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BMID FILE: 486

MONTHLY REPORTING PERIOD - APRIL, 2021

1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in April 2021. Documentation and figures are provided on the following pages to support this submission.

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	150,301,267	568.89
Well 4	4,680,000	17.71
Well 5	0	0
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	154,981,267	586.60

1. Beginning on April the 16th, BMID issued a voluntary Water Quality notice to its customers due to rising turbidity levels in the distribution system. The notice was a precautionary measure advising residence that the turbidity levels in the distribution system were increasing. The rise in turbidity was caused by increased flows which led to resuspending particulates in the water main. Turbidity levels reduced to normal levels by April 21;
2. BMID's quarterly testing for disinfection by-products was carried out on April 20. Results for both THMs and HAA were found to meet Guidelines for Canadian Drinking Water;
3. 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.
4. The WTP resumed full-time operations on March 21, 2021 as turbidity levels began to necessitate treatment. The WTP ran throughout April and will continue to operate until raw water quality improves in the late-fall or early-Winter;
5. Raw water turbidity levels in Mission Creek peaked at 33.84 (average daily turbidity) on April 29. Average daily turbidity for April was 11.23 NTU at the intake (Grit Pond);
6. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 1.48 NTU on April 16, 2021. Average turbidity for April was 0.65 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
7. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.86 NTU on April 16, 2021. Average monthly turbidity at the first customer was 0.56 NTU for April;
8. BMID's Ultraviolet Treatment Facility treated 569,055 m^3 of water, 102.7m^3 of which was "Off-Spec" (0.018%). Average UV Transmissivity was 90.7%. The average inlet chlorine residual level at the UV site was 1.11 mg/L. The average outgoing chlorine was 1.31 mg/L after the sodium hypochlorite top-up system;

9. 69 m^3 of “off-spec” water was recorded at the UV plant on April 20. This was a result of short-term drop in the value at the UV Transmittance meter. No untreated water entered the distribution system throughout the incident as the UV plant remained operational. Smaller “off-spec” flows occurred on April 14, 15 and 21. These resulted from routine maintenance, and acceptable treatment was maintained throughout;
10. BMID’s Scotty Creek source, used for irrigation in the north-end, was placed on Stand-by in September 2020. The Scotty Creek source will resume operation in the late spring to provide for additional irrigation supply when irrigation demand increases;
11. Well # 4 resumed operations as the primary domestic water source for the north-end on September 11, 2020 and continued to operate throughout April. This source will be placed on stand-by later in the spring when Well # 5 is activated to provide additional flow capacity;
12. 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 has completed substantial maintenance and will be available for use when system flows increase later in the spring;
13. Well #6, which supplies irrigation water to the twinned north-end water distribution systems, was placed in stand-by for the year in October. Well #6 will remain in stand-by mode for fire protection only until flows increase in late spring 2021;
14. *E.Coli* levels at Mission Creek’s Point-of-Diversion (creek intake prior to WTP) had normal counts for late-winter with a peak count of 34 on April 6, 2021. The average *E.Coli* count was 14.75 for the month based on 4 samples;
15. *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 3 out of 4 samples with a peak count of 4 on April 1, 2021. The reduction in *E.Coli* levels is credited to the settling of particles in the water in Stevens and Hadden Reservoirs;
16. 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 throughout April;

1.0 FLOWS - APRIL, 2021

The Maximum Daily Flow was on April 19, at 9,425,402 US gallons (35.68 ML)

The Minimum Daily Flow was on April 2, at 2,429,656 US gallons (9.20 ML)

Mission Creek provided 97% of domestic and irrigation flow throughout April.

