



## MONTHLY REPORTING PERIOD - OCTOBER, 2023

### SUMMARY

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

### WATER SUPPLY & USAGE SUMMARY

1. Water usage data for October, 2023 is as follows:

Source	Total (US Gallons)	Total (Mega Litres)
Mission Creek	99,567,668	376.86
Well 4	5,949,108	22.52
Well 5	0	0
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	105,516,777	399.38

2. BMID's control gates on the high-elevation reservoirs were opened in early July. These reservoirs continued to be utilized by BMID throughout early October to maintain adequate flows in Mission Creek. The control gate for Belgo Reservoir was closed for the winter in October. Greystokes and Loch Long Reservoirs remain open at the end of October;
3. BMID's Scotty Creek source supplying irrigation water to the north-end of the service area, was placed on stand-by mode on September 8<sup>th</sup>. The Scotty Creek source will remain in stand-by until irrigation demands increase in the summer of 2024;
4. Well #5, used as the primary water source in the north-end of the system for both irrigation and domestic consumption, was placed in stand-by mode on September 29<sup>th</sup>. Well #5 will resume operations in the summer of 2024 as irrigation demands increase in the north-end;
5. Well #4, used as a primary source for domestic water in the north-end of the distribution system during low-flow periods, resumed operation on September 27<sup>th</sup>. Well #4 was in operation throughout October and will remain in service until the spring/summer of 2024;
6. Well #6, which supplies water to the north-end irrigation distribution system, was placed in stand-by mode on September 24<sup>th</sup>. Well #6 will resume operations in the summer of 2024;
7. 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;

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## WATER QUALITY SUMMARY

1. The WTP was in operation for 13 days in early October as Mission Creek had experienced increased turbidity and colour in the raw water. The WTP was placed in stand-by mode on October 20 when Mission Creek had acceptable turbidity and colour in the raw water. The WTP will remain in stand-by for the remainder of the fall/winter, however, the plant will remain available to treat water if raw water quality diminishes;
2. Raw water turbidity levels in Mission Creek peaked at 1.48 NTU on October 23<sup>rd</sup>. Average daily raw water turbidity for October was 0.92 NTU at the Mission Creek Intake;
3. The highest turbidity level at the Distribution Intake (end of Hadden Reservoir) was 0.57 NTU on October 31<sup>st</sup>, 2023. Average settled water turbidity for October was 0.42 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
4. The highest turbidity level at the first customer (Booster #1) was 0.35 NTU on October 30<sup>th</sup> and 31<sup>st</sup>. Average monthly turbidity at the first customer was 0.29 NTU;
5. Average daily turbidity at the UV station peaked at 0.72 NTU on October 31<sup>st</sup>. Average monthly turbidity at the UV disinfection station was 0.64 NTU;
6. BMID's Ultraviolet Treatment Facility treated 376,904.7 m<sup>3</sup> of water, none of which was "Off-Spec" (0.00%);
7. Disinfection by-product testing took place on October 5<sup>th</sup> at five locations in the distribution system. All samples were found to be below the maximum acceptable levels for both Trihalomethanes and Haloacetic acids;
8. Regarding microbiological readings, BMID began withdrawing water from the upper elevation reservoirs in early summer, contributing to the flow of Mission Creek. Throughout October, BMID continued to supplement creek flows via the upper elevation reservoirs. Mission Creek is expected to have greater variability in microbiological readings as autumn conditions continue in the watershed;
9. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had average counts for October. The October 30<sup>th</sup> sample had the peak monthly count of 4 coliforms. The average monthly *E.Coli* was 2.4, 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 low counts on all 5 samples. The highest *E.Coli* count was on October 10<sup>th</sup> with a count of 2 coliforms. Average monthly *E.Coli* was 0.60 based on 5 samples. Reduction in *E.Coli* levels is due to the effectiveness of the Water Treatment Plant as well as 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 October;

