Appendix A – Greensand Field Notes

Sample Location Reference IDs

Sample **ID**	**Sample Location/Description**
01 RAW	Raw water sample from the Oakdale Well, collected upstream of chemical addition.
11 POX	Post-oxidation sample, collected downstream of chemical addition (NaOCl,KOH) and upstream of the pilot filters.
21 FILTER A	Effluent sample from pilot Filter A. Media: 24" GreensandPlus and 12" Anthracite.
22 FILTER B	Effluent sample from pilot Filter B. Media: 24" GreensandPlus and 12" Anthracite.
23 FILTER C	Effluent sample from pilot Filter C. Media: 24" GreensandPlus and 12" Anthracite.
24 FILTER D	Effluent sample from pilot Filter D. Media: 24" GreensandPlus and 12" Anthracite.
31 CBW A	Composite backwash sample, collected from water used during the backwash of Filter A.
32 CBW B	Composite backwash sample, collected from water used during the backwash of Filter B.
33 CBW C	Composite backwash sample, collected from water used during the backwash of Filter C.
34 CBW D	Composite backwash sample, collected from water used during the backwash of Filter D.
41 SSN A	Suspended supernatant sample, collected from the supernatant of a Filter A backwash that was allowed to settle.
42 SSN B	Suspended supernatant sample, collected from the supernatant of a Filter B backwash that was allowed to settle.
43 SSN C	Suspended supernatant sample, collected from the supernatant of a Filter C backwash that was allowed to settle.
44 SSN D	Suspended supernatant sample, collected from the supernatant of a Filter D backwash that was allowed to settle.

Date and Time	SAMPLE LOCATION	Cl2 (f)	Cl2 (t)	Fe(t)	Fe (d)	Mn(t)	Mn (d)	pH	Temp	JS#	Mn(t) - GF	CO2	A Trial	B Trial	C Trial	D Trial	A Runtime (hrs)	B Runtime (hrs)	C Runtime (hrs)	D Runtime (hrs)
04/30 16:00	Moved FELMA to site and load new, soaked media												1	1	1	1	0.00	0.00	0.00	0.00
04/30 16:00	A, B, C, D = 24" GSP + 12" Anthracite												1	1	1	1	0.00	0.00	0.00	0.00
04/30 16:00	Flows @ 1 gpm												1	1	1	1	0.00	0.00	0.00	0.00
04/30 16:00	NaOCl = 1/5, Start @ 150 ml/hr, V = 11.9 L @ 16:40												1	1	1	1	0.00	0.00	0.00	0.00
04/30 16:00	KOH = 1/5, Start @ 125 ml/hr, V = 13.9 L @ 16:40												1	1	1	1	0.62	0.62	0.62	0.62
04/30 16:37	11 POX	0.38											1	1	1	1	0.62	0.62	0.62	0.62
04/30 16:37	Increase NaOCl Q to 250 ml/hr												1	1	1	1	0.87	0.87	0.87	0.87
04/30 16:52	11 POX	0.65											1	1	1	1	0.88	0.88	0.88	0.88
04/30 16:53	Increase NAOCl Q to 350 ml/hr												1	1	1	1	1.08	1.08	1.08	1.08
04/30 17:05	11 POX	0.72											1	1	1	1	1.12	1.12	1.12	1.12
04/30 17:07	KOH V = 13.9 Q = 125 ml/hr D = 1/5 (manual)												1	1	1	1	1.12	1.12	1.12	1.12
04/30 17:07	NaOCl V = 11.7 Q = 350 ml/hr D = 1/5												1	1	1	1	15.50	15.50	15.50	15.50
05/01 07:30	KOH V = 13.9 Q = 125 ml/hr D = 1/5 (manual)												1	1	1	1	15.50	15.50	15.50	15.50
05/01 07:30	NaOCl V = 6.4 Q = 350 ml/hr D = 1/5												1	1	1	1	15.53	15.53	15.53	15.53
05/01 07:32	Calibrate online pH probes pH1 slope = 53.9 mV/pH, POX pH2 slope = 49.5 mV/pH												1	1	1	1	16.00	16.00	16.00	16.00
05/01 08:00	Increase KOH manual Q to 180 ml/hr												1	1	1	1	16.08	16.08	16.08	16.08
05/01 08:05	01 RAW			0.00	0.00	0.728	0.710						1	1	1	1	16.08	16.08	16.08	16.08
05/01 08:05	11 POX	0.54	0.92		0.02		0.720						1	1	1	1	16.08	16.08	16.08	16.08
05/01 08:05	21 FILTER A	0.29	0.31	0.00		0.003							1	1	1	1	16.08	16.08	16.08	16.08
05/01 08:05	22 FILTER B	0.28	0.51	0.00		0.001							1	1	1	1	16.08	16.08	16.08	16.08
05/01 08:05	23 FILTER C	0.27	0.53	0.00									1	1	1	1	16.08	16.08	16.08	16.08
05/01 08:05	24 FILTER D	0.35	0.58	0.00									1	1	1	1	16.45	16.45	16.45	16.45
05/01 08:27	Increase KOH Q to 240 ml/hr												1	1	1	1	16.75	16.75	16.75	16.75
05/01 08:45	23 FILTER C					0.010							1	1	1	1	16.75	16.75	16.75	16.75
05/01 08:45	24 FILTER D					0.013							1	1	1	1	16.83	16.83	16.83	16.83
05/01 08:50	Shutdown Filters A - D for BW @ 2.4 gpm * 10 min = 24 gallons, pause chemicals																			
05/01 09:28	Restart Filters A + B @ 4 gpm/sf and C + D @ 6 gpm/sf												2	2	2	2	0.00	0.00	0.00	0.00
05/01 09:48	Started NaOCl Q @ 350 ml/hr												2	2	2	2	0.33	0.33	0.33	0.33
05/01 09:48	Started KOH Q in manual @ 250 ml/hr												2	2	2	2	0.33	0.33	0.33	0.33
05/01 10:08	11 POX	0.62											2	2	2	2	0.67	0.67	0.67	0.67
05/01 10:08	Increase NaOCl Q to 400 ml/hr												2	2	2	2	0.67	0.67	0.67	0.67
05/01 10:25	11 POX	0.8											2	2	2	2	0.95	0.95	0.95	0.95
05/01 10:25	Increase NaOCl Q to 450 ml/hr												2	2	2	2	0.95	0.95	0.95	0.95
05/01 10:58	11 POX	0.73											2	2	2	2	1.50	1.50	1.50	1.50
05/01 10:58	Increase NaOCl Q to 500 ml/hr												2	2	2	2	1.50	1.50	1.50	1.50
05/01 11:23	Put KOH into manual with pH setpoint = 6.8 su												2	2	2	2	1.92	1.92	1.92	1.92
05/01 11:25	11 POX	0.9											2	2	2	2	1.95	1.95	1.95	1.95
05/01 11:28	Increase NaOCl Q to 550 ml/hr												2	2	2	2	2.00	2.00	2.00	2.00
05/01 11:40	Flow Calibration (see notes)												2	2	2	2	2.20	2.20	2.20	2.20
05/01 11:45	pH handheld calibration #185 m = 99.4, #380 m = 101.9												2	2	2	2	2.28	2.28	2.28	2.28
05/01 12:00	01 RAW			0.03	0.03	0.761	0.739	6.34	10.2				2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	01 RAW							6.68	10.1				2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	11 POX	0.74	1.25		0.01		0.684	6.62	10.4				2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	11 POX							6.84	10.3				2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	21 FILTER A	0.41	0.72	0.00		0.014		6.5	10.3	34	2.55		2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	21 FILTER A							6.8	10.3				2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	22 FILTER B	0.37	0.71	0.00		0.023		6.55	10.3	49	8		2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	22 FILTER B							6.88	10.2				2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	23 FILTER C	0.41	0.78	0.04		0.023		6.56	10.3	45	2.8		2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	23 FILTER C							6.92	10.2				2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	24 FILTER D	0.5	0.75	0.04		0.024		6.58	10.2	48	2.55		2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	24 FILTER D							6.93	10.2				2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:00	0.010 STD												2	2	2	2	2.53	2.53	2.53	2.53
05/01 12:52	Changed NaOCl Dilution from 1/5 to 1/3. new V = 12.0 L												2	2	2	2	3.40	3.40	3.40	3.40
05/01 12:52	Changed NaOCl Q to 330 ml/hr												2	2	2	2	3.40	3.40	3.40	3.40
05/01 13:00	11 POX	2.2											2	2	2	2	3.53	3.53	3.53	3.53
05/01 13:00	Decrease NaOCl Q to 280 ml/hr												2	2	2	2	3.53	3.53	3.53	3.53
05/01 13:08	11 POX	2.2											2	2	2	2	3.67	3.67	3.67	3.67
05/01 13:08	Decrease NaOCl Q to 230 ml/hr												2	2	2	2	3.67	3.67	3.67	3.67
05/01 13:14	11 POX	2.2											2	2	2	2	3.77	3.77	3.77	3.77
05/01 13:14	Decrease NaOCl Q to 180 ml/hr												2	2	2	2	3.77	3.77	3.77	3.77
05/01 13:23	11 POX	1.19											2	2	2	2	3.92	3.92	3.92	3.92
05/01 13:30	01 RAW			0.05	0.06	0.756	0.737	6.31	10.3				2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	01 RAW							6.72	10.2				2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	11 POX	0.96	1.51		0.06		0.688	6.41	10.5				2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	11 POX							7.06	10.5				2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	21 FILTER A	0.58	0.95	0.04		0.009		6.46	10.5	26	2.55		2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	21 FILTER A							6.99	10.5				2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	22 FILTER B	0.56	0.97	0.02		0.010		6.5	10.5	28	7.2		2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	22 FILTER B							6.98	10.5				2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	23 FILTER C	0.62	1.06	0.03		0.016		6.47	10.4	32	2.55		2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	23 FILTER C							6.96	10.4				2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	24 FILTER D	0.73	1.15	0.04		0.014		6.51	10.5	24	2.55		2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:30	24 FILTER D							6.96	10.5				2	2	2	2	4.03	4.03	4.03	4.03
05/01 13:35	Increase NaOCl Q to 150 ml/hr												2	2	2	2	4.12	4.12	4.12	4.12
05/01 14:10	11 POX	1.56											2	2	2	2	4.70	4.70	4.70	4.70
05/01 14:10	21 FILTER A	0.85											2	2	2	2	4.70	4.70	4.70	4.70
05/01 14:10	Increase NaOCl Q to 160 ml/hr												2	2	2	2	4.70	4.70	4.70	4.70
05/01 14:30	11 POX	1.68											2	2	2	2	5.03	5.03	5.03	5.03
05/01 14:30	21 FILTER A	0.94											2	2	2	2	5.03	5.03	5.03	5.03
05/01 15:15	01 RAW (FROM STATION)			0.07		0.730							2	2	2	2	5.78	5.78	5.78	5.78
05/01 16:15	01 RAW			0.08	0.05	0.780	0.744	6.4	10.2				2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	01 RAW							6.51	10.3				2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	11 POX	1.33	2.2		0.04		0.676	6.63	10.4				2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	11 POX							7.15	10.4				2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	21 FILTER A	0.8	0.91	0.03		0.010		6.59	10.4	35	2.55		2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	21 FILTER A							7	10.4				2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	22 FILTER B	0.8	1.14	0.02		0.010		6.59	10.4	25	2.55		2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	22 FILTER B							7.09	10.3				2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	23 FILTER C	0.88	1.36	0.04		0.011		6.6	10.3	39	2.55		2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	23 FILTER C							6.87	10.2				2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	24 FILTER D	0.98	1.46	0.04		0.010		6.61	10.3	44	2.8		2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:15	24 FILTER D							7.1	10.3				2	2	2	2	6.78	6.78	6.78	6.78
05/01 16:16	Increase NaOCl Q to 170 ml/hr												2	2	2	2	6.80	6.80	6.80	6.80
05/01 16:45	KOH V = 12.9 L, Q = 131 ml/hr, D = 1/5												2	2	2	2	7.28	7.28	7.28	7.28

Date and Time	SAMPLE LOCATION	Cl2 (f)	Cl2 (t)	Fe(t)	Fe (d)	Mn(t)	Mn (d)	pH	Temp	JS#	Mn(t) - GF	CO2	A Trial	B Trial	C Trial	D Trial	A Runtime (hrs)	B Runtime (hrs)	C Runtime (hrs)	D Runtime (hrs)
05/01 16:45	NaOCl V = 11.3 L, Q = 170 ml/hr, D = 1/3												2	2	2	2	7.28	7.28	7.28	7.28
05/01 18:00	21 FILTER A			0.00		0.010				31	30.8		2	2	2	2	8.53	8.53	8.53	8.53
05/01 18:00	23 FILTER C			0.00		0.000				43	4.2		2	2	2	2	8.53	8.53	8.53	8.53
05/01 21:00	21 FILTER A			0.00		0.000				40	12		2	2	2	2	11.53	11.53	11.53	11.53
05/01 21:00	23 FILTER C			0.00		0.000				50	3.7		2	2	2	2	11.53	11.53	11.53	11.53
05/02 00:00	21 FILTER A			0.00		0.000				37	7.1		2	2	2	2	14.53	14.53	14.53	14.53
05/02 00:00	23 FILTER C			0.00		0.000				795	2.7		2	2	2	2	14.53	14.53	14.53	14.53
05/02 03:00	21 FILTER A												2	2	2	2	17.53	17.53	17.53	17.53
05/02 03:00	23 FILTER C												2	2	2	2	17.53	17.53	17.53	17.53
05/02 06:00	21 FILTER A												2	2	2	2	20.53	20.53	20.53	20.53
05/02 06:00	23 FILTER C												2	2	2	2	20.53	20.53	20.53	20.53
05/02 07:00	KOH V = 10.3 L, Q = 0.0 ml/hr, D = 1/5												2	2	2	2	21.53	21.53	21.53	21.53
05/02 07:00	NaOCl V = 8.7 L, Q = 170 ml/hr, D = 1/3												2	2	2	2	21.53	21.53	21.53	21.53
05/02 07:00	Looks like loss of flow from ~300 - 600. I guess spike in pH caused KOH PID to go to zero and just stayed there												2	2	2	2	21.53	21.53	21.53	21.53
05/02 07:06	Put KOH pump in manual @ 103 ml/hr												2	2	2	2	21.63	21.63	21.63	21.63
05/02 07:20	Put KOH pump into auto												2	2	2	2	21.87	21.87	21.87	21.87
05/02 07:30	01 RAW			0.03	0.03	0.764	0.748	6.4	10				2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	01 RAW							6.35	10				2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	11 POX	1.5	2.16		0.05		0.707	6.54	10.1				2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	11 POX							6.52	10.1				2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	21 FILTER A	0.88	1.14	0.06		0.016		6.46	10	41	2.55		2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	21 FILTER A							6.55	10				2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	22 FILTER B	0.87	1.03	0.00		0.007		6.52	10	33	2.55		2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	22 FILTER B							6.55	10				2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	23 FILTER C	0.97	1.39	0.05		0.022		6.49	10	36	2.55		2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	23 FILTER C							6.53	10				2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	24 FILTER D	1.02	1.47	0.05		0.014		6.51	10	29	2.55		2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	24 FILTER D							6.54	10				2	2	2	2	22.03	22.03	22.03	22.03
05/02 07:30	0.010 STD												2	2	2	2	22.03	22.03	22.03	22.03
05/02 09:08	Flow Calibration (see notes)												2	2	2	2	23.67	23.67	23.67	23.67
05/02 09:40	01 RAW			0.00	0.03	0.800	0.787	6.18	10				2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	01 RAW							6.53	10				2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	11 POX	1.59	2.2		0.00		0.686	6.88	10.2				2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	11 POX							6.83	10.2				2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	21 FILTER A	0.87	1.06	0.00		0.021		6.9	10.1	782	2.55		2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	21 FILTER A							6.9	10.1				2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	22 FILTER B	0.84	0.89	0.00		0.010		6.84	10.1	790	2.55		2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	22 FILTER B							6.88	10.1				2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	23 FILTER C	0.91	1.36	0.01		0.020		6.8	10	799	2.55		2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	23 FILTER C							6.82	10				2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	24 FILTER D	1.05	1.36	0.00		0.021		6.73	10	786	2.8		2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	24 FILTER D							6.81	10				2	2	2	2	24.20	24.20	24.20	24.20
05/02 09:40	0.010 STD					0.013							2	2	2	2	24.20	24.20	24.20	24.20
05/02 10:15	RAW FROM STATION											15.8	2	2	2	2	24.78	24.78	24.78	24.78
05/02 10:15	RAW FROM STATION			0.07		0.800							2	2	2	2	24.78	24.78	24.78	24.78
05/02 14:10	Water heater tripped breaker												2	2	2	2	28.70	28.70	28.70	28.70
05/02 14:40	Lost power, not sure why												2	2	2	2	29.20	29.20	29.20	29.20
05/02 15:30	01 RAW			0.04	0.01	0.783	0.771	6.47	10				2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	01 RAW							6.59	10				2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	11 POX	1.35	1.73		0.00		0.686	7.14	10.1				2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	11 POX							7.12	10.1				2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	21 FILTER A	0.72	1.13	0.00		0.009		7.16	10.1	794	5.3		2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	21 FILTER A							7.01	10.1				2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	22 FILTER B	0.63	1.21	0.00		0.000		7.16	10	781	2.55		2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	22 FILTER B							6.97	10				2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	23 FILTER C	0.87	1.35	0.00		0.000		7.16	10	784	2.55		2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	23 FILTER C							6.77	10				2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	24 FILTER D	0.82	1.4	0.01		0.002		7.16	10	780	2.55		2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	24 FILTER D							6.88	10				2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:30	0.010 STD					0.007							2	2	2	2	30.03	30.03	30.03	30.03
05/02 15:38	Increase NaOCl Q to 180 ml/hr												2	2	2	2	30.17	30.17	30.17	30.17
05/02 16:10	KOH V = 9.3 L, Q = 147 ml/hr, D = 1/5												2	2	2	2	30.70	30.70	30.70	30.70
05/02 16:10	NaOCl V 7.0 L, Q = 180 ml/hr, D = 1/3												2	2	2	2	30.70	30.70	30.70	30.70
05/02 18:00	21 FILTER A			0.01		0.025				789	6.1		2	2	2	2	32.53	32.53	32.53	32.53
05/02 18:00	23 FILTER C			0.03		0.011				763	2.55		2	2	2	2	32.53	32.53	32.53	32.53
05/02 21:00	21 FILTER A			0.00		0.020				796	5.6		2	2	2	2	35.53	35.53	35.53	35.53
05/02 21:00	23 FILTER C			0.00		0.014				777	2.55		2	2	2	2	35.53	35.53	35.53	35.53
05/03 00:00	21 FILTER A			0.00		0.009				778	2.55		2	2	2	2	38.53	38.53	38.53	38.53
05/03 00:00	23 FILTER C			0.05		0.011				770	2.55		2	2	2	2	38.53	38.53	38.53	38.53
05/03 03:00	21 FILTER A			0.00		0.010				798	2.55		2	2	2	2	41.53	41.53	41.53	41.53
05/03 03:00	23 FILTER C			0.00		0.027				791	2.55		2	2	2	2	41.53	41.53	41.53	41.53
05/03 06:00	21 FILTER A			0.00		0.026				793	2.55		2	2	2	2	44.53	44.53	44.53	44.53
05/03 06:00	23 FILTER C			0.00		0.012				797	2.55		2	2	2	2	44.53	44.53	44.53	44.53
05/03 07:26	KOH V = 7.6 L, Q = 141 ml/hr, D = 1/5												2	2	2	2	45.97	45.97	45.97	45.97
05/03 07:26	NaOCl V = 4.0 L, Q = 180 ml/hr, D = 1/3												2	2	2	2	45.97	45.97	45.97	45.97
05/03 07:26	Loss of flow from ~0015 - 0115. Looks like KOH pump lost prime. POX pH ~ 6.3. Reprimed pump and set in manual to 166 ml/hr												2	2	2	2	45.97	45.97	45.97	45.97
05/03 08:30	01 RAW			0.05	0.01	0.800	0.771	6.41	9.1				2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	01 RAW							6.5	9.1				2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	11 POX	1.29	2.2		0.00		0.673	6.57	10.4				2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	11 POX							6.97	10.4				2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	21 FILTER A	0.76	1.09	0.00		0.010		6.76	10.1	785	2.55		2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	21 FILTER A							7.01	10.1				2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	22 FILTER B	0.62	1.25	0.00		0.019		6.67	10	771	2.55		2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	22 FILTER B							6.95	10				2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	23 FILTER C	0.78	1.4	0.00		0.017		6.75	9.9	779	2.55		2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	23 FILTER C							7	10				2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	24 FILTER D	0.82	1.43	0.01		0.022		6.73	10	787	2.55		2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	24 FILTER D							7	9.9				2	2	2	2	47.03	47.03	47.03	47.03
05/03 08:30	0.010 STD					0.009							2	2	2	2	47.03	47.03	47.03	47.03
05/03 09:10	Shutdown Filters A - D for BW @ 2.4 gpm * 10 min = 24 gallons, pause chemicals. BW with RAW water												2	2	2	2	47.70	47.70	47.70	47.70
05/03 09:38	Restarted Filters A + B @ 7 gpm/sf and Filters C + D @ 5 gpm/sf																			
05/03 09:46	Start NaOCl Q @ 220 ml/hr												3	3	3	3	0.00	0.00	0.00	0.00
05/03 09:48	Start KOH Q @ 180 l/hr												3	3	3	3	0.03	0.03	0.03	0.03
05/03 10:54	Put KOH into auto												3	3	3	3	1.13	1.13	1.13	1.13
05/03 11:00	11 POX	1.76											3	3	3	3	1.23	1.23	1.23	1.23

Date and Time	SAMPLE LOCATION	Cl2 (f)	Cl2 (t)	Fe(t)	Fe (d)	Mn(t)	Mn (d)	pH	Temp	JS#	Mn(t) - GF	CO2	A Trial	B Trial	C Trial	D Trial	A Runtime (hrs)	B Runtime (hrs)	C Runtime (hrs)	D Runtime (hrs)
05/03 11:00	21 FILTER A	1.12											3	3	3	3	1.23	1.23	1.23	1.23
05/03 11:00	23 FILTER C	1.36											3	3	3	3	1.23	1.23	1.23	1.23
05/03 11:01	Reduced NaOCl Q to 200 ml/hr												3	3	3	3	1.25	1.25	1.25	1.25
05/03 11:20	Flow Calibration (see notes)												3	3	3	3	1.57	1.57	1.57	1.57
05/03 12:00	01 RAW			0.03	0.04	0.800	0.789	6.4	9.9				3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	01 RAW							6.65	9.9				3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	11 POX	1.44	2.19		0.02		0.682	6.67	10.6				3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	11 POX							7	10.6				3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	21 FILTER A	0.83	1.25	0.04		0.009		6.78	10.2	773	2.7		3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	21 FILTER A							6.84	10.2				3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	22 FILTER B	0.95	1.32	0.04		0.008		6.78	10.2	775	2.55		3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	22 FILTER B							6.83	10.2				3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	23 FILTER C	0.89	1.35	0.02		0.010		6.75	10.2	760	2.8		3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	23 FILTER C							6.81	10.2				3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	24 FILTER D	0.89	1.34	0.04		0.013		6.79	10.4	762	5		3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	24 FILTER D							7.01	10.4				3	3	3	3	2.23	2.23	2.23	2.23
05/03 12:00	0.040 STD												3	3	3	3	2.23	2.23	2.23	2.23
05/03 15:00	01 RAW			0.09	0.03	0.800	0.800	6.39	10.1				3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	01 RAW							6.77	10.1				3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	11 POX	1.09	2.05		0.06		0.684	6.72	11.1				3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	11 POX							6.99	11.1				3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	21 FILTER A	0.69	0.92	0.04		0.012		6.82	10.4	766	2.55		3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	21 FILTER A							6.75	10.4				3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	22 FILTER B	0.65	1.46	0.03		0.010		6.83	10.4	751	2.55		3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	22 FILTER B							6.77	10.4				3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	23 FILTER C	0.68	1.07	0.04		0.009		6.82	10.4	776	2.55		3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	23 FILTER C							7.01	10.4				3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	24 FILTER D	0.67	1.3	0.03		0.014		6.82	10.4	761	2.55		3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	24 FILTER D							7	10.4				3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:00	0.010 STD												3	3	3	3	5.23	5.23	5.23	5.23
05/03 15:02	Increase NaOCl Q to 220 ml/hr												3	3	3	3	5.27	5.27	5.27	5.27
05/03 16:00	31 CBW FILTER A			0.85		1.400							3	3	3	3	6.23	6.23	6.23	6.23
05/03 16:00	32 CBW FILTER B			0.85		1.300							3	3	3	3	6.23	6.23	6.23	6.23
05/03 16:00	33 CBW FILTER C			1.35		1.200							3	3	3	3	6.23	6.23	6.23	6.23
05/03 16:00	34 CBW FILTER D			1.61		0.600							3	3	3	3	6.23	6.23	6.23	6.23
05/03 16:00	41 SSN FILTER A			0.33		1.230							3	3	3	3	6.23	6.23	6.23	6.23
05/03 16:00	42 SSN FILTER B			0.38		1.220							3	3	3	3	6.23	6.23	6.23	6.23
05/03 16:00	43 SSN FILTER C			0.56		1.150							3	3	3	3	6.23	6.23	6.23	6.23
05/03 16:00	44 SSS FILTER D			1.02		1.510							3	3	3	3	6.23	6.23	6.23	6.23
05/03 17:30	Added 8.0 L KOH (1/3), new V = 14.0 L (1/3)												3	3	3	3	7.73	7.73	7.73	7.73
05/03 17:33	Added 10.0 L NaOCl (1/5), new V = 11.9 L (1/3)												3	3	3	3	7.78	7.78	7.78	7.78
05/03 17:43	KOH V = 13.9 L, Q = 184 ml/hr, D = 1/5												3	3	3	3	7.95	7.95	7.95	7.95
05/03 17:43	NaOCl V = 11.8 L, Q = 220 ml/hr, D = 1/3												3	3	3	3	7.95	7.95	7.95	7.95
05/03 18:00	21 FILTER A									754	2.55		3	3	3	3	8.23	8.23	8.23	8.23
05/03 18:00	23 FILTER C									982	2.55		3	3	3	3	8.23	8.23	8.23	8.23
05/03 21:00	21 FILTER A			0.02		0.008							3	3	3	3	11.23	11.23	11.23	11.23
05/03 21:00	23 FILTER C			0.05		0.015							3	3	3	3	11.23	11.23	11.23	11.23
05/04 00:00	21 FILTER A									772	2.55		3	3	3	3	14.23	14.23	14.23	14.23
05/04 00:00	23 FILTER C									976	2.55		3	3	3	3	14.23	14.23	14.23	14.23
05/04 03:00	21 FILTER A									767	3.8		3	3	3	3	17.23	17.23	17.23	17.23
05/04 03:00	23 FILTER C									992	2.55		3	3	3	3	17.23	17.23	17.23	17.23
05/04 06:00	21 FILTER A			0.00		0.007							3	3	3	3	20.23	20.23	20.23	20.23
05/04 06:00	23 FILTER C			0.02		0.021							3	3	3	3	20.23	20.23	20.23	20.23
05/04 09:00	21 FILTER A									768	2.55		3	3	3	3	23.23	23.23	23.23	23.23
05/04 09:00	23 FILTER C									985	2.55		3	3	3	3	23.23	23.23	23.23	23.23
05/04 12:00	21 FILTER A			0.02		0.008							3	3	3	3	26.23	26.23	26.23	26.23
05/04 12:00	23 FILTER C			0.03		0.017							3	3	3	3	26.23	26.23	26.23	26.23
05/04 13:07	KOH V = 10.8 L, Q = 141 ml/hr, D = 1/5												3	3	3	3	27.35	27.35	27.35	27.35
05/04 13:07	NaOCl V = 7.2 L, Q = 220 ml/hr, D = 1/3												3	3	3	3	27.35	27.35	27.35	27.35
05/04 13:10	Added 5.0 L NaOCl (1/3), new V = 12.2 L (1/3)												3	3	3	3	27.40	27.40	27.40	27.40
05/04 15:00	21 FILTER A									757	2.55		3	3	3	3	29.23	29.23	29.23	29.23
05/04 15:00	23 FILTER C									998	2.55		3	3	3	3	29.23	29.23	29.23	29.23
05/04 18:00	21 FILTER A			0.02		0.019							3	3	3	3	32.23	32.23	32.23	32.23
05/04 18:00	23 FILTER C			0.04		0.016							3	3	3	3	32.23	32.23	32.23	32.23
05/04 21:00	21 FILTER A									769	2.55		3	3	3	3	35.23	35.23	35.23	35.23
05/04 21:00	23 FILTER C									971	2.55		3	3	3	3	35.23	35.23	35.23	35.23
05/05 00:00	21 FILTER A									764	2.55		3	3	3	3	38.23	38.23	38.23	38.23
05/05 00:00	23 FILTER C									755	2.7		3	3	3	3	38.23	38.23	38.23	38.23
05/05 03:00	21 FILTER A									759	2.55		3	3	3	3	41.23	41.23	41.23	41.23
05/05 03:00	23 FILTER C									972	2.55		3	3	3	3	41.23	41.23	41.23	41.23
05/05 09:00	21 FILTER A									788	2.55		3	3	3	3	47.23	47.23	47.23	47.23
05/05 09:00	23 FILTER C									983	2.55		3	3	3	3	47.23	47.23	47.23	47.23
05/05 12:00	21 FILTER A			0.00		0.016							3	3	3	3	50.23	50.23	50.23	50.23
05/05 12:00	23 FILTER C			0.02		0.020							3	3	3	3	50.23	50.23	50.23	50.23
05/05 15:00	21 FILTER A									753	2.55		3	3	3	3	53.23	53.23	53.23	53.23
05/05 15:00	23 FILTER C									980	2.55		3	3	3	3	53.23	53.23	53.23	53.23
05/05 15:25	KOH V = 7.2 L, Q = 194 ml/hr, D = 1/5												3	3	3	3	53.65	53.65	53.65	53.65
05/05 15:25	NaOCl V = 6.1 L, Q = 220 ml/hr, D = 1/3												3	3	3	3	53.65	53.65	53.65	53.65
05/05 15:37	Added 5.0 L NaOCl (1/3), new V = 11.2 L												3	3	3	3	53.85	53.85	53.85	53.85
05/05 15:47	01 RAW			0.09		0.792							3	3	3	3	54.02	54.02	54.02	54.02
05/05 15:47	21 FILTER A	1.1		0.00		0.007							3	3	3	3	54.02	54.02	54.02	54.02
05/05 15:47	22 FILTER B	1.13		0.00		0.003							3	3	3	3	54.02	54.02	54.02	54.02
05/05 15:47	23 FILTER C	0.98		0.01		0.004							3	3	3	3	54.02	54.02	54.02	54.02
05/05 15:47	24 FILTER D	1.29		0.01		0.000							3	3	3	3	54.02	54.02	54.02	54.02
05/05 16:03	Added 5.0 L (1/5) KOH, new V = 12.5 L												3	3	3	3	54.28	54.28	54.28	54.28
05/05 16:05	KOH V = 12.5 L, Q = 178 ml/hr, D = 1/5												3	3	3	3	54.32	54.32	54.32	54.32
05/05 16:05	NaOCl V = 11.1 L, Q = 220 ml/hr, D = 1/3												3	3	3	3	54.32	54.32	54.32	54.32
05/05 18:00	21 FILTER A			0.02		0.007							3	3	3	3	56.23	56.23	56.23	56.23
05/05 18:00	23 FILTER C			0.00		0.008							3	3	3	3	56.23	56.23	56.23	56.23
05/05 21:00	21 FILTER A									756	2.55		3	3	3	3	59.23	59.23	59.23	59.23
05/05 21:00	23 FILTER C									988	2.55		3	3	3	3	59.23	59.23	59.23	59.23
05/06 00:00	21 FILTER A												3	3	3	3	62.23	62.23	62.23	62.23
05/06 00:00	23 FILTER C									997	2.55		3	3	3	3	62.23	62.23	62.23	62.23
05/06 03:00	21 FILTER A												3	3	3	3	65.23	65.23	65.23	65.23
05/06 03:00	23 FILTER C			0.01		0.009							3	3	3	3	65.23	65.23	65.23	65.23

Date and Time	SAMPLE LOCATION	Cl2 (f)	Cl2 (t)	Fe(t)	Fe (d)	Mn(t)	Mn (d)	pH	Temp	JS#	Mn(t) - GF	CO2	A Trial	B Trial	C Trial	D Trial	A Runtime (hrs)	B Runtime (hrs)	C Runtime (hrs)	D Runtime (hrs)
05/06 06:00	21 FILTER A												3	3	3	3	68.23	68.23	68.23	68.23
05/06 06:00	23 FILTER C									993	2.55		3	3	3	3	68.23	68.23	68.23	68.23
05/06 07:05	KOH V = 9.5 L, Q = 203 ml/hr, D = 1/5												3	3	3	3	69.32	69.32	69.32	69.32
05/06 07:05	NaOCl V = 7.6 L, Q = 220 ml/hr, D = 1/3												3	3	3	3	69.32	69.32	69.32	69.32
05/06 07:10	01 RAW			0.00	0.00	0.790	0.785	5.65	10.2				3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	01 RAW							6.31	10.2				3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	11 POX	1.6	2.2		0.00		0.690	6.69	10.7				3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	11 POX							6.92	10.7				3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	21 FILTER A	1.28	1.79	0.00		0.017		6.67	10.2	758	2.55		3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	21 FILTER A							7.02	10.2				3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	22 FILTER B	1.26	1.78	0.00		0.006		6.59	10.2	774	2.55		3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	22 FILTER B							6.2	10.2				3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	23 FILTER C	1.28	1.77	0.00		0.004		6.56	10.2	765	2.55		3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	23 FILTER C							7.01	10.2				3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	24 FILTER D	1.25	1.26	0.00		0.008		6.65	10.2	752	2.55		3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	24 FILTER D							6.99	10.2				3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:10	0.010 STD					0.011							3	3	3	3	69.40	69.40	69.40	69.40
05/06 07:27	Decrease NaOCl Q to 200 ml/hr												3	3	3	3	69.68	69.68	69.68	69.68
05/06 08:00	Shutdown Filter A - D for BW @ 2.4 gpm * 10 min = 24 gallons. Pause chemicals. Install venturi for BW recycle												3	3	3	3	70.23	70.23	70.23	70.23
05/06 08:38	Started Filters A + B @ 5 gpm/sf and Filters C + D @ 7 gpm/sf												4.1	4.1	4.1	4.1	0.00	0.00	0.00	0.00
05/06 08:47	Started NaOCl pump @ 200 ml/hr, started KOH pump in manual @ 200 ml/hr												4.1	4.1	4.1	4.1	0.15	0.15	0.15	0.15
05/06 09:30	Put KOH into auto												4.1	4.1	4.1	4.1	0.87	0.87	0.87	0.87
05/06 10:23	11 POX	2.14											4.1	4.1	4.1	4.1	1.75	1.75	1.75	1.75
05/06 10:23	21 FILTER A	1.24											4.1	4.1	4.1	4.1	1.75	1.75	1.75	1.75
05/06 10:23	23 FILTER C	1.53											4.1	4.1	4.1	4.1	1.75	1.75	1.75	1.75
05/06 10:24	Reduced NaOCl Q to 180 ml/hr												4.1	4.1	4.1	4.1	1.77	1.77	1.77	1.77
05/06 12:28	11 POX	2.09											4.1	4.1	4.1	4.1	3.83	3.83	3.83	3.83
05/06 12:28	23 FILTER C	1.39											4.1	4.1	4.1	4.1	3.83	3.83	3.83	3.83
05/06 12:29	Decrease NaOCl Q to 160 ml/hr												4.1	4.1	4.1	4.1	3.85	3.85	3.85	3.85
05/06 12:30	Flow Calibration (see notes)												4.1	4.1	4.1	4.1	3.87	3.87	3.87	3.87
05/06 12:41	23 FILTER C	1.07											4.1	4.1	4.1	4.1	4.05	4.05	4.05	4.05
05/06 12:45	01 RAW			0.12	0.03	0.812	0.807	6.26	11.2				4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	01 RAW							6.52	11.2				4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	11 POX	1.53	2.05		0.04		0.697	6.56	11.7				4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	11 POX							7	11.7				4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	21 FILTER A	0.81	1.32	0.08		0.015		6.64	11.4	991	2.55		4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	21 FILTER A							6.88	11.4				4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	22 FILTER B	0.86	1.38	0.03		0.014		6.63	11.2	674	3.7		4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	22 FILTER B							6.9	11.2				4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	23 FILTER C	0.96	1.49	0.06		0.009		6.63	11.2	687	3.7		4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	23 FILTER C							6.88	11.2				4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	24 FILTER D	1.03	1.58	0.06		0.006		6.64	11.3	978	2.55		4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	24 FILTER D							6.9	11.3				4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 12:45	0.010 STD					0.007							4.1	4.1	4.1	4.1	4.12	4.12	4.12	4.12
05/06 14:45	01 RAW			0.06	0.04	0.942	0.886	6.24	10.5				4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	01 RAW							6.6	10.5				4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	11 POX	1.43	1.98		0.03		0.711	6.61	10.8				4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	11 POX							6.84	10.8				4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	21 FILTER A	0.78	1.25	0.09		0.012		6.66	10.5	963	2.55		4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	21 FILTER A							6.82	10.5				4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	22 FILTER B	0.84	1.33	0.05		0.019		6.64	10.6	986	2.55		4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	22 FILTER B							6.9	10.6				4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	23 FILTER C	0.99	1.52	0.08		0.008		6.68	10.5	999	2.55		4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	23 FILTER C							6.73	10.5				4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	24 FILTER D	1.01	1.6	0.02		0.014		6.63	10.5	995	2.55		4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	24 FILTER D							6.89	10.5				4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 14:45	0.010 STD					0.012							4.1	4.1	4.1	4.1	6.12	6.12	6.12	6.12
05/06 16:00	31 CBW FILTER A			0.90		4.250							4.1	4.1	4.1	4.1	7.37	7.37	7.37	7.37
05/06 16:00	32 CBW FILTER B			1.16		5.150							4.1	4.1	4.1	4.1	7.37	7.37	7.37	7.37
05/06 16:00	33 CBW FILTER C			1.03		4.600							4.1	4.1	4.1	4.1	7.37	7.37	7.37	7.37
05/06 16:00	34 CBW FILTER D			0.95		4.900							4.1	4.1	4.1	4.1	7.37	7.37	7.37	7.37
05/06 16:00	41 SSN FILTER A			0.22		1.340							4.1	4.1	4.1	4.1	7.37	7.37	7.37	7.37
05/06 16:00	42 SSN FILTER B			0.45		1.700							4.1	4.1	4.1	4.1	7.37	7.37	7.37	7.37
05/06 16:00	43 SSN FILTER C			0.37		1.160							4.1	4.1	4.1	4.1	7.37	7.37	7.37	7.37
05/06 16:00	44 SSS FILTER D			0.29		1.140							4.1	4.1	4.1	4.1	7.37	7.37	7.37	7.37
05/06 16:34	Added 3.0 L (1/3) NaOCl, new V = 8.8 L (1/3)												4.1	4.1	4.1	4.1	7.93	7.93	7.93	7.93
05/06 16:37	Added 5.0 L (1/5) KOH, new = 12.9 L (1/5)												4.1	4.1	4.1	4.1	7.98	7.98	7.98	7.98
05/06 16:45	KOH V = 12.8 L Q = 228 ml/hr D = 1/5												4.1	4.1	4.1	4.1	8.12	8.12	8.12	8.12
05/06 16:45	NaOCl V = 8.7 L Q = 160 ml/hr D = 1/3												4.1	4.1	4.1	4.1	8.12	8.12	8.12	8.12
05/06 18:00	21 FILTER A			0.01		0.008				990	2.55		4.1	4.1	4.1	4.1	9.37	9.37	9.37	9.37
05/06 21:00	21 FILTER A			0.00		0.010				994	2.55		4.1	4.1	4.1	4.1	12.37	12.37	12.37	12.37
05/07 00:00	21 FILTER A			0.00		0.010				970	2.55		4.1	4.1	4.1	4.1	15.37	15.37	15.37	15.37
05/07 03:00	21 FILTER A			0.00		0.008				977	2.55		4.1	4.1	4.1	4.1	18.37	18.37	18.37	18.37
05/07 06:00	21 FILTER A			0.02		0.008				964	2.55		4.1	4.1	4.1	4.1	21.37	21.37	21.37	21.37
05/07 06:54	KOH V = 9.9 L Q = 209 ml/hr D = 1/5												4.1	4.1	4.1	4.1	22.27	22.27	22.27	22.27
05/07 06:54	NaOCl V = 6.4 L Q = 160 ml/hr D = 1/3												4.1	4.1	4.1	4.1	22.27	22.27	22.27	22.27
05/07 07:15	01 RAW			0.06	0.02	0.919	0.916	6.68	10.1				4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	01 RAW							6.61	10.1				4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	11 POX	1.45	2.2		0.01		0.750	6.66	10.4				4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	11 POX							6.86	10.4				4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	21 FILTER A	0.81	1.37	0.01		0.017		6.78	10.1	984	2.55		4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	21 FILTER A							6.86	10.1				4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	22 FILTER B	0.9	1.37	0.03		0.020		6.69	10.1	979	2.55		4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	22 FILTER B							6.82	10.1				4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	23 FILTER C	1.09	1.51	0.08		0.015		6.75	10	981	2.55		4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	23 FILTER C							6.84	10				4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	24 FILTER D	1.07	1.52	0.07		0.025		6.81	10	996	2.55		4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	24 FILTER D							6.86	10				4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 07:15	0.010 STD					0.024							4.1	4.1	4.1	4.1	22.62	22.62	22.62	22.62
05/07 09:15	NaOCl Dose Test												4.1	4.1	4.1	4.1	24.62	24.62	24.62	24.62
05/07 09:52	01 RAW			0.02	0.04	0.956	0.932	6.5	10.4				4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	01 RAW							6.56	10.4				4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	11 POX	1.65	2.2		0.02		0.728	7.1	11.3				4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	11 POX							7.11	11.3				4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	21 FILTER A	0.8	1.24	0.02		0.018		7.09	10.6	957	2.55		4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23

Date and Time	SAMPLE LOCATION	Cl2 (f)	Cl2 (t)	Fe(t)	Fe (d)	Mn(t)	Mn (d)	pH	Temp	JS#	Mn(t) - GF	CO2	A Trial	B Trial	C Trial	D Trial	A Runtime (hrs)	B Runtime (hrs)	C Runtime (hrs)	D Runtime (hrs)
05/07 09:52	21 FILTER A							7	10.6				4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	22 FILTER B	0.95	1.34	0.04		0.007		7.06	10.8	969	2.55		4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	22 FILTER B							7	10.8				4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	23 FILTER C	1.06	1.51	0.00		0.020		7.09	10.6	959	2.55		4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	23 FILTER C							6.99	10.6				4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	24 FILTER D	1.05	1.2	0.00		0.011		7.08	10.6	960	3.3		4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	24 FILTER D							6.99	10.6				4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 09:52	0.010 STD												4.1	4.1	4.1	4.1	25.23	25.23	25.23	25.23
05/07 11:00	Fixed Filter B turbmeter. Not sure why it wasn't working												4.1	4.1	4.1	4.1	26.37	26.37	26.37	26.37
05/07 13:10	Flow Calibration (see notes)												4.1	4.1	4.1	4.1	28.53	28.53	28.53	28.53
05/07 14:00	01 RAW			0.07	0.03	0.946	0.883	6.59	11.9				4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	01 RAW							6.5	11.9				4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	11 POX	1.58	2.16		0.03		0.733	6.96	12.5				4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	11 POX							7.14	12.5				4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	21 FILTER A	0.87	1.29	0.05		0.014		7.15	12.4	989	2.55		4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	21 FILTER A							7.09	12.4				4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	22 FILTER B	0.9	1.34	0.06		0.006		7.1	12.1	953	2.55		4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	22 FILTER B							7.1	12.1				4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	23 FILTER C	1.06	1.44	0.00		0.013		7.14	12.1	958	2.55		4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	23 FILTER C							7.07	12.1				4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	24 FILTER D	1.07	1.49	0.01		0.012		7.1	12	975	2.55		4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	24 FILTER D							7.05	12				4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:00	0.010 STD					0.019							4.1	4.1	4.1	4.1	29.37	29.37	29.37	29.37
05/07 14:26	Added 5.0 L (1/5) KOH, new V = 13.6 L (1/5)												4.1	4.1	4.1	4.1	29.80	29.80	29.80	29.80
05/07 14:29	Added 6.0 L (1/3) NaOCl, new V = 11.1 L (1/3)												4.1	4.1	4.1	4.1	29.85	29.85	29.85	29.85
05/07 14:45	KOH V = 13.6 L Q = 206 ml/hr D = 1/5												4.1	4.1	4.1	4.1	30.12	30.12	30.12	30.12
05/07 14:45	NaOCl V = 11.1 L Q = 160 ml/hr D = 1/3												4.1	4.1	4.1	4.1	30.12	30.12	30.12	30.12
05/07 15:00	21 FILTER A									845	2.55		4.1	4.1	4.1	4.1	30.37	30.37	30.37	30.37
05/07 15:00	23 FILTER C									808	2.55		4.1	4.1	4.1	4.1	30.37	30.37	30.37	30.37
05/07 18:00	21 FILTER A			0.01		0.021							4.1	4.1	4.1	4.1	33.37	33.37	33.37	33.37
05/07 18:00	23 FILTER C			0.00		0.008							4.1	4.1	4.1	4.1	33.37	33.37	33.37	33.37
05/07 21:00	21 FILTER A			0.02		0.012							4.1	4.1	4.1	4.1	36.37	36.37	36.37	36.37
05/07 21:00	23 FILTER C			0.02		0.000							4.1	4.1	4.1	4.1	36.37	36.37	36.37	36.37
05/08 00:00	21 FILTER A									806	2.55		4.1	4.1	4.1	4.1	39.37	39.37	39.37	39.37
05/08 00:00	23 FILTER C									832	2.55		4.1	4.1	4.1	4.1	39.37	39.37	39.37	39.37
05/08 03:00	21 FILTER A			0.00		0.013							4.1	4.1	4.1	4.1	42.37	42.37	42.37	42.37
05/08 03:00	23 FILTER C			0.01		0.005							4.1	4.1	4.1	4.1	42.37	42.37	42.37	42.37
05/08 06:00	21 FILTER A									803	2.55		4.1	4.1	4.1	4.1	45.37	45.37	45.37	45.37
05/08 06:00	23 FILTER C									826	2.55		4.1	4.1	4.1	4.1	45.37	45.37	45.37	45.37
05/08 07:00	KOH V = 10.4 L Q = 184 ml/hr D = 1/5												4.1	4.1	4.1	4.1	46.37	46.37	46.37	46.37
05/08 07:00	NaOCl V = 8.3 L Q = 160 ml/hr D = 1/3												4.1	4.1	4.1	4.1	46.37	46.37	46.37	46.37
05/08 07:15	01 RAW			0.07	0.05	0.934	0.946						4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	01 RAW												4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	11 POX	1.75	2.06		0.02		0.735	6.67	10.3				4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	11 POX							6.84	10.2				4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	21 FILTER A	0.81	1.28	0.05		0.017		6.7	10.1	961	2.55		4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	21 FILTER A							6.88	10.1				4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	22 FILTER B	0.83	1.29	0.06		0.001		6.79	10.1	955	2.55		4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	22 FILTER B							6.91	10.1				4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	23 FILTER C	0.84	1.35	0.03		0.002		6.62	10.1	962	2.55		4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	23 FILTER C							6.87	10.1				4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	24 FILTER D	0.91	1.33	0.04		0.011		6.85	10.1	967	2.55		4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	24 FILTER D							6.93	10.1				4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 07:15	0.010 STD												4.1	4.1	4.1	4.1	46.62	46.62	46.62	46.62
05/08 08:00	21 FILTER A			0.00		0.010							4.1	4.1	4.1	4.1	47.37	47.37	47.37	47.37
05/08 08:00	23 FILTER C			0.01		0.010							4.1	4.1	4.1	4.1	47.37	47.37	47.37	47.37
05/08 08:30	21 FILTER A			0.00		0.010							4.1	4.1	4.1	4.1	47.87	47.87	47.87	47.87
05/08 08:30	23 FILTER C			0.01		0.002							4.1	4.1	4.1	4.1	47.87	47.87	47.87	47.87
05/08 08:30	Collected Lab samples for SE F - GSP Pre-Recycle: RAW, FILTER A, FILTER C												4.1	4.1	4.1	4.1	47.87	47.87	47.87	47.87
05/08 09:00	21 FILTER A			0.01		0.030							4.1	4.1	4.1	4.1	48.37	48.37	48.37	48.37
05/08 09:00	23 FILTER C			0.00		0.016							4.1	4.1	4.1	4.1	48.37	48.37	48.37	48.37
05/08 09:10	Started SSN recycle. 10% of pilot flow Q = 0.48 gpm												4.2	4.2	4.2	4.2	48.53	48.53	48.53	48.53
05/08 09:30	21 FILTER A			0.00		0.028				807	2.55		4.2	4.2	4.2	4.2	48.87	48.87	48.87	48.87
05/08 09:30	23 FILTER C			0.02		0.024				819	2.55		4.2	4.2	4.2	4.2	48.87	48.87	48.87	48.87
05/08 09:35	01 RAW			0.06	0.06	0.916	0.872	6.98	11.3				4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	RAW W/ SSN							6.75	11.3				4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	RAW W/ SSN	1.63	2.18		0.06		0.707	7.32	11.8				4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	11 POX							7.25	11.8				4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	21 FILTER A	0.79	1.26	0.05		0.019		7.27	11.5	965	2.55		4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	21 FILTER A							7.18	11.5				4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	22 FILTER B	1.02	1.33	0.08		0.016		7.28	11.5	956	2.55		4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	22 FILTER B							7.17	11.5				4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	23 FILTER C	0.96	1.38	0.01		0.022		7.27	11.4	951	2.55		4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	23 FILTER C							7.17	11.4				4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	24 FILTER D	1.07	1.56	0.08		0.019		7.3	10.4	974	2.55		4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	24 FILTER D							7.17	10.4				4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 09:35	0.040 STD					0.043							4.2	4.2	4.2	4.2	48.95	48.95	48.95	48.95
05/08 10:00	21 FILTER A			0.01		0.008				839	2.55		4.2	4.2	4.2	4.2	49.37	49.37	49.37	49.37
05/08 10:00	23 FILTER C			0.02		0.004				834	2.55		4.2	4.2	4.2	4.2	49.37	49.37	49.37	49.37
05/08 10:30	21 FILTER A			0.00		0.006				836	2.55		4.2	4.2	4.2	4.2	49.87	49.87	49.87	49.87
05/08 10:30	23 FILTER C			0.01		0.004				830	2.55		4.2	4.2	4.2	4.2	49.87	49.87	49.87	49.87
05/08 10:35	01 RAW			0.10		0.970							4.2	4.2	4.2	4.2	49.95	49.95	49.95	49.95
05/08 10:35	21 FILTER A			0.08		0.018				954	2.55		4.2	4.2	4.2	4.2	49.95	49.95	49.95	49.95
05/08 10:35	22 FILTER B			0.06		0.019				966	2.55		4.2	4.2	4.2	4.2	49.95	49.95	49.95	49.95
05/08 10:35	23 FILTER C			0.03		0.020				952	2.55		4.2	4.2	4.2	4.2	49.95	49.95	49.95	49.95
05/08 10:35	24 FILTER D			0.04		0.024				968	2.55		4.2	4.2	4.2	4.2	49.95	49.95	49.95	49.95
05/08 11:00	Collected Sample Event G - During Recycle: RAW, FILTER A, FILTER C												4.2	4.2	4.2	4.2	50.37	50.37	50.37	50.37
05/08 11:00	21 FILTER A			0.01		0.005				820	2.55		4.2	4.2	4.2	4.2	50.37	50.37	50.37	50.37
05/08 11:00	23 FILTER C			0.02		0.000				843	2.55		4.2	4.2	4.2	4.2	50.37	50.37	50.37	50.37
05/08 11:30	21 FILTER A			0.03		0.020				848	2.55		4.2	4.2	4.2	4.2	50.87	50.87	50.87	50.87
05/08 11:30	23 FILTER C			0.00		0.000				801	2.55		4.2	4.2	4.2	4.2	50.87	50.87	50.87	50.87
05/08 12:00	21 FILTER A			0.02		0.007				840	2.55		4.2	4.2	4.2	4.2	51.37	51.37	51.37	51.37
05/08 12:00	23 FILTER C			0.02		0.001				828	2.55		4.2	4.2	4.2	4.2	51.37	51.37	51.37	51.37
05/08 12:30	21 FILTER A			0.02		0.007				823	2.55		4.2	4.2	4.2	4.2	51.87	51.87	51.87	51.87
05/08 12:30	23 FILTER C			0.00		0.000				817	2.55		4.2	4.2	4.2	4.2	51.87	51.87	51.87	51.87

