



MONTHLY REPORTING PERIOD - AUGUST, 2020

1. SUMMARY

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

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	677,970,484	2,566.12
Well 4	0	0
Well 5	30,824,364	116.67
Well 6 (Irrigation Only)	19,104,000	73.68
Scotty Creek (Irrigation Only)	23,941,000	87.45
Total	751,365,848	2,843.92

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 not showed any increase in the groundwater levels. The hillside is being monitored for surface movement on a monthly basis and groundwater levels as required.
2. The Water Treatment Plant resumed full-time operations in April, and the plant continued to operate throughout August. It is expected that the WTP will continue to run until raw water quality improves in late fall or early winter;
3. Raw water turbidity levels in Mission Creek peaked at 2.05 NTU on August 7, 2020. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) peaked at 0.37 NTU on August 16, 2020. The significant reduction in turbidity demonstrates the effectiveness of BMID's Water Treatment Plant. Average turbidity for August was 0.26 NTU at the Distribution Intake;
4. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.31 NTU on August 20 and 21, 2020. Average monthly turbidity at the first customer was 0.18 NTU for August;
5. BMID's Ultraviolet Treatment Facility treated 2,236,260.4 m³ of water of which 2,774.5 m³ was "Off-Spec". (0.124%). Average UV Transmissivity was 89.77%. The average inlet chlorine residual level at the UV site was 1.37 mg/L. The average outgoing chlorine was 1.34 mg/L after the sodium hypochlorite top-up system;
6. The UV plant experienced a power loss on August 21 during regular cleaning-in-place maintenance. The power loss resulted in an unexpected "lamp failure" alarm which shut-down the flow to the on-line reactors. However, the third reactor was also not available due to the CIP by BMID crews. As a result, there was a brief period of time where there was no flow entering the distribution system. BMID crews were able to manually open the valves to allow flow, though the water was off-spec as it was not treated by the UV process during the event. The programming has since been altered to ensure this event will not happen in the future;
7. BMID's Scotty Creek source, used for irrigation in the north-end, was used as a supplemental irrigation supply for the entire month as dictated by flows;

8. Well # 4 was not used as a domestic water source throughout August;
9. Well #5, used as the primary domestic water source in the north-end of the system for both irrigation and domestic consumption during the summer was used throughout the month. Well #5 is scheduled for maintenance this fall;
10. Well #6, which supplies irrigation water to the twinned north-end water distribution systems, was in operation for the majority of the month and will continue to operate until irrigation flows begin to decrease;
11. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts for summer with a peak count of 26 on August 10, 2020. The average *E.Coli* count was 14.44 for the month based on 9 samples;
12. *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 most samples. Peak *E.Coli* results were sampled on August 19 with a count of 4. The reduction in *E.Coli* levels is credited to the settling of particles in the water in Stevens and Hadden Reservoirs;
13. 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;
14. Disinfection by-products (Haloacetic acids and Trihalomethanes) were monitored at four sites throughout the distribution system. Both THMs and HAAs were below the Canadian Drinking Water Guidelines;

1.0 FLOWS - AUGUST, 2020

The Maximum Daily Flow was on August 18, at 30,941,494 US gallons (117.11 ML)

The Minimum Daily Flow was on August 31, at 16,248,872 US gallons (60.22 ML)

Mission Creek provided 90% of domestic and irrigation flow throughout August.

