Geovac

Environmental Services, Inc.

6549 Robinson Road
Jacksonville, Florida 32254

December 1, 2010

Ms. Julie Hardy
FDEP Northwest District
160 Governmental Center
Pensacola, FL 32502-5794

Re: McKenzie Tank Lines, Inc; 2778 West Tharpe Street; Tallahassee, FL; Consent Order OGC 91-2007

Dear Ms. Hardy:

Attached please find the requested copies of the slug test data for the referenced site.

Should you have any questions, please contact me at your convenience.

Sincerely,
Geovac Environmental Services, Inc.

John M. Elrod
Florida Professional Geologist 603

Phone: 904/693-6923 **Fax:** 904/693-6925 **Cellular:** 904/591-8384

McKENZIE TANK LINES, INC.
THARPE STREET
CAPTURE ZONE ANALYSIS

LET:

K - Hydraulic Conductivity (ft/day)

T - Transmissivity (ft^2/day)

b - Aquifer Vertical Thickness (ft.)

w - Width of Plume (ft.)

I - Ground Water Gradient (ft/ft)

Q - Flow Rate of Pump During Test (ft^3/day)

f - Facility Factor

x_0 - Distance From Pump Test Well to Down-Gradient Groundwater Divide (ft)

Y_{MAX} - Maximum Capture Zone Half-Width From Plume Centerline (ft)

Y_{WELL} - Capture Zone Width at Well From Plume Centerline (ft)

ΔS - Well Draw Down (ft)

hydraulic conductivity calcluations, Bouwer and Rice

RW3 slug in	19		
RW3 slug out	11		
MW-9S slug in	5.1		
MW-9s slug out	3.4		
MW-31D slug in			
MW-31D slug out		average	
	38.5	9.625	ft/day

CAPTURE ZONE CALCULATION #1

BASIS: Slug Test Performed on June 9, 2009

K= 9.625 ft/day

b= 70 ft aquifer depth from 40 to 110 feet below land surface

T=K.b= 673.75 ft^2/day

w = 500 ft from plume map 1684.375

I = 0.005 ft/ft average from April 2009 report

Q = K(b.w)I . f = 1684.375 .f

For f= 1.5 Q = 2526.5625

For f= 2 Q = 3368.75

$x_0 = -Q/2.I.\pi.T.$ = 79.5798186 ft. 21.1651825 79.58235182

$Y_{MAX} = Q/2.T.I$ = 250 ft. 6.7375 250

$Y_{WELL} = Q/4.T.I$ = 125 ft.

CAPTURE ZONE CALCULATION #2

BASIS: Slug Tests Performed on monitoring wells MW-9, MW-31, RW-3

gpm	6.30902E-05	m3/sec is	5.45099297	m3/day			
ft3/sec	0.028316847	m3/sec					
m2/day	10.76	ft2/day					
m/sec	93001.86	ft2/day					

$Q =$ 4 gpm = 5.45099297 21.80397188 m^3/day

$\Delta S =$ 7.8 ft = 2.4 meters

$T = 2.3\ Q / 4\pi\ .\ \Delta S =$ $\dfrac{2.3 \times 5.45099297}{4 \times 3.1415927} = \dfrac{12.53728383}{2.4 \times 30.15928947} = 0.415702228$ m2/day

$K = T/b =$ $\dfrac{4.47295574}{30} = 0.14909852$ ft/day 4.472955974 ft2/day

$Q = K.\ b.\ w.\ I.\ f =$ 11.1823894 . f

For f= 1.5 Q = 16.77358403 ft/day

For f= 2 Q = 22.3647787 ft/day

$x_o = -Q/2.I.\pi.T. =$ -79.5798144 ft.

$Y_{MAX} = Q/2.T.I =$ 249.999987 ft.

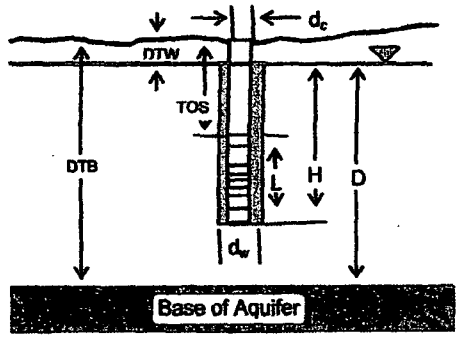
$Y_{WELL} = Q/4.T.I =$ 124.999993 ft.

