



118 Buckingham Circle, Charlottesville, VA 22903

May 30, 2017

Mr. Duncan Daugherty, PE
Virginia Department of Health
Office of Drinking Water
400 South Main Street-2nd Floor
Culpeper, Virginia 22701

Re: PWSID 7600005; Yield & Drawdown Test Results – WELL A

Dear Mr. Daugherty,

Please find the results of the constant rate testing of Well "A" at Townes at Point Seanna located in Spotsylvania County, Virginia (Figure 1).

Executive Summary

The well was pumped for 48 hours at a rate of 100 gpm and approximately 290,682 gallons of water were extracted during the test. A plot of Depth to Water vs Time is found in Attachment I. Data sheets, documenting all field measurements, are included in Attachment II. The specific capacity of 2.12 gal/ft and the rapid recovery (3 hours) indicate that this well is an extraordinary and reliable producer for this portion of the piedmont and is capable of much greater yields.

Finally, water levels in Well B were monitored before, during and after the test. The observed response is estimated to be approximately -0.40 feet or about 5 inches (Attachment III) and therefore considered negligible and highly unlikely to adversely impact the yield of the well (See WELL B REPORT). Therefore, it is our best professional opinion that both WELL A & Well B should be considered separate sources of groundwater.

Testing Methodology

The well was subjected to 48 hour, constant rate test and included a minimum of 24 hours of recovery measurements.

Water-level depths were collected in the well before, during, and after aquifer test. Groundwater levels were recorded using electronic pressure transducers and hand-held electronic water-level meters during the aquifer testing.

Additionally, depth to water measurements were recorded in the non-pumping well during the test in order to observe the degree of interference between pumping and non-pumping wells and to learn about the aquifer characteristics of the site as a whole.

A totalizer flow meter (with sweeps) was implemented to determine rate of flow. In addition, rates were also measured using a 5 gallon bucket and a stop watch. Water withdrawn from the wells was piped at least 150 feet away and downhill from the pumping well during the testing.

Water samples were collected as required by VDH and forwarded to the DCLS Laboratories in Richmond for the analyses of some of the constituents while the Bacteriological Testing was analyzed by Aqua-Air Laboratories in Charlottesville, Virginia.

WELL A SUMMARIZED RESULTS

System Name: Townes at Point Seanna

County: Spotsylvania

Well Number: Well A Class: IIB Size: 6 in

Name & Address of Company Performing Test:

True North Environmental

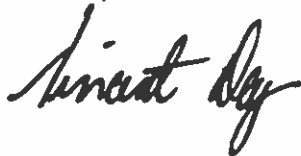
118 Buckingham Circle

Charlottesville, Virginia 22903

- Date & Time Test Started: May 9, 2017: 8:35 AM
- Date & Time Test Terminated: May 11, 2017: 8:47 AM
- Duration of Test: 48 hours + 12 minutes
- Type of Test & Rate: Constant Rate Test- 100 gpm
- Static Water Level: 13.25 feet below top of casing (btoc)
- Average Flow Rate: 101 gpm
- Total Volume of Water Withdrawn During Test: 290,682 gallons
- Pump Depth Setting: ~ 218 feet btoc
- Water Above Pump: 204.75 feet
- Total Drawdown: 47.47 feet
- Specific Capacity: 2.12 gpm/ft
- Drawdown over final 6.75 hours of Test: 0.19 ft
- Amount of Time to Reach 90% Recovery: 3 hours
- Well B Response: -0.40 feet

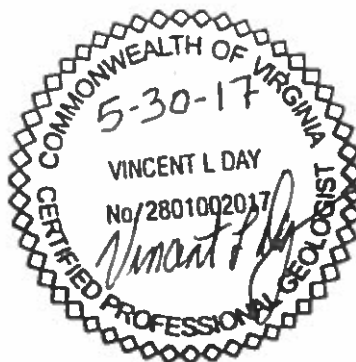
Please let me know if you need any additional information

