



engineering and constructing a better tomorrow

Well: OW-945
Test Date: 11/13/2006
Test Type: Recovery (slug out)
Test Name: OW-945-out

Conducted by: Grimes and Charles-Smith
Entered/date: 12/11/06
Checked/date: JCP by gmm with permission 12/12/06

WELL DATA

Table with well data: SWL = 12.37 (ft BTOC), WD = 56.50 (ft BTOC), WD = 54.50 (ft BGS), DTSP = 37.33 (ft BGS), rc = 0.08 (ft), n = 0.30, rw = 0.35 (ft), rc (adjusted) = 0.08 (ft), Le = 10 (ft), Lw = 41.13 (ft), Le/rw = 28.57, H = 49.13 (ft)

CALCULATION OF K

Equations for K calculation: K = [(rc^2 ln(Re/rw))/2Le]\*(1/t)ln(yo/yt), yo = 2.52 (ft) from plot, yt = 0.74 (ft) from plot, t = 0.42 (minutes) from plot, ln(Re/rw) = 2.86, K = 3.8E+00 (ft/day), K = 1.4E-03 (cm/sec)

TEST DATA

Large table with columns: Elapsed time (min), Log y, y (ft), WL (ft BTOC). Contains test data points from 0 to 4.846 minutes.

H is depth from SWL to top of bedrock as listed on boring logs

Calculation of ln(Re/rw)

Where: Lw < H; ln(Re/rw) = [(1.1/(ln(Lw/rw)))+(A+Bln((H-Lw)/rw))/(Le/rw)]^-1 = 2.86
Where: Lw = H; ln(Re/rw) = [(1.1/(ln(Lw/rw)))+(C/(Le/rw))]^-1 = 3.33

Test initialization

Calculation of Coefficients

Table with value range for Le/rw from Table of Coefficients and interpolated values of A, B and C for Le/rw.

