

APPENDIX C

WELL DEVELOPMENT LOGS

Groundwater Well Development Log

Fort McClellan, Alabama

Project Number: 774645
 Form Completed by: Justin Fisher
 Well Developed by (person/firm): Justin Fisher IT

Parcel No.: 123
 Well No.: PR-123-MW01
 Date started: 06/05/2003

Monitoring Well Information

Development Method: Purge/Surge
 Development Equipment: Grundfos pump, Water level indicator, Turbidimeter, Horiba V40 Water Quality Meter
 Casing Diameter: 2" PVC

Beginning Measurements

Depth to Water (ft): 62.70 ft. btoe
 Total depth of Well (ft): 75.60 ft. btoe

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.)
12:59	0	62.70	-	-	-	-	-	muddy	Flow Rate = 1.5 gpm. Pump @ 7460' btoe
13:01	3	below pump	-	-	-	-	-	muddy	Pump on btm @ 1200, well dry 1204
14:15	3	64.57	-	-	-	-	-	muddy	85.5% recharge @ 1325. Resume 1415
14:16	4.5	below pump	-	-	-	-	-	muddy	Recharge 1.5 gpm. Well dry @ 1416. Over night. Pump @ 7460 ft. btoe
13:05	4.5	63.30	-	-	-	-	-	muddy	6/6 Flow Rate = 0.167 gpm.
13:08	5	-	-	-	-	-	-	muddy	Pump clogged. Surge Well
13:10	5	-	-	-	-	-	-	muddy	Resume 0.167 gpm

TD - DTW = WC x (2)/4' well = One PV x 5 = Min PV + H2O to install well = Minimum H2O to remove
 75.60 - 62.70 = 12.90 x 0.163 = 2.10 x 5 = 10.51 + 30 gallons = 40.51 gallons to remove

QC'd by JS 06/25/03 QC'd by JB 06/25/01

Parcel No.: 123
 Well ID: PR-123-MW01
 Date: 06/06/2001

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
13:15	5.8	72.0 ↓	5.40	0036	off scale	2.89	25.7	muddy	
13:17	6.2	772.5	—	—	—	—	—	muddy	"UC1" Pump down. Well pumped
:									dry, water flowing back into well
:									from tubing. Level rising rapidly.
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Groundwater Well Development Log

Fort McClellan, Alabama

Project Number: 774645
 Form Completed by: Justin Fisher
 Well Developed by (person/firm): Justin Fisher IT

Parcel No.: 123
 Well No.: PR-123-MW02
 Date started: 05/24/2001

Monitoring Well Information

Development Method: Purge/Surge
 Development Equipment: Grundfos pump, water level indicator, Turbidimeter, Horiba U-10 Water Quality Meter
 Casing Diameter: 2" PVC

Beginning Measurements

Depth to Water (ft): 62.65 ft. btoe
 Total depth of Well (ft): 81.65 ft. btoe

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.)
15:35	0	62.65	-	-	-	-	-	mud	Pump @ 80.65' btoe, Flow Rate = 1.5 gpm
15:40	7.5	68.35	-	-	-	-	-	mud	"UC1" Pump down, Surge well
15:46	7.5	-	-	-	-	-	-	mud	Resume
15:50	13.5	below pump	-	-	-	-	-	mud	Water level below pump, shut down well dry.
09:20	13.5	63.55	-	-	-	-	-	mud	Pump @ 80.65' btoe 5/25/01. Flow Rate = 0.5 gpm
09:35	21	72.10	-	-	-	-	-	mud	"UC1" Pump down. Let Cool.
09:59	21	67.81	-	-	-	-	-	mud	Resume @ 0.5 gpm

TD - DTW = WC x (2 1/4' well) = One PV x 5 = Min PV + H2O to install well = Minimum H2O to remove
 81.65 - 62.65 = 19 x 0.163 = 3.10 x 5 = 15.49 + 30 gallons = 45.49 gallons to remove

