



MONTHLY REPORTING PERIOD - NOVEMBER, 2023

SUMMARY

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

WATER SUPPLY & USAGE SUMMARY

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

Source	Total (US Gallons)	Total (Mega Litres)
Mission Creek	58,995,050	223.30
Well 4	3,652,943	13.83
Well 5	0	0
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	62,647,992	237.12

2. BMID's control gates on the high-elevation reservoirs were opened in early July. These reservoirs were utilized by BMID until early November to maintain adequate flows in Mission Creek. The control gate for Belgo Reservoir was closed for the winter in late October, however, Graystones and Loch Long Reservoirs were closed in early November;
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 8th. 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 29th. 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 27th. Well #4 was in operation throughout November 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 24th. 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;

WATER QUALITY SUMMARY

1. The WTP was in operation for only three days (November 7th-9th) as Mission Creek had experienced increased turbidity and colour in the raw water. The WTP remained in stand-by mode for the remainder of November as 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 3.26 NTU on November 7th. Average daily raw water turbidity for November was 0.79 NTU at the Mission Creek Intake. Due to ice forming around the turbidity meter sample pump, turbidity results with the online turbidity meter were unavailable. WTP grab samples were used to determine turbidity at this site from November 1st to November 11th;
3. The highest turbidity level at the Distribution Intake (end of Hadden Reservoir) was 0.63 NTU on November 24th, 2023. Average settled water turbidity for November was 0.45 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
4. The highest turbidity level at the first customer (Booster #1) was 0.62 NTU on November 28th. Average monthly turbidity at the first customer was 0.48 NTU;
5. Average daily turbidity at the UV station peaked at 0.84 NTU on November 27th to the 29th. The turbidity meter reads consistently higher at this location, however, the turbidity results upstream and downstream of the UV plant have lower turbidity results. Average monthly turbidity at the UV disinfection station was 0.78 NTU;
6. BMID's Ultraviolet Treatment Facility treated 227,825 m³ of water, none of which was "Off-Spec" (0.00%);
7. Regarding microbiological readings, BMID ceased withdrawing water from the upper elevation reservoirs in late October/early November. Mission Creek is expected to have stable microbiological readings as autumn conditions continue in the watershed;
8. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts for November. The November 6th sample had the peak monthly count of 2 coliforms. The average monthly *E.Coli* was 1, based on 4 samples;
9. *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 4 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;
10. 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 November;

1.0 FLOWS - NOVEMBER, 2023

The Maximum Daily Flow was on November 20th, at 2,476,268 US gallons (9.37 ML)

The Minimum Daily Flow was on November 14th, at 1,932,655 US gallons (7.32 ML)

