



## MONTHLY REPORTING PERIOD - MAY, 2020

### 1. SUMMARY

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

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	210,368,875	796.25
Well 4	0	0.0
Well 5	11,009,579	41.67
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	115,000	0.44
Total	221,493,454	838.35

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 May. 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 36.43 NTU on May 31, 2020. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) peaked at 0.72 NTU on May 7 and 10, 2020. Average turbidity for May was 0.53 NTU at the Distribution Intake;
4. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.70 NTU on May 2. BMID's on-line analyser peaked at 1.02 1 NTU on May 1, however, turbidity during this event was found to be 0.61 using single-point analysis at the treatment plant. This was likely caused by sediment buildup in turbidity meter. Average monthly turbidity at the first customer was 0.50 NTU for May;
5. BMID's Ultraviolet Treatment Facility treated 730,290.8 m<sup>3</sup> of water of which only 14.0 m<sup>3</sup> was "Off-Spec". Average UV Transmissivity was 88.1%. The average inlet chlorine residual level at the UV site was 1.46 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 the during May. BMID crews are undertaking a change in the disinfection system from chlorine gas to hypochlorite as a way to reduce any potential safety concerns associated with chlorine gas. The source was used for only two days producing only 0.44 ML of water;
7. Well # 4 was not used throughout May as the well was shut-down for the season on April 22, 2020;

8. Well #5 was used as the primary domestic water source in the north-end of the system for both irrigation and domestic consumption throughout May. 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 May;
10. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts throughout May with a peak count of 13.2 on May 29, 2020. The average *E.Coli* count was 6.36 for May;
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 all samples. 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. 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;

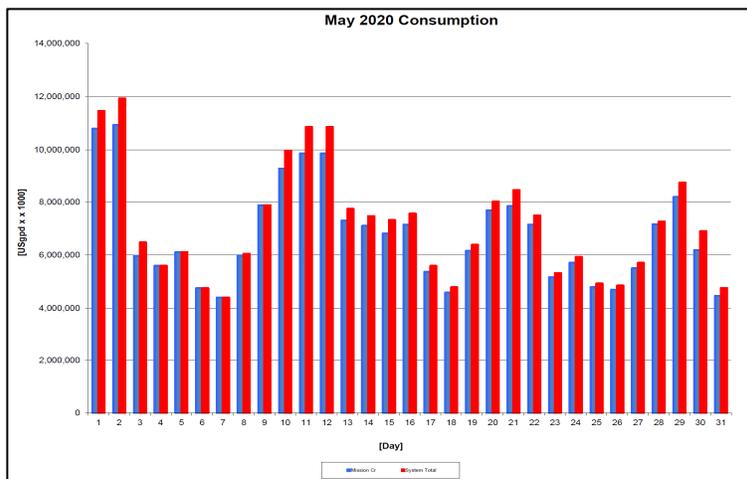
## 1.0 FLOWS - MAY, 2020

The Maximum Daily Flow was on May 2, at 11,927,225 US gallons (45.14 ML)

The Minimum Daily Flow was on May 7, at 4,398,721 US gallons (16.65 ML)

Mission Creek provided 95% of domestic flow throughout May.

