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BMID FILE: 486

MONTHLY REPORTING PERIOD - JUNE, 2020

1. SUMMARY

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

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	254,723,575	964.13
Well 4	6,332,000	23.97
Well 5	6,209,149	23.50
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	212,000	0.80
Total	267,476,724	1012.40

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 June. 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 53.55 NTU on June 1, 2020. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) peaked at 0.60 NTU on June 11,15 and 16, 2020. The significant reduction in turbidity demonstrates the effectiveness of BMID's Water Treatment Plant. Average turbidity for June was 0.47 NTU at the Distribution Intake;
4. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.71 NTU on June 21. Average monthly turbidity at the first customer was 0.50 NTU for June;
5. BMID's Ultraviolet Treatment Facility treated 869,855.9 m^3 of water of which only 431.4 m^3 was "Off-Spec". Average UV Transmissivity was 91.6%. The average inlet chlorine residual level at the UV site was 1.48 mg/L. The average outgoing chlorine was 1.53 mg/L after the sodium hypochlorite top-up system;
6. BMID's Scotty Creek source, used for irrigation in the north-end, was placed in stand-by mode for most of June as flows were significantly below normal for the month. BMID crews have completed work on changing the disinfection system from chlorine gas to hypochlorite in an effort to reduce any potential safety concerns associated with chlorine gas. The source was used for only four days producing only 0.870 ML of water;
7. Well # 4 was used as a domestic water source throughout June, as the well is able to run efficiently during low flow situations as experienced during June 2020;

8. Well #5, commonly 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 periodically as flows dictated. Well #5 is expected to supply domestic water to the north-end until flows reduce later in the fall;
9. Well #6, which supplies irrigation water to the dual north-end water distribution systems was not used throughout June;
10. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts for late spring/early summer with a peak count of 52.9 on June 17, 2020. The average *E.Coli* count was 15.08 for the month;
11. *E.Coli* levels in the raw water at the water distribution system intake down-stream of the WTP, immediately prior to disinfection, had zero counts on most samples. Peak *E.Coli* counts were sampled on June 2 and 29 with counts of 2 respectively. 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* or 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. THMs were all below the Canadian Drinking Water Guideline MAC of 0.10 mg/L. However, the two HAA tests were slightly above the ALARA guideline of 0.08mg/L;

1.0 FLOWS - JUNE, 2020

The Maximum Daily Flow was on June 23, at 15,166,641 US gallons (57.41 ML)

The Minimum Daily Flow was on June 14, at 4,110,143 US gallons (15.56 ML)

Mission Creek provided 95% of domestic flow throughout June.

