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BMID FILE: 486

MONTHLY REPORTING PERIOD - MARCH, 2017

1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in March, 2017. Documentation and figures are provided on the following pages to support this submission.

	March 2017	
Source	**Total (US Gals)**	**Total (Mega Litres)**
Mission Creek	55,875,000	211.49
Well 4	0	0
Well 5	1,970,000	7.46
Scotty Creek (Irrigation Only)	0	0
Total	57,845,000	218.94

1. The chlorine residual dropped to 0.21 mg/L at Booster No. 1 on March 2, 2017 as contractors working on commissioning the new UV disinfection plant ran the UV throughout the night without alerting BMID staff and management. As soon as BMID was alerted to the issue the UV plant was shut-down for the day and freshly chlorinated water was introduced into the rest of the system. Additional bacterial samples were taken thought in the distribution system as a precaution;
2. Turbidity levels at Hadden Pond Outlet, remained below 1.0 NTU for all of March. Peak turbidity at the intake was 0.50 NTU on March 21, 2017;
3. The highest monthly turbidity level recorded at the first customer (Booster #1) was 0.51 NTU on March 03, 2017 and average monthly turbidity was 0.48 NTU;
4. Mission Creek had average flows for March as temperatures in the Mission Creek watershed remained well below seasonal norms, resulting in predictable flows throughout the month;
5. *E.Coli* levels at the raw water intake on Mission Creek were high during March as the watershed began to thaw for spring. The highest raw water *E.Coli* count was 180 on March 21, 2017;
6. *E.Coli* levels at the point immediately prior to disinfection (Hadden Outlet) had zero counts on all but one sample during March, with a peak count of 1 on March 10, 2017;
7. No *E.Coli* were found in treated water in the distribution system through third-party analysis and no positive bacteria tests were found from the in-house presence-absence tests. However Ellison School's third-party bacterial sample on March 6, 2017 resulted in Total Coliform counts of 22 CFU. It is highly likely that the sample came back as positive due to operator error. After the positive sample came back, BMID crews flushed the watermain to bring in fresh water with higher free available chlorine residual. Subsequent tests confirmed no Total Coliforms at the sample point;

8. Well #5 was used throughout March as a source for domestic water in the north-end of the system in conjunction with Mission Creek system water as determined by usage and pressures in the area;

9. BMID's Water Treatment Plant resumed operations on March 15, 2017 as water quality in Mission Creek began to diminish due to melting conditions in the watershed which initiated the yearly spring freshet resulting in high turbidity;

1.0 FLOWS - MARCH, 2017

Maximum est. Daily Flow was on March 21, 2017 at 2,485,000 US gallons (9.67 ML)

Minimum est. Daily Flow was on March 11, 2017 at 1,014,000 US gallons (3.97 ML)

Mission Creek provided 96.6% of domestic flow throughout March.

