



## MONTHLY REPORTING PERIOD - JANUARY, 2023

### SUMMARY

This document provides a summary of the water quality information collected by BMID in January 2023. Documentation and figures are provided on the following pages to support this submission.

### WATER SUPPLY & USAGE SUMMARY

1. Water usage data for January is as follows:

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	66,444,753	251.49
Well 4	2,803,900	10.61
Well 5	0	0
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	69,248,653	262.1

2. BMID's control gates on the high-elevation reservoirs are closed for the winter. The gates will remain closed until summer of 2023;
3. BMID's Scotty Creek source supplying irrigation water to the north-end of the service area, provided water from May 27<sup>th</sup>, 2022 to September 9<sup>th</sup> 2022 when irrigation demands in the north-end reduced from peak flows experienced earlier in summer. The Scotty Creek source will resume service in the summer of 2023;
4. Well #4, used as a primary source for domestic water in the north-end of the distribution system, was in operation throughout the month of January;
5. Well #5, used as the primary domestic water source in the north-end of the system for both irrigation and domestic consumption during the summer months, was placed in stand-by mode on October 12<sup>th</sup> and will remain in stand-by until flows increase in the spring of 2023;
6. Well #6, which supplies water to the north-end irrigation distribution system, ran from May 26 to September 25, 2022. Well #6 will remain in stand-by mode until irrigation demands increase in the spring/summer of 2023;
7. The UV plant experienced higher than normal flows on January 3-4 and January 19-20. Flows were high on these days due to BMID crews refilling a transmission main after repairs and not as a result of increased consumption;
8. 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 continues to be monitored. It is currently stable and is not moving;

## WATER QUALITY SUMMARY

1. Full parameter samples were taken on January 16<sup>th</sup> on BMID's active water sources (Mission Creek via Pearson School sample station and Well #4). These samples provide BMID with additional chemical and physical information and are taken twice per year;
2. The WTP operated from February 8<sup>th</sup>, 2022 until October 31, 2022. The WTP was then placed in by-pass mode for the winter. However, the warmer weather in January 2023, led to a rise in turbidity in Mission Creek. As a consequence, the WTP resumed operations on an as needed bases. The WTP ran for 15 days throughout January;
3. Raw water turbidity levels in Mission Creek peaked at 2.72 NTU (average daily turbidity) on January 18<sup>th</sup>. Average daily raw water turbidity for January was 1.45 NTU at the Mission Creek intake;
4. The highest turbidity level at the Distribution Intake (end of Hadden Reservoir) was 0.50 NTU on January 30<sup>th</sup>, 2023. Average settled water turbidity for January was 0.40 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
5. The highest turbidity level at the first customer (Booster #1) was 0.55 NTU on January 6<sup>th</sup>. Average monthly turbidity at the first customer was 0.37 NTU;
6. The highest turbidity daily average at the UV plant was 0.49 NTU on January 16<sup>th</sup>. Average monthly turbidity at the UV plant was 0.43 NTU throughout January;
7. BMID's Ultraviolet Treatment Facility treated 251,520 m<sup>3</sup> of water, 1,238 m<sup>3</sup> of which was "Off-Spec" (0.495%). The off-spec incidences took place on January 3-4 and January 19-20 when one of the UV cells was drained as part of the maintenance work on the transmission main. The empty cell led to a programming issue that registered as an off-spec reading while the cell was in bypass. The UV plant continued to function properly throughout the event as there are multiple cells capable of treating water independently of one another;
8. Regarding microbiological readings, the Mission Creek watershed was frozen over throughout the month of January resulting in a greater groundwater influence on the raw water quality. There was a notable drop in *E.Coli* and *Total Coliform* levels from prior months readings;
9. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had low counts for January. The January 16<sup>th</sup> sample had the peak monthly count of 3 coliforms. The average monthly *E.Coli* was 1.0, based on 5 samples;
10. *E.Coli* levels in the raw water at the water distribution system intake at the east end of Hadden Reservoir, immediately prior to disinfection, had zero counts on all 5 samples. Reduction in *E.Coli* levels is due to the settling of particles as water passes through Stevens and Hadden Reservoirs;
11. No *E.Coli* or *Total Coliforms* were found in treated water in the distribution system through third-party analysis. In addition, zero positive samples were detected by BMID's in-house presence/absence testing throughout January;

