Appendix M

LNAPL Potential Migration

PTS Laboratories, Inc.

Delta Environmental Consultants, Inc.
PTS File No: 32457

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D4464)

PROJECT NAME: Superior Barge Dock
PROJECT NO: AM60-06N-6

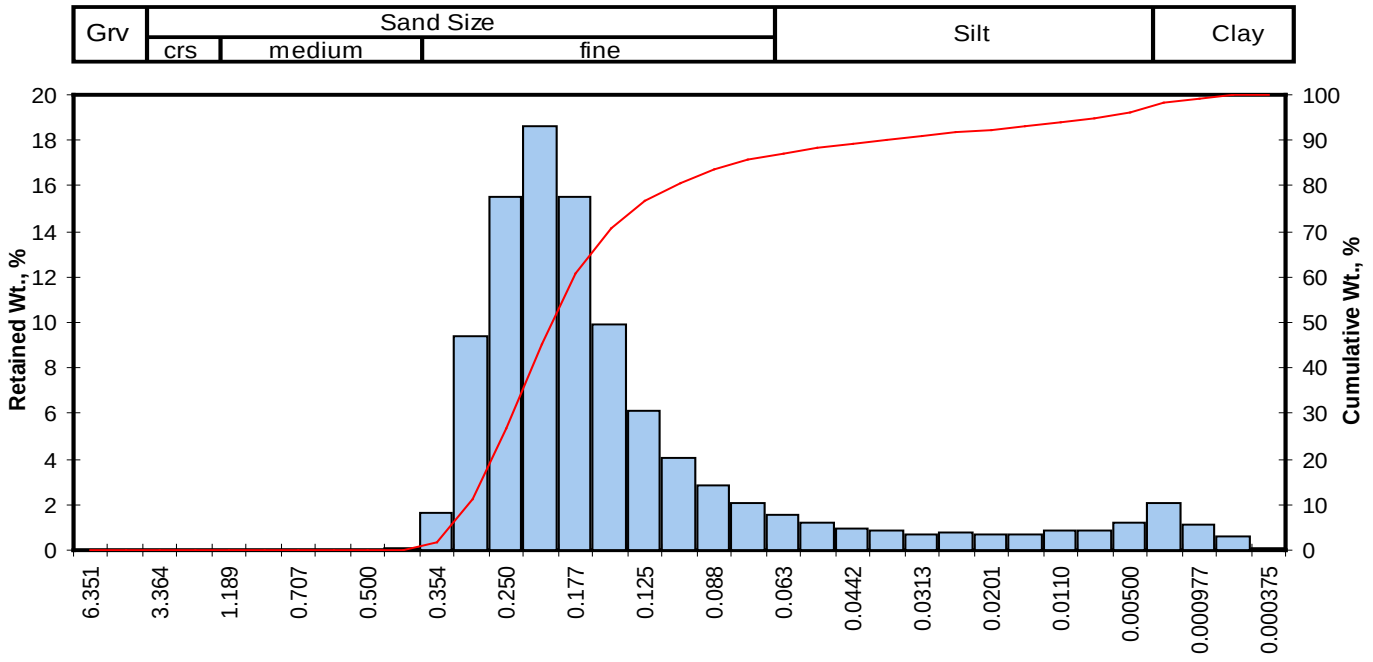
Sample ID	Depth, ft.	Description USCS/ASTM (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
M-8	17.3-17.9	Fine sand	0.199	0.00	0.00	0.10	85.52	10.52	3.86	14.38
T-6	14.8-15.5	Fine sand	0.202	0.00	0.00	0.45	91.98	6.03	1.53	7.56
Manifold #6	20.9-21.7	Fine sand	0.150	0.00	0.00	0.96	78.14	14.95	5.96	20.91
RR Loading Rack #4	11.2-12.0	Fine sand	0.185	0.00	0.00	0.44	85.83	9.81	3.93	13.74

(1) based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Delta Environmental Consultants, Inc.	**PTS File No:**	32457
Project:	Superior Barge Dock	**Sample ID:**	M-8
Project No:	AM60-06N-6	**Depth, ft:**	17.3-17.9



Particle Size, mm

Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.10	0.10	0.10
0.0139	0.354	1.50	45	1.64	1.64	1.74
0.0117	0.297	1.75	50	9.37	9.37	11.11
0.0098	0.250	2.00	60	15.50	15.50	26.61
0.0083	0.210	2.25	70	18.60	18.60	45.21
0.0070	0.177	2.50	80	15.50	15.50	60.71
0.0059	0.149	2.75	100	9.87	9.87	70.58
0.0049	0.125	3.00	120	6.08	6.08	76.66
0.0041	0.105	3.25	140	4.05	4.05	80.72
0.0035	0.088	3.50	170	2.82	2.82	83.54
0.0029	0.074	3.75	200	2.08	2.08	85.62
0.0025	0.063	4.00	230	1.58	1.58	87.20
0.0021	0.053	4.25	270	1.20	1.20	88.40
0.00174	0.0442	4.50	325	0.98	0.98	89.38
0.00146	0.0372	4.75	400	0.84	0.84	90.22
0.00123	0.0313	5.00	450	0.71	0.71	90.93
0.000986	0.0250	5.32	500	0.79	0.79	91.72
0.000790	0.0201	5.64	635	0.72	0.72	92.44
0.000615	0.0156	6.00		0.71	0.71	93.15
0.000435	0.0110	6.50		0.88	0.88	94.03
0.000308	0.00781	7.00		0.90	0.90	94.93
0.000197	0.00500	7.65		1.21	1.21	96.14
0.000077	0.00195	9.00		2.08	2.08	98.22
0.000038	0.000977	10.00		1.08	1.08	99.30
0.000019	0.000488	11.00		0.64	0.64	99.94
0.000015	0.000375	11.38		0.06	0.06	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.59	0.0131	0.333
10	1.72	0.0119	0.303
16	1.83	0.0111	0.281
25	1.97	0.0100	0.255
40	2.18	0.0087	0.221
50	2.33	0.0078	0.199
60	2.49	0.0070	0.178
75	2.93	0.0052	0.131
84	3.56	0.0033	0.085
90	4.69	0.0015	0.039
95	7.04	0.0003	0.008

Measure	Trask	Inman	Folk-Ward
Median, phi	2.33	2.33	2.33
Median, in.	0.0078	0.0078	0.0078
Median, mm	0.199	0.199	0.199
Mean, phi	2.37	2.69	2.57
Mean, in.	0.0076	0.0061	0.0066
Mean, mm	0.193	0.155	0.168
Sorting	1.394	0.863	1.258
Skewness	0.917	0.423	0.576
Kurtosis	0.233	2.157	2.334

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

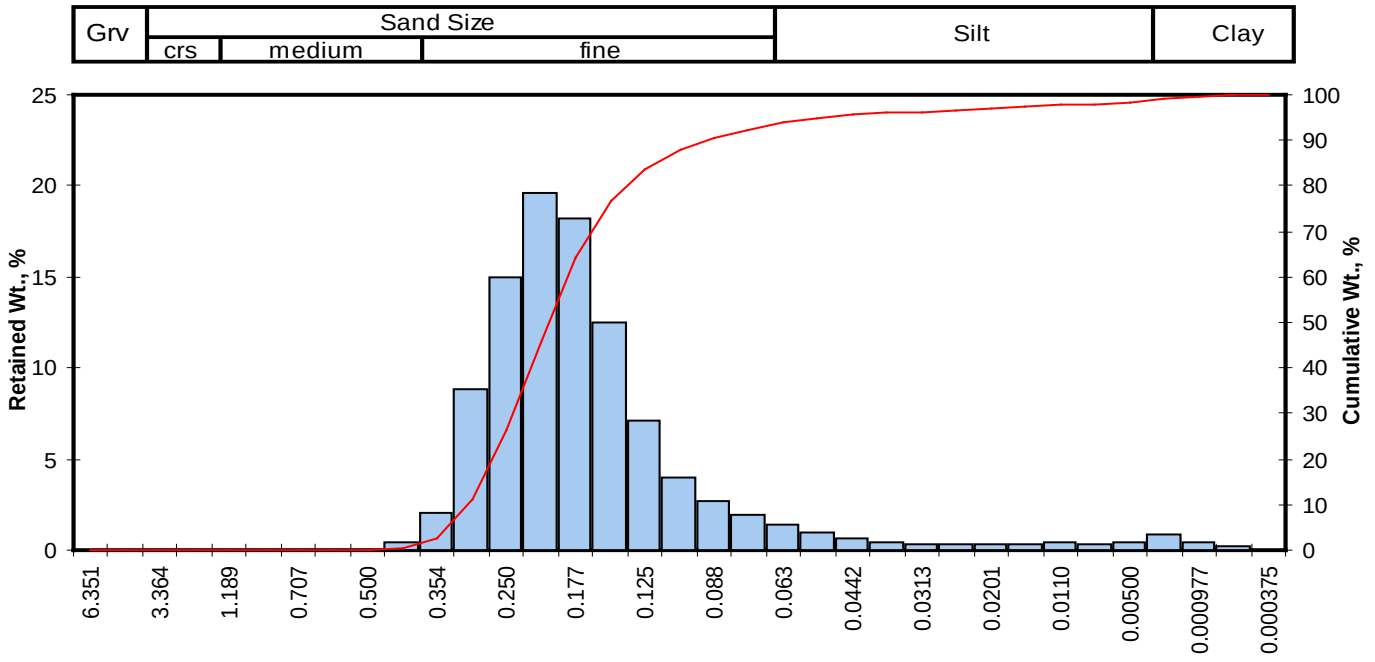
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.10
Fine Sand	200	85.52
Silt	>0.005 mm	10.52
Clay	<0.005 mm	3.86
	Total	**100**

Phone: (562) 907-3607
Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Delta Environmental Consultants, Inc.	**PTS File No:**	32457
Project:	Superior Barge Dock	**Sample ID:**	T-6
Project No:	AM60-06N-6	**Depth, ft:**	14.8-15.5