Figure 1.1 - Domestic Water System Flow

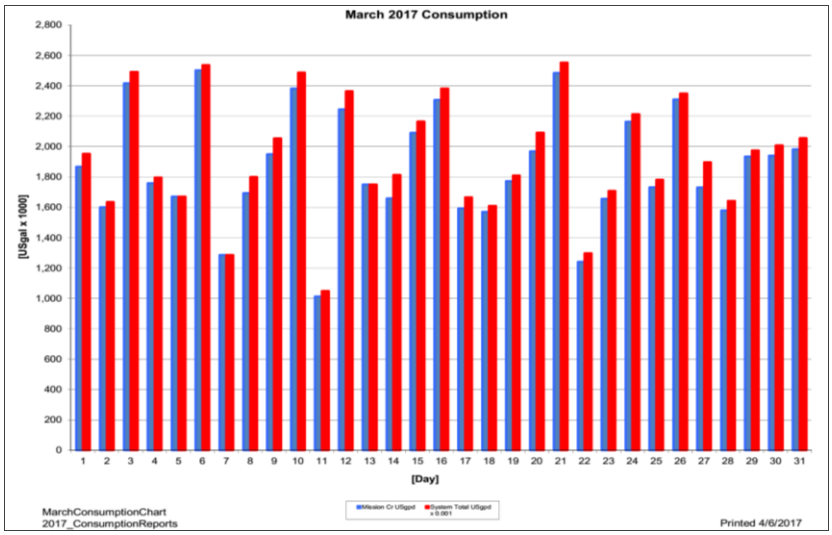

Table 1.2 - March, 2017 Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	System Total	System Total
2017	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Mar	1,867,000	0	85,000.0	1,952,000	7.39
2-Mar	1,600,000	0	35,000.0	1,635,000	6.19
3-Mar	2,417,000	0	75,000.0	2,492,000	9.43
4-Mar	1,759,000	0	38,000.0	1,797,000	6.80
5-Mar	1,671,000	0	0.0	1,671,000	6.32
6-Mar	2,503,000	0	34,000.0	2,537,000	9.60
7-Mar	1,286,000	0	0.0	1,286,000	4.87
8-Mar	1,693,000	0	107,000.0	1,800,000	6.81
9-Mar	1,949,000	0	106,000.0	2,055,000	7.78
10-Mar	2,382,000	0	105,000.0	2,487,000	9.41
11-Mar	1,014,000	0	36,000.0	1,050,000	3.97
12-Mar	2,245,000	0	120,000.0	2,365,000	8.95
13-Mar	1,751,000	0	0.0	1,751,000	6.63
14-Mar	1,659,000	0	154,000.0	1,813,000	6.86
15-Mar	2,091,000	0	75,000.0	2,166,000	8.20
16-Mar	2,308,000	0	74,000.0	2,382,000	9.02
17-Mar	1,593,000	0	73,000.0	1,666,000	6.31
18-Mar	1,571,000	0	39,000.0	1,610,000	6.09
19-Mar	1,773,000	0	38,000.0	1,811,000	6.85
20-Mar	1,969,000	0	123,000.0	2,092,000	7.92
21-Mar	2,485,000	0	69,000.0	2,554,000	9.67
22-Mar	1,241,000	0	57,000.0	1,298,000	4.91
23-Mar	1,656,000	0	52,000.0	1,708,000	6.46
24-Mar	2,164,000	0	50,000.0	2,214,000	8.38
25-Mar	1,732,000	0	50,000.0	1,782,000	6.74
26-Mar	2,311,000	0	38,000.0	2,349,000	8.89
27-Mar	1,731,000	0	166,000.0	1,897,000	7.18
28-Mar	1,579,000	0	63,000.0	1,642,000	6.21
29-Mar	1,935,000	0	40,000.0	1,975,000	7.48
30-Mar	1,940,000	0	68,000.0	2,008,000	7.60
31-Mar	1,983,000	0	73,000.0	2,056,000	7.78
Totals Usgpd	55,875,000	0	1,970,000	57,845,000	218.94
Totals ML	211.49	0.00	7.46		
Avg's	1,862,500	7.05		1,928,167	7.30
Max	2,503,000	9.47		2,554,000	9.67
Min	1,014,000	3.84		1,050,000	3.97

2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

Raw water samples were taken at three points at BMID settling ponds before chlorination

Samples were taken twice per week at Hadden Reservoir Outlet (point of disinfection) and at the raw water intake on Mission Creek; one sample is taken per week at Stevens (east, upstream settling basin) outlet.