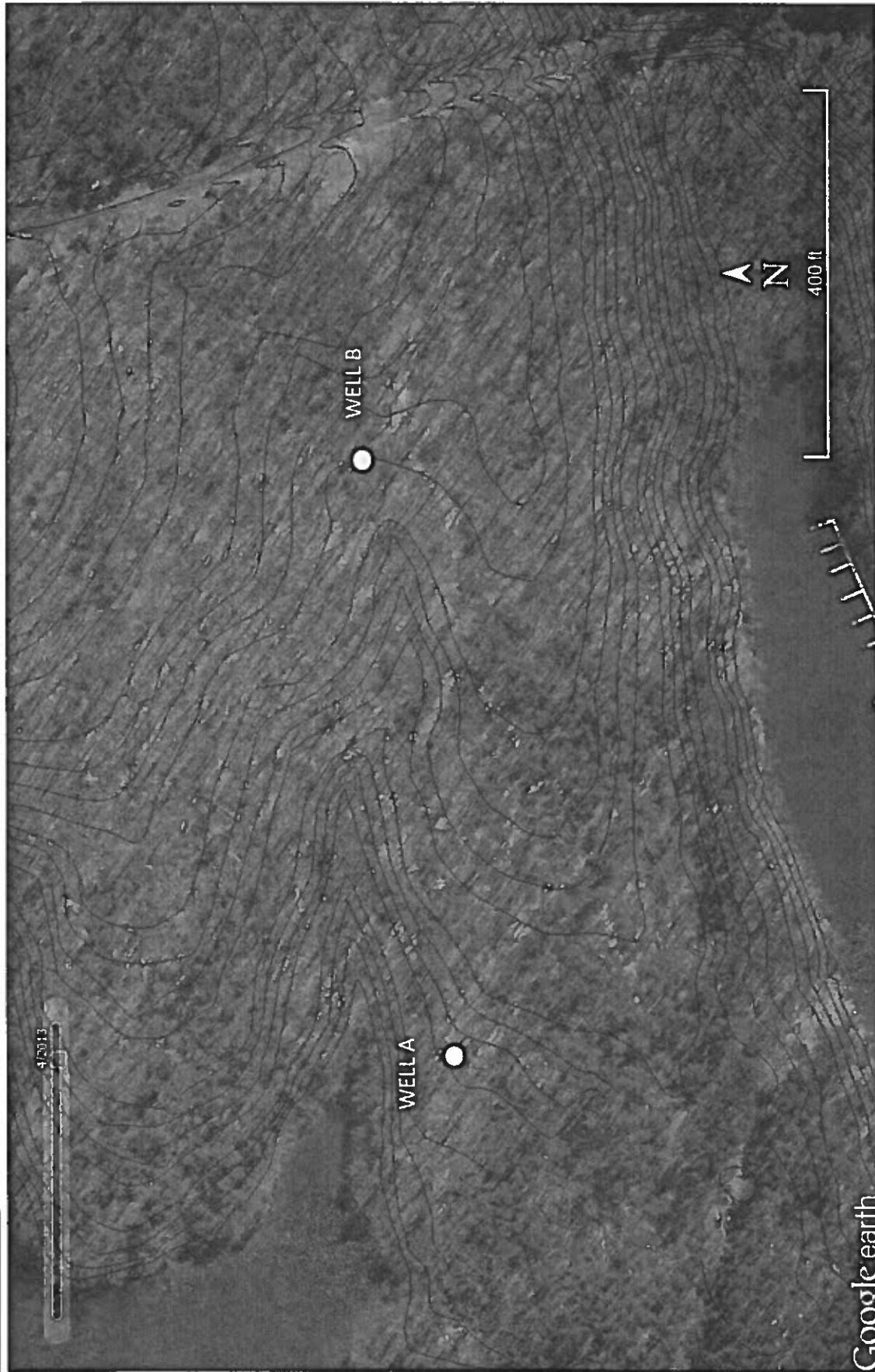
Sincerely,



Vincent Day, PG

Figure
Attachments





TOWNES AT POINT SIENNA
Well Location Map

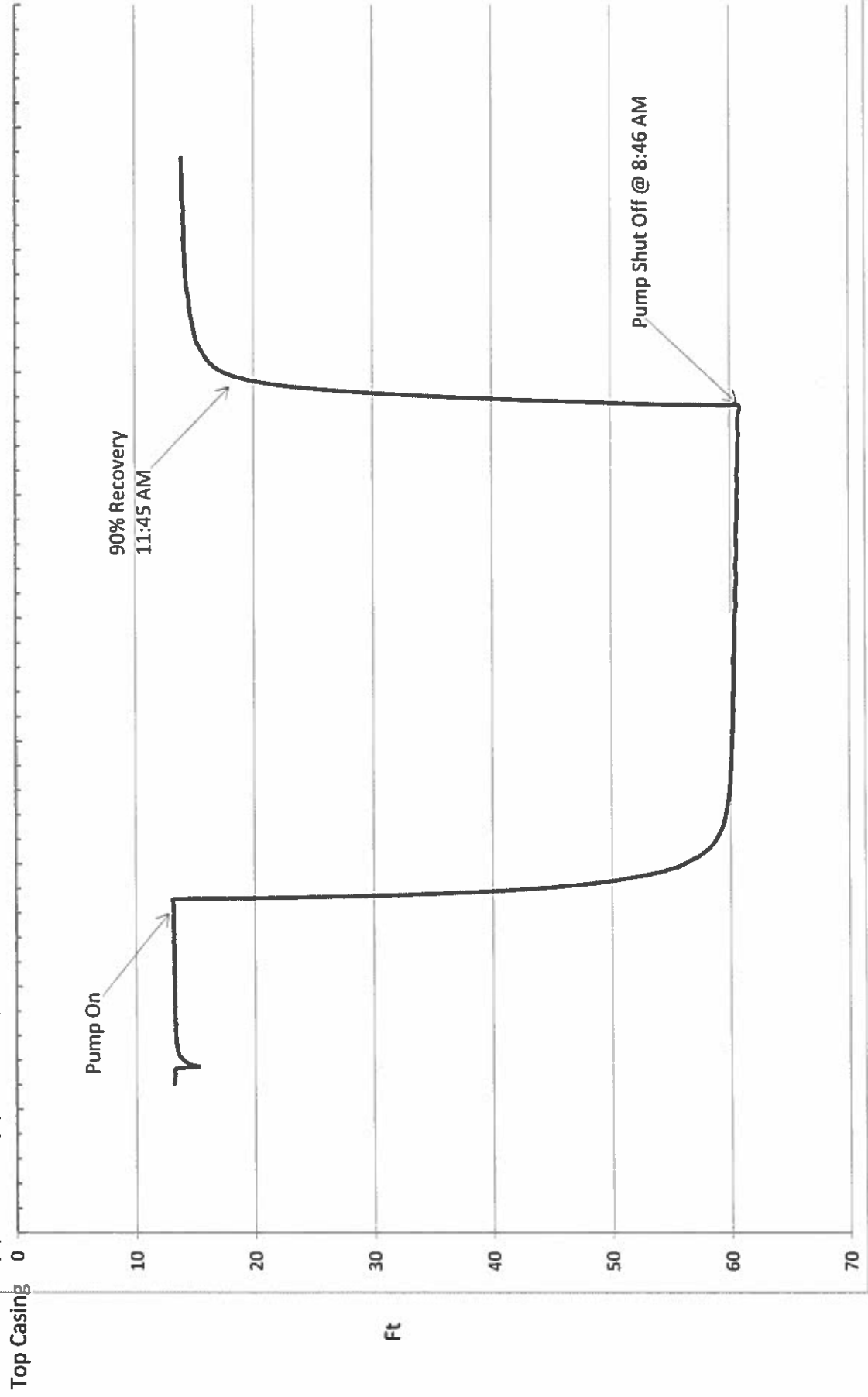
○ APPROXIMATE LOCATION OF WELL

FIGURE
1

ATTACHMENT I
PLOT OF DRAWDOWN & RECOVERY

Plot of Time vs Depth to Water

	5/8/2017	5/9/2017	5/10/2017	5/11/2017	5/12/2017	5/13/2017
5/8/2017						
5/9/2017						
5/10/2017						
5/11/2017						
5/12/2017						
5/13/2017						



