



## MONTHLY REPORTING PERIOD - JANUARY, 2019

### 1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in January, 2019. Documentation and figures are provided on the following pages to support this submission.

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	60,097,000	227.47
Well 4	2,119,000	8.02
Well 5	566,760	0.25
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	62,282,760	235.78

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 slowed down to minimal movement through January. Groundwater monitoring is showing a sharp decrease in groundwater levels since the fall. The hillside continues to move very slowly and will be continuously monitored going forward. Additionally, new groundwater monitoring stations are being installed during January and February along with well points to control the groundwater level;
2. Turbidity levels at the Distribution Intake peaked at 0.49 NTU on January 10. Average turbidity for January was 0.38 NTU;
3. The highest monthly turbidity level recorded at the first customer (Booster #1) was 0.45 NTU on January 8, 2019. Average monthly turbidity was 0.37 NTU for January;
4. BMID's Ultraviolet Treatment Facility treated 228,642 m<sup>3</sup> of water, with only 0.12% which was Out-of-Spec. Average UVT% was 84.7%. The average daily maximum Conductivity was 121.75 uS/cm. The average inlet chlorine residual was 1.71 mg/L compared to an average of 1.51 mg/L for the outlet post UV treatment;
5. Mission Creek had average flows for January as the upper watershed runoff was reduced due to freezing conditions;
6. BMID's Scotty Creek source, used for irrigation in the north-end, was shut off for the year on August 24 2018;
7. Well # 4 is currently the primary source of water for the north-end. Well #5 was placed on stand-by until spring;
8. Well #6 supplies irrigation water to the north-end of the system and was placed on stand-by until spring;
9. *E.Coli* levels at Mission Creek's Point of Diversion had a high count of 590 on January 23. However, this sample was likely a result of human error. The site was retested on January 25 where the results were normal at 7 *E.Coli* coliforms present;
10. The remainder of BMID's *E.Coli* levels at Mission Creek's Point of Diversion averaged 1.4 counts per samples after the January 23 sample was removed;

11. *E.Coli* levels at the distribution system intake, down-stream of the WTP, prior to disinfection, had zero counts on all but one sample throughout January, 2019. A peak count of 2 was sampled on January 28;
12. No *E.Coli* or *Total Coliforms* were found in treated water in the distribution system through third-party analysis. In addition, no positive bacteria tests were found from the in-house presence-absence tests during routine testing;
13. The WTP remained in stand-by mode throughout January. The plant remains capable of treating water if required due to poor water quality in Mission Creek;

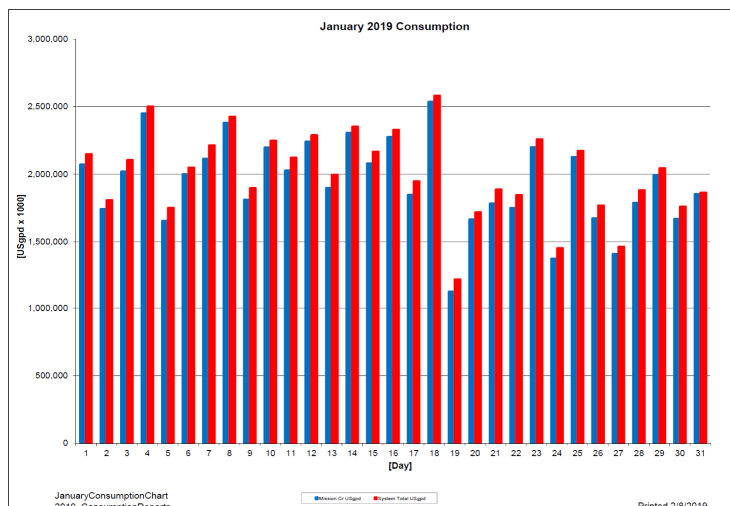
## 1.0 FLOWS - JANUARY, 2019

Maximum Daily Flow was on January 8, 2019 at 2,279,435 US gallons (8.64 ML)

Minimum Daily Flow was on January 4, 2019 at 1,469,687 US gallons (5.56 ML)

Mission Creek provided 96% of domestic flow throughout January.

