



MONTHLY REPORTING PERIOD - OCTOBER, 2020

1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in October, 2020. Documentation and figures are provided on the following pages to support this submission.

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	123,849,709	468.77
Well 4	3,678,000	13.92
Well 5	0	0
Well 6 (Irrigation Only)	1,301,000	4.92
Scotty Creek (Irrigation Only)	278,000	1.05
Total	127,527,709	488.67

1. A portion of the BMID's transmission main west of the Mission Creek Intake and east of the tunnel is located on an unstable slope. Slope movement has been minimal over the past 12 months. Monitoring has showed minor variations in groundwater levels, but no substantial changes. The hillside is being monitored for surface movement on a monthly basis and groundwater levels as required.
2. The Water Treatment Plant started full operations in April, 2020, and the plant operated through most of October. Raw water was of sufficient quality to bypass treatment on October 27 and 28. It is expected that the WTP will continue to run when necessary until raw water quality in Mission Creek improves in late fall or early winter;
3. Raw water turbidity levels in Mission Creek peaked at 5.75 NTU on October 17, 2020. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.44 NTU on October 27, 2020. The WTP ran effectively with average turbidity for October at 0.32 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
4. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.43 NTU on October 12, 2020. Average monthly turbidity at the first customer was 0.26 NTU for October;
5. BMID's Ultraviolet Treatment Facility treated 406,000.7 m³ of water none of which was "Off-Spec" (0%). Average UV Transmissivity was 90.76%. The average inlet chlorine residual level at the UV site was 1.22 mg/L. The average outgoing chlorine was 1.35 mg/L after the sodium hypochlorite top-up system;
6. BMID's Scotty Creek source, used for irrigation in the north-end, was used as a supplemental irrigation supply as dictated by flows. The Scotty Creek source was placed on Stand-by on October 24, 2020;
7. Well # 4 resumed operations as the primary domestic water source for the north-end on October 11, 2020;
8. Well #5, used as the primary domestic water source in the north-end of the system for both irrigation and domestic consumption was turned off for the year on September 11, 2020. Well #5 is began undergoing maintenance in October and the maintenance will continue into November;

9. Well #6, which supplies irrigation water to the twinned north-end water distribution systems, was in limited operation between October 3 and October 6 to compensate for additional flows normally supplied by Well #5 when in service. Well #6 will remain in stand-by mode for fire protection only until flows increase in spring 2021;
10. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had low counts for fall with a peak count of 4 on October 7, 2020. The average *E.Coli* count was 2.33 for the month based on 9 samples;
11. *E.Coli* levels in the raw water at the water distribution system intake down-stream of the WTP, immediately prior to disinfection, had low counts on all samples. Peak *E.Coli* counts of 1 were found on samples taken on October 1 and 28. The remaining samples were found to contain no *E.Coli* Bacteria. The reduction in *E.Coli* levels is credited to the settling of particles in the water in Stevens and Hadden Reservoirs;
12. No *E.Coli* or *Total Coliforms* were found in treated water in the distribution system through third-party analysis. In addition, no positive samples were detected by BMID's in-house presence/absence testing;
13. Disinfection by-products (Haloacetic acids and Trihalomethanes) were monitored at four sites throughout the distribution system. Both THMs and HAAs were slightly above the Canadian Drinking Water Guidelines due to high organics in the raw water from the Belgo Reservoir source. THMs averaged 0.145 mg/L which is over the guideline of 0.100 mg/L. HAAs averaged 0.0834 mg/L which is above the suggested level of 0.0800 mg/L. When Belgo Reservoir is turned off for the year later in the fall, the organics in the raw water will be reduced;

1.0 FLOWS - OCTOBER, 2020

The Maximum Daily Flow was on October 5, at 10,004,375 US gallons (37.87 ML)

The Minimum Daily Flow was on October 27, at 2,000,902 US gallons (7.57 ML)

Mission Creek provided 96% of domestic and irrigation flow throughout October.