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.45	0.45	0.45
0.0139	0.354	1.50	45	2.10	2.10	2.55
0.0117	0.297	1.75	50	8.86	8.86	11.42
0.0098	0.250	2.00	60	15.00	15.00	26.42
0.0083	0.210	2.25	70	19.60	19.60	46.02
0.0070	0.177	2.50	80	18.20	18.20	64.22
0.0059	0.149	2.75	100	12.50	12.50	76.72
0.0049	0.125	3.00	120	7.09	7.09	83.81
0.0041	0.105	3.25	140	4.01	4.01	87.82
0.0035	0.088	3.50	170	2.65	2.65	90.47
0.0029	0.074	3.75	200	1.97	1.97	92.44
0.0025	0.063	4.00	230	1.42	1.42	93.86
0.0021	0.053	4.25	270	0.97	0.97	94.83
0.00174	0.0442	4.50	325	0.67	0.67	95.50
0.00146	0.0372	4.75	400	0.48	0.48	95.98
0.00123	0.0313	5.00	450	0.35	0.35	96.33
0.000986	0.0250	5.32	500	0.35	0.35	96.68
0.000790	0.0201	5.64	635	0.30	0.30	96.98
0.000615	0.0156	6.00		0.30	0.30	97.28
0.000435	0.0110	6.50		0.38	0.38	97.66
0.000308	0.00781	7.00		0.36	0.36	98.02
0.000197	0.00500	7.65		0.45	0.45	98.47
0.000077	0.00195	9.00		0.83	0.83	99.30
0.000038	0.000977	10.00		0.45	0.45	99.75
0.000019	0.000488	11.00		0.23	0.23	99.98
0.000015	0.000375	11.38		0.02	0.02	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.57	0.0133	0.337
10	1.71	0.0120	0.306
16	1.83	0.0111	0.282
25	1.98	0.0100	0.254
40	2.17	0.0087	0.222
50	2.30	0.0080	0.202
60	2.44	0.0072	0.184
75	2.72	0.0060	0.152
84	3.01	0.0049	0.124
90	3.46	0.0036	0.091
95	4.31	0.0020	0.050

Measure	Trask	Inman	Folk-Ward
Median, phi	2.30	2.30	2.30
Median, in.	0.0080	0.0080	0.0080
Median, mm	0.202	0.202	0.202
Mean, phi	2.30	2.42	2.38
Mean, in.	0.0080	0.0074	0.0076
Mean, mm	0.203	0.187	0.192
Sorting	1.292	0.593	0.712
Skewness	0.972	0.193	0.329
Kurtosis	0.237	1.315	1.522

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.45
Fine Sand	200	91.98
Silt	>0.005 mm	6.03
Clay	<0.005 mm	1.53
	Total	**100**

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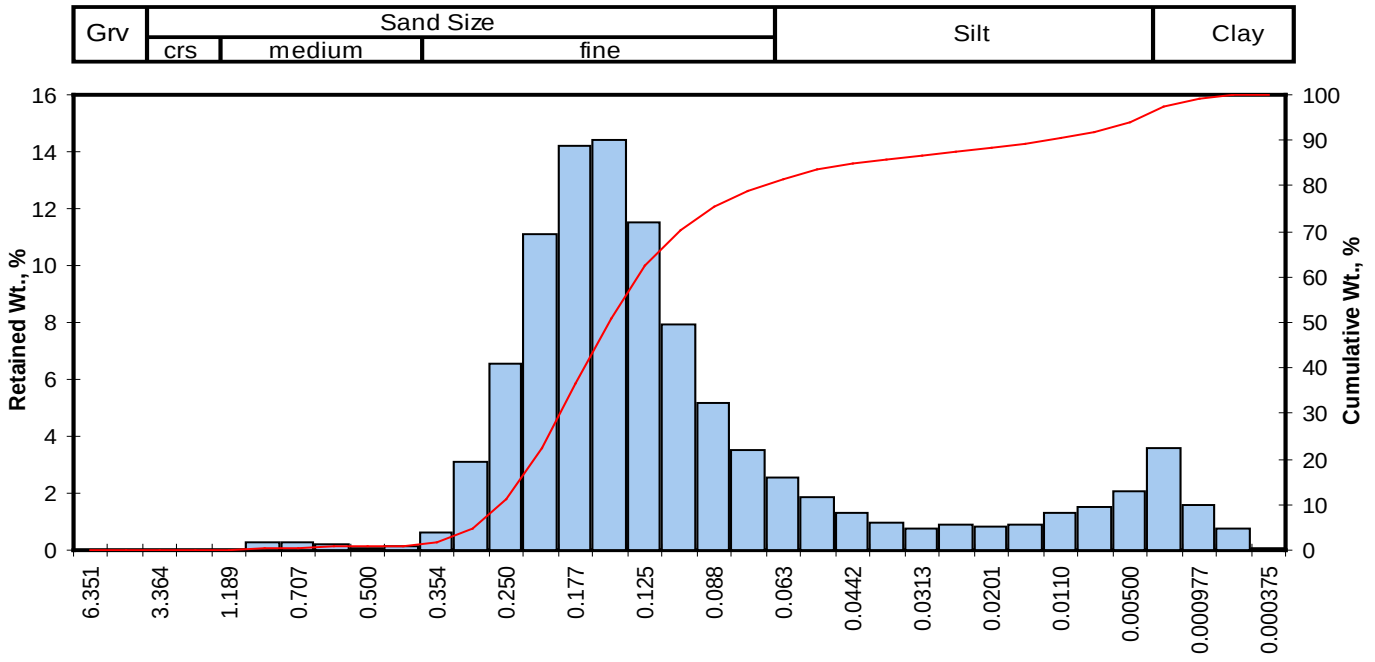
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Delta Environmental Consultants, Inc.	**PTS File No:**	32457
Project:	Superior Barge Dock	**Sample ID:**	Manifold #6
Project No:	AM60-06N-6	**Depth, ft:**	20.9-21.7



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.26	0.26	0.26
0.0278	0.707	0.50	25	0.28	0.28	0.54
0.0234	0.595	0.75	30	0.19	0.19	0.73
0.0197	0.500	1.00	35	0.07	0.07	0.81
0.0166	0.420	1.25	40	0.15	0.15	0.96
0.0139	0.354	1.50	45	0.60	0.60	1.56
0.0117	0.297	1.75	50	3.10	3.10	4.66
0.0098	0.250	2.00	60	6.56	6.57	11.23
0.0083	0.210	2.25	70	11.10	11.11	22.34
0.0070	0.177	2.50	80	14.20	14.22	36.56
0.0059	0.149	2.75	100	14.40	14.42	50.97
0.0049	0.125	3.00	120	11.50	11.51	62.49
0.0041	0.105	3.25	140	7.94	7.95	70.43
0.0035	0.088	3.50	170	5.15	5.16	75.59
0.0029	0.074	3.75	200	3.50	3.50	79.09
0.0025	0.063	4.00	230	2.54	2.54	81.64
0.0021	0.053	4.25	270	1.87	1.87	83.51
0.00174	0.0442	4.50	325	1.32	1.32	84.83
0.00146	0.0372	4.75	400	0.97	0.97	85.80
0.00123	0.0313	5.00	450	0.78	0.78	86.58
0.000986	0.0250	5.32	500	0.88	0.88	87.46
0.000790	0.0201	5.64	635	0.81	0.81	88.27
0.000615	0.0156	6.00		0.87	0.87	89.15
0.000435	0.0110	6.50		1.32	1.32	90.47
0.000308	0.00781	7.00		1.51	1.51	91.98
0.000197	0.00500	7.65		2.06	2.06	94.04
0.000077	0.00195	9.00		3.56	3.56	97.61
0.000038	0.000977	10.00		1.57	1.57	99.18
0.000019	0.000488	11.00		0.75	0.75	99.93
0.000015	0.000375	11.38		0.07	0.07	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	1.76	0.0116	0.295
10	1.95	0.0102	0.258
16	2.11	0.0091	0.232
25	2.30	0.0080	0.204
40	2.56	0.0067	0.170
50	2.73	0.0059	0.150
60	2.95	0.0051	0.130
75	3.47	0.0035	0.090
84	4.34	0.0019	0.049
90	6.32	0.0005	0.012
95	8.01	0.0002	0.004

Measure	Trask	Inman	Folk-Ward
Median, phi	2.73	2.73	2.73
Median, in.	0.0059	0.0059	0.0059
Median, mm	0.150	0.150	0.150
Mean, phi	2.77	3.23	3.06
Mean, in.	0.0058	0.0042	0.0047
Mean, mm	0.147	0.107	0.120
Sorting	1.502	1.118	1.505
Skewness	0.901	0.440	0.565
Kurtosis	0.231	1.794	2.180

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.96
Fine Sand	200	78.14
Silt	>0.005 mm	14.95
Clay	<0.005 mm	5.96
	Total	**100**