Date and Time	SAMPLE LOCATION	Cl2 (f)	Cl2 (t)	Fe(t)	Fe (d)	Mn(t)	Mn (d)	pH	Temp	JS#	Mn(t) - GF	CO2	A Trial	B Trial	C Trial	D Trial	A Runtime (hrs)	B Runtime (hrs)	C Runtime (hrs)	D Runtime (hrs)
05/08 13:00	21 FILTER A			0.01		0.021				844	2.55		4.2	4.2	4.2	4.2	52.37	52.37	52.37	52.37
05/08 13:00	23 FILTER C			0.00		0.006				827	2.55		4.2	4.2	4.2	4.2	52.37	52.37	52.37	52.37
05/08 13:10	Stopped SSN Recycle												4.3	4.3	4.3	4.3	52.53	52.53	52.53	52.53
05/08 13:15	Valve @ SSN recycle float not entirely closed. Air getting in. Closed valve. Emptying Filter D turbmeter. All filter turbidity spiked												4.3	4.3	4.3	4.3	52.62	52.62	52.62	52.62
05/08 13:30	21 FILTER A			0.01		0.029							4.3	4.3	4.3	4.3	52.87	52.87	52.87	52.87
05/08 13:30	23 FILTER C			0.02		0.001							4.3	4.3	4.3	4.3	52.87	52.87	52.87	52.87
05/08 13:35	01 RAW			0.07		0.946							4.3	4.3	4.3	4.3	52.95	52.95	52.95	52.95
05/08 13:35	21 FILTER A			0.05		0.007				814	2.55		4.3	4.3	4.3	4.3	52.95	52.95	52.95	52.95
05/08 13:35	22 FILTER B			0.07		0.013				810	2.55		4.3	4.3	4.3	4.3	52.95	52.95	52.95	52.95
05/08 13:35	23 FILTER C			0.03		0.011				829	2.55		4.3	4.3	4.3	4.3	52.95	52.95	52.95	52.95
05/08 13:35	24 FILTER D			0.06		0.016				850	7		4.3	4.3	4.3	4.3	52.95	52.95	52.95	52.95
05/08 13:38	Added 5.0 L (1/5) KOH, new V = 14.4 L (1/5)												4.3	4.3	4.3	4.3	53.00	53.00	53.00	53.00
05/08 14:00	21 FILTER A			0.00		0.016							4.3	4.3	4.3	4.3	53.37	53.37	53.37	53.37
05/08 14:00	23 FILTER C			0.02		0.008							4.3	4.3	4.3	4.3	53.37	53.37	53.37	53.37
05/08 14:30	Collected Sample Event H: RAW, FILTER C, FILTER A												4.3	4.3	4.3	4.3	53.87	53.87	53.87	53.87
05/08 15:04	Added 5.0 L (1/3) NaOCl, new V = 12.0 L (1/3)												4.3	4.3	4.3	4.3	54.43	54.43	54.43	54.43
05/08 15:15	01 RAW			0.10	0.04	0.890	0.914	6.58	11.4				4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	01 RAW							6.26	11.4				4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	11 POX	1.4	2.19		0.01		0.778	7.09	11.3				4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	11 POX							7.01	11.3				4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	21 FILTER A	0.86	1.21	0.01		0.009		7.05	11.7	818	2.55		4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	21 FILTER A							6.98	11.7				4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	22 FILTER B	0.87	1.51	0.01		0.017		7.03	10.7	816	6.5		4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	22 FILTER B							7.01	10.7				4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	23 FILTER C	0.88	1.39	0.02		0.002		6.86	11.5	813	2.55		4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	23 FILTER C							6.98	11.5				4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	24 FILTER D	0.92	1.47	0.01		0.012		7.1	10.6	838	2.55		4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	24 FILTER D							7.05	10.6				4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:15	0.010 STD												4.3	4.3	4.3	4.3	54.62	54.62	54.62	54.62
05/08 15:35	NaOCl V = 11.9 L Q = 160 ml/hr D = 1/3												4.3	4.3	4.3	4.3	54.95	54.95	54.95	54.95
05/08 15:35	KOH V = 14.1 L Q = 203 ml/hr D = 1/5												4.3	4.3	4.3	4.3	54.95	54.95	54.95	54.95
05/08 16:00	21 FILTER A			0.00		0.018				846	2.55		4.3	4.3	4.3	4.3	55.37	55.37	55.37	55.37
05/08 16:00	23 FILTER C			0.00		0.004				833	2.55		4.3	4.3	4.3	4.3	55.37	55.37	55.37	55.37
05/08 19:00	21 FILTER A			0.01		0.028				802	2.55		4.3	4.3	4.3	4.3	58.37	58.37	58.37	58.37
05/08 19:00	23 FILTER C			0.00		0.009				804	2.55		4.3	4.3	4.3	4.3	58.37	58.37	58.37	58.37
05/08 22:00	21 FILTER A			0.00		0.012				805	2.55		4.3	4.3	4.3	4.3	61.37	61.37	61.37	61.37
05/08 22:00	23 FILTER C			0.02		0.019				809	2.55		4.3	4.3	4.3	4.3	61.37	61.37	61.37	61.37
05/09 01:00	21 FILTER A			0.02		0.016				824	2.55		4.3	4.3	4.3	4.3	64.37	64.37	64.37	64.37
05/09 01:00	23 FILTER C			0.00		0.013				835	2.55		4.3	4.3	4.3	4.3	64.37	64.37	64.37	64.37
05/09 04:00	21 FILTER A			0.01		0.010				849	2.55		4.3	4.3	4.3	4.3	67.37	67.37	67.37	67.37
05/09 04:00	23 FILTER C			0.00		0.013				842	2.55		4.3	4.3	4.3	4.3	67.37	67.37	67.37	67.37
05/09 07:00	21 FILTER A			0.00		0.008				825	2.55		4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	23 FILTER C			0.01		0.017				800	2.6		4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 06:46	NaOCl V = 9.4 L Q = 175 ml/hr D = 1/3												4.3	4.3	4.3	4.3	70.13	70.13	70.13	70.13
05/09 06:46	KOH V = 11.3 L Q = 160 ml/hr D = 1/5												4.3	4.3	4.3	4.3	70.13	70.13	70.13	70.13
05/09 07:00	01 RAW			0.04	0.01	0.918	0.924	6.47	10.1				4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	01 RAW							6.88	9.8				4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	11 POX	1.41	2		0.00		0.789	6.67	10.2				4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	11 POX							6.8	10.1				4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	21 FILTER A	0.29	1.24	0.00		0.018		6.75	10	847	2.55		4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	21 FILTER A							6.9	9.9				4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	22 FILTER B	0.82	1.41	0.00		0.064		6.82	10	837	2.55		4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	22 FILTER B							7.01	9.9				4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	23 FILTER C	0.83	1.39	0.01		0.025		6.74	10	811	2.8		4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	23 FILTER C							6.84	9.8				4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	24 FILTER D	0.94	1.4	0.00		0.022		6.68	10	841	2.55		4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:00	24 FILTER D							6.84	9.8				4.3	4.3	4.3	4.3	70.37	70.37	70.37	70.37
05/09 07:45	Power went out. Not sure why												4.3	4.3	4.3	4.3	71.12	71.12	71.12	71.12
05/09 09:55	Flow Calibration (see notes)												4.3	4.3	4.3	4.3	73.28	73.28	73.28	73.28
05/09 10:10	01 RAW			0.05	0.05	0.944	0.908	6.48	10.4				4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	01 RAW							6.78	10.4				4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	11 POX	1.53	2.15		0.03		0.759	6.75	10.9				4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	11 POX							7.25	10.8				4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	21 FILTER A	0.67	1.34	0.04		0.010		6.87	10.7	815	2.55		4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	21 FILTER A							7.22	10.7				4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	22 FILTER B	0.78	1.24	0.04		0.018		6.84	10.7	822	2.55		4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	22 FILTER B							7.21	10.6				4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	23 FILTER C	0.9	1.48	0.03		0.015		6.8	10.6	821	2.55		4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	23 FILTER C							7.19	10.5				4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	24 FILTER D	0.94	1.48	0.04		0.046		6.86	10.7	812	32.8		4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	24 FILTER D							7.21	10.6				4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:10	0.010 STD					0.011							4.3	4.3	4.3	4.3	73.53	73.53	73.53	73.53
05/09 10:45	KOH Dose Test												4.3	4.3	4.3	4.3	74.12	74.12	74.12	74.12
05/09 11:48	NaOCl V = 8.5 L Q = 160 ml/hr D = 1/3												4.3	4.3	4.3	4.3	75.17	75.17	75.17	75.17
05/09 11:48	KOH V = 10.4 L Q = 169 ml/hr D = 1/5												4.3	4.3	4.3	4.3	75.17	75.17	75.17	75.17
05/09 15:00	21 FILTER A					0.022							4.3	4.3	4.3	4.3	78.37	78.37	78.37	78.37
05/09 15:00	23 FILTER C					0.028							4.3	4.3	4.3	4.3	78.37	78.37	78.37	78.37
05/09 18:00	21 FILTER A					0.013							4.3	4.3	4.3	4.3	81.37	81.37	81.37	81.37
05/09 18:00	23 FILTER C					0.008							4.3	4.3	4.3	4.3	81.37	81.37	81.37	81.37
05/09 21:00	21 FILTER A					0.015							4.3	4.3	4.3	4.3	84.37	84.37	84.37	84.37
05/09 21:00	23 FILTER C					0.016							4.3	4.3	4.3	4.3	84.37	84.37	84.37	84.37
05/10 00:00	21 FILTER A					0.004							4.3	4.3	4.3	4.3	87.37	87.37	87.37	87.37
05/10 00:00	23 FILTER C					0.006							4.3	4.3	4.3	4.3	87.37	87.37	87.37	87.37
05/10 03:00	21 FILTER A					0.000							4.3	4.3	4.3	4.3	90.37	90.37	90.37	90.37
05/10 03:00	23 FILTER C					0.006							4.3	4.3	4.3	4.3	90.37	90.37	90.37	90.37
05/10 06:00	21 FILTER A					0.003							4.3	4.3	4.3	4.3	93.37	93.37	93.37	93.37
05/10 06:00	23 FILTER C					0.001							4.3	4.3	4.3	4.3	93.37	93.37	93.37	93.37
05/10 09:30	KOH (1/5) V = 7.0 L NaOCl (1/3) V = 4.65 L												4.3	4.3	4.3	4.3	96.87	96.87	96.87	96.87
05/10 11:30	01 RAW			0.03	0.02	1.132	1.081	6.53					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	01 RAW							6.72					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	11 POX	1.1	2.06		0.02		0.919	6.65					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	11 POX							6.45					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	21 FILTER A	0.63	1.38	0.00		0.030		6.61					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	21 FILTER A							6.51					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	22 FILTER B	0.64	1.45	0.00		0.029		6.59					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87

Date and Time	SAMPLE LOCATION	Cl2 (f)	Cl2 (t)	Fe(t)	Fe (d)	Mn(t)	Mn (d)	pH	Temp	JS#	Mn(t) - GF	CO2	A Trial	B Trial	C Trial	D Trial	A Runtime (hrs)	B Runtime (hrs)	C Runtime (hrs)	D Runtime (hrs)
05/10 11:30	22 FILTER B							6.55					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	23 FILTER C	0.6	1.41	0.00		0.057		6.61					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	23 FILTER C							6.51					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	24 FILTER D	0.55	1.41	0.01		0.191		6.6					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	24 FILTER D							6.55					4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 11:30	0.040 STD					0.075							4.3	4.3	4.3	4.3	98.87	98.87	98.87	98.87
05/10 12:15	24 FILTER D					0.155							4.3	4.3	4.3	4.3	99.62	99.62	99.62	99.62
05/10 12:15	24 FILTER D					0.138							4.3	4.3	4.3	4.3	99.62	99.62	99.62	99.62
05/10 12:15	24 FILTER D					0.146							4.3	4.3	4.3	4.3	99.62	99.62	99.62	99.62
05/10 12:30	End trial, purge chemicals, empty turbidity												4.3	4.3	4.3	4.3	99.87	99.87	99.87	99.87
05/10 12:30	31 CBW FILTER A			10.00		25.000							4.3	4.3	4.3	4.3	99.87	99.87	99.87	99.87
05/10 12:30	33 CBW FILTER C			30.00		13.000							4.3	4.3	4.3	4.3	99.87	99.87	99.87	99.87
05/10 12:30	41 SSN FILTER A			0.03		0.370							4.3	4.3	4.3	4.3	99.87	99.87	99.87	99.87
05/10 12:30	43 SSN FILTER C			0.01		0.539							4.3	4.3	4.3	4.3	99.87	99.87	99.87	99.87

Appendix B – Biological Field Notes

Sample Location Reference IDs

Sample **ID**	**Sample Location/Description**
01 RAW	Raw water sample from the Oakdale Well, collected upstream of chemical and air addition.
02 MPOKA	Post-oxidation sample, collected downstream of chemical (KOH) and air addition and upstream of M1 and M2.
11 MEFF 1	Effluent sample from M1. Media: 48” of 0.95 mm Sand (Acclimated for Mn Removal)
12 MEFF 2	Effluent sample from M2. Media: 48” of 0.95 mm Sand (Acclimated for Mn Removal)

Date and Time	Source	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH	Temp (C)	Alk (mg/L as CaCO3)	ORP	DO	ATP (pg/gr)	GF ID (JS #)	GF Mn(t) (ppb)		M1 Trial	M2 Trial	M1 Run Time (hrs)	M2 Run Time (hrs)
03/19/19 07:15	01 RAW	0.03	0.02	0.723	0.704													
03/20/19 10:15	01 RAW	0.00		0.724														
03/20/19 11:00	Install bio filters from Putnam BMARS															1-1		0.00
03/20/19 15:30	No air added upstram of filters															1-1		4.50
03/20/19 16:20	01 RAW	0.04	0.02	0.731	0.718											1-1		5.33
03/20/19 16:20	02 MPOKA		0.04		0.705											1-1		5.33
03/20/19 16:20	11 MEFF 1	0.06		0.110												1-1		5.33
03/20/19 16:20	12 MEFF 2	0.07		0.049												1-1		5.33
03/20/19 16:25	KOH Volume to 36 L															1-1		5.42
03/20/19 18:35	01 RAW	0.07	0.03	0.744	0.713											1-1		7.58
03/20/19 18:35	02 MPOKA		0.07		0.698											1-1		7.58
03/20/19 18:35	11 MEFF 1	0.04		0.246												1-1		7.58
03/20/19 18:35	12 MEFF 2	0.05		0.192												1-1		7.58
03/20/19 20:00	11 MEFF 1			0.400												1-1		9.00
03/20/19 20:00	12 MEFF 2			0.352												1-1		9.00
03/21/19 04:00	11 MEFF 1			0.614												1-1		17.00
03/21/19 04:00	12 MEFF 2			0.608												1-1		17.00
03/21/19 11:30	01 RAW	0.07		0.770												1-1		24.50
03/21/19 11:30	02 MPOKA			0.764	0.740											1-1		24.50
03/21/19 11:30	11 MEFF 1	0.00		0.666												1-1		24.50
03/21/19 11:30	12 MEFF 2	0.00		0.644												1-1		24.50
03/21/19 12:30	Started Air Feed upstream of M1&M2															1-1		25.50
03/21/19 13:00	11 MEFF 1															1-1		26.00
03/21/19 13:00	12 MEFF 2															1-1		26.00
03/21/19 14:00	Lost air feed															1-1		27.00
03/22/19 09:05	01 RAW			0.720	0.743											1-1		46.08
03/22/19 09:05	02 MPOKA			0.703	0.705											1-1		46.08
03/22/19 09:05	11 MEFF 1			0.633												1-1		46.08
03/22/19 09:05	12 MEFF 2			0.663												1-1		46.08
03/22/19 09:30	Restart Air															1-1		46.50
03/22/19 10:20	KOH: 31L to 52															1-1		47.33
03/22/19 12:00	11 MEFF 1			0.675												1-1		49.00
03/22/19 12:00	12 MEFF 2			0.663												1-1		49.00
03/22/19 20:00	11 MEFF 1			0.689												1-1		57.00
03/22/19 20:00	12 MEFF 2			0.700												1-1		57.00
03/23/19 04:00	11 MEFF 1			0.691												1-1		65.00
03/23/19 04:00	12 MEFF 2			0.690												1-1		65.00
03/23/19 11:00	Sink Overflowing															1-1		72.00
03/23/19 11:15	01 RAW	0.02		0.738												1-1		72.25
03/23/19 11:15	02 MPOKA															1-1		72.25
03/23/19 11:15	11 MEFF 1	0.01		0.676												1-1		72.25
03/23/19 11:15	12 MEFF 2	0.01		0.662												1-1		72.25
03/23/19 11:50	Tap Drain at High Point to Relieve Sink Backup															1-1		72.83
03/25/19 08:45	01 RAW			0.743	0.719											1-1		117.75
03/25/19 08:45	02 MPOKA			0.696	0.695											1-1		117.75
03/25/19 08:45	11 MEFF 1			0.637												1-1		117.75
03/25/19 08:45	12 MEFF 2			0.669												1-1		117.75
03/25/19 08:50	Increase Air Feed															1-1		117.83
03/25/19 09:00	Calibrate DP Sensors															1-1		118.00
03/25/19 10:00	KOH V = 46L															1-1		119.00
03/25/19 10:23	Increase pH Setpoint from 7.5 to 8.5															1-1		119.38
03/25/19 11:20	Checked Chlorine Residual in Raw = 0.0 mg/L															1-1		120.33
03/25/19 12:30	Adjust Air Feed															1-1		121.50
03/26/19 07:00	02 MPOKA					8.52				6.07						1-1		140.00
03/26/19 07:15	01 RAW			0.839	0.758											1-1		140.25
03/26/19 07:15	02 MPOKA			0.736	0.754											1-1		140.25
03/26/19 07:15	11 MEFF 1			0.644												1-1		140.25
03/26/19 07:15	12 MEFF 2			0.638												1-1		140.25
03/26/19 07:50	Shutdown and Remove Mudballs at Surface															1-1		140.83
03/26/19 08:35	Restart Pilot Flow															1-1		141.58
03/26/19 09:00	KOH V = 44L															1-1		142.00
03/26/19 09:15	Shutdown Pilot and Fix Leak															1-1		142.25
03/26/19 10:00	Adjust Air Feed															1-1		143.00
03/26/19 16:00	11 MEFF 1			0.726												1-1		149.00
03/27/19 04:00	11 MEFF 1			0.687												1-1		161.00
03/27/19 07:30	01 RAW			0.784	0.756											1-1		164.50
03/27/19 07:30	02 MPOKA			0.765	0.759											1-1		164.50
03/27/19 07:30	11 MEFF 1			0.670												1-1		164.50
03/27/19 07:30	12 MEFF 2			0.646												1-1		164.50
03/27/19 10:00	DEP Visit															1-1		167.00
03/27/19 20:00	11 MEFF 1			0.665												1-1		177.00
03/28/19 09:50	01 RAW			0.818												1-1		190.83
03/28/19 09:50	11 MEFF 1			0.688												1-1		190.83
03/28/19 09:50	12 MEFF 2			0.681												1-1		190.83
03/28/19 09:55	Shutdown Pilot to Relocate M1 to Putnam															1-1		190.92
03/28/19 13:20	Install Filter D from Putnam as new M1 and BW																	194.33
03/28/19 14:15	Restart Both Filters at 5 gpm/sf														1-1	1-1	0.00	195.25
03/28/19 14:30	11 MEFF 1			0.035											1-1	1-1	0.25	195.50
03/28/19 16:00	11 MEFF 1			0.100											1-1	1-1	1.75	197.00
03/28/19 20:00	11 MEFF 1			0.107											1-1	1-1	5.75	201.00
03/29/19 00:00	11 MEFF 1			0.294											1-1	1-1	9.75	205.00
03/29/19 04:00	11 MEFF 1			0.405											1-1	1-1	13.75	209.00
03/29/19 07:15	KOH V = 37L														1-1	1-1	17.00	212.25
03/29/19 07:20	01 RAW	0.04		0.756	0.773										1-1	1-1	17.08	212.33
03/29/19 07:20	02 MPOKA	0.04		0.785	0.766										1-1	1-1	17.08	212.33
03/29/19 07:20	11 MEFF 1	0.03		0.480											1-1	1-1	17.08	212.33
03/29/19 07:20	12 MEFF 2	0.02		0.637											1-1	1-1	17.08	212.33
03/30/19 00:00	11 MEFF 1			0.553											1-1	1-1	33.75	229.00
03/31/19 00:00	11 MEFF 1			0.550											1-1	1-1	57.75	253.00
04/01/19 00:00	11 MEFF 1			0.590											1-1	1-1	81.75	277.00
04/01/19 07:15	01 RAW			0.796	0.759					7.8					1-1	1-1	89.00	284.25
04/01/19 07:15	02 MPOKA			0.749	0.737										1-1	1-1	89.00	284.25
04/01/19 07:15	11 MEFF 1			0.644											1-1	1-1	89.00	284.25
04/01/19 07:15	12 MEFF 2			0.645											1-1	1-1	89.00	284.25
04/01/19 07:30	KOH V = 26.5L														1-1	1-1	89.25	284.50
04/02/19 04:00	11 MEFF 1			0.662											1-1	1-1	109.75	305.00
04/03/19 00:00	11 MEFF 1			0.681											1-1	1-1	129.75	325.00
04/03/19 15:25	KOH V = 26L														1-1	1-1	145.17	340.42
04/03/19 15:30	01 RAW			0.808	0.764										1-1	1-1	145.25	340.50
04/03/19 15:30	02 MPOKA			0.755	0.743										1-1	1-1	145.25	340.50
04/03/19 15:30	11 MEFF 1			0.685											1-1	1-1	145.25	340.50
04/03/19 15:30	12 MEFF 2			0.664											1-1	1-1	145.25	340.50
04/03/19 16:00	Setup Autosampler on M2														1-1	1-1	145.75	341.00
04/04/19 00:00	11 MEFF 1			0.667											1-1	1-1	153.75	349.00
04/04/19 00:00	12 MEFF 2			0.636											1-1	1-1	153.75	349.00
04/05/19 00:00	11 MEFF 1			0.640											1-1	1-1	177.75	373.00
04/05/19 00:00	12 MEFF 2			0.637											1-1	1-1	177.75	373.00
04/05/19 07:25	KOH V = 23L														1-1	1-1	185.17	380.42
04/05/19 07:30	01 RAW	0.03		0.773	0.652										1-1	1-1	185.25	380.50
04/05/19 07:30	02 MPOKA			0.695	0.715										1-1	1-1	185.25	380.50
04/05/19 07:30	11 MEFF 1	0.02		0.661											1-1	1-1	185.25	380.50
04/05/19 07:30	12 MEFF 2	0.02		0.631											1-1	1-1	185.25	380.50
04/05/19 08:20	KOH: 23L to 43														1-1	1-1	186.08	381.33
04/05/19 08:30	RAW (from Station sample)									12.1					1-1	1-1	186.25	381.50

Date and Time	Source	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH	Temp (C)	Alk (mg/L as CaCO3)	ORP	DO	ATP (pg/gr)	GF ID (JS #)	GF Mn(t) (ppb)		M1 Trial	M2 Trial	M1 Run Time (hrs)	M2 Run Time (hrs)
04/06/19 00:00	11 MEFF 1			0.663											1-1	1-1	201.75	397.00
04/06/19 00:00	12 MEFF 2			0.651											1-1	1-1	201.75	397.00
04/07/19 00:00	11 MEFF 1			0.667											1-1	1-1	225.75	421.00
04/07/19 00:00	12 MEFF 2			0.606											1-1	1-1	225.75	421.00
04/08/19 00:00	11 MEFF 1			0.653											1-1	1-1	249.75	445.00
04/08/19 00:00	12 MEFF 2			0.607											1-1	1-1	249.75	445.00
04/08/19 07:20	KOH V = 37.5 L														1-1	1-1	257.08	452.33
04/08/19 07:25	01 RAW			0.830	0.781										1-1	1-1	257.17	452.42
04/08/19 07:25	02 MPOKA				0.763										1-1	1-1	257.17	452.42
04/08/19 07:25	11 MEFF 1			0.630											1-1	1-1	257.17	452.42
04/08/19 07:25	12 MEFF 2			0.589											1-1	1-1	257.17	452.42
04/09/19 00:00	11 MEFF 1			0.647											1-1	1-1	273.75	469.00
04/09/19 00:00	12 MEFF 2			0.579											1-1	1-1	273.75	469.00
04/10/19 00:00	11 MEFF 1			0.623											1-1	1-1	297.75	493.00
04/10/19 00:00	12 MEFF 2			0.578											1-1	1-1	297.75	493.00
04/10/19 07:20	KOH V = 34 L, Q = 71.9 ml/hr														1-1	1-1	305.08	500.33
04/10/19 07:30	01 RAW			0.789	0.773										1-1	1-1	305.25	500.50
04/10/19 07:30	02 MPOKA				0.755										1-1	1-1	305.25	500.50
04/10/19 07:30	11 MEFF 1			0.618											1-1	1-1	305.25	500.50
04/10/19 07:30	12 MEFF 2			0.572											1-1	1-1	305.25	500.50
04/10/19 08:00	Reset A/S for 12:00 Bottle 1														1-1	1-1	305.75	501.00
04/10/19 12:00	11 MEFF 1			0.614											1-1	1-1	309.75	505.00
04/10/19 12:00	12 MEFF 2			0.439											1-1	1-1	309.75	505.00
04/10/19 20:00	11 MEFF 1			0.513											1-1	1-1	317.75	513.00
04/10/19 20:00	12 MEFF 2			0.405											1-1	1-1	317.75	513.00
04/11/19 04:00	11 MEFF 1			0.542											1-1	1-1	325.75	521.00
04/11/19 04:00	12 MEFF 2			0.447											1-1	1-1	325.75	521.00
04/11/19 12:00	11 MEFF 1			0.540											1-1	1-1	333.75	529.00
04/11/19 12:00	12 MEFF 2			0.433											1-1	1-1	333.75	529.00
04/11/19 20:00	11 MEFF 1			0.542											1-1	1-1	341.75	537.00
04/11/19 20:00	12 MEFF 2			0.404											1-1	1-1	341.75	537.00
04/12/19 04:00	11 MEFF 1			0.505											1-1	1-1	349.75	545.00
04/12/19 04:00	12 MEFF 2			0.387											1-1	1-1	349.75	545.00
04/12/19 08:00	01 RAW	0.04		0.766	0.717										1-1	1-1	353.75	549.00
04/12/19 08:00	02 MPOKA				0.698										1-1	1-1	353.75	549.00
04/12/19 08:00	11 MEFF 1	0.01		0.541											1-1	1-1	353.75	549.00
04/12/19 08:00	12 MEFF 2	0.01		0.422											1-1	1-1	353.75	549.00
04/12/19 08:30	KOH V = 30.0 L, Q = 67.2 ml/hr														1-1	1-1	354.25	549.50
04/12/19 08:54	Put KOH pump in manual @ 35 ml/hr														1-1	1-1	354.65	549.90
04/12/19 08:55	Air scour and bump M1 V = 11 L, DP reduced from 18 to 2 psi														1-1	1-1	354.67	549.92
04/12/19 09:05	Place M1 in service. Put KOH pump in auto														1-1	1-1	354.83	550.08
04/12/19 09:25	Add 1/3 KOH to Day Tank. New V = 50 L														1-1	1-1	355.17	550.42
04/12/19 12:00	11 MEFF 1			0.474											1-1	1-1	357.75	553.00
04/12/19 12:00	12 MEFF 2			0.262											1-1	1-1	357.75	553.00
04/12/19 20:00	11 MEFF 1			0.446											1-1	1-1	365.75	561.00
04/12/19 20:00	12 MEFF 2			0.273											1-1	1-1	365.75	561.00
04/13/19 04:00	11 MEFF 1			0.469											1-1	1-1	373.75	569.00
04/13/19 04:00	12 MEFF 2			0.203											1-1	1-1	373.75	569.00
04/13/19 12:00	11 MEFF 1			0.449											1-1	1-1	381.75	577.00
04/13/19 12:00	12 MEFF 2			0.141											1-1	1-1	381.75	577.00
04/13/19 20:00	11 MEFF 1			0.455											1-1	1-1	389.75	585.00
04/13/19 20:00	12 MEFF 2			0.177											1-1	1-1	389.75	585.00
04/14/19 04:00	11 MEFF 1			0.486											1-1	1-1	397.75	593.00
04/14/19 04:00	12 MEFF 2			0.211											1-1	1-1	397.75	593.00
04/14/19 12:00	11 MEFF 1			0.515											1-1	1-1	405.75	601.00
04/14/19 12:00	12 MEFF 2			0.255											1-1	1-1	405.75	601.00
04/14/19 20:00	11 MEFF 1			0.454											1-1	1-1	413.75	609.00
04/14/19 20:00	12 MEFF 2			0.207											1-1	1-1	413.75	609.00
04/15/19 04:00	11 MEFF 1			0.472											1-1	1-1	421.75	617.00
04/15/19 04:00	12 MEFF 2			0.213											1-1	1-1	421.75	617.00
04/15/19 08:25	KOH V = 44.5 L, Q = 67.2 ml/hr														1-1	1-1	426.17	621.42
04/15/19 08:30	01 RAW	0.06	0.11	0.740	0.742										1-1	1-1	426.25	621.50
04/15/19 08:30	02 MPOKA		0.05		0.650										1-1	1-1	426.25	621.50
04/15/19 08:30	11 MEFF 1	0.06		0.422											1-1	1-1	426.25	621.50
04/15/19 08:30	12 MEFF 2	0.03		0.139											1-1	1-1	426.25	621.50
04/15/19 09:45	KOH V = 44.4 L, Q = 64.1 ml/hr														1-1	1-1	427.50	622.75
04/15/19 12:00	11 MEFF 1			0.327											1-1	1-1	429.75	625.00
04/15/19 12:00	12 MEFF 2			0.109											1-1	1-1	429.75	625.00
04/15/19 20:00	11 MEFF 1			0.256											1-1	1-1	437.75	633.00
04/15/19 20:00	12 MEFF 2			0.059											1-1	1-1	437.75	633.00
04/16/19 04:00	11 MEFF 1			0.316											1-1	1-1	445.75	641.00
04/16/19 04:00	12 MEFF 2			0.082											1-1	1-1	445.75	641.00
04/16/19 12:00	11 MEFF 1			0.328											1-1	1-1	453.75	649.00
04/16/19 12:00	12 MEFF 2			0.104											1-1	1-1	453.75	649.00
04/16/19 20:00	11 MEFF 1			0.282											1-1	1-1	461.75	657.00
04/16/19 20:00	12 MEFF 2			0.088											1-1	1-1	461.75	657.00
04/17/19 04:00	11 MEFF 1			0.268											1-1	1-1	469.75	665.00
04/17/19 04:00	12 MEFF 2			0.065											1-1	1-1	469.75	665.00
04/17/19 07:00	Looks like well pump went off. Apparently this is normal														1-1	1-1	472.75	668.00
04/17/19 12:00	11 MEFF 1			0.232											1-1	1-1	477.75	673.00
04/17/19 12:00	12 MEFF 2			0.044											1-1	1-1	477.75	673.00
04/17/19 20:00	11 MEFF 1			0.252											1-1	1-1	485.75	681.00
04/17/19 20:00	12 MEFF 2			0.052											1-1	1-1	485.75	681.00
04/18/19 04:00	11 MEFF 1			0.282											1-1	1-1	493.75	689.00
04/18/19 04:00	12 MEFF 2			0.075											1-1	1-1	493.75	689.00
04/18/19 12:00	11 MEFF 1			0.293											1-1	1-1	501.75	697.00
04/18/19 12:00	12 MEFF 2			0.072											1-1	1-1	501.75	697.00
04/18/19 12:55	KOH V = 39.5 L, Q = 73.4 ml/hr														1-1	1-1	502.67	697.92
04/18/19 13:00	01 RAW	0.07	0.08	0.774	0.790										1-1	1-1	502.75	698.00
04/18/19 13:00	02 MPOKA		0.07		0.712										1-1	1-1	502.75	698.00
04/18/19 13:00	11 MEFF 1	0.03		0.310											1-1	1-1	502.75	698.00
04/18/19 13:00	12 MEFF 2	0.01		0.082											1-1	1-1	502.75	698.00
04/18/19 14:00	Added 15.0 L KOH (1/3), new V = 54.0 L (1/3)														1-1	1-1	503.75	699.00
04/18/19 16:00	11 MEFF 1			0.032											1-1	1-1	505.75	701.00
04/18/19 16:00	12 MEFF 2			0.035											1-1	1-1	505.75	701.00
04/19/19 00:00	11 MEFF 1			0.031											1-1	1-1	513.75	709.00
04/19/19 00:00	12 MEFF 2			0.029											1-1	1-1	513.75	709.00
04/19/19 08:00	11 MEFF 1			0.030											1-1	1-1	521.75	717.00
04/19/19 08:00	12 MEFF 2			0.023											1-1	1-1	521.75	717.00
04/19/19 16:00	11 MEFF 1			0.049											1-1	1-1	529.75	725.00
04/19/19 16:00	12 MEFF 2			0.038											1-1	1-1	529.75	725.00
04/20/19 00:00	11 MEFF 1			0.045											1-1	1-1	537.75	733.00
04/20/19 00:00	12 MEFF 2			0.037											1-1	1-1	537.75	733.00
04/20/19 08:00	11 MEFF 1			0.055											1-1	1-1	545.75	741.00
04/20/19 08:00	12 MEFF 2			0.014											1-1	1-1	545.75	741.00
04/20/19 16:00	11 MEFF 1			0.100											1-1	1-1	553.75	749.00
04/20/19 16:00	12 MEFF 2			0.065											1-1	1-1	553.75	749.00
04/21/19 00:00	11 MEFF 1			0.050											1-1	1-1	561.75	757.00
04/21/19 00:00	12 MEFF 2			0.032											1-1	1-1	561.75	757.00
04/21/19 08:00	11 MEFF 1			0.036											1-1	1-1	569.75	765.00
04/21/19 08:00	12 MEFF 2			0.015											1-1	1-1	569.75	765.00
04/21/19 16:00	11 MEFF 1			0.057											1-1	1-1	577.75	773.00
04/21/19 16:00	12 MEFF 2			0.056											1-1	1-1	577.75	773.00
04/22/19 00:00	11 MEFF 1			0.108											1-1	1-1	585.75	781.00

Date and Time	Source	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH	Temp (C)	Alk (mg/L as CaCO3)	ORP	DO	ATP (pg/gr)	GF ID (JS #)	GF Mn(t) (ppb)		M1 Trial	M2 Trial	M1 Run Time (hrs)	M2 Run Time (hrs)
04/22/19 00:00	12 MEFF 2			0.014											1-1	1-1	585.75	781.00
04/22/19 08:00	11 MEFF 1			0.019											1-1	1-1	593.75	789.00
04/22/19 08:00	12 MEFF 2			0.017											1-1	1-1	593.75	789.00
04/22/19 11:50	KOH V = 43.5 L, D = 1/3, Q = 95.5 ml/hr														1-1	1-1	597.58	792.83
04/22/19 12:00	01 RAW	0.08	0.06	0.704	0.743										1-1	1-1	597.75	793.00
04/22/19 12:00	02 MPOKA		0.07		0.749										1-1	1-1	597.75	793.00
04/22/19 12:00	11 MEFF 1	0.04		0.021											1-1	1-1	597.75	793.00
04/22/19 12:00	12 MEFF 2	0.03		0.011											1-1	1-1	597.75	793.00
04/22/19 13:22	KOH V = 43.4 L, Q = 95.3 ml/hr														1-1	1-1	599.12	794.37
04/22/19 16:00	11 MEFF 1			0.035											1-1	1-1	601.75	797.00
04/22/19 16:00	12 MEFF 2			0.018											1-1	1-1	601.75	797.00
04/23/19 00:00	11 MEFF 1			0.019											1-1	1-1	609.75	805.00
04/23/19 00:00	12 MEFF 2			0.021											1-1	1-1	609.75	805.00
04/23/19 08:00	11 MEFF 1			0.033											1-1	1-1	617.75	813.00
04/23/19 08:00	12 MEFF 2			0.021											1-1	1-1	617.75	813.00
04/23/19 16:00	11 MEFF 1			0.024											1-1	1-1	625.75	821.00
04/23/19 16:00	12 MEFF 2			0.028											1-1	1-1	625.75	821.00
04/24/19 00:00	11 MEFF 1			0.022											1-1	1-1	633.75	829.00
04/24/19 00:00	12 MEFF 2			0.036											1-1	1-1	633.75	829.00
04/24/19 08:00	11 MEFF 1			0.023											1-1	1-1	641.75	837.00
04/24/19 08:00	12 MEFF 2			0.016											1-1	1-1	641.75	837.00
04/24/19 16:00	11 MEFF 1			0.006											1-1	1-1	649.75	845.00
04/24/19 16:00	12 MEFF 2			0.019											1-1	1-1	649.75	845.00
04/25/19 00:00	11 MEFF 1			0.010											1-1	1-1	657.75	853.00
04/25/19 00:00	12 MEFF 2			0.096											1-1	1-1	657.75	853.00
04/25/19 08:00	11 MEFF 1			0.041											1-1	1-1	665.75	861.00
04/25/19 08:00	12 MEFF 2			0.030											1-1	1-1	665.75	861.00
04/25/19 14:30	KOH V = 36 L, Q = 90.6 ml/hr, D =1/3														1-1	1-1	672.25	867.50
04/25/19 14:35	01 RAW	0.08	0.04	0.778	0.716										1-1	1-1	672.33	867.58
04/25/19 14:35	02 MPOKA		0.08		0.625										1-1	1-1	672.33	867.58
04/25/19 14:35	11 MEFF 1	0.03		0.020											1-1	1-1	672.33	867.58
04/25/19 14:35	12 MEFF 2	0.05		0.054											1-1	1-1	672.33	867.58
04/25/19 15:00	Shutdown Filters M1 + M2 for BW														1-1	1-1	672.75	868.00
04/25/19 15:00	BW M1: Air scour (1 min), 6 gpm/sf + air scour (3 min), 8 gpm/sf (5 min). Total BW = 11.5 gal																	
04/25/19 15:00	BW M2: Air scour (1 min), 6 gpm/sf + air scour (3 min), 8 gpm/sf (5 min). Total BW = 11.5 gal																	
04/25/19 15:22	Restarted M1 + M2 @ 5 gpm/sf														2-1	2-1	0.00	0.00
04/25/19 16:08	Added 9.0 L (1/3), KOH, new V = 45.0 L														2-1	2-1	0.77	0.77
04/25/19 16:00	11 MEFF 1			0.031											2-1	2-1	0.63	0.63
04/25/19 16:00	12 MEFF 2			0.031											2-1	2-1	0.63	0.63
04/25/19 20:00	11 MEFF 1											172	14.6	11 MEFF 1	2-1	2-1	4.63	4.63
04/25/19 20:00	12 MEFF 2											165	15.2	12 MEFF 2	2-1	2-1	4.63	4.63
04/26/19 00:00	11 MEFF 1											054	22.2	11 MEFF 1	2-1	2-1	8.63	8.63
04/26/19 00:00	12 MEFF 2											068	39.7	12 MEFF 2	2-1	2-1	8.63	8.63
04/26/19 04:00	11 MEFF 1			0.030											2-1	2-1	12.63	12.63
04/26/19 04:00	12 MEFF 2			0.062											2-1	2-1	12.63	12.63
04/26/19 08:00	11 MEFF 1											297	23	11 MEFF 1	2-1	2-1	16.63	16.63
04/26/19 08:00	12 MEFF 2											057	57.2	12 MEFF 2	2-1	2-1	16.63	16.63
04/26/19 12:00	11 MEFF 1											171	27	11 MEFF 1	2-1	2-1	20.63	20.63
04/26/19 12:00	12 MEFF 2											093	58.5	12 MEFF 2	2-1	2-1	20.63	20.63
04/26/19 16:00	11 MEFF 1			0.048											2-1	2-1	24.63	24.63
04/26/19 16:00	12 MEFF 2			0.115											2-1	2-1	24.63	24.63
04/26/19 20:00	11 MEFF 1											078	38.3	11 MEFF 1	2-1	2-1	28.63	28.63
04/26/19 20:00	12 MEFF 2											085	76.8	12 MEFF 2	2-1	2-1	28.63	28.63
04/27/19 00:00	11 MEFF 1											118	18.5	11 MEFF 1	2-1	2-1	32.63	32.63
04/27/19 00:00	12 MEFF 2											289	37.3	12 MEFF 2	2-1	2-1	32.63	32.63
04/27/19 04:00	11 MEFF 1			0.090											2-1	2-1	36.63	36.63
04/27/19 04:00	12 MEFF 2			0.180											2-1	2-1	36.63	36.63
04/27/19 08:00	11 MEFF 1											169	14.3	11 MEFF 1	2-1	2-1	40.63	40.63
04/27/19 08:00	12 MEFF 2											064	30	12 MEFF 2	2-1	2-1	40.63	40.63
04/27/19 12:00	11 MEFF 1											168	59.9	11 MEFF 1	2-1	2-1	44.63	44.63
04/27/19 12:00	12 MEFF 2											178	77.6	12 MEFF 2	2-1	2-1	44.63	44.63
04/27/19 16:00	11 MEFF 1			0.048											2-1	2-1	48.63	48.63
04/27/19 16:00	12 MEFF 2			0.144											2-1	2-1	48.63	48.63
04/27/19 20:00	11 MEFF 1											284	2.55	11 MEFF 1	2-1	2-1	52.63	52.63
04/27/19 20:00	12 MEFF 2											007	63.7	12 MEFF 2	2-1	2-1	52.63	52.63
04/28/19 00:00	11 MEFF 1											061	29.6	11 MEFF 1	2-1	2-1	56.63	56.63
04/28/19 00:00	12 MEFF 2											282	4.6	12 MEFF 2	2-1	2-1	56.63	56.63
04/28/19 04:00	11 MEFF 1			0.040											2-1	2-1	60.63	60.63
04/28/19 04:00	12 MEFF 2			0.152											2-1	2-1	60.63	60.63
04/28/19 08:00	11 MEFF 1											051	8.8	11 MEFF 1	2-1	2-1	64.63	64.63
04/28/19 08:00	12 MEFF 2											207	15.9	12 MEFF 2	2-1	2-1	64.63	64.63
04/28/19 12:00	11 MEFF 1											095	11.7	11 MEFF 1	2-1	2-1	68.63	68.63
04/28/19 12:00	12 MEFF 2											287	2.55	12 MEFF 2	2-1	2-1	68.63	68.63
04/28/19 16:00	11 MEFF 1			0.065											2-1	2-1	72.63	72.63
04/28/19 16:00	12 MEFF 2			0.122											2-1	2-1	72.63	72.63
04/28/19 20:00	11 MEFF 1											199	21.9	11 MEFF 1	2-1	2-1	76.63	76.63
04/28/19 20:00	12 MEFF 2											181	60	12 MEFF 2	2-1	2-1	76.63	76.63
04/29/19 00:00	11 MEFF 1											027	20.2	11 MEFF 1	2-1	2-1	80.63	80.63
04/29/19 00:00	12 MEFF 2											004	58.3	12 MEFF 2	2-1	2-1	80.63	80.63
04/29/19 04:00	11 MEFF 1			0.112											2-1	2-1	84.63	84.63
04/29/19 04:00	12 MEFF 2			0.051											2-1	2-1	84.63	84.63
04/29/19 08:00	11 MEFF 1											013	115	11 MEFF 1	2-1	2-1	88.63	88.63
04/29/19 08:00	12 MEFF 2											090	101.8	12 MEFF 2	2-1	2-1	88.63	88.63
04/29/19 11:15	KOH V = 37.4 L, Q = 155 ml/hr														2-1	2-1	91.88	91.88
04/29/19 11:20	01 RAW	0.04	0.00	0.719	0.742										2-1	2-1	91.97	91.97
04/29/19 11:20	02 MPOKA		0.02		0.966										2-1	2-1	91.97	91.97
04/29/19 11:20	11 MEFF 1	0.01		0.044											2-1	2-1	91.97	91.97
04/29/19 11:20	12 MEFF 2	0.08		0.033											2-1	2-1	91.97	91.97
04/29/19 11:22	Flushed POX lines, they looked clogged														2-1	2-1	92.00	92.00
04/29/19 12:30	Added 18.0 L KOH, new V = 54.8 L														2-1	2-1	93.13	93.13
04/29/19 16:00	11 MEFF 1			0.035											2-1	2-1	96.63	96.63
04/29/19 16:00	12 MEFF 2			0.067											2-1	2-1	96.63	96.63
04/29/19 20:00	11 MEFF 1											231	11.6	11 MEFF 1	2-1	2-1	100.63	100.63
04/29/19 20:00	12 MEFF 2											265	23.2	12 MEFF 2	2-1	2-1	100.63	100.63
04/30/19 00:00	11 MEFF 1											154	8.4	11 MEFF 1	2-1	2-1	104.63	104.63
04/30/19 00:00	12 MEFF 2											258	24	12 MEFF 2	2-1	2-1	104.63	104.63
04/30/19 04:00	11 MEFF 1			0.013											2-1	2-1	108.63	108.63
04/30/19 04:00	12 MEFF 2			0.034											2-1	2-1	108.63	108.63
04/30/19 08:00	11 MEFF 1											059	11.6	11 MEFF 1	2-1	2-1	112.63	112.63
04/30/19 08:00	12 MEFF 2											161	31.4	12 MEFF 2	2-1	2-1	112.63	112.63
04/30/19 10:40	KOH V = 53.0 L, Q = 71.9 ml/hr														2-1	2-1	115.30	115.30
04/30/19 10:45	01 RAW	0.49	0.02	0.744	0.724										2-1	2-1	115.38	115.38
04/30/19 10:45	02 MPOKA		0.05		0.682										2-1	2-1	115.38	115.38
04/30/19 10:45	11 MEFF 1	0.13		0.036											2-1	2-1	115.38	115.38
04/30/19 10:45	12 MEFF 2	0.09		0.054											2-1	2-1	115.38	115.38
04/30/19 15:00	Note: There is a yellow color in tank. System off ~ 15 minutes to connect Felma														2-1	2-1	119.63	119.63
04/30/19 12:00	11 MEFF 1											080	39.3	11 MEFF 1	2-1	2-1	116.63	116.63
04/30/19 12:00	12 MEFF 2											151	24.6	12 MEFF 2	2-1	2-1	116.63	116.63
04/30/19 16:00	11 MEFF 1			0.021											2-1	2-1	120.63	120.63
04/30/19 16:00	12 MEFF 2			0.044											2-1	2-1	120.63	120.63
04/30/19 16:45	KOH V = 52.0 L, Q = 67.2 ml/hr														2-1	2-1	121.38	121.38
04/30/19 16:56	Well on: Raw @ well = 0.02 Fe, Raw @ Bonnie = 0.07 Fe														2-1	2-1	121.57	121.57
04/30/19 20:00	11 MEFF 1											291	22.4	11 MEFF 1	2-1	2-1	124.63	124.63
04/30/19 20:00	12 MEFF 2											195	35.9	12 MEFF 2	2-1	2-1	124.63	124.63

Date and Time	Source	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH	Temp (C)	Alk (mg/L as CaCO3)	ORP	DO	ATP (pg/gr)	GF ID (JS #)	GF Mn(t) (ppb)	M1 Trial	M2 Trial	M1 Run Time (hrs)	M2 Run Time (hrs)
05/01/19 00:00	11 MEFF 1											014	23	11 MEFF 1	2-1	2-1	128.63	128.63
05/01/19 00:00	12 MEFF 2											212	31.4	12 MEFF 2	2-1	2-1	128.63	128.63
05/01/19 04:00	11 MEFF 1			0.022											2-1	2-1	132.63	132.63
05/01/19 04:00	12 MEFF 2			0.047											2-1	2-1	132.63	132.63
05/01/19 08:00	11 MEFF 1											129	19.3	11 MEFF 1	2-1	2-1	136.63	136.63
05/01/19 08:00	12 MEFF 2											196	31.1	12 MEFF 2	2-1	2-1	136.63	136.63
05/01/19 12:00	11 MEFF 1											001	30.8	11 MEFF 1	2-1	2-1	140.63	140.63
05/01/19 12:00	12 MEFF 2											124	28.9	12 MEFF 2	2-1	2-1	140.63	140.63
05/01/19 14:32	01 RAW	0.04	0.01	0.691	0.689										2-1	2-1	143.17	143.17
05/01/19 14:32	02 MPOKA		0.02		0.664										2-1	2-1	143.17	143.17
05/01/19 14:32	11 MEFF 1	0.00		0.006								283	16.1	11 MEFF 1	2-1	2-1	143.17	143.17
05/01/19 14:32	12 MEFF 2	0.00		0.030								159	30	12 MEFF 2	2-1	2-1	143.17	143.17
05/01/19 16:00	11 MEFF 1			0.018											2-1	2-1	144.63	144.63
05/01/19 16:00	12 MEFF 2			0.031											2-1	2-1	144.63	144.63
05/01/19 20:00	11 MEFF 1											015	15.9	11 MEFF 1	2-1	2-1	148.63	148.63
05/01/19 20:00	12 MEFF 2											249	27.4	12 MEFF 2	2-1	2-1	148.63	148.63
05/02/19 00:00	11 MEFF 1											264	8.8	11 MEFF 1	2-1	2-1	152.63	152.63
05/02/19 00:00	12 MEFF 2											113	22.9	12 MEFF 2	2-1	2-1	152.63	152.63
05/02/19 04:00	11 MEFF 1			0.033											2-1	2-1	156.63	156.63
05/02/19 04:00	12 MEFF 2			0.017											2-1	2-1	156.63	156.63
05/02/19 08:00	11 MEFF 1											104	13.6	11 MEFF 1	2-1	2-1	160.63	160.63
05/02/19 08:00	12 MEFF 2											008	16	12 MEFF 2	2-1	2-1	160.63	160.63
05/02/19 10:45	01 RAW	0.06	0.05	0.736	0.737										2-1	2-1	163.38	163.38
05/02/19 10:45	02 MPOKA		0.06		0.690										2-1	2-1	163.38	163.38
05/02/19 10:45	11 MEFF 1	0.04		0.027								115	11.2	11 MEFF 1	2-1	2-1	163.38	163.38
05/02/19 10:45	12 MEFF 2	0.03		0.032								071	12.3	12 MEFF 2	2-1	2-1	163.38	163.38
05/02/19 12:10	KOH V = 49.0 L, Q = 70.3 ml/hr, D = 1/3														2-1	2-1	164.80	164.80
05/02/19 16:00	11 MEFF 1			0.019								092	40	11 MEFF 1	2-1	2-1	168.63	168.63
05/02/19 16:00	12 MEFF 2			0.017								189	25.3	12 MEFF 2	2-1	2-1	168.63	168.63
05/02/19 20:00	11 MEFF 1											072	13.5	11 MEFF 1	2-1	2-1	172.63	172.63
05/02/19 20:00	12 MEFF 2											188	11.4	12 MEFF 2	2-1	2-1	172.63	172.63
05/03/19 00:00	11 MEFF 1			0.016								099	27.7	11 MEFF 1	2-1	2-1	176.63	176.63
05/03/19 00:00	12 MEFF 2			0.038								174	18.4	12 MEFF 2	2-1	2-1	176.63	176.63
05/03/19 04:00	11 MEFF 1											182	11.1	11 MEFF 1	2-1	2-1	180.63	180.63
05/03/19 04:00	12 MEFF 2											058	14.7	12 MEFF 2	2-1	2-1	180.63	180.63
05/03/19 08:00	11 MEFF 1			0.035								106	16.3	11 MEFF 1	2-1	2-1	184.63	184.63
05/03/19 08:00	12 MEFF 2			0.068								256	11.2	12 MEFF 2	2-1	2-1	184.63	184.63
05/03/19 12:00	11 MEFF 1											047	30.3	11 MEFF 1	2-1	2-1	188.63	188.63
05/03/19 12:00	12 MEFF 2											149	13	12 MEFF 2	2-1	2-1	188.63	188.63
05/03/19 13:23	01 RAW	0.03	0.00	0.679	0.653										2-1	2-1	190.02	190.02
05/03/19 13:23	02 MPOKA		0.01		0.681										2-1	2-1	190.02	190.02
05/03/19 13:23	11 MEFF 1	0.00		0.033								262	7.6	11 MEFF 1	2-1	2-1	190.02	190.02
05/03/19 13:23	12 MEFF 2	0.04		0.026								266	6.6	12 MEFF 2	2-1	2-1	190.02	190.02
05/03/19 13:36	KOH V = 47.0, Q = 71.9 ml/hr, D = 1/3														2-1	2-1	190.23	190.23
05/03/19 16:00	11 MEFF 1			0.067											2-1	2-1	192.63	192.63
05/03/19 16:00	12 MEFF 2			0.025											2-1	2-1	192.63	192.63
05/03/19 20:00	11 MEFF 1											275	8.8	11 MEFF 1	2-1	2-1	196.63	196.63
05/03/19 20:00	12 MEFF 2											263	4.3	12 MEFF 2	2-1	2-1	196.63	196.63
05/04/19 00:00	11 MEFF 1											016	9.6	11 MEFF 1	2-1	2-1	200.63	200.63
05/04/19 00:00	12 MEFF 2											197	7.1	12 MEFF 2	2-1	2-1	200.63	200.63
05/04/19 04:00	11 MEFF 1			0.021											2-1	2-1	204.63	204.63
05/04/19 04:00	12 MEFF 2			0.020											2-1	2-1	204.63	204.63
05/04/19 08:00	11 MEFF 1											248	8	11 MEFF 1	2-1	2-1	208.63	208.63
05/04/19 08:00	12 MEFF 2											038	6.4	12 MEFF 2	2-1	2-1	208.63	208.63
05/04/19 12:00	11 MEFF 1											002	9.7	11 MEFF 1	2-1	2-1	212.63	212.63
05/04/19 12:00	12 MEFF 2											052	5.7	12 MEFF 2	2-1	2-1	212.63	212.63
05/04/19 16:00	11 MEFF 1			0.023											2-1	2-1	216.63	216.63
05/04/19 16:00	12 MEFF 2			0.019											2-1	2-1	216.63	216.63
05/04/19 20:00	11 MEFF 1											017	17	11 MEFF 1	2-1	2-1	220.63	220.63
05/04/19 20:00	12 MEFF 2											086	11.4	12 MEFF 2	2-1	2-1	220.63	220.63
05/05/19 00:00	11 MEFF 1											153	8.8	11 MEFF 1	2-1	2-1	224.63	224.63
05/05/19 00:00	12 MEFF 2											274	2.7	12 MEFF 2	2-1	2-1	224.63	224.63
05/05/19 04:00	11 MEFF 1			0.016											2-1	2-1	228.63	228.63
05/05/19 04:00	12 MEFF 2			0.000											2-1	2-1	228.63	228.63
05/05/19 08:00	11 MEFF 1											074	10.4	11 MEFF 1	2-1	2-1	232.63	232.63
05/05/19 08:00	12 MEFF 2											213	5.4	12 MEFF 2	2-1	2-1	232.63	232.63
05/05/19 12:00	11 MEFF 1											276	13.1	11 MEFF 1	2-1	2-1	236.63	236.63
05/05/19 12:00	12 MEFF 2											281	6.1	12 MEFF 2	2-1	2-1	236.63	236.63
05/05/19 16:00	11 MEFF 1			0.010											2-1	2-1	240.63	240.63
05/05/19 16:00	12 MEFF 2			0.042											2-1	2-1	240.63	240.63
05/05/19 20:00	11 MEFF 1											272	4.7	11 MEFF 1	2-1	2-1	244.63	244.63
05/05/19 20:00	12 MEFF 2											222	3.9	12 MEFF 2	2-1	2-1	244.63	244.63
05/06/19 00:00	11 MEFF 1											162	7	11 MEFF 1	2-1	2-1	248.63	248.63
05/06/19 00:00	12 MEFF 2											100	5.6	12 MEFF 2	2-1	2-1	248.63	248.63
05/06/19 04:00	11 MEFF 1			0.024											2-1	2-1	252.63	252.63
05/06/19 04:00	12 MEFF 2			0.000											2-1	2-1	252.63	252.63
05/06/19 08:00	11 MEFF 1											155	5.3	11 MEFF 1	2-1	2-1	256.63	256.63
05/06/19 08:00	12 MEFF 2											273	2.55	12 MEFF 2	2-1	2-1	256.63	256.63
05/06/19 12:00	PLC went down for a bit. Not sure how long														2-1	2-1	260.63	260.63
05/06/19 12:00	KOH V = 41.5 L, Q = 71.9 ml/hr														2-1	2-1	260.63	260.63
05/06/19 10:35	01 RAW	0.09	0.05	0.745	0.745										2-1	2-1	259.22	259.22
05/06/19 10:35	02 MPOKA		0.08		0.720										2-1	2-1	259.22	259.22
05/06/19 10:35	11 MEFF 1	0.07		0.042								198	5.4	11 MEFF 1	2-1	2-1	259.22	259.22
05/06/19 10:35	12 MEFF 2	0.02		0.020								065	3.4	12 MEFF 2	2-1	2-1	259.22	259.22
05/06/19 11:32	Added 9.0 L (1/3) KOH, new V = 50.0 L (1/3)														2-1	2-1	260.17	260.17
05/06/19 12:00	11 MEFF 1			0.010											2-1	2-1	260.63	260.63
05/06/19 12:00	12 MEFF 2			0.021											2-1	2-1	260.63	260.63
05/06/19 16:00	11 MEFF 1											293	2.55	11 MEFF 1	2-1	2-1	264.63	264.63
05/06/19 16:00	12 MEFF 2											246	2.55	12 MEFF 2	2-1	2-1	264.63	264.63
05/06/19 20:00	11 MEFF 1			0.031											2-1	2-1	268.63	268.63
05/06/19 20:00	12 MEFF 2			0.004											2-1	2-1	268.63	268.63
05/07/19 00:00	11 MEFF 1											156	3.3	11 MEFF 1	2-1	2-1	272.63	272.63
05/07/19 00:00	12 MEFF 2											163	2.8	12 MEFF 2	2-1	2-1	272.63	272.63
05/07/19 04:00	11 MEFF 1			0.008											2-1	2-1	276.63	276.63
05/07/19 04:00	12 MEFF 2			0.011											2-1	2-1	276.63	276.63
05/07/19 08:00	11 MEFF 1											254	9.5	11 MEFF 1	2-1	2-1	280.63	280.63
05/07/19 08:00	12 MEFF 2											157	2.7	12 MEFF 2	2-1	2-1	280.63	280.63
05/07/19 12:00	11 MEFF 1			0.009											2-1	2-1	284.63	284.63
05/07/19 12:00	12 MEFF 2			0.005											2-1	2-1	284.63	284.63
05/07/19 16:00	11 MEFF 1											270	15.9	11 MEFF 1	2-1	2-1	288.63	288.63
05/07/19 16:00	12 MEFF 2											252	7	12 MEFF 2	2-1	2-1	288.63	288.63
05/07/19 20:00	11 MEFF 1			0.014											2-1	2-1	292.63	292.63
05/07/19 20:00	12 MEFF 2			0.049											2-1	2-1	292.63	292.63
05/08/19 00:00	11 MEFF 1											271	4.3	11 MEFF 1	2-1	2-1	296.63	296.63
05/08/19 00:00	12 MEFF 2											158	2.6	12 MEFF 2	2-1	2-1	296.63	296.63
05/08/19 04:00	11 MEFF 1			0.014											2-1	2-1	300.63	300.63
05/08/19 04:00	12 MEFF 2			0.025											2-1	2-1	300.63	300.63
05/08/19 08:00	11 MEFF 1											152	8.2	11 MEFF 1	2-1	2-1	304.63	304.63
05/08/19 08:00	12 MEFF 2											253	7.9	12 MEFF 2	2-1	2-1	304.63	304.63
05/08/19 12:00	11 MEFF 1			0.014											2-1	2-1	308.63	308.63
05/08/19 12:00	12 MEFF 2			0.016											2-1	2-1	308.63	308.63
05/08/19 16:00	11 MEFF 1											164	2.55	11 MEFF 1	2-1	2-1	312.63	312.63
05/08/19 16:00	12 MEFF 2											277	4.2	12 MEFF 2	2-1	2-1	312.63	312.63
05/08/19 20:00	11 MEFF 1			0.023											2-1	2-1	316.63	316.63