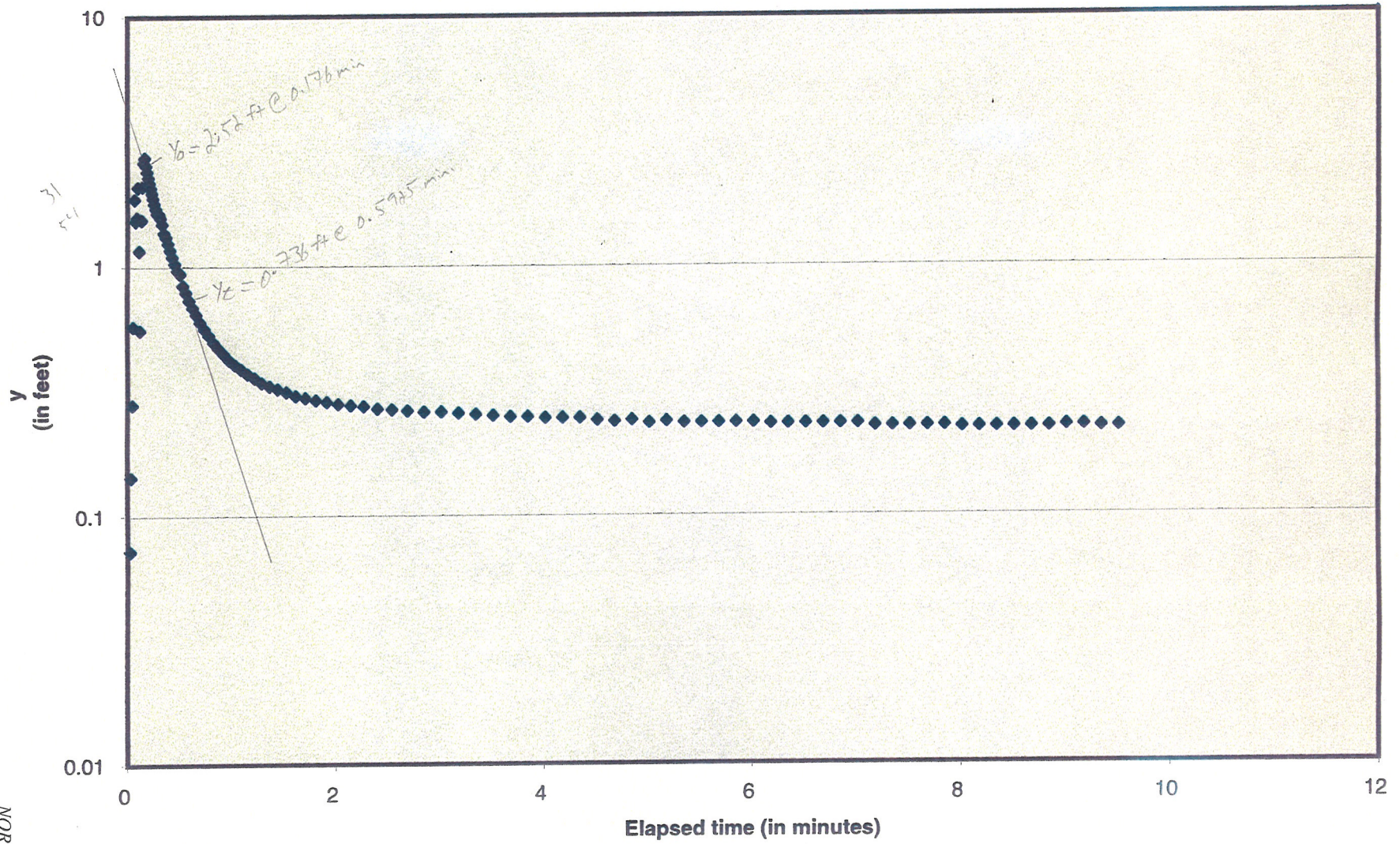
Test completion

Coefficients Table

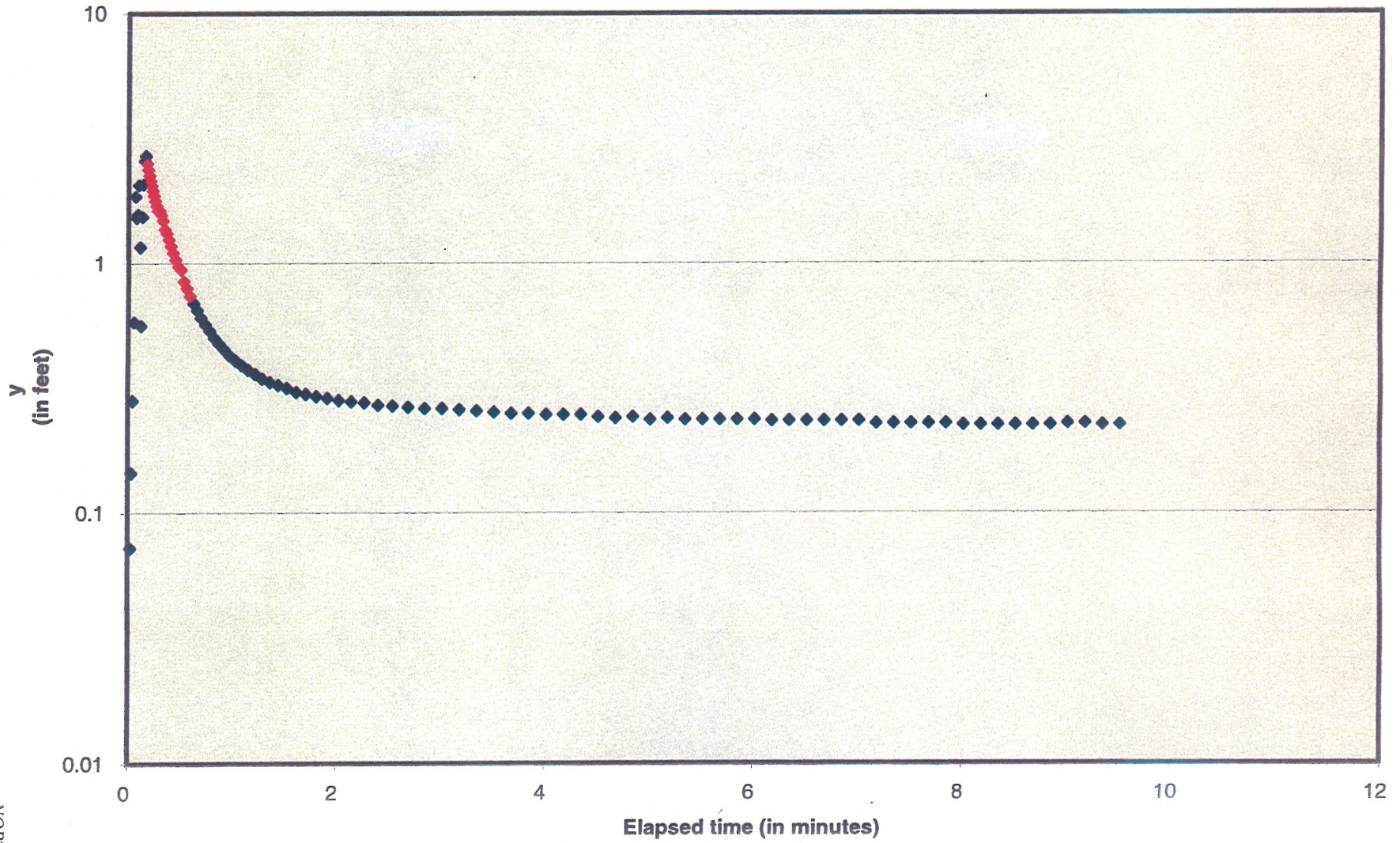
Large table with columns: Le/rw, A, B, C. Contains coefficients for various Le/rw values from 4 to 1500.