**Figure 1.1 - Domestic Water System Flow**



**Table 1.2 - May 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-May	10,794,125	0	613,817.0	0.0	49,000	11,456,942	43.36
2-May	10,928,014	0	999,211.0	0.0	0	11,927,225	45.14
3-May	5,966,782	0	508,092.0	0.0	0	6,474,874	24.51
4-May	5,597,844	0	0.0	0.0	0	5,597,844	21.19
5-May	6,114,064	0	0.0	0.0	0	6,114,064	23.14
6-May	4,753,605	0	0.0	0.0	0	4,753,605	17.99
7-May	4,398,721	0	0.0	0.0	0	4,398,721	16.65
8-May	5,981,876	0	0.0	0.0	66,000	6,047,876	22.89
9-May	7,874,688	0	0.0	0.0	0	7,874,688	29.81
10-May	9,267,817	0	695,633.0	0.0	0	9,963,450	37.71
11-May	9,858,262	0	999,692.0	0.0	0	10,857,954	41.10
12-May	9,856,602	0	999,945.0	0.0	0	10,856,547	41.09
13-May	7,295,848	0	441,176.0	0.0	0	7,737,024	29.28
14-May	7,097,353	0	365,039.0	0.0	0	7,462,392	28.25
15-May	6,813,639	0	505,351.0	0.0	0	7,318,990	27.70
16-May	7,145,936	0	414,002.0	0.0	0	7,559,938	28.61
17-May	5,367,654	0	226,054.0	0.0	0	5,593,708	21.17
18-May	4,586,034	0	202,542.0	0.0	0	4,788,576	18.12
19-May	6,157,308	0	228,903.0	0.0	0	6,386,211	24.17
20-May	7,675,929	0	333,379.0	0.0	0	8,009,308	30.32
21-May	7,841,645	0	608,028.0	0.0	0	8,449,673	31.98
22-May	7,145,788	0	344,500.0	0.0	0	7,490,288	28.35
23-May	5,162,688	0	155,552.0	0.0	0	5,318,240	20.13
24-May	5,715,759	0	212,657.0	0.0	0	5,928,416	22.44
25-May	4,786,442	0	140,933.0	0.0	0	4,927,375	18.65
26-May	4,695,256	0	155,193.0	0.0	0	4,850,449	18.36
27-May	5,502,666	0	204,928.0	0.0	0	5,707,594	21.60
28-May	7,157,485	0	99,139.0	0.0	0	7,256,624	27.47
29-May	8,186,144	0	540,697.0	0.0	0	8,726,841	33.03
30-May	6,184,876	0	713,255.0	0.0	0	6,898,131	26.11
31-May	4,458,025	0	301,861.0	0.0	0	4,759,886	18.02
Totals Usgpd	210,368,875	0	11,009,579	0	115,000	221,493,454	838.35
Totals ML	796.25	0.00	41.67	0.00	0.44	838	
Avg's	6,786,093	25.69				7,144,950	27.04
Max	10,928,014	41.36				11,927,225	45.14
Min	4,398,721	16.65				4,398,721	16.65

## 2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

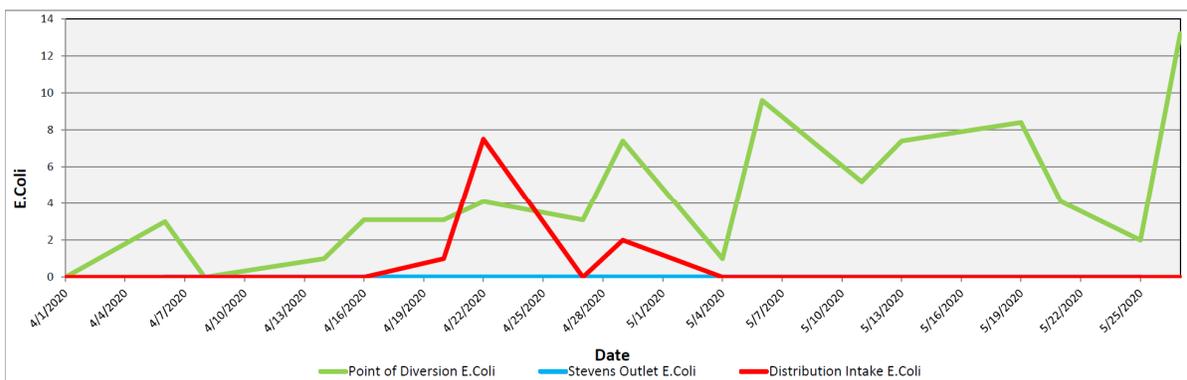
Raw water samples were taken at three points at BMID settling ponds before chlorination

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) April 2019 -May 2020**



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

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
1-Apr-20	0	0	0
6-Apr-20	3	0	0
8-Apr-20	0	0	0
14-Apr-20	1	0	0
16-Apr-20	3.1	0	0
20-Apr-20	3.1	0	1
22-Apr-20	4.1	0	7.5
27-Apr-20	3.1	0	0
29-Apr-20	7.4	0	2
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	0
19-May-20	8.4	0	0
21-May-20	4.1	0	0
25-May-20	2	0	0
27-May-20	13.2	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 m<sup>3</sup> 1<sup>st</sup> upper balancing reservoir (Stevens Res.)

