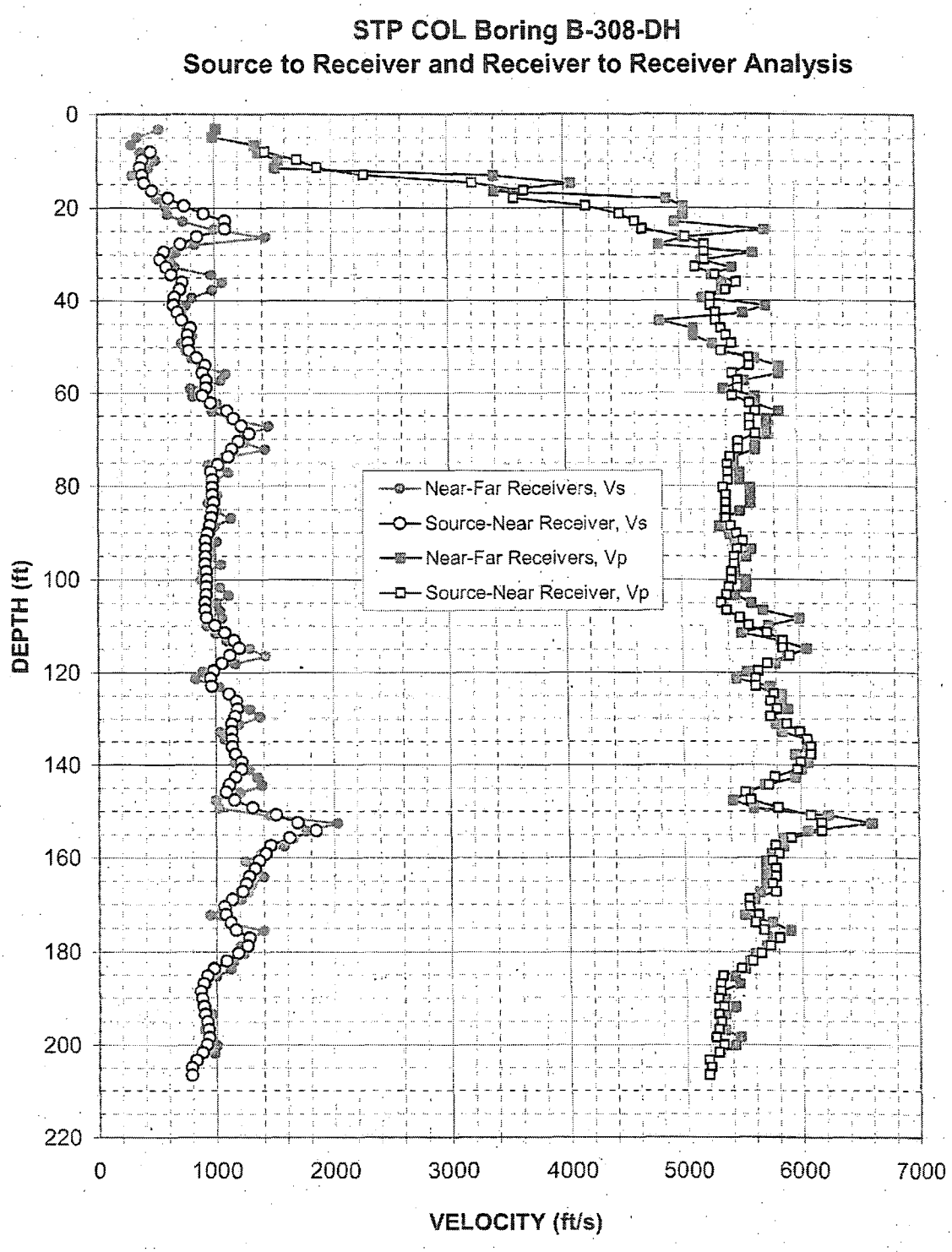


Figure A-3. Boring B-308-DH, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
8.1	460	1430
9.8	390	1710
11.4	370	1880
13.0	390	2290
14.7	400	3210
16.3	470	3660
18.0	610	3580
19.6	740	4190
21.2	910	4490
22.9	1090	4620
24.5	1090	4690
26.2	850	5060
27.8	710	5230
29.4	570	5230
31.1	540	5230
32.7	590	5150
34.4	630	5320
36.0	730	5500
37.6	710	5410
39.3	660	5280
40.9	650	5280
42.6	690	5320
44.2	720	5320
45.8	800	5360
47.5	770	5410
49.1	770	5460
50.8	780	5360
52.4	850	5600
54.0	920	5600
55.7	890	5460
57.3	930	5500
59.0	930	5500
60.6	890	5460
62.2	960	5600
63.9	1100	5650
65.5	1160	5600
67.2	1220	5600
68.8	1290	5650
70.5	1200	5500
72.1	1140	5500
73.7	1110	5430
75.4	1030	5410
77.0	960	5410
78.7	980	5410
80.3	980	5360
81.9	980	5390
83.6	990	5390
85.2	980	5390
86.9	970	5390
88.5	960	5430

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
90.1	940	5480
91.8	920	5530
93.4	920	5480
95.1	920	5460
96.7	910	5460
98.3	920	5430
100.0	930	5430
101.6	920	5410
103.3	920	5390
104.9	920	5340
106.5	920	5390
108.2	930	5500
109.8	1000	5580
111.5	1080	5730
113.1	1160	5860
114.7	1200	5860
116.4	1120	5920
118.0	1050	5730
119.7	980	5650
121.3	960	5630
122.9	970	5630
124.6	1110	5780
126.2	1170	5750
127.9	1180	5810
129.5	1160	5750
131.1	1140	5890
132.8	1140	6000
134.4	1140	6060
136.1	1140	6090
137.7	1170	6090
139.3	1210	6000
141.0	1210	5970
142.6	1170	5780
144.3	1110	5730
145.9	1090	5530
147.6	1160	5580
149.2	1310	5810
150.8	1500	6090
152.5	1690	6180
154.1	1850	6180
155.8	1620	5920
157.4	1460	5780
159.0	1420	5810
160.7	1360	5750
162.3	1320	5780
164.0	1280	5780
165.6	1250	5750
167.2	1220	5780
168.9	1140	5550
170.5	1070	5550

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
172.2	1080	5630
173.8	1120	5600
175.4	1170	5680
177.1	1280	5810
178.7	1260	5730
180.4	1180	5650
182.0	1090	5580
183.6	980	5480
185.3	930	5320
186.9	890	5300
188.6	870	5300
190.2	880	5280
191.8	890	5320
193.5	900	5280
195.1	920	5300
196.8	930	5280
198.4	940	5250
200.0	920	5320
201.7	880	5280
203.3	830	5190
205.0	790	5210
206.6	790	5190

Table A-3. Boring B-308-DH, S - R1 quality assurance analysis
P- and S_H-wave data

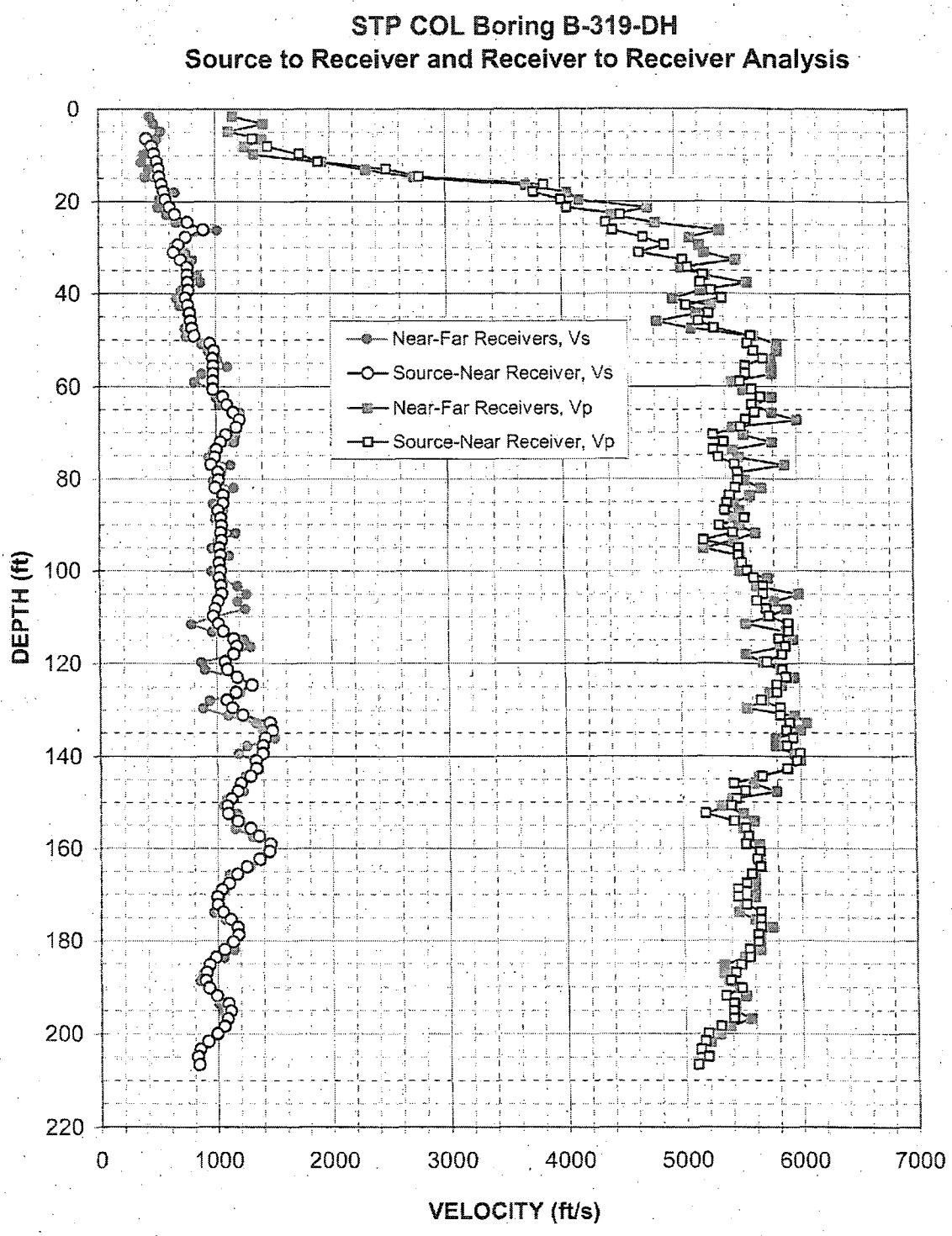


Figure A-4. Boring B-319-DH, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.5	400	1330
8.1	450	1460
9.8	470	1740
11.4	490	1900
13.0	510	2490
14.7	520	2780
16.3	540	3860
18.0	550	3770
19.6	570	4010
21.2	600	4060
22.9	650	4520
24.5	760	4400
26.2	890	4450
27.8	740	4720
29.4	680	4910
31.1	640	4690
32.7	700	5060
34.4	750	5100
36.0	750	5230
37.6	760	5210
39.3	760	5300
40.9	730	5390
42.6	760	5080
44.2	770	5280
45.8	780	5190
47.5	790	5320
49.1	810	5630
50.8	950	5600
52.4	980	5650
54.0	970	5730
55.7	970	5580
57.3	970	5580
59.0	970	5530
60.6	970	5630
62.2	1060	5700
63.9	1100	5630
65.5	1150	5650
67.2	1200	5580
68.8	1180	5530
70.5	1080	5300
72.1	1040	5390
73.7	1000	5300
75.4	990	5340
77.0	960	5480
78.7	1010	5500
80.3	1010	5500
81.9	990	5480
83.6	1060	5430
85.2	1060	5410
86.9	1010	5390

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
88.5	1040	5550
90.1	1050	5340
91.8	1040	5460
93.4	1050	5210
95.1	1030	5500
96.7	1040	5500
98.3	1030	5530
100.0	1040	5580
101.6	1030	5630
103.3	1040	5700
104.9	1050	5700
106.5	1010	5650
108.2	990	5730
109.8	970	5750
111.5	1010	5920
113.1	1060	5920
114.7	1150	5830
116.4	1180	5890
118.0	1150	5860
119.7	1070	5730
121.3	1100	5860
122.9	1180	5890
124.6	1300	5810
126.2	1160	5810
127.9	1080	5680
129.5	1130	5830
131.1	1220	5830
132.8	1460	5920
134.4	1480	5890
136.1	1410	5940
137.7	1390	5890
139.3	1390	6000
141.0	1340	5970
142.6	1340	5890
144.3	1290	5680
145.9	1200	5430
147.6	1180	5530
149.2	1120	5460
150.8	1080	5410
152.5	1100	5190
154.1	1180	5430
155.8	1290	5530
157.4	1360	5550
159.0	1460	5530
160.7	1450	5650
162.3	1360	5630
164.0	1250	5650
165.6	1170	5580
167.6	1100	5530
168.9	1030	5460

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
170.5	1000	5460
172.2	1000	5530
173.8	1040	5650
175.4	1110	5650
177.1	1170	5650
178.7	1180	5630
180.4	1130	5630
182.0	1060	5550
183.6	980	5550
185.3	930	5480
186.9	900	5430
188.6	890	5390
190.2	920	5480
191.8	990	5340
193.5	1090	5410
195.1	1110	5410
196.8	1080	5410
198.4	1060	5300
200.0	990	5190
201.7	910	5170
203.3	840	5130
205.0	820	5190
206.6	840	5100

Table A-4. Boring B-319-DH, S - R1 quality assurance analysis P- and S_H-wave data

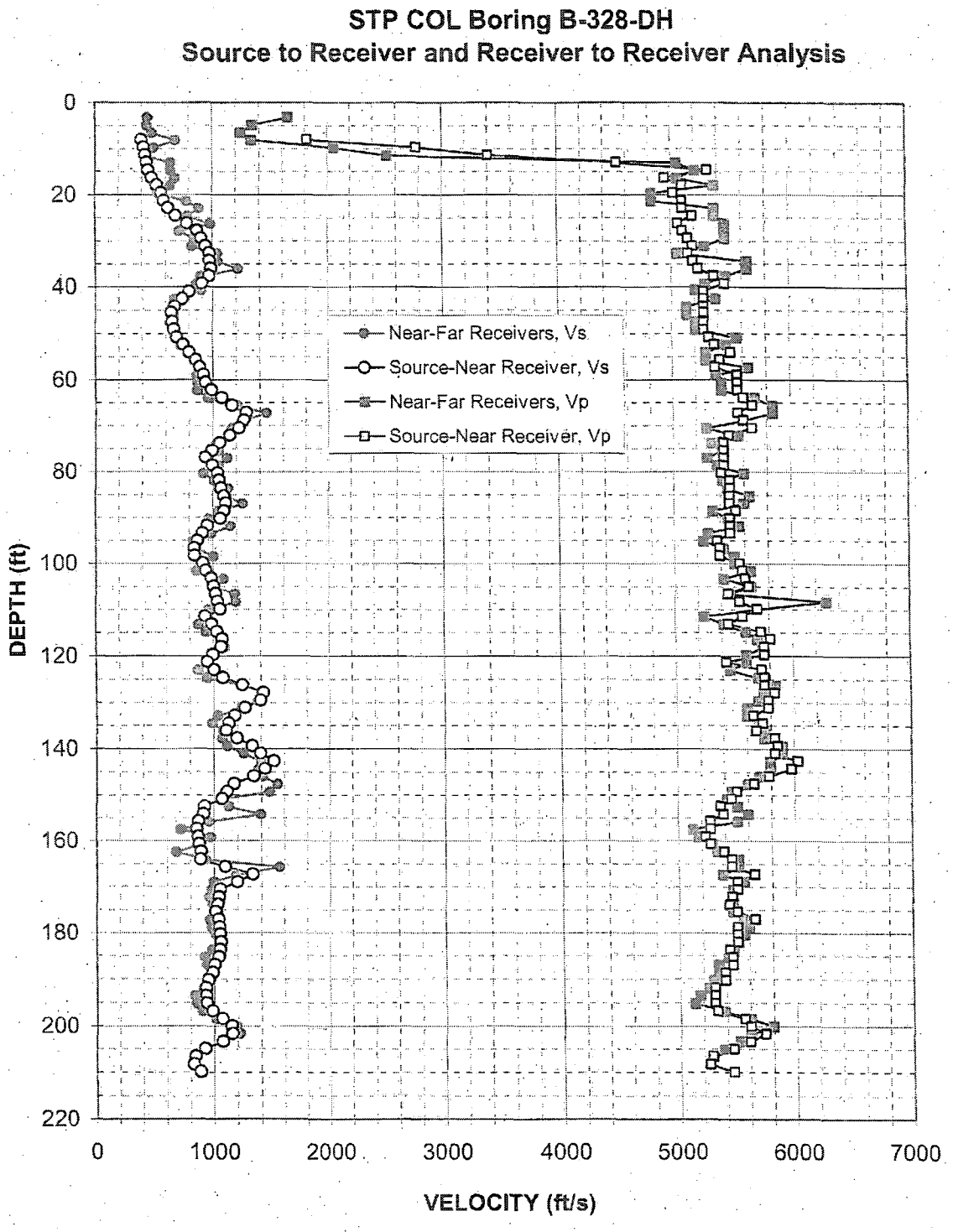


Figure A-5. Boring B-328-DH, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
8.1	400	1820
9.8	410	2780
11.4	430	3400
13.0	440	4520
14.7	450	5320
16.3	480	4950
18.0	530	5100
19.6	560	5020
21.2	590	5100
22.9	620	5100
24.5	690	5190
26.2	780	5060
27.8	870	5100
29.4	900	5150
31.1	940	5190
32.7	980	5150
34.4	980	5190
36.0	990	5230
37.6	970	5360
39.3	910	5460
40.9	800	5280
42.6	740	5280
44.2	670	5280
45.5	650	5280
47.5	660	5280
49.1	670	5280
50.8	690	5320
52.4	750	5360
54.0	800	5500
55.7	860	5410
57.3	890	5360
59.0	920	5550
60.6	940	5550
62.2	990	5550
63.9	1070	5600
65.5	1160	5680
67.2	1280	5550
68.8	1260	5600
70.5	1220	5680
72.1	1140	5480
73.7	1060	5430
75.4	1000	5430
77.0	940	5430
78.7	1000	5430
80.3	1040	5410
81.9	1050	5480
83.6	1070	5480
85.2	1090	5480
86.9	1110	5480
88.5	1100	5530

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
90.1	1060	5480
91.8	950	5480
93.4	910	5480
95.1	860	5360
96.7	840	5390
98.3	840	5390
100.0	910	5550
101.6	940	5580
103.3	980	5600
104.9	1000	5630
106.5	1020	5460
108.2	1040	5550
109.8	1060	5700
111.5	930	5580
113.1	990	5460
114.7	1030	5730
116.4	1070	5810
118.0	1070	5750
119.7	1000	5750
121.3	950	5430
122.9	1000	5730
124.6	1080	5750
126.2	1240	5750
127.9	1420	5830
129.5	1400	5780
131.1	1260	5780
132.8	1180	5650
134.4	1130	5730
136.1	1100	5680
137.7	1190	5830
139.3	1320	5860
141.0	1390	5830
142.6	1510	6030
144.3	1430	5970
145.9	1340	5780
147.6	1170	5650
149.2	1110	5500
150.8	1070	5460
152.5	920	5360
154.1	910	5390
155.8	870	5280
157.4	860	5280
159.0	860	5230
160.7	870	5280
162.3	890	5390
164.0	880	5460
165.6	1100	5460
167.2	1320	5650
168.9	1190	5500
170.5	1050	5500

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
172.2	1040	5460
173.8	1030	5430
175.4	1010	5500
177.1	1040	5650
178.7	1040	5500
180.4	1050	5500
182.0	1060	5500
183.6	1050	5430
185.3	1040	5460
186.9	1000	5460
188.6	990	5390
190.2	950	5390
191.8	930	5300
193.5	930	5300
195.1	940	5300
196.8	980	5320
198.4	1070	5550
200.0	1140	5600
201.7	1150	5730
203.3	1070	5600
205.0	930	5460
206.6	840	5280
208.2	830	5250
209.9	880	5460

Table A-5. Boring B-328-DH, S - R1 quality assurance analysis P- and S_H-wave data

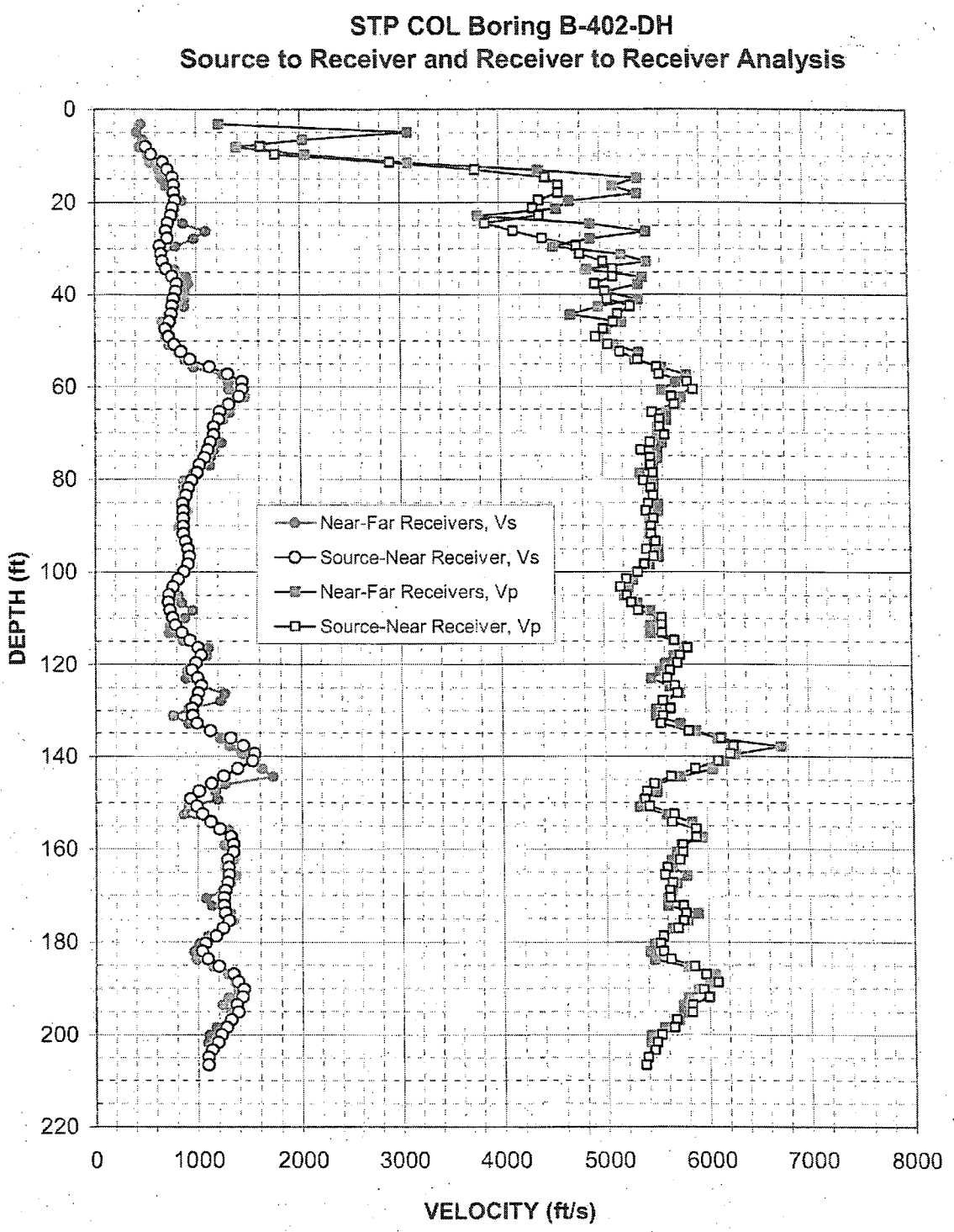


Figure A-6. Boring B-402-DH, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
8.1	510	1620
9.8	560	1760
11.4	670	2900
13.0	720	3770
14.7	770	4460
16.3	780	4590
18.0	780	4590
19.6	800	4400
21.2	770	4340
22.9	760	4400
24.5	730	3860
26.2	710	4140
27.8	720	4430
29.4	650	4760
31.1	660	4800
32.7	670	5020
34.4	710	5130
36.0	760	5130
37.6	810	4950
39.3	800	5040
40.9	780	5060
42.6	760	5300
44.2	760	5170
45.8	740	5130
47.5	700	5020
49.1	730	4950
50.8	780	5060
52.4	850	5190
54.0	940	5360
55.7	1120	5550
57.3	1300	5580
59.0	1440	5860
60.6	1440	5920
62.2	1410	5700
63.9	1310	5730
65.5	1220	5500
67.2	1210	5580
68.8	1160	5580
70.5	1160	5630
72.1	1130	5480
73.7	1110	5390
75.4	1080	5480
77.0	1020	5480
78.7	1000	5500
80.3	950	5410
81.9	920	5480
83.6	900	5500
85.2	860	5460
86.9	870	5430
88.5	870	5500

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
90.1	870	5480
91.8	870	5480
93.4	890	5530
95.1	910	5430
96.7	930	5500
98.3	910	5410
100.0	870	5340
101.6	820	5230
103.3	770	5170
104.9	730	5230
106.5	730	5280
108.2	740	5340
109.8	760	5580
111.5	790	5580
113.1	860	5580
114.7	930	5700
116.4	1010	5830
118.0	1040	5750
119.7	990	5730
121.3	950	5650
122.9	1000	5630
124.6	1040	5700
126.2	1010	5730
127.9	990	5580
129.5	950	5650
131.1	960	5580
132.8	1000	5550
134.4	1130	5830
136.1	1320	6150
137.7	1440	6270
139.3	1540	6240
141.0	1530	6120
142.6	1380	5890
144.3	1250	5650
145.9	1130	5480
147.6	1010	5410
149.2	930	5390
150.8	990	5430
152.5	1040	5680
154.1	1130	5650
155.8	1210	5890
157.4	1320	5890
159.0	1340	5750
160.7	1340	5750
162.3	1290	5730
164.0	1300	5600
165.6	1300	5580
167.2	1290	5650
168.9	1260	5630
170.5	1250	5630

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
172.2	1250	5750
173.8	1260	5780
175.4	1300	5750
177.1	1240	5700
178.7	1170	5550
180.4	1070	5530
182.0	1040	5550
183.6	1090	5630
185.3	1200	5860
186.9	1340	5970
188.6	1380	6090
190.2	1440	5940
191.8	1430	6000
193.5	1370	5830
195.1	1380	5830
196.8	1320	5680
198.4	1270	5650
200.0	1220	5530
201.7	1190	5480
203.3	1130	5460
205.0	1100	5390
206.6	1100	5360

Table A-6. Boring B-402-DH, S - R1 quality assurance analysis P- and S_H-wave data