Samples from the previous month are also provided to show a two month trend

Figure 2.1 - E.Coli Readings (CARO Lab results) February 2017 - March 2017

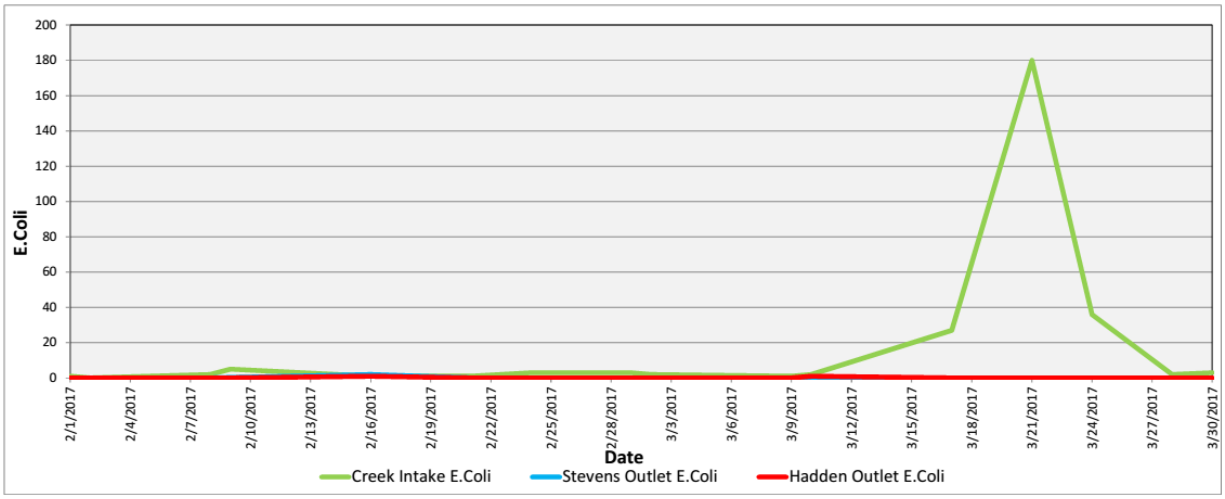

Table 2.2 - E.Coli Readings (CARO Labs)

Date	Creek Intake E.Coli	Stevens Outlet E.Coli	Hadden Outlet E.Coli
1-Feb-17	1	0	0
2-Feb-17	0		0
8-Feb-17	2	0	0
9-Feb-17	5		0
16-Feb-17	1	2	1
21-Feb-17	1	0	0
24-Feb-17	3		0
1-Mar-17	3	0	0
2-Mar-17	2		0
9-Mar-17	1	0	0
10-Mar-17	2		1
17-Mar-17	27		0
21-Mar-17	180	0	0
24-Mar-17	36		0
28-Mar-17	2	0	0
30-Mar-17	3		0

Stevens or WTP Intake (Raw) - Sampling of raw water at intake from Mission Creek
Stevens Outlet (Raw) - Sampling point after exiting 142,000 m^3 1st upper balancing reservoir (Stevens Res.)
Hadden Outlet (Raw) - Sampling point after exiting 75,000 m^3 2nd lower balancing reservoir (Hadden Res.)
(*Hadden Outlet = Point of Disinfection*)

3.0 RAW AND TREATED WATER TURBIDITY

Turbidity for the Mission Creek source was measured at Booster Station No. 1 on Gallagher's Road, the first-customer, through March 2017. The highest turbidity recorded at this location was 0.51 NTU on March 03, 2017.

Figure 3.1 – Daily Turbidity Readings (Hadden and Bst Stn 1)

