



MONTHLY REPORTING PERIOD - OCTOBER, 2022

1. SUMMARY

This document provides a summary of the water quality information collected by BMID in October 2022. Documentation and figures are provided on the following pages to support this submission.

WATER USAGE DATA FOR OCTOBER IS AS FOLLOWS:

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	166,635,629	630.72
Well 4	2,461,272	9.32
Well 5	13,523,391	51.19
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	182,620,292	691.22

1. A Water Quality Advisory was called on September 27th and was rescinded on October 5th. The scheduled WQA was called to allow BMID to undertake a planned inspection of its infrastructure which required the UV Plant to be bypassed for limited periods on September 27th and September 28th;
2. The WQA remained in effect, after the work was completed on October 5th, to allow UV disinfected water to run through the entire distribution system. Primary chlorine disinfection remained in operation throughout the WQA;
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 continues to be monitored. It is currently stable and not moving;
4. BMID's high-elevation reservoirs remained in service until the last week of October, when crews closed the gates for the dams for winter;
5. Water consumption was 179% of the 10-year average during October. This was due to the unusually hot and dry weather experienced during the month;
6. The WTP commenced operation on February 8th, 2022 and remained in operation until October 31st when the WTP was placed in by-pass mode for the winter as water quality in Mission Creek no longer required chemical treatment to reduce turbidity and colour to acceptable levels;
7. Raw water turbidity levels in Mission Creek peaked at 1.01 NTU (average daily turbidity) on October 25th. Average daily raw water turbidity for October was 0.87 NTU at the Mission Creek intake;
8. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.72 NTU on October 12, 2022. Average clarified water turbidity for October was 0.59 NTU at the Distribution Intake at the lower end of Hadden Reservoir;

9. The highest turbidity level at the first customer (Booster #1) was 0.45 NTU on October 3rd and 10th. Average monthly turbidity at the first customer was 0.36 NTU;
10. The highest turbidity daily average at the UV plant was 0.83 NTU on October 6th. Average monthly turbidity at the UV plant was 0.50 NTU throughout the month. Increased turbidity at the beginning of the month was likely influenced by the opening and closing of the UV facility during the planned shut-down;
11. BMID's Ultraviolet Treatment Facility treated 630,784.6 m³ of water, none of which was "Off-Spec" (0.00%);
12. BMID's Scotty Creek source, used for irrigation in the north-end, commenced operations on May 27th, 2022. The Scotty Creek source was placed in bypass mode for the year on September 9th as irrigation demands in the north end reduced from peak flows earlier in summer;
13. 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 October;
14. 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 in operation from October 1st until October 12th. Well #5 was then placed on stand-by mode and will remain in stand-by until flows increase in the spring of 2023;
15. Well #6, which supplies water to the north-end irrigation distribution system, resumed operations for the summer on May 26th. Well #6 was placed on stand-by mode on September 25th as irrigation flows began to reduce. Well #6 will remain in stand-by mode until flows increase in the spring/summer of 2023;
16. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts for late summer/ early autumn. The peak count was on the October 11th sample with a count of 17 coliforms. The average monthly *E.Coli* was 4.8, based on 5 samples;
17. *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 credited to the clarification process and the further settling of particles in the water in Stevens and Hadden Reservoirs;
18. 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 October;

1.0 FLOWS - OCTOBER, 2022

The Maximum Daily Flow was on October 2, at 12,630,526 US gallons (47.81 ML)

The Minimum Daily Flow was on October 30, at 2,102,201 US gallons (7.96 ML)

Mission Creek provided 91% of domestic and irrigation flow throughout October.