WELL ID: MWRW3 slug in

Local ID: MWRW3
Date: 6/9/2009
Time: 00:00

INPUT

Construction:	
Casing dia. (d_c)	4 Inch
Annulus dia. (d_w)	10 Inch
Screen Length (L)	10 Feet
Depths to:	
water level (DTW)	14.12 Feet
top of screen (TOS)	30 Feet
Base of Aquifer (DTB)	100 Feet
Annular Fill:	
across screen -- Medium Sand	
above screen -- Bentonite	
Aquifer Material -- Surficial Aquifer, central Flo	



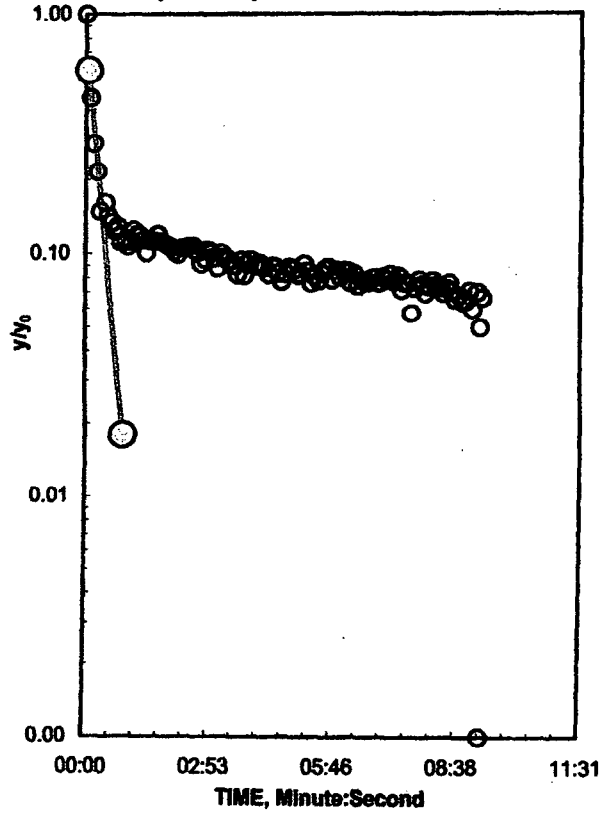
COMPUTED

L_{wetted}	10 Feet
D =	85.88 Feet
H =	25.88 Feet
L/r_w =	24.00
$y_{0\text{-DISPLACEMENT}}$ =	0.44 Feet
$y_{0\text{-SLUG}}$ =	0.39 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.334
B =	0.376
ln(Re/rw) =	2.264
Re =	4.01 Feet
Slope =	0.030312 $\log_{10}$/sec
$t_{80\%}$ recovery =	33 sec

Input is consistent.

K = 19 Feet/Day

Adjust slope of line to estimate K



REMARKS: Bouwer and Rice analysis of slug test, \

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

Reduced Data

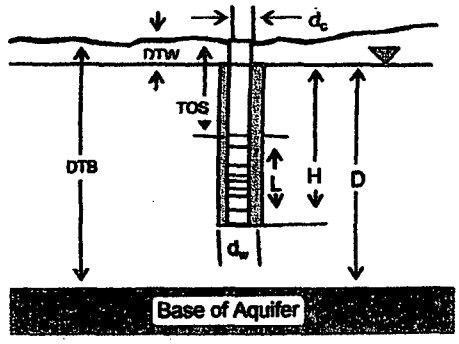
Entry	Time, Hr:Min:Sec	Water Level
1	0:00:00.0	14.59
2	0:00:11.0	14.28
3	0:00:20.0	14.22
4	0:00:32.0	14.21
5	0:00:41.0	14.21
6	0:00:50.0	14.20
7	0:01:00.0	14.20
8	0:01:08.0	14.21
9	0:01:16.0	14.20
10	0:01:26.0	14.19
11	0:01:37.0	14.20
12	0:01:46.0	14.20
13	0:01:56.0	14.20
14	0:02:05.0	14.20
15	0:02:15.0	14.20
16	0:02:25.0	14.20
17	0:02:34.0	14.20
18	0:02:42.0	14.19
19	0:02:52.0	14.20
20	0:03:01.0	14.19
21	0:03:11.0	14.19
22	0:03:21.0	14.19
23	0:03:30.0	14.19
24	0:03:39.0	14.19
25	0:03:48.0	14.19
26	0:03:58.0	14.19
27	0:04:06.0	14.19
28	0:04:18.0	14.19
29	0:04:27.0	14.19
30	0:04:36.0	14.18
31	0:04:46.0	14.19
32	0:04:58.0	14.19
33	0:05:07.0	14.19
34	0:05:17.0	14.18
35	0:05:28.0	14.18
36	0:05:37.0	14.19
37	0:05:46.0	14.18
38	0:05:58.0	14.19
39	0:06:08.0	14.19
40	0:06:17.0	14.19
41	0:06:28.0	14.18
42	0:06:37.0	14.18
43	0:06:47.0	14.19
44	0:06:57.0	14.19
45	0:07:07.0	14.19