Figure 1.1 - Domestic Water System Flow

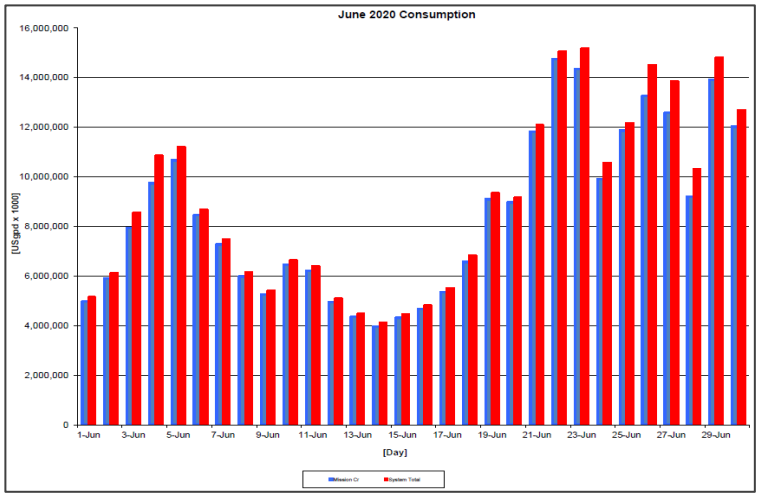

Table 1.2 - June 2020 - Daily Consumption Report

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-Jun	4,970,941	76,000	97,180	0	0	5,144,121	19.47
2-Jun	5,905,798	196,000	7,032	0	0	6,108,830	23.12
3-Jun	7,930,947	208,000	405,573	0	0	8,544,520	32.34
4-Jun	9,742,158	448,000	664,108	0	0	10,854,266	41.08
5-Jun	10,664,044	222,000	305,092	0	0	11,191,136	42.36
6-Jun	8,452,630	222,000	0	0	0	8,674,630	32.83
7-Jun	7,274,462	184,000	0	0	0	7,458,462	28.23
8-Jun	5,978,534	170,000	0	0	0	6,148,534	23.27
9-Jun	5,249,351	160,000	0	0	0	5,409,351	20.47
10-Jun	6,455,218	170,000	0	0	0	6,625,218	25.08
11-Jun	6,220,728	164,000	0	0	0	6,384,728	24.17
12-Jun	4,951,985	133,000	0	0	0	5,084,985	19.25
13-Jun	4,350,000	122,000	0	0	0	4,472,000	16.93
14-Jun	3,964,143	146,000	0	0	0	4,110,143	15.56
15-Jun	4,312,992	130,000	0	0	0	4,442,992	16.82
16-Jun	4,666,960	140,000	0	0	0	4,806,960	18.19
17-Jun	5,342,687	163,000	0	0	0	5,505,687	20.84
18-Jun	6,567,538	253,000	0	0	0	6,820,538	25.82
19-Jun	9,088,528	251,000	0	0	0	9,339,528	35.35
20-Jun	8,967,416	185,000	0	0	0	9,152,416	34.64
21-Jun	11,813,515	258,000	8,038	0	0	12,079,553	45.72
22-Jun	14,740,298	289,000	29,287	0	0	15,058,585	57.00
23-Jun	14,338,514	273,000	541,127	0	14,000	15,166,641	57.41
24-Jun	9,917,515	200,000	259,004	0	182,000	10,558,519	39.96
25-Jun	11,864,404	282,000	0	0	9,000	12,155,404	46.01
26-Jun	13,269,491	280,000	953,984	0	7,000	14,510,475	54.92
27-Jun	12,586,328	267,000	999,329	0	0	13,852,657	52.43
28-Jun	9,198,358	241,000	873,459	0	0	10,312,817	39.03
29-Jun	13,917,553	267,000	626,104	0	0	14,810,657	56.06
30-Jun	12,020,539	232,000	439,832	0	0	12,692,371	48.04
Totals Usgpd	254,723,575	6,332,000	6,209,149	0	212,000	267,476,724	1012.40
Totals ML	964.13	23.97	23.50	0.00	0.80		
Avg's	8,490,786	32.14				8,915,891	33.75
Max	14,740,298	55.79				15,166,641	57.41
Min	3,964,143	15.00				4,110,143	15.56

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) May 2019 -June 2020

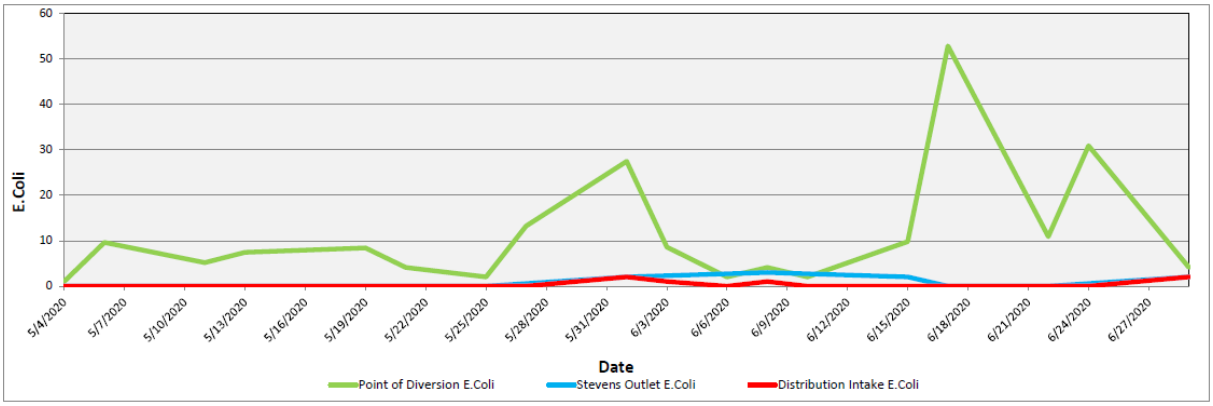

Table 2.1 - *E.Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
4-May-20	1	0	0
6-May-20	9.6	0	0
11-May-20	5.2	0	0
13-May-20	7.4		0
19-May-20	8.4	0	0
21-May-20	4.1		0
25-May-20	2	0	0
27-May-20	13.2		0
1-Jun-20	27.5	2	2
3-Jun-20	8.6		1
6-Jun-20	2		0
8-Jun-20	4.1	3	1
10-Jun-20	2		0
15-Jun-20	9.8	2	0
17-Jun-20	52.9	0	0
22-Jun-20	10.9	0	0
24-Jun-20	30.9		0
29-Jun-20	4.1	2	2

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 = Distribution Intake - Point of Disinfection*)

3.0 RAW AND TREATED WATER TURBIDITY

Through June 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 0.71 NTU on June 21.