Figure 1.1 - Domestic Water System Flow

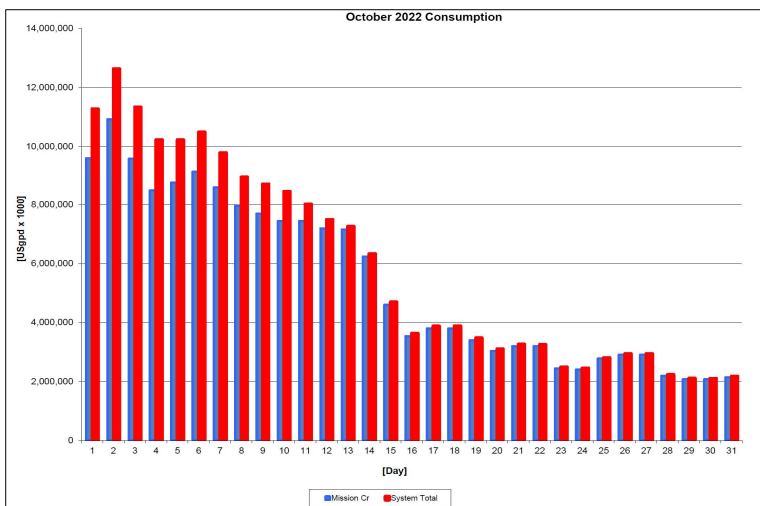


Table 1.2 - October 2022 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	System Total	System Total
2022	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Oct	9,605,611	80,308	1,590,303.4	11,276,222	42.68
2-Oct	10,918,704	80,044	1,631,778.1	12,630,526	47.81
3-Oct	9,590,157	80,044	1,669,554.4	11,339,755	42.92
4-Oct	8,482,642	33,285	1,716,576.7	10,232,504	38.73
5-Oct	8,749,588	101,441	1,378,703.2	10,229,732	38.72
6-Oct	9,151,262	110,687	1,226,805.5	10,488,754	39.70
7-Oct	8,582,446	126,009	1,085,210.4	9,793,666	37.07
8-Oct	7,960,744	138,161	871,496.8	8,970,402	33.95
9-Oct	7,693,692	126,802	877,572.7	8,698,067	32.92
10-Oct	7,444,895	137,368	864,364.2	8,446,628	31.97
11-Oct	7,445,080	126,009	446,975.6	8,018,065	30.35
12-Oct	7,194,645	134,198	164,049.6	7,492,893	28.36
13-Oct	7,157,423	102,234	0.0	7,259,657	27.48
14-Oct	6,234,301	98,800	0.0	6,333,100	23.97
15-Oct	4,600,291	96,686	0.0	4,696,977	17.78
16-Oct	3,535,969	94,837	0.0	3,630,806	13.74
17-Oct	3,797,737	78,723	0.0	3,876,459	14.67
18-Oct	3,797,790	81,364	0.0	3,879,154	14.68
19-Oct	3,394,531	81,364	0.0	3,475,895	13.16
20-Oct	3,032,536	68,948	0.0	3,101,484	11.74
21-Oct	3,189,296	74,232	0.0	3,263,527	12.35
22-Oct	3,189,375	62,608	0.0	3,251,983	12.31
23-Oct	2,432,601	52,570	0.0	2,485,171	9.41
24-Oct	2,402,486	52,306	0.0	2,454,791	9.29
25-Oct	2,769,606	33,021	0.0	2,802,627	10.61
26-Oct	2,906,473	33,814	0.0	2,940,287	11.13
27-Oct	2,906,500	35,663	0.0	2,942,163	11.14
28-Oct	2,190,831	35,663	0.0	2,226,494	8.43
29-Oct	2,071,584	33,814	0.0	2,105,398	7.97
30-Oct	2,067,067	35,135	0.0	2,102,201	7.96
31-Oct	2,139,767	35,135	0.0	2,174,901	8.23
Totals Usgpd	166,635,629	2,461,272	13,523,391	182,620,292	691.22
Totals ML	630.72	9.32	51.19		
Avg's	5,483,195	20.75		6,014,846	22.30
Max	10,918,704	41.33		12,630,526	47.81
Min	2,067,067	7.82		2,102,201	7.96

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) September 2022 - October 2022