**Figure 1.1 - Domestic Water System Flow**



**Table 1.2 - January 2019 - Daily Consumption Report**

Year	Mission Cr	Well #4	Well #5	System Total	System Total
2019	Usgrpd	Usgrpd	Usgrpd	Usgrpd	ML/Day
1-Jan	2,074,000	76,000	0.0	2,150,000	8.14
2-Jan	1,743,000	66,000	0.0	1,809,000	6.85
3-Jan	2,021,000	85,000	0.0	2,106,000	7.97
4-Jan	2,451,000	52,000	0.0	2,503,000	9.47
5-Jan	1,656,000	96,000	0.0	1,752,000	6.63
6-Jan	2,001,000	49,000	0.0	2,050,000	7.76
7-Jan	2,116,000	98,000	0.0	2,214,000	8.38
8-Jan	2,382,000	45,000	0.0	2,427,000	9.19
9-Jan	1,812,000	86,000	0.0	1,898,000	7.18
10-Jan	2,199,000	50,000	0.0	2,249,000	8.51
11-Jan	2,029,000	95,000	0.0	2,124,000	8.04
12-Jan	2,242,000	48,000	0.0	2,290,000	8.67
13-Jan	1,899,000	98,000	0.0	1,997,000	7.56
14-Jan	2,307,000	46,000	0.0	2,353,000	8.91
15-Jan	2,081,000	87,000	0.0	2,168,000	8.21
16-Jan	2,277,000	53,000	0.0	2,330,000	8.82
17-Jan	1,849,000	100,000	0.0	1,949,000	7.38
18-Jan	2,538,000	44,000	0.0	2,582,000	9.77
19-Jan	1,124,000	91,000	0.0	1,215,000	4.60
20-Jan	1,666,000	53,000	0.0	1,719,000	6.51
21-Jan	1,784,000	104,000	0.0	1,888,000	7.15
22-Jan	1,751,000	95,000	0.0	1,846,000	6.99
23-Jan	2,201,000	0	58,104.0	2,259,104	8.55
24-Jan	1,375,000	70,000	8,656.0	1,453,656	5.50
25-Jan	2,128,000	46,000	0.0	2,174,000	8.23
26-Jan	1,675,000	94,000	0.0	1,769,000	6.70
27-Jan	1,410,000	54,000	0.0	1,464,000	5.54
28-Jan	1,789,000	94,000	0.0	1,883,000	7.13
29-Jan	1,993,000	53,000	0.0	2,046,000	7.74
30-Jan	1,670,000	91,000	0.0	1,761,000	6.67
31-Jan	1,854,000	10,300	0.0	1,864,300	7.06
Totals Usgrpd	60,097,000	2,119,000	66,760	62,282,760	235.78
Totals ML	227.47	8.02	0.25		
Avg's	1,941,433	7.35		2,014,292	7.62
Max	2,538,000	9.61		2,582,000	9.77
Min	1,124,000	4.25		1,215,000	4.60

## 2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

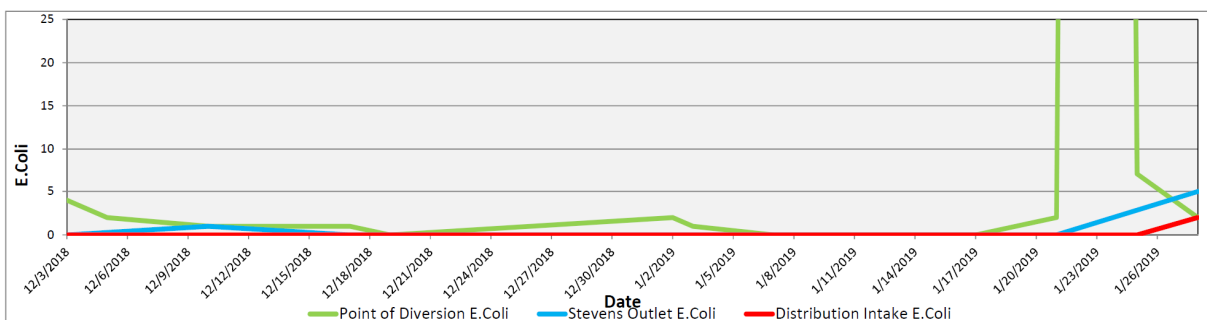
Raw water samples were taken at three points at BMID settling ponds before chlorination

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 E.Coli readings clearly show the effectiveness in risk reduction from the Water Treatment Plant and extended settling times in Stevens and Hadden Reservoirs.

