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North Anna COL Project
Hydraulic Conductivity (K) Calculation Worksheet
MACTEC Job Number: 6468-06-1472

Well: OW-947
Test Date: 11/13/2006
Test Type: Recovery (slug out)
Test Name: OW-947-out

Conducted by: Grimes & Charles-Smith
Entered/date: W 12/12-4-06
Checked/date: JCP by [illegible] with permission 12/12/06

WELL DATA

| | | |
|---|---|---|
| SWL = | 18.02 | (ft BTOC) |
| WD = | 60.00 | (ft BTOC) |
| WD = | 58.00 | (ft BGS) |
| DTSP = | 41.00 | (ft BGS) |
| rc = | 0.08 | (ft) |
| n = | 0.30 | |
| rw = | 0.35 | (ft) |
| rc (adjusted) = | 0.08 | (ft) |
| Le = | 10 | (ft) |
| Lw = | 38.98 | (ft) |
| Le/rw = | 28.57 | |
| H = | 62.68 | (ft) |

H is depth from SWL to top of bedrock (no recovery zone) as listed on boring logs

CALCULATION OF K

K = [(rc^2 ln(Re/rw))/2Le]*(1/t)ln(yo/yt)

| | | |
|---|---|---|
| yo = | 2.92 | (ft) from plot |
| yt = | 0.74 | (ft) from plot |
| t = | 3.90 | (minutes) from plot |
| ln(Re/rw) = | 2.70 | |
| K = | 4.6E-01 | (ft/day) |
| K = | 1.6E-04 | (cm/sec) |

Calculation of ln(Re/rw)

Where: Lw < H;

ln(Re/rw) = [{1.1/(ln(Lw/rw))}+{A+Bln((H-Lw)/rw)}/(Le/rw)}^-1= 2.70

Where: Lw = H;

ln(Re/rw) = [{1.1/(ln(Lw/rw))}+{C/(Le/rw)}]^-1 = 3.33

Calculation of Coefficients

Value range for Le/rw from Table of Coefficients

| Le/rw | A | B | C |
|---|---|---|---|
| 25 | 2.4 | 0.31 | 1.9 |
| 30 | 2.5 | 0.35 | 2.1 |