Figure 1.1 - Domestic Water System Flow

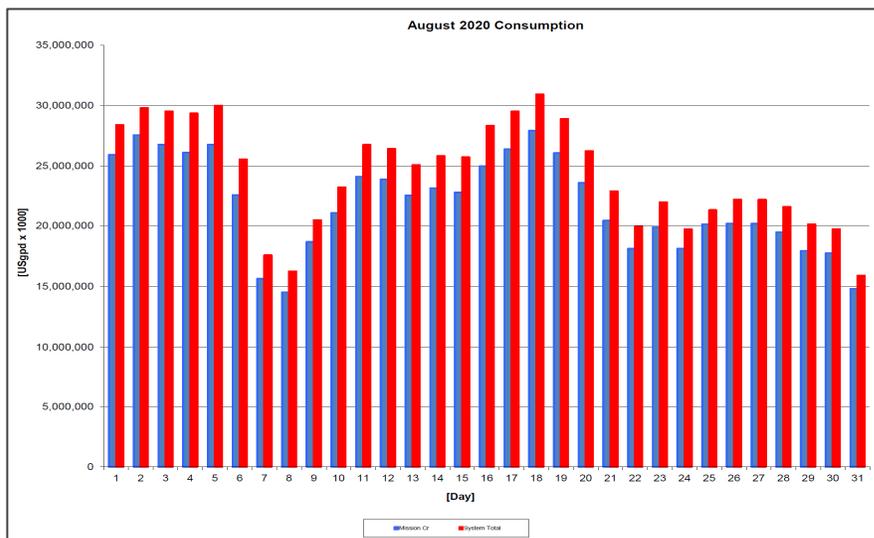


Table 1.2 - August 2020 - Daily Consumption Report

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-Aug	25,934,721	0	999,420	1,033,000	448,000	28,415,141	107.55
2-Aug	27,573,865	0	999,457	1,034,000	212,000	29,819,322	112.87
3-Aug	26,774,250	0	999,421	1,037,000	726,000	29,536,671	111.80
4-Aug	26,115,127	0	999,123	938,000	1,316,000	29,368,250	111.16
5-Aug	26,771,143	0	999,589	1,033,000	1,205,000	30,008,732	113.58
6-Aug	22,516,797	0	999,438	1,030,000	1,015,000	25,561,235	96.75
7-Aug	15,641,426	0	999,794	711,000	219,000	17,571,220	66.51
8-Aug	14,522,651	0	999,221	719,000	8,000	16,248,872	61.50
9-Aug	18,679,568	0	999,442	780,000	7,000	20,466,010	77.46
10-Aug	21,064,203	0	999,191	571,000	610,000	23,244,394	87.98
11-Aug	24,124,799	0	999,441	0	1,640,000	26,764,240	101.30
12-Aug	23,899,143	0	999,132	0	1,530,000	26,428,275	100.03
13-Aug	22,493,307	0	999,240	347,000	1,250,000	25,089,547	94.96
14-Aug	23,095,617	0	999,846	720,000	1,018,000	25,833,463	97.78
15-Aug	22,749,451	0	999,097	922,000	1,069,000	25,739,548	97.42
16-Aug	24,991,408	0	998,644	1,058,000	1,301,000	28,349,052	107.30
17-Aug	26,396,900	0	999,063	1,045,000	1,074,000	29,514,963	111.71
18-Aug	27,930,906	0	999,588	1,027,000	984,000	30,941,494	117.11
19-Aug	26,070,961	0	998,833	1,013,000	828,000	28,910,794	109.43
20-Aug	23,608,299	0	998,682	955,000	684,000	26,245,981	99.34
21-Aug	20,420,842	0	999,936	1,005,000	412,000	22,837,778	86.44
22-Aug	18,111,582	0	843,477	949,000	26,000	19,930,059	75.44
23-Aug	19,878,172	0	999,457	974,000	88,000	21,939,629	83.04
24-Aug	18,119,109	0	998,972	566,000	22,000	19,706,081	74.59
25-Aug	20,121,887	0	998,614	0	168,000	21,288,501	80.58
26-Aug	20,195,203	0	999,053	0	952,000	22,146,256	83.82
27-Aug	20,179,195	0	999,395	0	976,000	22,154,590	83.86
28-Aug	19,477,885	0	999,848	0	1,075,000	21,552,733	81.58
29-Aug	17,944,885	0	999,968	0	1,174,000	20,118,853	76.15
30-Aug	17,752,904	0	999,991	0	970,000	19,722,895	74.65
31-Aug	14,814,278	0	999,991	0	97,000	15,911,269	60.22
Totals Usgpd	677,970,484	0	30,824,364	19,467,000	23,104,000	751,365,848	2843.92
Totals ML	2,566.12	0.00	116.67	73.68	87.45		
Avg's	21,870,016	82.78				24,515,153	91.74
Max	27,930,906	105.72				30,941,494	117.11
Min	14,522,651	54.97				16,248,872	60.22