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

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

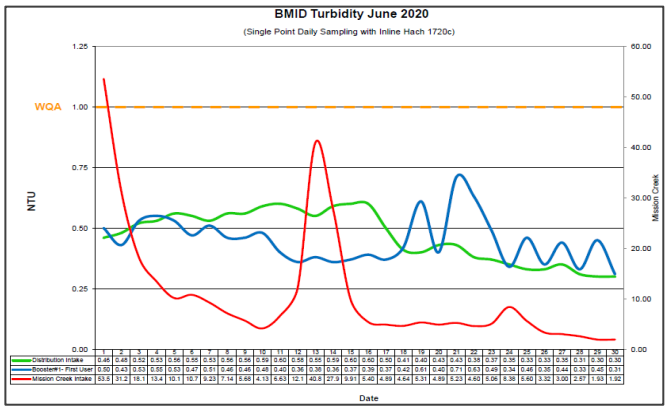

Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for June 2020			
Date	Mission Creek Intake Daily Average [NTU]	Distribution Intake Daily Average [NTU]	Booster#1- First User Daily Average [NTU]
1	53.55	0.46	0.50
2	31.22	0.48	0.43
3	18.16	0.52	0.53
4	13.41	0.53	0.55
5	10.14	0.56	0.53
6	10.78	0.55	0.47
7	9.23	0.53	0.51
8	7.14	0.56	0.46
9	5.68	0.56	0.46
10	4.13	0.59	0.48
11	6.63	0.60	0.40
12	12.14	0.58	0.36
13	40.89	0.55	0.38
14	27.95	0.59	0.36
15	9.91	0.60	0.37
16	5.40	0.60	0.39
17	4.89	0.50	0.37
18	4.64	0.41	0.42
19	5.31	0.40	0.61
20	4.89	0.43	0.40
21	5.23	0.43	0.71
22	4.60	0.38	0.63
23	5.06	0.37	0.49
24	8.38	0.35	0.34
25	5.60	0.33	0.46
26	3.32	0.33	0.35
27	3.00	0.35	0.44
28	2.57	0.31	0.33
29	1.93	0.30	0.45
30	1.92	0.30	0.31
AVG	10.92	0.47	0.45

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 June, 2020.