Date and Time	Source	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH	Temp (C)	Alk (mg/L as CaCO3)	ORP	DO	ATP (pg/gr)	GF ID (JS #)	GF Mn(t) (ppb)		M1 Trial	M2 Trial	M1 Run Time (hrs)	M2 Run Time (hrs)
05/08/19 20:00	12 MEFF 2			0.031											2-1	2-1	316.63	316.63
05/09/19 00:00	11 MEFF 1											211	3.4	11 MEFF 1,	2-1	2-1	320.63	320.63
05/09/19 00:00	12 MEFF 2											298	7.2	12 MEFF 2,	2-1	2-1	320.63	320.63
05/09/19 04:00	11 MEFF 1			0.011											2-1	2-1	324.63	324.63
05/09/19 04:00	12 MEFF 2			0.020											2-1	2-1	324.63	324.63
05/09/19 08:00	11 MEFF 1											255	2.55	11 MEFF 1,	2-1	2-1	328.63	328.63
05/09/19 08:00	12 MEFF 2											261	3.1	12 MEFF 2,	2-1	2-1	328.63	328.63
05/09/19 08:30	KOH V = 43.8 L Q = 73.4 ml/hr														2-1	2-1	329.13	329.13
05/09/19 08:40	01 RAW	0.03	0.00	1.000	0.974										2-1	2-1	329.30	329.30
05/09/19 08:40	02 MPOKA	0.00		0.776											2-1	2-1	329.30	329.30
05/09/19 08:40	11 MEFF 1	0.00		0.004											2-1	2-1	329.30	329.30
05/09/19 08:40	12 MEFF 2	0.00		0.019											2-1	2-1	329.30	329.30
05/09/19 09:00	Collected Sample Event A														2-1	2-1	329.63	329.63
05/09/19 09:38	KOH V = 43.7 L Q = 75.0 ml/hr														2-1	2-1	330.27	330.27
05/09/19 16:00	11 MEFF 1			0.025											2-1	2-1	336.63	336.63
05/09/19 16:00	12 MEFF 2			0.016											2-1	2-1	336.63	336.63
05/10/19 12:00	11 MEFF 1			0.018											2-1	2-1	356.63	356.63
05/10/19 12:00	12 MEFF 2			0.024											2-1	2-1	356.63	356.63
05/10/19 08:00	11 MEFF 1			0.025											2-1	2-1	352.63	352.63
05/10/19 09:38	12 MEFF 2			0.020											2-1	2-1	354.27	354.27
05/10/19 10:05	01 RAW	0.04	0.02	0.655	0.785										2-1	2-1	354.72	354.72
05/09/19 10:05	02 MPOKA	0.02	0.02	0.699	0.650										2-1	2-1	330.72	330.72
05/10/19 10:05	11 MEFF 1	0.00		0.022											2-1	2-1	354.72	354.72
05/10/19 10:05	12 MEFF 2	0.01		0.023											2-1	2-1	354.72	354.72
05/10/19 11:00	KOH V = 41.5 L														2-1	2-1	355.63	355.63
05/10/19 11:44	Shutdown Filters M1 for BW = 25L														2-1	2-1	356.37	356.37
05/10/19 11:55	Restarted M1 @ 10 gpm/sf and Shutdown M2 for BW = 25L														3-1	2-1	0.00	356.55
05/10/19 12:05	Restarted M2 @ 15 gpm/sf														3-1	3-1	0.17	0.00
05/10/19 12:30	Reduce MPOKA pH Setpoint from 8.5 to 8.3														3-1	3-1	0.58	0.42
05/10/19 16:00	11 MEFF 1			0.038											3-1	3-1	4.08	3.92
05/10/19 16:00	12 MEFF 2			0.052											3-1	3-1	4.08	3.92
05/10/19 16:00	11 MEFF 1			0.166								I		11 MEFF 1,	3-1	3-1	4.08	3.92
05/10/19 16:00	12 MEFF 2			0.206											3-1	3-1	4.08	3.92
05/11/19 00:00	11 MEFF 1			0.138											3-1	3-1	12.08	11.92
05/11/19 00:00	12 MEFF 2			0.177											3-1	3-1	12.08	11.92
05/11/19 08:00	11 MEFF 1			0.144											3-1	3-1	20.08	19.92
05/11/19 08:00	12 MEFF 2			0.231											3-1	3-1	20.08	19.92
05/11/19 16:00	11 MEFF 1			0.135											3-1	3-1	28.08	27.92
05/11/19 16:00	12 MEFF 2			0.230											3-1	3-1	28.08	27.92
05/11/19 16:00	31 CBW M1	20.00		353.000											3-1	3-1	28.08	27.92
05/11/19 16:00	32 CBW M2	20.00		562.000											3-1	3-1	28.08	27.92
05/11/19 16:00	41 SSN M1	0.12		0.085											3-1	3-1	28.08	27.92
05/11/19 16:00	42 SSN M2	0.13		0.094											3-1	3-1	28.08	27.92
05/12/19 08:00	11 MEFF 1			0.197											3-1	3-1	44.08	43.92
05/12/19 08:00	12 MEFF 2			0.264											3-1	3-1	44.08	43.92
05/12/19 16:00	11 MEFF 1			0.159											3-1	3-1	52.08	51.92
05/12/19 16:00	12 MEFF 2			0.252											3-1	3-1	52.08	51.92
05/13/19 00:00	11 MEFF 1			0.137											3-1	3-1	60.08	59.92
05/13/19 00:00	12 MEFF 2			0.210											3-1	3-1	60.08	59.92
05/13/19 08:00	11 MEFF 1			0.190											3-1	3-1	68.08	67.92
05/13/19 08:00	12 MEFF 2			0.227											3-1	3-1	68.08	67.92
05/13/19 08:00	Collect SSN samples from M1/M2/GSP - A+C CBW Samples.														3-1	3-1	68.08	67.92
05/13/19 08:00	Fill Lab Bottles and complete Field Analyses														3-1	3-1	68.08	67.92
05/13/19 10:10	KOH (1/3) V = 26 L														3-1	3-1	70.25	70.08
05/13/19 10:30	01 RAW			0.898											3-1	3-1	70.58	70.42
05/13/19 10:30	02 MPOKA			0.823											3-1	3-1	70.58	70.42
05/13/19 10:30	11 MEFF 1			0.119											3-1	3-1	70.58	70.42
05/13/19 10:30	12 MEFF 2			0.203											3-1	3-1	70.58	70.42
05/13/19 12:00	11 MEFF 1			0.073											3-1	3-1	72.08	71.92
05/13/19 12:00	12 MEFF 2			0.123											3-1	3-1	72.08	71.92
05/13/19 20:00	11 MEFF 1			0.078											3-1	3-1	80.08	79.92
05/13/19 20:00	12 MEFF 2			0.114											3-1	3-1	80.08	79.92
05/14/19 04:00	11 MEFF 1			0.079											3-1	3-1	88.08	87.92
05/14/19 04:00	12 MEFF 2			0.111											3-1	3-1	88.08	87.92
05/14/19 12:00	11 MEFF 1			0.081											3-1	3-1	96.08	95.92
05/14/19 12:00	12 MEFF 2			0.120											3-1	3-1	96.08	95.92
05/14/19 20:00	11 MEFF 1			0.058											3-1	3-1	104.08	103.92
05/14/19 20:00	12 MEFF 2			0.109											3-1	3-1	104.08	103.92
05/15/19 04:00	11 MEFF 1			0.061											3-1	3-1	112.08	111.92
05/15/19 04:00	12 MEFF 2			0.101											3-1	3-1	112.08	111.92
05/15/19 12:00	11 MEFF 1			0.061											3-1	3-1	120.08	119.92
05/15/19 12:00	12 MEFF 2			0.124											3-1	3-1	120.08	119.92
05/15/19 17:45	KOH V = 11.0 L														3-1	3-1	125.83	125.67
05/15/19 17:45	Add KOH, new V = 31.0 L														3-1	3-1	125.83	125.67
05/15/19 20:00	11 MEFF 1			0.065											3-1	3-1	128.08	127.92
05/15/19 20:00	12 MEFF 2			0.128											3-1	3-1	128.08	127.92
05/16/19 04:00	11 MEFF 1			0.060											3-1	3-1	136.08	135.92
05/16/19 04:00	12 MEFF 2			0.112											3-1	3-1	136.08	135.92
05/16/19 10:10	KOH V = 27.5														3-1	3-1	142.25	142.08
05/16/19 10:10	Add KOH, new V = 47.5 L														3-1	3-1	142.25	142.08
05/16/19 10:15	01 RAW	0.05	0.04	0.901	0.927										3-1	3-1	142.33	142.17
05/16/19 10:15	02 MPOKA	0.05	0.04	0.901	0.872										3-1	3-1	142.33	142.17
05/16/19 10:15	11 MEFF 1	0.03		0.063											3-1	3-1	142.33	142.17
05/16/19 10:15	12 MEFF 2	0.03		0.118											3-1	3-1	142.33	142.17
05/16/19 11:20	M1 DP = 10; M2 DP = 15 psi. Put KOH in manual														3-1	3-1	143.42	143.25
05/16/19 11:23	Shutdown M1 for BW. V = 30 L														3-1	3-1	143.47	143.30
05/16/19 11:30	Shutdown M2 for BW. Restarted m!. V = 30 L														3-1	3-1	143.58	143.42
05/16/19 11:37	Restart Filter M2. Put KOH in auto. Adjust flows														3-1	3-1	143.70	143.53
05/16/19 12:00	11 MEFF 1			0.024											3-1	3-1	144.08	143.92
05/16/19 12:00	12 MEFF 2			0.032											3-1	3-1	144.08	143.92
05/16/19 20:00	11 MEFF 1			0.044											3-1	3-1	152.08	151.92
05/16/19 20:00	12 MEFF 2			0.072											3-1	3-1	152.08	151.92
05/17/19 04:00	11 MEFF 1			0.054											3-1	3-1	160.08	159.92
05/17/19 04:00	12 MEFF 2			0.070											3-1	3-1	160.08	159.92
05/17/19 12:00	11 MEFF 1			0.051											3-1	3-1	168.08	167.92
05/17/19 12:00	12 MEFF 2			0.098											3-1	3-1	168.08	167.92
05/17/19 20:00	11 MEFF 1			0.056											3-1	3-1	176.08	175.92
05/17/19 20:00	12 MEFF 2			0.118											3-1	3-1	176.08	175.92
05/18/19 04:00	11 MEFF 1			0.051											3-1	3-1	184.08	183.92
05/18/19 04:00	12 MEFF 2			0.079											3-1	3-1	184.08	183.92
05/18/19 12:00	11 MEFF 1			0.045											3-1	3-1	192.08	191.92
05/18/19 12:00	12 MEFF 2			0.067											3-1	3-1	192.08	191.92
05/18/19 20:00	11 MEFF 1			0.048											3-1	3-1	200.08	199.92
05/18/19 20:00	12 MEFF 2			0.088											3-1	3-1	200.08	199.92
05/19/19 04:00	11 MEFF 1			0.030											3-1	3-1	208.08	207.92
05/19/19 04:00	12 MEFF 2			0.050											3-1	3-1	208.08	207.92
05/19/19 12:00	11 MEFF 1			0.046											3-1	3-1	216.08	215.92
05/19/19 12:00	12 MEFF 2			0.097											3-1	3-1	216.08	215.92
05/16/19 11:30	31 CBW M1	2.46		338.000											3-1	3-1	143.58	143.42
05/16/19 11:30	32 CBW M2	3.04		412.000											3-1	3-1	143.58	143.42
05/16/19 11:30	Settled Volume M1 = 18 mL and M2 = 20 mL														3-1	3-1	143.58	143.42
05/19/19 20:00	11 MEFF 1			0.039											3-1	3-1	224.08	223.92
05/19/19 20:00	12 MEFF 2			0.092											3-1	3-1	224.08	223.92
05/20/19 04:00	11 MEFF 1			0.055											3-1	3-1	232.08	231.92

Date and Time	Source	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH	Temp (C)	Alk (mg/L as CaCO3)	ORP	DO	ATP (pg/gr)	GF ID (JS #)	GF Mn(t) (ppb)		M1 Trial	M2 Trial	M1 Run Time (hrs)	M2 Run Time (hrs)
05/20/19 04:00	12 MEFF 2			0.089											3-1	3-1	232.08	231.92
05/20/19 10:50	KOH V = 32.0 L Q = 186 ml/hr														3-1	3-1	238.92	238.75
05/20/19 10:55	01 RAW			0.944	0.943										3-1	3-1	239.00	238.83
05/20/19 10:55	02 MPOKA			0.911	0.881										3-1	3-1	239.00	238.83
05/20/19 10:55	11 MEFF 1			0.048								502		11 MEFF 1	3-1	3-1	239.00	238.83
05/20/19 10:55	12 MEFF 2			0.091								512		12 MEFF 2	3-1	3-1	239.00	238.83
05/20/19 12:10	Add KOH new V = 43 L														3-1	3-1	240.25	240.08
05/20/19 12:14	Shutdown M2 for BW. V = 40 L														3-1	3-1	240.32	240.15
05/20/19 12:21	Place M2 in service @ 15 gpm/sf														3-1	3-1	240.43	240.27
05/20/19 20:00	11 MEFF 1			0.026											3-1	3-1	248.08	247.92
05/20/19 20:00	12 MEFF 2			0.055											3-1	3-1	248.08	247.92
05/21/19 04:00	11 MEFF 1			0.033											3-1	3-1	256.08	255.92
05/21/19 04:00	12 MEFF 2			0.057											3-1	3-1	256.08	255.92
05/21/19 12:00	11 MEFF 1			0.030											3-1	3-1	264.08	263.92
05/21/19 12:00	12 MEFF 2			0.065											3-1	3-1	264.08	263.92
05/21/19 20:00	11 MEFF 1			0.034											3-1	3-1	272.08	271.92
05/21/19 20:00	12 MEFF 2			0.109											3-1	3-1	272.08	271.92
05/22/19 04:00	11 MEFF 1			0.035											3-1	3-1	280.08	279.92
05/22/19 04:00	12 MEFF 2			0.105											3-1	3-1	280.08	279.92
05/22/19 12:00	11 MEFF 1			0.043											3-1	3-1	288.08	287.92
05/22/19 12:00	12 MEFF 2			0.126											3-1	3-1	288.08	287.92
05/22/19 20:00	11 MEFF 1			0.041											3-1	3-1	296.08	295.92
05/22/19 20:00	12 MEFF 2			0.129											3-1	3-1	296.08	295.92
05/23/19 04:00	11 MEFF 1			0.047											3-1	3-1	304.08	303.92
05/23/19 04:00	12 MEFF 2			0.138											3-1	3-1	304.08	303.92
05/23/19 07:00	KOH V = 29 L. Q = 191 ml/hr														3-1	3-1	307.08	306.92
05/23/19 07:30	01 RAW	0.03	0.03	0.969	0.961										3-1	3-1	307.58	307.42
05/23/19 07:30	02 MPOKA		0.03		0.933										3-1	3-1	307.58	307.42
05/23/19 07:30	11 MEFF 1	0.02		0.051								733		11 MEFF 1	3-1	3-1	307.58	307.42
05/23/19 07:30	12 MEFF 2	0.00		0.163								524		12 MEFF 2	3-1	3-1	307.58	307.42
05/23/19 08:25	Add KOH new V = 44 L														3-1	3-1	308.50	308.33
05/23/19 08:35	Shutdown M1 for BW. V = 40 L														3-1	3-1	308.67	308.50
05/23/19 08:45	Restart M1 @ 10 gpm/sf. Shutdown M2 for BW. 40 L														3-1	3-1	308.83	308.67
05/23/19 08:54	Restart M2 @ 15 gpm/sf														3-1	3-1	308.98	308.82
05/23/19 08:54	Adjust flows. Check MPOKA. Fill Backwash tank														3-1	3-1	308.98	308.82
05/23/19 12:00	11 MEFF 1			0.031											3-1	3-1	312.08	311.92
05/23/19 12:00	12 MEFF 2			0.037											3-1	3-1	312.08	311.92
05/23/19 20:00	11 MEFF 1			0.041											3-1	3-1	320.08	319.92
05/23/19 20:00	12 MEFF 2			0.045											3-1	3-1	320.08	319.92
05/24/19 04:00	11 MEFF 1			0.049											3-1	3-1	328.08	327.92
05/24/19 04:00	12 MEFF 2			0.040											3-1	3-1	328.08	327.92
05/24/19 12:00	11 MEFF 1			0.041											3-1	3-1	336.08	335.92
05/24/19 12:00	12 MEFF 2			0.050											3-1	3-1	336.08	335.92
05/24/19 20:00	11 MEFF 1			0.044											3-1	3-1	344.08	343.92
05/24/19 20:00	12 MEFF 2			0.079											3-1	3-1	344.08	343.92
05/25/19 04:00	11 MEFF 1			0.055											3-1	3-1	352.08	351.92
05/25/19 04:00	12 MEFF 2			0.064											3-1	3-1	352.08	351.92
05/25/19 12:00	11 MEFF 1			0.046											3-1	3-1	360.08	359.92
05/25/19 12:00	12 MEFF 2			0.086											3-1	3-1	360.08	359.92
05/25/19 20:00	11 MEFF 1			0.056											3-1	3-1	368.08	367.92
05/25/19 20:00	12 MEFF 2			0.102											3-1	3-1	368.08	367.92
05/26/19 04:00	11 MEFF 1			0.080											3-1	3-1	376.08	375.92
05/26/19 04:00	12 MEFF 2			0.099											3-1	3-1	376.08	375.92
05/26/19 12:00	11 MEFF 1			0.076											3-1	3-1	384.08	383.92
05/26/19 12:00	12 MEFF 2			0.109											3-1	3-1	384.08	383.92
05/26/19 20:00	11 MEFF 1			0.049											3-1	3-1	392.08	391.92
05/26/19 20:00	12 MEFF 2			0.102											3-1	3-1	392.08	391.92
05/27/19 04:00	11 MEFF 1			0.057											3-1	3-1	400.08	399.92
05/27/19 04:00	12 MEFF 2			0.108											3-1	3-1	400.08	399.92
05/27/19 11:50	KOH V = 29.0 L, Q = 208 ml/hr														3-1	3-1	407.92	407.75
05/27/19 11:52	01 RAW	0.04	0.04	0.967	0.959										3-1	3-1	407.95	407.78
05/27/19 11:52	02 MPOKA		0.06		1.034										3-1	3-1	407.95	407.78
05/27/19 11:52	11 MEFF 1	0.01		0.041											3-1	3-1	407.95	407.78
05/27/19 11:52	12 MEFF 2	0.04		0.100											3-1	3-1	407.95	407.78
05/27/19 12:00	11 MEFF 1			0.067											3-1	3-1	408.08	407.92
05/27/19 12:00	12 MEFF 2			0.126											3-1	3-1	408.08	407.92
05/27/19 20:00	11 MEFF 1														3-1	3-1	416.08	415.92
05/27/19 20:00	12 MEFF 2			0.067											3-1	3-1	416.08	415.92
05/28/19 04:00	11 MEFF 1														3-1	3-1	424.08	423.92
05/28/19 04:00	12 MEFF 2			0.052											3-1	3-1	424.08	423.92
05/28/19 12:00	11 MEFF 1														3-1	3-1	432.08	431.92
05/28/19 12:00	12 MEFF 2			0.051											3-1	3-1	432.08	431.92
05/28/19 13:10	KOH V = 24.0 L, Q = 211 ml/hr														3-1	3-1	433.25	433.08
05/28/19 13:10	Add KOH new V = 44 L														3-1	3-1	433.25	433.08
05/28/19 13:10	M1 Sample Tubing Had Slipped from Bucket - Replaced														3-1	3-1	433.25	433.08
05/28/19 20:00	11 MEFF 1			0.043											3-1	3-1	440.08	439.92
05/28/19 20:00	12 MEFF 2			0.062											3-1	3-1	440.08	439.92
05/29/19 04:00	11 MEFF 1			0.060											3-1	3-1	448.08	447.92
05/29/19 04:00	12 MEFF 2			0.069											3-1	3-1	448.08	447.92
05/29/19 10:45	KOH V = 40.0 L, Q = 144 ml/hr														3-1	3-1	454.83	454.67
05/29/19 10:50	01 RAW	0.05	0.04	0.913	0.892										3-1	3-1	454.92	454.75
05/29/19 10:50	02 MPOKA	0.05	0.05	0.879	0.847										3-1	3-1	454.92	454.75
05/29/19 10:50	11 MEFF 1	0.02		0.054											3-1	3-1	454.92	454.75
05/29/19 10:50	12 MEFF 2	0.02		0.079											3-1	3-1	454.92	454.75
05/29/19 12:18	Shutdown M1 for BW. V = 40 L														3-1	3-1	456.38	456.22
05/29/19 12:28	Restart M1 @ 10 gpm/sf. Shutdown M2 for BW. 40 L														3-1	3-1	456.55	456.38
05/29/19 12:39	Restart M2 @ 15 gpm/sf														3-1	3-1	456.73	456.57
05/29/19 13:00	Add KOH new V = 50 L														3-1	3-1	457.08	456.92
05/30/19 04:00	11 MEFF 1			0.027											3-1	3-1	472.08	471.92
05/30/19 04:00	12 MEFF 2			0.019											3-1	3-1	472.08	471.92
05/30/19 20:00	11 MEFF 1			0.040											3-1	3-1	488.08	487.92
05/30/19 20:00	12 MEFF 2			0.030											3-1	3-1	488.08	487.92
05/31/19 12:00	11 MEFF 1			0.034											3-1	3-1	504.08	503.92
05/31/19 12:00	12 MEFF 2			0.121											3-1	3-1	504.08	503.92
06/01/19 04:00	11 MEFF 1			0.030											3-1	3-1	520.08	519.92
06/01/19 04:00	12 MEFF 2			0.192											3-1	3-1	520.08	519.92
06/01/19 20:00	11 MEFF 1			0.033											3-1	3-1	536.08	535.92
06/01/19 20:00	12 MEFF 2			0.050											3-1	3-1	536.08	535.92
06/02/19 12:00	11 MEFF 1			0.034											3-1	3-1	552.08	551.92
06/02/19 12:00	12 MEFF 2			0.050											3-1	3-1	552.08	551.92
06/03/19 04:00	11 MEFF 1			0.051											3-1	3-1	568.08	567.92
06/03/19 04:00	12 MEFF 2			0.056											3-1	3-1	568.08	567.92
06/03/19 12:45	KOH V = 25.0 L, Q = 205 ml/hr														3-1	3-1	576.83	576.67
06/03/19 12:45	Add KOH new V = 33 L														3-1	3-1	576.83	576.67
06/03/19 13:00	11 MEFF 1			0.028								238	30.8	11 MEFF 1	3-1	3-1	577.08	576.92
06/03/19 13:00	12 MEFF 2			0.068								740		12 MEFF 2	3-1	3-1	577.08	576.92
06/03/19 20:00	11 MEFF 1			0.038											3-1	3-1	584.08	583.92
06/03/19 20:00	12 MEFF 2			0.070											3-1	3-1	584.08	583.92
06/04/19 12:00	11 MEFF 1			0.049											3-1	3-1	600.08	599.92
06/04/19 12:00	12 MEFF 2			0.042											3-1	3-1	600.08	599.92
06/04/19 15:30	KOH V = 27.0 L, Q = 209 ml/hr														3-1	3-1	603.58	603.42
06/04/19 16:22	Shutdown M1 for BW. V = 40 L														3-1	3-1	604.45	604.28
06/04/19 16:32	Restart M1 @ 10 gpm/sf. Shutdown M2 for BW. 40 L														3-1	3-1	604.62	604.45
06/04/19 16:41	Restart M2 @ 15 gpm/sf														3-1	3-1	604.77	604.60

Date and Time	Source	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH	Temp (C)	Alk (mg/L as CaCO3)	ORP	DO	ATP (pg/gr)	GF ID (JS #)	GF Mn(t) (ppb)		M1 Trial	M2 Trial	M1 Run Time (hrs)	M2 Run Time (hrs)
06/04/19 17:12	Add KOH new V = 46 L														3-1	3-1	605.28	605.12
06/06/19 09:55	KOH V = 39 L Q = 169 ml/hr														3-1	3-1	646.00	645.83
06/06/19 10:00	01 RAW	0.06	0.05	0.840	0.837										3-1	3-1	646.08	645.92
06/06/19 10:00	02 MPOKA		0.06		0.800										3-1	3-1	646.08	645.92
06/06/19 10:00	11 MEFF 1	0.03		0.045											3-1	3-1	646.08	645.92
06/06/19 10:00	12 MEFF 2	0.02		0.120											3-1	3-1	646.08	645.92
06/06/19 10:20	Add KOH (1/3) New V = 53 L														3-1	3-1	646.42	646.25
06/06/19 12:00	11 MEFF 1			0.050											3-1	3-1	648.08	647.92
06/06/19 12:00	12 MEFF 2			0.044											3-1	3-1	648.08	647.92
06/07/19 04:00	11 MEFF 1			0.076											3-1	3-1	664.08	663.92
06/07/19 04:00	12 MEFF 2			0.101											3-1	3-1	664.08	663.92
06/07/19 20:00	11 MEFF 1			0.063											3-1	3-1	680.08	679.92
06/07/19 20:00	12 MEFF 2			0.089											3-1	3-1	680.08	679.92
06/08/19 12:00	11 MEFF 1			0.045											3-1	3-1	696.08	695.92
06/08/19 12:00	12 MEFF 2			0.080											3-1	3-1	696.08	695.92
06/09/19 04:00	11 MEFF 1			0.064											3-1	3-1	712.08	711.92
06/09/19 04:00	12 MEFF 2			0.132											3-1	3-1	712.08	711.92
06/09/19 20:00	11 MEFF 1			0.068											3-1	3-1	728.08	727.92
06/09/19 20:00	12 MEFF 2			0.125											3-1	3-1	728.08	727.92
06/10/19 07:15	KOH V = 34 L														3-1	3-1	739.33	739.17
06/10/19 07:30	01 RAW			0.806	0.812										3-1	3-1	739.58	739.42
06/10/19 07:30	02 MPOKA				0.740										3-1	3-1	739.58	739.42
06/10/19 07:30	11 MEFF 1			0.061											3-1	3-1	739.58	739.42
06/10/19 07:30	12 MEFF 2			0.128											3-1	3-1	739.58	739.42
06/10/19 08:25	Increase DO - Target > 9.0 mg/L														3-1	3-1	740.50	740.33
06/10/19 08:30	Calibrate pH probes. MPOKA m=54.1, M1 = fail, M2 = 47.4. M1 = x3 Fail. Replace w/ spare. M = 47.7														3-1	3-1	740.58	740.42
06/10/19 09:50	Gradually increased Rotometer air valve. No change in MPOKA DO. Bypassing OMRGA valve. Rotometer valve no responsive														3-1	3-1	741.92	741.75
06/10/19 09:56	Shutdown M1 for BW. V = 40 L														3-1	3-1	742.02	741.85
06/10/19 10:05	Place M1 in servce @ 10 gpm/sf. Shutdown M2 for BW V = 40 L														4-1	3-1	0.00	742.00
06/10/19 10:14	Place M2 in service @ 15 gpm/sf. Place pH in auto. Transfer BW to holding tank. Refill BW storage. Adjust DO to > 9.0 mg/L														4-1	4-1	0.15	0.00
06/10/19 12:00	12 MEFF 2			0.025											4-1	4-1	1.92	1.77
06/10/19 20:00	12 MEFF 2			0.034											4-1	4-1	9.92	9.77
06/11/19 04:00	12 MEFF 2			0.031											4-1	4-1	17.92	17.77
06/11/19 12:00	12 MEFF 2			0.031											4-1	4-1	25.92	25.77
06/11/19 20:00	12 MEFF 2			0.100											4-1	4-1	33.92	33.77
06/12/19 04:00	12 MEFF 2			0.082											4-1	4-1	41.92	41.77
06/12/19 12:00	12 MEFF 2			0.073											4-1	4-1	49.92	49.77
06/12/19 16:00	KOH V = 29 L. Q = 180 ml/hr. Add KOH, New V = 49 L. Air pocket developing above media in M1. MPOKA DO = 14.5 mg/L. Reduce air feed														4-1	4-1	53.92	53.77
06/12/19 16:01	11 MEFF 1			0.107											4-1	4-1	53.93	53.78
06/12/19 16:01	12 MEFF 2			0.093											4-1	4-1	53.93	53.78
06/12/19 16:01	Fix distributor arm jam M1 autosampler														4-1	4-1	53.93	53.78
06/12/19 20:00	11 MEFF 1			0.057											4-1	4-1	57.92	57.77
06/12/19 20:00	12 MEFF 2			0.103											4-1	4-1	57.92	57.77
06/13/19 04:00	11 MEFF 1			0.068											4-1	4-1	65.92	65.77
06/13/19 04:00	12 MEFF 2			0.121											4-1	4-1	65.92	65.77
06/13/19 06:30	11 MEFF 1			0.088											4-1	4-1	68.42	68.27
06/13/19 06:30	12 MEFF 2			0.163											4-1	4-1	68.42	68.27
06/13/19 12:00	11 MEFF 1			0.063											4-1	4-1	73.92	73.77
06/13/19 12:00	12 MEFF 2														4-1	4-1	73.92	73.77
06/13/19 20:00	11 MEFF 1			0.125											4-1	4-1	81.92	81.77
06/13/19 20:00	12 MEFF 2			0.078											4-1	4-1	81.92	81.77
06/14/19 04:00	11 MEFF 1			0.127											4-1	4-1	89.92	89.77
06/14/19 04:00	12 MEFF 2			0.075											4-1	4-1	89.92	89.77
06/14/19 06:18	Loss of flow to pilot			0.155											4-1	4-1	92.22	92.07
06/14/19 08:14	Pilot flow restarted														4-1	4-1	94.15	94.00
06/14/19 08:55	KOH V = 42 L														4-1	4-1	94.83	94.68
06/14/19 09:30	01 RAW			0.811	0.774										4-1	4-1	95.42	95.27
06/14/19 09:30	02 MPOKA			0.715	0.700										4-1	4-1	95.42	95.27
06/14/19 09:30	11 MEFF 1			0.041											4-1	4-1	95.42	95.27
06/14/19 09:30	12 MEFF 2			0.086											4-1	4-1	95.42	95.27
06/14/19 12:00	11 MEFF 1			0.062											4-1	4-1	97.92	97.77
06/14/19 12:00	12 MEFF 2			0.048											4-1	4-1	97.92	97.77
06/14/19 20:00	11 MEFF 1											311	36.4	11 MEFF 1	4-1	4-1	105.92	105.77
06/14/19 20:00	12 MEFF 2											239	24	12 MEFF 2	4-1	4-1	105.92	105.77
06/15/19 04:00	11 MEFF 1			0.044											4-1	4-1	113.92	113.77
06/15/19 04:00	12 MEFF 2			0.026											4-1	4-1	113.92	113.77
06/15/19 12:00	11 MEFF 1											525	14.5	11 MEFF 1	4-1	4-1	121.92	121.77
06/15/19 12:00	12 MEFF 2											521	20.3	12 MEFF 2	4-1	4-1	121.92	121.77
06/15/19 20:00	11 MEFF 1			0.026											4-1	4-1	129.92	129.77
06/15/19 20:00	12 MEFF 2			0.043											4-1	4-1	129.92	129.77
06/16/19 04:00	11 MEFF 1											702	21.4	11 MEFF 1	4-1	4-1	137.92	137.77
06/16/19 04:00	12 MEFF 2											735	21.2	12 MEFF 2	4-1	4-1	137.92	137.77
06/16/19 12:00	11 MEFF 1			0.028											4-1	4-1	145.92	145.77
06/16/19 12:00	12 MEFF 2			0.042											4-1	4-1	145.92	145.77
06/16/19 20:00	11 MEFF 1											748	40	11 MEFF 1	4-1	4-1	153.92	153.77
06/16/19 20:00	12 MEFF 2											712	9.4	12 MEFF 2	4-1	4-1	153.92	153.77
06/17/19 04:00	11 MEFF 1			0.023											4-1	4-1	161.92	161.77
06/17/19 04:00	12 MEFF 2			0.050											4-1	4-1	161.92	161.77
06/17/19 12:00	11 MEFF 1											216	23.8	11 MEFF 1	4-1	4-1	169.92	169.77
06/17/19 12:00	12 MEFF 2											522	17.9	12 MEFF 2	4-1	4-1	169.92	169.77
06/17/19 16:30	KOH V = 26 L														4-1	4-1	174.42	174.27
06/17/19 16:35	01 RAW			0.736	0.741										4-1	4-1	174.50	174.35
06/17/19 16:35	02 MPOKA				0.663										4-1	4-1	174.50	174.35
06/17/19 16:35	11 MEFF 1			0.026											4-1	4-1	174.50	174.35
06/17/19 16:35	12 MEFF 2			0.047											4-1	4-1	174.50	174.35
06/17/19 16:35	Lost flow to pilot - Storage tank empty - called Mike - Turned on well														4-1	4-1	174.50	174.35
06/17/19 16:54	Pilot flow restored														4-1	4-1	174.82	174.67
06/17/19 16:56	Shutdown M1 for BW V = 40 L														4-1	4-1	174.85	174.70
06/17/19 17:05	Restarted Filter M1 @ 10 gpm/sf. Shutdown M2 for BW V = 40 L														4-2	4-1	0.00	174.85
06/17/19 17:13	Restarted Filter M2 @ 15 gpm/sf. Put KOH into auto. Adjust flow														4-2	4-2	0.13	0.00
06/17/19 20:00	11 MEFF 1			0.016											4-2	4-2	2.92	2.78
06/17/19 20:00	12 MEFF 2			0.041											4-2	4-2	2.92	2.78
06/18/19 04:00	11 MEFF 1											506	8.4	11 MEFF 1	4-2	4-2	10.92	10.78
06/18/19 04:00	12 MEFF 2											749	22.1	12 MEFF 2	4-2	4-2	10.92	10.78
06/18/19 12:00	11 MEFF 1			0.017											4-2	4-2	18.92	18.78
06/18/19 12:00	12 MEFF 2			0.099											4-2	4-2	18.92	18.78
06/18/19 20:00	11 MEFF 1											514		11 MEFF 1	4-2	4-2	26.92	26.78
06/18/19 20:00	12 MEFF 2											736		12 MEFF 2	4-2	4-2	26.92	26.78
06/19/19 04:00	11 MEFF 1			0.021											4-2	4-2	34.92	34.78
06/19/19 04:00	12 MEFF 2			0.108											4-2	4-2	34.92	34.78
06/19/19 12:00	11 MEFF 1											538		11 MEFF 1	4-2	4-2	42.92	42.78
06/19/19 12:00	12 MEFF 2											504		12 MEFF 2	4-2	4-2	42.92	42.78
06/19/19 15:25	KOH Q = 188 ml/hr V = 37.0 L														4-2	4-2	46.33	46.20
06/19/19 15:30	01 RAW	0.20	0.05	0.824	0.743										4-2	4-2	46.42	46.28
06/19/19 15:30	02 MPOKA		0.05		0.718										4-2	4-2	46.42	46.28
06/19/19 15:30	11 MEFF 1	0.10		0.031											4-2	4-2	46.42	46.28
06/19/19 15:30	12 MEFF 2	0.07		0.087											4-2	4-2	46.42	46.28
06/19/19 16:30	KOH Q = 188 ml/hr V = 36.8 L														4-2	4-2	47.42	47.28
06/19/19 20:00	11 MEFF 1			0.008								327	21.3	11 MEFF 1	4-2	4-2	50.92	50.78
06/19/19 20:00	12 MEFF 2			0.038											4-2	4-2	50.92	50.78
06/20/19 04:00	11 MEFF 1			0.013								508	11.8	11 MEFF 1	4-2	4-2	58.92	58.78
06/20/19 04:00	12 MEFF 2			0.055											4-2	4-2	58.92	58.78
06/20/19 12:00	11 MEFF 1			0.015								532	37.1	11 MEFF 1	4-2	4-2	66.92	66.78
06/20/19 12:00	12 MEFF 2			0.029											4-2	4-2	66.92	66.78

Date and Time	Source	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH	Temp (C)	Alk (mg/L as CaCO3)	ORP	DO	ATP (pg/gr)	GF ID (JS #)	GF Mn(t) (ppb)		M1 Trial	M2 Trial	M1 Run Time (hrs)	M2 Run Time (hrs)
06/20/19 20:00	11 MEFF 1			0.033								541	18.5	11 MEFF 1	4-2	4-2	74.92	74.78
06/20/19 20:00	12 MEFF 2			0.040											4-2	4-2	74.92	74.78
06/21/19 04:00	11 MEFF 1			0.027								513	32.6	11 MEFF 1	4-2	4-2	82.92	82.78
06/21/19 04:00	12 MEFF 2			0.050											4-2	4-2	82.92	82.78
06/21/19 06:30	KOH Q = 219 ml/hr V = 27.5 L														4-2	4-2	85.42	85.28
06/21/19 06:35	01 RAW	0.07	0.05	0.757											4-2	4-2	85.50	85.37
06/21/19 06:35	02 MPOKA	0.08													4-2	4-2	85.50	85.37
06/21/19 06:35	11 MEFF 1	0.04		0.026								505	11.7	11 MEFF 1	4-2	4-2	85.50	85.37
06/21/19 06:35	12 MEFF 2	0.02		0.057								343		12 MEFF 2	4-2	4-2	85.50	85.37
06/21/19 06:50	Add KOH, New V = 45.5 L.														4-2	4-2	85.75	85.62
06/21/19 12:00	11 MEFF 1			0.018								746	2.55	11 MEFF 1	4-2	4-2	90.92	90.78
06/21/19 12:00	12 MEFF 2			0.057											4-2	4-2	90.92	90.78
06/21/19 20:00	11 MEFF 1			0.023								503	9.8	11 MEFF 1	4-2	4-2	98.92	98.78
06/21/19 20:00	12 MEFF 2			0.074											4-2	4-2	98.92	98.78
06/22/19 04:00	11 MEFF 1			0.033								542	8.8	11 MEFF 1	4-2	4-2	106.92	106.78
06/22/19 04:00	12 MEFF 2			0.056											4-2	4-2	106.92	106.78
06/22/19 12:00	11 MEFF 1			0.032								218	20	11 MEFF 1	4-2	4-2	114.92	114.78
06/22/19 12:00	12 MEFF 2			0.018											4-2	4-2	114.92	114.78
06/22/19 20:00	11 MEFF 1			0.028								747	33	11 MEFF 1	4-2	4-2	122.92	122.78
06/22/19 20:00	12 MEFF 2			0.035											4-2	4-2	122.92	122.78
06/23/19 04:00	11 MEFF 1			0.026								750	7	11 MEFF 1	4-2	4-2	130.92	130.78
06/23/19 04:00	12 MEFF 2			0.025											4-2	4-2	130.92	130.78
06/23/19 09:00	01 RAW	0.05	0.03	0.711	0.708										4-2	4-2	135.92	135.78
06/23/19 09:00	02 MPOKA		0.00		0.656										4-2	4-2	135.92	135.78
06/23/19 09:00	11 MEFF 1	0.00		0.011								701	17.6	11 MEFF 1	4-2	4-2	135.92	135.78
06/23/19 09:00	12 MEFF 2	0.00		0.045								547	31.2	12 MEFF 2	4-2	4-2	135.92	135.78
06/23/19 09:36	01 RAW														4-2	4-2	136.52	136.38
06/23/19 09:36	02 MPOKA														4-2	4-2	136.52	136.38
06/23/19 09:36	11 MEFF 1														4-2	4-2	136.52	136.38
06/23/19 09:36	12 MEFF 2														4-2	4-2	136.52	136.38
06/23/19 09:36	No battery for Handheld pH probe - set KOH pump to manual @ 200 ml/hhr														4-2	4-2	136.52	136.38
06/23/19 09:40	Calibrate Raw pH probe: m = 51.1														4-2	4-2	136.58	136.45
06/23/19 09:50	Calibrate Mpoka pH probe: m = 49.3														4-2	4-2	136.75	136.62
06/23/19 09:50	Calibrate M1 pH probe: m = 48.2														4-2	4-2	136.75	136.62
06/23/19 09:50	Calibrate M2 pH probe: m = 45.9														4-2	4-2	136.75	136.62
06/23/19 10:00	Make new ascorbic and label container														4-2	4-2	136.92	136.78
06/23/19 10:18	Backwash M2 V = 12 gallons														4-2	4-2	137.22	137.08
06/23/19 10:30	Restart M2														4-2		137.42	
06/23/19 10:33	Check M1 vs M2 DP														4-2		137.47	
06/23/19 10:33	Why DP M2 so high? Open filter and break up chunks on top 18"														4-2		137.47	
06/23/19 10:44	BW M1 V = 48 L														4-2		137.65	
06/23/19 10:53	Restart M1														4-3		0.00	
06/23/19 10:58	Backwash M2 again V = 7.2 gallons														4-3		0.08	
06/23/19 11:04	Restart. DP Okay														4-3	4-3	0.18	0.00
06/23/19 11:04	Adjust MPOKA ample line flows to bucket														4-3	4-3	0.18	0.00
06/23/19 11:46	Put KOH back in auto														4-3	4-3	0.88	0.70
06/23/19 11:50	Reduce Q for M2 to 2.5 gpm. Flow check M1 PV = 2.021, Actual = 2 gal/ 59.17 sec														4-3	4-3	0.95	0.77
06/23/19 12:00	Add 20 L KOH @ 1/3, 35 L -> 55 L w/ 6+14														4-3	4-3	1.12	0.93
06/23/19 12:00	11 MEFF 1			0.028								723	16.6	11 MEFF 1	4-3	4-3	1.12	0.93
06/23/19 12:00	12 MEFF 2			0.059											4-3	4-3	1.12	0.93
06/23/19 20:00	11 MEFF 1			0.049								531	16.1	11 MEFF 1	4-3	4-3	9.12	8.93
06/23/19 20:00	12 MEFF 2			0.077											4-3	4-3	9.12	8.93
06/24/19 04:00	11 MEFF 1			0.036								344	13.4	11 MEFF 1	4-3	4-3	17.12	16.93
06/24/19 04:00	12 MEFF 2			0.068											4-3	4-3	17.12	16.93
06/24/19 10:35	01 RAW	0.08	0.09	0.651	0.538										4-3	4-3	23.70	23.52
06/24/19 10:35	02 MPOKA		0.05		0.552										4-3	4-3	23.70	23.52
06/24/19 10:35	11 MEFF 1	0.04		0.024		6.69						303	17.3	11 MEFF 1	4-3	4-3	23.70	23.52
06/24/19 10:35	11 MEFF 1					7.07									4-3	4-3	23.70	23.52
06/24/19 10:35	11 MEFF 1					6.72									4-3	4-3	23.70	23.52
06/24/19 10:35	12 MEFF 2	0.04		0.081		6.59									4-3	4-3	23.70	23.52
06/24/19 10:35	12 MEFF 2					6.96									4-3	4-3	23.70	23.52
06/24/19 10:35	12 MEFF 2					6.76									4-3	4-3	23.70	23.52
06/24/19 10:55	Calibrate pH meters. Slopes: 465 = 91.9, 185 = 92.3, 376 = 92.3														4-3	4-3	24.03	23.85
06/24/19 12:00	11 MEFF 1			0.025								745	2.55	11 MEFF 1	4-3	4-3	25.12	24.93
06/24/19 12:00	12 MEFF 2			0.038											4-3	4-3	25.12	24.93
06/24/19 20:00	11 MEFF 1			0.024											4-3	4-3	33.12	32.93
06/24/19 20:00	12 MEFF 2			0.039											4-3	4-3	33.12	32.93
06/25/19 04:00	11 MEFF 1			0.022											4-3	4-3	41.12	40.93
06/25/19 04:00	12 MEFF 2			0.031											4-3	4-3	41.12	40.93
06/25/19 12:00	11 MEFF 1			0.023											4-3	4-3	49.12	48.93
06/25/19 12:00	12 MEFF 2			0.034											4-3	4-3	49.12	48.93
06/25/19 20:00	11 MEFF 1			0.024								520	11.1	11 MEFF 1	4-3	4-3	57.12	56.93
06/25/19 20:00	12 MEFF 2			0.051								709	18	12 MEFF 2	4-3	4-3	57.12	56.93
06/26/19 04:00	11 MEFF 1			0.010								209	29.1	11 MEFF 1	4-3	4-3	65.12	64.93
06/26/19 04:00	12 MEFF 2			0.052								706	21.1	12 MEFF 2	4-3	4-3	65.12	64.93
06/26/19 12:00	11 MEFF 1			0.034											4-3	4-3	73.12	72.93
06/26/19 12:00	12 MEFF 2			0.041								713	13	12 MEFF 2	4-3	4-3	73.12	72.93
06/26/19 20:00	11 MEFF 1			0.072											4-3	4-3	81.12	80.93
06/26/19 20:00	12 MEFF 2			0.046								529	15.2	12 MEFF 2	4-3	4-3	81.12	80.93
06/27/19 04:00	11 MEFF 1			0.029								534	13.6	11 MEFF 1	4-3	4-3	89.12	88.93
06/27/19 04:00	12 MEFF 2			0.045								517	14	12 MEFF 2	4-3	4-3	89.12	88.93
06/27/19 12:00	11 MEFF 1			0.038											4-3	4-3	97.12	96.93
06/27/19 12:00	12 MEFF 2			0.030								543	22.9	12 MEFF 2	4-3	4-3	97.12	96.93
06/27/19 20:00	11 MEFF 1			0.024											4-3	4-3	105.12	104.93
06/27/19 20:00	12 MEFF 2			0.080								537	17.5	12 MEFF 2	4-3	4-3	105.12	104.93
06/28/19 04:00	11 MEFF 1			0.025								550	9.9	11 MEFF 1	4-3	4-3	113.12	112.93
06/28/19 04:00	12 MEFF 2			0.064								734	28.5	12 MEFF 2	4-3	4-3	113.12	112.93
06/28/19 12:00	11 MEFF 1			0.015											4-3	4-3	121.12	120.93
06/28/19 12:00	12 MEFF 2			0.019								511	21.8	12 MEFF 2	4-3	4-3	121.12	120.93
06/28/19 12:45	01 RAW			0.615											4-3	4-3	121.87	121.68
06/28/19 12:45	02 MPOKA														4-3	4-3	121.87	121.68
06/28/19 12:45	11 MEFF 1			0.548								540	15	11 MEFF 1	4-3	4-3	121.87	121.68
06/28/19 12:45	12 MEFF 2			0.015								731	32	12 MEFF 2	4-3	4-3	121.87	121.68
06/28/19 12:47	Tank empty (pump off)			0.037											4-3	4-3	121.90	121.72
06/28/19 12:55	Shutdown M1 for BW. BW with receding air V = 46 L														4-3	4-3	122.03	121.85
06/28/19 13:05	Restart M1														4-4	4-3	0.00	122.02
06/28/19 13:52	KOH @ 27 L														4-4	4-3	0.78	122.80
06/28/19 14:10	Pump overheating														4-4	4-3	1.08	123.10
06/28/19 20:00	11 MEFF 1			0.032								288	7	11 MEFF 1	4-4	4-3	6.92	128.93
06/28/19 20:00	12 MEFF 2			0.030								290	6.8	12 MEFF 2	4-4	4-3	6.92	128.93
06/29/19 04:00	11 MEFF 1			0.040											4-4	4-3	14.92	136.93
06/29/19 04:00	12 MEFF 2			0.043											4-4	4-3	14.92	136.93
06/29/19 12:00	11 MEFF 1			0.041								467	9.8	11 MEFF 1	4-4	4-3	22.92	144.93
06/29/19 12:00	12 MEFF 2			0.037								463	10.4	12 MEFF 2	4-4	4-3	22.92	144.93
06/29/19 20:00	11 MEFF 1			0.047											4-4	4-3	30.92	152.93
06/29/19 20:00	12 MEFF 2			0.096											4-4	4-3	30.92	152.93
06/30/19 04:00	11 MEFF 1			0.048								243	13.8	11 MEFF 1	4-4	4-3	38.92	160.93
06/30/19 04:00	12 MEFF 2			0.055								294	15.6	12 MEFF 2	4-4	4-3	38.92	160.93
06/30/19 12:00	11 MEFF 1			0.048											4-4	4-3	46.92	168.93
06/30/19 12:00	12 MEFF 2			0.077											4-4	4-3	46.92	168.93
06/30/19 20:00	11 MEFF 1			0.054								160	16.7	11 MEFF 1	4-4	4-3	54.92	176.93
06/30/19 20:00	12 MEFF 2			0.060								844	19.8	12 MEFF 2	4-4	4-3	54.92	176.93
07/01/19 04:00	11 MEFF 1			0.031											4-4	4-3	62.92	184.93
07/01/19 04:00	12 MEFF 2			0.053											4-4	4-3	62.92	184.93

Date and Time	Source	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH	Temp (C)	Alk (mg/L as CaCO3)	ORP	DO	ATP (pg/gr)	GF ID (JS #)	GF Mn(t) (ppb)		M1 Trial	M2 Trial	M1 Run Time (hrs)	M2 Run Time (hrs)
07/01/19 12:00	11 MEFF 1			0.038								204	12	11 MEFF 1	4-4	4-3	70.92	192.93
07/01/19 12:00	12 MEFF 2			0.045								240	19.6	12 MEFF 2	4-4	4-3	70.92	192.93
07/01/19 20:00	11 MEFF 1			0.038											4-4	4-3	78.92	200.93
07/01/19 20:00	12 MEFF 2			0.046											4-4	4-3	78.92	200.93
07/02/19 04:00	11 MEFF 1			0.056											4-4	4-3	86.92	208.93
07/02/19 04:00	12 MEFF 2			0.044											4-4	4-3	86.92	208.93
07/02/19 08:00	01 RAW			0.593											4-4	4-3	90.92	212.93
07/02/19 08:00	11 MEFF 1			0.023								387	13.6	11 MEFF 1	4-4	4-3	90.92	212.93
07/02/19 08:00	12 MEFF 2			0.030								965	21.8	12 MEFF 2	4-4	4-3	90.92	212.93
07/02/19 08:00	STD 30			0.033								677	22.3	STD 30, Pg	4-4	4-3	90.92	212.93
07/02/19 08:00	Collect Sample event B - Note M1 + M2 samples were swapped. M1 from M2 and M2 from M1														4-4	4-3	90.92	212.93
07/02/19 09:30	KOH V = 37.5 L. Refill to 55 L														4-4	4-3	92.42	214.43
07/02/19 12:00	11 MEFF 1			0.011											4-4	4-3	94.92	216.93
07/02/19 12:00	12 MEFF 2			0.027								176	14.5	12 MEFF 2	4-4	4-3	94.92	216.93
07/02/19 20:00	11 MEFF 1			0.023											4-4	4-3	102.92	224.93
07/02/19 20:00	12 MEFF 2			0.028								953	10.7	12 MEFF 2	4-4	4-3	102.92	224.93
07/03/19 04:00	11 MEFF 1			0.013											4-4	4-3	110.92	232.93
07/03/19 04:00	12 MEFF 2			0.003								006	8	12 MEFF 2	4-4	4-3	110.92	232.93
07/03/19 12:00	11 MEFF 1			0.024											4-4	4-3	118.92	240.93
07/03/19 12:00	12 MEFF 2			0.012								185	11	12 MEFF 2	4-4	4-3	118.92	240.93
07/03/19 20:00	11 MEFF 1			0.028											4-4	4-3	126.92	248.93
07/03/19 20:00	12 MEFF 2			0.069								433	18.5	12 MEFF 2	4-4	4-3	126.92	248.93
07/04/19 04:00	11 MEFF 1			0.013											4-4	4-3	134.92	256.93
07/04/19 04:00	12 MEFF 2			0.025								479	5.4	12 MEFF 2	4-4	4-3	134.92	256.93
07/04/19 12:00	11 MEFF 1			0.038											4-4	4-3	142.92	264.93
07/04/19 12:00	12 MEFF 2			0.026								082	8.8	12 MEFF 2	4-4	4-3	142.92	264.93
07/04/19 20:00	11 MEFF 1			0.023											4-4	4-3	150.92	272.93
07/04/19 20:00	12 MEFF 2			0.025								961	8.5	12 MEFF 2	4-4	4-3	150.92	272.93
07/05/19 04:00	11 MEFF 1			0.019											4-4	4-3	158.92	280.93
07/05/19 04:00	12 MEFF 2			0.033								492	5.1	12 MEFF 2	4-4	4-3	158.92	280.93
07/05/19 12:00	11 MEFF 1			0.024											4-4	4-3	166.92	288.93
07/05/19 12:00	12 MEFF 2			0.019								845	17.4	12 MEFF 2	4-4	4-3	166.92	288.93
07/05/19 14:15	KOH V = 42.0 L														4-4	4-3	169.17	291.18
07/05/19 14:15	Decant and Reduce BW Solids														4-4	4-3	169.17	291.18
07/05/19 14:25	01 RAW	0.09	0.04	0.627	0.629										4-4	4-3	169.33	291.35
07/05/19 14:25	02 MPOKA	0.05	0.02	0.589	0.539										4-4	4-3	169.33	291.35
07/05/19 14:25	11 MEFF 1	0.02		0.018								094	3.7	11 MEFF 1	4-4	4-3	169.33	291.35
07/05/19 14:25	12 MEFF 2	0.01		0.019								096	13.1	12 MEFF 2	4-4	4-3	169.33	291.35
07/05/19 14:25	STD 30			0.039											4-4	4-3	169.33	291.35
07/05/19 14:27	Feed pump shutdown - Overheated. Removed rubber covering.														4-4	4-3	169.37	291.38
07/05/19 14:27	Setup plywood to shade pump														4-4	4-3	169.37	291.38
07/05/19 14:30	Pump Restarted														4-4	4-3	169.42	291.43
07/05/19 14:30	Trend indicates 4 shutdowns since noon. Zero from midnight - noon														4-4	4-3	169.42	291.43
07/05/19 14:59	Pump shutdown														4-4	4-3	169.90	291.92
07/05/19 15:00	Run autosamples 1-10														4-4	4-3	169.92	291.93
07/05/19 15:03	Pump Restarted														4-4	4-3	169.97	291.98
07/05/19 15:19	Pump shutdown														4-4	4-3	170.23	292.25
07/05/19 15:23	Pump shutdown														4-4	4-3	170.30	292.32
07/05/19 15:45	Did first scrub of BW storage tank. Wanted to finish inside but tank does not fit through doorway.														4-4	4-3	170.67	292.68
07/05/19 15:45	Need to remove wall or use multiple smaller tanks from shop														4-4	4-3	170.67	292.68
07/05/19 15:45	Would use rubbish barrell but has leak.														4-4	4-3	170.67	292.68
07/05/19 16:05	Download Data														4-4	4-3	171.00	293.02
07/05/19 16:07	Pump shutdown														4-4	4-3	171.03	293.05
07/05/19 20:00	11 MEFF 1			0.019								222	6.5	11 MEFF 1	4-4	4-3	174.92	296.93
07/05/19 20:00	12 MEFF 2			0.010								819	16.5	12 MEFF 2	4-4	4-3	174.92	296.93
07/06/19 04:00	11 MEFF 1			0.025								630			4-4	4-3	182.92	304.93
07/06/19 04:00	12 MEFF 2			0.011								778	28.3	12 MEFF 2	4-4	4-3	182.92	304.93
07/06/19 08:10	KOH V = 38.0 L, Q = 202 ml/hr														4-4	4-3	187.08	309.10
07/06/19 08:16	Shutdown M1 for BW. V = 40 L														4-4	4-3	187.18	309.20
07/06/19 08:28	Place M1 in servce. Shutdown M2 for BW V = 40 L														4-5	4-3	0.00	309.40
07/06/19 08:35	Place M2 in servce														4-5	4-4	0.12	0.00
07/06/19 08:35	Adjust Air flows. DPs = 4 psid														4-5	4-4	0.12	0.00
07/06/19 08:45	Add KOH (1/3). New V = 49.5 L														4-5	4-4	0.28	0.17
07/06/19 12:00	11 MEFF 1			0.027								847	8.1	11 MEFF 1	4-5	4-4	3.53	3.42
07/06/19 12:00	12 MEFF 2			0.013								768	8.3	12 MEFF 2	4-5	4-4	3.53	3.42
07/06/19 20:00	11 MEFF 1			0.037								752	8.4	11 MEFF 1	4-5	4-4	11.53	11.42
07/06/19 20:00	12 MEFF 2			0.015								824	3.4	12 MEFF 2	4-5	4-4	11.53	11.42
07/07/19 04:00	11 MEFF 1			0.038								039	11.6	11 MEFF 1	4-5	4-4	19.53	19.42
07/07/19 04:00	12 MEFF 2			0.033								829	17.2	12 MEFF 2	4-5	4-4	19.53	19.42
07/07/19 12:00	11 MEFF 1			0.058								788	8.1	11 MEFF 1	4-5	4-4	27.53	27.42
07/07/19 12:00	12 MEFF 2			0.032								979	11.0	12 MEFF 2	4-5	4-4	27.53	27.42
07/07/19 20:00	11 MEFF 1			0.036								782	25.0	11 MEFF 1	4-5	4-4	35.53	35.42
07/07/19 20:00	12 MEFF 2			0.055								757	28.5	12 MEFF 2	4-5	4-4	35.53	35.42
07/08/19 04:00	11 MEFF 1			0.053								990	10.0	11 MEFF 1	4-5	4-4	43.53	43.42
07/08/19 04:00	12 MEFF 2			0.039								992	7.0	12 MEFF 2	4-5	4-4	43.53	43.42
07/08/19 12:00	11 MEFF 1			0.011								826	14.1	11 MEFF 1	4-5	4-4	51.53	51.42
07/08/19 12:00	12 MEFF 2			0.009								962	11.7	12 MEFF 2	4-5	4-4	51.53	51.42
07/08/19 20:00	11 MEFF 1			0.009								989	17.7	11 MEFF 1	4-5	4-4	59.53	59.42
07/08/19 20:00	12 MEFF 2			0.009								766	11.7	12 MEFF 2	4-5	4-4	59.53	59.42
07/09/19 04:00	11 MEFF 1			0.031								776	17.5	11 MEFF 1	4-5	4-4	67.53	67.42
07/09/19 04:00	12 MEFF 2			0.000								833	12.4	12 MEFF 2	4-5	4-4	67.53	67.42
07/09/19 12:00	11 MEFF 1			0.000								675			4-5	4-4	75.53	75.42
07/09/19 12:00	12 MEFF 2			0.026								813	12.9	12 MEFF 2	4-5	4-4	75.53	75.42
07/09/19 12:52	Shutoff M2 + BW, Suspect that high DO is causing filters to bind with entraped gas.														4-5	4-4	76.40	76.28
07/09/19 13:01	Restart M2 , V = 50 L														4-5	4-5	76.55	0.00
07/09/19 13:02	BW #1, V = 50 L														4-5	4-5	76.57	0.02
07/09/19 13:10	Restart DP ~ 5 psi															4-5		0.15
07/09/19 13:10	Refill BW Tank															4-5		0.15
07/09/19 13:18	Shutoff M1 to Re-BW, V = 70 L														4-6	4-5	0.00	0.28
07/09/19 13:45	KOH V = 28 L. Have 6 L KOH, so add 6 + 12														4-6	4-5	0.45	0.73
07/09/19 20:00	11 MEFF 1			0.006								573	2.55	11 MEFF 1	4-6	4-5	6.70	6.98
07/09/19 20:00	12 MEFF 2			0.000								493	12.4	12 MEFF 2	4-6	4-5	6.70	6.98
07/10/19 04:00	11 MEFF 1			0.005								792	8.0	11 MEFF 1	4-6	4-5	14.70	14.98
07/10/19 04:00	12 MEFF 2			0.016								780	8.1	12 MEFF 2	4-6	4-5	14.70	14.98
07/10/19 12:00	11 MEFF 1			0.006								799	10.3	11 MEFF 1	4-6	4-5	22.70	22.98
07/10/19 12:00	12 MEFF 2			0.025								764	9.6	12 MEFF 2	4-6	4-5	22.70	22.98
07/10/19 20:00	11 MEFF 1			0.000								044	7.4	11 MEFF 1	4-6	4-5	30.70	30.98
07/10/19 20:00	12 MEFF 2			0.018								777	12.3	12 MEFF 2	4-6	4-5	30.70	30.98
07/11/19 04:00	11 MEFF 1			0.029								031	14.7	11 MEFF 1	4-6	4-5	38.70	38.98
07/11/19 04:00	12 MEFF 2			0.008								032	14.6	12 MEFF 2	4-6	4-5	38.70	38.98
07/11/19 12:00	11 MEFF 1			0.021								810	12.8	11 MEFF 1	4-6	4-5	46.70	46.98
07/11/19 12:00	12 MEFF 2			0.054								786	16.8	12 MEFF 2	4-6	4-5	46.70	46.98
07/11/19 12:45	01 RAW	0.07	0.06	0.668	0.642										4-6	4-5	47.45	47.73
07/11/19 12:45	02 MPOKA		0.04		0.570										4-6	4-5	47.45	47.73
07/11/19 12:45	11 MEFF 1	0.01		0.056								376	9.2	11 MEFF 1	4-6	4-5	47.45	47.73
07/11/19 12:45	12 MEFF 2	0.00		0.024								018	28.8	12 MEFF 2	4-6	4-5	47.45	47.73
07/11/19 20:00	11 MEFF 1			0.028								084	16.8	11 MEFF 1	4-6	4-5	54.70	54.98
07/11/19 20:00	12 MEFF 2			0.060								802	24.8	12 MEFF 2	4-6	4-5	54.70	54.98
07/12/19 04:00	11 MEFF 1														4-6	4-5	62.70	62.98
07/12/19 04:00	12 MEFF 2														4-6	4-5	62.70	62.98
07/12/19 12:00	11 MEFF 1			0.032								771	8.0	11 MEFF 1	4-6	4-5	70.70	70.98
07/12/19 12:00	12 MEFF 2			0.027								806	15.5	12 MEFF 2	4-6	4-5	70.70	70.98
07/12/19 20:00	11 MEFF 1														4-6	4-5	78.70	78.98
07/12/19 20:00	12 MEFF 2														4-6	4-5	78.70	78.98

