



MONTHLY REPORTING PERIOD - NOVEMBER, 2018

1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in November, 2018. Documentation and figures are provided on the following pages to support this submission.

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	54,659,000	206.88
Well 4	1,744,850	6.72
Well 5	0	0
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	56,436,308	213.6

1. Turbidity levels at the Distribution Intake peaked at 0.45 NTU on November 21,22, and 24. Average turbidity for November was 0.41 NTU;
2. The highest monthly turbidity level recorded at the first customer (Booster #1) was 0.44 NTU on November 19-21 and 26. Average monthly turbidity was 0.42 NTU for November;
3. Samples taken at the Belgo Rd sample station were removed from the Presence/Absence (PA) rotation and added to the weekly sample rotation to be analysed by Caro;
4. Mission Creek had average flows for November as the upper watershed runoff reduced due to freezing conditions;
5. BMID's Scotty Creek source, used for irrigation in the north-end, was closed for the year on August 24;
6. Well # 4 is currently the primary source of water for the north-end. Well #5, used as a source for both domestic and irrigation water in the north-end of the system, was placed on stand-by until spring;
7. Well #6 supplies irrigation water and fire flows in the north-end of the system was placed on stand-by until spring;
8. *E.Coli* levels at Mission Creek's Point of Diversion averaged 21 counts per sample. The highest raw water *E.Coli* count was 77 on November 4 and 6, 2018;
9. *E.Coli* levels at the distribution system intake, down-stream of the WTP, had zero counts on most samples throughout November, averaging < 1 count per sample, with a peak count of 5 on November 5, 2018;
10. No *E.Coli* or *Total Coliforms* were found in treated water in the distribution system through third-party analysis. In addition, no positive bacteria tests were found from the in-house presence-absence tests during routine testing;
11. The WTP remained in use throughout November as high colour in Mission Creek required treatment during this time. The WTP was shut-down on November 29 as water quality in Mission Creek improved enough to by-pass treatment;

1.0 FLOWS - NOVEMBER, 2018

Maximum Daily Flow was on November 3, 2018 at 2,507,308 US gallons (9.49 ML)

Minimum Daily Flow was on November 19, 2018 at 1,025,142 US gallons (3.88 ML)

Mission Creek provided 97% of domestic flow throughout November.