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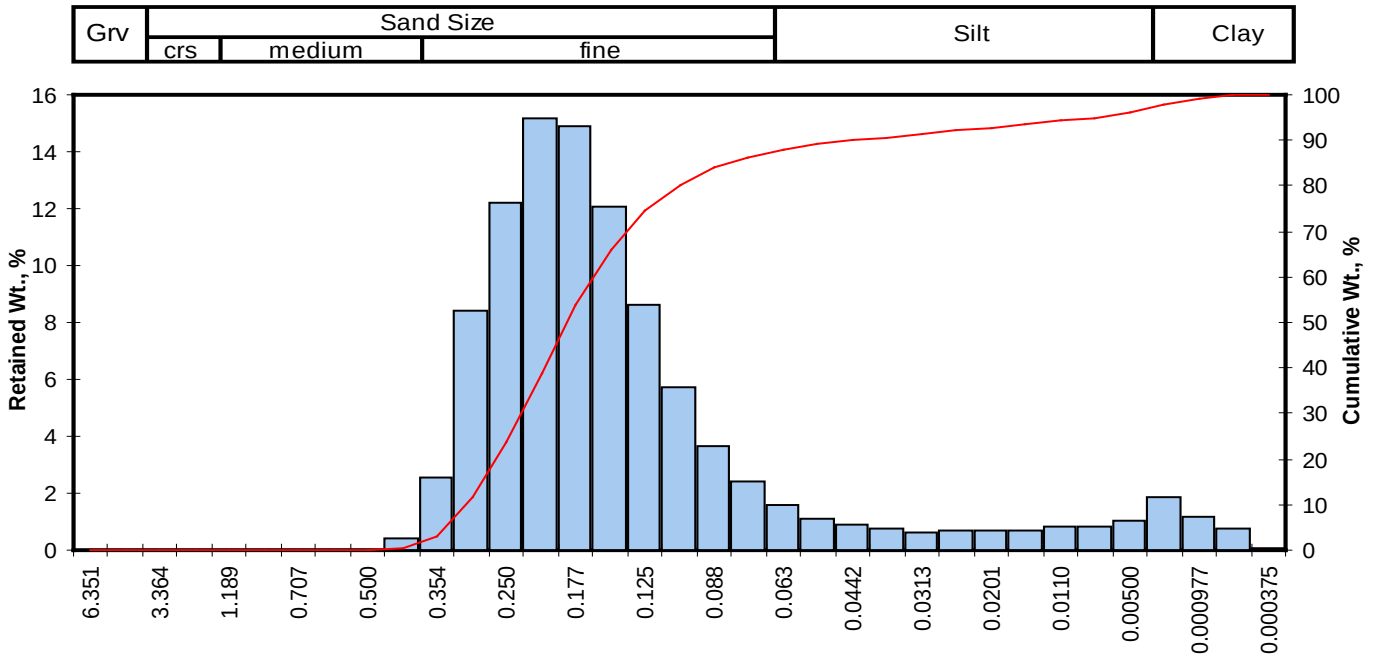
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: Delta Environmental Consultants, Inc.
Project: Superior Barge Dock
Project No: AM60-06N-6

PTS File No: 32457
Sample ID: RR Loading Rack #4
Depth, ft: 11.2-12.0



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.44	0.44	0.44
0.0139	0.354	1.50	45	2.56	2.56	3.00
0.0117	0.297	1.75	50	8.45	8.45	11.45
0.0098	0.250	2.00	60	12.20	12.20	23.64
0.0083	0.210	2.25	70	15.20	15.20	38.84
0.0070	0.177	2.50	80	14.90	14.90	53.73
0.0059	0.149	2.75	100	12.10	12.10	65.83
0.0049	0.125	3.00	120	8.63	8.63	74.46
0.0041	0.105	3.25	140	5.73	5.73	80.19
0.0035	0.088	3.50	170	3.67	3.67	83.86
0.0029	0.074	3.75	200	2.41	2.41	86.26
0.0025	0.063	4.00	230	1.62	1.62	87.88
0.0021	0.053	4.25	270	1.13	1.13	89.01
0.00174	0.0442	4.50	325	0.90	0.90	89.91
0.00146	0.0372	4.75	400	0.76	0.76	90.67
0.00123	0.0313	5.00	450	0.64	0.64	91.31
0.000986	0.0250	5.32	500	0.72	0.72	92.03
0.000790	0.0201	5.64	635	0.68	0.68	92.71
0.000615	0.0156	6.00		0.68	0.68	93.39
0.000435	0.0110	6.50		0.82	0.82	94.21
0.000308	0.00781	7.00		0.80	0.80	95.01
0.000197	0.00500	7.65		1.06	1.06	96.07
0.000077	0.00195	9.00		1.88	1.88	97.95
0.000038	0.000977	10.00		1.18	1.18	99.13
0.000019	0.000488	11.00		0.79	0.79	99.92
0.000015	0.000375	11.38		0.08	0.08	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.56	0.0134	0.339
10	1.71	0.0121	0.306
16	1.84	0.0110	0.279
25	2.02	0.0097	0.246
40	2.27	0.0082	0.207
50	2.44	0.0073	0.185
60	2.63	0.0064	0.162
75	3.02	0.0048	0.123
84	3.51	0.0034	0.087
90	4.53	0.0017	0.043
95	6.99	0.0003	0.008

Measure	Trask	Inman	Folk-Ward
Median, phi	2.44	2.44	2.44
Median, in.	0.0073	0.0073	0.0073
Median, mm	0.185	0.185	0.185
Mean, phi	2.44	2.68	2.60
Mean, in.	0.0073	0.0061	0.0065
Mean, mm	0.185	0.156	0.165
Sorting	1.415	0.836	1.241
Skewness	0.942	0.289	0.483
Kurtosis	0.234	2.250	2.224

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.44
Fine Sand	200	85.83
Silt	>0.005 mm	9.81
Clay	<0.005 mm	3.93
	Total	**100**

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32457

Page ____ of ____

Chain of Custody Record

Project Name Superior Barge Deck

BP BU/GEM CO Portfolio:

BP Laboratory Contract Number:

Date: 10-8-02 **Requested Due Date (mm/dd/yy)** 10-22-02

On-site Time:	7:30 Am	Temp:	32° F
Off- site Time:	6:30 Pm	Temp:	45° F
Sky Conditions:	Overcast		
Meteorological Events:	None		
Wind Speed:		Direction:	

Send To:	BP/GEM Facility No.:	Consultant/Contractor: Delta Environmental Cons.
Lab Name: PTS	BP/GEM Facility Address:	Address: 17500 W. Liberty Lane, Suite A
Lab Address: 8100 Secura Way Santa Fe Springs, CA 90670	Site ID No.	New Berlin, WI 53146
	Site Lat/Long:	e-mail EDD:
	California Global ID #:	Consultant/Contractor Project No.: AM60-06N-6
Lab PM:	BP/GEM PM Contact: Rick Carey/Ray Stoelting	Consultant/Contractor Tele/Fax: 262-827-4800
Tele/Fax: (562) 907-3607	Address: PO Box 6412, Chanhassen	Consultant/Contractor PM: Rick Carey
Report Type & QC Level:	Minnesota 55317	Invoice to: (Consultant)/Contractor or BP/GEM (Circle one)
BP/GEM Account No.: AM60-06N-6	Tele/Fax: 952 975 3817	BP/GEM Work Release No:

Lab Bottle Order No:

Item No.	Sample Description	Time	Matrix: Soil/Solid	Matrix: Water/Liquid	Matrix: Sediments	Matrix: Air	Laboratory No.	No. of containers	Preservatives: Unpreserved	Preservatives: H_2SO_4	Preservatives: HNO_3	Preservatives: HCl	Preservatives:	Preservatives:	Requested Analysis: BTEX 8021	Requested Analysis: BTEX/TPH	Requested Analysis: EPA 8260	Requested Analysis: EPA 8270	Requested Analysis: Capillary Pressure Saturation	Requested Analysis: Porosity	Requested Analysis: Dry Bulk Density	Requested Analysis: Hydraulic Conductivity	Requested Analysis:	Requested Analysis:	Sample Point Lat/Long and Comments
1	Main Fold #6 (20.9-21.7)	11:00Am	S					1	1										X	X	X	X			Sampled 10-3-02
2	RR Loading Rack #4 (13-13.8)	11:00Am	S					1	1										X	X	X	X			Sampled 10-8-02
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									

Sampler's Name: Scott Reinemaker	**Relinquished By / Affiliation**	**Date**	**Time**	**Accepted By / Affiliation**	**Date**	**Time**
Sampler's Company: Delta Environmental Cons.	[signature] /Delta	10-8-02	5:30	UPS		
Shipment Date: 10-8-02				PTS LABS TA Gilson	010602	10:00
Shipment Method: UPS Overnight						
Shipment Tracking No:						

Special Instructions:

Custody Seals In Place Yes____ No____ Temperature Blank Yes____ No____ Cooler Temperature on Receipt -30 °F/C Trip Blank Yes____ No____

LABORATORY

32457

Page ____ of ____

Chain of Custody Record

Project Name Superior Barge Dock

BP BU/GEM CO Portfolio:

BP Laboratory Contract Number:

Date: 10-14-02 **Requested Due Date (mm/dd/yy)**

On-site Time:	Temp:
Off- site Time:	Temp:
Sky Conditions:	
Meteorological Events:	
Wind Speed:	Direction:

Send To:	BP/GEM Facility No.:	Consultant/Contractor: Delta Environmental Consultants
Lab Name:	BP/GEM Facility Address:	Address: 17500 W. Liberty Ln Suite A
Lab Address: PTS	Site ID No.	
8100 Secura Way	Site Lat/Long:	e-mail EDD:
Santa Fe Springs, CA 90670	California Global ID #:	Consultant/Contractor Project No.: AMOC-06N-6
Lab PM:	BP/GEM PM Contact: Ray Stoelting	Consultant/Contractor Tele/Fax: 262-827-1055
Tele/Fax:	Address:	Consultant/Contractor PM: Wayne Hutchinson
Report Type & QC Level:		Invoice to: Consultant/Contractor or BP/GEM (Circle one)
BP/GEM Account No.:	Tele/Fax:	BP/GEM Work Release No:

Lab Bottle Order No:

Item No.	Sample Description	Time	Matrix: Soil/Solid	Water/Liquid	Sediments	Air	Laboratory No.	No. of containers	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl			Requested Analysis: BTEX 8021	BTEX/TPH	EPA 8260	EPA 8270	ASTM D2216	API RP40	EPA 9100	Capillary Pressure ASTM 4525M			Sample Point Lat/Long and Comments
1	M-8 (17.3-17.5')		X					1	1										X	X	X	X			Call Wayne @ 262-827-1055
2	T-6 (14.8-15.5')		X					1	1										X	X	X	X			to confirm receipt of samples
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									