WELL ID: MWRW3 slug out

Local ID: mwrw3
Date: 6/6/2009
Time: 00:01

INPUT

Construction:	
Casing dia. (d_c)	4 Inch
Annulus dia. (d_w)	10 Inch
Screen Length (L)	30 Feet
Depths to:	
water level (DTW)	36.9 Feet
top of screen (TOS)	30 Feet
Base of Aquifer (DTB)	70 Feet
Annular Fill:	
across screen -- Medium Sand	
above screen -- Bentonite	
Aquifer Material -- Surficial Aquifer, central Flo	



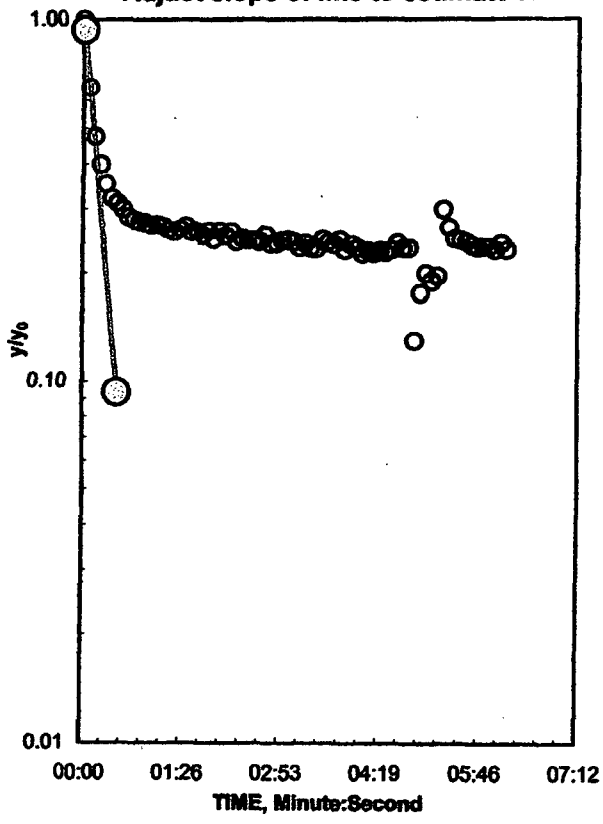
COMPUTED

L_{wetted}	23.1 Feet
D =	33.1 Feet
H =	23.1 Feet
L/r_w =	55.44
$y_{0\text{-DISPLACEMENT}}$ =	0.48 Feet
$y_{0\text{-SLUG}}$ =	0.39 Feet
From look-up table using L/r_w	
Partial penetrate A =	3.282
B =	0.529
ln(Re/rw) =	2.751
Re =	6.53 Feet
Slope =	0.034043 $\log_{10}$/sec
$t_{90\%}$ recovery =	29 sec

Input is consistent.