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

Figure 1.1 - Domestic Water System Flow

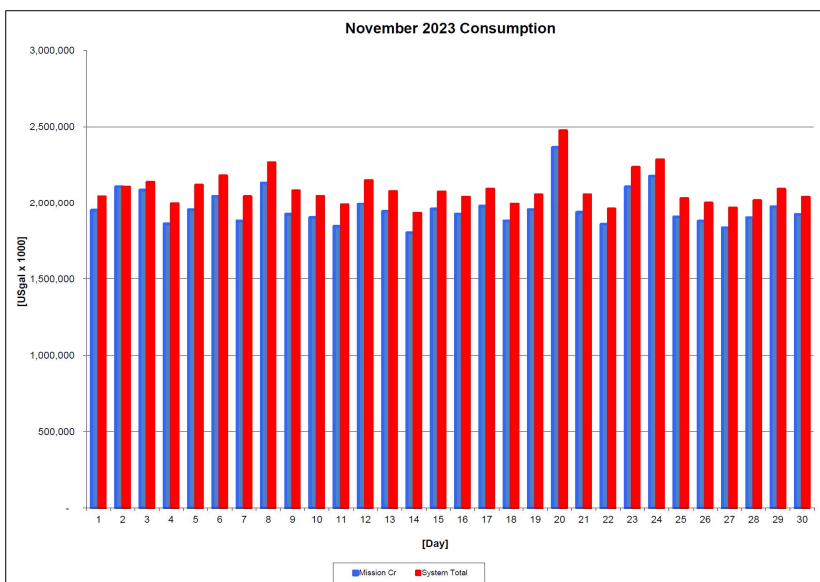


Table 1.2 - November 2023 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	System Total	System Total
2023	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Nov	1,950,408	94,837	-	2,045,245	7.74
2-Nov	2,109,836	-	-	2,109,836	7.99
3-Nov	2,087,487	52,834	-	2,140,321	8.10
4-Nov	1,861,673	138,689	-	2,000,362	7.57
5-Nov	1,953,578	167,220	-	2,120,798	8.03
6-Nov	2,046,593	134,727	-	2,181,320	8.26
7-Nov	1,880,139	166,427	-	2,046,566	7.75
8-Nov	2,134,298	132,878	-	2,267,176	8.58
9-Nov	1,923,383	160,615	-	2,083,999	7.89
10-Nov	1,902,567	145,294	-	2,047,860	7.75
11-Nov	1,844,924	141,595	-	1,986,520	7.52
12-Nov	1,994,525	156,917	-	2,151,442	8.14
13-Nov	1,942,668	137,368	-	2,080,036	7.87
14-Nov	1,802,947	129,707	-	1,932,655	7.32
15-Nov	1,958,413	118,348	-	2,076,761	7.86
16-Nov	1,924,678	118,612	-	2,043,290	7.73
17-Nov	1,976,667	119,405	-	2,096,072	7.93
18-Nov	1,880,720	118,084	-	1,998,804	7.57
19-Nov	1,954,080	104,083	-	2,058,163	7.79
20-Nov	2,366,374	109,895	-	2,476,268	9.37
21-Nov	1,936,619	122,311	-	2,058,929	7.79
22-Nov	1,857,948	101,177	-	1,959,125	7.42
23-Nov	2,108,779	128,387	-	2,237,166	8.47
24-Nov	2,178,574	107,781	-	2,286,355	8.65
25-Nov	1,906,239	127,858	-	2,034,097	7.70
26-Nov	1,878,052	127,330	-	2,005,382	7.59
27-Nov	1,835,599	130,764	-	1,966,363	7.44
28-Nov	1,901,774	119,141	-	2,020,915	7.65
29-Nov	1,973,048	120,726	-	2,093,774	7.92
30-Nov	1,922,459	119,933	-	2,042,392	7.73
Totals Usgpd	58,995,050	3,652,943	-	62,647,992	237.12
Totals ML	223.30	13.83	0.00		
Avg's	1966501.7	7.44		2088266.4	7.90
Max	2366373.5	8.96		2476268.2	9.37
Min	1802947.5	6.82		1932655.0	7.32

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 control gates on BMID's high-elevation reservoirs were closed throughout most of November, making for a greater contribution of ground water to the overall flow of Mission Creek leading to reduced E.Coli levels in the raw water.

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

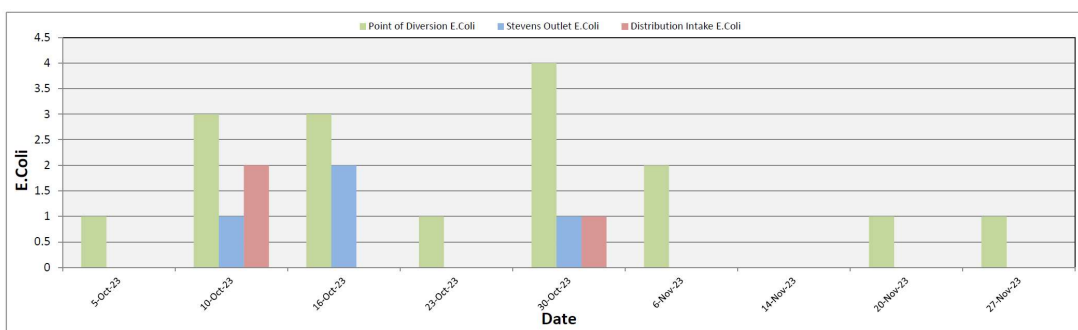


Table 2.1 - E.Coli Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
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
6-Nov-23	2	0	0
14-Nov-23	0	0	0
20-Nov-23	1	0	0
27-Nov-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 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 November 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 0.62 NTU on November 28th 2023. The lowest turbidity level was 0.26 NTU and the average turbidity was 0.48 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 water makes its way through the reservoirs.