90% recovery

# OW-945 (slug-out) Recovery vs. Time



### OW-945 (slug-out) Recovery vs. Time





MACTEC Engineering and Consulting  
 3301 Atlantic Avenue  
 Raleigh, North Carolina

Slug Test Data Sheet

MACTEC Job Name: North Anna COL MACTEC Job Number: 6468-06-1472  
 Date: 11-13-06 Time: 1328 Observation Well No.: OW945out  
 Weather Conditions: Cloudy Approx 52°F  
 Method of Slug: water, mechanical, or Test Method: Rising Head or  
 Withdrawal (circle one): pressure Falling Head  
 (circle)  
 Diameter of Screen: 2 in. Diameter of Casing: 2 in.  
 Total Well 34.5 ft below reference point Reference Point: Permanent mark on top  
 Depth: of casing  
 Length of 10 ft Depth interval of screened 41.5-51.5 ft  
 Screened Section: portion:  
 Depth to Groundwater: 12.37 ft below reference point

Groundwater Measurements Collected Prior to Slug Test		Comments/Remarks
Depth to Groundwater	Date	
		Used Transducer SN D00513
12.43	11-9-06	Hermit 3000
12.37 12.40	11-13-06	Set Transducer 30' below
12.37	11-13-06	TOC
		Transducer read 17.632
		vs. 17.63
		Final data = 0.224 = 91% (Hermit)
		90% = 0.271 recovery
		NOTE: Transducer slightly
		raised due to tangling
		during removal of slug.

OW945 IN =  
 Re-g 11-13-06

In-Situ Inc. Hermit 3000

Report generated: 12/11/06 17:39:14  
Report from file: P:\6468\2006 Projects\1472 North Anna COL\Slug Test Data\Raw data logger fil  
DataMgr Version 3.71

Serial number: 00045369  
Software Version 7.08  
Unit name: HERMIT 3000

Test name: OW945out PAGE 1 OF 3

Test defined on: 11/13/06 14:26:20  
Test started on: 11/13/06 14:38:49  
Test stopped on: 11/13/06 14:48:24  
Test extracted on: 11/13/06 18:01:41

Data gathered using Logarithmic testing  
Maximum time between data points: 0.1667 Minutes.  
Number of data samples: 108

TOTAL DATA SAMPLES 108

Channel number [1]

Measurement type: Pressure  
Channel name: D00513  
Linearity: 0.0212000  
Scale: 19.9368000  
Offset: 0.1304000  
Warmup: 50  
Specific gravity: 1.000  
Mode: TOC  
User-defined reference: 0.000 Feet H2O  
Referenced on: test start  
Pressure head at reference: 17.631 Feet H2O

Channel number [0]

Measurement type: Barometric Pressure  
Channel name: Barometric  
Linearity: 0.0000000  
Scale: 0.0000000  
Offset: 0.0000000  
Warmup: 50

Date	Time	ET (min)	Chan[1] Feet H2O	Chan[0] Inches Hg
11/13/06	14:38:49	0.0000	0.000	29.736
11/13/06	14:38:49	0.0110	0.000	29.736
11/13/06	14:38:50	0.0220	0.072	29.734
11/13/06	14:38:50	0.0330	0.144	29.736
11/13/06	14:38:51	0.0440	0.282	29.734
11/13/06	14:38:52	0.0550	0.581	29.734
11/13/06	14:38:52	0.0660	1.858	29.736
11/13/06	14:38:53	0.0770	1.522	29.736
11/13/06	14:38:54	0.0880	1.568	29.738
11/13/06	14:38:54	0.0990	2.071	29.736
11/13/06	14:38:55	0.1100	1.159	29.734
11/13/06	14:38:56	0.1210	0.561	29.738
11/13/06	14:38:56	0.1320	1.536	29.736
11/13/06	14:38:57	0.1430	2.083	29.734
11/13/06	14:38:58	0.1540	2.592	29.736
11/13/06	14:38:58	0.1650	2.710	29.732
11/13/06	14:38:59	0.1760	2.520	29.736
11/13/06	14:39:00	0.1870	2.387	29.734
11/13/06	14:39:00	0.1980	2.258	29.736
11/13/06	14:39:01	0.2090	2.152	29.734
11/13/06	14:39:02	0.2200	2.054	29.734