**ATTACHMENT II
DRAWDOWN & RECOVERY
FIELD DATA SHEET**

TIME	DTW (ft)		
5/8/2017 14:31	13.19	STATIC (ft)	13.25
5/8/2017 14:41	13.213	Pumping Rate (gpm)	100
5/8/2017 14:51	13.269	Depth @ 48 hrs	60.72
5/8/2017 15:01	13.248	Total Draw Down (ft)	47.47
5/8/2017 15:11	13.285	Specific Capacity (gpm/ft)	2.12
5/8/2017 15:21	13.271	Gallons Pumped	290,682
5/8/2017 15:31	13.312	90% Recovery Reached	11:45 AM; 3 hours after shutoff
5/8/2017 15:41	13.252		
5/8/2017 15:51	13.247		
5/8/2017 16:01	13.381		
5/8/2017 16:11	15.199		
5/8/2017 16:21	14.598		
5/8/2017 16:31	14.324		
5/8/2017 16:41	14.081		
5/8/2017 16:51	13.954		
5/8/2017 17:01	13.812		
5/8/2017 17:11	13.674		
5/8/2017 17:21	13.618		
5/8/2017 17:31	13.598		
5/8/2017 17:41	13.524		
5/8/2017 17:51	13.487		
5/8/2017 18:01	13.464		
5/8/2017 18:11	13.458		
5/8/2017 18:21	13.421		
5/8/2017 18:31	13.407		
5/8/2017 18:41	13.386		
5/8/2017 18:51	13.372		
5/8/2017 19:01	13.377		
5/8/2017 19:11	13.363		
5/8/2017 19:21	13.355		
5/8/2017 19:31	13.355		
5/8/2017 19:41	13.326		
5/8/2017 19:51	13.323		
5/8/2017 20:01	13.363		
5/8/2017 20:11	13.342		
5/8/2017 20:21	13.392		
5/8/2017 20:31	13.321		
5/8/2017 20:41	13.29		
5/8/2017 20:51	13.326		
5/8/2017 21:01	13.313		
5/8/2017 21:11	13.292		
5/8/2017 21:21	13.323		
5/8/2017 21:31	13.264		
5/8/2017 21:41	13.295		
5/8/2017 21:51	13.261		
5/8/2017 22:01	13.336		

TIME	DTW
5/8/2017 22:11	13.283
5/8/2017 22:21	13.269
5/8/2017 22:31	13.278
5/8/2017 22:41	13.249
5/8/2017 22:51	13.276
5/8/2017 23:01	13.259
5/8/2017 23:11	13.282
5/8/2017 23:21	13.271
5/8/2017 23:31	13.242
5/8/2017 23:41	13.258
5/8/2017 23:51	13.261
5/9/2017 0:01	13.296
5/9/2017 0:11	13.258
5/9/2017 0:21	13.272
5/9/2017 0:31	13.269
5/9/2017 0:41	13.239
5/9/2017 0:51	13.268
5/9/2017 1:01	13.274
5/9/2017 1:11	13.244
5/9/2017 1:21	13.229
5/9/2017 1:31	13.239
5/9/2017 1:41	13.224
5/9/2017 1:51	13.232
5/9/2017 2:01	13.244
5/9/2017 2:11	13.279
5/9/2017 2:21	13.245
5/9/2017 2:31	13.257
5/9/2017 2:41	13.222
5/9/2017 2:51	13.239
5/9/2017 3:01	13.229
5/9/2017 3:11	13.227
5/9/2017 3:21	13.262
5/9/2017 3:31	13.231
5/9/2017 3:41	13.203
5/9/2017 3:51	13.22
5/9/2017 4:01	13.239
5/9/2017 4:11	13.208
5/9/2017 4:21	13.206
5/9/2017 4:31	13.206
5/9/2017 4:41	13.207
5/9/2017 4:51	13.19
5/9/2017 5:01	13.222
5/9/2017 5:11	13.21
5/9/2017 5:21	13.197
5/9/2017 5:31	13.207
5/9/2017 5:41	13.194
5/9/2017 5:51	13.198

