APPENDIX C

WELL DEVELOPMENT LOGS

Groundwater Well Development Log

Fort McClellan , Alabama

Project Number: 796887
Form Completed by: ADAM DAY
Well Developed by (person/firm): SHAW E&I

Parcel No.: 96Q
Well No.: HR-96Q-MW01
Date started: ~~7/2~~ 7/18/02

Monitoring Well Information

Development Method: SURGE & PURGE
Development Equipment: WHALE PUMP, PID# 842996

Casing Diameter: 2"

Beginning Measurments
Depth to Water (ft): 27.39' TOC
Total depth of Well (ft): 44.51' TOC

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date) (Purge Rate, Pump Position, Misc.)
10:00	0	27.39	6.78	0.007	512	10.16	24.91	BROWN	43', 0.375 gpm
10:15	5.625	33.80	6.20	0.313	217	3.88	20.90	BROWNISH	43', 0.125 gpm
10:30	7.5	34.18	6.26	0.319	998	3.51	21.89	BROWNISH 7/19/02	43', 0.125 gpm
10:45	9.375	34.59 ~~36.00~~ 7/18/02	6.30	0.331	1223	4.64	22.92	BROWN	43', 0.125 gpm
11:00	11.25	34.45	6.40	0.267	733	4.67	22.92	BROWN	43', 0.125 gpm
11:15	13.125	35.81	6.40	0.260	469	4.45	23.47	BROWN	43', 0.125 gpm
11:30	15	36.39	6.36	0.269	332	4.34	24.22	BROWN	43', 0.0166 gpm

TD - DTW = WC x 2"/4" well = One PV x 5 = Min PV + H20 to install well = Minimum H20 to remove

44.51' - 27.39' TOC = 17.12' x 0.163 = 2.79056 x 5 = 13.9528 + 225 gal = 238.9528 gal

QC'd 7/29/02

Parcel No.: 96Q
Well ID: HR-96Q-MW01
Date: 7/18/02

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments
11 :45	15.016	36.21	6.38	0.241	418	4.36	25.36	BROWN	43', BATTERY DIED, ~~0.1106 gpm~~
13 :00	15.016	35.22	6.36	0.254	401	7.43	32.19	BROWN	43', 0.0625 gpm
13 : 15	15.9535	37.21	6.43	0.249	887	4.83	28.16	BROWN	43', 0.0625 gpm
13 : 30	16.891	38.11	6.47	0.252	1439	6.80	27.61	BROWN	43', 0.0625 gpm
13 : 45	17.8285	39.00	6.43	0.246	403	5.34	26.78	BROWN	43', 0.0625 gpm
14 : 00	18.766	39.45	6.44	0.246	425	4.92	26.45	BROWN	43', 0.0625 gpm
14 : 15	19.7035	40.34	6.44	0.255	471	4.68	26.27	Brown	43', 0.0625 gpm
14 : 30	20.641	41.07	6.43	0.255	581	6.97	26.62	BROWN	43', 0.0625 gpm
14 :45	21.5785	41.81	6.44	0.253	316	4.72	26.84	BROWN	43', 0.0625 gpm
15 :00	22.516	42.52	6.45	0.250	408	4.30	29.70	BROWN	43', DRY WATT 20 MINUTES
15 : ~~15~~ 20 7/18/02	22.516	40.35							
~~15 :30~~								7/18/02	
~~15 :45~~									

Parcel No.: 96Q
Well ID: HR-96Q-MW01
Date: 7/19/02

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments
9 :30	22.516	26.68	6.94	0.097	>999	9.65	17.41	BROWN	43', 0.5 gpm
9 :45	30.016	35.32	5.62	0.093	>999	9.05	18.03	BROWN	43', 0.25 gpm
10 :00	33.766	37.97	5.52	0.071	>999	7.55	21.51	BROWN	43', 0.25 gpm
10 :15	37.516	40.28	STOPPED PUMPING. WELL IS DRY.					7/19/02	43', 0.25 gpm
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Parcel No.: 96Q
Well ID: HR-96Q-mw01
Date: 7/25/02