Figure 1.1 - Domestic Water System Flow

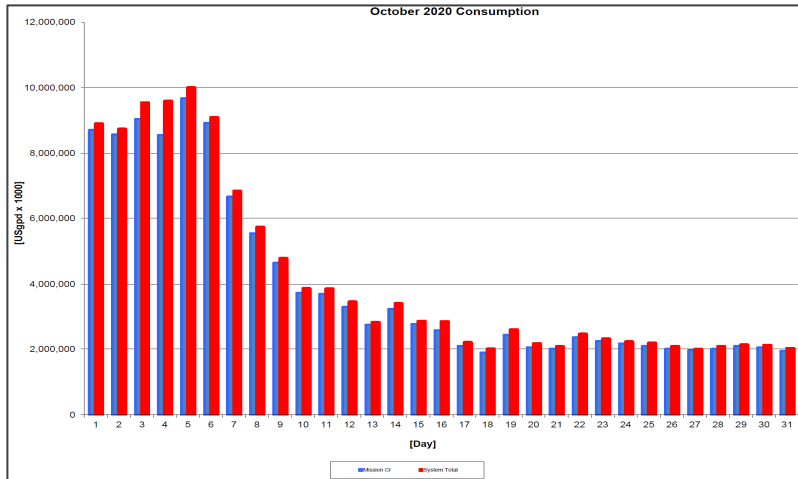


Table 1.2 - October 2020 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	Well #6	Scotty Crk	System Total	System Total
2020	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Oct	8,711,451	187,000	0.0	0.0	0.0	8,898,451	33.68
2-Oct	8,571,902	166,000	0.0	0.0	0.0	8,737,902	33.07
3-Oct	9,041,844	201,000	0.0	300,000.0	0.0	9,542,844	36.12
4-Oct	8,557,819	187,000	0.0	845,000.0	0.0	9,589,819	36.30
5-Oct	9,675,375	173,000	0.0	156,000.0	0.0	10,004,375	37.87
6-Oct	8,922,514	169,000	0.0	0.0	0.0	9,091,514	34.41
7-Oct	6,652,007	173,000	0.0	0.0	0.0	6,825,007	25.83
8-Oct	5,541,504	187,000	0.0	0.0	0.0	5,728,504	21.68
9-Oct	4,646,682	139,000	0.0	0.0	0.0	4,785,682	18.11
10-Oct	3,741,621	129,000	0.0	0.0	0.0	3,870,621	14.65
11-Oct	3,707,920	157,000	0.0	0.0	0.0	3,864,920	14.63
12-Oct	3,312,299	154,000	0.0	0.0	0.0	3,466,299	13.12
13-Oct	2,737,087	106,000	0.0	0.0	0.0	2,843,087	10.76
14-Oct	3,255,228	167,000	0.0	0.0	0.0	3,422,228	12.95
15-Oct	2,777,568	104,000	0.0	0.0	0.0	2,881,568	10.91
16-Oct	2,574,990	138,000	0.0	0.0	156,000.0	2,868,990	10.86
17-Oct	2,100,897	105,000	0.0	0.0	0.0	2,205,897	8.35
18-Oct	1,896,399	102,000	0.0	0.0	7,000.0	2,005,399	7.59
19-Oct	2,437,623	100,000	0.0	0.0	55,000.0	2,592,623	9.81
20-Oct	2,049,915	99,000	0.0	0.0	20,000.0	2,168,915	8.21
21-Oct	2,012,785	68,000	0.0	0.0	0.0	2,080,785	7.88
22-Oct	2,361,890	98,000	0.0	0.0	0.0	2,459,890	9.31
23-Oct	2,239,350	33,000	0.0	0.0	40,000.0	2,312,350	8.75
24-Oct	2,166,716	61,000	0.0	0.0	0.0	2,227,716	8.43
25-Oct	2,093,194	95,000	0.0	0.0	0.0	2,188,194	8.28
26-Oct	2,006,433	77,000	0.0	0.0	0.0	2,083,433	7.89
27-Oct	1,963,902	37,000	0.0	0.0	0.0	2,000,902	7.57
28-Oct	2,006,774	78,000	0.0	0.0	0.0	2,084,774	7.89
29-Oct	2,088,291	44,000	0.0	0.0	0.0	2,132,291	8.07
30-Oct	2,055,083	64,000	0.0	0.0	0.0	2,119,083	8.02
31-Oct	1,942,646	80,000	0.0	0.0	0.0	2,022,646	7.66
Totals Usgpd	123,849,709	3,678,000	0	1,301,000	278,000	127,527,709	488.67
Totals ML	468.77	13.92	0.00	4.92	1.05		
Avg's	4,063,569	15.38				4,236,135	15.76
Max	9,675,375	36.62				10,004,375	37.87
Min	1,896,399	7.18				2,000,902	7.57

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 WTP lowers colour, turbidity and particle counts in the raw water. The *E. Coli* readings are consistent with the reduction in those other parameters. The *E. Coli* readings confirm the WTP's effectiveness in reducing raw water quality risks with coagulation, flocculation, and sedimentation process followed by settling times across Stevens and Hadden Reservoirs.

