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BMID FILE: 486

MONTHLY REPORTING PERIOD - JANUARY, 2021

1. SUMMARY

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

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	65,758,698	248.9
Well 4	1,400,000	5.3
Well 5	0	0
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	67,158,698	254.20

1. On January 31, a water main break occurred in the Houghton Road area. The break lasted approximately one hour before BMID crews were able to isolate the flow and begin repairs on the water main. During the break, flows in the distribution system increased five-fold, resulting in a rise in turbidity throughout effected area. However, turbidity did not rise above 1.00 NTU for any considerable length of time and both primary and secondary disinfection systems continued to operate as designed;
2. BMID has undertaken an upgrade to its water main infrastructure downstream of the UV facility. This upgrade will allow for additional capacity to the northeast of the distribution system. As a result of the upgrade, BMID will utilize the flow meter at the UV station instead of Booster #1 to more accurately measure system flows;
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 Water Treatment Plant started full operations in April, 2020, and the plant continued to run until it was placed on stand-by on November 18 2020, when raw water was of sufficient quality to bypass treatment. For all of January 2021, the facility remained in stand-by mode. The WTP is able to restart if poor raw water quality necessitates treatment;
5. Raw water turbidity levels in Mission Creek peaked at 2.31 NTU on January 13, 2021. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.50 NTU on January 2, 2021. Average turbidity for January was 0.40 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
6. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.93 NTU on January 31 during a water main break. Average monthly turbidity at the first customer was 0.40 NTU for the month;
7. BMID's Ultraviolet Treatment Facility treated 248,923.6 m^3 of water, only 9.2 m^3 of which was "Off-Spec" (0.004%). Average UV Transmissivity was 85.6%. The average

inlet chlorine residual level at the UV site was 1.08 mg/L. The average outgoing chlorine was 1.38 mg/L after the sodium hypochlorite top-up system;

8. BMID's Scotty Creek source, used for irrigation in the north-end, was placed on Stand-by in September 2020;
9. Well # 4 resumed operations as the primary domestic water source for the north-end on September 11, 2020. Well #4 will continue to operate until spring 2021;
10. 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 undergoing maintenance which will continue throughout the winter;
11. 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 spring 2021;
12. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts for winter with a peak count of 4 on January 13, 2021. The average *E.Coli* count was 1.29 for the month based on 7 samples;
13. *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 with peak counts of 2 on January 6 and 20. The reduction in *E.Coli* levels is credited to the settling of particles in the water in Stevens and Hadden Reservoirs;
14. 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;

1.0 FLOWS - JANUARY, 2021

The Maximum Daily Flow was on January 11, at 3,423,802 US gallons (12.96 ML)

The Minimum Daily Flow was on January 23, at 1,821,651 US gallons (6.89 ML)

Mission Creek provided 98% of domestic and irrigation flow throughout January.