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) July 2019 -August 2020

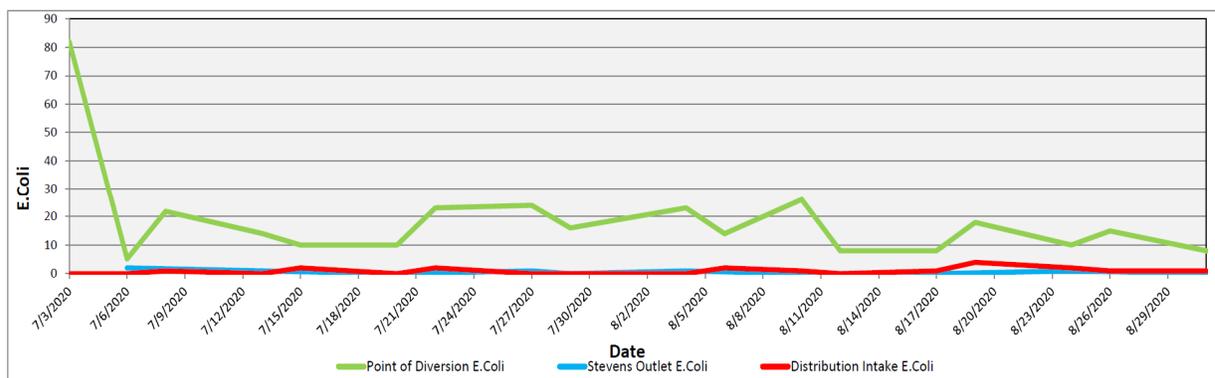


Table 2.1 - *E. Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
3-Jul-20	82		0
6-Jul-20	5.2	2	0
8-Jul-20	21.8		1
13-Jul-20	14.1	1	0
15-Jul-20	10		2
20-Jul-20	10	0	0
22-Jul-20	23		2
27-Jul-20	24	1	0
29-Jul-20	16	0	0
4-Aug-20	23	1	0
6-Aug-20	14		2
10-Aug-20	26	0	1
12-Aug-20	8		0
17-Aug-20	8	0	1
19-Aug-20	18		4
24-Aug-20	10	1	2
26-Aug-20	15		1
31-Aug-20	8	0	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 August 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 0.31 NTU on August 20 and 21.

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)

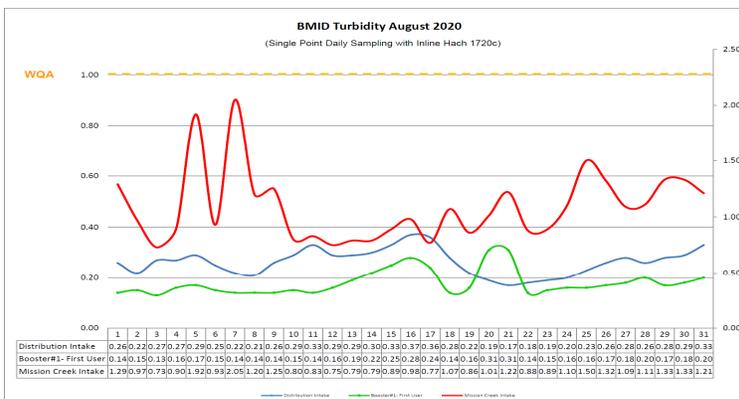


Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for August 2020			
Date	Mission Creek Intake	Distribution Intake	Booster#1- First User
	Daily Average [NTU]	Daily Average [NTU]	Daily Average [NTU]
1	1.29	0.26	0.14
2	0.97	0.22	0.15
3	0.73	0.27	0.13
4	0.90	0.27	0.16
5	1.92	0.29	0.17
6	0.93	0.25	0.15
7	2.05	0.22	0.14
8	1.20	0.21	0.14
9	1.25	0.26	0.14
10	0.80	0.29	0.15
11	0.83	0.33	0.14
12	0.75	0.29	0.16
13	0.79	0.29	0.19
14	0.79	0.30	0.22
15	0.89	0.33	0.25
16	0.98	0.37	0.28
17	0.77	0.36	0.24
18	1.07	0.28	0.14
19	0.86	0.22	0.16
20	1.01	0.19	0.31
21	1.22	0.17	0.31
22	0.88	0.18	0.14
23	0.89	0.19	0.15
24	1.10	0.20	0.16
25	1.50	0.23	0.16
26	1.32	0.26	0.17
27	1.09	0.28	0.18
28	1.11	0.26	0.20
29	1.33	0.28	0.17
30	1.33	0.29	0.18
31	1.21	0.33	0.20
AVG	1.09	0.26	0.18