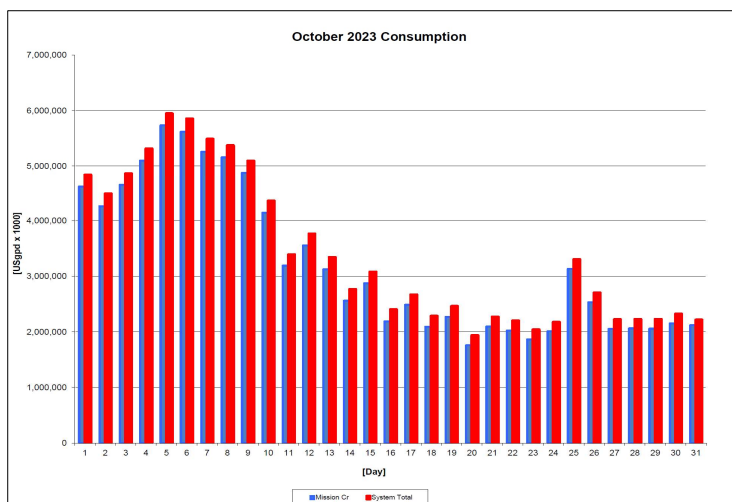
## 1.0 FLOWS - OCTOBER, 2023

The Maximum Daily Flow was on October 5<sup>th</sup>, at 5,943,551US gallons (22.5 ML)

The Minimum Daily Flow was on October 20<sup>th</sup>, at 1,931,968 US gallons (7.31 ML)

Mission Creek provided just over 94% of domestic and irrigation flow supplied in October.

**Figure 1.1 - Domestic Water System Flow**



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

Year	Mission Cr	Well #4	Well #5	System Total	System Total
2023	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Oct	4,614,319	223,488	-	4,837,807	18.31
2-Oct	4,258,030	225,865	-	4,483,895	16.97
3-Oct	4,642,004	219,789	-	4,861,793	18.40
4-Oct	5,099,391	211,336	-	5,310,727	20.10
5-Oct	5,732,480	211,072	-	5,943,551	22.50
6-Oct	5,618,516	231,149	-	5,849,665	22.14
7-Oct	5,254,540	231,149	-	5,485,688	20.76
8-Oct	5,155,766	212,921	-	5,368,687	20.32
9-Oct	4,876,192	214,242	-	5,090,434	19.27
10-Oct	4,140,341	211,600	-	4,351,942	16.47
11-Oct	3,187,579	199,713	-	3,387,291	12.82
12-Oct	3,555,623	206,053	-	3,761,676	14.24
13-Oct	3,125,947	211,072	-	3,337,019	12.63
14-Oct	2,558,136	205,260	-	2,763,396	10.46
15-Oct	2,873,240	202,090	-	3,075,330	11.64
16-Oct	2,188,401	210,543	-	2,398,944	9.08
17-Oct	2,485,277	179,900	-	2,665,177	10.09
18-Oct	2,090,552	190,467	-	2,281,018	8.63
19-Oct	2,266,649	192,052	-	2,458,700	9.31
20-Oct	1,756,031	175,937	-	1,931,968	7.31
21-Oct	2,095,571	172,239	-	2,267,810	8.58
22-Oct	2,023,135	172,239	-	2,195,374	8.31
23-Oct	1,863,232	174,088	-	2,037,320	7.71
24-Oct	2,011,300	160,351	-	2,171,651	8.22
25-Oct	3,132,235	168,805	-	3,301,039	12.49
26-Oct	2,529,077	170,390	-	2,699,467	10.22
27-Oct	2,049,446	170,390	-	2,219,836	8.40
28-Oct	2,061,836	161,408	-	2,223,244	8.41
29-Oct	2,055,575	169,333	-	2,224,908	8.42
30-Oct	2,149,409	169,333	-	2,318,742	8.78
31-Oct	2,117,841	94,837	-	2,212,678	8.37
Totals Usgpd	99,567,668	5,949,108	0	105,516,777	399.38
Totals ML	376.86	22.52	0.00		
Avg's	3,248,328	12.29		3,443,470	12.88
Max	5,732,480	21.70		5,943,551	22.50
Min	1,756,031	6.65		1,931,968	7.31