Figure 1.1 - Domestic Water System Flow

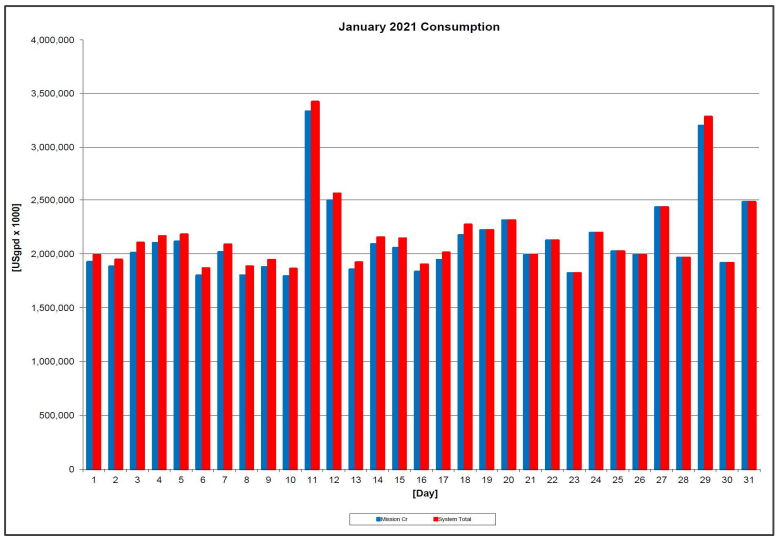

Table 1.2 - January 2021 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	Well #6	System Total	System Total
2021	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Jan	1,923,648	65,000	0.0	0.0	1,988,648	7.53
2-Jan	1,881,407	64,000	0.0	0.0	1,945,407	7.36
3-Jan	2,009,926	93,000	0.0	0.0	2,102,926	7.96
4-Jan	2,100,326	64,000	0.0	0.0	2,164,326	8.19
5-Jan	2,113,984	65,000	0.0	0.0	2,178,984	8.25
6-Jan	1,799,275	67,000	0.0	0.0	1,866,275	7.06
7-Jan	2,015,130	72,000	0.0	0.0	2,087,130	7.90
8-Jan	1,800,359	81,000	0.0	0.0	1,881,359	7.12
9-Jan	1,877,206	67,000	0.0	0.0	1,944,206	7.36
10-Jan	1,792,539	68,000	0.0	0.0	1,860,539	7.04
11-Jan	3,334,802	89,000	0.0	0.0	3,423,802	12.96
12-Jan	2,495,923	65,000	0.0	0.0	2,560,923	9.69
13-Jan	1,854,303	67,000	0.0	0.0	1,921,303	7.27
14-Jan	2,089,997	64,000	0.0	0.0	2,153,997	8.15
15-Jan	2,054,571	89,000	0.0	0.0	2,143,571	8.11
16-Jan	1,832,693	69,000	0.0	0.0	1,901,693	7.20
17-Jan	1,942,721	69,000	0.0	0.0	2,011,721	7.61
18-Jan	2,172,894	99,000	0.0	0.0	2,271,894	8.60
19-Jan	2,220,947	0	0.0	0.0	2,220,947	8.41
20-Jan	2,312,218	0	0.0	0.0	2,312,218	8.75
21-Jan	1,991,064	0	0.0	0.0	1,991,064	7.54
22-Jan	2,123,599	0	0.0	0.0	2,123,599	8.04
23-Jan	1,821,651	0	0.0	0.0	1,821,651	6.89
24-Jan	2,194,107	0	0.0	0.0	2,194,107	8.30
25-Jan	2,022,210	0	0.0	0.0	2,022,210	7.65
26-Jan	1,988,449	0	0.0	0.0	1,988,449	7.53
27-Jan	2,432,786	0	0.0	0.0	2,432,786	9.21
28-Jan	1,962,824	0	0.0	0.0	1,962,824	7.43
29-Jan	3,201,157	83,000	0.0	0.0	3,284,157	12.43
30-Jan	1,914,507	0	0.0	0.0	1,914,507	7.25
31-Jan	2,481,473	0	0.0	0.0	2,481,473	9.39
Totals Usgpd	65,758,698	1,400,000	0	0	67,158,698	254.20
Totals ML	248.90	5.30	0.00	0.00		
Avg's	2,109,241	7.98			2,155,907	8.16
Max	3,334,802	12.62			3,423,802	12.96
Min	1,792,539	6.78			1,821,651	6.89

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) December 2020 - January 2021