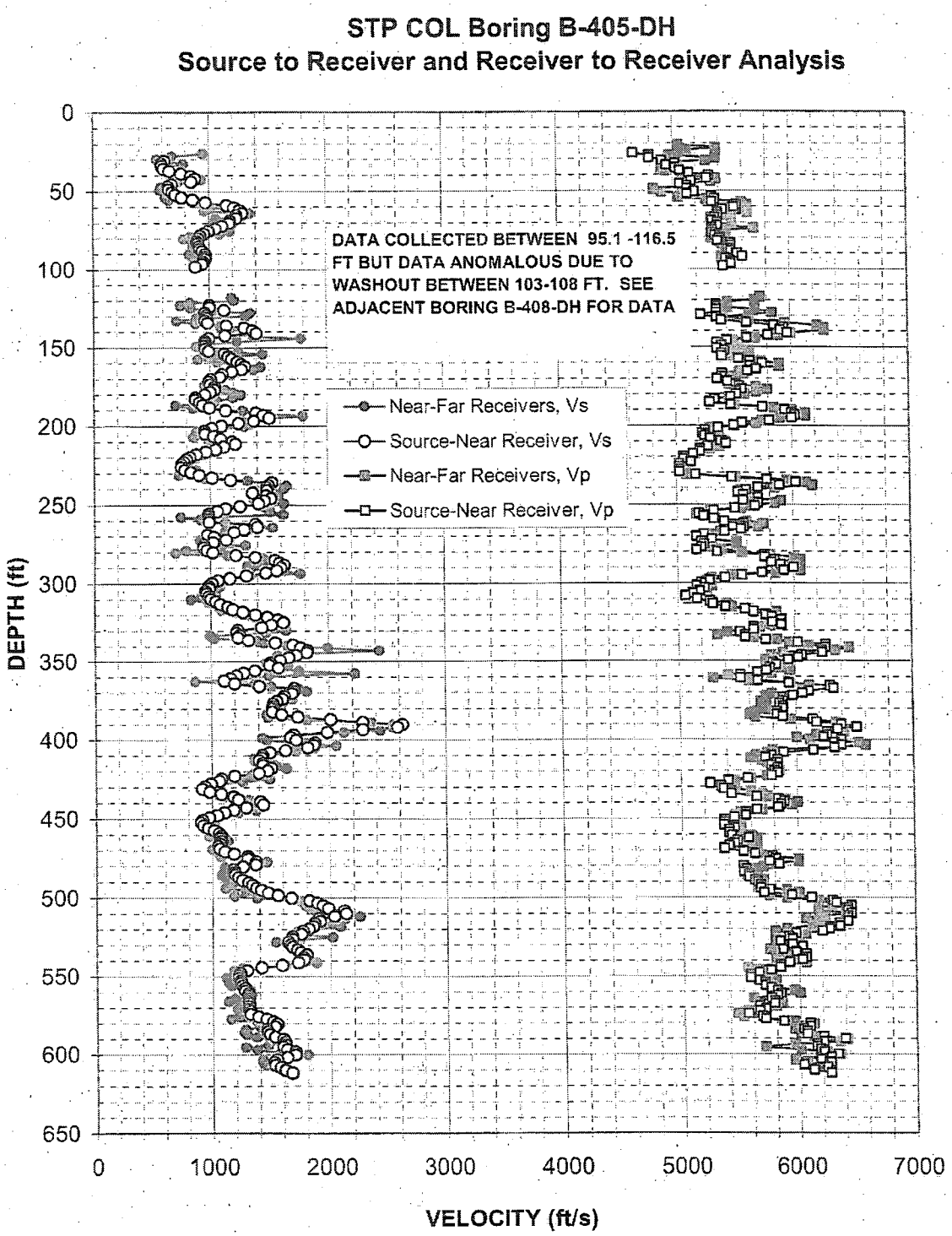


Figure A-7. Boring B-405-DH, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
26.2	-	4650
27.8	-	4800
29.4	-	4800
31.1	620	4910
32.7	590	5020
34.4	590	4950
36.0	610	5020
37.6	660	5060
39.3	760	5150
40.9	850	5320
42.6	880	5300
44.2	850	5170
45.8	680	5060
47.5	650	5130
49.1	650	5130
50.8	690	5190
52.4	710	5130
54.0	770	5340
55.7	860	5360
57.3	970	5340
59.0	1150	5550
60.6	1210	5530
62.2	1260	5430
63.9	1280	5390
65.5	1230	5390
67.2	1230	5360
68.8	1180	5340
70.5	1170	5390
72.1	1110	5390
73.7	1050	5340
75.4	1000	5340
77.0	950	5340
78.7	930	5360
80.3	910	5410
81.9	900	5390
83.6	900	5500
85.2	910	5500
86.9	920	5480
88.5	940	5500
90.1	970	5550
91.8	970	5600
93.4	970	5460
95.1	950	5500
96.7	940	5500
98.3	880	5430
100.0	-	-
101.6	-	-
103.3	-	-
104.9	-	-
106.5	-	-

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
108.2	-	-
109.8	-	-
111.5	-	-
98.3	-	-
100.0	-	-
101.6	-	-
103.3	-	-
104.9	-	-
106.5	-	-
108.2	-	-
109.8	-	-
111.5	-	-
113.1	-	-
114.7	-	-
116.4	-	-
118.0	-	-
119.7	-	-
121.3	-	-
122.9	1000	5360
124.6	1000	5360
126.2	1120	5360
127.9	960	5360
129.5	980	5230
131.1	980	5360
132.8	960	5410
134.4	980	5630
136.1	1140	5860
137.7	1300	5940
139.3	1370	5920
141.0	1400	5970
142.6	1130	5810
144.3	990	5630
145.9	960	5460
147.6	950	5360
149.2	950	5410
150.8	960	5360
152.5	990	5430
154.1	1120	5410
155.8	1160	5410
157.4	1190	5550
159.0	1230	5650
160.7	1270	5750
162.3	1300	5650
164.0	1270	5700
165.6	1190	5630
167.2	1100	5410
168.9	1090	5410
170.5	1010	5360
172.2	990	5460
173.8	1000	5530

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
175.4	1040	5550
177.1	1040	5580
178.7	1000	5530
180.4	960	5530
182.0	880	5480
183.6	880	5340
185.3	910	5300
186.9	940	5480
188.6	1000	5750
190.2	1130	5940
191.8	1390	6000
193.5	1460	6030
195.1	1500	6000
196.8	1370	5810
198.4	1240	5580
200.0	1100	5500
201.7	1020	5360
203.3	950	5250
205.0	950	5230
206.6	1030	5250
208.2	1090	5300
209.9	1190	5390
211.5	1210	5430
213.2	1120	5280
214.8	1050	5210
216.4	960	5210
218.1	880	5150
219.7	830	5060
221.4	800	5060
223.0	770	5130
224.7	760	5020
226.3	750	5020
227.9	780	5020
229.6	830	5020
231.2	910	5170
232.9	1020	5480
234.5	1170	5780
236.1	1530	6030
237.8	1500	5890
239.4	1480	5700
241.1	1480	5600
242.7	1360	5530
244.3	1480	5580
246.0	1520	5700
247.6	1460	5580
249.3	1410	5700
250.9	1250	5680
252.5	1130	5500
254.2	1060	5320
255.8	980	5190

Table A-7. Boring B-405-DH, S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
257.5	980	5230
259.1	990	5320
260.7	990	5410
262.4	1390	5580
264.0	1400	5580
265.7	1280	5550
267.3	1200	5410
268.9	980	5230
270.6	1030	5170
272.2	1130	5300
273.9	1020	5210
275.5	940	5230
277.1	940	5210
278.8	970	5170
280.4	1020	5340
282.1	1210	5750
283.7	1380	5750
285.3	1550	5830
287.0	1590	5810
288.6	1630	5890
290.3	1600	6000
291.9	1560	5920
293.5	1470	5730
295.2	1310	5550
296.8	1170	5410
298.5	1060	5280
300.1	1010	5210
301.8	980	5170
303.4	990	5230
305.0	960	5190
306.7	960	5130
308.3	980	5060
310.0	1000	5170
311.6	1040	5280
313.2	1080	5300
314.9	1140	5410
316.5	1190	5580
318.2	1270	5650
319.8	1380	5750
321.4	1480	5810
323.1	1570	5890
324.7	1620	5810
326.4	1520	5890
328.0	1430	5650
329.6	1230	5650
331.3	1220	5530
332.9	1240	5580
334.6	1230	5580
336.2	1320	5750
337.8	1550	6030

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
339.5	1700	6270
341.1	1760	6270
342.8	1820	6240
344.4	1810	6240
346.0	1720	6060
347.7	1660	6030
349.3	1590	5940
351.0	1500	5810
352.6	1500	5830
354.2	1570	5780
355.9	1370	5750
357.5	1270	5680
359.2	1210	5530
360.8	1170	5530
362.4	1110	5680
364.1	1200	5940
365.7	1410	6300
367.4	1710	6330
369.0	1700	6120
370.6	1680	6060
372.3	1620	5970
373.9	1600	5890
375.6	1560	5890
377.2	1530	5860
378.9	1530	5890
380.5	1520	5890
382.1	1520	5830
383.8	1590	5830
385.4	1730	5890
387.1	2010	6150
388.7	2290	6180
390.3	2630	6390
392.0	2580	6530
393.6	2290	6360
395.3	1980	6270
396.9	1700	6270
398.5	1670	6240
400.2	1720	6390
401.8	1880	6330
403.5	1870	6390
405.1	1810	6330
406.7	1630	6150
408.4	1490	5890
410.0	1430	5780
411.7	1420	5730
413.3	1400	5830
414.9	1440	5830
416.6	1440	5780
418.2	1500	5830
419.9	1480	5810

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
421.5	1400	5830
423.1	1190	5780
424.8	1080	5580
426.4	1060	5410
428.1	990	5250
429.7	940	5340
431.3	920	5360
433.0	980	5430
434.6	1080	5430
436.3	1180	5650
437.9	1220	5830
439.5	1410	5890
441.2	1440	5860
442.8	1290	5830
444.5	1180	5650
446.1	1100	5550
447.7	1040	5550
449.4	980	5460
451.0	920	5360
452.7	910	5360
454.3	920	5360
456.0	960	5460
457.6	1020	5410
459.2	1060	5410
460.9	1070	5430
462.5	1070	5580
464.2	1080	5480
465.8	1070	5460
467.4	1050	5410
469.1	1060	5360
470.7	1100	5530
472.4	1180	5630
474.0	1300	5780
475.6	1300	5810
477.3	1370	5750
478.9	1370	5830
480.6	1260	5530
482.2	1180	5550
483.8	1190	5530
485.5	1190	5580
487.1	1220	5580
488.8	1250	5630
490.4	1310	5650
492.0	1340	5680
493.7	1370	5680
495.3	1420	5750
497.0	1480	5700
498.6	1560	5940
500.2	1670	6120
501.9	1820	6300

Table A-7, continued. Boring B-405-DH, S - R1 quality assurance analysis
P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
503.5	1890	6330
505.2	1940	6460
506.8	1980	6430
508.4	2120	6430
510.1	2130	6460
511.7	2040	6430
513.4	1900	6430
515.0	1910	6430
516.6	1870	6360
518.3	1850	6360
519.9	1810	6270
521.6	1770	6210
523.2	1750	5970
524.8	1680	5920
526.5	1680	5940
528.1	1640	5830
529.8	1660	5940
531.4	1680	6030
533.1	1720	5860
534.7	1740	5970
536.3	1790	6060
538.0	1770	6060
539.6	1770	6030
541.3	1720	5920
542.9	1590	5830
544.5	1420	5830
546.2	1290	5750
547.8	1230	5650
549.5	1220	5580
551.1	1220	5580
552.7	1230	5650
554.4	1230	5700
556.0	1250	5700
557.7	1270	5750
559.3	1270	5810
560.9	1300	5830
562.6	1300	5810
564.2	1300	5750
565.9	1300	5780
567.5	1310	5780
569.1	1310	5650
570.8	1310	5700
572.4	1320	5650
574.1	1320	5550
575.7	1390	5680
577.3	1460	5700
579.0	1510	5860
580.6	1540	6090
582.3	1530	6090
583.9	1460	6030

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
585.5	1460	6060
587.2	1480	6060
588.8	1530	6210
590.5	1590	6390
592.1	1610	6210
593.7	1610	6150
595.4	1590	6150
597.0	1630	6180
598.7	1700	6210
600.3	1700	6330
601.9	1630	6270
603.6	1540	6180
605.2	1520	6270
606.9	1530	6030
608.5	1570	6240
610.1	1610	6120
611.8	1670	6270

Table A-7, continued. Boring B-405-DH, S - R1 quality assurance analysis
P- and S_H-wave data

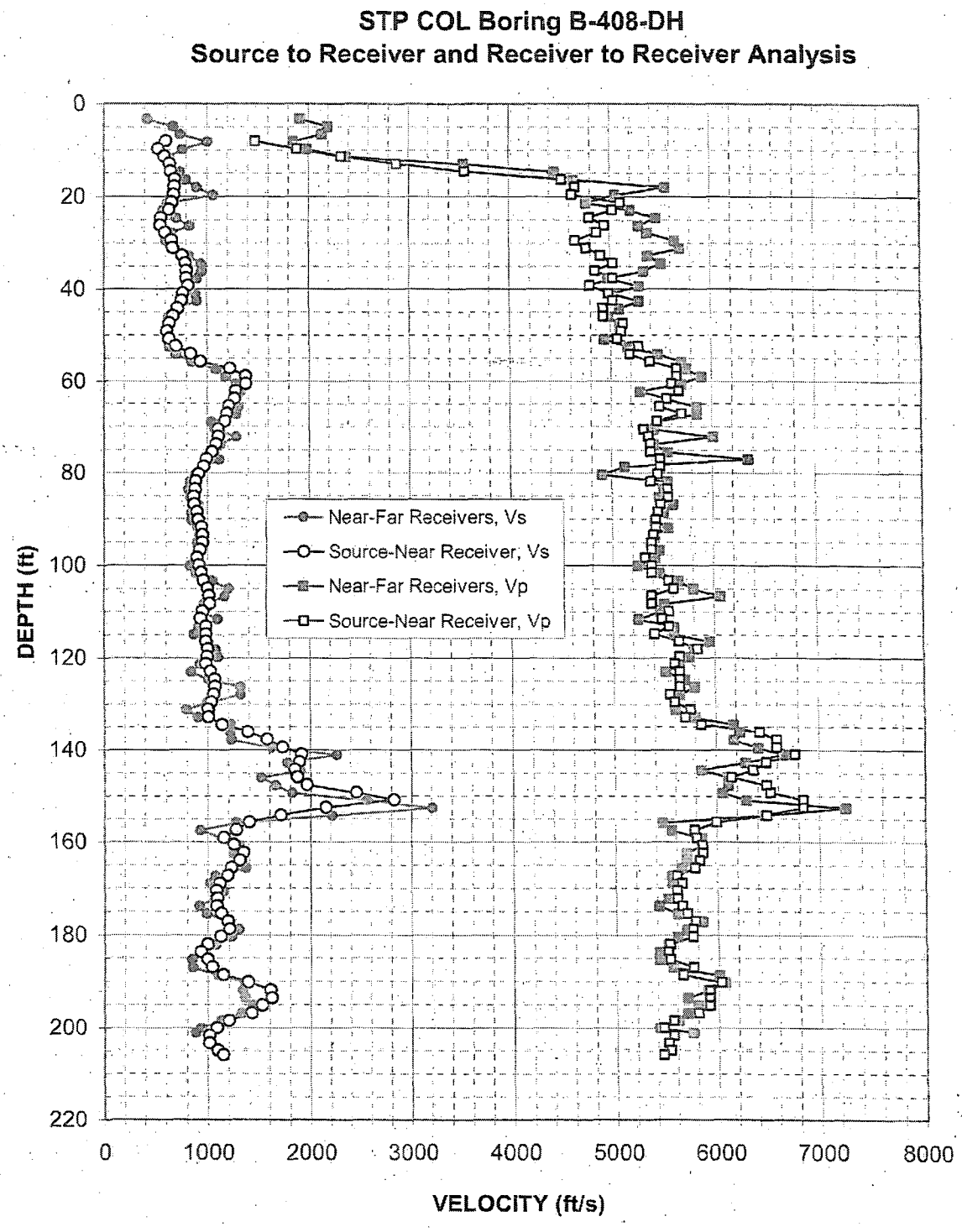


Figure A-8. Boring B-408-DH, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
8.1	600	1470
9.8	530	1880
11.4	590	2330
13.0	640	2880
14.7	650	3560
16.3	690	4520
18.0	690	4650
19.6	680	4620
21.2	660	5100
22.9	630	5020
24.5	560	4800
26.2	560	4950
27.8	600	4870
29.4	660	4650
31.1	670	4760
32.7	760	4910
34.4	790	5020
36.0	800	4850
37.6	800	5020
39.3	820	4800
40.9	770	4980
42.6	760	5020
44.2	720	4930
45.8	670	4930
47.5	630	5130
49.1	610	5100
50.8	640	5060
52.4	700	5280
54.0	840	5190
55.7	930	5390
57.3	1220	5650
59.0	1380	5650
60.6	1380	5600
62.2	1280	5680
63.9	1270	5550
65.5	1210	5480
67.2	1190	5700
68.8	1170	5460
70.5	1110	5320
72.1	1110	5360
73.7	1080	5390
75.4	1050	5390
77.0	990	5480
78.7	970	5480
80.3	920	5460
81.9	890	5390
83.6	890	5550
85.2	870	5550
86.9	870	5480
88.5	900	5460

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
90.1	910	5430
91.8	950	5430
93.4	960	5410
95.1	950	5390
96.7	930	5390
98.3	900	5320
100.0	920	5390
101.6	940	5390
103.3	960	5550
104.9	1000	5600
106.5	1020	5390
108.2	1020	5390
109.8	960	5550
111.5	930	5480
113.1	990	5550
114.7	990	5410
116.4	990	5650
118.0	1000	5830
119.7	990	5650
121.3	980	5600
122.9	1020	5650
124.6	1070	5650
126.2	1070	5650
127.9	1060	5550
129.5	1030	5600
131.1	1000	5750
132.8	1000	5700
134.4	1140	5860
136.1	1390	6430
137.7	1570	6590
139.3	1730	6590
141.0	1920	6770
142.6	1900	6490
144.3	1850	6360
145.9	1870	6150
147.6	1970	6490
149.2	2450	6530
150.8	2830	6840
152.5	2150	6840
154.1	1710	6490
155.8	1400	6000
157.4	1280	5780
159.0	1160	5810
160.7	1260	5860
162.3	1340	5860
164.0	1310	5830
165.6	1230	5780
167.2	1190	5600
168.9	1110	5650
170.5	1080	5600

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
172.2	1090	5600
173.8	1080	5650
175.4	1130	5700
177.1	1190	5780
178.7	1210	5750
180.4	1120	5750
182.0	1000	5530
183.6	930	5500
185.3	990	5530
186.9	1040	5750
188.6	1150	5650
190.2	1390	6030
191.8	1610	5920
193.5	1620	5920
195.1	1530	5920
196.8	1430	5810
198.4	1200	5550
200.0	1080	5460
201.7	1010	5550
203.3	1010	5500
205.0	1090	5530
206.0	1150	5460

Table A-8. Boring B-408-DH, S - R1 quality assurance analysis P- and S_H-wave data

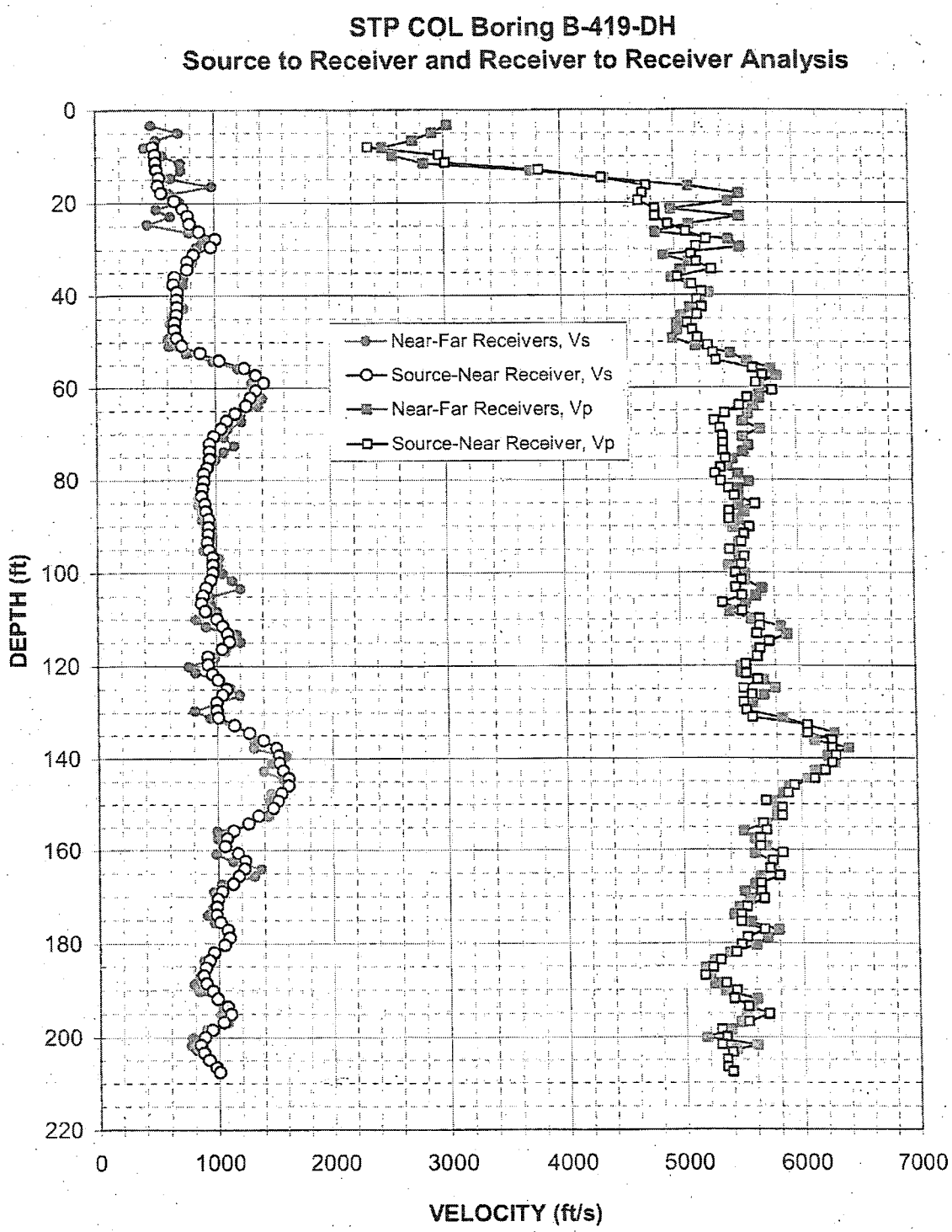


Figure A-9. Boring B-419-DH, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
8.1	490	2340
9.8	500	2960
11.4	510	3010
13.0	520	3810
14.7	540	4370
16.3	530	4760
18.0	560	4720
19.6	670	4690
21.2	730	4830
22.9	770	4830
24.5	790	4950
26.2	870	5100
27.8	1010	5280
29.4	970	5190
31.1	820	5150
32.7	770	5190
34.4	770	5320
36.0	670	5020
37.6	650	5150
39.3	690	5230
40.9	680	5190
42.6	680	5230
44.2	680	5190
45.8	660	5100
47.5	660	5150
49.1	680	5190
50.8	720	5280
52.4	870	5320
54.0	1040	5340
55.7	1250	5650
57.3	1350	5730
59.0	1420	5680
60.6	1350	5810
62.2	1300	5600
63.9	1260	5530
65.5	1170	5410
67.2	1100	5320
68.8	1040	5360
70.5	980	5390
72.1	950	5390
73.7	950	5390
75.4	950	5410
77.3	930	5360
78.7	900	5320
80.3	900	5360
81.9	880	5430
83.6	880	5480
85.2	900	5650
86.9	910	5430
88.5	940	5430

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
90.1	940	5600
91.8	930	5550
93.4	930	5530
95.1	940	5430
96.7	970	5550
98.3	970	5530
100.0	970	5480
101.6	950	5530
103.3	910	5480
104.9	880	5530
106.5	870	5360
108.2	900	5530
109.8	1000	5680
111.5	1050	5680
113.1	1100	5650
114.7	1110	5750
116.4	1040	5680
118.0	930	5650
119.7	930	5550
121.6	960	5550
122.9	1010	5650
124.9	1080	5530
126.2	1040	5600
127.9	1000	5530
129.5	1000	5550
131.1	1010	5600
132.8	1140	6060
134.4	1270	6060
136.1	1390	6270
137.7	1510	6270
139.3	1530	6300
141.0	1540	6270
142.6	1570	6210
144.3	1610	6120
145.9	1610	5940
147.6	1550	5890
149.2	1520	5700
150.8	1480	5830
152.5	1350	5830
154.1	1260	5680
155.8	1130	5700
157.4	1070	5650
159.0	1060	5650
160.7	1170	5830
162.3	1230	5750
164.0	1220	5730
165.6	1180	5810
167.2	1130	5650
168.9	1030	5650
170.5	1000	5680

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
172.2	980	5530
173.8	980	5480
175.4	1010	5480
177.1	1080	5680
178.7	1100	5530
180.4	1050	5480
182.0	960	5430
183.6	920	5300
185.3	890	5230
186.9	870	5170
188.6	890	5340
190.2	950	5430
191.8	990	5410
193.5	1070	5530
195.1	1100	5700
196.8	1040	5530
198.4	940	5300
200.0	880	5340
201.7	840	5300
203.3	870	5390
205.0	910	5340
206.6	980	5340
207.6	1000	5390

Table A-9. Boring B-419-DH, S - R1 quality assurance analysis P- and S_H-wave data

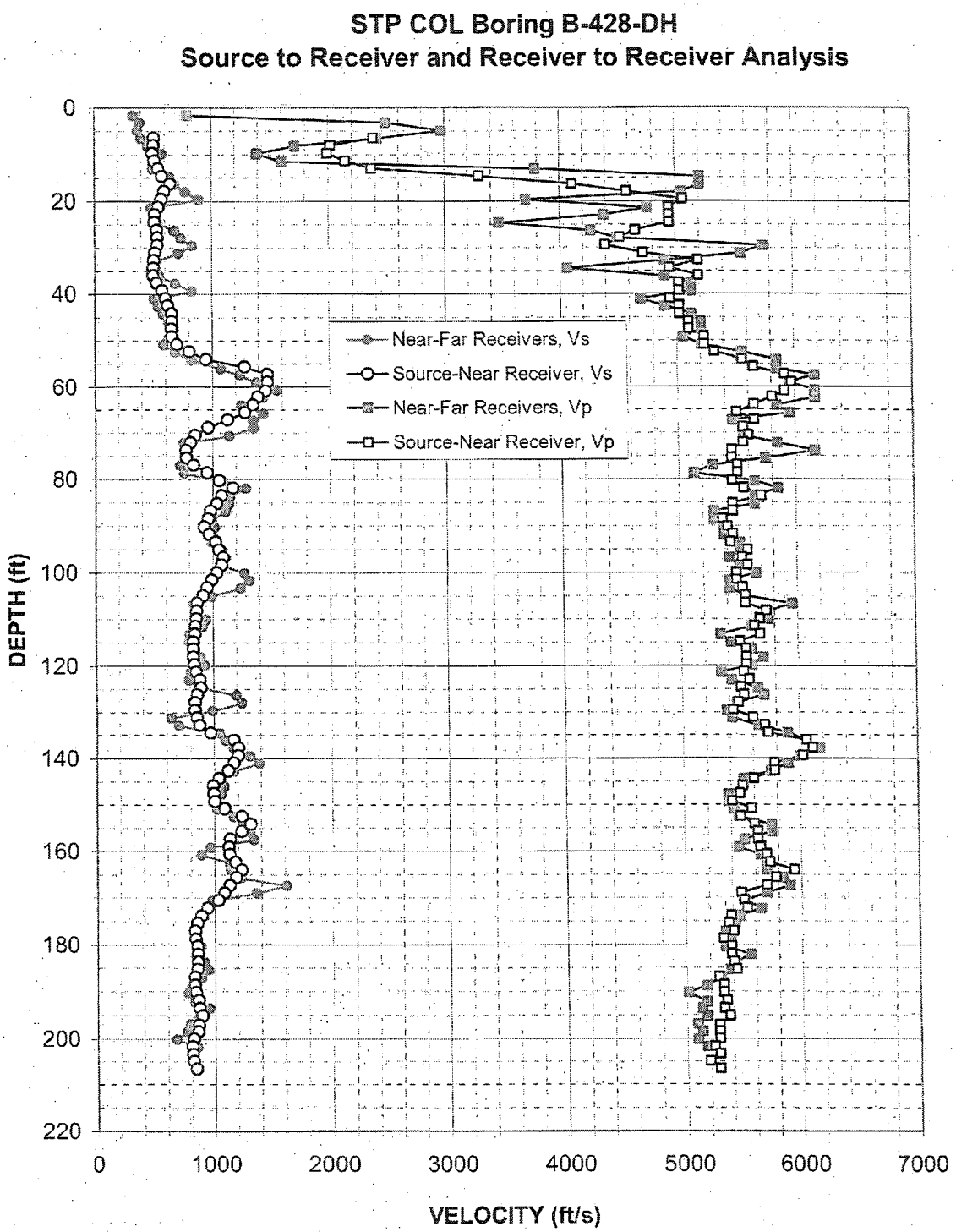


Figure A-10. Boring B-428-DH, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and S_H-wave data

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
6.5	510	2380
8.1	510	2020
9.8	500	1990
11.4	510	2150
13.0	550	2360
14.7	580	3300
16.3	650	4110
18.0	590	4590
19.6	570	5060
21.2	540	4950
22.9	520	4950
24.5	510	4950
26.2	530	4650
27.8	540	4520
29.4	540	4400
31.1	520	4720
32.7	510	5190
34.4	500	4950
36.0	500	5190
37.6	530	5020
39.3	580	5020
40.9	600	4950
42.6	620	5020
44.2	650	5020
45.8	650	5100
47.5	650	5100
49.1	650	5230
50.8	700	5230
52.4	800	5320
54.0	940	5550
55.7	1280	5650
57.3	1470	5920
59.0	1470	5970
60.9	1460	5920
62.2	1390	5810
63.9	1350	5650
65.5	1280	5500
67.2	1130	5650
68.8	960	5550
70.5	850	5600
72.1	810	5550
73.7	770	5460
75.4	780	5460
77.0	830	5500
78.7	950	5500
80.3	1060	5460
81.9	1170	5550
83.6	1070	5700
85.2	1030	5460
86.9	980	5460

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
88.5	960	5360
90.1	930	5410
91.8	970	5460
93.4	1020	5430
95.1	1050	5580
96.7	1080	5530
98.3	1070	5580
100.0	1030	5480
101.6	990	5480
103.3	950	5530
104.9	910	5550
106.5	860	5550
108.2	860	5730
109.8	860	5680
111.5	850	5630
113.1	840	5680
114.7	830	5500
116.4	830	5550
118.0	830	5550
119.7	830	5550
121.3	850	5530
122.9	880	5580
124.6	890	5500
126.2	860	5530
127.9	840	5480
129.5	840	5430
131.1	860	5600
132.8	880	5700
134.4	970	5730
136.1	1170	6060
137.7	1210	6120
139.3	1210	6030
141.0	1170	5780
142.6	1120	5780
144.3	1040	5600
145.9	990	5500
147.6	1000	5480
149.2	1000	5410
150.8	1080	5580
152.5	1240	5480
154.1	1310	5600
155.8	1230	5630
157.4	1130	5630
159.0	1120	5650
160.7	1130	5700
162.3	1180	5730
164.0	1230	5940
165.6	1180	5780
167.2	1130	5700
168.9	1080	5480

Depth (feet)	V_s (feet/sec)	V_p (feet/sec)
170.5	1030	5500
172.2	940	5530
173.8	890	5390
175.4	850	5360
177.1	830	5410
178.7	830	5320
180.4	850	5390
182.0	860	5390
183.6	860	5410
185.3	850	5430
186.9	830	5280
188.6	830	5320
190.2	840	5320
191.8	860	5340
193.5	860	5320
195.1	890	5360
197.1	860	5280
198.4	850	5280
200.0	820	5280
201.7	810	5230
203.3	810	5280
205.0	820	5190
206.6	840	5280

Table A-10. Boring B-428-DH, S - R1 quality assurance analysis P- and S_H-wave data

APPENDIX B

CALIPER, NATURAL GAMMA, RESISTIVITY, AND SPONTANEOUS POTENTIAL LOGS

ROBERTSON GEOLOGGING LIMITED

STP COL

B302ELOGUP01

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-302-DH 5 December 2006 ..