	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Name: Scott Rademaker						
Sampler's Company: Delta	Delta	10-11-02	8:15	UPS		
Shipment Date: 10-14-02				PTS	10-15-02	1130
Shipment Method: UPS						
Shipment Tracking No:						

Special Instructions:

Custody Seals In Place Yes____ No____ Temperature Blank Yes____ No____ Cooler Temperature on Receipt ____°F/C Trip Blank Yes____ No____

LABORATORY

PTS Laboratories

Delta Environmental Consultants, Inc.
PTS File No: 32457

PHYSICAL PROPERTIES DATA - AIR/WATER CAPILLARY PRESSURE

(METHODOLOGY: ASTM D2216 / API RP40, EPA 9100)

PROJECT NAME: Superior Barge Dock
PROJECT NO: AM60-06N-6

			API RP 40 /									
		METHODS:	**ASTM D2216**	**API RP 40**		**API RP 40**		**API RP 40**		**API RP 40**	**EPA 9100 / API RP 40**	
										25.0 PSI CONFINING STRESS		
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENT. (1)	MOISTURE CONTENT (% wt)	DENSITY BULK (g/cc)	DENSITY GRAIN (g/cc)	POROSITY, %Vb (2) TOTAL	POROSITY, %Vb (2) AIR FILLED	PORE FLUID SATURATIONS, % Pv (3) WATER	PORE FLUID SATURATIONS, % Pv (3) NAPL	SPECIFIC PERMEABILITY TO AIR (millidarcy)	SPECIFIC PERMEABILITY TO WATER (millidarcy)	SATURATED HYDRAULIC CONDUCTIVITY (cm/s)
M-8	17.3-17.9	V	21.5	1.59	2.66	40.3	2.8	37.3	55.6	1937	977	9.68E-04
T-6	14.8-15.5	V	15.4	1.64	2.64	37.8	11.8	67.6	1.1	2850	1297	1.29E-03
Manifold #6	20.9-21.7	V	21.9	1.55	2.67	41.8	5.7	45.0	41.2	2059	606	5.92E-04
RR Loading Rack #4	11.2-12.0	V	25.2	1.54	2.78	44.6	5.3	88.1	ND<0.1	1986	641	6.32E-04

(1) Sample Orientation: H = horizontal; V = vertical (2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids (3) Water = 0.9989 g/cc, NAPL = 0.8600 g/cc; Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

CAPILLARY PRESSURE DATA

(ASTM D425M, Centrifugal Method: air displacing water)

PROJECT NAME: Superior Barge Dock
PROJECT NO: AM60-06N-6

Capillary Pressure		Height Above Water Table,	Sample ID			
			M-8		**T-6**	
psi	cm water	ft	Saturation,% Pore Volume	Moisture, % dry weight	Saturation,% Pore Volume	Moisture, % dry weight
0.000	0.00	0.000	100.0	24.2	100.0	22.5
0.094	6.63	0.218	94.5	22.8	97.9	22.1
0.212	14.9	0.491	94.5	22.8	97.8	22.0
0.377	26.5	0.873	94.5	22.8	97.4	21.9
0.589	41.4	1.36	94.1	22.7	96.2	21.7
0.848	59.6	1.96	92.0	22.1	92.9	20.9
1.15	81.2	2.67	90.9	21.9	90.3	20.4
1.51	106	3.49	88.9	21.4	87.9	19.8
2.36	166	5.45	85.5	20.5	83.9	18.9
3.39	239	7.85	74.6	17.7	72.0	16.2
4.62	325	10.7	57.9	13.5	57.2	12.9
6.03	424	14.0	19.8	3.8	51.5	11.6
7.64	537	17.7	16.1	2.9	46.2	10.4
9.43	663	21.8	14.0	2.3	25.8	5.8
21.21	1491	49.1	10.5	1.4	12.1	2.7

CAPILLARY PRESSURE DATA

(ASTM D425M, Centrifugal Method: air displacing water)

PROJECT NAME: Superior Barge Dock
PROJECT NO: AM60-06N-6

Capillary Pressure		Height Above Water Table,	Sample ID			
			Manifold #6		**RR Loading Rack #4**	
psi	cm water	ft	Saturation,% Pore Volume	Moisture, % dry weight	Saturation,% Pore Volume	Moisture, % dry weight
0.000	0.00	0.000	100.0	27.1	100.0	27.9
0.094	6.63	0.218	99.3	26.9	100.0	27.9
0.212	14.9	0.491	98.8	26.8	100.0	27.9
0.377	26.5	0.873	98.7	26.7	100.0	27.9
0.589	41.4	1.36	97.4	26.4	99.1	27.7
0.848	59.6	1.96	88.3	23.9	97.9	27.3
1.15	81.2	2.67	76.1	20.6	96.8	27.0
1.51	106	3.49	70.8	19.2	94.7	26.4
2.36	166	5.45	61.8	16.7	88.8	24.7
3.39	239	7.85	56.3	15.2	83.0	23.0
4.62	325	10.7	53.7	14.5	79.3	21.9
6.03	424	14.0	50.0	13.5	76.7	21.2
7.64	537	17.7	48.4	13.1	75.5	20.8
9.43	663	21.8	47.0	12.7	73.5	20.3
21.21	1491	49.1	43.2	11.7	69.7	19.2

PTS Laboratories, Inc.

Delta Environmental Consultants, Inc.

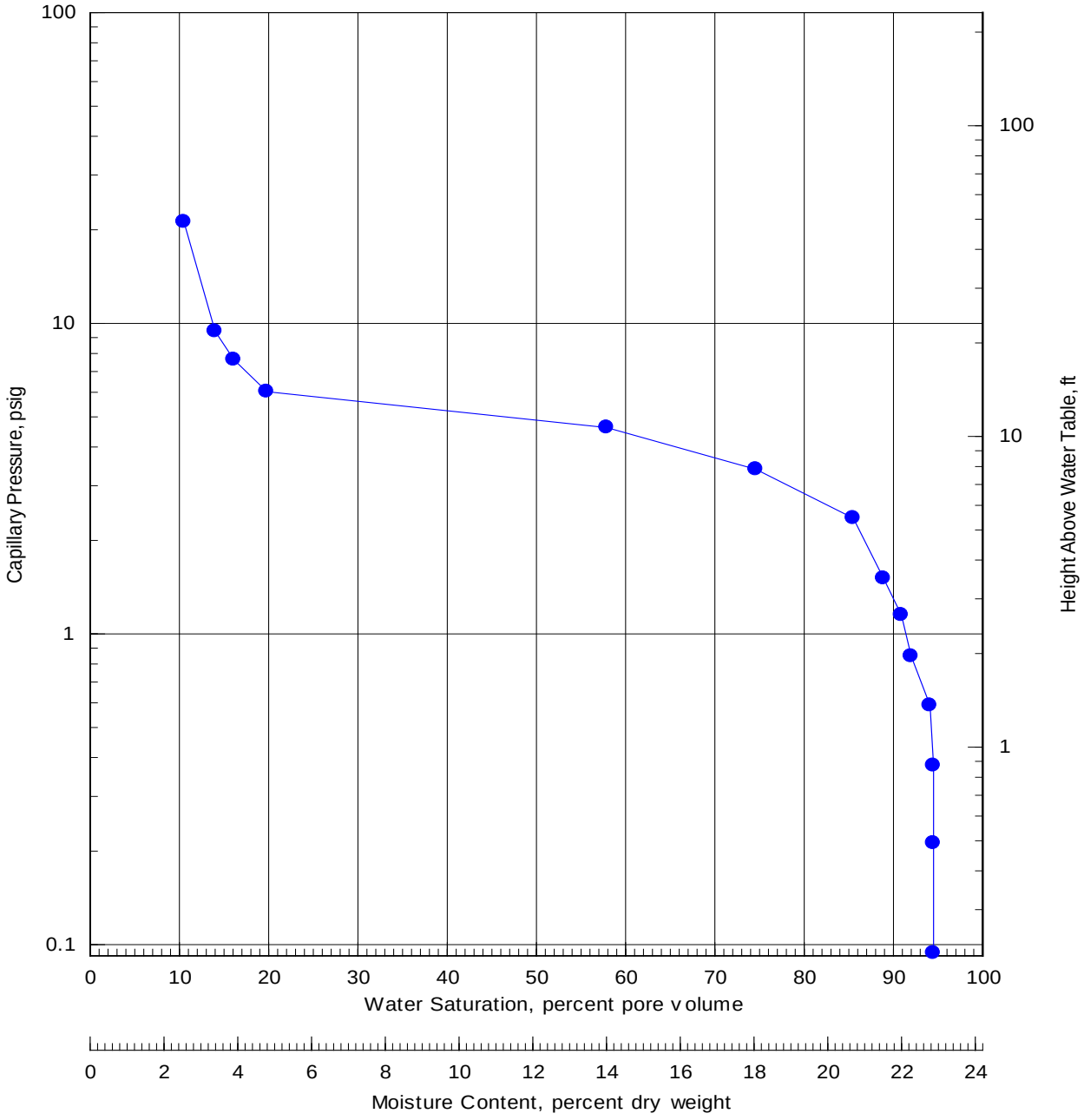
File No.: 32457

CAPILLARY PRESSURE
Centrifugal Method

Air Displacing Water System - ASTM D425M

Project Name: Superior Barge Dock
Project Number: AM60-06N-6

Sample ID: M-8



PTS Laboratories, Inc.

