APPENDIX D

SLUG TESTING METHODOLOGY AND RESULTS

1.0 Purpose

The purpose of this appendix is to determine the hydraulic conductivity of aquifer materials in the vicinity of 4 selected monitoring wells at Range K, Parcel 203(7) based on slug tests conducted in November 2001. The following wells were tested:

Shallow (residuum) water-bearing zone:
RNG-203-MW01
RNG-203-MW04

Deep (bedrock) water-bearing zone:
RNG-203-MW07
RNG-203-MW13.

2.0 Field Procedures

Slug tests were carried out at each of the wells listed above using the methodology specified in Section 5.4.1 of the *Draft Installation-Wide Sampling and Analysis Plan* (SAP) (IT, 2002). Two slug tests were carried out at each well, a rising head test and a falling head test, unless the static water level measured was below the top of the screened interval, in which case only a rising head test was carried out.

At the start of the tests, the monitoring well cap was removed and the monitoring well air headspace was surveyed using a photoionization detector. The depth to water and total depth of the well were measured using a depth to water level indicator. The MiniTroll™ pressure transducer/data logger connected to a laptop computer running Super Slug® (Starpoint Software, Inc. 1994) was lowered into the well to a depth that would allow a 10-foot slug to be lowered so that the top of the slug was 1-foot below the static water level and the bottom of the slug was not touching the transducer/data logger. A 10-foot slug was lowered into the well so that it was just above the static water level. The well was allowed to return to its static water level before proceeding with the falling head test. The transducer/data logger was activated and the slug was lowered into the well so that its top was at least 1-foot below the static water level and bottom not touching the transducer/data logger. Data was logged until the water level returned to within 0.1-feet of static water level. The rising head test was carried out by activating the data logger as the slug was removed from the well. Data was logged until the water level returned to within 0.1-feet of static water level.

3.0 Analysis Method

The computer program Super Slug® (Starpoint Software, Inc. 1994) was utilized to analyze the slug test data. The program is a recently developed window version numerical tool specifically designed for slug test analysis. A unique feature of this program is its ability to automatically filter unusable data (noise signal); also, the software adjusts test data so that the s-t curve begins at the maximum water level displacement. It also offers versatile graphic capabilities and three commonly used slug test analysis methods for selection by users, including Bouwer and Rice (1976), Cooper, Bredehoeft and Papadopulos (1967), and Hvorslev (1951). Additionally, Super Slug® allows for more customizable analyses than other commercially available programs by offering various type curve matching and supporting various input/output units.

Two water-bearing zones (shallow [residuum] and deep [bedrock]) have been identified for the areas where aquifer tests were conducted. Based on the screen interval, two wells were tested in the shallow zone and two wells in the deep zone.

4.0 Theory

The Bouwer and Rice (1976) method for unconfined aquifers is based on the following equations:

$$K = \left[\frac{r_c^2 \, ln(R_e / r_w)}{2 L_{scr}} \right] \frac{1}{t} ln \frac{H_o}{H_t}$$

where:

K	=	Aquifer hydraulic conductivity
r_c	=	Radius of the well casing
t	=	Time since slug removal or injections
H_t	=	Head in well at time t
H_0	=	Initial head change from static water level
R_e	=	Radius of influence of the test
r_w	=	Effective radius of the well (radius of well and gravel pack)
L_{scr}	=	Length of the well screen or open hole.

For partial penetration scenarios, the equation (2) can be used to calculate the radius of influence R_e:

$$ln\frac{R_e}{r_w}=\left[\frac{1.1}{ln(Z/r_w)}+\frac{A+B\,ln[(D-Z)/r_w]}{L_{scr}/r_w}\right]^{-1},$$

For fully penetrating wells using equation (3):

$$ln\frac{R_e}{r_w}=\left[\frac{1.1}{ln(Z/r_w)}+\frac{C}{L_{scr}/r_w}\right]^{-1}$$

where:

D = Aquifer saturated thickness
Z = Height of water column in the well.

Super Slug® automatically determines A, B, and C based on the amount of penetration of the aquifer by the well. Super Slug® automatically determines if the well is fully or partially penetrating and selects the proper parameters. If the well is greater than 95 percent fully penetrating, Super Slug® will assume full penetration and use equation (3).

When water level fluctuations occur within the screened interval of the well, the term r should be adjusted to account for the filter pack and the larger borehole size (after Bouwer, 1989) using the equation below:

$$r_{cadj}=\left[r_c^2+n(r_w^2-r_c^2)\right]^{1/2}$$

where:

n = Filter pack porosity (assumed 30 %).

Cooper, Bredehoeft and Papadopulos' (1967) method is developed for use in confined aquifers that are fully penetrated by the well screen. A series of type curves is plotted semi-logarithmically, with F (alpha, beta) plotted arithmetically on the vertical axis, and beta plotted logarithmically on the horizontal axis. A different curve is plotted for each selected value of alpha.

Time and Head Ratio values are plotted semi-logarithmically to the same scale as the type curves. Head Ratio is plotted arithmetically on the vertical scale; also, a log of time is plotted on the horizontal scale. The data is fit to a type curve, and a value of alpha is estimated.

When the match is indicated, Super Slug ® determines the match point of F (alpha, beta) and beta for the value of time = 0.1 days and head ratio = 0.5. These match points will be indicated with the results of the calculations.

Using Equation 1 below, aquifer transmissivity is determined from the values of t = 0.1 and the beta value calculated from the match curve:

$$\beta = T\tau/r^2c \qquad \text{Eq. 1}$$

where:

T	=	Aquifer transmissivity
t	=	Time since slug removal or injection
r_c	=	Radius of well casing.

Using Equation 2 below, storativity is calculated from the value of alpha estimated by the user:

$$\alpha = r^2_wS/ r^2c \qquad \text{Eq. 2}$$

where:

S	=	Aquifer storativity
r_w	=	Radius of well casing
r_c	=	Radius of well casing.

Because of the similar shape of the type curves, it may be difficult to obtain a unique match for one type curve, especially as alpha becomes small. Papadopulos et al. (1973) state that for alpha < 10^{-5}, if the error in the chosen alpha is within two orders of magnitude of its actual value, the error in the determined transmissivity would be less than 30 percent.

5.0 Assumptions

The Bouwer and Rice (1976) slug test analysis method for unconfined aquifers is based on the following assumptions:

- The aquifer is homogeneous, isotropic and unconfined
- Drawdown is negligible compared to aquifer thickness
- Flow in the unsaturated zone is negligible
- Well losses are negligible.

Cooper, Bredehoeft and Papadopulos' (1967) method for confined aquifers is based on the following assumptions:

- Aquifer has infinite areal extent
- Aquifer is homogeneous, isotropic and of uniform thickness
- Aquifer's potentiometric surface is initially horizontal
- A volume of water, V, is injected or discharged from the well instantaneously
- Test well is fully penetrating
- Flow to the test well is horizontal.

These assumptions represent the ideal conditions in which the calculations are exact and precise while any deviation from these assumptions, often encountered in the field conditions, will result in the testing results being approximate.

6.0 Results

Both falling and rising tests were conducted in four selected wells in November 2001. Table 1 summarizes the conditions under which the tests were conducted including depth to groundwater, the total well depth, and the geometric data of each well tested. The calculated hydraulic conductivity (K) and transmissivity (T) values are summarized in Table 2.

In the shallow (residuum) water-bearing zone, the Bouwer and Rice (1976) method for unconfined aquifers was chosen to analyze the test data for RNG-203-MW01 and RNG-203-MW04. The hydraulic conductivity values in this zone range from 0.26 ft/day at RNG-203-MW04 (rising test) to 60.7 ft/day at RNG-203-MW01 (rising test) with a geometric mean of 3.97 ft/day.

In the deep (bedrock) water-bearing zone, the Cooper, Bredehoeft and Papadopulos (1967) method for confined aquifers was chosen to analyze the test data for RNG-203-MW07 and RNG-203-MW13. The hydraulic conductivity values in this zone range from 3.61 ft/day at RNG-203-MW07 (rising test) to 4.54 ft/day at RNG-203-MW13 (rising test) with a geometric mean of 4.05 ft/day.

7.0 References

Bouwer, H. and Rice, R. C., 1976, ***A Slug Test Method for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells,*** Water Resources Research, Vol. 12, No. 3, pp. 423-428.

Bouwer, 1989, ***The Bouwer and Rice Slug Test- An Update,*** Ground Water, Vol.27, No.3, pp 304-309

Cooper, H. H., Bredehoeft, J. D. and Papadopulos, I. S., 1967, ***Response of a Finite Diameter Well to an Instantaneous Change of Water***, Water Resources Research, Vol. 3, No. 1, pp. 263-269.

Freeze, R. A. and Cherry, J. A., 1979, ***Groundwater***, Prentice-Hall, Englewood Cliffs, New Jersey, 604 p.

Hvorslev, 1951, ***Time Lag and Soil Permeability in Ground Water Observations,*** US Army Corps of Engineers, Waterways Experiment Station, Washington DC., Bulleting No. 36.

IT Corporation (IT), 2002, ***Draft Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama***, Revision 3, February.

Papadopolos, S. S., Bredehoeft, J. D., and Cooper, Jr. H. H., 1973, ***On the Analysis of "Slug Test" Data***, Water Resources Research, Vol. 9, No. 4.

Table 1

Summary of Monitoring Well Geometry Data
Range K, Former Agent Training Area, Parcel 203 (7)
Fort McClellan, Calhoun County, AL

Well No.	Water Level (TOC) (ft)	Total Depth (TOC) (ft)	Water-Bearing Zone	D (Assumed)	r_c (in)	r_w (in)	L_{scr} (ft)	Z (ft)
RNG-203-MW01	10.4	15.1	residuum	4.7	1	4	10	4.7
RNG-203-MW04	12.7	26.9	residuum	14.2	1	4	15	14.2
RNG-203-MW07	7.6	62.1	bedrock	30	2	3.94	20	54.5
RNG-203-MW13	5.95	73.9	bedrock	20	2	3.94	20	67.95

Note:
- D ---- Aquifer saturated thickness (assumed)
- r_c ---- Radius of well casing
- r_w ---- Radius of boring
- L_{scr} ---- Length of saturated well screen
- Z ---- Static height of water in well
- n ---- Porosity of filter pack (Assumed to be 30 percent. Porosities of unconsolidated sand range from 25 to 50 percent [Freeze and Cherry, 1979])

Table 2
Summary of Hydraulic Conductivities
Range K, Former Agent Training Area, Parcel 203 (7)
Fort McClellan, Calhoun County, AL

Well No.	Date Tested	Aquifer Response	Saturated Aquifer Thickness (Assumed)	Test Type	Transmisivities T (ft^2/day)	Hydraulic Conductivities K (ft/min)	Hydraulic Conductivities K (cm/sec)	Hydraulic Conductivities K (ft/day)
Residuum								
RNG-203-MW01	11/26/2001	Unconfined	4.70	Rising	2.85E+02	4.21E-02	2.14E-02	6.07E+01
RNG-203-MW04	11/26/2001	Unconfined	14.20	Rising	3.70E+00	1.81E-04	9.19E-05	2.60E-01
Maximum					2.85E+02	4.21E-02	2.14E-02	6.07E+01
Minimum					3.70E+00	1.81E-04	9.19E-05	2.60E-01
Geometric Mean					3.25E+01	2.76E-03	1.40E-03	3.97E+00
Bedrock								
RNG-203-MW07	11/26/2001	Confined	30.00	Falling	1.16E+02	2.70E-03	1.37E-03	3.88E+00
				Rising	1.08E+02	2.51E-03	1.28E-03	3.61E+00
RNG-203-MW13	11/26/2001	Confined	20.00	Falling	8.45E+01	2.93E-03	1.49E-03	4.22E+00
				Rising	9.07E+01	3.15E-03	1.60E-03	4.54E+00
Maximum					1.16E+02	3.15E-03	1.60E-03	4.54E+00
Minimum					8.45E+01	2.51E-03	1.28E-03	3.61E+00
Geometric Mean					9.92E+01	2.81E-03	1.43E-03	4.05E+00

Notes: 1 Saturated Aquifer Thickness
For a confined Aquifer, this is the distance from the base of the upper confining unit to the top of the lower confining unit.
For an unconfined aquifer, this is the distance from the water table to the top of the lower confining unit.

2 Analysis Method
Cooper, Bredehoeft, Papadopulos (1967) method is used for the well with confined aquifers response.
Bouwer and Rice (1976) method is used for the well with unconfined aquifers response.