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date)
09:30	37.56	29.57	4.95	0.184	>1000	5.60	21.07	Brown	P.R. .187gpm pump @ 43'
09:45	40.4	33.79	5.03	0.039	693	6.65	19.64	Brown	" "
0:00	43	38.56	5.12	0.039	622	5.90	18.69	Brown	" "
0:15	44.9	42.31	5.33	0.053	528	3.95	19.44	Brown	P.R. .125gpm "
0:30	46	43.20	5.30	0.058	265	2.68	22.05	Lt. Brown	PR .0625gpm "
0:45	46.9	44.5	5.16	0.057	>1000	3.55	22.01	Brown	" "
10:45	Well	went	Dry						
~~15:45~~	1L	34.65	5.21	0.054	430	4.67	19.91	Lt. Brown	1L Poly Bailer Collect sample for Photo
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7/25/02

Groundwater Well Development Log

Fort McClellan , Alabama

Project Number:
Form Completed by: J. Alexander - J. Cunningham
Well Developed by (person/firm): J. Alexander, J.C. Shaw EHI

Parcel No.: HR 145Q
Well No.: MW01
Date started: 7 18 02

Monitoring Well Information

PID - 0.0

Development Method: surge + pump
Development Equipment: whalepump, DTW indicator,

Casing Diameter: 2"

Beginning Measurments
Depth to Water (ft): 21.32 ' BTOC
Total depth of Well (ft): 50.12 ' BTOC

DTW after Development = 50.12 ft, as per J.C. Keith 7/25/02

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date) (Purge Rate, Pump Position, Misc.)	
									rate	depth
09:45	∅	21.32	5.81	.105	>999	2.29	18.2	orange	1 gpm	49'
09:50	5	32.13	change flow rate						.4	49'
10:00	9	36.00	5.30	.086	>999	2.68	18.6	orange cloudy	.4	49'
10:15	15	41.51	5.35	.081	>999	2.24	18.7	"	.25	50'
10:30	18.75	45.14	5.42	.086	>999	3.15	19.6	"	.25	50'
10:45	22.5	47.12	5.56	.087	>999	4.03	20.0	"	.20	50'
11:00	25.5	Top of pump	5.62	.088	>999	4.12	20.8	"	.20	50'

TD - DTW = WC x 2"/4" well = One PV x 5 = Min PV + H20 to install well = Minimum H20 to remove

50.12 - 21.32 = 28.8 X .163 = 4.7 X 5 = 23.472 + 125 = 148.5

Inst. 125

26-46

Parcel No.: 1450
Well ID: MW01
Date: 71802
07/24/02

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date) RATE	depth of pump
11:03	25.5	well goes dry								50'
11:33	25.5	43.89	not 80% recovery							7/18/02
7/19/02 09:45	25.5	21.62 ~~21.8~~ 71802	5.51	.053	566	6.85	18.5	orange cloudy	.3	50'
10:00	30	32.63	5.30	.038	632	7.19	19.6	"		50'
10:15	34.5	40.69	5.09	.035	>999	7.32	18.7	"		48'
10:30	39	44.90	5.01	.039	854	7.67	19.2	"		46'
10:40	—	47.12	Lowering pump to ~50' bTOC							50'
10:45	43.5	48.82	5.03	.037	>999	7.39	18.9	or. cloudy		50'
10:50	well goes dry									7 19 02
7/24/02 09:50	43.5	20.50	6.00	.039	190	6.30	22.6	Cloudy	.1gl	47'
10:05	45	24.21	5.54	.031	197	4.98	21.9	Cloudy	" "	"
10:20	46.5	25.89	5.37	.031	192	5.10	22.5	Cloudy	" "	"
10:35	48	26.61	5.46	.032	237	4.97	22.7	Orange	" "	"
10:50	49.5	27.46	5.50	.032	293	4.91	23.1	"	" "	"