QC'd by JB 06/25/01

Parcel No.: 123

Well ID: PR-123-mw02

Date: 05/25/2001

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
10:13	28	79.13	-	-	-	-	-	mud	Pump clogging @ 1010. Surge well Well dry. Pump on btm @ 1010
10:45	28	63.07	-	-	-	-	-	muddy	Pump @ 80.65' btec 5/30/01 Flow Rate = 0.25 gpm
10:51	29.5	68.53	-	-	-	-	-		"UCI" reading. Surge well, Uncoil wire.
11:20	29.5	65.66	-	-	-	-	-		Resume @ 0.25 gpm
11:25	30.75	66.85	5.37	0.078	1419	3.02	27.7	opaque	"19F" reading on box while collecting water. Reset and continue.
11:30	32.00	66.98	-	-	-	-	-		Pump failure. No readout on box.
13:15	32.00	64.79	-	-	-	-	-		Resume @ 0.25 gpm
13:30	35.75	71.14	5.31	0.039	1055	4.27	26.4	opaque	Increase Power. 0.25 gpm
13:45	39.50	75.06	5.07	0.033	1427	3.66	27.6	opaque	Pump on btm @ 1350
13:53	41.50	79.70	-	-	-	-	-	muddy	Flow ceased. Can't restore by surging well dry. 2 nd time
14:15	41.50	71.29	-	-	-	-	-	-	<80% Recovery. Recharge overnight
16:40	41.50- SF 42.125	63.18	-	-	-	-	-	muddy	Pump on btm 05/31/01 Flow Rate = 0.125 gpm
16:45	42.125 SF 44	66.19	5.02	0.034	1458	2.88	23.1	opaque	

Parcel No.: 123Well ID: PR-123-MW02Date: 05/31/2001

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
17:00	44	68.35	4.86	0.029	1328	4.37	23.6	opaque	Shut down. End of day.
09:25	44	63.08	—	—	—	—	—	muddy	Pump on 4pm 6/1/01. Flow Rate = 0.25 gpm
09:30	44.625	65.29	5.03	0.036	off scale	3.83	19.4	muddy	
09:34	45.125	—	—	—	—	—	—	—	Rain possibly affecting control "UC1" readout. 50R
09:54	45.125	64.15	—	—	—	—	—	muddy	Rain has slacked off. Flow Rate = Pump @ 80.105 ftoc, 0.125 gpm
10:00	45.875	66.63	5.11	0.030	854	3.87	19.5	opaque	Target purge volume surpassed
10:15	47.75	69.28	5.09	0.027	349	5.12	20.7	murky	
10:30	49.625	70.62	5.18	0.027	489	5.05	21.3	murky	
10:45	51.5	72.83	5.06	0.026	599	4.65	22.1	murky	
11:00	53.375	75.34	5.21	0.025	1992	4.28	22.7	muddy	
11:14	55.125	below pump	—	—	—	—	—	muddy	Well dry. 3 rd Time
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Groundwater Well Development Log

Fort McClellan, Alabama

Project Number: 774645
 Form Completed by: Justin Fisher
 Well Developed by (person/firm): Justin Fisher IT

Parcel No.: 123
 Well No.: PR-123-mw03
 Date started: 06/05/2001

Monitoring Well Information

Development Method: Purge/Surge
 Development Equipment: Grundfos Pump, Water level indicator, Turbidimeter, Horiba U-10 Water Quality Meter
 Casing Diameter: 2" PVC

Beginning Measurements

Depth to Water (ft): 53.28 ft. b.t.c.
 Total depth of Well (ft): 75.98 ft. b.t.c.

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.)
12:30	0	53.28	-	-	-	-	-	muddy	Flow Rate = 1.5 gpm, Surging well
12:36	9	below pump	-	-	-	-	-	muddy	Pump set on 4m @ 1233, Well dry
12:56	9	61.61	-	-	-	-	-	-	63.3% recovery, Recharge overnight
13:40	9	54.00	-	-	-	-	-	muddy	6/6/01, 0.25 gpm, Pump @ 74.98' b.t.c.
13:45	10.25	59.74	4.93	0.023	1365	4.59	24.1	opaque	
13:58	13.50	-	-	-	-	-	-	-	"UC1" Pump overload, Well reset.
14:28	13.50	-	-	-	-	-	-	muddy	Let pump cool. Surge well and resume

TD - DTW = WC x (2")/4' well = One PV x 5 = Min PV + H2O to install well = Minimum H2O to remove
 75.98 - 53.28 = 22.70 x 0.163 = 3.70 x 5 = 18.50 + 40 gallons = 58.50

