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BMID FILE: 486

MONTHLY REPORTING PERIOD - JANUARY, 2020

1. SUMMARY

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

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	58,447,626	221.22
Well 4	2,697,000	10.21
Well 5	0	0
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	61,144,626	231.43

1. Beginning on January 7, 2020 a Water Quality Advisory was issued by the Black Mountain Irrigation District in consultation with Interior Health. The precautionary advisory was issued due to a leak in a transmission line leading to the UV Treatment plant. The repair forced the temporary shut-down of the secondary disinfection facility. Primary chlorination at the Distribution intake was fully operational throughout the process and raw water quality from the Mission Creek source was good during the duration of the shut-down. The WQA was lifted on January 19, 2020
   It is noted that due to alarmist reporting by the local web news provider, there were many alarmed persons believing that a Boil Water Notice had been called;
2. 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 showed a steady decline in groundwater levels in the winter of 2018 and spring of 2019, but has since remained level. The hillside is being monitored for surface movement on a monthly basis and groundwater levels every two months.
3. It is noted that the WTP is not running over the winter. Turbidity levels at the Distribution Intake peaked at 0.49 NTU on January 31, 2020. Average turbidity for January was 0.38 NTU;
4. The highest monthly turbidity level recorded at the first customer (Booster #1) was 0.63 NTU on January 11. Average monthly turbidity was 0.36 NTU for January;
5. BMID's Ultraviolet Treatment Facility treated 197,737 m^3 of water. 555 m^3 was "Off-Spec". Average UV Transmissivity was 84.1%. The average inlet chlorine residual level at the UV site was 1.38 mg/L. The average outgoing chlorine was 1.54 mg/L after the sodium hypochlorite top-up system;
6. BMID's Scotty Creek source, used for irrigation in the north-end, was shut off for the year in September, 2019;
7. Well # 4 was used as the primary domestic water source in the north-end of the system starting on September 1, 2019. Well # 4 provided domestic water throughout January 2020;

8. Well # 5 was shut-off for the season in September but remains on stand-by until consumption rises in the spring of 2020;
9. Well #6, which supplies irrigation water to the dual north-end water distribution systems was not used throughout January;
10. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had low counts throughout January with a peak count of 26.2 on January 9, 2020. At the Point-of-Diversion the average *E.Coli* count was 4.15 per sample based on the 8 samples taken throughout 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 low counts throughout most of January, with a peak count of 2 on January 29, 2020. The average *E.*Coli count for January was 0.78 counts per sample based on 9 samples taken. 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. The Water Treatment Plant was on stand-by for the majority of January as water quality in Mission Creek was high for the majority of the month and treatment would not significantly improve the raw water quality. The WTP ran one day in January, on January 31, 2020, due to high turbidity in the creek;

1.0 FLOWS - JANUARY, 2020

Maximum Daily Flow was on January 15, 2020 at 2,204,931 US gallons (8.35 ML)

Minimum Daily Flow was on January 16, 2020 at 1,717,709 US gallons (6.50 ML)

Mission Creek provided 96% of domestic flow throughout January.