Figure 3.1 – Daily Turbidity Readings (Mission Creek Raw - Distribution Intake - Booster Station 1 and UV Plant)

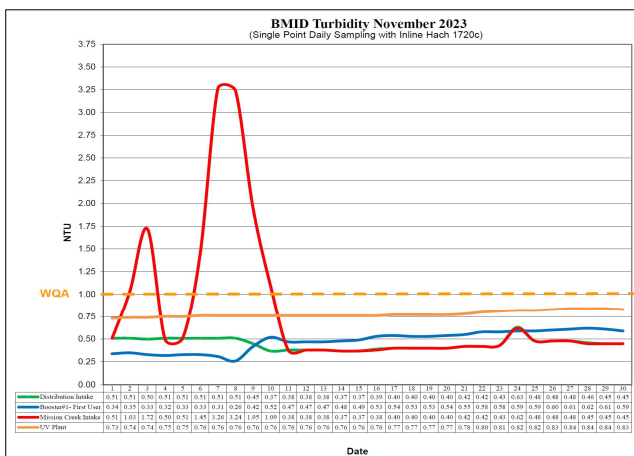


Table 3.1 - Daily Monitoring Record – Turbidity at On-Line Turbidity Analysers

Turbidity Point Sampling for November 2023				
Date	Mission Creek Intake Daily Average [NTU]	Distribution Intake Daily Average [NTU]	Booster#1- First User Daily Average [NTU]	UV Plant Daily Average [NTU]
1	*0.51	0.51	0.34	0.73
2	*1.03	0.51	0.35	0.74
3	*1.72	0.50	0.33	0.74
4	0.50	0.51	0.32	0.75
5	0.51	0.51	0.33	0.75
6	*1.45	0.51	0.33	0.76
7	*3.26	0.51	0.31	0.76
8	*3.24	0.51	0.26	0.76
9	*1.95	0.45	0.42	0.76
10	*1.09	0.37	0.52	0.76
11	*0.39	0.38	0.47	0.76
12	0.38	0.38	0.47	0.76
13	0.38	0.38	0.47	0.76
14	0.37	0.37	0.48	0.76
15	0.37	0.37	0.49	0.76
16	0.38	0.39	0.53	0.76
17	0.40	0.40	0.54	0.77
18	0.40	0.40	0.53	0.77
19	0.40	0.40	0.53	0.77
20	0.40	0.40	0.54	0.77
21	0.42	0.42	0.55	0.78
22	0.42	0.42	0.58	0.80
23	0.43	0.43	0.58	0.81
24	0.62	0.63	0.59	0.82
25	0.48	0.48	0.59	0.82
26	0.48	0.48	0.60	0.83
27	0.48	0.48	0.61	0.84
28	0.45	0.46	0.62	0.84
29	0.45	0.45	0.61	0.84
30	0.45	0.45	0.59	0.83
AVG	0.79	0.45	0.48	0.78

*WTP grab sample

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 November, 2023.