TIME	DTW
5/9/2017 6:01	13.191
5/9/2017 6:11	13.204
5/9/2017 6:21	13.206
5/9/2017 6:31	13.208
5/9/2017 6:41	13.204
5/9/2017 6:51	13.208
5/9/2017 7:01	13.204
5/9/2017 7:11	13.207
5/9/2017 7:21	13.178
5/9/2017 7:31	13.211
5/9/2017 7:41	13.174
5/9/2017 7:51	13.224
5/9/2017 8:01	13.18
5/9/2017 8:11	13.165
5/9/2017 8:21	13.157
5/9/2017 8:30	13.09
5/9/2017 8:31	13.158
5/9/2017 8:32	13.222
5/9/2017 8:33	13.148
5/9/2017 8:34	13.207
5/9/2017 8:35	13.262
5/9/2017 8:36	13.246 ON
5/9/2017 8:37	15.572
5/9/2017 8:38	17.185 109 gpm
5/9/2017 8:39	18.494
5/9/2017 8:40	19.611
5/9/2017 8:41	20.613
5/9/2017 8:42	21.57
5/9/2017 8:43	22.425
5/9/2017 8:44	23.266
5/9/2017 8:45	23.97
5/9/2017 8:46	24.762
5/9/2017 8:47	25.469
5/9/2017 8:48	26.161
5/9/2017 8:49	26.807
5/9/2017 8:50	27.474
5/9/2017 8:51	28.053
5/9/2017 8:52	28.668
5/9/2017 8:53	29.274
5/9/2017 8:54	29.635
5/9/2017 8:55	30.222
5/9/2017 8:56	30.812
5/9/2017 8:57	31.203
5/9/2017 8:58	31.681
5/9/2017 8:59	32.155
5/9/2017 9:00	32.624
5/9/2017 9:01	33.035

TIME	DTW
5/9/2017 9:02	33.412
5/9/2017 9:03	33.84
5/9/2017 9:04	34.193
5/9/2017 9:05	34.675
5/9/2017 9:06	35.099
5/9/2017 9:07	35.435
5/9/2017 9:08	35.749
5/9/2017 9:09	36.17
5/9/2017 9:10	36.393
5/9/2017 9:11	36.872
5/9/2017 9:12	37.104
5/9/2017 9:13	37.478
5/9/2017 9:14	37.799
5/9/2017 9:15	38.048
5/9/2017 9:16	38.351
5/9/2017 9:17	38.715
5/9/2017 9:18	38.903
5/9/2017 9:19	39.299
5/9/2017 9:20	39.506
5/9/2017 9:21	39.812
5/9/2017 9:22	40.099
5/9/2017 9:23	40.33
5/9/2017 9:24	40.541
5/9/2017 9:25	40.86
5/9/2017 9:26	41.086
5/9/2017 9:27	41.373
5/9/2017 9:28	41.61
5/9/2017 9:29	41.862
5/9/2017 9:30	42.091
5/9/2017 9:31	42.321
5/9/2017 9:32	42.48
5/9/2017 9:33	42.748
5/9/2017 9:34	42.913
5/9/2017 9:35	43.106
5/9/2017 9:36	43.383 106 gpm
5/9/2017 9:37	43.518
5/9/2017 9:38	43.76
5/9/2017 9:39	43.938
5/9/2017 9:40	44.116
5/9/2017 9:45	45.07
5/9/2017 9:50	45.857
5/9/2017 9:55	46.653
5/9/2017 10:00	47.404
5/9/2017 10:05	48.07
5/9/2017 10:10	48.705
5/9/2017 10:15	49.319
5/9/2017 10:20	49.801