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 August, 2020.

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

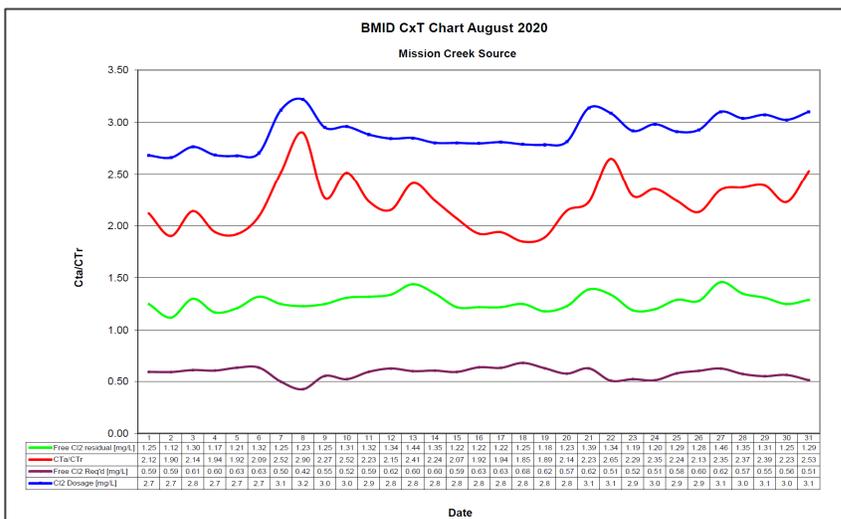


Table 4.2 - CT Table – Mission Creek Source

BMID August 2020 Mission Creek Source													
DATE	pH (Average)	TEMP (Present) [°C]	PEAK FLOW [Usgpm]	Free Cl2 residual [mg/L]	CT achieved	CT req'd	CTa/CTr	Free Cl2 Req'd [mg/L]	Cl2 Dosage [mg/L]	VOLUME TOTAL [USgal]	TIME [mins]	FLOW Daily Average [USGPM]	CL2 DOSAGE Average [PPD]
August													
1	7.83	21.1	21466	1.25	154.3	72.9	2.12	0.59	2.7	2649600	123	18063	582
2	7.85	21.2	21773	1.12	136.3	71.7	1.90	0.59	2.7	2649600	122	19172	613
3	7.84	21.2	22035	1.30	156.3	73.0	2.14	0.61	2.8	2649600	120	18806	618
4	7.86	20.7	21323	1.17	145.4	74.9	1.94	0.60	2.7	2649600	124	18132	585
5	7.84	20.8	22484	1.21	142.6	74.3	1.92	0.63	2.7	2649600	118	18586	598
6	7.82	19.7	20737	1.32	168.7	80.7	2.09	0.63	2.7	2649600	128	15645	509
7	7.80	19.1	15881	1.25	208.6	82.8	2.52	0.50	3.1	2649600	167	10843	406
8	7.80	19.1	13603	1.23	239.6	82.6	2.90	0.42	3.2	2649600	195	10104	391
9	7.84	19.0	17278	1.25	191.7	84.6	2.27	0.55	3.0	2649600	153	12999	461
10	7.81	19.2	16602	1.31	209.1	83.1	2.52	0.52	3.0	2649600	160	14622	520
11	7.78	19.1	18876	1.32	185.3	82.9	2.23	0.59	2.9	2649600	140	16773	581
12	7.75	19.1	20047	1.34	177.1	82.3	2.15	0.62	2.8	2649600	132	16604	568
13	7.73	19.1	19170	1.44	199.0	82.6	2.41	0.60	2.8	2649600	138	15646	536
14	7.72	19.1	19578	1.35	182.7	81.5	2.24	0.60	2.8	2649600	135	16051	541
15	7.70	18.7	19063	1.22	169.6	82.0	2.07	0.59	2.8	2649600	139	15808	532