Figure 1.1 - Domestic Water System Flow

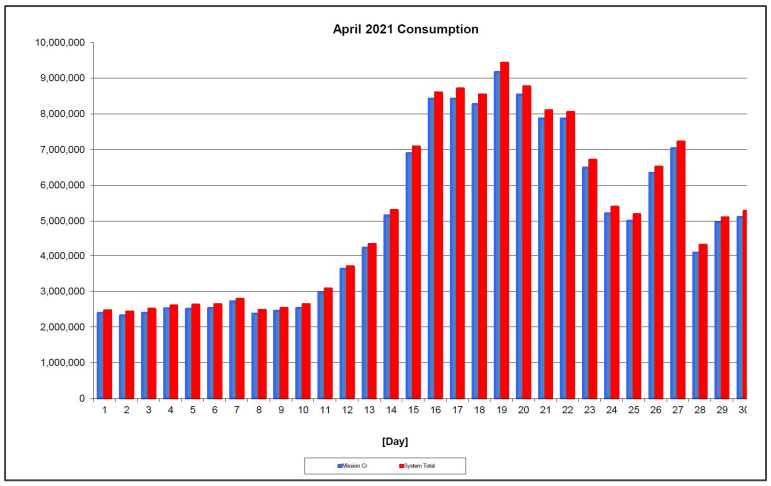

Table 1.2 - April 2021 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	System Total	System Total
2021	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Apr	2,386,953	73,000	0	2,459,953	9.31
2-Apr	2,316,656	113,000	0	2,429,656	9.20
3-Apr	2,396,674	105,000	0	2,501,674	9.47
4-Apr	2,514,283	80,000	0	2,594,283	9.82
5-Apr	2,503,822	116,000	0	2,619,822	9.92
6-Apr	2,528,522	105,000	0	2,633,522	9.97
7-Apr	2,708,159	73,000	0	2,781,159	10.53
8-Apr	2,369,702	104,000	0	2,473,702	9.36
9-Apr	2,453,339	74,000	0	2,527,339	9.57
10-Apr	2,532,406	104,000	0	2,636,406	9.98
11-Apr	2,958,409	113,000	0	3,071,409	11.63
12-Apr	3,621,983	75,000	0	3,696,983	13.99
13-Apr	4,214,627	115,000	0	4,329,627	16.39
14-Apr	5,153,837	140,000	0	5,293,837	20.04
15-Apr	6,893,357	185,000	0	7,078,357	26.79
16-Apr	8,420,456	173,000	0	8,593,456	32.53
17-Apr	8,420,720	282,000	0	8,702,720	32.94
18-Apr	8,269,614	271,000	0	8,540,614	32.33
19-Apr	9,167,402	258,000	0	9,425,402	35.68
20-Apr	8,534,869	233,000	0	8,767,869	33.19
21-Apr	7,869,208	225,000	0	8,094,208	30.64
22-Apr	7,869,393	178,000	0	8,047,393	30.46
23-Apr	6,492,634	212,000	0	6,704,634	25.38
24-Apr	5,202,445	189,000	0	5,391,445	20.41
25-Apr	4,995,810	187,000	0	5,182,810	19.62
26-Apr	6,337,433	180,000	0	6,517,433	24.67
27-Apr	7,032,761	187,000	0	7,219,761	27.33
28-Apr	4,081,405	212,000	0	4,293,405	16.25
29-Apr	4,953,885	142,000	0	5,095,885	19.29
30-Apr	5,100,501	176,000	0	5,276,501	19.97
Totals Usgpd	150,301,267	4,680,000	0	154,981,267	586.60
Totals ML	568.89	17.71	0.00		
Avg's	5,010,042	18.96		5,166,042	19.55
Max	9,167,402	34.70		9,425,402	35.68
Min	2,316,656	8.77		2,429,656	9.20

2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

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

Samples were taken at the Distribution Intake's Point of Disinfection and at the Mission Creek raw water Point of Diversion and 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) March 2021 - April 2021