Table 2
Summary of Hydraulic Conductivities
Range K, Former Agent Training Area, Parcel 203 (7)
Fort McClellan, Calhoun County, AL

Well No.	Date Tested	Aquifer Response	Saturated Aquifer Thickness (Assumed)	Test Type	Transmisivities T (ft^2/day)	Hydraulic Conductivities K (ft/min)	Hydraulic Conductivities K (cm/sec)	Hydraulic Conductivities K (ft/day)
Residuum								
RNG-203-MW01	11/26/01	Unconfined	4.70	Rising	2.85E+02	4.21E-02	2.14E-02	6.07E+01
RNG-203-MW04	11/26/01	Unconfined	14.20	Rising	3.70E+00	1.81E-04	9.19E-05	2.60E-01
Maximum					2.85E+02	4.21E-02	2.14E-02	6.07E+01
Minimum					3.70E+00	1.81E-04	9.19E-05	2.60E-01
Geometric Mean					3.25E+01	2.76E-03	1.40E-03	3.97E+00
Bedrock								
RNG-203-MW07	11/26/01	Confined	30.00	Falling	1.16E+02	2.70E-03	1.37E-03	3.88E+00
				Rising	1.08E+02	2.51E-03	1.28E-03	3.61E+00
RNG-203-MW13	11/26/01	Confined	20.00	Falling	8.45E+01	2.93E-03	1.49E-03	4.22E+00
				Rising	9.07E+01	3.15E-03	1.60E-03	4.54E+00
Maximum					1.16E+02	3.15E-03	1.60E-03	4.54E+00
Minimum					8.45E+01	2.51E-03	1.28E-03	3.61E+00
Geometric Mean					9.92E+01	2.81E-03	1.43E-03	4.05E+00

Notes: 1 Saturated Aquifer Thickness

For a confined Aquifer, this is the distance from the base of the upper confining unit to the top of the lower confining unit.

For an unconfined aquifer, this is the distance from the water table to the top of the lower confining unit.

2 Analysis Method

Cooper, Bredehoeft, Papadopulos (1967) method is used for the well with confined aquifers response.

Bouwer and Rice (1976) method is used for the well with unconfined aquifers response.

ATTACHMENT I

TIME VERSUS DRAWDOWN DATA
FIELD ACTIVITY DAILY LOGS

TIME VERSUS DRAWDOWN DATA

Rising Head Test

Site Name:	Fort McClellan
Location:	Parcel 203 (7)
Test Date:	11/27/01
Import File:	C:\Documents and Settings\jli\My Documents\Projects\FTMA\203mw1r.txt

Well Label:	RNG-203-MW01
Aquifer Thickness:	4.7 feet
Screen Length:	10. feet
Casing Radius:	1. inches
Effective Radius:	4. inches
Gravel Pack Porosity:	30. %
Corrected Casing Radius:	2.345 inches
Static Water Level:	0. feet
Water Table to Screen Bottom:	4.7 feet
Anisotropy Ratio:	1.
Time Adjustment:	0.6 Seconds

Test starts with trial 2
There are 137 time and drawdown measurements
Maximum head is 0.782 feet
Minimum head is -2.2e-002 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-1.e-002	0.754	0.754	0.9642
2	5.e-003	-5.e-003	0.756	0.756	0.9668
3	1.e-002	0.	0.782	0.782	1.
4	1.5e-002	5.e-003	0.738	0.738	0.9437
5	2.e-002	1.e-002	0.712	0.712	0.9105
6	2.5e-002	1.5e-002	0.702	0.702	0.8977
7	3.e-002	2.e-002	0.686	0.686	0.8772
8	3.5e-002	2.5e-002	0.663	0.663	0.8478
9	4.e-002	3.e-002	0.653	0.653	0.835
10	4.5e-002	3.5e-002	0.639	0.639	0.8171
11	5.e-002	4.e-002	0.625	0.625	0.7992
12	5.5e-002	4.5e-002	0.613	0.613	0.7839
13	6.e-002	5.e-002	0.601	0.601	0.7685
14	6.5e-002	5.5e-002	0.587	0.587	0.7506
15	7.e-002	6.e-002	0.575	0.575	0.7353
16	7.5e-002	6.5e-002	0.565	0.565	0.7225
17	8.e-002	7.e-002	0.551	0.551	0.7046

18	8.48e-002	7.48e-002	0.541	0.541	0.6918
19	9.e-002	8.e-002	0.529	0.529	0.6765
20	9.5e-002	8.5e-002	0.519	0.519	0.6637
21	0.1	9.e-002	0.507	0.507	0.6483
22	0.1058	9.58e-002	0.495	0.495	0.633
23	0.112	0.102	0.483	0.483	0.6176
24	0.1185	0.1085	0.465	0.465	0.5946
25	0.1255	0.1155	0.453	0.453	0.5793
26	0.1328	0.1228	0.439	0.439	0.5614
27	0.1407	0.1307	0.423	0.423	0.5409
28	0.149	0.139	0.405	0.405	0.5179
29	0.1578	0.1478	0.391	0.391	0.5
30	0.167	0.157	0.373	0.373	0.477
31	0.177	0.167	0.356	0.356	0.4552
32	0.1875	0.1775	0.34	0.34	0.4348
33	0.1985	0.1885	0.324	0.324	0.4143
34	0.2102	0.2002	0.306	0.306	0.3913
35	0.2227	0.2127	0.288	0.288	0.3683
36	0.2358	0.2258	0.268	0.268	0.3427
37	0.2498	0.2398	0.25	0.25	0.3197
38	0.2647	0.2547	0.23	0.23	0.2941
39	0.2803	0.2703	0.212	0.212	0.2711
40	0.297	0.287	0.192	0.192	0.2455
41	0.3147	0.3047	0.172	0.172	0.2199
42	0.3333	0.3233	0.156	0.156	0.1995
43	0.3532	0.3432	0.136	0.136	0.1739
44	0.3742	0.3642	0.118	0.118	0.1509
45	0.3963	0.3863	0.102	0.102	0.1304
46	0.4198	0.4098	8.6e-002	8.6e-002	0.11
47	0.4447	0.4347	7.2e-002	7.2e-002	9.207e-002
48	0.4697	0.4597	6.e-002	6.e-002	7.673e-002
49	0.4963	0.4863	4.8e-002	4.8e-002	6.138e-002
50	0.5247	0.5147	3.6e-002	3.6e-002	4.604e-002
51	0.5547	0.5447	2.8e-002	2.8e-002	3.581e-002
52	0.5863	0.5763	2.e-002	2.e-002	2.558e-002
53	0.6213	0.6113	1.6e-002	1.6e-002	2.046e-002
54	0.6578	0.6478	1.e-002	1.e-002	1.279e-002
55	0.6963	0.6863	6.e-003	6.e-003	7.673e-003
56	0.738	0.728	4.e-003	4.e-003	5.115e-003
57	0.7813	0.7713	2.e-003	2.e-003	2.558e-003
58	0.828	0.818	0.	0.	0.

59	0.8763	0.8663	2.e-003	2.e-003	2.558e-003
60	0.928	0.918	0.	0.	0.
61	0.983	0.973	0.	0.	0.
62	1.041	1.031	-3.e-003	-3.e-003	-3.836e-003
63	1.103	1.093	-3.e-003	-3.e-003	-3.836e-003
64	1.168	1.158	-3.e-003	-3.e-003	-3.836e-003
65	1.238	1.228	-3.e-003	-3.e-003	-3.836e-003
66	1.311	1.301	-3.e-003	-3.e-003	-3.836e-003
67	1.39	1.38	-5.e-003	-5.e-003	-6.394e-003
68	1.473	1.463	-5.e-003	-5.e-003	-6.394e-003
69	1.561	1.551	-5.e-003	-5.e-003	-6.394e-003
70	1.655	1.645	-5.e-003	-5.e-003	-6.394e-003
71	1.753	1.743	-5.e-003	-5.e-003	-6.394e-003
72	1.858	1.848	-5.e-003	-5.e-003	-6.394e-003
73	1.968	1.958	-5.e-003	-5.e-003	-6.394e-003
74	2.085	2.075	-5.e-003	-5.e-003	-6.394e-003
75	2.21	2.2	-5.e-003	-5.e-003	-6.394e-003
76	2.341	2.331	-5.e-003	-5.e-003	-6.394e-003
77	2.481	2.471	-7.e-003	-7.e-003	-8.951e-003
78	2.63	2.62	-7.e-003	-7.e-003	-8.951e-003
79	2.786	2.776	-7.e-003	-7.e-003	-8.951e-003
80	2.953	2.943	-7.e-003	-7.e-003	-8.951e-003
81	3.13	3.12	-7.e-003	-7.e-003	-8.951e-003
82	3.316	3.306	-7.e-003	-7.e-003	-8.951e-003
83	3.515	3.505	-9.e-003	-9.e-003	-1.151e-002
84	3.725	3.715	-9.e-003	-9.e-003	-1.151e-002
85	3.946	3.936	-9.e-003	-9.e-003	-1.151e-002
86	4.181	4.171	-9.e-003	-9.e-003	-1.151e-002
87	4.43	4.42	-9.e-003	-9.e-003	-1.151e-002
88	4.693	4.683	-9.e-003	-9.e-003	-1.151e-002
89	4.973	4.963	-9.e-003	-9.e-003	-1.151e-002
90	5.27	5.26	-1.1e-002	-1.1e-002	-1.407e-002
91	5.583	5.573	-9.e-003	-9.e-003	-1.151e-002
92	5.915	5.905	-1.1e-002	-1.1e-002	-1.407e-002
93	6.266	6.256	-1.3e-002	-1.3e-002	-1.662e-002
94	6.64	6.63	-1.4e-002	-1.4e-002	-1.79e-002
95	7.035	7.025	-1.2e-002	-1.2e-002	-1.535e-002
96	7.453	7.443	-1.2e-002	-1.2e-002	-1.535e-002
97	7.896	7.886	-1.4e-002	-1.4e-002	-1.79e-002
98	8.366	8.356	-1.4e-002	-1.4e-002	-1.79e-002
99	8.865	8.855	-1.4e-002	-1.4e-002	-1.79e-002

100	9.391	9.381	-1.6e-002	-1.6e-002	-2.046e-002
101	9.95	9.94	-1.6e-002	-1.6e-002	-2.046e-002
102	10.54	10.53	-1.6e-002	-1.6e-002	-2.046e-002
103	11.17	11.16	-1.6e-002	-1.6e-002	-2.046e-002
104	11.83	11.82	-1.8e-002	-1.8e-002	-2.302e-002
105	12.53	12.52	-1.8e-002	-1.8e-002	-2.302e-002
106	13.28	13.27	-1.8e-002	-1.8e-002	-2.302e-002
107	14.07	14.06	-1.8e-002	-1.8e-002	-2.302e-002
108	14.91	14.9	-2.e-002	-2.e-002	-2.558e-002
109	15.79	15.78	-2.e-002	-2.e-002	-2.558e-002
110	16.73	16.72	-2.e-002	-2.e-002	-2.558e-002
111	17.72	17.71	-2.e-002	-2.e-002	-2.558e-002
112	18.78	18.77	-2.e-002	-2.e-002	-2.558e-002
113	19.89	19.88	-2.2e-002	-2.2e-002	-2.813e-002
114	21.07	21.06	-2.2e-002	-2.2e-002	-2.813e-002
115	22.32	22.31	-2.2e-002	-2.2e-002	-2.813e-002
116	23.65	23.64	-2.2e-002	-2.2e-002	-2.813e-002
117	25.05	25.04	-2.2e-002	-2.2e-002	-2.813e-002
118	26.54	26.53	-2.2e-002	-2.2e-002	-2.813e-002
119	28.12	28.11	-2.e-002	-2.e-002	-2.558e-002
120	29.79	29.78	-2.2e-002	-2.2e-002	-2.813e-002
121	31.55	31.54	-2.e-002	-2.e-002	-2.558e-002
122	33.43	33.42	-2.2e-002	-2.2e-002	-2.813e-002
123	35.41	35.4	-2.2e-002	-2.2e-002	-2.813e-002
124	37.51	37.5	-2.2e-002	-2.2e-002	-2.813e-002
125	39.74	39.73	-2.2e-002	-2.2e-002	-2.813e-002
126	42.1	42.09	-2.2e-002	-2.2e-002	-2.813e-002
127	44.6	44.59	-2.2e-002	-2.2e-002	-2.813e-002
128	47.24	47.23	-2.2e-002	-2.2e-002	-2.813e-002
129	50.05	50.04	-2.2e-002	-2.2e-002	-2.813e-002
130	53.01	53.	-2.e-002	-2.e-002	-2.558e-002
131	56.16	56.15	-2.e-002	-2.e-002	-2.558e-002
132	59.49	59.48	-2.e-002	-2.e-002	-2.558e-002
133	63.02	63.01	-1.8e-002	-1.8e-002	-2.302e-002
134	66.76	66.75	-1.2e-002	-1.2e-002	-1.535e-002
135	70.72	70.71	-8.e-003	-8.e-003	-1.023e-002
136	74.91	74.9	-4.e-003	-4.e-003	-5.115e-003
137	79.35	79.34	0.	0.	0.