Figure 2.1 - Raw Water *E. Coli* Readings (CARO Lab results) September 2019 -October 2020

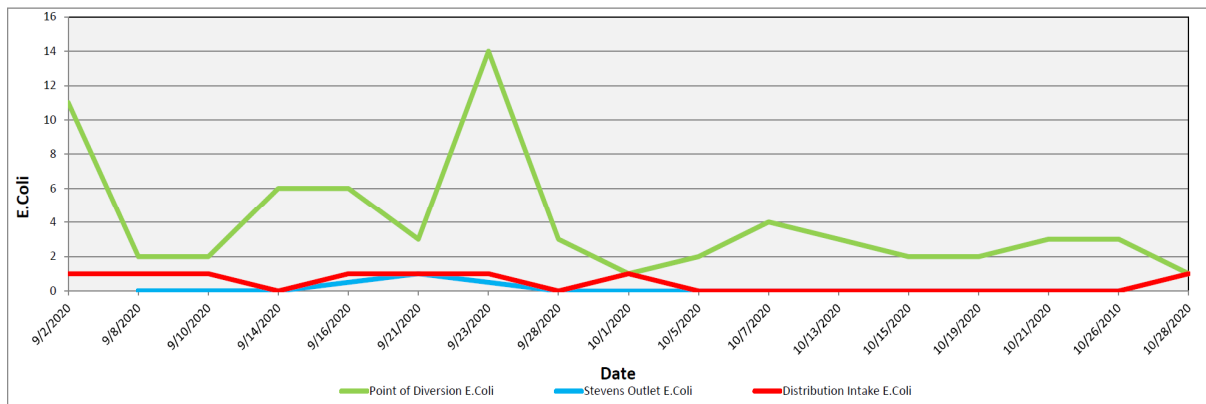


Table 2.1 - *E. Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
2-Sep-20	11		1
8-Sep-20	2	0	1
10-Sep-20	2		1
14-Sep-20	6	0	0
16-Sep-20	6		1
21-Sep-20	3	1	1
23-Sep-20	14		1
28-Sep-20	3	0	0
1-Oct-20	1		1
5-Oct-20	2	0	0
7-Oct-20	4		0
13-Oct-20	3	0	0
15-Oct-20	2		0
19-Oct-20	2	0	0
21-Oct-20	3		0
26-Oct-10	3	0	0
28-Oct-20	1		1

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

Through October 2020, turbidity for the Mission Creek source was measured at Booster Station No. 1 on Gallagher's Road, which is the approximate location of the first-customer. The highest turbidity level recorded at this location was 0.43 NTU on October 12.

The distribution intake is where the water leaves Hadden Reservoir. Turbidity levels are greatly reduced through the settling process as Mission Creek treated water makes its way through the reservoirs.