11/13/06	14:39:02	0.2310	1.959	29.738
11/13/06	14:39:03	0.2427	1.870	29.732
11/13/06	14:39:04	0.2552	1.783	29.734
11/13/06	14:39:05	0.2683	1.703	29.738
11/13/06	14:39:05	0.2823	1.628	29.738
11/13/06	14:39:06	0.2972	1.625	29.736
11/13/06	14:39:07	0.3128	1.565	29.736
11/13/06	14:39:08	0.3295	1.478	29.736
11/13/06	14:39:09	0.3472	1.363	29.738
11/13/06	14:39:10	0.3658	1.315	29.734
11/13/06	14:39:12	0.3857	1.240	29.734
11/13/06	14:39:13	0.4067	1.168	29.734
11/13/06	14:39:14	0.4288	1.096	29.734
11/13/06	14:39:16	0.4523	1.030	29.732
11/13/06	14:39:17	0.4772	0.966	29.734
11/13/06	14:39:19	0.5035	0.938	29.734
11/13/06	14:39:20	0.5315	0.843	29.734
11/13/06	14:39:22	0.5612	0.791	29.736
11/13/06	14:39:24	0.5925	0.736	29.734
11/13/06	14:39:26	0.6257	0.690	29.736
11/13/06	14:39:28	0.6608	0.647	29.734
11/13/06	14:39:30	0.6982	0.604	29.736
11/13/06	14:39:33	0.7377	0.567	29.736
11/13/06	14:39:35	0.7795	0.535	29.734
11/13/06	14:39:38	0.8238	0.501	29.734
11/13/06	14:39:41	0.8708	0.475	29.738
11/13/06	14:39:44	0.9207	0.452	29.736
11/13/06	14:39:47	0.9733	0.426	29.738
11/13/06	14:39:50	1.0292	0.408	29.736
11/13/06	14:39:54	1.0883	0.391	29.736
11/13/06	14:39:58	1.1510	0.374	29.736
11/13/06	14:40:02	1.2173	0.360	29.738
11/13/06	14:40:06	1.2877	0.345	29.736
11/13/06	14:40:10	1.3622	0.334	29.740
11/13/06	14:40:15	1.4412	0.325	29.738
11/13/06	14:40:20	1.5248	0.316	29.736
11/13/06	14:40:25	1.6133	0.305	29.736
11/13/06	14:40:31	1.7072	0.299	29.738
11/13/06	14:40:37	1.8065	0.293	29.736
11/13/06	14:40:43	1.9118	0.288	29.734
11/13/06	14:40:50	2.0233	0.282	29.738
11/13/06	14:40:57	2.1415	0.279	29.736
11/13/06	14:41:05	2.2667	0.276	29.738
11/13/06	14:41:12	2.3992	0.270	29.740
11/13/06	14:41:21	2.5397	0.268	29.738
11/13/06	14:41:30	2.6885	0.265	29.738
11/13/06	14:41:39	2.8460	0.262	29.740
11/13/06	14:41:49	3.0127	0.262	29.742
11/13/06	14:41:59	3.1793	0.259	29.742
11/13/06	14:42:09	3.3460	0.256	29.738
11/13/06	14:42:19	3.5127	0.253	29.736
11/13/06	14:42:29	3.6793	0.250	29.738
11/13/06	14:42:39	3.8460	0.250	29.738
11/13/06	14:42:49	4.0127	0.247	29.740
11/13/06	14:42:59	4.1793	0.247	29.740
11/13/06	14:43:09	4.3460	0.247	29.740
11/13/06	14:43:19	4.5127	0.242	29.738
11/13/06	14:43:29	4.6793	0.239	29.736
11/13/06	14:43:39	4.8460	0.242	29.738
11/13/06	14:43:49	5.0127	0.236	29.736
11/13/06	14:43:59	5.1793	0.239	29.738
11/13/06	14:44:09	5.3460	0.236	29.742
11/13/06	14:44:19	5.5127	0.236	29.736
11/13/06	14:44:29	5.6793	0.236	29.740
11/13/06	14:44:39	5.8460	0.236	29.738
11/13/06	14:44:49	6.0127	0.236	29.736
11/13/06	14:44:59	6.1793	0.233	29.740
11/13/06	14:45:09	6.3460	0.233	29.738
11/13/06	14:45:19	6.5127	0.233	29.736
11/13/06	14:45:29	6.6793	0.233	29.738

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11/13/06	14:45:39	6.8460	0.233	29.734
11/13/06	14:45:49	7.0127	0.233	29.738
11/13/06	14:45:59	7.1793	0.227	29.695
11/13/06	14:46:09	7.3460	0.227	29.691
11/13/06	14:46:19	7.5127	0.227	29.687
11/13/06	14:46:29	7.6793	0.227	29.687
11/13/06	14:46:39	7.8460	0.227	29.689
11/13/06	14:46:49	8.0127	0.224	29.687
11/13/06	14:46:59	8.1793	0.224	29.687
11/13/06	14:47:09	8.3460	0.224	29.713
11/13/06	14:47:19	8.5127	0.224	29.719
11/13/06	14:47:29	8.6793	0.224	29.724
11/13/06	14:47:39	8.8460	0.224	29.724
11/13/06	14:47:49	9.0127	0.227	29.722
11/13/06	14:47:59	9.1793	0.227	29.726
11/13/06	14:48:09	9.3460	0.224	29.728
11/13/06	14:48:19	9.5127	0.224	29.732