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

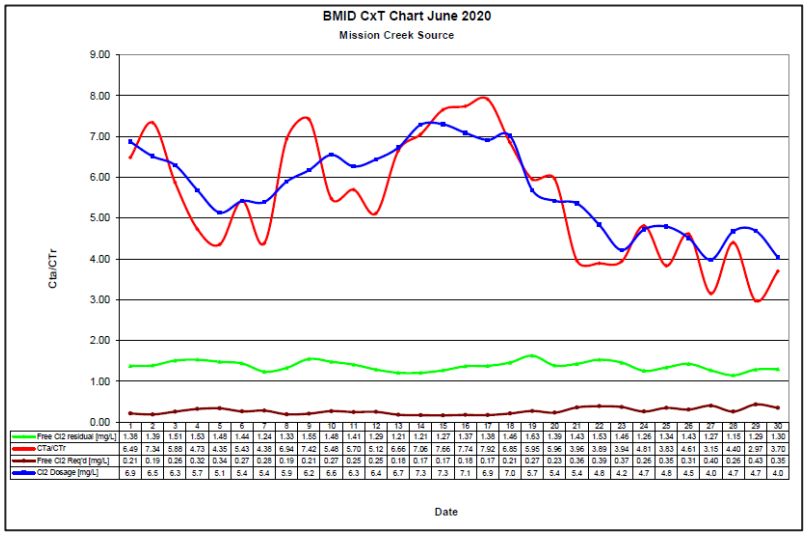

Table 4.2 - CT Table – Mission Creek Source

	BMID June 2020												
	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
	(Average)	(Present)	FLOW	residual	achieved	req'd		Req'd	Dosage	TOTAL		Daily Average	Average
June		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.08	14.9	6,502	1.38	562.4	86.7	6.49	0.21	6.9	2649600	408	2,547	210
2	7.10	15.2	5,858	1.39	628.7	85.7	7.34	0.19	6.5	2649600	452	2,972	233
3	7.12	14.8	7,577	1.51	528.0	89.8	5.88	0.26	6.3	2649600	350	3,806	288
4	7.13	15.4	9,885	1.53	410.1	86.7	4.73	0.32	5.7	2649600	268	4,756	325
5	7.10	15.1	10,343	1.48	379.1	87.1	4.35	0.34	5.1	2649600	256	5,462	337
6	7.13	15.1	8,017	1.44	475.9	87.7	5.43	0.27	5.4	2649600	330	4,383	285
7	7.13	15.5	8,985	1.24	365.7	83.4	4.38	0.28	5.4	2649600	295	3,937	255
8	7.15	15.5	5,979	1.33	589.4	84.9	6.94	0.19	5.9	2649600	443	3,200	227
9	7.16	14.3	5,838	1.55	703.5	94.8	7.42	0.21	6.2	2649600	454	2,953	219
10	7.16	14.2	7,551	1.48	519.3	94.8	5.48	0.27	6.6	2649600	351	3,178	250
11	7.17	12.8	6,298	1.41	593.2	104.1	5.70	0.25	6.3	2649600	421	3,242	244
12	7.17	12.8	6,502	1.29	525.7	102.7	5.12	0.25	6.4	2649600	408	2,775	215
13	7.18	15.3	5,611	1.21	571.4	85.9	6.66	0.18	6.7	2649600	472	2,425	196
14	7.18	15.0	5,182	1.21	618.7	87.7	7.06	0.17	7.3	2649600	511	2,112	185
15	7.19	14.8	4,891	1.27	688.0	89.9	7.66	0.17	7.3	2649600	542	2,268	199
16	7.20	15.1	5,246	1.37	691.9	89.4	7.74	0.18	7.1	2649600	505	2,405	205
17	7.14	16.3	5,740	1.38	637.0	80.5	7.92	0.17	6.9	2649600	462	2,652	220
18	7.08	16.3	7,113	1.46	543.9	79.3	6.85	0.21	7.0	2649600	373	3,016	254
19	7.08	16.8	9,313	1.63	463.7	77.9	5.95	0.27	5.7	2649600	285	4,463	305
20	7.10	17.5	8,456	1.39	435.5	73.0	5.96	0.23	5.4	2649600	313	4,504	294
21	7.12	17.3	12,779	1.43	296.5	74.9	3.96	0.36	5.4	2649600	207	5,642	363
22	7.12	17.1	13,566	1.53	298.8	76.7	3.89	0.39	4.8	2649600	195	7,092	412
23	7.13	17.5	13,196	1.46	293.2	74.4	3.94	0.37	4.2	2649600	201	7,725	392
24	7.17	17.2	9,194	1.26	363.1	75.4	4.81	0.26	4.7	2649600	288	5,176	294
25	7.17	17.4	12,336	1.34	287.8	75.1	3.83	0.35	4.8	2649600	215	5,717	329
26	7.15	17.9	11,303	1.43	335.2	72.7	4.61	0.31	4.5	2649600	234	6,616	359
27	7.20	17.5	14,269	1.27	235.8	74.8	3.15	0.40	4.0	2649600	186	7,049	337
28	7.22	17.4	9,256	1.15	329.2	74.8	4.40	0.26	4.7	2649600	286	4,810	270
29	7.25	17.4	14,945	1.29	228.7	76.9	2.97	0.43	4.7	2649600	177	6,450	364
30	7.25	17.8	12,423	1.30	277.3	74.9	3.70	0.35	4.0	2649600	213	6,793	329
Averages	7.15	15.91		1.3803	462.558	83.4	5.48	0.271	5.73132				

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	869,855.9 m^3	100.0%
On-Spec Water:	869,424.5 m^3	99.95%
Off-Spec Water:	431.4 m^3	0.050%

Average monthly chlorine residual before UV Treatment was 1.48 mg/L
The average monthly chlorine residual after UV treatment and re-chlorination was 1.53 mg/L.