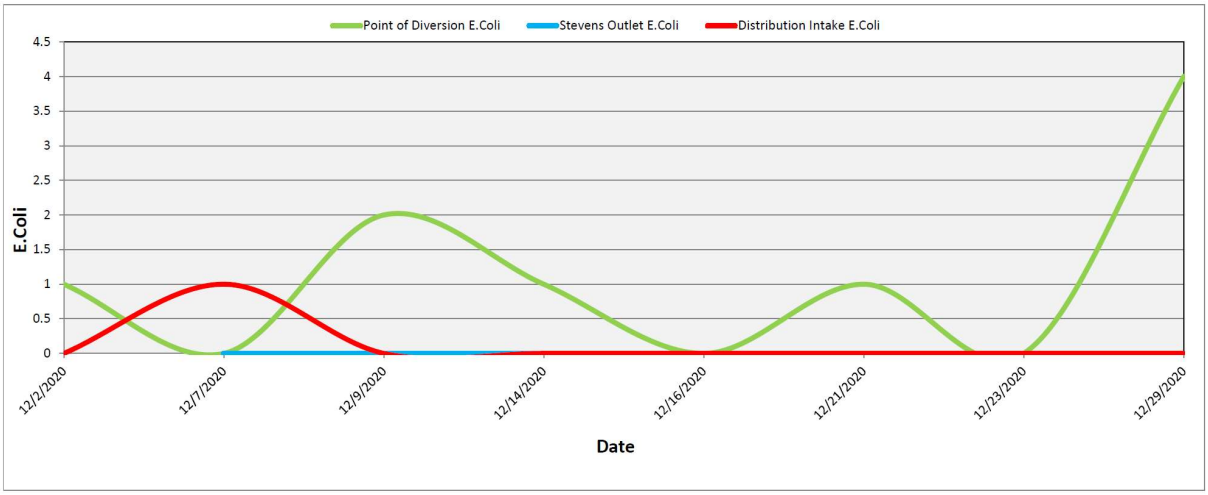

Table 2.1 - *E.Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
2-Dec-20	1		0
7-Dec-20	0	0	1
9-Dec-20	2		0
14-Dec-20	1		0
16-Dec-20	0		0
21-Dec-20	1	0	0
23-Dec-20	0	0	0
29-Dec-20	4	0	0
4-Jan-21	2	0	0
6-Jan-21	1		2
11-Jan-21	1		1
13-Jan-21	4		0
18-Jan-21	1	1	0
20-Jan-21	0		2
25-Jan-21	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^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 January 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 0.93 NTU on January 31, 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)

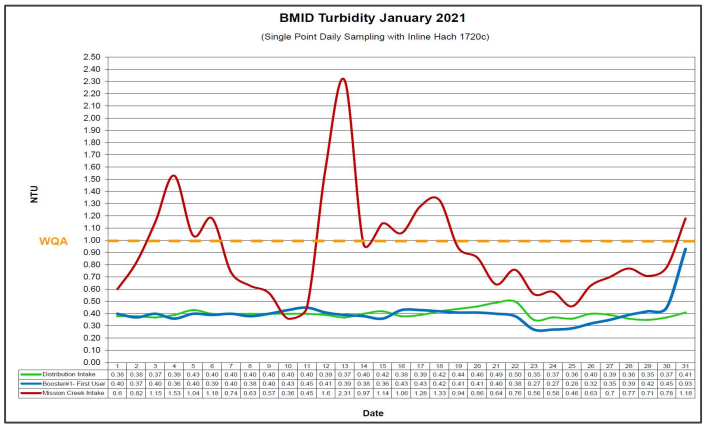

Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for January 2021			
Date	Mission Creek Intake Daily Average [NTU]	Distribution Intake Daily Average NTU	Booster#1- First User Daily Average NTU
1	0.6	0.38	0.40
2	0.82	0.38	0.37
3	1.15	0.37	0.40
4	1.53	0.39	0.36
5	1.04	0.43	0.40
6	1.18	0.40	0.39
7	0.74	0.40	0.40
8	0.63	0.40	0.38
9	0.57	0.40	0.40
10	0.36	0.40	0.43
11	0.45	0.40	0.45
12	1.6	0.39	0.41
13	2.31	0.37	0.39
14	0.97	0.40	0.38
15	1.14	0.42	0.36
16	1.06	0.38	0.43
17	1.28	0.39	0.43
18	1.33	0.42	0.42
19	0.94	0.44	0.41
20	0.86	0.46	0.41
21	0.64	0.49	0.40
22	0.76	0.50	0.38
23	0.56	0.35	0.27
24	0.58	0.37	0.27
25	0.46	0.36	0.28
26	0.63	0.40	0.32
27	0.7	0.39	0.35
28	0.77	0.36	0.39
29	0.71	0.35	0.42
30	0.78	0.37	0.45
31	1.18	0.41	0.93
AVG	0.91	0.40	0.40