K = 11 Feet/Day

Adjust slope of line to estimate K



REMARKS: Bouwer and Rice analysis of slug test, \

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

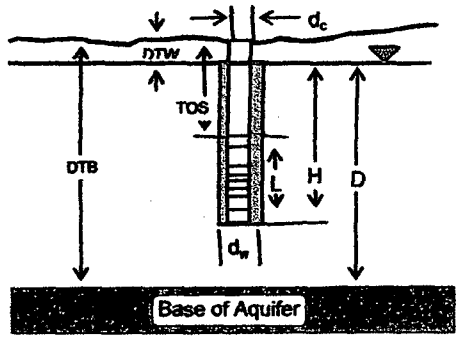
Entry	Reduced Data Time, Hr:Min:Sec	Water Level
1	0:01:30.0	13.72
2	0:01:35.0	13.89
3	0:01:40.0	13.97
4	0:01:45.0	14.01
5	0:01:50.0	14.03
6	0:01:55.0	14.05
7	0:02:00.0	14.05
8	0:02:05.0	14.06
9	0:02:10.0	14.07
10	0:02:15.0	14.07
11	0:02:20.0	14.07
12	0:02:25.0	14.07
13	0:02:30.0	14.07
14	0:02:35.0	14.07
15	0:02:40.0	14.07
16	0:02:45.0	14.08
17	0:02:50.0	14.08
18	0:02:55.0	14.07
19	0:03:00.0	14.07
20	0:03:05.0	14.08
21	0:03:10.0	14.08
22	0:03:15.0	14.08
23	0:03:20.0	14.08
24	0:03:25.0	14.08
25	0:03:30.0	14.08
26	0:03:35.0	14.08
27	0:03:40.0	14.08
28	0:03:45.0	14.08
29	0:03:50.0	14.08
30	0:03:55.0	14.08
31	0:04:00.0	14.08
32	0:04:05.0	14.08
33	0:04:10.0	14.08
34	0:04:15.0	14.09
35	0:04:20.0	14.09
36	0:04:25.0	14.08
37	0:04:30.0	14.08
38	0:04:35.0	14.08
39	0:04:40.0	14.09
40	0:04:45.0	14.09
41	0:04:50.0	14.09
42	0:04:55.0	14.09
43	0:05:00.0	14.08
44	0:05:05.0	14.09
45	0:05:10.0	14.09

WELL ID: MW-9S slug in

Local ID: mw-9s
Date: 6/9/2009
Time: 14:25

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	8.25 Inch
Screen Length (L)	10 Feet
Depths to:	
water level (DTW)	34.2 Feet
top of screen (TOS)	34 Feet
Base of Aquifer (DTB)	70 Feet
Annular Fill:	
across screen – Fine Sand	
above screen – Bentonite	
Aquifer Material – Surficial Aquifer, central Flo	



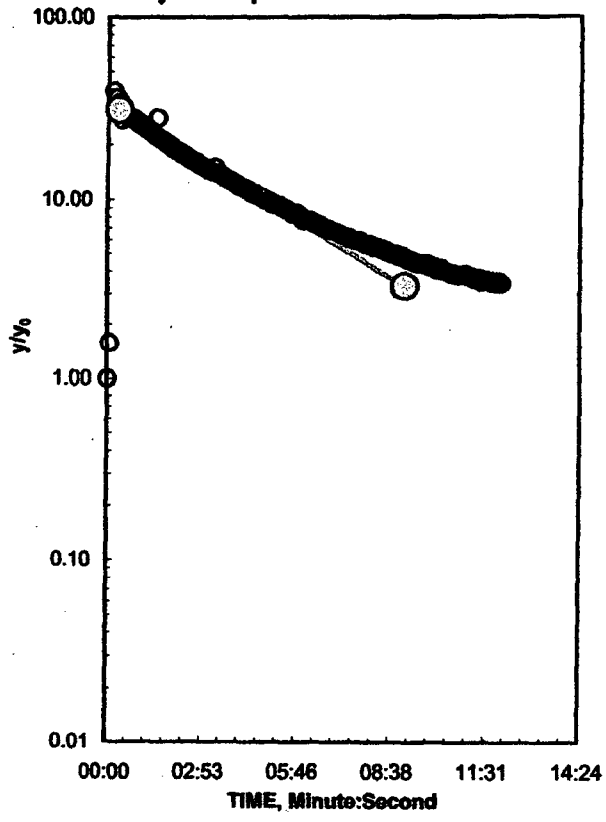
COMPUTED

L_{wetted}	9.8 Feet
D =	35.8 Feet
H =	9.8 Feet
L/r_w =	23.52
$y_{0\text{-DISPLACEMENT}}$ =	0.04 Feet
$y_{0\text{-SLUG}}$ =	0.08 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.320
B =	0.373
ln(Re/rw) =	1.951
Re =	2.93 Feet
Slope =	0.001847 $\log_{10}$/sec
$t_{60\%}$ recovery =	542 sec

Input is consistent.