Rising Head Test

Site Name:	Fort McClellan
Location:	Parcel 203 (7)
Test Date:	11/27/01
Import File:	C:\Documents and Settings\jli\My Documents\Projects\FTMC\203mw4ra.txt

Well Label:	RNG-203-MW04
Aquifer Thickness:	14.2 feet
Screen Length:	15. feet
Casing Radius:	1. inches
Effective Radius:	4. inches
Gravel Pack Porosity:	30. %
Corrected Casing Radius:	2.345 inches
Static Water Level:	0. feet
Water Table to Screen Bottom:	14.2 feet
Anisotropy Ratio:	1.
Time Adjustment:	148.9 Seconds

Test starts with trial 0
There are 149 time and drawdown measurements
Maximum head is 0.482 feet
Minimum head is -4.8e-002 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	2.481	0.	0.482	0.482	1.
2	2.63	0.1484	0.47	0.47	0.9751
3	2.786	0.305	0.463	0.463	0.9606
4	2.953	0.4717	0.45	0.45	0.9336
5	3.13	0.6484	0.441	0.441	0.9149
6	3.316	0.835	0.431	0.431	0.8942
7	3.515	1.033	0.423	0.423	0.8776
8	3.725	1.243	0.411	0.411	0.8527
9	3.946	1.465	0.401	0.401	0.832
10	4.181	1.7	0.396	0.396	0.8216
11	4.43	1.948	0.382	0.382	0.7925
12	4.693	2.212	0.374	0.374	0.7759
13	4.973	2.492	0.365	0.365	0.7573
14	5.27	2.788	0.355	0.355	0.7365
15	5.583	3.102	0.345	0.345	0.7158
16	5.915	3.433	0.337	0.337	0.6992
17	6.266	3.785	0.325	0.325	0.6743

18	6.64	4.158	0.315	0.315	0.6535
19	7.035	4.553	0.306	0.306	0.6349
20	7.453	4.972	0.298	0.298	0.6183
21	7.896	5.415	0.283	0.283	0.5871
22	8.366	5.885	0.276	0.276	0.5726
23	8.865	6.383	0.269	0.269	0.5581
24	9.391	6.91	0.261	0.261	0.5415
25	9.95	7.468	0.251	0.251	0.5207
26	10.54	8.06	0.239	0.239	0.4959
27	11.17	8.687	0.229	0.229	0.4751
28	11.83	9.35	0.224	0.224	0.4647
29	12.53	10.05	0.215	0.215	0.4461
30	13.28	10.8	0.205	0.205	0.4253
31	14.07	11.59	0.2	0.2	0.4149
32	14.91	12.42	0.19	0.19	0.3942
33	15.79	13.31	0.183	0.183	0.3797
34	16.73	14.25	0.172	0.172	0.3568
35	17.72	15.24	0.16	0.16	0.332
36	18.78	16.29	0.153	0.153	0.3174
37	19.89	17.41	0.148	0.148	0.3071
38	21.07	18.59	0.138	0.138	0.2863
39	22.32	19.84	0.133	0.133	0.2759
40	23.65	21.17	0.123	0.123	0.2552
41	25.05	22.57	0.116	0.116	0.2407
42	26.54	24.06	0.111	0.111	0.2303
43	28.12	25.64	0.104	0.104	0.2158
44	29.79	27.31	0.106	0.106	0.2199
45	31.55	29.07	9.e-002	9.e-002	0.1867
46	33.43	30.95	8.2e-002	8.2e-002	0.1701
47	35.41	32.93	8.e-002	8.e-002	0.166
48	37.51	35.03	8.5e-002	8.5e-002	0.1763
49	39.74	37.26	6.6e-002	6.6e-002	0.1369
50	42.1	39.62	5.9e-002	5.9e-002	0.1224
51	44.6	42.12	5.6e-002	5.6e-002	0.1162
52	47.24	44.76	4.9e-002	4.9e-002	0.1017
53	50.05	47.57	4.2e-002	4.2e-002	8.714e-002
54	53.01	50.53	3.9e-002	3.9e-002	8.091e-002
55	56.16	53.68	3.2e-002	3.2e-002	6.639e-002
56	59.49	57.01	3.2e-002	3.2e-002	6.639e-002
57	63.02	60.54	3.e-002	3.e-002	6.224e-002
58	66.76	64.28	3.9e-002	3.9e-002	8.091e-002

59	70.72	68.24	2.e-002	2.e-002	4.149e-002
60	74.91	72.43	1.7e-002	1.7e-002	3.527e-002
61	79.35	76.87	1.5e-002	1.5e-002	3.112e-002
62	84.06	81.58	1.e-002	1.e-002	2.075e-002
63	89.05	86.57	7.e-003	7.e-003	1.452e-002
64	94.33	91.84	7.e-003	7.e-003	1.452e-002
65	99.92	97.44	-1.e-003	-1.e-003	-2.075e-003
66	105.8	103.4	4.e-003	4.e-003	8.299e-003
67	112.1	109.6	-3.e-003	-3.e-003	-6.224e-003
68	118.8	116.3	-3.e-003	-3.e-003	-6.224e-003
69	125.8	123.3	-3.e-003	-3.e-003	-6.224e-003
70	133.3	130.8	-9.e-003	-9.e-003	-1.867e-002
71	141.2	138.7	-1.1e-002	-1.1e-002	-2.282e-002
72	149.5	147.1	-1.1e-002	-1.1e-002	-2.282e-002
73	158.4	155.9	-1.4e-002	-1.4e-002	-2.905e-002
74	167.8	165.3	-1.9e-002	-1.9e-002	-3.942e-002
75	177.7	175.3	-1.7e-002	-1.7e-002	-3.527e-002
76	188.3	185.8	-2.2e-002	-2.2e-002	-4.564e-002
77	198.3	195.8	-1.7e-002	-1.7e-002	-3.527e-002
78	208.3	205.8	-1.7e-002	-1.7e-002	-3.527e-002
79	218.3	215.8	-1.7e-002	-1.7e-002	-3.527e-002
80	228.3	225.8	-1.7e-002	-1.7e-002	-3.527e-002
81	238.3	235.8	-1.5e-002	-1.5e-002	-3.112e-002
82	248.3	245.8	-1.5e-002	-1.5e-002	-3.112e-002
83	258.3	255.8	-1.5e-002	-1.5e-002	-3.112e-002
84	268.3	265.8	-1.8e-002	-1.8e-002	-3.734e-002
85	278.3	275.8	-1.8e-002	-1.8e-002	-3.734e-002
86	288.3	285.8	-2.e-002	-2.e-002	-4.149e-002
87	298.3	295.8	-2.3e-002	-2.3e-002	-4.772e-002
88	308.3	305.8	-2.e-002	-2.e-002	-4.149e-002
89	318.3	315.8	-1.8e-002	-1.8e-002	-3.734e-002
90	328.3	325.8	-2.e-002	-2.e-002	-4.149e-002
91	338.3	335.8	-2.3e-002	-2.3e-002	-4.772e-002
92	348.3	345.8	-2.1e-002	-2.1e-002	-4.357e-002
93	358.3	355.8	-2.1e-002	-2.1e-002	-4.357e-002
94	368.3	365.8	-2.1e-002	-2.1e-002	-4.357e-002
95	378.3	375.8	-2.8e-002	-2.8e-002	-5.809e-002
96	388.3	385.8	-3.6e-002	-3.6e-002	-7.469e-002
97	398.3	395.8	-3.6e-002	-3.6e-002	-7.469e-002
98	408.3	405.8	-3.8e-002	-3.8e-002	-7.884e-002
99	418.3	415.8	-4.1e-002	-4.1e-002	-8.506e-002

100	428.3	425.8	-4.1e-002	-4.1e-002	-8.506e-002
101	438.3	435.8	-4.8e-002	-4.8e-002	-9.959e-002
102	448.3	445.8	-4.6e-002	-4.6e-002	-9.544e-002
103	458.3	455.8	-4.6e-002	-4.6e-002	-9.544e-002
104	468.3	465.8	-4.6e-002	-4.6e-002	-9.544e-002
105	478.3	475.8	-4.6e-002	-4.6e-002	-9.544e-002
106	488.3	485.8	-4.4e-002	-4.4e-002	-9.129e-002
107	498.3	495.8	-3.9e-002	-3.9e-002	-8.091e-002
108	508.3	505.8	-3.6e-002	-3.6e-002	-7.469e-002
109	518.3	515.8	-3.4e-002	-3.4e-002	-7.054e-002
110	528.3	525.8	-2.9e-002	-2.9e-002	-6.017e-002
111	538.3	535.8	-3.2e-002	-3.2e-002	-6.639e-002
112	548.3	545.8	-2.9e-002	-2.9e-002	-6.017e-002
113	558.3	555.8	-2.4e-002	-2.4e-002	-4.979e-002
114	568.3	565.8	-2.4e-002	-2.4e-002	-4.979e-002
115	578.3	575.8	-2.9e-002	-2.9e-002	-6.017e-002
116	588.3	585.8	-2.4e-002	-2.4e-002	-4.979e-002
117	598.3	595.8	-2.2e-002	-2.2e-002	-4.564e-002
118	608.3	605.8	-2.4e-002	-2.4e-002	-4.979e-002
119	618.3	615.8	-2.7e-002	-2.7e-002	-5.602e-002
120	628.3	625.8	-2.7e-002	-2.7e-002	-5.602e-002
121	638.3	635.8	-2.9e-002	-2.9e-002	-6.017e-002
122	648.3	645.8	-2.9e-002	-2.9e-002	-6.017e-002
123	658.3	655.8	-2.7e-002	-2.7e-002	-5.602e-002
124	668.3	665.8	-2.9e-002	-2.9e-002	-6.017e-002
125	678.3	675.8	-3.2e-002	-3.2e-002	-6.639e-002
126	688.3	685.8	-3.e-002	-3.e-002	-6.224e-002
127	698.3	695.8	-3.e-002	-3.e-002	-6.224e-002
128	708.3	705.8	-3.2e-002	-3.2e-002	-6.639e-002
129	718.3	715.8	-3.2e-002	-3.2e-002	-6.639e-002
130	728.3	725.8	-3.4e-002	-3.4e-002	-7.054e-002
131	738.3	735.8	-3.9e-002	-3.9e-002	-8.091e-002
132	748.3	745.8	-3.4e-002	-3.4e-002	-7.054e-002
133	758.3	755.8	-3.2e-002	-3.2e-002	-6.639e-002
134	768.3	765.8	-3.e-002	-3.e-002	-6.224e-002
135	778.3	775.8	-3.e-002	-3.e-002	-6.224e-002
136	788.3	785.8	-2.7e-002	-2.7e-002	-5.602e-002
137	798.3	795.8	-2.5e-002	-2.5e-002	-5.187e-002
138	808.3	805.8	-2.5e-002	-2.5e-002	-5.187e-002
139	818.3	815.8	-2.5e-002	-2.5e-002	-5.187e-002
140	828.3	825.8	-2.e-002	-2.e-002	-4.149e-002

141	838.3	835.8	-2.e-002	-2.e-002	-4.149e-002
142	848.3	845.8	-2.2e-002	-2.2e-002	-4.564e-002
143	858.3	855.8	-1.8e-002	-1.8e-002	-3.734e-002
144	868.3	865.8	-1.e-002	-1.e-002	-2.075e-002
145	878.3	875.8	-8.e-003	-8.e-003	-1.66e-002
146	888.3	885.8	2.e-003	2.e-003	4.149e-003
147	898.3	895.8	0.	0.	0.
148	908.3	905.8	0.	0.	0.
149	918.3	915.8	0.	0.	0.