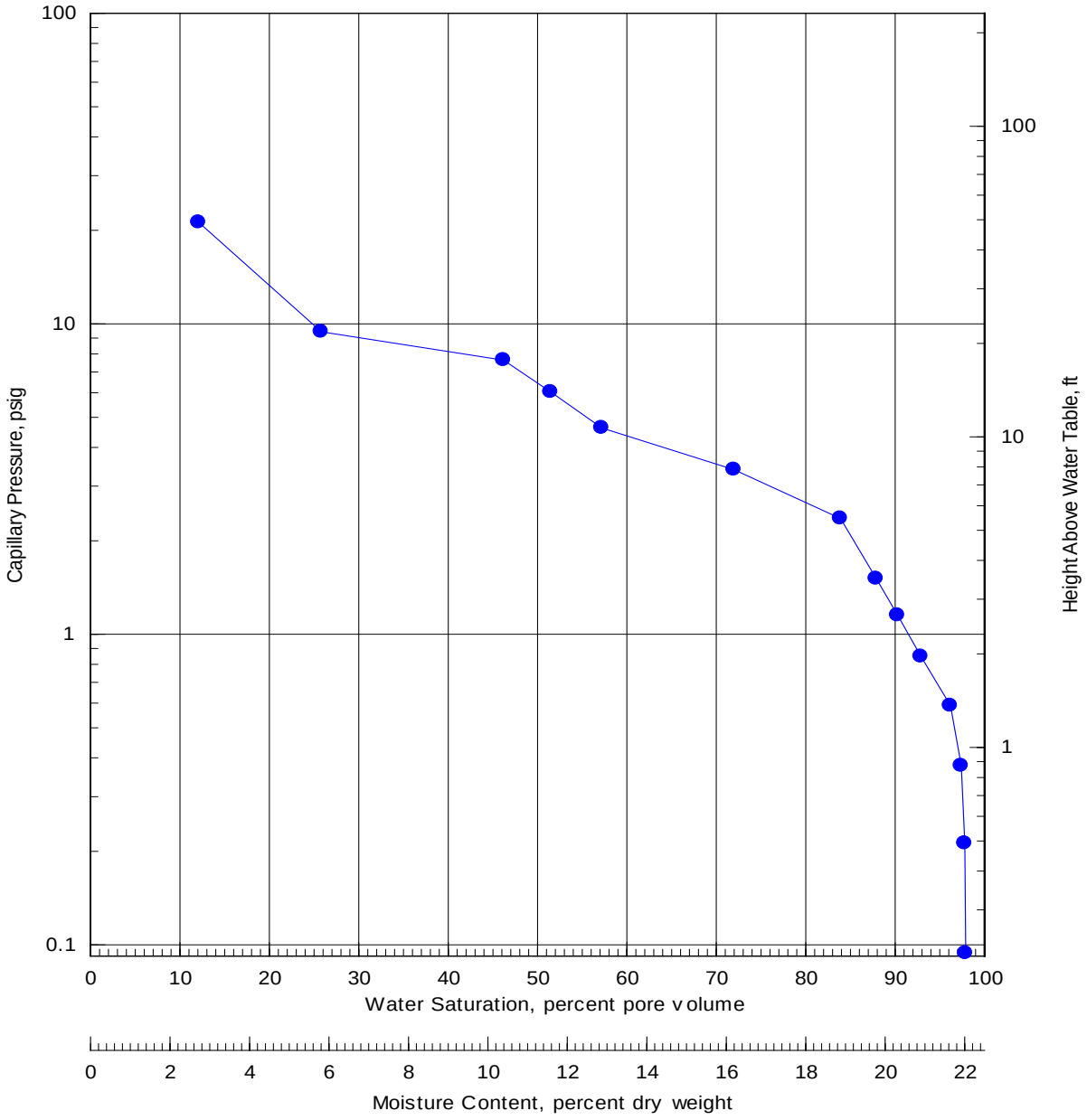
Delta Environmental Consultants, Inc.

File No.: 32457

CAPILLARY PRESSURE
Centrifugal Method
Air Displacing Water System - ASTM D425M

Project Name: Superior Barge Dock
Project Number: AM60-06N-6

Sample ID: T-6



PTS Laboratories, Inc.

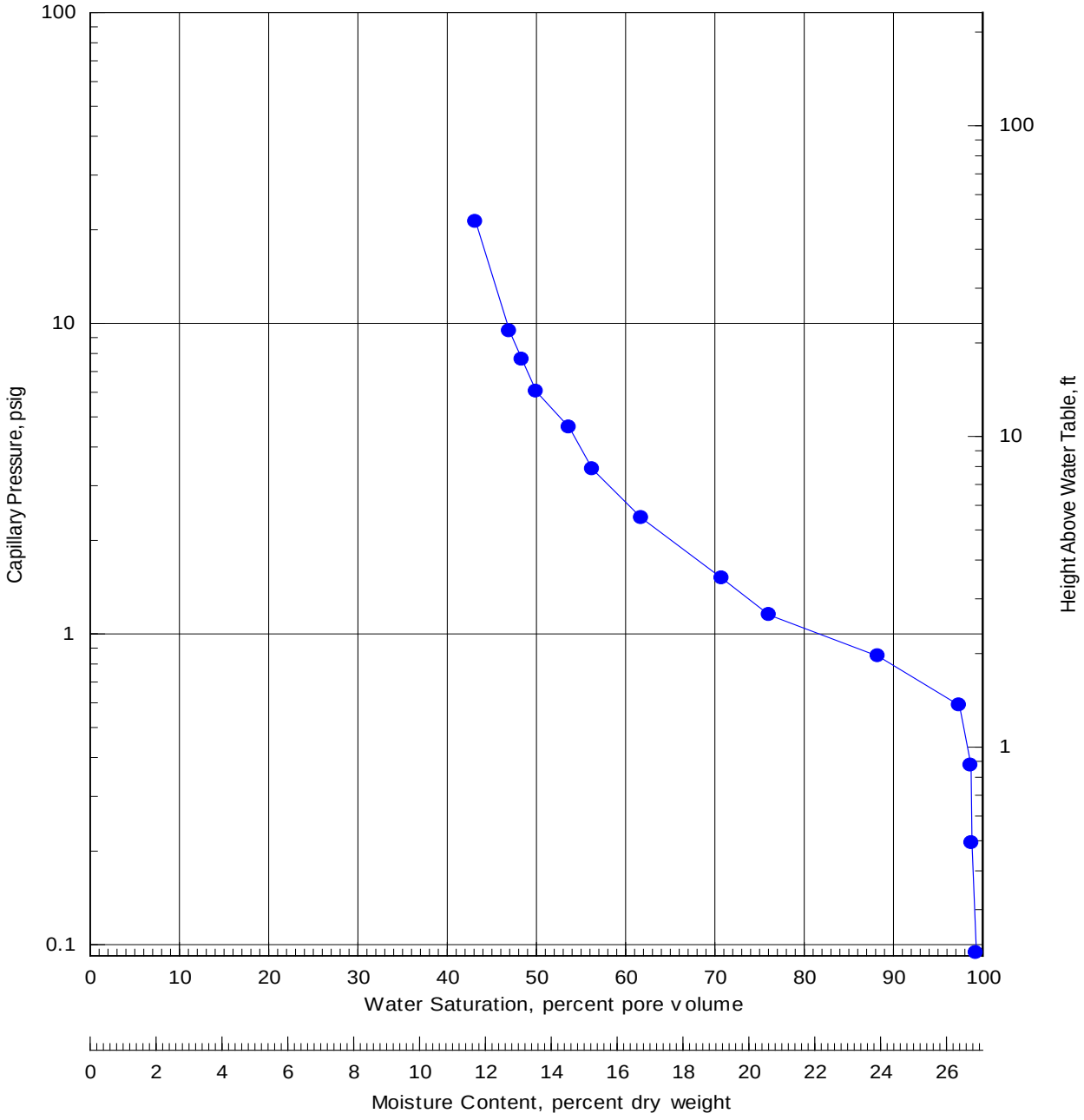
Delta Environmental Consultants, Inc.

File No.: 32457

CAPILLARY PRESSURE
Centrifugal Method
Air Displacing Water System - ASTM D425M

Project Name: Superior Barge Dock
Project Number: AM60-06N-6

Sample ID: Manifold #6



PTS Laboratories, Inc.

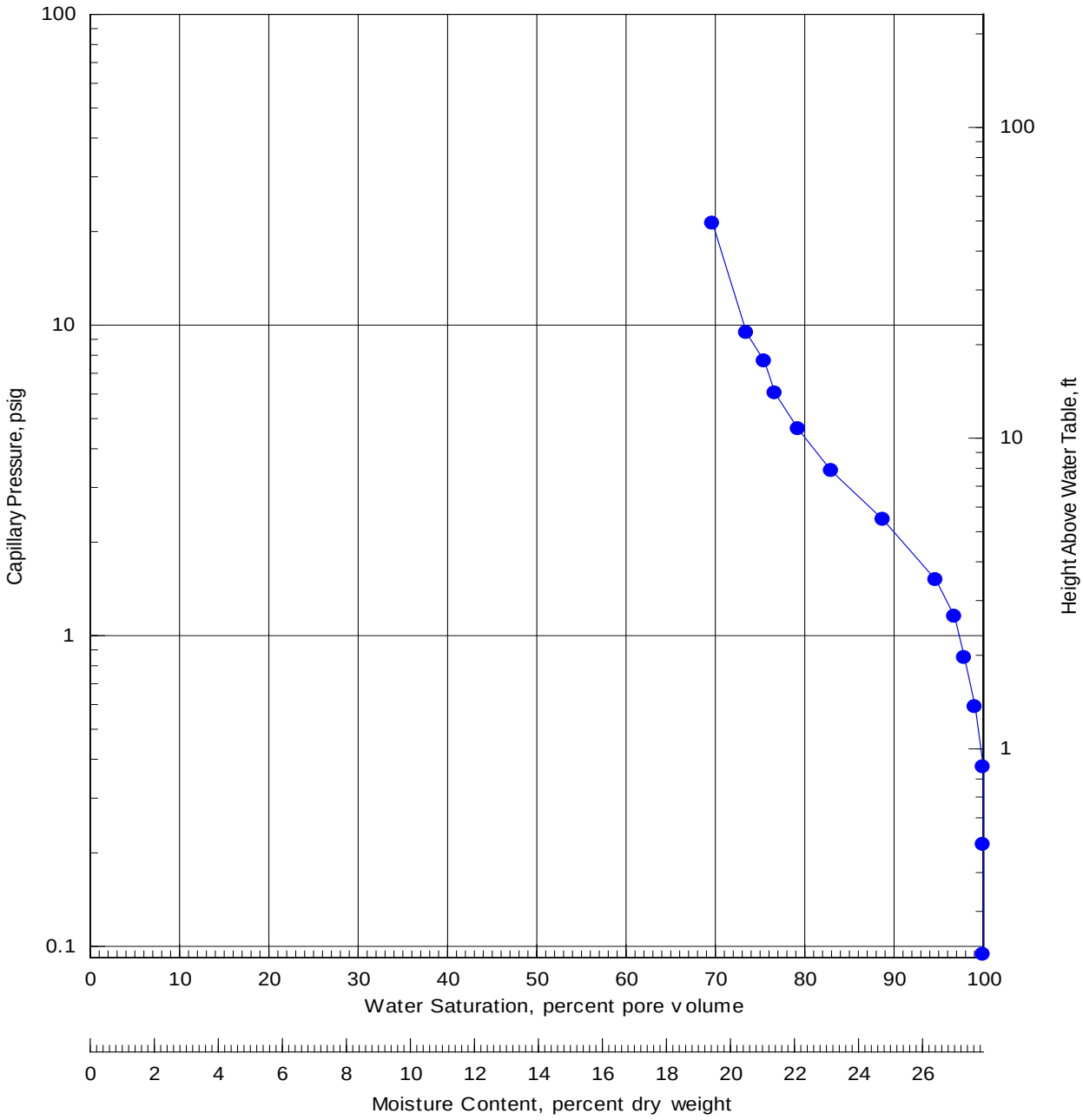
Delta Environmental Consultants, Inc.