Figure 1.1 - Domestic Water System Flow

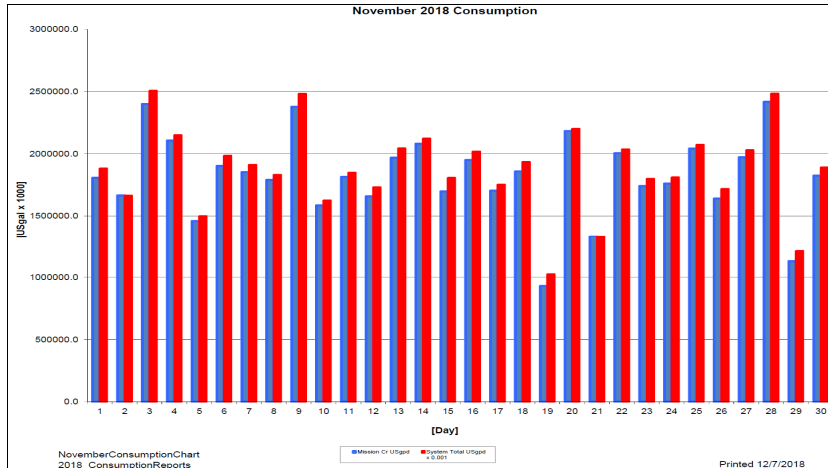


Table 1.2 - November, 2018 Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	System Total	System Total
2018	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Nov	1807000.0	75745.0	0.0	1882745.0	7.13
2-Nov	1665000.0	0.0	0.0	1665000.0	6.30
3-Nov	2400000.0	107308.0	0.0	2507308.0	9.49
4-Nov	2106000.0	44947.0	0.0	2150947.0	8.14
5-Nov	1460000.0	40658.0	0.0	1500658.0	5.68
6-Nov	1902000.0	83747.0	0.0	1985747.0	7.52
7-Nov	1852000.0	60035.0	0.0	1912035.0	7.24
8-Nov	1791000.0	40837.0	0.0	1831837.0	6.93
9-Nov	2377000.0	106441.0	0.0	2483441.0	9.40
10-Nov	1586000.0	40690.0	0.0	1626690.0	6.16
11-Nov	1814000.0	35926.0	0.0	1849926.0	7.00
12-Nov	1658000.0	74219.0	0.0	1732219.0	6.56
13-Nov	1969000.0	75591.0	0.0	2044591.0	7.74
14-Nov	2081000.0	43402.0	0.0	2124402.0	8.04
15-Nov	1698000.0	107449.0	0.0	1805449.0	6.83
16-Nov	1950000.0	69252.0	0.0	2019252.0	7.64
17-Nov	1704000.0	49803.0	0.0	1753803.0	6.64
18-Nov	1859000.0	76454.0	0.0	1935454.0	7.33
19-Nov	930000.0	95142.0	0.0	1025142.0	3.88
20-Nov	2182000.0	20140.0	0.0	2202140.0	8.34
21-Nov	1334000.0	0.0	0.0	1334000.0	5.05
22-Nov	2005000.0	31963.0	0.0	2036963.0	7.71
23-Nov	1741000.0	59479.0	0.0	1800479.0	6.81
24-Nov	1761000.0	50709.0	0.0	1811709.0	6.86
25-Nov	2042000.0	31309.0	0.0	2073309.0	7.85
26-Nov	1640000.0	79087.0	0.0	1719087.0	6.51
27-Nov	1972000.0	58198.0	0.0	2030198.0	7.68
28-Nov	2418000.0	67159.0	0.0	2485159.0	9.41
29-Nov	1130000.0	82383.0	0.0	1212383.0	4.59
30-Nov	1825000.0	66777.0	0.0	1891777.0	7.16
Totals Usgpd	54659000.0	1774850.0	0.0	56433850.0	213.60
Totals ML	206.88	6.72	0.00		
Avg's	1821966.7	6.90		1881128.3	7.12
Max	2418000.0	9.15		2507308.0	9.49
Min	930000.0	3.52		1025142.0	3.88

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 the Distribution Intake’s Point of Disinfection and at the Mission Creek raw water Point of Diversion; one sample is taken per week at Stevens Pond outlet (point halfway between WTP Outlet and Distribution Intake).

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

The E.Coli readings clearly show the effectiveness in risk reduction from the Water Treatment Plant and extended settling times in Stevens and Hadden Reservoirs.