Figure 1.1 - Domestic Water System Flow

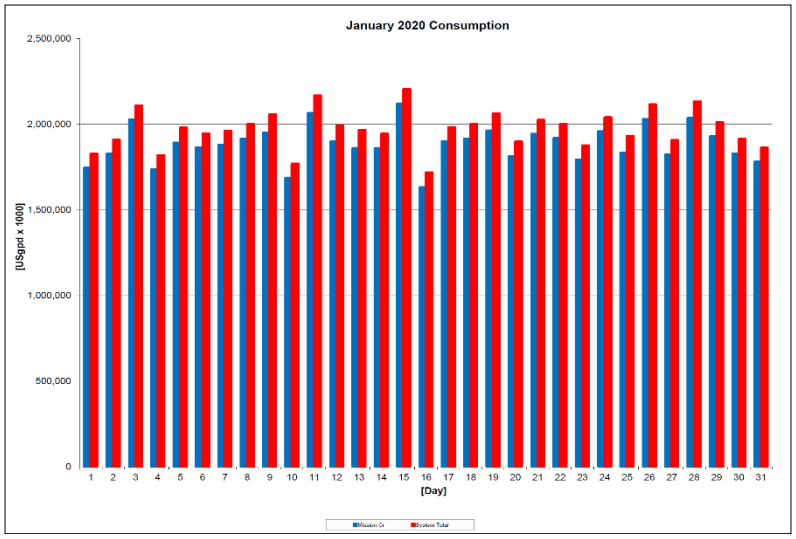

Table 1.2 - January 2020 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	Well #6	System Total	System Total
2020	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Jan	1,745,915	82,000	0.0	0.0	1,827,915	6.92
2-Jan	1,827,356	82,000	0.0	0.0	1,909,356	7.23
3-Jan	2,028,612	80,000	0.0	0.0	2,108,612	7.98
4-Jan	1,736,136	83,000	0.0	0.0	1,819,136	6.89
5-Jan	1,893,533	88,000	0.0	0.0	1,981,533	7.50
6-Jan	1,864,555	81,000	0.0	0.0	1,945,555	7.36
7-Jan	1,880,085	82,000	0.0	0.0	1,962,085	7.43
8-Jan	1,917,776	83,000	0.0	0.0	2,000,776	7.57
9-Jan	1,952,191	105,000	0.0	0.0	2,057,191	7.79
10-Jan	1,687,533	82,000	0.0	0.0	1,769,533	6.70
11-Jan	2,064,653	104,000	0.0	0.0	2,168,653	8.21
12-Jan	1,897,692	94,000	0.0	0.0	1,991,692	7.54
13-Jan	1,860,443	106,000	0.0	0.0	1,966,443	7.44
14-Jan	1,860,835	84,000	0.0	0.0	1,944,835	7.36
15-Jan	2,120,931	84,000	0.0	0.0	2,204,931	8.35
16-Jan	1,631,709	86,000	0.0	0.0	1,717,709	6.50
17-Jan	1,901,354	83,000	0.0	0.0	1,984,354	7.51
18-Jan	1,916,421	85,000	0.0	0.0	2,001,421	7.58
19-Jan	1,963,886	99,000	0.0	0.0	2,062,886	7.81
20-Jan	1,815,340	83,000	0.0	0.0	1,898,340	7.19
21-Jan	1,943,380	82,000	0.0	0.0	2,025,380	7.67
22-Jan	1,918,510	82,000	0.0	0.0	2,000,510	7.57
23-Jan	1,794,330	82,000	0.0	0.0	1,876,330	7.10
24-Jan	1,957,998	82,000	0.0	0.0	2,039,998	7.72
25-Jan	1,834,972	98,000	0.0	0.0	1,932,972	7.32
26-Jan	2,030,998	85,000	0.0	0.0	2,115,998	8.01
27-Jan	1,823,671	84,000	0.0	0.0	1,907,671	7.22
28-Jan	2,036,141	97,000	0.0	0.0	2,133,141	8.07
29-Jan	1,929,516	83,000	0.0	0.0	2,012,516	7.62
30-Jan	1,831,151	83,000	0.0	0.0	1,914,151	7.25
31-Jan	1,780,003	83,000	0.0	0.0	1,863,003	7.05
Totals Usgpd	58,447,626	2,697,000	0	0	61,144,626	231.43
Totals ML	221.22	10.21	0.00	0.00		
Avg's	1,888,921	7.15			1,976,054	7.48
Max	2,120,931	8.03			2,204,931	8.35
Min	1,631,709	6.18			1,717,709	6.50