File No.: 32457

CAPILLARY PRESSURE
Centrifugal Method
Air Displacing Water System - ASTM D425M

Project Name: Superior Barge Dock
Project Number: AM60-06N-6

Sample ID: RR Loading Rack #4



32457

Page ____ of ____

Chain of Custody Record

Project Name Superior Barge Deck

BP BU/GEM CO Portfolio:

BP Laboratory Contract Number:

Date: 10-8-02 **Requested Due Date (mm/dd/yy)** 10-22-02

On-site Time:	7:30 Am	Temp:	32° F
Off- site Time:	6:30 Pm	Temp:	45° F
Sky Conditions:	Overcast		
Meteorological Events:	None		
Wind Speed:		Direction:	

Send To:	BP/GEM Facility No.:	Consultant/Contractor: Delta Environmental Cons.
Lab Name: PTS	BP/GEM Facility Address:	Address: 17500 W. Liberty Lane, Suite A
Lab Address: 8100 Secura Way Santa Fe Springs, CA 90670	Site ID No.	New Berlin, WI 53146
	Site Lat/Long:	e-mail EDD:
	California Global ID #:	Consultant/Contractor Project No.: AM60-06N-6
Lab PM:	BP/GEM PM Contact: Rick Carey/Ray Stoelting	Consultant/Contractor Tele/Fax: 262-827-4800
Tele/Fax: (562) 907-3607	Address: PO Box 6412, Chanhassen	Consultant/Contractor PM: Rick Carey
Report Type & QC Level:	Minnesota 55317	Invoice to: (Consultant)/Contractor or BP/GEM (Circle one)
BP/GEM Account No.: AM60-06N-6	Tele/Fax: 952 975 3817	BP/GEM Work Release No:

Lab Bottle Order No:

Item No.	Sample Description	Time	Matrix: Soil/Solid	Matrix: Water/Liquid	Matrix: Sediments	Matrix: Air	Laboratory No.	No. of containers	Preservatives: Unpreserved	Preservatives: H_2SO_4	Preservatives: HNO_3	Preservatives: HCl	Preservatives:	Preservatives:	Requested Analysis: BTEX 8021	Requested Analysis: BTEX/TPH	Requested Analysis: EPA 8260	Requested Analysis: EPA 8270	Requested Analysis: Capillary Pressure Saturation	Requested Analysis: Porosity	Requested Analysis: Dry Bulk Density	Requested Analysis: Hydraulic Conductivity	Requested Analysis:	Requested Analysis:	Sample Point Lat/Long and Comments
1	Main Fold #6 (20.9-21.7)	11:00Am	S					1	1										X	X	X	X			Sampled 10-3-02
2	RR Loading Rack #4 (13-13.8)	11:00Am	S					1	1										X	X	X	X			Sampled 10-8-02
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									

Sampler's Name: Scott Reinemaker	**Relinquished By / Affiliation**	**Date**	**Time**	**Accepted By / Affiliation**	**Date**	**Time**
Sampler's Company: Delta Environmental Cons.	[signature] /Delta	10-8-02	5:30	UPS		
Shipment Date: 10-8-02				PTS LABS TA Gilson	010602	10:00
Shipment Method: UPS Overnight						
Shipment Tracking No:						

Special Instructions:

Custody Seals In Place Yes____ No____ Temperature Blank Yes____ No____ Cooler Temperature on Receipt -30 °F/C Trip Blank Yes____ No____

LABORATORY

32457

Page ____ of ____

Chain of Custody Record

Project Name Superior Barge Dock

BP BU/GEM CO Portfolio:

BP Laboratory Contract Number:

Date: 10-14-02 **Requested Due Date (mm/dd/yy)**

On-site Time:	Temp:
Off- site Time:	Temp:
Sky Conditions:	
Meteorological Events:	
Wind Speed:	Direction:

Send To:	BP/GEM Facility No.:	Consultant/Contractor: Delta Environmental Consultants
Lab Name:	BP/GEM Facility Address:	Address: 17500 W. Liberty Ln Suite A
Lab Address: PTS	Site ID No.	
8100 Secura Way	Site Lat/Long:	e-mail EDD:
Santa Fe Springs, CA 90670	California Global ID #:	Consultant/Contractor Project No.: AMOC-06N-6
Lab PM:	BP/GEM PM Contact: Ray Stoelting	Consultant/Contractor Tele/Fax: 262-827-1055
Tele/Fax:	Address:	Consultant/Contractor PM: Wayne Hutchinson
Report Type & QC Level:		Invoice to: Consultant/Contractor or BP/GEM (Circle one)
BP/GEM Account No.:	Tele/Fax:	BP/GEM Work Release No:

Lab Bottle Order No:

Item No.	Sample Description	Time	Matrix: Soil/Solid	Water/Liquid	Sediments	Air	Laboratory No.	No. of containers	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl			Requested Analysis: BTEX 8021	BTEX/TPH	EPA 8260	EPA 8270	ASTM D2216	API RP40	EPA 9100	Capillary Pressure ASTM 4525M			Sample Point Lat/Long and Comments
1	M-8 (17.3-17.5')		X					1	1										X	X	X	X			Call Wayne @ 262-827-1055
2	T-6 (14.8-15.5')		X					1	1										X	X	X	X			to confirm receipt of samples
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									

	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Name: Scott Rademaker						
Sampler's Company: Delta	Delta	10-11-02	8:15	UPS		
Shipment Date: 10-14-02				PTS	10-15-02	1130
Shipment Method: UPS						
Shipment Tracking No:						

Special Instructions:

Custody Seals In Place Yes____ No____ Temperature Blank Yes____ No____ Cooler Temperature on Receipt ____°F/C Trip Blank Yes____ No____

LABORATORY

PTS Laboratories, Inc.

8100 Secura Way • Santa Fe Springs, CA 90670
Telephone (562) 347-2500 • Fax (562) 907-3610

August 11, 2011

Clarence Bieze
Antea Group
5910 Rice Creek Parkway, Suite 100
St. Paul, MN 55126

Re: PTS File No: 41430
Physical Properties Data
Former Amoco Terminal

Dear Mr. Bieze:

Please find enclosed report for Physical Properties analyses conducted upon samples received from your Former Amoco Terminal project. All analyses were performed by applicable ASTM, EPA, or API methodologies. An electronic version of the report has previously been sent to your attention via the internet. The samples are currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please give Rachel Spitz a call at (562) 347-2504.

Sincerely,
PTS Laboratories

for Rachel Spitz

Michael Mark Brady, P.G.
District Manager

Encl.

PTS Laboratories

Project Name: Former Amoco Terminal
Project Number: N/A

PTS File No: 41430
Client: Antea Group

TEST PROGRAM - 20110714

CORE ID	Depth ft.	Core Recovery ft.	Pore Fluid Saturation Package	A/W Drng. Capillarity Pkg.				Notes
		Plugs:	Vert. 1.5"	Vert. 1"				
Date Received: 20110712								
EW-09	18-20	2.00		19				
EW-11	18-20	2.00		19				
EW-06	21-23	2.00		22				
TOTALS:	3 cores	6.00	0	3	0	0	0	3

Laboratory Test Program Notes

Standard TAT for mobility analysis is 3-6 weeks.

Pore Fluid Saturation Package: API RP40 Dean-Stark Method: Includes initial pore fluid saturations, total porosity, air-filled porosity, grain density, dry bulk density and moisture content.

Air/Water Drainage Capillarity Package: Air/Water Drainage Capillary Pressure Curve (air displacing water) with Air Permeability and Hydraulic Conductivity: includes fluid production vs. capillary pressure, total and air-filled porosity, grain density, dry bulk density, moisture content and initial pore fluid saturations (NAPL and water).

PTS Laboratories

Project Name: Former Amoco Terminal
Project Number: N/A

PTS File No: 41430
Client: Antea Group

TEST PROGRAM - 20110714

CORE ID	Depth ft.	Core Recovery ft.	Pore Fluid Saturation Package	A/W Drng. Capillarity Pkg.				Notes
		Plugs:	Vert. 1.5"	Vert. 1"				
Date Received: 20110712								
EW-09	18-20	2.00		19				
EW-11	18-20	2.00		19				
EW-06	21-23	2.00		22				
TOTALS:	3 cores	6.00	0	3	0	0	0	3

Laboratory Test Program Notes

Standard TAT for mobility analysis is 3-6 weeks.