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

| | | | |
|---|---|---|---|
| 28.57 | 2.47 | 0.34 | 2.04 |

Coefficients Table

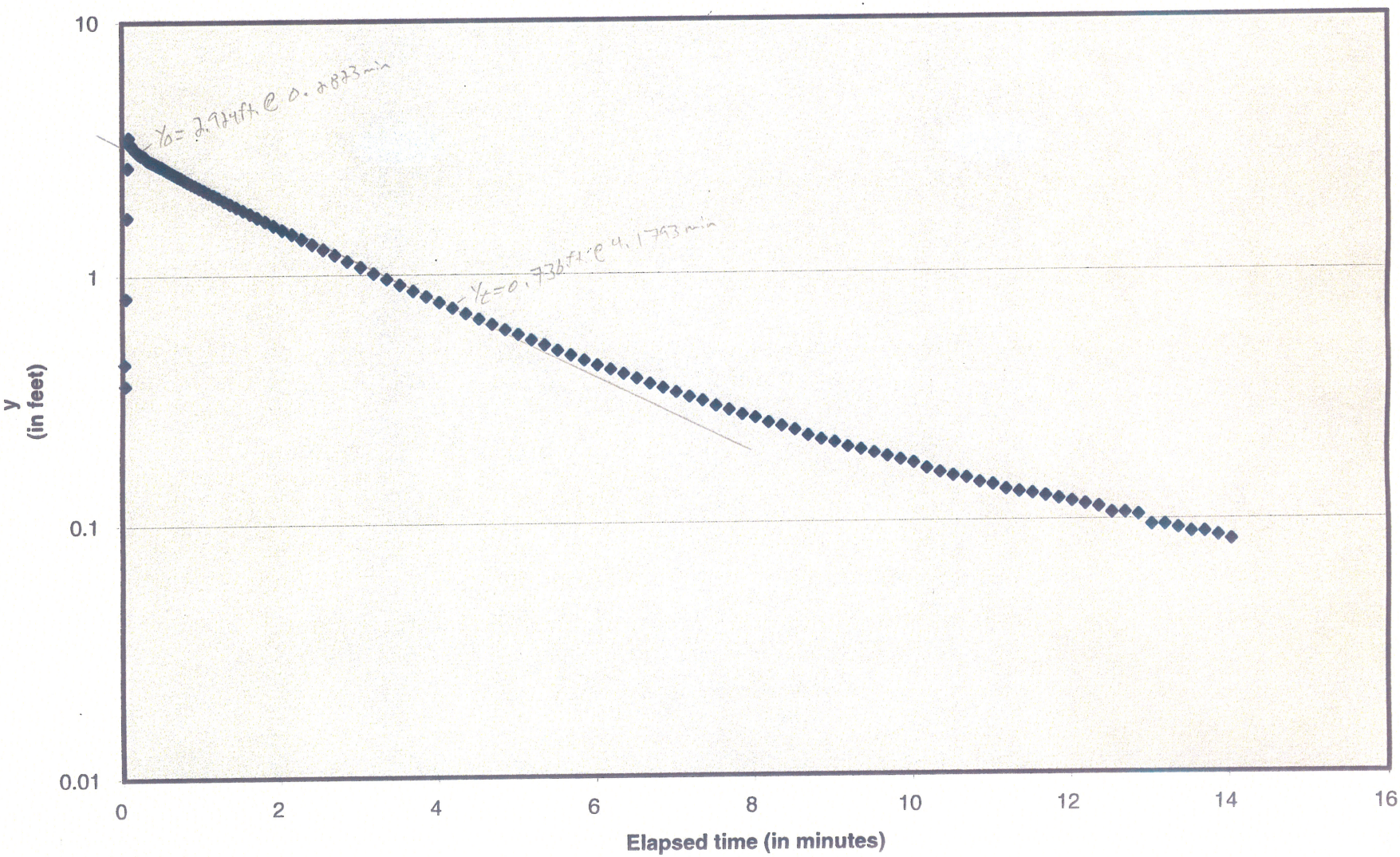
| Le/rw | A | Le/rw | B | Le/rw | C |
|---|---|---|---|---|---|
| 4 | 1.75 | 4 | 0.25 | 4 | 0.75 |
| 5 | 1.76 | 5 | 0.25 | 5 | 0.85 |
| 6 | 1.77 | 6 | 0.25 | 6 | 0.90 |
| 7 | 1.80 | 7 | 0.25 | 7 | 1.00 |
| 8 | 1.83 | 8 | 0.25 | 8 | 1.10 |
| 9 | 1.90 | 9 | 0.25 | 9 | 1.20 |
| 10 | 1.95 | 10 | 0.25 | 10 | 1.30 |
| 15 | 2.10 | 15 | 0.27 | 15 | 1.50 |
| 20 | 2.23 | 20 | 0.29 | 20 | 1.75 |
| 25 | 2.40 | 25 | 0.31 | 25 | 1.90 |
| 30 | 2.50 | 30 | 0.35 | 30 | 2.10 |
| 40 | 2.75 | 40 | 0.45 | 40 | 2.45 |
| 50 | 3.00 | 50 | 0.50 | 50 | 2.70 |
| 60 | 3.45 | 60 | 0.52 | 60 | 3.00 |
| 70 | 3.70 | 70 | 0.60 | 70 | 3.40 |
| 80 | 3.90 | 80 | 0.65 | 80 | 3.60 |
| 90 | 4.20 | 90 | 0.70 | 90 | 3.85 |
| 100 | 4.50 | 100 | 0.75 | 100 | 4.20 |
| 150 | 5.45 | 150 | 0.98 | 150 | 5.70 |
| 200 | 6.10 | 200 | 1.20 | 200 | 7.00 |
| 250 | 6.70 | 250 | 1.30 | 250 | 8.00 |
| 300 | 7.10 | 300 | 1.50 | 300 | 8.80 |
| 400 | 7.75 | 400 | 1.90 | 400 | 9.90 |
| 500 | 8.20 | 500 | 2.20 | 500 | 10.60 |
| 600 | 8.50 | 600 | 2.33 | 600 | 11.10 |
| 700 | 8.70 | 700 | 2.50 | 700 | 11.50 |
| 800 | 8.90 | 800 | 2.70 | 800 | 11.80 |
| 900 | 9.00 | 900 | 2.75 | 900 | 12.00 |
| 1000 | 9.20 | 1000 | 2.83 | 1000 | 12.40 |
| 1500 | 9.50 | 1500 | 3.18 | 1500 | 12.90 |