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 2019 -January 2020

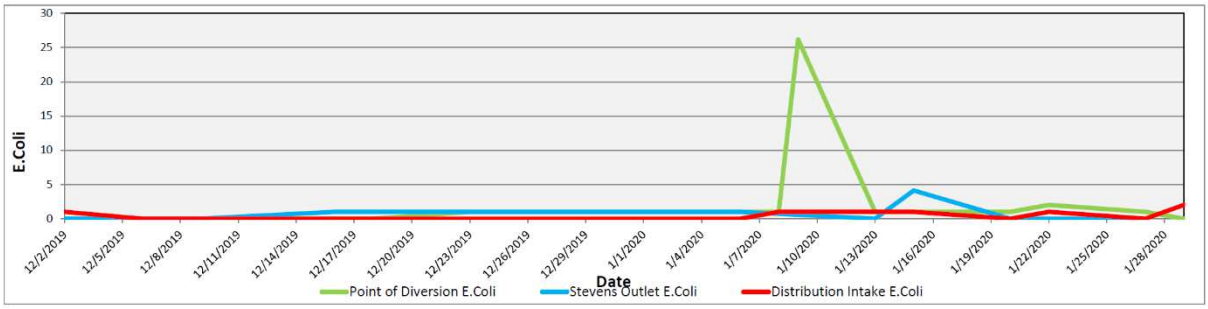

Table 2.1 - *E.Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
2-Dec-19	0	0	1
6-Dec-19	0	0	0
9-Dec-19	0	0	0
11-Dec-19	0		0
16-Dec-19	0	1	0
18-Dec-19	0		0
23-Dec-19	1	1	0
30-Dec-19	1	1	0
6-Jan-20	1	1	0
8-Jan-20	1		1
9-Jan-20	26.2		1
13-Jan-20	1	0	1
15-Jan-20		4.1	1
20-Jan-20	1	0	0
22-Jan-20	2		1
27-Jan-20	1	0	0
29-Jan-20	0		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 January 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 0.63 NTU on January 11. The average turbidity for the month was 0.36 NTU during January.

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)

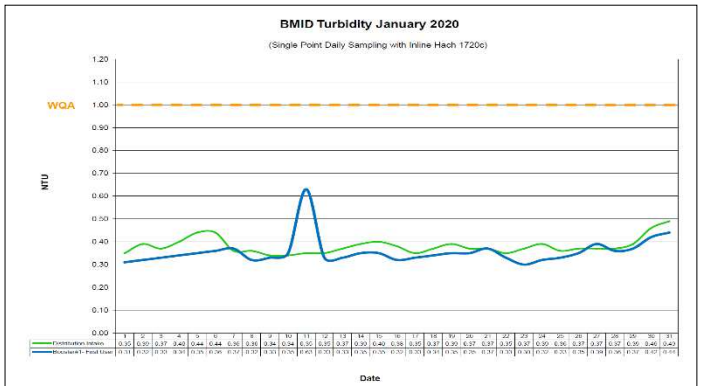

Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for January 2020		
Date	Distribution Intake Daily Average NTU	Booster#1- First User Daily Average NTU
1	0.35	0.31
2	0.39	0.32
3	0.37	0.33
4	0.40	0.34
5	0.44	0.35
6	0.44	0.36
7	0.36	0.37
8	0.36	0.32
9	0.34	0.33
10	0.34	0.35
11	0.35	0.63
12	0.35	0.33
13	0.37	0.33
14	0.39	0.35
15	0.40	0.35
16	0.38	0.32
17	0.35	0.33
18	0.37	0.34
19	0.39	0.35
20	0.37	0.35
21	0.37	0.37
22	0.35	0.33
23	0.37	0.30
24	0.39	0.32
25	0.36	0.33
26	0.37	0.35
27	0.37	0.39
28	0.37	0.36
29	0.39	0.37
30	0.46	0.42
31	0.49	0.44
AVG	0.38	0.36

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, 2020.

