PACIFIC SURVEYS

CALIPER
BOREHOLE VOLUMES

Job No.
13188

Company WATER DEVELOPMENT CORP.
Well MW-24
Field WHITTIER
County LOS ANGELES State CA

Location:
WASHINGTON & LAMBERT
HOME DEPOT PARKING LOT
Sec. Twp. Rge.

Other Services:
ELOG
GR/LL3

Permanent Datum	G.L	Elevation above perm. datum	Elevation
Log Measured From	G.L		K.B.
Drilling Measured From	G.L		D.F.
			G.L.

Date	6-4-2007		
Run Number	ONE		
Depth Driller	200'		
Depth Logger	200'		
Bottom Logged Interval	200'		
Top Log Interval	20'		
Type Caliper	3 ARM		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
Max. Recorded Temp.	N/A		
pH/Fluid Loss	N/A		
Time Well Ready	9:00 AM		
Time Logger on Bottom	9:20 AM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU		
Witnessed By	J. OCKERMAN		

Borehole Record				Gravel Feed/Tubing Schedule			
Run Number	Bit	From	To	Size	Type	From	To

Casing Schd.	Size	Wgt/Ft	Top	Bottom
Surface String	18"	CSG	0	20'
Production String				
Production String				
Production String				
Production String				

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Comments

XY Caliper Calibration Report

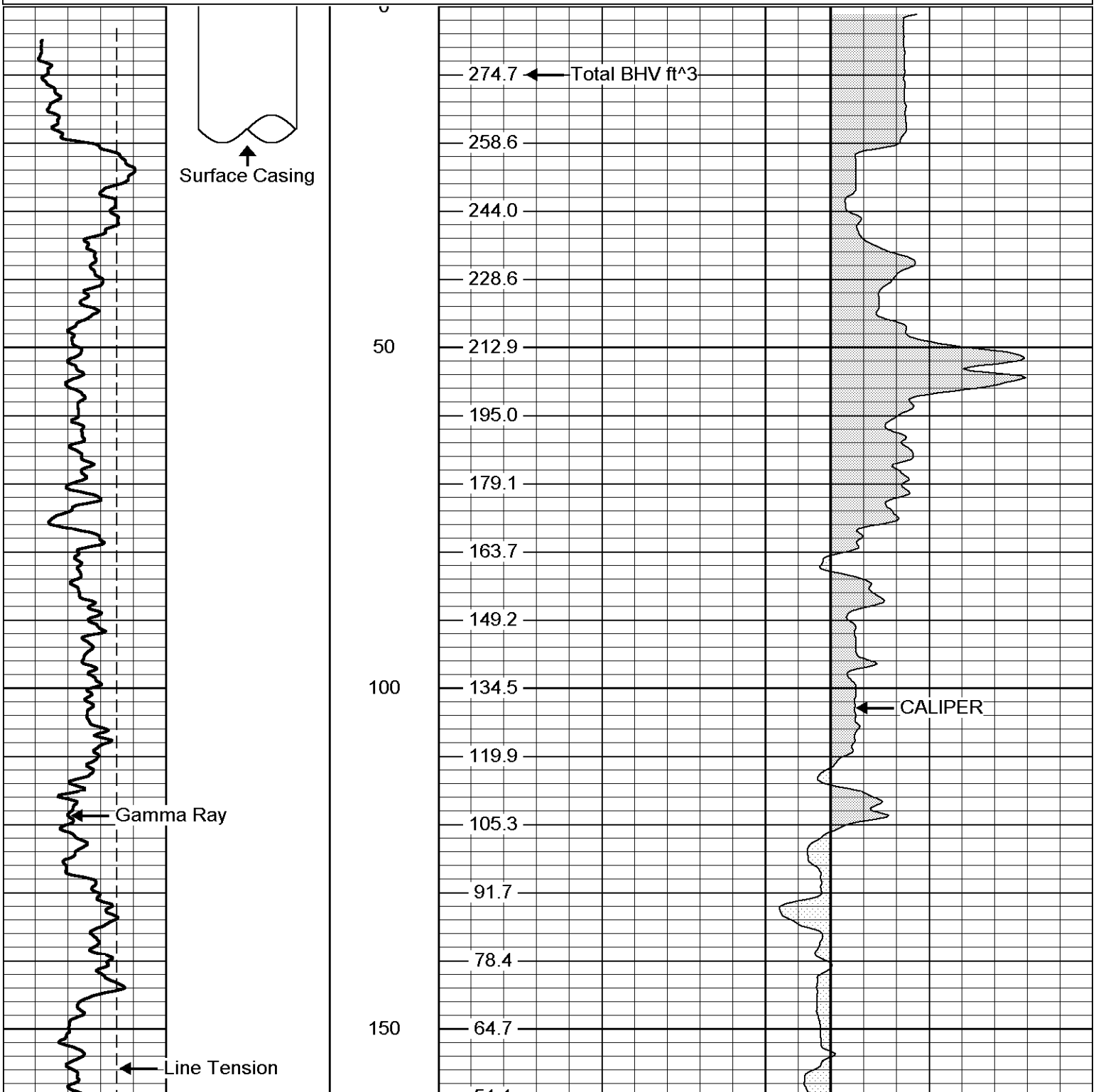
Serial Number: Long
Tool Model: Comprobe
Performed: Sat Mar 31 19:15:21 2007

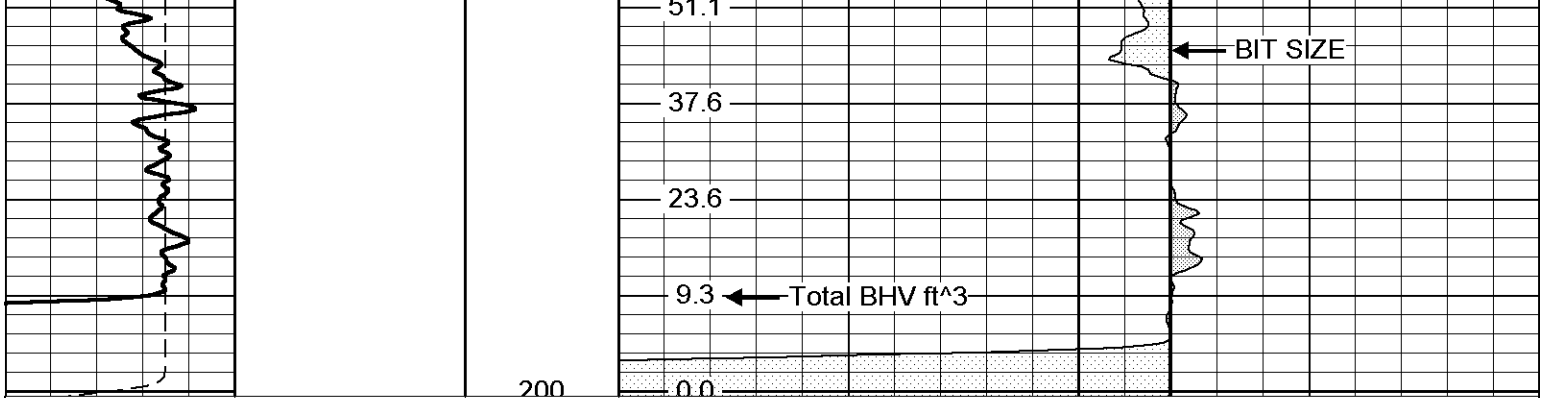
Small Ring: 21.437 in
Large Ring: 33.437 in

	X Caliper	Y Caliper	
Reading with Small Ring:	423.3	423.3	cps
Reading with Large Ring:	594.3	594.3	cps
Gain:	0.0701754	0.0701754	
Offset:	-6.06826	-6.06826	

Database File: 13188.db
Dataset Pathname: WDC/MW-24/run1/CAL
Presentation Format: XYC2
Dataset Creation: Mon Jun 04 10:27:20 2007 by Log Warrior Version 6.6
Charted by: Depth in Feet scaled 1:240

0 LTEN (lb) 100	CSG SCHLD		10 CALIPER (in) 20
30 GR (GAPI) 80			10 BIT SIZE (in) 20
			20 CALIPER back-up (in) 30




51.1
37.6
23.6
9.3
0.0
BIT SIZE
Total BHV ft^3
200
0 LTEN (lb) 100
30 GR (GAPI) 80
CSG SCHLD
10 CALIPER (in) 20
10 BIT SIZE (in) 20
20 CALIPER back-up (in) 30

PACIFIC SURVEYS

ELECTRIC LOG
LATEROLOG 3
GAMMA RAY

Job No.
13188

Company WATER DEVELOPMENT CORP.
Well MW-24
Field WHITTIER
County LOS ANGELES State CA

Location:
WASHINGTON & LAMBERT
HOME DEPOT PARKING LOT
Sec. Twp. Rge.

Other Services:
GR/LL3
CALIPER

Permanent Datum	G.L	Elevation above perm. datum	Elevation
Log Measured From	G.L		K.B.
Drilling Measured From	G.L		D.F.
			G.L.

Date	6-4-2007		
Run Number	ONE		
Depth Driller	200'		
Depth Logger	200'		
Bottom Logged Interval	200'		
Top Log Interval	20'		
Casing Driller	20'		
Casing Logger	20'		
Bit Size	16"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	8.1 @ 77F		
Rmf @ Meas. Temp	8.9 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEAS		
Rm @ BHT	N/A		
Time Circulation Stopped	1 HOUR		
Time Logger on Bottom	9:20 AM		
Max. Recorded Temperature	N/A		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU		
Witnessed By	J. OCKERMAN		

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Comments

ELOG Calibration Report

Serial: D1
Model: DTQ

Shop Calibration Performed: Tue Apr 10 15:16:05 2007
Before Survey Verification Performed: Tue Apr 10 10:25:41 2007
After Survey Verification Performed: Tue Apr 10 10:29:37 2007

Shop Calibration

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	9.658	101.397		10.200	102.200	Ohm-m	1.003	0.514
Long	9.725	99.673		10.200	102.200	Ohm-m	1.023	-19.747
IEE	29.852	6297.139	counts	0.033	6.892	A		
VSN	92.639	7135.843	counts	1.767	136.107	V		
VLN	43.509	1781.565	counts	0.830	33.981	V		

Before Survey Verification

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	721.161	100.845		608.444	100.864	Ohm-m	0.818	18.347
Long	1267.030	100.391		100.770	100.770	Ohm-m	0.829	17.532
IEE	13.306	5487.682	counts	0.015	6.006	A		
VSN	107.806	6217.551	counts	2.056	118.592	V		
VLN	47.352	1547.393	counts	0.903	29.515	V		

After Survey Verification

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	643.636	100.848		721.161	100.845	Ohm-m	1.143	-14.408
Long	1116.370	100.421		100.391	100.391	Ohm-m	1.148	-14.925
IEE	14.748	5686.417	counts	0.016	6.223	A		
VSN	106.645	6443.833	counts	2.034	122.908	V		
VLN	46.243	1604.565	counts	0.882	30.605	V		

After Survey Verification compared to Before Survey Calibration

	Zero Before	Zero After		Cal Before	Cal After	
Short	608.444	721.161	Ohm-m	100.864	100.845	Ohm-m
Long	1068.080	1267.030	Ohm-m	100.770	100.391	Ohm-m

Gamma Ray Calibration Report

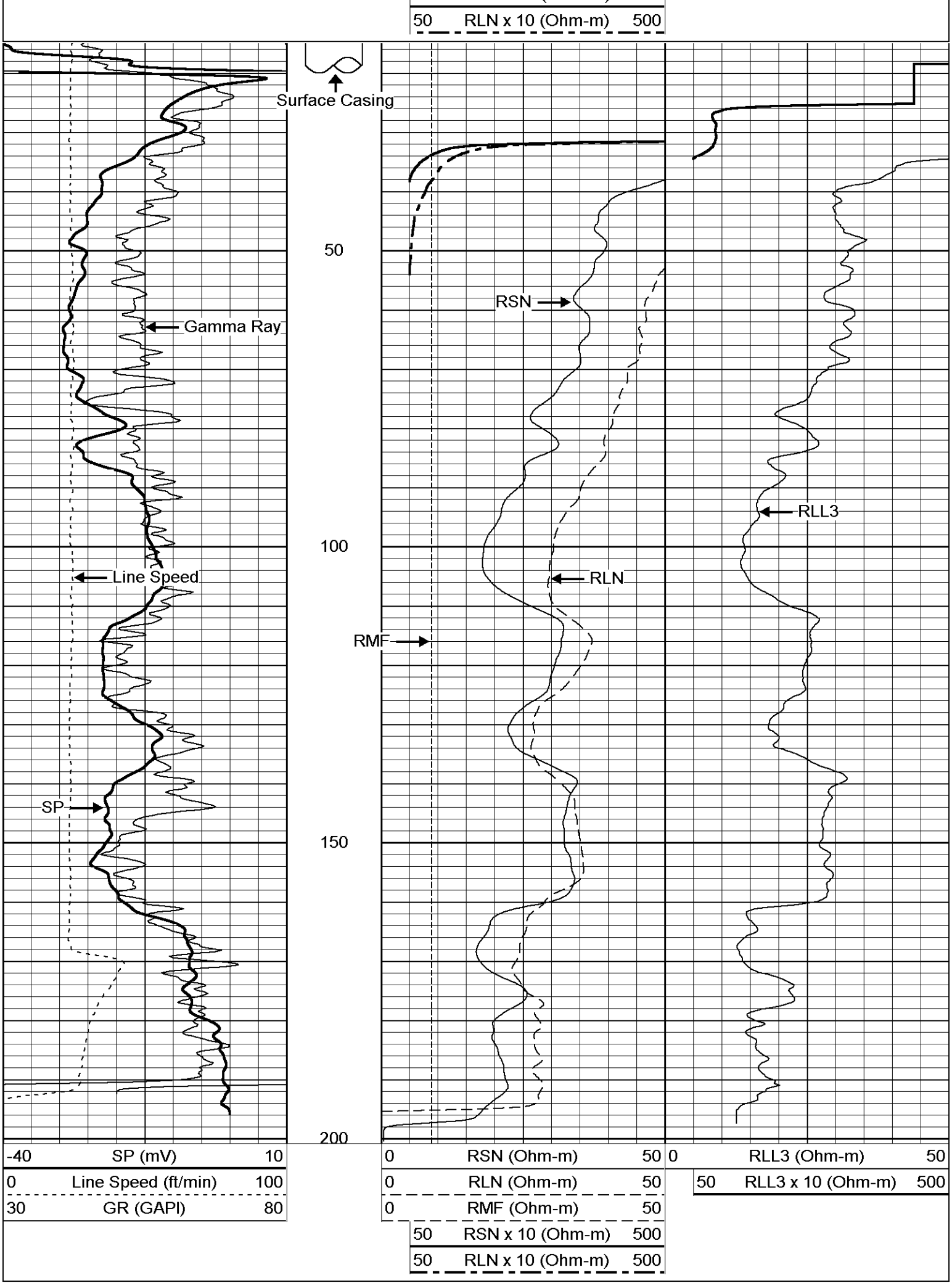
Serial Number:	D1	
Tool Model:	ELOG	
Performed:	Tue Feb 06 12:37:44 2007	
Calibrator Value:	162	GAPI
Background Reading:	170.762	cps
Calibrator Reading:	684.717	cps
Sensitivity:	0.315203	GAPI/cps

Database File:	13188.db
Dataset Pathname:	WDC/MW-24/run1/ELOG
Presentation Format:	ELOG
Dataset Creation:	Mon Jun 04 09:29:46 2007 by Log Warrior Version 6.6
Charted by:	Depth in Feet scaled 1:240

-40	SP (mV)	10
0	Line Speed (ft/min)	100
30	GR (GAPI)	80

0	RSN (Ohm-m)	50
0	RLN (Ohm-m)	50
0	RMF (Ohm-m)	50
50	RSN x 10 (Ohm-m)	500

0	RLL3 (Ohm-m)	50
50	RLL3 x 10 (Ohm-m)	500


50 RLN x 10 (Ohm-m) 500
Surface Casing
50
100
150
200
Gamma Ray
Line Speed
SP
RSN
RLN
RMF
RLL3
-40 SP (mV) 10
0 Line Speed (ft/min) 100
30 GR (GAPI) 80
0 RSN (Ohm-m) 50
0 RLN (Ohm-m) 50
0 RMF (Ohm-m) 50
50 RSN x 10 (Ohm-m) 500
50 RLN x 10 (Ohm-m) 500
0 RLL3 (Ohm-m) 50
50 RLL3 x 10 (Ohm-m) 500

PACIFIC SURVEYS

LATEROLOG 3
GAMMA RAY

Job No.
13188

Company WATER DEVELOPMENT CORP.
Well MW-24
Field WHITTIER
County LOS ANGELES State CA

Location:
WASHINGTON & LAMBERT
HOME DEPOT PARKING LOT
Sec. Twp. Rge.

Other Services:
ELOG
CALIPER

Permanent Datum	G.L	Elevation above perm. datum	Elevation
Log Measured From	G.L		K.B.
Drilling Measured From	G.L		D.F.
			G.L.

Date	6-4-2007		
Run Number	ONE		
Depth Driller	200'		
Depth Logger	200'		
Bottom Logged Interval	200'		
Top Log Interval	20'		
Casing Driller	20'		
Casing Logger	20'		
Bit Size	16"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	8.1 @ 77F		
Rmf @ Meas. Temp	8.9 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEAS		
Rm @ BHT	N/A		
Time Circulation Stopped	1 HOUR		
Time Logger on Bottom	9:20 AM		
Max. Recorded Temperature	N/A		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU		
Witnessed By	J. OCKERMAN		

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Comments

Gamma Ray Calibration Report

Serial Number: 13
Tool Model: GROH
Performed: Tue Feb 06 12:55:29 2007

Calibrator Value: 162 GAPI

Background Reading:	53.4722	
Calibrator Reading:	219.9	
Sensitivity:	0.973395	GAPI/

Simplec Long Guard Calibration Report

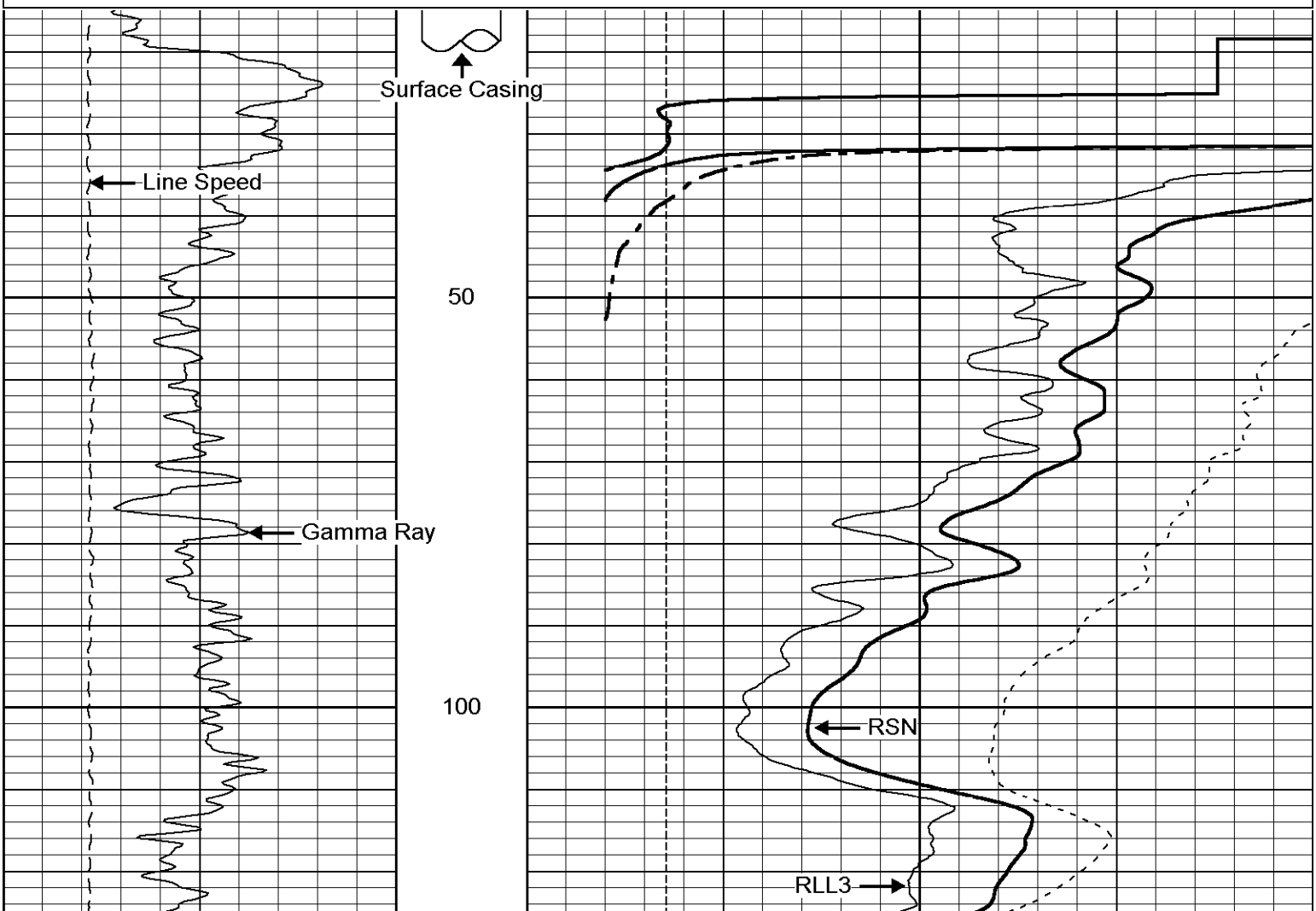
Serial Number:	294
Tool Model:	M&W
Performed:	Tue Feb 06 12:54:36 2007

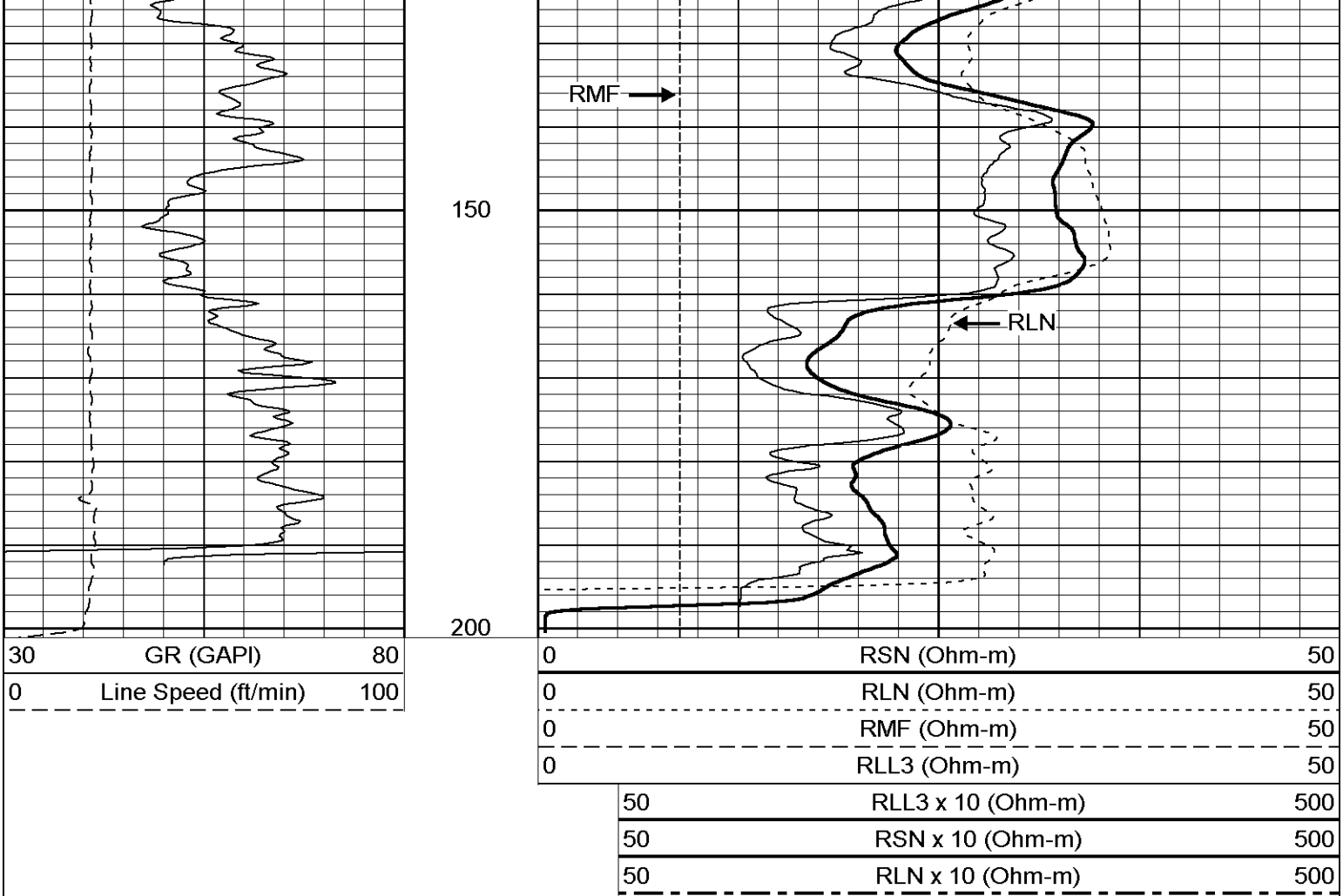
System Reading	Calibration Reference	
0.479	2.500	Ohm-m
0.694	5.000	
6.660	50.000	
32.599	250.000	
65.919	500.000	

Database File:	13188.db
Dataset Pathname:	WDC/MW-24/run1/LL3
Presentation Format:	GUARD
Dataset Creation:	Mon Jun 04 09:52:52 2007 by Log Warrior Version 6.6
Charted by:	Depth in Feet scaled 1:240

30	GR (GAPI)	80
0	Line Speed (ft/min)	100

0	RSN (Ohm-m)	50
0	RLN (Ohm-m)	50
0	RMF (Ohm-m)	50
0	RLL3 (Ohm-m)	50
50	RLL3 x 10 (Ohm-m)	500
50	RSN x 10 (Ohm-m)	500
50	RLN x 10 (Ohm-m)	500




RMF
RLN
150
200
30 GR (GAPI) 80
0 Line Speed (ft/min) 100
0 RSN (Ohm-m) 50
0 RLN (Ohm-m) 50
0 RMF (Ohm-m) 50
0 RLL3 (Ohm-m) 50
50 RLL3 x 10 (Ohm-m) 500
50 RSN x 10 (Ohm-m) 500
50 RLN x 10 (Ohm-m) 500

PACIFIC SURVEYS

CALIPER
BOREHOLE VOLUMES

Job No. 13055	
Company	WDC EXPLORATION & WELLS
Well	MW-25
Field	SANTA FE SPRINGS
File No.	
County	LOS ANGELES State CA

Location: 9101 SORENSEN Sec. Twp. Rge.	Other Services: ELOG GR/LL3

Permanent Datum	GL		Elevation above perm. datum	Elevation
Log Measured From	GL	0'		K.B.
Drilling Measured From	GL			D.F. G.L.

Date	3-1-2007		
Run Number	ONE		
Depth Driller	220'		
Depth Logger	220'		
Bottom Logged Interval	218'		
Top Log Interval	0'		
Type Caliper	3-ARM		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
Max. Recorded Temp.	N/A		
pH/Fluid Loss	N/A		
Time Well Ready	14:30		
Time Logger on Bottom	14:45		
Equipment Number	PS-3		
Location	L.A.		
Recorded By	KOHN/RIDDER		
Witnessed By	JABLONSKI		

Borehole Record				Gravel Feed/Tubing Schedule			
Run Number	Bit	From	To	Size	Type	From	To
ONE	14.5"	20'	220'				

Casing Schedule	Size	Wgt/Ft	Top	Bottom
Surface String	14.75" ID	CSG	0	20'
Production String				
Production String				
Production String				
Production String				

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Comments

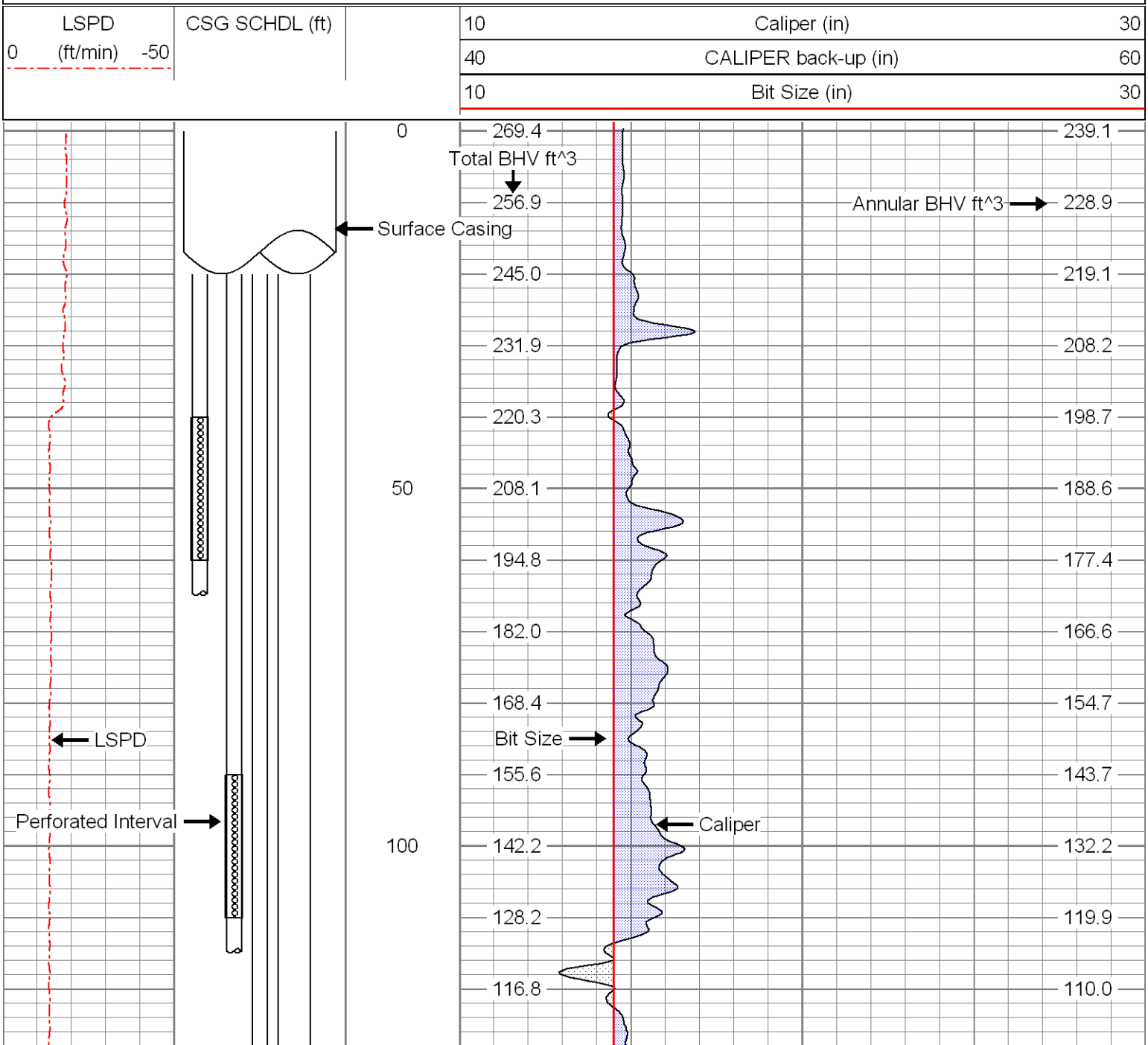
Calibration Report

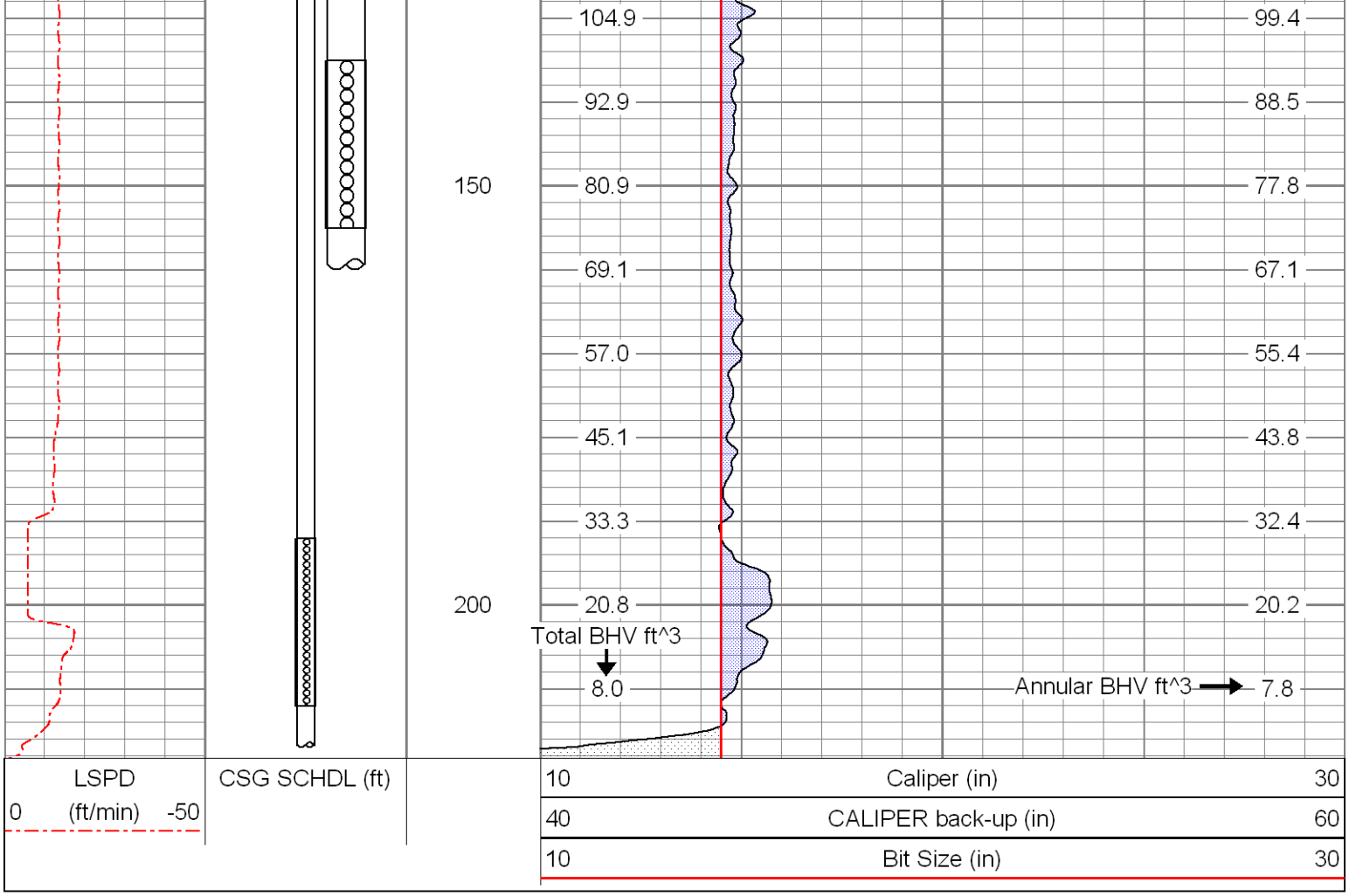
Database File: 13055.db
Dataset Pathname: wdc/well/run2/cal.4
Dataset Creation: Thu Mar 01 16:13:32 2007 by Calc Open-Cased 060407

XY Caliper Calibration Report

Serial Number:	Short		
Tool Model:	Comprobe		
Performed:	Fri Aug 04 15:51:00 2006		
Small Ring:	6	in	
Large Ring:	18	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	348.657	348.657	cps
Reading with Large Ring:	749.7	749.7	cps
Gain:	0.029922	0.029922	
Offset:	-4.25	-4.25	

Database File:	13055.db
Dataset Pathname:	wdc/well/run2/cal.4
Presentation Format:	xyc
Dataset Creation:	Thu Mar 01 16:13:32 2007 by Calc Open-Cased 060407
Charted by:	Depth in Feet scaled 1:240




104.9
99.4
92.9
88.5
150
80.9
77.8
69.1
67.1
57.0
55.4
45.1
43.8
33.3
32.4
200
20.8
20.2
Total BHV ft^3
8.0
Annular BHV ft^3
7.8
LSPD
0 (ft/min) -50
CSG SCHDL (ft)
10 Caliper (in) 30
40 CALIPER back-up (in) 60
10 Bit Size (in) 30

PACIFIC SURVEYS

ELECTRIC LOG
LATEROLOG3
GAMMA-RAY

Job No.
13055

File No.

Company WDC EXPLORATION & WELLS
Well MW-25
Field SANTA FE SPRINGS
County LOS ANGELES State CA

Location:
9101 SORENSEN
Sec. Twp. Rge.