## 2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

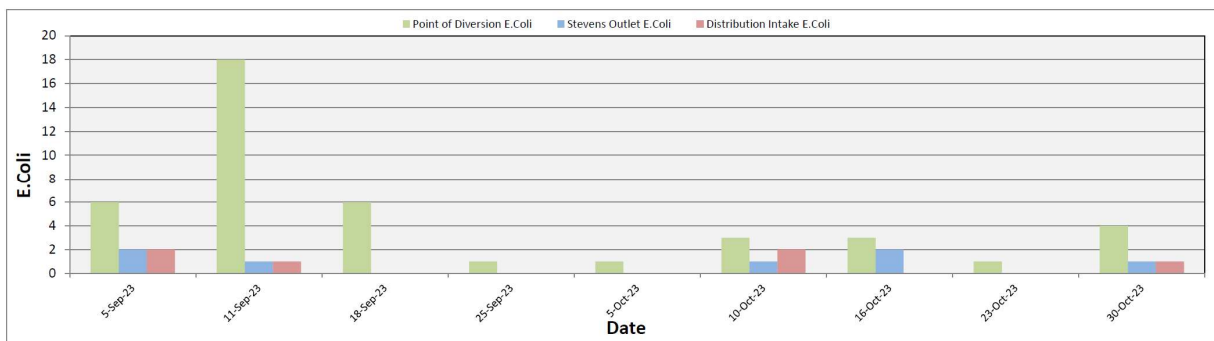
Raw water samples were taken at three points at BMID settling ponds before chlorination.

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

Throughout October, Mission Creek's flow has been supplemented by BMID's high-elevation storage reservoirs. Moreover, The *E. Coli* readings confirm the WTP's effectiveness in reducing raw water quality risks with coagulation, flocculation, and sedimentation processes followed by settling times across Stevens and Hadden Reservoirs.

**Figure 2.1 - Raw Water *E.Coli* Readings (CARO Lab results) September 2023 - October 2023**



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

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
5-Sep-23	6	2	2
11-Sep-23	18	1	1
18-Sep-23	6	0	0
25-Sep-23	1	0	0
5-Oct-23	1	0	0
10-Oct-23	3	1	2
16-Oct-23	3	2	0
23-Oct-23	1	0	0
30-Oct-23	4	1	1

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.)

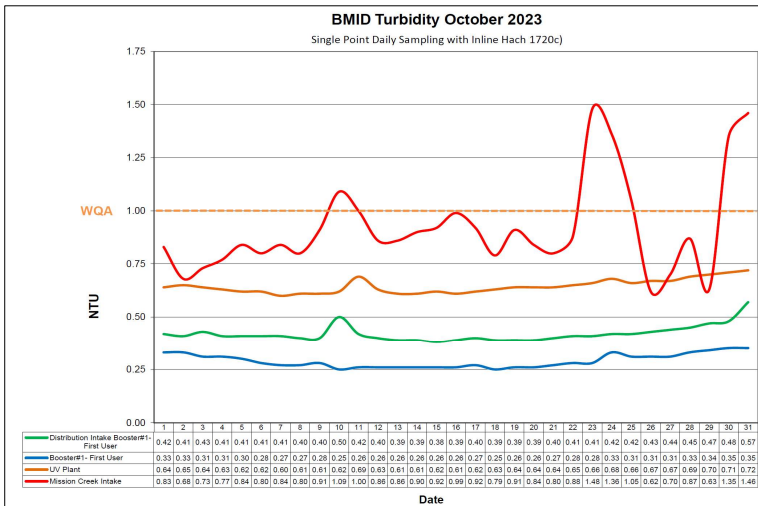
Hadden Outlet (Raw) - Sampling point after exiting 75,000 m<sup>3</sup> 2<sup>nd</sup> lower balancing reservoir (Hadden Res.)  
 (Hadden Outlet = Distribution Intake - Point of Disinfection)

### 3.0 RAW AND TREATED WATER TURBIDITY

Through October 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 0.35 NTU on October 30<sup>th</sup> and 31<sup>st</sup>, 2023. The lowest turbidity level was 0.25 NTU and the average turbidity was 0.29 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 (Mission Creek Raw - Distribution Intake - Booster Station 1 and UV Plant)**