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

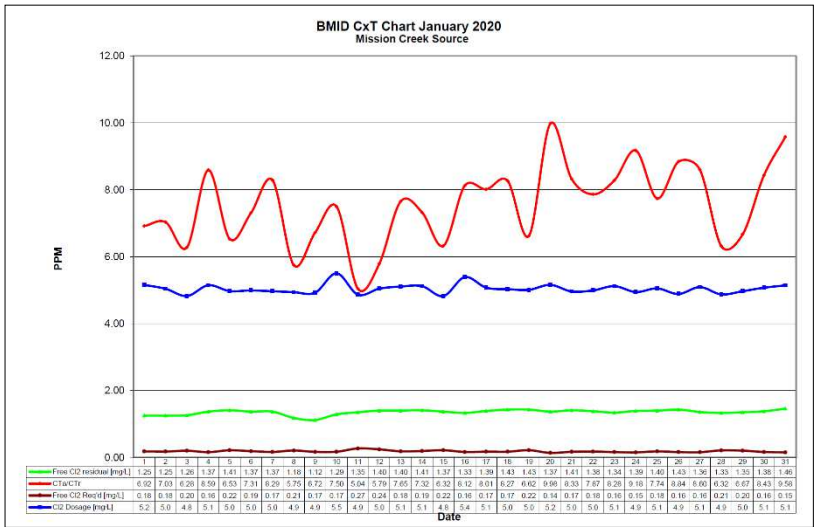

Table 4.2 - CT Table – Mission Creek Source

	BMID January 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
January		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	USGPM	[PPD]
1	7.58	5.2	2381	1.25	1391.0	201.1	6.92	0.18	5.2	2649600	1113	1209	75
2	7.59	5.0	2301	1.25	1439.4	204.6	7.03	0.18	5.0	2649600	1151	1271	77
3	7.60	4.9	2569	1.26	1299.5	207.0	6.28	0.20	4.8	2649600	1031	1416	82
4	7.61	5.3	2065	1.37	1757.8	204.6	8.59	0.16	5.1	2649600	1283	1208	75
5	7.62	5.5	2812	1.41	1328.6	203.4	6.53	0.22	5.0	2649600	942	1315	79
6	7.64	4.9	2335	1.37	1554.6	212.6	7.31	0.19	5.0	2649600	1135	1303	78
7	7.63	5.2	2110	1.37	1720.4	207.5	8.29	0.17	5.0	2649600	1256	1298	78
8	7.62	5.3	2708	1.18	1154.6	200.8	5.75	0.21	4.9	2649600	978	1336	79
9	7.61	4.4	2089	1.12	1420.6	211.3	6.72	0.17	4.9	2649600	1268	1353	80
10	7.60	4.4	2119	1.29	1613.0	215.1	7.50	0.17	5.5	2649600	1250	1173	78
11	7.59	5.2	3473	1.35	1029.9	204.2	5.04	0.27	4.9	2649600	763	1434	84
12	7.59	2.4	2570	1.40	1443.4	249.3	5.79	0.24	5.0	2649600	1031	1324	80
13	7.59	3.8	2143	1.40	1731.0	226.2	7.65	0.18	5.1	2649600	1236	1287	79
14	7.59	3.7	2237	1.41	1670.1	228.0	7.32	0.19	5.1	2649600	1184	1286	79
15	7.59	4.5	2672	1.37	1358.5	214.8	6.32	0.22	4.8	2649600	992	1486	86
16	7.59	4.3	2001	1.33	1761.1	216.8	8.12	0.16	5.4	2649600	1324	1131	73
17	7.59	5.4	2273	1.39	1620.3	202.2	8.01	0.17	5.1	2649600	1166	1315	80
18	7.59	5.4	2256	1.43	1679.5	203.1	8.27	0.17	5.0	2649600	1174	1338	81
19	7.59	5.7	2876	1.43	1317.4	198.9	6.62	0.22	5.0	2649600	921	1357	82
20	7.59	7.4	2071	1.37	1752.8	175.7	9.98	0.14	5.2	2649600	1279	1260	78
21	7.59	6.1	2324	1.41	1607.5	193.1	8.33	0.17	5.0	2649600	1140	1361	81
22	7.59	5.6	2333	1.38	1567.3	199.2	7.87	0.18	5.0	2649600	1136	1325	80
23	7.59	5.9	2207	1.34	1608.7	194.3	8.28	0.16	5.1	2649600	1201	1250	77
24	7.59	6.2	2098	1.39	1755.5	191.3	9.18	0.15	4.9	2649600	1263	1358	81
25	7.59	6.0	2468	1.40	1503.0	194.2	7.74	0.18	5.1	2649600	1074	1281	78
26	7.59	6.2	2230	1.43	1699.1	192.1	8.84	0.16	4.9	2649600	1188	1405	83
27	7.59	5.9	2152	1.36	1674.5	194.7	8.60	0.16	5.1	2649600	1231	1265	77
28	7.59	6.1	2913	1.33	1209.7	191.4	6.32	0.21	4.9	2649600	910	1408	83
29	7.59	6.2	2816	1.35	1270.2	190.5	6.67	0.20	5.0	2649600	941	1343	80
30	7.60	5.3	2124	1.38	1721.5	204.1	8.43	0.16	5.1	2649600	1247	1274	78
31	7.61	6.7	2153	1.46	1796.8	187.5	9.58	0.15	5.1	2649600	1231	1234	76

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	197,737 m^3	100.0%
On-Spec Water:	197,182 m^3	99.72%
Off-Spec Water:	555 m^3	0.281%

BMID's UV Disinfection Treatment Plant was bypassed between January 7 and January 11, 2020 to allow BMID crews to repair a leaking transmission main.
Average monthly chlorine residual before UV Treatment was 1.38 mg/L
The average monthly chlorine residual after UV treatment and re-chlorination was 1.54 mg/L.