Other Services:
CALIPER
GR/LL3

Permanent Datum	GL		Elevation above perm. datum	Elevation
Log Measured From	GL	0'		K.B.
Drilling Measured From	GL			D.F.
				G.L.

Date	3-1-2007		
Run Number	ONE		
Depth Driller	220'		
Depth Logger	220'		
Bottom Logged Interval	220'		
Top Log Interval	0'		
Casing Driller	14.75"ID @ 20'		
Casing Logger	20'		
Bit Size	14.5"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	8.7 @77F		
Rmf @ Meas. Temp	9.55 @77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEAS		
Rm @ BHT	N/A		
Time Circulation Stopped	1 HOUR		
Time Logger on Bottom	14:45		
Max. Recorded Temperature	N/A		
Equipment Number	PS-3		
Location	L.A.		
Recorded By	KOHN/RIDDER		
Witnessed By	JABLONSKI		

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Comments

Calibration Report

Database File: 13055.db
Dataset Pathname: wdc/well/run1/elog
Dataset Creation: Thu Mar 01 14:54:34 2007 by Log Open-Cased 060407

ELOG Calibration Report

Serial:	D4
Model:	DTQ
Shop Calibration Performed:	Mon Oct 16 13:47:57 2006
Before Survey Verification Performed:	Fri Jan 13 10:44:59 2006
After Survey Verification Performed:	Fri Jan 13 10:45:04 2006

Shop Calibration

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	8.968	100.640		10.200	102.200	Ohm-m	1.004	1.200
Long	7.047	96.307		10.200	102.200	Ohm-m	1.031	-17.315
IEE	7010.940	7011.000	counts	7.673	7.673	A		
VSN	7971.520	7972.920	counts	152.047	152.074	V		
VLN	2025.980	2026.000	counts	38.643	38.643	V		

Before Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	101.284	101.286		101.238	101.262	Ohm-m	10.606	-972.995
Long	102.574	102.569		102.569	102.569	Ohm-m	68.614	-6935.150
IEE	7177.640	7188.640	counts	7.855	7.867	A		
VSN	8167.660	8180.360	counts	155.788	156.030	V		
VLN	2067.920	2071.000	counts	39.443	39.502	V		

After Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	101.291	101.291		101.284	101.286	Ohm-m	5.546	-460.437
Long	102.568	102.559		102.569	102.569	Ohm-m	0.563	44.827
IEE	7216.000	7220.860	counts	7.897	7.903	A		
VSN	8211.900	8217.460	counts	156.632	156.738	V		
VLN	2078.860	2080.080	counts	39.652	39.675	V		

After Survey Verification compared to Before Survey Calibration

	Zero			Cal		
	Before	After		Before	After	
Short	101.238	101.284	Ohm-m	101.262	101.286	Ohm-m
Long	102.872	102.574	Ohm-m	102.569	102.569	Ohm-m

Gamma Ray Calibration Report

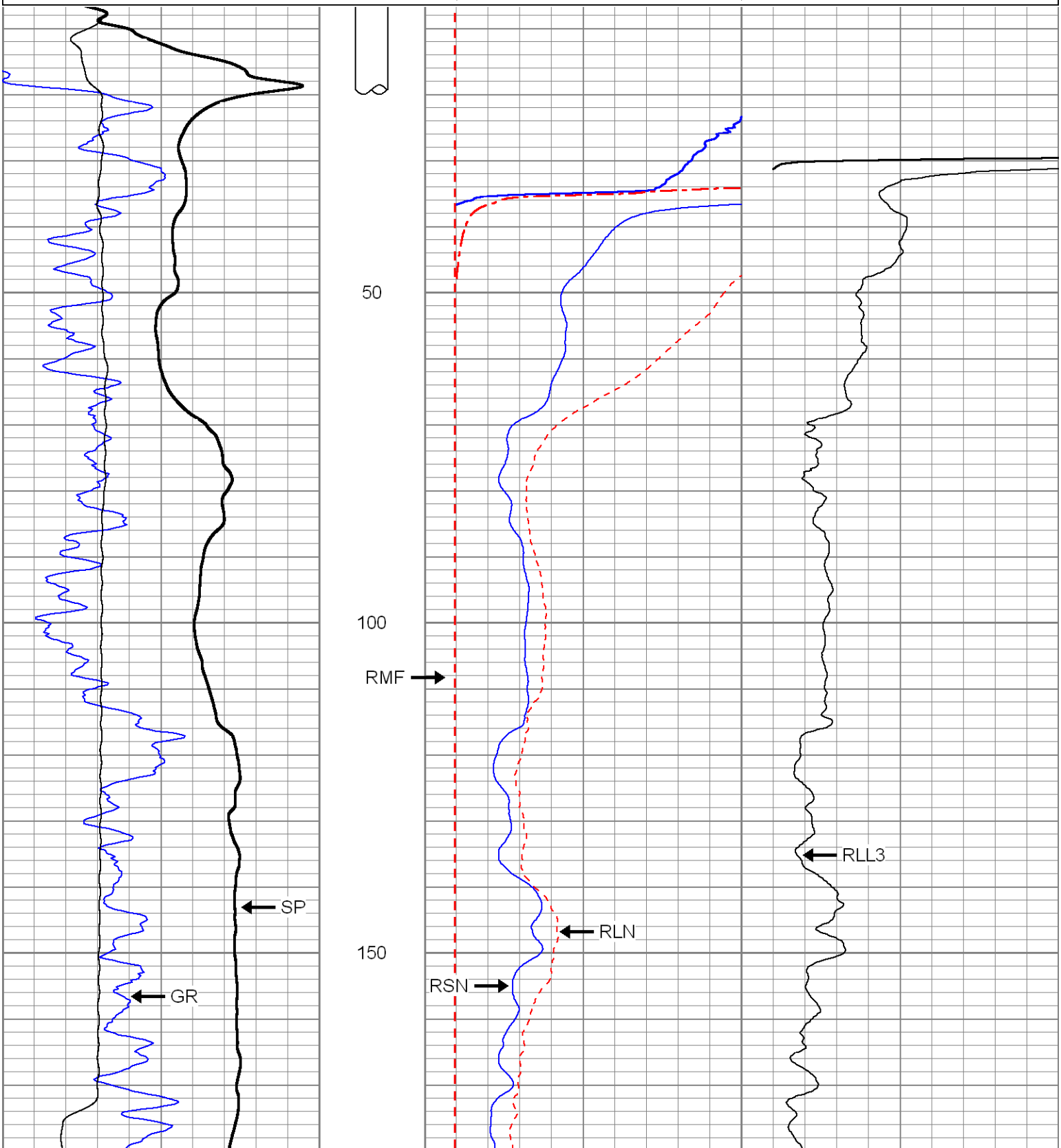
Serial Number:	D4	
Tool Model:	ELOG	
Performed:	Fri Jan 13 10:45:11 2006	
Calibrator Value:	162.0	GAPI
Background Reading:	172.5	cps
Calibrator Reading:	717.9	cps
Sensitivity:	0.2970	GAPI/cps

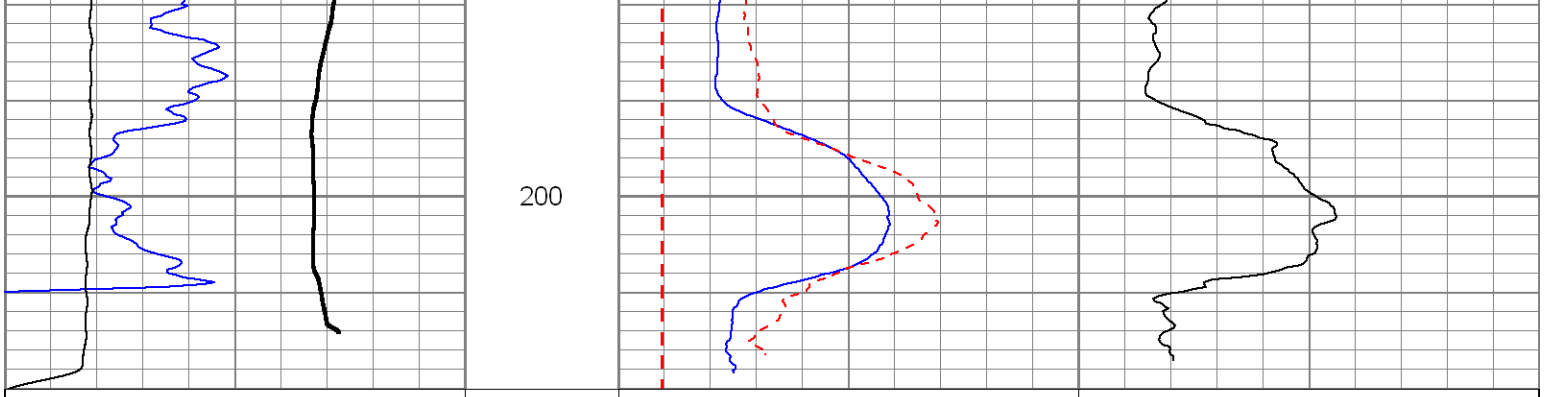
Database File:	13055.db
Dataset Pathname:	wdc/well/run1/elog
Presentation Format:	elog2
Dataset Creation:	Thu Mar 01 14:54:34 2007 by Log Open-Cased 060407
Charted by:	Depth in Feet scaled 1:240

-160	S.P. (mV)	60
40	Gamma-Ray (GAPI)	90
180	GR back-up (GAPI)	280
0	Line Speed (ft/min)	-100

0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
100	RSN back-up (Ohm-m)	1000
100	RLN back-up (Ohm-m)	1000

0	RLL3 (Ohm-m)	100
100	RLL3 back-up (Ohm-m)	1000





-160	S.P. (mV)	60		0	RSN (Ohm-m)	100	0	RLL3 (Ohm-m)	100
40	Gamma-Ray (GAPI)	90		0	RLN (Ohm-m)	100	100	RLL3 back-up (Ohm-m)	1000
180	GR back-up (GAPI)	280		0	RMF (Ohm-m)	100			
0	Line Speed (ft/min)	-100		100	RSN back-up (Ohm-m)	1000			
				100	RLN back-up (Ohm-m)	1000			

PACIFIC SURVEYS

LATEROLOG3
GAMMA-RAY

Job No.
13055

File No.

Company	WDC EXPLORATION & WELLS
Well	MW-25
Field	SANTA FE SPRINGS
County	LOS ANGELES State CA

Location:

9101 SORENSEN

Sec. Twp. Rge.

Other Services:

CALIPER
ELOG

Permanent Datum	GL		Elevation above perm. datum	Elevation
Log Measured From	GL	0'		K.B.
Drilling Measured From	GL			D.F.
				G.L.

Date	3-1-2007		
Run Number	ONE		
Depth Driller	220'		
Depth Logger	220'		
Bottom Logged Interval	220'		
Top Log Interval	0'		
Casing Driller	14.75"ID @ 20'		
Casing Logger	20'		
Bit Size	14.5"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	8.7 @77F		
Rmf @ Meas. Temp	9.55 @77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEAS		
Rm @ BHT	N/A		
Time Circulation Stopped	1 HOUR		
Time Logger on Bottom	14:45		
Max. Recorded Temperature	N/A		
Equipment Number	PS-3		
Location	L.A.		
Recorded By	KOHN/RIDDER		
Witnessed By	JABLONSKI		

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Comments

Calibration Report

Database File: 13055.db
Dataset Pathname: wdc/well/run1/LL3
Dataset Creation: Thu Mar 01 15:13:05 2007 by Log Open-Cased 060407

Gamma Ray Calibration Report

Serial Number:	12	
Tool Model:	GROH	
Performed:	Fri Aug 11 15:12:10 2006	
Calibrator Value:	162.0	GAPI
Background Reading:	54.0	
Calibrator Reading:	216.3	
Sensitivity:	0.9984	GAPI/

RLL3 (Resistivity Laterolog 3) Calibration Report:

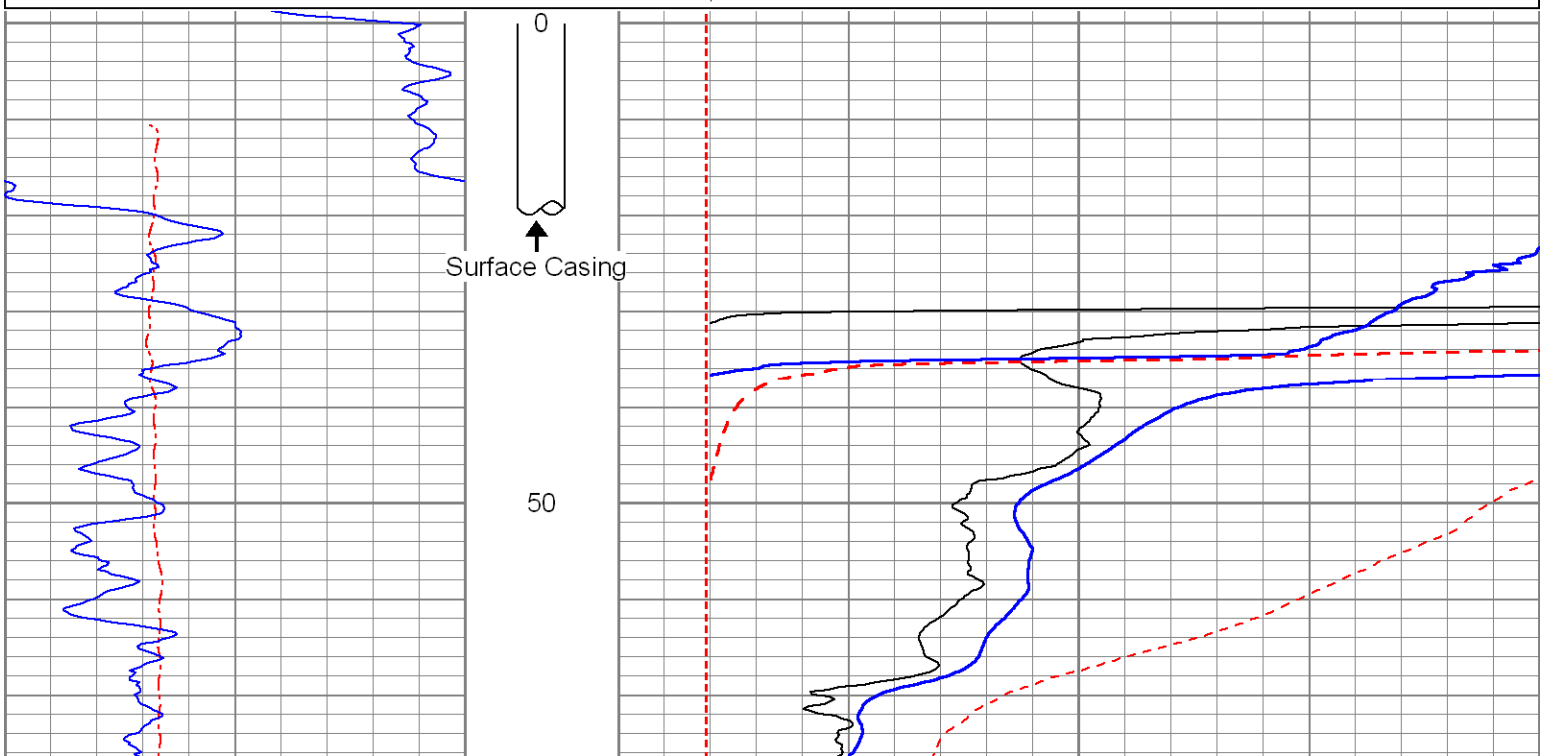
Serial Number:	231
Tool Model:	M&W
Performed:	Mon Oct 16 15:08:38 2006

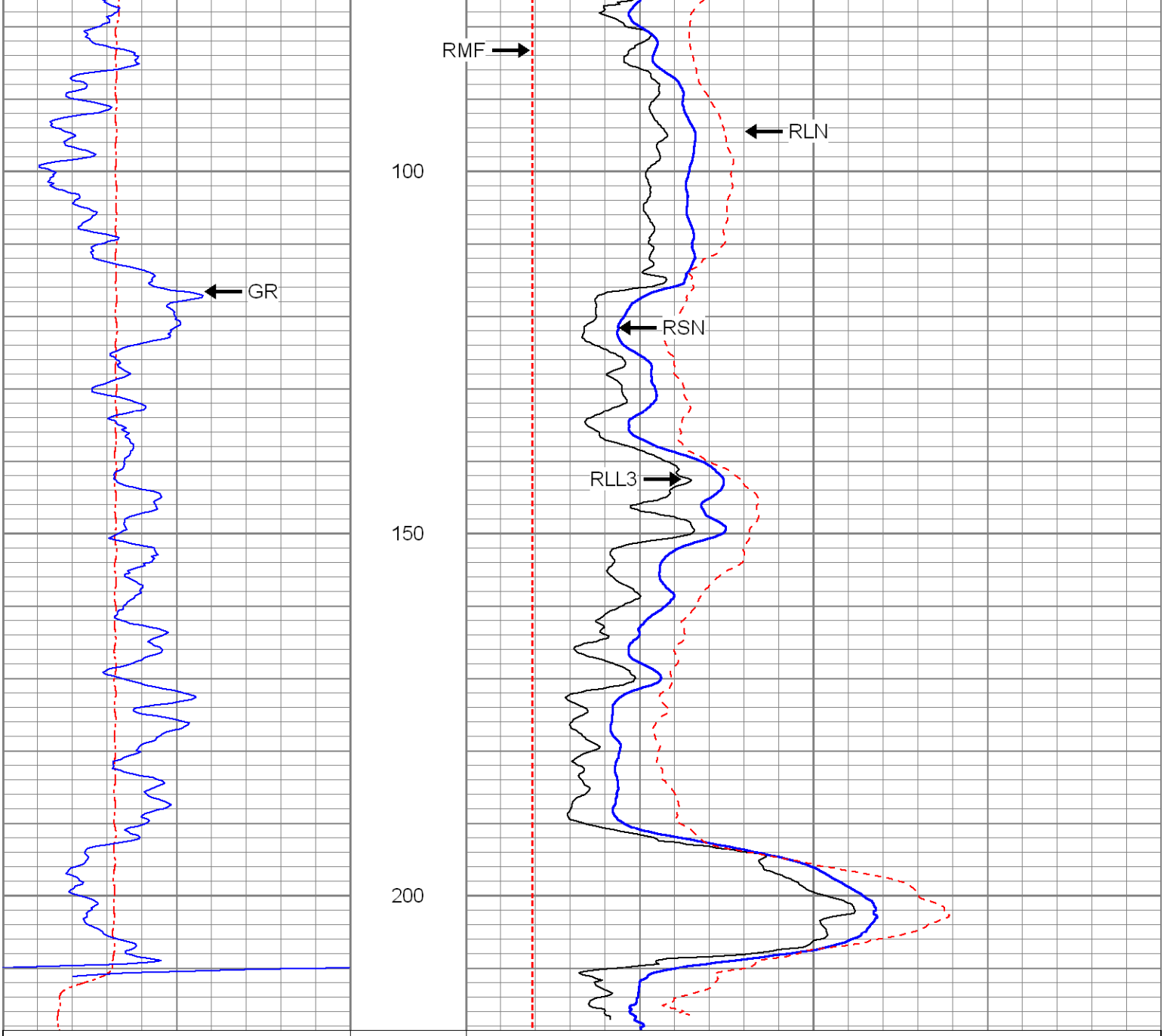
System Reading	Calibration Reference	
0.006	2.500	Ohm-m
0.010	5.000	
0.103	50.000	
0.496	250.000	
0.980	500.000	

Database File:	13055.db
Dataset Pathname:	wdc/well/run1/LL3
Presentation Format:	ll3
Dataset Creation:	Thu Mar 01 15:13:05 2007 by Log Open-Cased 060407
Charted by:	Depth in Feet scaled 1:240

0	Line Speed (ft/min)	-100
40	Gamma-Ray (GAPI)	90

0	RLL3 (Ohm-m)	100
0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
100	RLL3 back-up (Ohm-m)	1000
100	RSN back-up (Ohm-m)	1000
100	RLN back-up (Ohm-m)	1000





0	Line Speed (ft/min)	-100
40	Gamma-Ray (GAPI)	90

0	RLL3 (Ohm-m)	100
0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
100	RLL3 back-up (Ohm-m)	1000
100	RSN back-up (Ohm-m)	1000
100	RLN back-up (Ohm-m)	1000

PACIFIC SURVEYS

CALIPER BOREHOLE VOLUMES

Job No. 13043	
Company	WDC EXPLORATION & WELLS
Well	MW-26
Field	SANTA FE SPRINGS
File No.	
County	LOS ANGELES State CA

Location: BELL RANCH ROAD EAST OF NORWALK BLVD. Sec. Twp. Rge.	Other Services: ELOG GR/LL3

Permanent Datum	GL	Elevation above perm. datum	Elevation
Log Measured From	GL 0'		K.B.
Drilling Measured From	GL		D.F. G.L.

Date	2/22/2007		
Run Number	ONE		
Depth Driller	250'		
Depth Logger	250'		
Bottom Logged Interval	248'		
Top Log Interval	0'		
Type Caliper	3-ARM		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	NA		
Max. Recorded Temp.	NA		
pH/Fluid Loss	NA		
Time Well Ready	11:00		
Time Logger on Bottom	11:40		
Equipment Number	PS-3		
Location	LA		
Recorded By	KOHN/LAPORTE		
Witnessed By	JABLONSKI		

Borehole Record				Gravel Feed/Tubing Schedule			
Run Number	Bit	From	To	Size	Type	From	To
ONE	14.75"	20'	220'				

Casing Schedule	Size	Wgt/Ft	Top	Bottom
Surface String	16"	COND	0	20
Production String				
Production String				
Production String				
Production String				

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Comments

4" PVC 0-95'
2.5" PVC 0-125'
2.5"PVC 0-165'
2.5"PVC 0-210'

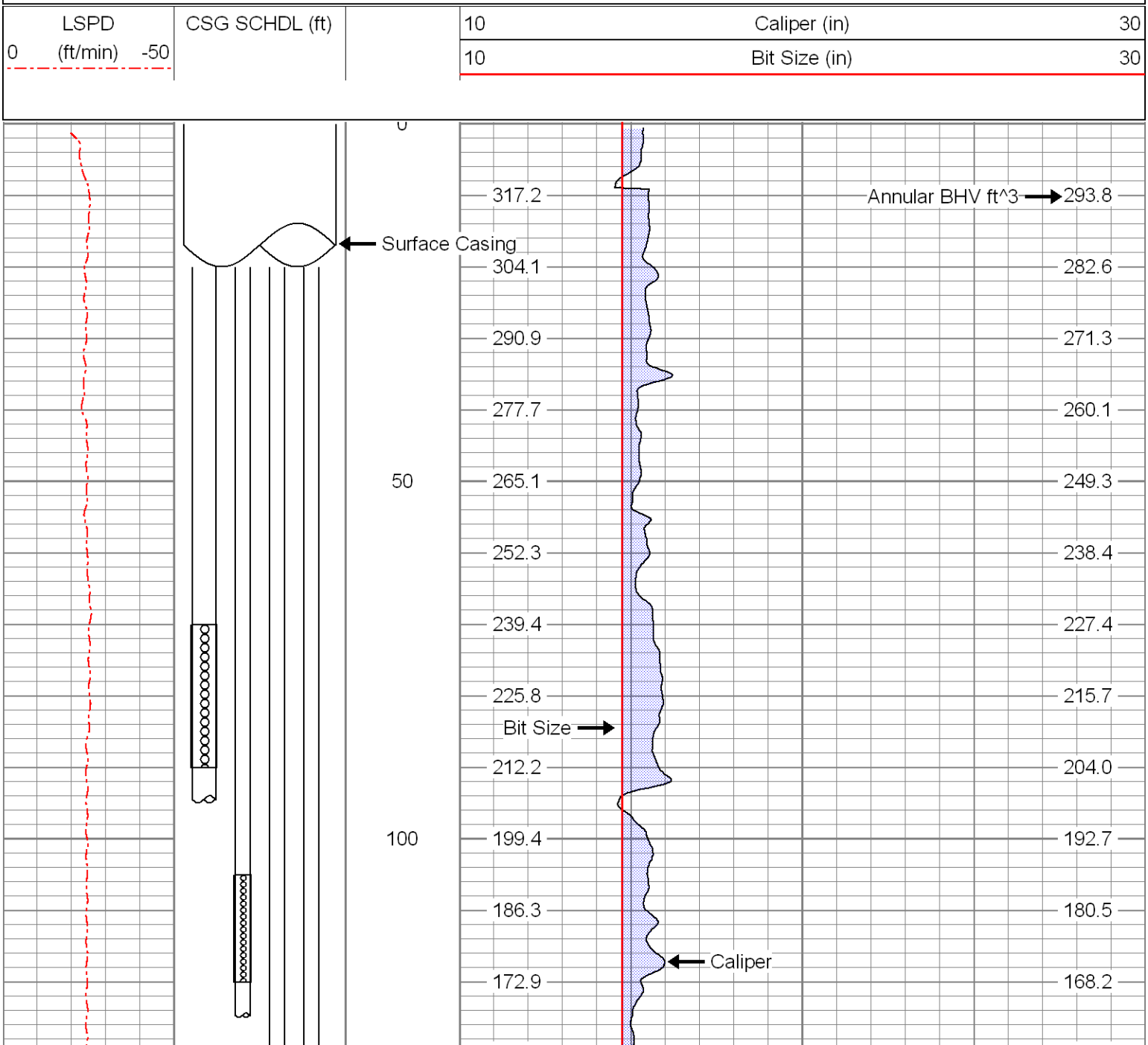
Calibration Report

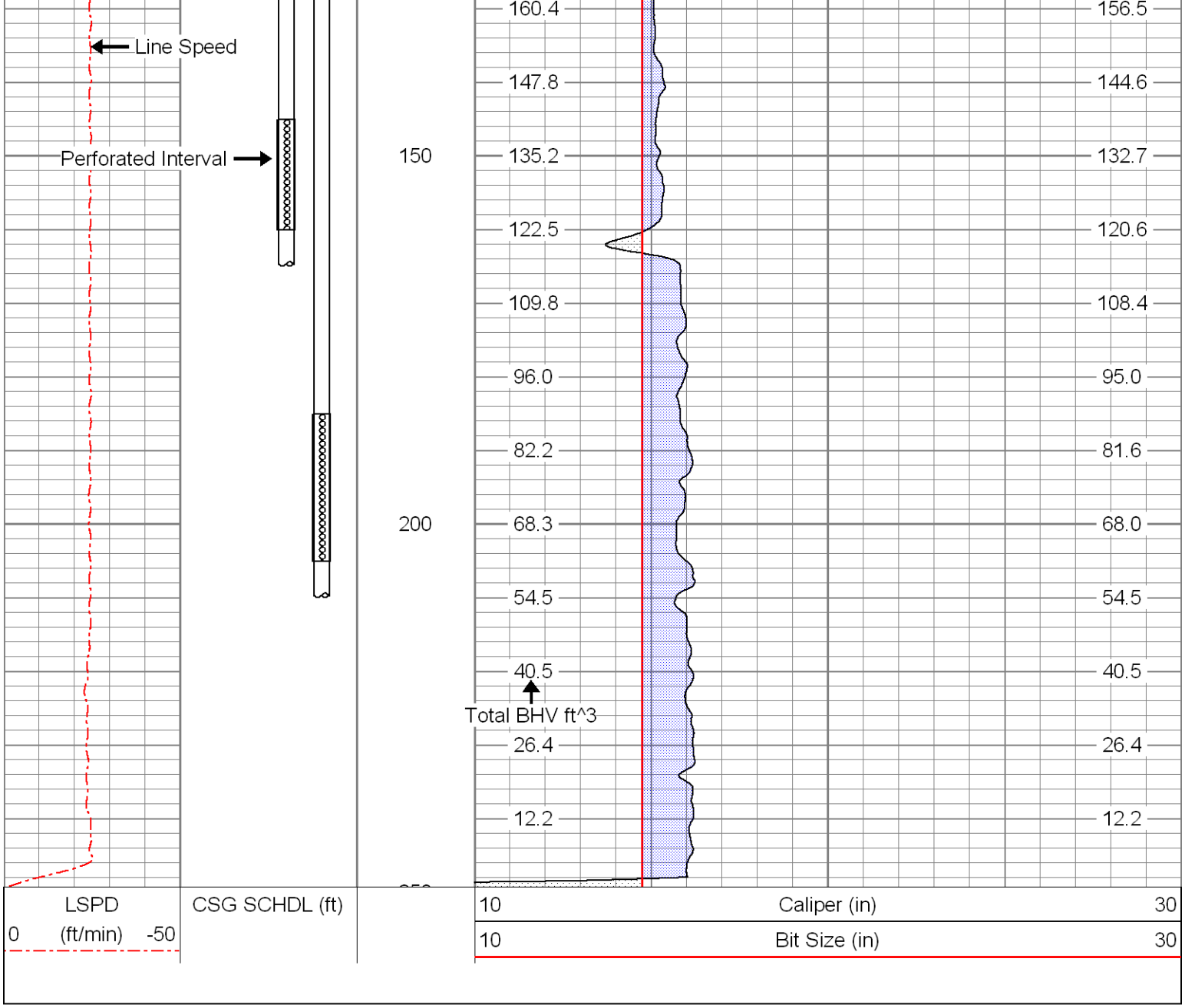
Database File: 13043.db
Dataset Pathname: wdc/well/run1/cal
Dataset Creation: Thu Feb 22 12:14:59 2007 by Log Open-Cased 060407

XY Caliper Calibration Report

Serial Number:	Long		
Tool Model:	Comprobe		
Performed:	Thu Feb 22 12:03:18 2007		
Small Ring:	20	in	
Large Ring:	36	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	496.2	496.2	cps
Reading with Large Ring:	735.3	735.3	cps
Gain:	0.0669176	0.0669176	
Offset:	-11.6047	-11.6047	

Database File:	13043.db
Dataset Pathname:	wdc/well/run1/cal2.1
Presentation Format:	xyc
Dataset Creation:	Thu Feb 22 12:49:29 2007 by Calc Open-Cased 060407
Charted by:	Depth in Feet scaled 1:240




Line Speed
Perforated Interval
150
200
160.4
147.8
135.2
122.5
109.8
96.0
82.2
68.3
54.5
40.5
26.4
12.2
156.5
144.6
132.7
120.6
108.4
95.0
81.6
68.0
54.5
40.5
26.4
12.2
Total BHV ft^3
LSPD
0 (ft/min) -50
CSG SCHDL (ft)
10 Caliper (in) 30
10 Bit Size (in) 30

PACIFIC SURVEYS

ELECTRIC LOG
LATEROLOG 3
GAMMA-RAY

Job No.
13043

File No.

Company WDC EXPLORATION & WELLS
Well MW-26
Field SANTA FE SPRINGS
County LOS ANGELES State CA

Location:

BELL RANCH ROAD EAST OF NORWALK BLVD.

Sec. Twp. Rge.

Other Services:

CALIPER
GR/LL3

Permanent Datum	GL		Elevation above perm. datum	Elevation
Log Measured From	GL	0'		K.B.
Drilling Measured From	GL			D.F.
				G.L.

Date	2/22/2007		
Run Number	ONE		
Depth Driller	250'		
Depth Logger	250'		
Bottom Logged Interval	250'		
Top Log Interval	30'		
Casing Driller	16"		
Casing Logger	20'		
Bit Size	14.75"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	NA		
pH / Fluid Loss	NA		
Source of Sample	PIT		
Rm @ Meas. Temp	7.8 @77F		
Rmf @ Meas. Temp	8.5@77F		
Rmc @ Meas. Temp	NA		
Source of Rmf / Rmc	MEAS		
Rm @ BHT	NA		
Time Circulation Stopped	11:00		
Time Logger on Bottom	11:40		
Max. Recorded Temperature	NA		
Equipment Number	PS-3		
Location	LA		
Recorded By	KOHN/LAPORTE		
Witnessed By	JABLONSKI		

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Comments

Calibration Report

Database File: 13043.db
Dataset Pathname: wdc/well/run1/elog
Dataset Creation: Thu Feb 22 11:45:02 2007 by Log Open-Cased 060407

ELOG Calibration Report

Serial:	D4
Model:	DTQ
Shop Calibration Performed:	Mon Oct 16 13:47:57 2006
Before Survey Verification Performed:	Fri Jan 13 10:44:59 2006
After Survey Verification Performed:	Fri Jan 13 10:45:04 2006

Shop Calibration

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	8.968	100.640		10.200	102.200	Ohm-m	1.004	1.200
Long	7.047	96.307		10.200	102.200	Ohm-m	1.031	-17.315
IEE	7010.940	7011.000	counts	7.673	7.673	A		
VSN	7971.520	7972.920	counts	152.047	152.074	V		
VLN	2025.980	2026.000	counts	38.643	38.643	V		

Before Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	101.284	101.286		101.238	101.262	Ohm-m	10.606	-972.995
Long	102.574	102.569		102.569	102.569	Ohm-m	68.614	-6935.150
IEE	7177.640	7188.640	counts	7.855	7.867	A		
VSN	8167.660	8180.360	counts	155.788	156.030	V		
VLN	2067.920	2071.000	counts	39.443	39.502	V		

After Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	101.291	101.291		101.284	101.286	Ohm-m	5.546	-460.437
Long	102.568	102.559		102.569	102.569	Ohm-m	0.563	44.827
IEE	7216.000	7220.860	counts	7.897	7.903	A		
VSN	8211.900	8217.460	counts	156.632	156.738	V		
VLN	2078.860	2080.080	counts	39.652	39.675	V		

After Survey Verification compared to Before Survey Calibration

	Zero			Cal		
	Before	After		Before	After	
Short	101.238	101.284	Ohm-m	101.262	101.286	Ohm-m
Long	102.872	102.574	Ohm-m	102.569	102.569	Ohm-m

Gamma Ray Calibration Report

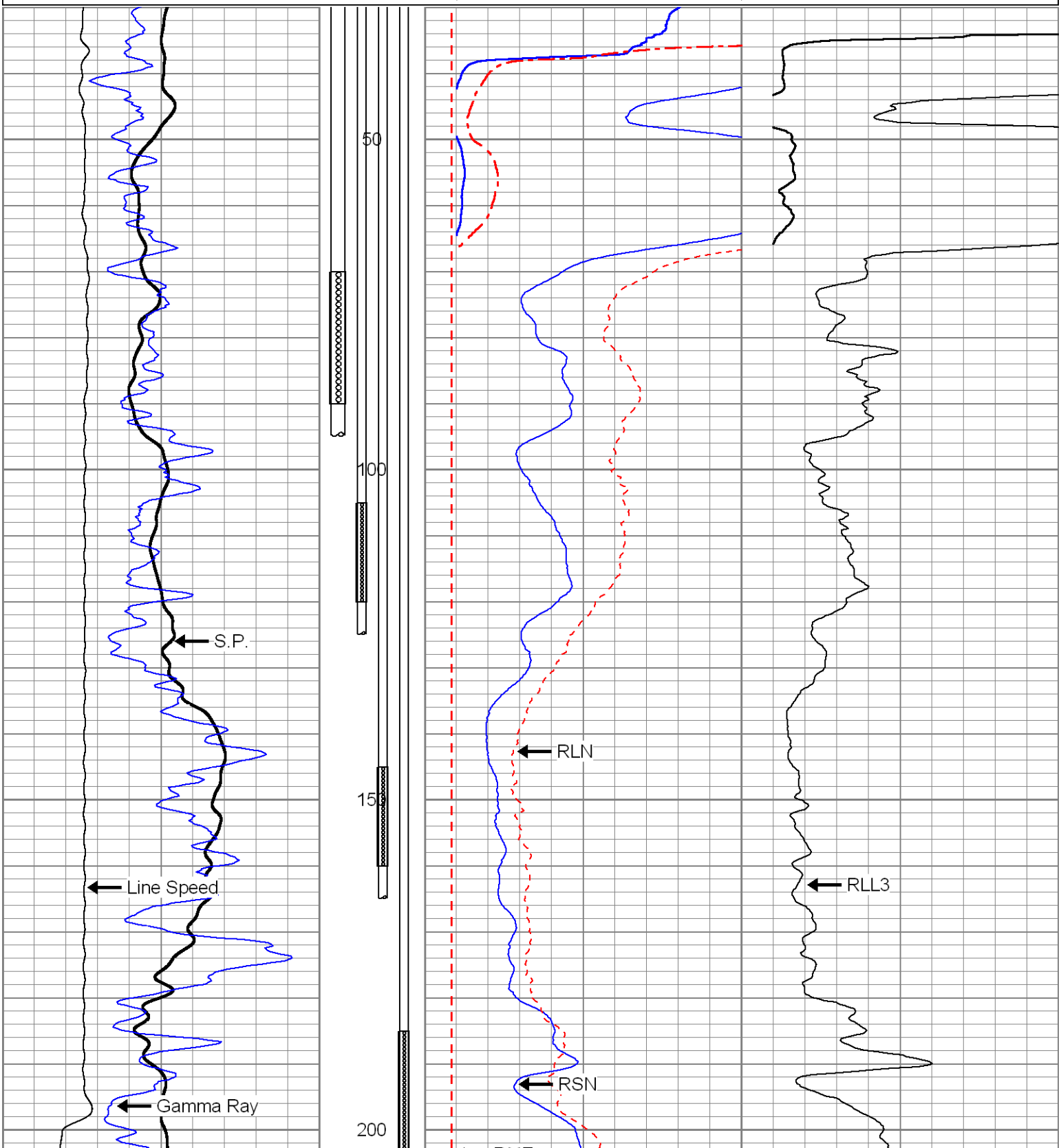
Serial Number:	D4	
Tool Model:	ELOG	
Performed:	Fri Jan 13 10:45:11 2006	
Calibrator Value:	162.0	GAPI
Background Reading:	172.5	cps
Calibrator Reading:	717.9	cps
Sensitivity:	0.2970	GAPI/cps

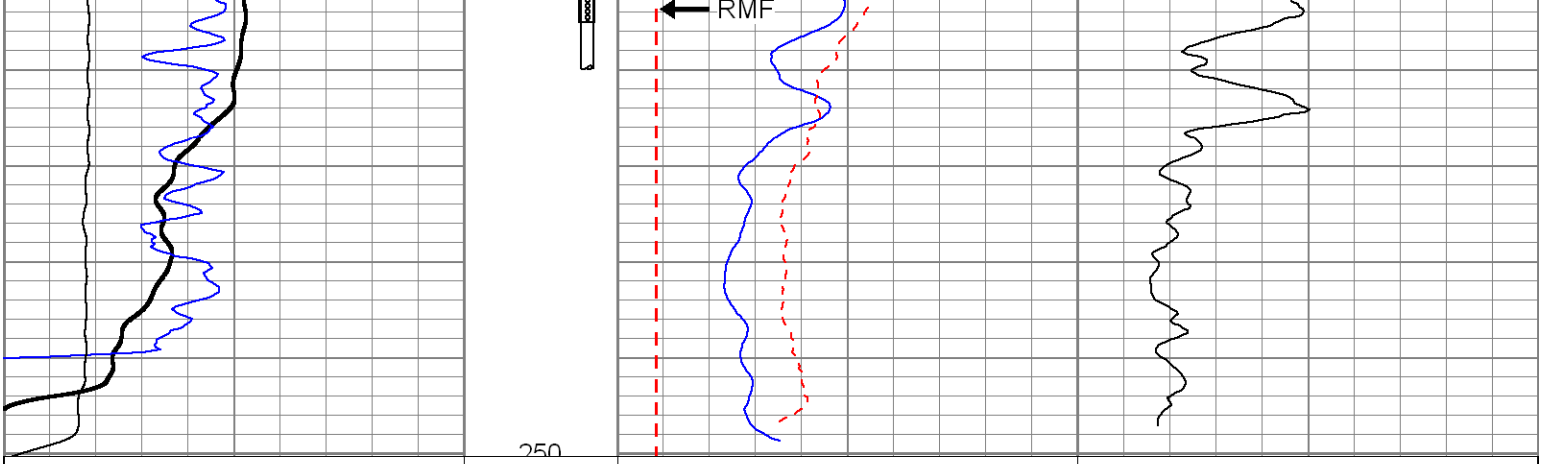
Database File:	13043.db
Dataset Pathname:	wdc/well/run1/elog.1
Presentation Format:	elog2
Dataset Creation:	Thu Feb 22 12:00:43 2007 by Calc Open-Cased 060407
Charted by:	Depth in Feet scaled 1:240

0	S.P. (mV)	150
40	Gamma-Ray (GAPI)	90
180	GR back-up (GAPI)	280
0	Line Speed (ft/min)	-100

0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
100	RSN back-up (Ohm-m)	1000
100	RLN back-up (Ohm-m)	1000

0	RLL3 (Ohm-m)	100
100	RLL3 back-up (Ohm-m)	1000





0	S.P. (mV)	150
40	Gamma-Ray (GAPI)	90
180	GR back-up (GAPI)	280
0	Line Speed (ft/min)	-100

0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
100	RSN back-up (Ohm-m)	1000
100	RLN back-up (Ohm-m)	1000

0	RLL3 (Ohm-m)	100
100	RLL3 back-up (Ohm-m)	1000

PACIFIC SURVEYS

LATEROLOG 3
GAMMA-RAY

Job No.
13043

File No.