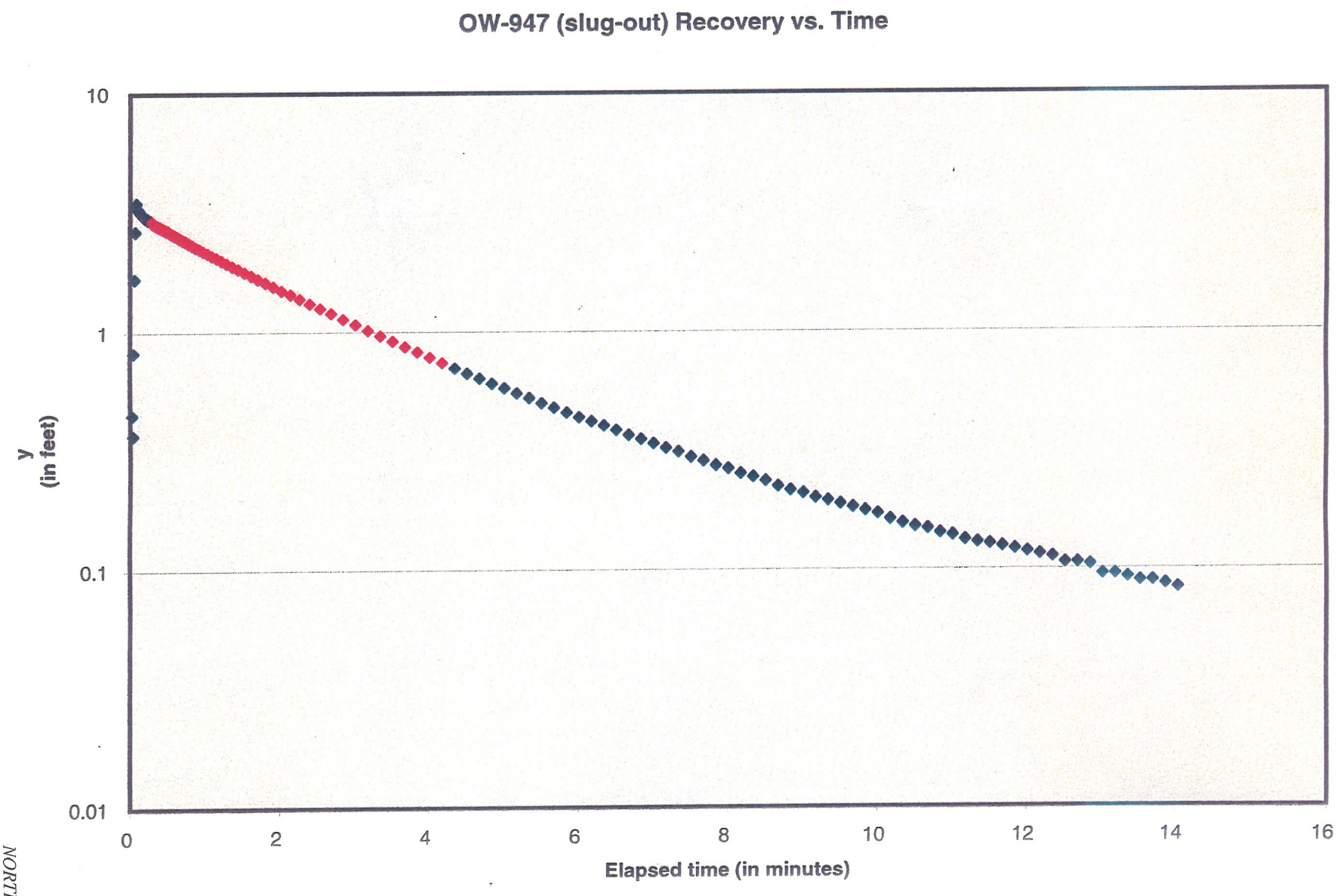
Reference: Bouwer(1989), Bouwer and Rice(1976)