TIME	DTW		
5/9/2017 10:25	50.404		
5/9/2017 10:30	50.829 102 gpm		
5/9/2017 10:45	52.014		
5/9/2017 11:00	53.137		
5/9/2017 11:15	54.092		
5/9/2017 11:30	54.824		
5/9/2017 11:45	55.547		
5/9/2017 12:00	56.039 100 gpm	Draw Down (ft/hr)	
5/9/2017 13:00	57.556	1.517	
5/9/2017 14:00	58.49	0.934	
5/9/2017 15:00	59.008	0.518	
5/9/2017 16:00	59.389 100 gpm	0.381	
5/9/2017 17:00	59.575	0.186	STABILIZATION (<0.20 ft/hr)
5/9/2017 18:00	59.725	0.15	
5/9/2017 19:00	59.853	0.128	
5/9/2017 20:00	59.945	0.092	
5/9/2017 21:00	59.981	0.036	
5/9/2017 22:00	60.032	0.051	
5/9/2017 23:00	60.053	0.021	
5/10/2017 0:00	60.099 100 gpm	0.046	
5/10/2017 1:00	60.128	0.029	
5/10/2017 2:00	60.177	0.049	
5/10/2017 3:00	60.22	0.043	
5/10/2017 4:00	60.189 100 gpm	-0.031	
5/10/2017 5:00	60.262	0.073	
5/10/2017 6:00	60.258	-0.004	
5/10/2017 7:00	60.262	0.004	
5/10/2017 8:00	60.247	-0.015	
5/10/2017 9:00	60.311	0.064	
5/10/2017 10:00	60.32	0.009	
5/10/2017 11:00	60.313 100 gpm	-0.007	
5/10/2017 12:00	60.319	0.006	
5/10/2017 13:00	60.434	0.115	
5/10/2017 14:00	60.42	-0.014	
5/10/2017 15:00	60.428	0.008	
5/10/2017 16:00	60.498	0.07	
5/10/2017 17:00	60.411	-0.087	
5/10/2017 18:00	60.5	0.089	
5/10/2017 19:00	60.498	-0.002	
5/10/2017 20:00	60.456	-0.042	
5/10/2017 21:00	60.481	0.025	
5/10/2017 22:00	60.552 100 gpm	0.071	
5/10/2017 23:00	60.566	0.014	
5/11/2017 0:00	60.535	-0.031	
5/11/2017 1:00	60.595	0.06	
5/11/2017 2:00	60.525	-0.07	
5/11/2017 3:00	60.616	0.091	