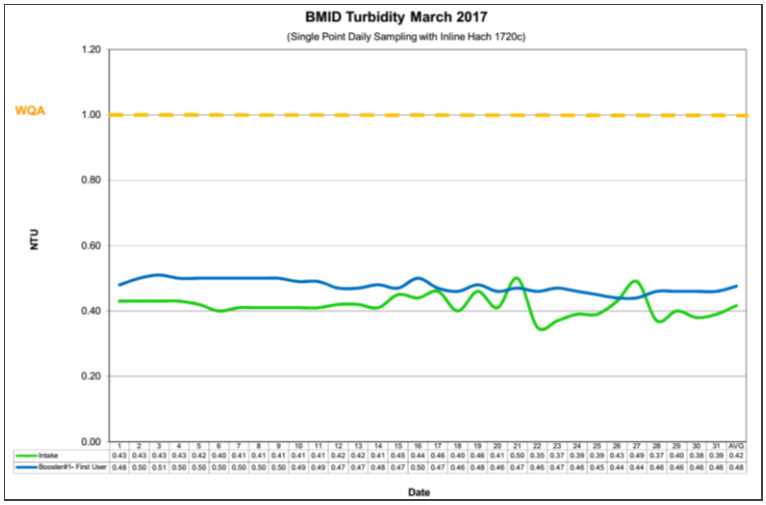

Table 3.2 - Daily Monitoring Record – Turbidity at Intake & Bst Stn 1

Turbidity Point Sampling for March 2017				
Date	Intake		Booster#1- First User	
	Sample Time	[NTU]	Sample Time	[NTU]
1	9:36 AM	0.43	8:53 AM	0.48
2	10:07 AM	0.43	8:10 AM	0.50
3	8:09 AM	0.43	11:55 AM	0.51
4	11:35 AM	0.43	11:07 AM	0.50
5	10:25 AM	0.42	9:55 AM	0.50
6	1:39 PM	0.40	1:01 PM	0.50
7	11:00 AM	0.41	8:15 AM	0.50
8	9:55 AM	0.41	8:56 AM	0.50
9	9:50 AM	0.41	7:55 AM	0.50
10	8:31 AM	0.41	2:51 PM	0.49
11	9:33 AM	0.41	9:03 AM	0.49
12	10:10 AM	0.42	9:57 AM	0.47
13	9:02 AM	0.42	8:18 AM	0.47
14	10:07 AM	0.41	8:19 AM	0.48
15	11:06 AM	0.45	10:35 AM	0.47
16	1:45 PM	0.44	1:06 PM	0.50
17	11:20 AM	0.46	10:44 AM	0.47
18	8:55 AM	0.40	8:07 AM	0.46
19	9:25 AM	0.46	9:05 AM	0.48
20	11:38 AM	0.41	11:04 AM	0.46
21	2:06 PM	0.50	1:44 PM	0.47
22	8:38 AM	0.35	7:44 AM	0.46
23	8:20 AM	0.37	7:47 AM	0.47
24	11:40 AM	0.39	10:32 AM	0.46
25	9:01 AM	0.39	8:20 AM	0.45
26	12:35 PM	0.43	12:09 PM	0.44
27	12:40 PM	0.49	9:37 AM	0.44
28	8:31 AM	0.37	8:05 AM	0.46
29	8:38 AM	0.40	7:52 AM	0.46
30	8:26 AM	0.38	7:41 AM	0.46
31	8:54 AM	0.39	7:57 AM	0.46
AVG		0.42		0.48

4.0 CHLORINE CONTACT TIME

Temperature, pH, current flow and chlorine residual levels are recorded to determine the CT levels that are required to provide 3 log inactivation of *Giardia*. Chlorine Contact times exceeded the CT levels required to provide 3 log (99.9%) inactivation of *Giardia Lamblia* throughout the month of March, 2017.