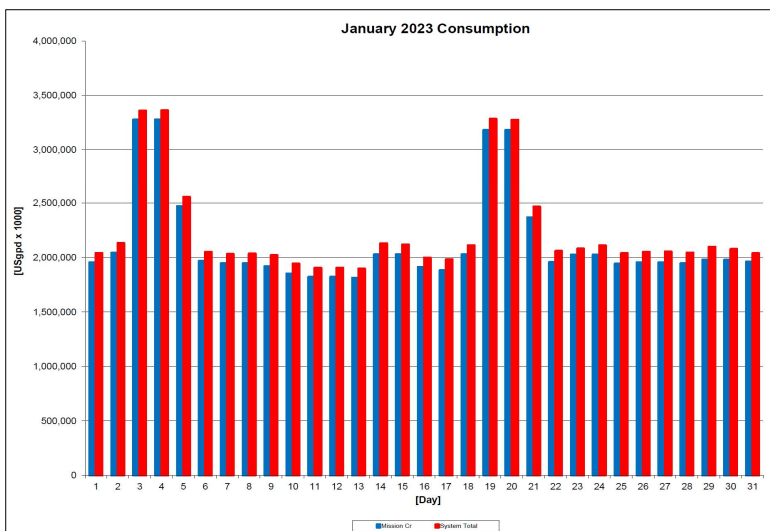
## 1.0 FLOWS - JANUARY, 2023

The Maximum Daily Flow was on January 3<sup>rd</sup>, at 3,358,920 US gallons (12.71 ML)

The Minimum Daily Flow was on January 13<sup>th</sup>, at 1,896,992 US gallons (7.18 ML)

Mission Creek provided just under 96% of domestic flow supplied in January.

**Figure 1.1 - Domestic Water System Flow**



**Table 1.2 - January 2023 - Daily Consumption Report**

Year	Mission Cr	Well #4	Well #5	Well #6	System Total	System Total
2023	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Jan	1,955,375	85,327	-	-	2,040,702	7.72
2-Jan	2,042,340	89,025	-	-	2,131,365	8.07
3-Jan	3,277,027	81,893	-	-	3,358,920	12.71
4-Jan	3,277,080	84,534	-	-	3,361,614	12.72
5-Jan	2,471,329	83,742	-	-	2,555,071	9.67
6-Jan	1,967,659	83,214	-	-	2,050,872	7.76
7-Jan	1,945,600	84,799	-	-	2,030,399	7.69
8-Jan	1,945,680	89,025	-	-	2,034,705	7.70
9-Jan	1,919,474	101,970	-	-	2,021,443	7.65
10-Jan	1,852,665	90,082	-	-	1,942,747	7.35
11-Jan	1,821,149	82,685	-	-	1,903,834	7.21
12-Jan	1,821,228	84,534	-	-	1,905,763	7.21
13-Jan	1,812,986	84,006	-	-	1,896,992	7.18
14-Jan	2,028,048	101,177	-	-	2,129,226	8.06
15-Jan	2,028,101	90,610	-	-	2,118,712	8.02
16-Jan	1,912,051	85,855	-	-	1,997,906	7.56
17-Jan	1,882,305	100,385	-	-	1,982,689	7.50
18-Jan	2,027,177	85,063	-	-	2,112,239	7.99
19-Jan	3,181,080	102,498	-	-	3,283,578	12.43
20-Jan	3,181,133	93,516	-	-	3,274,649	12.39
21-Jan	2,367,774	98,007	-	-	2,465,781	9.33
22-Jan	1,956,431	102,498	-	-	2,058,929	7.79
23-Jan	2,025,935	54,155	-	-	2,080,090	7.87
24-Jan	2,026,014	84,006	-	-	2,110,020	7.99
25-Jan	1,942,404	96,950	-	-	2,039,354	7.72
26-Jan	1,955,137	96,158	-	-	2,051,295	7.76
27-Jan	1,955,216	98,535	-	-	2,053,752	7.77
28-Jan	1,946,419	98,007	-	-	2,044,426	7.74
29-Jan	1,979,097	117,027	-	-	2,096,125	7.93
30-Jan	1,979,150	98,007	-	-	2,077,157	7.86
31-Jan	1,961,688	76,609	-	-	2,038,298	7.71
Totals Usgpd	66,444,753	2,803,900	0	0	69,248,653	262.11
Totals ML	251.49	10.61	0.00	0.00		
Avg's	2,149,435	8.14			2,240,345	8.48
Max	3,277,080	12.40			3,361,614	12.72
Min	1,812,986	6.86			1,896,992	7.18