TIME	DTW	Drawdown (ft/hr)
5/11/2017 4:00	60.623	0.007
5/11/2017 5:00	60.636	0.013
5/11/2017 6:00	60.692	0.056
5/11/2017 7:00	60.616 100 gpm	-0.076
5/11/2017 8:00	60.707	0.091
5/11/2017 8:46	60.724	RECOVERY BEGINS
5/11/2017 8:47	59.543	
5/11/2017 8:48	58.139	
5/11/2017 8:49	57.128	
5/11/2017 8:50	56.229	
5/11/2017 8:51	55.367	
5/11/2017 8:52	54.731	
5/11/2017 8:53	54.081	
5/11/2017 8:54	53.421	
5/11/2017 8:55	52.833	
5/11/2017 8:56	52.261	
5/11/2017 8:57	51.647	
5/11/2017 8:58	51.111	
5/11/2017 8:59	50.569	
5/11/2017 9:00	50.025	
5/11/2017 9:01	49.537	
5/11/2017 9:02	48.996	
5/11/2017 9:03	48.519	
5/11/2017 9:04	48.013	
5/11/2017 9:05	49.403	
5/11/2017 9:06	48.176	
5/11/2017 9:07	47.478	
5/11/2017 9:08	46.874	
5/11/2017 9:09	46.418	
5/11/2017 9:10	45.912	
5/11/2017 9:11	45.423	
5/11/2017 9:12	44.948	
5/11/2017 9:13	44.509	
5/11/2017 9:14	44.042	
5/11/2017 9:15	43.641	
5/11/2017 9:16	43.222	
5/11/2017 9:17	42.789	
5/11/2017 9:18	42.375	
5/11/2017 9:19	42.018	
5/11/2017 9:20	41.57	
5/11/2017 9:21	41.182	
5/11/2017 9:22	40.846	
5/11/2017 9:23	40.419	
5/11/2017 9:24	40.005	
5/11/2017 9:25	39.679	
5/11/2017 9:26	39.295	
5/11/2017 9:27	38.94	

0

TIME	DTW
5/11/2017 9:28	38.597
5/11/2017 9:29	38.218
5/11/2017 9:30	37.845
5/11/2017 9:31	37.552
5/11/2017 9:32	37.184
5/11/2017 9:33	36.836
5/11/2017 9:34	36.527
5/11/2017 9:35	36.184
5/11/2017 9:36	35.851
5/11/2017 9:37	35.564
5/11/2017 9:38	35.277
5/11/2017 9:39	34.928
5/11/2017 9:40	34.685
5/11/2017 9:41	34.291
5/11/2017 9:42	34.034
5/11/2017 9:43	33.751
5/11/2017 9:44	33.398
5/11/2017 9:45	33.196
5/11/2017 9:46	32.823
5/11/2017 9:47	32.565
5/11/2017 9:48	32.372
5/11/2017 9:49	32.074
5/11/2017 9:50	31.735
5/11/2017 9:51	31.541
5/11/2017 9:52	31.325
5/11/2017 9:53	31.006
5/11/2017 9:54	30.776
5/11/2017 9:55	30.541
5/11/2017 9:56	30.302
5/11/2017 9:57	30.081
5/11/2017 9:58	29.782
5/11/2017 9:59	29.546
5/11/2017 10:00	29.317
5/11/2017 10:05	28.212
5/11/2017 10:10	27.202
5/11/2017 10:15	26.273
5/11/2017 10:20	25.379
5/11/2017 10:25	24.587
5/11/2017 10:30	23.859
5/11/2017 10:35	23.091
5/11/2017 10:40	22.526
5/11/2017 10:45	21.992
5/11/2017 11:00	20.561
5/11/2017 11:15	19.473
5/11/2017 11:30	18.593
5/11/2017 11:45	17.982 90% Recovered
5/11/2017 12:00	17.43

TIME	DTW
5/11/2017 12:15	17.063
5/11/2017 12:30	16.702
5/11/2017 12:45	16.526
5/11/2017 13:00	16.256
5/11/2017 14:00	15.678
5/11/2017 15:00	15.206
5/11/2017 16:00	14.994
5/11/2017 17:00	14.844
5/11/2017 18:00	14.653
5/11/2017 19:00	14.616
5/11/2017 20:00	14.433
5/11/2017 21:00	14.337
5/11/2017 22:00	14.289
5/11/2017 23:00	14.262
5/12/2017 0:00	14.214
5/12/2017 1:00	14.16
5/12/2017 2:00	14.194
5/12/2017 3:00	14.127
5/12/2017 4:00	14.163
5/12/2017 5:00	14.013
5/12/2017 6:00	14.036
5/12/2017 7:00	14.009
5/12/2017 8:00	13.984
5/12/2017 9:00	13.987

**ATTACHMENT III
RESPONSE PLOT
WELL B**

WELL B- Response to WELL A Pumping