Figure 4.1 - CT Trending – BMID Mission Creek Source – March 2017

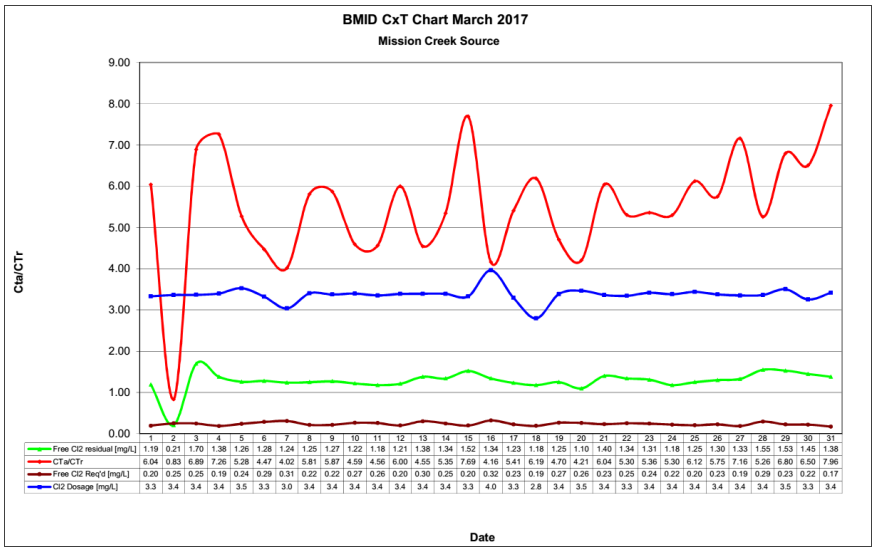

Table 4.2 - CT Table – Mission Creek Source

	BMID March 2017												
	Mission Creek Source												
DATE	pH	TEMP	PEAK	Free Cl_2	CT	CT	CTa/CTr	Free Cl_2	Cl_2	VOLUME	TIME	FLOW	CL_2 **DOSAGE**
	(highest)	(lowest)	FLOW	residual	achieved	req'd		Req'd	Dosage	TOTAL		PRESENT	PRESENT
March		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	6873	[PPD]
1	7.90	1.8	1848	1.19	1706.2	282.4	6.04	0.20	3.3	2649600	1434	1274	51
2	7.90	2.0	3102	***0.21***	179.4	214.9	0.83	0.25	3.4	2649600	854	2597	105
3	7.91	1.7	2169	1.70	2076.7	301.3	6.89	0.25	3.4	2649600	1222	1804	73
4	7.91	2.2	1787	1.38	2046.1	281.8	7.26	0.19	3.4	2649600	1483	1542	63
5	7.92	1.8	2208	1.26	1512.0	286.6	5.28	0.24	3.5	2649600	1200	1415	60
6	7.93	1.7	2616	1.28	1296.4	289.9	4.47	0.29	3.3	2649600	1013	1303	52
7	7.94	1.8	2839	1.24	1157.3	288.1	4.02	0.31	3.0	2649600	933	1534	56
8	7.93	1.9	1997	1.25	1658.5	285.5	5.81	0.22	3.4	2649600	1327	1149	47
9	7.93	2.2	2045	1.27	1645.5	280.3	5.87	0.22	3.4	2649600	1296	1430	58
10	7.94	2.5	2572	1.22	1256.8	273.8	4.59	0.27	3.4	2649600	1030	2131	87
11	7.94	2.0	2432	1.18	1285.6	281.8	4.56	0.26	3.4	2649600	1089	1613	65
12	7.93	1.8	1871	1.21	1713.5	285.5	6.00	0.20	3.4	2649600	1416	1719	70
13	7.93	2.0	2795	1.38	1308.2	287.7	4.55	0.30	3.4	2649600	948	2060	84
14	7.94	2.1	2320	1.34	1530.4	286.2	5.35	0.25	3.4	2649600	1142	1275	52
15	7.93	2.1	1807	1.52	2228.8	289.7	7.69	0.20	3.3	2649600	1466	1349	54
16	7.93	2.1	2988	1.34	1188.2	285.5	4.16	0.32	4.0	2649600	887	1680	80
17	7.95	2.3	2153	1.23	1513.7	279.8	5.41	0.23	3.3	2649600	1231	1414	56
18	7.96	2.3	1814	1.18	1723.6	278.5	6.19	0.19	2.8	2649600	1461	1607	54
19	7.96	2.4	2521	1.25	1313.8	279.3	4.70	0.27	3.4	2649600	1051	2384	97
20	7.94	2.4	2557	1.10	1139.8	271.0	4.21	0.26	3.5	2649600	1036	1368	57
21	7.92	2.4	2204	1.40	1683.0	278.7	6.04	0.23	3.4	2649600	1202	1113	45
22	7.91	2.7	2468	1.34	1438.6	271.2	5.30	0.25	3.3	2649600	1074	2165	87
23	7.92	2.9	2418	1.31	1435.5	267.9	5.36	0.24	3.4	2649600	1096	1631	67
24	7.92	2.7	2215	1.18	1411.5	266.5	5.30	0.22	3.4	2649600	1196	1255	51
25	7.90	2.9	2047	1.25	1618.0	264.4	6.12	0.20	3.4	2649600	1294	1307	54
26	7.90	2.9	2260	1.30	1524.1	265.0	5.75	0.23	3.4	2649600	1172	1478	60
27	7.89	3.0	1868	1.33	1886.5	263.5	7.16	0.19	3.4	2649600	1418	1638	66
28	7.91	3.1	2906	1.55	1413.2	268.7	5.26	0.29	3.4	2649600	912	1509	61
29	7.88	3.2	2256	1.53	1796.9	264.3	6.80	0.23	3.5	2649600	1174	1948	82
30	7.88	3.4	2278	1.45	1686.5	259.3	6.50	0.22	3.3	2649600	1163	1585	62
31	7.87	3.6	1821	1.38	2007.9	252.3	7.96	0.17	3.4	2649600	1455	1583	65
Averages	7.92	2.38	2296	1.28	1572.8	275.2	5.87	0.23	3.3				