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

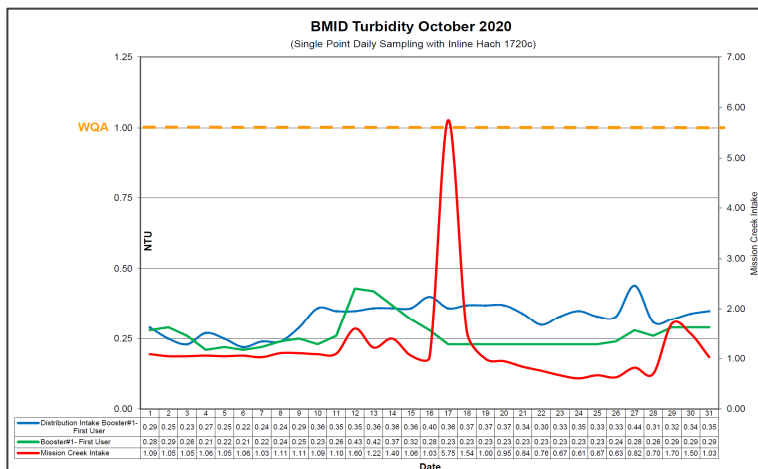


Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for October 2020			
Date	Mission Creek Intake	Distribution Intake	Booster#1- First User
	Daily Average [NTU]	Daily Average [NTU]	Daily Average [NTU]
1	1.09	0.29	0.28
2	1.05	0.25	0.29
3	1.05	0.23	0.26
4	1.06	0.27	0.21
5	1.05	0.25	0.22
6	1.06	0.22	0.21
7	1.03	0.24	0.22
8	1.11	0.24	0.24
9	1.11	0.29	0.25
10	1.09	0.36	0.23
11	1.10	0.35	0.26
12	1.60	0.35	0.43
13	1.22	0.36	0.42
14	1.40	0.36	0.37
15	1.06	0.36	0.32
16	1.03	0.40	0.28
17	5.75	0.36	0.23
18	1.54	0.37	0.23
19	1.00	0.37	0.23
20	0.95	0.37	0.23
21	0.84	0.34	0.23
22	0.76	0.30	0.23
23	0.67	0.33	0.23
24	0.61	0.35	0.23
25	0.67	0.33	0.23
26	0.63	0.33	0.24
27	0.82	0.44	0.28
28	0.70	0.31	0.26
29	1.70	0.32	0.29
30	1.50	0.34	0.29
31	1.03	0.35	0.29
Average	1.20	0.32	0.26

4.0 CHLORINE CONTACT TIME

Temperature, pH, peak 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 October, 2020.