Company WDC EXPLORATION & WELLS
Well MW-26
Field SANTA FE SPRINGS
County LOS ANGELES State CA

Location:

BELL RANCH ROAD EAST OF NORWALK BLVD.

Sec. Twp. Rge.

Other Services:

CALIPER
E-LOG

Permanent Datum	GL	Elevation above perm. datum	Elevation
Log Measured From	GL	0'	K.B.
Drilling Measured From	GL		D.F.
			G.L.

Date	2/21/2007		
Run Number	ONE		
Depth Driller	250'		
Depth Logger	250'		
Bottom Logged Interval	250'		
Top Log Interval	30'		
Casing Driller	16"		
Casing Logger	20'		
Bit Size	14.75"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	NA		
pH / Fluid Loss	NA		
Source of Sample	PIT		
Rm @ Meas. Temp	7.8 @77F		
Rmf @ Meas. Temp	8.5 @77F		
Rmc @ Meas. Temp	NA		
Source of Rmf / Rmc	MEAS		
Rm @ BHT	NA		
Time Circulation Stopped	11:00		
Time Logger on Bottom	11:40		
Max. Recorded Temperature	NA		
Equipment Number	PS-3		
Location	LA		
Recorded By	KOHN/LAPORTE		
Witnessed By	JABLONSKI		

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Comments

Calibration Report

Database File: 13043.db
Dataset Pathname: wdc/well/run1/LL3
Dataset Creation: Thu Feb 22 12:58:40 2007 by Log Open-Cased 060407

Gamma Ray Calibration Report

Serial Number:	12	
Tool Model:	GROH	
Performed:	Fri Aug 11 15:12:10 2006	
Calibrator Value:	162.0	GAPI
Background Reading:	54.0	
Calibrator Reading:	216.3	
Sensitivity:	0.9984	GAPI/

RLL3 (Resistivity Laterolog 3) Calibration Report:

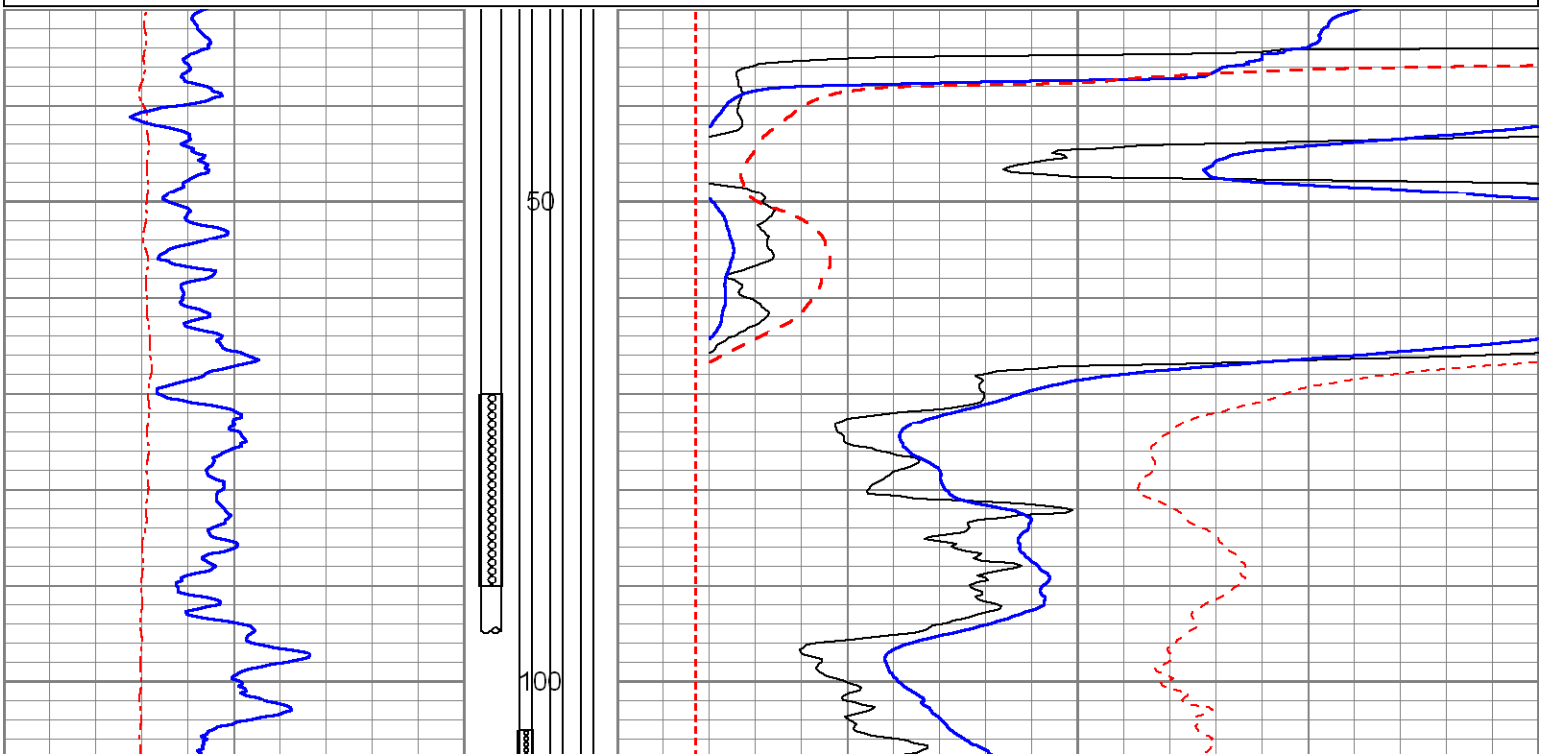
Serial Number:	231
Tool Model:	M&W
Performed:	Mon Oct 16 15:08:38 2006

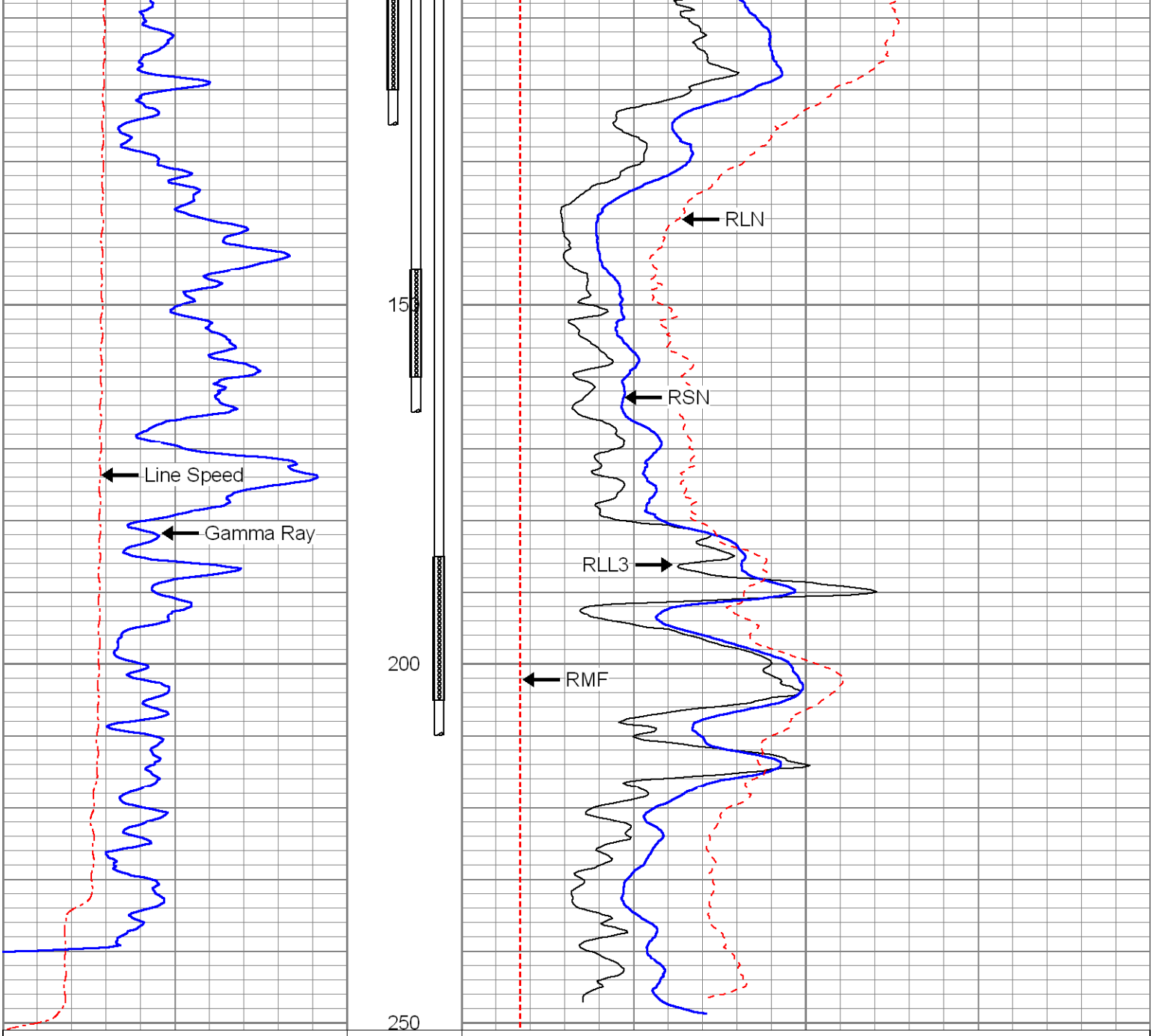
System Reading	Calibration Reference	
0.006	2.500	Ohm-m
0.010	5.000	
0.103	50.000	
0.496	250.000	
0.980	500.000	

Database File:	13043.db
Dataset Pathname:	wdc/well/run1/LL3
Presentation Format:	ll3
Dataset Creation:	Thu Feb 22 12:58:40 2007 by Log Open-Cased 060407
Charted by:	Depth in Feet scaled 1:240

0	Line Speed (ft/min)	-100
40	Gamma Ray (GAPI)	90

0	RLL3 (Ohm-m)	100
0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
100	RLL3 back-up (Ohm-m)	1000
100	RSN back-up (Ohm-m)	1000
100	RLN back-up (Ohm-m)	1000





0	Line Speed (ft/min)	-100
40	Gamma Ray (GAPI)	90

0	RLL3 (Ohm-m)	100
0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
100	RLL3 back-up (Ohm-m)	1000
100	RSN back-up (Ohm-m)	1000
100	RLN back-up (Ohm-m)	1000

PACIFIC SURVEYS

CALIPER
BOREHOLE VOLUMES

Job No.				
13093	Company	WDC EXPLORATION & WELLS		
	Well	MW-27		
	Field	SANTA FE SPRINGS		
	County	LOS ANGELES	State	CA

Location:	Other Services:
SE CORNER OF CLARK & NORWALK BLVD.	E-LOG GR/LL3
Sec. Twp. Rge.	

Permanent Datum	G.L		Elevation	Elevation
Log Measured From	G.L	0'	above perm. datum	K.B.
Drilling Measured From	G.L			D.F. G.L.

Date	4-12-07		
Run Number	ONE		
Depth Driller	225'		
Depth Logger	225'		
Bottom Logged Interval	225'		
Top Log Interval	20'		
Type Caliper	3 ARM		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
Max. Recorded Temp.	N/A		
pH/Fluid Loss	N/A		
Time Well Ready	11:00 AM		
Time Logger on Bottom	11:00 AM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/KOHN		
Witnessed By	JABLONSKI		

Borehole Record				Gravel Feed/Tubing Schedule			
Run Number	Bit	From	To	Size	Type	From	To
ONE	14.5"	20'	225'				

Casing Schd.	Size	Wgt/Ft	Top	Bottom
Surface String	17.5"	CSG	0	20'
Production String	4"	PVC	0	110'
Production String	2"	PVC	0	140'
Production String	4"	PVC	0	190'
Production String	2"	PVC	0	220'

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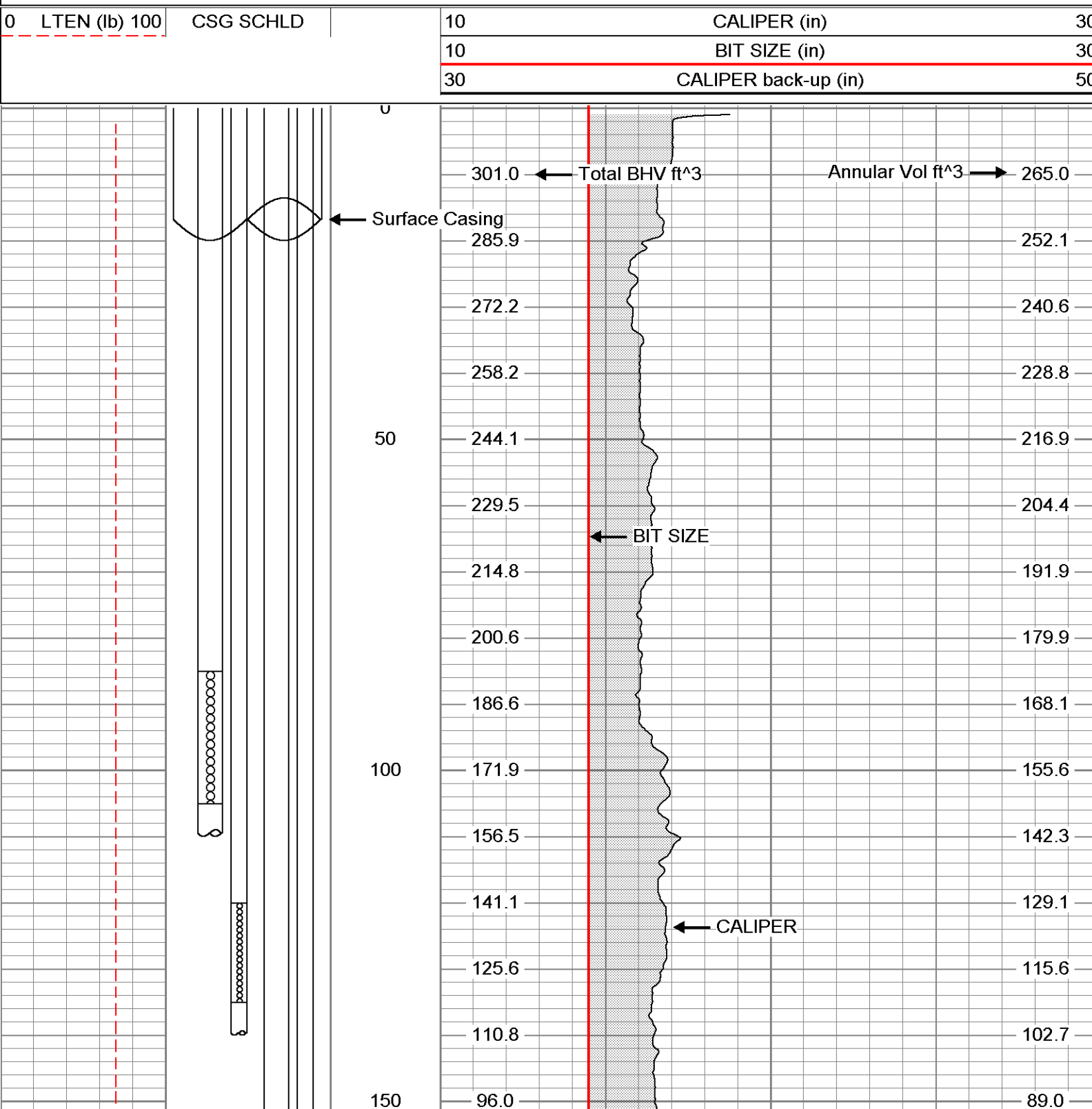
Comments

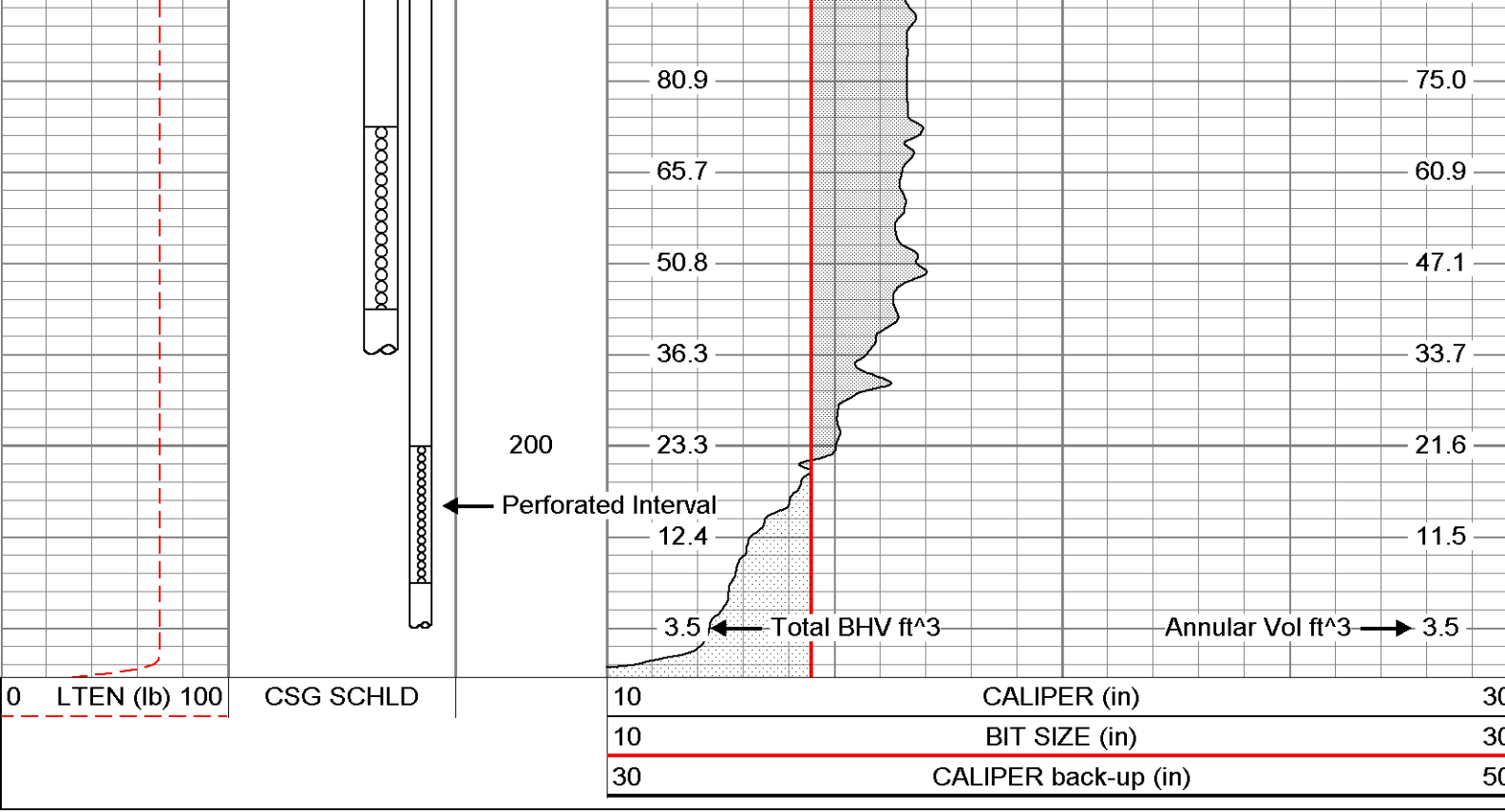
XY Caliper Calibration Report

Serial Number: Long
Tool Model: Comprobe
Performed: Sat Mar 31 19:15:21 2007

Small Ring:	21.437	in	
Large Ring:	33.437	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	423.3	423.3	cps
Reading with Large Ring:	594.3	594.3	cps
Gain:	0.0701754	0.0701754	
Offset:	-6.06826	-6.06826	

Database File: 13093.db
Dataset Pathname: wdc/mw-27/run2/CAL
Presentation Format: XYC2
Dataset Creation: Thu Apr 12 11:39:04 2007 by Log Warrior Version 6.6
Charted by: Depth in Feet scaled 1:240




80.9
65.7
50.8
36.3
23.3
12.4
3.5
75.0
60.9
47.1
33.7
21.6
11.5
3.5
200
Perforated Interval
Total BHV ft^3
Annular Vol ft^3
0 LTEN (lb) 100
CSG SCHLD
10 CALIPER (in) 30
10 BIT SIZE (in) 30
30 CALIPER back-up (in) 50

PACIFIC SURVEYS

ELECTRIC LOG
LATEROLOG 3
GAMMA-RAY

Job No.
13093

Company WDC EXPLORATION & WELLS
Well MW-27
Field SANTA FE SPRINGS
County LOS ANGELES State CA

Location:
SE CORNER OF CLARK & NORWALK BLVD.
Sec. Twp. Rge.

Other Services:
GR/LL3
CALIPER

Permanent Datum	G.L	Elevation above perm. datum	Elevation
Log Measured From	G.L	0'	K.B.
Drilling Measured From	G.L		D.F.
			G.L.

Date	4-12-07		
Run Number	ONE		
Depth Driller	225'		
Depth Logger	225'		
Bottom Logged Interval	225'		
Top Log Interval	20'		
Casing Driller	17.25" @ 20'		
Casing Logger	20'		
Bit Size	14.5"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	8.2 @ 77F		
Rmf @ Meas. Temp	8.9 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEAS.		
Rm @ BHT	N/A		
Time Circulation Stopped	1 HOUR		
Time Logger on Bottom	11:00 AM		
Max. Recorded Temperature	N/A		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/KOHN		
Witnessed By	JABLONSKI		

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Comments

ELOG Calibration Report

Serial: D1
Model: DTQ

Shop Calibration Performed: Tue Apr 10 15:16:05 2007
Before Survey Verification Performed: Tue Apr 10 10:25:41 2007
After Survey Verification Performed: Tue Apr 10 10:29:37 2007

Shop Calibration

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	9.658	101.397		10.200	102.200	Ohm-m	1.003	0.514
Long	9.725	99.673		10.200	102.200	Ohm-m	1.023	-19.747
IEE	29.852	6297.139	counts	0.033	6.892	A		
VSN	92.639	7135.843	counts	1.767	136.107	V		
VLN	43.509	1781.565	counts	0.830	33.981	V		

Before Survey Verification

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	721.161	100.845		608.444	100.864	Ohm-m	0.818	18.347
Long	1267.030	100.391		100.770	100.770	Ohm-m	0.829	17.532
IEE	13.306	5487.682	counts	0.015	6.006	A		
VSN	107.806	6217.551	counts	2.056	118.592	V		
VLN	47.352	1547.393	counts	0.903	29.515	V		

After Survey Verification

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	643.636	100.848		721.161	100.845	Ohm-m	1.143	-14.408
Long	1116.370	100.421		100.391	100.391	Ohm-m	1.148	-14.925
IEE	14.748	5686.417	counts	0.016	6.223	A		
VSN	106.645	6443.833	counts	2.034	122.908	V		
VLN	46.243	1604.565	counts	0.882	30.605	V		

After Survey Verification compared to Before Survey Calibration

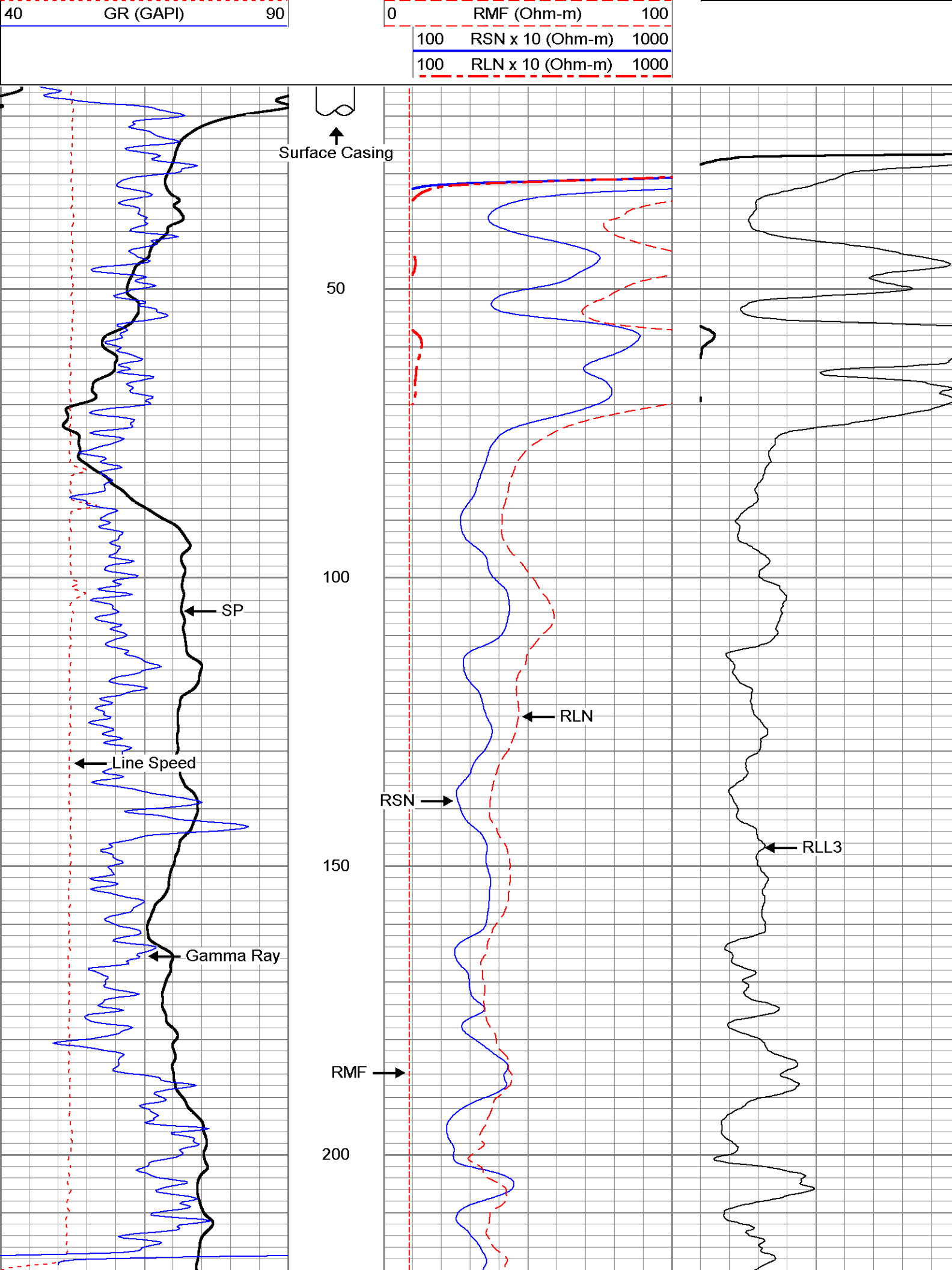
	Zero Before	Zero After		Cal Before	Cal After	
Short	608.444	721.161	Ohm-m	100.864	100.845	Ohm-m
Long	1068.080	1267.030	Ohm-m	100.770	100.391	Ohm-m

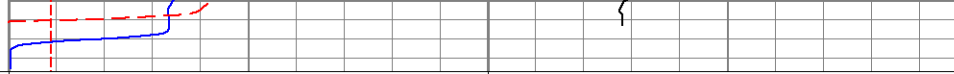
Gamma Ray Calibration Report

Serial Number:	D1	
Tool Model:	ELOG	
Performed:	Tue Feb 06 12:37:44 2007	
Calibrator Value:	162	GAPI
Background Reading:	170.762	cps
Calibrator Reading:	684.717	cps
Sensitivity:	0.315203	GAPI/cps

Database File:	13093.db
Dataset Pathname:	wdc/mw-27/run1/elog
Presentation Format:	ELOG
Dataset Creation:	Thu Apr 12 11:06:09 2007 by Log Warrior Version 6.6
Charted by:	Depth in Feet scaled 1:240

-100	SP (mV)	50		0	RSN (Ohm-m)	100	0		RLL3 (Ohm-m)		100
0	Line Speed (ft/min)	100		0	RLN (Ohm-m)	100		100	RLL3 x 10 (Ohm-m)		1000


40 GR (GAPI) 90
0 RMF (Ohm-m) 100
100 RSN x 10 (Ohm-m) 1000
100 RLN x 10 (Ohm-m) 1000
Surface Casing
50
100
150
200
SP
Line Speed
Gamma Ray
RLN
RSN
RMF
RLL3



-100	SP (mV)	50
0	Line Speed (ft/min)	100
40	GR (GAPI)	90

0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
100	RSN x 10 (Ohm-m)	1000
100	RLN x 10 (Ohm-m)	1000

0	RLL3 (Ohm-m)	100
100	RLL3 x 10 (Ohm-m)	1000

PACIFIC SURVEYS

LATEROLOG 3
GAMMA-RAY

Job No.
13093

Company WDC EXPLORATION & WELLS
Well MW-27
Field SANTA FE SPRINGS
County LOS ANGELES State CA

Location:

SE CORNER OF CLARK & NORWALK BLVD.

Sec. Twp. Rge.

Other Services:

E-LOG
CALIPER

Permanent Datum	G.L	Elevation above perm. datum	Elevation
Log Measured From	G.L	0'	K.B.
Drilling Measured From	G.L		D.F.
			G.L.