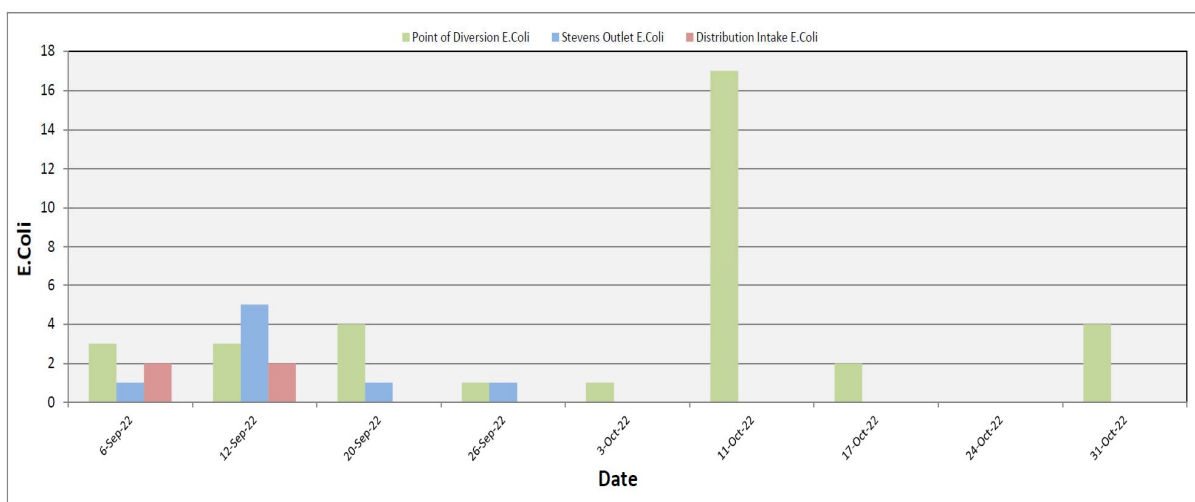


Table 2.1 - *E. Coli* Readings (CARO Labs)

Date	Point of Diversion E. Coli	Stevens Outlet E. Coli	Distribution Intake E. Coli
6-Sep-22	3	1	2
12-Sep-22	3	5	2
20-Sep-22	4	1	0
26-Sep-22	1	1	0
3-Oct-22	1	0	0
11-Oct-22	17	0	0
17-Oct-22	2	0	0
24-Oct-22	0	0	0
31-Oct-22	4	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 m³ 1st upper balancing reservoir (Stevens Res.)

Hadden Outlet (Raw) - Sampling point after exiting 75,000 m³ 2nd lower balancing reservoir (Hadden Res.)

(Hadden Outlet = Distribution Intake - Point of Disinfection)

3.0 RAW AND TREATED WATER TURBIDITY

Through October 2022, 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 0.45 NTU on October 3 and 10, 2022.

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)

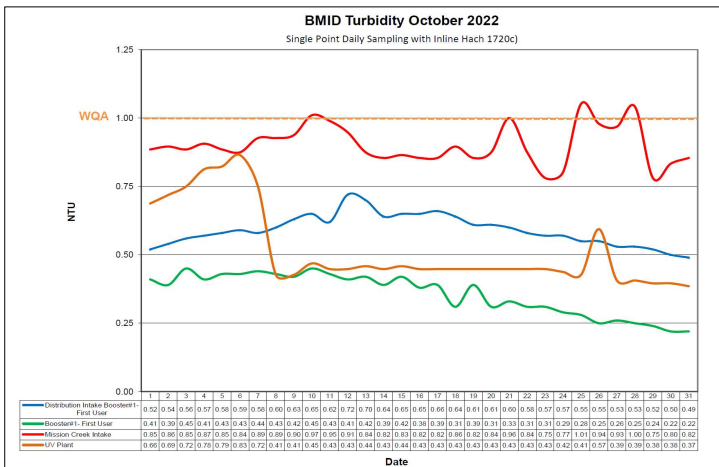


Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for October 2022				
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	0.85	0.52	0.41	0.66
2	0.86	0.54	0.39	0.69
3	0.85	0.56	0.45	0.72
4	0.87	0.57	0.41	0.78
5	0.85	0.58	0.43	0.79
6	0.84	0.59	0.43	0.83
7	0.89	0.58	0.44	0.72
8	0.89	0.60	0.43	0.41
9	0.90	0.63	0.42	0.41
10	0.97	0.65	0.45	0.45
11	0.95	0.62	0.43	0.43
12	0.91	0.72	0.41	0.43
13	0.84	0.70	0.42	0.44
14	0.82	0.64	0.39	0.43
15	0.83	0.65	0.42	0.44
16	0.82	0.65	0.38	0.43
17	0.82	0.66	0.39	0.43
18	0.86	0.64	0.31	0.43
19	0.82	0.61	0.39	0.43
20	0.84	0.61	0.31	0.43
21	0.96	0.60	0.33	0.43
22	0.84	0.58	0.31	0.43
23	0.75	0.57	0.31	0.43
24	0.77	0.57	0.29	0.42
25	1.01	0.55	0.28	0.41
26	0.94	0.55	0.25	0.57
27	0.93	0.53	0.26	0.39
28	1.00	0.53	0.25	0.39
29	0.75	0.52	0.24	0.38
30	0.80	0.50	0.22	0.38
31	0.82	0.49	0.22	0.37
Average	0.87	0.59	0.36	0.50

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 October, 2022.