Date and Time	Source	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH	Temp (C)	Alk (mg/L as CaCO3)	ORP	DO	ATP (pg/gr)	GF ID (JS #)	GF Mn(t) (ppb)		M1 Trial	M2 Trial	M1 Run Time (hrs)	M2 Run Time (hrs)
07/13/19 04:00	11 MEFF 1			0.032								783	8.3	11 MEFF 1,	4-6	4-5	86.70	86.98
07/13/19 04:00	12 MEFF 2			0.064								111	33.7	12 MEFF 2,	4-6	4-5	86.70	86.98
07/13/19 12:00	11 MEFF 1														4-6	4-5	94.70	94.98
07/13/19 12:00	12 MEFF 2														4-6	4-5	94.70	94.98
07/13/19 20:00	11 MEFF 1			0.040								816	10.9	11 MEFF 1,	4-6	4-5	102.70	102.98
07/13/19 20:00	12 MEFF 2			0.050								827	16.3	12 MEFF 2,	4-6	4-5	102.70	102.98
07/14/19 04:00	11 MEFF 1														4-6	4-5	110.70	110.98
07/14/19 04:00	12 MEFF 2			0.054								779	9.5	12 MEFF 2,	4-6	4-5	110.70	110.98
07/14/19 12:00	11 MEFF 1			0.043								803	13.5	11 MEFF 1,	4-6	4-5	118.70	118.98
07/14/19 12:00	12 MEFF 2														4-6	4-5	118.70	118.98
07/14/19 20:00	11 MEFF 1			0.060								029	10.3	11 MEFF 1,	4-6	4-5	126.70	126.98
07/14/19 20:00	12 MEFF 2			0.091								834	21.0	12 MEFF 2,	4-6	4-5	126.70	126.98
07/15/19 04:00	11 MEFF 1														4-6	4-5	134.70	134.98
07/15/19 04:00	12 MEFF 2														4-6	4-5	134.70	134.98
07/15/19 06:55	Pump is off. No water in the storage tank														4-6	4-5	137.62	137.90
07/15/19 07:00	KOH. V = 23.0 L														4-6	4-5	137.70	137.98
07/15/19 07:30	BW M1 V = 48 L														4-6	4-5	138.20	138.48
07/15/19 07:50	BW M2 V = 48 L															4-5		138.82

Appendix C – Greensand & Biological Lab Data

Laboratory Report Reference Numbers

Lab Report #	Date	Page #	Trial #	Sample Location	Analysis
L1919233	05/08/19	C-2 - C-60	4	Raw Filter A Filter C	Volatiles, Metals, Inorganics, Miscellaneous
L1919236	05/08/19	C-61 - C-82	4	Raw w/ SSN Filter A Filter C	Metals, pH
L1919237	05/08/19	C-83 - C-104	4	Raw Filter A Filter C	Metals, pH
L1919388	05/09/19	C-105 - C-122	2-1	Raw Filter M1 Filter M2	Metals
L1919892	05/10/19 - 05/13/19	C-123 - C-160	4 (Greensand) 2-1 (Biological)	Filter A and C CBW Filter A and C SSN Filter M1 and M2 CBW Filter M1 and M2 SSN	Metals, Inorganics, Miscellaneous
L1919267	05/16/19	C-161 - C-183	4	Filter A Filter C	Simulated Distribution System Analysis
L1929093	07/02/19	C-184 - C-213	4-3 (M1) 4-2 (M2)	Raw Filter M1 Filter M2 Filter M1 and M2 CBW Filter M1 and M2 SSN	Metals, Inorganics, Miscellaneous

ANALYTICAL REPORT

Lab Number:	L1919233
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Erik Grotton
Phone:	(508) 248-7094
Project Name:	WEST BOYLSTON-SE F
Project Number:	03508
Report Date:	05/17/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1919233-01	RAW	DW	WEST BOYLSTON, MA	05/08/19 08:30	05/08/19
L1919233-02	FILTER A	DW	WEST BOYLSTON, MA	05/08/19 08:30	05/08/19
L1919233-03	FILTER C	DW	WEST BOYLSTON, MA	05/08/19 08:30	05/08/19
L1919233-04	TRIP BLANK	DW	WEST BOYLSTON, MA	05/08/19 00:00	05/08/19

Project Name:	WEST BOYLSTON-SE F	**Lab Number:**	L1919233
Project Number:	03508	**Report Date:**	05/17/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: WEST BOYLSTON-SE F **Lab Number:** L1919233
Project Number: 03508 **Report Date:** 05/17/19

Case Narrative (continued)

Report Submission

The results of the SDS, THMs and HAAs analyses will be issued under separate cover.

Sample Receipt

L1919233-04: A sample identified as "TRIP BLANK" was received but not listed on the Chain of Custody. At the client's request, this sample was not analyzed.

Volatile Organics by Method 524.2

The required Trip Blank for EPA Method 524.2 was submitted with the sample upon return to the laboratory; however, at the client's request it was not analyzed. It could not be determined if analytes detected were the result of exposure to contaminants during trip from laboratory to field and back to the laboratory. Analytes detected in this sample are to be considered qualified.

Total Metals

The WG1237435-2 LCS recovery, associated with L1919233-01 through -03, is above the acceptance criteria for cadmium (116%); however, the associated samples are non-detect to the RL for this target analyte. The results of the original analysis are reported.

Dissolved Organic Carbon

L1919233-01 and -02: The DOC result is greater than the TOC result due to the filtering procedure required by the DOC method.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Amita Naik

Title: Technical Director/Representative Date: 05/17/19

ORGANICS

VOLATILES

Project Name: WEST BOYLSTON-SE F
Lab Number: L1919233
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-01
Client ID: RAW
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw
Analytical Method: 16,524.2
Analytical Date: 05/13/19 18:58
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Dichlorodifluoromethane	ND		ug/l	0.50	--	1
Chloromethane	ND		ug/l	0.50	--	1
Vinyl chloride	ND		ug/l	0.50	--	1
Bromomethane	ND		ug/l	0.50	--	1
Chloroethane	ND		ug/l	0.50	--	1
Trichlorofluoromethane	ND		ug/l	0.50	--	1
1,1-Dichloroethene	ND		ug/l	0.50	--	1
Methylene chloride	ND		ug/l	0.50	--	1
Methyl tert butyl ether	ND		ug/l	0.50	--	1
trans-1,2-Dichloroethene	ND		ug/l	0.50	--	1
1,1-Dichloroethane	ND		ug/l	0.50	--	1
2,2-Dichloropropane	ND		ug/l	0.50	--	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	--	1
Chloroform	0.63		ug/l	0.50	--	1
Bromochloromethane	ND		ug/l	0.50	--	1
1,1,1-Trichloroethane	ND		ug/l	0.50	--	1
1,1-Dichloropropene	ND		ug/l	0.50	--	1
Carbon tetrachloride	ND		ug/l	0.50	--	1
1,2-Dichloroethane	ND		ug/l	0.50	--	1
Benzene	ND		ug/l	0.50	--	1
Trichloroethene	ND		ug/l	0.50	--	1
1,2-Dichloropropane	ND		ug/l	0.50	--	1
Bromodichloromethane	ND		ug/l	0.50	--	1
Dibromomethane	ND		ug/l	0.50	--	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	--	1
Toluene	ND		ug/l	0.50	--	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	--	1
1,1,2-Trichloroethane	ND		ug/l	0.50	--	1

Project Name: WEST BOYLSTON-SE F
Lab Number: L1919233
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-01
Client ID: RAW
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichloropropane	ND		ug/l	0.50	--	1
Tetrachloroethene	ND		ug/l	0.50	--	1
Dibromochloromethane	ND		ug/l	0.50	--	1
1,2-Dibromoethane	ND		ug/l	0.50	--	1
Chlorobenzene	ND		ug/l	0.50	--	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Ethylbenzene	ND		ug/l	0.50	--	1
p/m-Xylene	ND		ug/l	0.50	--	1
o-Xylene	ND		ug/l	0.50	--	1
Styrene	ND		ug/l	0.50	--	1
Isopropylbenzene	ND		ug/l	0.50	--	1
Bromoform	ND		ug/l	0.50	--	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	--	1
1,2,3-Trichloropropane	ND		ug/l	0.50	--	1
Xylenes, Total[1]	ND		ug/l	0.50	--	1
n-Propylbenzene	ND		ug/l	0.50	--	1
Bromobenzene	ND		ug/l	0.50	--	1
1,3,5-Trimethylbenzene	ND		ug/l	0.50	--	1
o-Chlorotoluene	ND		ug/l	0.50	--	1
p-Chlorotoluene	ND		ug/l	0.50	--	1
tert-Butylbenzene	ND		ug/l	0.50	--	1
1,2,4-Trimethylbenzene	ND		ug/l	0.50	--	1
sec-Butylbenzene	ND		ug/l	0.50	--	1
p-Isopropyltoluene	ND		ug/l	0.50	--	1
1,3-Dichlorobenzene	ND		ug/l	0.50	--	1
1,4-Dichlorobenzene	ND		ug/l	0.50	--	1
n-Butylbenzene	ND		ug/l	0.50	--	1
1,2-Dichlorobenzene	ND		ug/l	0.50	--	1
1,2-Dibromo-3-chloropropane	ND		ug/l	0.50	--	1
1,2,4-Trichlorobenzene	ND		ug/l	0.50	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	0.50	--	1
1,2,3-Trichlorobenzene	ND		ug/l	0.50	--	1

Project Name: WEST BOYLSTON-SE F **Lab Number:** L1919233

Project Number: 03508 **Report Date:** 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-01 Date Collected: 05/08/19 08:30

Client ID: RAW Date Received: 05/08/19

Sample Location: WEST BOYLSTON, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichlorobenzene-d4	109		80-120
4-Bromofluorobenzene	83		80-120

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919233
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-02
Client ID: FILTER A
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw
Analytical Method: 16,524.2
Analytical Date: 05/13/19 19:32
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Dichlorodifluoromethane	ND		ug/l	0.50	--	1
Chloromethane	ND		ug/l	0.50	--	1
Vinyl chloride	ND		ug/l	0.50	--	1
Bromomethane	ND		ug/l	0.50	--	1
Chloroethane	ND		ug/l	0.50	--	1
Trichlorofluoromethane	ND		ug/l	0.50	--	1
1,1-Dichloroethene	ND		ug/l	0.50	--	1
Methylene chloride	ND		ug/l	0.50	--	1
Methyl tert butyl ether	ND		ug/l	0.50	--	1
trans-1,2-Dichloroethene	ND		ug/l	0.50	--	1
1,1-Dichloroethane	ND		ug/l	0.50	--	1
2,2-Dichloropropane	ND		ug/l	0.50	--	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	--	1
Chloroform	0.89		ug/l	0.50	--	1
Bromochloromethane	ND		ug/l	0.50	--	1
1,1,1-Trichloroethane	ND		ug/l	0.50	--	1
1,1-Dichloropropene	ND		ug/l	0.50	--	1
Carbon tetrachloride	ND		ug/l	0.50	--	1
1,2-Dichloroethane	ND		ug/l	0.50	--	1
Benzene	ND		ug/l	0.50	--	1
Trichloroethene	ND		ug/l	0.50	--	1
1,2-Dichloropropane	ND		ug/l	0.50	--	1
Bromodichloromethane	ND		ug/l	0.50	--	1
Dibromomethane	ND		ug/l	0.50	--	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	--	1
Toluene	ND		ug/l	0.50	--	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	--	1
1,1,2-Trichloroethane	ND		ug/l	0.50	--	1

Project Name: WEST BOYLSTON-SE F **Lab Number:** L1919233

Project Number: 03508 **Report Date:** 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-02 Date Collected: 05/08/19 08:30

Client ID: FILTER A Date Received: 05/08/19

Sample Location: WEST BOYLSTON, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichloropropane	ND		ug/l	0.50	--	1
Tetrachloroethene	ND		ug/l	0.50	--	1
Dibromochloromethane	ND		ug/l	0.50	--	1
1,2-Dibromoethane	ND		ug/l	0.50	--	1
Chlorobenzene	ND		ug/l	0.50	--	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Ethylbenzene	ND		ug/l	0.50	--	1
p/m-Xylene	ND		ug/l	0.50	--	1
o-Xylene	ND		ug/l	0.50	--	1
Styrene	ND		ug/l	0.50	--	1
Isopropylbenzene	ND		ug/l	0.50	--	1
Bromoform	ND		ug/l	0.50	--	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	--	1
1,2,3-Trichloropropane	ND		ug/l	0.50	--	1
Xylenes, Total[1]	ND		ug/l	0.50	--	1
n-Propylbenzene	ND		ug/l	0.50	--	1
Bromobenzene	ND		ug/l	0.50	--	1
1,3,5-Trimethylbenzene	ND		ug/l	0.50	--	1
o-Chlorotoluene	ND		ug/l	0.50	--	1
p-Chlorotoluene	ND		ug/l	0.50	--	1
tert-Butylbenzene	ND		ug/l	0.50	--	1
1,2,4-Trimethylbenzene	ND		ug/l	0.50	--	1
sec-Butylbenzene	ND		ug/l	0.50	--	1
p-Isopropyltoluene	ND		ug/l	0.50	--	1
1,3-Dichlorobenzene	ND		ug/l	0.50	--	1
1,4-Dichlorobenzene	ND		ug/l	0.50	--	1
n-Butylbenzene	ND		ug/l	0.50	--	1
1,2-Dichlorobenzene	ND		ug/l	0.50	--	1
1,2-Dibromo-3-chloropropane	ND		ug/l	0.50	--	1
1,2,4-Trichlorobenzene	ND		ug/l	0.50	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	0.50	--	1
1,2,3-Trichlorobenzene	ND		ug/l	0.50	--	1

Project Name: WEST BOYLSTON-SE F **Lab Number:** L1919233

Project Number: 03508 **Report Date:** 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-02 Date Collected: 05/08/19 08:30

Client ID: FILTER A Date Received: 05/08/19

Sample Location: WEST BOYLSTON, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichlorobenzene-d4	111		80-120
4-Bromofluorobenzene	82		80-120

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919233
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-03
Client ID: FILTER C
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw
Analytical Method: 16,524.2
Analytical Date: 05/13/19 20:07
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Dichlorodifluoromethane	ND		ug/l	0.50	--	1
Chloromethane	ND		ug/l	0.50	--	1
Vinyl chloride	ND		ug/l	0.50	--	1
Bromomethane	ND		ug/l	0.50	--	1
Chloroethane	ND		ug/l	0.50	--	1
Trichlorofluoromethane	ND		ug/l	0.50	--	1
1,1-Dichloroethene	ND		ug/l	0.50	--	1
Methylene chloride	ND		ug/l	0.50	--	1
Methyl tert butyl ether	ND		ug/l	0.50	--	1
trans-1,2-Dichloroethene	ND		ug/l	0.50	--	1
1,1-Dichloroethane	ND		ug/l	0.50	--	1
2,2-Dichloropropane	ND		ug/l	0.50	--	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	--	1
Chloroform	0.92		ug/l	0.50	--	1
Bromochloromethane	ND		ug/l	0.50	--	1
1,1,1-Trichloroethane	ND		ug/l	0.50	--	1
1,1-Dichloropropene	ND		ug/l	0.50	--	1
Carbon tetrachloride	ND		ug/l	0.50	--	1
1,2-Dichloroethane	ND		ug/l	0.50	--	1
Benzene	ND		ug/l	0.50	--	1
Trichloroethene	ND		ug/l	0.50	--	1
1,2-Dichloropropane	ND		ug/l	0.50	--	1
Bromodichloromethane	ND		ug/l	0.50	--	1
Dibromomethane	ND		ug/l	0.50	--	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	--	1
Toluene	ND		ug/l	0.50	--	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	--	1
1,1,2-Trichloroethane	ND		ug/l	0.50	--	1

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919233
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-03
Client ID: FILTER C
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichloropropane	ND		ug/l	0.50	--	1
Tetrachloroethene	ND		ug/l	0.50	--	1
Dibromochloromethane	ND		ug/l	0.50	--	1
1,2-Dibromoethane	ND		ug/l	0.50	--	1
Chlorobenzene	ND		ug/l	0.50	--	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Ethylbenzene	ND		ug/l	0.50	--	1
p/m-Xylene	ND		ug/l	0.50	--	1
o-Xylene	ND		ug/l	0.50	--	1
Styrene	ND		ug/l	0.50	--	1
Isopropylbenzene	ND		ug/l	0.50	--	1
Bromoform	ND		ug/l	0.50	--	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	--	1
1,2,3-Trichloropropane	ND		ug/l	0.50	--	1
Xylenes, Total[1]	ND		ug/l	0.50	--	1
n-Propylbenzene	ND		ug/l	0.50	--	1
Bromobenzene	ND		ug/l	0.50	--	1
1,3,5-Trimethylbenzene	ND		ug/l	0.50	--	1
o-Chlorotoluene	ND		ug/l	0.50	--	1
p-Chlorotoluene	ND		ug/l	0.50	--	1
tert-Butylbenzene	ND		ug/l	0.50	--	1
1,2,4-Trimethylbenzene	ND		ug/l	0.50	--	1
sec-Butylbenzene	ND		ug/l	0.50	--	1
p-Isopropyltoluene	ND		ug/l	0.50	--	1
1,3-Dichlorobenzene	ND		ug/l	0.50	--	1
1,4-Dichlorobenzene	ND		ug/l	0.50	--	1
n-Butylbenzene	ND		ug/l	0.50	--	1
1,2-Dichlorobenzene	ND		ug/l	0.50	--	1
1,2-Dibromo-3-chloropropane	ND		ug/l	0.50	--	1
1,2,4-Trichlorobenzene	ND		ug/l	0.50	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	0.50	--	1
1,2,3-Trichlorobenzene	ND		ug/l	0.50	--	1

Project Name: WEST BOYLSTON-SE F
Lab Number: L1919233
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-03
Client ID: FILTER C
Sample Location: WEST BOYLSTON, MA

Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichlorobenzene-d4	113		80-120
4-Bromofluorobenzene	82		80-120

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919233
Report Date: 05/17/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 16,524.2
Analytical Date: 05/13/19 13:46
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03 Batch: WG1236969-4					
Dichlorodifluoromethane	ND		ug/l	0.50	--
Chloromethane	ND		ug/l	0.50	--
Vinyl chloride	ND		ug/l	0.50	--
Bromomethane	ND		ug/l	0.50	--
Chloroethane	ND		ug/l	0.50	--
Trichlorofluoromethane	ND		ug/l	0.50	--
1,1-Dichloroethene	ND		ug/l	0.50	--
Methylene chloride	ND		ug/l	0.50	--
Methyl tert butyl ether	ND		ug/l	0.50	--
trans-1,2-Dichloroethene	ND		ug/l	0.50	--
1,1-Dichloroethane	ND		ug/l	0.50	--
2,2-Dichloropropane	ND		ug/l	0.50	--
cis-1,2-Dichloroethene	ND		ug/l	0.50	--
Chloroform	ND		ug/l	0.50	--
Bromochloromethane	ND		ug/l	0.50	--
1,1,1-Trichloroethane	ND		ug/l	0.50	--
1,1-Dichloropropene	ND		ug/l	0.50	--
Carbon tetrachloride	ND		ug/l	0.50	--
1,2-Dichloroethane	ND		ug/l	0.50	--
Benzene	ND		ug/l	0.50	--
Trichloroethene	ND		ug/l	0.50	--
1,2-Dichloropropane	ND		ug/l	0.50	--
Bromodichloromethane	ND		ug/l	0.50	--
Dibromomethane	ND		ug/l	0.50	--
cis-1,3-Dichloropropene	ND		ug/l	0.50	--
Toluene	ND		ug/l	0.50	--
trans-1,3-Dichloropropene	ND		ug/l	0.50	--
1,1,2-Trichloroethane	ND		ug/l	0.50	--
1,3-Dichloropropane	ND		ug/l	0.50	--

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919233
Report Date: 05/17/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 16,524.2
Analytical Date: 05/13/19 13:46
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03 Batch: WG1236969-4					
Tetrachloroethene	ND		ug/l	0.50	--
Dibromochloromethane	ND		ug/l	0.50	--
1,2-Dibromoethane	ND		ug/l	0.50	--
Chlorobenzene	ND		ug/l	0.50	--
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	--
Ethylbenzene	ND		ug/l	0.50	--
p/m-Xylene	ND		ug/l	0.50	--
o-Xylene	ND		ug/l	0.50	--
Styrene	ND		ug/l	0.50	--
Isopropylbenzene	ND		ug/l	0.50	--
Bromoform	ND		ug/l	0.50	--
Xylenes, Total[1]	ND		ug/l	0.50	--
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	--
1,2,3-Trichloropropane	ND		ug/l	0.50	--
n-Propylbenzene	ND		ug/l	0.50	--
Bromobenzene	ND		ug/l	0.50	--
1,3,5-Trimethylbenzene	ND		ug/l	0.50	--
o-Chlorotoluene	ND		ug/l	0.50	--
p-Chlorotoluene	ND		ug/l	0.50	--
tert-Butylbenzene	ND		ug/l	0.50	--
1,2,4-Trimethylbenzene	ND		ug/l	0.50	--
sec-Butylbenzene	ND		ug/l	0.50	--
p-Isopropyltoluene	ND		ug/l	0.50	--
1,3-Dichlorobenzene	ND		ug/l	0.50	--
1,4-Dichlorobenzene	ND		ug/l	0.50	--
n-Butylbenzene	ND		ug/l	0.50	--
1,2-Dichlorobenzene	ND		ug/l	0.50	--
1,2-Dibromo-3-chloropropane	ND		ug/l	0.50	--
1,2,4-Trichlorobenzene	ND		ug/l	0.50	--

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919233
Report Date: 05/17/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 16,524.2
Analytical Date: 05/13/19 13:46
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03 Batch: WG1236969-4					
Hexachlorobutadiene	ND		ug/l	0.50	--
Naphthalene	ND		ug/l	0.50	--
1,2,3-Trichlorobenzene	ND		ug/l	0.50	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichlorobenzene-d4	110		80-120
4-Bromofluorobenzene	87		80-120

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919233

Report Date: 05/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG1236969-3								
Dichlorodifluoromethane	72		-		70-130	-		20
Chloromethane	85		-		70-130	-		20
Vinyl chloride	82		-		70-130	-		20
Bromomethane	95		-		70-130	-		20
Chloroethane	88		-		70-130	-		20
Trichlorofluoromethane	90		-		70-130	-		20
1,1-Dichloroethene	90		-		70-130	-		20
Methylene chloride	90		-		70-130	-		20
Methyl tert butyl ether	95		-		70-130	-		20
trans-1,2-Dichloroethene	88		-		70-130	-		20
1,1-Dichloroethane	95		-		70-130	-		20
2,2-Dichloropropane	95		-		70-130	-		20
cis-1,2-Dichloroethene	90		-		70-130	-		20
Chloroform	90		-		70-130	-		20
Bromochloromethane	90		-		70-130	-		20
1,1,1-Trichloroethane	90		-		70-130	-		20
1,1-Dichloropropene	85		-		70-130	-		20
Carbon tetrachloride	92		-		70-130	-		20
1,2-Dichloroethane	92		-		70-130	-		20
Benzene	88		-		70-130	-		20
Trichloroethene	92		-		70-130	-		20
1,2-Dichloropropane	90		-		70-130	-		20
Bromodichloromethane	90		-		70-130	-		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG1236969-3								
Dibromomethane	92		-		70-130	-		20
cis-1,3-Dichloropropene	92		-		70-130	-		20
Toluene	90		-		70-130	-		20
trans-1,3-Dichloropropene	92		-		70-130	-		20
1,1,2-Trichloroethane	90		-		70-130	-		20
1,3-Dichloropropane	90		-		70-130	-		20
Tetrachloroethene	95		-		70-130	-		20
Dibromochloromethane	95		-		70-130	-		20
1,2-Dibromoethane	98		-		70-130	-		20
Chlorobenzene	85		-		70-130	-		20
1,1,1,2-Tetrachloroethane	82		-		70-130	-		20
Ethylbenzene	85		-		70-130	-		20
p/m-Xylene	82		-		70-130	-		20
o-Xylene	75		-		70-130	-		20
Styrene	82		-		70-130	-		20
Isopropylbenzene	80		-		70-130	-		20
Bromoform	85		-		70-130	-		20
1,1,2,2-Tetrachloroethane	82		-		70-130	-		20
1,2,3-Trichloropropane	85		-		70-130	-		20
n-Propylbenzene	78		-		70-130	-		20
Bromobenzene	80		-		70-130	-		20
1,3,5-Trimethylbenzene	78		-		70-130	-		20
o-Chlorotoluene	80		-		70-130	-		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919233

Report Date: 05/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG1236969-3								
p-Chlorotoluene	80		-		70-130	-		20
tert-Butylbenzene	75		-		70-130	-		20
1,2,4-Trimethylbenzene	78		-		70-130	-		20
sec-Butylbenzene	78		-		70-130	-		20
p-Isopropyltoluene	75		-		70-130	-		20
1,3-Dichlorobenzene	82		-		70-130	-		20
1,4-Dichlorobenzene	88		-		70-130	-		20
n-Butylbenzene	78		-		70-130	-		20
1,2-Dichlorobenzene	85		-		70-130	-		20
1,2-Dibromo-3-chloropropane	78		-		70-130	-		20
1,2,4-Trichlorobenzene	78		-		70-130	-		20
Hexachlorobutadiene	88		-		70-130	-		20
Naphthalene	85		-		70-130	-		20
1,2,3-Trichlorobenzene	78		-		70-130	-		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichlorobenzene-d4	98				80-120
4-Bromofluorobenzene	93				80-120

Matrix Spike Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919233

Report Date: 05/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG1236969-6	QC Sample: L1919445-01	Client ID: MS Sample								
Dichlorodifluoromethane	ND	4	3.1	78		-	-		70-130	-		20
Chloromethane	ND	4	3.8	95		-	-		70-130	-		20
Vinyl chloride	ND	4	3.9	98		-	-		70-130	-		20
Bromomethane	ND	4	3.9	98		-	-		70-130	-		20
Chloroethane	ND	4	4.1	103		-	-		70-130	-		20
Trichlorofluoromethane	ND	4	4.2	105		-	-		70-130	-		20
1,1-Dichloroethene	ND	4	4.0	100		-	-		70-130	-		20
Methylene chloride	ND	4	4.0	100		-	-		70-130	-		20
Methyl tert butyl ether	ND	4	3.9	98		-	-		70-130	-		20
trans-1,2-Dichloroethene	ND	4	4.0	100		-	-		70-130	-		20
1,1-Dichloroethane	ND	4	4.1	103		-	-		70-130	-		20
2,2-Dichloropropane	ND	4	4.3	108		-	-		70-130	-		20
cis-1,2-Dichloroethene	ND	4	4.1	103		-	-		70-130	-		20
Chloroform	ND	4	4.1	103		-	-		70-130	-		20
Bromochloromethane	ND	4	4.1	103		-	-		70-130	-		20
1,1,1-Trichloroethane	ND	4	4.2	105		-	-		70-130	-		20
1,1-Dichloropropene	ND	4	4.0	100		-	-		70-130	-		20
Carbon tetrachloride	ND	4	4.1	103		-	-		70-130	-		20
1,2-Dichloroethane	ND	4	4.0	100		-	-		70-130	-		20
Benzene	ND	4	4.0	100		-	-		70-130	-		20
Trichloroethene	ND	4	4.1	103		-	-		70-130	-		20
1,2-Dichloropropane	ND	4	4.0	100		-	-		70-130	-		20
Bromodichloromethane	ND	4	3.9	98		-	-		70-130	-		20
Dibromomethane	ND	4	4.1	103		-	-		70-130	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG1236969-6	QC Sample: L1919445-01	Client ID: MS Sample								
cis-1,3-Dichloropropene	ND	4	3.7	92		-	-		70-130	-		20
Toluene	ND	4	4.0	100		-	-		70-130	-		20
trans-1,3-Dichloropropene	ND	4	3.6	90		-	-		70-130	-		20
1,1,2-Trichloroethane	ND	4	4.0	100		-	-		70-130	-		20
1,3-Dichloropropane	ND	4	4.0	100		-	-		70-130	-		20
Tetrachloroethene	ND	4	4.4	110		-	-		70-130	-		20
Dibromochloromethane	ND	4	4.0	100		-	-		70-130	-		20
1,2-Dibromoethane	ND	4	4.2	105		-	-		70-130	-		20
Chlorobenzene	ND	4	3.8	95		-	-		70-130	-		20
1,1,1,2-Tetrachloroethane	ND	4	3.7	92		-	-		70-130	-		20
Ethylbenzene	ND	4	3.6	90		-	-		70-130	-		20
p/m-Xylene	ND	8	7.3	91		-	-		70-130	-		20
o-Xylene	ND	4	3.2	80		-	-		70-130	-		20
Styrene	ND	4	3.5	88		-	-		70-130	-		20
Isopropylbenzene	ND	4	3.5	88		-	-		70-130	-		20
Bromoform	ND	4	3.4	85		-	-		70-130	-		20
1,1,2,2-Tetrachloroethane	ND	4	3.5	88		-	-		70-130	-		20
1,2,3-Trichloropropane	ND	4	3.8	95		-	-		70-130	-		20
n-Propylbenzene	ND	4	3.5	88		-	-		70-130	-		20
Bromobenzene	ND	4	3.5	88		-	-		70-130	-		20
1,3,5-Trimethylbenzene	ND	4	3.5	88		-	-		70-130	-		20
o-Chlorotoluene	ND	4	3.5	88		-	-		70-130	-		20
p-Chlorotoluene	ND	4	3.6	90		-	-		70-130	-		20
tert-Butylbenzene	ND	4	3.4	85		-	-		70-130	-		20

Matrix Spike Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919233

Report Date: 05/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG1236969-6	QC Sample: L1919445-01	Client ID: MS Sample								
1,2,4-Trimethylbenzene	ND	4	3.4	85		-	-		70-130	-		20
sec-Butylbenzene	ND	4	3.6	90		-	-		70-130	-		20
p-Isopropyltoluene	ND	4	3.4	85		-	-		70-130	-		20
1,3-Dichlorobenzene	ND	4	3.6	90		-	-		70-130	-		20
1,4-Dichlorobenzene	ND	4	3.7	92		-	-		70-130	-		20
n-Butylbenzene	ND	4	3.4	85		-	-		70-130	-		20
1,2-Dichlorobenzene	ND	4	3.6	90		-	-		70-130	-		20
1,2-Dibromo-3-chloropropane	ND	4	3.4	85		-	-		70-130	-		20
1,2,4-Trichlorobenzene	ND	4	3.3	82		-	-		70-130	-		20
Hexachlorobutadiene	ND	4	4.0	100		-	-		70-130	-		20
Naphthalene	ND	4	3.4	85		-	-		70-130	-		20
1,2,3-Trichlorobenzene	ND	4	3.3	82		-	-		70-130	-		20

Surrogate	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1,2-Dichlorobenzene-d4	98				80-120
4-Bromofluorobenzene	91				80-120

Lab Duplicate Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236969-5 QC Sample: L1919152-01 Client ID: DUP Sample						
Dichlorodifluoromethane	ND	ND	ug/l	NC		20
Chloromethane	ND	ND	ug/l	NC		20
Vinyl chloride	ND	ND	ug/l	NC		20
Bromomethane	ND	ND	ug/l	NC		20
Chloroethane	ND	ND	ug/l	NC		20
Trichlorofluoromethane	ND	ND	ug/l	NC		20
1,1-Dichloroethene	ND	ND	ug/l	NC		20
Methylene chloride	ND	ND	ug/l	NC		20
Methyl tert butyl ether	ND	ND	ug/l	NC		20
trans-1,2-Dichloroethene	ND	ND	ug/l	NC		20
1,1-Dichloroethane	ND	ND	ug/l	NC		20
2,2-Dichloropropane	ND	ND	ug/l	NC		20
cis-1,2-Dichloroethene	ND	ND	ug/l	NC		20
Chloroform	ND	ND	ug/l	NC		20
Bromochloromethane	ND	ND	ug/l	NC		20
1,1,1-Trichloroethane	ND	ND	ug/l	NC		20
1,1-Dichloropropene	ND	ND	ug/l	NC		20
Carbon tetrachloride	ND	ND	ug/l	NC		20
1,2-Dichloroethane	ND	ND	ug/l	NC		20
Benzene	ND	ND	ug/l	NC		20
Trichloroethene	ND	ND	ug/l	NC		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236969-5 QC Sample: L1919152-01 Client ID: DUP Sample						
1,2-Dichloropropane	ND	ND	ug/l	NC		20
Bromodichloromethane	ND	ND	ug/l	NC		20
Dibromomethane	ND	ND	ug/l	NC		20
cis-1,3-Dichloropropene	ND	ND	ug/l	NC		20
Toluene	ND	ND	ug/l	NC		20
trans-1,3-Dichloropropene	ND	ND	ug/l	NC		20
1,1,2-Trichloroethane	ND	ND	ug/l	NC		20
1,3-Dichloropropane	ND	ND	ug/l	NC		20
Tetrachloroethene	ND	ND	ug/l	NC		20
Dibromochloromethane	ND	ND	ug/l	NC		20
1,2-Dibromoethane	ND	ND	ug/l	NC		20
Chlorobenzene	ND	ND	ug/l	NC		20
1,1,1,2-Tetrachloroethane	ND	ND	ug/l	NC		20
Ethylbenzene	ND	ND	ug/l	NC		20
p/m-Xylene	ND	ND	ug/l	NC		20
o-Xylene	ND	ND	ug/l	NC		20
Styrene	ND	ND	ug/l	NC		20
Isopropylbenzene	ND	ND	ug/l	NC		20
Bromoform	ND	ND	ug/l	NC		20
1,1,2,2-Tetrachloroethane	ND	ND	ug/l	NC		20
1,2,3-Trichloropropane	ND	ND	ug/l	NC		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236969-5 QC Sample: L1919152-01 Client ID: DUP Sample						
Xylene (Total)[1]	ND	ND	ug/l	NC		20
n-Propylbenzene	ND	ND	ug/l	NC		20
Bromobenzene	ND	ND	ug/l	NC		20
Trihalomethanes, Total	ND	ND	ug/l	NC		20
1,3,5-Trimethylbenzene	ND	ND	ug/l	NC		20
o-Chlorotoluene	ND	ND	ug/l	NC		20
p-Chlorotoluene	ND	ND	ug/l	NC		20
tert-Butylbenzene	ND	ND	ug/l	NC		20
1,2,4-Trimethylbenzene	ND	ND	ug/l	NC		20
sec-Butylbenzene	ND	ND	ug/l	NC		20
p-Isopropyltoluene	ND	ND	ug/l	NC		20
1,3-Dichlorobenzene	ND	ND	ug/l	NC		20
1,4-Dichlorobenzene	ND	ND	ug/l	NC		20
n-Butylbenzene	ND	ND	ug/l	NC		20
1,2-Dichlorobenzene	ND	ND	ug/l	NC		20
1,2-Dibromo-3-chloropropane	ND	ND	ug/l	NC		20
1,2,4-Trichlorobenzene	ND	ND	ug/l	NC		20
Hexachlorobutadiene	ND	ND	ug/l	NC		20
Naphthalene	ND	ND	ug/l	NC		20
1,2,3-Trichlorobenzene	ND	ND	ug/l	NC		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits

Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236969-5 QC Sample: L1919152-01 Client ID: DUP Sample

Surrogate	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichlorobenzene-d4	107		112		80-120
4-Bromofluorobenzene	84		82		80-120

METALS

Project Name: WEST BOYLSTON-SE F
Lab Number: L1919233
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-01
Client ID: RAW
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	ND		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Antimony, Total	ND		mg/l	0.0040	--	1	05/15/19 13:21	05/16/19 10:37	EPA 3005A	3,200.8	AM
Arsenic, Total	0.0023		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:37	EPA 3005A	3,200.8	AM
Barium, Total	0.0213		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:37	EPA 3005A	3,200.8	AM
Beryllium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:37	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.0002	--	1	05/15/19 13:21	05/16/19 10:37	EPA 3005A	3,200.8	AM
Calcium, Total	21.4		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Chromium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:37	EPA 3005A	3,200.8	AM
Copper, Total	ND		mg/l	0.010	--	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Magnesium, Total	2.68		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Manganese, Total	0.962		mg/l	0.010	--	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Manganese, Total	0.8972		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:37	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.0002	--	1	05/09/19 12:42	05/09/19 19:10	EPA 245.1	3,245.1	EA
Nickel, Total	ND		mg/l	0.0020	--	1	05/15/19 13:21	05/16/19 10:37	EPA 3005A	3,200.8	AM
Potassium, Total	3.68		mg/l	2.50	--	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Selenium, Total	ND		mg/l	0.0050	--	1	05/15/19 13:21	05/16/19 10:37	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.007	--	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Sodium, Total	48.5		mg/l	2.00	--	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Thallium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:37	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	64.4		mg/l	0.660	NA	1	05/15/19 13:21	05/16/19 17:43	EPA 3005A	19,200.7	AB
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/15/19 16:05	05/16/19 00:33	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.8626		mg/l	0.0010	--	1	05/15/19 16:05	05/16/19 15:00	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON-SE F
Lab Number: L1919233
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-02
Client ID: FILTER A
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	ND		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB
Antimony, Total	ND		mg/l	0.0040	--	1	05/15/19 13:21	05/16/19 10:53	EPA 3005A	3,200.8	AM
Arsenic, Total	0.0015		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:53	EPA 3005A	3,200.8	AM
Barium, Total	0.0182		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:53	EPA 3005A	3,200.8	AM
Beryllium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:53	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.0002	--	1	05/15/19 13:21	05/16/19 10:53	EPA 3005A	3,200.8	AM
Calcium, Total	20.8		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB
Chromium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:53	EPA 3005A	3,200.8	AM
Copper, Total	ND		mg/l	0.010	--	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB
Magnesium, Total	2.63		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB
Manganese, Total	ND		mg/l	0.010	--	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB
Manganese, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:53	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.0002	--	1	05/09/19 12:42	05/09/19 19:12	EPA 245.1	3,245.1	EA
Nickel, Total	ND		mg/l	0.0020	--	1	05/15/19 13:21	05/16/19 10:53	EPA 3005A	3,200.8	AM
Potassium, Total	16.7		mg/l	2.50	--	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB
Selenium, Total	ND		mg/l	0.0050	--	1	05/15/19 13:21	05/16/19 10:53	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.007	--	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB
Sodium, Total	50.5		mg/l	2.00	--	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB
Thallium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:53	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	62.9		mg/l	0.660	NA	1	05/15/19 13:21	05/16/19 18:36	EPA 3005A	19,200.7	AB

Project Name: WEST BOYLSTON-SE F
Lab Number: L1919233
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-03
Client ID: FILTER C
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	ND		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB
Antimony, Total	ND		mg/l	0.0040	--	1	05/15/19 13:21	05/16/19 10:58	EPA 3005A	3,200.8	AM
Arsenic, Total	0.0014		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:58	EPA 3005A	3,200.8	AM
Barium, Total	0.0198		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:58	EPA 3005A	3,200.8	AM
Beryllium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:58	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.0002	--	1	05/15/19 13:21	05/16/19 10:58	EPA 3005A	3,200.8	AM
Calcium, Total	20.8		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB
Chromium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:58	EPA 3005A	3,200.8	AM
Copper, Total	ND		mg/l	0.010	--	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB
Magnesium, Total	2.60		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB
Manganese, Total	ND		mg/l	0.010	--	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB
Manganese, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:58	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.0002	--	1	05/09/19 12:42	05/09/19 19:14	EPA 245.1	3,245.1	EA
Nickel, Total	0.0020		mg/l	0.0020	--	1	05/15/19 13:21	05/16/19 10:58	EPA 3005A	3,200.8	AM
Potassium, Total	17.2		mg/l	2.50	--	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB
Selenium, Total	ND		mg/l	0.0050	--	1	05/15/19 13:21	05/16/19 10:58	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.007	--	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB
Sodium, Total	51.2		mg/l	2.00	--	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB
Thallium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:58	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	62.7		mg/l	0.660	NA	1	05/15/19 13:21	05/16/19 18:54	EPA 3005A	19,200.7	AB

Project Name: WEST BOYLSTON-SE F **Lab Number:** L1919233

Project Number: 03508 **Report Date:** 05/17/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1235391-1										
Mercury, Total	ND		mg/l	0.0002	--	1	05/09/19 12:42	05/09/19 18:46	3,245.1	EA

Prep Information

Digestion Method: EPA 245.1

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1237435-1										
Antimony, Total	ND		mg/l	0.0040	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM
Arsenic, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM
Barium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM
Beryllium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM
Cadmium, Total	ND		mg/l	0.0002	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM
Chromium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM
Manganese, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM
Nickel, Total	ND		mg/l	0.0020	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM
Selenium, Total	ND		mg/l	0.0050	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM
Thallium, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1237438-1										
Aluminum, Total	ND		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB
Calcium, Total	ND		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB
Copper, Total	ND		mg/l	0.010	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB
Magnesium, Total	ND		mg/l	0.100	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB
Manganese, Total	ND		mg/l	0.010	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB

Project Name: WEST BOYLSTON-SE F **Lab Number:** L1919233

Project Number: 03508 **Report Date:** 05/17/19

Method Blank Analysis
Batch Quality Control

Potassium, Total	ND	mg/l	2.50	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB
Silver, Total	ND	mg/l	0.007	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB
Sodium, Total	ND	mg/l	2.00	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB
Zinc, Total	ND	mg/l	0.050	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab for sample(s): 01-03 Batch: WG1237438-1										
Hardness	ND		mg/l	0.660	NA	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1237507-1										
Manganese, Dissolved	ND		mg/l	0.0010	--	1	05/15/19 16:05	05/16/19 14:28	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1237508-1										
Iron, Dissolved	ND		mg/l	0.050	--	1	05/15/19 16:05	05/16/19 00:14	19,200.7	AB

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919233

Report Date: 05/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1235391-2								
Mercury, Total	105		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1237435-2								
Antimony, Total	105		-		85-115	-		
Arsenic, Total	97		-		85-115	-		
Barium, Total	113		-		85-115	-		
Beryllium, Total	113		-		85-115	-		
Cadmium, Total	**116**	Q	-		85-115	-		
Chromium, Total	112		-		85-115	-		
Manganese, Total	112		-		85-115	-		
Nickel, Total	114		-		85-115	-		
Selenium, Total	98		-		85-115	-		
Thallium, Total	99		-		85-115	-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919233

Report Date: 05/17/19

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1237438-2					
Aluminum, Total	102	-	85-115	-	
Calcium, Total	97	-	85-115	-	
Copper, Total	111	-	85-115	-	
Iron, Total	111	-	85-115	-	
Magnesium, Total	105	-	85-115	-	
Manganese, Total	111	-	85-115	-	
Potassium, Total	111	-	85-115	-	
Silver, Total	114	-	85-115	-	
Sodium, Total	108	-	85-115	-	
Zinc, Total	107	-	85-115	-	
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-03 Batch: WG1237438-2					
Hardness	102	-	85-115	-	
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1237507-2					
Manganese, Dissolved	96	-	85-115	-	
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1237508-2					
Iron, Dissolved	96	-	85-115	-	

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1235391-3 QC Sample: L1919259-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.0054	109		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1235391-5 QC Sample: L1919261-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.0054	109		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-3 QC Sample: L1919233-01 Client ID: RAW												
Antimony, Total	ND	0.5	0.6012	120		-	-		70-130	-		20
Arsenic, Total	0.0023	0.12	0.1272	104		-	-		70-130	-		20
Barium, Total	0.0213	2	2.384	118		-	-		70-130	-		20
Beryllium, Total	ND	0.05	0.0599	120		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.0611	120		-	-		70-130	-		20
Chromium, Total	ND	0.2	0.2463	123		-	-		70-130	-		20
Manganese, Total	0.8972	0.5	1.521	125		-	-		70-130	-		20
Nickel, Total	ND	0.5	0.5842	117		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1277	106		-	-		70-130	-		20
Thallium, Total	ND	0.12	0.1236	103		-	-		70-130	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-5 QC Sample: L1919445-01 Client ID: MS Sample									
Antimony, Total	ND	0.5	0.5709	114	-	-	70-130	-	20
Arsenic, Total	ND	0.12	0.1218	102	-	-	70-130	-	20
Barium, Total	0.0025	2	2.393	120	-	-	70-130	-	20
Beryllium, Total	ND	0.05	0.0594	119	-	-	70-130	-	20
Cadmium, Total	ND	0.051	0.0624	122	-	-	70-130	-	20
Chromium, Total	ND	0.2	0.2305	115	-	-	70-130	-	20
Manganese, Total	ND	0.5	0.5781	116	-	-	70-130	-	20
Nickel, Total	ND	0.5	0.5831	117	-	-	70-130	-	20
Selenium, Total	ND	0.12	0.1218	102	-	-	70-130	-	20
Thallium, Total	ND	0.12	0.1224	102	-	-	70-130	-	20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-3 QC Sample: L1919233-01 Client ID: RAW									
Aluminum, Total	ND	2	2.44	122	-	-	75-125	-	20
Calcium, Total	21.4	10	30.7	93	-	-	75-125	-	20
Copper, Total	ND	0.25	0.287	115	-	-	75-125	-	20
Iron, Total	ND	1	1.25	125	-	-	75-125	-	20
Magnesium, Total	2.68	10	12.8	101	-	-	75-125	-	20
Manganese, Total	0.962	0.5	1.48	104	-	-	75-125	-	20
Potassium, Total	3.68	10	14.9	112	-	-	75-125	-	20
Silver, Total	ND	0.05	0.059	119	-	-	75-125	-	20
Sodium, Total	48.5	10	59.8	113	-	-	75-125	-	20
Zinc, Total	ND	0.5	0.622	124	-	-	75-125	-	20

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery		MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-3 QC Sample: L1919233-01 Client ID: RAW										
Hardness	64.4	66.2	130	99		-	-	75-125	-	20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-7 QC Sample: L1919445-01 Client ID: MS Sample										
Aluminum, Total	ND	2	2.46	123		-	-	75-125	-	20
Calcium, Total	44.9	10	55.9	110		-	-	75-125	-	20
Copper, Total	0.016	0.25	0.304	115		-	-	75-125	-	20
Iron, Total	ND	1	1.29	**129**	Q	-	-	75-125	-	20
Magnesium, Total	11.7	10	22.0	103		-	-	75-125	-	20
Manganese, Total	ND	0.5	0.556	111		-	-	75-125	-	20
Potassium, Total	ND	10	12.8	**128**	Q	-	-	75-125	-	20
Silver, Total	ND	0.05	0.060	119		-	-	75-125	-	20
Sodium, Total	27.4	10	39.1	117		-	-	75-125	-	20
Zinc, Total	ND	0.5	0.626	125		-	-	75-125	-	20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-7 QC Sample: L1919445-01 Client ID: MS Sample										
Hardness	160	66.2	230	106		-	-	75-125	-	20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237507-3 QC Sample: L1919233-01 Client ID: RAW										
Manganese, Dissolved	0.8626	0.5	1.452	118		-	-	70-130	-	20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237508-3 QC Sample: L1919233-01 Client ID: RAW										
Iron, Dissolved	ND	1	1.01	101		-	-	75-125	-	20

Lab Duplicate Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1235391-4 QC Sample: L1919259-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1235391-6 QC Sample: L1919261-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-4 QC Sample: L1919233-01 Client ID: RAW						
Antimony, Total	ND	ND	mg/l	NC		20
Arsenic, Total	0.0023	0.0024	mg/l	3		20
Barium, Total	0.0213	0.0213	mg/l	0		20
Beryllium, Total	ND	ND	mg/l	NC		20
Cadmium, Total	ND	ND	mg/l	NC		20
Chromium, Total	ND	ND	mg/l	NC		20
Manganese, Total	0.8972	0.8940	mg/l	0		20
Nickel, Total	ND	0.0021	mg/l	NC		20
Selenium, Total	ND	ND	mg/l	NC		20
Thallium, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-6 QC Sample: L1919445-01 Client ID: DUP Sample						
Arsenic, Total	ND	ND	mg/l	NC		20
Manganese, Total	ND	ND	mg/l	NC		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-4 QC Sample: L1919233-01 Client ID: RAW					
Aluminum, Total	ND	ND	mg/l	NC	20
Calcium, Total	21.4	21.2	mg/l	1	20
Copper, Total	ND	ND	mg/l	NC	20
Iron, Total	ND	ND	mg/l	NC	20
Magnesium, Total	2.68	2.62	mg/l	2	20
Manganese, Total	0.962	0.927	mg/l	4	20
Potassium, Total	3.68	3.70	mg/l	1	20
Silver, Total	ND	ND	mg/l	NC	20
Sodium, Total	48.5	49.0	mg/l	1	20
Zinc, Total	ND	ND	mg/l	NC	20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-4 QC Sample: L1919233-01 Client ID: RAW					
Hardness	64.4	63.8	mg/l	1	20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-8 QC Sample: L1919445-01 Client ID: DUP Sample					
Iron, Total	ND	0.063	mg/l	NC	20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237507-4 QC Sample: L1919233-01 Client ID: RAW					
Manganese, Dissolved	0.8626	0.8550	mg/l	1	20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237508-4 QC Sample: L1919233-01 Client ID: RAW					
Iron, Dissolved	ND	ND	mg/l	NC	20

INORGANICS
&
MISCELLANEOUS

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919233
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-01
Client ID: RAW
Sample Location: WEST BOYLSTON, MA
Sample Depth:
Matrix: Dw

Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Turbidity	0.59		NTU	0.20	--	1	-	05/08/19 19:36	44,180.1	AS
Odor @ 60 C	NO ODOR		TON	1	--	1	-	05/08/19 18:53	121,2150B	AS
Color, True	ND		A.P.C.U.	5.0	--	1	-	05/08/19 22:30	121,2120B	AS
Color, Apparent	ND		A.P.C.U.	5.0	--	1	-	05/08/19 22:30	121,2120B	AS
Alkalinity, Total	25.3		mg CaCO3/L	2.00	NA	1	-	05/08/19 19:11	121,2320B	MR
Carbon Dioxide	230		mg/l	2.0	--	1	-	05/08/19 19:11	121,4500CO2-D	MR
Solids, Total Dissolved	260		mg/l	10	--	1	-	05/13/19 08:20	121,2540C	DW
Cyanide, Total	ND		mg/l	0.005	--	1	05/09/19 11:00	05/09/19 16:16	121,4500CN-CE	ML
Fluoride	ND		mg/l	0.20	--	1	-	05/13/19 21:30	121,4500F-C	MM
pH (H)	6.3		SU	-	NA	1	-	05/08/19 22:38	121,4500H+-B	AS
Total Organic Carbon	0.800		mg/l	0.500	--	1	-	05/14/19 07:21	121,5310C	DW
Dissolved Organic Carbon	1.0		mg/l	1.0	--	1	05/09/19 01:30	05/14/19 07:21	121,5310C	DW
Surfactants, MBAS	ND		mg/l	0.050	--	1	05/09/19 04:13	05/09/19 07:17	121,5540C	MA
Bacteria in Water - Westborough Lab										
Coliform, Total	Negative		col/100ml	-	NA	1	-	05/09/19 11:05	121,9223B	JT
Escherichia Coli	Negative		col/100ml	-	NA	1	-	05/09/19 11:05	121,9223B	JT
Anions by Ion Chromatography - Westborough Lab										
Chloride	104.		mg/l	5.00	--	10	-	05/09/19 21:04	44,300.0	AU
Sulfate	10.1		mg/l	1.00	--	1	-	05/09/19 19:16	44,300.0	AU

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919233
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-02
Client ID: FILTER A
Sample Location: WEST BOYLSTON, MA
Sample Depth:
Matrix: Dw

Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Turbidity	0.37		NTU	0.20	--	1	-	05/08/19 19:36	44,180.1	AS
Odor @ 60 C	NO ODOR		TON	1	--	1	-	05/08/19 18:53	121,2150B	AS
Color, True	ND		A.P.C.U.	5.0	--	1	-	05/08/19 22:30	121,2120B	AS
Color, Apparent	5.0		A.P.C.U.	5.0	--	1	-	05/08/19 22:30	121,2120B	AS
Alkalinity, Total	40.3		mg CaCO3/L	2.00	NA	1	-	05/08/19 19:11	121,2320B	MR
Carbon Dioxide	210		mg/l	2.0	--	1	-	05/08/19 19:11	121,4500CO2-D	MR
Solids, Total Dissolved	270		mg/l	10	--	1	-	05/13/19 08:20	121,2540C	DW
Cyanide, Total	ND		mg/l	0.005	--	1	05/09/19 11:00	05/09/19 16:17	121,4500CN-CE	ML
Fluoride	ND		mg/l	0.20	--	1	-	05/13/19 21:30	121,4500F-C	MM
pH (H)	6.6		SU	-	NA	1	-	05/08/19 22:38	121,4500H+-B	AS
Total Organic Carbon	0.800		mg/l	0.500	--	1	-	05/14/19 07:21	121,5310C	DW
Dissolved Organic Carbon	1.0		mg/l	1.0	--	1	05/09/19 01:30	05/14/19 07:21	121,5310C	DW
Surfactants, MBAS	ND		mg/l	0.050	--	1	05/09/19 04:13	05/09/19 07:18	121,5540C	MA
Bacteria in Water - Westborough Lab										
Coliform, Total	Negative		col/100ml	-	NA	1	-	05/09/19 11:05	121,9223B	JT
Escherichia Coli	Negative		col/100ml	-	NA	1	-	05/09/19 11:05	121,9223B	JT
Anions by Ion Chromatography - Westborough Lab										
Chloride	106.		mg/l	5.00	--	10	-	05/09/19 21:52	44,300.0	AU
Sulfate	10.0		mg/l	1.00	--	1	-	05/09/19 19:28	44,300.0	AU

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919233
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919233-03
Client ID: FILTER C
Sample Location: WEST BOYLSTON, MA
Sample Depth:
Matrix: Dw

Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Turbidity	0.22		NTU	0.20	--	1	-	05/08/19 19:36	44,180.1	AS
Odor @ 60 C	NO ODOR		TON	1	--	1	-	05/08/19 18:53	121,2150B	AS
Color, True	ND		A.P.C.U.	5.0	--	1	-	05/08/19 22:30	121,2120B	AS
Color, Apparent	6.0		A.P.C.U.	5.0	--	1	-	05/08/19 22:30	121,2120B	AS
Alkalinity, Total	40.1		mg CaCO3/L	2.00	NA	1	-	05/08/19 19:11	121,2320B	MR
Carbon Dioxide	200		mg/l	2.0	--	1	-	05/08/19 19:11	121,4500CO2-D	MR
Solids, Total Dissolved	280		mg/l	10	--	1	-	05/13/19 08:20	121,2540C	DW
Cyanide, Total	ND		mg/l	0.005	--	1	05/09/19 11:00	05/09/19 16:18	121,4500CN-CE	ML
Fluoride	ND		mg/l	0.20	--	1	-	05/13/19 21:30	121,4500F-C	MM
pH (H)	6.7		SU	-	NA	1	-	05/08/19 22:38	121,4500H+-B	AS
Total Organic Carbon	0.800		mg/l	0.500	--	1	-	05/14/19 07:21	121,5310C	DW
Dissolved Organic Carbon	ND		mg/l	1.0	--	1	05/09/19 01:30	05/14/19 07:21	121,5310C	DW
Surfactants, MBAS	ND		mg/l	0.050	--	1	05/09/19 04:13	05/09/19 07:19	121,5540C	MA
Bacteria in Water - Westborough Lab										
Coliform, Total	Negative		col/100ml	-	NA	1	-	05/09/19 11:05	121,9223B	JT
Escherichia Coli	Negative		col/100ml	-	NA	1	-	05/09/19 11:05	121,9223B	JT
Anions by Ion Chromatography - Westborough Lab										
Chloride	106.		mg/l	5.00	--	10	-	05/09/19 22:52	44,300.0	AU
Sulfate	10.0		mg/l	1.00	--	1	-	05/09/19 19:40	44,300.0	AU

Project Name: WEST BOYLSTON-SE F **Lab Number:** L1919233

Project Number: 03508 **Report Date:** 05/17/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG1235076-1										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	05/08/19 19:11	121,2320B	MR
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG1235079-1										
Odor	NO ODOR		TON	1	--	1	-	05/08/19 18:53	121,2150B	AS
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG1235083-3										
Turbidity	ND		NTU	0.20	--	1	-	05/08/19 19:36	44,180.1	AS
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG1235193-1										
Surfactants, MBAS	ND		mg/l	0.050	--	1	05/09/19 04:13	05/09/19 07:13	121,5540C	MA
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG1235319-1										
Cyanide, Total	ND		mg/l	0.005	--	1	05/09/19 11:00	05/09/19 15:29	121,4500CN-CE	ML
Bacteria in Water - Westborough Lab for sample(s): 01-03 Batch: WG1235345-1										
Coliform, Total	Negative		col/100ml	-	NA	1	-	05/09/19 11:05	121,9223B	JT
Escherichia Coli	Negative		col/100ml	-	NA	1	-	05/09/19 11:05	121,9223B	JT
Anions by Ion Chromatography - Westborough Lab for sample(s): 01-03 Batch: WG1235931-1										
Sulfate	ND		mg/l	1.00	--	1	-	05/09/19 17:40	44,300.0	AU
Anions by Ion Chromatography - Westborough Lab for sample(s): 01-03 Batch: WG1235931-1										
Chloride	ND		mg/l	0.500	--	1	-	05/09/19 17:40	44,300.0	AU
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG1236395-1										
Solids, Total Dissolved	ND		mg/l	10	--	1	-	05/13/19 08:20	121,2540C	DW
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG1236646-1										
Fluoride	ND		mg/l	0.20	--	1	-	05/13/19 21:30	121,4500F-C	MM
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG1236787-1										
Total Organic Carbon	ND		mg/l	0.500	--	1	-	05/14/19 07:21	121,5310C	DW
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG1236791-1										
Dissolved Organic Carbon	ND		mg/l	1.0	--	1	05/09/19 01:30	05/14/19 07:21	121,5310C	DW

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919233

Report Date: 05/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG1235076-2								
Alkalinity, Total	100		-		90-110	-		10
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG1235083-1								
Turbidity	105		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG1235119-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG1235193-2								
Surfactants, MBAS	102		-		65-126	-		
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG1235319-2								
Cyanide, Total	101		-		90-110	-		
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-03 Batch: WG1235931-2								
Chloride	102		-		90-110	-		
Sulfate	103		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG1236395-2								
Solids, Total Dissolved	116		-		80-120	-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919233

Report Date: 05/17/19

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG1236646-2					
Fluoride	86	-	78-115	-	
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG1236787-2					
Total Organic Carbon	104	-	90-110	-	
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG1236791-2					
Dissolved Organic Carbon	104	-	90-110	-	

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235076-4 QC Sample: L1919233-01 Client ID: RAW												
Alkalinity, Total	25.3	100	125	100		-	-		86-116	-		10
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235193-4 QC Sample: L1919233-01 Client ID: RAW												
Surfactants, MBAS	ND	0.4	0.320	80		-	-		52-157	-		32
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235319-4 QC Sample: L1919109-02 Client ID: MS Sample												
Cyanide, Total	ND	0.2	0.183	92		-	-		90-110	-		30
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235931-3 QC Sample: L1919233-03 Client ID: FILTER C												
Chloride	106	40	146	100		-	-		90-110	-		18
Sulfate	10.0	8	18.2	102		-	-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236646-4 QC Sample: L1919233-01 Client ID: RAW												
Fluoride	ND	2	1.7	86		-	-		69-124	-		13
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236787-4 QC Sample: L1918812-01 Client ID: MS Sample												
Total Organic Carbon	18.0	80	96.2	98		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236791-4 QC Sample: L1919233-02 Client ID: FILTER A												
Dissolved Organic Carbon	1.0	8	8.9	99		-	-		80-120	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235075-1 QC Sample: L1919233-01 Client ID: RAW						
Carbon Dioxide	230	180	mg/l	24		
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235076-3 QC Sample: L1919233-01 Client ID: RAW						
Alkalinity, Total	25.3	25.1	mg CaCO3/L	1		10
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235079-2 QC Sample: L1919233-03 Client ID: FILTER C						
Odor	NO ODOR	NO ODOR	TON	NC		
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235083-2 QC Sample: L1919233-03 Client ID: FILTER C						
Turbidity	0.22	ND	NTU	NC		13
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235119-2 QC Sample: L1919086-01 Client ID: DUP Sample						
pH	7.9	7.9	SU	0		5
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235120-1 QC Sample: L1919233-03 Client ID: FILTER C						
Color, Apparent	6.0	6.0	A.P.C.U.	0		
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235121-1 QC Sample: L1919233-03 Client ID: FILTER C						
Color, True	ND	ND	A.P.C.U.	NC		
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235193-3 QC Sample: L1919233-01 Client ID: RAW						
Surfactants, MBAS	ND	ND	mg/l	NC		32
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235319-3 QC Sample: L1919109-01 Client ID: DUP Sample						
Cyanide, Total	ND	ND	mg/l	NC		30

Lab Duplicate Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919233

Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235931-4 QC Sample: L1919233-03 Client ID: FILTER C					
Sulfate	10.0	10.0	mg/l	1	20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1235931-4 QC Sample: L1919233-03 Client ID: FILTER C					
Chloride	106	106	mg/l	0	18
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236395-3 QC Sample: L1919084-01 Client ID: DUP Sample					
Solids, Total Dissolved	2800	2900	mg/l	4	10
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236646-3 QC Sample: L1919233-01 Client ID: RAW					
Fluoride	ND	ND	mg/l	NC	13
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236787-3 QC Sample: L1918812-01 Client ID: DUP Sample					
Total Organic Carbon	18.0	17.3	mg/l	4	20
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1236791-3 QC Sample: L1919233-01 Client ID: RAW					
Dissolved Organic Carbon	1.0	1.0	mg/l	0	20

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1919233-01A	Vial HCl preserved	A	NA		4.0	Y	Absent		524.2(14)
L1919233-01B	Vial HCl preserved	A	NA		4.0	Y	Absent		524.2(14)
L1919233-01C	Vial unpreserved	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-01D	Vial unpreserved	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-01E	Vial H2SO4 preserved	A	NA		4.0	Y	Absent		TOC-5310(28)
L1919233-01F	Vial H2SO4 preserved	A	NA		4.0	Y	Absent		TOC-5310(28)
L1919233-01G	Bacteria Cup Na2S2O3 preserved	A	NA		4.0	Y	Absent		T-COLI-C(1.25)
L1919233-01H	Bacteria Cup Na2S2O3 preserved	A	NA		4.0	Y	Absent		T-COLI-C(1.25)
L1919233-01J	Plastic 250ml unpreserved	A	7	7	4.0	Y	Absent		-
L1919233-01K	Plastic 250ml HNO3 preserved	A	<2	<2	4.0	Y	Absent		CD-2008T(180),AG-UI(180),CA-UI(180),MN-2008T(180),NI-2008T(180),ZN-UI(180),BE-2008T(180),K-UI(180),FE-UI(180),HARDU(180),MG-UI(180),AS-2008T(180),HG-U(28),SE-2008T(180),AL-UI(180),BA-2008T(180),MN-UI(180),NA-UI(180),CR-2008T(180),CU-UI(180),SB-2008T(180),TL-2008T(180)
L1919233-01L	Plastic 250ml NaOH preserved	A	>12	>12	4.0	Y	Absent		TCN-4500(14)
L1919233-01M	Plastic 500ml unpreserved/No Headspace	A	NA		4.0	Y	Absent		ALK-T-2320(14),CO2(1)
L1919233-01N	Plastic 950ml unpreserved	A	7	7	4.0	Y	Absent		F-4500(28),SO4-300(28),CL-300(28),TURB-180(2),MBAS-5540(2),PH-4500(.01),TDS-2540(7)
L1919233-01N1	Plastic 950ml unpreserved	A	7	7	4.0	Y	Absent		MBAS-5540(2)
L1919233-01P	Amber 950ml unpreserved	A	7	7	4.0	Y	Absent		COLOR-T-2120(2),COLOR-A-2120(2),ODOR-2150(1)
L1919233-01X	Plastic 120ml HNO3 preserved Filtrates	A	NA		4.0	Y	Absent		FE-RI(180),MN-2008S(180)
L1919233-01Y	Vial H2SO4 preserved Filtrates	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-01Z	Vial H2SO4 preserved Filtrates	A	NA		4.0	Y	Absent		DOC-5310(28)

*Values in parentheses indicate holding time in days

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1919233-02A	Vial HCl preserved	A	NA		4.0	Y	Absent		524.2(14)
L1919233-02B	Vial HCl preserved	A	NA		4.0	Y	Absent		524.2(14)
L1919233-02C	Vial unpreserved	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-02D	Vial unpreserved	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-02E	Vial H2SO4 preserved	A	NA		4.0	Y	Absent		TOC-5310(28)
L1919233-02F	Vial H2SO4 preserved	A	NA		4.0	Y	Absent		TOC-5310(28)
L1919233-02G	Bacteria Cup Na2S2O3 preserved	A	NA		4.0	Y	Absent		T-COLI-C(1.25)
L1919233-02H	Bacteria Cup Na2S2O3 preserved	A	NA		4.0	Y	Absent		T-COLI-C(1.25)
L1919233-02K	Plastic 250ml HNO3 preserved	A	<2	<2	4.0	Y	Absent		CD-2008T(180),AG-UI(180),CA-UI(180),MN-2008T(180),NI-2008T(180),ZN-UI(180),BE-2008T(180),K-UI(180),FE-UI(180),HARDU(180),MG-UI(180),AS-2008T(180),HG-U(28),SE-2008T(180),AL-UI(180),BA-2008T(180),MN-UI(180),NA-UI(180),CR-2008T(180),CU-UI(180),SB-2008T(180),TL-2008T(180)
L1919233-02L	Plastic 250ml NaOH preserved	A	>12	>12	4.0	Y	Absent		TCN-4500(14)
L1919233-02M	Plastic 500ml unpreserved/No Headspace	A	NA		4.0	Y	Absent		ALK-T-2320(14),CO2(1)
L1919233-02N	Plastic 950ml unpreserved	A	7	7	4.0	Y	Absent		F-4500(28),SO4-300(28),CL-300(28),TURB-180(2),MBAS-5540(2),PH-4500(.01),TDS-2540(7)
L1919233-02N1	Plastic 950ml unpreserved	A	7	7	4.0	Y	Absent		MBAS-5540(2)
L1919233-02P	Amber 950ml unpreserved	A	7	7	4.0	Y	Absent		COLOR-T-2120(2),COLOR-A-2120(2),ODOR-2150(1)
L1919233-02Y	Vial H2SO4 preserved Filtrates	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-02Z	Vial H2SO4 preserved Filtrates	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-03A	Vial HCl preserved	A	NA		4.0	Y	Absent		524.2(14)
L1919233-03B	Vial HCl preserved	A	NA		4.0	Y	Absent		524.2(14)
L1919233-03C	Vial unpreserved	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-03D	Vial unpreserved	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-03E	Vial H2SO4 preserved	A	NA		4.0	Y	Absent		TOC-5310(28)
L1919233-03F	Vial H2SO4 preserved	A	NA		4.0	Y	Absent		TOC-5310(28)
L1919233-03G	Bacteria Cup Na2S2O3 preserved	A	NA		4.0	Y	Absent		T-COLI-C(1.25)
L1919233-03H	Bacteria Cup Na2S2O3 preserved	A	NA		4.0	Y	Absent		T-COLI-C(1.25)

*Values in parentheses indicate holding time in days

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919233
Report Date: 05/17/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1919233-03K	Plastic 250ml HNO3 preserved	A	<2	<2	4.0	Y	Absent		CD-2008T(180),AG-UI(180),CA-UI(180),MN-2008T(180),NI-2008T(180),ZN-UI(180),BE-2008T(180),K-UI(180),FE-UI(180),HARDU(180),MG-UI(180),AS-2008T(180),HG-U(28),SE-2008T(180),AL-UI(180),BA-2008T(180),MN-UI(180),NA-UI(180),CR-2008T(180),CU-UI(180),SB-2008T(180),TL-2008T(180)
L1919233-03L	Plastic 250ml NaOH preserved	A	>12	>12	4.0	Y	Absent		TCN-4500(14)
L1919233-03M	Plastic 500ml unpreserved/No Headspace	A	NA		4.0	Y	Absent		ALK-T-2320(14),CO2(1)
L1919233-03N	Plastic 950ml unpreserved	A	7	7	4.0	Y	Absent		F-4500(28),SO4-300(28),CL-300(28),TURB-180(2),MBAS-5540(2),PH-4500(.01),TDS-2540(7)
L1919233-03N1	Plastic 950ml unpreserved	A	7	7	4.0	Y	Absent		MBAS-5540(2)
L1919233-03P	Amber 950ml unpreserved	A	7	7	4.0	Y	Absent		COLOR-T-2120(2),COLOR-A-2120(2),ODOR-2150(1)
L1919233-03Y	Vial H2SO4 preserved Filtrates	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-03Z	Vial H2SO4 preserved Filtrates	A	NA		4.0	Y	Absent		DOC-5310(28)
L1919233-04A	Vial HCl preserved	A	NA		4.0	Y	Absent		ARCHIVE()
L1919233-04B	Vial HCl preserved	A	NA		4.0	Y	Absent		ARCHIVE()

*Values in parentheses indicate holding time in days

Project Name:	WEST BOYLSTON-SE F	**Lab Number:**	L1919233
Project Number:	03508	**Report Date:**	05/17/19

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON-SE F	**Lab Number:**	L1919233
Project Number:	03508	**Report Date:**	05/17/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON-SE F	**Lab Number:**	L1919233
Project Number:	03508	**Report Date:**	05/17/19

REFERENCES

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

16 Methods for the Determination of Organic Compounds in Drinking Water - Supplement II. EPA/600/R-92/129, August 1992.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 5/8/19

ALPHA Job #: L1919233

Project Information

Project Name: WEST BOYLSTON - SE F

Project Location: WEST BOYLSTON, MA

Project #: 03508

Project Manager: ERIK GROTTON

ALPHA Quote #:

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☒ Same as Client info PO #:

Client Information

Client: BLUELEAF INC

Address: 57 PRESSER HILL RD
CHARLTON, MA 01507

Phone: 508-294-3714

Email: egrotton@blueleafwater.com

Regulatory Requirements & Project Information Requirements

☐ Yes ☒ No MA MCP Analytical Methods
☐ Yes ☒ No CT RCP Analytical Methods
☐ Yes ☒ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☒ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☒ No NPDES RGP
☐ Other State /Fed Program ______ Criteria ______

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due:

Additional Project Information:

LAB TO FILTER:
- Dissolved Fe, Mn
- DOC

SDS:
see Ethan Leishton
TTHM + HAA5 to be done

ANALYSIS

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC: ☐ 8260 ☐ 624 ☐ 524.2	SVOC: ☐ ABN ☐ PAH	METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15	METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13	EPH: ☐ Ranges & Targets ☐ Ranges Only	VPH: ☐ Ranges & Targets ☐ Ranges Only	☐ PCB ☐ PEST	TPH: ☐ Quant Only ☐ Fingerprint	Total Fe, Mn, pH	Dissolved Fe, Mn	Turb, Color (T/A), Alk, TC, CO2	SDS (see Ethan Leishton)	Total VOCs, IOC Scan[illegible]	TOC/DOC	Sample Comments	Total # Bottles
19233-01	RAW	5/8	8:30	DW	BJS									X	X	X		X	X		14
02	FILTER A	5/8	8:30	DW	BJS									X		X	X	X	X		16
03	FILTER C	5/8	8:30	DW	BJS									X		X	X	X	X		16

SAMPLE INFO
Filtration
☐ Field
☒ Lab to do
Preservation
☐ Lab to do

Container Type
Preservative

Container Type	Preservative
P= Plastic	A= None
A= Amber glass	B= HCl
V= Vial	C= HNO_3
G= Glass	D= H_2SO_4
B= Bacteria cup	E= NaOH
C= Cube	F= MeOH
O= Other	G= $NaHSO_4$
E= Encore	H = $Na_2S_2O_3$
D= BOD Bottle	I= Ascorbic Acid
	J = NH_4Cl
	K= Zn Acetate
	O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	5/8 16:28	Chris [illegible]	5/8/19 1628

ANALYTICAL REPORT

Lab Number:	L1919236
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Erik Grotton
Phone:	(508) 248-7094
Project Name:	WEST BOYLSTON-SE G
Project Number:	03508
Report Date:	05/17/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: WEST BOYLSTON-SE G
Project Number: 03508

Lab Number: L1919236
Report Date: 05/17/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1919236-01	RAW W1 SSN	DW	WEST BOYLSTON, MA	05/08/19 11:00	05/08/19
L1919236-02	FILTER A	DW	WEST BOYLSTON, MA	05/08/19 11:00	05/08/19
L1919236-03	FILTER C	DW	WEST BOYLSTON, MA	05/08/19 11:00	05/08/19

Project Name:	WEST BOYLSTON-SE G	**Lab Number:**	L1919236
Project Number:	03508	**Report Date:**	05/17/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Amita Naik

Title: Technical Director/Representative Date: 05/17/19

METALS

Project Name: WEST BOYLSTON-SE G
Lab Number: L1919236
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919236-01
Client ID: RAW W1 SSN
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 11:00
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 18:58	EPA 3005A	19,200.7	AB
Manganese, Total	0.8463		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 13:08	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/15/19 16:05	05/16/19 00:52	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.8010		mg/l	0.0010	--	1	05/15/19 16:05	05/16/19 15:04	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON-SE G
Lab Number: L1919236
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919236-02
Client ID: FILTER A
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 11:00
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 19:03	EPA 3005A	19,200.7	AB
Manganese, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 13:12	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON-SE G
Lab Number: L1919236
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919236-03
Client ID: FILTER C
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 11:00
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 19:08	EPA 3005A	19,200.7	AB
Manganese, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 13:16	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON-SE G
Project Number: 03508
Lab Number: L1919236
Report Date: 05/17/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1237435-1										
Manganese, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1237438-1										
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1237507-1										
Manganese, Dissolved	ND		mg/l	0.0010	--	1	05/15/19 16:05	05/16/19 14:28	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1237508-1										
Iron, Dissolved	ND		mg/l	0.050	--	1	05/15/19 16:05	05/16/19 00:14	19,200.7	AB

Project Name: WEST BOYLSTON-SE G
Project Number: 03508
Lab Number: L1919236
Report Date: 05/17/19

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE G

Project Number: 03508

Lab Number: L1919236

Report Date: 05/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1237435-2								
Manganese, Total	112		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1237438-2								
Iron, Total	111		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1237507-2								
Manganese, Dissolved	96		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1237508-2								
Iron, Dissolved	96		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE G
Project Number: 03508

Lab Number: L1919236
Report Date: 05/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-3 QC Sample: L1919233-01 Client ID: MS Sample												
Manganese, Total	0.8972	0.5	1.521	125		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-5 QC Sample: L1919445-01 Client ID: MS Sample												
Manganese, Total	ND	0.5	0.5781	116		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-3 QC Sample: L1919233-01 Client ID: MS Sample												
Iron, Total	ND	1	1.25	125		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-7 QC Sample: L1919445-01 Client ID: MS Sample												
Iron, Total	ND	1	1.29	**129**	Q	-	-		75-125	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237507-3 QC Sample: L1919233-01 Client ID: MS Sample												
Manganese, Dissolved	0.8626	0.5	1.452	118		-	-		70-130	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237508-3 QC Sample: L1919233-01 Client ID: MS Sample												
Iron, Dissolved	ND	1	1.01	101		-	-		75-125	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE G

Project Number: 03508

Lab Number: L1919236

Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-4 QC Sample: L1919233-01 Client ID: DUP Sample						
Manganese, Total	0.8972	0.8940	mg/l	0		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-6 QC Sample: L1919445-01 Client ID: DUP Sample						
Manganese, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-4 QC Sample: L1919233-01 Client ID: DUP Sample						
Iron, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-8 QC Sample: L1919445-01 Client ID: DUP Sample						
Iron, Total	ND	0.063	mg/l	NC		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237507-4 QC Sample: L1919233-01 Client ID: DUP Sample						
Manganese, Dissolved	0.8626	0.8550	mg/l	1		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237508-4 QC Sample: L1919233-01 Client ID: DUP Sample						
Iron, Dissolved	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: WEST BOYLSTON-SE G
Project Number: 03508
Lab Number: L1919236
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919236-01
Client ID: RAW W1 SSN
Sample Location: WEST BOYLSTON, MA
Sample Depth:
Matrix: Dw

Date Collected: 05/08/19 11:00
Date Received: 05/08/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	6.3		SU	-	NA	1	-	05/08/19 22:38	121,4500H+-B	AS

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE G

Project Number: 03508

Lab Number: L1919236

Report Date: 05/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1235119-1								
pH	100		-		99-101	-		5

Lab Duplicate Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE G

Project Number: 03508

Lab Number: L1919236

Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1235119-2 QC Sample: L1919086-01 Client ID: DUP Sample						
pH	7.9	7.9	SU	0		5

Project Name: WEST BOYLSTON-SE G
Project Number: 03508

Lab Number: L1919236
Report Date: 05/17/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1919236-01A	Plastic 60ml unpreserved	A	7	7	4.2	Y	Absent		PH-4500(.01)
L1919236-01B	Plastic 120ml HNO3 preserved	A	<2	<2	4.2	Y	Absent		MN-2008T(180),FE-UI(180)
L1919236-01C	Plastic 250ml unpreserved	A	7	7	4.2	Y	Absent		-
L1919236-01X	Plastic 120ml HNO3 preserved Filtrates	A	7	7	4.2	Y	Absent		FE-RI(180),MN-2008S(180)
L1919236-02A	Plastic 120ml HNO3 preserved	A	<2	<2	4.2	Y	Absent		MN-2008T(180),FE-UI(180)
L1919236-03A	Plastic 120ml HNO3 preserved	A	<2	<2	4.2	Y	Absent		MN-2008T(180),FE-UI(180)

*Values in parentheses indicate holding time in days

Project Name:	WEST BOYLSTON-SE G	**Lab Number:**	L1919236
Project Number:	03508	**Report Date:**	05/17/19

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON-SE G	**Lab Number:**	L1919236
Project Number:	03508	**Report Date:**	05/17/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON-SE G	**Lab Number:**	L1919236
Project Number:	03508	**Report Date:**	05/17/19

REFERENCES

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 5/8/19

ALPHA Job #: L1919236

Client Information

Client: BIWELDAF INC
Address: 57 PRESSER HILL RD
CHARLTON, MA 01507
Phone: 508-294-3714
Email: egrotton@biweldwire.com

Project Information

Project Name: WEST BOYLSTON - SEG
Project Location: WEST BOYLSTON, MA
Project #: 03508
Project Manager: ERIK GROTTON
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due:

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☐ Yes ☒ No MA MCP Analytical Methods ☐ Yes ☒ No CT RCP Analytical Methods
☐ Yes ☒ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☒ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☒ No NPDES RGP
☐ Other State /Fed Program _____ Criteria _____

Additional Project Information:

LAB TO FILTER!
-Dissolved Fe/Mn

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	ANALYSIS: VOC: ☐ 8260 ☐ 624 ☐ 524.2	SVOC: ☐ ABN ☐ PAH	METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15	METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13	EPH: ☐ Ranges & Targets ☐ Ranges Only	VPH: ☐ Ranges & Targets ☐ Ranges Only	☐ PCB ☐ PEST	TPH: ☐ Quant Only ☐ Fingerprint	Total Fe, Mn	Dissolved Fe, Mn, pH	SAMPLE INFO: Filtration ☐ Field ☒ Lab to do; Preservation ☐ Lab to do	Sample Comments	TOTAL # BOTTLES
A236-01	RAW W/ SSN	5/8	11:00	DW	BJS								X	X				3
-02	FILTER A	5/8	11:00	DW	BJS								X					1
-03	FILTER C	5/8	11:00	DW	BJS								X					1

Container Type
Preservative

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
	5/8 16:28	Christeleau	5/8/19 1628

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

ANALYTICAL REPORT

Lab Number:	L1919237
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Erik Grotton
Phone:	(508) 248-7094
Project Name:	WEST BOYLSTON-SE H
Project Number:	03508
Report Date:	05/17/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: WEST BOYLSTON-SE H
Project Number: 03508

Lab Number: L1919237
Report Date: 05/17/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1919237-01	RAW	DW	WEST BOYLSTON, MA	05/08/19 14:30	05/08/19
L1919237-02	FILTER A	DW	WEST BOYLSTON, MA	05/08/19 14:30	05/08/19
L1919237-03	FILTER C	DW	WEST BOYLSTON, MA	05/08/19 14:30	05/08/19

Project Name:	WEST BOYLSTON-SE H	**Lab Number:**	L1919237
Project Number:	03508	**Report Date:**	05/17/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Amita Naik

Title: Technical Director/Representative Date: 05/17/19

METALS

Project Name: WEST BOYLSTON-SE H
Lab Number: L1919237
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919237-01
Client ID: RAW
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 14:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	0.107		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 19:12	EPA 3005A	19,200.7	AB
Manganese, Total	0.9278		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 13:20	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/15/19 16:05	05/16/19 00:56	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.9333		mg/l	0.0010	--	1	05/15/19 16:05	05/16/19 15:52	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON-SE H
Lab Number: L1919237
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919237-02
Client ID: FILTER A
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 14:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 19:17	EPA 3005A	19,200.7	AB
Manganese, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 13:24	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON-SE H
Lab Number: L1919237
Project Number: 03508
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919237-03
Client ID: FILTER C
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/08/19 14:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 19:21	EPA 3005A	19,200.7	AB
Manganese, Total	0.0010		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 14:10	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON-SE H
Project Number: 03508
Lab Number: L1919237
Report Date: 05/17/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1237435-1										
Manganese, Total	ND		mg/l	0.0010	--	1	05/15/19 13:21	05/16/19 10:21	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1237438-1										
Iron, Total	ND		mg/l	0.050	--	1	05/15/19 13:21	05/16/19 17:06	19,200.7	AB

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1237507-1										
Manganese, Dissolved	ND		mg/l	0.0010	--	1	05/15/19 16:05	05/16/19 14:28	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1237508-1										
Iron, Dissolved	ND		mg/l	0.050	--	1	05/15/19 16:05	05/16/19 00:14	19,200.7	AB

Project Name: WEST BOYLSTON-SE H
Project Number: 03508
Lab Number: L1919237
Report Date: 05/17/19

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE H

Project Number: 03508

Lab Number: L1919237

Report Date: 05/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1237435-2								
Manganese, Total	112		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1237438-2								
Iron, Total	111		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1237507-2								
Manganese, Dissolved	96		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1237508-2								
Iron, Dissolved	96		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE H
Project Number: 03508

Lab Number: L1919237
Report Date: 05/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-3 QC Sample: L1919233-01 Client ID: MS Sample												
Manganese, Total	0.8972	0.5	1.521	125		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-5 QC Sample: L1919445-01 Client ID: MS Sample												
Manganese, Total	ND	0.5	0.5781	116		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-3 QC Sample: L1919233-01 Client ID: MS Sample												
Iron, Total	ND	1	1.25	125		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-7 QC Sample: L1919445-01 Client ID: MS Sample												
Iron, Total	ND	1	1.29	**129**	Q	-	-		75-125	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237507-3 QC Sample: L1919233-01 Client ID: MS Sample												
Manganese, Dissolved	0.8626	0.5	1.452	118		-	-		70-130	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237508-3 QC Sample: L1919233-01 Client ID: MS Sample												
Iron, Dissolved	ND	1	1.01	101		-	-		75-125	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE H
Project Number: 03508

Lab Number: L1919237
Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-4 QC Sample: L1919233-01 Client ID: DUP Sample						
Manganese, Total	0.8972	0.8940	mg/l	0		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237435-6 QC Sample: L1919445-01 Client ID: DUP Sample						
Manganese, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-4 QC Sample: L1919233-01 Client ID: DUP Sample						
Iron, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1237438-8 QC Sample: L1919445-01 Client ID: DUP Sample						
Iron, Total	ND	0.063	mg/l	NC		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237507-4 QC Sample: L1919233-01 Client ID: DUP Sample						
Manganese, Dissolved	0.8626	0.8550	mg/l	1		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237508-4 QC Sample: L1919233-01 Client ID: DUP Sample						
Iron, Dissolved	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: WEST BOYLSTON-SE H
Project Number: 03508

Lab Number: L1919237
Report Date: 05/17/19

SAMPLE RESULTS

Lab ID: L1919237-01
Client ID: RAW
Sample Location: WEST BOYLSTON, MA

Date Collected: 05/08/19 14:30
Date Received: 05/08/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	6.2		SU	-	NA	1	-	05/08/19 22:38	121,4500H+-B	AS

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE H

Project Number: 03508

Lab Number: L1919237

Report Date: 05/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1235119-1								
pH	100		-		99-101	-		5

Lab Duplicate Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE H

Project Number: 03508

Lab Number: L1919237

Report Date: 05/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1235119-2 QC Sample: L1919086-01 Client ID: DUP Sample						
pH	7.9	7.9	SU	0		5

Project Name: WEST BOYLSTON-SE H
Project Number: 03508

Lab Number: L1919237
Report Date: 05/17/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1919237-01A	Plastic 60ml unpreserved	A	7	7	4.6	Y	Absent		PH-4500(.01)
L1919237-01B	Plastic 120ml HNO3 preserved	A	<2	<2	4.6	Y	Absent		MN-2008T(180),FE-UI(180)
L1919237-01C	Plastic 250ml unpreserved	A	7	7	4.6	Y	Absent		-
L1919237-01X	Plastic 120ml HNO3 preserved Filtrates	A	NA		4.6	Y	Absent		FE-RI(180),MN-2008S(180)
L1919237-02A	Plastic 250ml HNO3 preserved	A	<2	<2	4.6	Y	Absent		MN-2008T(180),FE-UI(180)
L1919237-02B	Plastic 60ml unpreserved	A	7	7	4.6	Y	Absent		ARCHIVE()
L1919237-03A	Plastic 250ml HNO3 preserved	A	<2	<2	4.6	Y	Absent		MN-2008T(180),FE-UI(180)
L1919237-03B	Plastic 60ml unpreserved	A	7	7	4.6	Y	Absent		ARCHIVE()

*Values in parentheses indicate holding time in days

Project Name:	WEST BOYLSTON-SE H	**Lab Number:**	L1919237
Project Number:	03508	**Report Date:**	05/17/19

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON-SE H	**Lab Number:**	L1919237
Project Number:	03508	**Report Date:**	05/17/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON-SE H	**Lab Number:**	L1919237
Project Number:	03508	**Report Date:**	05/17/19

REFERENCES

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 5/8/19

ALPHA Job #: L1919257

Project Information

Project Name: WEST BOYLSTON - SE H
Project Location: WEST BOYLSTON, MA
Project #: 03508
Project Manager: ERIK GRATTON
ALPHA Quote #:

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☒ Same as Client info PO #:

Client Information

Client: BLUELEAF INC
Address: 57 DRESSER HILL RD
CHARLTON, MA 01507
Phone: 508-294-3714
Email: egratton@blueleafwater.com

Regulatory Requirements & Project Information Requirements

- ☐ Yes ☒ No MA MCP Analytical Methods
- ☐ Yes ☒ No CT RCP Analytical Methods
- ☐ Yes ☒ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
- ☐ Yes ☒ No GW1 Standards (Info Required for Metals & EPH with Targets)
- ☐ Yes ☒ No NPDES RGP
- ☐ Other State /Fed Program ________ Criteria ________

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due:

Additional Project Information:

LAB TO FILTER:
-Dissolved Fe/Mn

ANALYSIS: VOC: ☐ 8260 ☐ 624 ☐ 524.2; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☐ Ranges & Targets ☐ Ranges Only; VPH: ☐ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☐ Quant Only ☐ Fingerprint; Total Fe, Mn, pH; Dissolved Fe, Mn

SAMPLE INFO: Filtration ☐ Field ☒ Lab to do; Preservation ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	Total Fe, Mn, pH	Dissolved Fe, Mn	Sample Comments	TOTAL # BOTTLES
19257-01	RAW	5/8	1430	DW	BJS	X	X		3
-02	FILTER A	5/8	1430	DW	BJS	X			2
-03	FILTER C	5/8	1430	DW	BJS	X			2

Container Type
Preservative

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	5/8 16:28	Chris Tebeau [signature]	5/8/19 1628

FORM NO: 01-01 (rev. 12-Mar-2012)

ANALYTICAL REPORT

Lab Number:	L1919388
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Erik Grotton
Phone:	(508) 248-7094
Project Name:	WEST BOYLSTON-SE A
Project Number:	03508
Report Date:	05/20/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: WEST BOYLSTON-SE A
Project Number: 03508

Lab Number: L1919388
Report Date: 05/20/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1919388-01	RAW	DW	WEST BOYLSTON, MA	05/09/19 09:00	05/09/19
L1919388-02	M1	DW	WEST BOYLSTON, MA	05/09/19 09:00	05/09/19
L1919388-03	M2	DW	WEST BOYLSTON, MA	05/09/19 09:00	05/09/19

Project Name:	WEST BOYLSTON-SE A	**Lab Number:**	L1919388
Project Number:	03508	**Report Date:**	05/20/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

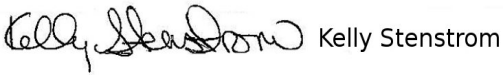
When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Kelly Stenstrom

Title: Technical Director/Representative Date: 05/20/19

METALS

Project Name: WEST BOYLSTON-SE A
Lab Number: L1919388
Project Number: 03508
Report Date: 05/20/19

SAMPLE RESULTS

Lab ID: L1919388-01
Client ID: RAW
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/09/19 09:00
Date Received: 05/09/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	05/17/19 16:12	05/18/19 00:36	EPA 3005A	19,200.7	AB
Manganese, Total	0.9623		mg/l	0.0010	--	1	05/17/19 16:12	05/18/19 18:01	EPA 3005A	3,200.8	MG
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/18/19 10:55	05/20/19 12:32	EPA 3005A	19,200.7	LC
Manganese, Dissolved	0.9806		mg/l	0.0010	--	1	05/18/19 10:55	05/18/19 16:50	EPA 3005A	3,200.8	MG

Project Name: WEST BOYLSTON-SE A
Lab Number: L1919388
Project Number: 03508
Report Date: 05/20/19

SAMPLE RESULTS

Lab ID: L1919388-02
Client ID: M1
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/09/19 09:00
Date Received: 05/09/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	05/17/19 16:12	05/18/19 00:54	EPA 3005A	19,200.7	AB
Manganese, Total	0.0032		mg/l	0.0010	--	1	05/17/19 16:12	05/18/19 18:50	EPA 3005A	3,200.8	MG

Project Name: WEST BOYLSTON-SE A
Lab Number: L1919388
Project Number: 03508
Report Date: 05/20/19

SAMPLE RESULTS

Lab ID: L1919388-03
Client ID: M2
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/09/19 09:00
Date Received: 05/09/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	05/17/19 16:12	05/18/19 00:59	EPA 3005A	19,200.7	AB
Manganese, Total	0.0029		mg/l	0.0010	--	1	05/17/19 16:12	05/18/19 19:07	EPA 3005A	3,200.8	MG

Project Name: WEST BOYLSTON-SE A
Project Number: 03508
Lab Number: L1919388
Report Date: 05/20/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1238428-1										
Manganese, Total	ND		mg/l	0.0010	--	1	05/17/19 16:12	05/18/19 17:25	3,200.8	MG

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1238429-1										
Iron, Total	ND		mg/l	0.050	--	1	05/17/19 16:12	05/17/19 23:58	19,200.7	AB

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1238650-1										
Manganese, Dissolved	ND		mg/l	0.0010	--	1	05/18/19 10:55	05/18/19 16:34	3,200.8	MG

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1238652-1										
Iron, Dissolved	ND		mg/l	0.050	--	1	05/18/19 10:55	05/20/19 12:23	19,200.7	LC

Project Name: WEST BOYLSTON-SE A
Project Number: 03508
Lab Number: L1919388
Report Date: 05/20/19

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE A

Project Number: 03508

Lab Number: L1919388

Report Date: 05/20/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1238428-2								
Manganese, Total	104		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1238429-2								
Iron, Total	105		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1238650-2								
Manganese, Dissolved	98		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1238652-2								
Iron, Dissolved	110		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE A
Project Number: 03508

Lab Number: L1919388
Report Date: 05/20/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1238428-3 QC Sample: L1919431-01 Client ID: MS Sample												
Manganese, Total	0.0076	0.5	0.5325	105		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1238428-5 QC Sample: L1919435-01 Client ID: MS Sample												
Manganese, Total	0.1190	0.5	0.6441	105		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1238429-3 QC Sample: L1919435-01 Client ID: MS Sample												
Iron, Total	ND	1	1.08	108		-	-		75-125	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238650-3 QC Sample: L1919388-01 Client ID: RAW												
Manganese, Dissolved	0.9806	1	2.097	112		-	-		70-130	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238652-3 QC Sample: L1919388-01 Client ID: RAW												
Iron, Dissolved	ND	2	2.20	110		-	-		75-125	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE A
Project Number: 03508

Lab Number: L1919388
Report Date: 05/20/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1238428-6 QC Sample: L1919435-01 Client ID: DUP Sample						
Manganese, Total	0.1190	0.1208	mg/l	2		20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1238429-4 QC Sample: L1919435-01 Client ID: DUP Sample						
Iron, Total	ND	0.051	mg/l	NC		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238650-4 QC Sample: L1919388-01 Client ID: RAW						
Manganese, Dissolved	0.9806	0.9913	mg/l	1		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238652-4 QC Sample: L1919388-01 Client ID: RAW						
Iron, Dissolved	ND	ND	mg/l	NC		20

Project Name: WEST BOYLSTON-SE A
Project Number: 03508

Lab Number: L1919388
Report Date: 05/20/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1919388-01A	Plastic 120ml HNO3 preserved	A	<2	<2	2.9	Y	Absent		MN-2008T(180),FE-UI(180)
L1919388-01B	Plastic 250ml unpreserved	A	7	7	2.9	Y	Absent		-
L1919388-01X	Plastic 120ml HNO3 preserved Filtrates	A	NA		2.9	Y	Absent		FE-RI(180),MN-2008S(180)
L1919388-02A	Plastic 120ml HNO3 preserved	A	<2	<2	2.9	Y	Absent		MN-2008T(180),FE-UI(180)
L1919388-03A	Plastic 120ml HNO3 preserved	A	<2	<2	2.9	Y	Absent		MN-2008T(180),FE-UI(180)

*Values in parentheses indicate holding time in days

Project Name:	WEST BOYLSTON-SE A	**Lab Number:**	L1919388
Project Number:	03508	**Report Date:**	05/20/19

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON-SE A	**Lab Number:**	L1919388
Project Number:	03508	**Report Date:**	05/20/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON-SE A	**Lab Number:**	L1919388
Project Number:	03508	**Report Date:**	05/20/19

REFERENCES

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 5/9/19

ALPHA Job #: L1919388

Client Information

Client: BLUELEAF INC
Address: 57 DRESSER HILL RD
CHARLTON, MA 01507
Phone: 508-294-3714
Email: egrotton@blueleafwater.com

Project Information

Project Name: WEST BOYLSTON - SE A
Project Location: WEST BOYLSTON, MA
Project #: 03508
Project Manager: ERIK GROTTON
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due:

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☐ Yes ☒ No MA MCP Analytical Methods ☐ Yes ☒ No CT RCP Analytical Methods
☐ Yes ☒ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☒ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☒ No NPDES RGP
☐ Other State /Fed Program _____ Criteria _____

Additional Project Information:

LAB TO FILTER:
-Dissolved Fe/Mn

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC: ☐ 8260 ☐ 624 ☐ 524.2	SVOC: ☐ ABN ☐ PAH	METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15	METALS: ☐ RCRA5 ☐ RCRA8	EPH: ☐ Ranges & Targets ☐ Ranges Only ☐ PP13	VPH: ☐ Ranges & Targets ☐ Ranges Only	☐ PCB ☐ PEST	TPH: ☐ Quant Only ☐ Fingerprint	Total Fe, Mn	Dissolved Fe, Mn				Sample Comments	TOTAL # BOTTLES
19388-01	RAW	5/9	9:02	DW	BJJ								X	X						2
-02	M1	5/9	9:00	DW	BJJ								X							1
-03	M2	5/9	9:00	DW	BJJ								X							1

SAMPLE INFO
Filtration
☐ Field
☒ Lab to do
Preservation
☐ Lab to do

Container Type																				
Preservative																				

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
	5/9/19 12:30		5/9/19 1230

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

ANALYTICAL REPORT

Lab Number:	L1919892
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Aaron Davis
Phone:	(508) 248-7094
Project Name:	WEST BOYLSTON
Project Number:	03508
Report Date:	05/22/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1919892-01	FILTER A CBW	DW	OAKDALE	05/10/19 13:00	05/13/19
L1919892-02	FILTER C CBW	DW	OAKDALE	05/10/19 13:00	05/13/19
L1919892-03	CBW M1	DW	OAKDALE	05/10/19 12:00	05/13/19
L1919892-04	CBW M2	DW	OAKDALE	05/10/19 12:00	05/13/19
L1919892-05	FILTER A SSN	DW	OAKDALE	05/13/19 10:00	05/13/19
L1919892-06	FILTER C SSN	DW	OAKDALE	05/13/19 10:00	05/13/19
L1919892-07	SSN M1	DW	OAKDALE	05/13/19 10:00	05/13/19
L1919892-08	SSN M2	DW	OAKDALE	05/13/19 10:00	05/13/19

Project Name:	WEST BOYLSTON	**Lab Number:**	L1919892
Project Number:	03508	**Report Date:**	05/22/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	WEST BOYLSTON	**Lab Number:**	L1919892
Project Number:	03508	**Report Date:**	05/22/19

Case Narrative (continued)

Sample Receipt

L1919892-01 and -02: The sample was analyzed with the method required holding time exceeded for Dissolved Metals, pH, and Total Residual Chlorine.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Cristin Walker

Title: Technical Director/Representative Date: 05/22/19

METALS

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-01
Client ID: FILTER A CBW
Sample Location: OAKDALE
Date Collected: 05/10/19 13:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	1.38		mg/l	0.050	--	1	05/20/19 10:05	05/20/19 16:55	EPA 3005A	19,200.7	AB
Manganese, Total	6.340		mg/l	0.0010	--	1	05/20/19 10:05	05/21/19 15:00	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/21/19 09:35	05/21/19 13:58	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.3374		mg/l	0.0100	--	10	05/21/19 09:35	05/21/19 20:23	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-02
Client ID: FILTER C CBW
Sample Location: OAKDALE
Date Collected: 05/10/19 13:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	1.12		mg/l	0.050	--	1	05/20/19 10:05	05/20/19 16:59	EPA 3005A	19,200.7	AB
Manganese, Total	5.192		mg/l	0.0010	--	1	05/20/19 10:05	05/21/19 15:17	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/21/19 09:35	05/21/19 14:17	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.5804		mg/l	0.0100	--	10	05/21/19 09:35	05/21/19 20:27	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-03
Client ID: CBW M1
Sample Location: OAKDALE
Date Collected: 05/10/19 12:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	3.24		mg/l	0.050	--	1	05/20/19 10:05	05/20/19 17:03	EPA 3005A	19,200.7	AB
Manganese, Total	188.7		mg/l	0.1000	--	100	05/20/19 10:05	05/21/19 19:19	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/21/19 09:35	05/21/19 14:21	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.0031		mg/l	0.0010	--	1	05/21/19 09:35	05/22/19 10:48	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-04
Client ID: CBW M2
Sample Location: OAKDALE
Date Collected: 05/10/19 12:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	3.25		mg/l	0.050	--	1	05/20/19 10:05	05/20/19 17:08	EPA 3005A	19,200.7	AB
Manganese, Total	149.0		mg/l	0.1000	--	100	05/20/19 10:05	05/21/19 19:23	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/21/19 09:35	05/21/19 14:26	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.0023		mg/l	0.0010	--	1	05/21/19 09:35	05/22/19 10:52	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-05
Client ID: FILTER A SSN
Sample Location: OAKDALE
Date Collected: 05/13/19 10:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	0.076		mg/l	0.050	--	1	05/20/19 10:05	05/20/19 17:12	EPA 3005A	19,200.7	AB
Manganese, Total	0.7208		mg/l	0.0010	--	1	05/20/19 10:05	05/21/19 15:29	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/21/19 09:35	05/21/19 14:45	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.3302		mg/l	0.0010	--	1	05/21/19 09:35	05/21/19 20:39	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-06
Client ID: FILTER C SSN
Sample Location: OAKDALE
Date Collected: 05/13/19 10:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	05/20/19 10:05	05/20/19 17:16	EPA 3005A	19,200.7	AB
Manganese, Total	0.6064		mg/l	0.0010	--	1	05/20/19 10:05	05/21/19 15:33	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/21/19 09:35	05/21/19 14:50	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.5518		mg/l	0.0010	--	1	05/21/19 09:35	05/21/19 21:17	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-07
Client ID: SSN M1
Sample Location: OAKDALE
Sample Depth:
Matrix: Dw

Date Collected: 05/13/19 10:00
Date Received: 05/13/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	0.125		mg/l	0.050	--	1	05/20/19 10:05	05/20/19 17:20	EPA 3005A	19,200.7	AB
Manganese, Total	0.1647		mg/l	0.0010	--	1	05/20/19 10:05	05/21/19 15:37	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/21/19 09:35	05/21/19 14:54	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.0034		mg/l	0.0010	--	1	05/21/19 09:35	05/21/19 21:21	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-08
Client ID: SSN M2
Sample Location: OAKDALE
Date Collected: 05/13/19 10:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	0.190		mg/l	0.050	--	1	05/20/19 10:05	05/20/19 17:25	EPA 3005A	19,200.7	AB
Manganese, Total	0.3225		mg/l	0.0010	--	1	05/20/19 10:05	05/21/19 15:41	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	05/21/19 09:35	05/21/19 14:59	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.0021		mg/l	0.0010	--	1	05/21/19 09:35	05/21/19 21:25	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-08 Batch: WG1238971-1										
Manganese, Total	ND		mg/l	0.0010	--	1	05/20/19 10:05	05/21/19 13:22	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-08 Batch: WG1238974-1										
Iron, Total	ND		mg/l	0.050	--	1	05/20/19 10:05	05/20/19 16:01	19,200.7	LC

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01-08 Batch: WG1239410-1										
Manganese, Dissolved	ND		mg/l	0.0010	--	1	05/21/19 09:35	05/21/19 20:07	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01-08 Batch: WG1239413-1										
Iron, Dissolved	ND		mg/l	0.050	--	1	05/21/19 09:35	05/21/19 13:49	19,200.7	AB

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON

Project Number: 03508

Lab Number: L1919892

Report Date: 05/22/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-08 Batch: WG1238971-2								
Manganese, Total	97		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-08 Batch: WG1238974-2								
Iron, Total	107		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01-08 Batch: WG1239410-2								
Manganese, Dissolved	102		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01-08 Batch: WG1239413-2								
Iron, Dissolved	109		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1238971-3 QC Sample: L1920192-01 Client ID: MS Sample												
Manganese, Total	0.0029	0.5	0.5165	103		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1238971-5 QC Sample: L1920192-11 Client ID: MS Sample												
Manganese, Total	ND	0.5	0.5205	104		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1238974-3 QC Sample: L1920192-01 Client ID: MS Sample												
Iron, Total	ND	1	1.08	108		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1238974-7 QC Sample: L1920192-11 Client ID: MS Sample												
Iron, Total	ND	1	1.14	114		-	-		75-125	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1239410-3 QC Sample: L1919892-01 Client ID: FILTER A CBW												
Manganese, Dissolved	0.3374	0.5	0.8713	107		-	-		70-130	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1239413-3 QC Sample: L1919892-01 Client ID: FILTER A CBW												
Iron, Dissolved	ND	1	1.17	117		-	-		75-125	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1238971-4 QC Sample: L1920192-01 Client ID: DUP Sample						
Manganese, Total	0.0029	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1238971-6 QC Sample: L1920192-11 Client ID: DUP Sample						
Manganese, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1238974-4 QC Sample: L1920192-01 Client ID: DUP Sample						
Iron, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1238974-8 QC Sample: L1920192-11 Client ID: DUP Sample						
Iron, Total	ND	ND	mg/l	NC		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1239410-4 QC Sample: L1919892-01 Client ID: FILTER A CBW						
Manganese, Dissolved	0.3374	0.3315	mg/l	2		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1239413-4 QC Sample: L1919892-01 Client ID: FILTER A CBW						
Iron, Dissolved	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-01
Client ID: FILTER A CBW
Sample Location: OAKDALE

Date Collected: 05/10/19 13:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	28.		mg/l	5.0	NA	1	-	05/15/19 11:20	121,2540D	DR
Chlorine, Total Residual	3.5		mg/l	0.40	--	20	-	05/13/19 22:05	121,4500CL-D	AS
pH (H)	6.1		SU	-	NA	1	-	05/13/19 18:52	121,4500H+-B	AS

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-02
Client ID: FILTER C CBW
Sample Location: OAKDALE

Date Collected: 05/10/19 13:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	26.		mg/l	5.0	NA	1	-	05/15/19 11:20	121,2540D	DR
Chlorine, Total Residual	3.2		mg/l	0.40	--	20	-	05/13/19 22:05	121,4500CL-D	AS
pH (H)	6.2		SU	-	NA	1	-	05/13/19 18:52	121,4500H+-B	AS

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-03
Client ID: CBW M1
Sample Location: OAKDALE

Date Collected: 05/10/19 12:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	1600		mg/l	170	NA	33.3	-	05/15/19 10:20	121,2540D	DR
pH	7.6	(H)	SU	-	NA	1	-	05/13/19 18:52	121,4500H+-B	AS

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-04
Client ID: CBW M2
Sample Location: OAKDALE

Date Collected: 05/10/19 12:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	1700		mg/l	170	NA	33.3	-	05/15/19 10:20	121,2540D	DR
pH	7.6	(H)	SU	-	NA	1	-	05/13/19 18:52	121,4500H+-B	AS

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-05
Client ID: FILTER A SSN
Sample Location: OAKDALE

Date Collected: 05/13/19 10:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/16/19 12:00	121,2540D	DR
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	05/13/19 22:05	121,4500CL-D	AS
pH (H)	6.8		SU	-	NA	1	-	05/13/19 18:52	121,4500H+-B	AS

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-06
Client ID: FILTER C SSN
Sample Location: OAKDALE
Sample Depth:
Matrix: Dw

Date Collected: 05/13/19 10:00
Date Received: 05/13/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/16/19 12:00	121,2540D	DR
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	05/13/19 22:05	121,4500CL-D	AS
pH (H)	6.7		SU	-	NA	1	-	05/13/19 18:52	121,4500H+-B	AS