Date	4-12-07		
Run Number	ONE		
Depth Driller	225'		
Depth Logger	225'		
Bottom Logged Interval	225'		
Top Log Interval	20'		
Casing Driller	17.25" @ 20'		
Casing Logger	20'		
Bit Size	14.5"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	8.2 @ 77F		
Rmf @ Meas. Temp	8.9 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEAS.		
Rm @ BHT	N/A		
Time Circulation Stopped	1 HOUR		
Time Logger on Bottom	11:00 AM		
Max. Recorded Temperature	N/A		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/KOHN		
Witnessed By	JABLONSKI		

<< Fold Here >>

All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

Gamma Ray Calibration Report

Serial Number: 13
Tool Model: GROH
Performed: Tue Feb 06 12:55:29 2007

Calibrator Value:	162	GAPI
Background Reading:	53.4722	
Calibrator Reading:	219.9	
Sensitivity:	0.973395	GAPI/

Simplec Long Guard Calibration Report

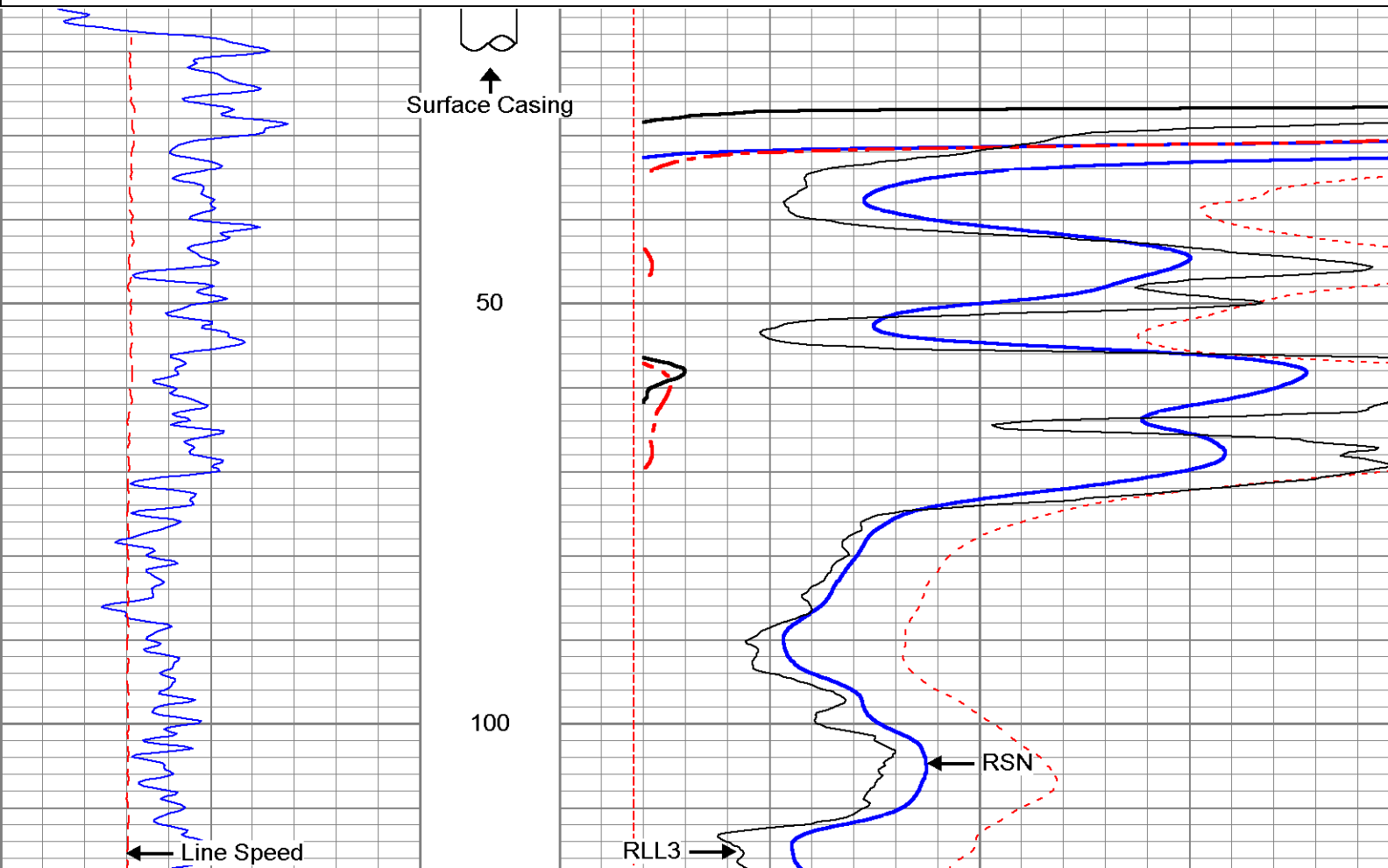
Serial Number:	294
Tool Model:	M&W
Performed:	Tue Feb 06 12:54:36 2007

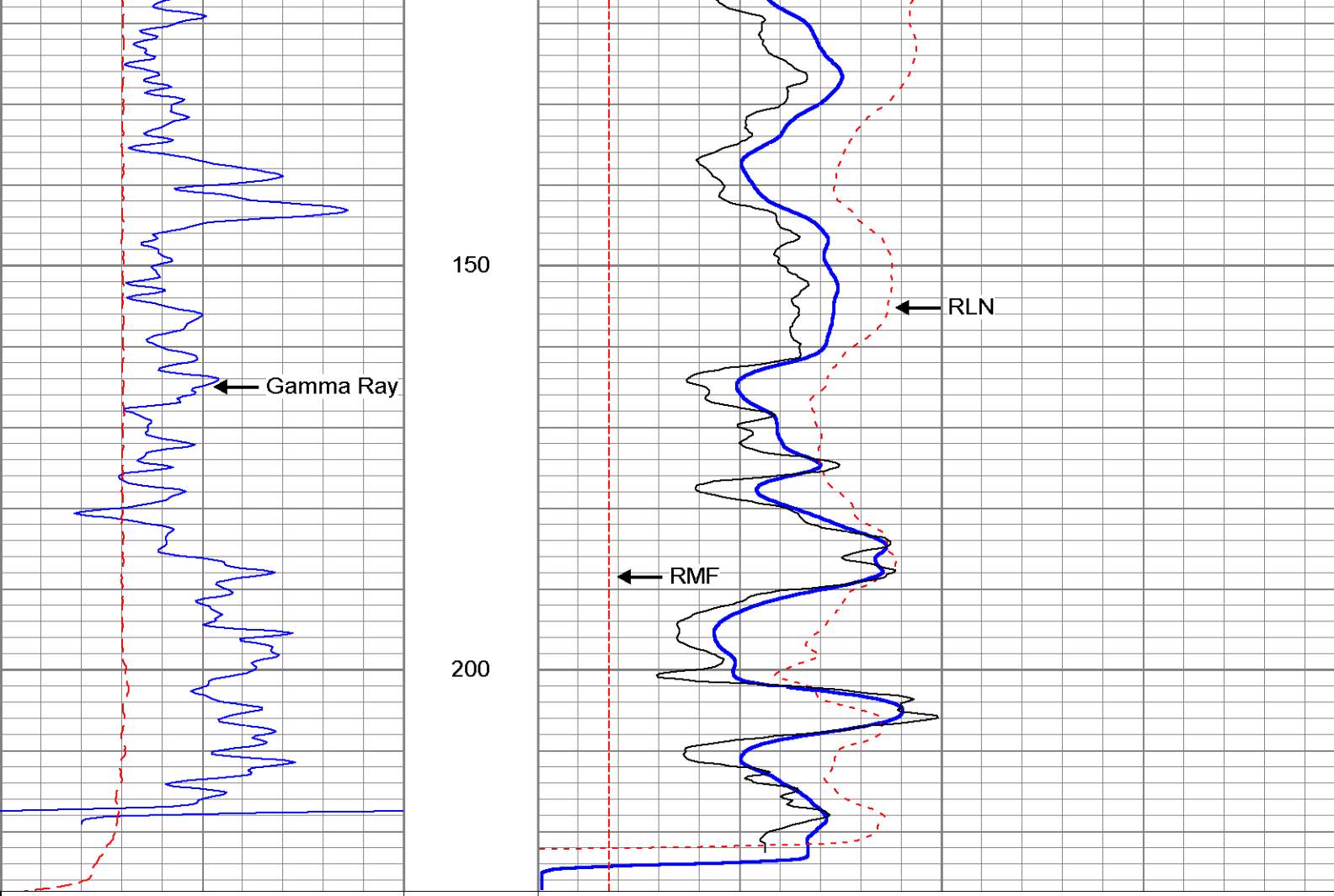
System Reading	Calibration Reference	
0.479	2.500	Ohm-m
0.694	5.000	
6.660	50.000	
32.599	250.000	
65.919	500.000	

Database File:	13093.db
Dataset Pathname:	wdc/mw-27/run1/ll3
Presentation Format:	GUARD
Dataset Creation:	Thu Apr 12 11:23:11 2007 by Log Warrior Version 6.6
Charted by:	Depth in Feet scaled 1:240

40	GR (GAPI)	90
0	Line Speed (ft/min)	100

0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
0	RLL3 (Ohm-m)	100
100	RLL3 x 10 (Ohm-m)	1000
100	RSN x 10 (Ohm-m)	1000
100	RLN x 10 (Ohm-m)	1000





40	GR (GAPI)	90
0	Line Speed (ft/min)	100

0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
0	RLL3 (Ohm-m)	100
100	RLL3 x 10 (Ohm-m)	1000
100	RSN x 10 (Ohm-m)	1000
100	RLN x 10 (Ohm-m)	1000

CH2MHILL

PROJECT NUMBER	WELL ID	
335392.FI.01	MW-23A	Sheet 1 of 1

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: MW-23A 5-18-07

DEVELOPMENT CONTRACTOR: Prosonic

DEVELOPMENT METHOD AND EQUIPMENT USED: Bail, Swab, Pump

START WATER LEVELS: 28.18 START: END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: 3-10 gpm average 4 LOGGER: J. Ockerman

TOTAL QUANTITY OF WATER DISCHARGED: 750 TD = 60.0'

DISPOSITION OF DISCHARGE WATER:

MONITORING EQUIPMENT USED: QED MP20

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
8:55			Bail	20	gallons					Dark Brown very little fines
	Swab									
9:30		Bail	20	gallons						
10:00		Pump	on	at	55'					
10:05	50	10	33.20	2000	22.50	8.01	1.321	123	3.45	Brown
10:10	100	3	29.40	2000	23.98	7.76	1.334	119	2.70	↓
10:16	150	4	29.38	625	23.98	7.47	1.365	116	2.55	Cloudy
10:25	200	4	29.40	444	24.07	7.34	1.378	114	2.76	
10:35	240	4	29.36	261	24.08	7.29	1.385	114	2.78	
10:45	280	4	29.38	86.3	23.88	7.26	1.401	113	2.73	
10:55	320	4	29.36	26.8	23.85	7.22	1.413	113	2.54	Clear
	Swab									
11:30	Pump		at	45'						
11:35	370	10	34.87	2000	22.67	7.28	1.425	112	4.73	Brown
11:40	400	4	29.60	1158	23.58	7.21	1.426	111	3.10	↓
11:45	420	4	29.58	230	23.80	7.18	1.429	113	3.03	Cloudy
11:50	440	4	29.55	288	23.91	7.19	1.435	114	3.03	
11:55	460	4	29.57	242	23.97	7.15	1.441	114	2.85	
12:00	480	4	29.55	208	23.92	7.15	1.444	115	2.90	↓
12:05	500	4	29.55	148	24.05	7.12	1.444	115	2.58	
	Pump off to empty tank									
13:25	Pump on		at	55'						Cloudy
13:30	25	5	29.40	105	25.37	7.24	1.447	124	3.17	
13:35	50	5	29.45	44.2	24.21	7.17	1.460	125	3.15	
13:40	80	5	29.45	30.4	24.12	7.08	1.441	125	2.99	
13:45	105	5	29.45	22.5	24.34	7.07	1.450	125	2.62	clearing
13:50	130	5	29.44	17.1	23.99	7.07	1.450	125	2.68	
13:55	155	5	29.45	13.1	24.18	7.07	1.460	125	2.54	↓
14:00	180	5	29.45	11.9	23.91	7.08	1.460	125	2.47	
14:05	210	5	29.45	9.2	23.98	7.07	1.460	125	2.49	
14:10	235	5	29.45	8.3	23.96	7.07	1.460	125	2.35	clear
	Pump		off							

6/12/07

CH2MHILL

PROJECT NUMBER 335392.FI.01

WELL ID MW24A

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2

LOCATION: HOME DEPOT PRKG LOT

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: SWAB, BAIL, PUMP

START WATER LEVELS: 36.86 w/PUMP IN START: 0700 END: 0825

MAXIMUM DRAWDOWN DURING PUMPING: 0.5'

RANGE AND AVERAGE DISCHARGE RATE:

LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED: 300 gallons

DISPOSITION OF DISCHARGE WATER: TANK # 108237

MONITORING EQUIPMENT USED: HACH TURBIDITY METER / YSI 556 MPS

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0702		4		PUMP ON.						
0707	20	4	37.11	164	24.29	7.02	1753	68.1	0.68	
0712	40	4	37.07	133	24.49	6.98	1760	60.5	0.62	
0722	80	4		12.1	24.91	6.95	1766	55.8	0.68	CLEAR
0727	100	4		5.10	24.56	6.94	1751	54.4	0.68	CLEAR
0728	PUMP OFF. SURGE WELL. MOVE INTAKE TO 61' BTC									
0730	PUMP ON.									
0735	120	4	37.05	74.2	24.44	6.95	1751	50.7	1.64	CLEARING
0740	140			71.9	25.17	6.93	1769	36.7	0.99	CLEARING
0745	160	4		28.9	25.32	6.93	1772	33.0	0.88	CLEAR
0750	180	4	37.01	6.27	25.30	6.93	1771	23.6	0.78	CLEAR
0752	SURGE WELL.									
0755	PUMP ON									
0800	200	4		86.5	24.94	6.93	1755	19.5	0.93	CLEARING
0805	220	4		80.6	25.77	6.92	1788	19.3	1.31	
0815	260	4		47.0	25.88	6.88	1792	18.7	0.70	
0820	280	4	36.95	13.1	25.83	6.86	1788	23.6	0.65	CLEAR
0825	300	4		5.82	25.90	6.85	1790	25.0	0.65	CLEAR
		PUMP OFF. DONE W/ THIS WELL.								
0845			COLLECT SAMPLE				OC2-MW24A-W-0-565			

WellDevLog.xls

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID: MW24-A

WELL DEVELOPMENT LOG

6/11/07

PROJECT: Omega Chemical OU-2

LOCATION: HOME DEPOT PARKING LOT SCREEN 50-70 - TD=75'

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: SWAB, BAIL, PUMP

START WATER LEVELS:

START: 0900 END: 1645

MAXIMUM DRAWDOWN DURING PUMPING: 0.5'

RANGE AND AVERAGE DISCHARGE RATE:

LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED: 840

DISPOSITION OF DISCHARGE WATER: TANK # 108237

MONITORING EQUIPMENT USED: HACH TURBIDIMETER / YSI 556 MPS

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
1020	BAIL WELL.									TH 111
	BAILED 400 gallons FROM MW24-A.									PID - 0.8ppm WHEN BAILING
1225	FINISHED SWABBING.									
1300	PUMP ON 4gpm INTAKE AT 63' BTOC.									
1310	40	4	37.11	>1000	25.83	6.98	1839	-25.7	2.60	
1320	80	4	37.06	1000	25.87	6.92	1828	-5.5	1.83	PID - 0.0ppm
1330	120	4		610	25.92	6.90	1828	1.0	1.49	
1340	160	4	37.04	268	25.89	6.88	1817	8.3	1.45	CLEARING
1350	200	4		193	26.07	6.86	1809	17.9	0.90	
1410	280	4		151	26.07	6.83	1799	30.9	1.62	PID - 0.0ppm
1430	360	4		107	26.62	6.83	1813	29.7	0.74	
1450	440	4	36.99	111	26.40	6.88	1802	29.1	0.90	CLEARING
1500	480	4		102	26.55	6.87	1811	24.4	0.70	CLEARING
1510	520	4	36.98	97.5	26.62	6.87	1813	24.7	0.70	CLEARING PID - 0.0ppm
1530	600	4		74.5	26.87	6.86	1819	37.5	1.31	CLEAR
1550	680	4	36.94	85.3	26.77	6.86	1813	31.2	0.73	CLEAR
1610	760	4		102	27.33	6.84	1844	40.3	0.97	CLEARING
1630	840	4	36.91	66.5	27.35	6.85	1832	37.2	0.73	CLEAR
1631		PUMP OFF. DONE FOR DAY.								

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID: MW24B

WELL DEVELOPMENT LOG 6/12/07

PROJECT: Omega Chemical OU-2

LOCATION: HOME DEPOT PARKING LOT

DEVELOPMENT CONTRACTOR: WDC

SCREEN 110-125' TD-130'

DEVELOPMENT METHOD AND EQUIPMENT USED: SWAB, BAIL, PUMP

START WATER LEVELS: 47.80 START: 0920 END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE:

LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER: TANK# 108237

MONITORING EQUIPMENT USED: HACH TURBIDITY METER / YSI 556 MPS

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0920		SET PUMP @ 112' BTC.								
0928		PUMP ON @ 2.5 gpm								
0938	25	2.5	43.88	702	23.66	7.31	1635	40.6	0.75	
0948	50		43.90	327	23.75	7.29	1605	34.8	0.85	
0958	75	2.5		128	23.74	7.29	1593	33.6	0.94	
1008	100	2.5	43.93	65	23.76	7.17	1586	67.2	1.72	CLEAR
1018	125	2.5		73.1	23.78	7.29	1585	49.5	1.03	CLEAR
1028	150	2.5		54.8	23.87	7.38	1583	40.9	1.05	CLEAR
1038	175			38.9	23.84	7.43	1582	38.4	1.07	CLEAR
1048	200		43.92	36.8	23.88	7.26	1582	72.1	1.32	CLEAR
1058	225			29.1	23.95	7.33	1582	53.1	1.10	CLEAR
1108	250	2.5		23.9	24.00	7.24	1583	47.6	1.10	CLEAR
1118	275			24.7	23.98	7.10	1582	67.8	1.99	CLEAR
1128	300	2.5	43.94	22.5	23.97	7.14	1584	70.9	1.46	CLEAR
1148	350			19.5	24.05	7.18	1586	50.8	1.12	CLEAR
1149		MOVE INTAKE TO 117' BTC. SURGE WELL.								
1158		PUMP ON. MOVE DISCHARGE TO TANK# 148L								
1203	365	2.5	43.11	724	25.36	7.09	1639	52.2	2.87	CLOUDY
1208	375	2.5	43.19	66.0	25.14	7.20	1625	31.2	1.78	CLEARING
1218	400			24.1	25.07	7.21	1622	12.8	1.32	CLEAR
1228	425			14.5	25.05	7.18	1621	49.6	1.34	CLEAR
1238	450	2.5		9.4	25.08	7.18	1621	28.0	1.17	CLEAR
1239	PUMP OFF DONE W/ DEVELOPMENT									
	6/13/07									
	0755	COLLECT SAMPLE FROM WELL								

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID: MW-24C

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2

LOCATION: HOME DEPOT PRKNG LOT

DEVELOPMENT CONTRACTOR: WDC

SCREEN 140-160' TD = 165'

DEVELOPMENT METHOD AND EQUIPMENT USED: SWAB, BAIL, PUMP

START WATER LEVELS: 42.70 START: 0740 END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE:

LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER: TANK #1 108237

MONITORING EQUIPMENT USED: TURBIDITY METER / YSI 556MPS

Time	Volume Discharged (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
1035	PUMP		SET @ 84' BTC.				3gpm	43.31 DTW		
1040	15	3	42.92	>1000	26.37	7.48	1718	163.7	1.65	
1100	75	3	42.48	>1000	25.56	7.35	1593	136.9	2.04	
1120	135	3	42.44	404	25.41	7.25	1560	124.8	2.59	CLEARING
1140	195	3	42.39	332	25.38	7.23	1556	114.4	2.54	CLEARING.
1145	PUMP OFF.			LUNCH.						
1215	PUMP		ON	4gpm						
1220	235	4	42.38	208	24.92	7.26	1537	89.4	2.36	
1240	315	4		146	24.93	7.21	1534	80.0	2.44	
1300	395	4	4238	141	24.85	7.28	1526	87.2	4.53	
1320	475	4		125	24.91	7.35	1528	88.8	3.17	
1340	555	4	42.37	99.3	24.85	7.18	1522	85.0	4.31	
1342	PUMP OFF.			LOWER INTAKE TO 150' BTC						
1401	PUMP ON @ 4gpm									
1416	615	4	42.16	52.5	24.80	7.28	1526	86.1	3.11	CLEAR
1423	645	4		5.27	24.63	7.18	1521	80.1	2.67	CLEAR
1424		SURGE WATER.								
1430		PUMP ON.								
1435	665			9.19	25.38	7.22	1545	80.2	2.45	CLEAR
1445	705	4	42.27	6.04	24.31	7.19	1510	76.4	2.79	CLEAR
1446	LOWER INTAKE TO 154' BTC.									
1455	745	4		2.38	24.41	7.17	1514	79.6	4.31	CLEAR
	PUMP OFF. DONE W/ DEVELOPMENT									
	6/12/07									
0855			COLLECT SAMPLE - OC2-MW24C-W-0-567							

WellDevLog.xls

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID: MW24-D

WELL DEVELOPMENT LOG 6/11/07

PROJECT: Omega Chemical OU-2

LOCATION: HOME DEPOT PARKING LOT SCREEN 173-178 BTC TD = 183' BTC

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP.

START WATER LEVELS: 41.01 START: 0740 END: 1645

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE:

LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER: TANK # 108237

MONITORING EQUIPMENT USED: YSI 556 MPS / HACH TURBIDITY METER

Time	Volume Discharged (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0740			SET PUMP INTAKE @ 175' BGS							
0822			PUMP ON @ 2gpm WATER LEVEL DROPING FAST.							
0840			168.5	>1000	24.16	7.51	1420	99.3	0.72	
0850	40	1.5	169.6	>1000	24.38	7.48	1356	88.6	0.93	
0900	55	1.5	169.1	1000	24.27	7.47	1336	79.3	1.99	
0920	85	1.5	167.55	>1000	24.20	7.46	1330	67.0	1.58	
0923	PUMP OFF.			PUMP IS DEAD.						
	6/12/07									
1250	SET PUMP IN WELL @ 176' BTC.									PUMP ON.
1300	PUMP OFF. GENERATOR OUT OF FUEL.									
1319	PUMP ON.									
1330	20	2	91.97	>1000						
	PUMP IS ACTING WEIRD FLOW IS GOING UP AND DOWN.									
1410	±70	1								
1425	±100	.75	134.51	>1000	29.12	7.42	1438	31.0	2.94	
1445	115			500	28.57	7.30	1413	58.7	2.81	
1455	125	.75	133.94	99	28.20	7.34	1383	34.8	2.48	
1505	135		136.80	154	28.09	7.33	1352	26.0	2.15	
1525	150			90.8	28.04	7.19	1344	72.0	2.55	
1535	160	.75	136.68	71.9	27.81	7.30	1336	37.8	1.87	
1550	175			46.6	27.49	7.16	1318	79.4	2.57	
1600	185			46.0	27.13	7.27	1323	43.9	1.81	
1615	195		135.51	105	27.02	7.28	1311	32.9	1.70	
1630	205			89.3	27.10	7.22	1293	72.9	1.99	

CH2MHILL

PROJECT NUMBER 335392.FI.01

WELL ID MW24D

WELL DEVELOPMENT LOG 6/13/07

PROJECT: Omega Chemical OU-2

LOCATION: HOME DEPOT PRKG LOT SCREEN 173-178' TD=183

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: SWAB, BAIL, PUMP,

START WATER LEVELS:

START: 0700

END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE:

LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER: TANK #145L

MONITORING EQUIPMENT USED: HACH TURBIDIMETER / YSI 556MPS

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0732		.75		PUMP	ON @ 171' BTOC.					
0743		PUMP	SHUT	OFF.						
0825		MOVE	INTAKE	TO	163' BTOC.					
0830	±30	.75	112.31	>1000	26.06	7.43	1326	62.5	2.94	
0840	40		117.75	>1000	27.98	7.43	1357	51.3	1.35	
0850	50		130.71	>1000	26.54	7.37	1297	50.1	1.11	
0900	60		127.41	490	27.29	7.34	1327	58.0	4.02	
0920	75			367	28.04	7.36	1312	40.5	1.04	
0940	90		127.38	33.0	28.45	7.32	1310	55.2	1.12	
0950	100			41.8	28.72	7.33	1308	40.6	0.91	
1000	110	.75		20.3	29.30	7.37	1319	23.8	0.85	
1020	125			27.4	29.88	7.31	1320	40.3	1.35	
10:35	135		127.38	15.3	30.30	7.38	1322	14.2	0.78	
10:50	150			18.4	30.34	7.37	1318	20.8	0.75	
11:00	157		127.38	12.1	30.58	7.23	1329	23.8	0.79	
11:15	170		127.38	9.8	31.11	7.26	1324	24.6	0.68	

CH2MHILL

PROJECT NUMBER 335392.FI.01

WELL ID MW24-D

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2

LOCATION: HOME DEPOT PARKING LOT

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: SWAB, BAIL PUMP 173-178' TD-183

START WATER LEVELS: START: END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER: ROLL OFF # 108237

MONITORING EQUIPMENT USED: TURBIDITY METER / YSI 556 MPS

Time	Volume Discharged (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
	BAILED 100 gallons									
	SWABBED									
1230		1.25	46.00	PUMP INTAKE @ 120'						
1322	55			>1000	25.89	7.50	1608	39.8	2.46	VERY TURBID
1340	88	1.25		>1000	26.23	7.49	1586	22.5	1.94	PID- 0.0
1400	112			>1000	25.62	7.49	1599	19.7	1.63	
1402	PUMP OFF.									
1415	PUMP ON @ 173' BTC.									
1430	145	2		>1000	24.74	7.43	1496	16.7	7.44	PID- 0.0
1440	165	2		1000	24.71	7.44	1484	11.8	1.90	TURBID
1450	185	2		>1000	24.74	7.41	1471	10.9	1.81	
1500	205	2		>1000	24.68	7.41	1459	17.9	2.05	
1510	225		127.9	1000	24.88	7.42	1440	20.9	2.63	
1520	245			>1000	25.48	7.44	1404	11.5	1.48	PID- 0.0
1540	285		122	>1000	24.82	7.42	1445	9.7	1.64	
1550	305			>1000	24.80	7.42	1490	16.6	3.02	TURBID -
1620	365	2	139.8	>1000	24.81	7.40	1463	10.0	1.85	
1650	425	2	143.6	>1000	25.34	7.46	1491	18.9	2.81	TURBID PID- 0.0
	PUMP OFF. DONE FOR DAY.									

CH2MHILL

PROJECT NUMBER	WELL ID	
335392.FI.01	MW-28	Sheet 1 of 1

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: MW-28 5-17-07

DEVELOPMENT CONTRACTOR: Prosonic

DEVELOPMENT METHOD AND EQUIPMENT USED: Bail, Swab, Pump, Swab, Bail, Pump

START WATER LEVELS: 73.65 START: 10:28 END: 15:15

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: 4-5 gpm LOGGER: J. Ockerman

TOTAL QUANTITY OF WATER DISCHARGED: 860

DISPOSITION OF DISCHARGE WATER:

MONITORING EQUIPMENT USED: QED MP20

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
10:28	0	4	73.78	w/ pump in			Begin	pumping		at 100' after 20 gal Bailed
10:32	16	4	75.26	837	21.8	7.17	1.404	138	5.61	cloudy
10:38	40	4	75.25	396	21.83	6.87	1.480	129	2.00	cloudy
10:44	64	4	75.26	373	22.22	6.77	1.480	120	1.83	↓
10:54	104	4	75.26	245	22.23	6.74	1.500	112	1.58	↓
11:05	148	4	75.26	137	22.23	6.74	1.51	109	2.12	↓
11:15	188	4	75.26	106	22.20	6.73	0.726	108	1.33	almost clear
11:30	225		75.26		22.44	6.74	1.52	107	1.61	
12:40	270		Pump off		Surge well			10 minutes top 10' of screen		
								10 minutes bottom 10' of screen		
13:10	Bail 20 gallons until no sediment.									
13:30	Pump on at 100' DTW 73.70									
13:45	75	5	74.90	215	25.37	6.85	0.890	126	2.09	cloudy
13:55	125	5	74.95	168	24.60	6.79	1.480	124	1.86	↓
14:05	200	4	74.95	125	23.79	6.71	1.500	123	1.28	↓
14:15	250	4.5	74.95	84.9	22.95	6.70	0.830	122	1.20	↓
14:25	300	4.5	↓	96.4	22.85	6.72	1.53	121	1.43	↓
14:35	350	4.5	↓	72.5	22.59	6.75	0.119	121	1.74	↓
14:45	400	4.5	↓	44.6	23.13	6.76	1.500	120	1.03	↓
	Reposition pump at 90'									
14:55	450	4.5	74.95	37.7	22.41	6.66	1.53	120	0.81	clear
15:05	490	4	74.95	18.7	22.21	6.66	1.52	120	1.00	↓
15:15	550	4.5	74.95	10.1	22.05	6.66	1.53	120	0.94	↓

TD = 109.7

WellDevLog

6/5/07

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID:

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2

LOCATION: MW-29

DEVELOPMENT CONTRACTOR: ~~WDC~~ PROSONIC

SCREEN 90-110 TD=115 4"

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP

START WATER LEVELS: 80.11

START: 0800

END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE:

LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER:

MONITORING EQUIPMENT USED: YSI 556 MPS / HACH TURBIDIMETER

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0835	START BAILING WELL.									
0855	TAG BOTTOM 116' BTC. 15 SGLLONS REMOVED. DTW = 80.40 BTC.									
0925	FINISHED SWABBING.									
0945	BAILED 15 SGLLONS TAG BOTTOM 116'									
1010	PUMP SET A 114' BTC.					80.90 DTW				PID: 0.0ppm
1013		2		PUMP ON.						
1015	5		80.9	>1000	23.07	7.58	1581	56.8	3.15	VERY TURBID.
1018	20	4.5	80.8	>1000	24.21	7.47	1642	52.9	2.58	
1035	100	4.5	80.9	648	23.63	7.12	1773	19.8	0.98	CLEARING
1040	120		80.9	289	23.62	7.09	1790	13.2	1.11	CLEARING.
1050	165		80.9	249	23.61	7.06	1806	10.3	1.35	
1100	220	4.5		137	23.61	7.05	1817	11.2	1.22	
1110	270			40.4	23.65	7.03	1839	13.1	2.44	CLEAR.
1120	315			29.0	23.59	7.02	1848	16.0	1.85	
1124	MOVE INTAKE TO 109' BTC.									
1130	360			70.8	23.64	7.00	1865	16.3	1.37	
1140	405	4.5	80.9	57.9	23.56	6.99	1870	18.6	1.44	CLEAR PID-0.0ppm
1155	490			49.7	23.55	7.00	1874	21.6	1.68	CLEAR
1156	PUMP OFF. TANK IS FULL						LUNCH.			
1313	PUMP ON. INTAKE @ 104' BTC.									
1315	500	4.5	80.7	554	23.56	7.05	1875	46.8	4.82	CLOUDY.
1320	530			36.2	23.83	7.03	1907	39.6	3.14	CLEAR.
1330	580		80.8	12.2	23.78	7.01	1909	35.9	2.35	CLEAR
1332	MOVE INTAKE TO 99' BTC.									
1340	630		80.8	8.63	23.80	7.00	1917	34.3	2.05	CLEAR
1342	PUMP OFF SURGE WELL.									
1346	PUMP ON.									
1350	650		80.8	21.3	23.93	7.01	1922	48.8	6.58	CLEAR
1355	670		80.8	13.0	24.06	7.00	1928	48.3	4.33	CLEAR
	PUMP OFF. DONE									

CH2MHILL

PROJECT NUMBER 335392.FI.01

WELL ID MW-30

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2

LOCATION: MW-30

DEVELOPMENT CONTRACTOR: Prosonic

DEVELOPMENT METHOD AND EQUIPMENT USED: Bail, swab, bail, pump x2

START WATER LEVELS: 91.6

START: 6-15-07

END: 6-15-07

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE:

LOGGER: J. Ockerman

TOTAL QUANTITY OF WATER DISCHARGED: 325

DISPOSITION OF DISCHARGE WATER:

MONITORING EQUIPMENT USED:

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
	10	Bail								
	Swab									
	10	Bail								
8:55	0	5	91.70	Start	Pumping	at	110'			
9:00	25	5	92.13	894	27.64	7.18	2138	-40.1	3.68	Dark
9:12	100	5	92.15	152	27.45	7.11	2231	-27.9	1.41	cloudy
9:20	150	3.5	92.0	28.1	26.26	7.08	2104	-58.8	2.67	clear
9:30	180	3.5	92.0	11.6	27.91	6.95	2260	-61.6	0.96	clear
9:45	Swab		10	min	at	100'				
9:55	Swab		10	min	at	110'				
10:15	Bail		10	gal.						
10:35		3.5	91.70	Begin	Pumping	again	at	100'		
10:40	200	3.5	92.0	1000	29.46	7.31	2739	-66.9	3.34	↑
10:50	235	3.5	92.0	147	28.16	7.15	2395	-50.5	1.49	
11:00	270	3.5	92.00	37.8	27.85	7.11	2381	-70.8	1.53	slight hydrocarbon odor
11:15	305	3.5	92.00	6.55	28.12	7.09	2339	-68.7	1.18	
11:20	325	3.5	92.00	4.69	28.19	7.03	2370	-69.1	0.98	↓

CH2MHILL

PROJECT NUMBER 335392.FI.01

WELL ID

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: MW25A 3/8/07

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP

START WATER LEVELS: 38.65 w/ Pump START: 1344 END: 1522

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: 3gpm LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED: 300 gallons

DISPOSITION OF DISCHARGE WATER: TANK HML155

MONITORING EQUIPMENT USED: YSI / HACH TURBIDIMETER

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
1344	PUMP		ON.	INTAKE @ 55' BTC.						
1346	6	3	39.0	>1000	24.18	6.80	1457	36.1	2.67	VERY TURBID
1351	21		41.3	>1000	25.11	6.64	1486	53.8	2.79	TURBID
1401	51		41.3	679	25.15	6.95	1481	49.9	2.92	CLOUDY
1411	81			261	25.07	6.98	1465	79.2	3.02	CLEARING
1421	111			81.3	25.05	6.95	1453	91.5	3.11	CLEAR
1431	141			37.6	24.96	6.92	1443	99.7	3.23	CLEAR
1432	SURGE WELL.									
1440	PUMP ON									
1445	156	3		41.7	25.16	6.93	1447	89.3	2.98	CLEAR
1450	171			32.2	25.12	6.90	1446	96.0	3.02	CLEAR
1500	200			12.1	25.07	6.91	1435	102.0	3.06	CLEAR
1504			41.1	MOVE PUMP INTAKE TO 158' BTC.						
1510	230			13.3	24.98	6.89	1440	100.5	2.99	CLEAR
1520	260			3.34	25.02	6.91	1435	92.6	2.76	CLEAR
1522	PUMP OFF DONE W/ DEVELOPEMENT.									

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3
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CH2MHILL

PROJECT NUMBER 335392.FI.01

WELL ID MW25B

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: 3/12/07

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP

START WATER LEVELS: 38.21 START: 0700 END: 1200

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER: TANK # HMT 208L

MONITORING EQUIPMENT USED: YSI 556 MPS / HACH TURBIDITY METER

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0806		PUMP ON, INTAKE @ 80' BTC								
		3	38.62	W/PUMP IN WELL						
0811			41.80							
0831	75	3	41.73	140	22.11	7.06	1208	96.5	2.45	CLEARING
0849	130	LOWER INTAKE TO 95' BTC								
0850		38.27	W/PUMP @ 95' BTC				PUMP ON.			
0855	145	3	41.22	296	22.20	6.92	1200	95.2	2.54	CLOUDY
0905	175	3		42.0	22.29	6.94	1198	95.1	2.58	CLEAR
0915	205	3	41.26	44.0	22.31	6.95	1197	94.6	2.58	CLEAR
0925	235	3	41.27	19.3	22.37	6.95	1196	94.6	2.56	CLEAR
0926	PUMP OFF. SURGE WELL.									
1000	INSTALL PUMP TO 105' BTC.									
			38.31	W/PUMP @ 105' BTC.						
1005	PUMP ON.									
1015	270	3	41.68	559	22.79	6.99	1195	73.5	2.63	CLOUDY
1025	300	3		62.3	22.67	6.92	1187	90.8	2.69	CLEARING
1035	330		41.66	48.9	22.70	6.96	1186	86.9	2.66	CLEAR
1045	360			24.3	22.74	6.93	1185	92.7	2.71	CLEAR
1055	390			15.4	22.78	6.91	1186	95.2	2.72	CLEAR
1056	SURGE WELL									
1103	PUMP ON.									
1108	405	3		36.8	22.82	6.93	1189	94.1	2.71	CLEAR
1118	435	3	41.46	23.8	22.84	6.94	1189	94.9	2.68	CLEAR
1120	MOVE INTAKE TO 100' BTC.									
1130	470			64.4	22.94	6.91	1187	93.1	2.73	CLEARING
1140	500	3	41.48	27.6	22.94	6.89	1186	97.6	2.65	CLEAR
1150	530			15.4	22.91	6.91	1187	99.6	2.70	CLEAR
1151		PUMP OFF. DONE W/ DEVELOPMENT								

PB
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CH2MHILL

PROJECT NUMBER 335392.FI.01

WELL ID

WELL DEVELOPMENT LOG

PROJECT : Omega Chemical OU-2 LOCATION : MW25C 3/9/07

DEVELOPMENT CONTRACTOR : WDC

DEVELOPMENT METHOD AND EQUIPMENT USED : SWAB, BAIL, PUMP

START WATER LEVELS : 44.2' BTC w/ PUMP START : END :

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: LOGGER : M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER: TANK HML155 & HMT208L

MONITORING EQUIPMENT USED: YSI 55MPS / HACH TURBIDITY METER

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
	SET PUMP IN WELL @ 125' BTC TO PUMP FLUIDS FROM WELL.									
0900	PUMP ON @ 3 gpm									
0930	90		90.1							
0938	114		90.6							
0955	165	PUMP OFF. LOWER INTAKE TO 145' BTC								
1003	PUMP ON 3gpm.									
1008	180	3		130	23.57	7.78	491	2.8	0.70	CLEARING
1013	195			86.6	24.11	7.78	490	1.2	0.54	CLEAR
1023	225		90.35	119	24.30	7.78	496	1.5	0.52	CLEARING
1033	255			142	24.38	7.73	500	3.1	0.52	CLEARING.
1043	285			108	24.31	7.74	480	2.5	0.49	CLEARING.
1053	315			253	24.56	7.71	479	3.7	0.47	CLOUDY
1103	345			>1000	24.35	7.55	530	10.4	0.58	CLOUDY
1113	375	3	86.6	835	24.31	7.42	573	17.3	0.65	CLOUDY
1115	INCREASE PUMPING RATE TO 9gpm TO STRESS WELL FORMATION									
1125	465	9	PUMP OFF. DTW = 142' BTC.							
1147	RECHARGED TO 60', PUMP ON. 9gpm									
1154	528.		140'	PUMP OFF LET RECHARGE.						
1214		4	57.8	PUMP ON. 4gpm						
1219	550		78.1	247	23.14	6.93	480	26.1	0.76	CLOUDY
1224	570			284	23.78	6.72	464	30.4	0.63	CLOUDY
1229	590	4	102	257	23.86	7.11	443	16.6	0.57	CLOUDY
1234	610	4	109.5	206	23.86	7.50	432	11.6	0.52	CLOUDY
1239	630	4	109.8	96.2	23.83	7.60	434	10.8	0.48	CLEARING
1249	670	4	108.4	427	23.74	7.60	458	14.6	0.47	CLOUDY
1304	730	4	102.2	>1000	23.77	7.42	595	16.7	0.68	CLOUDY
1324	810	4	99.6	279	23.58	7.33	643	23.3	0.76	CLOUDY.
1344	890	4	101.1	328	23.83	7.40	614	21.6	0.68	CLOUDY
1354	930	4	101.5	322	23.74	7.39	591	21.4	0.64	CLOUDY
1404	970			547	23.64	7.36	628	25.7	0.65	CLOUDY
1414	1010	4		271	23.66	7.32	633	27.1	0.70	CLOUDY
1424	1050	4	100.8	223	23.63	7.31	625	27.2	0.69	CLOUDY

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID:

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: MW25C 3/8/07

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP

START WATER LEVELS: START: 0900 END: 1230

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: 3gpm LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED: 400 gallons

DISPOSITION OF DISCHARGE WATER: TANK# HML 155

MONITORING EQUIPMENT USED: YSI 556 MPS / HACH TURBIDITY METER

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0900	SET PUMP @ 143' BTC						DTW= 43.4' BTC			
0912	PUMP ON			3gpm						
0916	12	3		>1000	23.37	8.00	777	-0.6	1.95	VERY TURBID
0921	27		91.5	>1000	24.02	8.08	803	-7.2	1.38	VERY TURBID
0926	42	3	96.2	>1000	24.87	8.02	870	-10.2	1.34	VERY TURBID
0929	REDUCE FLOW RATE TO 2gpm									
0935	54	2		>1000	25.01	7.96	996	-13.9	0.98	TURBID
0945	74	2	96.0	>1000	25.14	7.97	854	-11.8	0.97	CLOUDY NO ODORS
0955	94		94.9	1000	25.18	7.95	784	-10.6	0.95	CLOUDY
1005	114			1000	25.16	7.93	732	-4.8	0.92	CLOUDY
1015	134			752	25.22	7.93	685	-4.2	0.83	CLOUDY
1025	154	2	95.2	545	25.42	7.96	667	-7.5	0.90	CLEARING
1035	174			405	25.32	7.92	639	-8.8	0.81	CLEARING
1045	194			337	25.28	7.84	611	-7.3	0.77	CLEARING
1055	214			350	25.25	7.80	602	-5.2	0.75	CLEARING
1105	234			283	25.36	7.86	592	-9.4	0.71	CLEARING
1115	254		95.5	223	25.23	7.83	581	-8.5	0.69	CLEARING
1125	274			242	25.20	7.79	565	-7.6	0.69	CLEARING
1135	294			237	25.26	7.86	554	-12.9	0.62	CLEARING
1145	314			219	25.22	7.79	552	-9.6	0.63	CLEARING
1155	334			200	25.38	7.79	545	-15.2	0.60	CLEARING
1159	PUMP OFF SURGE WELL									
1212	PUMP ON. INCREASE FLOW RATE TO 3gpm.									
1216	346	3	90.6	243	25.47	7.91	540	7.9	1.56	CLEARING
1226	376			>1000	24.92	7.66	554	0.2	0.67	CLOUDY
1229	PUMP OFF. PULL PUMP AND SWAB WELL AGAIN.									