Falling Head Test

Site Name:	Fort McClellan
Location:	Parcel 203 (7)
Test Date:	11/27/01
Import File:	C:\Documents and Settings\jli\My Documents\Projects\FTMA\203mw7f.txt

Well Label:	RNG-203-MW07
Aquifer Thickness:	30. feet
Screen Length:	20. feet
Casing Radius:	2. inches
Effective Radius:	3.94 inches
Static Water Level:	0. feet
Water Table to Screen Bottom:	54.5 feet
Anisotropy Ratio:	1.
Time Adjustment:	0. Seconds

Test starts with trial 0
There are 97 time and drawdown measurements
Maximum head is 2.46 feet
Minimum head is -1.568 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	-2.46	2.46	1.
2	5.e-003	5.e-003	-2.399	2.399	0.9752
3	1.e-002	1.e-002	-1.198	1.198	0.487
4	1.5e-002	1.5e-002	1.568	-1.568	-0.6374
5	2.e-002	2.e-002	-1.1	1.1	0.4472
6	2.5e-002	2.5e-002	-1.508	1.508	0.613
7	3.e-002	3.e-002	-1.462	1.462	0.5943
8	3.5e-002	3.5e-002	-0.824	0.824	0.335
9	4.e-002	4.e-002	-0.807	0.807	0.328
10	4.5e-002	4.5e-002	-1.235	1.235	0.502
11	5.e-002	5.e-002	-0.902	0.902	0.3667
12	5.5e-002	5.5e-002	-1.017	1.017	0.4134
13	6.e-002	6.e-002	-1.022	1.022	0.4154
14	6.5e-002	6.5e-002	-0.995	0.995	0.4045
15	7.e-002	7.e-002	-0.975	0.975	0.3963
16	7.5e-002	7.5e-002	-0.963	0.963	0.3915
17	8.e-002	8.e-002	-0.948	0.948	0.3854
18	8.48e-002	8.48e-002	-0.948	0.948	0.3854
19	9.e-002	9.e-002	-0.934	0.934	0.3797

20	9.5e-002	9.5e-002	-0.921	0.921	0.3744
21	0.1	0.1	-0.912	0.912	0.3707
22	0.1058	0.1058	-0.897	0.897	0.3646
23	0.112	0.112	-0.89	0.89	0.3618
24	0.1185	0.1185	-0.877	0.877	0.3565
25	0.1255	0.1255	-0.863	0.863	0.3508
26	0.1328	0.1328	-0.848	0.848	0.3447
27	0.1407	0.1407	-0.836	0.836	0.3398
28	0.149	0.149	-0.824	0.824	0.335
29	0.1578	0.1578	-0.806	0.806	0.3276
30	0.167	0.167	-0.787	0.787	0.3199
31	0.177	0.177	-0.772	0.772	0.3138
32	0.1875	0.1875	-0.755	0.755	0.3069
33	0.1985	0.1985	-0.741	0.741	0.3012
34	0.2102	0.2102	-0.719	0.719	0.2923
35	0.2227	0.2227	-0.702	0.702	0.2854
36	0.2358	0.2358	-0.677	0.677	0.2752
37	0.2498	0.2498	-0.662	0.662	0.2691
38	0.2647	0.2647	-0.64	0.64	0.2602
39	0.2803	0.2803	-0.621	0.621	0.2524
40	0.297	0.297	-0.597	0.597	0.2427
41	0.3147	0.3147	-0.572	0.572	0.2325
42	0.3333	0.3333	-0.552	0.552	0.2244
43	0.3532	0.3532	-0.526	0.526	0.2138
44	0.3742	0.3742	-0.501	0.501	0.2037
45	0.3963	0.3963	-0.455	0.455	0.185
46	0.4198	0.4198	-0.455	0.455	0.185
47	0.4447	0.4447	-0.43	0.43	0.1748
48	0.4697	0.4697	-0.406	0.406	0.165
49	0.4963	0.4963	-0.389	0.389	0.1581
50	0.5247	0.5247	-0.345	0.345	0.1402
51	0.5547	0.5547	-0.337	0.337	0.137
52	0.5863	0.5863	-0.318	0.318	0.1293
53	0.6213	0.6213	-0.296	0.296	0.1203
54	0.6578	0.6578	-0.274	0.274	0.1114
55	0.6963	0.6963	-0.252	0.252	0.1024
56	0.738	0.738	-0.23	0.23	9.35e-002
57	0.7813	0.7813	-0.208	0.208	8.455e-002
58	0.828	0.828	-0.193	0.193	7.846e-002
59	0.8763	0.8763	-0.171	0.171	6.951e-002
60	0.928	0.928	-0.156	0.156	6.341e-002

61	0.983	0.983	-0.139	0.139	5.65e-002
62	1.041	1.041	-0.122	0.122	4.959e-002
63	1.103	1.103	-0.108	0.108	4.39e-002
64	1.168	1.168	-0.1	0.1	4.065e-002
65	1.238	1.238	-8.8e-002	8.8e-002	3.577e-002
66	1.311	1.311	-7.8e-002	7.8e-002	3.171e-002
67	1.39	1.39	-6.9e-002	6.9e-002	2.805e-002
68	1.473	1.473	-6.1e-002	6.1e-002	2.48e-002
69	1.561	1.561	-5.2e-002	5.2e-002	2.114e-002
70	1.655	1.655	-4.7e-002	4.7e-002	1.911e-002
71	1.753	1.753	-4.4e-002	4.4e-002	1.789e-002
72	1.858	1.858	-3.7e-002	3.7e-002	1.504e-002
73	1.968	1.968	-3.7e-002	3.7e-002	1.504e-002
74	2.085	2.085	-3.2e-002	3.2e-002	1.301e-002
75	2.21	2.21	-3.e-002	3.e-002	1.22e-002
76	2.341	2.341	-2.5e-002	2.5e-002	1.016e-002
77	2.481	2.481	-2.2e-002	2.2e-002	8.943e-003
78	2.63	2.63	-1.7e-002	1.7e-002	6.911e-003
79	2.786	2.786	-2.e-002	2.e-002	8.13e-003
80	2.953	2.953	-1.7e-002	1.7e-002	6.911e-003
81	3.13	3.13	-1.3e-002	1.3e-002	5.285e-003
82	3.316	3.316	-1.e-002	1.e-002	4.065e-003
83	3.515	3.515	-1.3e-002	1.3e-002	5.285e-003
84	3.725	3.725	-5.e-003	5.e-003	2.033e-003
85	3.946	3.946	-5.e-003	5.e-003	2.033e-003
86	4.181	4.181	-3.e-003	3.e-003	1.22e-003
87	4.43	4.43	-8.e-003	8.e-003	3.252e-003
88	4.693	4.693	-8.e-003	8.e-003	3.252e-003
89	4.973	4.973	0.	0.	0.
90	5.27	5.27	0.	0.	0.
91	5.583	5.583	-3.e-003	3.e-003	1.22e-003
92	5.915	5.915	-5.e-003	5.e-003	2.033e-003
93	6.266	6.266	2.e-003	-2.e-003	-8.13e-004
94	6.64	6.64	2.e-003	-2.e-003	-8.13e-004
95	7.035	7.035	0.	0.	0.
96	7.453	7.453	2.e-003	-2.e-003	-8.13e-004
97	7.896	7.896	0.	0.	0.

Rising Head Test

Site Name:	Fort McClellan
Location:	Parcel 203 (7)
Test Date:	11/27/01
Import File:	C:\Documents and Settings\jli\My Documents\Projects\FTMA\203mw7r.txt

Well Label:	RNG-203-MW07
Aquifer Thickness:	30. feet
Screen Length:	20. feet
Casing Radius:	2. inches
Effective Radius:	3.94 inches
Static Water Level:	0. feet
Water Table to Screen Bottom:	54.5 feet
Anisotropy Ratio:	1.
Time Adjustment:	2.7 Seconds

Test starts with trial 9
There are 104 time and drawdown measurements
Maximum head is 1.139 feet
Minimum head is -6.5e-002 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-4.5e-002	-6.5e-002	-6.5e-002	-5.707e-002
2	5.e-003	-4.e-002	0.207	0.207	0.1817
3	1.e-002	-3.5e-002	0.359	0.359	0.3152
4	1.5e-002	-3.e-002	0.349	0.349	0.3064
5	2.e-002	-2.5e-002	0.701	0.701	0.6155
6	2.5e-002	-2.e-002	0.691	0.691	0.6067
7	3.e-002	-1.5e-002	0.899	0.899	0.7893
8	3.5e-002	-1.e-002	0.985	0.985	0.8648
9	4.e-002	-5.e-003	1.105	1.105	0.9701
10	4.5e-002	0.	1.139	1.139	1.
11	5.e-002	5.e-003	1.114	1.114	0.9781
12	5.5e-002	1.e-002	1.097	1.097	0.9631
13	6.e-002	1.5e-002	1.083	1.083	0.9508
14	6.5e-002	2.e-002	1.073	1.073	0.9421
15	7.e-002	2.5e-002	1.065	1.065	0.935
16	7.5e-002	3.e-002	1.043	1.043	0.9157
17	8.e-002	3.5e-002	1.031	1.031	0.9052
18	8.48e-002	3.98e-002	1.017	1.017	0.8929
19	9.e-002	4.5e-002	1.004	1.004	0.8815

20	9.5e-002	5.e-002	0.992	0.992	0.8709
21	0.1	5.5e-002	0.98	0.98	0.8604
22	0.1058	6.08e-002	0.965	0.965	0.8472
23	0.112	6.7e-002	0.951	0.951	0.8349
24	0.1185	7.35e-002	0.939	0.939	0.8244
25	0.1255	8.05e-002	0.919	0.919	0.8068
26	0.1328	8.78e-002	0.909	0.909	0.7981
27	0.1407	9.57e-002	0.892	0.892	0.7831
28	0.149	0.104	0.875	0.875	0.7682
29	0.1578	0.1128	0.855	0.855	0.7507
30	0.167	0.122	0.843	0.843	0.7401
31	0.177	0.132	0.821	0.821	0.7208
32	0.1875	0.1425	0.801	0.801	0.7032
33	0.1985	0.1535	0.784	0.784	0.6883
34	0.2102	0.1652	0.765	0.765	0.6716
35	0.2227	0.1777	0.74	0.74	0.6497
36	0.2358	0.1908	0.718	0.718	0.6304
37	0.2498	0.2048	0.696	0.696	0.6111
38	0.2647	0.2197	0.679	0.679	0.5961
39	0.2803	0.2353	0.652	0.652	0.5724
40	0.297	0.252	0.63	0.63	0.5531
41	0.3147	0.2697	0.606	0.606	0.532
42	0.3333	0.2883	0.581	0.581	0.5101
43	0.3532	0.3082	0.557	0.557	0.489
44	0.3742	0.3292	0.528	0.528	0.4636
45	0.3963	0.3513	0.508	0.508	0.446
46	0.4198	0.3748	0.483	0.483	0.4241
47	0.4447	0.3997	0.459	0.459	0.403
48	0.4697	0.4247	0.435	0.435	0.3819
49	0.4963	0.4513	0.41	0.41	0.36
50	0.5247	0.4797	0.388	0.388	0.3406
51	0.5547	0.5097	0.366	0.366	0.3213
52	0.5863	0.5413	0.341	0.341	0.2994
53	0.6213	0.5763	0.317	0.317	0.2783
54	0.6578	0.6128	0.295	0.295	0.259
55	0.6963	0.6513	0.273	0.273	0.2397
56	0.738	0.693	0.251	0.251	0.2204
57	0.7813	0.7363	0.229	0.229	0.2011
58	0.828	0.783	0.209	0.209	0.1835
59	0.8763	0.8313	0.192	0.192	0.1686
60	0.928	0.883	0.17	0.17	0.1493

61	0.983	0.938	0.16	0.16	0.1405
62	1.041	0.9963	0.146	0.146	0.1282
63	1.103	1.058	0.134	0.134	0.1176
64	1.168	1.123	0.116	0.116	0.1018
65	1.238	1.193	0.104	0.104	9.131e-002
66	1.311	1.266	9.2e-002	9.2e-002	8.077e-002
67	1.39	1.345	8.4e-002	8.4e-002	7.375e-002
68	1.473	1.428	7.e-002	7.e-002	6.146e-002
69	1.561	1.516	6.5e-002	6.5e-002	5.707e-002
70	1.655	1.61	6.2e-002	6.2e-002	5.443e-002
71	1.753	1.708	5.2e-002	5.2e-002	4.565e-002
72	1.858	1.813	4.7e-002	4.7e-002	4.126e-002
73	1.968	1.923	4.3e-002	4.3e-002	3.775e-002
74	2.085	2.04	3.8e-002	3.8e-002	3.336e-002
75	2.21	2.165	3.3e-002	3.3e-002	2.897e-002
76	2.341	2.296	3.3e-002	3.3e-002	2.897e-002
77	2.481	2.436	2.e-002	2.e-002	1.756e-002
78	2.63	2.585	2.5e-002	2.5e-002	2.195e-002
79	2.786	2.741	2.e-002	2.e-002	1.756e-002
80	2.953	2.908	1.8e-002	1.8e-002	1.58e-002
81	3.13	3.085	1.5e-002	1.5e-002	1.317e-002
82	3.316	3.271	8.e-003	8.e-003	7.024e-003
83	3.515	3.47	8.e-003	8.e-003	7.024e-003
84	3.725	3.68	1.e-002	1.e-002	8.78e-003
85	3.946	3.901	1.e-002	1.e-002	8.78e-003
86	4.181	4.136	1.e-002	1.e-002	8.78e-003
87	4.43	4.385	8.e-003	8.e-003	7.024e-003
88	4.693	4.648	5.e-003	5.e-003	4.39e-003
89	4.973	4.928	3.e-003	3.e-003	2.634e-003
90	5.27	5.225	3.e-003	3.e-003	2.634e-003
91	5.583	5.538	8.e-003	8.e-003	7.024e-003
92	5.915	5.87	5.e-003	5.e-003	4.39e-003
93	6.266	6.221	3.e-003	3.e-003	2.634e-003
94	6.64	6.595	3.e-003	3.e-003	2.634e-003
95	7.035	6.99	3.e-003	3.e-003	2.634e-003
96	7.453	7.408	3.e-003	3.e-003	2.634e-003
97	7.896	7.851	0.	0.	0.
98	8.366	8.321	0.	0.	0.
99	8.865	8.82	-2.e-003	-2.e-003	-1.756e-003
100	9.391	9.346	-2.e-003	-2.e-003	-1.756e-003
101	9.95	9.905	-2.e-003	-2.e-003	-1.756e-003

102	10.54	10.5	-2.e-003	-2.e-003	-1.756e-003
103	11.17	11.12	-2.e-003	-2.e-003	-1.756e-003
104	11.83	11.79	0.	0.	0.