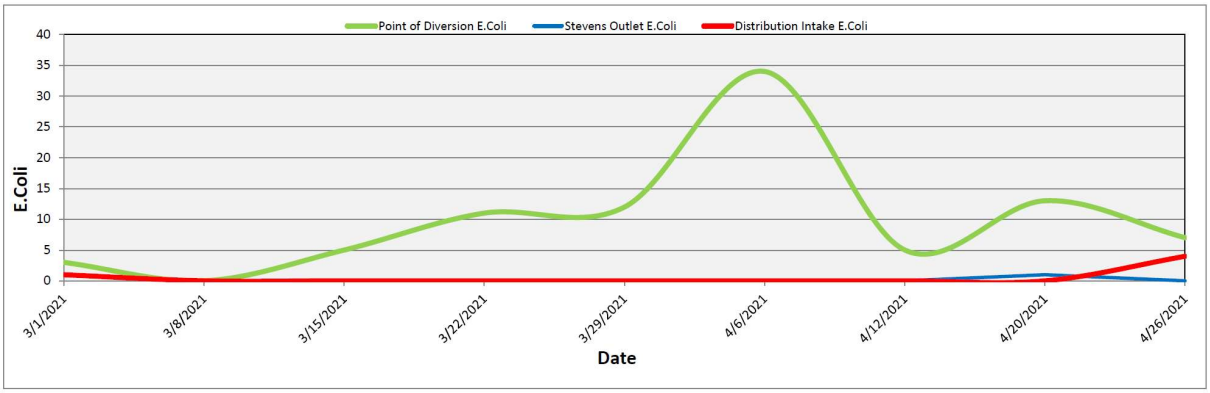

Table 2.1 - *E.Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
1-Mar-21	3		1
8-Mar-21	0	0	0
15-Mar-21	5	0	0
22-Mar-21	11	0	0
29-Mar-21	12	0	0
6-Apr-21	34	0	0
12-Apr-21	5	0	0
20-Apr-21	13	1	0
26-Apr-21	7	0	4

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 April 2021, 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 0.86 NTU on April 16, 2021.

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)

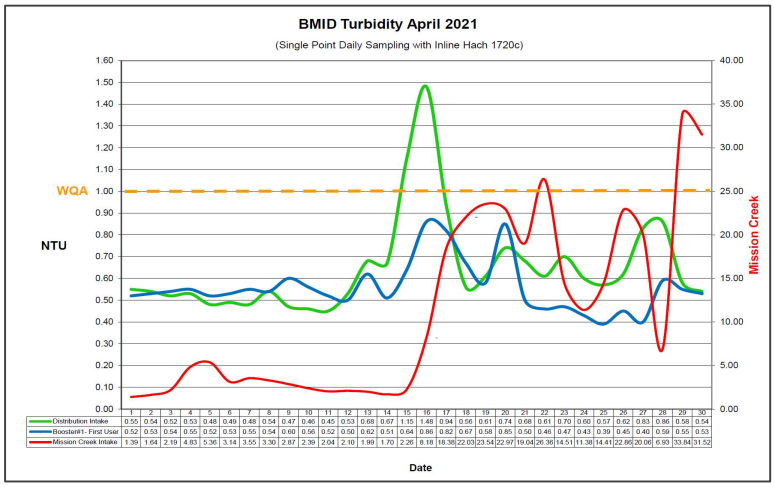

Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Date	Mission Creek Intake	Distribution Intake	Booster#1- First User
	Daily Average [NTU]	Daily Average NTU	Daily Average NTU
1	1.39	0.55	0.52
2	1.64	0.54	0.53
3	2.19	0.52	0.54
4	4.83	0.53	0.55
5	5.36	0.48	0.52
6	3.14	0.49	0.53
7	3.55	0.48	0.55
8	3.30	0.54	0.54
9	2.87	0.47	0.60
10	2.39	0.46	0.56
11	2.04	0.45	0.52
12	2.10	0.53	0.50
13	1.99	0.68	0.62
14	1.70	0.67	0.51
15	2.26	1.15	0.64
16	8.18	1.48	0.86
17	18.38	0.94	0.82
18	22.03	0.56	0.67
19	23.54	0.61	0.58
20	22.97	0.74	0.85
21	19.04	0.68	0.50
22	26.36	0.61	0.46
23	14.51	0.70	0.47
24	11.38	0.60	0.43
25	14.41	0.57	0.39
26	22.86	0.62	0.45
27	20.06	0.83	0.40
28	6.93	0.86	0.59
29	33.84	0.58	0.55
30	31.52	0.54	0.53
AVG	11.23	0.65	0.56

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 April, 2021.