COMPANY	GEOVISION
WELL	B-302-DH
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

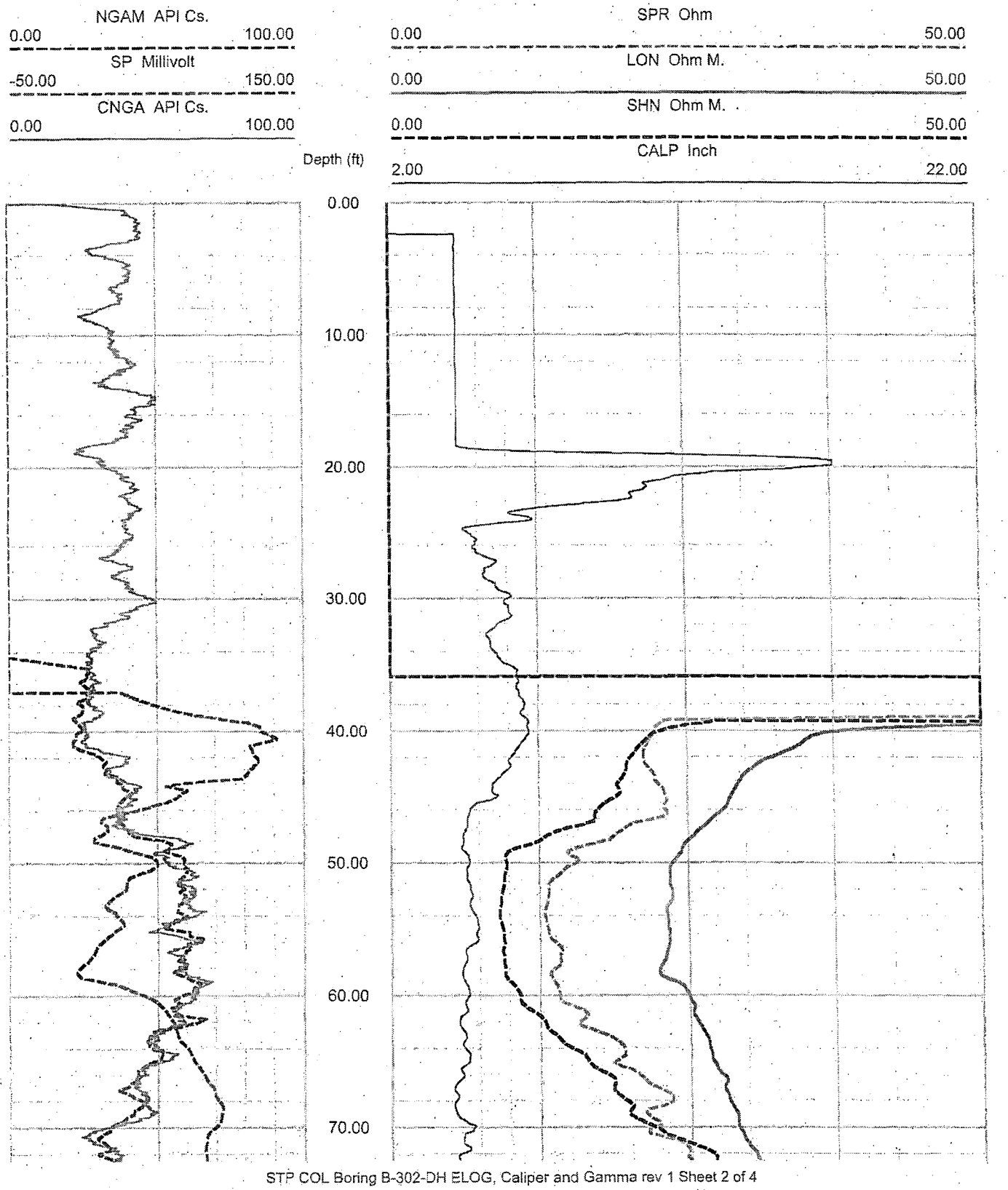
OTHER SERVICES

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

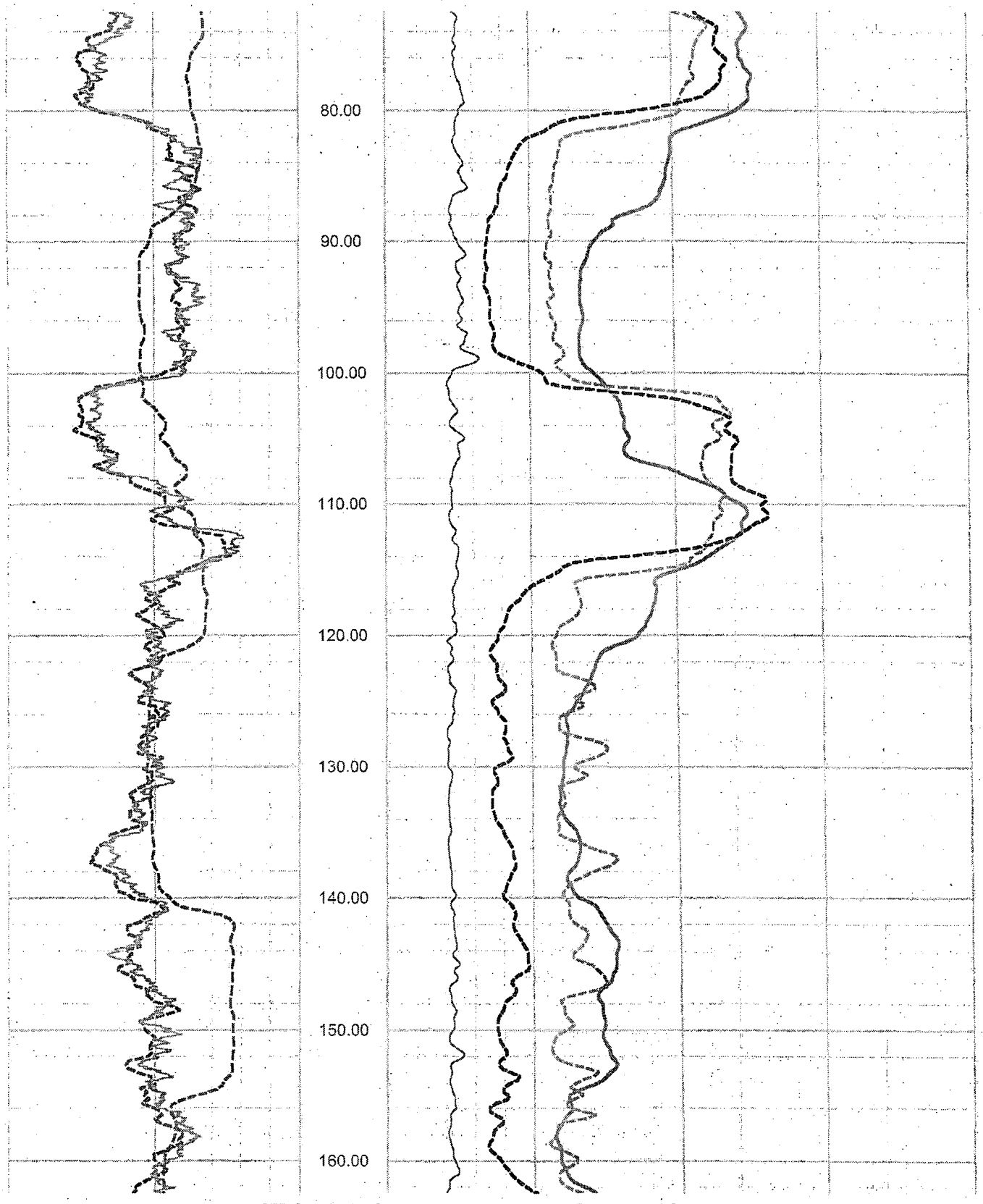
DATE	05 Dec 06	05 Dec 06	05 Dec 06
RUN#	2	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	215.00	0.00	0.00
DEPTH LOGGER	218.00	0.00	0.00
LOG DEEPEST	0.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
2	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

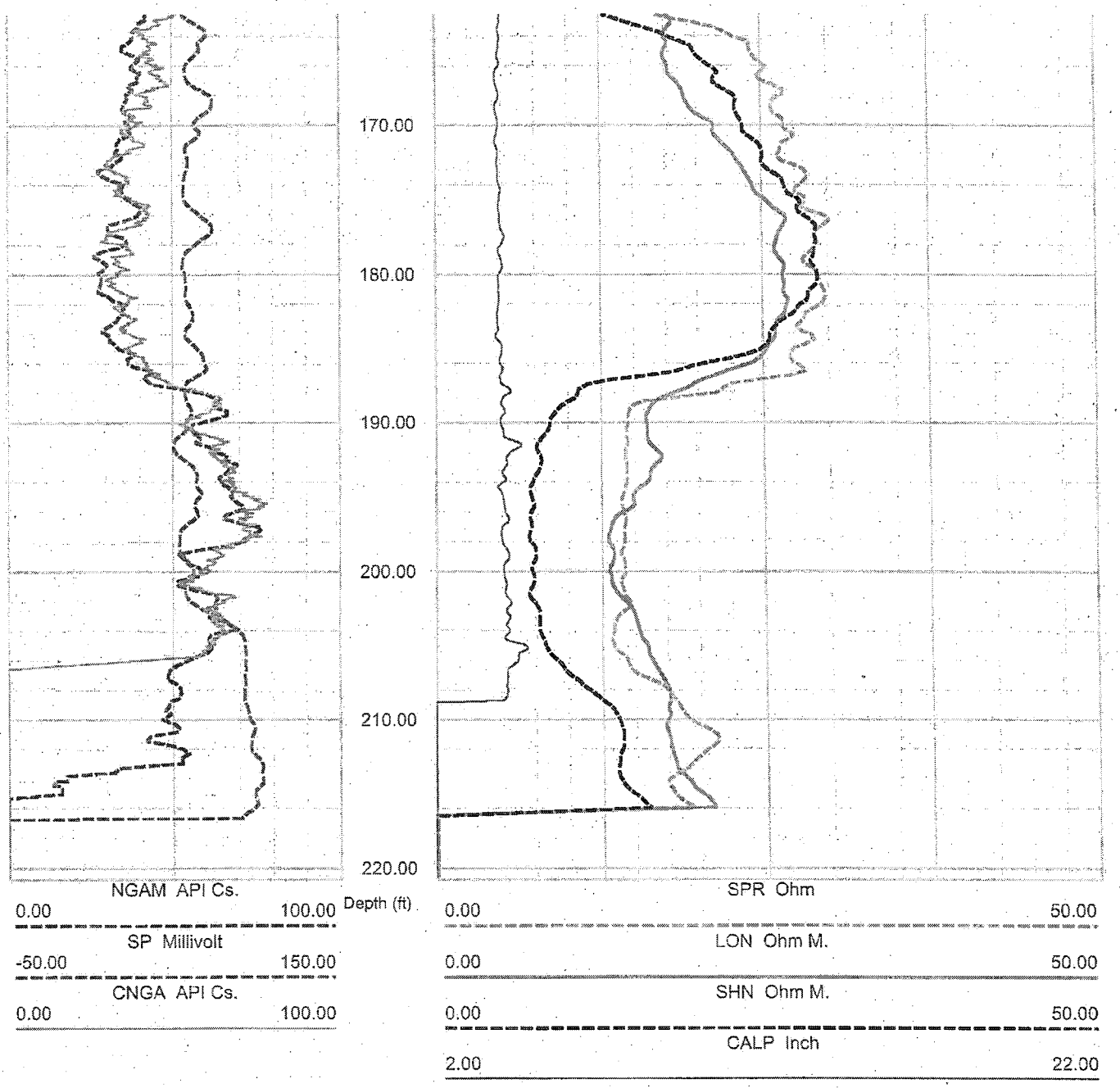
STP COL Boring B-302-DH ELOG, Caliper and Gamma rev 1 Sheet 1 of 4



STP COL Boring B-302-DH ELOG, Caliper and Gamma rev 1 Sheet 2 of 4



STP COL Boring B-302-DH ELOG, Caliper and Gamma rev 1 Sheet 3 of 4



STP COL Boring B-302-DH ELOG, Caliper and Gamma rev 1 Sheet 4 of 4

ROBERTSON GEOLOGGING LIMITED

STP COL

B305ELOGUP01

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-305-DHA 8-19 December 2..

COMPANY	GEOVISION
WELL	B-305-DHA
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

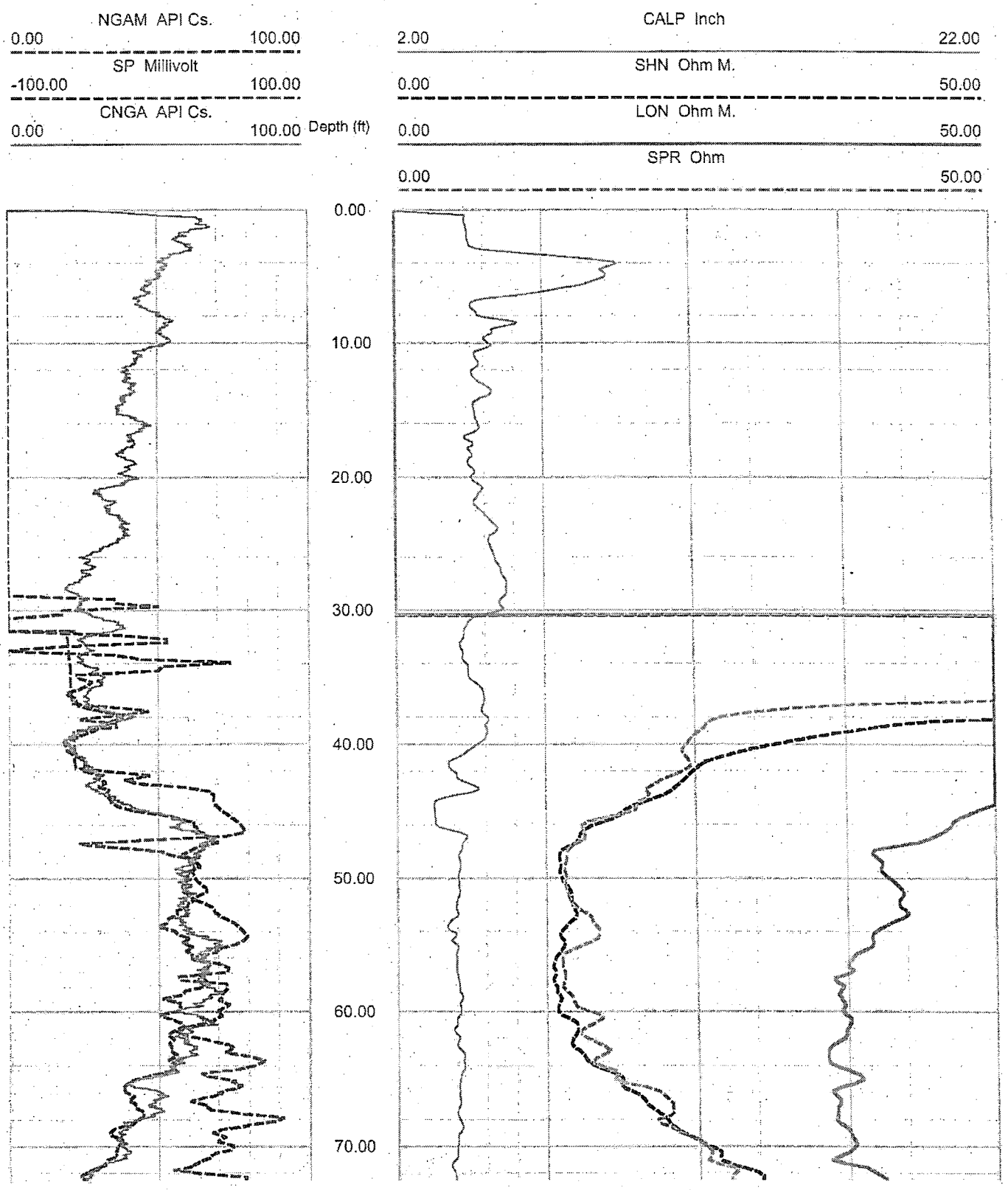
OTHER SERVICES

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

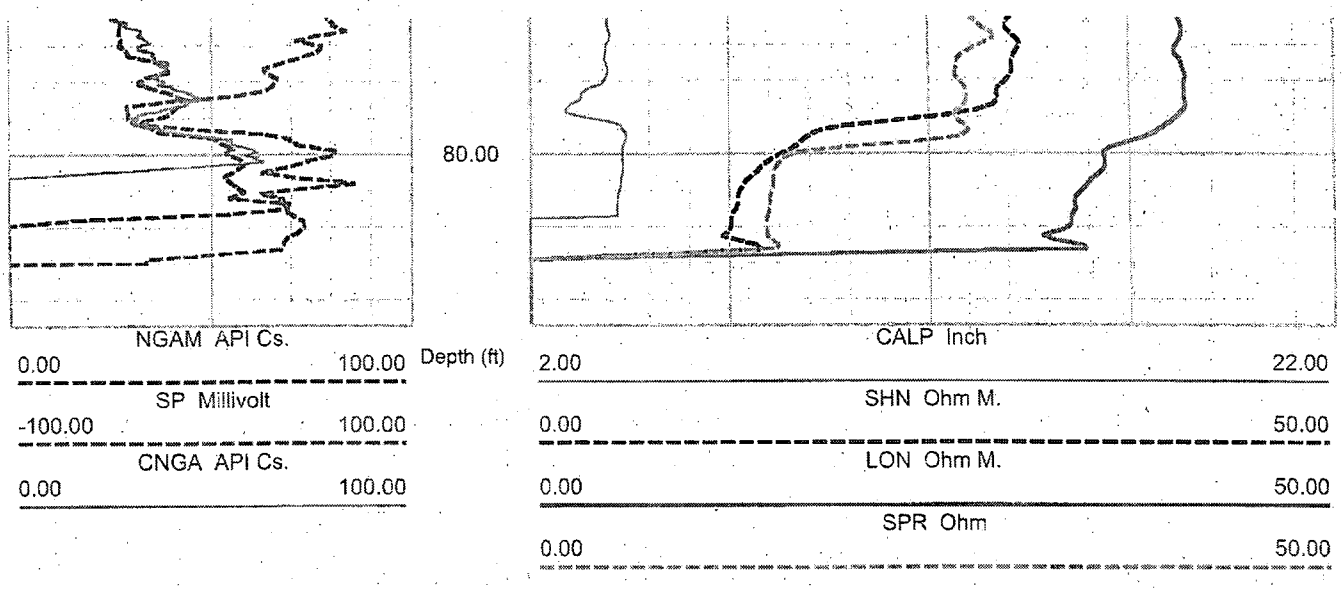
DATE	08 Dec 06	08 Dec 06	08 Dec 06
RUN#	2	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	90.00	0.00	0.00
DEPTH LOGGER	90.00	0.00	0.00
LOG DEEPEST	90.00	0.00	0.00
LOG SHALLOW	35.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
2	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

STP COL Boring B-305-DHA top section ELOG, Caliper and Gamma rev 1.1 Sheet 1 of 3



STP COL Boring B-305-DHA top section ELOG, Caliper and Gamma rev 1.1 Sheet 2 of 3



STP COL Boring B-305-DHA top section ELOG, Caliper and Gamma rev 1.1 Sheet 3 of 3

ROBERTSON GEOLOGGING LIMITED

STP COL

B305ELOGUP03

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-305-DHA 8-19 December 2..

COMPANY	GEOVISION
WELL	B-305DHA
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

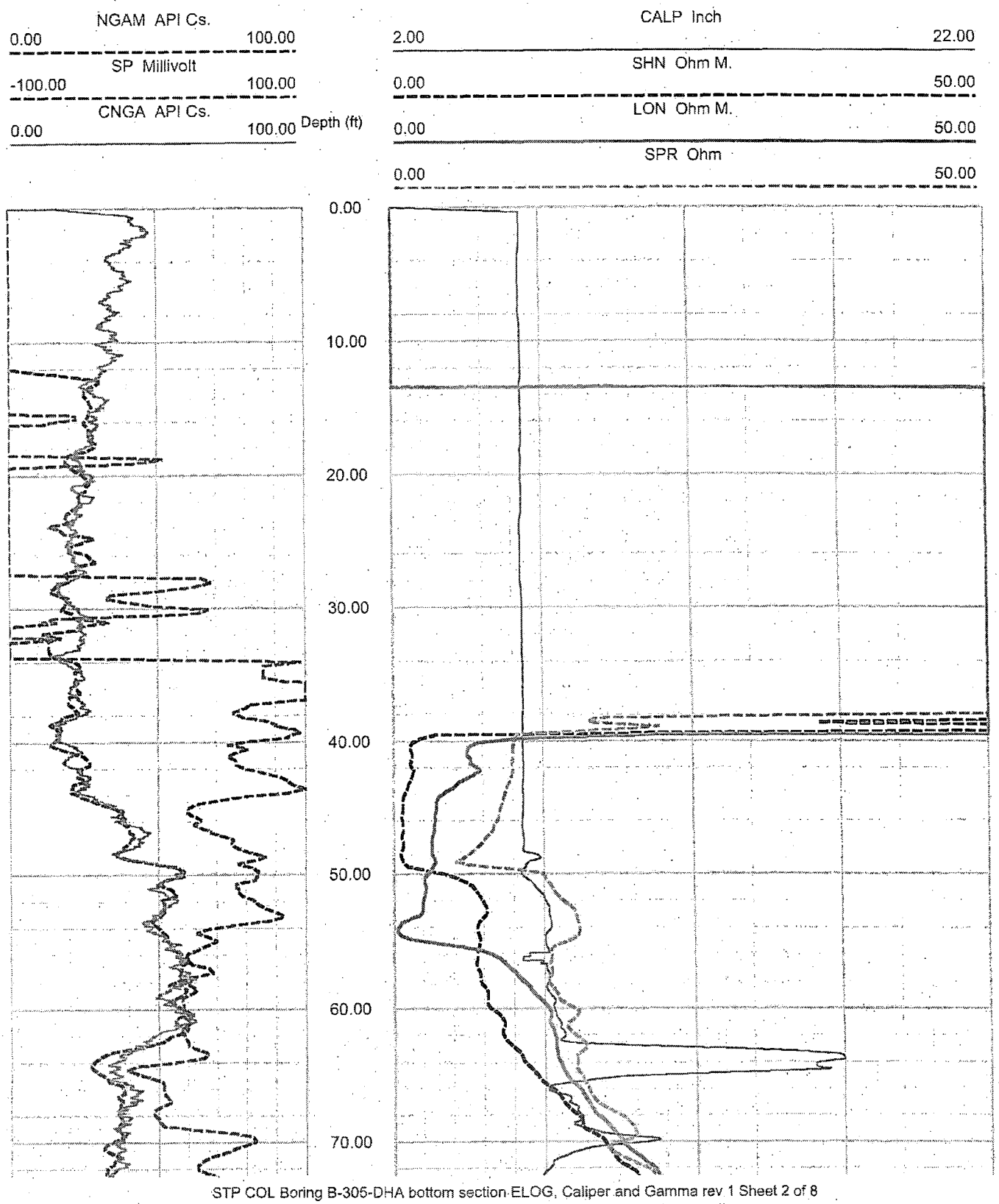
OTHER SERVICES

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

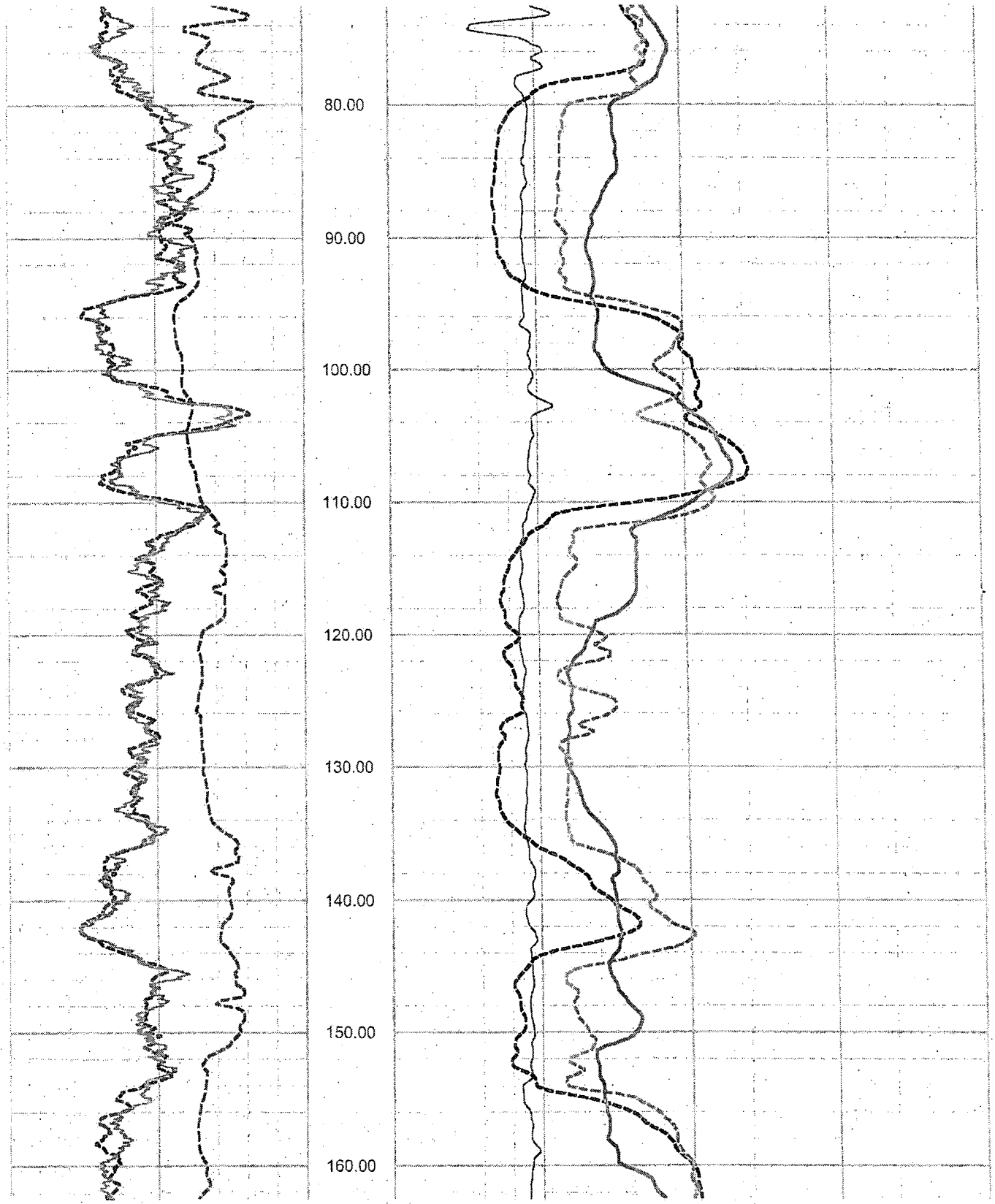
DATE	19 Dec 06	15 Dec 06	15 Dec 06
RUN#	2	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	618.00	0.00	0.00
DEPTH LOGGER	618.00	0.00	0.00
LOG DEEPEST	618.00	0.00	0.00
LOG SHALLOW	20.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
2	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