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engineering and constructing a better tomorrow

Well: OW-946
Test Date: 11/14/2006
Test Type: Recovery (slug in)
Test Name: OW-946-in

Conducted by: Charles Smith
Entered/date: 12/30/11
Checked/date: JEP by GJM with permission 12/12/06

WELL DATA

Table with well data: SWL = 26.53 (ft BTOC), WD = 45.90 (ft BTOC), WD = 43.40 (ft BGS), DTSP = 25.20 (ft BGS), rc = 0.08 (ft), n = 0.30, rw = 0.35 (ft), rc (adjusted) = 0.20 (ft), Le = 10 (ft), Lw = 13.87 (ft), Le/rw = 28.57, H = 17.77 (ft)

CALCULATION OF K

K = [(rc^2 ln(Re/rw))/2Le]\*(1/l)ln(yo/yt)
yo = 2.02 (ft) from plot
yt = 1.09 (ft) from plot
l = 0.47 (minutes) from plot
ln(Re/rw) = 2.38
K = 9.2E+00 (ft/day)
K = 3.2E-03 (cm/sec)

TEST DATA

Large table with columns: Elapsed time (min), Log y, y (ft), WL (ft BTOC). Contains multiple rows of test data points.

H is depth from SWL to top of bedrock as listed on boring logs

Calculation of ln(Re/rw)

Where: Lw < H; ln(Re/rw) = [(1.1/ln(Lw/rw)) + (A+Bln((H-Lw)/rw))/(Le/rw)]^-1 = 2.38
Where: Lw = H; ln(Re/rw) = [(1.1/ln(Lw/rw)) + (C/(Le/rw))]^-1 = 2.70

Calculation of Coefficients

Value range for Le/rw from Table of Coefficients

Table with columns: Le/rw, A, B, C. Values for Le/rw 25, 30.

Interpolated values of A, B and C for Le/rw

Table with columns: Le/rw, A, B, C. Value for Le/rw 28.57.

Coefficients Table

Large table with columns: Le/rw, A, B, C. Lists values for Le/rw from 4 to 1500.