## 2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

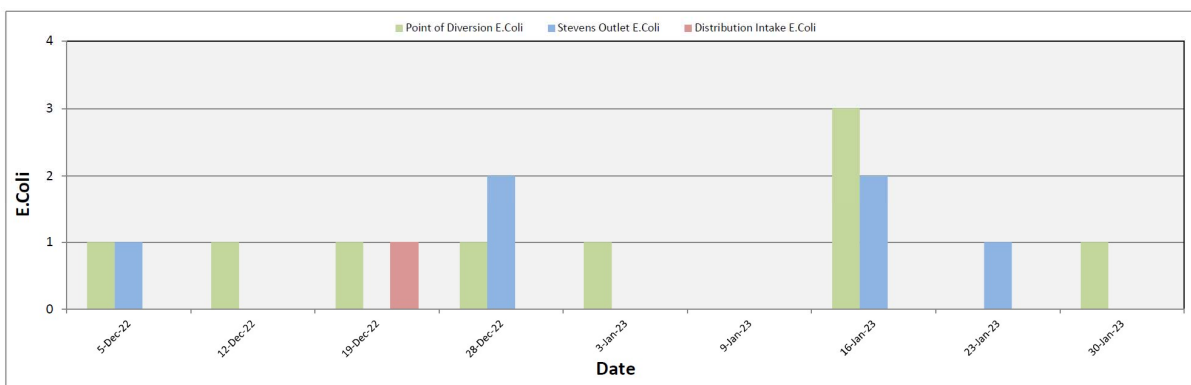
Raw water samples were taken at three points at BMID settling ponds before chlorination

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 watershed is frozen over with snow cover and no overland flow to the creeks in the watershed. The creek flow at this time of year is highly influenced by groundwater contributions. For this reason, coliform and *E.Coli* counts are lower than in prior months.

**Figure 2.1 - Raw Water *E.Coli* Readings (CARO Lab results) December 2022 - January 2023**



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

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
5-Dec-22	1	1	0
12-Dec-22	1	0	0
19-Dec-22	1	0	1
28-Dec-22	1	2	0
3-Jan-23	1	0	0
9-Jan-23	0	0	0
16-Jan-23	3	2	0
23-Jan-23	0	1	0
30-Jan-23	1	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.)