Falling Head Test

Site Name:	Fort McClellan
Location:	Parcel 203 (7)
Test Date:	11/27/01
Import File:	C:\Documents and Settings\jli\My Documents\Projects\FTMA\203mw13f.txt

Well Label:	RNG-203-MW13
Aquifer Thickness:	20. feet
Screen Length:	20. feet
Casing Radius:	2. inches
Effective Radius:	3.94 inches
Static Water Level:	0. feet
Water Table to Screen Bottom:	67.95 feet
Anisotropy Ratio:	1.
Time Adjustment:	0.6 Seconds

Test starts with trial 2
There are 106 time and drawdown measurements
Maximum head is 1.783 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-1.e-002	-0.459	0.459	0.2574
2	5.e-003	-5.e-003	-1.175	1.175	0.659
3	1.e-002	0.	-1.783	1.783	1.
4	1.5e-002	5.e-003	-1.582	1.582	0.8873
5	2.e-002	1.e-002	-0.483	0.483	0.2709
6	2.5e-002	1.5e-002	-0.891	0.891	0.4997
7	3.e-002	2.e-002	-0.983	0.983	0.5513
8	3.5e-002	2.5e-002	-0.746	0.746	0.4184
9	4.e-002	3.e-002	-0.766	0.766	0.4296
10	4.5e-002	3.5e-002	-0.717	0.717	0.4021
11	5.e-002	4.e-002	-0.678	0.678	0.3803
12	5.5e-002	4.5e-002	-0.668	0.668	0.3746
13	6.e-002	5.e-002	-0.671	0.671	0.3763
14	6.5e-002	5.5e-002	-0.712	0.712	0.3993
15	7.e-002	6.e-002	-0.575	0.575	0.3225
16	7.5e-002	6.5e-002	-0.602	0.602	0.3376
17	8.e-002	7.e-002	-0.592	0.592	0.332
18	8.48e-002	7.48e-002	-0.58	0.58	0.3253
19	9.e-002	8.e-002	-0.57	0.57	0.3197

20	9.5e-002	8.5e-002	-0.561	0.561	0.3146
21	0.1	9.e-002	-0.543	0.543	0.3045
22	0.1058	9.58e-002	-0.534	0.534	0.2995
23	0.112	0.102	-0.524	0.524	0.2939
24	0.1185	0.1085	-0.512	0.512	0.2872
25	0.1255	0.1155	-0.497	0.497	0.2787
26	0.1328	0.1228	-0.48	0.48	0.2692
27	0.1407	0.1307	-0.47	0.47	0.2636
28	0.149	0.139	-0.453	0.453	0.2541
29	0.1578	0.1478	-0.441	0.441	0.2473
30	0.167	0.157	-0.426	0.426	0.2389
31	0.177	0.167	-0.409	0.409	0.2294
32	0.1875	0.1775	-0.4	0.4	0.2243
33	0.1985	0.1885	-0.385	0.385	0.2159
34	0.2102	0.2002	-0.373	0.373	0.2092
35	0.2227	0.2127	-0.353	0.353	0.198
36	0.2358	0.2258	-0.346	0.346	0.1941
37	0.2498	0.2398	-0.336	0.336	0.1884
38	0.2647	0.2547	-0.334	0.334	0.1873
39	0.2803	0.2703	-0.312	0.312	0.175
40	0.297	0.287	-0.3	0.3	0.1683
41	0.3147	0.3047	-0.29	0.29	0.1626
42	0.3333	0.3233	-0.283	0.283	0.1587
43	0.3532	0.3432	-0.27	0.27	0.1514
44	0.3742	0.3642	-0.256	0.256	0.1436
45	0.3963	0.3863	-0.248	0.248	0.1391
46	0.4198	0.4098	-0.239	0.239	0.134
47	0.4447	0.4347	-0.229	0.229	0.1284
48	0.4697	0.4597	-0.224	0.224	0.1256
49	0.4963	0.4863	-0.214	0.214	0.12
50	0.5247	0.5147	-0.202	0.202	0.1133
51	0.5547	0.5447	-0.195	0.195	0.1094
52	0.5863	0.5763	-0.185	0.185	0.1038
53	0.6213	0.6113	-0.18	0.18	0.101
54	0.6578	0.6478	-0.173	0.173	9.703e-002
55	0.6963	0.6863	-0.166	0.166	9.31e-002
56	0.738	0.728	-0.155	0.155	8.693e-002
57	0.7813	0.7713	-0.148	0.148	8.301e-002
58	0.828	0.818	-0.141	0.141	7.908e-002
59	0.8763	0.8663	-0.136	0.136	7.628e-002
60	0.928	0.918	-0.131	0.131	7.347e-002

61	0.983	0.973	-0.124	0.124	6.955e-002
62	1.041	1.031	-0.117	0.117	6.562e-002
63	1.103	1.093	-0.107	0.107	6.001e-002
64	1.168	1.158	-0.107	0.107	6.001e-002
65	1.238	1.228	-0.102	0.102	5.721e-002
66	1.311	1.301	-9.7e-002	9.7e-002	5.44e-002
67	1.39	1.38	-9.5e-002	9.5e-002	5.328e-002
68	1.473	1.463	-8.5e-002	8.5e-002	4.767e-002
69	1.561	1.551	-8.5e-002	8.5e-002	4.767e-002
70	1.655	1.645	-8.e-002	8.e-002	4.487e-002
71	1.753	1.743	-7.3e-002	7.3e-002	4.094e-002
72	1.858	1.848	-7.3e-002	7.3e-002	4.094e-002
73	1.968	1.958	-6.8e-002	6.8e-002	3.814e-002
74	2.085	2.075	-6.6e-002	6.6e-002	3.702e-002
75	2.21	2.2	-5.9e-002	5.9e-002	3.309e-002
76	2.341	2.331	-6.1e-002	6.1e-002	3.421e-002
77	2.481	2.471	-5.6e-002	5.6e-002	3.141e-002
78	2.63	2.62	-5.2e-002	5.2e-002	2.916e-002
79	2.786	2.776	-4.9e-002	4.9e-002	2.748e-002
80	2.953	2.943	-4.4e-002	4.4e-002	2.468e-002
81	3.13	3.12	-4.2e-002	4.2e-002	2.356e-002
82	3.316	3.306	-4.2e-002	4.2e-002	2.356e-002
83	3.515	3.505	-3.9e-002	3.9e-002	2.187e-002
84	3.725	3.715	-3.9e-002	3.9e-002	2.187e-002
85	3.946	3.936	-3.7e-002	3.7e-002	2.075e-002
86	4.181	4.171	-3.2e-002	3.2e-002	1.795e-002
87	4.43	4.42	-3.e-002	3.e-002	1.683e-002
88	4.693	4.683	-2.7e-002	2.7e-002	1.514e-002
89	4.973	4.963	-2.7e-002	2.7e-002	1.514e-002
90	5.27	5.26	-2.5e-002	2.5e-002	1.402e-002
91	5.583	5.573	-2.5e-002	2.5e-002	1.402e-002
92	5.915	5.905	-2.2e-002	2.2e-002	1.234e-002
93	6.266	6.256	-2.e-002	2.e-002	1.122e-002
94	6.64	6.63	-1.7e-002	1.7e-002	9.534e-003
95	7.035	7.025	-1.5e-002	1.5e-002	8.413e-003
96	7.453	7.443	-1.3e-002	1.3e-002	7.291e-003
97	7.896	7.886	-1.3e-002	1.3e-002	7.291e-003
98	8.366	8.356	-1.e-002	1.e-002	5.609e-003
99	8.865	8.855	-8.e-003	8.e-003	4.487e-003
100	9.391	9.381	-8.e-003	8.e-003	4.487e-003
101	9.95	9.94	-8.e-003	8.e-003	4.487e-003

102	10.54	10.53	-3.e-003	3.e-003	1.683e-003
103	11.17	11.16	-3.e-003	3.e-003	1.683e-003
104	11.83	11.82	-3.e-003	3.e-003	1.683e-003
105	12.53	12.52	-5.e-003	5.e-003	2.804e-003
106	13.28	13.27	0.	0.	0.

Rising Head Test

Site Name: Fort McClellan
Location: Parcel 203 (7)
Test Date: 11/27/01
Import File: C:\Documents and Settings\jli\My Documents\Projects\FTMA\203mw13r.txt

---

Well Label: RNG-203-MW13
Aquifer Thickness: 20. feet
Screen Length: 20. feet
Casing Radius: 2. inches
Effective Radius: 3.94 inches
Static Water Level: 0. feet
Water Table to Screen Bottom: 67.95 feet
Anisotropy Ratio: 1.
Time Adjustment: 3.3 Seconds
Test starts with trial 11
There are 101 time and drawdown measurements
Maximum head is 0.917 feet
Minimum head is -5.e-003 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-5.5e-002	0.215	0.215	0.2345
2	5.e-003	-5.e-002	7.9e-002	7.9e-002	8.615e-002
3	1.e-002	-4.5e-002	0.123	0.123	0.1341
4	1.5e-002	-4.e-002	0.186	0.186	0.2028
5	2.e-002	-3.5e-002	0.145	0.145	0.1581
6	2.5e-002	-3.e-002	0.411	0.411	0.4482
7	3.e-002	-2.5e-002	0.497	0.497	0.542
8	3.5e-002	-2.e-002	0.617	0.617	0.6728
9	4.e-002	-1.5e-002	0.746	0.746	0.8135
10	4.5e-002	-1.e-002	0.841	0.841	0.9171
11	5.e-002	-5.e-003	0.912	0.912	0.9945
12	5.5e-002	0.	0.917	0.917	1.
13	6.e-002	5.e-003	0.888	0.888	0.9684
14	6.5e-002	1.e-002	0.849	0.849	0.9258
15	7.e-002	1.5e-002	0.805	0.805	0.8779
16	7.5e-002	2.e-002	0.761	0.761	0.8299
17	8.e-002	2.5e-002	0.719	0.719	0.7841
18	8.48e-002	2.98e-002	0.68	0.68	0.7415
19	9.e-002	3.5e-002	0.661	0.661	0.7208

20	9.5e-002	4.e-002	0.636	0.636	0.6936
21	0.1	4.5e-002	0.597	0.597	0.651
22	0.1058	5.08e-002	0.573	0.573	0.6249
23	0.112	5.7e-002	0.534	0.534	0.5823
24	0.1185	6.35e-002	0.514	0.514	0.5605
25	0.1255	7.05e-002	0.495	0.495	0.5398
26	0.1328	7.78e-002	0.475	0.475	0.518
27	0.1407	8.57e-002	0.458	0.458	0.4995
28	0.149	9.4e-002	0.441	0.441	0.4809
29	0.1578	0.1028	0.434	0.434	0.4733
30	0.167	0.112	0.419	0.419	0.4569
31	0.177	0.122	0.407	0.407	0.4438
32	0.1875	0.1325	0.392	0.392	0.4275
33	0.1985	0.1435	0.382	0.382	0.4166
34	0.2102	0.1552	0.365	0.365	0.398
35	0.2227	0.1677	0.355	0.355	0.3871
36	0.2358	0.1808	0.34	0.34	0.3708
37	0.2498	0.1948	0.328	0.328	0.3577
38	0.2647	0.2097	0.316	0.316	0.3446
39	0.2803	0.2253	0.304	0.304	0.3315
40	0.297	0.242	0.294	0.294	0.3206
41	0.3147	0.2597	0.282	0.282	0.3075
42	0.3333	0.2783	0.27	0.27	0.2944
43	0.3532	0.2982	0.257	0.257	0.2803
44	0.3742	0.3192	0.245	0.245	0.2672
45	0.3963	0.3413	0.24	0.24	0.2617
46	0.4198	0.3648	0.228	0.228	0.2486
47	0.4447	0.3897	0.221	0.221	0.241
48	0.4697	0.4147	0.211	0.211	0.2301
49	0.4963	0.4413	0.204	0.204	0.2225
50	0.5247	0.4697	0.196	0.196	0.2137
51	0.5547	0.4997	0.184	0.184	0.2007
52	0.5863	0.5313	0.174	0.174	0.1897
53	0.6213	0.5663	0.172	0.172	0.1876
54	0.6578	0.6028	0.162	0.162	0.1767
55	0.6963	0.6413	0.157	0.157	0.1712
56	0.738	0.683	0.147	0.147	0.1603
57	0.7813	0.7263	0.14	0.14	0.1527
58	0.828	0.773	0.135	0.135	0.1472
59	0.8763	0.8213	0.13	0.13	0.1418
60	0.928	0.873	0.12	0.12	0.1309