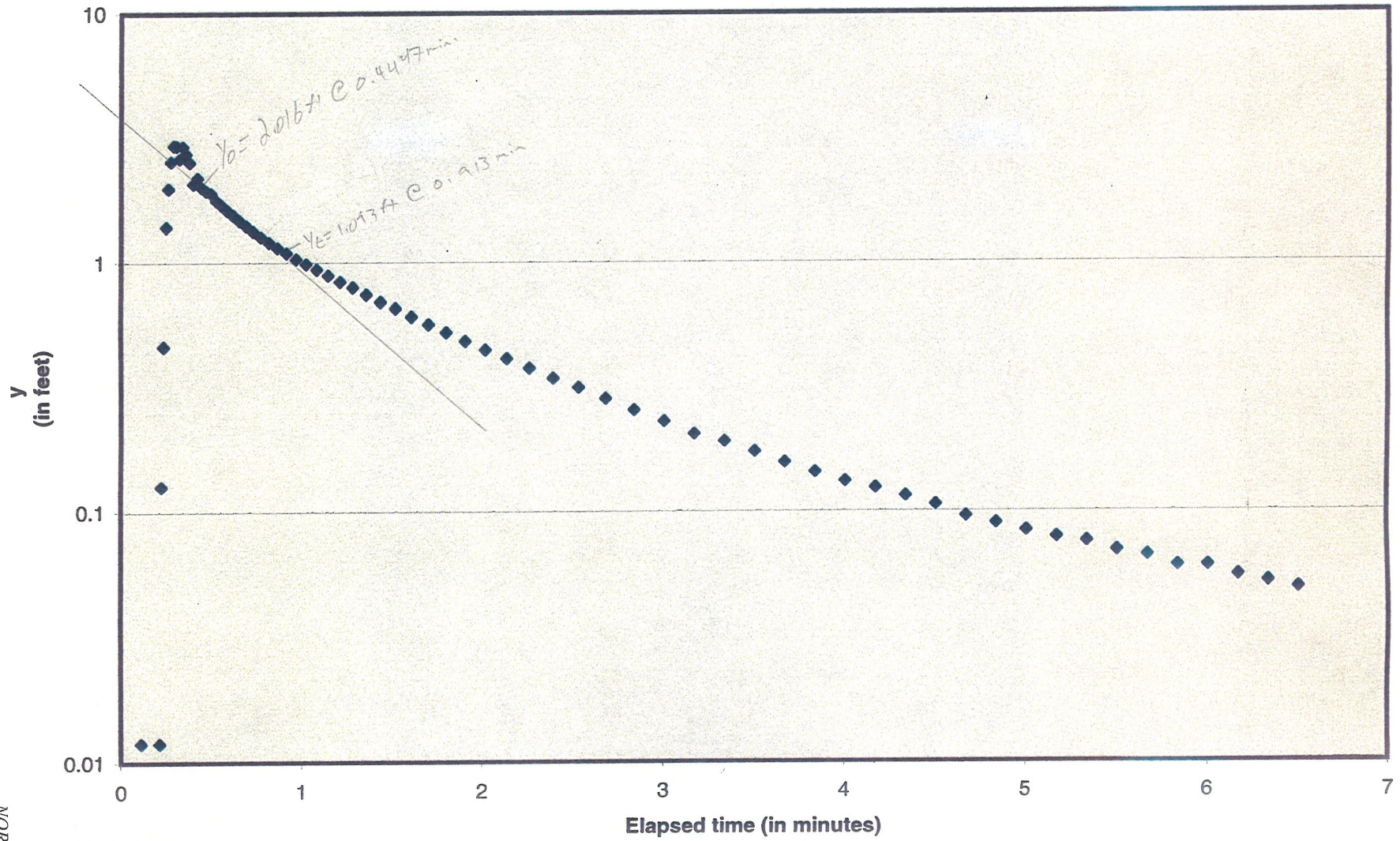
Test initialization

Test completion

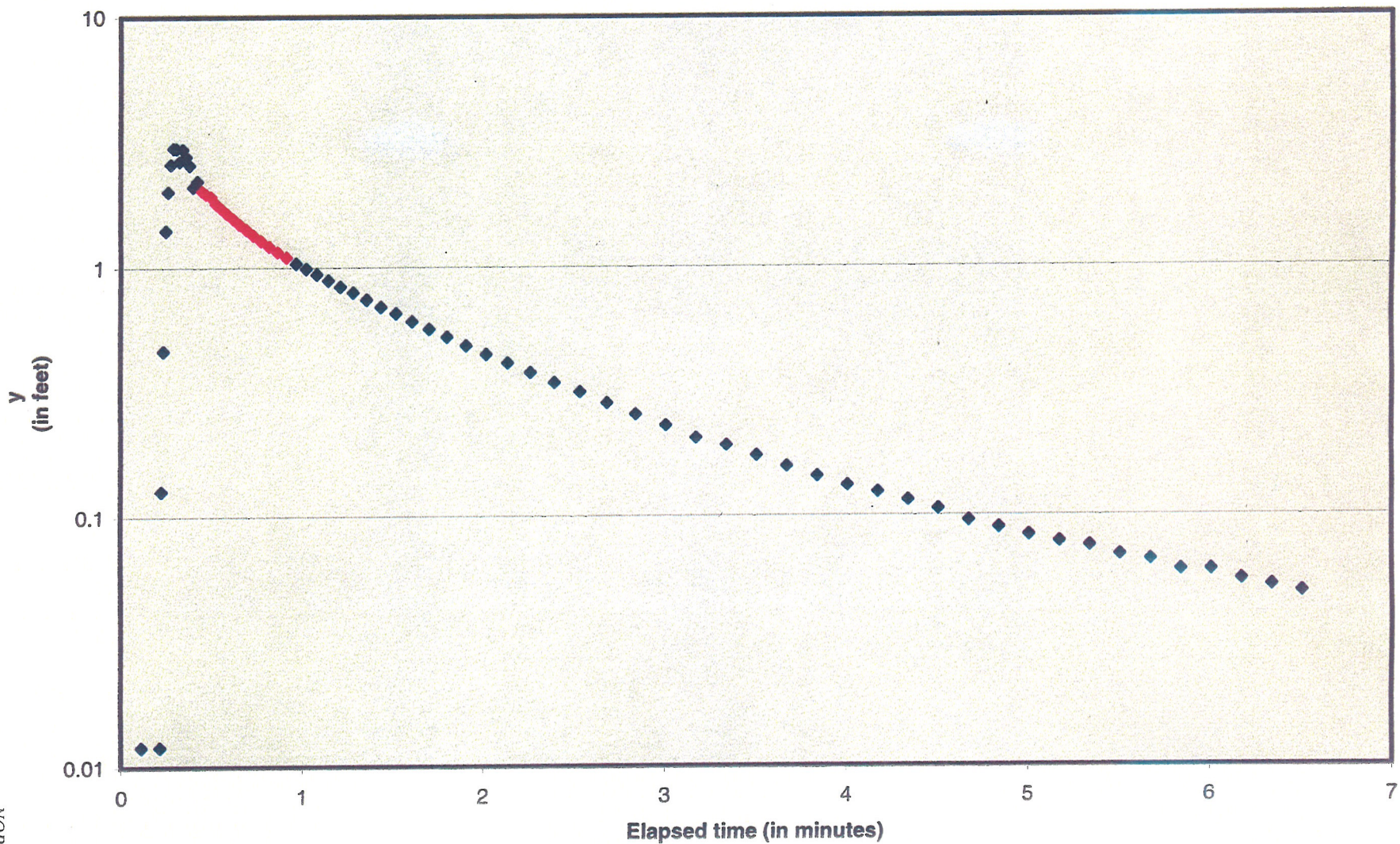
90% recovery



# OW-946 (slug-in) Recovery vs. Time



### OW-946 (slug-in) Recovery vs. Time





MACTEC Engineering and Consulting  
3301 Atlantic Avenue  
Raleigh, North Carolina

**Slug Test Data Sheet**

MACTEC Job Name: North Anna COL MACTEC Job Number: 6468-06-1472

Date: 11-14-06 Time: 1545 Observation Well No.: 01W946-IN

Weather Conditions: Sunny Approx 60°F

Method of Slug water (mechanical, or)

Test Method: Rising Head or

Withdrawal (circle one): pressure

Falling Head  
(circle)

Diameter of Screen: 2 in.

Diameter of Casing: 2 in.

Total Well Depth: 43.4 ft below reference point

Reference Point: Permanent mark on top of casing

Length of Screened Section: 10 ft

Depth interval of screened portion: 30.4-40.4 ft

Depth to Groundwater: 26.53 ft below reference point

**Groundwater Measurements Collected Prior to Slug Test**

Comments/Remarks

Depth to Groundwater Date

26.39 (pre-development) 11-14-06

26.53 (post-development) 11-14-06

USED Transducer  
SN P00513 HiMetric 3000  
Set Transducer 35'  
below TOC  
Transducer read 26.46'  
26.537 11-14-06  
vs. 26.53' static  
offset = 2.959  
= 99.9% Recovery

In-Situ Inc. Hermit 3000

Report generated: 12/11/06 17:40:46  
Report from file: P:\6468\2006 Projects\1472 North Anna COL\Slug Test Data\Raw data logger fil  
DataMgr Version 3.71

Serial number: 00045369  
Firmware Version 7.08  
Unit name: HERMIT 3000

Test name: OW946IN PAGE 1 OF 2

Test defined on: 11/14/06 16:38:23  