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID:

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: MW25D

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP

START WATER LEVELS: 66.2' BTC START: END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: 2.5gpm LOGGER: M. Ladeau 3/7/07

TOTAL QUANTITY OF WATER DISCHARGED: ±400 gallons

DISPOSITION OF DISCHARGE WATER: HMT 155

MONITORING EQUIPMENT USED:

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
	SET PUMP @ 80' BTC				DTW= 55.6' PUMP ON					
1244	200	2.5	57.5							VERY TURBID
1310	PUMP ON @ 150' BTC.									
1327	PUMP ON @ 200' BTC.									
1332	300	2		459	23.20	8.09	837	29.2	2.34	CLOUDY
1337	310			32.1	23.18	7.98	820	32.4	2.13	CLEAR
1342	320			18.2	23.14	7.95	811	32.7	2.17	CLEAR
1352	340			3.78	23.03	7.86	787	33.6	2.15	CLEAR
1353	SURGE WELL PUMP OFF.									
1400	PUMP ON.									
1405	350			5.31	23.18	7.89	783	31.3	2.09	CLEAR
1408	MOVE INTAKE TO 205' BTC.									
1413	360			506	23.09	7.89	785	33.5	2.11	CLOUDY
1418	370	2		17.7	22.91	7.86	772	33.7	2.12	CLEAR
1423	380			3.70	22.74	7.82	762	34.6	2.10	CLEAR
1424	SURGE WELL PUMP OFF									
1433	PUMP ON.									
1438	390			4.25	22.76	7.76	768	34.5	2.18	CLEAR
1440	PUMP OFF.									

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID:

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: MW26-A 2/27/07

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAILER, SWAB, PUMP

START WATER LEVELS: 68.20' w/PUMP IN WELL START: 0950 END: 1300

MAXIMUM DRAWDOWN DURING PUMPING: 1' BTC

RANGE AND AVERAGE DISCHARGE RATE: 3gpm LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED: 500 gallons

DISPOSITION OF DISCHARGE WATER: BIN HMT 217L

MONITORING EQUIPMENT USED: YSI 556MPS / HACH TURBIDIMETER V= 17.5 gallons

Time	Volume Discharged (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0953	9	3	68.20	71000						VERY TURBID.
0955	15			71000	21.9	7.08	1720			
0959	27		68.70	406	23.2	6.98	1642			CLOUDY NO ODORS
1009	57			75.8	23.6	6.86	1617	79.1	3.5	CLEARING
1019	87		69.20	11.0	23.83	7.17	1741	80.2	3.03	CLEAR
1025	MOVE INTAKE TO 78' BTC									
1029	117			8.22	23.81	7.17	1742	81.7	2.72	CLEAR
1039	147			2.04	24.38	7.09	1764	74.0	3.09	CLEAR
1042	SURGE WELL.									
1045	PUMP ON.									
1049	168		68.80	32.4	24.43	7.11	1767	112.9	3.18	CLEAR
1059	198			34.4	24.65	7.07	1781	104.7	3.16	CLEAR
1109	228			4.41	24.69	7.03	1774	102.6	3.25	CLEAR
1112	PUMP OFF SURGE WELL MOVE INTAKE TO 82' BTC									
1120	PUMP ON.									
1129	267			16.9	24.76	7.12	1776	145.1	3.41	CLEAR
1139	297		68.6	20.7	24.67	7.01	1782	134.4	2.57	CLEAR
1149	327			11.9	24.66	7.01	1779	132.9	2.48	CLEAR
1159	357			4.96	24.74	6.97	1782	128.1	2.61	CLEAR
1200	SURGE WELL									
1203	PUMP ON									
1209	375		68.4	16.6	24.67	6.96	1773	149.7	2.86	CLEAR
1219	405			24.7	24.58	6.97	1770	142.5	2.29	CLEAR
1229	435			33.8	24.66	7.06	1782	132.6	2.78	CLEAR
1239	465		68.4	29.3	24.64	7.02	1776	134.6	2.62	CLEAR
1249	495			8.25	24.62	7.00	1771	134.2	2.61	CLEAR
1255	COLLECT SAMPLES FROM WELL OC2-MW26A-W-0-452									
1318	FINAL DTW = 70.50 BTC									

WellDevLog.xls

CH2MHILL

PROJECT NUMBER 335392.FI.01

WELL ID

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: MW26-B 2/28/07

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP

START WATER LEVELS: 68.73 START: 0725 END: 1200

MAXIMUM DRAWDOWN DURING PUMPING: 1' BTC

RANGE AND AVERAGE DISCHARGE RATE: 2gpm LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED: 350 gallons

DISPOSITION OF DISCHARGE WATER: BIN HMT 217L

MONITORING EQUIPMENT USED: YSI 556 MPS / HACH TURBIDIMETER

Time	Volume Discharged (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0800	PUMP	ON		2gpm						VERY TURBID
0805	10	2	68.8	977	21.51	7.21	1631	233.4	3.91	CLOUDY
0810	20			93.9	21.76	7.21	1635	160.7	2.83	CLEARING NO ODORS
0820	40		68.9	20.9	21.80	7.16	1624	150.5	2.55	CLEAR
0830	60			54.2	21.87	7.13	1620	150.1	2.55	CLEAR
0840	80			5.78	21.90	7.09	1615	150.5	2.61	CLEAR
0850	100		68.8	5.13	21.88	7.09	1615	149.7	2.62	CLEAR
SURGE WELL				PUMP OFF						
0858	PUMP ON									
0900	105			111	21.99	7.10	1619	149.2	2.86	CLOUDY
0905	115			30.3	21.90	7.10	1614	148.5	2.60	CLEAR
0915	135			12.8	21.89	7.08	1612	149.5	2.57	CLEAR
0925	155			47.1	21.93	7.08	1610	149.2	2.77	CLEAR
0935	175			8.41	22.02	7.08	1613	149.8	2.83	CLEAR
	MOVE PUMP INTAKE TO 113' BTC.									
0940	185			>1000	22.09	7.09	1615	148.6	2.60	CLOUDY
0955	215		68.9	29.1	21.99	7.09	1607	150.2	2.80	CLEAR
1005	235			8.18	22.05	7.10	1610	149.9	2.80	CLEAR
	SURGE WELL			PULL PUMP		AND	CHANGE WATER IN PUMP			
1037	PUMP	ON								
1040	245	2	69.0	649	22.02	7.08	1615	151.1	2.54	CLOUDY
1050	265			14.6	22.05	7.09	1611	151.2	2.51	CLEAR
1100	285			13.3	22.08	7.07	1609	151.9	2.64	CLEAR
1110	305			5.56	22.05	7.10	1605	151.7	2.65	CLEAR
	PUMP OFF			SURGE WELL			LOWER PUMP			INTAKE TO 118' BTC
1125	PUMP ON.									
1127	310			94.6	22.14	7.10	1607	151.8	2.70	CLOUDY
1137	330		69.8	3.34	22.14	7.07	1606	152.4	2.75	CLEAR
1140	SURGE WELL			PUMP OFF.						
1148	PUMP ON									
1150	335			34.0	22.09	7.11	1604	153.0	2.88	CLEAR
1155	345		69.8	7.19	22.06	7.07	1602	152.8	2.78	CLEAR
1158	PUMP OFF			DONE w/ DEVELOPMENT						

WellDevLog.xls

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID:

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: MW26C 3/1/07

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP

START WATER LEVELS: START: 0720 END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: 2gpm LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER: TANK # HMT 217L

MONITORING EQUIPMENT USED: YSI 556MPS / HACH TURBIDIMETER

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
	SET PUMP INTAKE AT 90' BTC TO REMOVE DRILL FLUID									
0727	DTW = 75.1 w/ PUMP @ 90' BTC. PUMP ON.									
0729	WATER LEVEL @ 88' PUMP OFF. MOVE INTAKE TO 120' BTC.									
0733	PUMP ON @120' BTC DTW = 90.6' BTC.									
0742	25	2	90.6	>1000	21.84	7.48	1552	156.7	3.47	VERY MUDDY
0745	PUMP OFF MOVE INTAKE TO 150' BTC.									
0750	PUMP ON									
0755	45	2	89.2	>1000	21.59	7.35	1525	158.9	1.53	CLOUDY
0800	55			352	22.01	7.34	1531	157.2	1.53	CLEARING
0805	65			184	21.99	7.30	1525	160.3	1.55	CLEARING
0815	85		91.5	176	21.98	7.31	1521	159.1	1.52	CLEARING
0825	105			94.0	22.09	7.30	1522	158.9	1.55	CLEARING
0835	125		92.4	212	22.08	7.29	1525	158.3	1.46	CLOUDY
0845	145		92.6	90.2	22.16	7.28	1527	157.7	1.48	CLEARING
0855	165			72.7	22.10	7.29	1522	157.1	1.49	CLEAR
0905	185		92.6	40.0	22.19	7.28	1525	157.2	1.58	CLEAR
0915	205			27.8	22.19	7.27	1524	157.8	1.51	CLEAR
0925	225			52.2	22.20	7.26	1525	154.4	1.45	CLEAR
0926	PUMP OFF SURGE WELL PULL PUMP AND CHANGE WATER IN PUMP.									
0950	PUMP ON.			>1000	22.26	7.28	1543	154.9	1.50	VERY TURBID.
0955	235		89.9	402	22.28	7.26	1537	156.1	1.47	CLOUDY
1000	245			124	22.27	7.26	1531	155.8	1.50	CLEARING
1010	265	2	90.1	57.0	22.28	7.24	1525	156.9	1.51	CLEAR
1020	285			58.1	22.26	7.24	1521	156.8	1.51	CLEAR
1030	305			32.1	22.32	7.23	1531	157.3	1.59	CLEAR
1040	325	2		37.6	22.29	7.22	1530	157.7	1.70	CLEAR
1050	345		91.1	22.8	22.28	7.19	1528	158.8	1.70	CLEAR
1100	365			20.9	22.33	7.17	1530	160.0	1.62	CLEAR
1102	MOVE PUMP INTAKE TO 155' BTC.									
1110	385			31.4	22.32	7.17	1526	158.7	1.65	CLEAR
1120	405			19.0	22.36	7.16	1528	159.8	1.65	CLEAR
1121	PUMP OFF SURGE WELL.									
1128	PUMP ON									
1130	410			690	22.52	7.16	1553	155.7	1.68	CLOUDY
1140	430			38.1	22.38	7.26	1527	157.1	1.62	CLEARING
1150	450			43.6	22.39	7.30	1525	156.9	1.65	CLEAR
1200	470			44.1	22.40	7.32	1522	157.6	1.69	CLEAR

CH2MHILL

PROJECT NUMBER 335392.FI.01

WELL ID 2of2

WELL DEVELOPMENT LOG

PROJECT : Omega Chemical OU-2 LOCATION : MW26C 3/1/07

DEVELOPMENT CONTRACTOR : WDC

DEVELOPMENT METHOD AND EQUIPMENT USED : BAIL, SWAB, PUMP

START WATER LEVELS : START : END : 1230

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: LOGGER : M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED: 520 gallons

DISPOSITION OF DISCHARGE WATER:

MONITORING EQUIPMENT USED:

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
1210	490	2		23.9	22.42	7.23	1525	159.6	1.68	CLEAR
1212	MOVE		INTAKE	TO	160'	BTC.				
1220	510		90.8	27.5	22.50	7.26	1521	159.1	1.64	CLEAR
1224	PUMP		OFF.	DONE	W/	DEVELOPMENT		OF		MW26C

WellDevLog.xls

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID:

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: MW26D 3/2/07

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP

START WATER LEVELS: 74.20 START: 0750 END: 1200 74.10

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: 2gpm LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER: TANK # HMT 217L

MONITORING EQUIPMENT USED: YSI 556 MPS / HACH TURBIDIMETER

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0750	SET PUMP @ 100' BTC PUMP ON.									
0830	SET PUMP @ 170' BTC TO PUMP OUT FLUIDS.									
0858	SET PUMP INTAKE @ 190' BTC. PUMP ON.									
0900	100			>1000	21.33	5.90	481	42.4	1.24	CLOUDY
0910	120			317	22.19	6.55	488	0.8	0.08	CLEARING
RECALIBRATED PH & ORP METER DUE TO STRANGE READINGS.										
0920	140	2		114	22.09	7.94	484	55.4	0.39	CLEARING
0930	160			93.4	22.16	7.90	484	32.2	0.08	CLEARING.
0940	180			116	22.17	7.84	486	27.3	0.05	CLEARING
0950	200			62.2	22.31	7.87	482	23.5	0.04	CLEAR
1000	220			28.6	22.28	7.86	481	21.2	0.04	CLEAR
SURGE WELL PUMP OFF										
1006	PUMP ON.									
1010	240			27.3	22.21	7.82	478	36.2	0.33	CLEAR
1020	260			20.8	22.34	7.79	479	26.5	0.06	CLEAR
1030	280			12.5	22.37	7.83	478	21.8	0.05	CLEAR
MOVE PUMP INTAKE TO 200' BTC.										
1035	PUMP ON									
1040	290			58.0	22.39	7.71	493	24.8	0.04	CLEARING
1050	310			26.3	22.41	7.85	482	21.5	0.03	CLEAR
1100	330			16.7	22.37	7.87	480	19.3	0.04	CLEAR
PUMP OFF SURGE WELL.										
1103	PUMP ON.									
1110	350			26.2	22.40	7.81	478	22.8	0.04	CLEAR
1120	370			65.4	22.39	7.80	476	20.9	0.03	CLEAR
1130	390			69.2	22.40	7.79	477	19.7	0.03	CLEAR
1140	410			44.2	22.45	7.77	477	19.3	0.02	CLEAR
1150	430			38.0	22.43	7.78	476	16.6	0.02	CLEAR
PUMP OFF DONE W/ DEVELOPMENT.										

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID: MW27A

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: 4/23/07

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED:

START WATER LEVELS: START: END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED:

DISPOSITION OF DISCHARGE WATER: TANK # 274502

MONITORING EQUIPMENT USED: MP20 - LAMOTTE TURBIDITY METER

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
1245	PUMP ON @ 90' BTC.									
1250	20	4	79.08	118	24.16	7.27	1.65	192	0.87	CLEARING
1300			79.01	8.24	24.42	7.23	1.65	191	1.20	CLEAR
1301	PUMP OFF. SURGE WELL.									
1307	PUMP ON.									
1310	35	4	78.71	14.2	24.66	7.19	1.63	191	0.77	CLEAR
1320	75			4.54	24.24	7.20	1.65	190	0.41	CLEAR
1322	LOWER PUMP INTAKE TO 95' BTC.									
1330	115		78.75	2.99	24.33	7.15	1.63	189	0.15	CLEAR
1335	PUMP OFF SURGE WELL.									
1340	PUMP ON.									
1345	135	4		5.47	24.49	7.15	1.64	189	0.12	CLEAR
1355	175		78.51	1.23	24.53	7.14	1.65	189	0.12	CLEAR
1359	PUMP OFF. MOVE INTAKE TO 100' BTC.									
1415	PUMP ON									
1425	220	4	78.39	4.38	24.59	7.15	1.66	189	0.54	CLEAR
1427	PUMP OFF SURGE WELL.									
1435	PUMP ON.									
1440	240		78.52	27.7	24.24	7.15	1.65	189	0.27	CLEAR
1450	280	4		4.16	24.19	7.13	1.66	189	0.09	CLEAR
1455	PUMP OFF. DONE FOR WELL									

CH2MHILL

PROJECT NUMBER 335392.FI.01

WELL ID MW27B

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: O 4/23/07

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP

START WATER LEVELS: START: 0700 END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED: ±300 gallons

DISPOSITION OF DISCHARGE WATER: TANK # 274502

MONITORING EQUIPMENT USED: MP-20 LAMOTTE TURBIDITY METER

Time	Volume Dischared (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0920	20	4	77.10	59.1	24.50	7.39	1.446	185	0.34	CLEARING
0930	60	4	79.24	15.0	24.49	7.43	1.438	184	0.17	CLEAR
0940	100	4	79.24	3.65	24.57	7.43	1.444	184	0.10	CLEAR
0945	SURGE WELL PUMP OFF.									
0950	PUMP ON.									
0955	140	4	79.51	11.5	24.32	7.44	1.449	184	0.12	CLEAR
1005	180			3.30	24.21	7.41	1.450	185	0.08	CLEAR
1008	PUMP OFF. MOVE INTAKE TO 156' BTC.									
1015	PUMP ON.									
1020	200	4	78.93	7.24	24.76	7.38	1.441	185	0.09	CLEAR
1030	240			6.35	24.78	7.39	1.446	185	0.07	CLEAR
1032	PUMP OFF. SURGE WELL.									
1040	PUMP ON.									
1045	260	4	78.98	5.14	24.87	7.40	1.450	185	0.07	CLEAR
1048	PUMP OFF DONE W/THIS WELL.									

CH2MHILL

PROJECT NUMBER: 335392.FI.01

WELL ID: MW27C

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION:

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: BAIL, SWAB, PUMP

START WATER LEVELS: START: 0800 END:

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: LOGGER: M. Ladeau

TOTAL QUANTITY OF WATER DISCHARGED: SCREEN 180-190

DISPOSITION OF DISCHARGE WATER: TANK # 274502 TD = 195.7'

MONITORING EQUIPMENT USED: MP 20 - LA MOTTE 2000 TURBIDIMETER

Time	Volume Discharged (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
0840	PUMP ON @ 100' BGS									
0850	15.0	1.5	95.9	76000	23.63	7.82	0.710	245	1.07	VERY CLOUDY
0900	30.0	1.5		6773	24.15	8.10	794	225	0.59	CLOUDY
0910	45			6455	24.18	8.14	803	226	0.37	CLOUDY
0920	60			849	24.18	8.12	779	217	0.14	CLOUDY
0930	75		95.18	303	24.23	8.10	772	214	0.11	CLOUDY
0940	90			338	24.41	8.06	759	211	0.09	CLOUDY
0950	105			167	24.53	7.99	749	207	0.07	CLEARING
1000	120			63.1	24.48	7.98	743	206	0.06	CLEARING
1001	PUMP OFF LOWER INTAKE.									
1013	SET PUMP @ 180' 2 GPM									
1015	125	2		943	24.38	7.94	738	202	0.16	CLOUDY
1030	155	2		335	24.29	7.91	737	201	0.15	CLOUDY
1045	185			67.2	24.32	7.90	734	197	0.08	CLEARING
1100	215	2		22.0	24.06	7.88	735	196	0.09	
1101	PUMP OFF LUNCH.									
1200	PUMP ON. 2 GPM									
1210	235	2		26.8	25.04	7.89	738	191	0.26	CLEAR
1220	255	2		11.7	25.06	7.87	738	190	0.17	CLEAR
1230	275	2		11.3	25.05	7.85	732	190	0.12	CLEAR
1234	MOVE INTAKE TO 185' BTC									
1240	295	2		1954	24.98	7.84	708	190	0.10	CLOUDY
1300	335			17.4	25.02	7.81	731	187	0.07	CLEAR
1320	375			5.21	25.08	7.87	727	188	0.05	CLEAR
1321	SURGE WELL									
1332	PUMP ON									
1335	380			66.4	25.70	7.77	735	186	0.08	CLEAR
1345	400	2		14.7	25.02	7.78	728	185	0.07	CLEAR
1355	420			8.10	24.98	7.77	722	184	0.05	CLEAR
1357	PUMP OFF. DONE W/ DEVELOPMENT OF THIS WELL.									

CH2MHILL

PROJECT NUMBER	WELL ID
335392.FI.01	

WELL DEVELOPMENT LOG

PROJECT: Omega Chemical OU-2 LOCATION: MW-27D 04-18-07

DEVELOPMENT CONTRACTOR: WDC

DEVELOPMENT METHOD AND EQUIPMENT USED: Bailer, Swab & Pump

START WATER LEVELS: START: 83.88' TOC END: 83.6' TOC

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE: ~ 2 gpm LOGGER: ~~M. Ladeau~~ Tom-Shing Ma

TOTAL QUANTITY OF WATER DISCHARGED: ~ 532 gal.

DISPOSITION OF DISCHARGE WATER: on-site container

MONITORING EQUIPMENT USED: LaMotte 2002e turbidimeter, MP-20, Water level Meter

Time	Volume Discharged (gal)	Flow Rate (gpm)	Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Remarks (color, odor, sheen, sediment, etc.)
11:17		2gpm		112	24.62	7.75	0.807	101	0.11	clear. No o
11:21		"		84	24.60	7.76	0.811	99	0.10	"
11:23		"		149	24.61	7.75	0.805	97	0.09	"
11:27		"		1119	24.7	7.75	0.802	91	0.09	cloudy
11:33		"		507	24.62	7.74	0.800	86	0.08	cloudy
12:08		"		34.2	24.52	7.74	0.793	57	0.06	clear
12:25		"		35.2	24.61	7.73	0.791	49	0.11	clear
12:28		"		28.5	24.59	7.72	0.792	46	0.09	"
12:33		"		80.0	24.45	7.72	0.791	42	0.09	"
12:37		"		50.0	24.49	7.71	0.790	40	0.07	"
12:42		"		53.1	24.45	7.74	0.791	36	0.06	"
12:52		"		43.8	24.56	7.72	0.790	34	0.09	"
12:55		"		44.7	24.61	7.72	0.792	31	0.08	"
12:58		"		42.0	24.54	7.71	0.791	29	0.07	"
13:06		"		35.8	24.54	7.77	0.791	21	0.06	"
					Done					

Note: Reading wasn't correctly read until 11:17 PM due to unfamiliar with equipment (no manual)

initial water is cloudy and turned to clear in ~10 min.

Turbidemeter from Equipco (DRT-15CE) is not working (out of battery?)
Turbidity is read using WDC's LaMotte 2020e Turbidimeter & MP-20 (EquipCO)

CH2MHILL

PROJECT NUMBER	WELL NUMBER MW 31	SHEET 1 OF 1

WELL DEVELOPMENT LOG

PROJECT: OMEGA LOCATION: Whittier / Mar Vista
DEVELOPMENT CONTRACTOR: TRI-COUNTY (BILL)
DEVELOPMENT METHOD AND EQUIPMENT USED: SURGE + BAIL
START WATER LEVELS: 99.04 START: END: LOGGER: V. MATHUR 9-8-09

MAXIMUM DRAWDOWN DURING PUMPING: ? — SOUNDER CAN NOT FILL DOWN CASING WITH PUMP
RANGE AND AVERAGE DISCHARGE RATE: 1-2 GPM
TOTAL QUANTITY OF WATER DISCHARGED: 205
DISPOSITION OF DISCHARGE WATER: 4 DRUMS, LABELED

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C) F	pH	µS/cm Conductivity (µmhos/cm)	Remarks (color, odor, sheen, sediment, etc.)
1038	0	99.04	—	—	—	—	TD = 126.2, FINES, brown
1126	5	100.84	—	—	—	—	BAILED, brown, fines
1158	15	109.10	—	—	—	—	[BAILED, brown, fines
1248	35	112.15	—	—	—	—	recharging 1 ft / min]
1330	35	99.40	—	—	—	—	Prep for surging
1410	40	99.04	>1000	82.4	6.73	2.21	BAILED. Prepare to set-up pump
1500	40.5	99.04	>1000	78.2	6.62	1.81	pump at 110' BGS 320 gal/22 sec = 1-1.5 GPM
1510	~~4250~~ 250	—	400	77.1	6.65	1.66	
1520	60	—	121	76.1	6.55	1.60	
1530	70	—	75.6	76.0	6.53	1.63	
1540	80	—	~~75.4~~ 122	75.4	6.49	1.59	increase to 44 sec/gal = 1.5 gpm
1547	90	—	93.6	74.5	6.45	1.55	
1555	100	—	36.8	73.8	6.45	1.58	
~~1610~~ 1615	105	—	470	74.5	6.62	1.57	DROP PUMP TO 118! 32 sec/gal = 2 gpm
1625	125	—	79.3	73.9	6.56	1.54	
1635	145	—	25.3	73.7	6.53	1.52	
1645	165	—	18.3	73.4	6.50	1.54	
1655	185	—	15.7	73.3	6.49	1.55	
1705	205	—	15.5	73.2	6.48	1.55	STABLE. IMHOFF CONE < 0.75 ml/L

Well Wizard (R) Specification Sheet

Rev Date: 8/2/2007

Customer: CH2M Hill
Site/Location: Omega Chemical
Date: June 13, 2007
Salesperson: Dave Corder / GL

Well ID No.	**MW-26A**	**MW-26B**	**MW-26C**	**MW-26D**	**MW-24A**	**MW-24B**
Well System Type	A	A	A	L	A	A
Casing Material & Schedule	PVC Sch80	PVC Sch80	PVC Sch80	PVC Sch80	PVC Sch80	PVC Sch80
Well Diameter (Inches)	4	2	2	2	4	2
Well Depth	95	125	165	210	75	130
Static Water Level	67.65	67.72	73.05	71.59	35	40
Water Column Height	27.35	57.28	91.95	138.41	40	90
Top of Screen	70	105	145	185	50	110
Bottom of Screen	90	120	160	205	70	125
Recovery Rate (gpm)	_____	_____	_____	_____	_____	_____
Sample Collection Point (ft-below top of casing)	**85**	**113**	**153**	**195**	**65**	**118**
Cap Model	C46S	C26S	C26S	C26S	C46S	C26S
Elbow/Flex Flow Model	37740	37740	37740	37740	37740	37740
Cap Adapter Model	_____	_____	_____	_____	_____	_____
Tubing Stick-up Above Cap (included in total tube length)	0	0	0	0	0	0
Bladder Pump Model	T1200M	T1200M	T1200M	T1200M	T1200M	T1200M
Bladder Pump Inlet Screen	35200	35200	35200		35200	35200
Pump Submergence	17.4	45.3	80.0	30.0	30.0	78.0
Bladder PumpTubing Model	PT5000	PT5000	PT5000	PT5000	PT5000	PT5000
Bladder Pump Tubing Length	81.5	109.5	149.5	101.6	61.5	114.5
Drop Tube Kit	_____	_____	_____	37757	_____	_____
Drop Tubing Model	_____	_____	_____	35374	_____	_____
Drop Tubing Length	_____	_____	_____	88	_____	_____
Drop Tube Inlet Screen	_____	_____	_____	38850	_____	_____
Drop Tube Weight Model	_____	_____	_____	35415	_____	_____
Drop Tube Extra Weights	_____	_____	_____	0	_____	_____
Initial Purge Volume (ml) (pump & tubing)	1,269	1,535	1,915	2,374	1,079	1,583

APPROVAL:
Signature: _____
Date: _____

Well Wizard (R) Specification Sheet

Rev Date: 8/2/2007

Customer: CH2M Hill
Site/Location: Omega Chemical
Date: June 13, 2007
Salesperson: Dave Corder / GL

Well ID No.	**MW-24C**	**MW-24D**	**MW-25A**	**MW-25B**	**MW-25C**	**MW-25D**
Well System Type	L	L	A	A	L	L
Casing Material & Schedule	PVC Sch80	PVC Sch80	PVC Sch80	PVC Sch80	PVC Sch80	PVC Sch80
Well Diameter (Inches)	4	2	4	2	4	2
Well Depth	165	183	70	115	155	214
Static Water Level	42	45	37.65	37.67	39.45	49.91
Water Column Height	123	138	32.35	77.33	115.55	164.09
Top of Screen	140	173	45	90	140	194
Bottom of Screen	160	178	65	110	150	209
Recovery Rate (gpm)	_____	_____	_____	_____	_____	_____
Sample Collection Point (ft-below top of casing)	**150**	**176**	**60**	**100**	**145**	**203**
Cap Model	C46S	C26S	C46S	C26S	C46S	C26S
Elbow/Flex Flow Model	37740	37740	37740	37740	37740	37740
Cap Adapter Model	_____	_____	_____	_____	_____	_____
Tubing Stick-up Above Cap (included in total tube length)	0	0	0	0	0	0
Bladder Pump Model	T1200M	T1200M	T1200M	T1200M	T1200M	T1200M
Bladder Pump Inlet Screen			35200	35200		
Pump Submergence	30.0	30.0	22.4	62.3	30.0	30.0
Bladder PumpTubing Model	PT5000	PT5000	PT5000	PT5000	PT5000	PT5000
Bladder Pump Tubing Length	72.0	75.0	56.5	96.5	69.5	79.9
Drop Tube Kit	37757	37757	_____	_____	37757	37757
Drop Tubing Model	35374	35374	_____	_____	35374	35374
Drop Tubing Length	72.6	95.6	_____	_____	70.2	115.7
Drop Tube Inlet Screen	38850	38850	_____	_____	38850	38850
Drop Tube Weight Model	35415	35415	_____	_____	35415	35415
Drop Tube Extra Weights	0	0	_____	_____	0	1
Initial Purge Volume (ml) (pump & tubing)	1,947	2,194	1,032	1,412	1,899	2,509

APPROVAL:
Signature: _____
Date: _____

Well Wizard (R) Specification Sheet

Rev Date: 8/2/2007

Customer: CH2M Hill
Site/Location: Omega Chemical
Date: June 13, 2007
Salesperson: Dave Corder / GL

Well ID No.	**MW-27A**	**MW-27B**	**MW-27C**	**MW-27D**	**MW-23A**	**MW-28**
Well System Type	A	A	L	L	A	A
Casing Material & Schedule	PVC Sch80	PVC Sch80	PVC Sch80	PVC Sch80	PVC Sch80	PVC Sch80
Well Diameter (Inches)	4	4	2	2	4	4
Well Depth	115	169	195	215	60	110
Static Water Level	77.18	77.02	84.34	83	28	73.65
Water Column Height	37.82	91.98	110.66	132	32	36.35
Top of Screen	90	144	180	200	35	85
Bottom of Screen	110	164	190	210	55	105
Recovery Rate (gpm)	_____	_____	_____	_____	_____	_____
Sample Collection Point (ft-below top of casing)	**105**	**154**	**185**	**205**	**50**	**100**
Cap Model	C46S	C46S	C26S	C26S	C46S	C46S
Elbow/Flex Flow Model	37740	37740	37740	37740	37740	37740
Cap Adapter Model	_____	_____	_____	_____	_____	_____
Tubing Stick-up Above Cap (included in total tube length)	0	0	0	0	0	0
Bladder Pump Model	T1200M	T1200M	T1200M	T1200M	T1200M	T1200M
Bladder Pump Inlet Screen	35200	35200			35200	35200
Pump Submergence	27.8	77.0	30.0	30.0	22.0	26.4
Bladder PumpTubing Model	PT5000	PT5000	PT5000	PT5000	PT5000	PT5000
Bladder Pump Tubing Length	101.5	150.5	114.3	113.0	46.5	96.5
Drop Tube Kit	_____	_____	37757	37757	_____	_____
Drop Tubing Model	_____	_____	35374	35374	_____	_____
Drop Tubing Length	_____	_____	65.3	86.6	_____	_____
Drop Tube Inlet Screen	_____	_____	38850	38850	_____	_____
Drop Tube Weight Model	_____	_____	35415	35415	_____	_____
Drop Tube Extra Weights	_____	_____	0	0	_____	_____
Initial Purge Volume (ml) (pump & tubing)	1,459	1,925	2,279	2,469	937	1,412

APPROVAL:
Signature: _____
Date: _____

Well Wizard (R) Specification Sheet

Rev Date: 8/2/2007

Customer: CH2M Hill
Site/Location: Omega Chemical
Date: June 13, 2007
Salesperson: Dave Corder / GL

Well ID No.	**MW-29**	**MW-30**				
Well System Type	A	A				
Casing Material & Schedule	PVC Sch80	PVC Sch80				
Well Diameter (Inches)	4	4				
Well Depth	115	120				
Static Water Level	80	90				
Water Column Height	35	30				
Top of Screen	90	95				
Bottom of Screen	110	115				
Recovery Rate (gpm)						
Sample Collection Point (ft-below top of casing)	**105**	**110**				
Cap Model	C46S	C46S				
Elbow/Flex Flow Model	37740	37740				
Cap Adapter Model						
Tubing Stick-up Above Cap (included in total tube length)	0	0				
Bladder Pump Model	T1200M	T1200M				
Bladder Pump Inlet Screen	35200	35200				
Pump Submergence	25.0	20.0				
Bladder PumpTubing Model	PT5000	PT5000				
Bladder Pump Tubing Length	101.5	106.5				
Drop Tube Kit						
Drop Tubing Model						
Drop Tubing Length						
Drop Tube Inlet Screen						
Drop Tube Weight Model						
Drop Tube Extra Weights						
Initial Purge Volume (ml) (pump & tubing)	1,459	1,507				

APPROVAL:
Signature: _____
Date: _____

Well Wizard (R) Specification Sheet

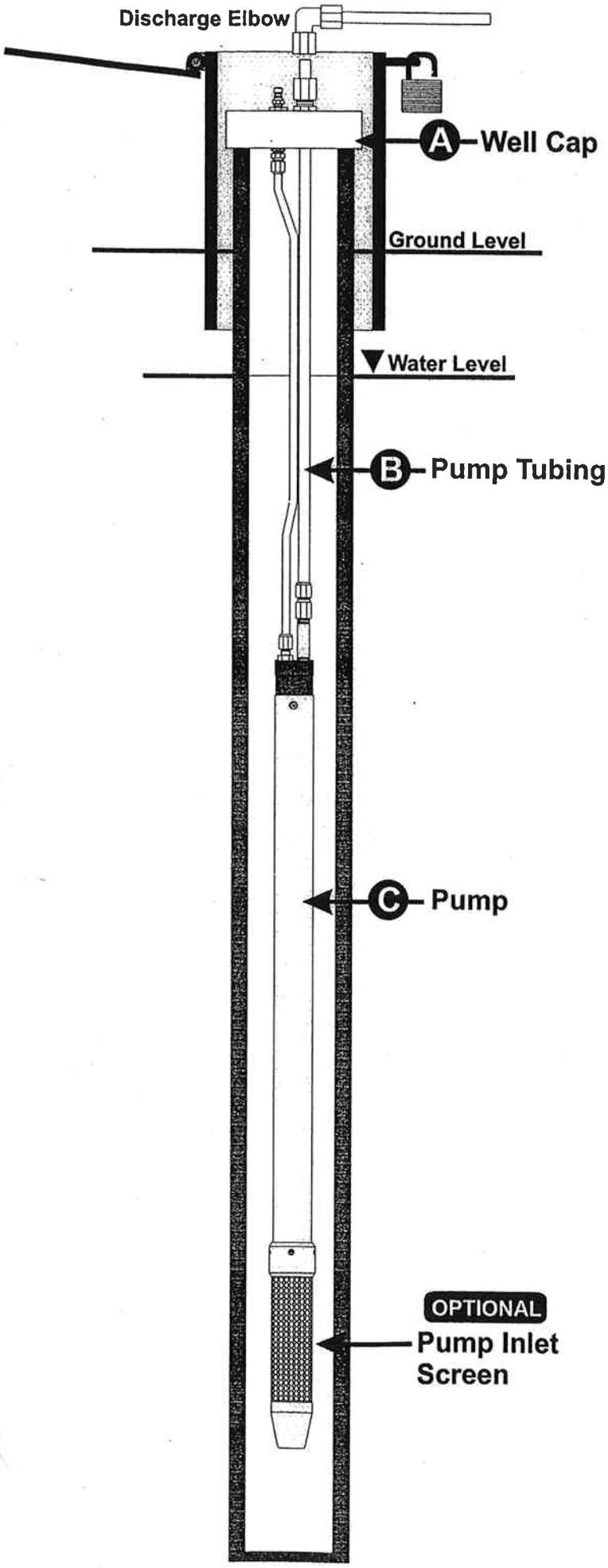
Customer:	CH2M Hill
Site/Location:	Omega Chemical
Date:	10/16/2009
Salesperson:	Dave Corder / GL