K = 5.1 Feet/Day

Adjust slope of line to estimate K



REMARKS: Bouwer and Rice analysis of slug test, \

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

Reduced Data

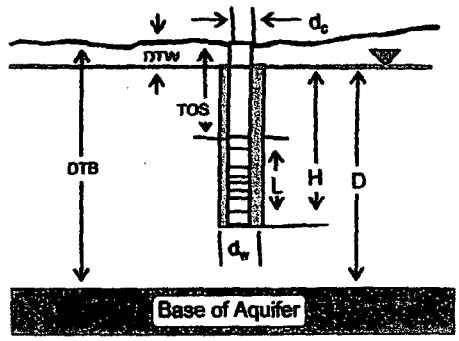
Entry	Time, Hr:Min:Sec	Water Level
1	14:25:28.0	6.24
2	14:25:44.0	7.58
3	14:26:58.0	7.28
4	14:26:14.0	7.27
5	14:26:28.0	7.19
6	14:26:44.0	7.12
7	14:26:58.0	7.05
8	14:27:14.0	6.99
9	14:27:28.0	6.93
10	14:27:44.0	6.88
11	14:27:58.0	6.84
12	14:28:14.0	6.80
13	14:28:28.0	6.77
14	14:28:44.0	6.78
15	14:28:58.0	6.72
16	14:29:14.0	6.69
17	14:29:28.0	6.66
18	14:29:44.0	6.64
19	14:29:58.0	6.61
20	14:30:14.0	6.59
21	14:30:28.0	6.57
22	14:30:44.0	6.56
23	14:30:58.0	6.54
24	14:31:14.0	6.52
25	14:31:28.0	6.50
26	14:31:44.0	6.49
27	14:31:58.0	6.48
28	14:32:14.0	6.47
29	14:32:28.0	6.45
30	14:32:44.0	6.44
31	14:32:58.0	6.43
32	14:33:14.0	6.42
33	14:33:28.0	6.42
34	14:33:44.0	6.41
35	14:33:58.0	6.40
36	14:34:14.0	6.39
37	14:34:28.0	6.39
38	14:34:44.0	6.38
39	14:34:58.0	6.37
40	14:35:14.0	6.37
41	14:35:28.0	6.36
42	14:35:44.0	6.35
43	14:35:58.0	6.35
44	14:36:14.0	6.35
45	14:36:28.0	6.34

WELL ID: MW-9S slug out

Local ID: MW-9S
Date: 6/9/2009
Time: 00:00

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	8.25 Inch
Screen Length (L)	10 Feet
Depths to:	
water level (DTW)	34.2 Feet
top of screen (TOS)	34 Feet
Base of Aquifer (DTB)	100 Feet
Annular Fill:	
across screen -- Medium Sand	
above screen -- Bentonite	
Aquifer Material -- Surficial Aquifer, central Flo	