Figure 2.1 - Raw Water E.Coli Readings (CARO Lab results) Oct-Nov 2018

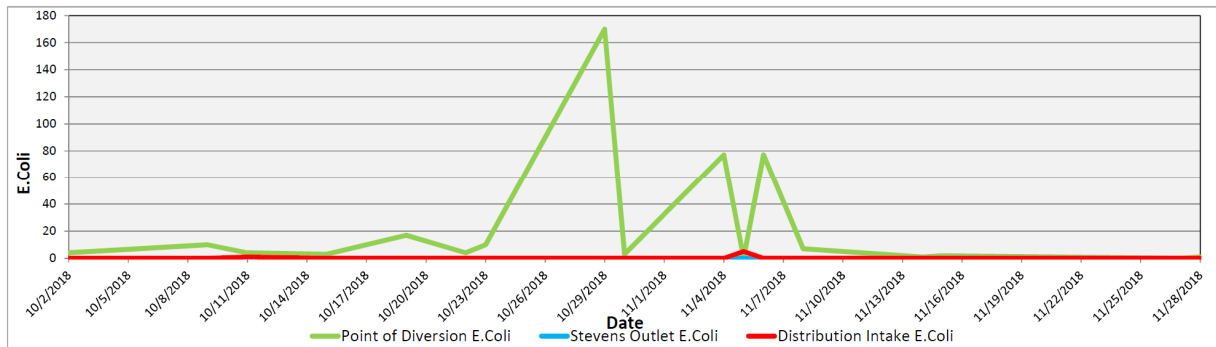


Table 2.1 - E.Coli Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
2-Oct-18	4	0	0
9-Oct-18	10	0	0
11-Oct-18	4	0	1
15-Oct-18	3	0	0
19-Oct-18	17	0	0
22-Oct-18	4	0	0
23-Oct-18	10	0	0
29-Oct-18	170	0	0
30-Oct-18	3	0	0
4-Nov-18	77	0	0
5-Nov-18	0	0	5
6-Nov-18	77	0	0
8-Nov-18	7	0	0
14-Nov-18	1	0	0
15-Nov-18	2	0	0
27-Nov-18	0	0	0
28-Nov-18	1	0	0

Stevens or WTP Intake (Raw) - Sampling of raw water at intake from Mission Creek

Stevens Outlet (Raw) - Sampling point after exiting 142,000 m³ 1st upper balancing reservoir (Stevens Res.)

Hadden Outlet (Raw) - Sampling point after exiting 75,000 m³ 2nd lower balancing reservoir (Hadden Res.)

(Hadden Outlet = Distribution Intake - 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 November 2018. The highest turbidity recorded at this location was 0.44 NTU on November 19-21 and November 6, 2018. The average turbidity for the month was 0.42 NTU during November.

Figure 3.1 – Daily Turbidity Readings (Distribution Intake and Booster Station 1)

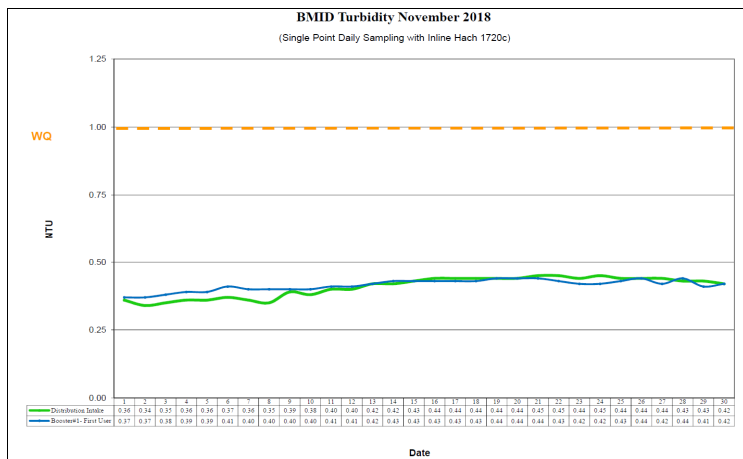


Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for November 2018				
Date	Distribution Intake		Booster#1- First User	
	Sample Time	[NTU]	Sample Time	[NTU]
1	9:25 AM	0.36	7:57 AM	0.37
2	7:11 AM	0.34	6:40 AM	0.37
3	11:30 AM	0.35	11:10 AM	0.38
4	11:45 AM	0.36	1:20 PM	0.39
5	9:27 AM	0.36	8:22 AM	0.39
6	9:01 AM	0.37	7:52 AM	0.41
7	9:26 AM	0.36	8:02 AM	0.40
8	8:50 AM	0.35	8:02 AM	0.40
9	2:59 PM	0.39	2:30 PM	0.40
10	10:40 AM	0.38	9:50 AM	0.40
11	9:11 AM	0.40	8:48 AM	0.41
12	8:39 AM	0.40	8:17 AM	0.41
13	12:18 PM	0.42	8:35 AM	0.42
14	8:55 AM	0.42	7:56 AM	0.43
15	8:53 AM	0.43	7:19 AM	0.43
16	9:31 AM	0.44	8:00 AM	0.43
17	8:28 AM	0.44	7:59 AM	0.43
18	8:18 AM	0.44	7:53 AM	0.43
19	8:22 AM	0.44	8:00 AM	0.44
20	3:16 PM	0.44	12:58 PM	0.44
21	8:22 AM	0.45	8:00 AM	0.44
22	8:59 AM	0.45	8:15 AM	0.43
23	8:30 AM	0.44	8:07 AM	0.42
24	9:14 AM	0.45	8:45 AM	0.42
25	9:49 AM	0.44	9:32 AM	0.43
26	9:05 AM	0.44	8:25 AM	0.44
27	8:59 AM	0.44	8:25 AM	0.42
28	2:59 PM	0.43	3:20 PM	0.44
29	8:45 AM	0.43	8:09 AM	0.41
30	8:42 AM	0.42	8:15 AM	0.42
AVG		0.41		0.42

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 November, 2018.