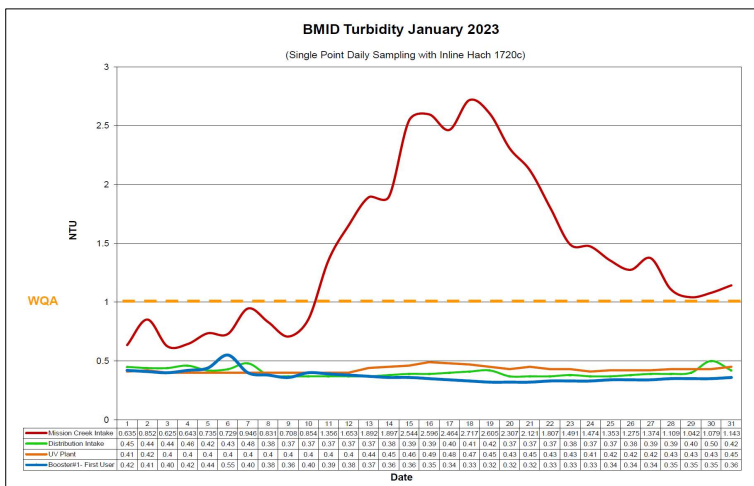
(Hadden Outlet = Distribution Intake - Point of Disinfection)

### 3.0 RAW AND TREATED WATER TURBIDITY

Through January 2023, 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 0.55 NTU on January 6<sup>th</sup>, 2023. The lowest turbidity level was 0.32 NTU and the average turbidity was 0.37 NTU.

The distribution intake is where the water leaves Hadden Reservoir and enters a closed conduit. 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 On-Line Turbidity Analysers**

Turbidity Point Sampling for January 2023				
Date	Mission Creek Intake	Distribution Intake	Booster#1- First User	UV Plant
	Daily Average [NTU]	Daily Average NTU	Daily Average NTU	Daily Average [NTU]
1	0.64	0.45	0.42	0.41
2	0.85	0.44	0.41	0.42
3	0.63	0.44	0.40	0.40
4	0.64	0.46	0.42	0.40
5	0.74	0.42	0.44	0.40
6	0.73	0.43	0.55	0.40
7	0.95	0.48	0.40	0.40
8	0.83	0.38	0.38	0.40
9	0.71	0.37	0.36	0.40
10	0.85	0.37	0.40	0.40
11	1.36	0.37	0.39	0.40
12	1.65	0.37	0.38	0.40
13	1.89	0.37	0.37	0.44
14	1.90	0.38	0.36	0.45
15	2.54	0.39	0.36	0.46
16	2.60	0.39	0.35	0.49
17	2.46	0.40	0.34	0.48
18	2.72	0.41	0.33	0.47
19	2.61	0.42	0.32	0.45
20	2.31	0.37	0.32	0.43
21	2.12	0.37	0.32	0.45
22	1.81	0.37	0.33	0.43
23	1.49	0.38	0.33	0.43
24	1.47	0.37	0.33	0.41
25	1.35	0.37	0.34	0.42
26	1.28	0.38	0.34	0.42
27	1.37	0.39	0.34	0.42
28	1.11	0.39	0.35	0.43
29	1.04	0.40	0.35	0.43
30	1.08	0.50	0.35	0.43
31	1.14	0.42	0.36	0.45
AVG	1.45	0.40	0.37	0.43