Figure 4.1 - CT Trending – BMID Mission Creek Source – October 2020

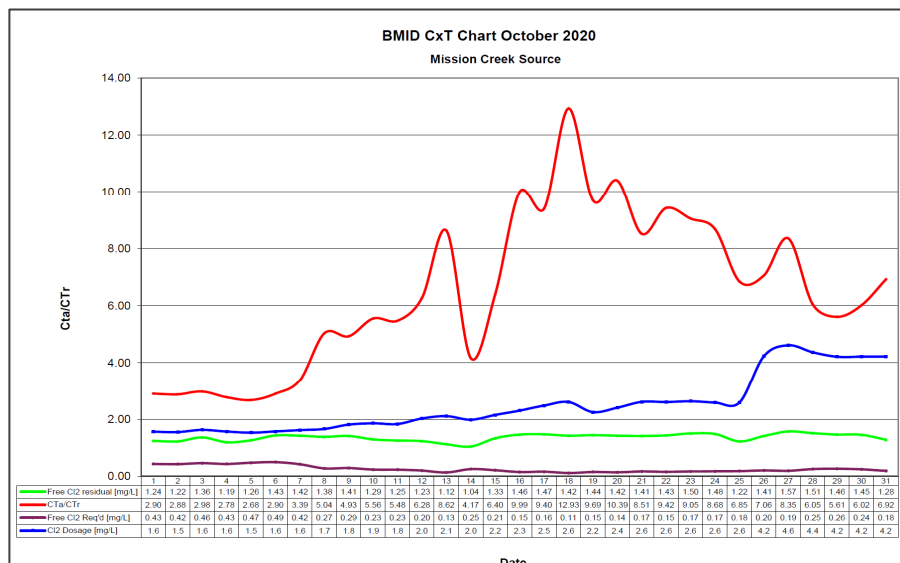


Table 4.2 - CT Table – Mission Creek Source

BMID October 2020 Mission Creek Source													
DATE	pH (Average)	TEMP (Present)	PEAK FLOW	Free Cl2 residual	CT achieved	CT req'd	Cta/CTr	Free Cl2 Req'd	Cl2 Dosage	VOLUME TOTAL	TIME	FLOW Daily Average	CL2 DOSAGE Average
October		[°C]	[USgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.85	12.8	8,694	1.24	377.9	130.3	2.90	0.43	1.6	2649600	305	6,051	113
2	7.87	12.5	8,409	1.22	384.4	133.6	2.88	0.42	1.5	2649600	315	5,953	111
3	7.86	12.3	8,819	1.36	408.6	137.2	2.98	0.46	1.6	2649600	300	6,293	123
4	7.84	12.7	8,740	1.19	360.8	129.9	2.78	0.43	1.6	2649600	303	5,941	112
5	7.85	12.5	9,353	1.26	356.9	133.3	2.68	0.47	1.5	2649600	283	6,712	123
6	7.84	12.4	9,578	1.43	395.6	136.4	2.90	0.49	1.6	2649600	277	6,199	117
7	7.82	12.5	8,266	1.42	455.2	134.4	3.39	0.42	1.6	2649600	321	4,619	90
8	7.81	12.5	5,444	1.38	671.6	133.3	5.04	0.27	1.7	2649600	487	3,845	77
9	7.81	12.5	5,660	1.41	660.1	133.8	4.93	0.29	1.8	2649600	468	3,232	70
10	7.81	12.3	4,597	1.29	743.5	133.8	5.56	0.23	1.9	2649600	576	2,595	58
11	7.81	12.1	4,477	1.25	739.8	135.1	5.48	0.23	1.8	2649600	592	2,577	57
12	7.81	11.9	3,801	1.23	857.4	136.6	6.28	0.20	2.0	2649600	697	2,303	56
13	7.81	12.9	2,739	1.12	1083.4	125.7	8.62	0.13	2.1	2649600	967	1,900	48
14	7.78	11.5	4,878	1.04	564.9	135.6	4.17	0.25	2.0	2649600	543	2,262	54
15	7.76	11.4	3,912	1.33	900.8	140.7	6.40	0.21	2.2	2649600	677	1,935	50
16	7.74	11.3	2,714	1.46	1425.4	142.6	9.99	0.15	2.3	2649600	976	1,788	50
17	7.73	11.0	2,852	1.47	1365.7	145.3	9.40	0.16	2.5	2649600	929	1,459	44
18	7.77	10.8	1,958	1.42	1921.6	148.6	12.93	0.11	2.6	2649600	1353	1,316	41
19	7.79	10.6	2,590	1.44	1473.1	152.0	9.69	0.15	2.2	2649600	1023	1,698	46
20	7.81	10.5	2,353	1.42	1599.0	153.8	10.39	0.14	2.4	2649600	1126	1,421	41
21	7.81	10.1	2,778	1.41	1344.8	158.0	8.51	0.17	2.6	2649600	954	1,400	44
22	7.77	9.9	2,541	1.43	1491.1	158.3	9.42	0.15	2.6	2649600	1043	1,637	51
23	7.75	9.5	2,698	1.50	1473.1	162.8	9.05	0.17	2.6	2649600	982	1,556	49
24	7.72	9.1	2,734	1.48	1434.3	165.3	8.68	0.17	2.6	2649600	969	1,505	47
25	7.72	8.8	2,879	1.22	1122.8	164.0	6.85	0.18	2.6	2649600	920	1,457	45
26	7.73	8.1	2,999	1.41	1245.7	176.5	7.06	0.20	4.2	2649600	883	1,395	71
27	7.74	7.5	2,654	1.57	1567.4	187.7	8.35	0.19	4.6	2649600	998	1,364	76
28	7.75	7.0	3,410	1.51	1173.3	193.8	6.05	0.25	4.4	2649600	777	1,398	74
29	7.76	6.8	3,511	1.46	1101.8	196.2	5.61	0.26	4.2	2649600	755	1,449	74
30	7.77	6.8	3,245	1.45	1184.0	196.7	6.02	0.24	4.2	2649600	817	1,425	72
31	7.80	6.8	2,511	1.28	1350.7	195.1	6.92	0.18	4.2	2649600	1055	1,354	69
Averages	7.79	10.63	4574	1.36	1007.57	151.82	6.51	0.25	2.50				

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated: 406,000.7 m³ 100.0%
On-Spec Water: 406,000.7 m³ 100.0%
Off-Spec Water: 0 m³ 0%

Average monthly chlorine residual before UV Treatment was 1.22 mg/L
The average monthly chlorine residual after UV treatment and re-chlorination was 1.35 mg/L.