**Table 3.1 - Daily Monitoring Record – Turbidity at On-Line Turbidity Analysers**

Turbidity Point Sampling for October 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	0.83	0.42	0.33	0.64
2	0.68	0.41	0.33	0.65
3	0.73	0.43	0.31	0.64
4	0.77	0.41	0.31	0.63
5	0.84	0.41	0.30	0.62
6	0.80	0.41	0.28	0.62
7	0.84	0.41	0.27	0.60
8	0.80	0.40	0.27	0.61
9	0.91	0.40	0.28	0.61
10	1.09	0.50	0.25	0.62
11	1.00	0.42	0.26	0.69
12	0.86	0.40	0.26	0.63
13	0.86	0.39	0.26	0.61
14	0.90	0.39	0.26	0.61
15	0.92	0.38	0.26	0.62
16	0.99	0.39	0.26	0.61
17	0.92	0.40	0.27	0.62
18	0.79	0.39	0.25	0.63
19	0.91	0.39	0.26	0.64
20	0.84	0.39	0.26	0.64
21	0.80	0.40	0.27	0.64
22	0.88	0.41	0.28	0.65
23	1.48	0.41	0.28	0.66
24	1.36	0.42	0.33	0.68
25	1.05	0.42	0.31	0.66
26	0.62	0.43	0.31	0.67
27	0.70	0.44	0.31	0.67
28	0.87	0.45	0.33	0.69
29	0.63	0.47	0.34	0.70
30	1.35	0.48	0.35	0.71
31	1.46	0.57	0.35	0.72
Average	0.92	0.42	0.29	0.64