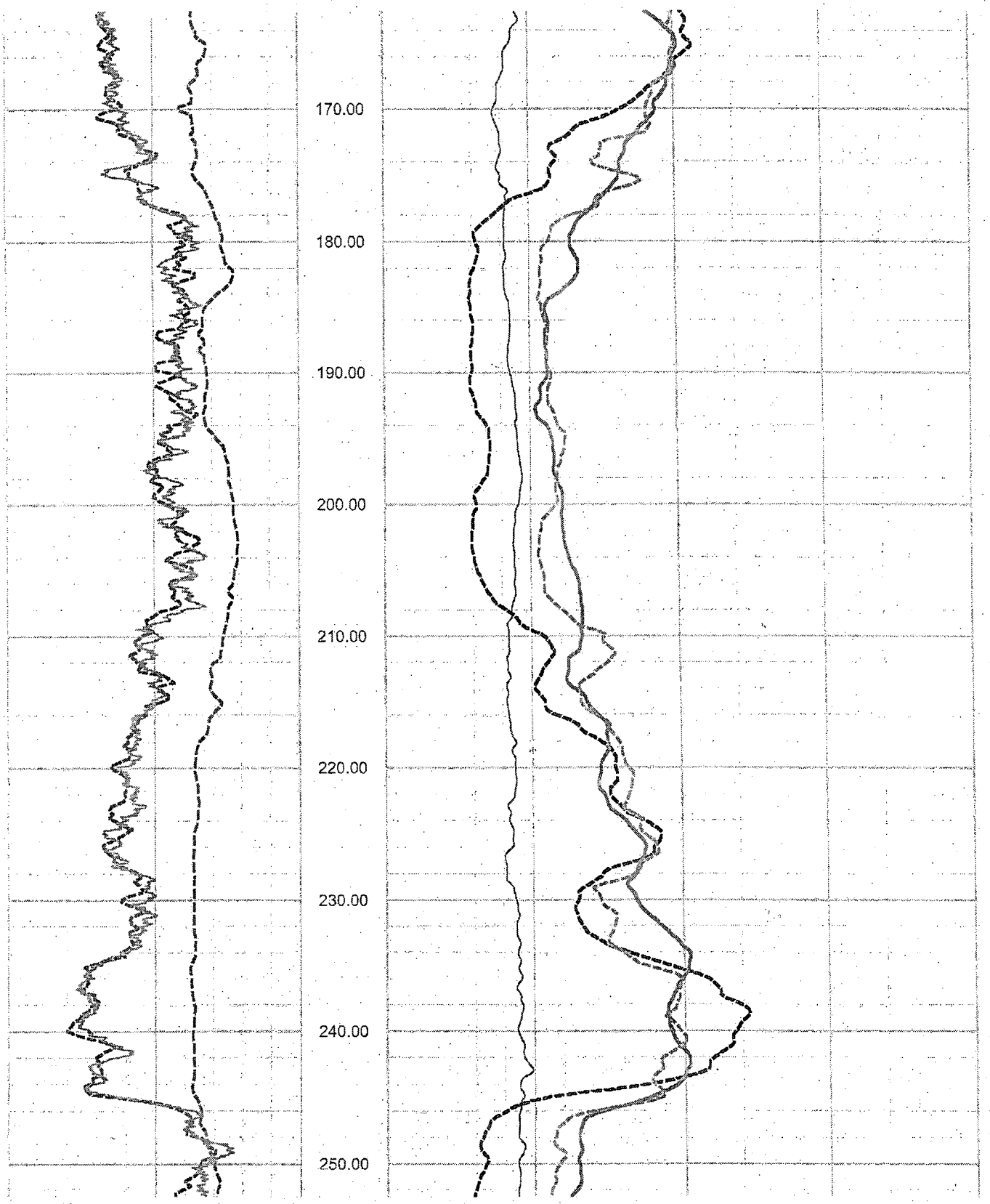
STP COL Boring B-305-DHA bottom section ELOG, Caliper and Gamma rev 1 Sheet 1 of 8



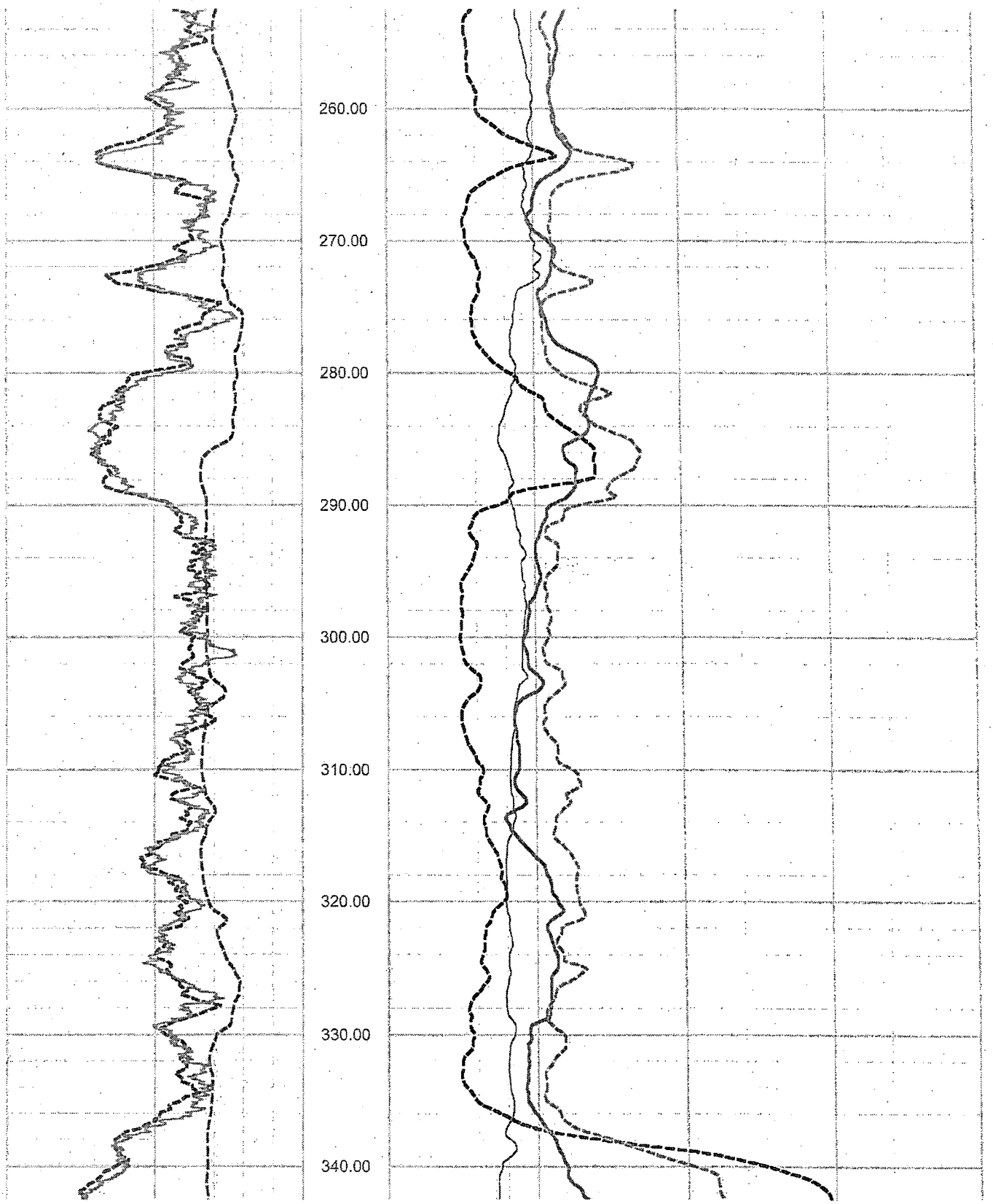
STP COL Boring B-305-DHA bottom section ELOG, Caliper and Gamma rev 1 Sheet 2 of 8



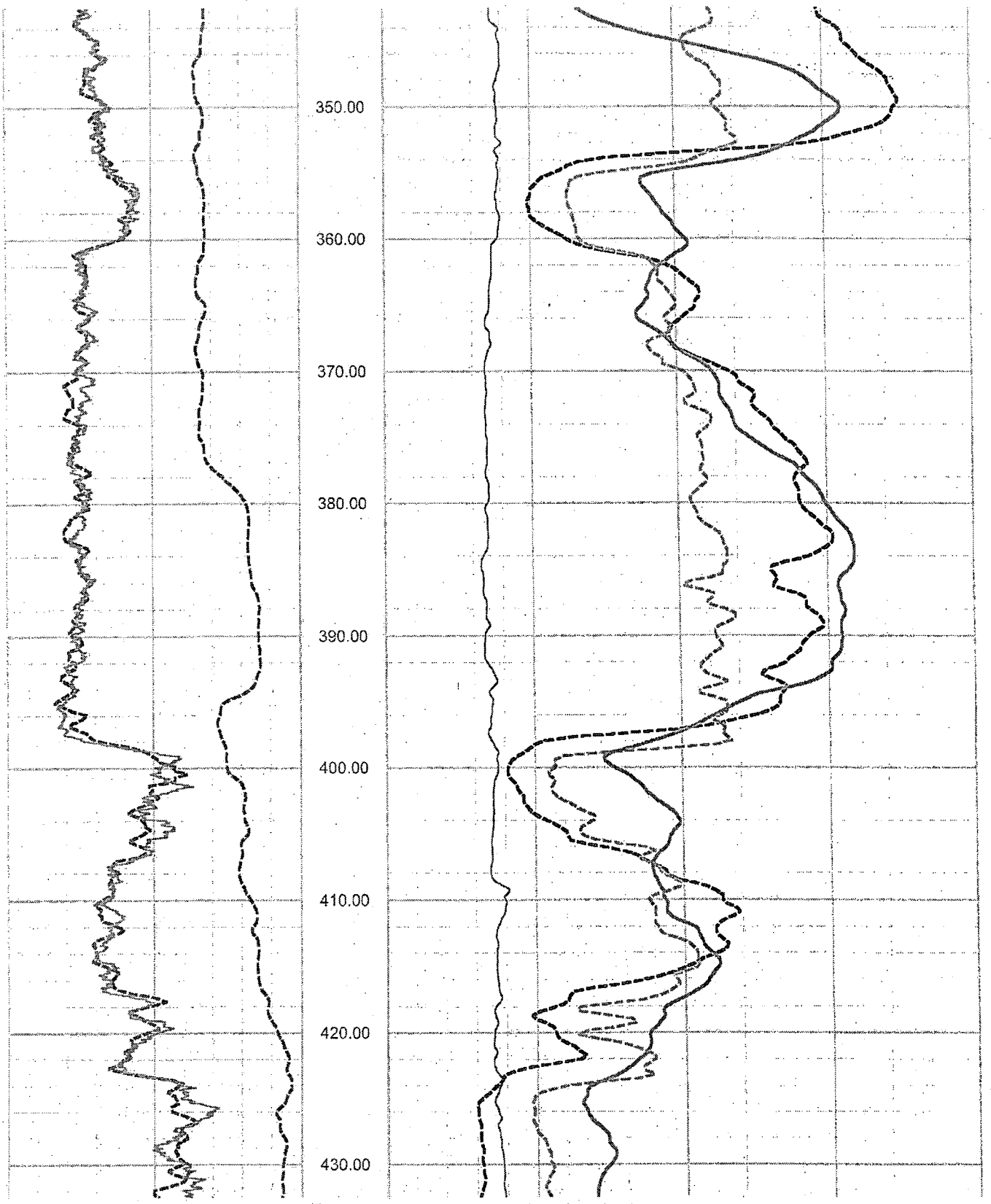
STP COL Boring B-305-DHA bottom section ELOG, Caliper and Gamma rev 1 Sheet 3 of 8



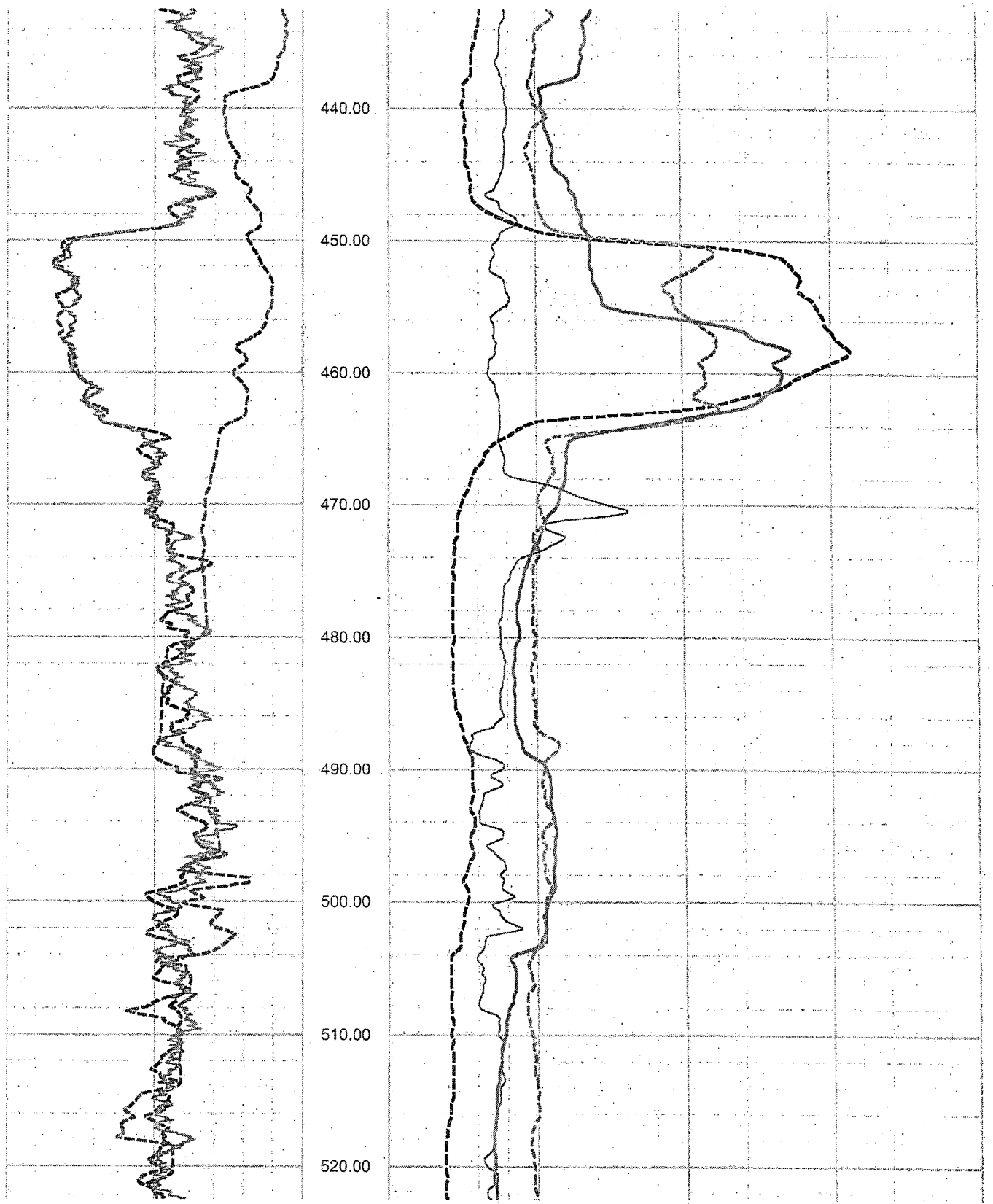
STP COL Boring B-305-DHA bottom section ELOG, Caliper and Gamma rev 1 Sheet 4 of 8



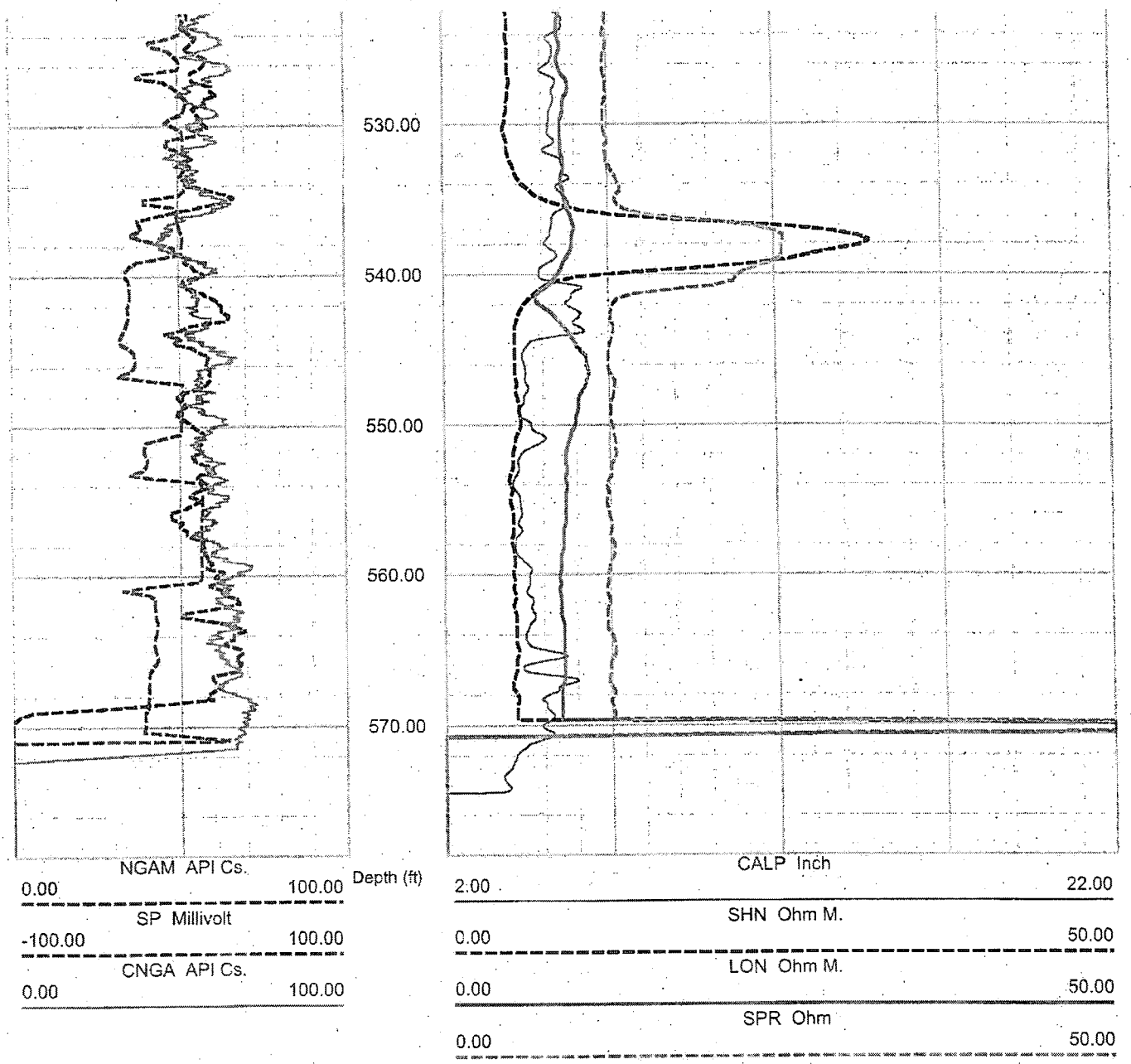
STP COL Boring B-305-DHA bottom section ELOG, Caliper and Gamma rev 1 Sheet 5 of 8



STP COL Boring B-305-DHA bottom section ELOG, Caliper and Gamma rev 1 Sheet 6 of 8



STP COL Boring B-305-DHA bottom section ELOG, Caliper and Gamma rev 1 Sheet 7 of 8



STP COL Boring B-305-DHA bottom section ELOG, Caliper and Gamma rev 1 Sheet 8 of 8

ROBERTSON GEOLOGGING LIMITED

STP COL

B308ELOGUP01

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-308-DH 7 December 2006 ..

COMPANY	GEOVISION
WELL	B-319-DH
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

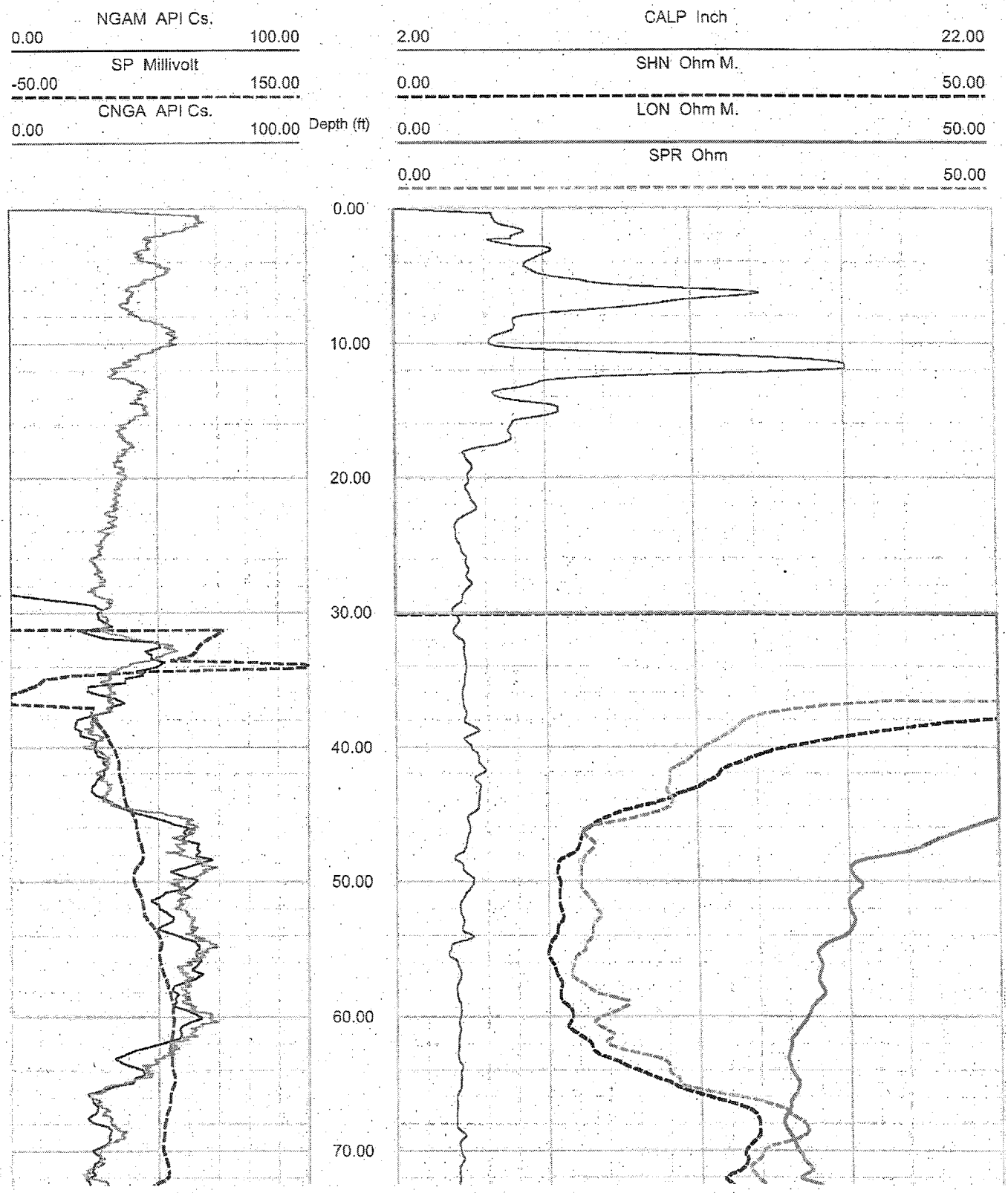
OTHER SERVICES

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

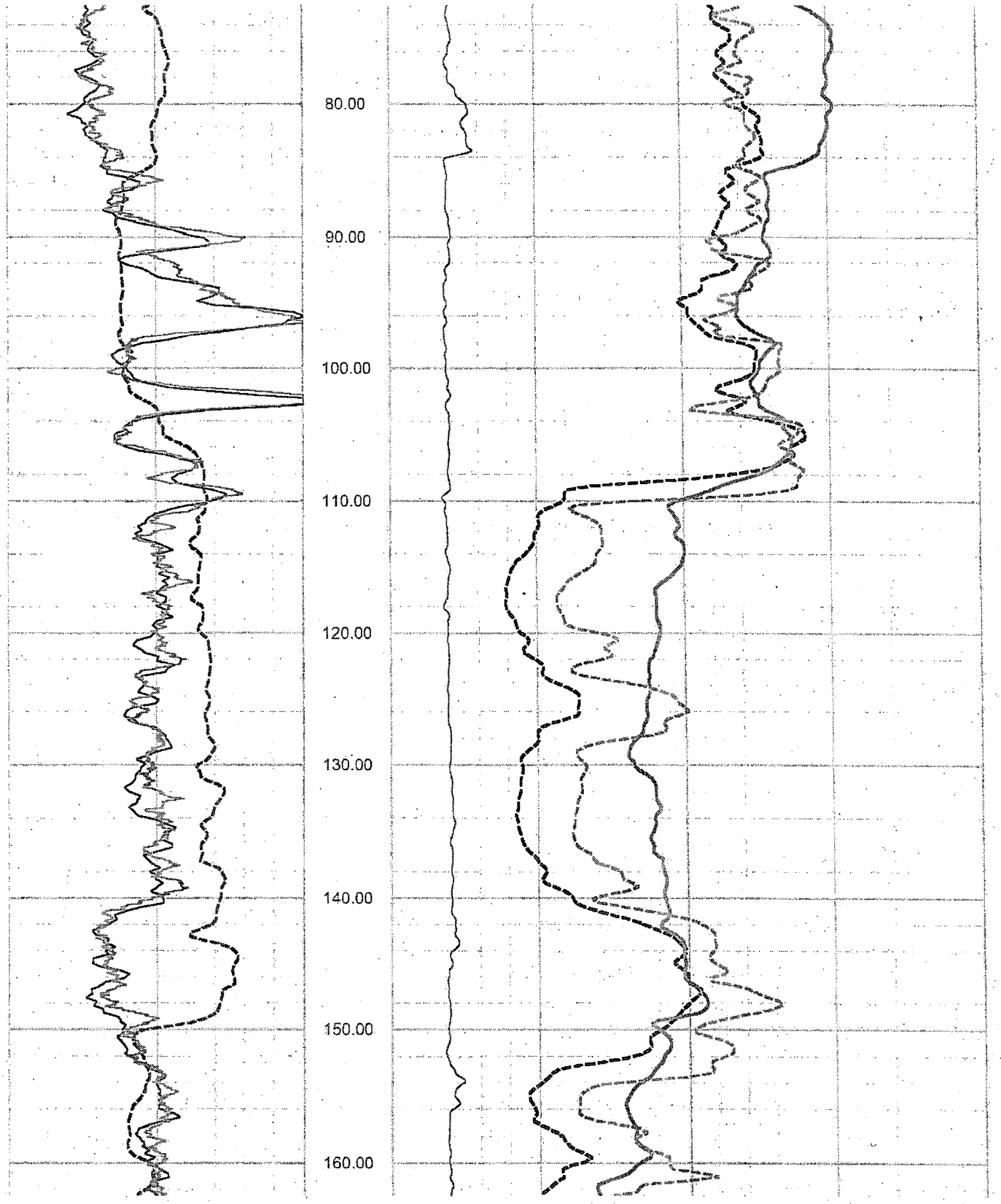
DATE	07 Dec 06	05 Dec 06	05 Dec 06
RUN#	2	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	215.00	0.00	0.00
DEPTH LOGGER	215.00	0.00	0.00
LOG DEEPEST	210.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
2	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

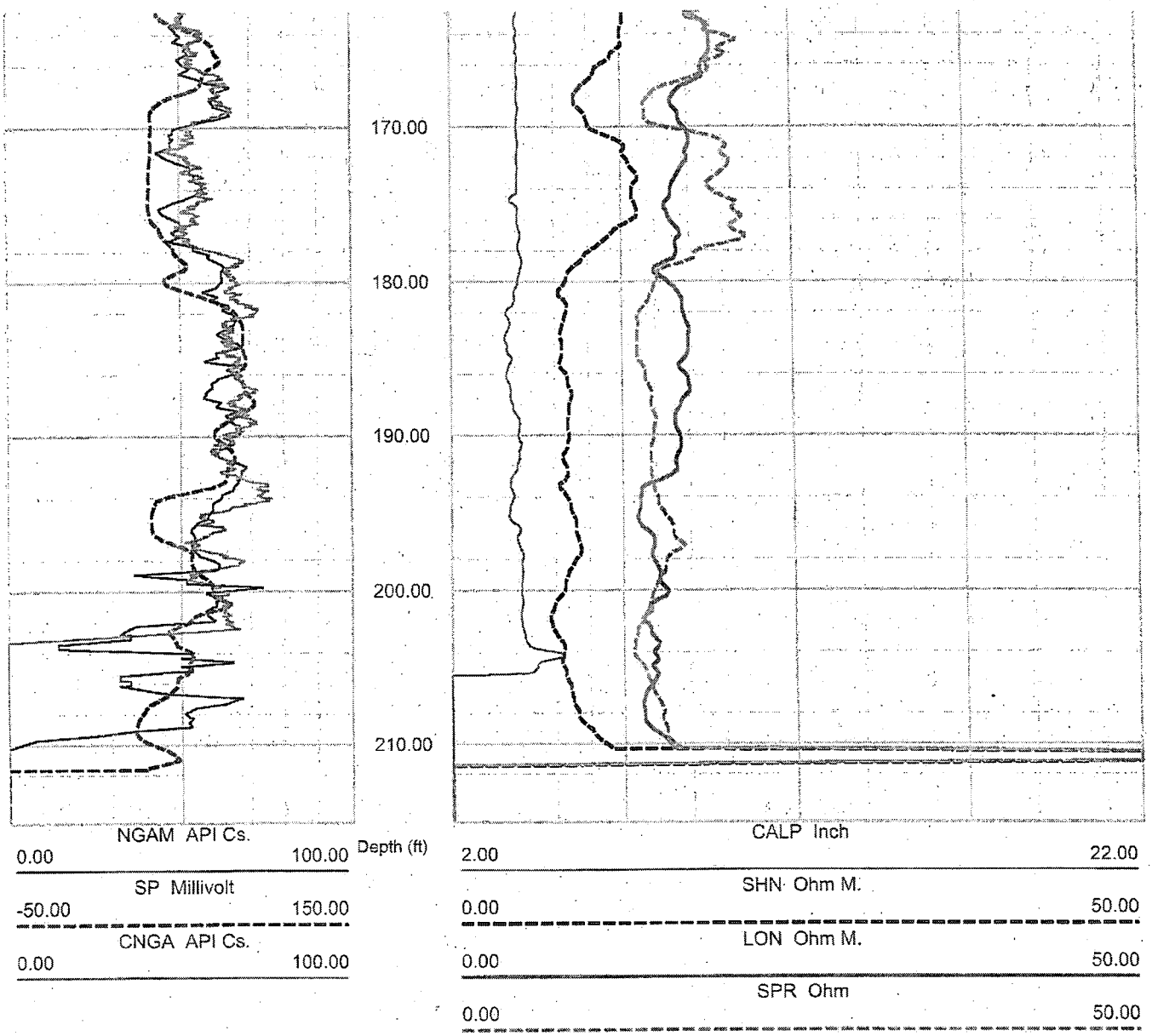
STP COL Boring B-308-DH ELOG, Caliper and Gamma rev 1 Sheet 1 of 4



STP COL Boring B-308-DH ELOG, Caliper and Gamma rev 1 Sheet 2 of 4



STP COL Boring B-308-DH ELOG, Caliper and Gamma rev 1 Sheet 3 of 4



STP COL Boring B-308-DH ELOG, Caliper and Gamma rev 1 Sheet 4 of 4

ROBERTSON GEOLOGGING LIMITED

STP COL

B319ELOGUP01

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-319-DH 7 December 2006 ..