Well ID No.	MW-31
Well System Type	A
Casing Material & Schedule	SCH80-PVC
Well Diameter (Inches)	2
Well Depth	126
Static Water Level	99
Water Column Height	27
Screen Length	15
Casing Length to Screen	105.5
Recovery Rate (gpm)	_____
Sample Collection Point	**114.5**
Cap Model	C26S
Elbow/Flex Flow Model	37740
Cap Adapter Model	_____
Tubing Stick-up Above Cap	0
Bladder Pump Model	T1200
Bladder Pump Inlet Screen	35200
Pump Submergence	15.5
Bladder Pump Tubing Model	PT5000
Bladder Pump Tubing Length	111.1
3 Loose Fittings	1/4" Brass Tu Nut & Ferrules for 1/4" Air Tube to well cap
Support Cable Model	
Support Cable Length	
Support Cable Hardware	
Initial Purge Volume (ml) (pump and tubing)	1,556

APPROVAL:

Signature: _____

Date: _____



WELL WIZARD®

Dedicated Monitoring Systems

WELL SYSTEM "A"

BLADDER PUMP ONLY

CheckList

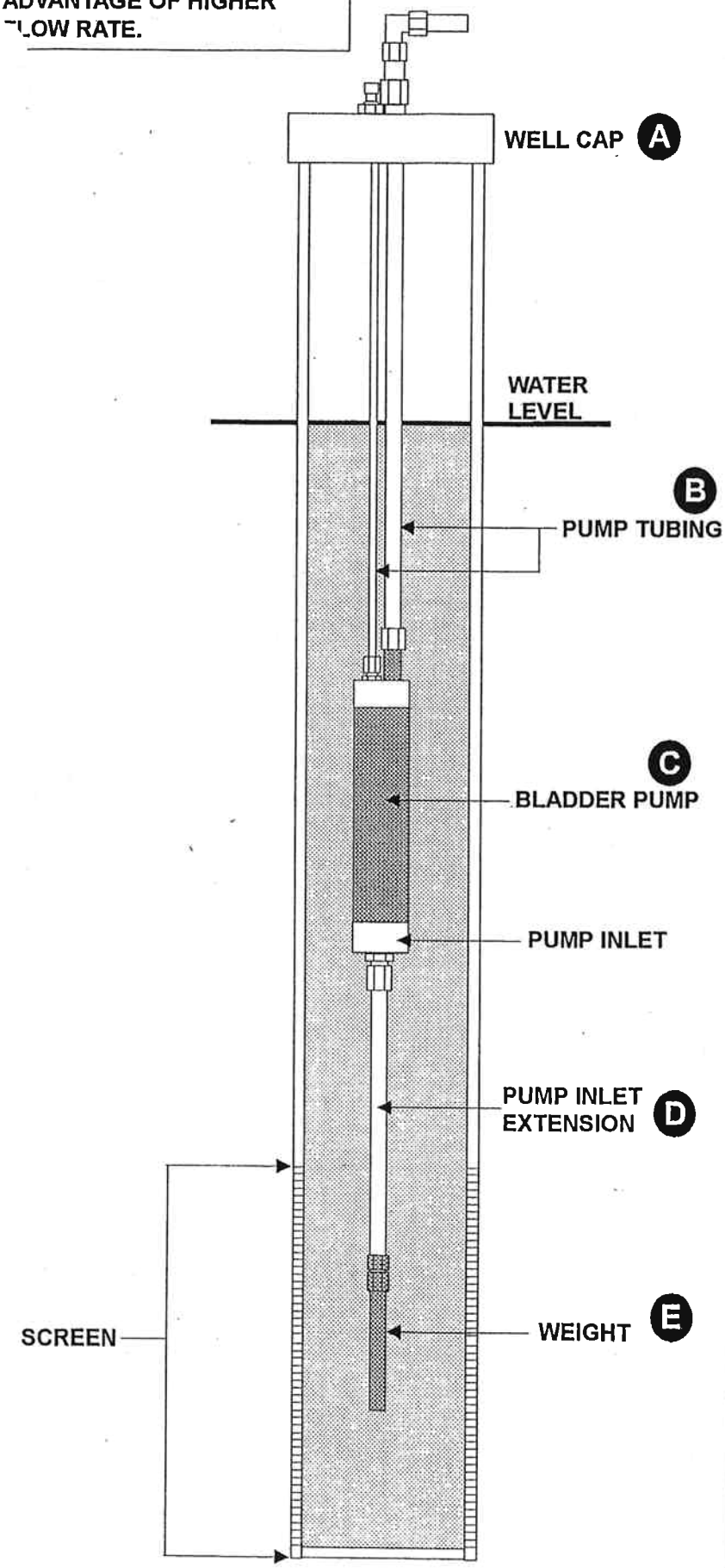
- Ⓐ Well Cap
- Ⓑ Bladder Pump Tubing
- Ⓒ Bladder Pump

Options:

- Pump Inlet Screen
- Flex-Flo Discharge Adapter

REV. #3 3-3-00

DEEP HIGH RECOVERY WELL. BLADDER PUMP WITH AN INLET EXTENSION TO TAKE ADVANTAGE OF HIGHER FLOW RATE.



WELL WIZARD

WELL SYSTEM: L
TYPE

BLADDER PUMP WITH AN INLET EXTENSION

CHECKLIST

A. WELL CAP

B. PUMP TUBING

C. BLADDER PUMP

D. PUMP INLET EXTENSION TUBING

E. WEIGHT

SECTION 9001
ENGINEERING SPECIFICATION: DEDICATED GROUND-WATER SAMPLING PUMP SPECIFICATION

PART 1 --- GENERAL

1.1 SCOPE

1.1.1 The manufacturer shall furnish a dedicated ground water sampling system with one or more bladder pumps and associated tubing and well caps for the collection of ground water quality samples.

1.2 PROCESS DESCRIPTION

1.2.1 A bladder pump allows water to flow through an inlet check valve into the interior of the pump bladder due to the pressure gradient exerted by the hydrostatic head of the water it is submerged in. After the interior of the bladder is filled with water, compressed gas is applied to the exterior of the bladder to force the water to flow through an outlet check valve and out of the pump. The compressed gas is delivered to the pump through a gas supply tube connected to a compressed gas source with a control device located at the wellhead, and the pump liquid discharge is delivered to the wellhead through a water discharge tube with both tubes terminating in a wellhead cap. The water pumped and conveyed in a manner to minimize alteration of water quality in any way. When the pump bladder is squeezed sufficiently to empty it of water, the compressed gas control device stops the flow of compressed gas and vents the pump's gas supply tube to the atmosphere. This venting allows the pressure on the outside of the pump bladder to decrease to less than that of the hydrostatic head present at the pump inlet due to the pump's submergence. The pump bladder can thereby refill and repeat the cycle as needed to achieve desired flow for purging and sampling the well. The pump controller at the wellhead controls the sequencing of applying compressed gas to and venting of the pump. A compressed gas source at the wellhead provides the necessary flow of compressed gas to the controller. A water level measurement device allows measurement of water levels in the well before and during pumping, and can be connected to the pump controller to temporarily cease pumping when the water level in the well is drawn down beyond preset limits. A flow cell connected to the water discharge tube measures water quality parameters and provides indication of completion of well purging.

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1.3 SUBMITTALS

1.3.1 Manufacturer shall submit the following with the bid:

1.3.1.1 Product data for selected models, including dimensions, materials of construction, pressure and depth ratings, flow capacity, weights, measurement accuracy, accessories and warranty coverage. See attached data sheets for full specifications.

PART 2 --- PRODUCTS

2.1 GENERAL

2.1.1 The sampling pump system shall be a Well Wizard dedicated bladder pump system. See data sheets for model number(s). Equipment shall be manufactured by QED Environmental Systems Inc. and represented by _____ or pre-approved equivalent.

2.1.2 All components and options shall meet requirements specified on the data sheets attached to this specification.

2.2 EQUIPMENT DESIGN REQUIREMENTS

2.2.1 Standard product design shall include complete bladder pump assembly, with all fittings, check valves, bladder and inlet screens with the following specifications:

2.2.1.1 The bladder pumps shall be of squeeze-type design, with water entering the interior of the bladder tube, and air pressure applied to the annular space between the exterior of the bladder and the interior of the pump body.

2.2.1.2 The pump shall be capable of running dry without any damage to the pump, controls or power source.

2.2.1.3 The pump shall also be capable of continuous operation for a minimum of 12 hours at a low rate of 0.1 L/minute or less without damage, malfunction or automatic shutdown.

2.2.1.4 The pump must be capable of lifting water from 300 feet without modification.

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2.2.1.5 The bladder and all other pump components must be able to withstand 150 PSI differential pressure without damage or malfunction.

2.2.1.6 The pump assembly must be able to withstand a submergence of at least 200 feet and an inlet pressure of at least 85 PSI without damage to the bladder or other components; and without slippage of the bladder from its mounting or leakage around the bladder mounting seal.

2.2.1.7 Bladders shall be Dura-Flex Type-62 Teflon, field replaceable, and capable of a minimum of 200,000 cycles of operation without failure or leakage. Evidence of this performance must be supported by a minimum of ten years of production QC testing data from the manufacturer of the pumps.

2.2.1.8 The pump assembly must be cleaned using a multi-stage washing and rinsing process utilizing phosphate-free laboratory-grade detergent and deionized and filtered water. The cleanliness of the pumps must be certified by soaking the pumps for at least 24 hours in reagent-grade water, with internal recirculation of the water through each pump assembly. Samples of the final soak water shall be analyzed by an independent EPA-certified laboratory for EPA Method 8260 and 625 volatile organic compounds, acid extractable and base-neutral compounds, and results of the analysis correlated to each pump through a numbered and signed certification tag attached to the pump. The efficacy of the cleaning and certification process must be supported by a minimum of ten years of production QC testing data from the manufacturer of the pumps.

2.2.1.9 The pump and tubing when assembled must have a minimum tensile strength of 150 pounds without the use of an auxiliary support cable to prevent pump loss and fitting leakage.

2.2.1.10 The pump and all of its components including the bladder shall be covered by a minimum standard warranty of 10 years provided by the manufacturer of the pump.

(Choose for PVC Pump)

2.2.1.11 The bladder pump shall have an overall length of 42 inches, an outside diameter of 1.66 inches, and a bladder capacity of 395 milliliters; or (where the application warrants) an overall length of 19.5 inches, an outside diameter of 1.66 inches, and a bladder capacity of 130 milliliters.

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2.2.1.12 The pump must be constructed entirely of PVC and PTFE materials, with lead-free Viton® o-rings. The materials used in construction of the pump, including external fittings and connections, must be virgin-grade first-run quality, with no reprocessed or reground ingredient, additives or fillers used.

2.2.1.13 All PVC components used must be NSF-grade, extruded specifically with no markings or lubricants.

2.2.1.14 Each pump shall be fitted with a PVC inlet screen, 6 inches in length, and having a screen opening size of .010 slot. The screen shall attach directly by threading to the pump inlet housing.

2.2.1.15 To provide steady low-flow pumping rates and to minimize sample aeration in the discharge tube and the introduction of air into in-line flow cells, the pump shall have a check valve design that typically allows less than 0.1 ml/minute drainback during the pump refill cycle, and in no more than 0.5 ml/minute drainback during refill.

(Choose for Stainless Steel/Teflon Pump)

2.2.1.16 The bladder pump shall have an overall length of 42 inches, an outside diameter of 1.5 inches, and a bladder capacity of 495 milliliters; or (where the application warrants) an overall length of 15 inches, an outside diameter of 1.5 inches, and a bladder capacity of 100 milliliters.

2.2.1.17 The pump must be constructed entirely of Type 316 stainless steel and PTFE materials, with lead-free Viton® o-rings. The materials used in construction of the pump, including external fittings and connections, must be virgin-grade first-run quality, with no reprocessed or reground ingredient, additives or fillers used.

2.2.1.18 All stainless steel components of the pump, including the body, discharge nipple, center discharge rod, fittings, center rod and body cross pins, and inlet screen assembly must be electropolished to remove all traces of embedded scale, rust, foreign debris, oils and grinding compounds from manufacturing; and to passivate the surface of the metal to protect against corrosion, tarnish or oxidation that could affect sample chemistry.

2.2.1.19 The pump fittings must be type 316 Stainless Steel, compression-type design with a two-part ferrule and outer compression nut, as manufactured by Swagelock®, with special provision made to ensure elimination of the standard metal coatings normally present on the threads.

2.2.1.20 Each pump shall be provided with a fine stainless steel mesh inlet screen

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assembly to protect the pump from malfunction or damage by large solids. The inlet screen shall be 6 inches in length, and of .010 mesh. The screen shall attach to the pump inlet housing by means of stainless steel set screws.

2.2.1.21 To provide steady low-flow pumping rates and to minimize sample aeration in the discharge tube and the introduction of air into in-line flow cells, the pump shall have a check valve design that typically allows less than 0.1 ml/minute drainback during the pump refill cycle, and in no more than 0.5 ml/minute drainback during refill.

(Choose for High Pressure Stainless Steel/Teflon Pump)

2.2.1.22 The bladder pump shall have an overall length of 42 inches, an outside diameter of 1.66 inches, and a bladder capacity of 395 milliliters.

2.2.1.23 The pump must be constructed entirely of Type 316 stainless steel and PTFE materials, with lead-free Viton® o-rings. The materials used in construction of the pump, including external fittings and connections, must be virgin-grade first-run quality, with no reprocessed or reground ingredient, additives or fillers used.

2.2.1.24 All stainless steel components of the pump, including the body, discharge nipple, center discharge rod, fittings, center rod and body cross pins, and inlet screen assembly must be electropolished to remove all traces of embedded scale, rust, foreign debris, oils and grinding compounds from manufacturing; and to passivate the surface of the metal to protect against corrosion, tarnish or oxidation that could affect sample chemistry.

2.2.1.25 The pump fittings must be type 316 Stainless Steel, compression-type design with a two-part ferrule and outer compression nut, as manufactured by Swagelock®, with special provision made to ensure elimination of the standard metal coatings normally present on the threads.

2.2.1.26 Each pump shall be provided with a fine stainless steel mesh inlet screen assembly to protect the pump from malfunction or damage by large solids. The inlet screen shall be 6 inches in length, and of .010 mesh. The screen shall attach to the pump inlet housing by means of stainless steel set screws.

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(Choose for Teflon Pump)

2.2.1.27 The bladder pump shall have an overall length of 42 inches, an outside diameter of 1.5 inches, and a bladder capacity of 495 milliliters; or (where the application warrants) an overall length of 15 inches, an outside diameter of 1.5 inches, and a bladder capacity of 100 milliliters.

2.2.1.28 The pump must be constructed entirely of PTFE materials, with lead-free Viton® o-rings. The materials used in construction of the pump, including external fittings and connections, must be 100% virgin-grade first-run quality, with no reprocessed or reground ingredient, additives or fillers used.

2.2.1.29 Each pump shall be fitted with a Teflon inlet screen, 6 inches in length, and having a screen opening size of .010 slot. The screen shall attach directly by threading to the pump inlet housing.

2.2.1.30 The bladder pumps shall be of squeeze-type design, with water entering the interior of the bladder tube, and air pressure applied to the annular space between the exterior of the bladder and the interior of the pump body.

2.2.1.31 The pump shall be capable of running dry without any damage to the pump, controls or power source.

2.2.1.32 The pump shall also be capable of continuous operation for a minimum of 12 hours at a low rate of 0.1 L/minute or less without damage, malfunction or automatic shutdown.

2.2.1.33 The pump must be capable of lifting water from 300 feet without modification.

2.2.1.34 The bladder and all other pump components must be able to withstand 150 PSI differential pressure without damage or malfunction.

2.2.1.35 The pump assembly must be able to withstand a submergence of at least 200 feet and an inlet pressure of at least 85 PSI without damage to the bladder or other components; and without slippage of the bladder from its mounting or leakage around the bladder mounting seal.

2.2.1.36 Bladders shall be Dura-Flex Type-62 Teflon, field replaceable, and capable of a minimum of 200,000 cycles of operation without failure or

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leakage. Evidence of this performance must be supported by a minimum of ten years of production QC testing data from the manufacturer of the pumps.

(Choose for PVC Pump)

2.2.1.37 The bladder pump shall have an overall length of 42 inches, an outside diameter of 1.66 inches, and a bladder capacity of 395 milliliters; or (where the application warrants) an overall length of 19.5 inches, an outside diameter of 1.66 inches, and a bladder capacity of 130 milliliters.

2.2.1.38 The pump must be constructed entirely of PVC and PTFE materials, with lead-free Viton® o-rings. The materials used in construction of the pump, including external fittings and connections, must be virgin-grade first-run quality, with no reprocessed or reground ingredient, additives or fillers used.

2.2.1.39 All PVC components used must be NSF-grade, extruded specifically with no markings or lubricants.

2.2.1.40 Each pump shall be fitted with a PVC inlet screen, 6 inches in length, and having a screen opening size of .010 slot. The screen shall attach directly by threading to the pump inlet housing.

2.2.1.41 To provide steady low-flow pumping rates and to minimize sample aeration in the discharge tube and the introduction of air into in-line flow cells, the pump shall have a check valve design that typically allows less than 0.1 ml/minute drainback during the pump refill cycle, and in no more than 0.5 ml/minute drainback during refill.

(Choose for Stainless Steel/Teflon Pump)

2.2.1.42 The bladder pump shall have an overall length of 42 inches, an outside diameter of 1.5 inches, and a bladder capacity of 495 milliliters; or (where the application warrants) an overall length of 15 inches, an outside diameter of 1.5 inches, and a bladder capacity of 100 milliliters.

2.2.1.43 The pump must be constructed entirely of Type 316 stainless steel and PTFE materials, with lead-free Viton® o-rings. The materials used in construction of the pump, including external fittings and connections, must be virgin-grade first-run quality, with no reprocessed or reground ingredient, additives or fillers used.

2.2.1.44 All stainless steel components of the pump, including the body, discharge nipple, center discharge rod, fittings, center rod and body cross pins, and inlet screen assembly must be electropolished to remove all traces of embedded scale, rust, foreign debris, oils and grinding compounds from

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manufacturing; and to passivate the surface of the metal to protect against corrosion, tarnish or oxidation that could affect sample chemistry.

2.2.1.45 The pump fittings must be type 316 Stainless Steel, compression-type design with a two-part ferrule and outer compression nut, as manufactured by Swagelock®, with special provision made to ensure elimination of the standard metal coatings normally present on the threads.

2.2.1.46 Each pump shall be provided with a fine stainless steel mesh inlet screen assembly to protect the pump from malfunction or damage by large solids. The inlet screen shall be 6 inches in length, and of .010 mesh. The screen shall attach to the pump inlet housing by means of stainless steel set screws.

2.2.1.47 To provide steady low-flow pumping rates and to minimize sample aeration in the discharge tube and the introduction of air into in-line flow cells, the pump shall have a check valve design that typically allows less than 0.1 ml/minute drainback during the pump refill cycle, and in no more than 0.5 ml/minute drainback during refill.

(Choose for High Pressure Stainless Steel/Teflon Pump)

2.2.1.48 The bladder pump shall have an overall length of 42 inches, an outside diameter of 1.66 inches, and a bladder capacity of 395 milliliters.

2.2.1.49 The pump must be constructed entirely of Type 316 stainless steel and PTFE materials, with lead-free Viton® o-rings. The materials used in construction of the pump, including external fittings and connections, must be virgin-grade first-run quality, with no reprocessed or reground ingredient, additives or fillers used.

2.2.1.50 All stainless steel components of the pump, including the body, discharge nipple, center discharge rod, fittings, center rod and body cross pins, and inlet screen assembly must be electropolished to remove all traces of embedded scale, rust, foreign debris, oils and grinding compounds from manufacturing; and to passivate the surface of the metal to protect against corrosion, tarnish or oxidation that could affect sample chemistry.

2.2.1.51 The pump fittings must be type 316 Stainless Steel, compression-type design with a two-part ferrule and outer compression nut, as manufactured by Swagelock®, with special provision made to ensure elimination of the standard metal coatings normally present on the threads.

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2.2.1.52 Each pump shall be provided with a fine stainless steel mesh inlet screen assembly to protect the pump from malfunction or damage by large solids. The inlet screen shall be 6 inches in length, and of .010 mesh. The screen shall attach to the pump inlet housing by means of stainless steel set screws.

(Choose for Teflon Pump)

2.2.1.53 The bladder pump shall have an overall length of 42 inches, an outside diameter of 1.5 inches, and a bladder capacity of 495 milliliters; or (where the application warrants) an overall length of 15 inches, an outside diameter of 1.5 inches, and a bladder capacity of 100 milliliters.

2.2.1.54 The pump must be constructed entirely of PTFE materials, with lead-free Viton® o-rings. The materials used in construction of the pump, including external fittings and connections, must be 100% virgin-grade first-run quality, with no reprocessed or reground ingredient, additives or fillers used.

2.2.1.55 Each pump shall be fitted with a Teflon inlet screen, 6 inches in length, and having a screen opening size of .010 slot. The screen shall attach directly by threading to the pump inlet housing.

2.2.2 Pump Tubing

2.2.2.1 Each pump shall be supplied with tubing to meet the following specifications;

2.2.2.2 The air supply and discharge tubing shall be thermally bonded together for installation as a single line, without any external sheathing material or cable ties. The air supply and discharge tubing shall be able to be separated without the use of any tools for attachment to fittings. Once separated, the remaining bonding ridge shall not require trimming or removal for installation into a compression-type fitting for leak-tight connection to compression type fittings.

2.2.2.3 Tubing shall be ¼" air supply, with discharge sized to match the bladder pump. The tolerance on the diameter shall not exceed + 0.05 inches, and shall fit into standard-sized compression-type fittings without trimming, reaming or resizing.

2.2.2.4 The tubing shall have a minimum bend radius of 1.25 inches, and must be able to withstand 300 PSI working pressure.

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2.2.2.5 All materials must be 100% virgin-grade, extruded in the USA with US-manufactured resins, with no regrind materials, additives, fillers, mold release agents or printing.

2.2.2.6 Each tubing bundle shall be provided with inserts (material to be compatible with the pump construction) needed for secure connection to the pump and wellhead assembly.

(Choose for Polyethylene Tube)
2.2.2.7 The tubing shall be manufactured of all polyethylene.

(Choose for Teflon-Lined Polyethylene Tube)
2.2.2.8 The tubing shall be manufactured of polyethylene, with the discharge tubing having an inner-wall lining of Teflon.

2.2.2.9 The tubing shall be provided with rigid inserts inside the end of the tube connected to the pump fittings, to prevent discharge flow from being blocked due to the Teflon lining being pushed or peeled back into the liquid flow path.

(Choose for Teflon Tube)
2.2.2.10 The tubing shall be manufactured of all Teflon.

2.2.3 Wellhead Cap Assembly

2.2.3.1 Each pump shall be supplied with a well cap assembly to meet the following specifications;

2.2.3.2 The system shall include a well head cap assembly designed to support the weight of the down-well system components and limit the access to the well to prevent accidental contamination or damage.

2.2.3.3 The cap body shall be constructed of anodized aluminum, require less than ¼" vertical clearance between the top of the casing and the underside of any existing protective well closures, and be machined to fit standard well casing diameters without interference to allow easy installation and removal without modification. Manufacturer shall also be able to provide caps for specialized applications requiring water tight, or locking capabilities.

2.2.3.4 The pump air supply fitting shall consist of a compression-type brass fitting for connection to the pump air supply tubing, and a quick-connect

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brass fitting for connection to the controlled air supply hose.

2.2.3.5 The pump discharge fitting shall be a bore-through design that allows the discharge tubing to pass continuously through the cap, preventing sample water from contacting the fitting. The cap shall also include a flexible discharge tube, constructed of inert materials, which attaches via a slip fit grip ring to the pump discharge tube end and stores between uses in the water level measurement hole.

2.2.3.6 The cap shall include an access hole for water level measurement and include a polyethylene dust protection cap to cover the entire cap to prevent accidental introduction of contaminants to the fittings or well.

2.2.3.7 The cap shall include as standard equipment a polyethylene tag with special writing surface to allow marking well identification and pump controller setting information.

2.2.4 Freeze Protection

2.2.4.1 Each pump shall be provided with freeze protection that shall meet the following specifications;

2.2.4.2 The cap shall include a means of freeze protection that will allow for the positive discharge of any water in the tubing to prevent blockage of flow due to ice formation or damage to the pump discharge tubing near the well head.

(Choose for Freeze Protection Kit-MicroPurge Applications)

2.2.4.3 The freeze protection kit shall consist of a length of flexible polyethylene tubing 0.125” OD with a quick-connect brass fitting allowing connection to the controller compressed gas supply hose end. Water in the discharge tube near the wellhead can be removed by inserting the 0.125” tube into the pump liquid discharge tube end at the wellhead, then applying gentle drive gas pressure to the 0.125” tube. An optional in-line filter shall be available for removal of organic and particulate contaminants from the gas supply if desired.

(Choose for freeze prevention in standard 3-5 well volume applications)

2.2.4.4 A special tube coupler of appropriate size and material with a .020 inch diameter drilled hole installed shall be supplied to allow for drain back and prevent in-line freezing once sampling is completed.

2.2.5 General System Specifications and Vendor Requirements

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2.2.5.1 The manufacturer shall have a minimum of 15 years experience providing pneumatic bladder pumps in groundwater monitoring applications.

2.2.5.2 The entire system shall be covered by a standard one-year warranty provided by the manufacturer, with the exception of the bladder pumps which shall be covered by a standard ten-year warranty as noted in A.12 above.

2.2.5.3 The manufacturer shall provide full product technical support by telephone during normal business hours, and additional 7 day/24 hour support via a toll-free telephone hotline.

2.2.5.4 The manufacturer shall have a local factory trained agent, and shall have OSHA certified technicians available for installation or start-up assistance.

2.2.5.5 The manufacturer shall have a minimum of eleven (11) years experience with a pump certification program as described in 2.2.1.8.

2.2.5.6 Manufacturer's facility shall include a 300' test well for flow rate verification.

2.2.5.7 Manufacturer must be capable of shipping all standard equipment within ten working days of receipt of order.

2.2.5.8 All bladder pumps, downwell tubing, well caps, and accessories to be supplied by:

QED Environmental Systems, Inc.
P.O. Box 3726
Ann Arbor, MI 48106
(800) 624-2024 (734) 995-1170 FAX
www.qedenv.com

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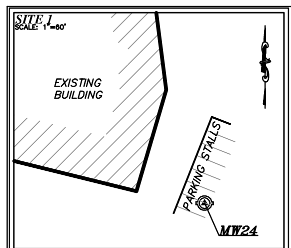
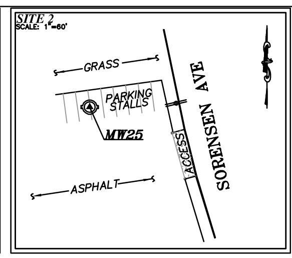
SITE PLAN

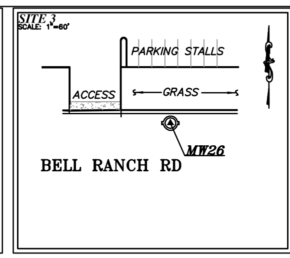
MONITORING WELL LOCATIONS

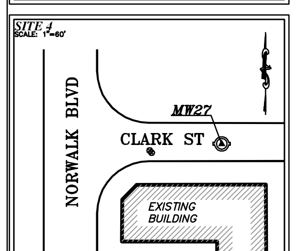
PROJECT: OMEGA CHEMICAL SUPERFUND

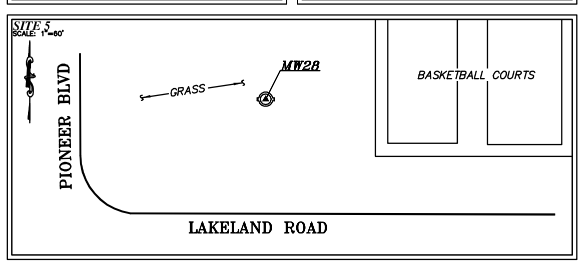
12509-12512 E. WHITTIER BOULEVARD, WHITTIER, CA 90602

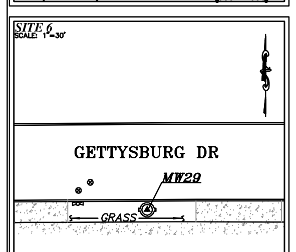


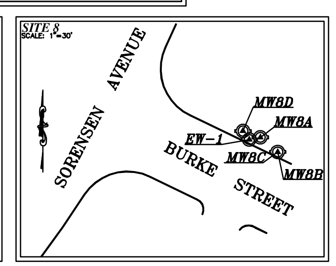








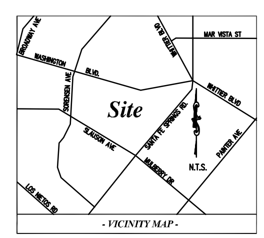




DATE OF SURVEY: JUNE 13, 2007
JUNE 15, 2007

MONITORING WELLS								
WELL	NORTH	EAST	LATITUDE (DD)	LONGITUDE (DD)	TOR (ELEVATION)	FS (ELEVATION)	TOC (ELEVATION)	RISER_HT
EW-1	1808595.34	6543331.44	33.9621008	-118.0604647	150.01	150.02	149.51	-0.51
MW1A	1810464.43	6545699.47	33.9672404	-118.0526588	157.82	157.81	157.71	-0.10
MW1B	1810456.17	6545699.85	33.9672177	-118.0526575	158.17	158.10	158.05	-0.05
MW2	1809964.97	6545867.18	33.9658682	-118.0521049	154.38	154.24	154.21	-0.03
MW3	1808349.14	6546316.30	33.9614288	-118.0506210	151.78	151.86	151.48	-0.38
MW4A	1808423.98	6545021.22	33.9616326	-118.0548920	147.01	147.02	146.80	-0.22
MW4B	1808429.84	6545029.43	33.9616487	-118.0548649	147.00	147.00	146.84	-0.16
MW5	1809423.75	6544954.25	33.9643797	-118.0551146	150.84	150.84	150.60	-0.24
MW6	1809793.31	6543946.66	33.9653936	-118.0584382	150.43	150.39	150.28	-0.11
MW7	1806750.99	6545808.68	33.9570366	-118.0522923	143.59	143.59	143.28	-0.31
MW8A	1808596.84	6543338.82	33.9621049	-118.0604404	150.39	150.44	150.14	-0.30
MW8B	1808587.02	6543350.64	33.9620780	-118.0604014	150.30	150.33	150.03	-0.30
MW8C	1808587.14	6543350.18	33.9620783	-118.0604029	150.30	150.33	150.03	-0.30
MW8D	1808601.10	6543327.29	33.9621166	-118.0604784	150.08	150.09	149.91	-0.18
MW9A	1808749.62	6542301.97	33.9625230	-118.0638599	149.00	148.88	148.84	-0.04
MW9B	1808748.80	6542309.59	33.9625207	-118.0638348	149.12	149.06	148.90	-0.16
MW10	1805921.85	6543346.79	33.9547545	-118.0604088	147.59	147.40	147.45	0.05
MW11	1805272.37	6544161.72	33.9529711	-118.0577204	151.21	150.94	150.89	-0.05
MW23A	1808227.10	6543940.36	33.9610899	-118.0584560	149.16	149.07	148.76	-0.31
MW24A	1810097.75	6546502.64	33.9662340	-118.0500094	162.40	162.44	162.04	-0.40
MW24B	1810097.88	6546502.16	33.9662343	-118.0500110	162.40	162.44	162.03	-0.41
MW24C	1810098.53	6546502.45	33.9662361	-118.0500100	162.40	162.44	162.02	-0.42
MW24D	1810098.16	6546502.75	33.9662351	-118.0500090	162.40	162.44	162.05	-0.39
MW25A	1806718.88	6542666.37	33.9569435	-118.0626541	148.33	148.25	147.90	-0.35
MW25B	1806719.02	6542666.25	33.9569438	-118.0626545	148.33	148.25	147.84	-0.41
MW25C	1806719.02	6542666.25	33.9569438	-118.0626545	148.33	148.25	147.86	-0.39
MW25D	1806719.02	6542666.25	33.9569438	-118.0626545	148.33	148.25	147.87	-0.38
MW26A	1804189.57	6540903.91	33.9499902	-118.0684602	155.98	155.98	155.62	-0.36
MW26B	1804189.37	6540903.41	33.9499896	-118.0684618	155.98	155.98	155.45	-0.53
MW26C	1804189.96	6540903.85	33.9499912	-118.0684604	155.98	155.98	155.41	-0.57
MW26D	1804189.84	6540903.40	33.9499909	-118.0684619	155.98	155.98	155.37	-0.61
MW27A	1800163.18	6539738.30	33.9389240	-118.0722939	139.43	139.47	139.24	-0.23
MW27B	1800162.89	6539738.58	33.9389232	-118.0722930	139.43	139.47	139.18	-0.29
MW27C	1800162.77	6539738.05	33.9389229	-118.0722948	139.43	139.47	139.17	-0.30
MW27D	1800162.56	6539738.38	33.9389223	-118.0722937	139.43	139.47	139.13	-0.34
MW28	1797615.66	6537016.80	33.9319182	-118.0812594	120.48	120.40	119.91	-0.49
MW29	1792670.98	6539764.56	33.9183368	-118.0721896	107.53	107.34	107.10	-0.24
MW30	1791580.08	6542832.13	33.9153448	-118.0620767	107.22	107.24	106.70	-0.54

RISER_HT – RISER HEIGHT
RISER HEIGHT DEFINITION: THE MEASURED DISTANCE FROM GROUND SURFACE TO TOP OF WELL CASING.