### 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, 2023.

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

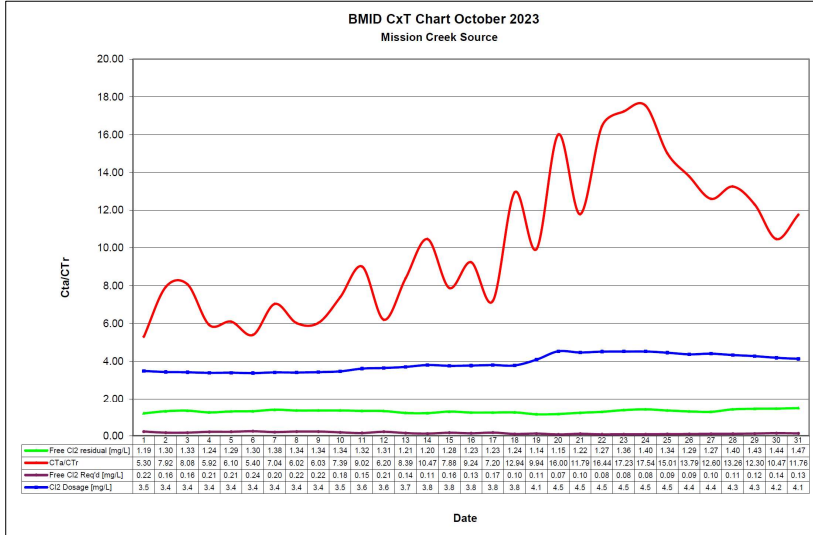


Table 4.2 - CT Table – Mission Creek Source

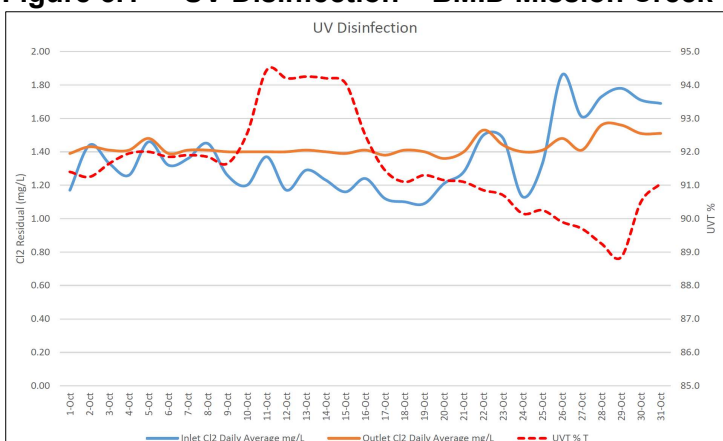
BMID October 2023 Mission Creek Source													
DATE	pH	TEMP	PEAK	Free Cl2	CT	CT	CTa/CTr	Free Cl2	Cl2	VOLUME	TIME	FLOW	CL2 DOSAGE
	(Average)	(Present)	FLOW	residual	achieved	req'd		Req'd	Dosage	TOTAL	[mins]	Daily Average	Average
October		[°C]	[USgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]		[USGPM]	[PPD]
1	7.30	13.7	5,944	1.19	530.5	100.1	5.30	0.22	3.5	2649600	446	3,265	137
2	7.30	14.2	4,438	1.30	776.1	97.9	7.92	0.16	3.4	2649600	597	3,043	126
3	7.32	14.4	4,470	1.33	788.4	97.6	8.08	0.16	3.4	2649600	593	3,281	135
4	7.35	14.3	5,643	1.24	582.3	98.4	5.92	0.21	3.4	2649600	470	3,630	148
5	7.35	14.4	5,706	1.29	599.0	98.3	6.10	0.21	3.4	2649600	464	4,058	165
6	7.40	14.4	6,372	1.30	540.6	100.2	5.40	0.24	3.4	2649600	416	3,994	162
7	7.40	14.3	5,104	1.38	716.4	101.8	7.04	0.20	3.4	2649600	519	3,709	152
8	7.40	13.9	5,659	1.34	627.4	104.2	6.02	0.22	3.4	2649600	468	3,646	149
9	7.41	14.6	5,912	1.34	600.5	99.6	6.03	0.22	3.4	2649600	448	3,440	142
10	7.44	14.4	4,708	1.34	754.2	102.1	7.39	0.18	3.5	2649600	563	2,948	123
11	7.45	13.7	3,614	1.32	967.8	107.3	9.02	0.15	3.6	2649600	733	2,235	97
12	7.48	13.7	5,167	1.31	671.7	108.4	6.20	0.21	3.6	2649600	513	2,536	111
13	7.44	12.9	3,424	1.21	936.4	111.6	8.39	0.14	3.7	2649600	774	2,235	99
14	7.47	13.8	2,869	1.20	1108.3	105.8	10.47	0.11	3.8	2649600	924	1,807	83
15	7.47	13.4	3,915	1.28	866.3	109.9	7.88	0.16	3.8	2649600	677	2,029	92
16	7.49	13.6	3,249	1.23	1003.0	108.5	9.24	0.13	3.8	2649600	815	1,569	71
17	7.51	13.8	4,200	1.23	775.9	107.8	7.20	0.17	3.8	2649600	631	1,759	80
18	7.49	14.6	2,504	1.24	1311.9	101.4	12.94	0.10	3.8	2649600	1058	1,506	68
19	7.47	14.6	3,059	1.14	987.4	99.4	9.94	0.11	4.1	2649600	866	1,601	79
20	7.46	14.7	1,934	1.15	1575.7	98.5	16.00	0.07	4.5	2649600	1370	1,252	68
21	7.44	13.9	2,631	1.22	1228.5	104.2	11.79	0.10	4.5	2649600	1007	1,506	81
22	7.42	13.9	1,965	1.27	1712.1	104.1	16.44	0.08	4.5	2649600	1348	1,427	77
23	7.42	13.5	1,934	1.36	1863.5	108.1	17.23	0.08	4.5	2649600	1370	1,316	71
24	7.43	13.8	1,981	1.40	1872.2	106.8	17.54	0.08	4.5	2649600	1337	1,427	77
25	7.39	12.0	1,997	1.34	1777.8	118.4	15.01	0.09	4.5	2649600	1327	1,474	79
26	7.42	11.4	1,997	1.29	1711.4	124.1	13.79	0.09	4.4	2649600	1129	1,490	78
27	7.37	9.8	1,965	1.27	1712.1	135.9	12.60	0.10	4.4	2649600	1348	1,442	76
28	7.37	9.1	1,934	1.40	1918.3	144.7	13.26	0.11	4.3	2649600	1370	1,458	76
29	7.40	8.5	2,013	1.43	1882.2	153.0	12.30	0.12	4.3	2649600	1316	1,458	75
30	7.42	8.4	2,346	1.44	1626.5	155.4	10.47	0.14	4.2	2649600	1129	1,522	77
31	7.42	8.6	2,156	1.47	1806.8	153.7	11.76	0.13	4.1	2649600	1229	1,490	74
Averages		13.04	3,496	1.30	1155.84	111.84	10.15	0.15	3.90				

## 5.0 ULTRAVIOLET DISINFECTION

Total Water Treated: 376,904.7 m<sup>3</sup> 100.00%  
 On-Spec Water: 376,904.7 m<sup>3</sup> 100.00%  
 Off-Spec Water: 0.0 m<sup>3</sup> 0.000%

Average monthly chlorine residual before UV Treatment was 1.37 mg/L  
 The average monthly chlorine residual after UV treatment and re-chlorination was 1.43 mg/L.