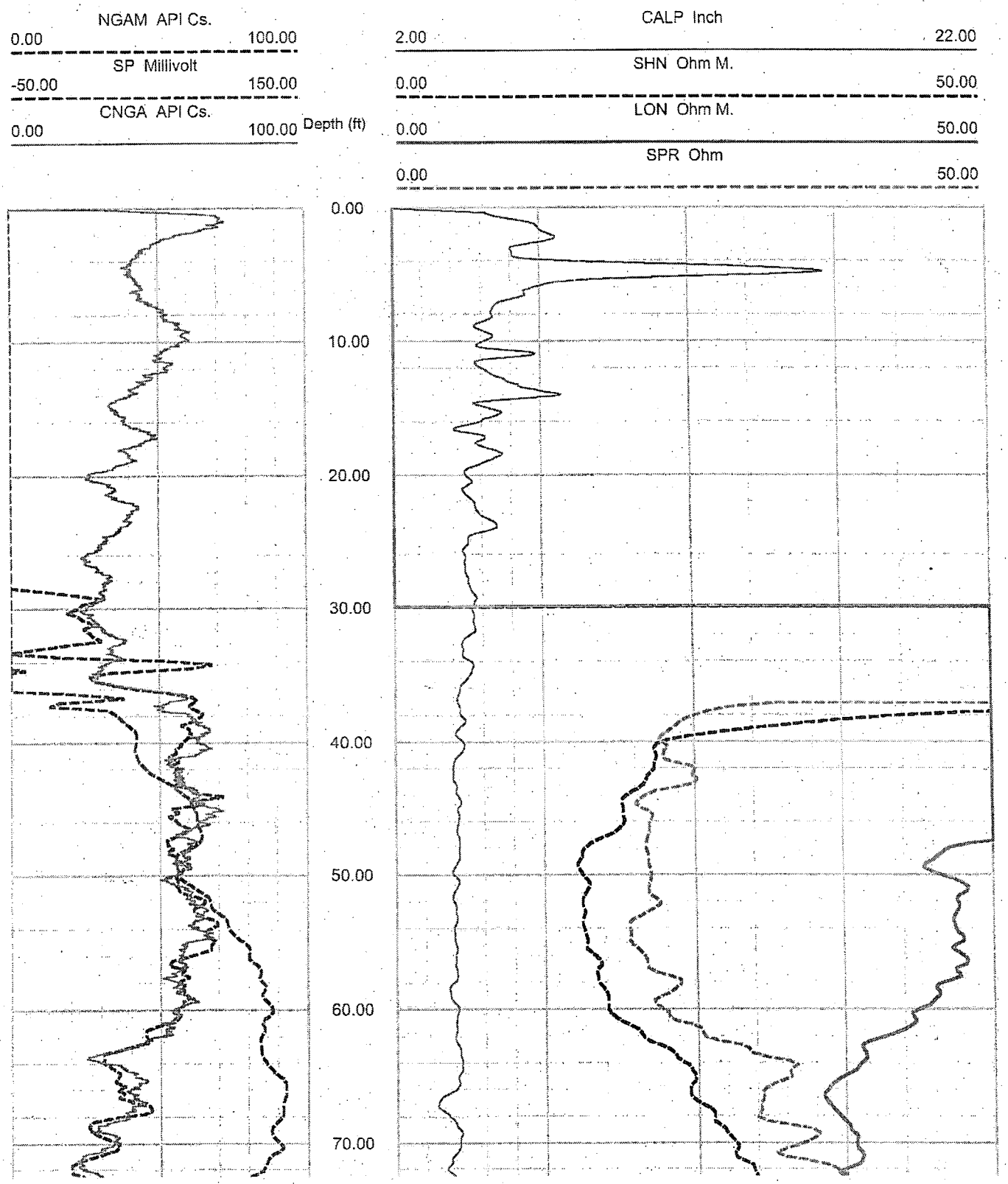
COMPANY	GEOVISION	OTHER SERVICES
WELL	B-319-DH	
FIELD		
COUNTRY		
STATE		
COUNTY		
LAT.:		
LONG.:		

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

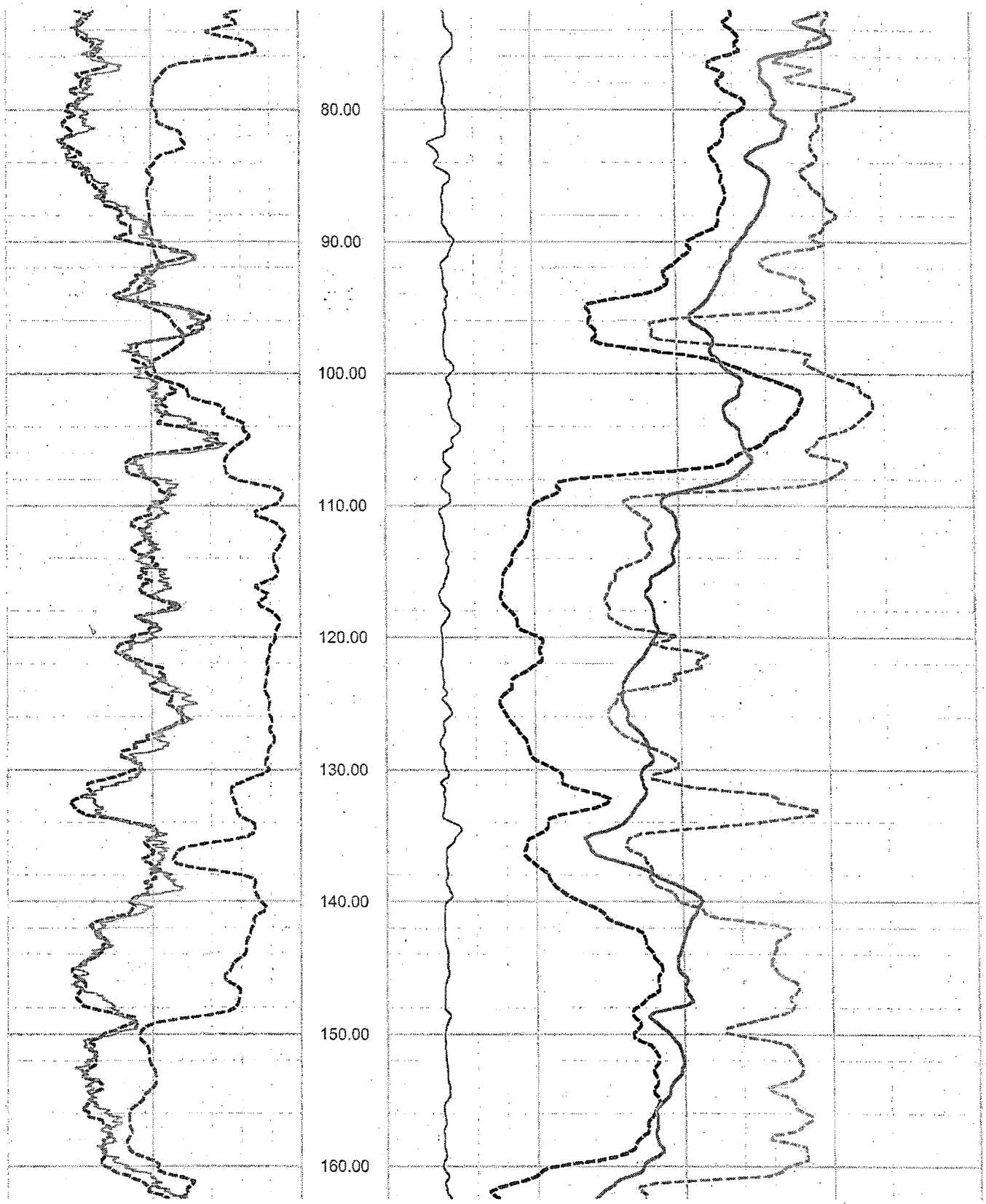
DATE	07 Dec 06	05 Dec 06	05 Dec 06
RUN#	2	0	0
TYPE OF LOG	CALIPER		
DEPTH DRILLER	215.00	0.00	0.00
DEPTH LOGGER	215.00	0.00	0.00
LOG DEEPEST	215.00	0.00	0.00
LOG SHALLOW	41.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
2	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

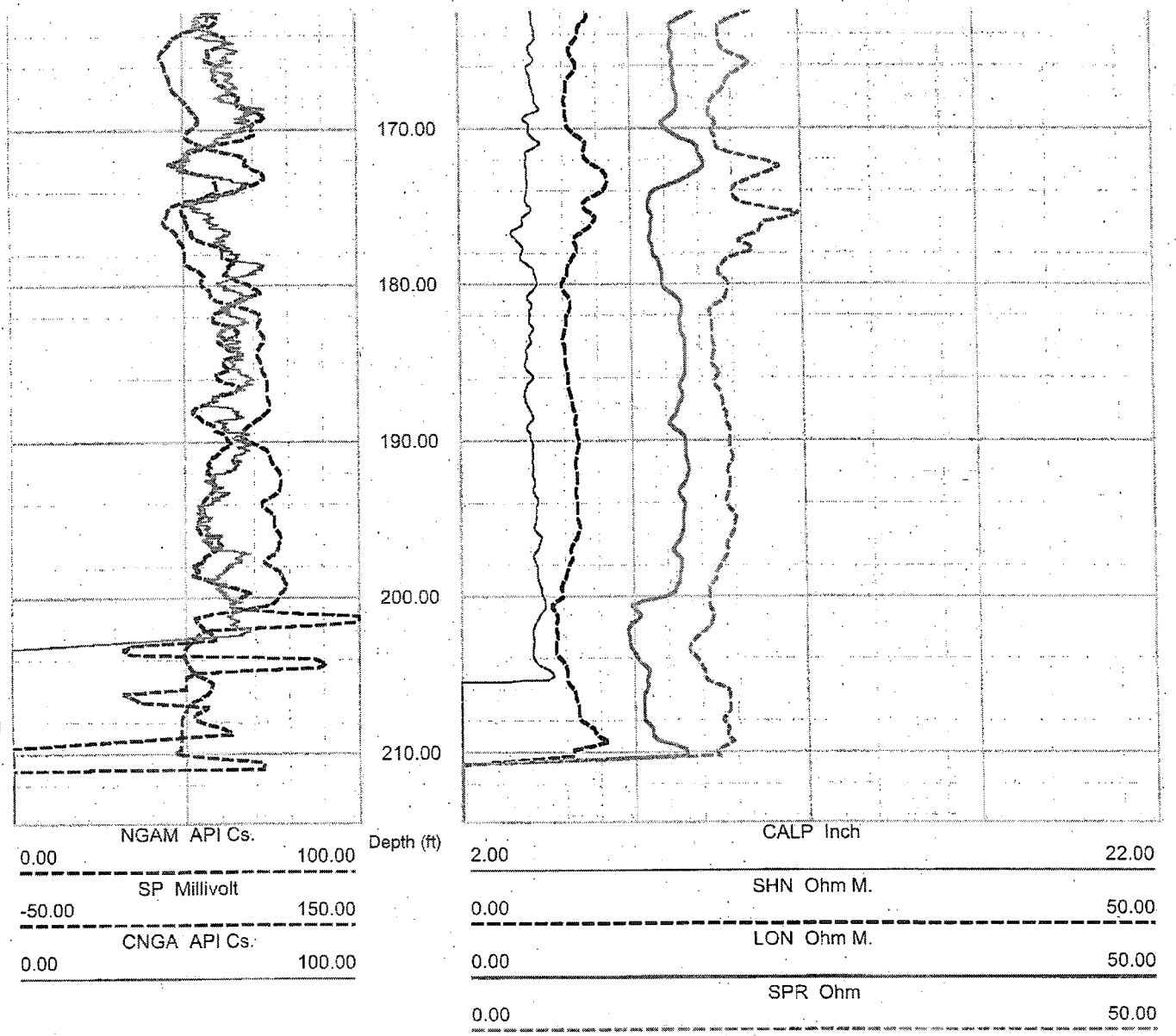
STP COL Boring B-319-DH ELOG, Caliper and Gamma rev 1 Sheet 1 of 4



STP COL Boring B-319-DH ELOG, Caliper and Gamma rev 1 Sheet 2 of 4



STP COL Boring B-319-DH ELOG, Caliper and Gamma rev 1 Sheet 3 of 4



STP COL Boring B-319-DH ELOG, Caliper and Gamma rev 1 Sheet 4 of 4

ROBERTSON GEOLOGGING LIMITED

STP COL

B328ELOGUP01CALUP01

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-328-DH 8 November 2006 ..

COMPANY	GEOVision
WELL	B-328-DH
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

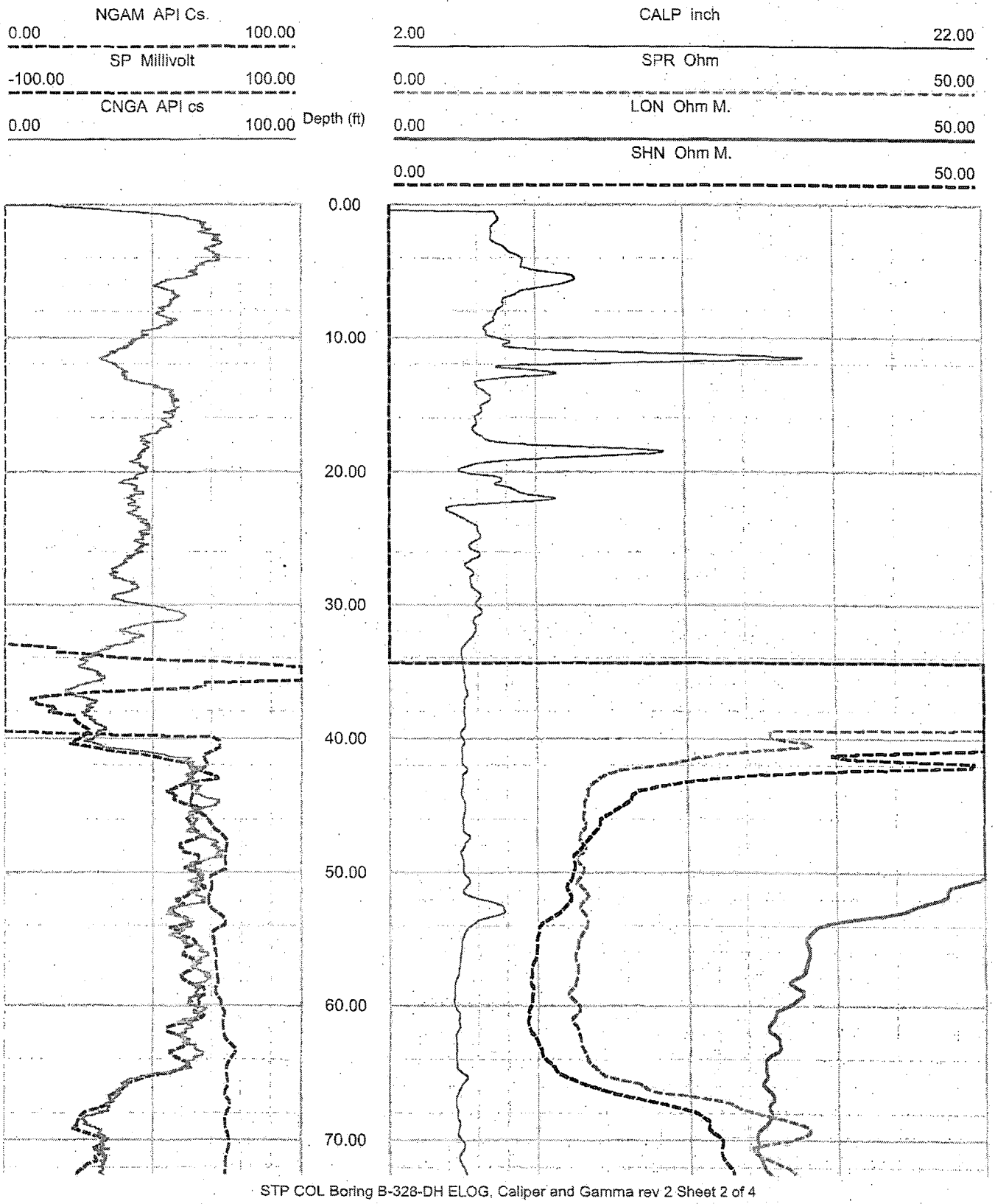
OTHER SERVICES

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

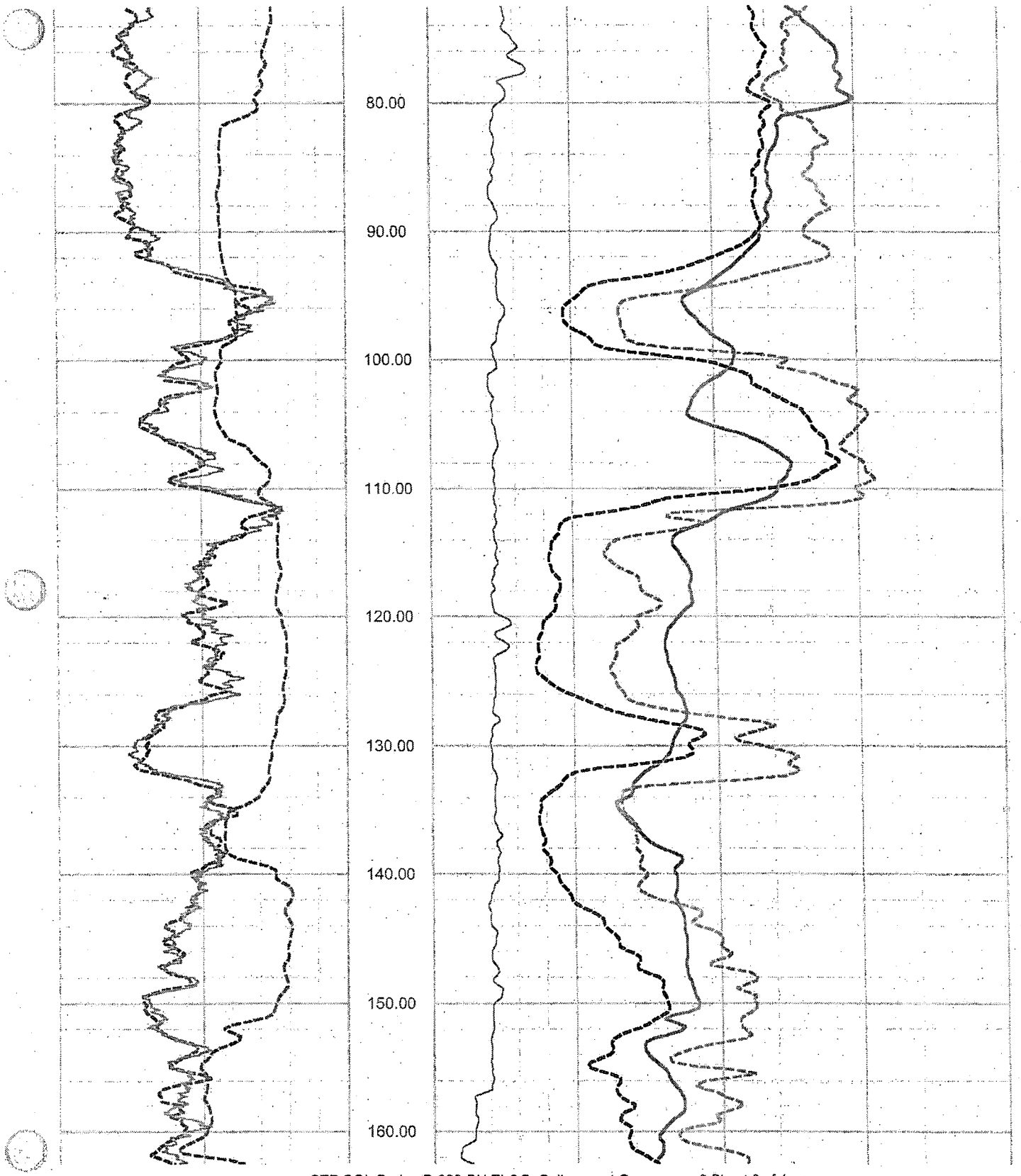
DATE	08 Nov 06	21 Oct 05	21 Oct 05
RUN#	3	0	0
TYPE OF LOG	ELOG, CALI..		
DEPTH DRILLER	215.00	0.00	0.00
DEPTH LOGGER	218.00	0.00	0.00
LOG DEEPEST	218.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
3	4.00	0.00	218.00	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

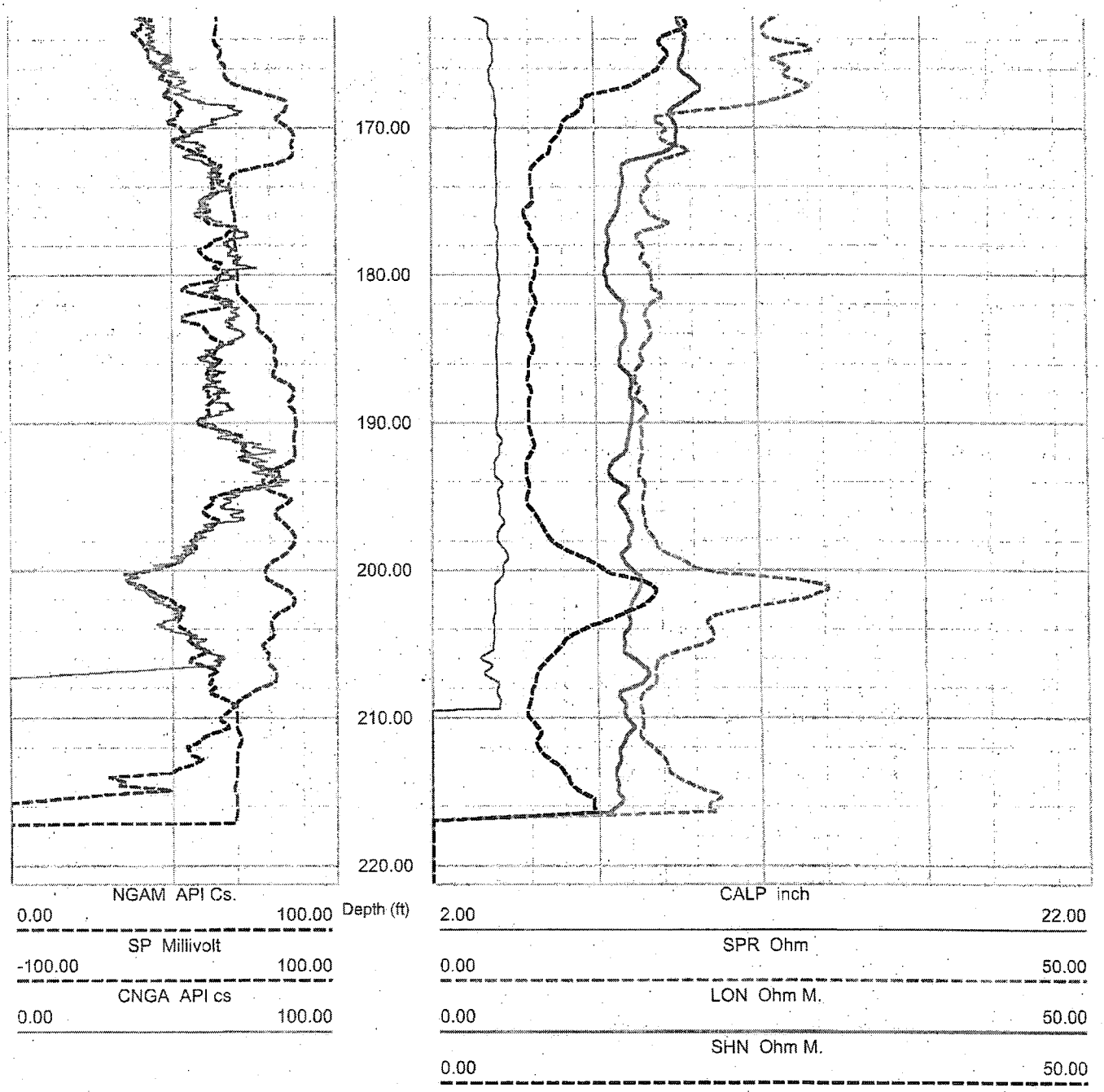
STP COL Boring B-328-DH ELOG, Caliper and Gamma rev 2 Sheet 1 of 4



STP COL Boring B-328-DH ELOG, Caliper and Gamma rev 2 Sheet 2 of 4



STP COL Boring B-328-DH ELOG, Caliper and Gamma rev 2 Sheet 3 of 4



STP COL Boring B-328-DH ELOG, Caliper and Gamma rev 2 Sheet 4 of 4

ROBERTSON GEOLOGGING LIMITED

STP COL

B402ELOGUP01

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-402-DH 6 December 2006 ..