Parcel No.: 145 Q
Well ID: MW01
Date: 07/24/02

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date)
11 :05	51	28.09	5.53	.030	405	4.85	22.5	Orange	.1gl— 47'
11 :20	52.5	28.89	5.69	.031	390	4.78	22.3	Orange	" " 49'
11 :35	54	Storming	—	—	—	—	—	—	" " "
11 :50	55.5	—	NO Readings at this Time!			—	—	—	" " "
12 :05	57	—	—	—	—			—	" " "
12 :20	58.5	—	—	—	—	—	—		" " "
12 :35	60	32.99	5.70	.030	75	5.45	20.8	Cloudy	" " "
12 :50	61.5	33.40	5.66	.028	71	5.01	20.4	Cloudy	.15gm 49'
13 :05	63.75	35.71	5.17	.028	249	4.85	19.6	Orange	" " "
13 :20	66	37.82	5.10	.030	497	4.99	20.4	Dk Orange	" " "
13 :35	68.25	39.67	5.15	.032	191	5.46	19.9	Orange Cloudy	" " "
13 :50	70.50	41.49	5.40	.032	120	5.81	20.3	Cloudy	.1gl— "
14 :05	~~72.75~~ 70	41.98	5.74	.031	69	5.90	20.9	" "	" " "
14 :20	~~75~~ 73.5	42.47	5.70	.031	97	5.88	21.1	" "	" " "

Parcel No.: HR-145Q
Well ID: HR-145Q-MW01
Date: 07/24/02

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date)
14:35	75	43.05	5.68	.032	79	5.57	21.3	Cloudy	.1 gpm 49'
14:50	76.5	43.76	5.66	.032	74	5.39	21.1	"	" " "
:									Taking Photo sampled
:									Reached 8hr Maxi
:									NTU – 74 1450 Time
:									76.5 Total Gallons
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Final Entry
07/24/02

Groundwater Well Development Log

Fort McClellan , Alabama

Project Number:
Form Completed by: Jewel H Cunningham, R. Grains
Well Developed by (person/firm): JHC and R. Grains ~~EI~~ Shaw E+I

Parcel No.: 145
Well No.: HR-14Q-MW02
Date started: 07/25/02

Monitoring Well Information

PID - 0.0

Development Method: Surge + Purge
Development Equipment: Whale pump, 210 gal tank, Horiba U-10, Orion turbidity meter
Casing Diameter: 2" pvc

Beginning Measurments
Depth to Water (ft): 14.67
Total depth of Well (ft): 26.91

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date) (Purge Rate, Pump Position, Misc.)
10:00	—	14.67	6.04	.111	>1000	1.40	19.6	Dk Red	.35gl Well Surged Set @ 4.5'
10:15	5.25	18.05	5.89	.117	"	2.49	19.7	" "	" " " "
10:30	10.50	19.23	5.93	.124	"	1.97	19.9	" "	" " " "
10:45	15.75	20.19	5.85	.129	"	2.26	20.3	" "	" " " "
11:00	21	22.05	5.52	.122	"	1.26	19.3	" "	" " Bottom of Well
11:15	26.25	24.96	5.66	.122	>1000	2.60	19.5	" "	" " " "
11:20	28	Well	Went	Dry	! No	Measurement	Here!		— — —

TD - DTW = WC x 2/4' well = One PV x 5 = Min PV + H20 to install well = Minimum H20 to remove