Test started on: 11/14/06 16:41:26  
Test stopped on: 11/14/06 16:48:01  
Test extracted on: 11/14/06 17:59:51

Data gathered using Logarithmic testing  
Maximum time between data points: 0.1667 Minutes.  
Number of data samples: 89

TOTAL DATA SAMPLES 89

Channel number [1]

Measurement type: Pressure  
Channel name: D00513  
Linearity: 0.0212000  
Scale: 19.9368000  
Offset: 0.1304000  
Warmup: 50  
Specific gravity: 1.000  
Mode: TOC  
User-defined reference: 0.000 Feet H2O  
Referenced on: test start  
Pressure head at reference: 8.546 Feet H2O

Channel number [0]

Measurement type: Barometric Pressure  
Channel name: Barometric  
Linearity: 0.0000000  
Scale: 0.0000000  
Offset: 0.0000000  
Warmup: 50

Date	Time	ET (min)	Chan[1] Feet H2O	Chan[0] Inches Hg
11/14/06	16:41:26	0.0000	0.000	29.555
11/14/06	16:41:26	0.0112	-0.003	29.555
11/14/06	16:41:27	0.0223	0.000	29.555
11/14/06	16:41:28	0.0335	-0.006	29.555
11/14/06	16:41:28	0.0447	-0.006	29.555
11/14/06	16:41:29	0.0558	-0.006	29.553
11/14/06	16:41:30	0.0670	-0.006	29.557
11/14/06	16:41:30	0.0782	-0.006	29.555
11/14/06	16:41:31	0.0893	-0.006	29.557
11/14/06	16:41:32	0.1005	-0.009	29.553
11/14/06	16:41:32	0.1117	-0.012	29.555
11/14/06	16:41:33	0.1228	-0.006	29.553
11/14/06	16:41:34	0.1340	-0.006	29.557
11/14/06	16:41:34	0.1452	-0.006	29.555
11/14/06	16:41:35	0.1563	-0.009	29.553
11/14/06	16:41:36	0.1675	-0.009	29.553
11/14/06	16:41:36	0.1787	-0.009	29.551
11/14/06	16:41:37	0.1898	-0.009	29.551
11/14/06	16:41:38	0.2010	-0.006	29.553
11/14/06	16:41:38	0.2122	-0.012	29.555
11/14/06	16:41:39	0.2233	-0.127	29.557