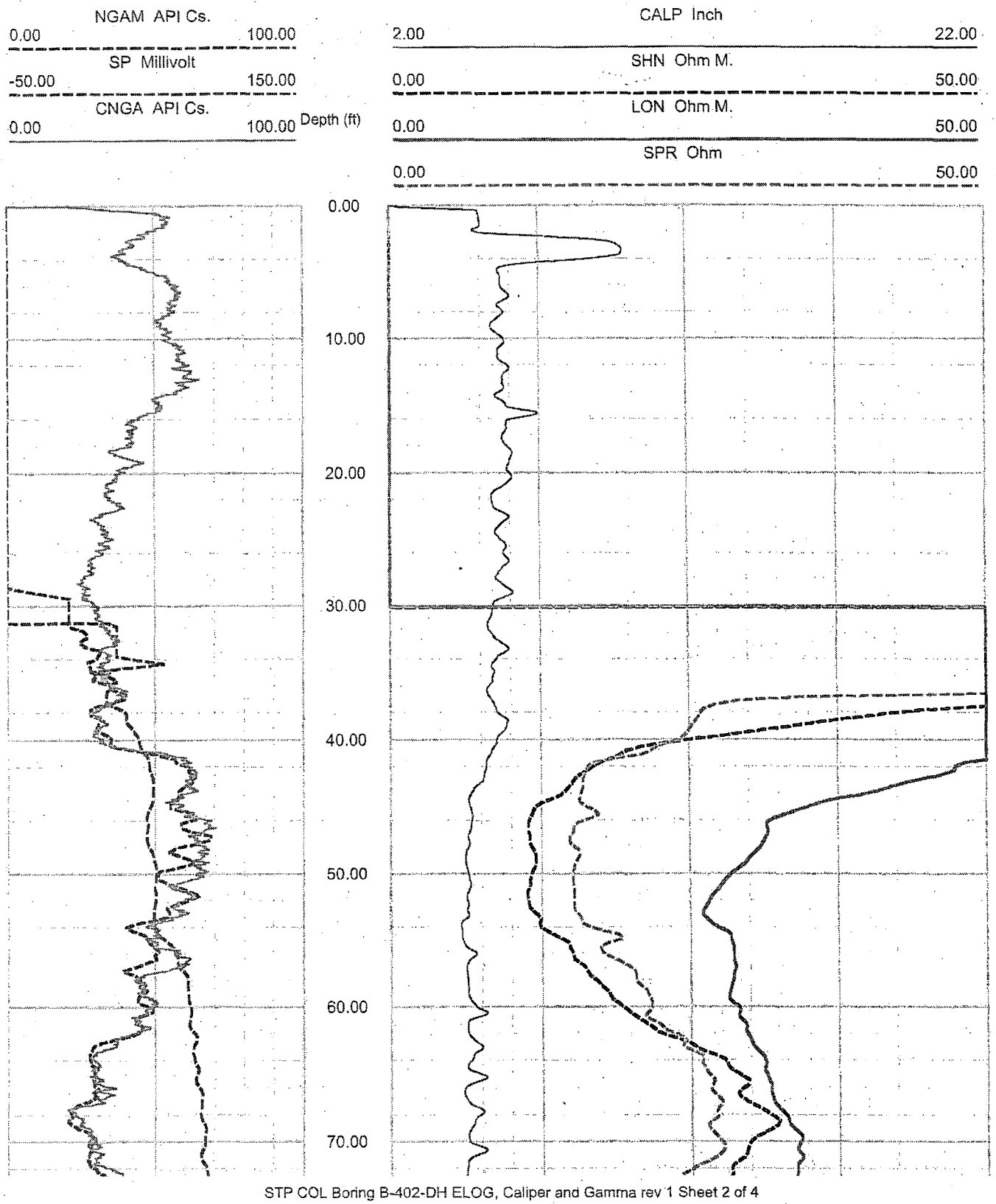
COMPANY	GEOVISION
WELL	B-402-DH
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

OTHER SERVICES

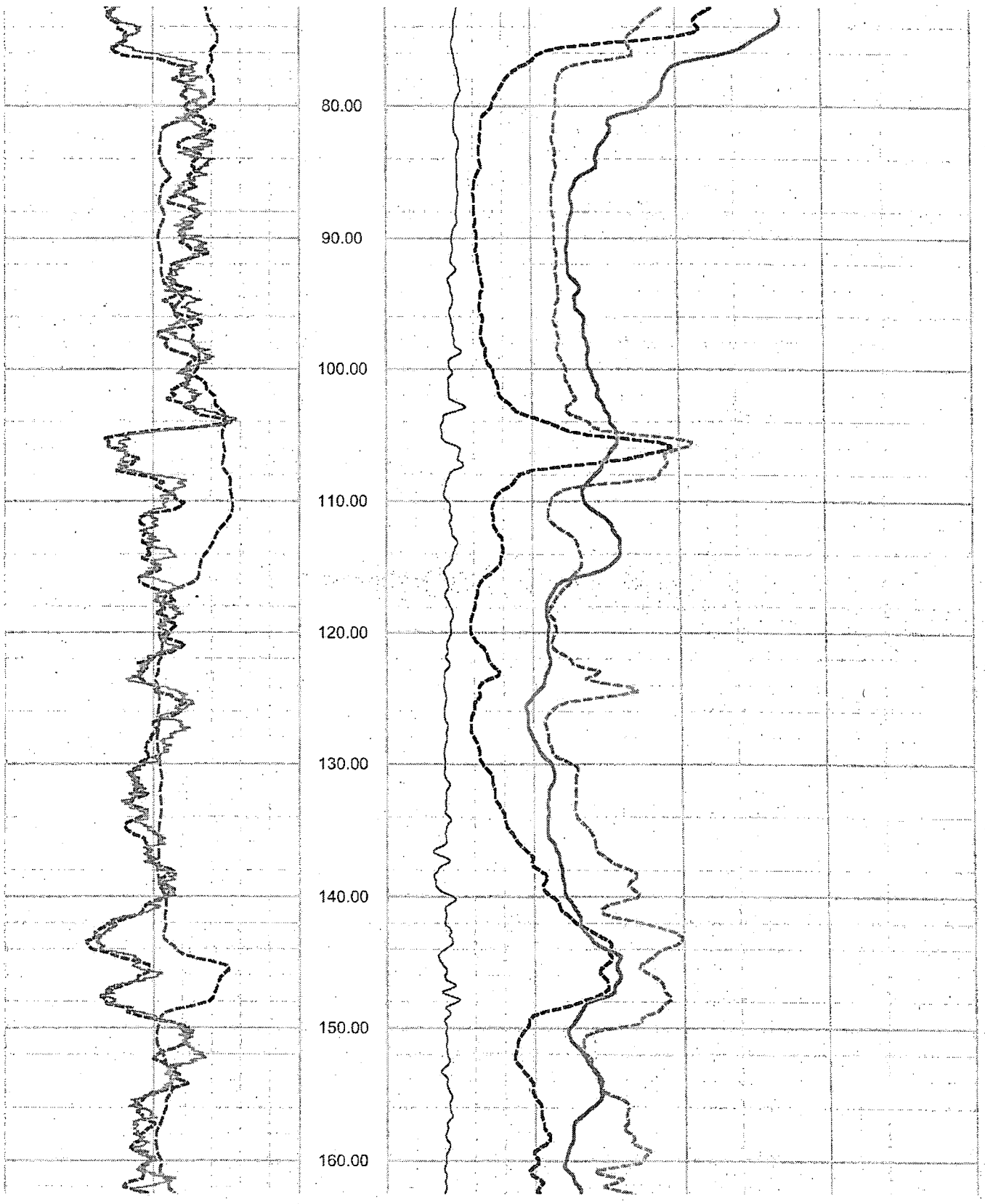
Perm. Da..	Elev	KB	0.00
Log. Da..		DF	0.00
Drill Datum		GL	0.00

DATE	06 Dec 06	05 Dec 06	05 Dec 06
RUN#	2	0	0
TYPE OF LOG	CAL		
DEPTH DRILLER	215.00	0.00	0.00
DEPTH LOGGER	215.00	0.00	0.00
LOG DEEPEST	215.00	0.00	0.00
LOG SHALLOW	39.00	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			

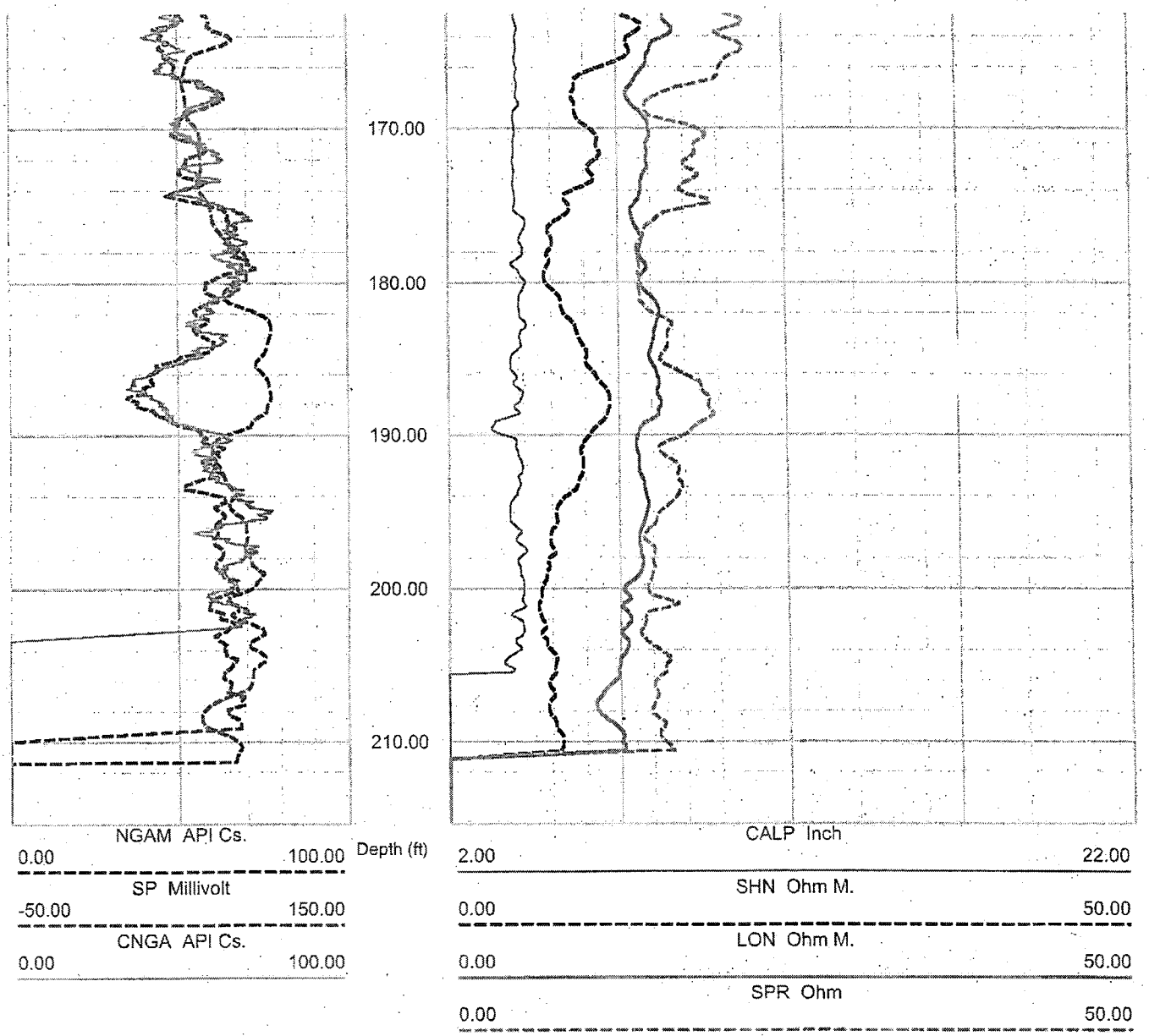
RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00



STP COL Boring B-402-DH ELOG, Caliper and Gamma rev 1 Sheet 2 of 4



STP COL Boring B-402-DH ELOG, Caliper and Gamma rev 1 Sheet 3 of 4



STP COL Boring B-402-DH ELOG, Caliper and Gamma rev 1 Sheet 4 of 4

ROBERTSON GEOLOGGING LIMITED

STP COL

B405ELOGUP02

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-405-DH 7-8 November 200..

COMPANY	GEOVision
WELL	B-405-DH
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

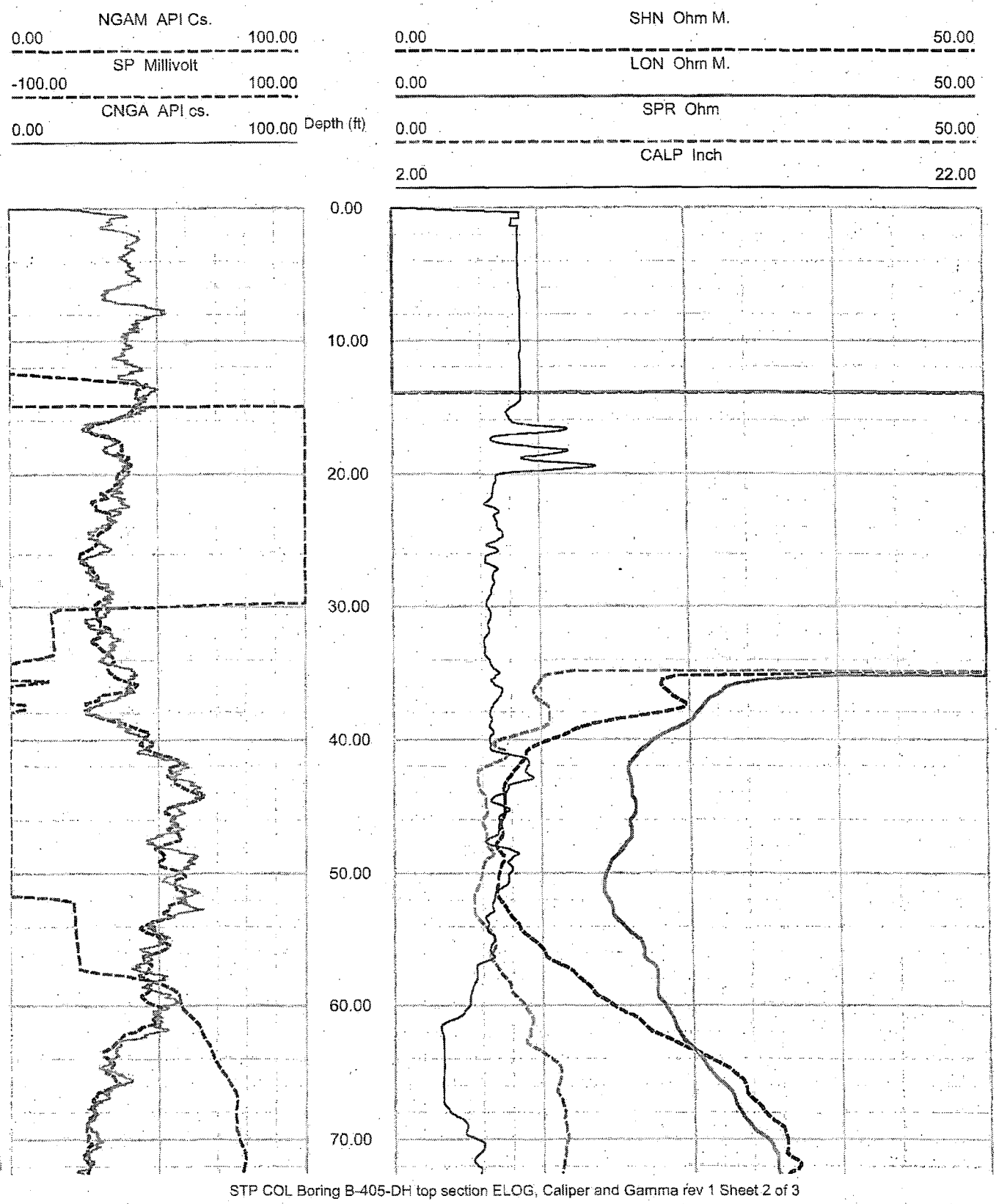
OTHER SERVICES

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

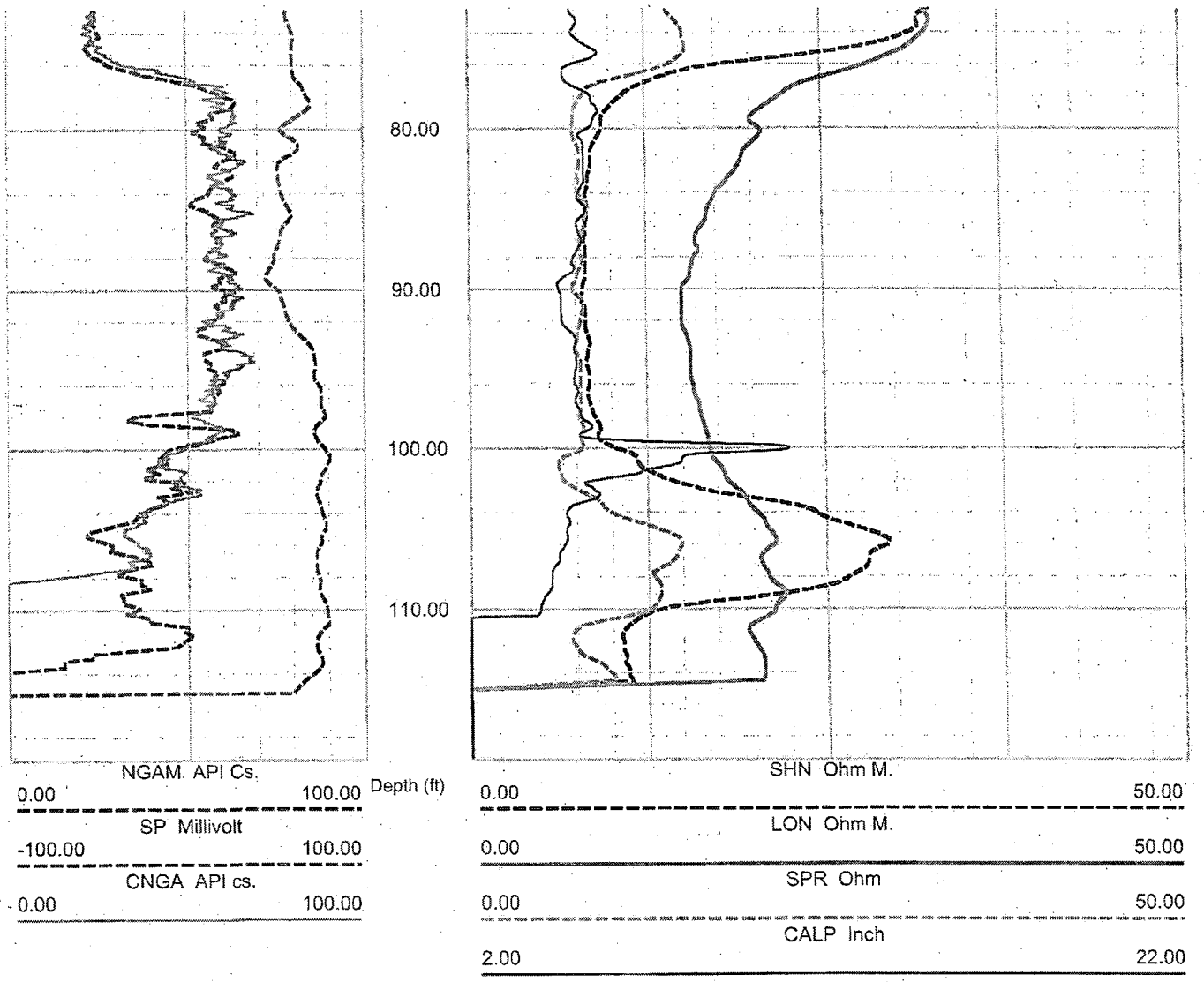
DATE	08 Nov 06	21 Oct 05	21 Oct 05
RUN#	2	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	120.00	0.00	0.00
DEPTH LOGGER	120.00	0.00	0.00
LOG DEEPEST	120.00	0.00	0.00
LOG SHALLOW	20.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
2	4.00	0.00	120.00	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

STP COL Boring B-405-DH top section ELOG, Caliper and Gamma rev 1 Sheet 1 of 3



STP COL Boring B-405-DH top section ELOG, Caliper and Gamma rev 1 Sheet 2 of 3



STP COL Boring B-405-DH top section ELOG, Caliper and Gamma rev 1 Sheet 3 of 3

ROBERTSON GEOLOGGING LIMITED

STP COL

B405ELOGUP01

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-405-DH 7-8 November 200..

COMPANY	GEOVision
WELL	B-405-DH
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

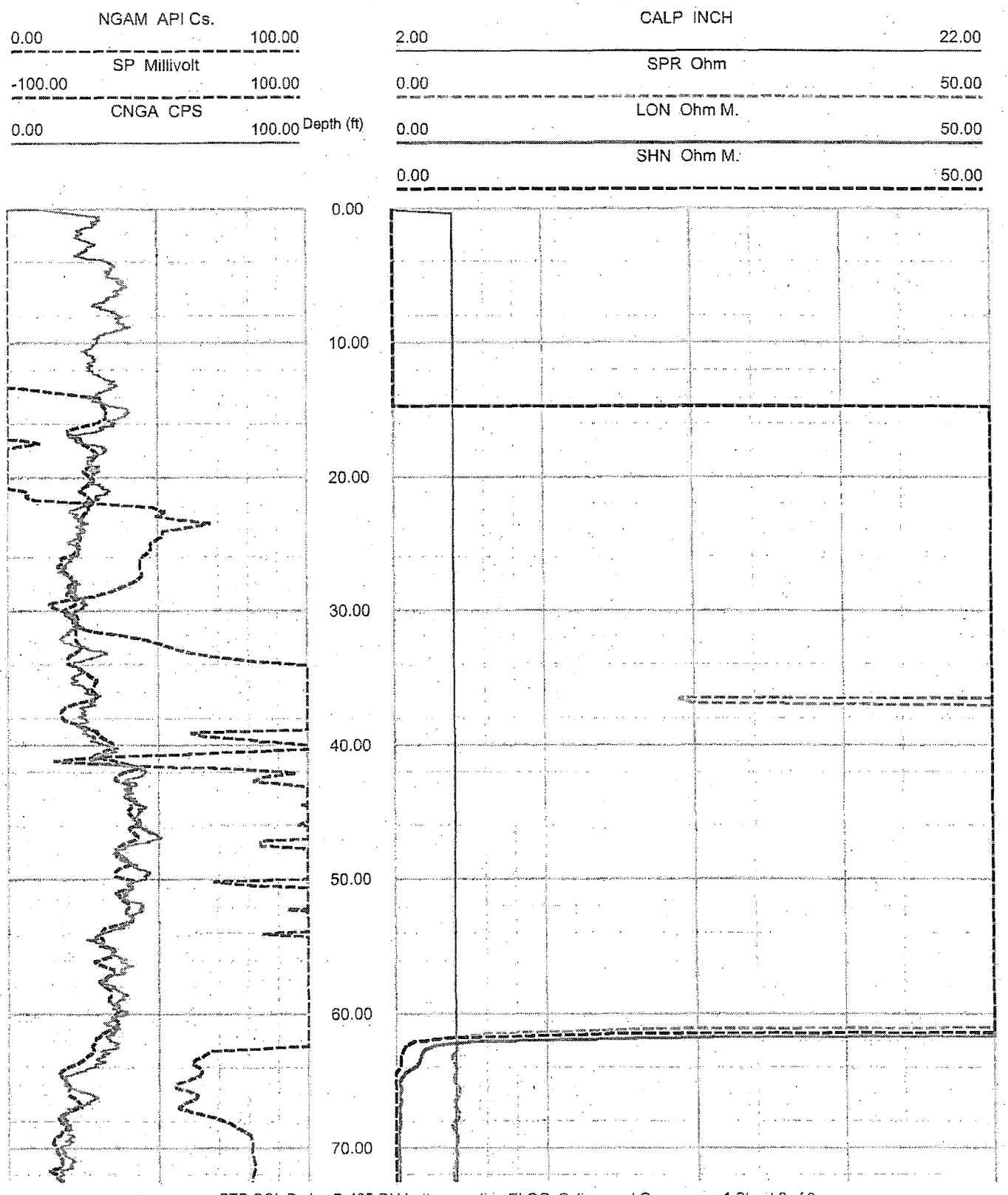
OTHER SERVICES

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

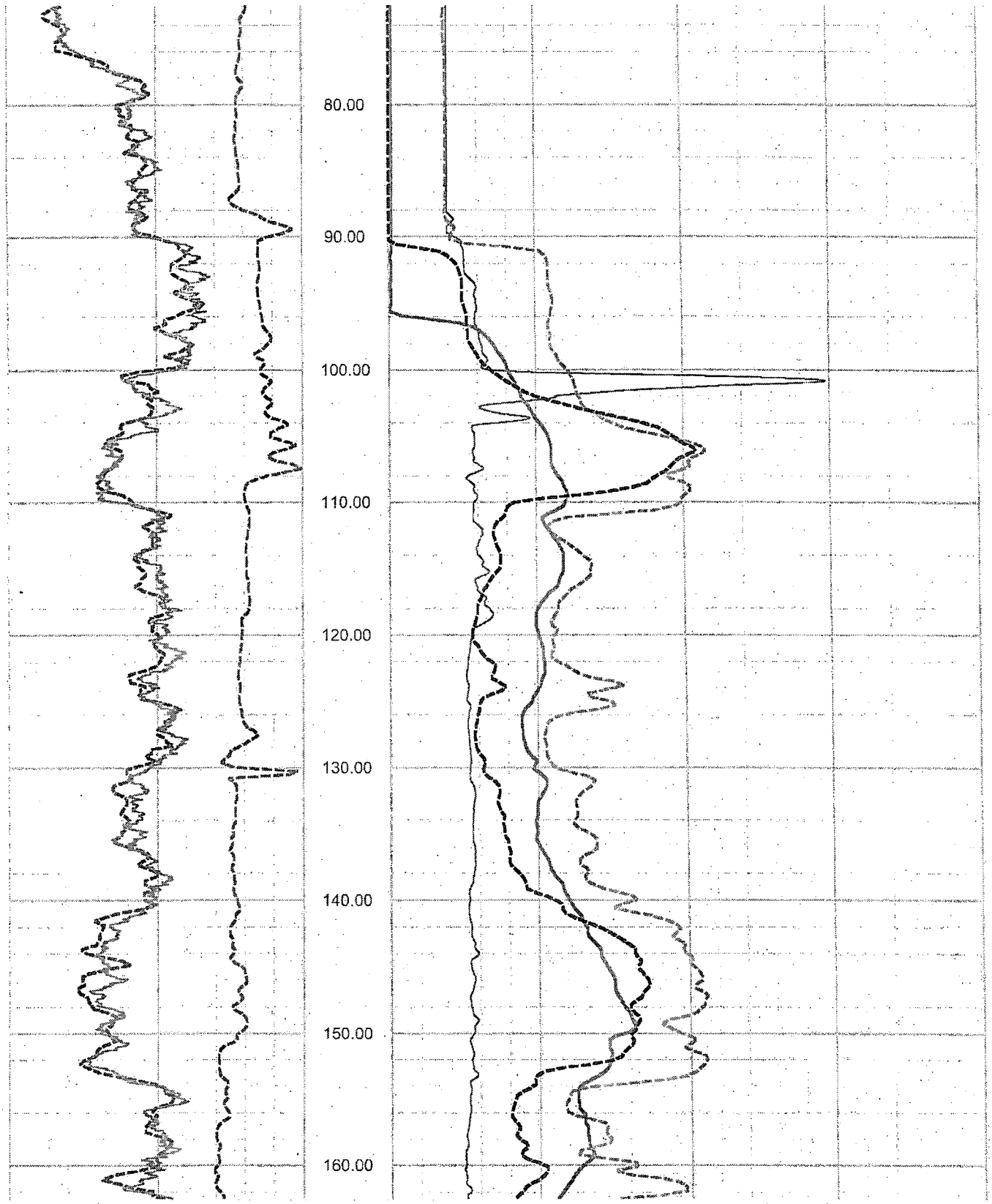
DATE	07 Nov 06	21 Oct 05	21 Oct 05
RUN#	3	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	618.00	0.00	0.00
DEPTH LOGGER	618.00	0.00	0.00
LOG DEEPEST	618.00	0.00	0.00
LOG SHALLOW	30.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
3	4.00	0.00	618.00	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