QC'd by J/S 06/24/01

Parcel No.: 123Well ID: PR-123-1W03Date: 06/06/2001

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
14:40	16.50	58.52	5.24	0.025	1464	4.51	25.6	opaque	
14:55	20.25	63.31	4.82	0.021	1484	4.27	25.9	opaque	
15:10	24	66.02	4.79	0.021	1565	4.57	25.9	opaque	
15:25	27.75	69.19	4.90	0.023	1183	4.54	25.7	opaque	Pump on atm @ 1535
15:40	31.5	73.45	4.84	0.024	off scale	4.37	26.6	muddy	
15:43	32.25	below pump	-	-	-	-	-	muddy	Well dry 2 nd Time.
16:04	32.25 67.2 JF	67.29	-	-	-	-	-	-	<30% Recharge, Recharge overnight. Pump @ 74.98 ft. ltrc.
08:54	32.25	55.14	-	-	-	-	-	muddy	6/7/01. Flow Rate = 0.167 gpm
09:10	34.92	62.40	4.67	0.039	322	4.37	22.0	very cloudy	
09:25	37.43	63.95	4.86	0.022	268	4.16	22.9	very cloudy	
09:40	39.93	65.32	4.97	0.022	239	4.11	23.3	very cloudy	
01:55	42.44	68.28	4.99	0.023	674	4.11	23.4	murky	
10:10	44.94	64.98	4.98	0.023	797	4.32	23.4	murky	Pump on atm @ 1015

Parcel No.: 123Well ID: PR-123-MWC3Date: 06/06/2001

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
10:25	47.45	73.54	4.84	0.024	1087	4.63	23.5	opaque	
10:28	47.95	below pump	—	—	—	—	—	—	Well dry, 3 rd Time.
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Groundwater Well Development Log

Fort McClellan, Alabama

Project Number: 774645
 Form Completed by: Justin Fisher
 Well Developed by (person/firm): Justin Fisher IT

Parcel No.: 123
 Well No.: PR-123-MW04
 Date started: 05/24/2001

Monitoring Well Information

Development Method: Purge/Surge
 Development Equipment: Grundfos pump, water level indicator, Turbidimeter, Horiba U-10 Water Quality Meter
 Casing Diameter: 2" PVC

Beginning Measurements
 Depth to Water (ft): 52.50 ft. b10c
 Total depth of Well (ft): 77.42 ft. b10c

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.)
09:55	0	52.50	5.40	0.048	off scale	5.91	21.8	muddy opaque	Pump @ 76.42 ft b10c, Flow Rate = 1.5 gpm
09:58	4.5	64.65	-	-	-	-	-	mud	"UC1" reading, Pump down.
10:25	4.5	59.72	-	-	-	-	-	mud	0.5 gal/min.
10:35	12	72.70	5.14	0.027	off scale	6.01	20.2	mud	
10:37	13	75.38	-	-	-	-	-	mud	Flow ceased. Allow to recharge
11:12	13	66.36	-	-	-	-	-	mud	<80% recharge. Pump dry @ 1.5 gpm
11:13	14.5	74.75	-	-	-	-	-	mud	with pump on atm and let recharge overnight.

TD - DTW = WC x (2)/4' well = One PV x 5 = Min PV + H2O to install well = Minimum H2O to remove
 $77.42 - 52.50 = 24.92 \times 0.163 = 4.06 \times 5 = 20.31 + 30 \text{ gallons} = 50.31 \text{ gallons to remove}$

QC'd by JS 06/25/01

Parcel No.: 123Well ID: PR-123-MW04Date: 05/25/01

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
09:48	14.5	59.64	-	-	-	-	-	-	05/25/2001 Check water level while developing.
09:51	14.5	59.33	-	-	-	-	-	-	PR-123-MW02, 05/25/01
10:34	14.5	58.30	-	-	-	-	-	-	Check water level.
10:35	14.5	55.05	-	-	-	-	-	-	Flow Rate = 0.25 gpm. 05/31/01. Pump on btme.
10:44	16.25	63.30	-	-	-	-	-	-	"UC2" readout, surge well.
10:53	16.25	-	-	-	-	-	-	-	Resume @ 0.25 gpm.
11:00	18.0	65.80	-	-	-	-	-	-	"UC1" readout, surge well.
11:08	18.0	65.20	-	-	-	-	-	-	Resume @ 0.25 gpm Pump @ ~77' btm.
11:15	19.75	67.42	4.96	0.027	1096	5.02	23.5	opaque	
11:30	23.50	74.13	4.64	0.023	off scale	4.42	24.1	muddy	
11:34	~24	below pump	-	-	-	-	-	muddy	Well dry. Let Recharge, 2 nd time
11:54	~24	70.63	-	-	-	-	-	-	<80% recovery. Recharge overnight
10:50	24	55.86	-	-	-	-	-	muddy	Pump @ 76.42' btm. 6/4/01. Flow Rate = 0.125 gpm