Figure 4.1 - CT Trending – BMID Mission Creek Source – November 2018

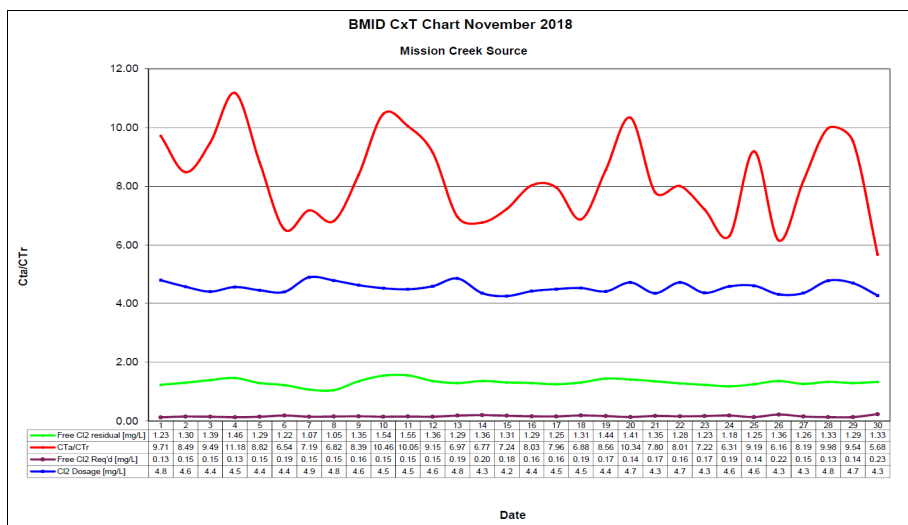


Table 4.2 - CT Table – Mission Creek Source

BMID November 2018													
Mission Creek Source													
DATE	pH (highest)	TEMP (lowest)	PEAK FLOW	Free Cl ₂ residual	CT achieved	CT req'd	CTa/CTR	Free Cl ₂ Req'd	Cl ₂ Dosage	VOLUME TOTAL	TIME	FLOW PRESENT	CL ₂ DOSAGE PRESENT
November		[°C]	[USgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.56	7.9	2031	1.23	1604.6	165.2	9.71	0.13	4.8	2649600	1305	1411	81
2	7.56	7.9	2437	1.30	1413.4	166.6	8.49	0.15	4.6	2649600	1087	1479	81
3	7.57	7.8	2283	1.39	1613.2	170.0	9.49	0.15	4.4	2649600	1161	1705	90
4	7.56	7.7	2014	1.46	1920.8	171.9	11.18	0.13	4.5	2649600	1316	1501	82
5	7.57	7.7	2289	1.29	1493.2	169.3	8.82	0.15	4.4	2649600	1158	1519	81
6	7.57	7.8	2965	1.22	1090.2	166.7	6.54	0.19	4.4	2649600	894	1652	87
7	7.56	7.9	2439	1.07	1162.4	161.8	7.19	0.15	4.9	2649600	1086	1075	63
8	7.58	7.8	2492	1.05	1116.4	163.6	6.82	0.15	4.8	2649600	1063	1169	67
9	7.59	7.7	2484	1.35	1440.0	171.7	8.39	0.16	4.6	2649600	1067	1588	88
10	7.59	7.0	2122	1.54	1922.9	183.8	10.46	0.15	4.5	2649600	1249	1791	97
11	7.59	6.7	2176	1.55	1887.4	187.8	10.05	0.15	4.5	2649600	1218	1861	100
12	7.60	6.7	2130	1.36	1691.8	184.8	9.15	0.15	4.6	2649600	1244	1310	72
13	7.60	6.2	2584	1.29	1322.7	189.9	6.97	0.19	4.8	2649600	1025	1015	59
14	7.59	5.7	2695	1.36	1337.1	197.4	6.77	0.20	4.3	2649600	983	2224	116
15	7.60	5.5	2401	1.31	1445.6	199.8	7.24	0.18	4.2	2649600	1104	1844	94
16	7.59	5.1	2084	1.29	1640.1	204.2	8.03	0.16	4.4	2649600	1271	1757	93
17	7.59	5.3	2075	1.25	1596.1	200.4	7.96	0.16	4.5	2649600	1277	1227	66
18	7.59	5.0	2448	1.31	1417.9	206.1	6.88	0.19	4.5	2649600	1082	1549	84
19	7.60	4.9	2111	1.44	1807.4	211.2	8.56	0.17	4.4	2649600	1255	1778	94
20	7.50	4.7	1754	1.41	2130.0	206.0	10.34	0.14	4.7	2649600	1511	1133	64
21	7.50	4.1	2149	1.35	1664.5	213.4	7.80	0.17	4.3	2649600	1233	1823	95
22	7.60	4.0	1916	1.28	1770.1	220.9	8.01	0.16	4.7	2649600	1383	1115	63
23	7.56	4.4	2145	1.23	1519.4	210.6	7.22	0.17	4.3	2649600	1235	1799	94
24	7.55	4.7	2426	1.18	1288.8	204.2	6.31	0.19	4.6	2649600	1092	1239	68