**Figure 2.1 - Raw Water *E.Coli* Readings (CARO Lab results) December-January 2018/2019**



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

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
3-Dec-18	4	0	0
5-Dec-18	2	0	0
10-Dec-18	1	1	0
12-Dec-18	1	0	0
17-Dec-18	1	0	0
19-Dec-18	0	0	0
2-Jan-19	2	0	0
3-Jan-19	1	0	0
7-Jan-19	0	0	0
9-Jan-19	0	0	0
14-Jan-19	0	0	0
17-Jan-19	0	0	0
21-Jan-19	2	0	0
23-Jan-19	590	0	0
25-Jan-19	7	0	0
28-Jan-19	2	5	2

Stevens or WTP Intake (Raw) - Sampling of raw water at intake from Mission Creek

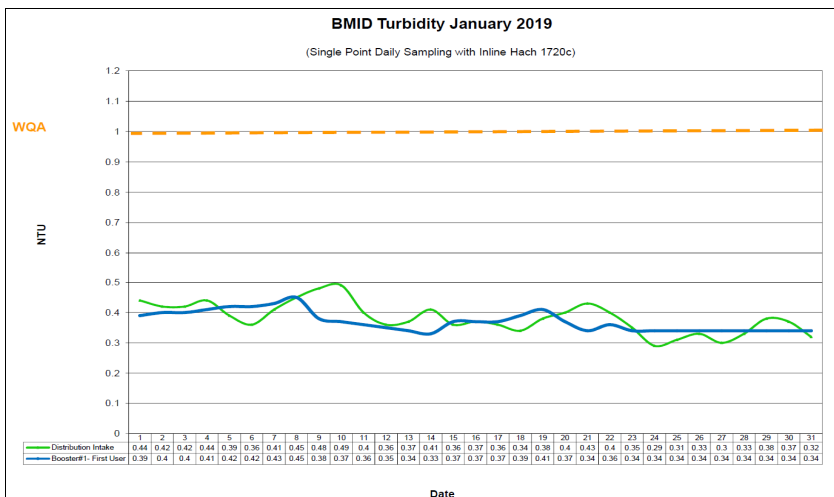
Stevens Outlet (Raw) - Sampling point after exiting 142,000 m<sup>3</sup> 1<sup>st</sup> upper balancing reservoir (Stevens Res.)

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

Turbidity for the Mission Creek source was measured at Booster Station No. 1 on Gallagher’s Road, the first-customer, through January 2019. The highest turbidity recorded at this location was 0.45 NTU on January 8. The average turbidity for the month was 0.37 NTU during January.

**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 2019		
Date	Distribution Intake	Booster#1- First User
	Daily Average NTU	Daily Average NTU
1	0.44	0.39
2	0.42	0.40
3	0.42	0.40
4	0.44	0.41
5	0.39	0.42
6	0.36	0.42
7	0.41	0.43
8	0.45	0.45
9	0.48	0.38
10	0.49	0.37
11	0.40	0.36
12	0.36	0.35
13	0.37	0.34
14	0.41	0.33
15	0.36	0.37
16	0.37	0.37
17	0.36	0.37
18	0.34	0.39
19	0.38	0.41
20	0.40	0.37
21	0.43	0.34
22	0.40	0.36
23	0.35	0.34
24	0.29	0.34
25	0.31	0.34
26	0.33	0.34
27	0.30	0.34
28	0.33	0.34
29	0.38	0.34
30	0.37	0.34
31	0.32	0.34
AVG	0.38	0.37

### 4.0 CHLORINE CONTACT TIME

Temperature, pH, current 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, 2019.