TEST DATA

| Elapsed time (min) | Log y | y (ft) | WL (ft BTOC) | |
|---|---|---|---|---|
| 0 | #NUM! | 0 | 18.02 | |
| 0.011 | -2.22 | 0.006 | 18.03 | |
| 0.022 | -0.35 | 0.446 | 18.47 | |
| 0.033 | -0.44 | 0.365 | 18.39 | |
| 0.044 | -0.09 | 0.82 | 18.84 | |
| 0.055 | 0.23 | 1.691 | 19.71 | |
| 0.066 | 0.42 | 2.654 | 20.67 | |
| 0.077 | 0.54 | 3.485 | 21.51 | |
| 0.088 | 0.52 | 3.318 | 21.34 | |
| 0.099 | 0.52 | 3.293 | 21.31 | |
| 0.11 | 0.51 | 3.241 | 21.26 | |
| 0.121 | 0.51 | 3.218 | 21.24 | |
| 0.132 | 0.50 | 3.183 | 21.20 | |
| 0.143 | 0.50 | 3.149 | 21.17 | |
| 0.154 | 0.50 | 3.132 | 21.15 | |
| 0.165 | 0.49 | 3.088 | 21.11 | |
| 0.176 | 0.49 | 3.071 | 21.09 | |
| 0.187 | 0.48 | 3.045 | 21.07 | |
| 0.198 | 0.48 | 3.025 | 21.05 | |
| 0.209 | 0.48 | 3.014 | 21.03 | |
| 0.22 | 0.48 | 3.011 | 21.03 | |
| 0.231 | 0.47 | 2.976 | 21.00 | |
| 0.2427 | 0.47 | 2.979 | 21.00 | |
| 0.2552 | 0.47 | 2.959 | 20.98 | |
| 0.2683 | 0.47 | 2.945 | 20.97 | |
| 0.2823 | 0.47 | 2.924 | 20.94 | Test initialization |
| 0.2972 | 0.46 | 2.873 | 20.89 | |
| 0.3128 | 0.46 | 2.855 | 20.88 | |
| 0.3295 | 0.45 | 2.832 | 20.85 | |
| 0.3472 | 0.45 | 2.812 | 20.83 | |
| 0.3658 | 0.45 | 2.795 | 20.82 | |
| 0.3857 | 0.44 | 2.772 | 20.79 | |
| 0.4067 | 0.44 | 2.752 | 20.77 | |
| 0.4288 | 0.44 | 2.729 | 20.75 | |
| 0.4523 | 0.43 | 2.703 | 20.72 | |
| 0.4772 | 0.43 | 2.68 | 20.70 | |
| 0.5035 | 0.43 | 2.669 | 20.69 | |
| 0.5315 | 0.42 | 2.623 | 20.64 | |
| 0.5612 | 0.41 | 2.594 | 20.61 | |
| 0.5925 | 0.41 | 2.559 | 20.58 | |
| 0.6257 | 0.40 | 2.525 | 20.55 | |
| 0.6608 | 0.40 | 2.487 | 20.51 | |
| 0.6982 | 0.39 | 2.453 | 20.47 | |
| 0.7377 | 0.38 | 2.416 | 20.44 | |
| 0.7795 | 0.38 | 2.372 | 20.39 | |
| 0.8238 | 0.37 | 2.332 | 20.35 | |
| 0.8708 | 0.36 | 2.289 | 20.31 | |
| 0.9207 | 0.35 | 2.249 | 20.27 | |
| 0.9733 | 0.34 | 2.203 | 20.22 | |
| 1.0292 | 0.33 | 2.157 | 20.18 | |
| 1.0883 | 0.32 | 2.108 | 20.13 | |
| 1.151 | 0.31 | 2.062 | 20.08 | |
| 1.2173 | 0.30 | 2.01 | 20.03 | |
| 1.2877 | 0.29 | 1.958 | 19.98 | |
| 1.3622 | 0.28 | 1.904 | 19.92 | |
| 1.4412 | 0.27 | 1.852 | 19.87 | |
| 1.5248 | 0.25 | 1.797 | 19.82 | |
| 1.6133 | 0.24 | 1.74 | 19.76 | |
| 1.7072 | 0.23 | 1.682 | 19.70 | |
| 1.8065 | 0.21 | 1.625 | 19.65 | |
| 1.9118 | 0.19 | 1.564 | 19.58 | |
| 2.0233 | 0.18 | 1.504 | 19.52 | |
| 2.1415 | 0.16 | 1.449 | 19.47 | |
| 2.2667 | 0.14 | 1.386 | 19.41 | |
| 2.3992 | 0.12 | 1.323 | 19.34 | |
| 2.5397 | 0.10 | 1.262 | 19.28 | |
| 2.6885 | 0.08 | 1.202 | 19.22 | |
| 2.846 | 0.06 | 1.136 | 19.16 | |
| 3.0127 | 0.03 | 1.076 | 19.10 | |
| 3.1793 | 0.01 | 1.015 | 19.04 | |
| 3.346 | -0.02 | 0.963 | 18.98 | |
| 3.5127 | -0.04 | 0.912 | 18.93 | |
| 3.6793 | -0.06 | 0.863 | 18.88 | |
| 3.846 | -0.09 | 0.82 | 18.84 | |
| 4.0127 | -0.11 | 0.776 | 18.80 | |
| 4.1793 | -0.13 | 0.736 | 18.76 | Test completion |
| 4.346 | -0.16 | 0.699 | 18.72 | |
| 4.5127 | -0.18 | 0.664 | 18.68 | |
| 4.6793 | -0.20 | 0.633 | 18.65 | |
| 4.846 | -0.22 | 0.601 | 18.62 | |

## OW-947 (slug-out) Recovery vs. Time




OW-947 (slug-out) Recovery vs. Time
y
(in feet)
10
1
0.1
0.01
0
2
4
6
8
10
12
14
16
Elapsed time (in minutes)