26.91 − 14.67 = 12.24 x .163 = 2 x 5 = 10 + 60 = 70 gal

QC'd [illegible]
7/31/02

Parcel No.: HR-145q
Well ID: HR-145q-mw02
Date: 07/25/02

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date)
12:45	28	23.41	6.22	.101	>1000	2.34	20.6	DK Red	.15gpm pump set bottom
13:00	30.25	25.13	5.81	.085	>1000	3.39	21.7	" "	" " " " "
13:05		Well	went	Dry.	—	—	—	—	— —
:			— 7/29/02	—					
10:45	30.25	17.5	5.87	0.108	999	9.63	23.2	cloudy (light beige)	pump - 0.5' from bottom rate - 0.14gpm
11:00	32.35	20.1	5.24	0.09	534	7.65	23.2	cloudy (beige)	pump - 1.5' from bottom rate - 0.08gpm
11:15	33.55	20.8	5.62	0.07	113	4.19	25.6	cloudy (lt. beige)	pump - 2.5' from bottom rate - 0.08gpm
11:30	34.75	21.6	5.63	0.046	200	4.16	25.2	"	pump - 3.5' from bottom rate - 0.08gpm
11:45	35.95	22.5	5.68	0.046	152	4.22	25.7	"	pump - 0.5' from bottom rate - 0.08gpm
12:00	37.15	23.03	5.77	0.046	101	5.06	25.3	"	" , "
12:15	38.35	23.70	5.75	0.045	60	4.45	25.8	pt. cloudy (lt. beige)	" , "
12:30	39.55	24.30	5.73	0.041	45	3.58	26.2	"	" , "

Parcel No.: HR-145Q
Well ID: HR-145Q-mw02
Date: 7/29/02

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date)
12:45	40.75	25.1	5.76	0.045	104	3.20	26.6	cloudy (lt. paige)	pump - 0.5' from bottom rate - 0.08gpm
12:55	41.45	—	—	—	—	—	—	—	well is dry
:									well went dry for the 3rd time. Will return in 24hrs
:									to collect photo sample w/ bailer.
08:55	41.45	22.9	—	—	65	—	—	—	Collected photosample w/ poly bailer.
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Groundwater Well Development Log

Fort McClellan, Alabama

Project Number: 796887
Form Completed by: Lee FLIPPEN
Well Developed by (person/firm): Lee FLIPPEN / Shaw I+E

Parcel No.: HR148Q
Well No.: MW01
Date started: 7-18-02

Monitoring Well Information

FINAL TD = 33.00' TOC

Development Method: Surge + purge
Development Equipment: Whale pumps, Horiba U-22, AquaFAST II, Heron water indicator
Casing Diameter: 2" .163

Beginning Measurments
Depth to Water (ft): 26.26' TOC
Total depth of Well (ft): 33.00' TOC FINAL Depth 33.00' TOC

PID 4.1 BZ 0.0 screen 20'-30'

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date) (Purge Rate, Pump Position, Misc.)
13:45	Ø	26.26	6.02	.071	999+	5.54	25.70	Brown	Depth 33', Purge Rate .12gpm
14:00	1.8	27.76	5.32	.062	999+	5.41	24.44	Brown	Depth 33', PR .12gpm
14:15	3.6	29.48	5.48	.060	999+	6.74	23.75	Brown	Depth 33', PR .12gpm
14:30	5.4	30.27	5.44	.055	569	5.97	22.47	"	" "
14:45	7.2	31.30	5.54	.063	999+	4.65	22.71	"	" "
15:00	9.0	32.01	5.51	.062	999+	4.34	22.05	"	" "
15:04	9.0	Dry -	WAit 20 min. And Check For 80% Recovery = TD 33.00' -(WC 6.74 x .80) = 27.61' Water Level (80%)						TD - (WC X .80) = 80% WL

TD - DTW = WC x 2'/4' well = One PV x 5 = Min PV + H20 to install well = Minimum H20 to remove

33.00' - 26.26' = 6.74 x .163 = 1.10 x 5 = 5.5g + 70g = 75.5g

oc'd 7/2/02

Parcel No.: HR 148 Q
Well ID: MW 01
Date: 7-18-02

7-19-02 PID 0.0, DTW 27.60'