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

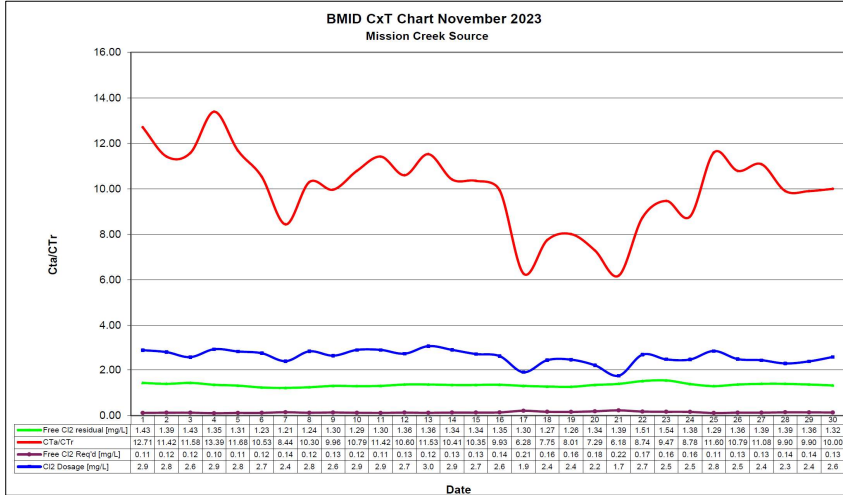


Table 4.2 - CT Table – Mission Creek Source

BMID November 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		Daily Average	Average
November		[°C]	[USgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.42	9.9	2,131.88	1.43	1777.3	139.9	12.71	0.11	2.9	2649600	1243	2,132	73
2	7.42	9.1	2,190.52	1.39	1681.3	147.2	11.42	0.12	2.8	2649600	1210	2,191	73
3	7.42	9.4	2,260.26	1.43	1676.3	144.8	11.58	0.12	2.6	2649600	1172	2,260	70
4	7.42	9.7	1,899.67	1.35	1882.9	140.6	13.39	0.10	2.9	2649600	1395	1,900	66
5	7.42	9.0	2,023.30	1.31	1715.5	146.9	11.68	0.11	2.8	2649600	1310	2,023	68
6	7.42	8.4	2,039.15	1.23	1598.2	151.7	10.53	0.12	2.7	2649600	1299	2,039	67
7	7.42	8.1	2,458.39	1.21	1304.1	154.5	8.44	0.14	2.4	2649600	1078	2,458	71
8	7.42	7.7	2,001.11	1.24	1641.8	159.5	10.30	0.12	2.8	2649600	1324	2,001	68
9	7.42	7.7	2,152.48	1.30	1600.2	160.6	9.96	0.13	2.6	2649600	1231	2,152	68
10	7.46	7.7	1,946.43	1.29	1756.0	162.8	10.79	0.12	2.9	2649600	1361	1,946	67
11	7.47	8.1	1,896.50	1.30	1816.2	159.1	11.42	0.11	2.9	2649600	1397	1,896	66
12	7.47	7.5	2,036.77	1.36	1769.2	166.9	10.60	0.13	2.7	2649600	1301	2,037	66
13	7.47	7.5	1,872.72	1.36	1924.2	166.9	11.53	0.12	3.0	2649600	1415	1,873	69
14	7.47	6.6	1,923.44	1.34	1845.9	177.3	10.41	0.13	2.9	2649600	1378	1,923	67
15	7.47	6.4	1,907.59	1.34	1861.2	179.8	10.35	0.13	2.7	2649600	1389	1,908	62
16	7.47	6.3	1,987.64	1.35	1799.6	181.2	9.93	0.14	2.6	2649600	1333	1,988	62
17	7.51	5.8	2,899.03	1.30	1188.1	189.3	6.28	0.21	1.9	2649600	914	2,899	66
18	7.53	5.4	2,223.81	1.27	1513.2	195.3	7.75	0.16	2.4	2649600	1191	2,224	65
19	7.52	6.0	2,234.90	1.26	1493.8	186.5	8.01	0.16	2.4	2649600	1186	2,235	66
20	7.52	5.9	2,569.35	1.34	1381.9	189.5	7.29	0.18	2.2	2649600	1031	2,569	68
21	7.52	6.1	3,169.28	1.39	1162.1	187.9	6.18	0.22	1.7	2649600	836	3,169	67
22	7.52	6.3	2,440.96	1.51	1639.1	187.6	8.74	0.17	2.7	2649600	1085	2,441	78
23	7.52	6.5	2,322.08	1.54	1757.2	185.6	9.47	0.16	2.5	2649600	1141	2,322	69
24	7.53	5.7	2,149.31	1.38	1701.2	193.7	8.78	0.16	2.5	2649600	1233	2,149	64
25	7.52	8.2	1,834.68	1.29	1863.0	160.6	11.60	0.11	2.8	2649600	1444	1,835	62
26	7.52	9.0	2,180.22	1.36	1652.8	153.2	10.79	0.13	2.5	2649600	1215	2,180	65
27	7.52	9.4	2,223.01	1.39	1656.7	149.5	11.08	0.13	2.4	2649600	1192	2,223	65
28	7.52	8.9	2,402.92	1.39	1532.7	154.7	9.90	0.14	2.3	2649600	1103	2,403	66
29	7.56	8.5	2,262.64	1.36	1592.6	160.9	9.90	0.14	2.4	2649600	1171	2,263	65
30	7.57	7.9	2,087.49	1.32	1675.4	167.5	10.00	0.13	2.6	2649600	1269	2,087	64
Averages	7.48	7.62	2190.92	1.34	1648.66	166.7	10.03	0.14	2.58			2191	67.1

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	227,825 m ³	100.00%
On-Spec Water:	227,825 m ³	100.00%
Off-Spec Water:	0.0 m ³	0.000%

Average monthly chlorine residual before UV Treatment was 1.27 mg/L
The average monthly chlorine residual after UV treatment and re-chlorination was 1.40 mg/L.