Figure 4.1 - CT Trending – BMID Mission Creek Source – January 2019

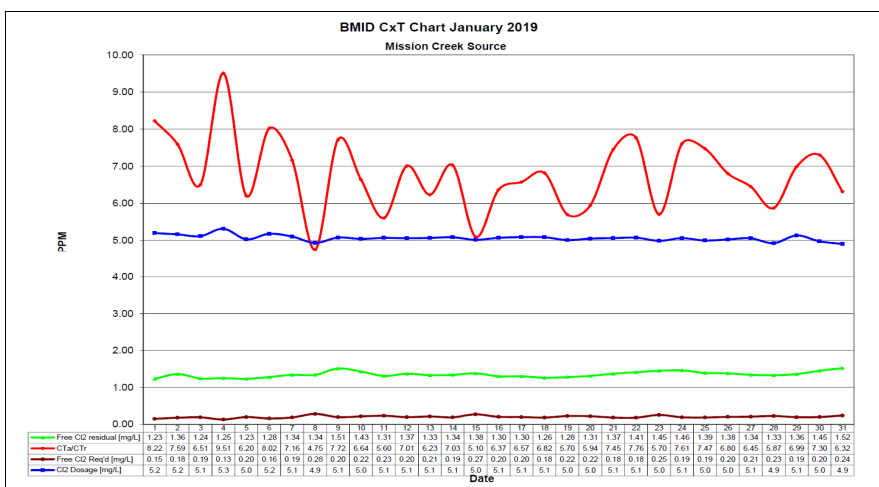


Table 4.2 - CT Table – Mission Creek Source

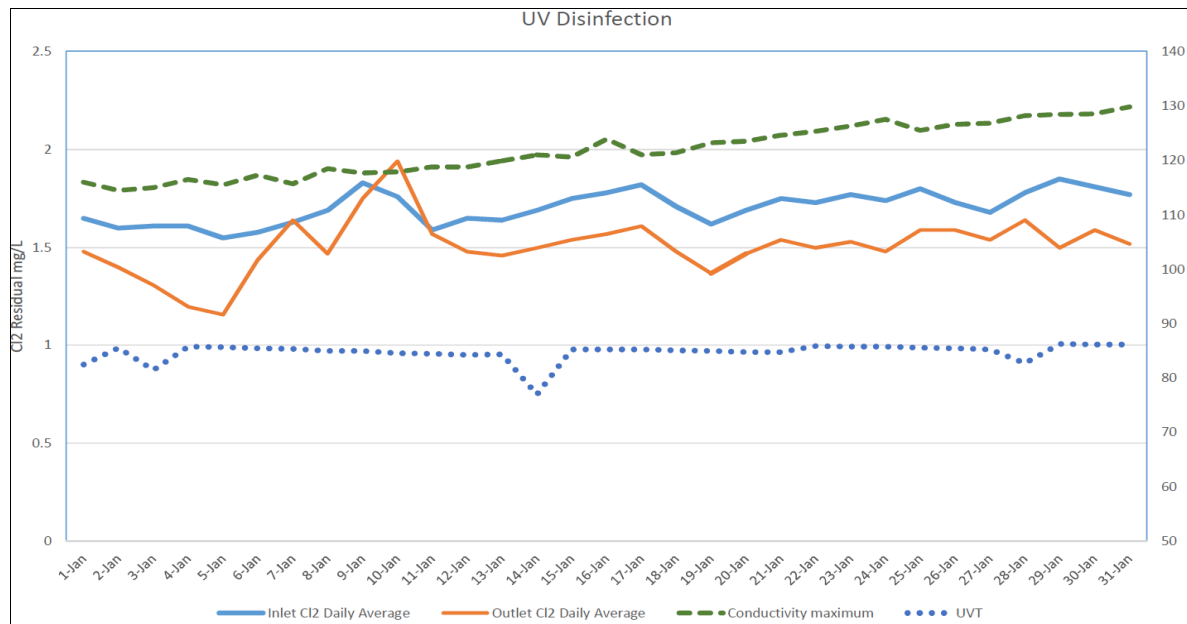
BMID January 2019 Mission Creek Source													
DATE	pH	TEMP	PEAK	Free Cl2	CT	CT	CTa/CTr	Free Cl2	Cl2	VOLUME	TIME	FLOW	CL2 DOSAGE
January	Average	(lowest)	FLOW	residual	achieved	req'd		Req'd	Dosage	TOTAL		Dily Average	Average
		[°C]	[USgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	USGPM	[PPD]
1	7.64	3.5	1719	1.23	1895.9	230.6	8.22	0.15	5.2	2649600	1541	1072.07	67.0
2	7.65	3.5	2021	1.36	1783.0	234.9	7.59	0.18	5.2	2649600	1311	1123.10	69.7
3	7.65	3.5	2180	1.24	1507.1	231.7	6.51	0.19	5.1	2649600	1215	1196.94	73.6
4	7.65	3.5	1502	1.25	2205.1	231.9	9.51	0.13	5.3	2649600	1764	983.02	62.8
5	7.66	3.5	2263	1.23	1440.1	232.2	6.20	0.20	5.0	2649600	1171	1324.62	80.1
6	7.66	3.2	1773	1.28	1912.9	238.5	8.02	0.16	5.2	2649600	1494	1094.01	68.1
7	7.67	3.2	2057	1.34	1726.0	241.0	7.16	0.19	5.1	2649600	1288	1214.36	74.5
8	7.67	2.8	3016	1.34	1177.2	247.8	4.75	0.28	4.9	2649600	879	1563.29	92.7
9	7.68	3.0	2077	1.51	1926.3	249.6	7.72	0.20	5.1	2649600	1276	1212.53	74.0
10	7.68	3.2	2336	1.43	1622.0	244.2	6.64	0.22	5.0	2649600	1134	1221.43	74.0
11	7.69	3.1	2543	1.31	1364.9	243.5	5.60	0.23	5.1	2649600	1042	1248.86	76.1
12	7.69	3.1	2113	1.37	1717.9	245.2	7.01	0.20	5.1	2649600	1254	1240.12	75.4
13	7.68	3.1	2325	1.33	1515.7	243.2	6.23	0.21	5.1	2649600	1140	1247.86	76.0
14	7.67	3.1	2082	1.34	1705.3	242.7	7.03	0.19	5.1	2649600	1273	1208.99	73.9