61	0.983	0.928	0.113	0.113	0.1232
62	1.041	0.9863	0.115	0.115	0.1254
63	1.103	1.048	9.6e-002	9.6e-002	0.1047
64	1.168	1.113	9.6e-002	9.6e-002	0.1047
65	1.238	1.183	9.1e-002	9.1e-002	9.924e-002
66	1.311	1.256	8.6e-002	8.6e-002	9.378e-002
67	1.39	1.335	8.4e-002	8.4e-002	9.16e-002
68	1.473	1.418	7.6e-002	7.6e-002	8.288e-002
69	1.561	1.506	6.9e-002	6.9e-002	7.525e-002
70	1.655	1.6	6.9e-002	6.9e-002	7.525e-002
71	1.753	1.698	6.4e-002	6.4e-002	6.979e-002
72	1.858	1.803	5.9e-002	5.9e-002	6.434e-002
73	1.968	1.913	5.6e-002	5.6e-002	6.107e-002
74	2.085	2.03	5.2e-002	5.2e-002	5.671e-002
75	2.21	2.155	4.9e-002	4.9e-002	5.344e-002
76	2.341	2.286	4.7e-002	4.7e-002	5.125e-002
77	2.481	2.426	4.7e-002	4.7e-002	5.125e-002
78	2.63	2.575	4.4e-002	4.4e-002	4.798e-002
79	2.786	2.731	3.7e-002	3.7e-002	4.035e-002
80	2.953	2.898	3.4e-002	3.4e-002	3.708e-002
81	3.13	3.075	3.4e-002	3.4e-002	3.708e-002
82	3.316	3.261	3.e-002	3.e-002	3.272e-002
83	3.515	3.46	2.7e-002	2.7e-002	2.944e-002
84	3.725	3.67	2.5e-002	2.5e-002	2.726e-002
85	3.946	3.891	2.7e-002	2.7e-002	2.944e-002
86	4.181	4.126	2.2e-002	2.2e-002	2.399e-002
87	4.43	4.375	2.2e-002	2.2e-002	2.399e-002
88	4.693	4.638	1.5e-002	1.5e-002	1.636e-002
89	4.973	4.918	1.5e-002	1.5e-002	1.636e-002
90	5.27	5.215	1.5e-002	1.5e-002	1.636e-002
91	5.583	5.528	1.2e-002	1.2e-002	1.309e-002
92	5.915	5.86	8.e-003	8.e-003	8.724e-003
93	6.266	6.211	8.e-003	8.e-003	8.724e-003
94	6.64	6.585	1.e-002	1.e-002	1.091e-002
95	7.035	6.98	3.e-003	3.e-003	3.272e-003
96	7.453	7.398	5.e-003	5.e-003	5.453e-003
97	7.896	7.841	3.e-003	3.e-003	3.272e-003
98	8.366	8.311	3.e-003	3.e-003	3.272e-003
99	8.865	8.81	0.	0.	0.
100	9.391	9.336	-5.e-003	-5.e-003	-5.453e-003
101	9.95	9.895	0.	0.	0.

FIELD ACTIVITY DAILY LOGS

COPY

NOV 29 2001

IT CORPORATION
A Member of The IT Group

SLUG TEST FORM

DATE: 11 / 27 / 01

PROJECT NAME: FTMA	PROJECT No.: 774645
	COST CODE : 25020300

WELL No. : RNG-203 -MW 13	WELL LOCATION : Range K

INITIAL MEASUREMENT (PRIOR TO THE TEST)

TIME	DTW (ft)	CASING DIAMETER (in)	TD (ft)
1510	5.95	2	73.9

FALLING TEST (SLUG IN)	TEST No. : 19	REF. = 0

TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)
1513	46.27						
1515	46.28						
1517	46.28						

TEST STARTED:	1518
TEST STOPPED:	1532

RISING TEST (SLUG OUT)	TEST No. : 20	REF. = 0

TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)

TEST STARTED:	1532
TEST STOPPED:	1542

NOTES: DTW ---- depth to water
TD ---- total epth
XD ---- trnsducer reading (ft above the probe)
Type equipment ---- In-Situ miniTROLL (0.72" OD)

PID 0.0 ppm
troll 1160

203 mw 13 f.bin
203 mw 13r.bin

COPY

NOV 29 2001

IT CORPORATION
A Member of The IT Group

SLUG TEST FORM

DATE: 11/27/01

PROJECT NAME: FTMA	PROJECT No.: 774645
	COST CODE : 25020300

WELL No. : RNG-203-MW01	WELL LOCATION : Range K

INITIAL MEASUREMENT (PRIOR TO THE TEST)

TIME	DTW (ft)	CASING DIAMETER (in)	TD (ft)
1415	10.4	2	15.10

FALLING TEST (SLUG IN)	TEST No. :	REF. =

TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)
TEST STARTED:							
TEST STOPPED:							

RISING TEST (SLUG OUT)	TEST No. : 9	REF. = 0

TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)
1424	4.99						
1425	4.96						
1427	4.96						
TEST STARTED:	1427						
TEST STOPPED:	1551						

NOTES: DTW ---- depth to water
TD ---- total epth
XD ---- trnsducer reading (ft above the probe)
Type equipment ---- In-Situ miniTROLL (0.72" OD)

PID 0.0 ppm
troll 4769

* we within screen
rising test only.

203 mw 1 r. bin

COPY

NOV 29 2001

IT CORPORATION
A Member of The IT Group

SLUG TEST FORM

DATE: 11/26/01

PROJECT NAME: FTMA	PROJECT No.: 794645
	COST CODE : 25020300
WELL No. : RNG-203-MW04	WELL LOCATION : Range K

INITIAL MEASUREMENT (PRIOR TO THE TEST)

TIME	DTW (ft)	CASING DIAMETER (in)	TD (ft)
1517	12.7	2	26.9

FALLING TEST (SLUG IN) | TEST No. : 7 | REF. = 0

TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)
1520	13.55	1535	13.7				
1523	13.63						
1526	13.65						
1529	13.67						
1532	13.69						
TEST STARTED:	1535						
TEST STOPPED:	1615						

RISING TEST (SLUG OUT) | TEST No. : 8 | REF. = 0

TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)
1616	12.8						
TEST STARTED:	1616						
TEST STOPPED:	0738 (11-27-01)						

NOTES: DTW ---- depth to water
TD ---- total epth
XD ---- trnsducer reading (ft above the probe)
Type equipment ---- In-Situ miniTROLL (0.72" OD)

PID 0.0 ppm

troll 1160

203 mw 4f. bin
203 mw 4x bin

COPY

NOV 29 2001

IT CORPORATION
A Member of The IT Group

SLUG TEST FORM

DATE: 11/27/01

PROJECT NAME: FTMA	PROJECT No.: 774645
	COST CODE : 25020300

WELL No. : RVG - 203 - MW 07	WELL LOCATION : Range K

INITIAL MEASUREMENT (PRIOR TO THE TEST)

TIME	DTW (ft)	CASING DIAMETER (in)	TD (ft)
1432	7.6	2	62.1

FALLING TEST (SLUG IN)	TEST No. : 17	REF. = 0

TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)
1437	27.33						
1439	27.33						
1441	27.34						
1443	27.34						

TEST STARTED:	1443
TEST STOPPED:	1451

RISING TEST (SLUG OUT)	TEST No. : 18	REF. = 0

TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)	TIME	(XD) (ft)

TEST STARTED:	1451
TEST STOPPED:	1504

NOTES: DTW ---- depth to water
TD ---- total epth
XD ---- trnsducer reading (ft above the probe)
Type equipment ---- In-Situ miniTROLL (0.72" OD)

PID 0.0 ppm
troll 1160

203 mw 7f. bin
203 mw 7r. bin

ATTACHMENT II

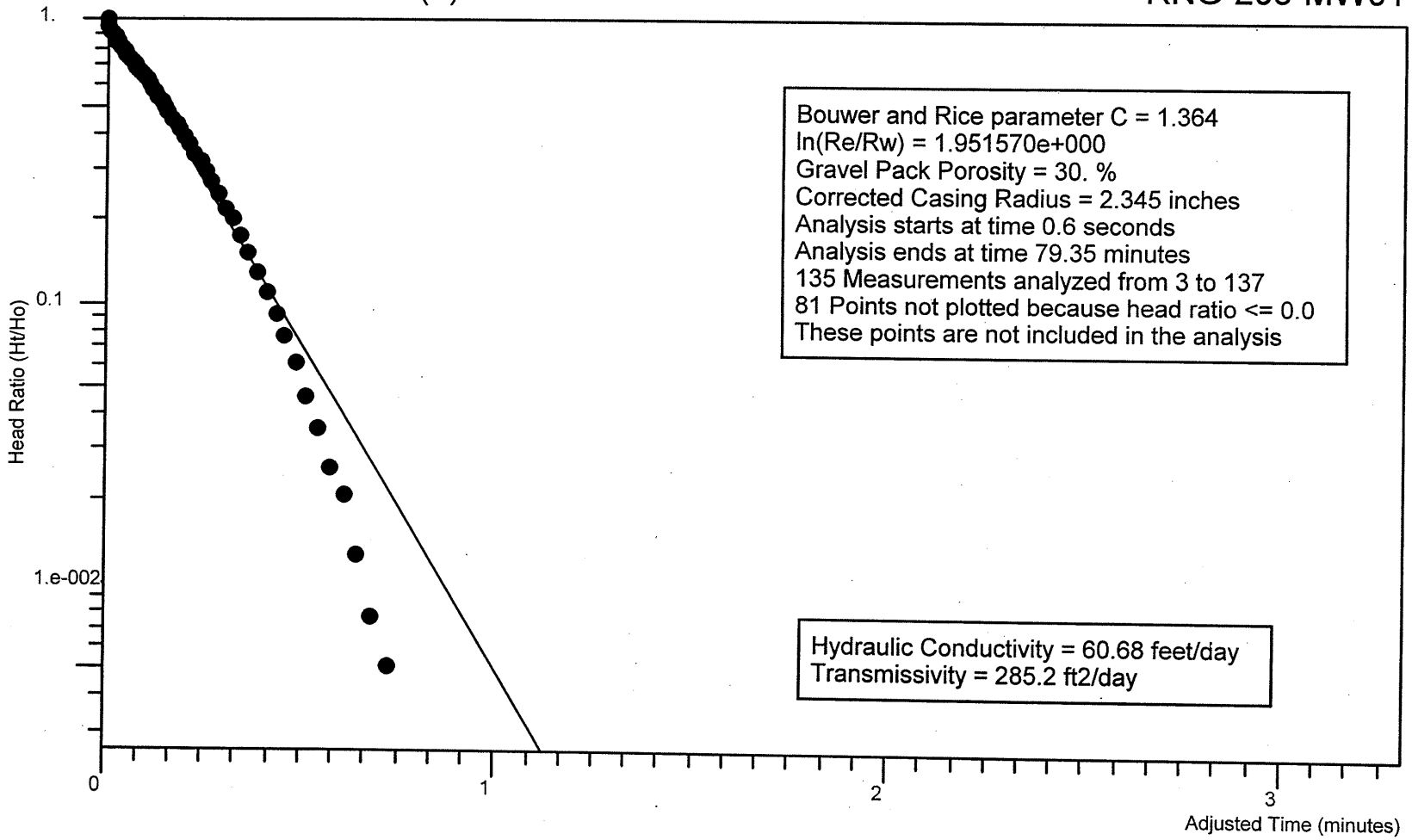
TIME VERSUS WELL RECOVERY GRAPHS

Rising Head Test 11/27/01

Fort McClellan Parcel 203 (7)