11/14/06	16:41:40	0.2350	-0.469	29.553
11/14/06	16:41:40	0.2475	-1.397	29.555
11/14/06	16:41:41	0.2607	-1.998	29.557
11/14/06	16:41:42	0.2747	-2.576	29.553
11/14/06	16:41:43	0.2895	-2.991	29.555
11/14/06	16:41:44	0.3052	-2.982	29.551
11/14/06	16:41:45	0.3218	-2.645	29.555
11/14/06	16:41:46	0.3395	-2.959	29.555
11/14/06	16:41:47	0.3582	-2.769	29.553
11/14/06	16:41:48	0.3780	-2.556	29.553
11/14/06	16:41:49	0.3990	-2.088	29.553
11/14/06	16:41:51	0.4212	-2.205	29.557
11/14/06	16:41:52	0.4447	-2.016	29.553
11/14/06	16:41:54	0.4695	-1.950	29.551
11/14/06	16:41:55	0.4958	-1.909	29.557
11/14/06	16:41:57	0.5238	-1.786	29.553
11/14/06	16:41:59	0.5535	-1.711	29.555
11/14/06	16:42:01	0.5848	-1.633	29.557
11/14/06	16:42:03	0.6180	-1.558	29.557
11/14/06	16:42:05	0.6532	-1.481	29.557
11/14/06	16:42:07	0.6905	-1.412	29.557
11/14/06	16:42:09	0.7300	-1.340	29.553
11/14/06	16:42:12	0.7718	-1.271	29.557
11/14/06	16:42:14	0.8162	-1.208	29.557
11/14/06	16:42:17	0.8632	-1.147	29.553
11/14/06	16:42:20	0.9130	-1.093	29.555
11/14/06	16:42:23	0.9657	-1.035	29.551
11/14/06	16:42:27	1.0215	-0.986	29.553
11/14/06	16:42:30	1.0807	-0.937	29.553
11/14/06	16:42:34	1.1433	-0.886	29.555
11/14/06	16:42:38	1.2097	-0.837	29.553
11/14/06	16:42:42	1.2800	-0.794	29.553
11/14/06	16:42:47	1.3545	-0.745	29.551
11/14/06	16:42:52	1.4335	-0.696	29.555
11/14/06	16:42:57	1.5172	-0.656	29.555
11/14/06	16:43:02	1.6057	-0.610	29.555
11/14/06	16:43:07	1.6995	-0.569	29.555
11/14/06	16:43:13	1.7988	-0.529	29.557
11/14/06	16:43:20	1.9042	-0.489	29.553
11/14/06	16:43:26	2.0157	-0.451	29.553
11/14/06	16:43:34	2.1338	-0.417	29.553
11/14/06	16:43:41	2.2590	-0.382	29.555
11/14/06	16:43:49	2.3915	-0.348	29.555
11/14/06	16:43:57	2.5320	-0.319	29.555
11/14/06	16:44:06	2.6808	-0.288	29.553
11/14/06	16:44:16	2.8383	-0.259	29.553
11/14/06	16:44:26	3.0050	-0.233	29.557
11/14/06	16:44:36	3.1717	-0.207	29.555
11/14/06	16:44:46	3.3383	-0.193	29.555
11/14/06	16:44:56	3.5050	-0.175	29.557
11/14/06	16:45:06	3.6717	-0.158	29.557
11/14/06	16:45:16	3.8383	-0.144	29.553
11/14/06	16:45:26	4.0050	-0.132	29.555
11/14/06	16:45:36	4.1717	-0.124	29.553
11/14/06	16:45:46	4.3383	-0.115	29.557
11/14/06	16:45:56	4.5050	-0.106	29.557
11/14/06	16:46:06	4.6717	-0.095	29.557
11/14/06	16:46:16	4.8383	-0.089	29.557
11/14/06	16:46:26	5.0050	-0.083	29.553
11/14/06	16:46:36	5.1717	-0.078	29.561
11/14/06	16:46:46	5.3383	-0.075	29.559
11/14/06	16:46:56	5.5050	-0.069	29.557
11/14/06	16:47:06	5.6717	-0.066	29.559
11/14/06	16:47:16	5.8383	-0.060	29.559
11/14/06	16:47:26	6.0050	-0.060	29.553
11/14/06	16:47:36	6.1717	-0.055	29.557
11/14/06	16:47:46	6.3383	-0.052	29.557
11/14/06	16:47:56	6.5050	-0.049	29.557

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