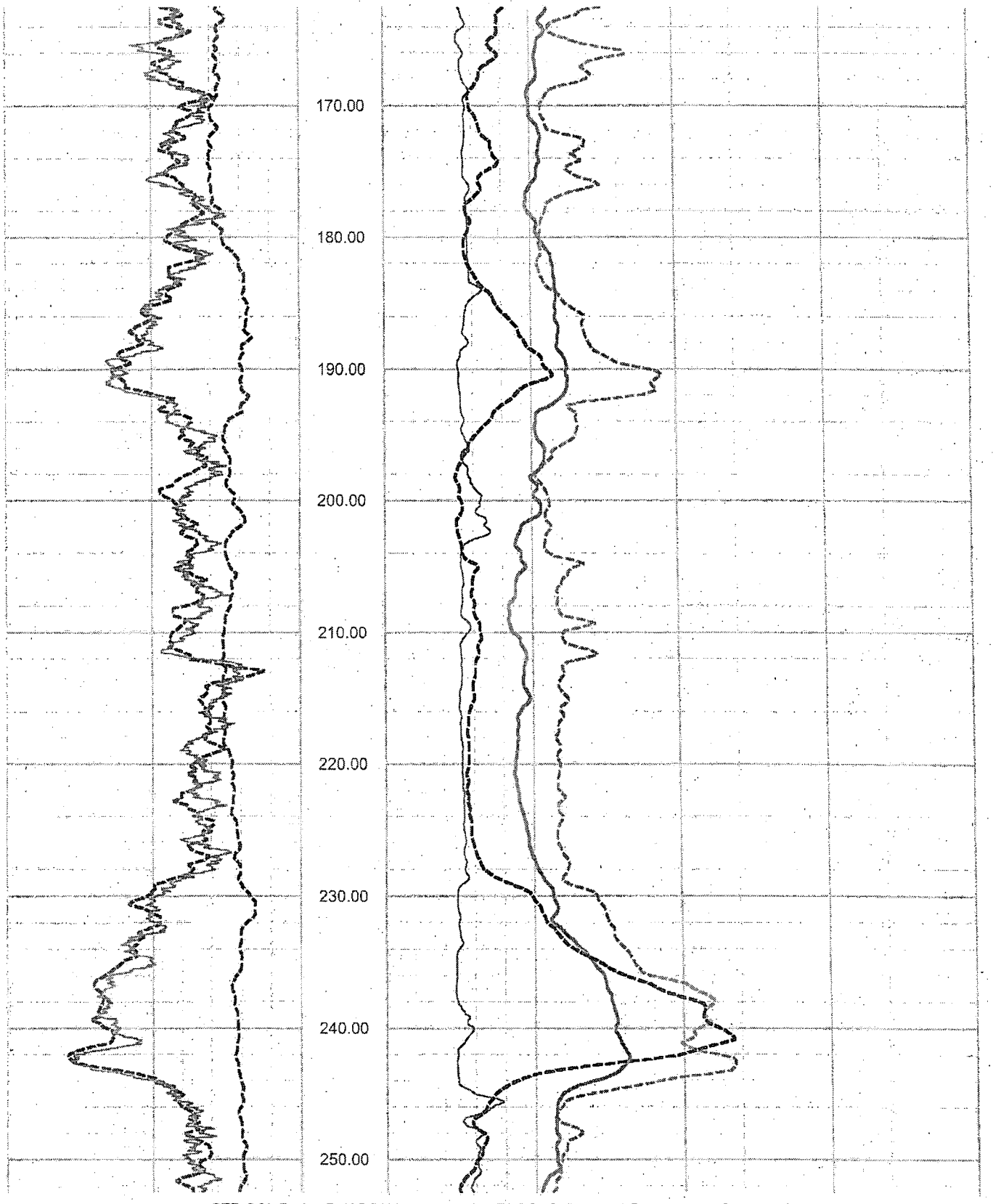
STP COL Boring B-405-DH bottom section ELOG, Caliper and Gamma rev 1 Sheet 1 of 9



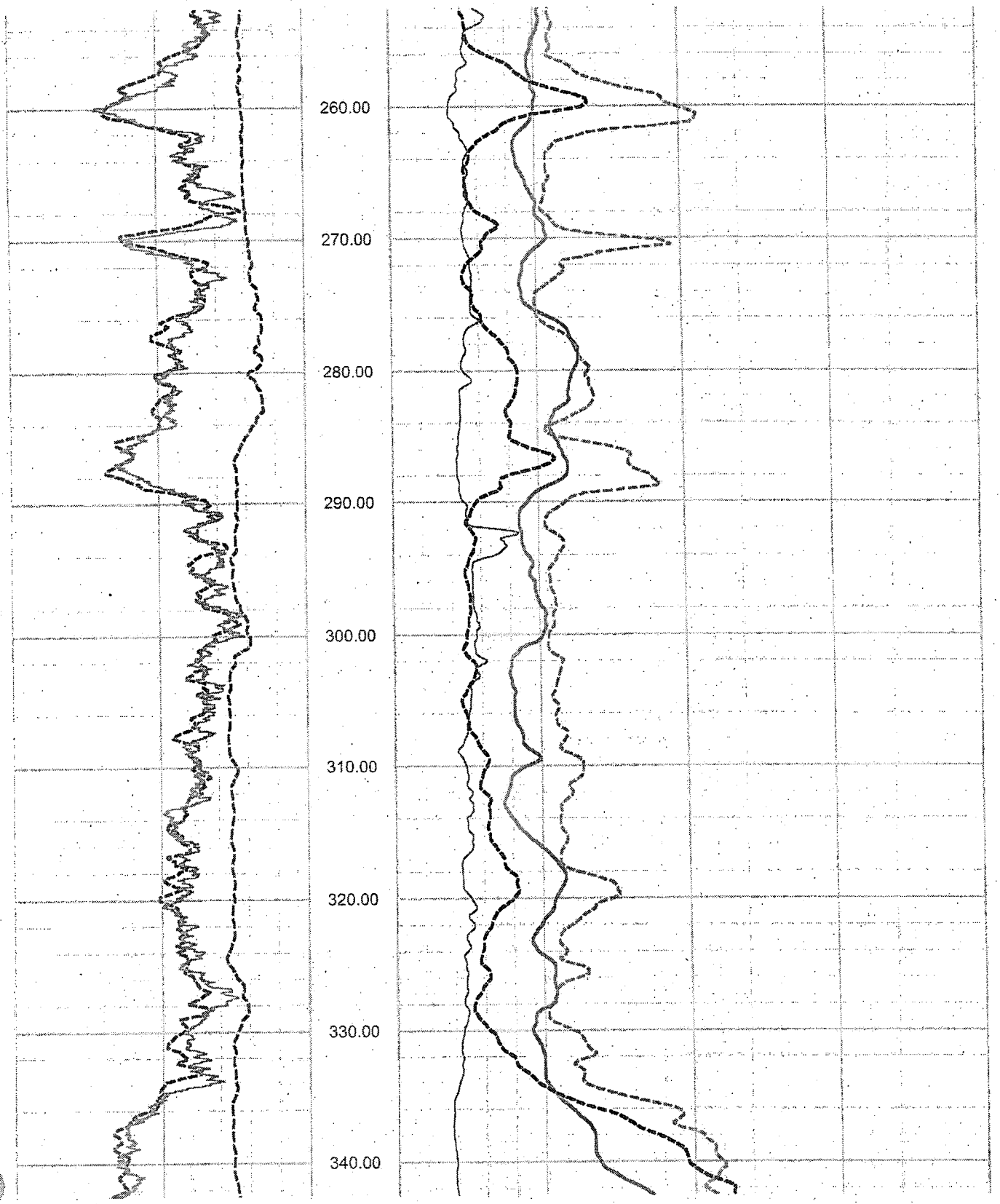
STP COL Boring B-405-DH bottom section ELOG, Caliper and Gamma rev 1 Sheet 2 of 9



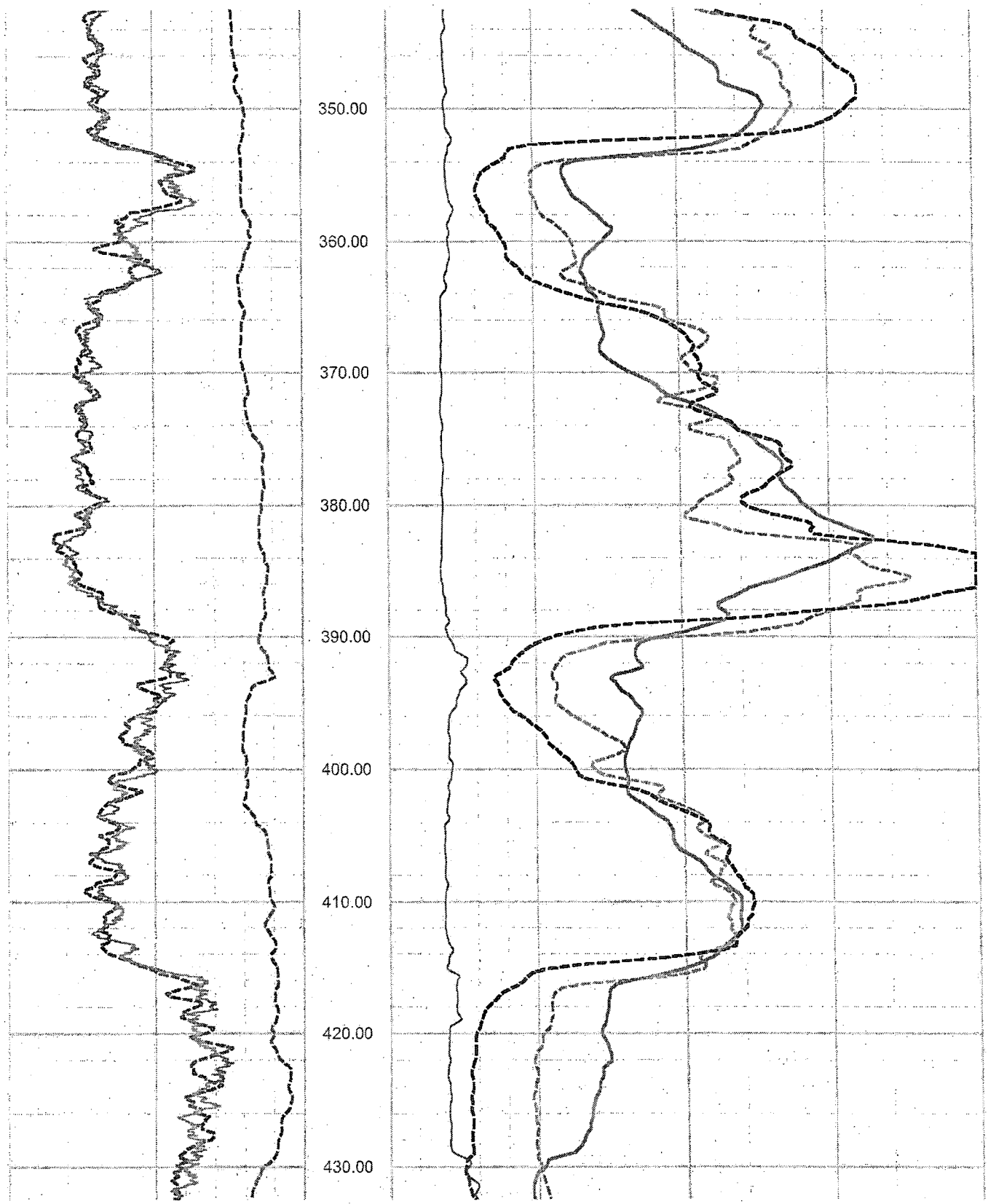
STP COL Boring B-405-DH bottom section ELOG, Caliper and Gamma rev 1 Sheet 3 of 9



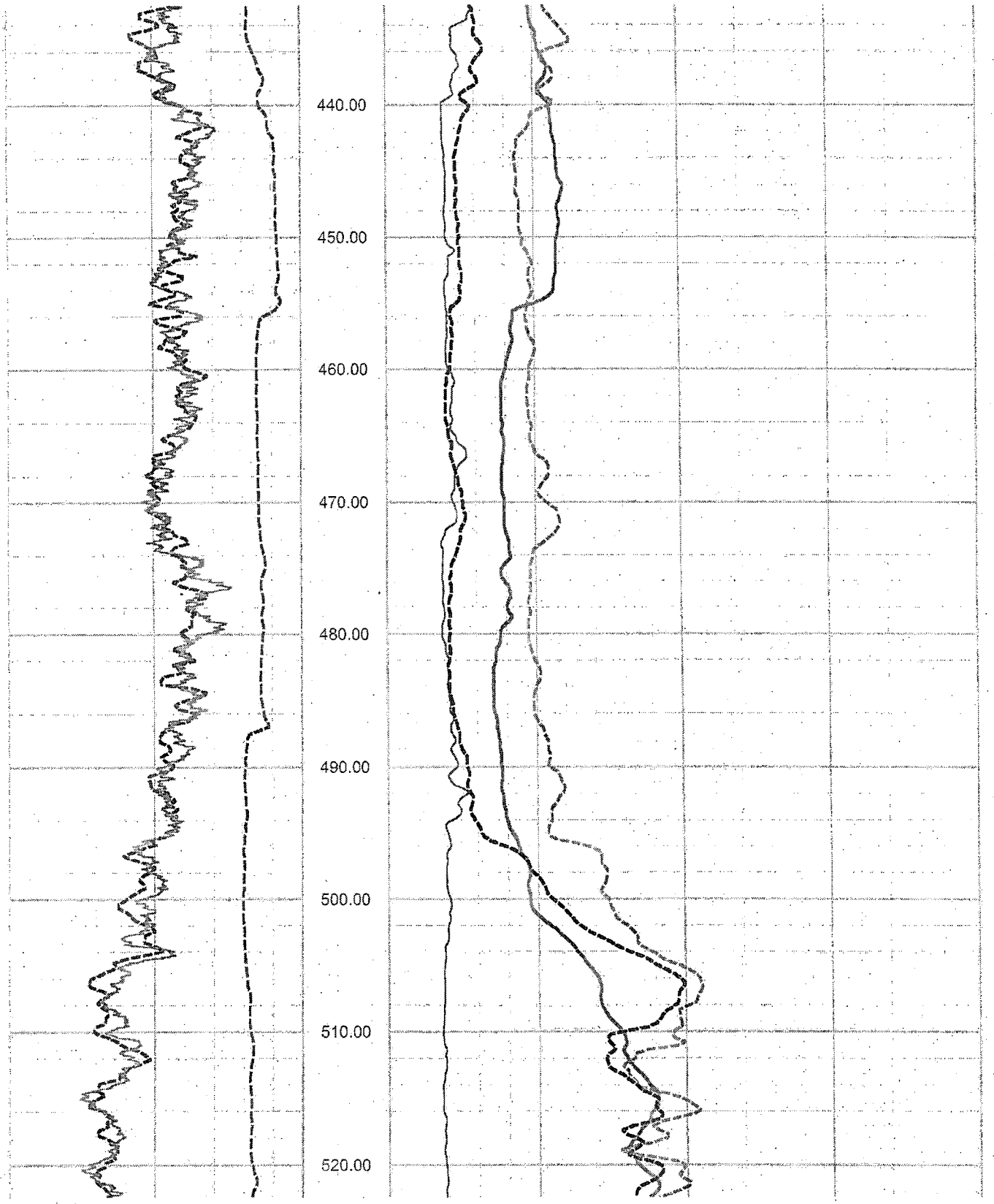
STP COL Boring B-405-DH bottom section ELOG, Caliper and Gamma rev 1 Sheet 4 of 9



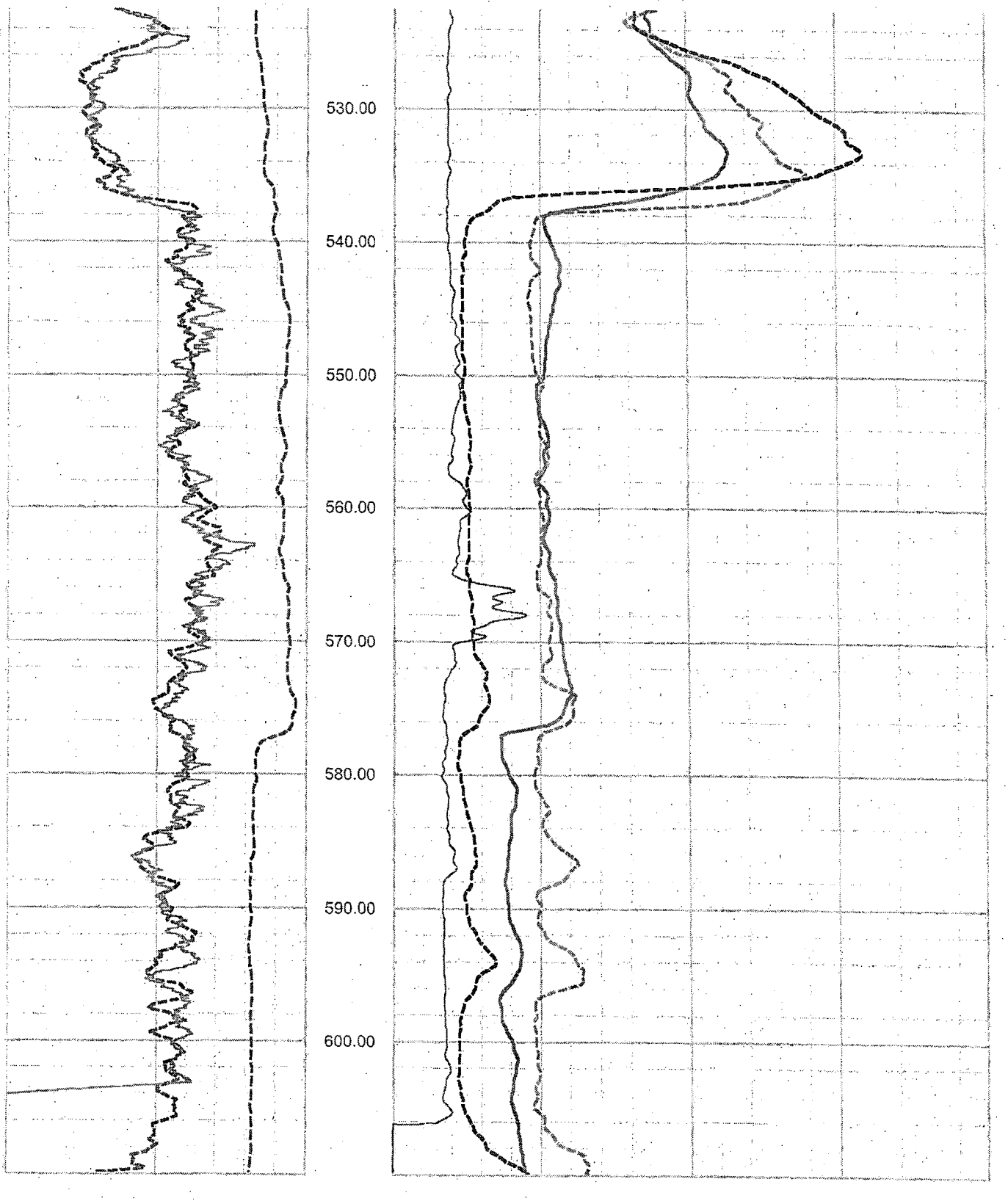
STP COL Boring B-405-DH bottom section ELOG, Caliper and Gamma rev 1 Sheet 5 of 9



STP COL Boring B-405-DH bottom section ELOG, Caliper and Gamma rev 1 Sheet 6 of 9



STP COL Boring B-405-DH bottom section ELOG, Caliper and Gamma rev 1 Sheet 7 of 9



STP COL Boring B-405-DH bottom section ELOG, Caliper and Gamma rev 1 Sheet 8 of 9

NGAM API Cs.			CALP INCH		
0.00	100.00	Depth (ft)	2.00		22.00
SP Millivolt			SPR Ohm		
-100.00	100.00		0.00		50.00
CNGA CPS			LON Ohm M.		
0.00	100.00		0.00		50.00
			SHN Ohm M.		
			0.00		50.00

STP COL Boring B-405-DH bottom section ELOG, Caliper and Gamma rev 1 Sheet 9 of 9

ROBERTSON GEOLOGGING LIMITED

STP COL

B408ELOGUP01CALUP01

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-408-DH 9 November 2006 ..

COMPANY	GEOVision
WELL	B-408-DH
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

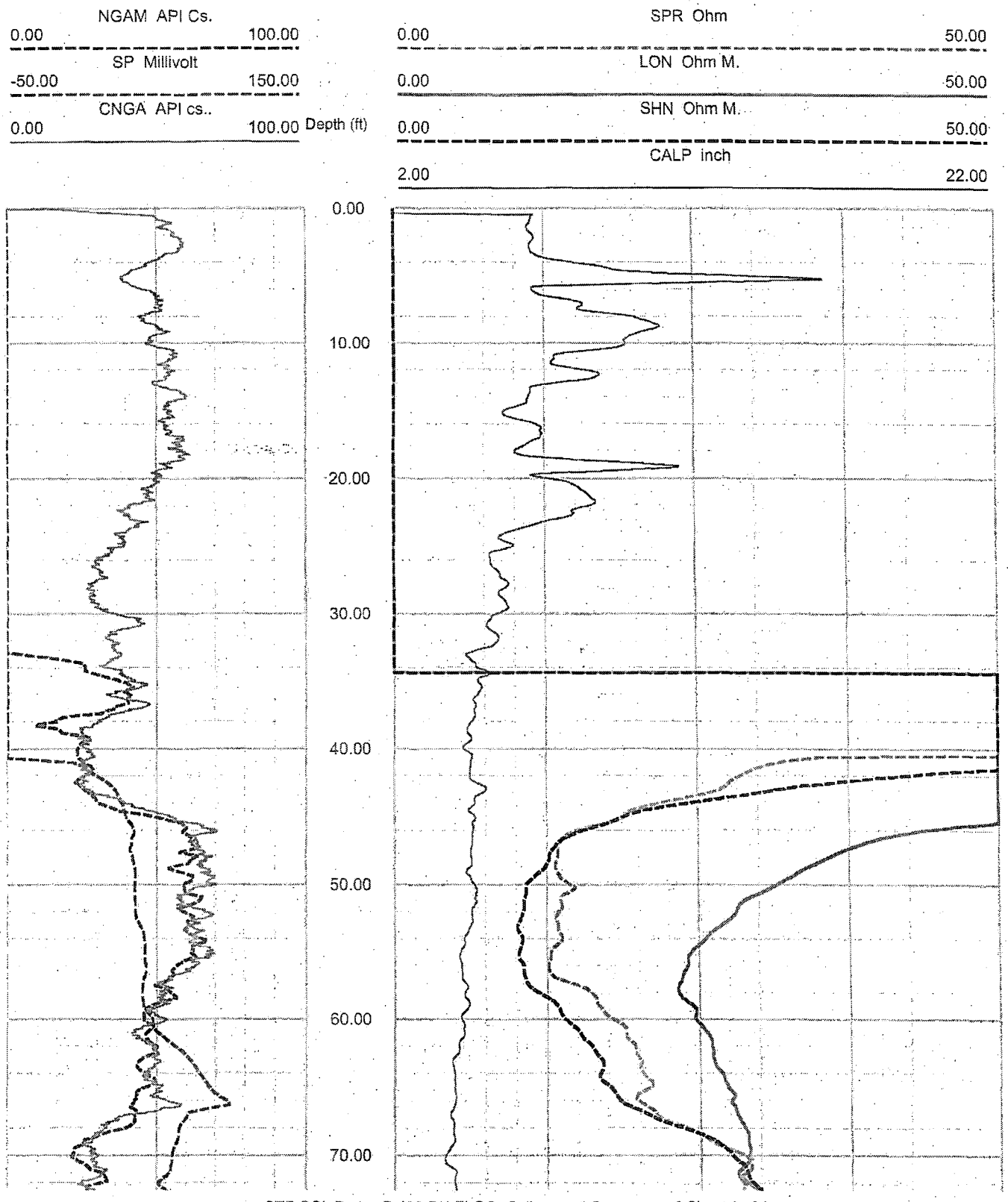
OTHER SERVICES

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

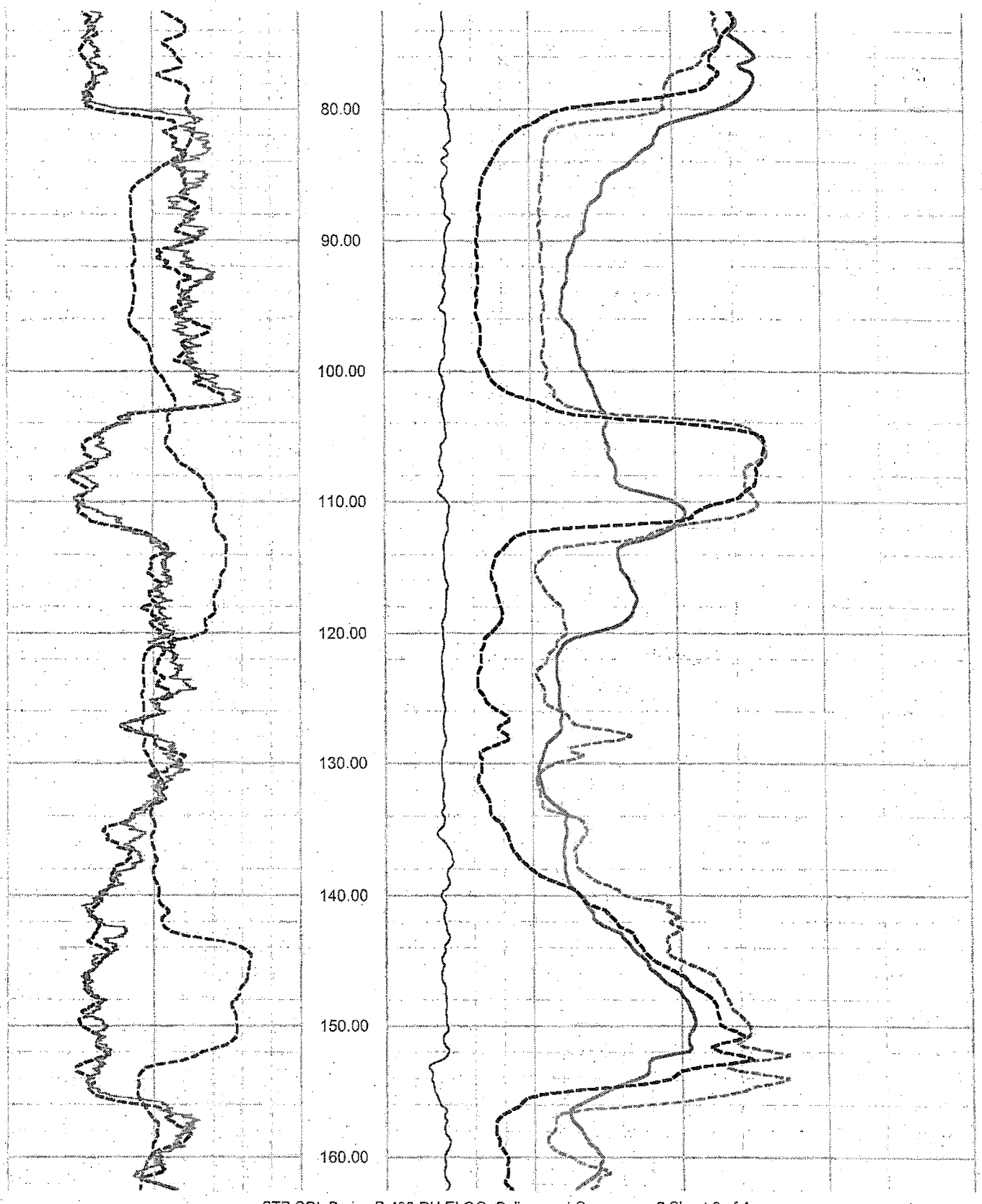
DATE	09 Nov 06	21 Oct 05	21 Oct 05
RUN#	1	0	0
TYPE OF LOG	ELOG, CALI..		
DEPTH DRILLER	215.00	0.00	0.00
DEPTH LOGGER	215.00	0.00	0.00
LOG DEEPEST	215.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
1	4.00	0.00	215.00	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

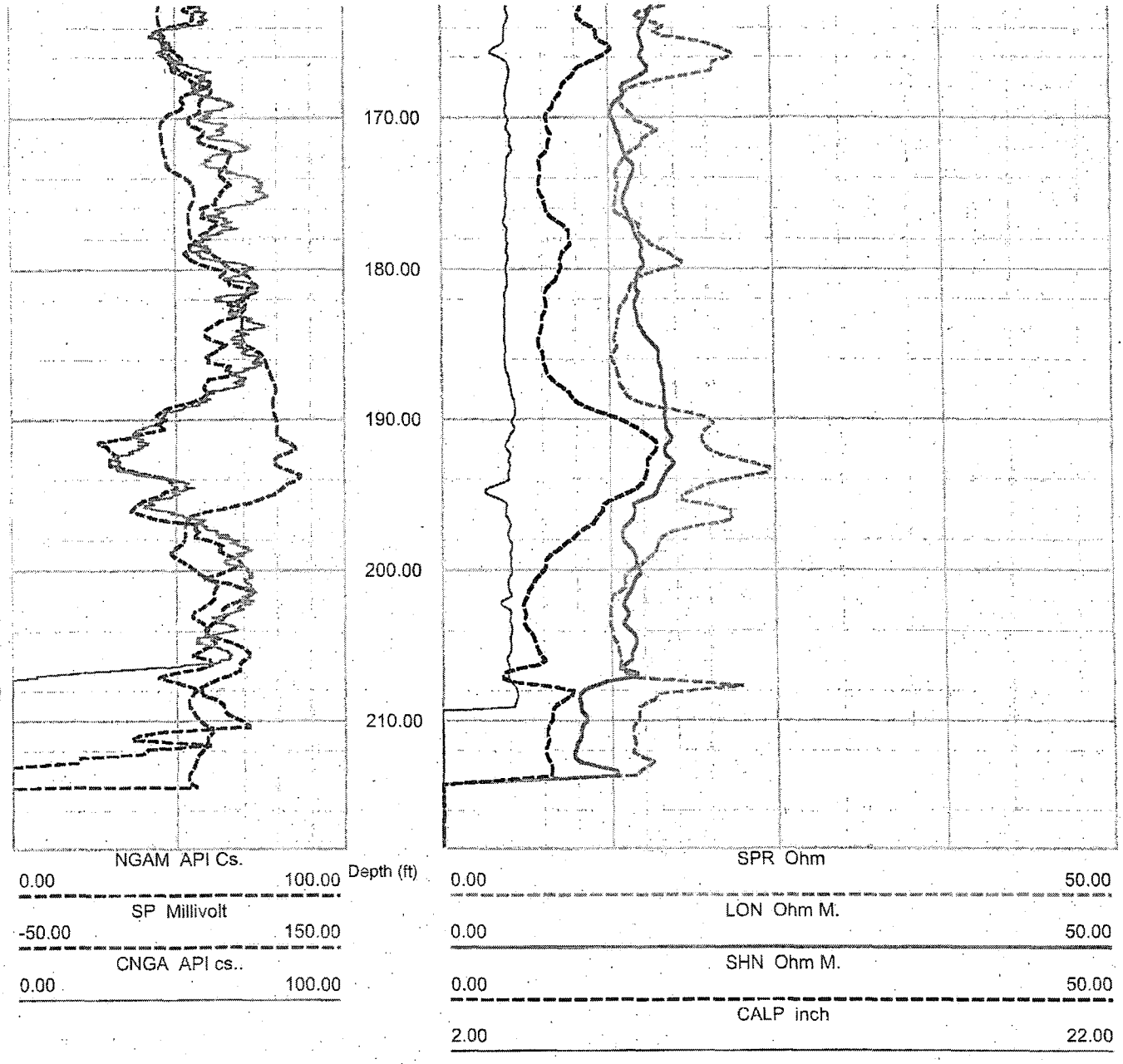
STP COL Boring B-408-DH ELOG, Caliper and Gamma rev 2 Sheet 1 of 4



STP COL Boring B-408-DH ELOG, Caliper and Gamma rev 2 Sheet 2 of 4



STP COL Boring B-408-DH ELOG, Caliper and Gamma rev 2 Sheet 3 of 4



STP COL Boring B-408-DH ELOG, Caliper and Gamma rev 2 Sheet 4 of 4

ROBERTSON GEOLOGGING LIMITED

STP COL

B419ELOGUP01

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-419-DH 4 December 2006 ..