Lee FLIPPEN

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date)
15:24	9.0	31.43	well did not Recover 80%. Recharge Rate = TD 33.00 - DTW 31.43 = 1.57'/20min				Recharge Rate =		(TD 33.00 - DTW 31.43 = 1.57'/20min = .0785'/min. ~~Lee Flippen~~ 7-18-02)
7-19-02 09:30	9.0	27.60	6.60	.074	999+	6.89	20.00	Brown	7-19-02 Depth 33', Purge Rate .13gpm
09:45	10.95	28.10	5.78	.056	531	7.64	19.90	Brown	Depth 33', P. Rate .25gpm
10:00	14.70	29.98	5.49	.052	539	7.85	19.68	Brown	Depth 33', PR .13gpm
2hrs 10:15	16.65	30.58	5.43	.049	447	7.58	19.04	cloudy	Depth 33', PR .12gpm
10:30	18.45	30.46	5.44	.053	681	7.60	18.97	Brown	Depth 33', PR .12gpm
10:45	20.25	31.75	5.35	.049	999+	6.90	20.10	Brown	Depth 33', PR .12 gpm
11:00	22.05	32.01	5.40	.051	999+	6.88	20.26	Brown	Depth 33', PR .12gpm
11:05	22.05	Dry - well RAN Dry - Stopped parameters							7-19-02 For the Day - ~~Lee Flippen~~
7-25-02 09:15	22.05	26.58	6.02	.036	351	7.57	17.77	cloudy	7-25-02 Depth 27', 29', 31', PR .05gpm
3hrs 09:30	22.80	27.93	5.42	.029	248	7.63	20.77	cloudy	Depth 30', PR .05gpm
09:45	23.55	27.88	5.01	.030	999+	7.67	22.42	Brown	Depth 30', PR .05gpm
10:00	24.30	28.18	5.02	.030	547	7.69	22.12	cloudy	Depth 30', PR .05gpm
10:15	25.05	28.03	5.01	.030	194	7.61	24.59	cloudy	Depth 30', PR .05gpm

Parcel No.: HR 148Q
Well ID: MW 01
Date: 7-25-02

Lee FLIPPEN

	Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date)
4hrs	10:30	25.80	28.52	5.08	.030	310	7.29	23.69	cloudy	Depth 32', Purge Rate .05gpm
	10:45	26.55	28.28	5.20	.030	219	7.44	25.94	cloudy	Depth 32', PR .05gpm
	11:00	27.30	28.58	5.32	.030	352	7.84	23.48	cloudy	Depth 32', PR .05gpm
	11:15	28.05	28.48	5.30	.029	370	7.61	26.32	cloudy	Depth 32', PR .05gpm
5hrs	11:30	28.80	28.59	5.29	.029	475	7.51	22.95	cloudy	Depth 32', PR .05gpm
	11:45	29.55	28.63	5.29	.030	397	7.38	26.60	cloudy	Depth 32', PR .05gpm
	12:00	30.30	28.98	5.38	.030	443	7.68	23.23	cloudy	Depth 32', PR .05gpm
	12:15	31.05	29.32	5.42	.029	542	7.47	25.77	cloudy	Depth 32', PR .05gpm
6hrs	12:30	31.80	29.18	5.47	.029	325	7.58	25.50	cloudy	Depth 32', PR .05gpm
	12:45	32.55	29.22	5.58	.029	280	7.26	26.94	cloudy	Depth 32', PR .05gpm
	13:00	33.30	29.25	5.61	.029	307	7.75	25.35	cloudy	Depth 32', PR .05gpm
	13:15	34.05	30.18	5.62	.030	415	7.19	23.99	cloudy	Depth 32', PR .05gpm
7hrs	13:30	34.80	29.98	5.65	.030	221	7.26	24.43	cloudy	Depth 32', PR .05gpm
	13:45	35.55	28.52	5.59	.031	209	7.05	26.91	cloudy	Depth 32', PR .05gpm

Parcel No.: HR 148Q
Well ID: MW 01
Date: 7-25-02

Lee FLIPPEN

Time 24hr	Purge Volume (gal)	Water Level (ft) (TOC)	pH (std units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved oxygen (mg/L)	Temperature (°C)	Clarity (color)	Comments (Date if different from start date)
14:00	36.30	30.68	5.58	.031	226	7.18	23.44	cloudy	Depth 33', Purge Rate .05gpm
14:15	37.05	30.98	5.51	.028	333	7.00	25.20	cloudy	Depth 33', Purge Rate .05gpm
8hrs 14:30	37.80	30.87	5.51	.028	196	7.02	24.35	cloudy	-Took 1 l H2O Photo Sample- ~~Lee Flippen~~ 7-25-02
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Lee Flippen 7-25-02