16	7.69	18.7	20574	1.22	157.1	81.7	1.92	0.63	2.8	2649600	129	17392	585
17	7.70	19.7	21808	1.22	148.2	76.5	1.94	0.63	2.8	2649600	121	18344	619
18	7.71	19.5	22950	1.25	144.3	78.1	1.85	0.68	2.8	2649600	115	19394	650
19	7.72	19.3	21010	1.18	148.8	78.8	1.89	0.62	2.8	2649600	126	18109	606
20	7.73	19.8	19788	1.23	164.7	76.8	2.14	0.57	2.8	2649600	134	16394	554
21	7.72	18.7	19630	1.39	187.6	84.2	2.23	0.62	3.1	2649600	135	14160	534
22	7.71	18.4	15738	1.34	225.6	85.2	2.65	0.51	3.1	2649600	168	12591	467
23	7.75	18.6	16481	1.19	191.3	83.7	2.29	0.52	2.9	2649600	161	13833	485
24	7.78	18.5	15848	1.20	200.6	85.2	2.35	0.51	3.0	2649600	167	12591	451
25	7.79	17.6	16581	1.29	206.1	92.0	2.24	0.58	2.9	2649600	160	13984	489
26	7.79	17.8	17549	1.28	193.3	90.7	2.13	0.60	2.9	2649600	151	14027	494
27	7.80	17.0	16812	1.46	230.1	98.1	2.35	0.62	3.1	2649600	158	14025	523
28	7.80	17.4	16016	1.35	223.3	94.3	2.37	0.57	3.0	2649600	165	13526	494
29	7.81	17.6	15658	1.31	221.7	92.9	2.39	0.55	3.1	2649600	169	12494	461
30	7.81	17.3	15776	1.25	209.9	94.2	2.23	0.56	3.0	2649600	168	12317	448
31	7.82	16.8	13749	1.29	248.6	98.3	2.53	0.51	3.1	2649600	193	10277	383
Averages	7.78	19.00	18577	1.28	186.05	83.3	2.22	0.58	2.90				

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated: 2,236,260.4 m³ 100.0%
 On-Spec Water: 2,233,485.9 m³ 99.876%
 Off-Spec Water: 2,744.5 m³ 0.124%

Average monthly chlorine residual before UV Treatment was 1.37 mg/L
 The average monthly chlorine residual after UV treatment and re-chlorination was 1.34 mg/L.