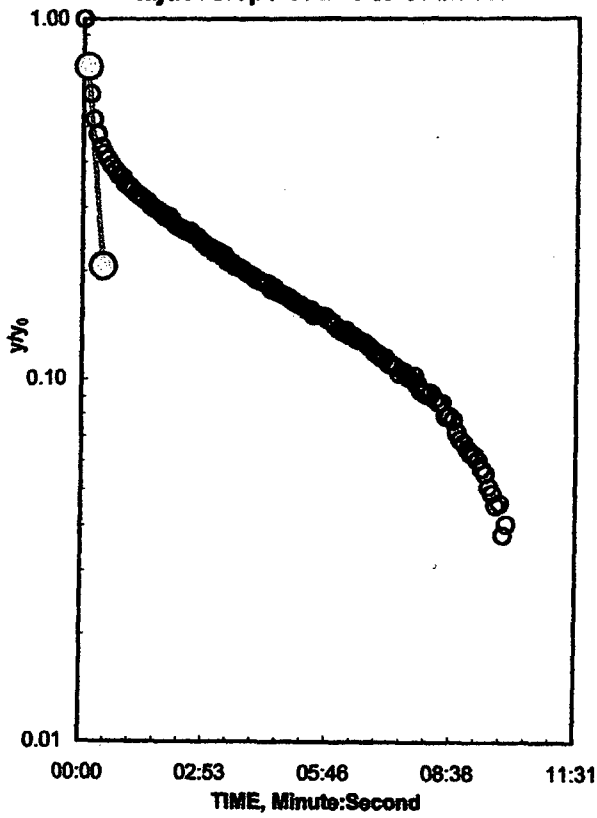
COMPUTED

L_{wetted}	9.8 Feet
D =	65.8 Feet
H =	9.8 Feet
L/r_w =	28.51
$y_{0\text{-DISPLACEMENT}}$ =	1.19 Feet
$y_{0\text{-SLUG}}$ =	1.56 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.459
B =	0.406
ln(Re/rw) =	2.053
Re =	2.68 Feet
Slope =	0.023748 $\log_{10}$/sec
$t_{90\%}$ recovery =	42 sec

Input is consistent.

K = 3.4 Feet/Day

Adjust slope of line to estimate K



REMARKS: Bouwer and Rice analysis of slug test, \

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

Reduced Data

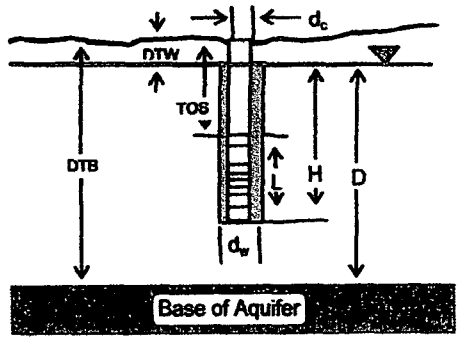
Entry	Time, Hr:Min:Sec	Water Level
1	0:00:05.0	4.89
2	0:00:15.0	5.35
3	0:00:25.0	5.51
4	0:00:35.0	5.58
5	0:00:45.0	5.62
6	0:00:55.0	5.64
7	0:01:05.0	5.67
8	0:01:15.0	5.68
9	0:01:25.0	5.70
10	0:01:35.0	5.71
11	0:01:45.0	5.73
12	0:01:55.0	5.74
13	0:02:05.0	5.74
14	0:02:15.0	5.76
15	0:02:25.0	5.77
16	0:02:35.0	5.77
17	0:02:45.0	5.78
18	0:02:55.0	5.80
19	0:03:05.0	5.81
20	0:03:15.0	5.81
21	0:03:25.0	5.82
22	0:03:35.0	5.83
23	0:03:45.0	5.84
24	0:03:55.0	5.85
25	0:04:05.0	5.85
26	0:04:15.0	5.86
27	0:04:25.0	5.86
28	0:04:35.0	5.87
29	0:04:45.0	5.88
30	0:04:55.0	5.88
31	0:05:05.0	5.89
32	0:05:15.0	5.89
33	0:05:25.0	5.90
34	0:05:35.0	5.90
35	0:05:45.0	5.90
36	0:05:55.0	5.91
37	0:06:05.0	5.92
38	0:06:15.0	5.92
39	0:06:25.0	5.92
40	0:06:35.0	5.93
41	0:06:45.0	5.93
42	0:06:55.0	5.94
43	0:07:05.0	5.94
44	0:07:15.0	5.95
45	0:07:25.0	5.95

WELL ID: MW31D slug in

Local ID: mw31d
Date: 6/9/2009
Time: 00:00

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	8.25 Inch
Screen Length (L)	5 Feet
Depths to:	
water level (DTW)	6.08 Feet
top of screen (TOS)	100 Feet
Base of Aquifer (DTB)	110 Feet
Annular Fill:	
across screen – Medium Sand	
above screen – Bentonite	
Aquifer Material – Surficial Aquifer, central Flo	