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 January, 2021.

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

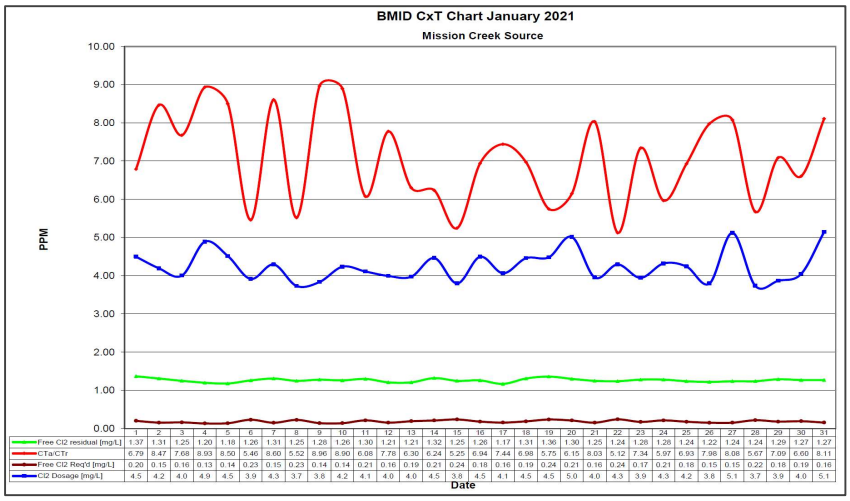

Table 4.2 - CT Table – Mission Creek Source

	BMID January 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
January		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	USGPM	[PPD]
1	7.87	6.0	2505	1.37	1449.0	213.4	6.79	0.20	4.5	2649600	1058	1209	65
2	7.88	6.3	1968	1.31	1763.6	208.3	8.47	0.15	4.2	2649600	1346	1271	64
3	7.89	6.1	2050	1.25	1615.8	210.4	7.68	0.16	4.0	2649600	1293	1416	68
4	7.90	6.2	1707	1.20	1862.1	208.4	8.93	0.13	4.9	2649600	1552	1208	71
5	7.92	7.2	1883	1.18	1660.2	195.3	8.50	0.14	4.5	2649600	1407	1315	71
6	7.92	5.7	2794	1.26	1194.7	218.8	5.46	0.23	3.9	2649600	948	1303	61
7	7.92	4.8	1722	1.31	2016.1	234.3	8.60	0.15	4.3	2649600	1539	1298	67
8	7.91	5.2	2660	1.25	1245.0	225.5	5.52	0.23	3.7	2649600	996	1336	60
9	7.91	4.9	1637	1.28	2071.5	231.1	8.96	0.14	3.8	2649600	1618	1353	62
10	7.91	5.5	1697	1.26	1967.8	221.2	8.90	0.14	4.2	2649600	1562	1173	60
11	7.91	6.3	2696	1.30	1277.6	210.2	6.08	0.21	4.1	2649600	983	1434	71
12	7.91	4.7	1774	1.21	1807.0	232.4	7.78	0.16	4.0	2649600	1493	1324	64
13	7.90	5.6	2339	1.21	1371.0	217.6	6.30	0.19	4.0	2649600	1133	1287	61
14	7.90	5.1	2458	1.32	1423.0	228.2	6.24	0.21	4.5	2649600	1078	1286	69
15	7.90	3.1	2428	1.25	1364.0	260.0	5.25	0.24	3.8	2649600	1091	1486	68
16	7.90	4.4	2022	1.26	1650.8	237.9	6.94	0.18	4.5	2649600	1310	1131	61