DATES OF SURVEY
JUNE 15, 2007
JUNE 13, 2007

BENCH MARK
THE ELEVATIONS SHOWN HEREON ARE BASED UPON NGS GPS POINT "DYHS" (DOWNEY HIGH SCHOOL) ELEVATION = 124.06 FEET (NAVD 88)

COORDINATES
THE COORDINATES SHOWN HEREON ARE BASED UPON THE STATE PLANE COORDINATE SYSTEM (NAD 83), CALIFORNIA ZONE V, BASED UPON STATIC GPS OBSERVATION, HOLDING NGS GPS POINT "DYHS" (DOWNEY HIGH SCHOOL)

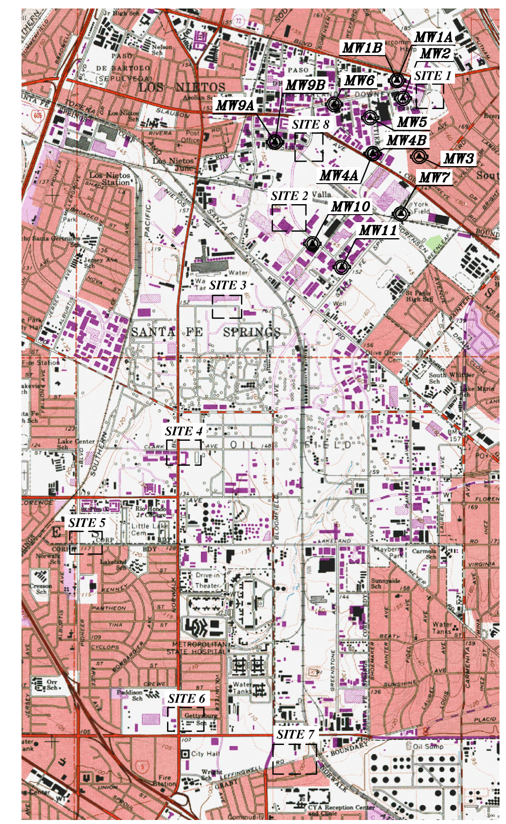
PREPARED FOR
CH2MHILL
555 SOUTH FLOWER STREET, SUITE 3550
LOS ANGELES, CA
PHONE: (916) 920-0212 X245
FAX: (916) 614-3573

Legend
MONITORING WELL
WATER VALVES
FIRE HYDRANT
POWER POLE
TOR TOP OF RIM
TOC TOP OF CASING
FS FINISH SURFACE
DD DEGREES

NO.	DATE	REVISIONS	BY
	06/25/07	SUBMITTAL	SM

CALVADA SURVEYING, INC.
411 Jenks Cir., Suite 205, Corona, CA 92880
Phone: 951-280-9960 Fax: 951-280-9746
Toll Free: 800-CALVADA www.calvada.com
JOB NO. 07258
SHEET 2 OF 2

SITE PLAN
MONITORING WELL LOCATIONS
PROJECT: OMEGA CHEMICAL SUPERFUND
12509-12512 E. WHITTIER BOULEVARD, WHITTIER, CA 90602

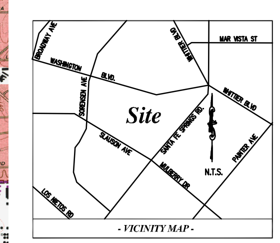


2500 0 1250 2500
SCALE 1" = 2500'

DATES OF SURVEY: JUNE 13, 2007
JUNE 15, 2007

MONITORING WELLS								
WELL	NORTH	EAST	LATITUDE (DD)	LONGITUDE (DD)	TOR (ELEVATION)	FS (ELEVATION)	TOC (ELEVATION)	RISER_HT
EW-1	1808595.34	6543331.44	33.9621008	-118.0604647	150.01	150.02	149.51	-0.51
MW1A	1810464.43	6545699.47	33.9672404	-118.0526588	157.82	157.81	157.71	-0.10
MW1B	1810456.17	6545699.85	33.9672177	-118.0526575	158.17	158.10	158.05	-0.05
MW2	1809964.97	6545867.18	33.9658682	-118.0521049	154.38	154.24	154.21	-0.03
MW3	1808349.14	6546316.30	33.9614288	-118.0506210	151.78	151.86	151.48	-0.38
MW4A	1808423.98	6545021.22	33.9616326	-118.0548920	147.01	147.02	146.80	-0.22
MW4B	1808429.84	6545029.43	33.9616487	-118.0548649	147.00	147.00	146.84	-0.16
MW5	1809423.75	6544954.25	33.9643797	-118.0551146	150.84	150.84	150.60	-0.24
MW6	1809793.31	6543946.66	33.9653936	-118.0584382	150.43	150.39	150.28	-0.11
MW7	1806750.99	6545808.68	33.9570366	-118.0522923	143.59	143.59	143.28	-0.31
MW8A	1808596.84	6543338.82	33.9621049	-118.0604404	150.39	150.44	150.14	-0.30
MW8B	1808587.02	6543350.64	33.9620780	-118.0604014	150.30	150.33	150.03	-0.30
MW8C	1808587.14	6543350.18	33.9620783	-118.0604029	150.30	150.33	150.03	-0.30
MW8D	1808601.10	6543327.29	33.9621166	-118.0604784	150.08	150.09	149.91	-0.18
MW9A	1808749.62	6542301.97	33.9625230	-118.0638599	149.00	148.88	148.84	-0.04
MW9B	1808748.80	6542309.59	33.9625207	-118.0638348	149.12	149.06	148.90	-0.16
MW10	1805921.85	6543346.79	33.9547545	-118.0604088	147.59	147.40	147.45	0.05
MW11	1805272.37	6544161.72	33.9529711	-118.0577204	151.21	150.94	150.89	-0.05
MW23A	1808227.10	6543940.36	33.9610899	-118.0584560	149.16	149.07	148.76	-0.31
MW24A	1810097.75	6546502.64	33.9662340	-118.0500094	162.40	162.44	162.04	-0.40
MW24B	1810097.88	6546502.16	33.9662343	-118.0500110	162.40	162.44	162.03	-0.41
MW24C	1810098.53	6546502.45	33.9662361	-118.0500100	162.40	162.44	162.02	-0.42
MW24D	1810098.16	6546502.75	33.9662351	-118.0500090	162.40	162.44	162.05	-0.39
MW25A	1806718.88	6542666.37	33.9569435	-118.0626541	148.33	148.25	147.90	-0.35
MW25B	1806719.02	6542666.25	33.9569438	-118.0626545	148.33	148.25	147.84	-0.41
MW25C	1806719.02	6542666.25	33.9569438	-118.0626545	148.33	148.25	147.86	-0.39
MW25D	1806719.02	6542666.25	33.9569438	-118.0626545	148.33	148.25	147.87	-0.38
MW26A	1804189.57	6540903.91	33.9499902	-118.0684602	155.98	155.98	155.62	-0.36
MW26B	1804189.37	6540903.41	33.9499896	-118.0684618	155.98	155.98	155.45	-0.53
MW26C	1804189.96	6540903.85	33.9499912	-118.0684604	155.98	155.98	155.41	-0.57
MW26D	1804189.84	6540903.40	33.9499909	-118.0684619	155.98	155.98	155.37	-0.61
MW27A	1800163.18	6539738.30	33.9389240	-118.0722939	139.43	139.47	139.24	-0.23
MW27B	1800162.89	6539738.58	33.9389232	-118.0722930	139.43	139.47	139.18	-0.29
MW27C	1800162.77	6539738.05	33.9389229	-118.0722948	139.43	139.47	139.17	-0.30
MW27D	1800162.56	6539738.38	33.9389223	-118.0722937	139.43	139.47	139.13	-0.34
MW28	1797615.66	6537016.80	33.9319182	-118.0812594	120.48	120.40	119.91	-0.49
MW29	1792670.98	6539764.56	33.9183368	-118.0721896	107.53	107.34	107.10	-0.24
MW30	1791580.08	6542832.13	33.9153448	-118.0620767	107.22	107.24	106.70	-0.54

RISER_HT – RISER HEIGHT
RISER HEIGHT DEFINITION: THE MEASURED DISTANCE FROM GROUND SURFACE TO TOP OF WELL CASING.



DATES OF SURVEY
JUNE 15, 2007
JUNE 13, 2007

BENCH MARK
THE ELEVATIONS SHOWN HEREON ARE BASED UPON NGS GPS POINT "DYHS" (DOWNEY HIGH SCHOOL) ELEVATION = 124.06 FEET (NAVD 88)

COORDINATES
THE COORDINATES SHOWN HEREON ARE BASED UPON THE STATE PLANE COORDINATE SYSTEM (NAD 83), CALIFORNIA ZONE V, BASED UPON STATIC GPS OBSERVATION, HOLDING NGS GPS POINT "DYHS" (DOWNEY HIGH SCHOOL)

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CH2MHILL
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Legend
MONITORING WELL
WATER VALVES
FIRE HYDRANT
POWER POLE
TOR TOP OF RIM
TOC TOP OF CASING
FS FINISH SURFACE
DD DEGREES

NO.	DATE	REVISIONS	BY
	06/25/07	SUBMITTAL	SM

CALVADA SURVEYING, INC.
411 Jenks Cir., Suite 205, Corona, CA 92880
Phone: 951-280-9960 Fax: 951-280-9746
Toll Free: 800-CALVADA www.calvada.com
JOB NO. 07258

SHEET 1 OF 2

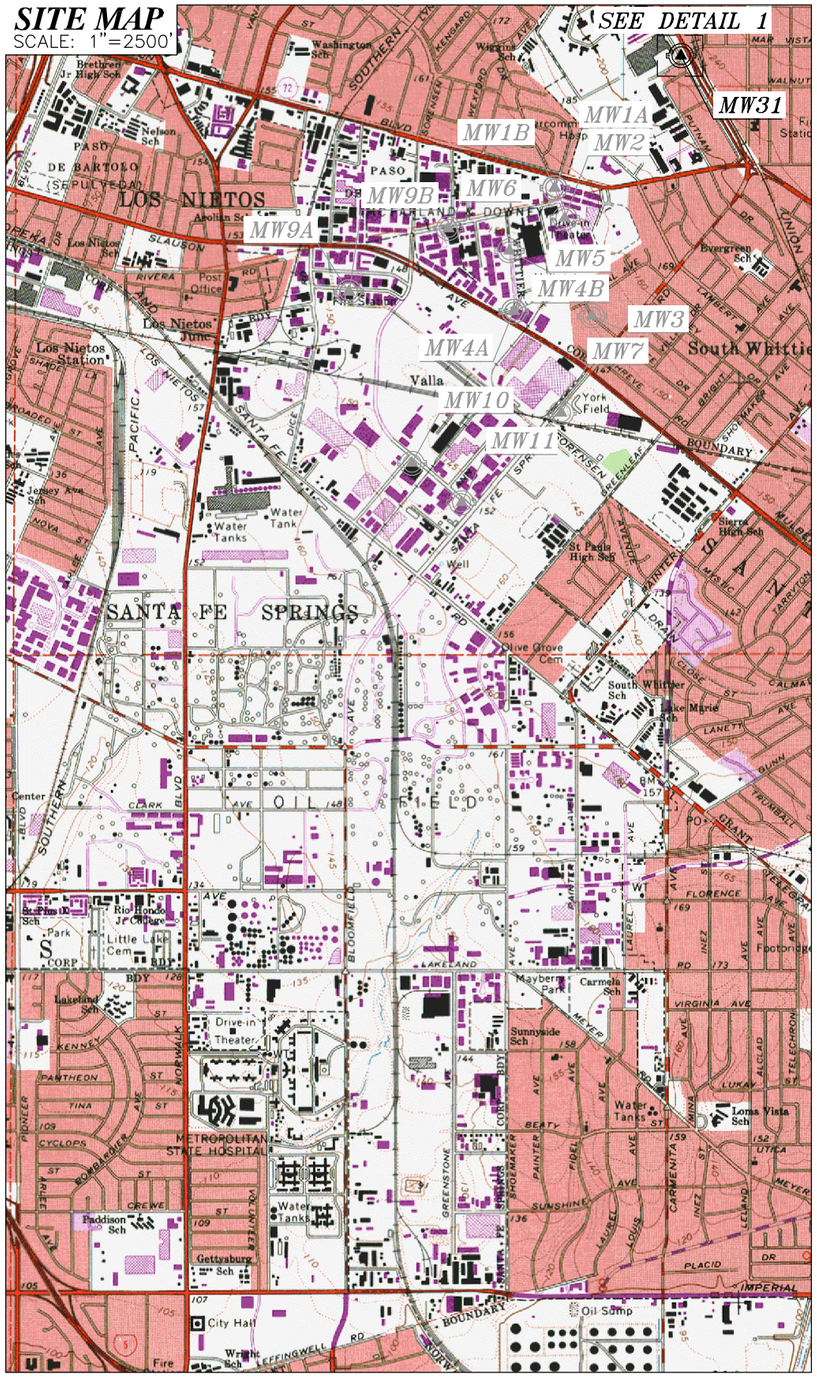
Hydropunch GPS Data
Omega Chemical Superfund Site

	Northing	Easting
Well MW-27 HP Borings		
HP27-1	3755117.947	401008.277
HP27-2	3755023.271	400832.620
HP27-3	3755023.223	400774.603
HP27-4	3755023.704	400691.730
HP27-5	3755024.385	400616.835
HP27-6	3755850.709	400829.832
HP27-7	3755901.786	400898.298
HP27-8	3755901.603	400956.837
HP27-9	3755900.256	401019.394
Well MW-28 HP Borings		
HP28-1	3755075.472	400440.559
HP28-2	3755132.400	400333.117
HP28-3	3755133.717	400199.683
HP28-4	3755138.508	400062.793
HP28-5	3755125.727	399911.758
Wells MW-29 and MW-30 HP Borings		
HP29-1	3754301.999	401251.971
HP29-2	3754300.971	401178.519
HP29-3	3754300.620	401136.283
HP29-4	3754301.235	401067.935
HP29-5	3754314.008	400991.388
HP29-6	3754302.428	400948.759
HP29-7	3754292.184	400806.859
HP29-8	3754134.446	400732.404
HP29-9	3754133.827	400815.910
HP29-10	3754096.769	400883.654
HP29-11	3754096.159	400936.441
HP29-12	3754100.012	400985.865
HP29-13	3754099.666	401057.572
HP29-14	3754098.909	401138.190
HP29-15	3753885.067	400791.327
HP29-16	3753622.327	400939.200
HP29-17	3753622.828	400992.417
HP29-18	3753621.925	401059.423
HP29-19	3753625.202	401118.480
HP29-20	3753644.123	401204.389
HP29-21	3754058.669	401266.427
HP29-22	3753962.883	401266.936
HP29-23	3753885.093	401265.761
HP29-24	3753781.999	401259.126
HP29-25	3753695.150	401264.896
HP29-26	3753868.213	401628.554
HP29-27	3753777.426	401626.394
HP29-28	3753685.001	401633.937
HP29-30	3753265.397	401837.719
HP29-31	3753234.769	401728.637
HP29-32	3753217.546	401641.291
HP29-33	3753125.361	401502.648
HP29-34	3753112.299	401357.979
HP29-35	3753055.568	400737.340
HP29-36	3753289.573	400649.917
HP29-37	3753128.745	400544.695
HP29-38	3753321.615	400448.491
HP29-39	3753401.585	400329.882
HP29-40	3753886.454	400653.578
HP29-41	3753887.745	400516.416
HP29-42	3753898.172	400369.511
HP29-43	3753897.793	400219.982

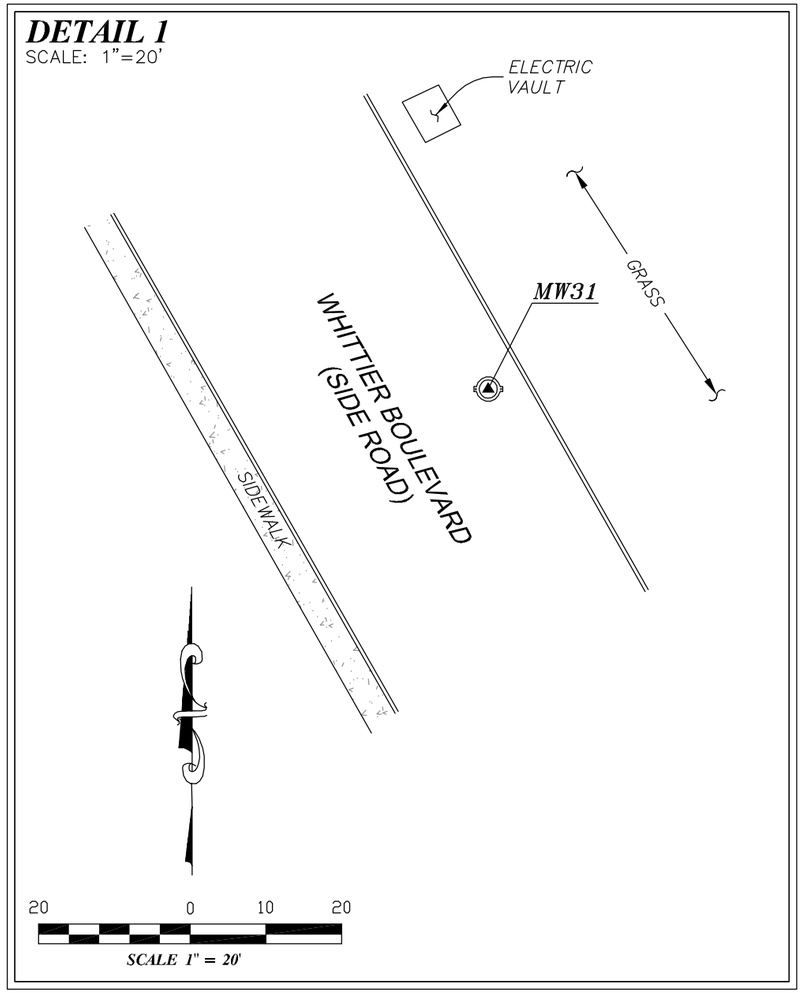
	Northing	Easting
Earl Manufacturing HP Borings		
HPE-1	3758495.949	401745.475
HPE-2	3758460.602	401743.520
HPE-3	3758432.121	401734.393
HPE-4	3758432.206	401720.907
HPE-5	3758432.940	401705.322
HPE-6	3758434.337	401690.968
HPE-7	3758435.313	401674.873
Site D HP Borings		
HPT-1	3758684.161	402519.851
HPT-2	3758660.647	402494.732
HPT-3	3758660.311	402477.242
HPT-4	3758659.560	402462.914
HPT-5	3758660.666	402452.332
Site E HP Borings		
HPF-1	3757551.002	401515.711
HPF-2	3757539.411	401554.533
HPF-3	3757361.777	401401.736
HPF-4	3757379.974	401360.935
HPF-5	3757402.919	401352.401
HPF-6	3757423.114	401329.076
Site F HP Borings		
HPW-1	3758537.377	401543.027
HPW-2	3758488.237	401542.042
HPW-3	3758444.894	401488.151
HPW-4	3758439.486	401457.933
HPW-5	3758433.931	401426.178
HPW-6	3758429.352	401395.881
HPW-7	3758425.137	401366.908
HPW-8	3758471.507	401341.879
HPW-9	3758455.130	401524.214
HPW-10	3758590.078	401529.012
TCE Source at Whittier Blvd. HP Borings		
HPA-1	3759591.622	403415.109
HPA-6	3759635.780	403423.469
HPA-7	3759665.541	403407.222
HPA-8	3759697.273	403394.585
HPA-9	3759723.422	403376.634
HPA-10	3759756.034	403361.870
HPA-11	3759782.266	403346.924
HPA-12	3759751.411	403419.163
HPA-13	3759742.440	403429.864
HPA-14	3759732.233	403442.538
HPA-15	3759722.054	403454.591
HPA-16	3759808.122	403460.922
HPA-17	3759779.821	403465.179
HPA-18	3759755.574	403473.196
Residential Area Boring Locations		
HPRA-1	3759093.890	402839.001
HPRA-2	3759191.470	402874.101
HPRA-3	3759152.545	402962.721
HPRA-4	3759066.602	402901.838

SITE PLAN
MONITORING WELL LOCATIONS
PROJECT: OMEGA CHEMICAL SUPERFUND
12509-12512 E. WHITTIER BOULEVARD, WHITTIER, CA 90602

SITE MAP
SCALE: 1"=2500'



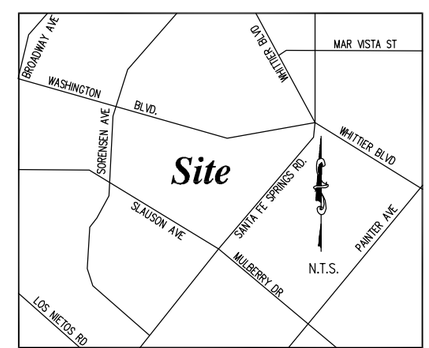
DETAIL 1
SCALE: 1"=20'



DATE OF SURVEY: SEPTEMBER 22, 2009

MONITORING WELLS								
WELL	NORTH	EAST	LATITUDE (DD)	LONGITUDE (DD)	TOR (ELEVATION)	FS (ELEVATION)	TOC (ELEVATION)	RISER_HT
MW31	1812642.61	6547783.09	33.9732286	-118.0457904	233.01	233.00	232.67	-0.33

RISER_HT – RISER HEIGHT
RISER HEIGHT DEFINITION: THE MEASURED DISTANCE FROM GROUND SURFACE TO TOP OF WELL CASING.



- VICINITY MAP -

DATE OF SURVEY
SEPTEMBER 22, 2009

BENCH MARK
THE ELEVATIONS SHOWN HEREON ARE BASED UPON NGS GPS POINT "DYHS" (DOWNEY HIGH SCHOOL) ELEVATION = 124.06 FEET (NAVD 88)

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FAX: (916) 614-3573

Legend

	MONITORING WELL
	WATER VALVES
	FIRE HYDRANT
	POWER POLE
TOR	TOP OF RIM
TOC	TOP OF CASING
FS	FINISH SURFACE
DD	DECIMAL DEGREES

NO.	DATE	REVISIONS	BY
	06/25/07	SUBMITTAL	SM
1	10/01/09	ADDITIONAL WELL	SM

CALVADA SURVEYING, INC.
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JOB NO. 07258

Cone Penetration Testing Procedure (CPT)

Gregg Drilling & Testing, 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 0.85.

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.

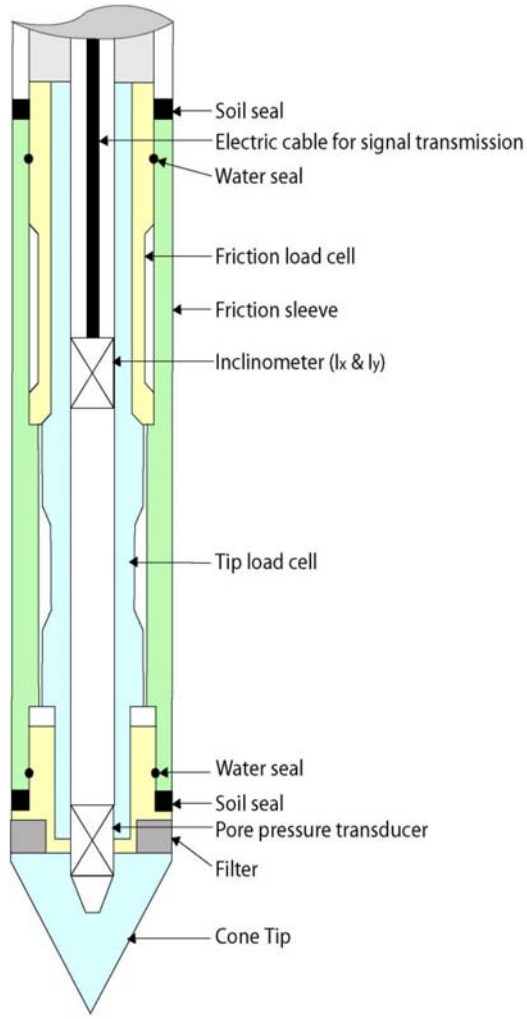


Figure CPT

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 $100 f_s/q_c$ 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)

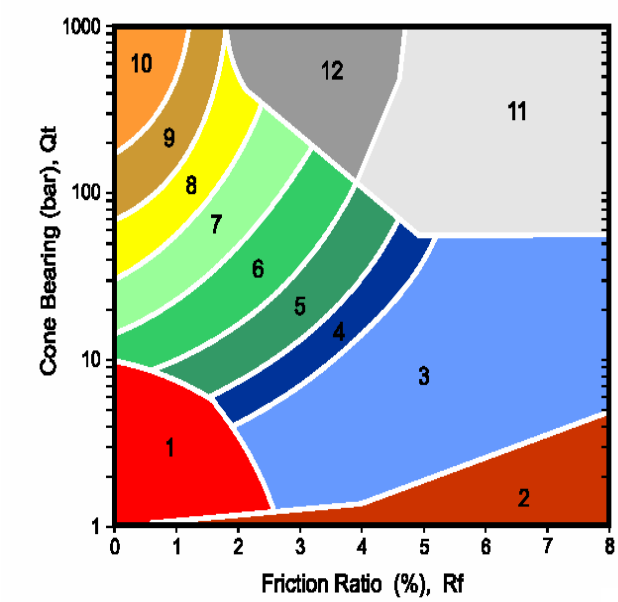
Cohesionless soils (sands)

- 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 et al, 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

Cone Penetration Test (CPT) Interpretation

Gregg have recently updated their CPT interpretation and plotting software (2007). The software takes the CPT data and performs basic interpretation in terms of soil behavior type (SBT) and various geotechnical parameters using current published empirical correlations based on the comprehensive review by Lunne, Robertson and Powell (1997). The interpretation is presented in tabular format using MS Excel. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software.

The following provides a summary of the methods used for the interpretation. Many of the empirical correlations to estimate geotechnical parameters have constants that have a range of values depending on soil type, geologic origin and other factors. The software uses 'default' values that have been selected to provide, in general, conservatively low estimates of the various geotechnical parameters.

Input:

1. Units for display (Imperial or metric) (atm. pressure, pa = 0.96 tsf or 0.1 MPa)
2. Depth interval to average results,(ft or m). Data are collected at either 0.02 or 0.05m and can be averaged every 1, 3 or 5 intervals.
3. Elevation of ground surface (ft or m)
4. Depth to water table, z_w (ft or m) – input required
5. Net area ratio for cone, a (default to 0.85)
6. Relative Density constant, C_{Dr} (default to 350)
7. Young's modulus number for sands, α (default to 5)
8. Small strain shear modulus number
   a. for sands, S_G (default to 180 for SBT_n 5, 6, 7)
   b. for clays, C_G (default to 50 for SBT_n 1, 2, 3 & 4)
9. Undrained shear strength cone factor for clays, N_{kt} (default to 15)
10. Over Consolidation ratio number, k_{ocr} (default to 0.3)
11. Unit weight of water, (default to γ_w = 62.4 lb/ft^3 or 9.81 kN/m^3)

Column

1. Depth, z, (m) – CPT data is collected in meters
2. Depth (ft)
3. Cone resistance, q_c (tsf or MPa)
4. Sleeve friction, f_s (tsf or MPa)
5. Penetration pore pressure, u (psi or MPa), measured behind the cone (i.e. u_2)
6. Other – any additional data, if collected, e.g. electrical resistivity or UVIF
7. Total cone resistance, q_t (tsf or MPa) $q_t = q_c + u\,(1-a)$

8	Friction Ratio, R_f (%)	$R_f = (f_s/q_t) \times 100\%$
9	Soil Behavior Type (non-normalized), SBT	see note
10	Unit weight, γ (pcf or kN/m^3)	based on SBT, see note
11	Total overburden stress, σ_v (tsf)	$\sigma_{vo} = \gamma z$
12	Insitu pore pressure, u_o (tsf)	$u_o = \gamma_w (z - z_w)$
13	Effective overburden stress, σ'_{vo} (tsf)	$\sigma'_{vo} = \sigma_{vo} - u_o$
14	Normalized cone resistance, Q_{t1}	$Q_{t1} = (q_t - \sigma_{vo}) / \sigma'_{vo}$
15	Normalized friction ratio, F_r (%)	$F_r = f_s / (q_t - \sigma_{vo}) \times 100\%$
16	Normalized Pore Pressure ratio, B_q	$B_q = u - u_o / (q_t - \sigma_{vo})$
17	Soil Behavior Type (normalized), SBT_n	see note
18	SBT_n Index, I_c	see note
19	Normalized Cone resistance, Q_{tn} (n varies with Ic)	see note
20	Estimated permeability, k_{SBT} (cm/sec or ft/sec)	see note
21	Equivalent SPT N_{60}, blows/ft	see note
22	Equivalent SPT $(N_1)_{60}$ blows/ft	see note
23	Estimated Relative Density, D_r, (%)	see note
24	Estimated Friction Angle, ϕ', (degrees)	see note
25	Estimated Young's modulus, E_s (tsf)	see note
26	Estimated small strain Shear modulus, Go (tsf)	see note
27	Estimated Undrained shear strength, s_u (tsf)	see note
28	Estimated Undrained strength ratio	s_u/σ_v'
29	Estimated Over Consolidation ratio, OCR	see note

Notes:

1 Soil Behavior Type (non-normalized), SBT — Lunne et al. (1997)
listed below

2 Unit weight, γ either constant at 119 pcf or based on Non-normalized SBT
(Lunne et al., 1997 and table below)

3 Soil Behavior Type (Normalized), SBT_n — Lunne et al. (1997)

4 SBT_n Index, I_c — $I_c = ((3.47 - \log Q_{t1})^2 + (\log F_r + 1.22)^2)^{0.5}$

5 Normalized Cone resistance, Q_{tn} (n varies with Ic)

$Q_{tn} = ((q_t - \sigma_{vo})/pa)\ (pa/(\sigma'_{vo})^n$ and recalculate I_c, then iterate:

When $I_c < 1.64$, $n = 0.5$ (clean sand)
When $I_c > 3.30$, $n = 1.0$ (clays)
When $1.64 < I_c < 3.30$, $n = (I_c - 1.64)0.3 + 0.5$
Iterate until the change in n, $\Delta n < 0.01$

6 Estimated permeability, k_{SBT} (based on Normalized SBT_n)
(Lunne et al., 1997 and table below)

7 Equivalent SPT N_{60}, blows/ft Lunne et al. (1997)

$$\frac{(q_c/p_a)}{N_{60}} = 8.5\left(1 - \frac{I_c}{4.6}\right)$$

8 Equivalent SPT $(N_1)_{60}$ blows/ft $(N_1)_{60} = N_{60}\, C_N$,
where $C_N = (pa/\sigma'_{vo})^{0.5}$

9 Relative Density, D_r, (%) $D_r^2 = Q_{tn} / C_{Dr}$
Only SBT_n 5, 6, 7 & 8 *Show 'N/A' in zones 1, 2, 3, 4 & 9*

10 Friction Angle, ϕ', (degrees) $\tan\phi' = \frac{1}{2.68}\left[\log\left(\frac{q_c}{\sigma'_{vo}}\right) + 0.29\right]$
Only SBT_n 5, 6, 7 & 8 *Show'N/A' in zones 1, 2, 3, 4 & 9*

11 Young's modulus, E_s $E_s = \alpha\, q_t$
Only SBT_n 5, 6, 7 & 8 *Show 'N/A' in zones 1, 2, 3, 4 & 9*

12 Small strain shear modulus, Go
a. $G_o = S_G\,(q_t\ \sigma'_{vo}\ pa)^{1/3}$ *For SBT_n 5, 6, 7*
b. $G_o = C_G\, q_t$ *For SBT_n 1, 2, 3& 4*
Show 'N/A' in zones 8 & 9

13 Undrained shear strength, s_u $s_u = (q_t - \sigma_{vo}) / N_{kt}$
Only SBT_n 1, 2, 3, 4 & 9 *Show 'N/A' in zones 5, 6, 7 & 8*

14 Over Consolidation ratio, OCR $OCR = k_{ocr}\, Q_{t1}$
Only SBT_n 1, 2, 3, 4 & 9 *Show 'N/A' in zones 5, 6, 7 & 8*

SBT Zones		**SBT_n Zones**	
The following updated and simplified SBT descriptions have been used in the software:			
1	sensitive fine grained	1	sensitive fine grained
2	organic soils	2	organic soils
3	clays	3	clays
4	clays & silty clays	4	clays & silty clays
5	clays & silty clays		
6	silty sands & sandy silts	5	silty sands & sandy silts
7	silty sands & sandy silts		
8	sands & silty sands	6	sands & silty sands
9	sands & silty sands		
10	sands	7	sands
11	very dense/stiff soils*	8	very dense/stiff soils*
12	very dense/stiff soils*	9	very dense/stiff soils*

* heavily overconsolidated and/or cemented

Track when soils fall with zones of same description and print that description (i.e. if soils fall only within SBT zones 4 & 5, print 'clays & silty clays')

Estimated Permeability (see Lunne et al., 1997)

SBT_n	Permeability (ft/sec)	(m/sec)
1	$3x\ 10^{-8}$	$1x\ 10^{-8}$
2	$3x\ 10^{-7}$	$1x\ 10^{-7}$
3	$1x\ 10^{-9}$	$3x\ 10^{-10}$
4	$3x\ 10^{-8}$	$1x\ 10^{-8}$
5	$3x\ 10^{-6}$	$1x\ 10^{-6}$
6	$3x\ 10^{-4}$	$1x\ 10^{-4}$
7	$3x\ 10^{-2}$	$1x\ 10^{-2}$
8	$3x\ 10^{-6}$	$1x\ 10^{-6}$
9	$1x\ 10^{-8}$	$3x\ 10^{-9}$

Estimated Unit Weight (see Lunne et al., 1997)

SBT	Approximate Unit Weight (lb/ft^3)	(kN/m^3)
1	111.4	17.5
2	79.6	12.5
3	111.4	17.5
4	114.6	18.0
5	114.6	18.0
6	114.6	18.0
7	117.8	18.5
8	120.9	19.0
9	124.1	19.5
10	127.3	20.0
11	130.5	20.5
12	120.9	19.0

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 Gregg In-Situ, Inc. job number, the next character is typically C for CPT (S if shear waves were collected, R if Resistivity was used, U for UVIF or M for 'Mini-Cone') followed by two or three characters indicating the sounding number. The last 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 05-127 (Job Number 127 in the year 2005) the first sounding will have file names 127C01.COR and 127C01.PPC.

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 sounding ID
Columns 17-31 Field representative
Columns 32-47 contain the project name

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 CPT operator.
Column 3: Sleeve (f_s) data. Recorded in units selected by the operator
Column 4: Dynamic pore pressure readings (u_2). 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 new line (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_2. 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_2).

CPT Dissipation Files

CPT Dissipation files have the same naming convention as the CPT sounding files and have the extension PPC. PPC 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 Sounding or Location ID
Columns 17-31 Field Representative
Columns 32-47 Project Name

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 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. Unit information is not stored in this file. Users would have to check the CPT file for the units that were used.

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.

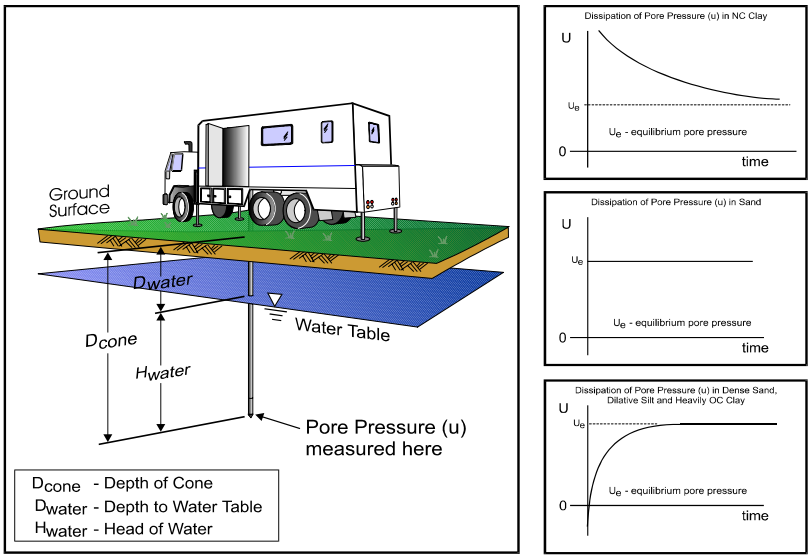
Pore pressure dissipation data can be interpreted to provide estimates of:

- 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. Pore pressure dissipation data is presented in graphical form in Appendix PPDT.