5.0 WATER DISTRIBUTION SAMPLING (TREATED)

Third Party Analysis (CARO Analytical Services)

- Samples taken once per week at eight locations around the BMID service area
- 46 samples were found to be absent of Coliforms.
- 47 samples were found to be absent of *E.Coli*.
- One sample has Total Coliforms present (Ellison School – March 6).

Table 5.1 - CARO Independent Lab Testing – Total Coliforms – E.Coli

	PRV 7		Booster 1		Ellison Blow-Off		Ellison School		612 Adams Rd		Prospect Reservoir		Tower Reservoir		Well #5	
Date	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli
1-Feb-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
8-Feb-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-Feb-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-Feb-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-Mar-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6-Mar-17	0	0	0	0	0	0	22	0	0	0	0	0	0	0	-	-
9-Mar-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Mar-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-Mar-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Mar-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

In-House Analysis (BMID Staff)

- Presence/Absence samples taken on a three week cycle at ten sites around the BMID service area.
- All samples were found to be absent of both Total Coliforms and *E.Coli*.

Table 5.2 - BMID In-house Testing – Presence Absence

	3/6/2017				3/13/2017				3/20/2017				3/27/2017			
Location	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
2670 Enterprise Way	0.69	10.0	-	X									0.45	8.0	-	X
#5 217 Franklin Rd					0.93	4.0	-	X								
2105 Morrison	0.20	6.8	-	X									0.45	6.4	-	X
654 Mayfair Ct									0.89	4.0	-	X				
800 Galbraith Ct					0.90	4.2	-	X								
1625 Hyashi					0.69	3.8	-	X								
PRV #10	0.56	4.8	-	X									0.63	4.2	-	X
260 Campion Rd									0.65	4.4	-	X				
2821 Fenwick Rd					0.51	4.0	-	X								
2931 Belgo Rd									0.65	6.6	-	X				

- BMID Population = 22,400

RECOMMENDED TESTS

- Recommended number of samples per month = 22

  (as per Guide for Canadian Drinking Water Quality)

ACTUAL TESTS

- Total tests by BMID staff (presence/absence) = 13
- Total tests sampled by BMID and tested by Caro Labs = 47
- Total tests sampled in BMID treated distribution system = 60 (One positive sample)