COMPANY	GeoVision
WELL	B-419-DH
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

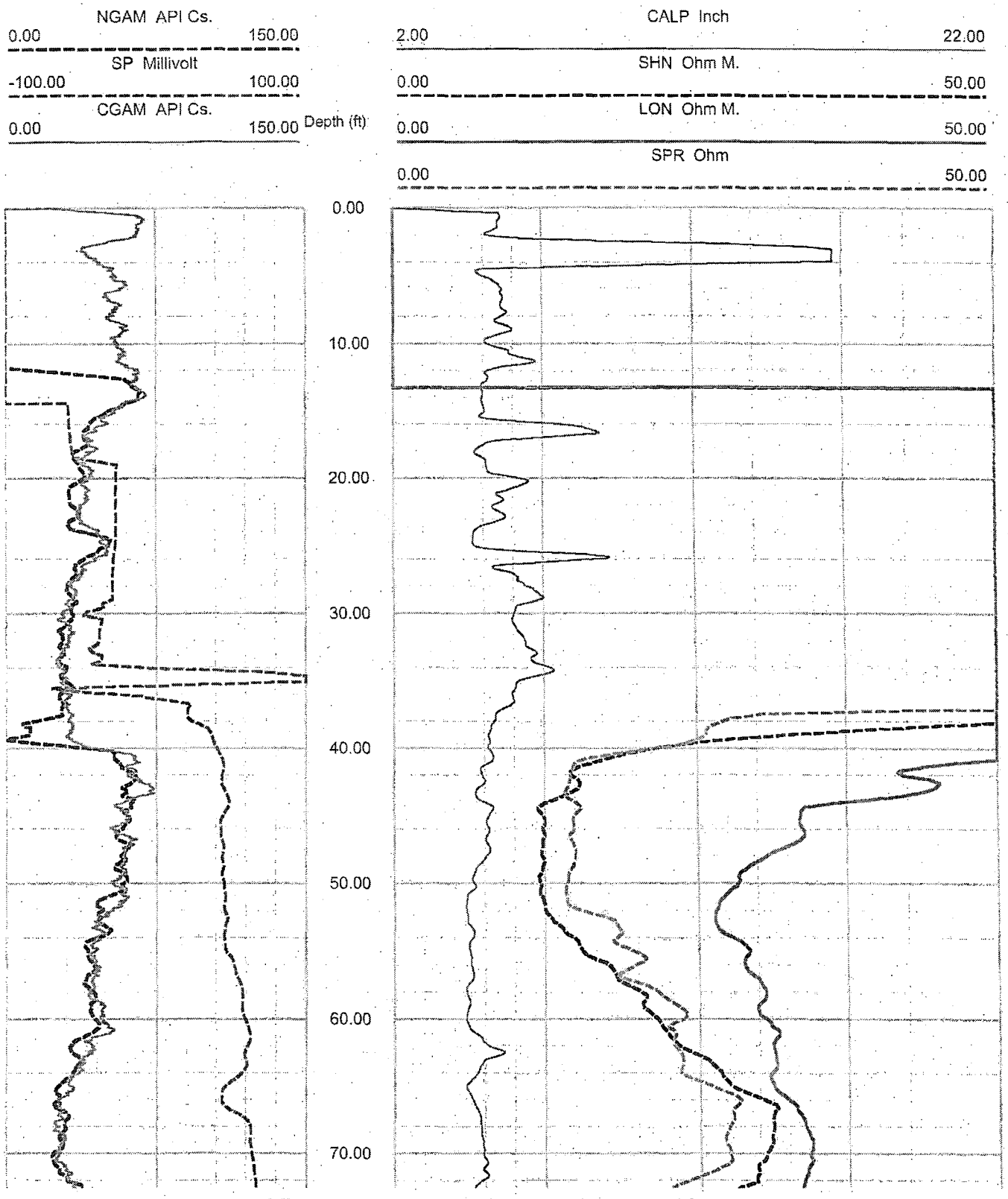
OTHER SERVICES

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

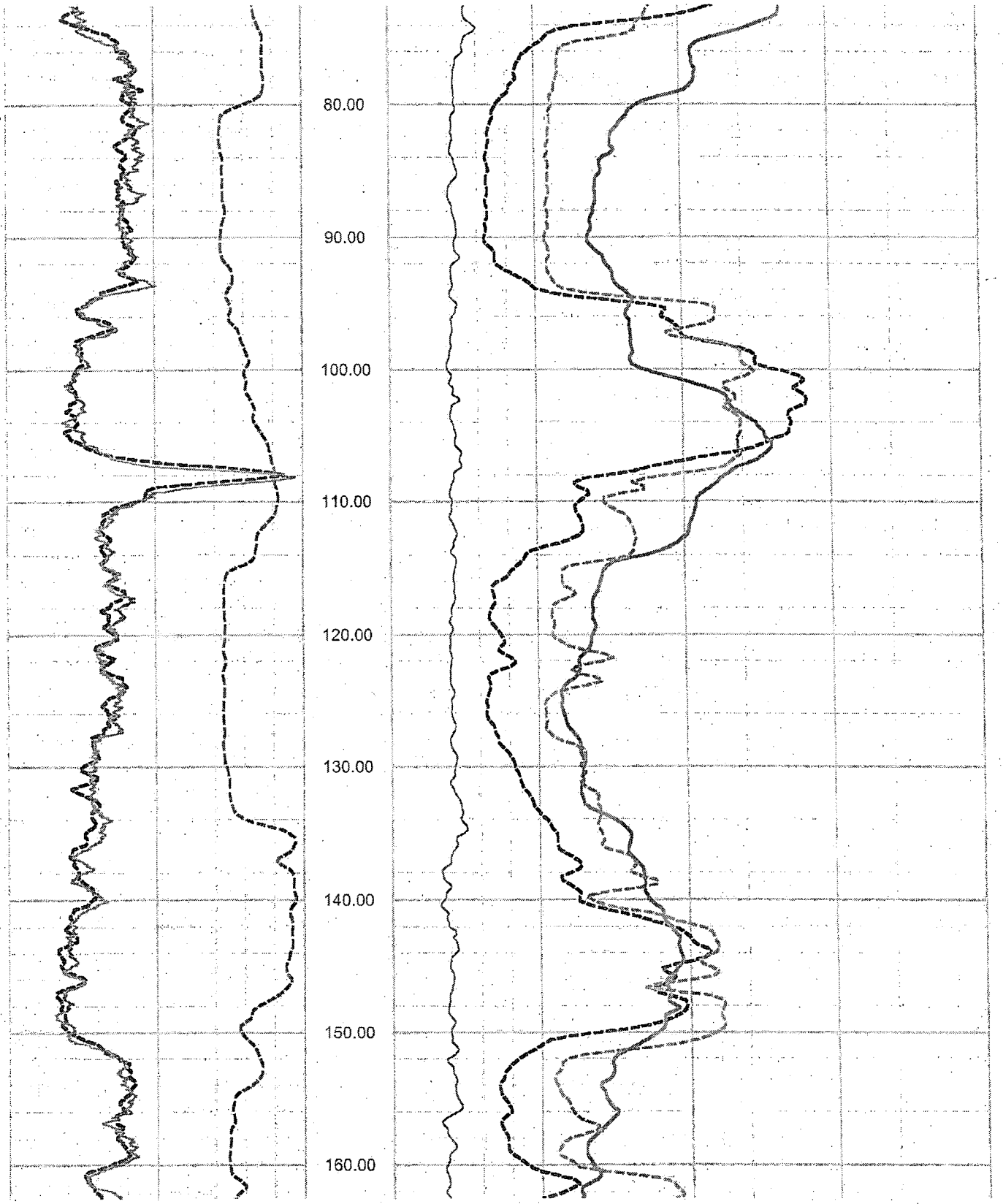
DATE	04 Dec 06	01 Oct 06	01 Oct 06
RUN#	2	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	215.00	0.00	0.00
DEPTH LOGGER	0.00	0.00	0.00
LOG DEEPEST	215.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R.STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
2	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

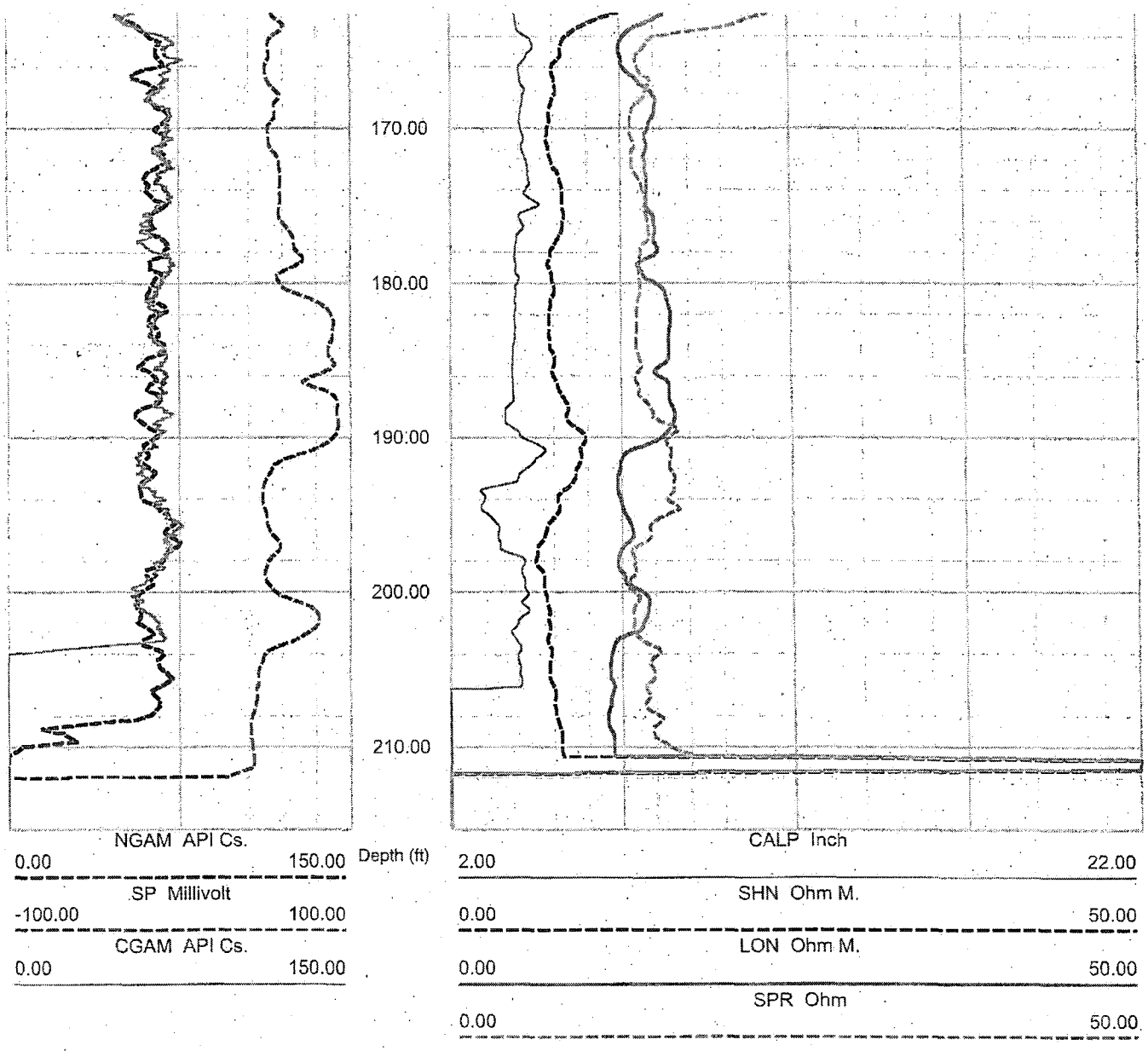
STP COL Boring B-419-DH ELOG, Caliper and Gamma rev 1 Sheet 1 of 4



STP COL Boring B-419-DH ELOG, Caliper and Gamma rev 1 Sheet 2 of 4



STP COL Boring B-419-DH ELOG, Caliper and Gamma rev 1 Sheet 3 of 4



STP COL Boring B-419-DH ELOG; Caliper and Gamma rev 1 Sheet 4 of 4

ROBERTSON GEOLOGGING LIMITED

STP COL

B428ELOGUP01

ROBERTSON GEOLOGGING TECHNOLOGY

REMARKS (C:\Data\PS\STP\B-428-DH 5 December 2006 ..

COMPANY	GEOVISION
WELL	B-428-DH
FIELD	
COUNTRY	
STATE	
COUNTY	
LAT.:	
LONG.:	

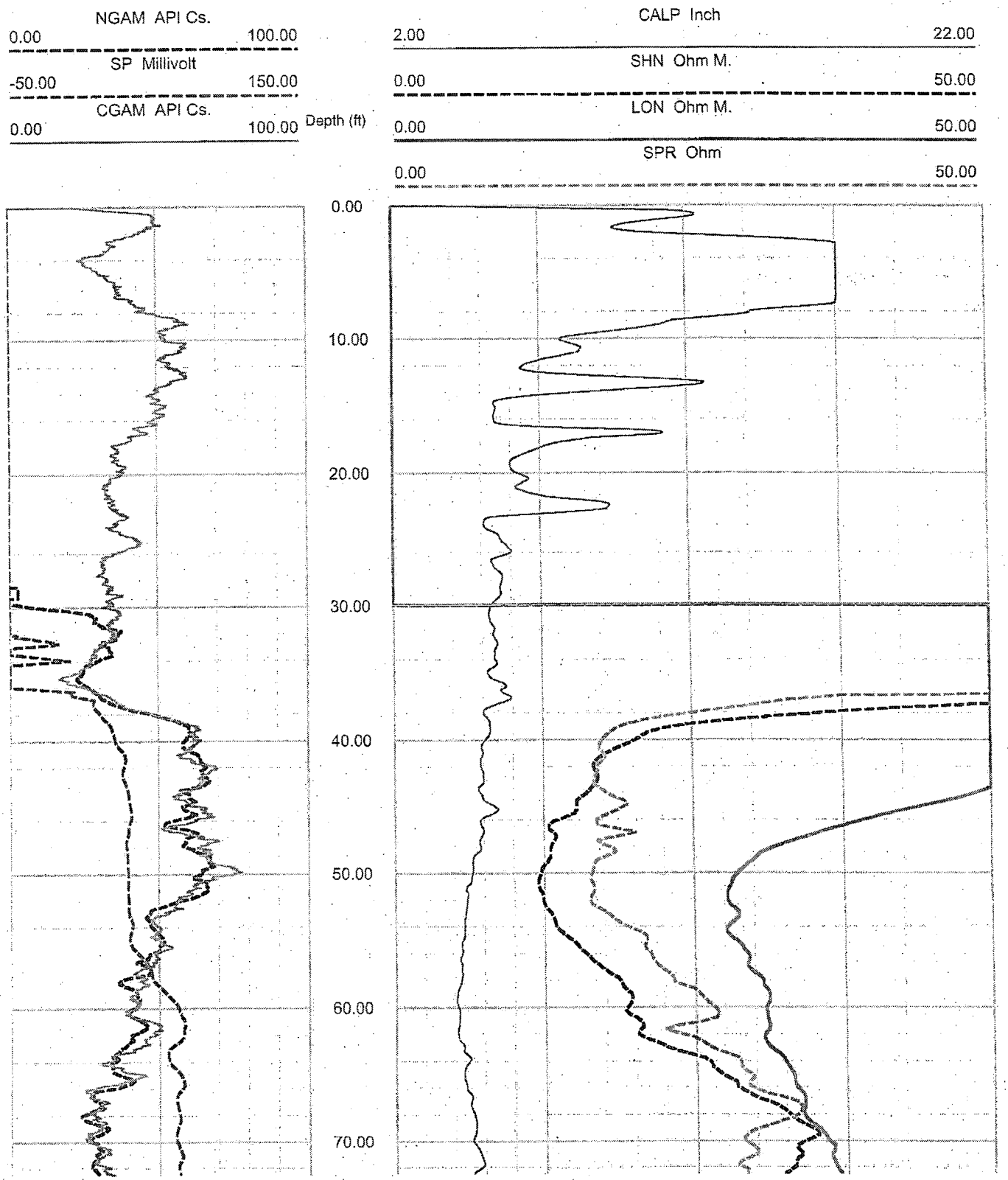
OTHER SERVICES

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

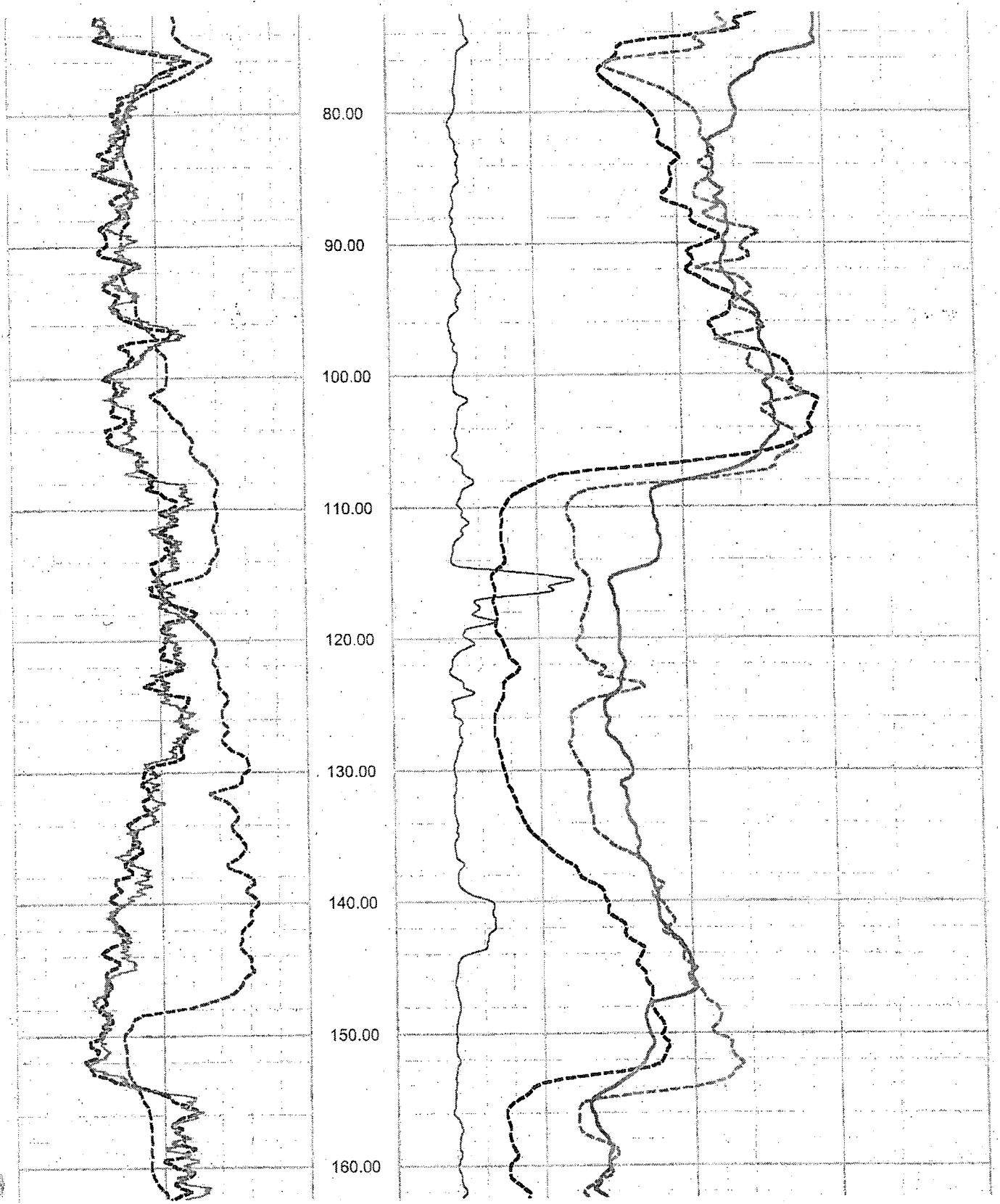
DATE	05 Dec 06	05 Dec 06	05 Dec 06
RUN#	2	0	0
TYPE OF LOG	ELOG		
DEPTH DRILLER	215.00	0.00	0.00
DEPTH LOGGER	215.00	0.00	0.00
LOG DEEPEST	0.00	0.00	0.00
LOG SHALLOW	0.00	0.00	0.00
FLUID IN HOLE	DRILLING MUD		
SALINITY			
DENSITY			
LEVEL			
MAX TEMP °C	0.00	0.00	0.00
RIG TIME			
RECORDED BY	R. STELLER		
WITNESSED BY			

RUN#	BIT RECORD SIZE	FROM	TO	CASING RECORD SIZE	WEIGHT	FROM	TO
2	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

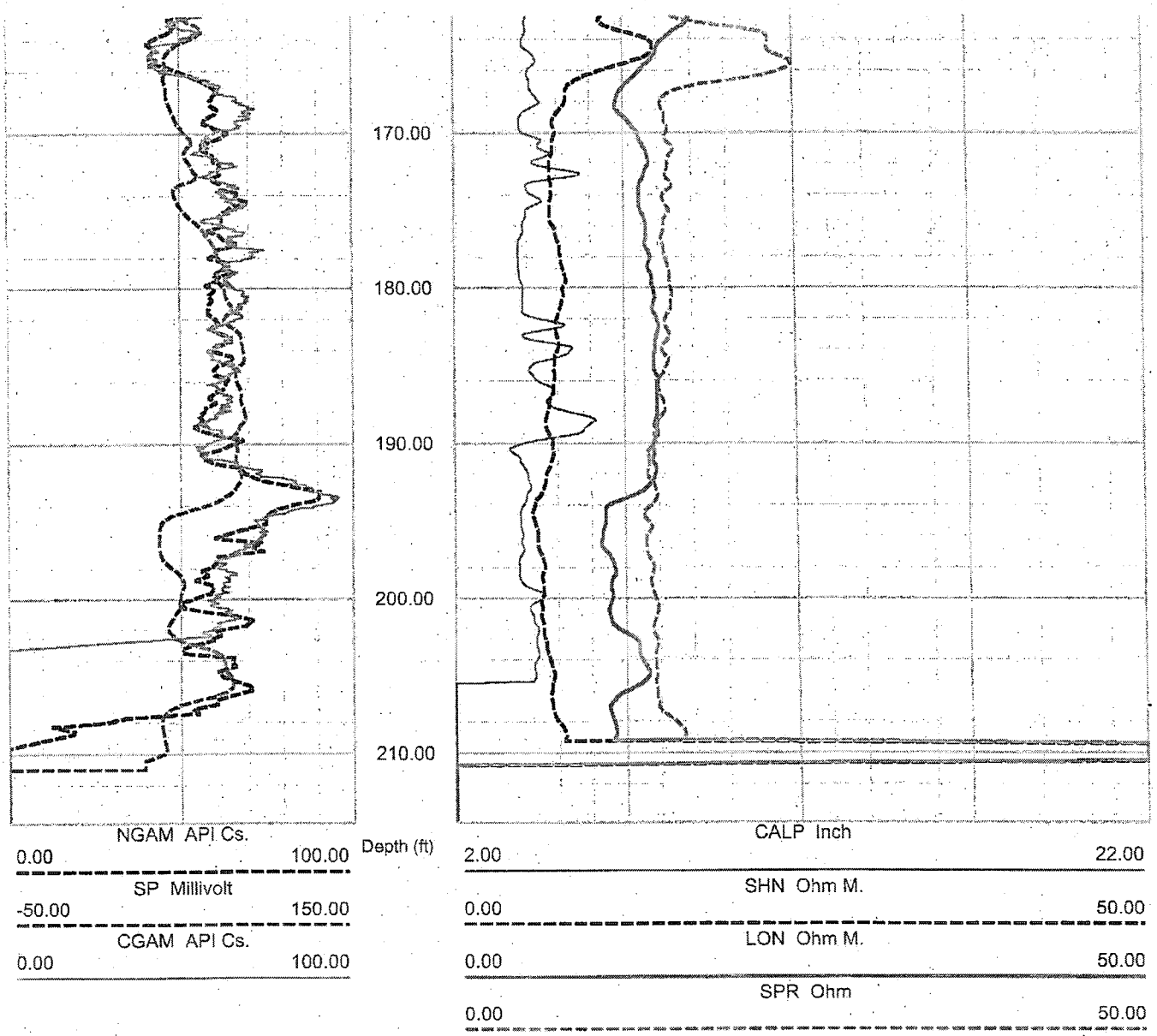
STP COL Boring B-428-DH ELOG, Caliper and Gamma rev 1 Sheet 1 of 4



STP COL Boring B-428-DH ELOG, Caliper and Gamma rev 1 Sheet 2 of 4



STP COL Boring B-428-DH ELOG, Caliper and Gamma rev 1 Sheet 3 of 4



STP COL Boring B-428-DH ELOG, Caliper and Gamma rev 1 Sheet 4 of 4