Bouwer and Rice Method

RNG-203-MW01



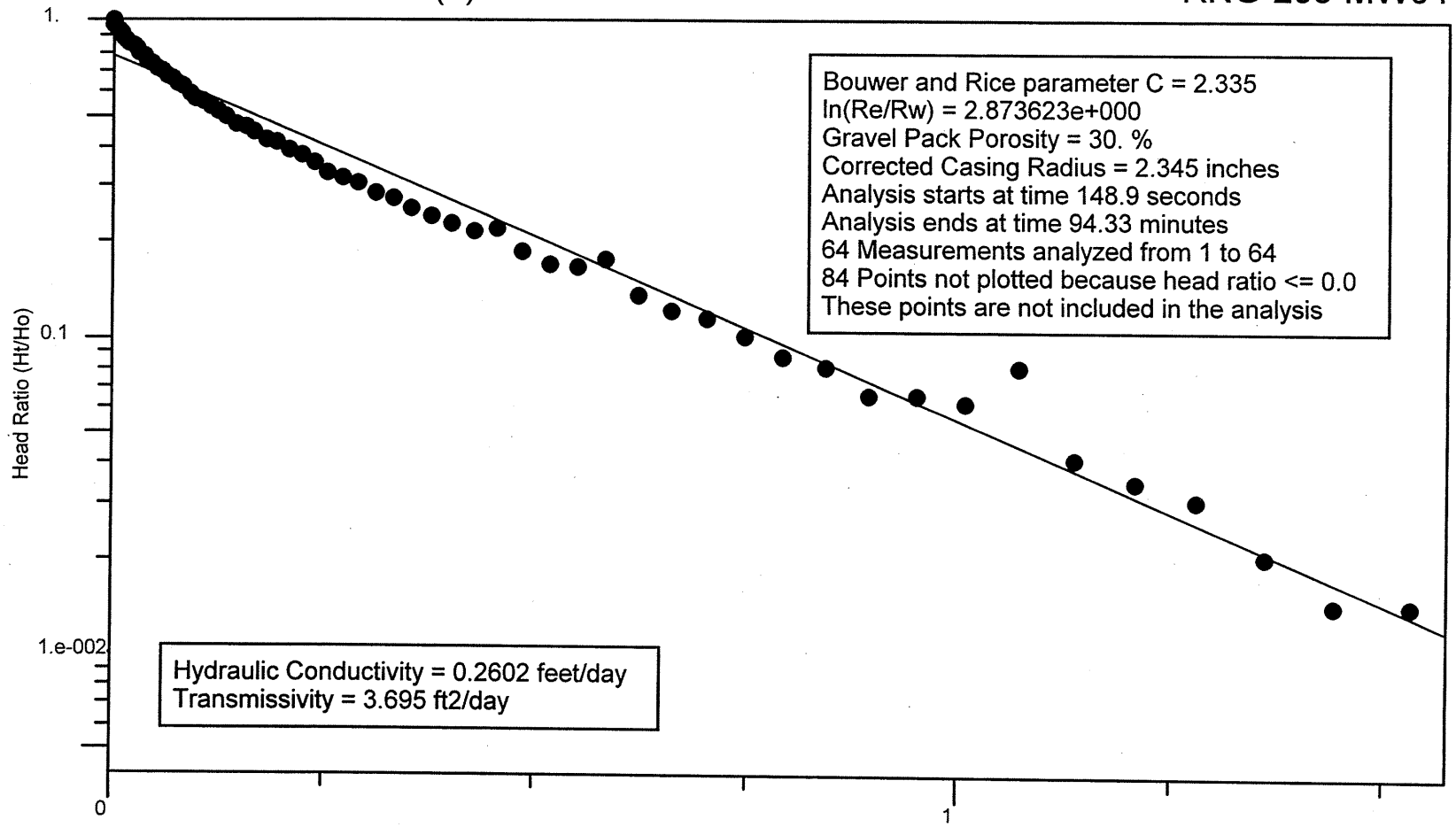
Ho is 0.782 feet at 0.6 seconds

Rising Head Test 11/27/01

Fort McClellan Parcel 203 (7)