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

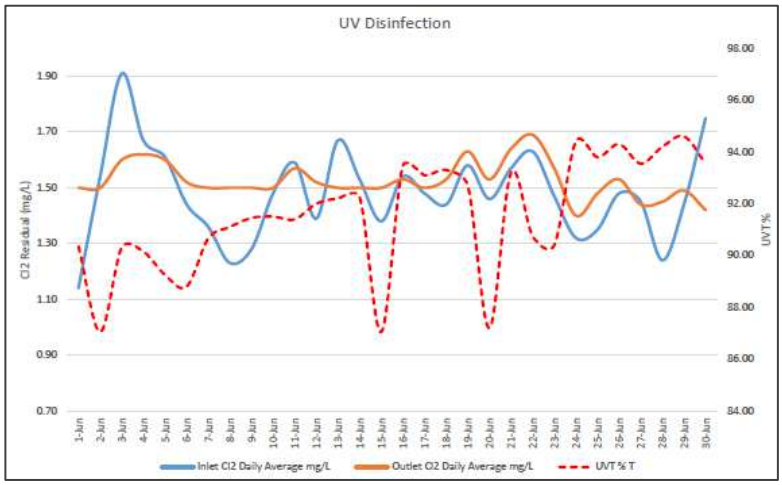

Table 5.2 - UV Disinfection Table – Mission Creek Source

	Inlet Cl2 Daily	Outlet Cl2 Daily	UVT		In Spec Water Volume	Off Spec Water	Off Spec % of Water
Date	mg/L	mg/L	% T		Cubic Meters	Cubic Meters	Percentage
1-Jun	1.14	1.50	90.35		14,890.0	0	0.00%
2-Jun	1.54	1.50	87.05		17,858.4	0	0.00%
3-Jun	1.91	1.60	90.30		25,562.5	0	0.00%
4-Jun	1.67	1.62	90.15		31,305.9	0	0.00%
5-Jun	1.61	1.60	89.25		33,965.4	0	0.00%
6-Jun	1.44	1.52	88.80		33,966.5	0	0.00%
7-Jun	1.36	1.50	90.65		27,143.6	0	0.00%
8-Jun	1.23	1.50	91.10		22,788.0	0	0.00%
9-Jun	1.28	1.50	91.45		18,072.0	0	0.00%
10-Jun	1.48	1.50	91.50		20,183.1	0	0.00%
11-Jun	1.59	1.57	91.40		20,183.8	0	0.00%
12-Jun	1.39	1.52	92.00		18,844.3	0	0.00%
13-Jun	1.67	1.50	92.20		15,248.7	0	0.00%
14-Jun	1.53	1.50	92.25		12,818.0	0	0.00%
15-Jun	1.38	1.50	87.05		13,208.6	0	0.00%
16-Jun	1.54	1.53	93.45		13,940.7	0	0.00%
17-Jun	1.48	1.50	93.10		15,999.4	0	0.00%
18-Jun	1.44	1.53	93.30		20,840.9	0	0.00%
19-Jun	1.58	1.63	92.70		29,005.6	0	0.00%
20-Jun	1.46	1.53	87.20		29,006.6	0	0.00%
21-Jun	1.57	1.64	93.20		38,402.8	0	0.00%
22-Jun	1.63	1.69	90.75		48,498.2	69.8	0.14%
23-Jun	1.47	1.57	90.40		48,420.7	149	0.31%
24-Jun	1.32	1.40	94.40		46,404.5	79.2	0.17%
25-Jun	1.35	1.48	93.80		37,562.5	0	0.00%
26-Jun	1.48	1.53	94.30		42,953.6	0	0.00%
27-Jun	1.45	1.44	93.55		42,955.3	0	0.00%
28-Jun	1.24	1.45	94.20		40,138.3	66.7	0.17%
29-Jun	1.44	1.49	94.60		44,594.3	66.7	0.15%
30-Jun	1.75	1.42	93.55		44,662.3	0	0.00%
Average	1.48	1.53	91.60	Total	869424.5	431.4	0.050%

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
- 51 samples were found to be absent of Coliforms.
- 51 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		Ellison Blow-Off		Ellison 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
4-May-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
11-May-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
19-May-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
25-May-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
1-Jun-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
8-Jun-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
15-Jun-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
22-Jun-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
29-Jun-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

8-Jun-20		
Location	THM (mg/L)	HAA (mg/L)
Kirschner Reservoir		0.114
2921 Belgo Rd	0.0573	
Pearson School	0.0528	0.0878
3976 Highway 97	0.0506	

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

	6/1/2020				6/8/2020				6/15/2020				6/22/2020				6/29/2020			
Location	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres					0.56	18.4	-	X									1.02	18.6	-	X
170 Kneller Rd					0.61	17.6	-	X									0.88	17.8	-	X
2105 Morrison	0.52	21.0	-	X									1.52	17.6	-	X				
Staymen Rd	0.99	17.0	-	X									1.13	17.2	-	X				
260 Campion Rd									0.77	16.2	-	X								
Fenwick Rd									0.07	17.8	-	X								
Solly Ct					0.82	16.8	-	X									0.96	18.4	-	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 = 51
- Total tests sampled in BMID treated distribution system = 60 (Zero Positive Samples)