Figure 4.1 - CT Trending – BMID Mission Creek Source – October 2022

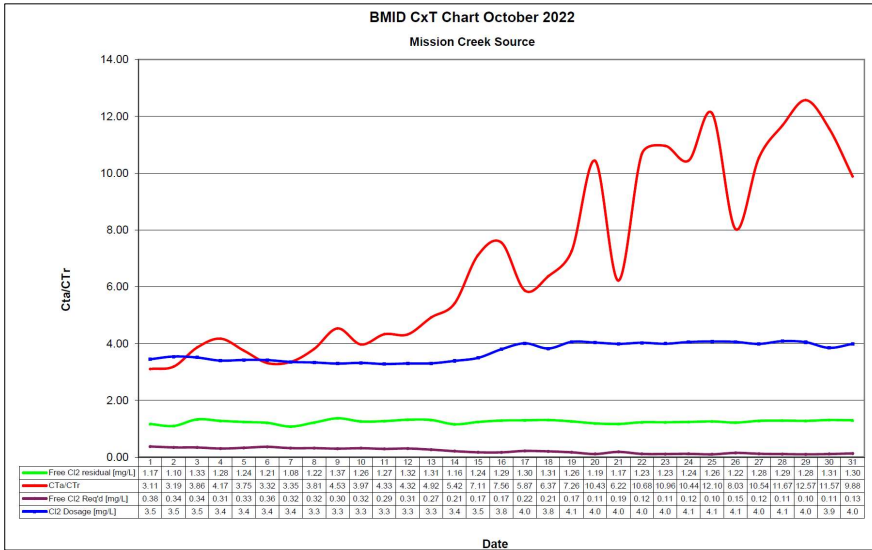


Table 4.2 - CT Table – Mission Creek Source

BMID October 2022 Mission Creek Source													
DATE	pH (Average)	TEMP (Present)	PEAK FLOW	Free Cl2 residual	CT achieved	CT req'd	CTa/CTr	Free Cl2 Req'd	Cl2 Dosage	VOLUME TOTAL	TIME	FLOW Daily Average	CL2 DOSAGE Average
October		[°C]	[USgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.57	14.5	9,589	1.17	323.3	104.1	3.11	0.38	3.5	2649600	276	6,847	284
2	7.55	14.5	8,924	1.10	326.6	102.4	3.19	0.34	3.5	2649600	297	7,751	330
3	7.53	14.7	8,845	1.33	398.4	103.2	3.86	0.34	3.5	2649600	300	6,736	284
4	7.55	14.9	7,973	1.28	425.4	101.9	4.17	0.31	3.4	2649600	332	6,007	246
5	7.53	14.8	8,638	1.24	380.3	101.4	3.75	0.33	3.4	2649600	307	6,197	255
6	7.55	14.6	9,368	1.21	342.2	103.2	3.32	0.36	3.4	2649600	283	6,499	267
7	7.56	14.5	8,321	1.08	343.9	102.5	3.35	0.32	3.4	2649600	318	6,071	245
8	7.58	14.5	8,068	1.22	400.7	105.1	3.81	0.32	3.3	2649600	328	5,643	226
9	7.59	13.1	6,768	1.37	536.3	118.3	4.53	0.30	3.3	2649600	391	5,453	216
10	7.61	13.6	7,402	1.26	451.0	113.6	3.97	0.32	3.3	2649600	358	5,246	209
11	7.59	13.8	6,974	1.27	482.5	111.4	4.33	0.29	3.3	2649600	380	5,120	202
12	7.56	13.7	7,244	1.32	482.8	111.7	4.32	0.31	3.3	2649600	366	5,040	200
13	7.58	13.8	6,324	1.31	548.8	111.5	4.92	0.27	3.3	2649600	419	4,391	174
14	7.59	12.9	4,850	1.16	633.7	117.0	5.42	0.21	3.4	2649600	546	3,233	132
15	7.61	13.2	3,963	1.24	829.1	116.6	7.11	0.17	3.5	2649600	669	2,473	104
16	7.62	12.5	3,661	1.29	933.5	123.5	7.56	0.17	3.8	2649600	724	2,504	114
17	7.58	12.7	4,882	1.30	705.6	120.3	5.87	0.22	4.0	2649600	543	2,647	128
18	7.60	12.1	4,311	1.31	805.1	126.4	6.37	0.21	3.8	2649600	615	2,441	112
19	7.58	12.0	3,661	1.26	911.8	125.6	7.26	0.17	4.1	2649600	724	2,108	103
20	7.58	11.9	2,409	1.19	1308.7	125.4	10.43	0.11	4.0	2649600	1100	1,886	92
21	7.56	11.6	3,931	1.17	788.6	126.8	6.22	0.19	4.0	2649600	674	2,235	107
22	7.58	12.2	2,473	1.23	1318.0	123.5	10.68	0.12	4.0	2649600	1072	1,712	83
23	7.58	12.3	2,425	1.23	1343.9	122.6	10.96	0.11	4.0	2649600	1093	1,633	78
24	7.59	12.2	2,536	1.24	1295.5	124.1	10.44	0.12	4.1	2649600	1045	1,680	82
25	7.59	12.0	2,187	1.26	1526.3	126.1	12.10	0.10	4.1	2649600	1211	1,506	74
26	7.59	11.9	3,186	1.22	1014.6	126.4	8.03	0.15	4.1	2649600	832	1,585	77
27	7.59	12.3	2,599	1.28	1304.7	123.8	10.54	0.12	4.0	2649600	1019	1,569	75
28	7.59	11.6	2,251	1.29	1518.6	130.1	11.67	0.11	4.1	2649600	1177	1,458	72
29	7.59	11.6	2,076	1.28	1633.4	129.9	12.57	0.10	4.0	2649600	1276	1,427	69
30	7.64	10.7	2,124	1.31	1634.2	141.3	11.57	0.11	3.9	2649600	1247	1,458	68
31	7.64	11.7	2,647	1.30	1301.3	131.6	9.88	0.13	4.0	2649600	1001	1,506	72
Averages	7.58	12.98	5,034	1.25	846.74	117.79	6.95	0.22	3.70				