15	7.65	2.9	2923	1.38	1250.9	245.4	5.10	0.27	5.0	2649600	906	1321.55	79.7
16	7.65	2.8	2209	1.30	1559.3	244.9	6.37	0.20	5.1	2649600	1199	1217.47	74.2
17	7.67	2.9	2139	1.30	1610.3	244.9	6.57	0.20	5.1	2649600	1239	1198.39	73.3
18	7.69	3.0	2008	1.26	1662.6	243.8	6.82	0.18	5.1	2649600	1320	1192.62	72.9
19	7.70	3.2	2461	1.28	1378.1	241.9	5.70	0.22	5.0	2649600	1077	1316.96	79.3
20	7.70	2.9	2357	1.31	1472.6	247.8	5.94	0.22	5.0	2649600	1124	1280.39	77.7
21	7.71	2.8	1933	1.37	1877.9	252.1	7.45	0.18	5.1	2649600	1371	1245.53	75.8
22	7.71	2.8	1901	1.41	1965.2	253.2	7.76	0.18	5.1	2649600	1394	1231.31	75.1
23	7.71	2.5	2595	1.45	1480.5	259.6	5.70	0.25	5.0	2649600	1021	1312.05	78.7
24	7.72	2.8	1991	1.46	1943.0	255.4	7.61	0.19	5.1	2649600	1331	1200.00	73.0
25	7.72	2.8	1944	1.39	1894.5	253.5	7.47	0.19	5.0	2649600	1363	1278.23	76.8
26	7.72	2.8	2122	1.38	1723.1	253.2	6.80	0.20	5.0	2649600	1249	1236.46	74.7
27	7.73	2.9	2191	1.34	1620.5	251.3	6.45	0.21	5.1	2649600	1209	1191.00	72.4
28	7.73	2.8	2374	1.33	1484.4	252.7	5.87	0.23	4.9	2649600	1116	1381.52	81.8
29	7.74	2.6	1999	1.36	1802.6	258.0	6.99	0.19	5.1	2649600	1325	1097.19	67.7
30	7.74	2.6	2020	1.45	1901.9	260.5	7.30	0.20	5.0	2649600	1312	1294.07	77.4
31	7.74	2.5	2413	1.52	1669.0	264.2	6.32	0.24	4.9	2649600	1098	1311.27	77.3

## 5.0 ULTRAVIOLET DISINFECTION

Total Water Treated	228,638	100%
On-Spec Water	228,355 m <sup>3</sup>	99.88%
Off-Spec Water	283 m <sup>3</sup>	0.12%

Average monthly chlorine residual before UV Treatment was 1.71 mg/L compared to 1.51 mg/L after UV disinfection.