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-07
Client ID: SSN M1
Sample Location: OAKDALE

Date Collected: 05/13/19 10:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/16/19 12:00	121,2540D	DR
pH (H)	7.6		SU	-	NA	1	-	05/13/19 18:52	121,4500H+-B	AS

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

SAMPLE RESULTS

Lab ID: L1919892-08
Client ID: SSN M2
Sample Location: OAKDALE

Date Collected: 05/13/19 10:00
Date Received: 05/13/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/16/19 12:00	121,2540D	DR
pH	7.7	(H)	SU	-	NA	1	-	05/13/19 18:52	121,4500H+-B	AS

Project Name: WEST BOYLSTON
Project Number: 03508
Lab Number: L1919892
Report Date: 05/22/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-02,05-06 Batch: WG1236698-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	05/13/19 22:05	121,4500CL-D	AS
General Chemistry - Westborough Lab for sample(s): 03-04 Batch: WG1237296-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/15/19 10:20	121,2540D	DR
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1237300-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/15/19 11:20	121,2540D	DR
General Chemistry - Westborough Lab for sample(s): 05-08 Batch: WG1237763-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/16/19 12:00	121,2540D	DR

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON

Project Number: 03508

Lab Number: L1919892

Report Date: 05/22/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-08 Batch: WG1236661-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01-02,05-06 Batch: WG1236698-2								
Chlorine, Total Residual	108		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02,05-06 QC Batch ID: WG1236698-4 QC Sample: L1919950-01 Client ID: MS Sample												
Chlorine, Total Residual	ND	0.25	0.25	100		-	-		80-120	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-08 QC Batch ID: WG1236661-2 QC Sample: L1919892-01 Client ID: FILTER A CBW						
pH (H)	6.1	6.0	SU	2		5
General Chemistry - Westborough Lab Associated sample(s): 01-02,05-06 QC Batch ID: WG1236698-3 QC Sample: L1919927-01 Client ID: DUP Sample						
Chlorine, Total Residual	1.0	1.0	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 03-04 QC Batch ID: WG1237296-2 QC Sample: L1920042-03 Client ID: DUP Sample						
Solids, Total Suspended	2800	2800	mg/l	0		29
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1237300-2 QC Sample: L1920051-02 Client ID: DUP Sample						
Solids, Total Suspended	52	54	mg/l	4		29
General Chemistry - Westborough Lab Associated sample(s): 05-08 QC Batch ID: WG1237763-2 QC Sample: L1919896-01 Client ID: DUP Sample						
Solids, Total Suspended	19	25	mg/l	27		29

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent
B	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1919892-01A	Plastic 120ml HNO3 preserved	A	<2	<2	3.9	Y	Absent		MN-2008T(180),FE-UI(180)
L1919892-01B	Plastic 250ml unpreserved	A	7	7	3.9	Y	Absent		-
L1919892-01C	Plastic 500ml unpreserved	A	7	7	3.9	Y	Absent		TRC-4500(1),PH-4500(.01)
L1919892-01D	Plastic 950ml unpreserved	A	7	7	3.9	Y	Absent		TSS-2540(7)
L1919892-01X	Plastic 120ml HNO3 preserved Filtrates	A	NA		3.9	Y	Absent		FE-RI(180),MN-2008S(180)
L1919892-02A	Plastic 120ml HNO3 preserved	A	<2	<2	3.9	Y	Absent		MN-2008T(180),FE-UI(180)
L1919892-02B	Plastic 250ml unpreserved	A	7	7	3.9	Y	Absent		-
L1919892-02C	Plastic 500ml unpreserved	A	7	7	3.9	Y	Absent		TRC-4500(1),PH-4500(.01)
L1919892-02D	Plastic 950ml unpreserved	A	7	7	3.9	Y	Absent		TSS-2540(7)
L1919892-02X	Plastic 120ml HNO3 preserved Filtrates	A	NA		3.9	Y	Absent		FE-RI(180),MN-2008S(180)
L1919892-03A	Plastic 120ml HNO3 preserved	A	<2	<2	3.9	Y	Absent		MN-2008T(180),FE-UI(180)
L1919892-03B	Plastic 250ml unpreserved	A	7	7	3.9	Y	Absent		-
L1919892-03C	Plastic 950ml unpreserved	A	7	7	3.9	Y	Absent		PH-4500(.01),TSS-2540(7)
L1919892-03X	Plastic 120ml HNO3 preserved Filtrates	A	NA		3.9	Y	Absent		FE-RI(180),MN-2008S(180)
L1919892-04A	Plastic 120ml HNO3 preserved	A	<2	<2	3.9	Y	Absent		MN-2008T(180),FE-UI(180)
L1919892-04B	Plastic 250ml unpreserved	A	7	7	3.9	Y	Absent		-
L1919892-04C	Plastic 950ml unpreserved	A	7	7	3.9	Y	Absent		PH-4500(.01),TSS-2540(7)
L1919892-04X	Plastic 120ml HNO3 preserved Filtrates	A	NA		3.9	Y	Absent		FE-RI(180),MN-2008S(180)
L1919892-05A	Plastic 120ml HNO3 preserved	B	<2	<2	2.9	Y	Absent		MN-2008T(180),FE-UI(180)
L1919892-05B	Plastic 250ml unpreserved	B	7	7	2.9	Y	Absent		-
L1919892-05C	Plastic 500ml unpreserved	B	7	7	2.9	Y	Absent		TRC-4500(1),PH-4500(.01)
L1919892-05D	Plastic 950ml unpreserved	B	7	7	2.9	Y	Absent		TSS-2540(7)

*Values in parentheses indicate holding time in days

Project Name: WEST BOYLSTON
Project Number: 03508

Lab Number: L1919892
Report Date: 05/22/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1919892-05X	Plastic 120ml HNO3 preserved Filtrates	B	NA		2.9	Y	Absent		FE-RI(180),MN-2008S(180)
L1919892-06A	Plastic 120ml HNO3 preserved	B	<2	<2	2.9	Y	Absent		MN-2008T(180),FE-UI(180)
L1919892-06B	Plastic 250ml unpreserved	B	7	7	2.9	Y	Absent		-
L1919892-06C	Plastic 500ml unpreserved	B	7	7	2.9	Y	Absent		TRC-4500(1),PH-4500(.01)
L1919892-06D	Plastic 950ml unpreserved	B	7	7	2.9	Y	Absent		TSS-2540(7)
L1919892-06X	Plastic 120ml HNO3 preserved Filtrates	B	NA		2.9	Y	Absent		FE-RI(180),MN-2008S(180)
L1919892-07A	Plastic 120ml HNO3 preserved	B	<2	<2	2.9	Y	Absent		MN-2008T(180),FE-UI(180)
L1919892-07B	Plastic 250ml unpreserved	B	7	7	2.9	Y	Absent		-
L1919892-07C	Plastic 950ml unpreserved	B	7	7	2.9	Y	Absent		PH-4500(.01),TSS-2540(7)
L1919892-07X	Plastic 120ml HNO3 preserved Filtrates	B	NA		2.9	Y	Absent		FE-RI(180),MN-2008S(180)
L1919892-08A	Plastic 120ml HNO3 preserved	B	<2	<2	2.9	Y	Absent		MN-2008T(180),FE-UI(180)
L1919892-08B	Plastic 250ml unpreserved	B	7	7	2.9	Y	Absent		-
L1919892-08C	Plastic 950ml unpreserved	B	7	7	2.9	Y	Absent		PH-4500(.01),TSS-2540(7)
L1919892-08X	Plastic 120ml HNO3 preserved Filtrates	B	NA		2.9	Y	Absent		FE-RI(180),MN-2008S(180)

*Values in parentheses indicate holding time in days

Project Name:	WEST BOYLSTON	**Lab Number:**	L1919892
Project Number:	03508	**Report Date:**	05/22/19

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON	**Lab Number:**	L1919892
Project Number:	03508	**Report Date:**	05/22/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON	**Lab Number:**	L1919892
Project Number:	03508	**Report Date:**	05/22/19

REFERENCES

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 5/13/19

ALPHA Job #: L1919892

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Client Information

Client: Blueleaf, Inc.
Address: 57 Dresser Hill Rd.
Phone: 774 200 8029
Email: ADAVIS@BLUELEAFWATER.com

Additional Project Information:

Project Information

Project Name: West Boylston
Project Location: Oakdale
Project #: 03508
Project Manager: Aaron Davis
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due:

Report Information - Data Deliverables

☒ ADEx ☐ EMAIL

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program _____ Criteria _____

ANALYSIS: VOC: ☐ 8260 ☐ 624 ☐ 524.2; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☐ Ranges & Targets ☐ Ranges Only; VPH: ☐ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☐ Quant Only ☐ Fingerprint

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	Total Fe, Mn	Dis Fe, Mn	pH	TSS	Total Cl2 Residual	Sample Comments	TOTAL # BOTTLES
1919892-01	Filter A CBW	5/10	13:00	GW	ARD	X	X	X	X	X		4
02	Filter C CBW		13:00			X	X	X	X	X		4
03	CBW M1		12:00			X	X	X	X			3
04	CBW M2		12:00			X	X	X	X			3
05	Filter A SSN	5/13	10:00			X	X	X	X	X		4
06	Filter C SSN		10:00			X	X	X	X	X		4
07	SSN M1		10:00			X	X	X	X			3
08	SSN M2		10:00			X	X	X	X			3
							↑ Lab Filter For Dissolved Metals					

SAMPLE INFO
Filtration
☐ Field
☐ Lab to do
Preservation
☐ Lab to do

Container Type												
Preservative												

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
	5/13/19 13:29		5/13/19 1329

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

ANALYTICAL REPORT

Lab Number:	L1919267
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Erik Grotton
Phone:	(508) 248-7094
Project Name:	WEST BOYLSTON-SE F
Project Number:	03508
Report Date:	05/31/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919267
Report Date: 05/31/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1919267-01	FILTER A	DW	WEST BOYLSTON, MA	05/08/19 08:30	05/08/19
L1919267-02	FILTER C	DW	WEST BOYLSTON, MA	05/08/19 08:30	05/08/19
L1919267-03	FILTER A - SDS SPLITS	DW	WEST BOYLSTON, MA	05/16/19 17:15	05/16/19
L1919267-04	FILTER C - SDS SPLITS	DW	WEST BOYLSTON, MA	05/16/19 17:15	05/16/19

Project Name:	WEST BOYLSTON-SE F	**Lab Number:**	L1919267
Project Number:	03508	**Report Date:**	05/31/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	WEST BOYLSTON-SE F	**Lab Number:**	L1919267
Project Number:	03508	**Report Date:**	05/31/19

Case Narrative (continued)

Report Submission

The analysis of HAA was subcontracted. A copy of the laboratory report is included as an addendum. Please note: This data is only available in PDF format and is not available on Data Merger.

Volatile Organics by Method 524

The WG1238852-6 MS recoveries, performed on L1919267-04, are above the acceptance criteria for chloroform (193%) and bromodichloromethane (143%); however, the associated LCS recoveries are within overall method allowances.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Kelly Stenstrom

Title: Technical Director/Representative Date: 05/31/19

ORGANICS

VOLATILES

Project Name: WEST BOYLSTON-SE F
Lab Number: L1919267
Project Number: 03508
Report Date: 05/31/19

SAMPLE RESULTS

Lab ID: L1919267-03
Client ID: FILTER A - SDS SPLITS
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/16/19 17:15
Date Received: 05/16/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw
Analytical Method: 16,524.2
Analytical Date: 05/18/19 09:58
Analyst: NLK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Chloroform	6.5		ug/l	0.50	--	1
Bromodichloromethane	3.8		ug/l	0.50	--	1
Dibromochloromethane	2.5		ug/l	0.50	--	1
Bromoform	ND		ug/l	0.50	--	1
THMs, Total	13		ug/l	0.50	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichlorobenzene-d4	101		80-120
4-Bromofluorobenzene	102		80-120

Project Name: WEST BOYLSTON-SE F
Lab Number: L1919267
Project Number: 03508
Report Date: 05/31/19

SAMPLE RESULTS

Lab ID: L1919267-04
Client ID: FILTER C - SDS SPLITS
Sample Location: WEST BOYLSTON, MA
Date Collected: 05/16/19 17:15
Date Received: 05/16/19
Field Prep: Not Specified

Sample Depth:
Matrix: Dw
Analytical Method: 16,524.2
Analytical Date: 05/18/19 10:27
Analyst: NLK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Chloroform	6.3		ug/l	0.50	--	1
Bromodichloromethane	3.5		ug/l	0.50	--	1
Dibromochloromethane	2.3		ug/l	0.50	--	1
Bromoform	ND		ug/l	0.50	--	1
THMs, Total	12		ug/l	0.50	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichlorobenzene-d4	101		80-120
4-Bromofluorobenzene	102		80-120

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919267
Report Date: 05/31/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 16,524.2
Analytical Date: 05/18/19 09:30
Analyst: MKS

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 03-04 Batch: WG1238852-4					
Chloroform	ND		ug/l	0.50	--
Bromodichloromethane	ND		ug/l	0.50	--
Dibromochloromethane	ND		ug/l	0.50	--
Bromoform	ND		ug/l	0.50	--
THMs, Total	ND		ug/l	0.50	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichlorobenzene-d4	101		80-120
4-Bromofluorobenzene	103		80-120

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919267

Report Date: 05/31/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 03-04 Batch: WG1238852-3								
Chloroform	120		-		70-130	-		20
Bromodichloromethane	105		-		70-130	-		20
Dibromochloromethane	115		-		70-130	-		20
Bromoform	112		-		70-130	-		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichlorobenzene-d4	99				80-120
4-Bromofluorobenzene	107				80-120

Matrix Spike Analysis

Batch Quality Control

Project Name: WEST BOYLSTON-SE F

Project Number: 03508

Lab Number: L1919267

Report Date: 05/31/19

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*
Volatile Organics by GC/MS - Westborough Lab SPLITS	Associated sample(s): 03-04		QC Batch ID: WG1238852-6			QC Sample: L1919267-04			Client ID: FILTER C - SDS			
Chloroform	6.3	4	14	**193**	Q	-	-		70-130	-		20
Bromodichloromethane	3.5	4	9.2	**143**	Q	-	-		70-130	-		20
Dibromochloromethane	2.3	4	6.9	115		-	-		70-130	-		20
Bromoform	ND	4	3.5	88		-	-		70-130	-		20

Surrogate	*MS % Recovery*	*MS Qualifier*	*MSD % Recovery*	*MSD Qualifier*	*Acceptance Criteria*
1,2-Dichlorobenzene-d4	101				80-120
4-Bromofluorobenzene	108				80-120

Lab Duplicate Analysis
Batch Quality Control

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919267
Report Date: 05/31/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab - SDS SPLITS	Associated sample(s): 03-04	QC Batch ID: WG1238852-5		QC Sample: L1919267-03		Client ID: FILTER A
Chloroform	6.5	6.7	ug/l	3		20
Bromodichloromethane	3.8	4.0	ug/l	5		20
Dibromochloromethane	2.5	2.4	ug/l	4		20
Bromoform	ND	ND	ug/l	NC		20
THMs, Total	13	13	ug/l	2		20

Surrogate	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichlorobenzene-d4	101		102		80-120
4-Bromofluorobenzene	102		105		80-120

INORGANICS
&
MISCELLANEOUS

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919267
Report Date: 05/31/19

SAMPLE RESULTS

Lab ID: L1919267-01
Client ID: FILTER A
Sample Location: WEST BOYLSTON, MA
Sample Depth:
Matrix: Dw

Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Simulated Distribution System - Westborough Lab										
Chlorine Dose	1.0		mg Cl2/L	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Incubation Time	167		hours	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
pH, Initial	6.33		SU	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
pH, Final	7.23		SU	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Incubation Temp, Initial	15		deg. C	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Incubation Temp, Final	15		deg. C	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Residual Chlorine, Initial	1.27		mg/l	0.050	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Residual Chlorine, Final (as Total)	0.740		mg/l	0.050	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Residual Chlorine, Final (as Free)	0.700		mg/l	0.050	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO

Project Name: WEST BOYLSTON-SE F
Project Number: 03508
Lab Number: L1919267
Report Date: 05/31/19

SAMPLE RESULTS

Lab ID: L1919267-02
Client ID: FILTER C
Sample Location: WEST BOYLSTON, MA
Sample Depth:
Matrix: Dw

Date Collected: 05/08/19 08:30
Date Received: 05/08/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Simulated Distribution System - Westborough Lab										
Chlorine Dose	1.0		mg Cl2/L	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Incubation Time	167		hours	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
pH, Initial	6.39		SU	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
pH, Final	7.52		SU	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Incubation Temp, Initial	15		deg. C	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Incubation Temp, Final	15		deg. C	-	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Residual Chlorine, Initial	1.39		mg/l	0.050	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Residual Chlorine, Final (as Total)	0.680		mg/l	0.050	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO
Residual Chlorine, Final (as Free)	0.660		mg/l	0.050	--	1	05/09/19 18:15	05/16/19 17:15	8,5710C	JO

Project Name: WEST BOYLSTON-SE F
Project Number: 03508

Lab Number: L1919267
Report Date: 05/31/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1919267-01A	Amber 1000ml unpreserved	A	7	7	4.0	Y	Absent		SDS(1)
L1919267-01B	Amber 1000ml unpreserved	A	7	7	4.0	Y	Absent		SDS(1)
L1919267-02A	Amber 1000ml unpreserved	A	7	7	4.0	Y	Absent		SDS(1)
L1919267-02B	Amber 1000ml unpreserved	A	7	7	4.0	Y	Absent		SDS(1)
L1919267-03A	Vial NH4Cl preserved split	A	NA		4.0	Y	Absent		SUB-HAA(9)
L1919267-03B	Vial NH4Cl preserved split	A	NA		4.0	Y	Absent		SUB-HAA(9)
L1919267-03C	Vial NH4Cl preserved split	A	NA		4.0	Y	Absent		SUB-HAA(9)
L1919267-03D	Vial NH4Cl preserved split	A	NA		4.0	Y	Absent		SUB-HAA(9)
L1919267-03E	Vial HCl preserved split	A	NA		4.0	Y	Absent		524-THM(14)
L1919267-03F	Vial HCl preserved split	A	NA		4.0	Y	Absent		524-THM(14)
L1919267-04A	Vial NH4Cl preserved split	A	NA		4.0	Y	Absent		SUB-HAA(9)
L1919267-04B	Vial NH4Cl preserved split	A	NA		4.0	Y	Absent		SUB-HAA(9)
L1919267-04C	Vial NH4Cl preserved split	A	NA		4.0	Y	Absent		SUB-HAA(9)
L1919267-04D	Vial NH4Cl preserved split	A	NA		4.0	Y	Absent		SUB-HAA(9)
L1919267-04E	Vial HCl preserved split	A	NA		4.0	Y	Absent		524-THM(14)
L1919267-04F	Vial HCl preserved split	A	NA		4.0	Y	Absent		524-THM(14)

*Values in parentheses indicate holding time in days

Project Name:	WEST BOYLSTON-SE F	**Lab Number:**	L1919267
Project Number:	03508	**Report Date:**	05/31/19

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON-SE F	**Lab Number:**	L1919267
Project Number:	03508	**Report Date:**	05/31/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON-SE F	**Lab Number:**	L1919267
Project Number:	03508	**Report Date:**	05/31/19

REFERENCES

8 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. 19th Edition. 1995.

16 Methods for the Determination of Organic Compounds in Drinking Water - Supplement II. EPA/600/R-92/129, August 1992.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 5/8/19

ALPHA Job #: L1919267

Project Information

Project Name: WEST BOYLSTON - SE F
Project Location: WEST BOYLSTON, MA
Project #: 03508
Project Manager: ERIK GROTTON
ALPHA Quote #:

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☒ Same as Client info PO #:

Client Information

Client: BLUELEAF INC
Address: 57 PRESSER HILL RD
CHARLTON, MA 01507
Phone: 508-294-3714
Email: egrotton@blueleafwater.com

Regulatory Requirements & Project Information Requirements

☐ Yes ☒ No MA MCP Analytical Methods
☐ Yes ☒ No CT RCP Analytical Methods
☐ Yes ☒ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☒ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program ______ Criteria ______

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due:

Additional Project Information:

LAB TO FILTER:
- Dissolved Fe, Mn
- DOC

SDS:
see Ethan Leighton
TTHM + HAAS to be done

ANALYSIS

VOC: ☐ 8260 ☐ 624 ☐ 524.2 | SVOC: ☐ ABN ☐ PAH | METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15 | METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13 | EPH: ☐ Ranges & Targets ☐ Ranges Only | VPH: ☐ Ranges & Targets ☐ Ranges Only | ☐ PCB ☐ PEST | TPH: ☐ Quant Only ☐ Fingerprint | Total Fe, Mn, pH | Dissolved Fe, Mn | Turb, Color (T/A), Alk, Tc, CO2 | SDS (see Ethan Leighton) | Total VOCs, TOC, Secondary | TOC/DOC

SAMPLE INFO
Filtration: ☐ Field ☒ Lab to do
Preservation: ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC	SVOC	METALS (MCP)	METALS (RCRA)	EPH	VPH	PCB/PEST	TPH	Total Fe, Mn, pH	Dissolved Fe, Mn	Turb, Color, Alk, Tc, CO2	SDS	Total VOCs, TOC, Secondary	TOC/DOC	Sample Comments	Total # Bottles
19267-01	RAW	5/8	8:30	DW	BJS									X	X	X		X	X		14
02	FILTER A	5/8	8:30	DW	BJS									X		X	X	X	X		16
03	FILTER C	5/8	8:30	DW	BJS									X		X	X	X	X		16

Container Type:
Preservative:

Container Type	Preservative
P= Plastic	A= None
A= Amber glass	B= HCl
V= Vial	C= HNO_3
G= Glass	D= H_2SO_4
B= Bacteria cup	E= NaOH
C= Cube	F= MeOH
O= Other	G= $NaHSO_4$
E= Encore	H = $Na_2S_2O_3$
D= BOD Bottle	I= Ascorbic Acid
	J = NH_4Cl
	K= Zn Acetate
	O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	5/8 16:28	Chris [signature]	5/8/19 1628

FORM NO: 01-01 (rev. 12-Mar-2012)

GRANITE STATE
ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone: (800) 699-9920 | (603) 432-3044 website: www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 05/29/2019

CLIENT NAME: Alpha Analytical-Westborough

CLIENT ADDRESS: 8 Walkup Dr.
Westborough, MA 01581

SAMPLE ID#: 1905-02582-001

SAMPLED BY: Alpha Analytical-Westborough

SAMPLE ADDRESS: L1919267
Filter A-SDS SPLITS
MA

MORE LOC INFO:

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▽
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 05/16/2019 5:15PM

DATE AND TIME RECEIVED: 05/21/2019 10:05AM

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 3.7° CELSIUS

CLIENT JOB #

Test Description	Results	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date-Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	TA-NH	05/24/19 8:45AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	WS-NH	05/28/19 6:04PM
Dichloroacetic Acid*	2.0	ug/L			1	No Limit	EPA 552.2	WS-NH	05/28/19 6:04PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	WS-NH	05/28/19 6:04PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	WS-NH	05/28/19 6:04PM
Total Haloacetic Acids*	3.3	ug/L	✓		1	60 ug/L	EPA 552.2	WS-NH	05/28/19 6:04PM
Trichloroacetic Acid*	1.3	ug/L			1	No Limit	EPA 552.2	WS-NH	05/28/19 6:04PM
2,3-Dibromopropionic Acid	84	%	✓			70-130%	EPA 552.2 - SS	WS-NH	05/28/19 6:04PM

The results presented in this report relate to the samples listed above in the condition in which they were received.
RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.

Data Qualifier (DQ) Flags: None

*** MA Certified Analysis**

Donald A. D'Anjou, Ph. D.
Laboratory Director

This analysis meets Commonwealth of Massachusetts requirements except as noted.
State Certifications: | NH 1015 | MA M-NH003 | ME NH00003 | RI 101513 | VT VT-101507 |

GRANITE STATE
ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone: (800) 699-9920 | (603) 432-3044 website: www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 05/29/2019

CLIENT NAME: Alpha Analytical-Westborough

CLIENT ADDRESS: 8 Walkup Dr.
Westborough, MA 01581

SAMPLE ID#: 1905-02582-002

SAMPLED BY: Alpha Analytical-Westborough

SAMPLE ADDRESS: L1919267
Filter C-SDS SPLITS
MA

MORE LOC INFO:

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▽
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 05/16/2019 5:15PM

DATE AND TIME RECEIVED: 05/21/2019 10:05AM

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 3.7° CELSIUS

CLIENT JOB #

Test Description	Results	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date-Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	TA-NH	05/24/19 8:45AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	WS-NH	05/28/19 6:44PM
Dichloroacetic Acid*	1.7	ug/L			1	No Limit	EPA 552.2	WS-NH	05/28/19 6:44PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	WS-NH	05/28/19 6:44PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	WS-NH	05/28/19 6:44PM
Total Haloacetic Acids*	2.9	ug/L	✓		1	60 ug/L	EPA 552.2	WS-NH	05/28/19 6:44PM
Trichloroacetic Acid*	1.2	ug/L			1	No Limit	EPA 552.2	WS-NH	05/28/19 6:44PM
2,3-Dibromopropionic Acid	90	%	✓			70-130%	EPA 552.2 - SS	WS-NH	05/28/19 6:44PM

The results presented in this report relate to the samples listed above in the condition in which they were received.
RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.

Data Qualifier (DQ) Flags: None

*** MA Certified Analysis**

Donald A. D'Anjou, Ph. D.
Laboratory Director

This analysis meets Commonwealth of Massachusetts requirements except as noted.
State Certifications: | NH 1015 | MA M-NH003 | ME NH00003 | RI 101513 | VT VT-101507 |

ANALYTICAL REPORT

Lab Number:	L1929093
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Erik Grotton
Phone:	(508) 248-7094
Project Name:	WEST BOYLSTON
Project Number:	03T08
Report Date:	07/12/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: WEST BOYLSTON
Project Number: 03T08

Lab Number: L1929093
Report Date: 07/12/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1929093-01	RAW	WATER	CONANT	07/02/19 08:00	07/02/19
L1929093-02	M1	WATER	CONANT	07/02/19 08:00	07/02/19
L1929093-03	M2	WATER	CONANT	07/02/19 08:00	07/02/19
L1929093-04	M1 SSN	WATER	CONANT	07/02/19 08:00	07/02/19
L1929093-05	M1 CBW	WATER	CONANT	07/02/19 08:00	07/02/19
L1929093-06	M2 SSN	WATER	CONANT	07/02/19 08:00	07/02/19
L1929093-07	M2 CBW	WATER	CONANT	07/02/19 08:00	07/02/19

Project Name:	WEST BOYLSTON	**Lab Number:**	L1929093
Project Number:	03T08	**Report Date:**	07/12/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	WEST BOYLSTON	**Lab Number:**	L1929093
Project Number:	03T08	**Report Date:**	07/12/19

Case Narrative (continued)

Sample Receipt

The samples were received at the laboratory above the required temperature range. The samples were transported via Client in a cooler with ice. All requested analyses were performed.

Total Metals

The WG1258239-3 MS recovery for manganese (48%), performed on L1929093-01, recovered outside the 70-130% acceptance criteria. The result for this analyte is considered suspect due to either the heterogeneous nature of the sample or matrix interference.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Melissa Sturgis Melissa Sturgis

Title: Technical Director/Representative Date: 07/12/19

METALS

Project Name: WEST BOYLSTON
Project Number: 03T08
Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-01
Client ID: RAW
Sample Location: CONANT
Sample Depth:
Matrix: Water

Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	07/10/19 20:00	07/11/19 11:03	EPA 3005A	19,200.7	LC
Manganese, Total	1.037		mg/l	0.00100	--	1	07/10/19 20:00	07/11/19 11:50	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	07/11/19 14:45	07/11/19 18:56	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.7221		mg/l	0.0100	--	10	07/11/19 14:45	07/12/19 15:14	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03T08
Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-02
Client ID: M1
Sample Location: CONANT
Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	07/10/19 20:00	07/11/19 11:17	EPA 3005A	19,200.7	LC
Manganese, Total	0.01497		mg/l	0.00100	--	1	07/10/19 20:00	07/11/19 11:55	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03T08
Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-03
Client ID: M2
Sample Location: CONANT
Sample Depth:
Matrix: Water

Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	ND		mg/l	0.050	--	1	07/10/19 20:00	07/11/19 12:17	EPA 3005A	19,200.7	LC
Manganese, Total	0.03466		mg/l	0.00100	--	1	07/10/19 20:00	07/11/19 11:57	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03T08
Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-04
Client ID: M1 SSN
Sample Location: CONANT
Sample Depth:
Matrix: Water

Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	0.075		mg/l	0.050	--	1	07/10/19 20:00	07/11/19 12:22	EPA 3005A	19,200.7	LC
Manganese, Total	0.2457		mg/l	0.00100	--	1	07/10/19 20:00	07/11/19 12:00	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	07/11/19 14:45	07/11/19 19:14	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.0156		mg/l	0.0010	--	1	07/11/19 14:45	07/12/19 15:18	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03T08
Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-05
Client ID: M1 CBW
Sample Location: CONANT
Sample Depth:
Matrix: Water

Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	2.10		mg/l	0.050	--	1	07/10/19 20:00	07/11/19 12:27	EPA 3005A	19,200.7	LC
Manganese, Total	133		mg/l	0.010	--	1	07/10/19 20:00	07/11/19 12:27	EPA 3005A	19,200.7	LC
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	07/11/19 14:45	07/11/19 19:19	EPA 3005A	19,200.7	AB
Manganese, Dissolved	ND		mg/l	0.010	--	1	07/11/19 14:45	07/11/19 19:19	EPA 3005A	19,200.7	AB

Project Name: WEST BOYLSTON
Project Number: 03T08
Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-06
Client ID: M2 SSN
Sample Location: CONANT
Sample Depth:
Matrix: Water

Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	0.072		mg/l	0.050	--	1	07/10/19 20:00	07/11/19 12:31	EPA 3005A	19,200.7	LC
Manganese, Total	0.1904		mg/l	0.00100	--	1	07/10/19 20:00	07/11/19 12:24	EPA 3005A	3,200.8	AM
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	07/11/19 14:45	07/11/19 19:24	EPA 3005A	19,200.7	AB
Manganese, Dissolved	ND		mg/l	0.0010	--	1	07/11/19 14:45	07/12/19 15:22	EPA 3005A	3,200.8	AM

Project Name: WEST BOYLSTON
Project Number: 03T08
Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-07
Client ID: M2 CBW
Sample Location: CONANT
Sample Depth:
Matrix: Water

Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Iron, Total	1.26		mg/l	0.050	--	1	07/10/19 20:00	07/11/19 13:17	EPA 3005A	19,200.7	LC
Manganese, Total	169		mg/l	0.010	--	1	07/10/19 20:00	07/11/19 13:17	EPA 3005A	19,200.7	LC
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	ND		mg/l	0.050	--	1	07/11/19 14:45	07/11/19 19:28	EPA 3005A	19,200.7	AB
Manganese, Dissolved	0.242		mg/l	0.010	--	1	07/11/19 14:45	07/11/19 19:28	EPA 3005A	19,200.7	AB

Project Name: WEST BOYLSTON
Project Number: 03T08
Lab Number: L1929093
Report Date: 07/12/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-07 Batch: WG1258231-1										
Iron, Total	ND		mg/l	0.050	--	1	07/10/19 20:00	07/11/19 10:54	19,200.7	LC
Manganese, Total	ND		mg/l	0.010	--	1	07/10/19 20:00	07/11/19 10:54	19,200.7	LC

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-04,06 Batch: WG1258239-1										
Manganese, Total	ND		mg/l	0.00100	--	1	07/10/19 20:00	07/11/19 11:42	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01,04,06 Batch: WG1258699-1										
Manganese, Dissolved	ND		mg/l	0.0010	--	1	07/11/19 14:45	07/12/19 14:52	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01,04-07 Batch: WG1258700-1										
Iron, Dissolved	ND		mg/l	0.050	--	1	07/11/19 14:45	07/11/19 18:46	19,200.7	AB
Manganese, Dissolved	ND		mg/l	0.010	--	1	07/11/19 14:45	07/11/19 18:46	19,200.7	AB

Project Name: WEST BOYLSTON
Project Number: 03T08
Lab Number: L1929093
Report Date: 07/12/19

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: WEST BOYLSTON

Project Number: 03T08

Lab Number: L1929093

Report Date: 07/12/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07 Batch: WG1258231-2								
Iron, Total	109		-		85-115	-		
Manganese, Total	101		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-04,06 Batch: WG1258239-2								
Manganese, Total	102		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01,04,06 Batch: WG1258699-2								
Manganese, Dissolved	100		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01,04-07 Batch: WG1258700-2								
Iron, Dissolved	108		-		85-115	-		
Manganese, Dissolved	100		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: WEST BOYLSTON
Project Number: 03T08

Lab Number: L1929093
Report Date: 07/12/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG1258231-3 QC Sample: L1929093-01 Client ID: RAW												
Iron, Total	ND	1	1.10	110		-	-		75-125	-		20
Manganese, Total	0.712	0.5	1.15	88		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG1258231-7 QC Sample: L1928160-01 Client ID: MS Sample												
Iron, Total	8.73	1	9.77	104		-	-		75-125	-		20
Manganese, Total	0.742	0.5	1.26	104		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-04,06 QC Batch ID: WG1258239-3 QC Sample: L1929093-01 Client ID: RAW												
Manganese, Total	1.037	0.5	1.276	**48**	Q	-	-		70-130	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01,04,06 QC Batch ID: WG1258699-3 QC Sample: L1929093-01 Client ID: RAW												
Manganese, Dissolved	0.7221	0.5	1.200	96		-	-		70-130	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01,04-07 QC Batch ID: WG1258700-3 QC Sample: L1929093-01 Client ID: RAW												
Iron, Dissolved	ND	1	1.10	110		-	-		75-125	-		20
Manganese, Dissolved	0.684	0.5	1.18	99		-	-		75-125	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: WEST BOYLSTON
Project Number: 03T08

Lab Number: L1929093
Report Date: 07/12/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG1258231-4 QC Sample: L1929093-02 Client ID: M1						
Iron, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-04,06 QC Batch ID: WG1258239-4 QC Sample: L1929093-02 Client ID: M1						
Manganese, Total	0.01497	0.01539	mg/l	3		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01,04,06 QC Batch ID: WG1258699-4 QC Sample: L1929093-01 Client ID: RAW						
Manganese, Dissolved	0.7221	0.6818	mg/l	6		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01,04-07 QC Batch ID: WG1258700-4 QC Sample: L1929093-01 Client ID: RAW						
Iron, Dissolved	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: WEST BOYLSTON
Project Number: 03T08

Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-04
Client ID: M1 SSN
Sample Location: CONANT

Sample Depth:
Matrix: Water

Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	ND		mg/l	1.0	NA	1	-	07/03/19 14:25	121,2540D	DR

Project Name: WEST BOYLSTON
Project Number: 03T08

Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-05
Client ID: M1 CBW
Sample Location: CONANT

Sample Depth:
Matrix: Water

Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	1500		mg/l	20	NA	20	-	07/03/19 14:25	121,2540D	DR

Project Name: WEST BOYLSTON
Project Number: 03T08

Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-06
Client ID: M2 SSN
Sample Location: CONANT

Sample Depth:
Matrix: Water

Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	1.9		mg/l	1.0	NA	1	-	07/03/19 14:25	121,2540D	DR

Project Name: WEST BOYLSTON
Project Number: 03T08

Lab Number: L1929093
Report Date: 07/12/19

SAMPLE RESULTS

Lab ID: L1929093-07
Client ID: M2 CBW
Sample Location: CONANT

Sample Depth:
Matrix: Water

Date Collected: 07/02/19 08:00
Date Received: 07/02/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	2700		mg/l	20	NA	20	-	07/03/19 14:25	121,2540D	DR

Project Name: WEST BOYLSTON
Project Number: 03T08
Lab Number: L1929093
Report Date: 07/12/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 04-07 Batch: WG1256143-1										
Solids, Total Suspended	ND		mg/l	1.0	NA	1	-	07/03/19 14:25	121,2540D	DR

Lab Duplicate Analysis
Batch Quality Control

Project Name: WEST BOYLSTON
Project Number: 03T08

Lab Number: L1929093
Report Date: 07/12/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 04-07 QC Batch ID: WG1256143-2 QC Sample: L1929093-05 Client ID: M1 CBW						
Solids, Total Suspended	1500	1500	mg/l	0		29

Project Name: WEST BOYLSTON
Project Number: 03T08

Lab Number: L1929093
Report Date: 07/12/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1929093-01A	Plastic 120ml HNO3 preserved	A	<2	<2	8.5	Y	Absent		MN-2008T(180),FE-UI(180)
L1929093-01B	Plastic 250ml unpreserved	A	7	7	8.5	Y	Absent		-
L1929093-01X	Plastic 120ml HNO3 preserved Filtrates	A	NA		8.5	Y	Absent		FE-RI(180),MN-2008S(180)
L1929093-02A	Plastic 120ml HNO3 preserved	A	<2	<2	8.5	Y	Absent		MN-2008T(180),FE-UI(180)
L1929093-03A	Plastic 120ml HNO3 preserved	A	<2	<2	8.5	Y	Absent		MN-2008T(180),FE-UI(180)
L1929093-04A	Plastic 120ml HNO3 preserved	A	<2	<2	8.5	Y	Absent		MN-2008T(180),FE-UI(180)
L1929093-04B	Plastic 250ml unpreserved	A	7	7	8.5	Y	Absent		-
L1929093-04C	Plastic 950ml unpreserved	A	7	7	8.5	Y	Absent		TSS-2540-LOW(7)
L1929093-04X	Plastic 120ml HNO3 preserved Filtrates	A	NA		8.5	Y	Absent		FE-RI(180),MN-2008S(180)
L1929093-05A	Plastic 120ml HNO3 preserved	A	<2	<2	8.5	Y	Absent		FE-UI(180),MN-UI(180)
L1929093-05B	Plastic 250ml unpreserved	A	7	7	8.5	Y	Absent		-
L1929093-05C	Plastic 950ml unpreserved	A	7	7	8.5	Y	Absent		TSS-2540-LOW(7)
L1929093-05X	Plastic 120ml HNO3 preserved Filtrates	A	NA		8.5	Y	Absent		FE-RI(180),MN-RI(180)
L1929093-06A	Plastic 120ml HNO3 preserved	A	<2	<2	8.5	Y	Absent		MN-2008T(180),FE-UI(180)
L1929093-06B	Plastic 250ml unpreserved	A	7	7	8.5	Y	Absent		-
L1929093-06C	Plastic 950ml unpreserved	A	7	7	8.5	Y	Absent		TSS-2540-LOW(7)
L1929093-06X	Plastic 120ml HNO3 preserved Filtrates	A	NA		8.5	Y	Absent		FE-RI(180),MN-2008S(180)
L1929093-07A	Plastic 120ml HNO3 preserved	A	<2	<2	8.5	Y	Absent		FE-UI(180),MN-UI(180)
L1929093-07B	Plastic 250ml unpreserved	A	7	7	8.5	Y	Absent		-
L1929093-07C	Plastic 950ml unpreserved	A	7	7	8.5	Y	Absent		TSS-2540-LOW(7)
L1929093-07X	Plastic 120ml HNO3 preserved Filtrates	A	NA		8.5	Y	Absent		FE-RI(180),MN-RI(180)

*Values in parentheses indicate holding time in days

Project Name:	WEST BOYLSTON	**Lab Number:**	L1929093
Project Number:	03T08	**Report Date:**	07/12/19

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON	**Lab Number:**	L1929093
Project Number:	03T08	**Report Date:**	07/12/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	WEST BOYLSTON	**Lab Number:**	L1929093
Project Number:	03T08	**Report Date:**	07/12/19

REFERENCES

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

ALPHA ANALYTICAL — World Class Chemistry

PAGE ____ OF ____

8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 7/2/19

ALPHA Job #: L1929013

Project Information

Project Name: 40 West Boylston
Project Location: Conant
Project #: 03508
Project Manager: Erik Grotton
ALPHA Quote #:

Report Information - Data Deliverables

☒ ADEx ☐ EMAIL

Billing Information

☐ Same as Client info PO #:

Client Information

Client: Blueleaf Inc
Address: 57 Dresser Hill Rd, Charlton MA 01507
Phone: 508-294-3714
Email: egrotton@blueleafecon.com

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program ____________ Criteria ____________

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due:

Additional Project Information:

ANALYSIS

VOC: ☐ 8260 ☐ 624 ☐ 524.2; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☐ Ranges & Targets ☐ Ranges Only; VPH: ☐ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☐ Quant Only ☐ Fingerprint; Fe, Mn (total); Fe, Mn (dissolved); TSS

SAMPLE INFO — Filtration: ☐ Field ☐ Lab to do; Preservation: ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	Fe, Mn (total)	Fe, Mn (dissolved)	TSS	Sample Comments
29013-01	DAW	7/2	8:00	GW	esg	X	X		
-02	M1	"	"	GW	esg	X			
-03	M2	"	"	GW	esg	X			
-04	M1 SSW	↓	↓	↓	↓	X	X	X	
(CF) -05	M1 CBW	↓	↓	↓	↓	X	X	X	Mn ~ 800 mg/L
-06	M2 SSW	↓	↓	↓	↓	X	X	X	
-07	M2 CBW	↓	↓	↓	↓	X	X	X	Mn ~ 800 mg/L

	Fe, Mn (total)	Fe, Mn (dissolved)	TSS
Container Type	P	P	P
Preservative	C	A	A

Container Type: P= Plastic, A= Amber glass, V= Vial, G= Glass, B= Bacteria cup, C= Cube, O= Other, E= Encore, D= BOD Bottle

Preservative: A= None, B= HCl, C= HNO_3, D= H_2SO_4, E= NaOH, F= MeOH, G= $NaHSO_4$, H = $Na_2S_2O_3$, I= Ascorbic Acid, J = NH_4Cl, K= Zn Acetate, O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	7/2/19 16:42	[signature]	7/2/19 1642

FORM NO: 01-01 (rev. 12-Mar-2012)

Appendix D – Greensand Performance Figures

Filter Performance Operational Reference Table

Trial	Fig. #	Page #	FSLR (gpm/sf)	Description
A-1	D.01	D-2	5	
B-1	D.02	D-3	5	
C-1	D.03	D-4	5	
D-1	D.04	D-5	5	
A-2	D.05	D-6	4	
B-2	D.06	D-7	4	
C-2	D.07	D-8	6	
D-2	D.08	D-9	6	
A-3	D.09	D-10	7	
B-3	D.10	D-12	7	
C-3	D.11	D-14	5	
D-3	D.12	D-11	5	
A-4	D.13	D-16	5	SSN Recycle
B-4	D.14	D-13	5	
C-4	D.15	D-18	7	
D-4	D.16	D-15	7	

Figure D.01: Operating Parameters and Results
Filter A, Trial 1 - April 30 - May 1, 2019

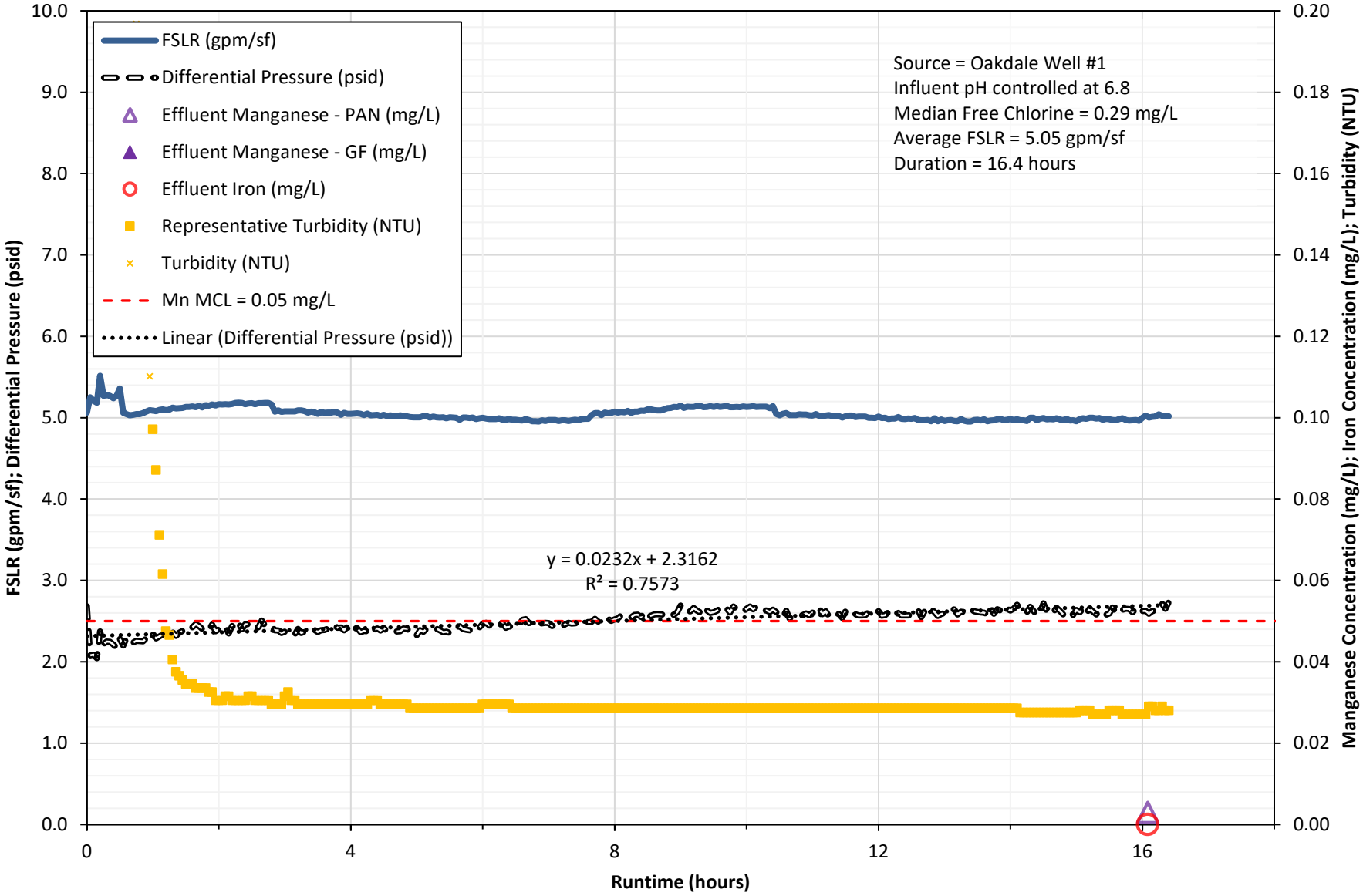


Figure D.02: Operating Parameters and Results
Filter B, Trial 1 - April 30 - May 1, 2019

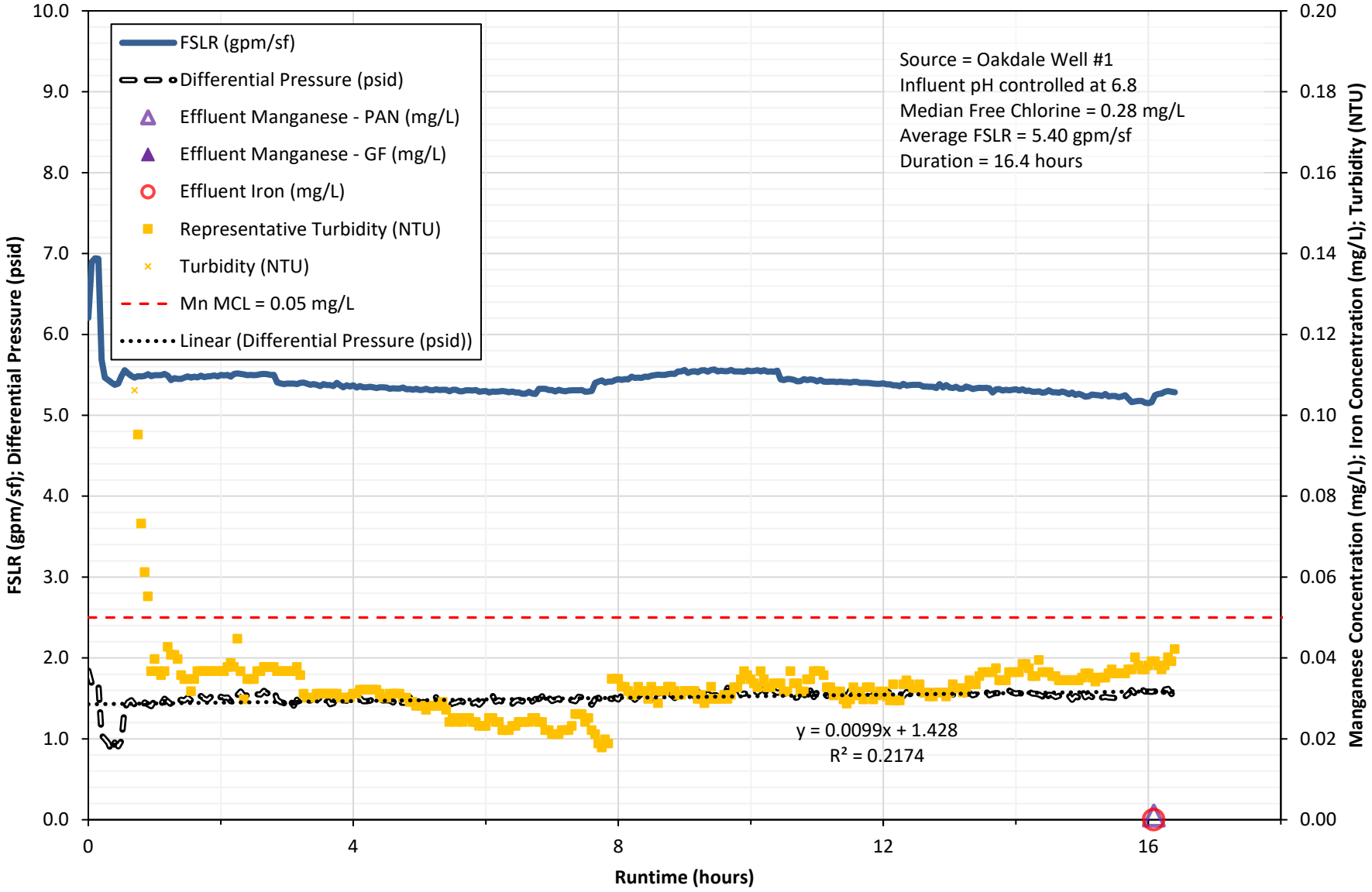


Figure D.03: Operating Parameters and Results
Filter C, Trial 1 - April 30 - May 1, 2019

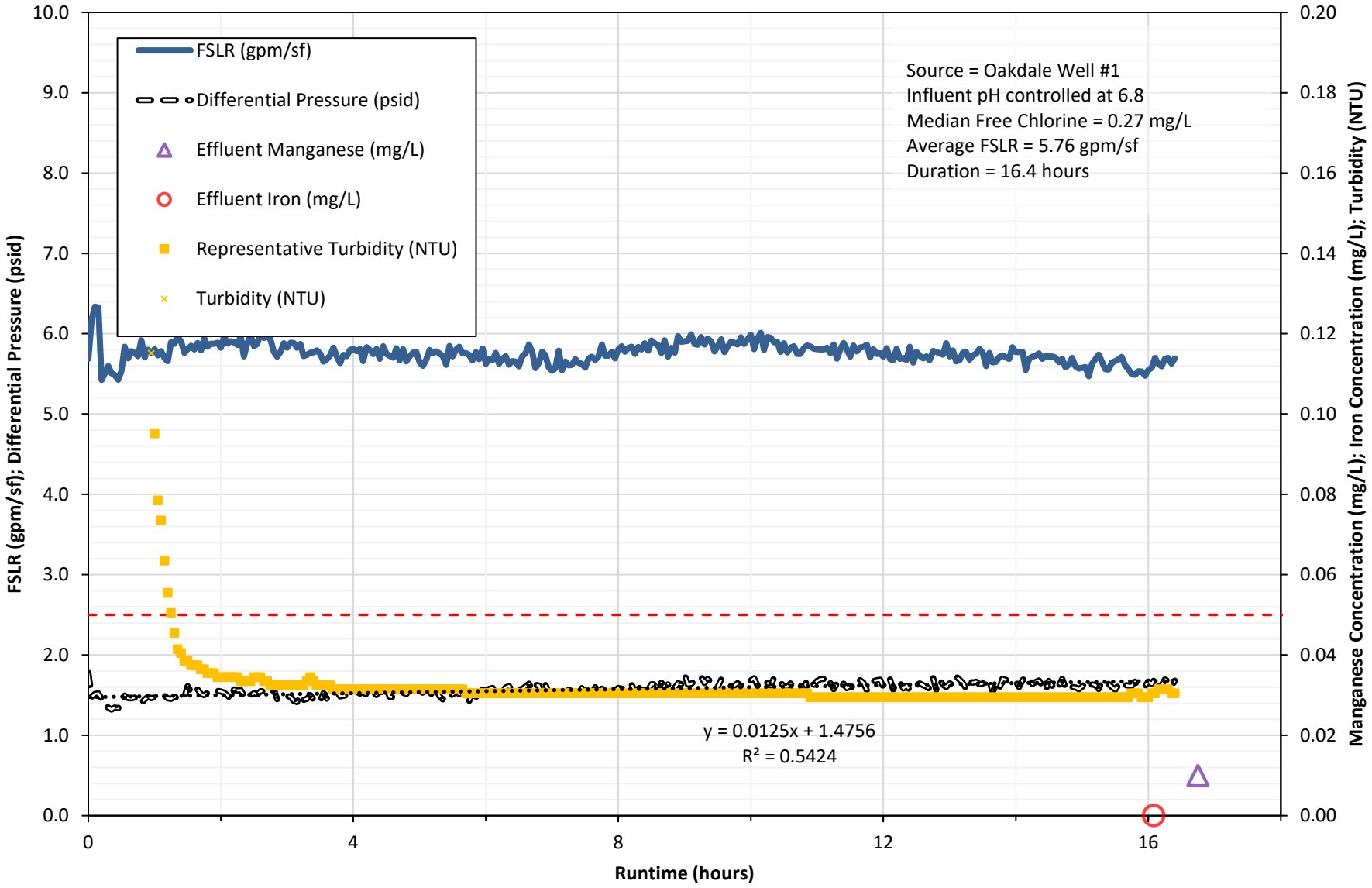


Figure D.04: Operating Parameters and Results
Filter D, Trial 1 - April 30 - May 1, 2019

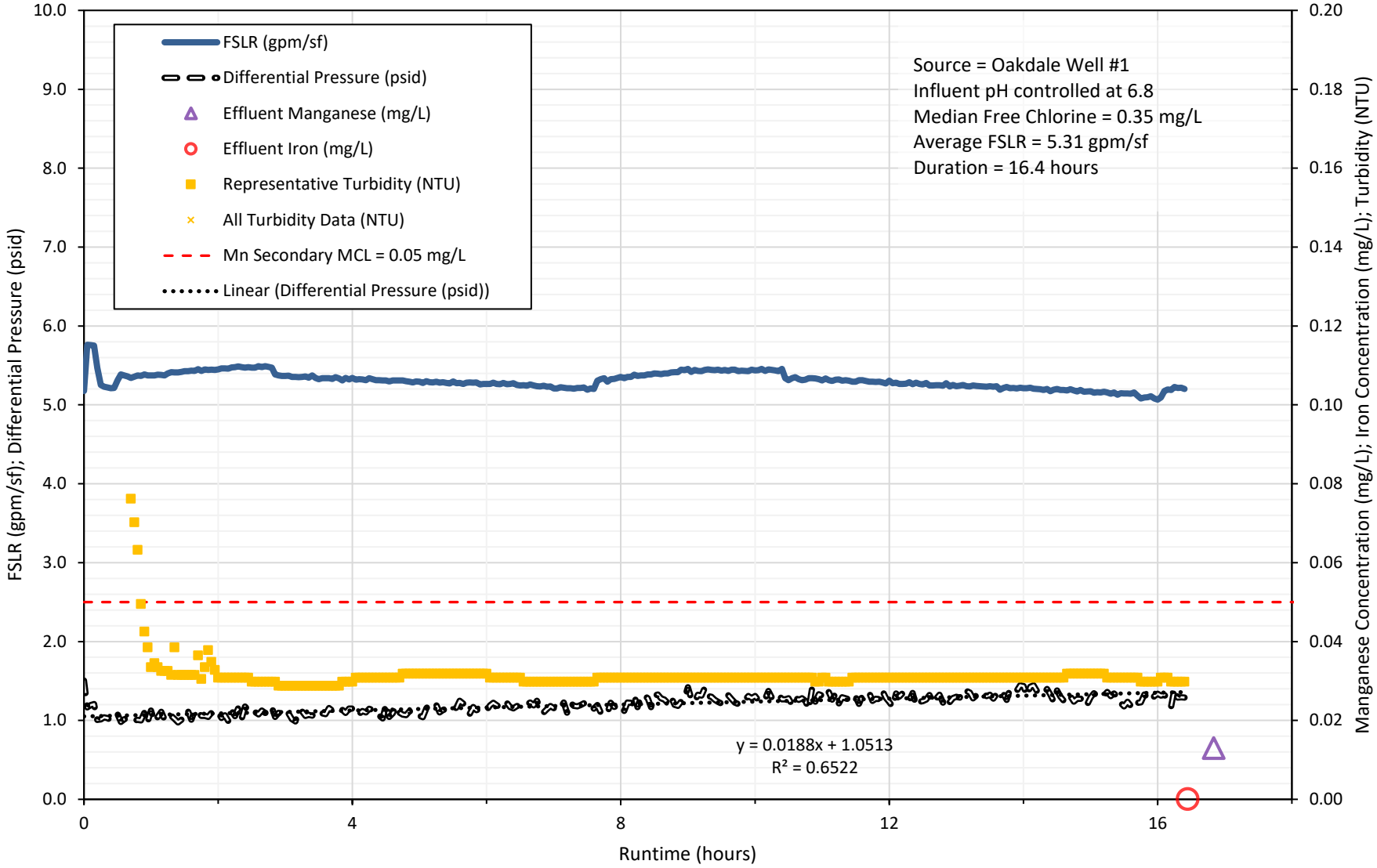


Figure D.05: Operating Parameters and Results
Filter A, Trial 2 - May 1 - 3, 2019