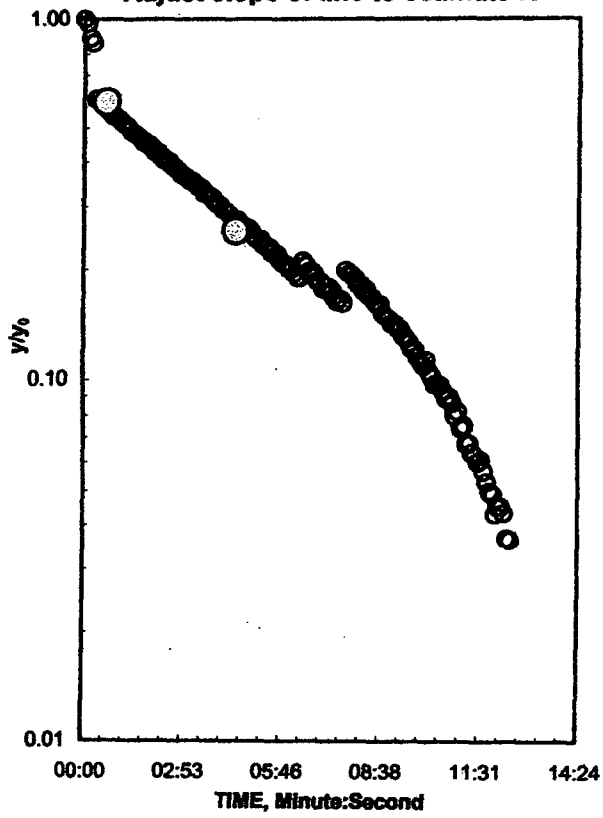
COMPUTED

L_{wetted}	5 Feet
D =	103.92 Feet
H =	98.92 Feet
L/r_w =	14.55
$y_{0\text{-DISPLACEMENT}}$ =	1.23 Feet
$y_{0\text{-SLUG}}$ =	1.56 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.049
B =	0.308
ln(Re/rw) =	2.552
Re =	4.41 Feet
Slope =	0.001593 $\log_{10}$/sec
$t_{80\%}$ recovery =	628 sec

Input is consistent.

K = 0.56 Feet/Day

Adjust slope of line to estimate K



REMARKS: Bouwer and Rice analysis of slug test, \

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

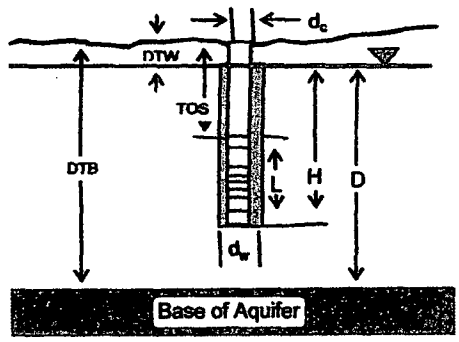
Entry	Reduced Data Time, Hr:Min:Sec	Water Level
1	0:00:30.0	12.23
2	0:00:45.0	12.06
3	0:01:00.0	11.72
4	0:01:15.0	11.68
5	0:01:30.0	11.65
6	0:01:45.0	11.62
7	0:02:00.0	11.59
8	0:02:15.0	11.56
9	0:02:30.0	11.54
10	0:02:45.0	11.51
11	0:03:00.0	11.49
12	0:03:15.0	11.47
13	0:03:30.0	11.45
14	0:03:45.0	11.43
15	0:04:00.0	11.40
16	0:04:15.0	11.39
17	0:04:30.0	11.37
18	0:04:45.0	11.35
19	0:05:00.0	11.34
20	0:05:15.0	11.32
21	0:05:30.0	11.30
22	0:05:45.0	11.29
23	0:06:00.0	11.27
24	0:06:15.0	11.26
25	0:06:30.0	11.25
26	0:06:45.0	11.23
27	0:07:00.0	11.25
28	0:07:15.0	11.24
29	0:07:30.0	11.22
30	0:07:45.0	11.21
31	0:08:00.0	11.20
32	0:08:15.0	11.24
33	0:08:30.0	11.22
34	0:08:45.0	11.22
35	0:09:00.0	11.20
36	0:09:15.0	11.18
37	0:09:30.0	11.17
38	0:09:45.0	11.17
39	0:10:00.0	11.15
40	0:10:15.0	11.14
41	0:10:30.0	11.14
42	0:10:45.0	11.12
43	0:11:00.0	11.11
44	0:11:15.0	11.11
45	0:11:30.0	11.09

WELL ID: MW-31D slug out

Local ID: MW-31D
Date: 6-969
Time: 13:47

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	8.25 Inch
Screen Length (L)	5 Feet
Depths to:	
water level (DTW)	13.47 Feet
top of screen (TOS)	100 Feet
Base of Aquifer (DTB)	110 Feet
Annular Fill:	
across screen -- Medium Sand	
above screen -- Bentonite	
Aquifer Material -- Surficial Aquifer, central Flo	