Figure 5.1 - UV Disinfection – BMID Mission Creek Source – November 2023

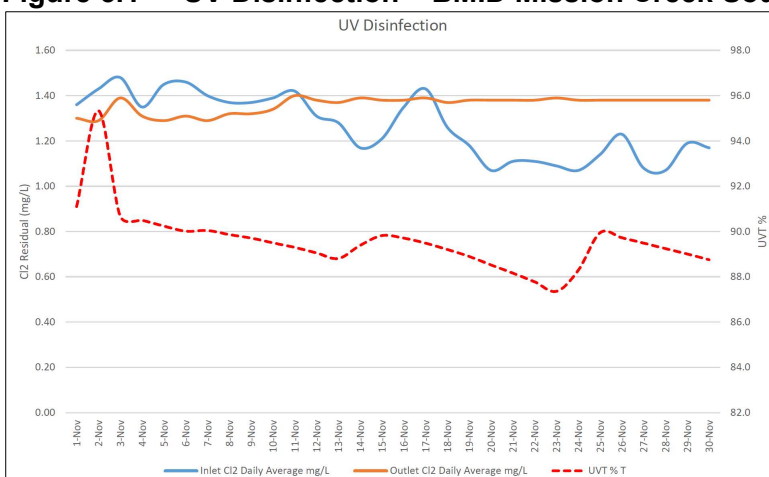


Table 5.2 - UV Disinfection Table – Mission Creek Source

Date	Inlet Cl2	Outlet Cl2	UVT	Turbidity		In Spec	Off Spec	Off Spec %
	Daily	Daily						
	mg/L	mg/L	% T	NTU		Cubic Meters	Cubic Meters	Percentage
1-Nov	1.36	1.30	91.1	0.73		7,383	0	0.00%
2-Nov	1.43	1.29	95.3	0.74		7,987	0	0.00%
3-Nov	1.48	1.39	90.7	0.74		7,902	0	0.00%
4-Nov	1.35	1.31	90.5	0.75		7,047	0	0.00%
5-Nov	1.45	1.29	90.2	0.75		7,395	0	0.00%
6-Nov	1.46	1.31	90.0	0.76		7,747	0	0.00%
7-Nov	1.40	1.29	90.0	0.76		7,117	0	0.00%
8-Nov	1.37	1.32	89.9	0.76		8,079	0	0.00%
9-Nov	1.37	1.32	89.7	0.76		7,281	0	0.00%
10-Nov	1.39	1.34	89.5	0.76		7,202	0	0.00%
11-Nov	1.42	1.40	89.3	0.76		6,984	0	0.00%
12-Nov	1.31	1.38	89.1	0.76		7,550	0	0.00%
13-Nov	1.28	1.37	88.8	0.76		7,354	0	0.00%
14-Nov	1.17	1.39	89.4	0.76		6,825	0	0.00%
15-Nov	1.21	1.38	89.8	0.76		7,413	0	0.00%
16-Nov	1.35	1.38	89.7	0.76		7,286	0	0.00%
17-Nov	1.43	1.39	89.5	0.77		7,483	0	0.00%
18-Nov	1.26	1.37	89.2	0.77		7,119	0	0.00%
19-Nov	1.18	1.38	88.9	0.77		11,902	0	0.00%
20-Nov	1.07	1.38	88.5	0.77		8,958	0	0.00%
21-Nov	1.11	1.38	88.2	0.78		7,331	0	0.00%
22-Nov	1.11	1.38	87.8	0.80		7,033	0	0.00%
23-Nov	1.09	1.39	87.4	0.81		7,983	0	0.00%
24-Nov	1.07	1.38	88.3	0.82		8,247	0	0.00%
25-Nov	1.14	1.38	89.9	0.82		7,216	0	0.00%
26-Nov	1.23	1.38	89.7	0.83		7,109	0	0.00%
27-Nov	1.08	1.38	89.5	0.84		6,949	0	0.00%
28-Nov	1.07	1.38	89.2	0.84		7,199	0	0.00%
29-Nov	1.19	1.38	89.0	0.84		7,469	0	0.00%
30-Nov	1.17	1.38	88.8	0.83		7,277	0	0.00%
Average	1.27	1.40	89.57	0.78	Total	227,825	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
- 26 samples were found to be absent of Coliforms.
- 26 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 #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-Oct-23	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
16-Oct-23	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
30-Oct-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6-Nov-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Nov-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Nov-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-Nov-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 10 samples were found to be absent of both *Total Coliforms* and *E. Coli*.

Table 6.2 - BMID In-house Testing – Presence Absence

Location	11/6/2023				11/14/2023				11/20/2023				11/27/2023			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres	0.77	13.2	-	X									0.81	10.2	-	X
170 Kneller Rd	0.81	13.4	-	X									0.99	7.6	-	X
2105 Morrison Staymen Rd									0.35	14.6	-	X				
260 Campion Rd					0.00	13.6	-	X								
Fenwick Rd					0.23	13.0	-	X								
Solly Ct	0.87	9.2	-	X									0.87	9.2	-	X

- 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) = 10
- Total tests sampled by BMID and tested by Caro Labs 26
- Total tests sampled in BMID treated distribution system = 36
- 0 Positive *E. Coli* and Total Coliform Samples