25	7.54	4.3	1707	1.25	1940.2	211.0	9.19	0.14	4.6	2649600	1552	1341	74
26	7.53	4.3	2746	1.36	1312.3	213.0	6.16	0.22	4.3	2649600	965	2362	122
27	7.51	4.4	1964	1.26	1699.8	207.6	8.19	0.15	4.3	2649600	1349	1667	87
28	7.53	4.4	1675	1.33	2103.9	210.8	9.98	0.13	4.8	2649600	1582	1101	63
29	7.52	4.4	1714	1.29	1994.2	209.1	9.54	0.14	4.7	2649600	1546	1227	69
30	7.52	4.4	2954	1.33	1192.9	210.0	5.68	0.23	4.3	2649600	897	2656	136
Averages	7.56	5.88	2247	1.31	1584.64	193	8.24	0.16	4.52				

5.0 WATER DISTRIBUTION SAMPLING (TREATED)

Third Party Analysis (CARO Analytical Services)

- Samples taken once per week at ten locations around the BMID service area
- 50 samples were found to be absent of Coliforms.
- 50 samples were found to be absent of *E. Coli*.

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

Date	2921 Belgo Rd		Booster I		Elison Blow-Off		Elison School		612 Adams Rd		3076 Highway 97		Prospect Reservoir		Tower Reservoir		Well #4		Kirschner Res	
	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli
9-Oct-18	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Oct-18	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-Oct-18	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-Oct-18	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Nov-18	0	0	0	0	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

Location	11/5/2018				11/13/2018				11/19/2018				11/26/2018			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres					0.97	10.0	-	X								
170 Kneller Rd									0.99	8.2	-	X				
2105 Morrison					0.27	11.0	-	X								
Pearson School	0.89	11.0	-	X									0.87	9.0	-	X
Staymen Rd									0.50	10.6	-	X				
PRV #10																
260 Campion Rd	0.41	11.6	-	X									0.47	10.0	-	X
Fenwick Rd									0.04	10.4	-	X				
Solly Ct	0.83	10	-	X									0.78	8	-	X

- BMID Population = 25,000

RECOMMENDED TESTS

- Recommended number of samples per month = 25
(as per Guide for Canadian Drinking Water Quality)

ACTUAL TESTS

- Total tests by BMID staff (presence/absence) = 11
- Total tests sampled by BMID and tested by Caro Labs = 50
- Total tests sampled in BMID treated distribution system = 61 (Zero Positive Samples)