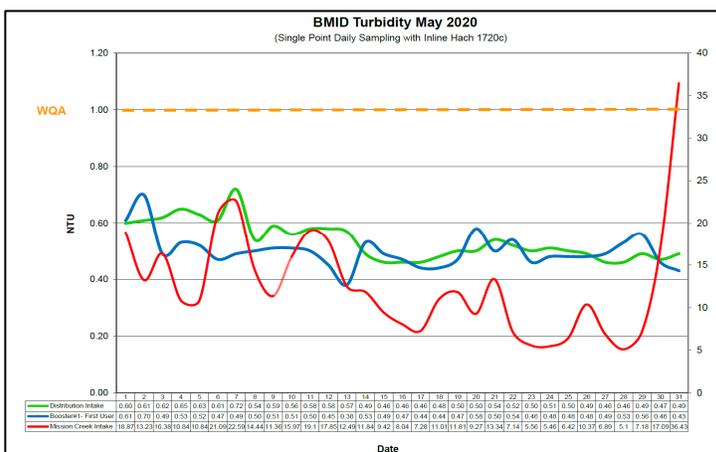
Hadden Outlet (Raw) - Sampling point after exiting 75,000 m<sup>3</sup> 2<sup>nd</sup> lower balancing reservoir (Hadden Res.)  
 (Hadden Outlet = Distribution Intake - Point of Disinfection)

### 3.0 RAW AND TREATED WATER TURBIDITY

Through May 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 0.70 NTU on May 2. However, this sample was analysed at the WTP lab and not on the on-line analyser at Booster 1 due to unstable readings on May 1 and 2.

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**

Date	Mission Creek Intake	Distribution Intake	Booster#1- First User
	Daily Average [NTU]	Daily Average [NTU]	Daily Average [NTU]
1	18.87	0.60	0.61
2	13.23	0.61	0.70
3	16.38	0.62	0.49
4	10.84	0.65	0.53
5	10.84	0.63	0.52
6	21.09	0.61	0.47
7	22.59	0.72	0.49
8	14.44	0.54	0.50
9	11.36	0.59	0.51
10	15.97	0.56	0.51
11	19.1	0.58	0.50
12	17.85	0.58	0.45
13	12.49	0.57	0.38
14	11.84	0.49	0.53
15	9.42	0.46	0.49
16	8.04	0.46	0.47
17	7.28	0.46	0.44
18	11.01	0.48	0.44
19	11.81	0.50	0.47
20	9.27	0.50	0.58
21	13.34	0.54	0.50
22	7.14	0.52	0.54
23	5.56	0.50	0.46
24	5.46	0.51	0.48
25	6.42	0.50	0.48
26	10.37	0.49	0.48
27	6.89	0.46	0.49
28	5.1	0.46	0.53
29	7.18	0.49	0.56
30	17.09	0.47	0.46
31	36.43	0.49	0.43
AVG	12.73	0.53	0.50