Figure 4.1 - CT Trending – BMID Mission Creek Source – April 2021

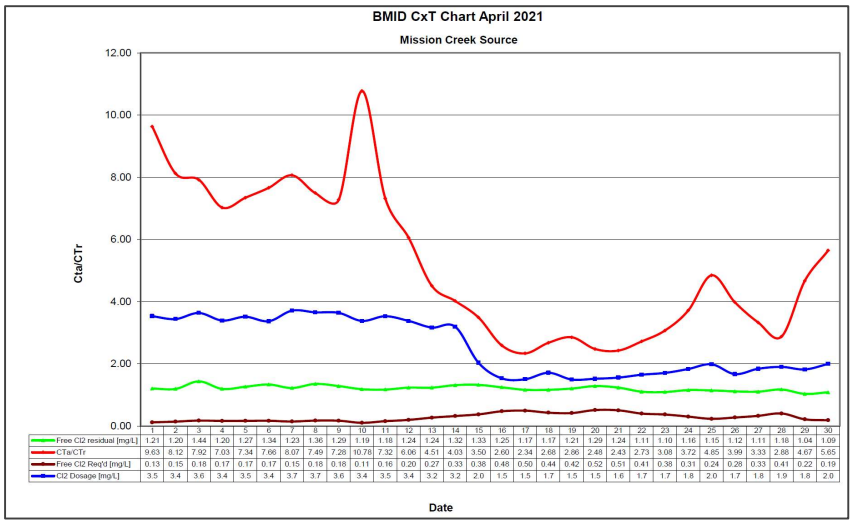

Table 4.2 - CT Table – Mission Creek Source

	BMID April 2021												
	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
April		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.87	10.7	2,202	1.21	1456.2	151.2	9.63	0.13	3.5	2649600	1203	1,581	67
2	7.88	10.4	2,530	1.20	1256.9	154.7	8.12	0.15	3.4	2649600	1047	1,710	71
3	7.89	10.1	2,957	1.44	1290.4	162.9	7.92	0.18	3.6	2649600	896	1,573	69
4	7.85	9.8	2,834	1.20	1121.9	159.6	7.03	0.17	3.4	2649600	935	1,741	71
5	7.87	10.6	2,988	1.27	1126.2	153.3	7.34	0.17	3.5	2649600	887	1,755	74
6	7.83	9.7	2,855	1.34	1243.7	162.3	7.66	0.17	3.4	2649600	928	1,820	74
7	7.86	10.5	2,638	1.23	1235.3	153.2	8.07	0.15	3.7	2649600	1004	1,670	75
8	7.88	10.6	3,093	1.36	1165.0	155.5	7.49	0.18	3.7	2649600	857	1,811	80
9	7.91	10.9	3,078	1.29	1110.4	152.6	7.28	0.18	3.6	2649600	861	1,606	70
10	7.92	10.4	1,868	1.19	1687.9	156.6	10.78	0.11	3.4	2649600	1418	1,787	73
11	7.94	10.3	2,693	1.18	1161.0	158.6	7.32	0.16	3.5	2649600	984	1,764	75
12	7.97	9.8	3,245	1.24	1012.6	167.1	6.06	0.20	3.4	2649600	817	2,134	87
13	7.99	9.8	4,330	1.24	758.7	168.2	4.51	0.27	3.2	2649600	612	2,713	103
14	7.98	9.8	5,133	1.32	681.4	169.2	4.03	0.33	3.2	2649600	516	3,051	117
15	7.96	10.9	6,465	1.33	545.1	155.9	3.50	0.38	2.0	2649600	410	3,691	90
16	7.94	12.0	8,970	1.25	369.2	142.2	2.60	0.48	1.5	2649600	295	5,238	97