17	7.90	5.4	1898	1.17	1633.2	219.5	7.44	0.16	4.1	2649600	1396	1315	64
18	7.90	4.1	2037	1.31	1704.2	244.3	6.98	0.19	4.5	2649600	1301	1338	72
19	7.89	4.1	2561	1.36	1406.9	244.8	5.75	0.24	4.5	2649600	1035	1357	73
20	7.89	5.0	2453	1.30	1404.5	228.5	6.15	0.21	5.0	2649600	1080	1260	76
21	7.89	4.6	1766	1.25	1875.5	233.5	8.03	0.16	4.0	2649600	1500	1361	65
22	7.89	3.9	2619	1.24	1254.7	244.8	5.12	0.24	4.3	2649600	1012	1325	68
23	7.89	3.7	1852	1.28	1831.3	249.4	7.34	0.17	3.9	2649600	1431	1250	59
24	7.88	4.3	2383	1.28	1423.1	238.5	5.97	0.21	4.3	2649600	1112	1358	71
25	7.88	4.8	2068	1.24	1588.8	229.2	6.93	0.18	4.2	2649600	1281	1281	65
26	7.88	4.8	1772	1.22	1824.7	228.7	7.98	0.15	3.8	2649600	1496	1405	64
27	7.88	5.2	1824	1.24	1800.8	223.0	8.08	0.15	5.1	2649600	1452	1265	78
28	7.88	5.4	2633	1.24	1247.8	219.9	5.67	0.22	3.7	2649600	1006	1408	63
29	7.88	5.7	2226	1.29	1535.6	216.7	7.09	0.18	3.9	2649600	1190	1343	62
30	7.87	4.6	2192	1.27	1535.2	232.5	6.60	0.19	4.0	2649600	1209	1274	62
31	7.87	4.6	1785	1.27	1885.2	232.5	8.11	0.16	5.1	2649600	1484	1234	76
Averages	7.89	5.1	2142	1.26	1602.9	227.1	7.08	0.18	4.2				

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	248,923.6 m^3	100.0%
On-Spec Water:	248,914.4 m^3	99.006%
Off-Spec Water:	9.2 m^3	0.004%

Average monthly chlorine residual before UV Treatment was 1.08 mg/L
The average monthly chlorine residual after UV treatment and re-chlorination was 1.38 mg/L.