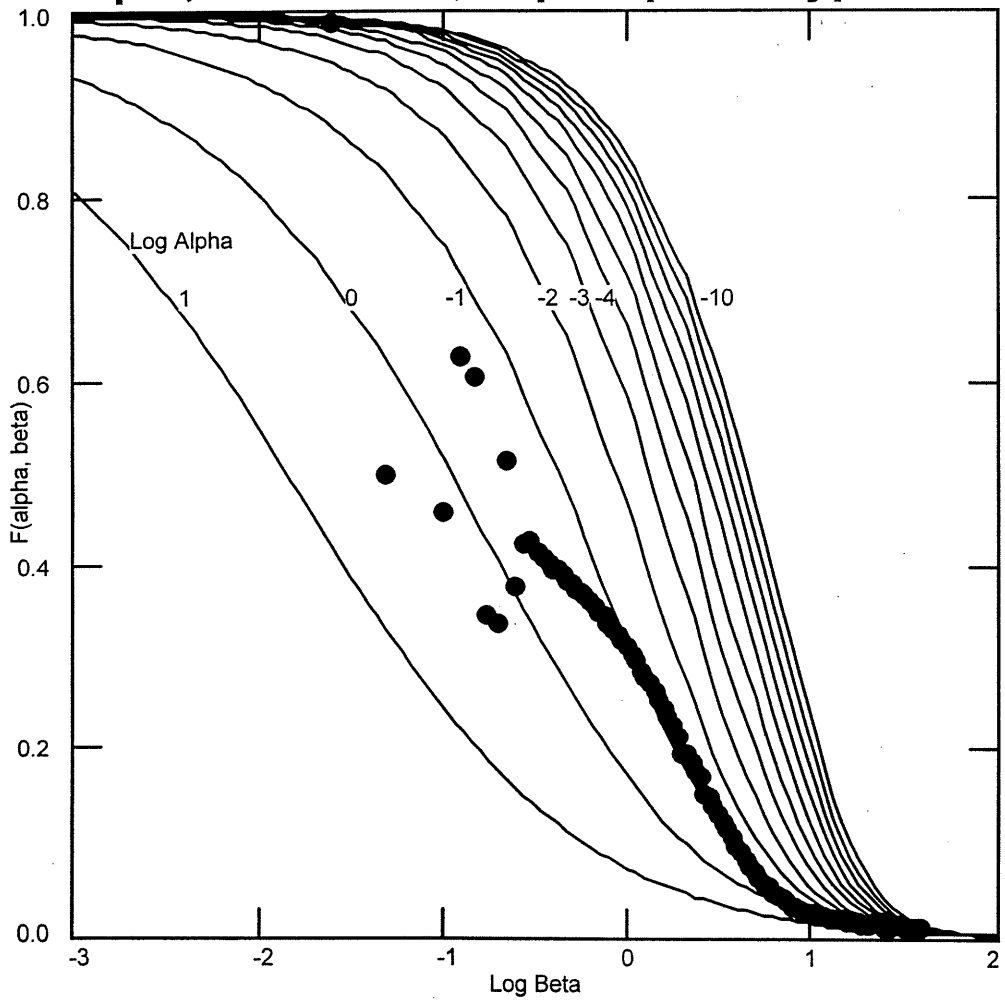
Bouwer and Rice Method

RNG-203-MW04



Ho is 0.482 feet at 148.9 seconds

Cooper, Bredehoeft, Papadopulos Type Curve



Well RNG-203-MW07

log Beta = 2.622
F(alpha, beta) = 0.5124

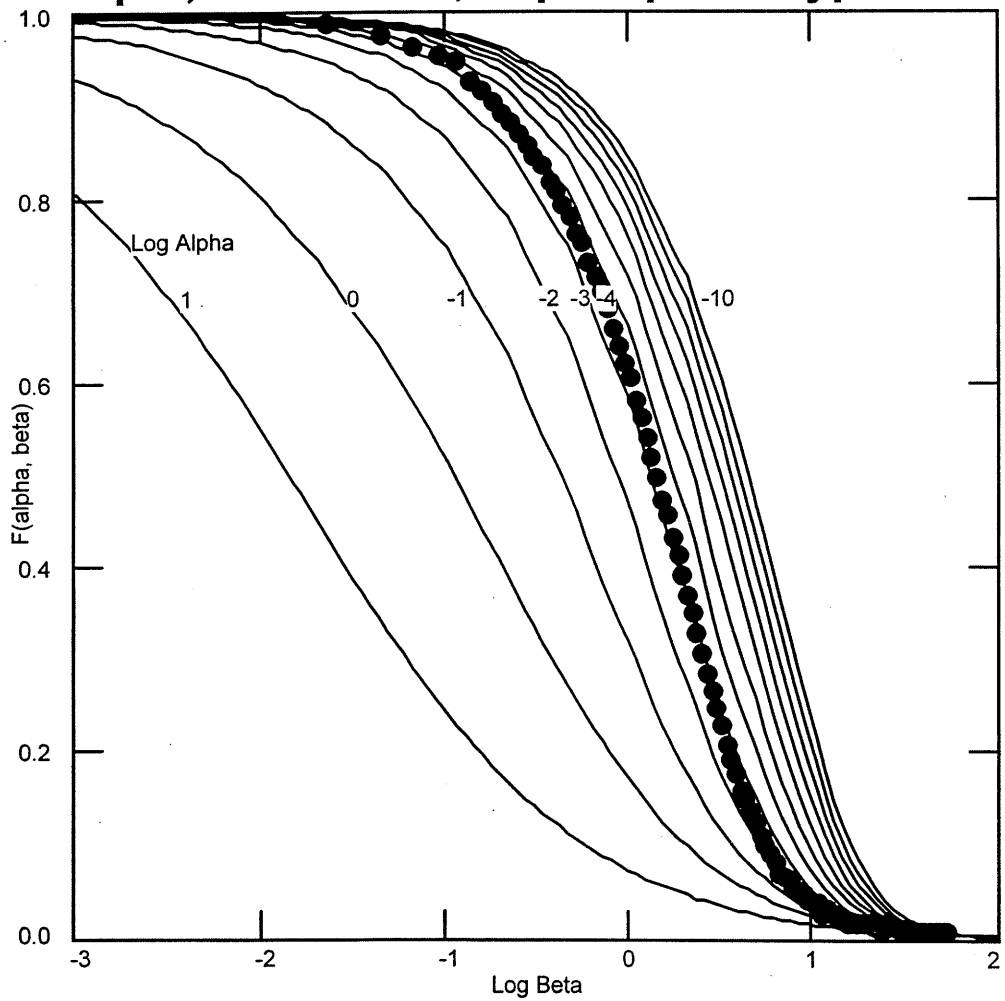
Transmissivity
116.4 ft2/day

Hydraulic Conductivity
3.881 feet/day

log(Alpha) = -1.
Storativity = 2.577e-002

Fort McClellan
Parcel 203 (7)
11/27/01

Cooper, Bredehoeft, Papadopulos Type Curve



Well RNG-203-MW07

log Beta = 2.591
F(alpha, beta) = 0.5093

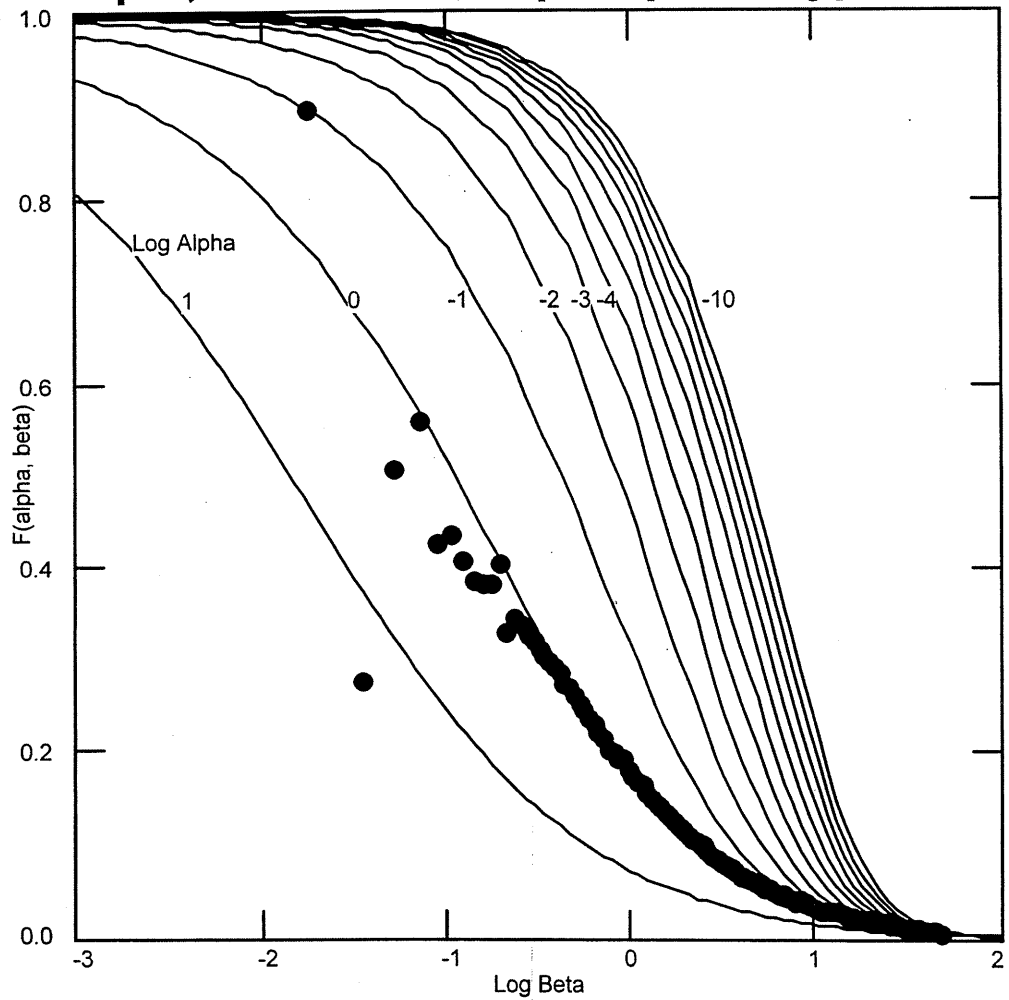
Transmissivity
108.4 ft2/day

Hydraulic Conductivity
3.614 feet/day

log(Alpha) = -3.5
Storativity = 8.148e-005

Fort McClellan
Parcel 203 (7)
11/27/01

Cooper, Bredehoeft, Papadopulos Type Curve



Well RNG-203-MW13

log Beta = 2.483
F(alpha, beta) = 0.5062

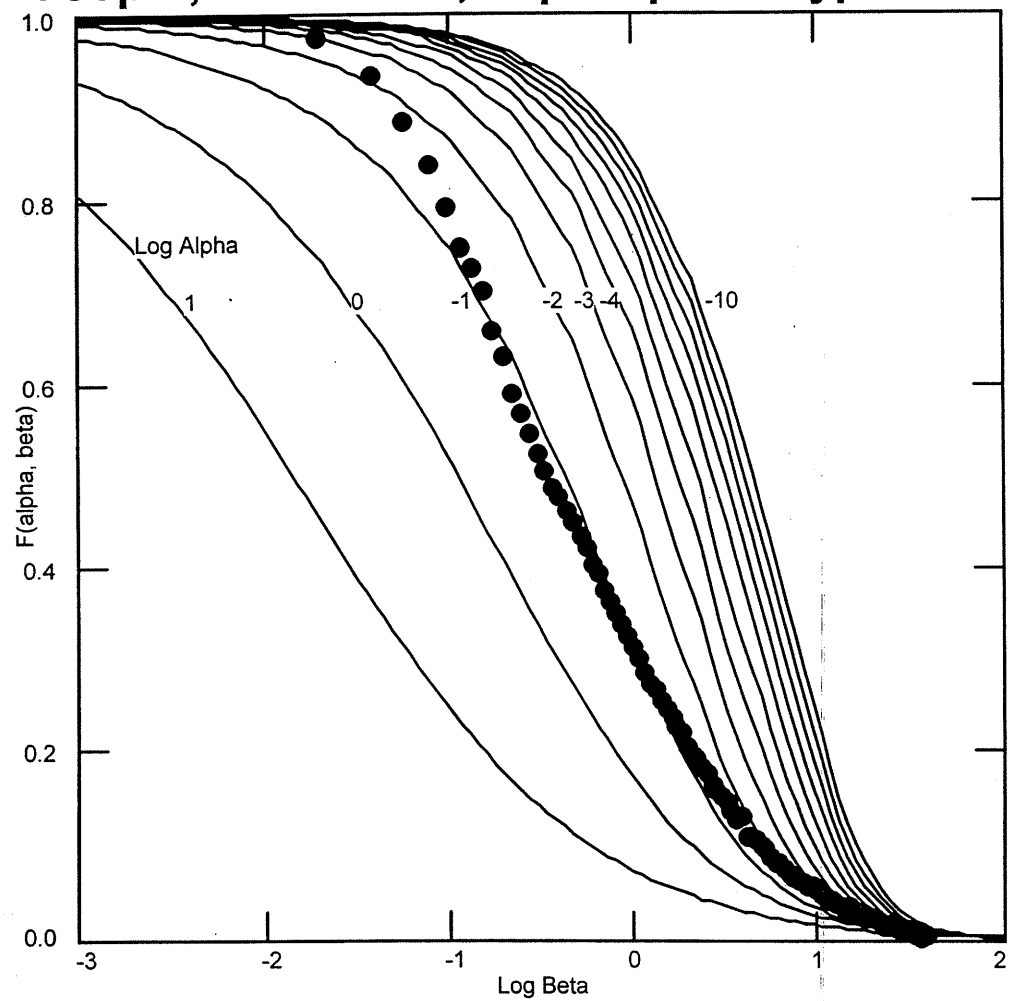
Transmissivity
84.47 ft2/day

Hydraulic Conductivity
4.223 feet/day

log(Alpha) = 0.
Storativity = 0.2577

Fort McClellan
Parcel 203 (7)
11/27/01

Cooper, Bredehoeft, Papadopulos Type Curve



Well RNG-203-MW13

log Beta = 2.514
F(alpha, beta) = 0.5062

Transmissivity
90.71 ft2/day

Hydraulic Conductivity
4.536 feet/day

log(Alpha) = -1.
Storativity = 2.577e-002

Fort McClellan
Parcel 203 (7)
11/27/01

APPENDIX E

SURVEY DATA

Survey Data
Range K - Pelham Range, Parcel 203(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Northing	Easting	Ground Elevation (ft amsl)	Top of Casing Elevation (ft amsl)
RNG-203-GP01	1178019.38	606287.46	585.48	NA
RNG-203-GP02	1178075.06	606359.83	591.78	NA
RNG-203-MW01	1178057.76	606622.75	583.95	586.55
RNG-203-MW02	1178219.91	606436.13	593.90	596.75
RNG-203-MW03	1178269.19	606493.26	598.26	601.16
RNG-203-MW04	1178176.62	606330.85	586.73	589.80
RNG-203-MW05	1178174.77	606658.94	589.00	590.97
RNG-203-MW06	1177901.70	606516.70	580.02	582.04
RNG-203-MW07	1177893.44	606532.98	578.87	580.94
RNG-203-MW08	1177825.48	606745.92	582.85	584.77
RNG-203-MW09	1177831.94	606749.02	582.56	584.53
RNG-203-MW10	1177815.73	606575.23	575.65	577.69
RNG-203-MW11	1177824.16	606585.70	575.98	577.99
RNG-203-MW12	1177775.14	606363.76	577.08	578.97
RNG-203-MW13	1177769.25	606359.91	576.74	578.85
RNG-203-MW14	1178043.42	606097.40	582.37	584.55
RNG-203-MW15	1178035.31	606214.65	582.93	585.04
RNG-203-MW16	1177961.75	606336.06	589.63	591.56
RNG-203-MW17	1177955.87	606326.06	589.01	590.85
RNG-203-MW18	1177756.36	606375.16	574.69	576.80
RNG-203-MW19	1177714.96	606181.89	576.22	578.36
RNG-203-MW20	1177551.02	606285.51	569.53	571.77
RNG-203-MW21	1177624.75	606553.98	578.92	581.14
RNG-203-MW22	1177566.19	606282.47	569.74	572.05
RNG-203-MW23	1177422.41	606414.62	576.91	579.68
RNG-203-MW24	1177327.87	606258.24	569.43	571.73
RNG-203-MW25	1177501.04	606112.28	568.88	570.74

Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

ft amsl - Feet above mean sea level.
NA - Not applicable.

APPENDIX F

VARIANCE REPORTS

INTERNATIONAL TECHNOLOGY CORPORATION	**Variance No:** PARCEL203(7)SEPTEMBER02.VR1
	Linked w/NC No: x
	Date of Issue: 9-27-02
	Page _1 of 1__
Project Name: **Fort McClellan** – CK10	Project Number: 774645.25020301

-Variance Report -

I.Description: (by the person identifying the change)

DRAFT FINAL SITE-SPECIFIC FIELD SAMPLING PLAN ADDENDUM FOR THE SUPPLEMENTAL REMEDIAL INVESTIGATION AT RANGE K, PARCEL 203(7)

The Draft Final Site-Specific Field Sampling Plan Addendum (DFSSFSPA) proposed drilling and installation of a single-cased 4-inch polyvinyl chloride (PVC) well with a 10 to 20-foot section of PVC screen to straddle the residuum \ bedrock interface at monitoring well location RNG-203-MW17. However, permanent 8-inch steel outer casing was installed five feet into competent bedrock and the well screen was placed solely in bedrock.

Identified by: Jeffrey J. Tarr, PG – IT Site Manager	Date: 9-27-02

II. Justification for Variance:

Table 2 of the DFSSFSPA inadvertently proposed screening the residuum \ bedrock interface using a 10 to 20 foot screen at proposed well location RNG-203-MW17. Monitoring wells RNG-203-MW16 and RNG-203-MW17 were proposed 200 feet west-northwest of well cluster RNG-203-MW06 and RNG-203-MW07 to 1) define the western extent of groundwater contamination and 2) determine if a groundwater contaminant source exists upgradient and outside the fenced area of Range K. Therefore, a decision was made to install permanent 8-inch outer casing 5 feet into competent bedrock to isolate any potential groundwater contamination that may be present within the residuum. Bedrock core samples were collected after the 8-inch permanent outer casing was grouted in-place. A 7-7/8-inch air hammer was used to ream the borehole from the bottom of the 8-inch outer casing and a 4-inch PVC well with 10-foot of screen was successfully installed. After installing the 10-foot well screen in competent bedrock at monitoring well location RNG-203-MW17, monitoring well RNG-203-MW16 was installed above the top of bedrock and within the residuum. This variance will not alter the intent of the supplemental remedial investigation at Range K.

III. Applicable Document/Work Plan: (by the person identifying the change)

Draft Final Site-Specific Field Sampling Plan Addendum for the Supplemental Remedial Investigation at Range K, Former Agent Training Area, Parcel 203(7), Pelham Range, Calhoun County, Alabama, July 30, 2002.

Distribution List:
1. Jeanne Yacoub, IT Project Manager
2. Steve Moran, IT Technical Lead
3. Jeffrey Tarr, IT Site Manager
4. Randy McBride, IT QA Officer
5. Mr. Ellis Pope, US Army Corps of Engineers
6. Mr. Ross McCollum, US Army Corps of Engineers

- Signatures -

Requested by: Jeffrey Tarr, PG - IT Site Manager Jeffrey J. Tarr	9-27-2002 Date
Approved by: COE Gary A. Hatto	09/30/02 Date
Project Manager Approval: Jeanne Yacoub	10/23/02 Date
QA Approval:Randy McBride Randy L. McBride	10-17-02 Date

Shaw
Shaw Environmental & Infrastructure, Inc.

Variance No:	PARCEL203(7)SEPTEMBER01.VR1
Linked w/NC No:	
Date of Issue:	2-11-2004
	Page _1 of 1__
Project Name: Fort McClellan – CK10	**Project Number:** 774645.25050100

-Variance Report -

I.Description: **(by the person identifying the change)**

FINAL SITE-SPECIFIC FIELD SAMPLING PLAN, RANGE K, FORMER AGENT TRAINING AREA, PARCEL 203(7).

The Final Site-Specific Field Sampling Plan (FSSFSP) proposed a groundwater sample from residuum monitoring well RNG-203-MW02. However, a groundwater sample was not collected.

Identified by: Jeffrey Tarr, PG – Technical Lead | **Date:** 2-11-2004

II. Justification for Variance:

The FSSFSP proposed a groundwater sample from residuum monitoring well RNG-203-MW02. During sampling activities, groundwater was purged from the well, but went dry prior to collecting a sample. The well was allowed to recharge and a second attempt was made within 24 hours. However, the well did not recharge enough to collect a groundwater sample. It should be noted that this well was sampled three times during subsequent field events; June 6, 2000, October 9, 2002 and August 14, 2003. This variance will not alter the intent of the supplemental remedial investigation at Range K.

III. Applicable Document/Work Plan: **(by the person identifying the change)**

Final Remedial Investigation Site-Specific Field Sampling Plan, Site-Specific Safety and Health Plan, and Site-Specific Unexploded Ordnance Safety Plan Attachments; Range K, Former Agent Training Area, Parcel 203(7); Fort McClellan, Calhoun County, Alabama, March 2001.

Distribution List:
1. Jeanne Yacoub, Shaw Project Manager
2. Steve Moran, Shaw Technical Lead
3. Jack Gregston, Shaw Site Manager
4. Randy McBride, Shaw QA Officer
5. Damon Young, US Army Corps of Engineers
6. Lee Coker, US Army Corps of Engineers

-Signatures-

Requested by:	Jeffrey J. Tarr 2/11/2004 Date
Approved by:	Damon L. Young COE 2/17/04 Date
Project Manager Approval:	Jeanne Yacoub 2/12/04 Date
QA Approval:	Randall L. McBride 2-12-04 Date