17	7.93	12.2	9,569	1.17	324.0	138.4	2.34	0.50	1.5	2649600	277	6,468	117
18	7.91	11.3	7,903	1.17	392.3	146.3	2.68	0.44	1.7	2649600	335	5,633	116
19	7.90	12.0	8,037	1.21	398.9	139.6	2.86	0.42	1.5	2649600	330	5,986	108
20	7.88	11.3	9,372	1.29	364.7	146.9	2.48	0.52	1.5	2649600	283	6,364	117
21	7.85	11.4	9,415	1.24	349.0	143.6	2.43	0.51	1.6	2649600	281	5,977	112
22	7.79	11.1	7,641	1.11	384.9	141.2	2.73	0.41	1.7	2649600	347	5,536	110
23	7.76	12.1	7,675	1.10	400.5	130.2	3.08	0.38	1.7	2649600	345	5,376	111
24	7.72	12.3	6,417	1.16	474.9	127.7	3.72	0.31	1.8	2649600	413	4,484	99
25	7.65	12.6	5,155	1.15	591.0	121.9	4.85	0.24	2.0	2649600	514	3,435	82
26	7.60	12.5	6,200	1.12	478.7	120.1	3.99	0.28	1.7	2649600	427	3,932	79
27	7.59	11.9	7,081	1.11	415.3	124.6	3.33	0.33	1.8	2649600	374	4,478	99
28	7.57	12.0	8,753	1.18	357.2	124.0	2.88	0.41	1.9	2649600	303	4,794	110
29	7.55	13.0	5,235	1.04	526.3	112.7	4.67	0.22	1.8	2649600	506	2,978	65
30	7.53	13.0	4,539	1.09	636.2	112.7	5.65	0.19	2.0	2649600	584	3,404	82
Averages	7.83	11.2	5362	1.21	777.191	145.1	5.23	0.286	2.5486		633	3,483	90.04

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	569,055.0 m^3	100.0%
On-Spec Water:	568,952.3 m^3	99.98%
Off-Spec Water:	107.7 m^3	0.018%

Average monthly chlorine residual before UV Treatment was 1.11 mg/L
The average monthly chlorine residual after UV treatment and re-chlorination was 1.31 mg/L.