### 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 May, 2020.

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

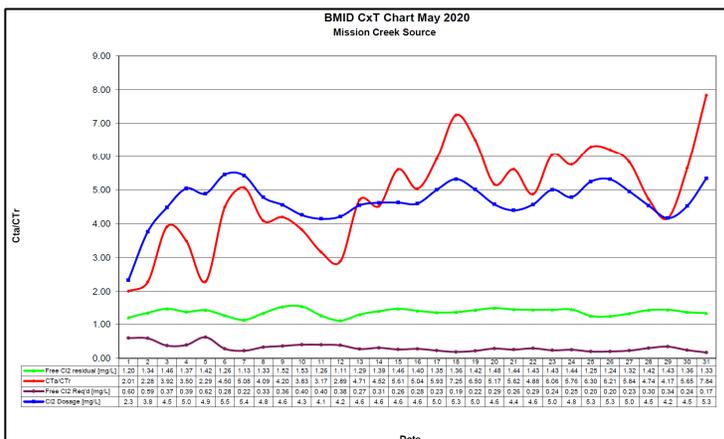


Table 4.2 - CT Table – Mission Creek Source

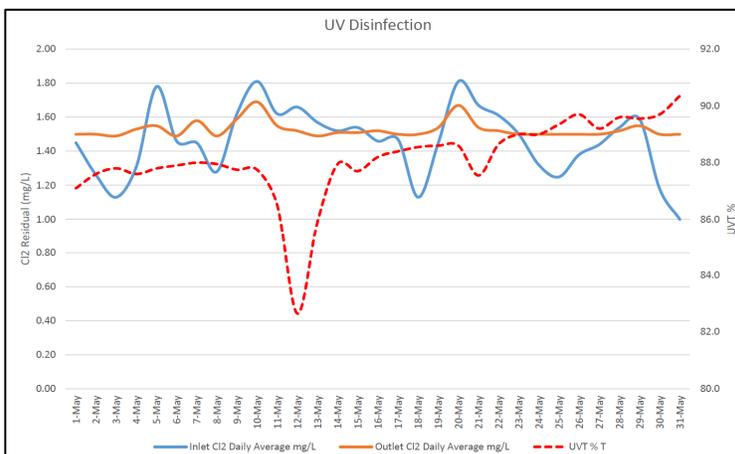
BMID May 2020 Mission Creek Source													
DATE	pH (Average)	TEMP (Present) [°C]	PEAK FLOW [Usgpm]	Free Cl2 residual [mg/L]	CT achieved	CT req'd	CTa/CTr	Free Cl2 Req'd [mg/L]	Cl2 Dosage [mg/L]	VOLUME TOTAL [USgal]	TIME [mins]	FLOW Daily Average [Usgpm]	CL2 DOSAGE Average [PPD]
May													
1	7.45	10.0	11567	1.20	274.9	136.8	2.01	0.60	2.3	2649600	229	7503	211
2	7.42	10.1	11396	1.34	311.6	136.6	2.28	0.59	3.8	2649600	233	7594	344
3	7.38	10.0	7193	1.46	537.8	137.3	3.92	0.37	4.5	2649600	368	4129	223
4	7.33	10.0	7770	1.37	467.2	133.6	3.50	0.39	5.0	2649600	341	3880	235
5	7.25	1.0	6756	1.42	556.9	243.3	2.29	0.62	4.9	2649600	392	4245	250
6	7.27	10.0	5755	1.26	580.1	129.0	4.50	0.28	5.5	2649600	460	3306	217
7	7.28	10.2	4696	1.13	637.6	125.6	5.08	0.22	5.4	2649600	564	3051	199
8	7.27	10.3	6764	1.33	521.0	127.4	4.09	0.33	4.8	2649600	392	4163	240
9	7.23	10.7	7698	1.52	523.2	124.5	4.20	0.36	4.6	2649600	344	5469	300
10	7.19	10.9	8750	1.53	463.3	121.1	3.83	0.40	4.3	2649600	303	6452	330
11	7.14	11.7	9651	1.26	345.9	109.2	3.17	0.40	4.1	2649600	275	6857	342
12	7.06	12.5	10335	1.11	284.6	98.4	2.89	0.38	4.2	2649600	256	6832	346
13	7.04	12.6	7314	1.29	467.3	99.1	4.71	0.27	4.6	2649600	362	5073	278
14	7.03	13.1	8441	1.39	436.3	96.5	4.52	0.31	4.6	2649600	314	4923	274
15	7.02	13.2	7167	1.46	539.8	96.1	5.61	0.26	4.6	2649600	370	4728	263
16	7.02	13.2	7700	1.40	481.7	95.5	5.04	0.28	4.6	2649600	344	4968	275
17	7.01	13.8	6640	1.35	538.7	90.8	5.93	0.23	5.0	2649600	399	3727	224
18	7.00	13.4	5340	1.36	674.8	93.1	7.25	0.19	5.3	2649600	496	3195	205
19	6.98	12.8	5970	1.42	630.2	96.9	6.50	0.22	5.0	2649600	444	4292	259
20	6.99	13.3	8021	1.48	488.9	94.6	5.17	0.29	4.6	2649600	330	5337	294
21	7.00	13.5	7281	1.44	524.0	93.3	5.62	0.26	4.4	2649600	364	5458	289
22	7.01	13.2	8133	1.43	465.9	95.5	4.88	0.29	4.6	2649600	326	4945	272
23	7.02	12.8	6346	1.43	597.1	98.5	6.06	0.24	5.0	2649600	418	3585	216
24	7.03	12.4	6501	1.44	586.9	101.8	5.76	0.25	4.8	2649600	408	3972	229
25	7.00	13.1	5601	1.25	591.3	93.9	6.30	0.20	5.3	2649600	473	3316	209
26	7.03	12.7	5424	1.24	605.7	97.5	6.21	0.20	5.3	2649600	488	3253	208
27	6.99	12.7	6181	1.32	565.8	96.9	5.84	0.23	5.0	2649600	429	3832	228
28	7.01	12.9	8158	1.42	461.2	97.4	4.74	0.30	4.5	2649600	325	4986	272
29	7.02	13.1	9413	1.43	402.5	96.5	4.17	0.34	4.2	2649600	281	5689	285
30	7.05	14.0	7002	1.36	514.6	91.0	5.65	0.24	4.5	2649600	378	4301	234
31	7.04	14.0	4975	1.33	708.3	90.4	7.84	0.17	5.3	2649600	533	3112	200