Pore Fluid Saturation Package: API RP40 Dean-Stark Method: Includes initial pore fluid saturations, total porosity, air-filled porosity, grain density, dry bulk density and moisture content.

Air/Water Drainage Capillarity Package: Air/Water Drainage Capillary Pressure Curve (air displacing water) with Air Permeability and Hydraulic Conductivity: includes fluid production vs. capillary pressure, total and air-filled porosity, grain density, dry bulk density, moisture content and initial pore fluid saturations (NAPL and water).

Sample Disposal	Pore Fluid Saturation	Extract A/W Pc
		60
2	145	575
$0	$0	$1,905

$1,905.00

Test Program Acknowledgement

Electronic Signature: Wayne R. Hutchinson

Date: 7/15/2011

PTS File No: 41430
Client: Antea Group

SAMPLE PROPERTIES - AIR/WATER CAPILLARY PRESSURE

PROJECT NAME: Former Amoco Terminal
PROJECT NO: N/A

		METHODS:	API RP 40 / ASTM D2216	API RP 40		API RP 40		API RP 40	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	MOISTURE CONTENT, % weight	DENSITY		POROSITY, %Vb (2)		PORE FLUID SATURATIONS, % Pv (3)	
				DRY BULK, g/cc	GRAIN, g/cc	TOTAL	AIR FILLED	WATER	NAPL
EW-09	19	V	17.8	1.61	2.80	42.6	13.7	60.9	7.0
EW-11	19	V	20.1	1.60	2.83	43.3	10.9	69.3	5.7
EW-06	22	V	21.0	1.50	2.67	43.7	11.3	60.4	13.6

(1) Sample Orientation: H = horizontal; V = vertical
(2) Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids
(3) Water = 0.9996 g/cc
Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS File No: 41430
Client: Antea Group

PERMEABILITY DATA - AIR/WATER CAPILLARY PRESSURE

PROJECT NAME: Former Amoco Terminal
PROJECT NO: N/A

		METHODS:	API RP 40; EPA 9100		
			25 PSI CONFINING STRESS		
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	SPECIFIC PERMEABILITY TO AIR, millidarcy (2)	EFFECTIVE PERMEABILITY TO WATER, millidarcy (3)	HYDRAULIC CONDUCTIVITY, cm/s (3)
EW-09	19	V	4390	3780	3.71E-03
EW-11	19	V	1020	4.06	4.01E-06
EW-06	22	V	12400	8050	7.97E-03

(1) Sample Orientation: H = horizontal; V = vertical
(2) No pore fluids in place
(3) Permeability to water and hydraulic conductivity measured at saturated conditions

PTS File No: 41430
Client: Antea Group

AIR/WATER CAPILLARY PRESSURE TABULAR DATA

(ASTM D6836; Centrifugal Method: air displacing water)

PROJECT NAME: Former Amoco Terminal
PROJECT NO: N/A

Capillary Pressure		Height Above Water Table,	Sample ID	
			EW-09 at 19 ft.	
psi	cm water	ft	Saturation, % pore volume	Moisture, % dry weight
0.000	0.00	0.000	100.0	20.4
0.078	5.49	0.181	100.0	20.4
0.176	12.3	0.406	100.0	20.4
0.312	21.9	0.722	99.5	20.3
0.488	34.3	1.13	98.8	20.1
0.702	49.4	1.63	98.2	20.0
0.956	67.2	2.21	96.4	19.6
1.25	87.8	2.89	87.2	17.8
1.95	137	4.52	64.8	13.2
3.30	232	7.63	41.6	8.5
4.99	351	11.6	32.3	6.6
7.80	549	18.1	22.0	4.5
17.6	1235	40.6	12.6	2.6
31.2	2195	72.2	9.6	2.0

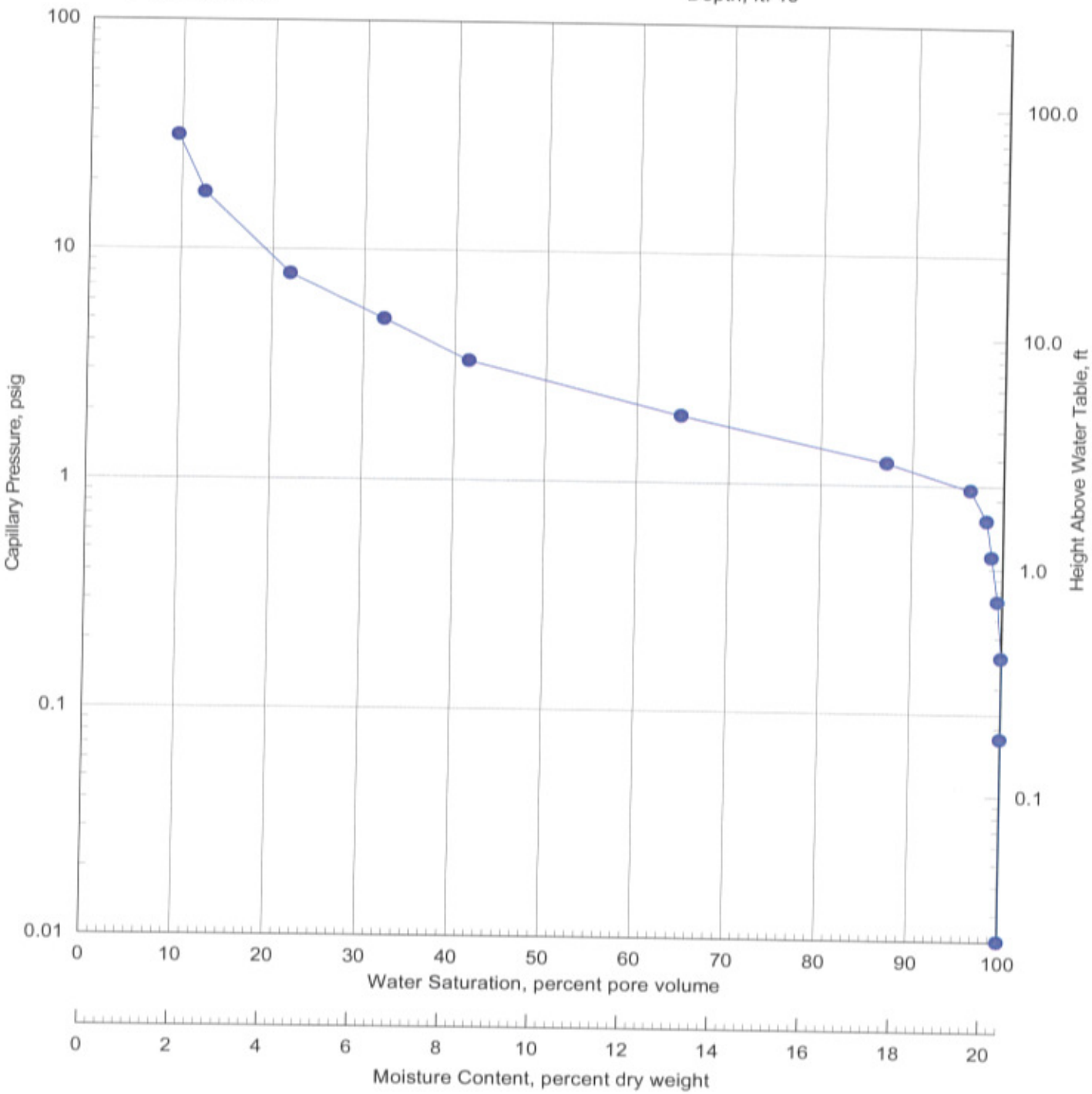
PTS Laboratories

Antea Group
PTS File No.: 41430

CAPILLARY PRESSURE
Centrifugal Method
Air Displacing Water System - ASTM D6836

Project Name: Former Amoco Terminal
Project No: N/A

Sample ID: EW-09
Depth, ft: 19



PTS File No: 41430
Client: Antea Group

AIR/WATER CAPILLARY PRESSURE TABULAR DATA

(ASTM D6836; Centrifugal Method: air displacing water)