Figure 5.1 - UV Disinfection – BMID Mission Creek Source – April 2021

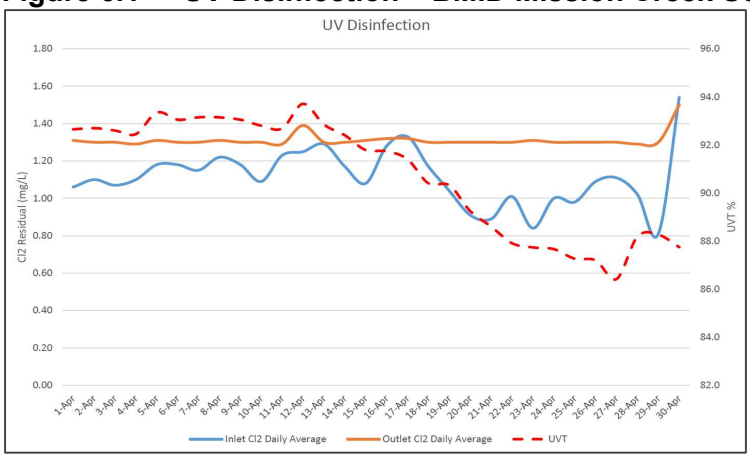

Table 5.2 - UV Disinfection Table – Mission Creek Source

	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-Apr	1.06	1.31		92.7		9035.6	0	0.00%
2-Apr	1.10	1.30		92.7		8769.5	0	0.00%
3-Apr	1.07	1.30		92.6		9072.4	0	0.00%
4-Apr	1.10	1.29		92.5		9517.6	0	0.00%
5-Apr	1.18	1.31		93.4		9478.0	0	0.00%
6-Apr	1.18	1.30		93.1		9571.5	0	0.00%
7-Apr	1.15	1.30		93.2		10251.5	0	0.00%
8-Apr	1.22	1.31		93.2		8970.3	0	0.00%
9-Apr	1.18	1.30		93.1		9286.9	0	0.00%
10-Apr	1.09	1.30		92.8		9586.2	0	0.00%
11-Apr	1.23	1.29		92.7		11198.8	0	0.00%
12-Apr	1.25	1.39		93.7		13710.7	0	0.00%
13-Apr	1.29	1.30		92.9		15954.1	0	0.00%
14-Apr	1.17	1.30		92.4		19509.4	15.1	0.08%
15-Apr	1.08	1.31		91.8		26094.2	15.1	0.06%
16-Apr	1.28	1.32		91.7		31874.9	0	0.00%
17-Apr	1.33	1.32		91.4		31875.9	0	0.00%
18-Apr	1.17	1.30		90.4		31303.9	0	0.00%
19-Apr	1.04	1.30		90.3		34702.4	0	0.00%
20-Apr	0.91	1.30		89.2		32308.0	69	0.21%
21-Apr	0.89	1.30		88.6		29788.2	3.5	0.01%
22-Apr	1.01	1.30		87.9		29788.9	0	0.00%
23-Apr	0.84	1.31		87.7		24577.3	0	0.00%
24-Apr	1.00	1.30		87.7		19693.4	0	0.00%
25-Apr	0.98	1.30		87.3		18911.2	0	0.00%
26-Apr	1.09	1.30		87.2		23989.8	0	0.00%
27-Apr	1.11	1.30		86.4		26621.9	0	0.00%
28-Apr	1.02	1.29		88.2		15449.8	0	0.00%
29-Apr	0.81	1.30		88.3		18752.5	0	0.00%
30-Apr	1.54	1.50		87.8		19307.5	0	0.00%
Average	1.11	1.31		90.7	Total	568952.3	102.7	0.018%

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
- 25 samples were found to be absent of Coliforms.
- 25 samples were found to be absent of *E.Coli*.

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

	2921 Belgo Rd		Booster 1		Ellison Blow-Off		Ellison School		3976 Highway 97		Prospect Reservoir		Tower Reservoir		Well #4		Kirschner Res		Pearson School	
Date	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
1-Mar-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	0	0	0	0	0	0
8-Mar-21	-	-	0	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-	-	-
15-Mar-21	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
22-Mar-21	-	-	0	0	0	0	0	0	0	0			0	0	0	0				
29-Mar-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	0	0	0	0	0	0
6-Apr-21	-	-	0	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-	0	0
12-Apr-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	0	0	0	0	0	0
20-Apr-21	-	-	0	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-	-	-
26-Apr-21	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 seven sites around the BMID service area.
- All 9 samples were found to be absent of both *Total Coliforms* and E.*Coli.*

Table 6.2 - BMID In-house Testing – Presence Absence

	4/6/2021				4/12/2021				4/21/2021				4/26/2021			
Location	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres					0.76	15.6	-	X								
170 Kneller Rd					0.67	15.6	-	X								
2105 Morrison	0.67	13.4	-	X									0.56	12.4	-	X
Staymen Rd	0.45	12.6	-	X									0.25	11.2	-	X
260 Campion Rd									0.44	11.8	-	X				
Fenwick Rd									0.19	12.7	-	X				
Solly Ct					0.87	13.8	-	X								

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

20-Apr-21		
Location	THM (mg/L)	HAA (mg/L)
UV Plant	0.0525	0.0284
Pearson School	0.0634	0.0388

- 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 = 25
- Total tests sampled in BMID treated distribution system = 34 (Zero positive samples)