## 5.0 ULTRAVIOLET DISINFECTION

Total Water Treated: 730,290.8 m<sup>3</sup> 100.0%  
 On-Spec Water: 730,276.8 m<sup>3</sup> 99.998%  
 Off-Spec Water: 14.0 m<sup>3</sup> 0.002%

Average monthly chlorine residual before UV Treatment was 1.46 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 – May 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 Cubic Meters	Off Spec Water Cubic Meters	Off Spec % of Water Volume Percentage
1-May	1.45	1.50	87.1	35375.4	0.0	0.00%
2-May	1.26	1.50	87.6	35844.7	0.0	0.00%
3-May	1.13	1.49	87.8	35845.4	0.0	0.00%
4-May	1.31	1.53	87.6	19020.0	0.0	0.00%
5-May	1.78	1.55	87.8	18882.0	0.0	0.00%
6-May	1.46	1.49	87.9	18882.5	0.0	0.00%
7-May	1.45	1.58	88.0	14796.0	0.0	0.00%
8-May	1.28	1.49	88.0	18540.5	7.0	0.04%
9-May	1.62	1.59	87.8	25425.1	7.0	0.03%
10-May	1.81	1.69	87.8	29879.7	0.0	0.00%
11-May	1.62	1.55	86.5	31465.2	0.0	0.00%
12-May	1.66	1.52	82.7	32029.7	0.0	0.00%
13-May	1.57	1.49	85.9	32030.4	0.0	0.00%
14-May	1.52	1.51	88.0	23108.8	0.0	0.00%
15-May	1.54	1.51	87.7	22614.3	0.0	0.00%
16-May	1.46	1.52	88.2	22792.6	0.0	0.00%
17-May	1.47	1.50	88.4	22793.4	0.0	0.00%
18-May	1.13	1.50	88.6	16308.4	0.0	0.00%
19-May	1.45	1.54	88.6	19411.4	0.0	0.00%
20-May	1.81	1.67	88.6	24270.2	0.0	0.00%
21-May	1.67	1.54	87.6	24493.2	0.0	0.00%
22-May	1.61	1.52	88.7	24494.2	0.0	0.00%
23-May	1.50	1.50	89.0	22742.9	0.0	0.00%
24-May	1.32	1.50	89.0	17297.5	0.0	0.00%
25-May	1.25	1.50	89.4	17298.0	0.0	0.00%
26-May	1.38	1.50	89.7	14720.5	0.0	0.00%
27-May	1.44	1.50	89.2	16602.6	0.0	0.00%
28-May	1.54	1.52	89.6	22839.4	0.0	0.00%
29-May	1.59	1.55	89.6	25898.4	0.0	0.00%
30-May	1.18	1.50	89.7	25899.0	0.0	0.00%
31-May	1.00	1.50	90.4	18675.4	0.0	0.00%
<b>Average</b>	<b>1.46</b>	<b>1.53</b>	<b>88.1</b>	<b>Total 730276.8</b>	<b>14</b>	<b>0.002%</b>

## 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
- 40 samples were found to be absent of Coliforms.
- 40 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-Apr-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Apr-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Apr-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-Apr-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-May-20	0	0	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	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	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	0	0

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

May 04 - 2020		
Location	THM (mg/L)	HAA (mg/L)
Kirschner Reservoir		0.080
2921 Belgo Rd	0.0876	
Pearson School	0.0662	0.0848
3976 Highway 97	0.0852	

### 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	5/4/2020				5/11/2020				5/19/2020				5/25/2020			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres									0.97	14.2	-	X				
170 Kneller Rd									0.91	16.8	-	X				
2105 Morrison Staymen Rd					1.15	18.2	-	X								
260 Campion Rd	0.67	13.8	-	X	0.88	14.6	-	X								
Fenwick Rd	0.26	14.6	-	X									0.61	15.4	-	X
Solly Ct									1.04	15.2	-	X	0.26	19.6	-	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 = 40
- Total tests sampled in BMID treated distribution system = 49 (Zero Positive Samples)