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



**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						
	mg/L	mg/L	% T	NTU		Cubic Meters	Cubic Meters	Percentage
1-Oct	1.17	1.39	91.4	0.64		17,467	0	0.00%
2-Oct	1.44	1.43	91.3	0.65		16,118	0	0.00%
3-Oct	1.33	1.41	91.7	0.64		17,572	0	0.00%
4-Oct	1.26	1.41	92.0	0.63		19,303	0	0.00%
5-Oct	1.46	1.48	92.0	0.62		21,700	0	0.00%
6-Oct	1.32	1.39	91.9	0.62		21,268	0	0.00%
7-Oct	1.36	1.41	91.9	0.60		19,891	0	0.00%
8-Oct	1.45	1.41	91.9	0.61		19,517	0	0.00%
9-Oct	1.26	1.40	91.7	0.61		18,458	0	0.00%
10-Oct	1.20	1.40	92.6	0.62		15,673	0	0.00%
11-Oct	1.37	1.40	94.5	0.69		12,066	0	0.00%
12-Oct	1.17	1.40	94.2	0.63		13,460	0	0.00%
13-Oct	1.29	1.41	94.3	0.61		11,833	0	0.00%
14-Oct	1.23	1.40	94.2	0.61		9,684	0	0.00%
15-Oct	1.16	1.39	94.1	0.62		10,876	0	0.00%
16-Oct	1.24	1.41	92.5	0.61		8,284	0	0.00%
17-Oct	1.12	1.38	91.5	0.62		9,408	0	0.00%
18-Oct	1.10	1.41	91.1	0.63		7,914	0	0.00%
19-Oct	1.09	1.40	91.3	0.64		8,580	0	0.00%
20-Oct	1.21	1.36	91.2	0.64		6,647	0	0.00%
21-Oct	1.28	1.40	91.1	0.64		7,933	0	0.00%
22-Oct	1.50	1.53	90.9	0.65		7,658	0	0.00%
23-Oct	1.48	1.44	90.7	0.66		7,053	0	0.00%
24-Oct	1.13	1.40	90.2	0.68		7,614	0	0.00%
25-Oct	1.33	1.41	90.3	0.66		11,857	0	0.00%
26-Oct	1.86	1.48	89.9	0.67		9,574	0	0.00%
27-Oct	1.61	1.41	89.7	0.67		7,758	0	0.00%
28-Oct	1.73	1.56	89.3	0.69		7,805	0	0.00%
29-Oct	1.78	1.56	88.9	0.70		7,781	0	0.00%
30-Oct	1.71	1.51	90.5	0.71		8,136	0	0.00%
31-Oct	1.69	1.51	91.1	0.72		8,017	0	0.00%
<b>Average</b>	<b>1.37</b>	<b>1.43</b>	<b>91.58</b>	<b>0.64</b>	<b>Total</b>	<b>376,904.70</b>	<b>0</b>	<b>0.000%</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
- 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 97		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
5-Sep-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11-Sep-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Sep-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-Sep-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5-Oct-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-Oct-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-Oct-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23-Oct-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-Oct-23	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 11 samples were found to be absent of both *Total Coliforms* and *E. Coli*.

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

Location	10/5/2023				10/10/2023				10/16/2023				10/23/2023				10/30/2023			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres									0.85	16.6	-	X								
170 Kneller Rd									0.66	17.6	-	X								
2105 Morrison					0.82	18.0	-	X									0.54	15.6	-	X
Staymen Rd					0.64	17.6	-	X									0.46	14.8	-	X
260 Champion Rd	0.11	19.8	-	X									0.02	17.2	-	X				
Fenwick Rd	0.44	19.6	-	X									0.53	17.2	-	X				
Solly Ct									0.85	17.8	-	X								

**Table 6.3 - BMID Disinfection By-product Testing – THM and HAA**

5-Oct-23		
Location	THM (mg/L)	HAA (mg/L)
Kirschner Reservoir	0.0805	0.0741
Pearson School	0.0642	0.0629
2921 Belgo Rd	0.0778	0.0666
Ellison School*	<0.00400	<0.00200
3976 Hwy 97 N	0.0674	0.0602

\*Primarily Well Water Supply

- Both THM and HAA results are within the limits as set out in the Guidelines for Canadian Drinking Water Quality at all locations
- 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