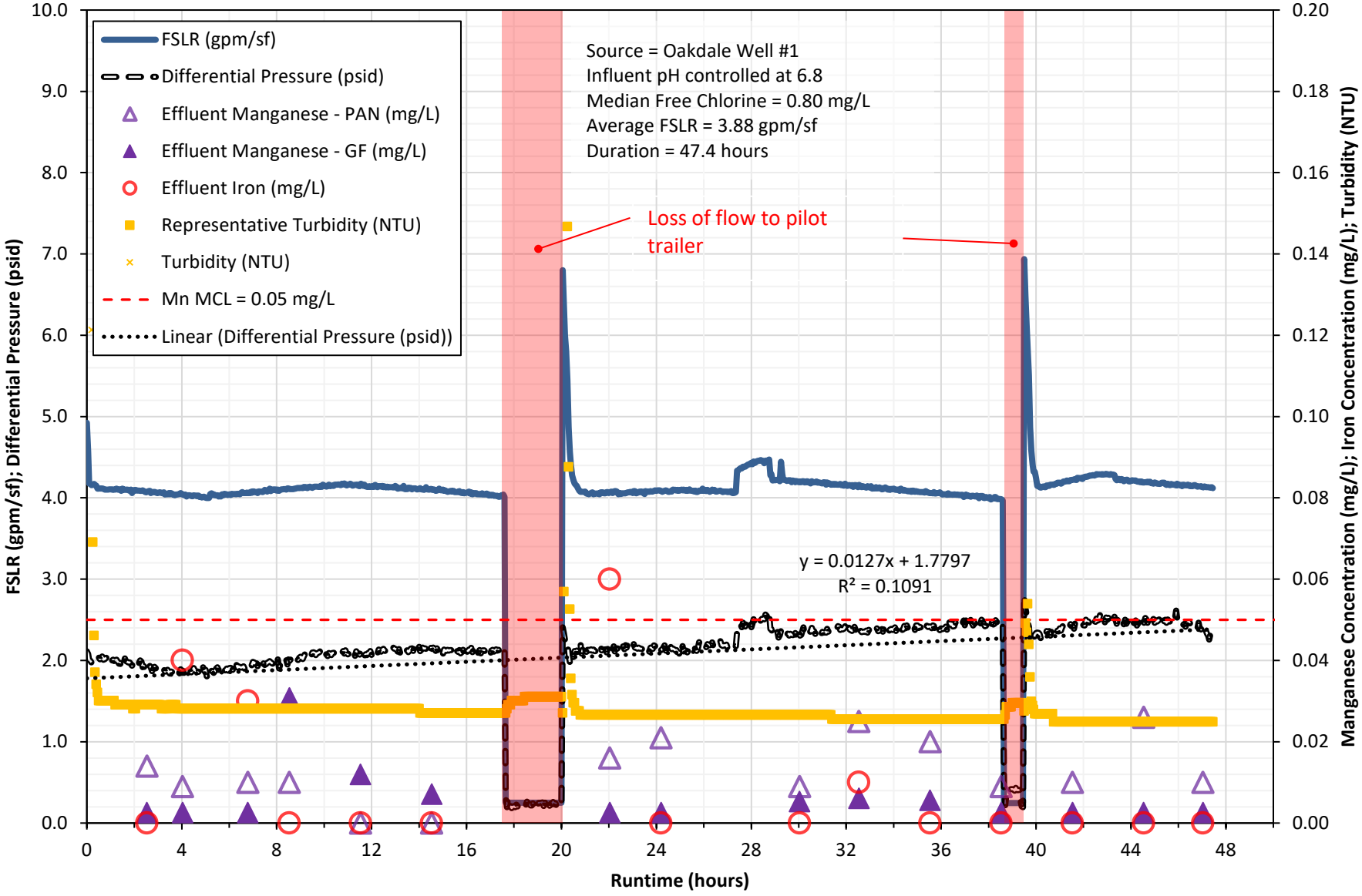


Figure D.06: Operating Parameters and Results
Filter B, Trial 2 - May 1 - 3, 2019

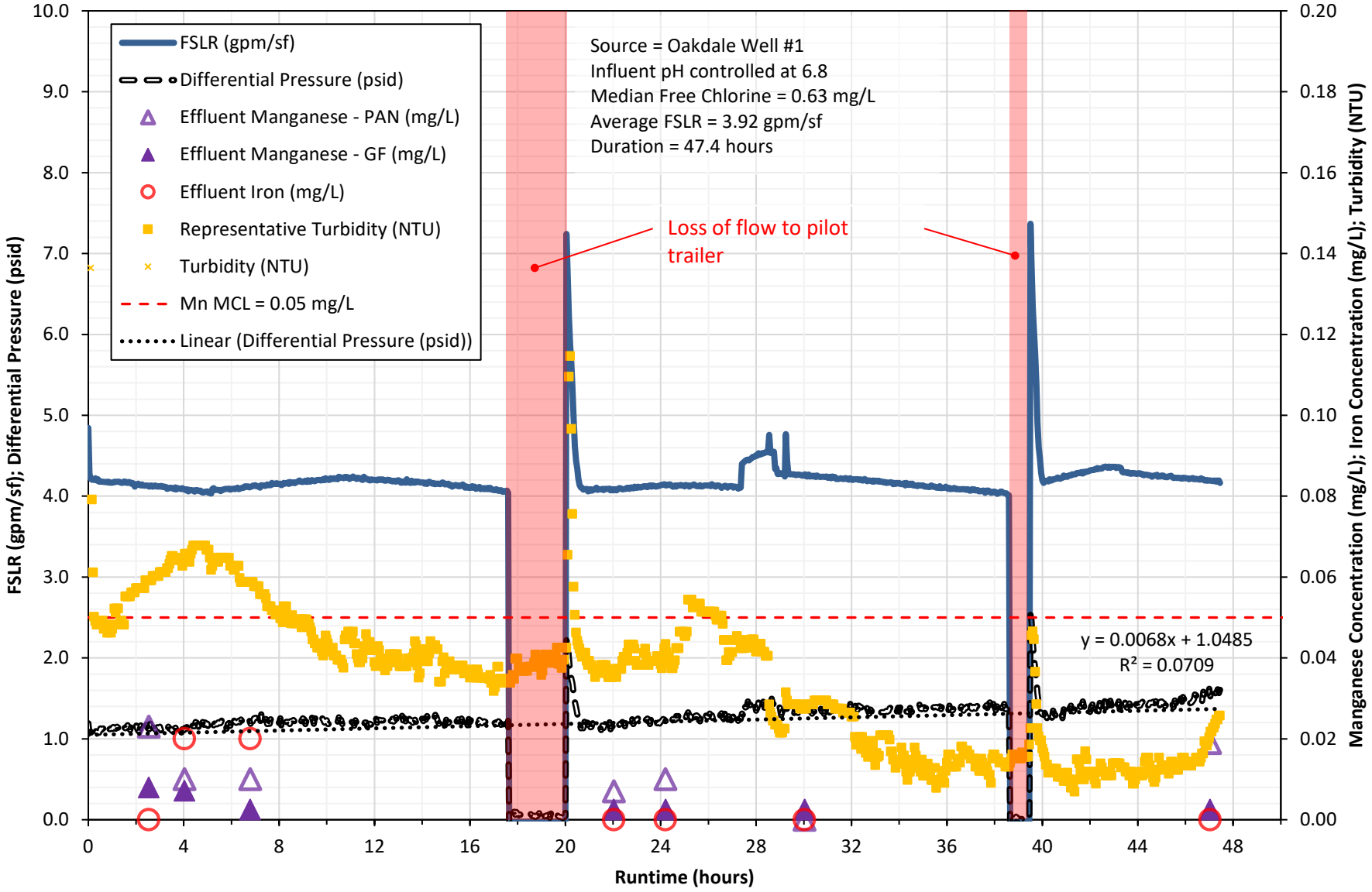


Figure D.07: Operating Parameters and Results
Filter C, Trial 2 - May 1 - 3, 2019

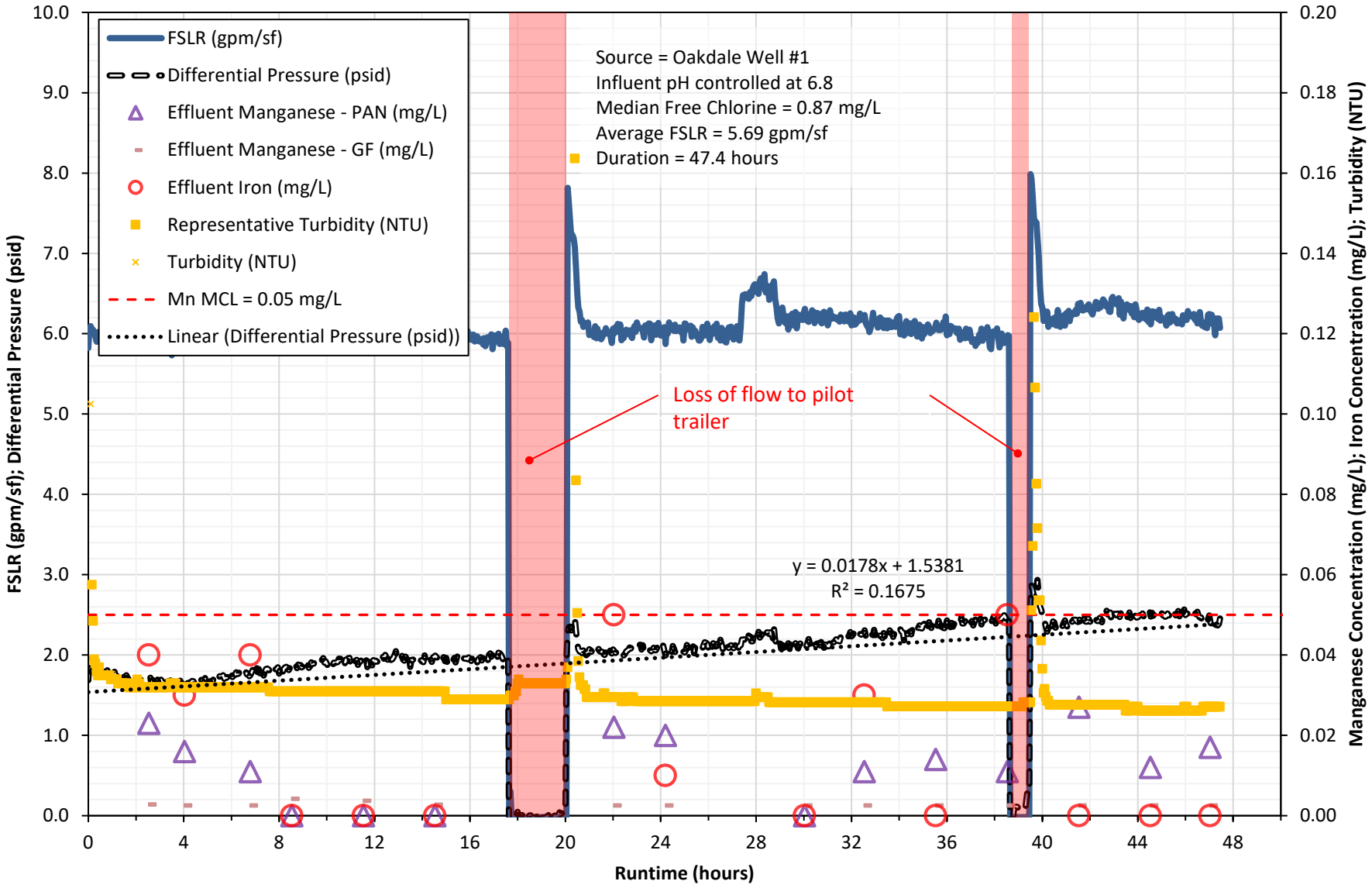


Figure D.08: Operating Parameters and Results
Filter D, Trial 2 - May 1 - 3, 2019

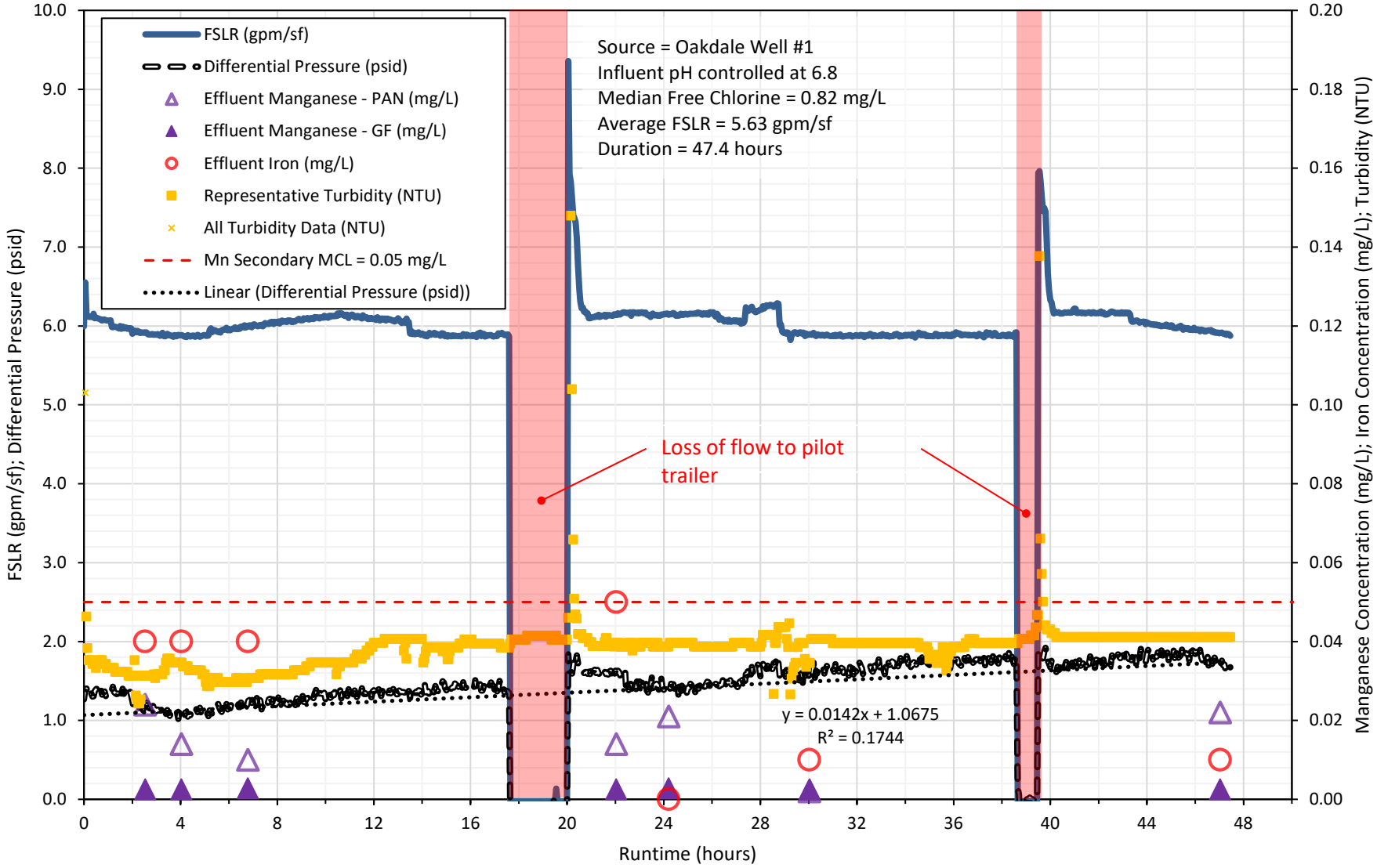


Figure D.09: Operating Parameters and Results
Filter A, Trial 3 - May 3 - 6, 2019

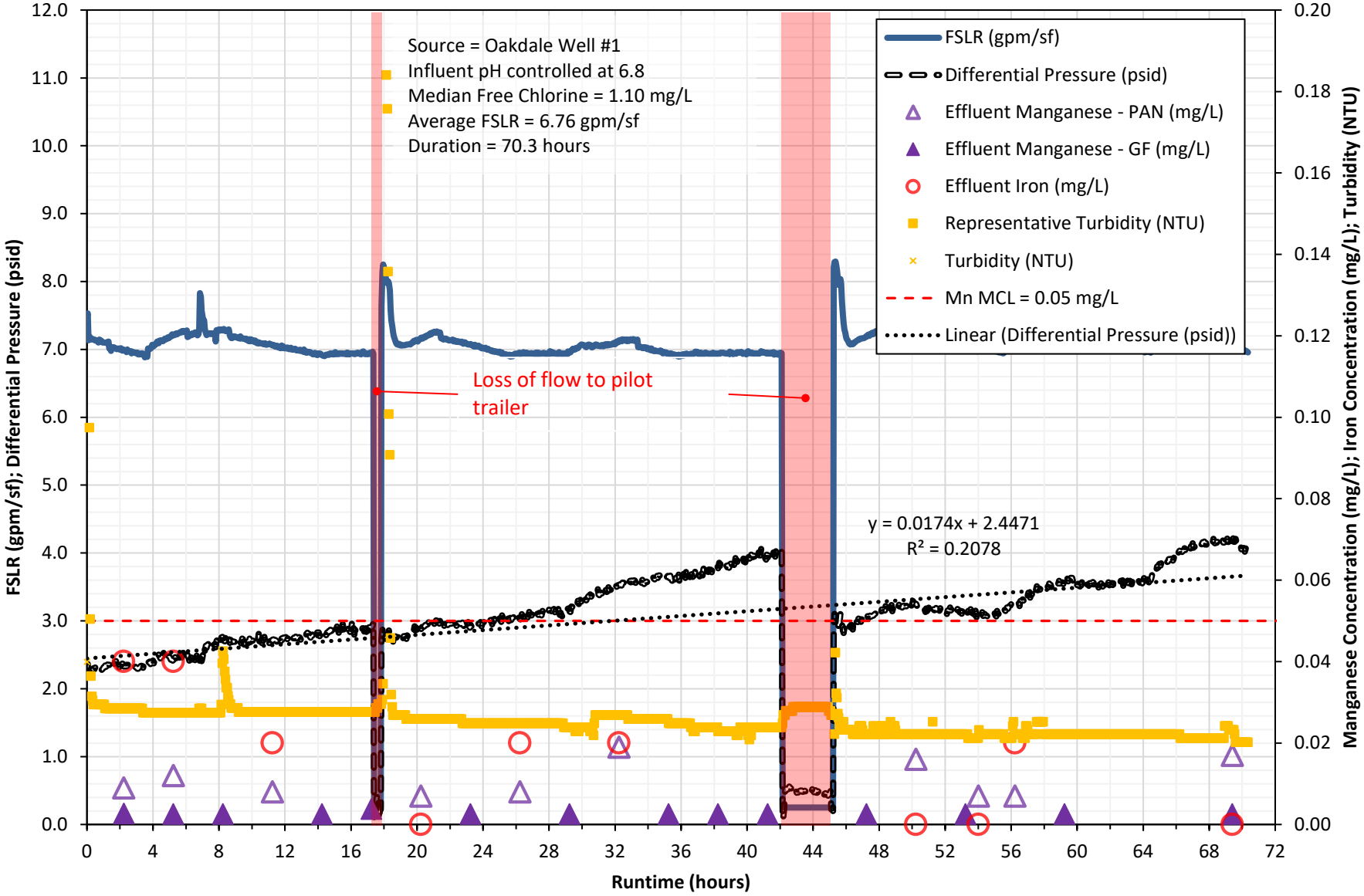


Figure D.10: Operating Parameters and Results
Filter B, Trial 3 - May 3 - 6, 2019

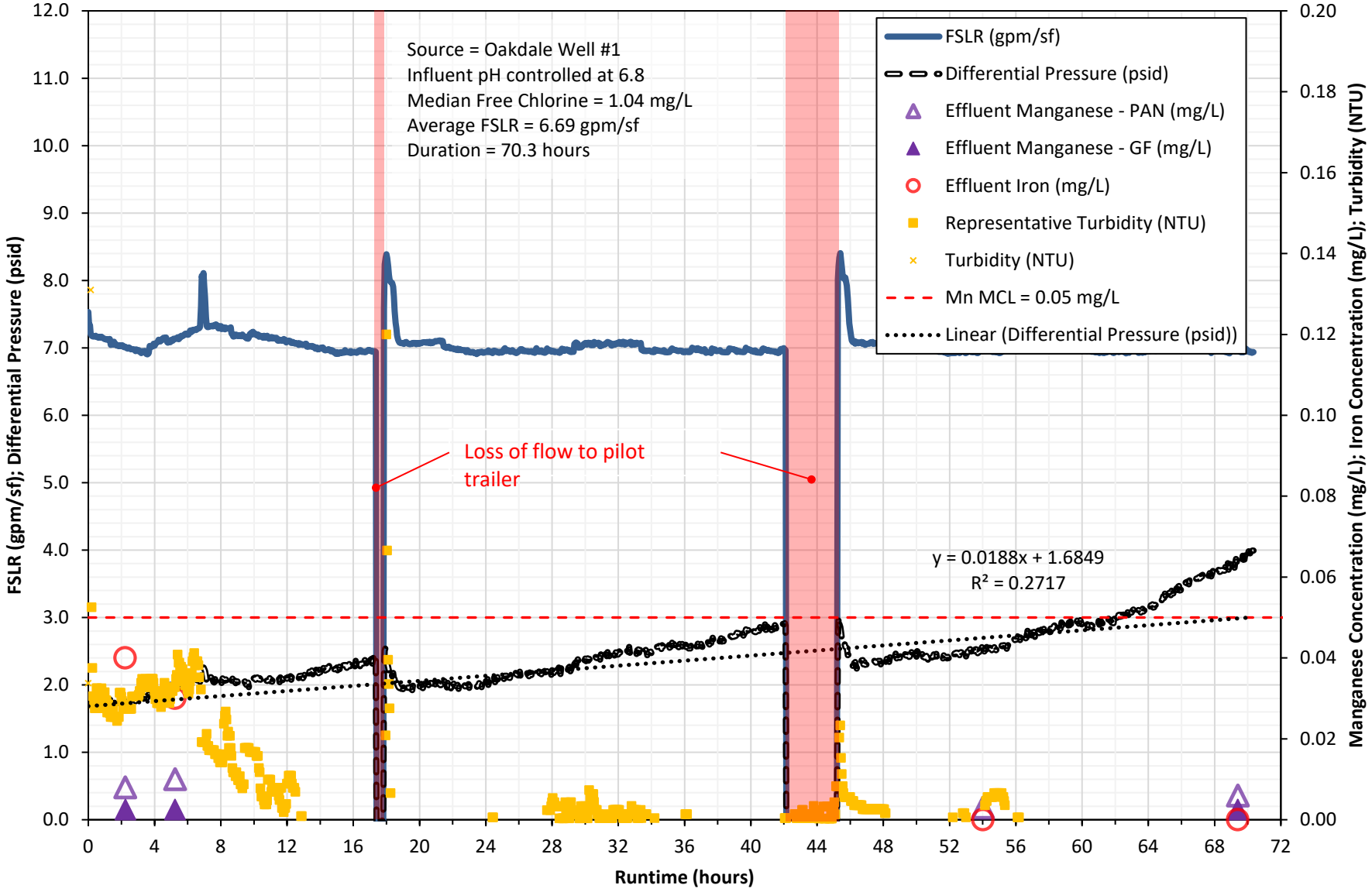


Figure D.11: Operating Parameters and Results
Filter C, Trial 3 - May 3 - 6, 2019

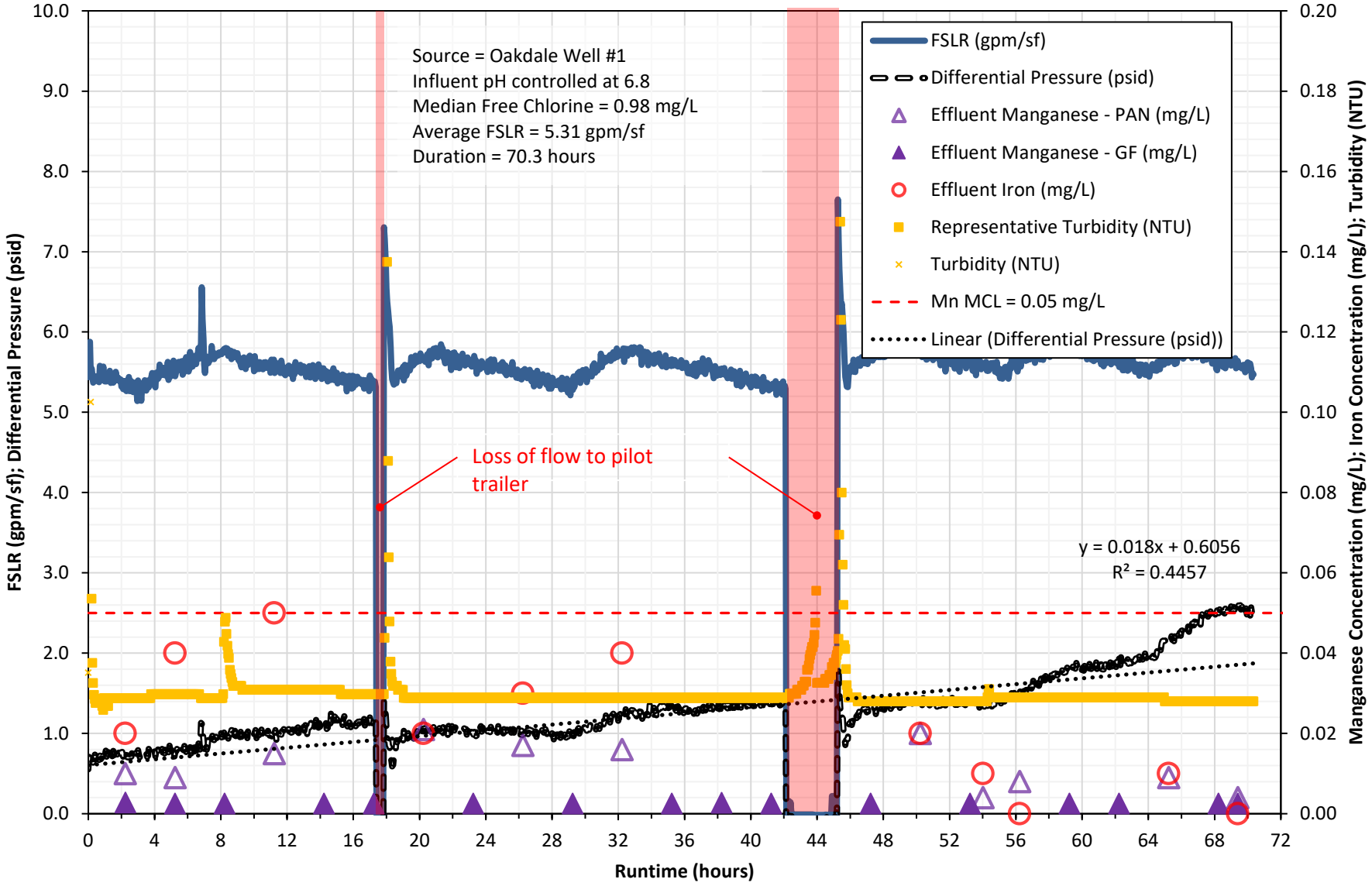


Figure D.12: Operating Parameters and Results
Filter D, Trial 3 - May 3 - 6, 2019

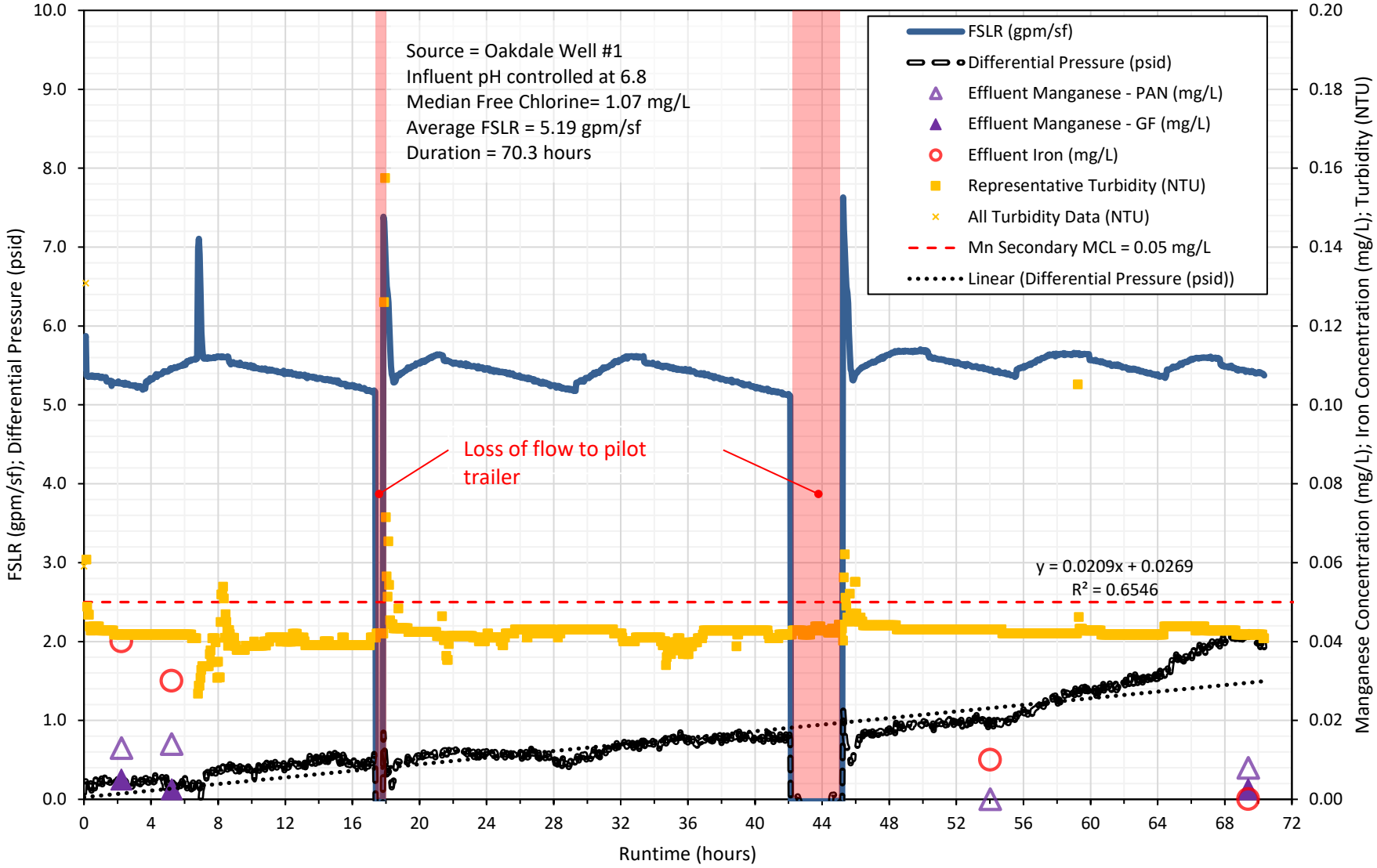


Figure D.13: Operating Parameters and Results
Filter A, Trial 4 - May 6 - 10, 2019

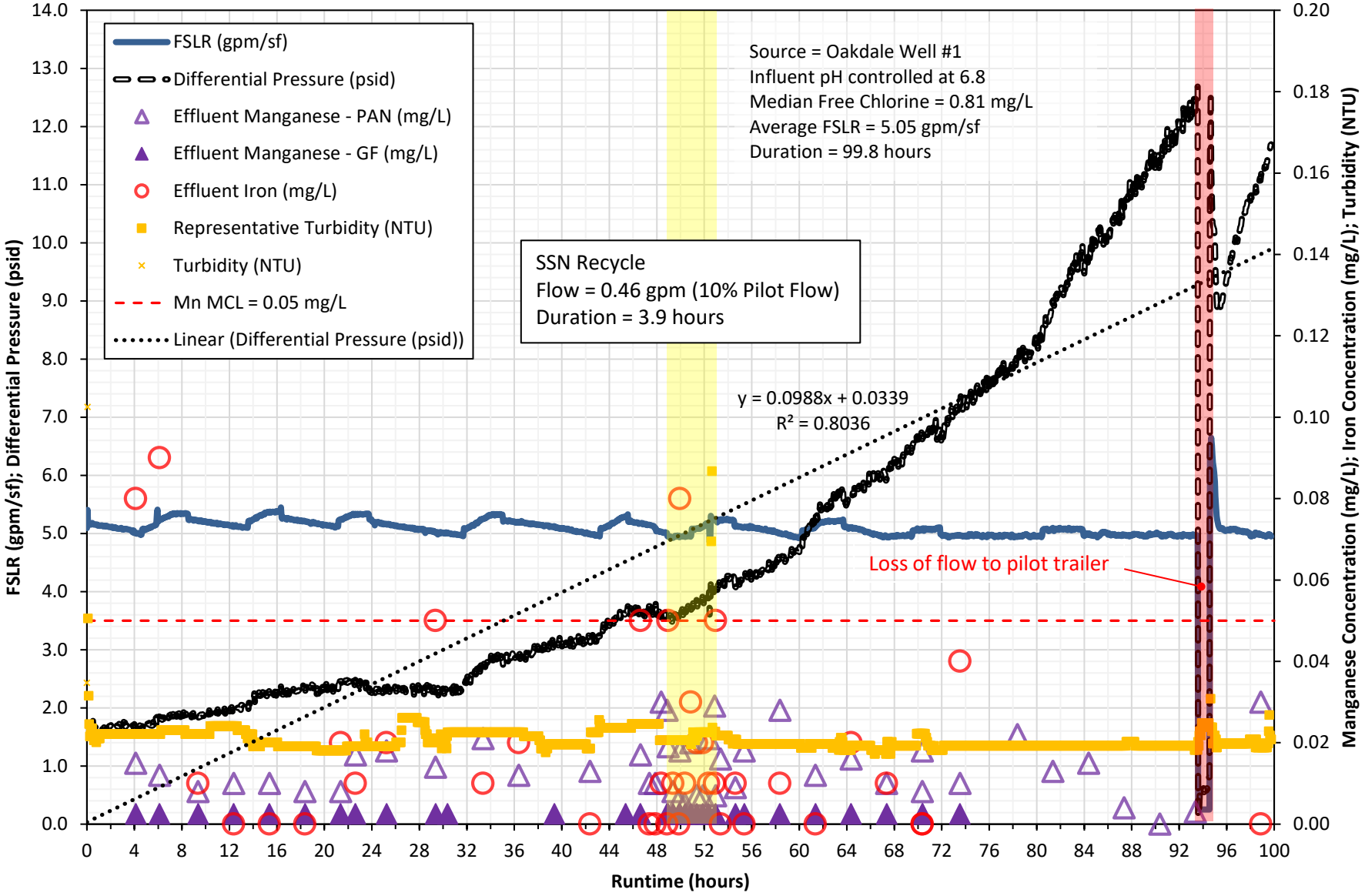


Figure D.14: Operating Parameters and Results
Filter B, Trial 4 - May 6 - 10, 2019

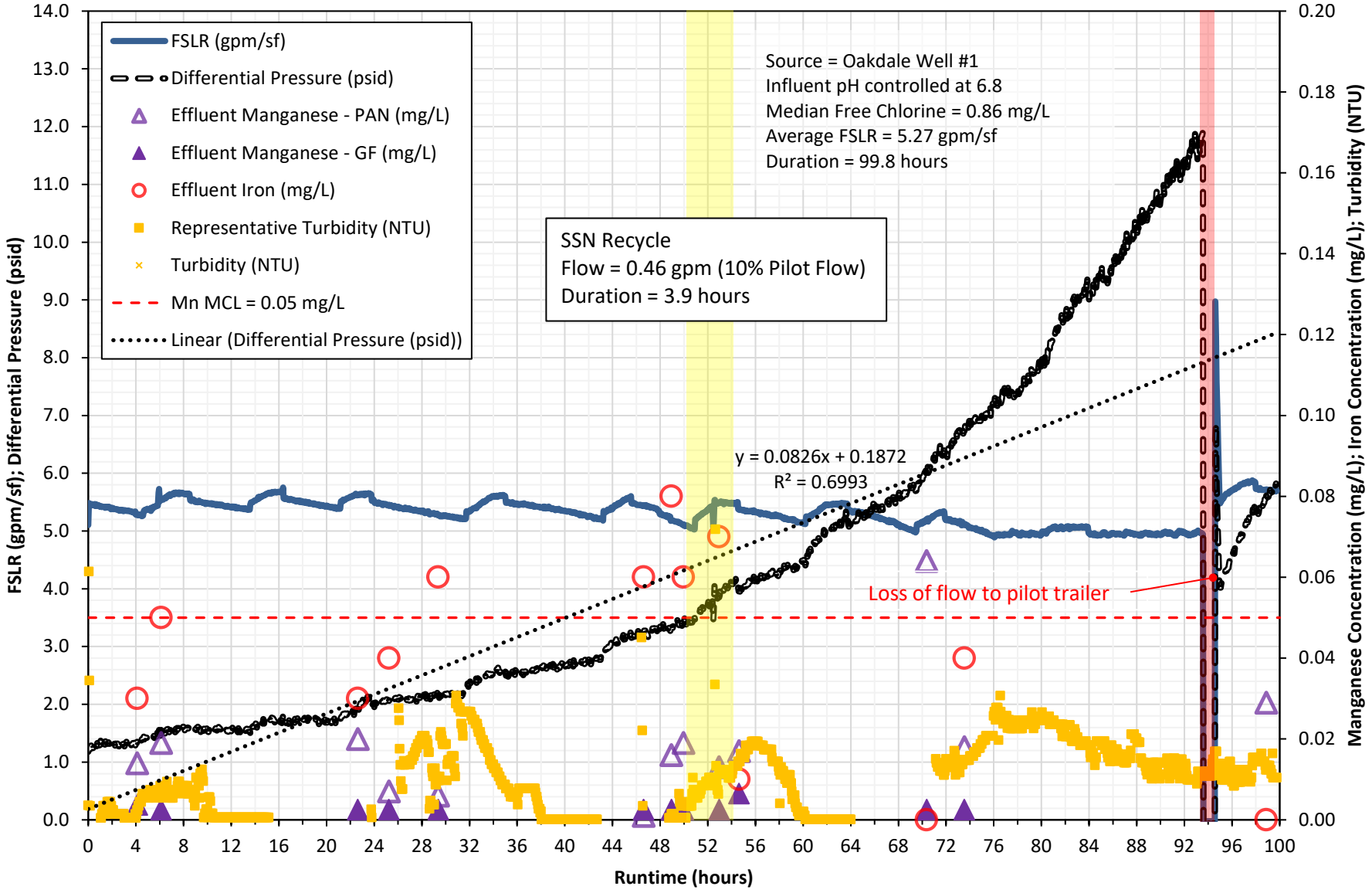


Figure D.15: Operating Parameters and Results
Filter C, Trial 4 - May 6 - 10, 2019

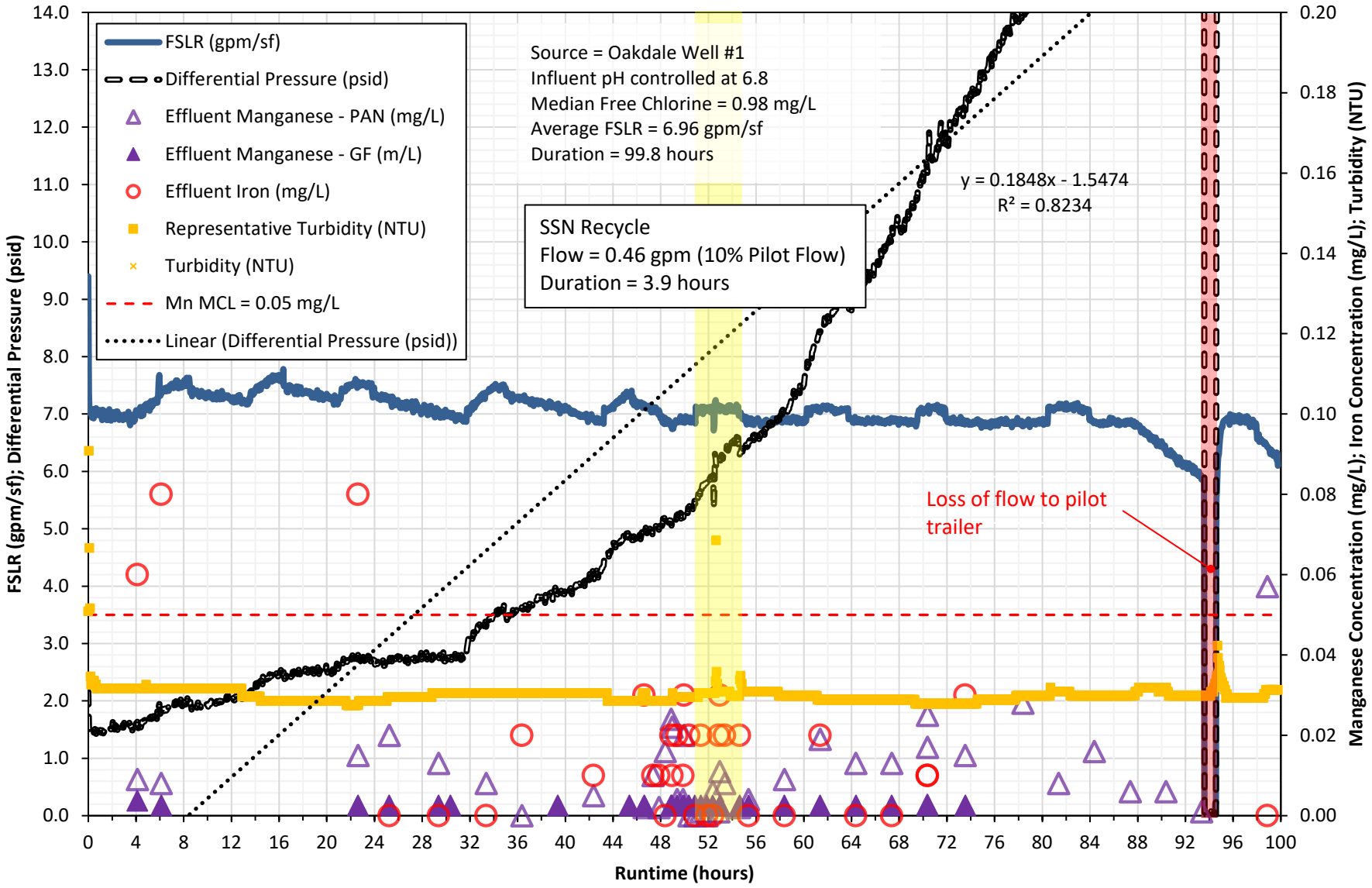
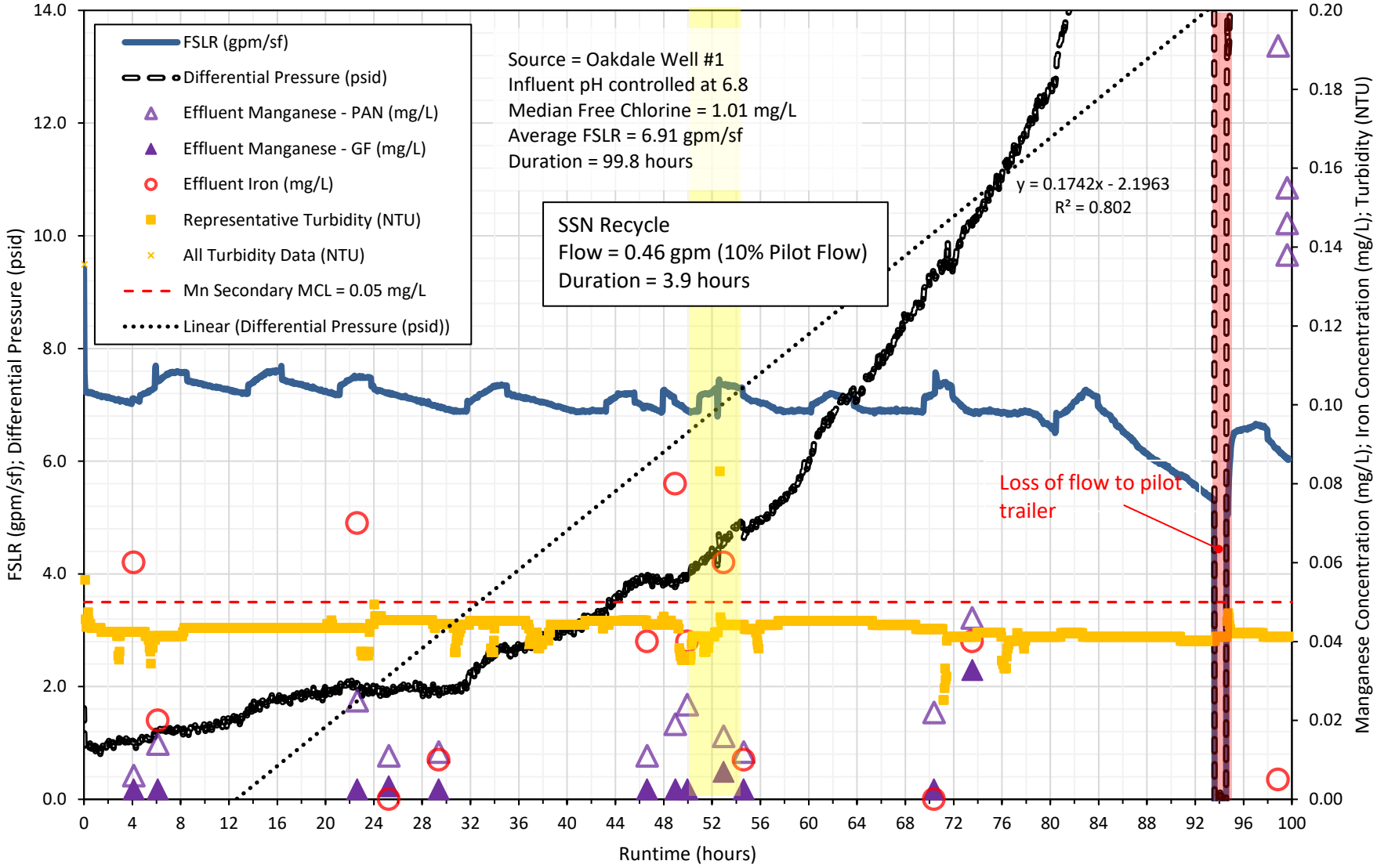


Figure D.16: Operating Parameters and Results
Filter D, Trial 4 - May 6 - 10, 2019



Appendix E – Biological Performance Figures

Filter Performance Operational Reference Table

Filter	Pretreatment		Trial	Figure #	Page #	FSLR (gpm/sf)	Description
	pH (s.u.)	DO (ppm)					
M1	8.50	7.70	1-1	E.01	E-2	5	Phase 1: Acclimation at Low Loading Rate
M2	8.50	7.70	1-1	E.02	E-3	5	
M1	8.50	7.50	2-1	E.03	E-4	5	Phase 2: Representative at Low Loading Rate
M2	8.50	7.50	2-1	E.04	E-5	5	
M1	8.30	7.50	3-1	E.05	E-6	10	Phase 3: Acclimation at High Loading Rate
M2	8.30	7.50	3-1	E.06	E-7	15	
M1	8.30	> 9.00	4-1	E.07	E-8	10	Phase 4: Representative at High Loading Rate
M2	8.30	> 9.00	4-1	E.08	E-9	15	
M1	8.30	> 9.00	4-2	E.09	E-10	10	
M2	8.30	> 9.00	4-2	E.10	E-11	15	
M1	8.30	> 9.00	4-3	E.11	E-12	10	
M2	8.30	> 9.00	4-3	E.12	E-13	15	
M1	8.30	> 9.00	4-4	E.13	E-14	10	
M2	8.30	> 9.00	4-4	E.14	E-15	15	
M1	8.30	> 9.00	4-5	E.15	E-16	10	
M2	8.30	> 9.00	4-5	E.16	E-17	15	
M1	8.30	> 9.00	4-6	E.17	E-18	10	

Figure E.01: Performance of Filter M1 at 5 gpm/sf
Phase 1, Trial 1: Acclimation at Low Rate, March 20 to April 25 2019

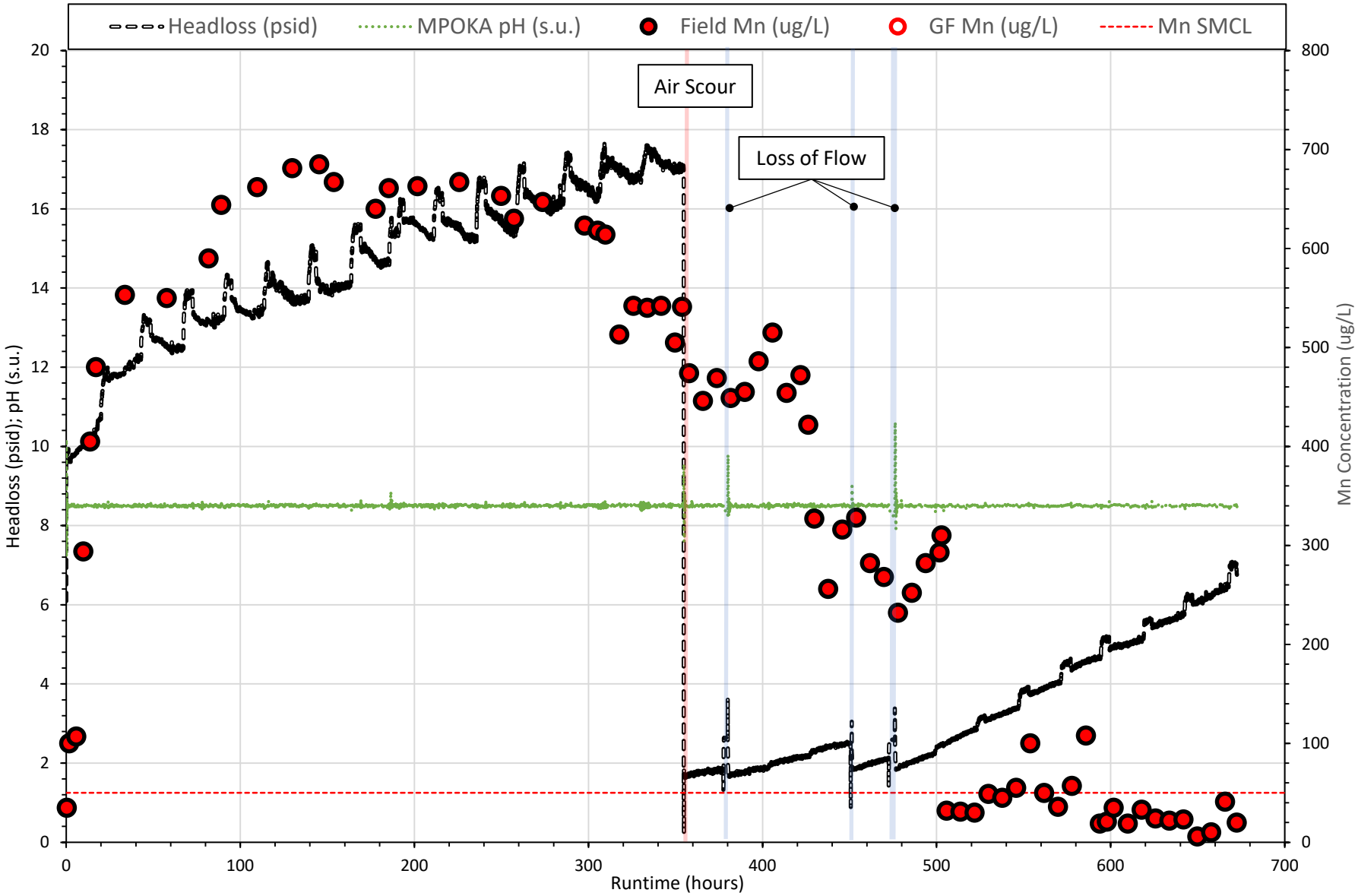


Figure E.02: Performance of Filter M2 at 5 gpm/sf
Phase 1, Trial 1: Acclimation at Low Rate, March 28 to April 25 2019

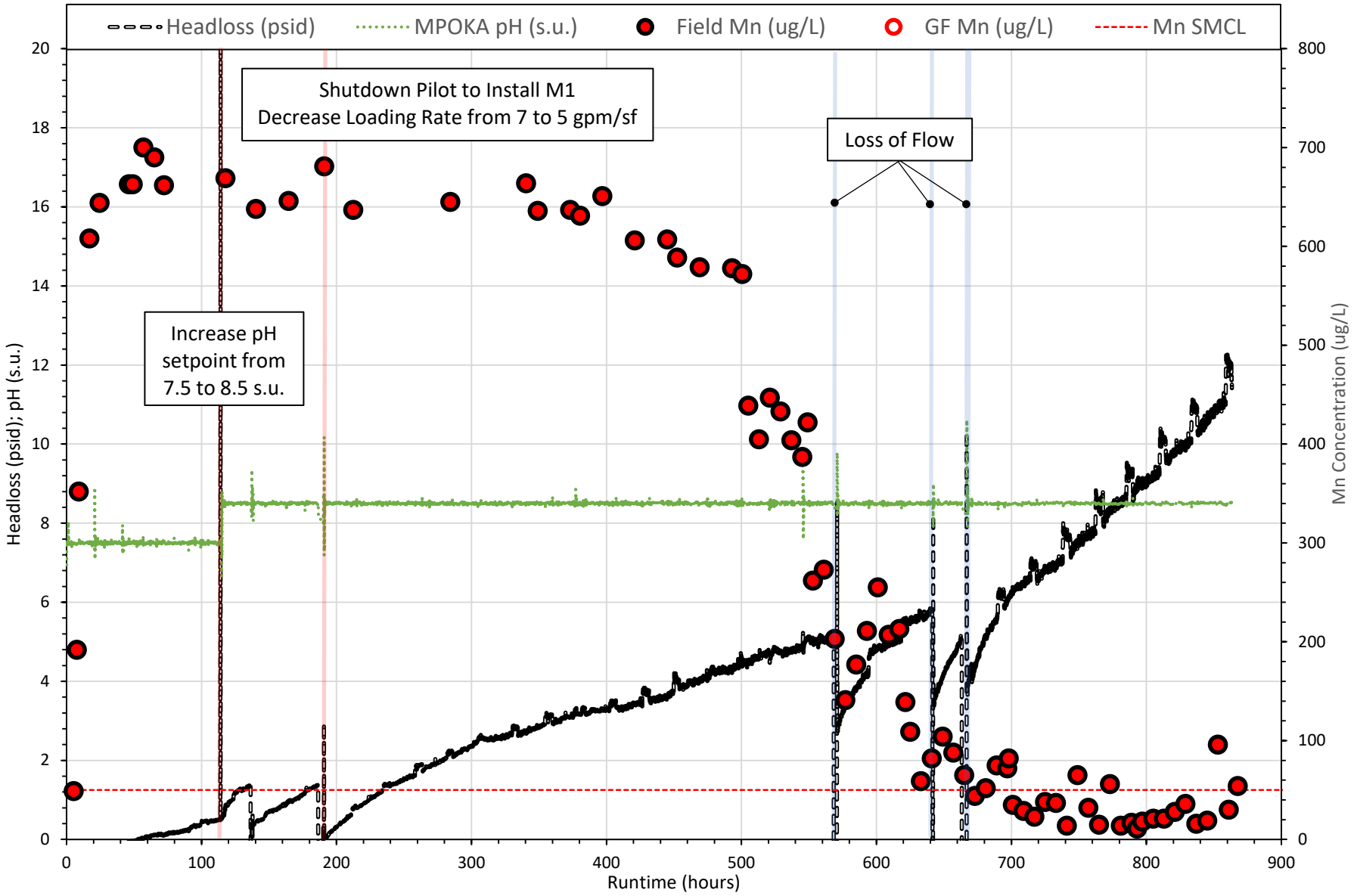


Figure E.03: Performance of Filter M1 at 5 gpm/sf
Phase 2, Trial 1: Representative at Low Rate, April 25 to May 10 2019