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	630,784.6 m ³	100.00%
On-Spec Water:	630,784.3 m ³	100.00%
Off-Spec Water:	0 m ³	0.00%

Average monthly chlorine residual before UV Treatment was 1.23 mg/L
 The average monthly chlorine residual after UV treatment and re-chlorination was 1.43 mg/L.

Figure 5.1 - UV Disinfection – BMID Mission Creek Source – October 2022

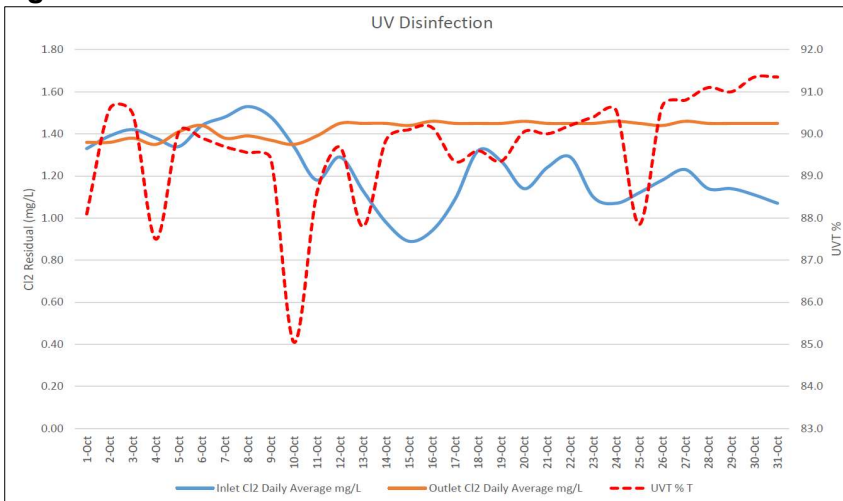


Table 5.2 - UV Disinfection Table – Mission Creek Source

Date	Inlet Cl2	Outlet Cl2	UVT	Turbidity		In Spec Water	Off Spec	Off Spec %
	Daily	Daily				Volume	Water	of Water
	mg/L	mg/L	% T	NTU		Cubic Meters	Cubic Meters	Percentage
1-Oct	1.33	1.36	88.1	0.66		36,361	0	0.00%
2-Oct	1.39	1.36	90.6	0.69		41,332	0	0.00%
3-Oct	1.42	1.38	90.5	0.72		36,303	0	0.00%
4-Oct	1.38	1.35	87.5	0.78		32,110	0	0.00%
5-Oct	1.34	1.41	90.1	0.79		33,121	0	0.00%
6-Oct	1.44	1.44	89.9	0.83		34,641	0	0.00%
7-Oct	1.48	1.38	89.7	0.72		32,488	0	0.00%
8-Oct	1.53	1.39	89.6	0.41		30,135	0	0.00%
9-Oct	1.48	1.37	89.4	0.41		29,124	0	0.00%
10-Oct	1.34	1.35	85.1	0.45		28,182	0	0.00%
11-Oct	1.18	1.39	88.6	0.43		28,183	0	0.00%
12-Oct	1.29	1.45	89.7	0.43		27,235	0	0.00%
13-Oct	1.13	1.45	87.8	0.44		27,094	0	0.00%
14-Oct	0.98	1.45	89.9	0.43		23,599	0	0.00%
15-Oct	0.89	1.44	90.1	0.44		17,414	0	0.00%
16-Oct	0.94	1.46	90.2	0.43		13,385	0	0.00%
17-Oct	1.09	1.45	89.3	0.43		14,376	0	0.00%
18-Oct	1.32	1.45	89.6	0.43		14,376	0	0.00%
19-Oct	1.27	1.45	89.4	0.43		12,850	0	0.00%
20-Oct	1.14	1.46	90.1	0.43		11,479	0	0.00%
21-Oct	1.24	1.45	90.0	0.43		12,073	0	0.00%
22-Oct	1.29	1.45	90.2	0.43		12,073	0	0.00%
23-Oct	1.10	1.45	90.4	0.43		9,208	0	0.00%
24-Oct	1.07	1.46	90.6	0.42		9,094	0	0.00%
25-Oct	1.12	1.45	87.9	0.41		10,484	0	0.00%
26-Oct	1.18	1.44	90.7	0.57		11,002	0	0.00%
27-Oct	1.23	1.46	90.8	0.39		11,002	0	0.00%
28-Oct	1.14	1.45	91.1	0.39		8,293	0	0.00%
29-Oct	1.14	1.45	91.0	0.38		7,842	0	0.00%
30-Oct	1.11	1.45	91.4	0.38		7,825	0	0.00%
31-Oct	1.07	1.45	91.4	0.37		8,100	0	0.00%
Average	1.23	1.43	89.68	0.50	Total	630,784.60	0	0.000%