PROJECT NAME: Former Amoco Terminal
PROJECT NO: N/A

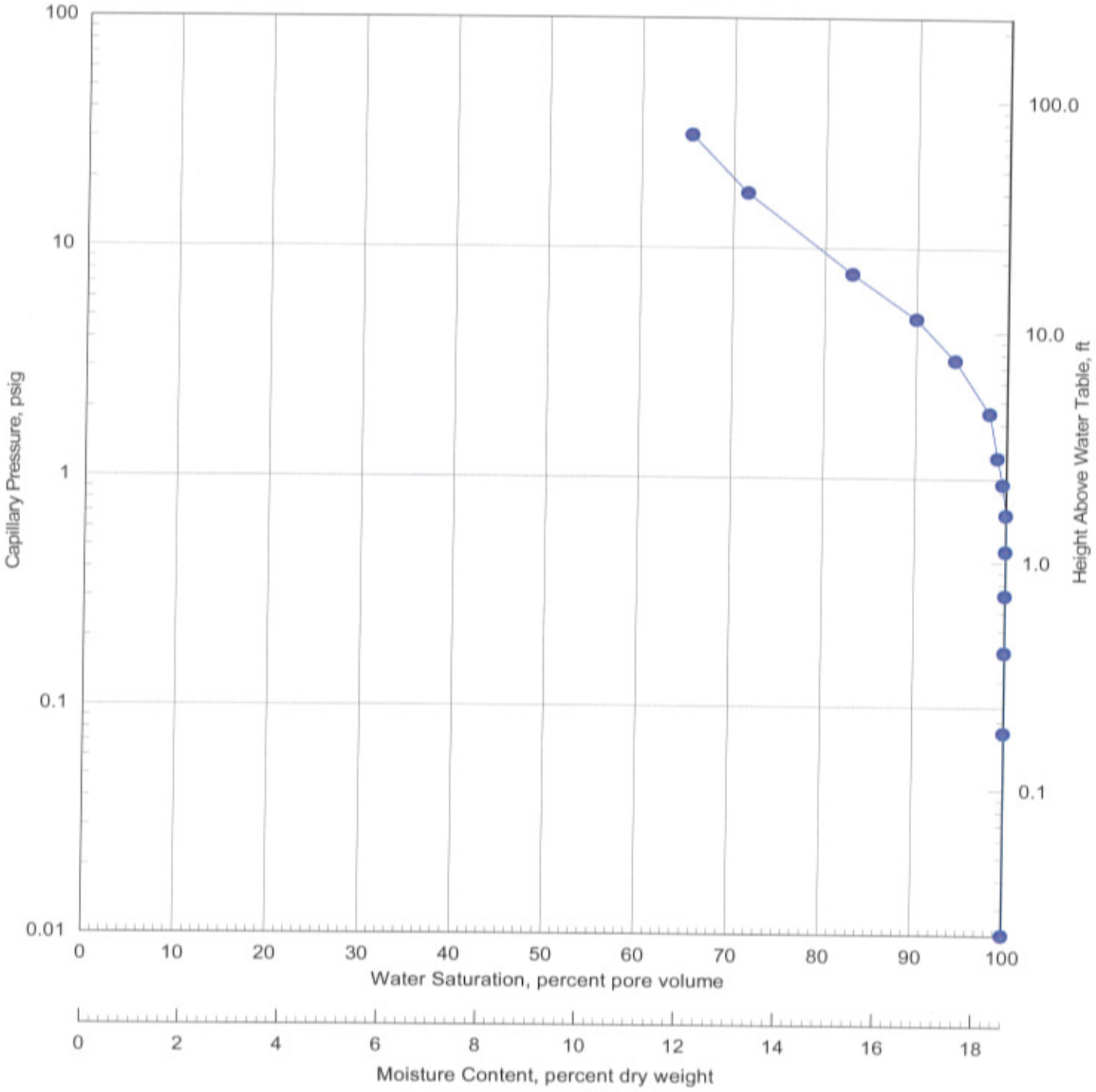
Capillary Pressure		Height Above Water Table,	Sample ID	
			EW-11 at 19 ft.	
psi	cm water	ft	Saturation, % pore volume	Moisture, % dry weight
0.000	0.00	0.000	100.0	18.6
0.077	5.41	0.178	100.0	18.6
0.173	12.2	0.401	100.0	18.6
0.308	21.7	0.713	100.0	18.6
0.481	33.8	1.11	100.0	18.6
0.693	48.7	1.60	100.0	18.6
0.943	66.3	2.18	99.6	18.6
1.23	86.6	2.85	99.0	18.5
1.92	135	4.45	98.1	18.3
3.25	229	7.53	94.3	17.6
4.93	346	11.4	90.0	16.8
7.70	541	17.8	83.0	15.5
17.3	1218	40.1	71.6	13.4
30.8	2165	71.3	65.5	12.2

Antea Group
PTS File No.: 41430

CAPILLARY PRESSURE
Centrifugal Method
Air Displacing Water System - ASTM D6836

Project Name: Former Amoco Terminal
Project No: N/A

Sample ID: EW-11
Depth, ft: 19



PTS File No: 41430
Client: Antea Group

AIR/WATER CAPILLARY PRESSURE TABULAR DATA

(ASTM D6836; Centrifugal Method: air displacing water)

PROJECT NAME: Former Amoco Terminal
PROJECT NO: N/A

Capillary Pressure		Height Above Water Table,	Sample ID	
			EW-06 at 22 ft.	
psi	cm water	ft	Saturation, % pore volume	Moisture, % dry weight
0.000	0.00	0.000	100.0	21.2
0.078	5.49	0.181	100.0	21.2
0.176	12.3	0.406	100.0	21.2
0.312	21.9	0.722	100.0	21.2
0.488	34.3	1.13	96.4	20.4
0.702	49.4	1.63	67.9	14.4
0.956	67.2	2.21	57.2	12.1
1.25	87.8	2.89	46.2	9.8
1.95	137	4.52	34.0	7.2
3.30	232	7.63	25.1	5.4
4.99	351	11.6	19.8	4.2
7.80	549	18.1	15.0	3.2
17.6	1235	40.6	10.9	2.3
31.2	2195	72.2	8.9	1.9

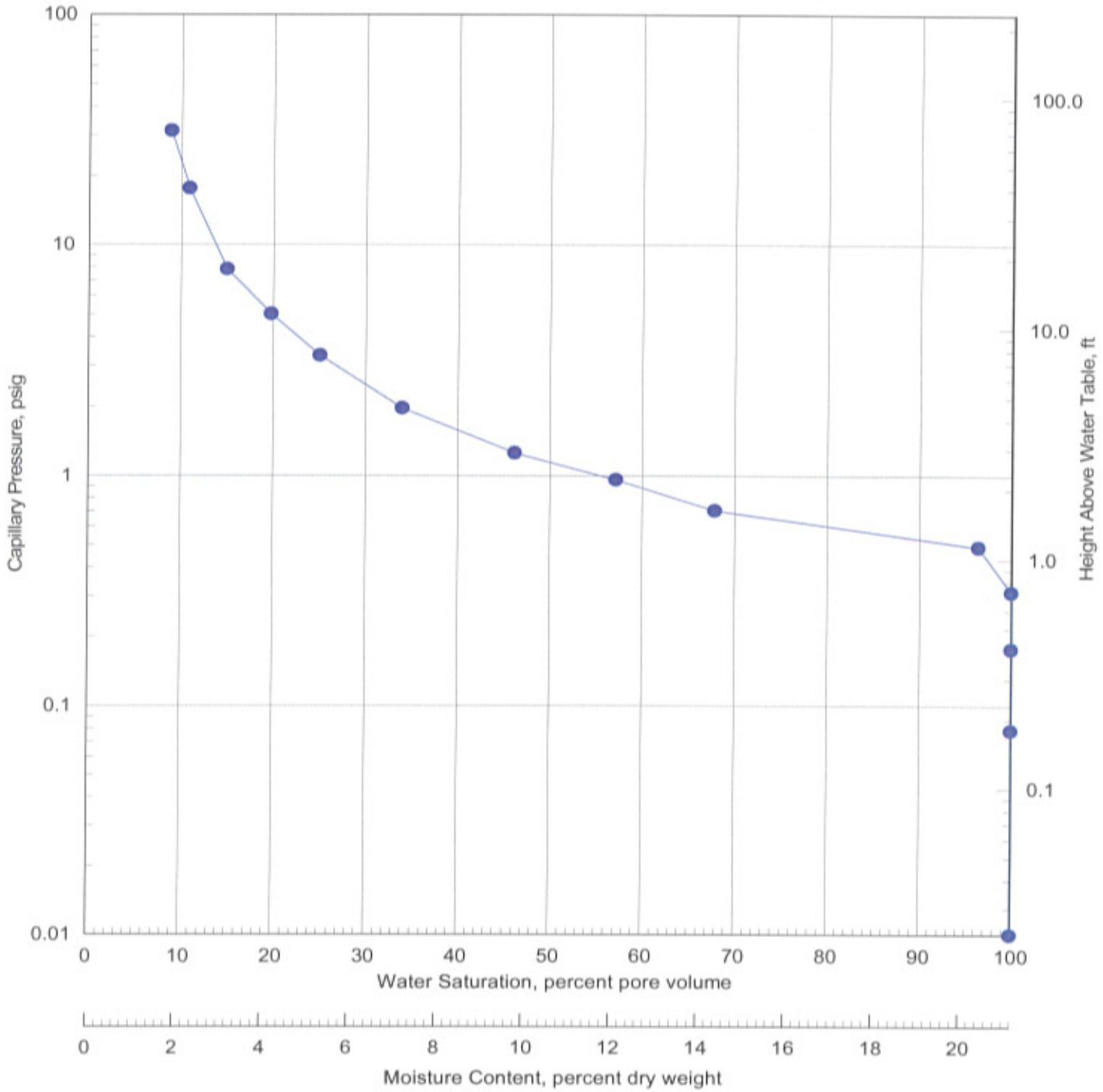
PTS Laboratories

Antea Group
PTS File No.: 41430

CAPILLARY PRESSURE
Centrifugal Method
Air Displacing Water System - ASTM D6836

Project Name: Former Amoco Terminal
Project No: N/A

Sample ID: EW-06
Depth, ft: 22



PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

COMPANY: Antea Group

ADDRESS: 5910 Rice Creek Pkwy, CITY: Shoreview, MN ZIP CODE: 55126

PROJECT MANAGER: Clarence Bieze 651-697-5109

PROJECT NAME: Former Amoco Terminal PHONE NUMBER

PROJECT NUMBER FAX NUMBER

SITE LOCATION: Superior, WI

SAMPLER SIGNATURE: [signature]

PO#

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☐
72 HOURS ☐
OTHER:

SAMPLE INTEGRITY (CHECK):
INTACT ____ ON ICE ✓

PTS QUOTE NO.

PTS FILE: 41430

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE	TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE	FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	GRAIN SIZE DISTRIBUTION, ASTM D422/464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	COMMENTS
EW-09	7/8/11	9:05	18'-20'	1																		
EW-11	7/11/11	10:10	18'-20'	1																		
EW-06	7/11/11	16:25	21'-23'	1																		

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
[signature]	[signature]		
COMPANY: Antea Group	COMPANY: PTS Labs Inc	COMPANY	COMPANY
DATE: 7/11/2011 TIME: 17:30	DATE: 7/12/11 TIME: 1358	DATE TIME	DATE TIME