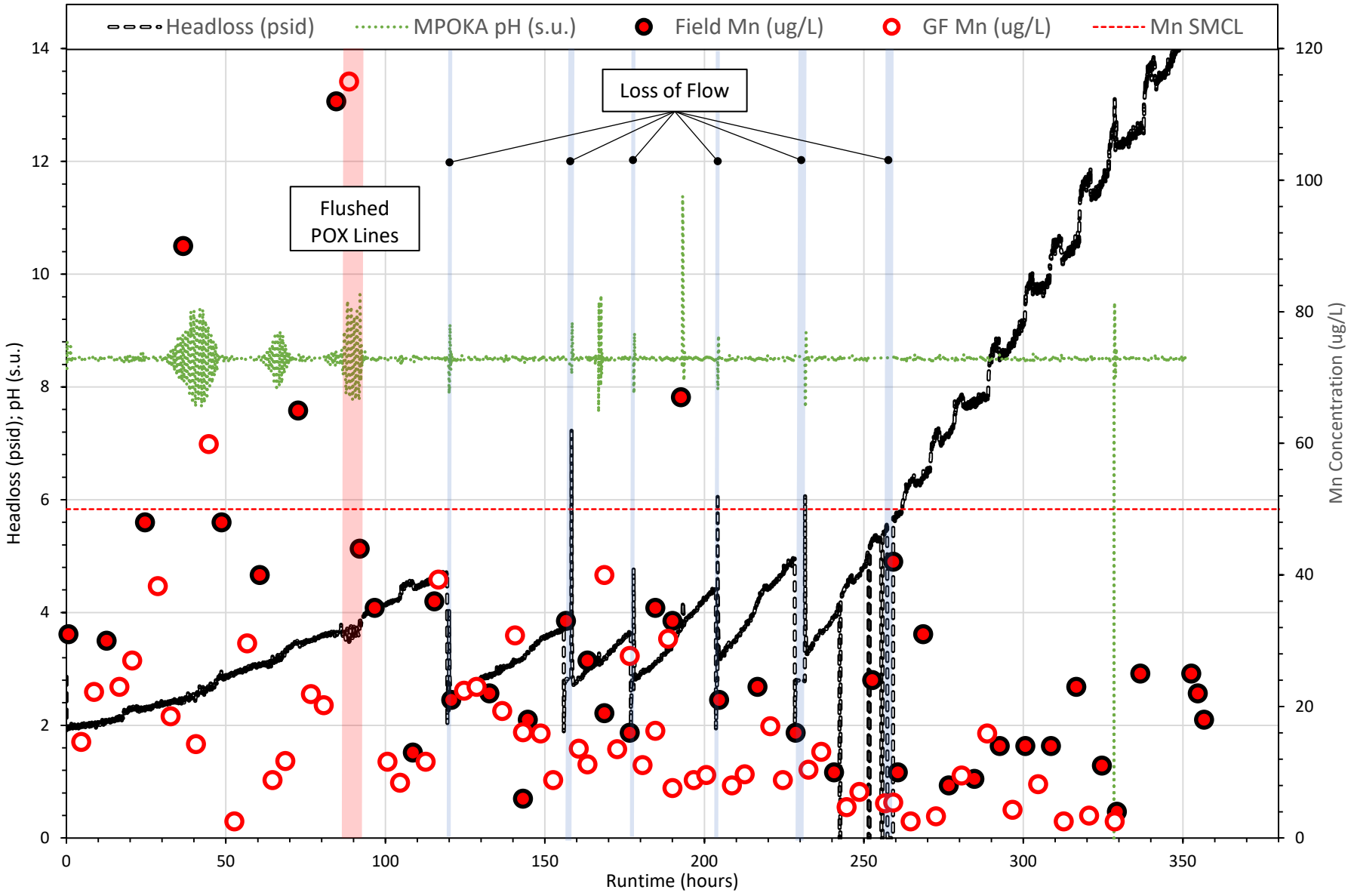


Figure E.04: Performance of Filter M2 at 5 gpm/sf
Phase 2, Trial 1: Representative at Low Rate, April 25 to May 10 2019

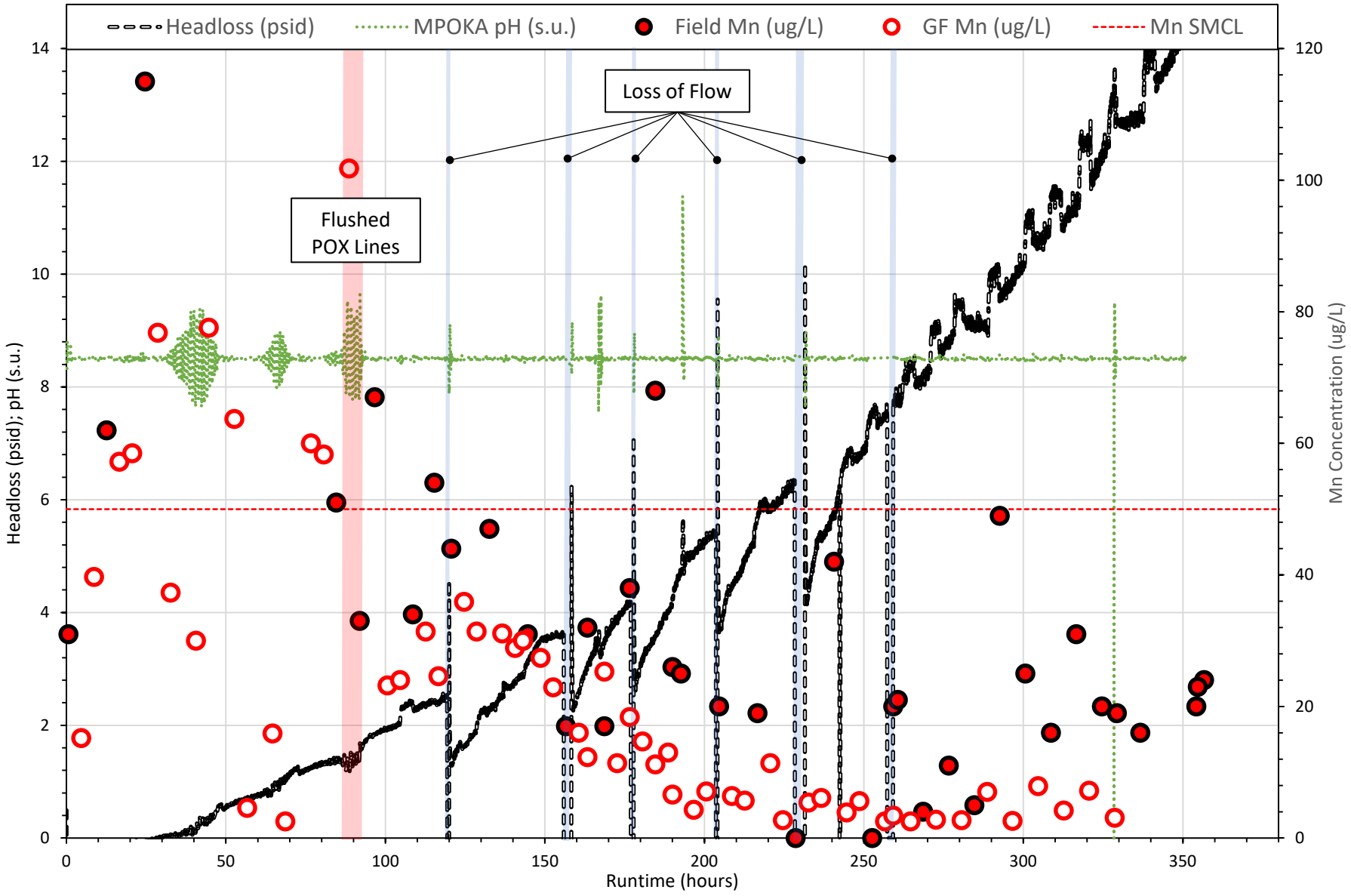


Figure E.05: Performance of Filter M1 at 10 gpm/sf
Phase 3, Trial 1: Acclimation at High Rate, May 10 to June 10 2019

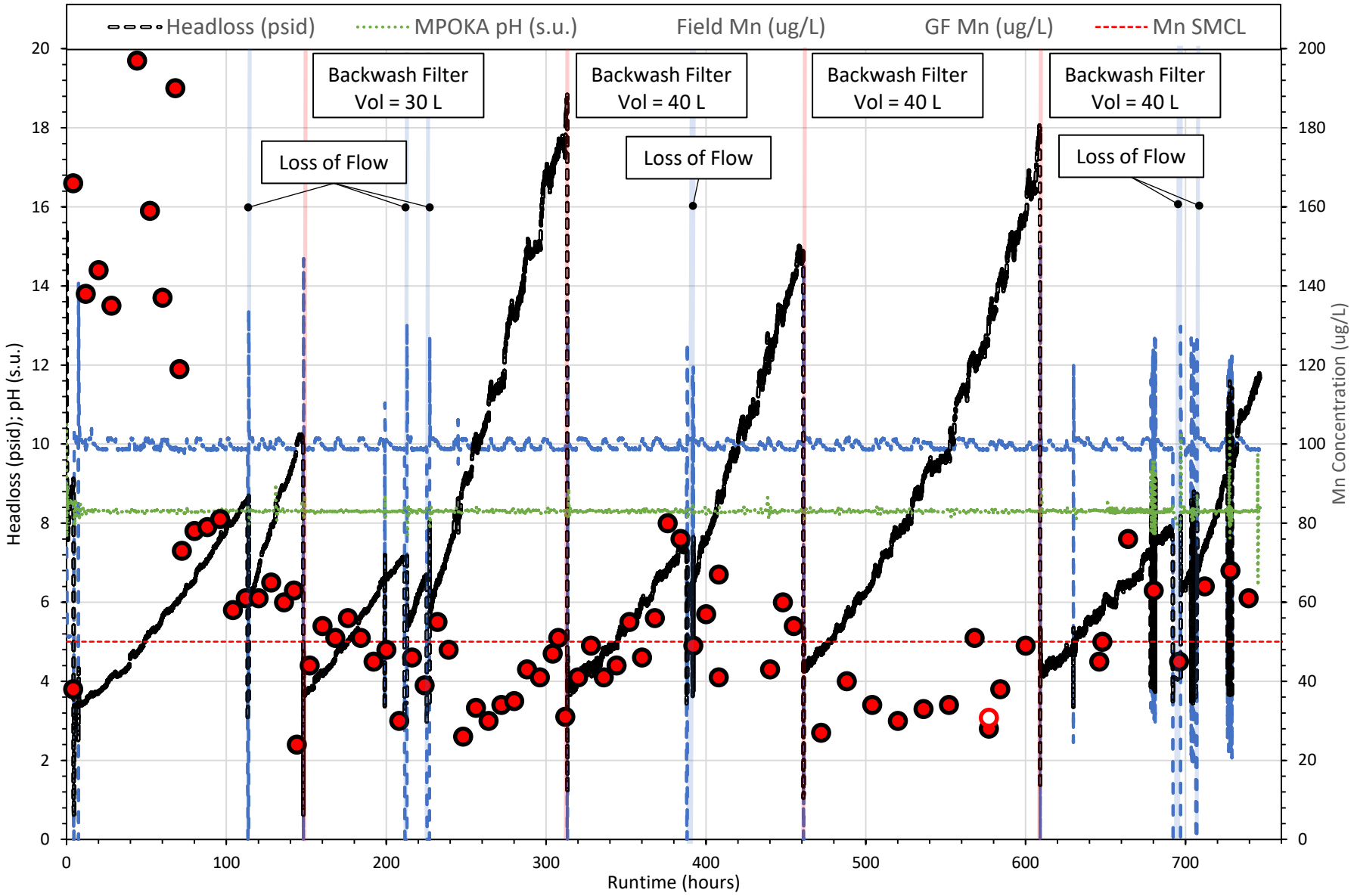


Figure E.06: Performance of Filter M2 at 15 gpm/sf
Phase 3, Trial 1: Acclimation at High Rate, May 10 to June 10 2019

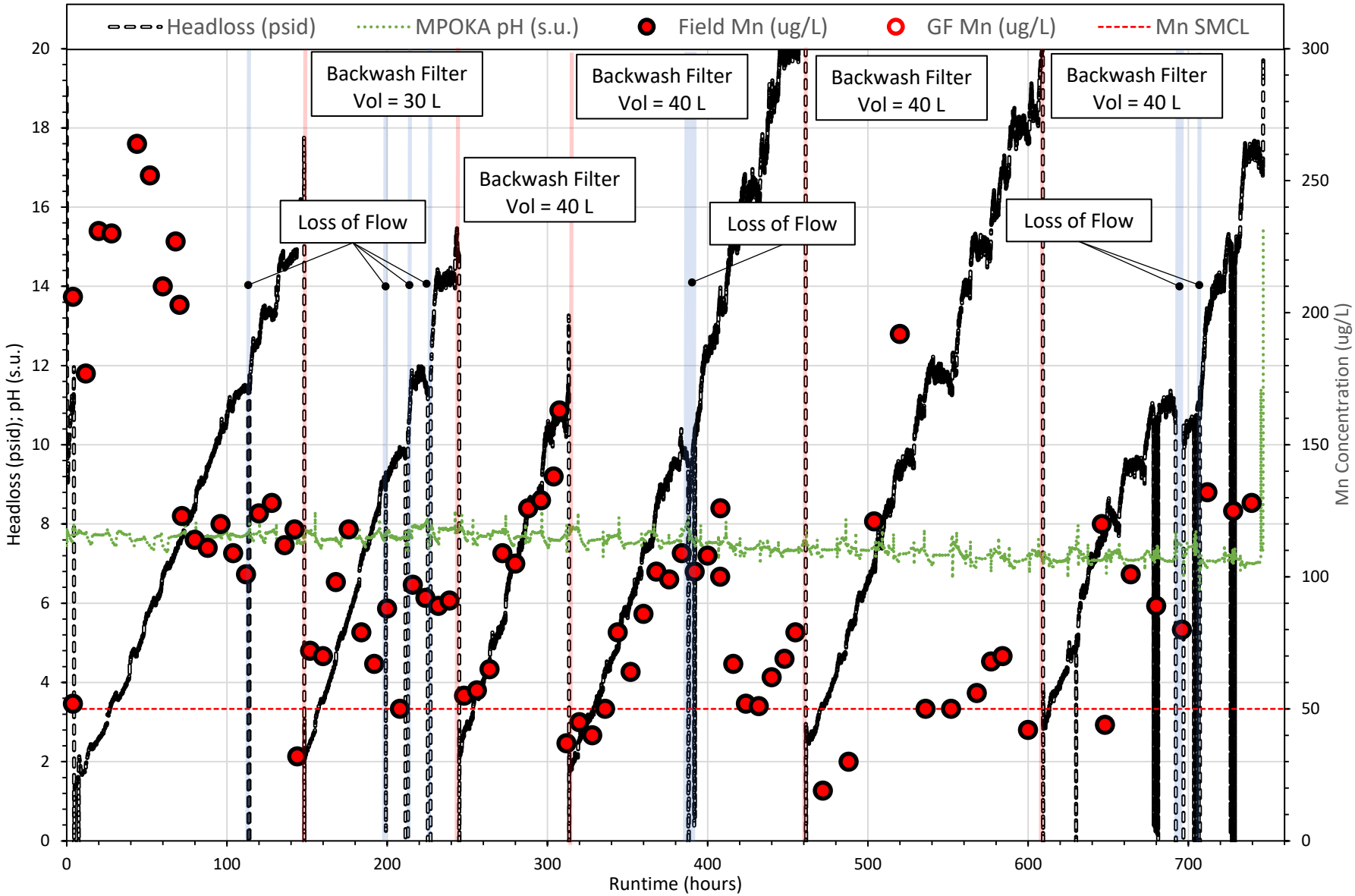


Figure E.07: Performance of Filter M1 at 10 gpm/sf
Phase 4, Trial 1: Representative at High Rate, June 10 to June 17 2019

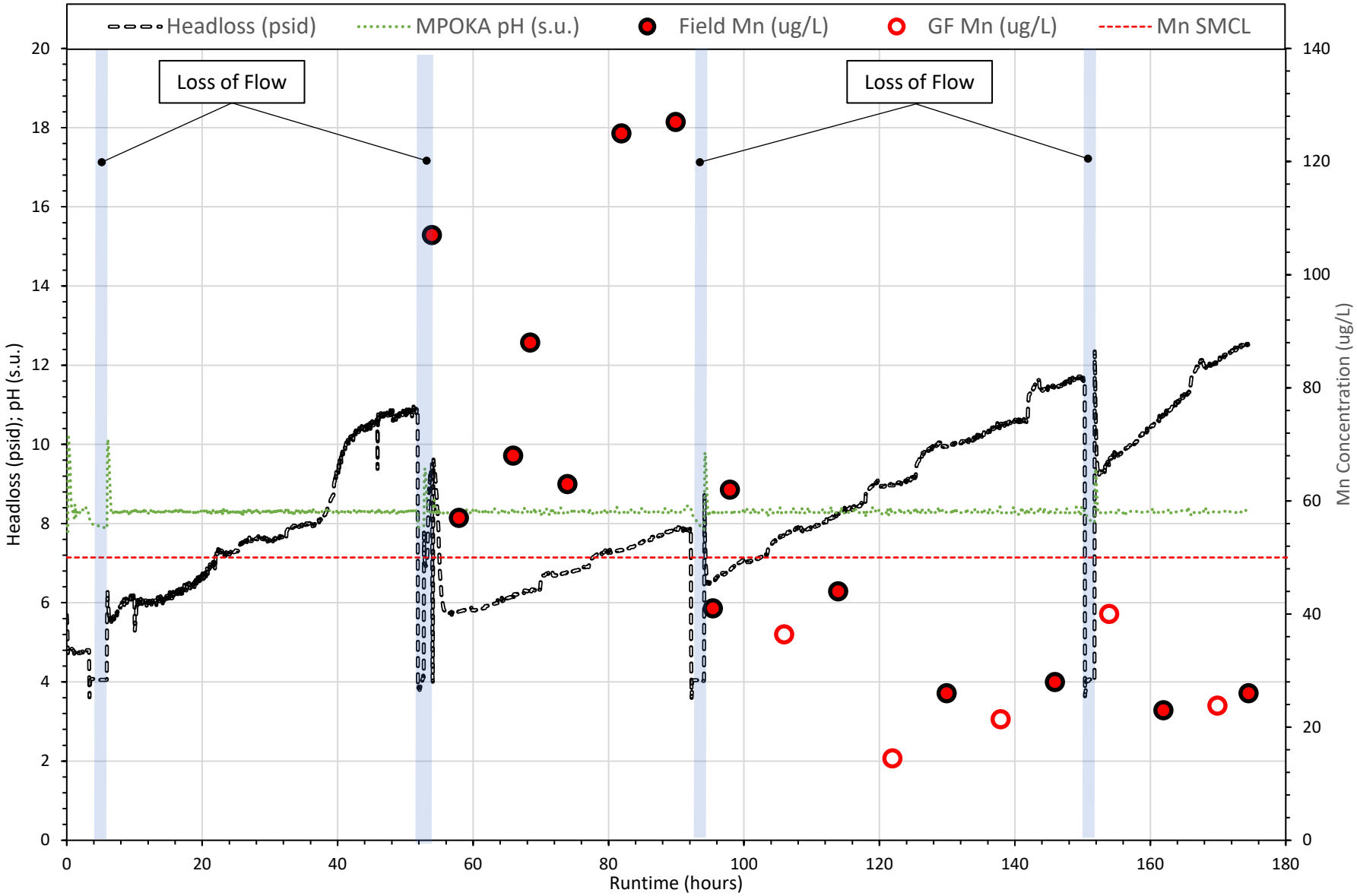


Figure E.08: Performance of Filter M2 at 15 gpm/sf
Phase 4, Trial 1: Representative at High Rate, June 04 to June 17 2019

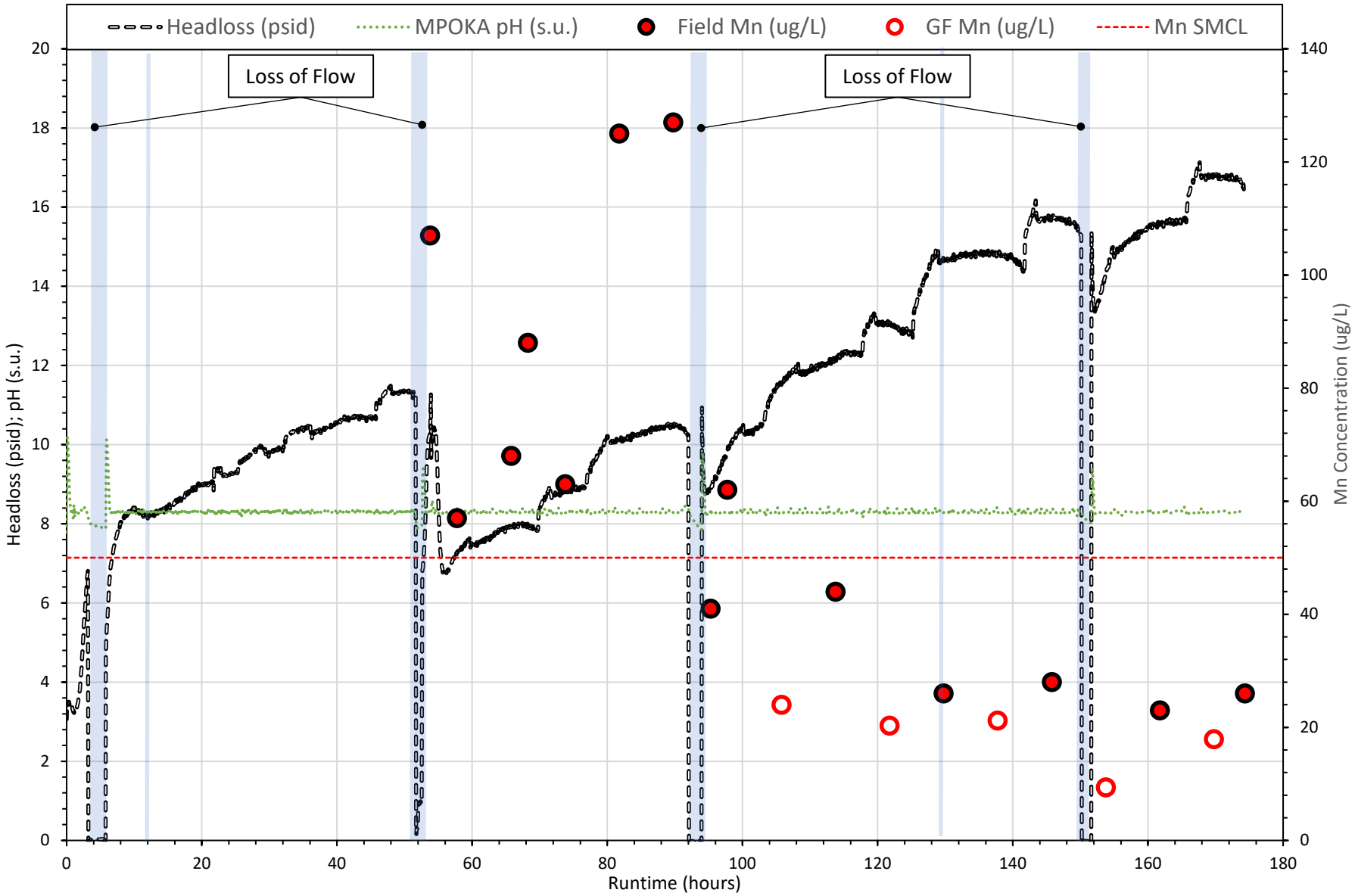


Figure E.09: Performance of Filter M1 at 10 gpm/sf
Phase 4, Trial 2: Representative at High Rate, June 17 to June 23 2019

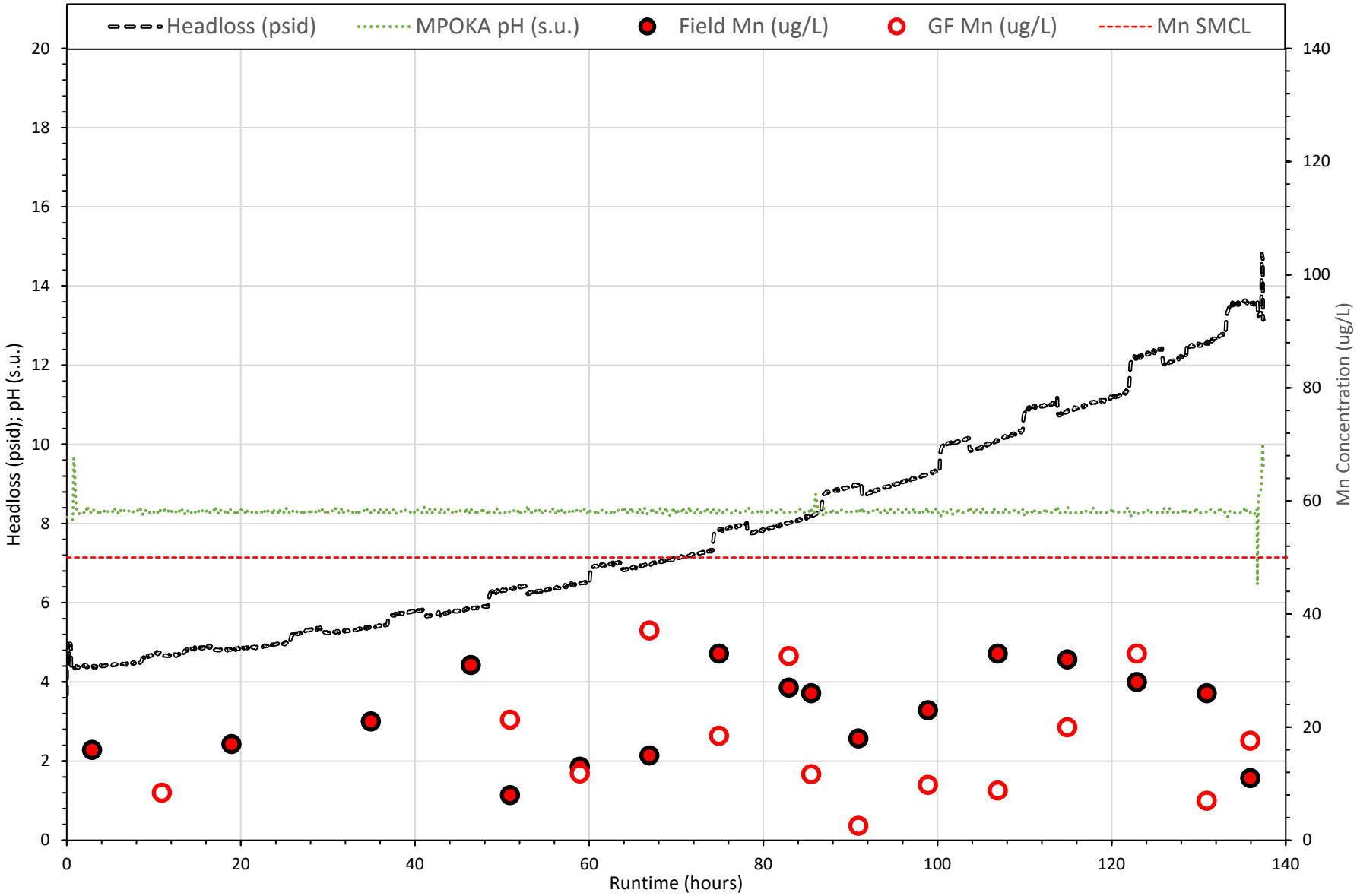


Figure E.10: Performance of Filter M2 at 15 gpm/sf
Phase 4, Trial 2: Representative at High Rate, June 17 to June 23 2019

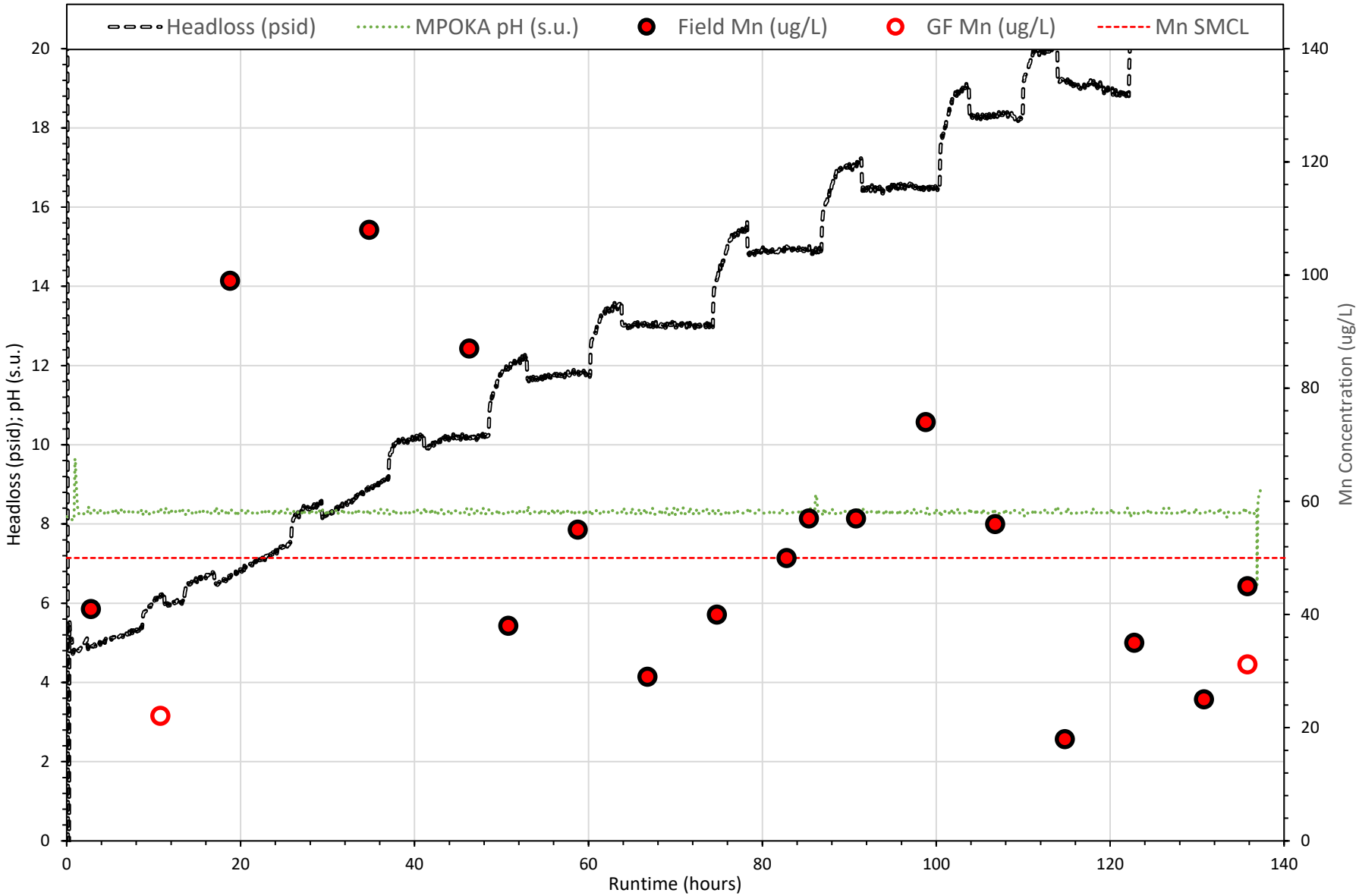


Figure E.11: Performance of Filter M1 at 10 gpm/sf
Phase 4, Trial 3: Representative at High Rate, June 23 to June 28 2019

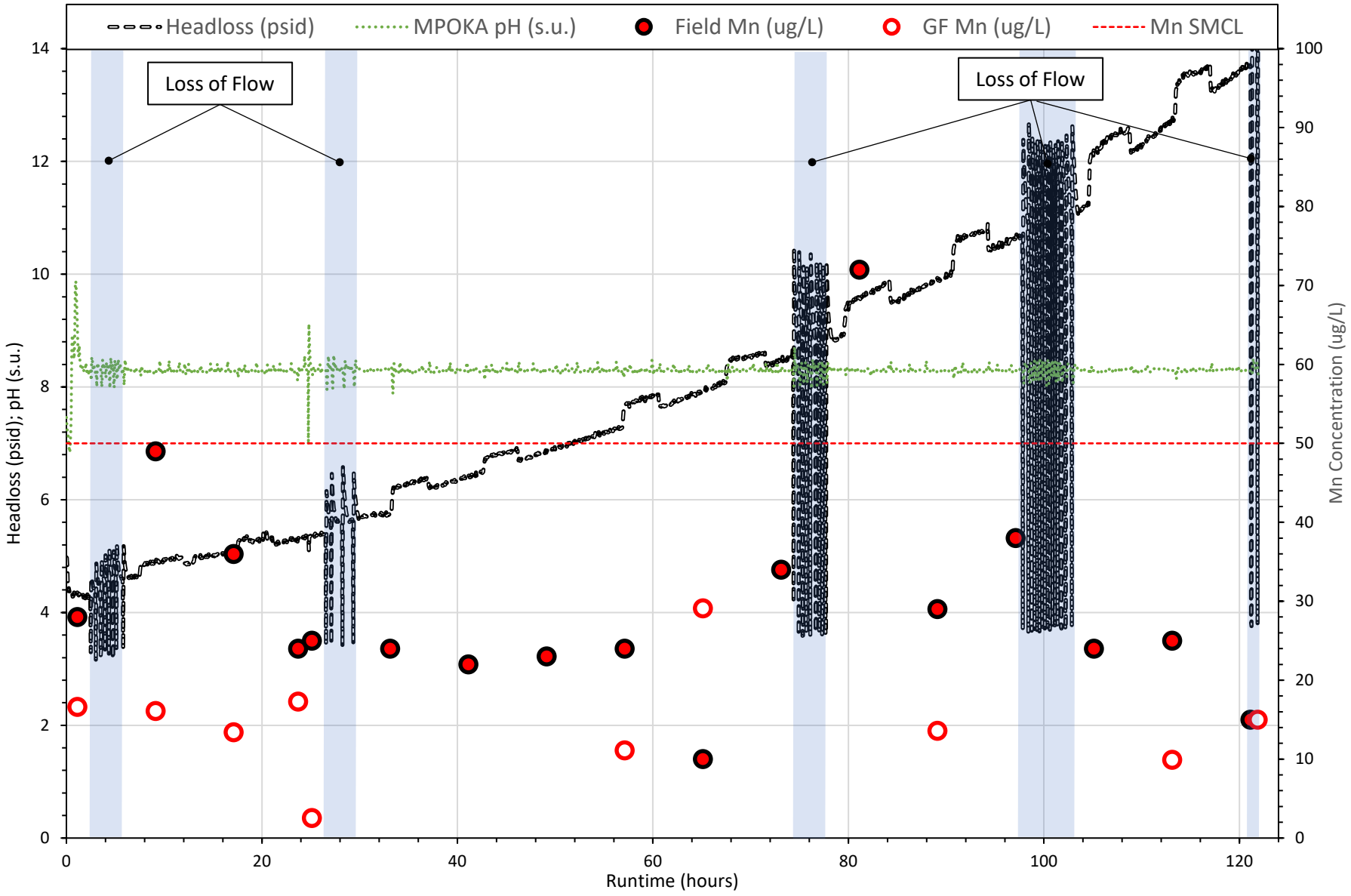


Figure E.12: Performance of Filter M2 at 15 gpm/sf
Phase 4, Trial 3: Representative at High Rate, June 23 to July 06 2019

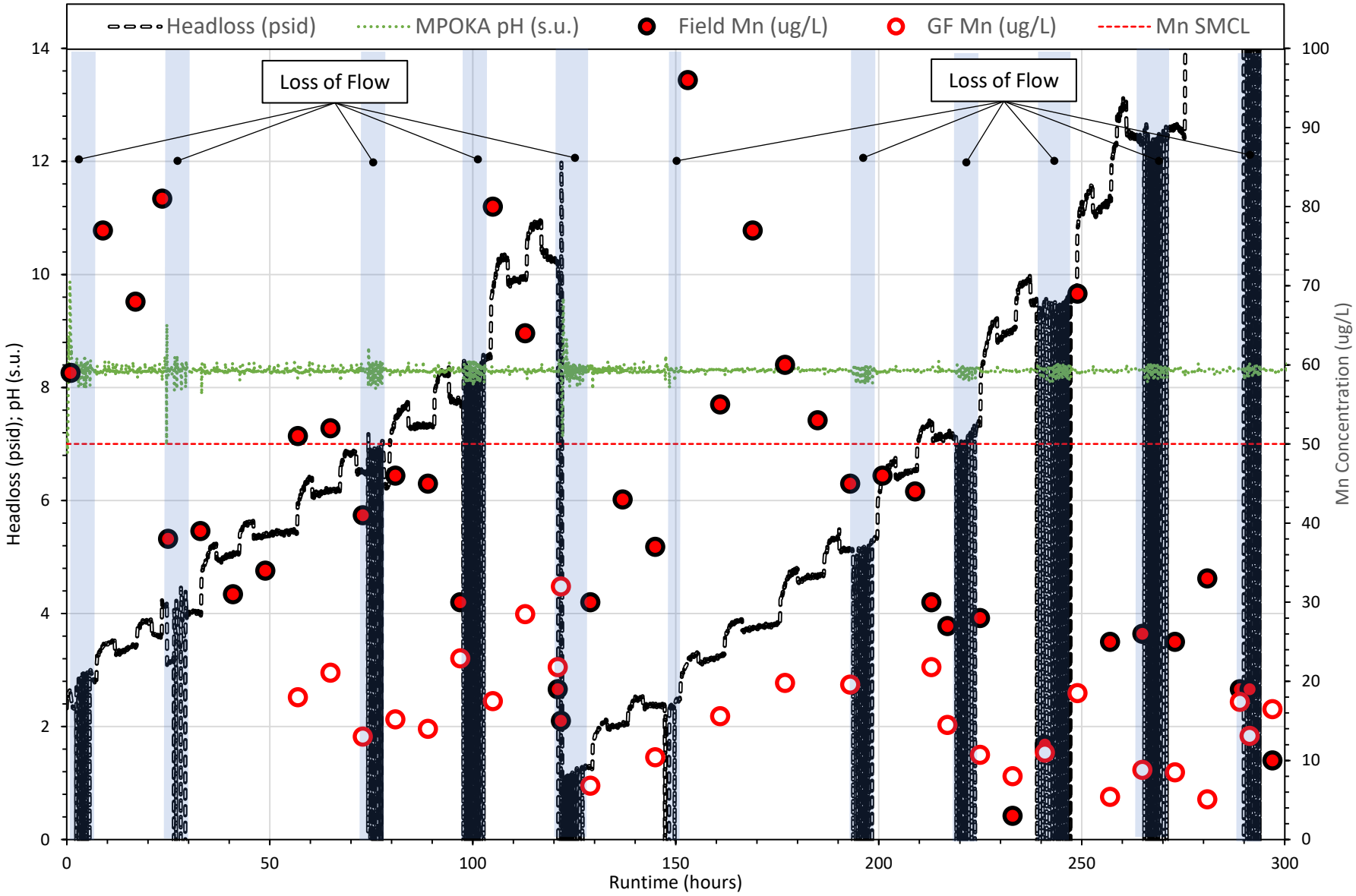


Figure E.13: Performance of Filter M1 at 10 gpm/sf
Phase 4, Trial 4: Representative at High Rate, June 28 to July 06 2019

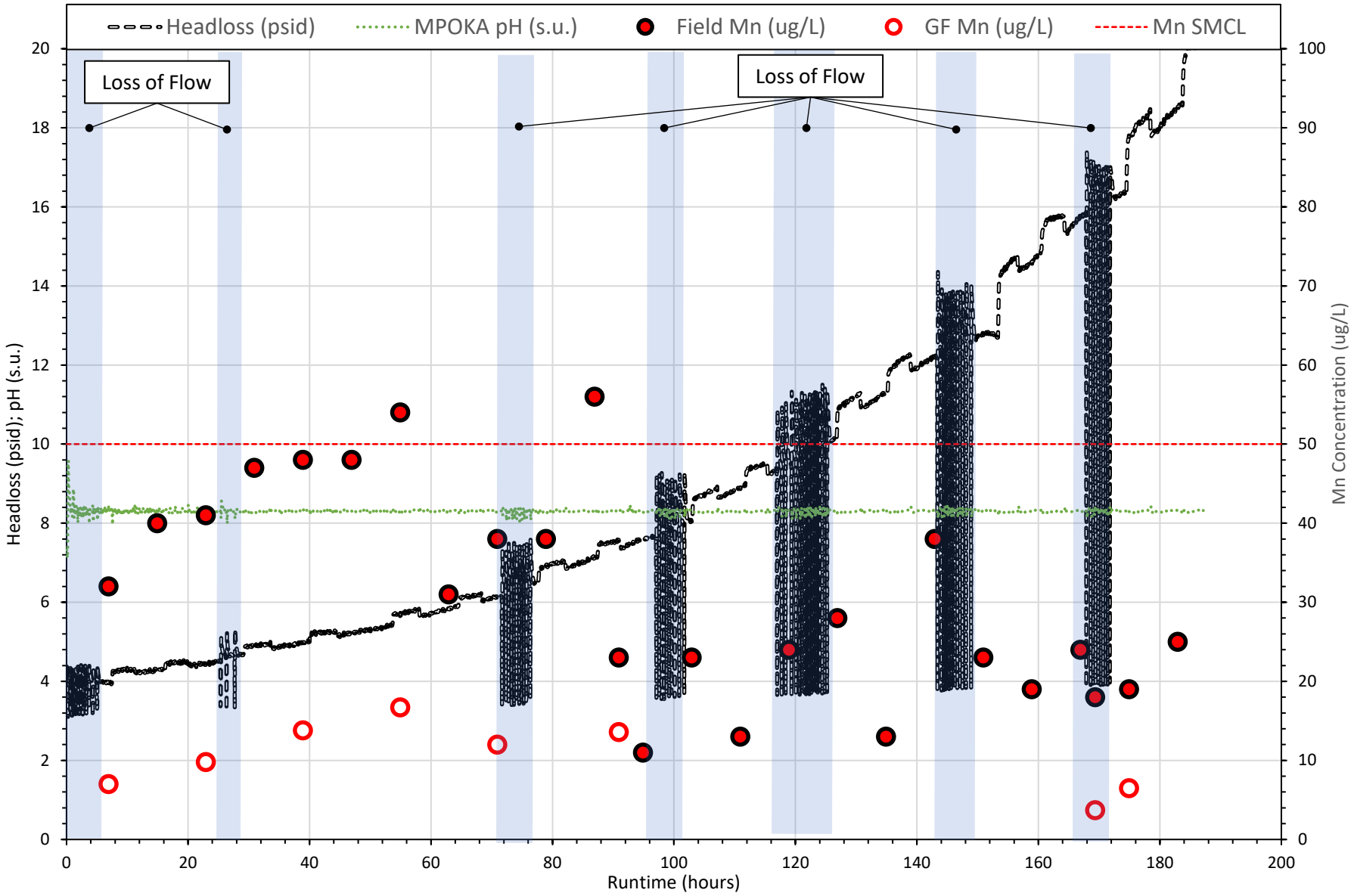


Figure E.14: Performance of Filter M2 at 15 gpm/sf
Phase 4, Trial 4: Reprsentative at High Rate, July 06 to July 09 2019

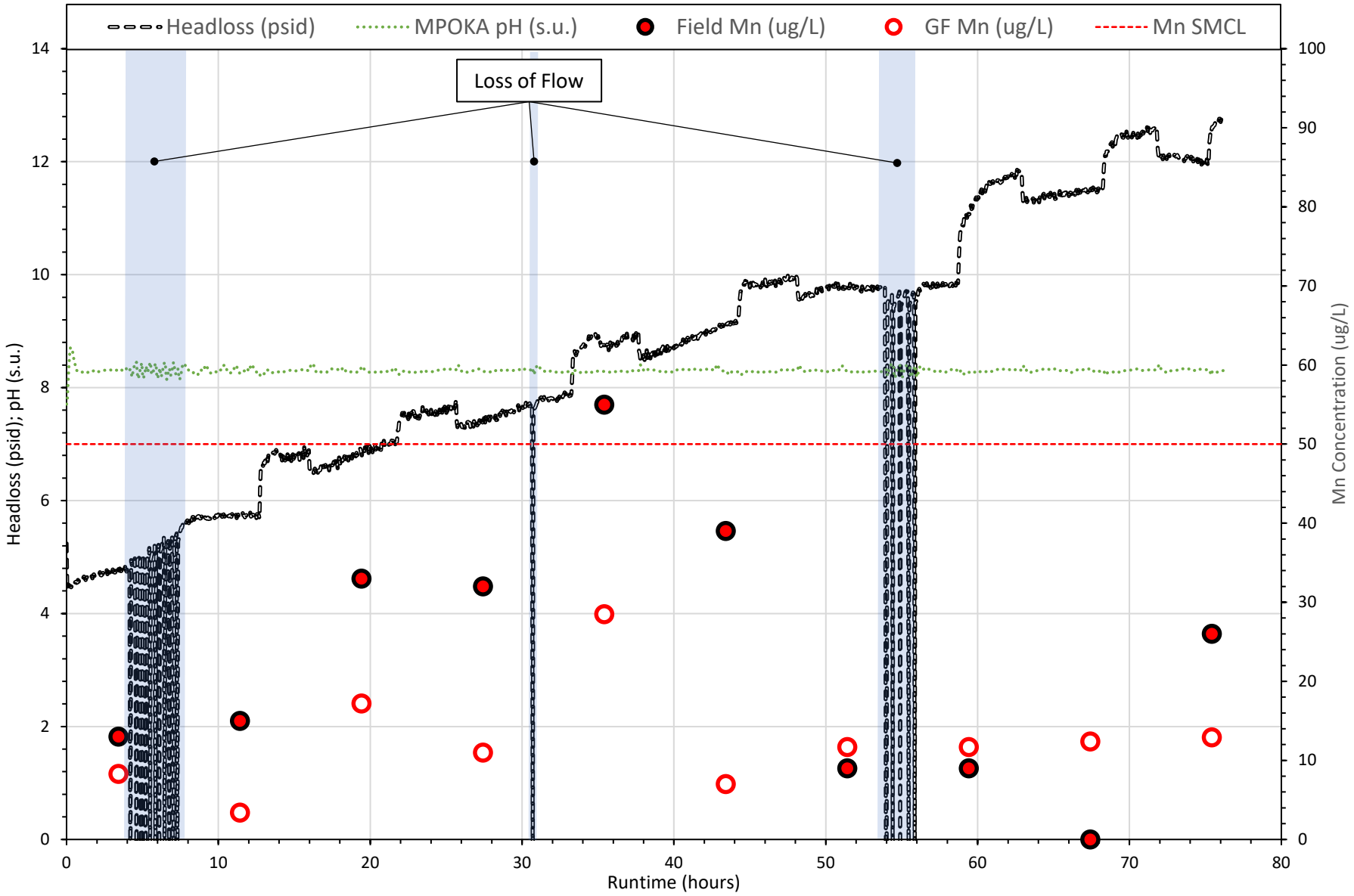


Figure E.15: Performance of Filter M1 at 10 gpm/sf
Phase 4, Trial 5: Representative at High Rate, July 06 to July 09 2019

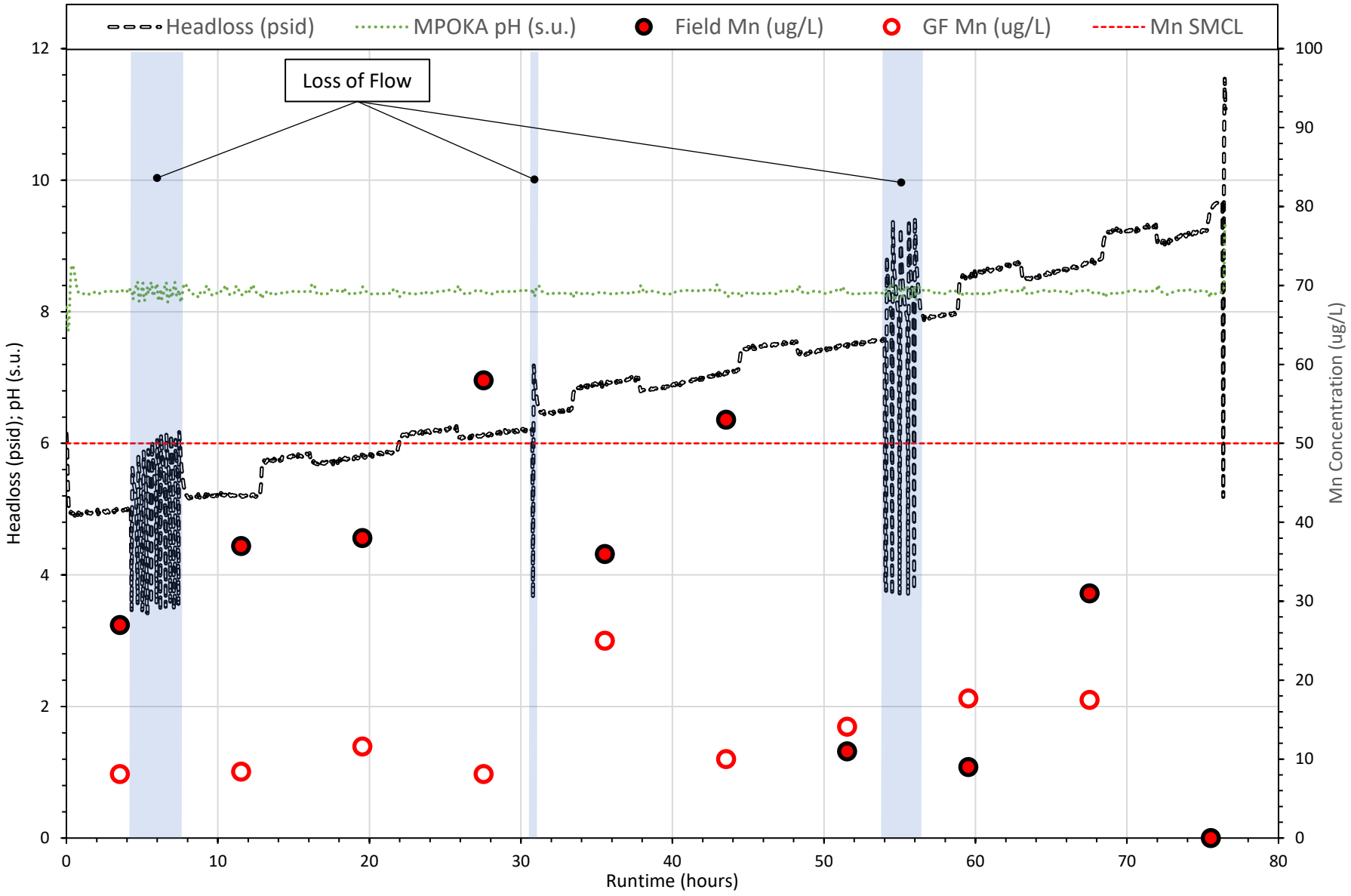


Figure E.16: Performance of Filter M2 at 15 gpm/sf
Phase 4, Trial 5: Represenative at High Rate, July 09 to July 14 2019

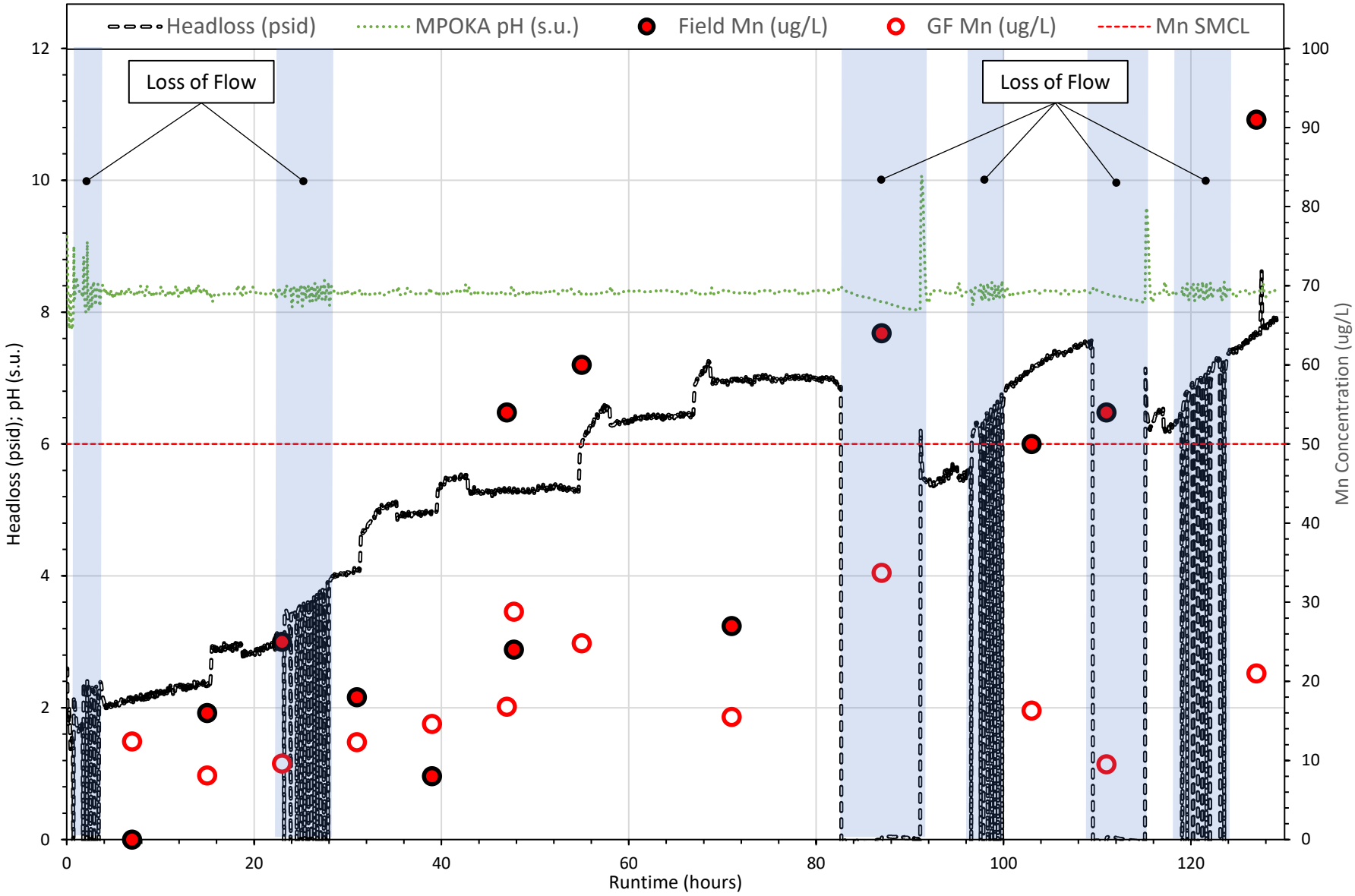


Figure E.17: Performance of Filter M1 at 10 gpm/sf
Phase 4, Trial 6: Representative at High Rate, July 09 to July 14 2019