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	2921 Belgo Rd		Booster 1		Elison Blow-Off		Elison School		3976 Highway 07		Prospect Reservoir		Tower Reservoir		Well #5		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	Coliforms	E.coli
6-Sep-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-Sep-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Sep-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-Sep-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3-Oct-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11-Oct-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17-Oct-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-Oct-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-Oct-22	0	0	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 12 samples were found to be absent of both *Total Coliforms* and *E. Coli*.

Table 6.2 - BMID In-house Testing – Presence Absence

Location	10/4/2022				10/11/2022				10/18/2022				10/24/2022				10/31/2022			
	Cl2	Temp	Pres.	Abs.	Cl2	Temp	Pres.	Abs.	Cl2	Temp	Pres.	Abs.	Cl2	Temp	Pres.	Abs.	Cl2	Temp	Pres.	Abs.
Sylvania Cres	0.69	19.2	-	X									0.71	14.8	-	X				
170 Kneller Rd	0.71	19.6	-	X									0.67	15.0	-	X				
2105 Morrison									0.54	18.2	-	X								
Staymen Rd									0.42	17.6	-	X								
260 Campion Rd					0.60	19.2	-	X									0.05	19.2	-	X
Fenwick Rd					0.00	19.6	-	X									0.05	16.6	-	X
Solly Ct	0.91	19	-	X									0.73	14	-	X				

Disinfection By-Products Testing – CARO Independent Lab

- Both Trihalomethane (THM) and Haloacetic acid (HAA) disinfection by-products were analysed and found to be at acceptable levels

Table 6.3 - Disinfection By-Products Testing

3-Oct-22		
Location	THM (mg/L)	HAA (mg/L)
UV Plant	0.0522	0.0377
Pearson School	0.0699	0.0479

- 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) = 12
- Total tests sampled by BMID and tested by Caro Labs 30
- Total tests sampled in BMID treated distribution system = 42
- 0 Positive E.Coli and Total Coliform Samples