Water Table Calculation

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

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

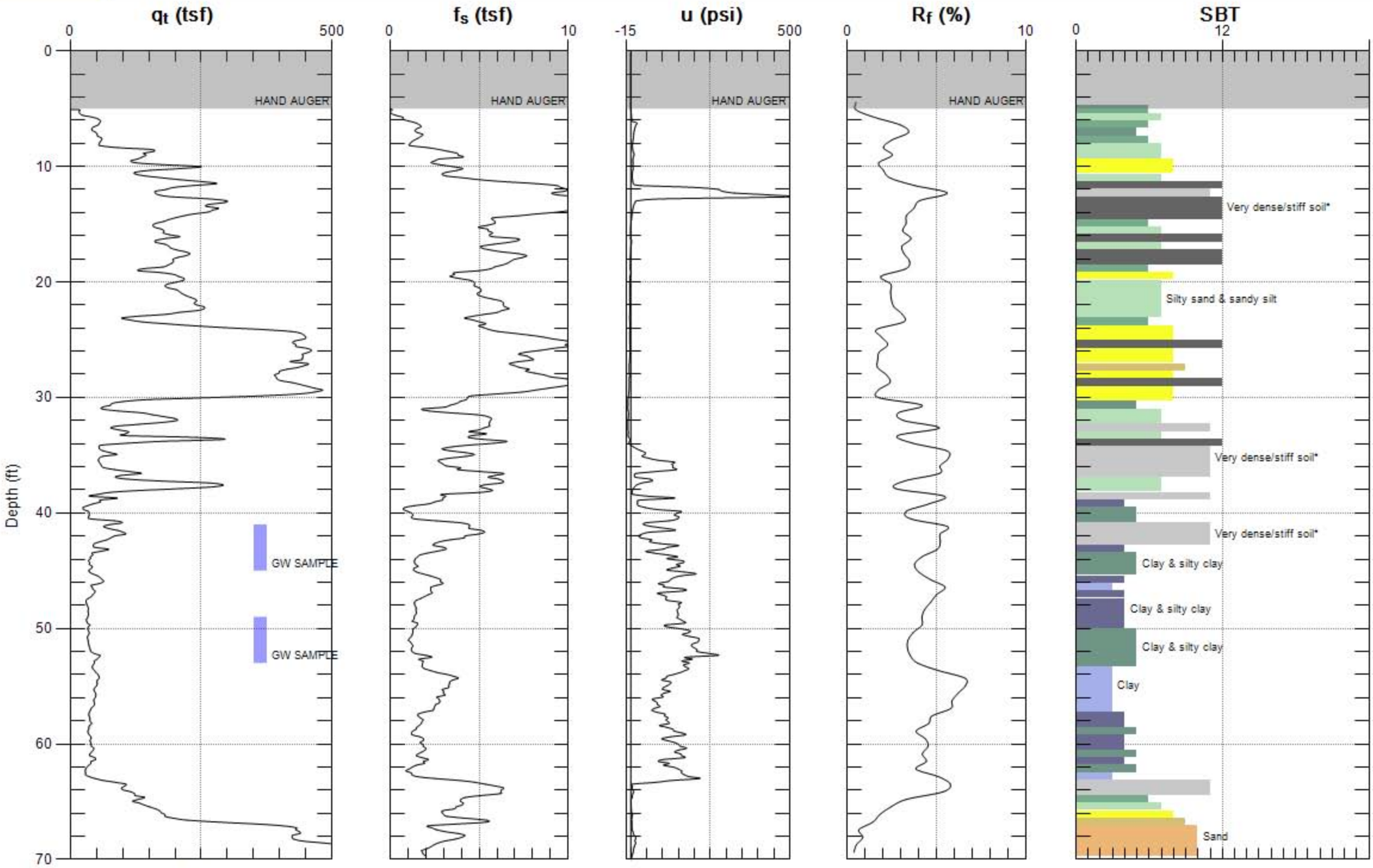
Useful Conversion Factors: 1psi = 0.704m = 2.31 feet (water)
1tsf = 0.958 bar = 13.9 psi
1m = 3.28 feet

Figure PPDT

CH2M HILL

Site: OMEGA
Sounding: CPT-HPW-06

Engineer: D.JABLONSKI
Date: 3/7/2007 08:24



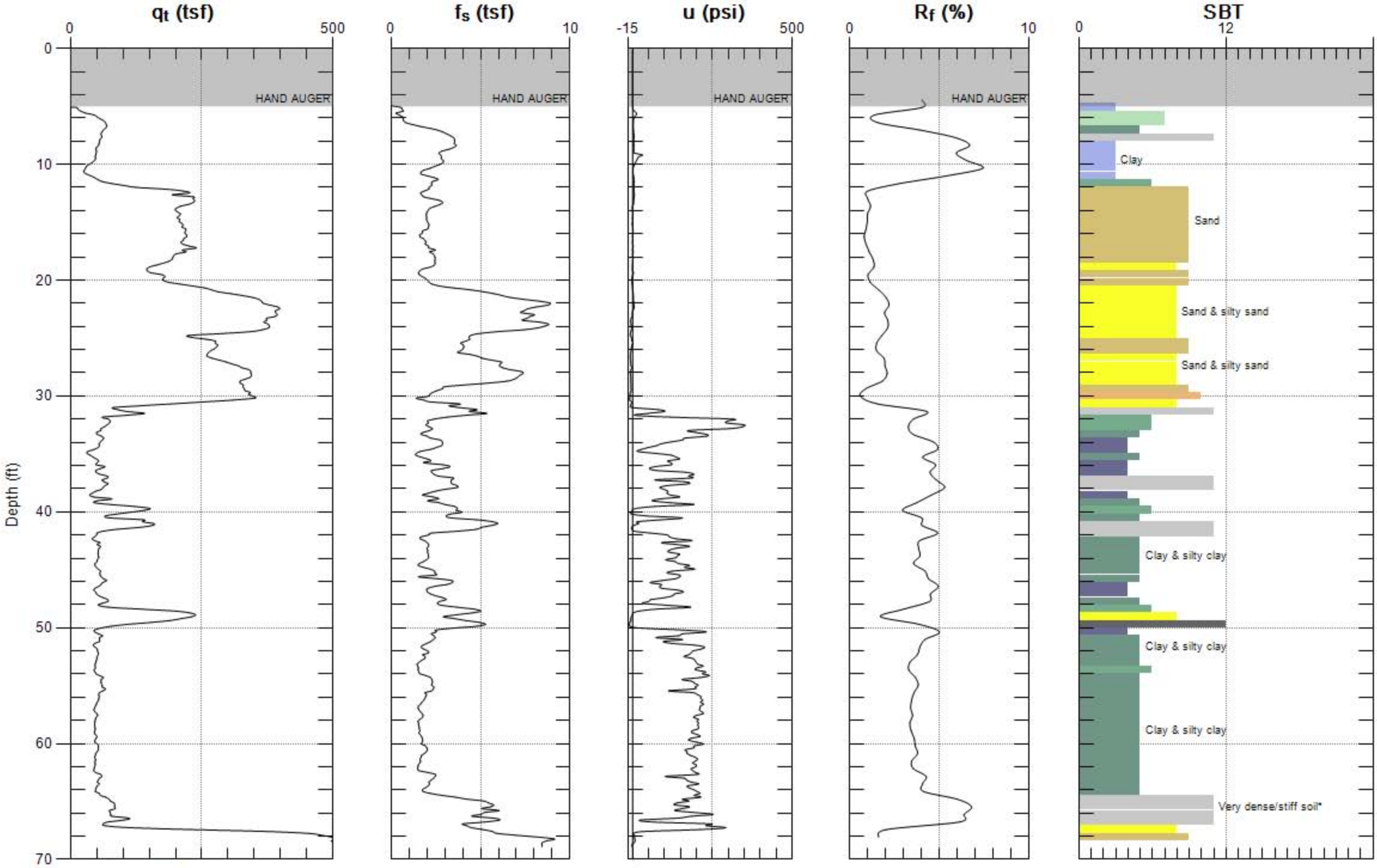
Max. Depth: 70.050 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

CH2M HILL

Site: OMEGA
Sounding: CPT-HPW-01

Engineer: D.JABLONSKI
Date: 3/8/2007 03:02



Max. Depth: 68.900 (ft)
Avg. Interval: 0.656 (ft)

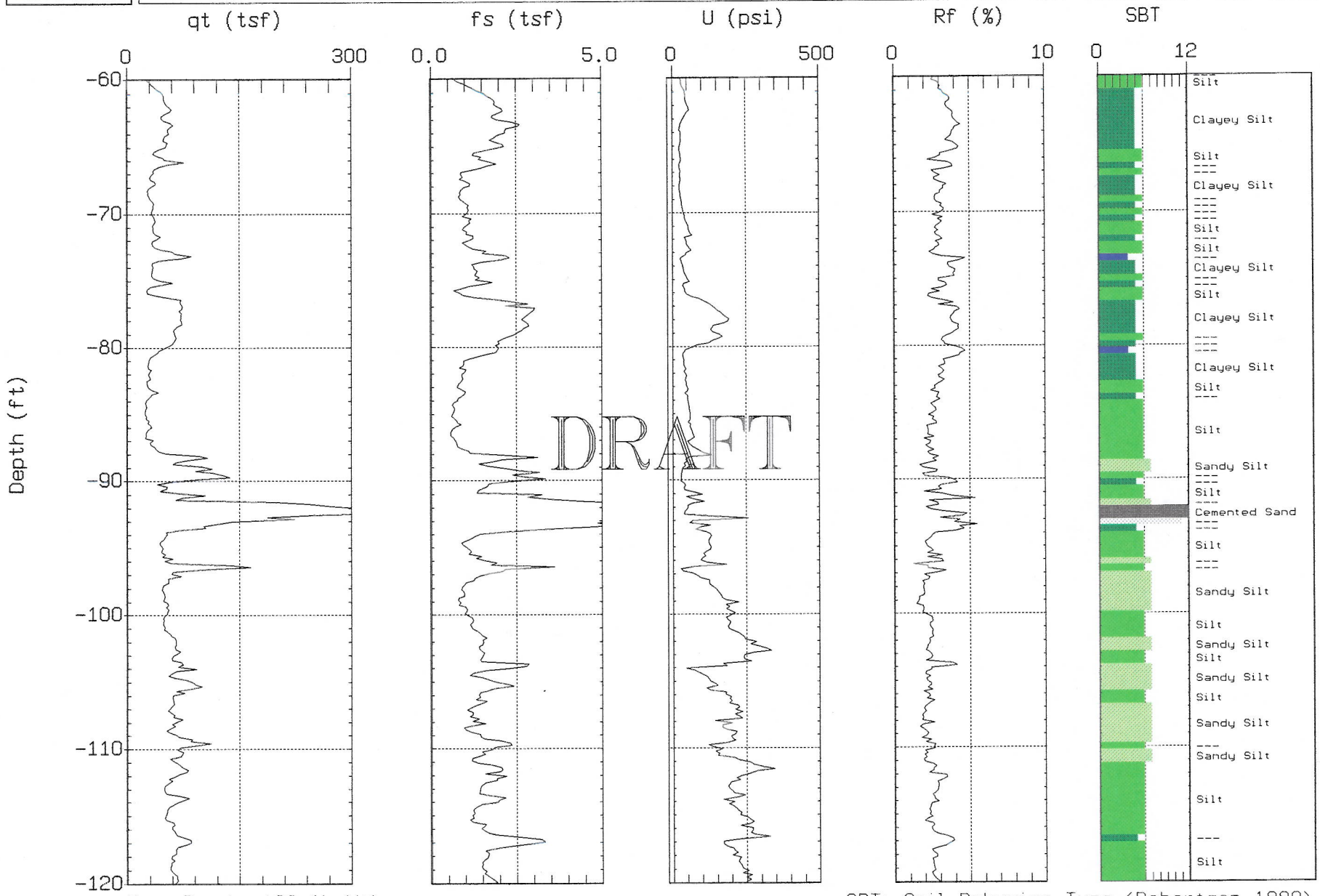
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CH2M HILL

Site: OMEGA CHEMICAL
Location: HP-A-1

GEOLOGIST: LIZ BRYANT
Date: 02/19/07 10:43



Max. Depth: 128.61 (ft)
Depth Inc.: 0.164 (ft)

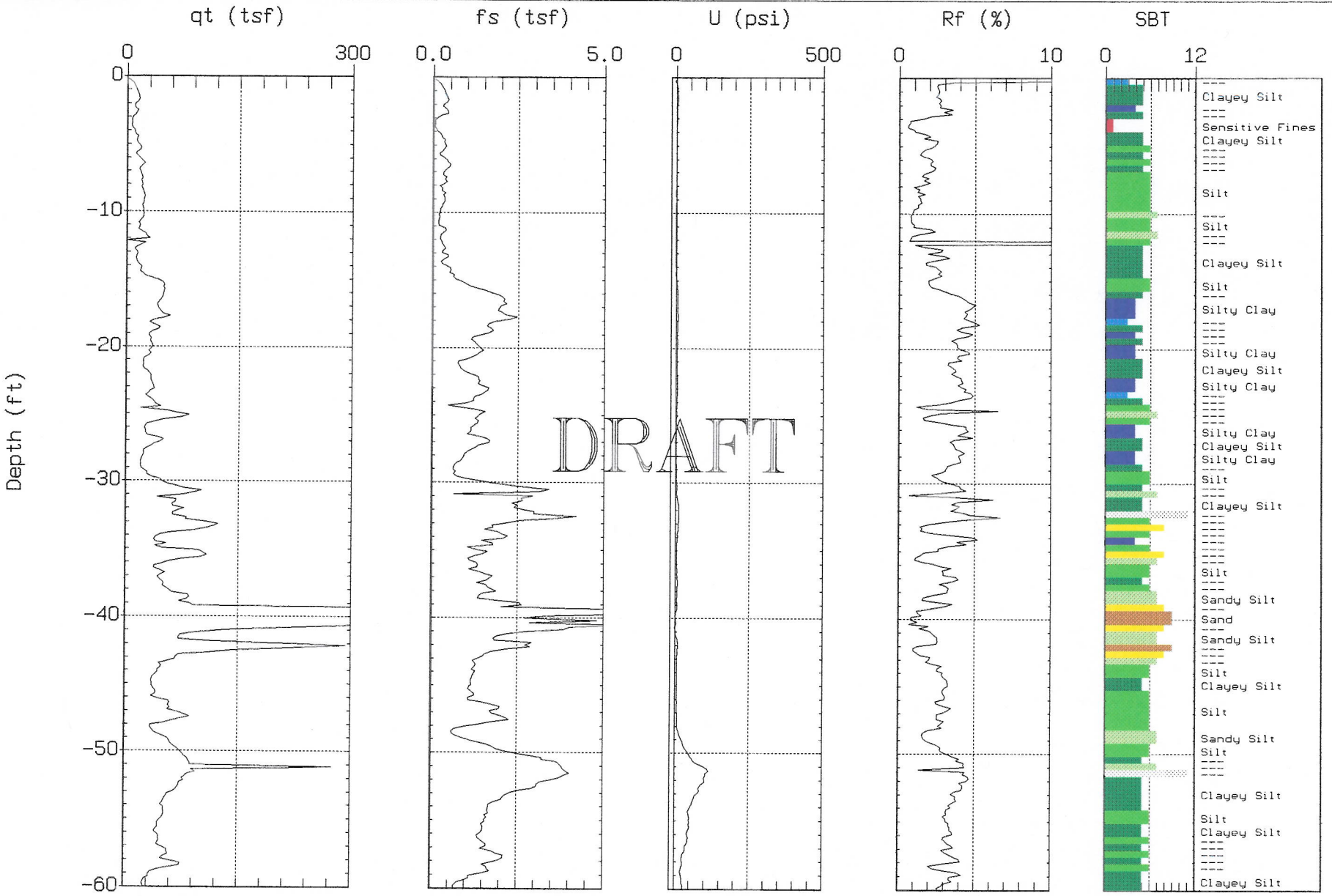
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CH2M HILL

Site: OMEGA CHEMICAL
Location: HP-A-1

GEOLOGIST: LIZ BRYANT
Date: 02/19/07 10:43



Max. Depth: 128.61 (ft)
Depth Inc.: 0.164 (ft)

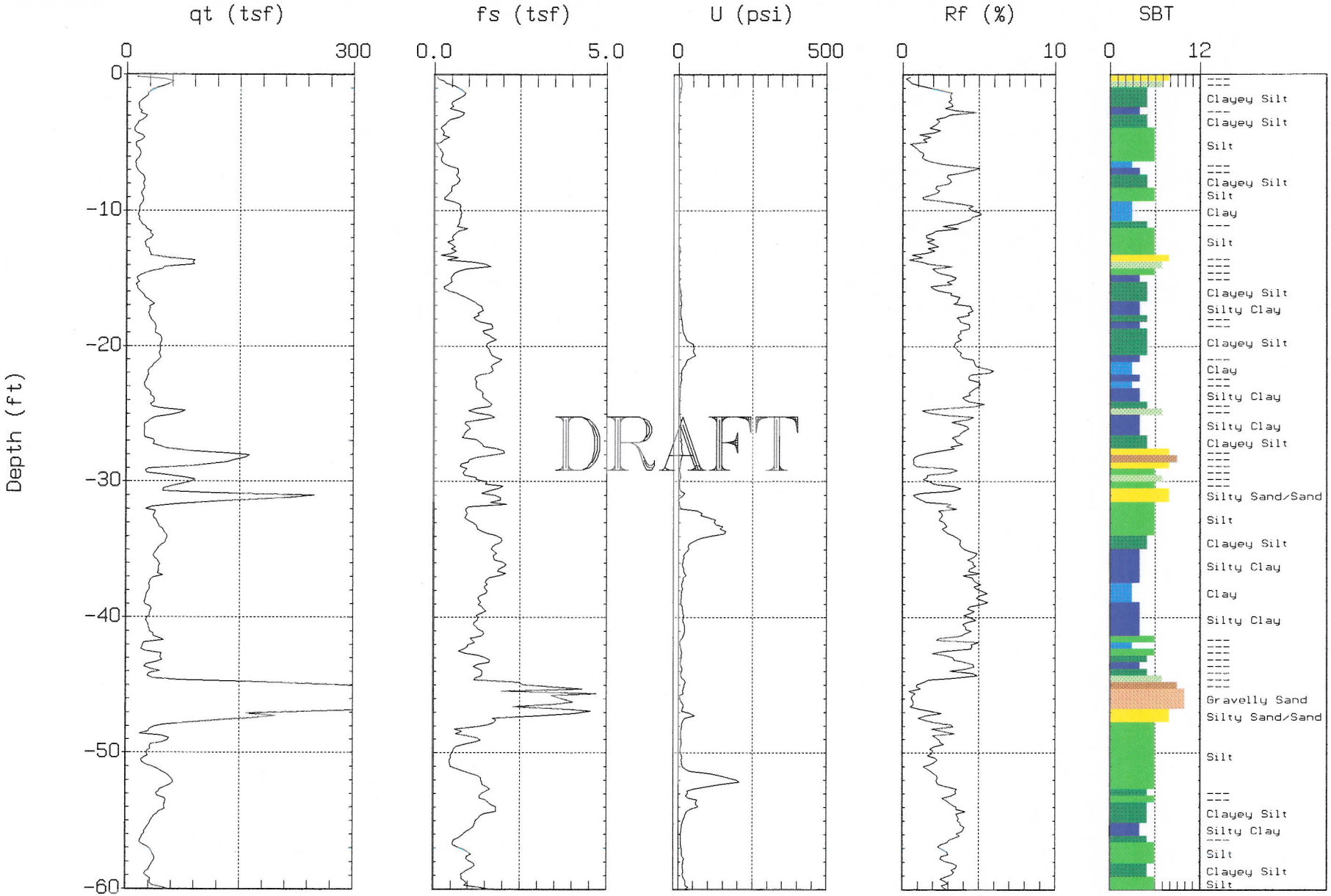
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CH2M HILL

Site: OMEGA CHEMICAL
Location: HP-A-8

GEOLOGIST: LIZ BRYANT
Date: 02/15/07 13:54



Max. Depth: 119.91 (ft)
Depth Inc.: 0.164 (ft)

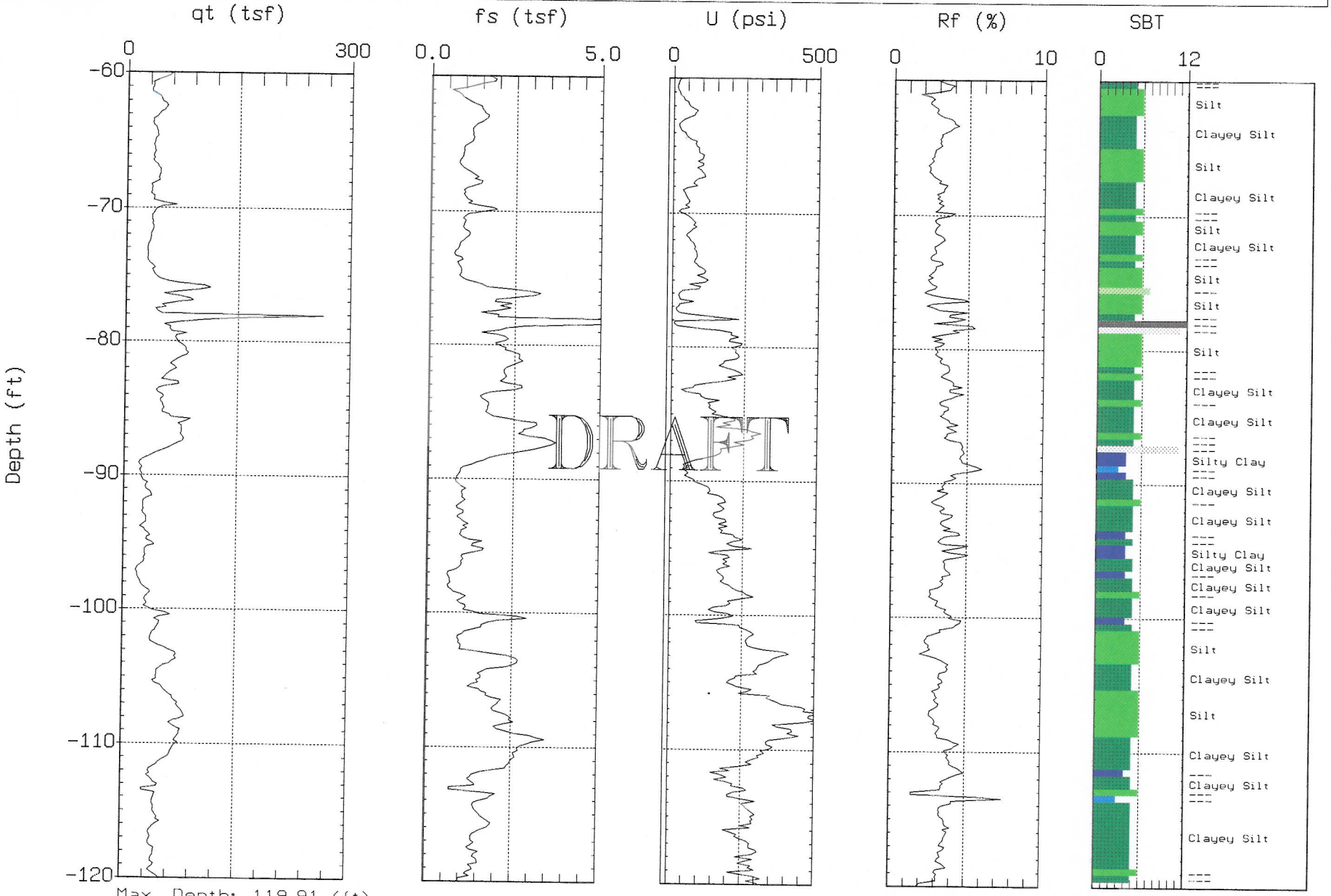
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CH2M HILL

Site: OMEGA CHEMICAL
Location: HP-A-8

GEOLOGIST: LIZ BRYANT
Date: 02/15/07 13:54



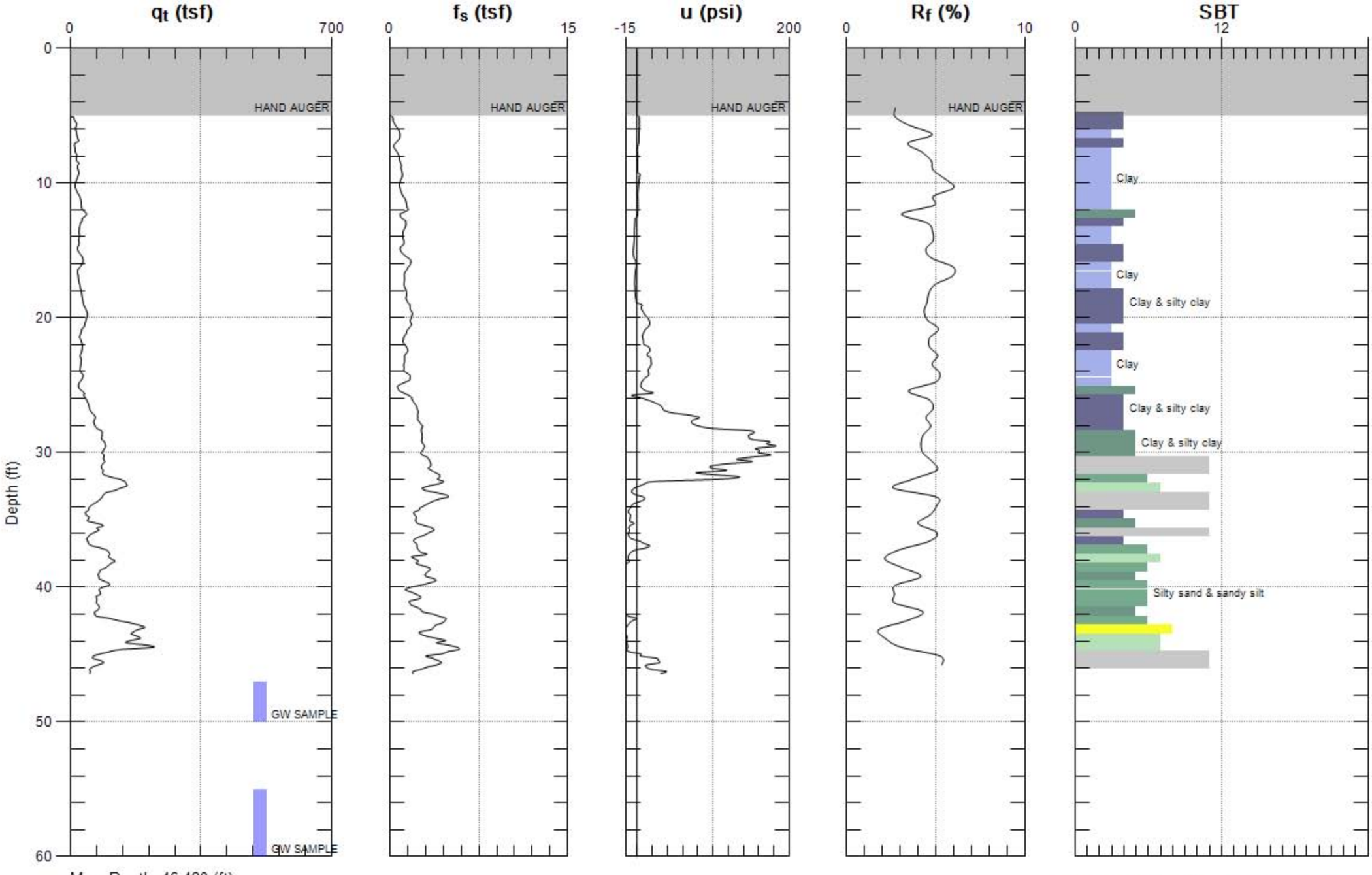
Max. Depth: 119.91 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

CH2M HILL

Site: OMEGA CHEMICAL
Sounding: HPRA3

Engineer: D.JABLONSKI
Date: 1/9/2007 08:26



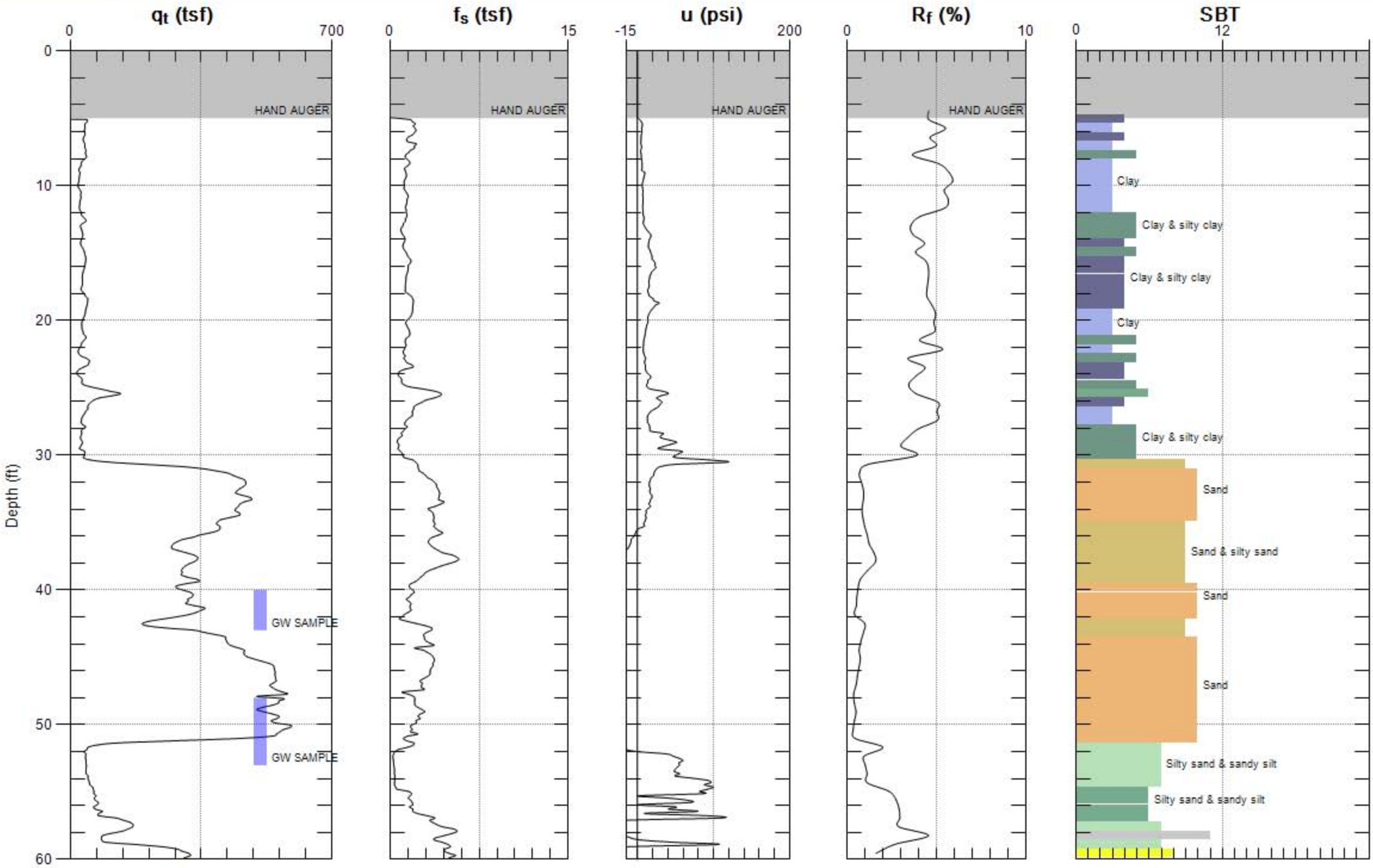
Max. Depth: 46.420 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

CH2M HILL

Site: OMEGA CHEMICAL
Sounding: HPRA2

Engineer: D.JABLONSKI
Date: 1/9/2007 02:24



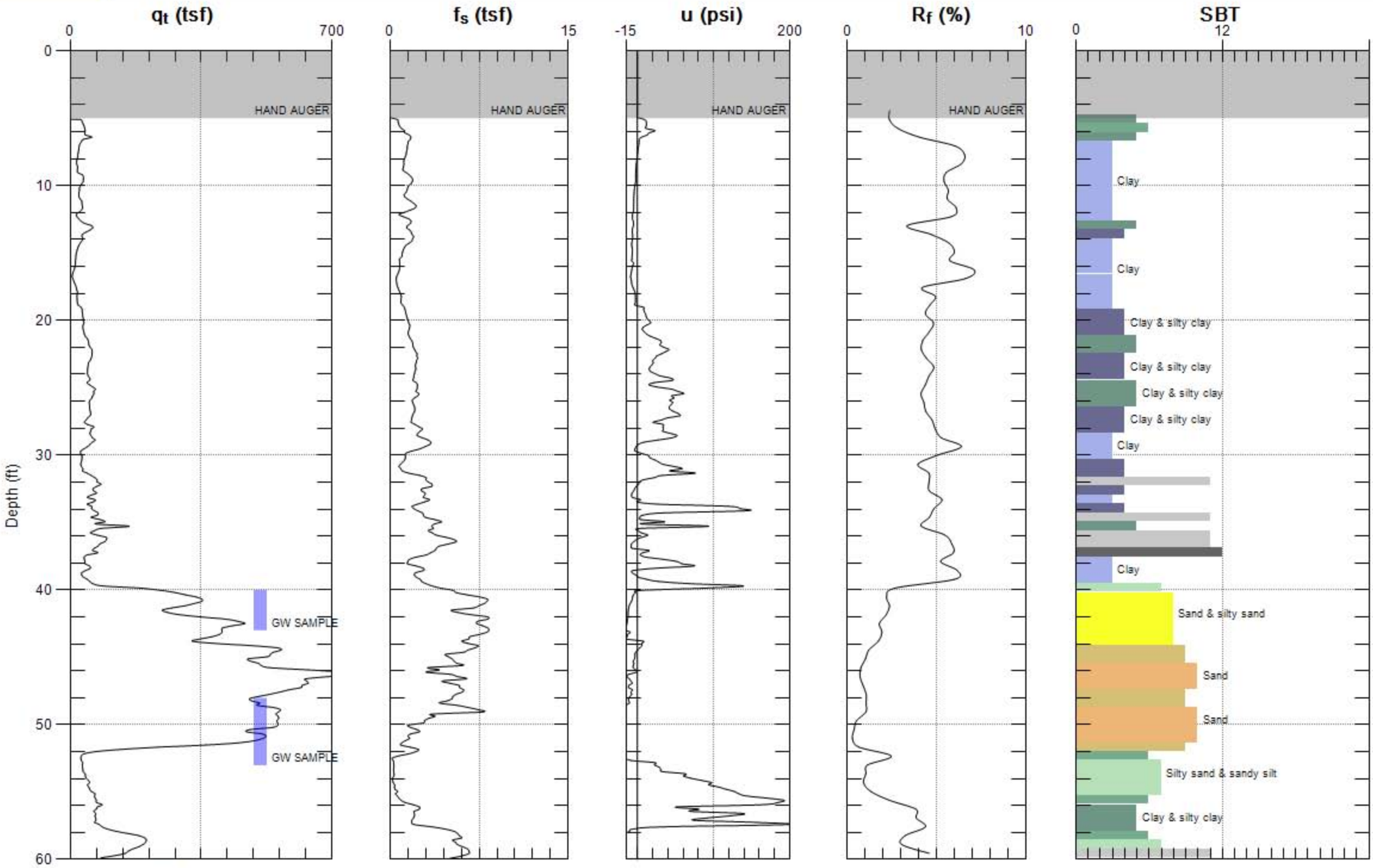
Max. Depth: 60.040 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

CH2M HILL

Site: OMEGA CHEMICAL
Sounding: HPRA1

Engineer: D.JABLONSKI
Date: 1/10/2007 08:16



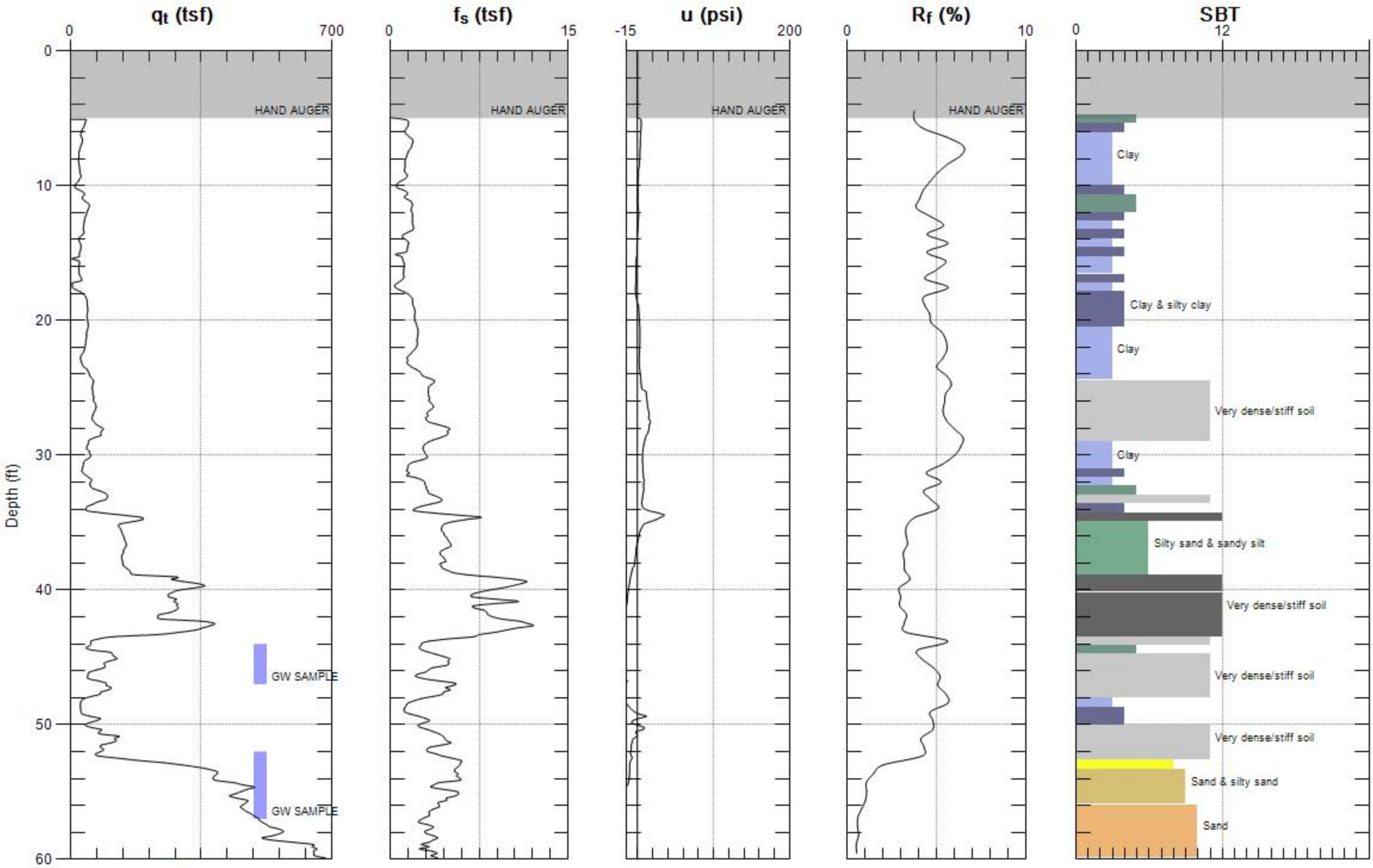
Max. Depth: 60.040 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

CH2M HILL

Site: OMEGA CHEMICAL
Sounding: HPRA4

Engineer: D.JABLONSKI
Date: 1/10/2007 12:08



Max. Depth: 60.040 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)