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

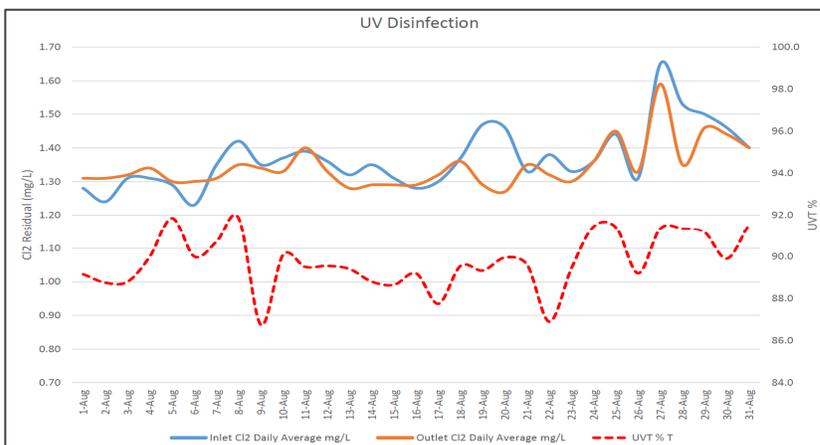


Table 5.2 - UV Disinfection Table – Mission Creek Source

Date	Inlet Cl2	Outlet Cl2	UVT	In Spec Water	Off Spec	Off Spec %
	Daily	Daily				
	mg/L	mg/L	% T	Cubic Meters	Cubic Meters	Percentage
1-Aug	1.28	1.31	89.2	85,731	0	0.00%
2-Aug	1.24	1.31	88.8	93,465	0	0.00%
3-Aug	1.31	1.32	88.8	87,034	0	0.00%
4-Aug	1.31	1.34	90.0	86,205	120	0.14%
5-Aug	1.29	1.30	91.9	90,699	0	0.00%
6-Aug	1.23	1.30	90.0	73,027	0	0.00%
7-Aug	1.35	1.31	90.7	50,883	0	0.00%
8-Aug	1.42	1.35	91.9	48,336	0	0.00%
9-Aug	1.35	1.34	86.8	60,332	0	0.00%
10-Aug	1.37	1.33	90.1	69,758	0	0.00%
11-Aug	1.39	1.40	89.5	79,905	0	0.00%
12-Aug	1.36	1.33	89.6	78,331	0	0.00%
13-Aug	1.32	1.28	89.4	75,018	0	0.00%
14-Aug	1.35	1.29	88.8	75,885	0	0.00%
15-Aug	1.31	1.29	88.7	74,418	0	0.00%
16-Aug	1.28	1.29	89.2	83,436	0	0.00%
17-Aug	1.30	1.32	87.8	86,812	0	0.00%
18-Aug	1.37	1.36	89.6	91,568	0	0.00%
19-Aug	1.47	1.29	89.3	87,078	0	0.00%
20-Aug	1.46	1.27	90.0	77,706	0	0.00%
21-Aug	1.33	1.35	89.6	63,818	1963	2.98%
22-Aug	1.38	1.32	86.9	59,987	98	0.16%
23-Aug	1.33	1.30	89.5	65,075	0	0.00%
24-Aug	1.36	1.36	91.5	59,385	0	0.00%
25-Aug	1.44	1.45	91.4	67,527	0	0.00%
26-Aug	1.31	1.33	89.2	65,921	0	0.00%
27-Aug	1.65	1.59	91.4	64,851	565	0.86%
28-Aug	1.53	1.35	91.4	64,660	28	0.04%
29-Aug	1.50	1.46	91.2	60,059	0	0.00%
30-Aug	1.46	1.44	89.9	57,728	0	0.00%
31-Aug	1.40	1.40	91.6	48,849	0	0.00%
Average	1.37	1.34	89.77	Total 2,233,485.90	2774.5	0.124%

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
- 50 samples were found to be absent of Coliforms.
- 50 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
6-Jul-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13-Jul-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Jul-20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19-Jul-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Jul-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-Jul-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Aug-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-Aug-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17-Aug-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-Aug-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-Aug-20	0	0	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

4-Aug-20		
Location	THM (mg/L)	HAA (mg/L)
Kirschner Reservoir		0.0460
2921 Belgo Rd	0.0786	
Pearson School	0.0708	0.0400
3976 Highway 97	0.0847	

In-House Analysis (BMID Staff)

- Presence/Absence samples taken on a three-week cycle at seven sites around the BMID service area.
- All 12 samples were found to be absent of both Total Coliforms and *E. Coli*.

Table 6.4 - BMID In-house Testing – Presence Absence

Location	8/5/2020				8/10/2020				8/17/2020				8/24/2020				8/31/2020			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres					0.86	19.1	-	X									0.77	20.6	-	X
170 Kneller Rd					0.77	19.0	-	X									0.63	21.6	-	X
2105 Morrison	1.00	21.8	-	X									0.93	20.8	-	X				
Staymen Rd	1.00	22.2	-	X									0.62	18.6	-	X				
260 Campion Rd									0.20	21.6	-	X								
Fenwick Rd									0.39	21.4	-	X								
Solly Ct					0.29	20.4	-	X									0.79	20.6	-	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) = 12
- Total tests sampled by BMID and tested by Caro Labs = 50
- Total tests sampled in BMID treated distribution system = 62 (Zero Positive Samples)