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

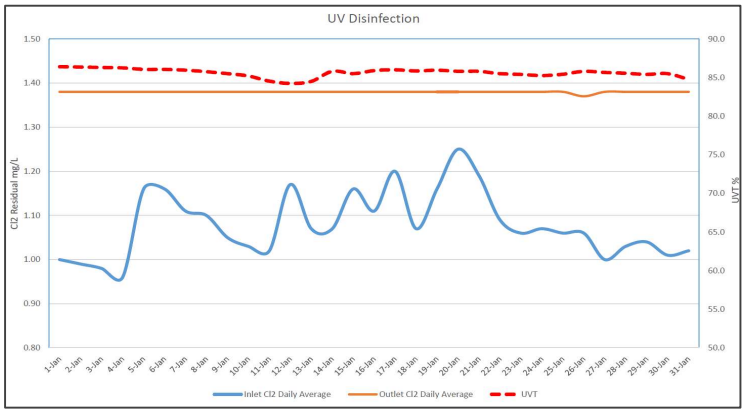

Table 5.2 - UV Disinfection Table – Mission Creek Source

	Inlet Cl2 Daily Average	Outlet Cl2 Daily Average		UVT		In Spec Water Volume	Off Spec Water Volume	Off Spec % of Water Volume
Date	mg/L	mg/L		% T		Cubic Meters	Cubic Meters	Percentage
1-Jan	1.00	1.38		86.4		7282	0	0.00%
2-Jan	0.99	1.38		86.4		7122	0	0.00%
3-Jan	0.98	1.38		86.3		7608	0	0.00%
4-Jan	0.96	1.38		86.3		7951	0	0.00%
5-Jan	1.16	1.38		86.1		8002	0	0.00%
6-Jan	1.16	1.38		86.1		6811	0	0.00%
7-Jan	1.11	1.38		86.0		7628	0	0.00%
8-Jan	1.10	1.38		85.8		6815	0	0.00%
9-Jan	1.05	1.38		85.5		7106	0	0.00%
10-Jan	1.03	1.38		85.2		6786	0	0.00%
11-Jan	1.02	1.38		84.5		12624	0	0.00%
12-Jan	1.17	1.38		84.2		9448	0	0.00%
13-Jan	1.07	1.38		84.5		7019	0	0.00%
14-Jan	1.07	1.38		85.8		7912	0	0.00%
15-Jan	1.16	1.38		85.5		7777	0	0.00%
16-Jan	1.11	1.38		85.9		6938	0	0.00%
17-Jan	1.20	1.38		86.0		7354	0	0.00%
18-Jan	1.07	1.38		85.9		8225	0	0.00%
19-Jan	1.16	1.38		86.0		8407	0	0.00%
20-Jan	1.25	1.38		85.8		8753	0	0.00%
21-Jan	1.19	1.38		85.8		7537	0	0.00%
22-Jan	1.09	1.38		85.5		8039	0	0.00%
23-Jan	1.06	1.38		85.4		6896	0	0.00%
24-Jan	1.07	1.38		85.3		8306	0	0.00%
25-Jan	1.06	1.38		85.4		7655	0	0.00%
26-Jan	1.06	1.37		85.8		7527	0	0.00%
27-Jan	1.00	1.38		85.7		9209	0	0.00%
28-Jan	1.03	1.38		85.6		7430	0	0.00%
29-Jan	1.04	1.38		85.4		12118	0	0.00%
30-Jan	1.01	1.38		85.5		7247	0	0.00%
31-Jan	1.02	1.38		84.8		9384	9.2	0.10%
Average	1.08	1.38		85.6	Total	248914.4	9.2	0.004%

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		Ellison Blow-Off		Ellison School		3976 Highway 97		Prospect Reservoir		Tower Reservoir		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
7-Dec-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Dec-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-Dec-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-Dec-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Jan-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11-Jan-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Jan-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-Jan-21	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-Jan-21	-	-	-	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

4-Jan-21		
Location	THM (mg/L)	HAA (mg/L)
Kirschner Reservoir		0.1280
2921 Belgo Rd	0.1060	
Pearson School	0.0902	0.0972
3976 Highway 97	0.0882	

In-House Analysis (BMID Staff)

- Presence/Absence samples taken on a three-week cycle at seven sites around the BMID service area.
- All 10 samples were found to be absent of both Total Coliforms and *E.Coli*.

Table 6.4 - BMID In-house Testing – Presence Absence

Location	1/4/2021				1/15/2021				1/18/2021				1/25/2021			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres	0.79	10.4	-	X									0.71	9.3	-	X
170 Kneller Rd	0.70	7.4	-	X									0.69	8.4	-	X
2105 Morrison									0.44	9.6	-	X				
Staymen Rd									0.36	8.5	-	X				
260 Campion Rd					0.46	14.4	-	X								
Fenwick Rd					0.00	12.2	-	X								
Solly Ct	0.86	9.0	-	X									0.75	11.2	-	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) = 10
- Total tests sampled by BMID and tested by Caro Labs = 40
- Total tests sampled in BMID treated distribution system = 50 (Zero Positive Samples)