### 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, 2023.

Figure 4.1 - CT Trending – BMID Mission Creek Source – January 2023

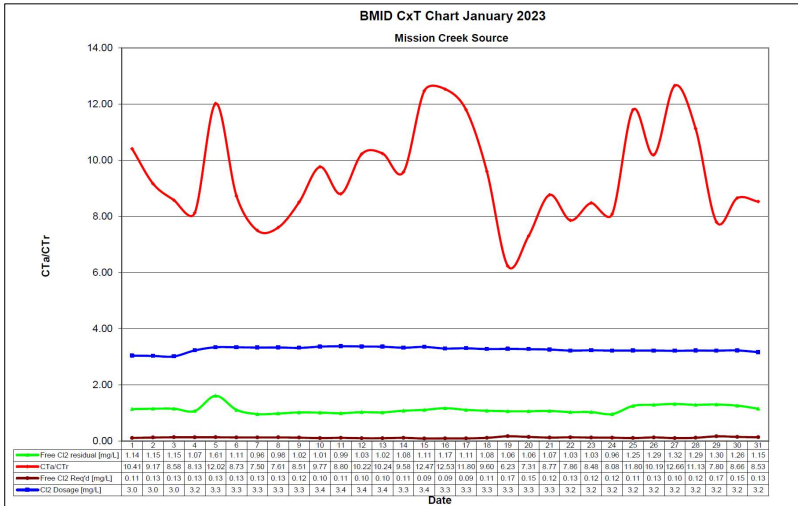


Table 4.2 - CT Table – Mission Creek Source

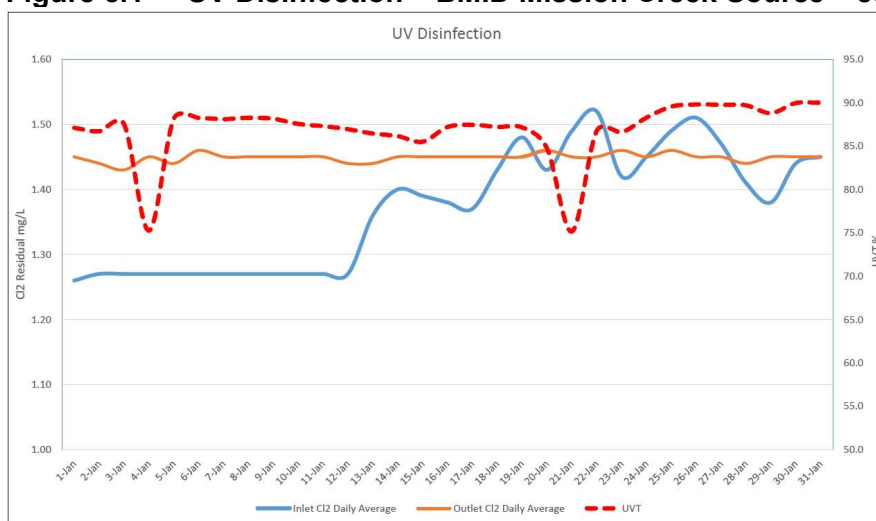
BMID January 2023 Mission Creek Source													
DATE	pH	TEMP	PEAK	Free Cl <sub>2</sub>	CT	CT	CTa/CTr	Free Cl <sub>2</sub>	Cl <sub>2</sub>	VOLUME	TIME	FLOW	CL <sub>2</sub> DOSAGE
	Average	(Present)	FLOW	residual	achieved	req'd		Req'd	Dosage	TOTAL		Daily Average	Average
January		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	USGPM	[PPD]
1	7.39	7.5	1837	1.14	1644.2	157.9	10.41	0.11	3.0	2649600	1442	1349	49
2	7.38	6.2	1927	1.15	1580.9	172.4	9.17	0.13	3.0	2649600	1375	1438	52
3	7.42	5.3	1907	1.15	1598.0	186.2	8.58	0.13	3.0	2649600	1390	1421	52
4	7.45	5.3	1873	1.07	1513.9	186.2	8.13	0.13	3.2	2649600	1415	1403	54
5	7.46	5.4	1798	1.61	2372.3	197.4	12.02	0.13	3.3	2649600	1473	1387	56
6	7.45	5.3	1800	1.11	1634.1	187.3	8.73	0.13	3.3	2649600	1472	1373	55
7	7.45	5.7	1903	0.96	1336.7	178.2	7.50	0.13	3.3	2649600	1392	1377	55
8	7.46	5.9	1929	0.98	1346.1	176.9	7.61	0.13	3.3	2649600	1374	1358	54
9	7.16	6.1	2021	1.02	1337.3	157.2	8.51	0.12	3.3	2649600	1311	1321	53
10	7.63	9.7	1889	1.01	1417.0	145.1	9.77	0.10	3.4	2649600	1403	1273	51
11	7.63	8.1	1843	0.99	1423.0	161.6	8.80	0.11	3.4	2649600	1437	1282	52
12	7.63	9.4	1797	1.03	1519.0	148.6	10.22	0.10	3.4	2649600	1475	1270	51