**Figure 5.1 - UV Disinfection – BMID Mission Creek Source – January 2019**



**Table 5.2 - UV Disinfection Table – Mission Creek Source**

	Inlet Cl2 Daily Average	Outlet Cl2 Daily Average	Conductivity maximum	UVT		In Spec Water Volume	Off Spec Water Volume	Off Spec % of Water Volume
Date	mg/L	mg/L	uS/cm	% T		Cubic Meters	Cubic Meters	Percentage
1-Jan	1.65	1.48	116	82.4		5872.3	0.9	0.02%
2-Jan	1.6	1.4	114.5	85.5		5344.9	51.9	0.97%
3-Jan	1.61	1.31	115	81.4		12914	98.2	0.76%
4-Jan	1.61	1.2	116.5	85.7		10823.9	4.8	0.04%
5-Jan	1.55	1.16	115.5	85.6		8826.3	1.7	0.02%
6-Jan	1.58	1.44	117.3	85.4		5980.7	0.8	0.01%
7-Jan	1.63	1.64	115.7	85.3		6626.5	0.4	0.01%
8-Jan	1.69	1.47	118.5	84.9		8530	0.5	0.01%
9-Jan	1.83	1.75	117.7	84.9		6632.7	0.9	0.01%
10-Jan	1.76	1.94	117.9	84.5		6666.9	21.8	0.33%
11-Jan	1.59	1.57	118.8	84.4		6843.3	1.3	0.02%
12-Jan	1.65	1.48	118.8	84.2		6789.1	0.8	0.01%
13-Jan	1.64	1.46	119.9	84.3		6803.3	2	0.03%
14-Jan	1.69	1.5	121	76.9		6618.2	3.1	0.05%
15-Jan	1.75	1.54	120.6	85.2		7232.1	29.2	0.40%
16-Jan	1.78	1.57	123.9	85.2		6641.7	2.7	0.04%
17-Jan	1.82	1.61	121	85.2		6565.2	0.1	0.00%
18-Jan	1.71	1.48	121.4	85.0		6533.5	0	0.00%
19-Jan	1.62	1.37	123.2	84.9		7190	0	0.00%
20-Jan	1.69	1.47	123.5	84.7		7008.7	0	0.00%
21-Jan	1.75	1.54	124.6	84.7		6706.2	0	0.00%
22-Jan	1.73	1.5	125.3	85.8		6726.9	0	0.00%
23-Jan	1.77	1.53	126.3	85.7		7167.9	0	0.00%
24-Jan	1.74	1.48	127.5	85.7		6574.3	0	0.00%
25-Jan	1.8	1.59	125.5	85.5		11318	0	0.00%
26-Jan	1.73	1.59	126.6	85.4		6771.2	0	0.00%
27-Jan	1.68	1.54	126.8	85.2		6515.1	0	0.00%
28-Jan	1.78	1.64	128.2	82.7		9854.4	58.7	0.60%
29-Jan	1.85	1.5	128.4	86.2		6001.2	2.9	0.05%
30-Jan	1.81	1.59	128.5	86.1		7107	0	0.00%
31-Jan	1.77	1.52	129.8	86.1		7169.7	0	0.00%
<b>Average</b>	<b>1.71</b>	<b>1.51</b>	<b>121.75</b>	<b>84.7</b>	<b>Total</b>	<b>228355.2</b>	<b>282.7</b>	<b>0.12%</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
- 45 samples were found to be absent of Coliforms.
- 45 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	
	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
3-Dec-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-Dec-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17-Dec-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Jan-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-Jan-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Jan-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-Jan-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Jan-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Table 6.2 – Disinfection By-Products - THM and HAA Results**

	19-Nov-18	12-Dec-18	11-Jan-19
THM mg/L	0.132	0.0974	0.131
HAA mg/L	0.0852	0.037	0.0359

### In-House Analysis (BMID Staff)

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

**Table 6.3 - BMID In-house Testing – Presence Absence**

Location	1/2/2019				1/7/2019				1/14/2019				1/21/2019				1/28/2019			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres									0.96	4.2	-	X								
170 Kneller Rd									0.92	7.2	-	X								
2105 Morrison					0.22	4.8	-	X									0.49	7.0	-	X
Staymen Rd					0.48	4.2	-	X									0.74	4.8	-	X
260 Campion Rd	-	-	-	-									0.45	7.6	-	X				
Fenwick Rd	0.38	8.0	-	X									0.28	7.4	-	X				
Solly Ct									0.92	7.4	-	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) = 10
- Total tests sampled by BMID and tested by Caro Labs = 45
- Total tests sampled in BMID treated distribution system = 55 (Zero Positive Samples)