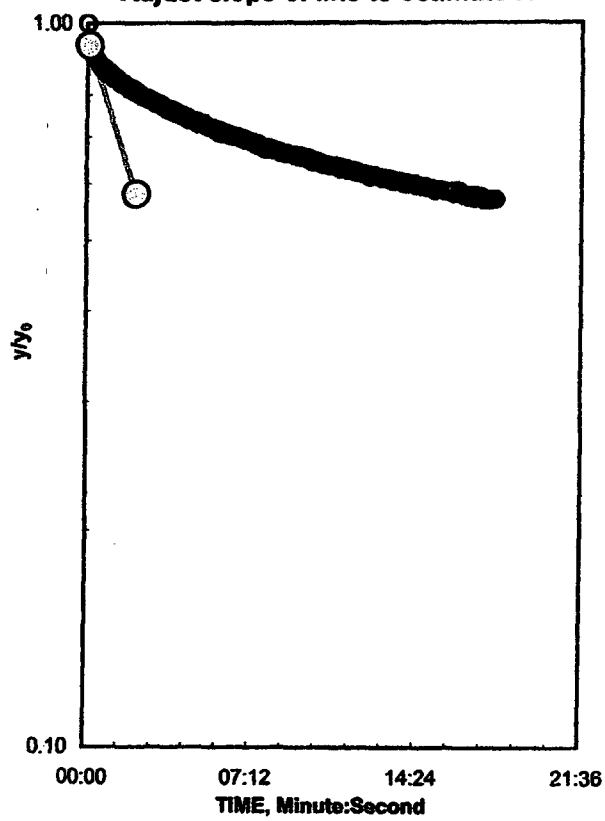
COMPUTED

L_{wetted}	5 Feet
D =	96.53 Feet
H =	91.53 Feet
L/r_w =	14.55
$y_{0\text{-DISPLACEMENT}}$ =	1.07 Feet
$y_{0\text{-SLUG}}$ =	1.56 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.049
B =	0.308
ln(Re/rw) =	2.534
Re =	4.33 Feet
Slope =	0.001656 $\log_{10}$/sec
$t_{60\%}$ recovery =	604 sec

Input is consistent.

K = 0.58 Feet/Day

Adjust slope of line to estimate K

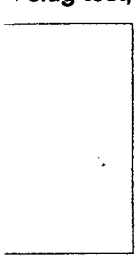


REMARKS: Bouwer and Rice analysis of slug test, \

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

f slug test, WRR 1976



Entry	Reduced Data Time, Hr:Min:Sec	Water Level
1	13:47:27.0	9.75
2	13:47:47.0	9.86
3	13:48:07.0	9.89
4	13:48:27.0	9.91
5	13:48:47.0	9.92
6	13:49:07.0	9.94
7	13:49:27.0	9.95
8	13:49:47.0	9.97
9	13:50:07.0	9.98
10	13:50:27.0	9.99
11	13:50:47.0	10.00
12	13:51:07.0	10.01
13	13:51:27.0	10.02
14	13:51:47.0	10.03
15	13:52:07.0	10.03
16	13:52:27.0	10.04
17	13:52:47.0	10.05
18	13:53:07.0	10.06
19	13:53:27.0	10.07
20	13:53:47.0	10.07
21	13:54:07.0	10.08
22	13:54:27.0	10.08
23	13:54:47.0	10.09
24	13:55:07.0	10.10
25	13:55:27.0	10.10
26	13:55:47.0	10.11
27	13:56:07.0	10.11
28	13:56:27.0	10.12
29	13:56:47.0	10.12
30	13:57:07.0	10.12
31	13:57:27.0	10.13
32	13:57:47.0	10.14
33	13:58:07.0	10.14
34	13:58:27.0	10.14
35	13:58:47.0	10.15
36	13:59:07.0	10.15
37	13:59:27.0	10.16
38	13:59:47.0	10.16
39	14:00:07.0	10.16
40	14:00:27.0	10.17
41	14:00:47.0	10.17
42	14:01:07.0	10.18
43	14:01:27.0	10.18
44	14:01:47.0	10.18
45	14:02:07.0	10.19