13	7.63	10.5	1919	1.02	1408.0	137.5	10.24	0.10	3.4	2649600	1380	1276	52
14	7.64	11.0	2222	1.08	1287.7	134.4	9.58	0.11	3.3	2649600	1192	1435	57
15	7.64	11.7	1834	1.11	1603.7	128.6	12.47	0.09	3.4	2649600	1445	1348	54
16	7.64	12.0	1949	1.17	1590.7	126.9	12.53	0.09	3.3	2649600	1360	1331	53
17	7.65	11.5	1905	1.11	1543.7	130.8	11.80	0.09	3.3	2649600	1391	1309	52
18	7.64	11.3	2263	1.08	1264.3	131.6	9.60	0.11	3.3	2649600	1171	1428	56
19	7.59	10.9	3398	1.06	826.5	132.6	6.23	0.17	3.3	2649600	780	1425	56
20	7.56	7.5	2314	1.06	1213.7	166.1	7.31	0.15	3.3	2649600	1145	1429	56
21	7.56	7.0	1878	1.07	1509.4	172.2	8.77	0.12	3.3	2649600	1411	1308	51
22	7.55	6.7	1993	1.03	1369.2	174.2	7.86	0.13	3.2	2649600	1329	1379	53
23	7.57	7.2	1900	1.03	1436.6	169.4	8.48	0.12	3.2	2649600	1395	1417	55
24	7.56	7.8	1964	0.96	1295.2	160.3	8.08	0.12	3.2	2649600	1349	1362	53
25	7.53	8.8	1824	1.25	1815.4	153.9	11.80	0.11	3.2	2649600	1452	1371	53
26	7.55	8.7	2138	1.29	1598.5	156.8	10.19	0.13	3.2	2649600	1239	1379	53
27	7.55	8.9	1780	1.32	1964.9	155.2	12.66	0.10	3.2	2649600	1489	1375	53
28	7.56	8.0	1858	1.29	1839.2	165.2	11.13	0.12	3.2	2649600	1426	1347	52
29	7.58	5.8	2275	1.30	1513.8	194.0	7.80	0.17	3.2	2649600	1164	1398	54
30	7.58	4.8	1863	1.26	1791.8	207.0	8.66	0.15	3.2	2649600	1422	1380	54
31	7.58	6.3	1942	1.15	1569.3	184.0	8.53	0.13	3.2	2649600	1365	1356	52
Averages	7.54	7.9	1992	1.12	1521.4	162.5	9.46	0.12	3.3				