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

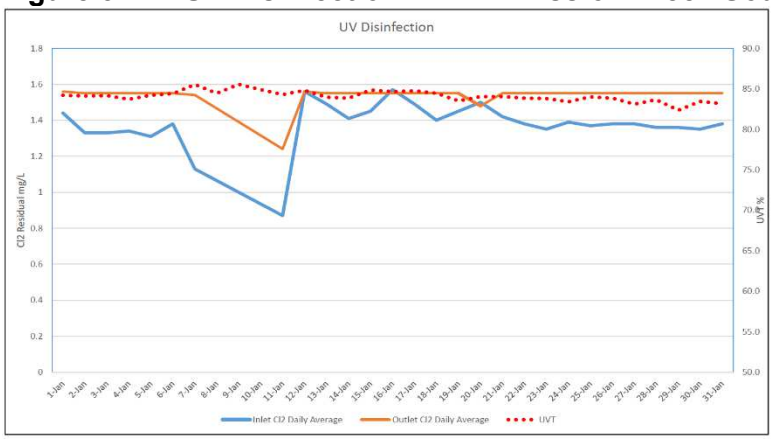

Table 5.2 - UV Disinfection Table – Mission Creek Source

	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	1.44	1.56		84.2		6703	0	0.00%
2-Jan	1.33	1.55		84.1		7052	0	0.00%
3-Jan	1.33	1.55		84.2		7786	0	0.00%
4-Jan	1.34	1.55		83.7		6679	0	0.00%
5-Jan	1.31	1.55		84.2		7265	0	0.00%
6-Jan	1.38	1.55		84.4		7218	0	0.00%
7-Jan	1.13	1.54		85.5		3412	283	8.29%
8-Jan	NA	NA		84.5		0	NA	NA
9-Jan	NA	NA		85.6		0	NA	NA
10-Jan	NA	NA		84.9		0	NA	NA
11-Jan	0.87	1.24		84.3		5223	272	5.20%
12-Jan	1.56	1.56		84.8		7318	0	0.00%
13-Jan	1.49	1.55		84.0		7119	0	0.00%
14-Jan	1.41	1.55		83.9		7142	0	0.00%
15-Jan	1.45	1.55		84.9		8192	0	0.00%
16-Jan	1.57	1.55		84.7		6289	0	0.00%
17-Jan	1.49	1.55		84.8		7298	0	0.00%
18-Jan	1.4	1.55		84.5		7408	0	0.00%
19-Jan	1.45	1.55		83.5		7515	0	0.00%
20-Jan	1.5	1.48		84.0		6996	0	0.00%
21-Jan	1.42	1.55		84.1		7564	0	0.00%
22-Jan	1.38	1.55		83.9		7349	0	0.00%
23-Jan	1.35	1.55		83.8		6950	0	0.00%
24-Jan	1.39	1.55		83.4		7519	0	0.00%
25-Jan	1.37	1.55		84.0		7099	0	0.00%
26-Jan	1.38	1.55		83.9		7798	0	0.00%
27-Jan	1.38	1.55		83.1		7029	0	0.00%
28-Jan	1.36	1.55		83.7		7855	0	0.00%
29-Jan	1.36	1.55		82.4		7448	0	0.00%
30-Jan	1.35	1.55		83.5		7084	0	0.00%
31-Jan	1.38	1.55		83.2		6876	0	0.00%
Average	1.38	1.54		84.1	Total	197182	555	0.281%

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

	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
2-Dec-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9-Dec-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-Dec-19	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17-Dec-19	-	-	-	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23-Dec-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-Dec-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6-Jan-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13-Jan-20	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0
15-Jan-20	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-
20-Jan-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-Jan-20	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

Location	THM (mg/L)	HAA (mg/L)
Kirschner Reservoir		0.411
2921 Belgo Rd	0.1310	
Pearson School	0.1140	0.385
3976 Highway 97	0.1110	

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

	1/6/2020				1/14/2020				1/20/2020				1/27/2020			
Location	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres									0.89	8.2	-	X				
170 Kneller Rd									0.82	8.2	-	X				
2105 Morrison					0.57	9.2	-	X								
Staymen Rd					0.50	9.2	-	X								
260 Campion Rd	0.29	9.6	-	X									0.70	10.2	-	X
Fenwick Rd	0.12	8.4	-	X									0.30	9.6	-	X
Solly Ct									1.03	10.2	-	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) = 9
- Total tests sampled by BMID and tested by Caro Labs = 40
- Total tests sampled in BMID treated distribution system = 49 (Zero Positive Samples)