Parcel No.: 123Well ID: PR-123-MW04Date: 06/09/2001

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
10:55	24.625	59.10	-	-	-	-	-	-	"9F" readout - Cannot Fix.
13:25	24.625	59.50	-	-	-	-	-	muddy	New pump and Control box 0.125 gpm Pump @ 76.42' btoe
13:40	26.5	62.25	4.82	0.029	1121	5.15	28.9	opaque	
13:55	28.375	65.22	4.49	0.022	1058	4.61	30.0	opaque	
14:10	30.25	66.60	4.44	0.020	845	4.75	28.6	opaque	
14:25	32.125	70.10	4.37	0.021	1462	4.49	28.9	opaque	Irratic flow @ 1430
14:40	~34	74.76	4.35	0.022	1860	3.96	28.8	muddy	
14:44	~34.5	76.15	-	-	-	-	-	muddy	Lower pump to 3tw. Flow Ceased. Well dry. 3 rd time
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Groundwater Well Development Log

Fort McClellan, Alabama

Project Number: 774645
 Form Completed by: Justin Fisher
 Well Developed by (person/firm): Justin Fisher IT

Parcel No.: 123
 Well No.: PR-123-MW05
 Date started: 06/05/2001

Monitoring Well Information

Development Method: Purge/Surge
 Development Equipment: Grundfos pump, Water level indicator, Turbidimeter, Horiba U-10 Water Quality Meter
 Casing Diameter: 2" PVC

Beginning Measurements

Depth to Water (ft): 56.74 ft. btoe
 Total depth of Well (ft): 74.27 ft. btoe

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.)
13:35	0	56.74	-	-	-	-	-	muddy	Flow Rate = 1.5 gpm. Surging Well.
13:41	9	below pump	-	-	-	-	-	muddy	Well dry, Let Recharge.
14:01	9	59.07	-	-	-	-	-	-	86.7% Recharge.
14:45	9	58.32	-	-	-	-	-	muddy	Resume @ 1.5 gpm. Surging Well
14:50	16.5	below pump	-	-	-	-	-	muddy	Well dry. Recharge Overnight.
10:10	16.5	56.68	-	-	-	-	-	muddy	Pump @ 73.27' btoe. 6/6/01 Flow Rate = 0.167 gpm
10:15	17.335	-	-	-	-	-	-	-	Pump closed, Surge well

$$\begin{aligned}
 TD - DTW &= WC \times \left(\frac{2}{4}\right)' \text{ well} = \text{One PV} \times 5 = \text{Min PV} + H_{20} \text{ to install well} = \text{Minimum } H_{20} \text{ to remove} \\
 74.27 - 56.74 &= 17.53 \times 0.163 = 2.86 \times 5 = 14.29 + 45 \text{ gallons} = 59.29 \text{ gallon to remove}
 \end{aligned}$$

QC'd by JBS 06/25/01

Parcel No.: 123Well ID: PR-123-mw01.5Date: 06/06/2001K.M.H.
6/6/01

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
10:19	17.335	-	-	-	-	-	-	muddy	Resume @ 0.167 gpm
10:30	14.17	60.73	5.65	0.051	off scale	3.78	26.3	muddy	
10:45	21.68	62.03	5.43	0.034	off scale	3.74	27.2	muddy	
11:00	24.18	63.25	5.33	0.024	off scale	4.01	27.0	muddy	
11:15	26.69	63.86	5.35	0.021	off scale	4.09	27.0	opaque	
11:30	29.19	65.49	5.37	0.023	825	3.89	29.1	murky	
11:45	31.70	65.90	5.35	0.029	off scale	3.32	31.5	opaque	Pump on bottom @ 1205
12:00	34.20	69.59	5.52	0.032	off scale	3.17	29.4	muddy	
12:13	36.37	below pump	-	-	-	-	-	-	Well dry. 3 rd Time.
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