## 5.0 ULTRAVIOLET DISINFECTION

Total Water Treated: 251,520.8 m<sup>3</sup> 100.00%  
 On-Spec Water: 250,282.6 m<sup>3</sup> 99.505%  
 Off-Spec Water: 1,238.2 m<sup>3</sup> 0.495%

Average monthly chlorine residual before UV Treatment was 1.37 mg/L  
 The average monthly chlorine residual after UV treatment and re-chlorination was 1.45 mg/L.

**Figure 5.1 - UV Disinfection – BMID Mission Creek Source – January 2023**



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

	Inlet Cl2 Daily Average	Outlet Cl2 Daily Average	UVT	Turbidity		In Spec Water Volume	Off Spec Water Volume	Off Spec % of Water Volume
Date	mg/L	mg/L	% T	NTU		Cubic Meters	Cubic Meters	Percentage
1-Jan	1.26	1.45	87.1	0.41		7402	0	0.00%
2-Jan	1.27	1.44	86.7	0.42		7731	0	0.00%
3-Jan	1.27	1.43	87.5	0.40		12351	54.3	0.44%
4-Jan	1.27	1.45	75.3	0.40		12351	54.3	0.44%
5-Jan	1.27	1.44	88.2	0.40		9355	0	0.00%
6-Jan	1.27	1.46	88.3	0.40		7448	0	0.00%
7-Jan	1.27	1.45	88.1	0.40		7365	0	0.00%
8-Jan	1.27	1.45	88.3	0.40		7365	0	0.00%
9-Jan	1.27	1.45	88.1	0.40		7266	0	0.00%
10-Jan	1.27	1.45	87.6	0.40		7013	0	0.00%
11-Jan	1.27	1.45	87.3	0.40		6894	0	0.00%
12-Jan	1.27	1.44	87.0	0.40		6894	0	0.00%
13-Jan	1.36	1.44	86.5	0.44		6863	0	0.00%
14-Jan	1.40	1.45	86.2	0.45		7677	0	0.00%
15-Jan	1.39	1.45	85.5	0.46		7677	0	0.00%
16-Jan	1.38	1.45	87.2	0.49		7238	0	0.00%
17-Jan	1.37	1.45	87.5	0.48		7125	0	0.00%
18-Jan	1.43	1.45	87.2	0.47		7674	0	0.00%
19-Jan	1.48	1.45	87.2	0.45		11477	564.8	4.92%
20-Jan	1.43	1.46	84.8	0.43		11477	564.8	4.92%
21-Jan	1.49	1.45	75.2	0.45		8963	0	0.00%
22-Jan	1.52	1.45	86.8	0.43		7406	0	0.00%
23-Jan	1.42	1.46	86.6	0.43		7669	0	0.00%
24-Jan	1.45	1.45	88.3	0.41		7669	0	0.00%
25-Jan	1.49	1.46	89.6	0.42		7353	0	0.00%
26-Jan	1.51	1.45	89.8	0.42		7401	0	0.00%
27-Jan	1.47	1.45	89.8	0.42		7401	0	0.00%
28-Jan	1.41	1.44	89.7	0.43		7368	0	0.00%
29-Jan	1.38	1.45	88.8	0.43		7492	0	0.00%
30-Jan	1.44	1.45	90.0	0.43		7492	0	0.00%
31-Jan	1.45	1.45	90.0	0.45		7426	0	0.00%
Average	1.37	1.45	87.0		Total	250282.6	1238.2	0.495%

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

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

Date	2021 Belgo Rd		Booster 1		Elison Blow-Off		Elison 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
5-Dec-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-Dec-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19-Dec-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-Dec-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3-Jan-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9-Jan-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-Jan-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23-Jan-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-Jan-23	0	0	0	0	0	0	0	0	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 samples were found to be absent of both *Total Coliforms* and *E. Coli*.

**Table 6.2 - BMID In-house Testing – Presence Absence**

Location	1/2/2023				1/9/2023				1/16/2023				1/23/2023				1/30/2023			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres									0.97	9.2	-	X								
170 Kneller Rd									1.11	8.4	-	X								
2105 Morrison					0.73	11.6	-	X									0.81	8.6	-	X
Staymen Rd					1.05	11.4	-	X									0.99	9.4	-	X
260 Campion Rd	0.88	9.4	-	X									0.84	9.8	-	X				
Fenwick Rd	0.86	7.2	-	X									0.89	9.2	-	X				
Solly Ct									1.09	10.2	-	X								

### Table 6.3 - Disinfection By-Products Testing

- Both THM and HAA were found to be at acceptable levels on all tests.

3-Jan-23		
Location	THM (mg/L)	HAA (mg/L)
UV Plant	0.0522	0.0601
Pearson School	0.0736	0.0742

- BMID Population = 28,000

#### RECOMMENDED TESTS

- Recommended number of samples per month = 28  
(as per Guide for Canadian Drinking Water Quality)

#### ACTUAL TESTS

- Total tests by BMID staff (presence/absence) = 11
- Total tests sampled by BMID and tested by Caro Labs 30
- Total tests sampled in BMID treated distribution system = 41
- 0 Positive *E. Coli* and Total Coliform Samples