Figure 5.1 - UV Disinfection – BMID Mission Creek Source – October 2020

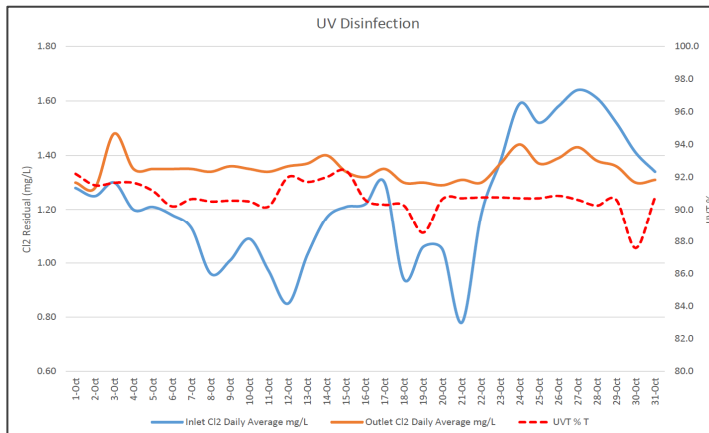


Table 5.2 - UV Disinfection Table – Mission Creek Source

Date	Inlet Cl2 Daily mg/L	Outlet Cl2 Daily mg/L	UVT % T	In Spec Water Volume Cubic Meters	Off Spec Water Cubic Meters	Off Spec % of Water Percentage
1-Oct	1.28	1.30	92.2	28,431	0	0.00%
2-Oct	1.25	1.28	91.5	26,877	0	0.00%
3-Oct	1.30	1.48	91.7	29,197	0	0.00%
4-Oct	1.20	1.35	91.7	27,104	0	0.00%
5-Oct	1.21	1.35	91.2	30,601	0	0.00%
6-Oct	1.18	1.35	90.2	28,568	0	0.00%
7-Oct	1.13	1.35	90.7	20,708	0	0.00%
8-Oct	0.96	1.34	90.5	16,522	0	0.00%
9-Oct	1.01	1.36	90.6	14,157	0	0.00%
10-Oct	1.09	1.35	90.5	10,770	0	0.00%
11-Oct	0.97	1.34	90.2	10,445	0	0.00%
12-Oct	0.85	1.36	92.0	9,756	0	0.00%
13-Oct	1.03	1.37	91.7	7,442	0	0.00%
14-Oct	1.17	1.40	92.0	8,949	0	0.00%
15-Oct	1.21	1.34	92.4	7,949	0	0.00%
16-Oct	1.22	1.32	90.6	8,878	0	0.00%
17-Oct	1.30	1.35	90.3	7,978	0	0.00%
18-Oct	0.94	1.30	90.3	7,220	0	0.00%
19-Oct	1.06	1.30	88.6	9,341	0	0.00%
20-Oct	1.05	1.29	90.7	7,797	0	0.00%
21-Oct	0.78	1.31	90.7	7,691	0	0.00%
22-Oct	1.18	1.30	90.8	8,954	0	0.00%
23-Oct	1.38	1.37	90.8	8,521	0	0.00%
24-Oct	1.59	1.44	90.7	8,249	0	0.00%
25-Oct	1.52	1.37	90.7	7,961	0	0.00%
26-Oct	1.58	1.39	90.9	7,634	0	0.00%
27-Oct	1.64	1.43	90.6	7,485	0	0.00%
28-Oct	1.61	1.38	90.3	7,648	0	0.00%
29-Oct	1.52	1.36	90.6	7,962	0	0.00%
30-Oct	1.41	1.30	87.6	7,796	0	0.00%
31-Oct	1.34	1.31	90.8	7,410	0	0.00%
Average	1.22	1.35	90.76	Total 406,000.70	0	0.000%

6.0 WATER DISTRIBUTION SAMPLING (TREATED)

Third Party Analysis (CARO Analytical Services)

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

Table 6.1 - CARO Independent Lab Testing – Total Coliforms – E.Coli

Date	2921 Belgo Rd		Booster 1		Elison Blow-Off		Elison School		3976 Highway 97		Prospect Reservoir		Tower Reservoir		Well #5		Well #4		Kirschner Res		Pearson School	
	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	Coliforms	E.coli
8-Sep-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0	0	0	0
14-Sep-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
21-Sep-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
28-Sep-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
5-Oct-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
8-Oct-20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13-Oct-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
19-Oct-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
26-Oct-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0

Table 6.3 – Disinfection By-Products - THM and HAA Results

13-Oct-20		
Location	THM (mg/L)	HAA (mg/L)
Kirschner Reservoir		0.0837
2921 Belgo Rd	0.1430	
Pearson School	0.1490	0.0831
3976 Highway 97	0.1450	

In-House Analysis (BMID Staff)

- Presence/Absence samples taken on a three-week cycle at seven sites around the BMID service area.
- All 9 samples were found to be absent of both Total Coliforms and *E. Coli*.

Table 6.4 - BMID In-house Testing – Presence Absence

Location	10/6/2020				10/13/2020				10/19/2020				10/26/2020			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres					0.66	15.6	-	X								
170 Kneller Rd					0.52	15.6	-	X								
2105 Morrison	0.98	16.2	-	X									0.44	13.4	-	X
Staymen Rd	0.76	18.1	-	X									0.47	13.0	-	X
260 Campion Rd									0.05	17.0	-	X				
Fenwick Rd									0.00	16.6	-	X				
Solly Ct					0.35	16.6	-	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) = 9
- Total tests sampled by BMID and tested by Caro Labs = 41
- Total tests sampled in BMID treated distribution system = 50 (Zero Positive Samples)