



MONTHLY REPORTING PERIOD - NOVEMBER, 2022

1. SUMMARY

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

WATER SUPPLY & USAGE SUMMARY

1. Water usage data for November is as follows:

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	62,551,861	236.76
Well 4	727,260	2.75
Well 5	0	0
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	63,279,121	239.51

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 27th, 2022 to September 9, 2022 when irrigation demands in the north end reduced from peak flows experienced earlier in summer;
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 November;
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 12th 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. 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 operated from February 8th, 2022 until October 31, 2022. The WTP is in by-pass mode for the winter. By late October raw water quality in Mission Creek had improved to where it no longer required chemical treatment to reduce turbidity and colour. Barring an extreme weather event, the WTP will remain in by-pass mode until spring 2023;
2. Raw water turbidity levels in Mission Creek peaked at 1.03 NTU (average daily turbidity) on November 5th. Average daily raw water turbidity for November was 0.77 NTU at the Mission Creek intake;
3. The highest turbidity level at the Distribution Intake (end of Hadden Reservoir) was 0.60 NTU on November 18th and 24th, 2022. Average settled water turbidity for November was 0.52 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
4. The highest turbidity level at the first customer (Booster #1) was 0.33 NTU on November 10th and 30th. Average monthly turbidity at the first customer was 0.29 NTU;
5. The highest turbidity daily average at the UV plant was 0.48 NTU on November 4th. Average monthly turbidity at the UV plant was 0.40 NTU throughout the month;
6. BMID's Ultraviolet Treatment Facility treated 236,785 m³ of water, none of which was "Off-Spec" (0.00%);
7. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had low counts for November. The level was on the November 21st sample with a count of 3 *E.Coli*. The average monthly *E.Coli* was 1.75, based on 4 samples;
8. *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 to the settling of particles as water passes through Stevens and Hadden Reservoirs;
9. 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, 2022

The Maximum Daily Flow was on November 2nd, at 2,295,813 US gallons (8.69 ML)

The Minimum Daily Flow was on November 12th, at 2,011,379 US gallons (7.61 ML)

Mission Creek provided over 98% of domestic flow supplied in November.

Figure 1.1 - Domestic Water System Flow

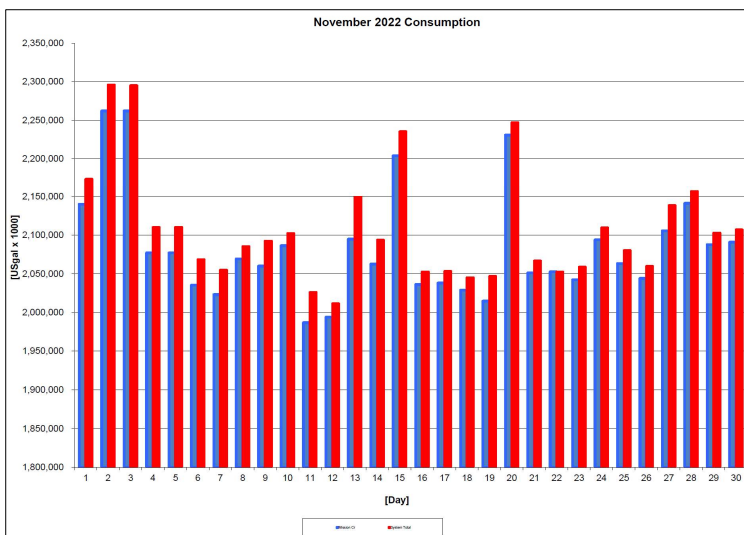


Table 1.2 - November 2022 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	System Total	System Total
2022	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Nov	2,139,820	33,814	-	2,173,633	8.23
2-Nov	2,261,999	33,814	-	2,295,813	8.69
3-Nov	2,262,052	33,021	-	2,295,073	8.69
4-Nov	2,076,973	33,021	-	2,109,994	7.99
5-Nov	2,077,000	33,285	-	2,110,285	7.99
6-Nov	2,035,181	33,285	-	2,068,467	7.83
7-Nov	2,022,924	31,965	-	2,054,888	7.78
8-Nov	2,069,154	16,114	-	2,085,268	7.89
9-Nov	2,059,908	32,493	-	2,092,400	7.92
10-Nov	2,086,219	15,850	-	2,102,069	7.96
11-Nov	1,986,573	39,361	-	2,025,935	7.67
12-Nov	1,993,944	17,435	-	2,011,379	7.61
13-Nov	2,094,778	54,419	-	2,149,197	8.13
14-Nov	2,062,470	31,172	-	2,093,642	7.92
15-Nov	2,203,802	31,436	-	2,235,238	8.46
16-Nov	2,036,053	16,379	-	2,052,431	7.77
17-Nov	2,037,955	15,322	-	2,053,277	7.77
18-Nov	2,028,656	16,379	-	2,045,035	7.74
19-Nov	2,014,444	32,229	-	2,046,672	7.75
20-Nov	2,230,589	16,379	-	2,246,968	8.50
21-Nov	2,051,058	15,586	-	2,066,644	7.82
22-Nov	2,052,432	-	-	2,052,432	7.77
23-Nov	2,042,076	16,643	-	2,058,719	7.79
24-Nov	2,093,827	15,586	-	2,109,413	7.98
25-Nov	2,063,210	16,907	-	2,080,117	7.87
26-Nov	2,043,872	15,850	-	2,059,723	7.80
27-Nov	2,105,557	32,757	-	2,138,314	8.09
28-Nov	2,141,061	15,322	-	2,156,383	8.16
29-Nov	2,087,487	15,322	-	2,102,809	7.96
30-Nov	2,090,789	16,114	-	2,106,904	7.97
Totals Usgpd	62,551,861	727,260	-	63,279,121	239.51
Totals ML	236.76	2.75	0.00		
Avg's	2085062.0	7.89		2109304.0	7.98
Max	2262052.0	8.56		2295812.9	8.69
Min	1986573.4	7.52		2011379.1	7.61

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) October 2022 - November 2022

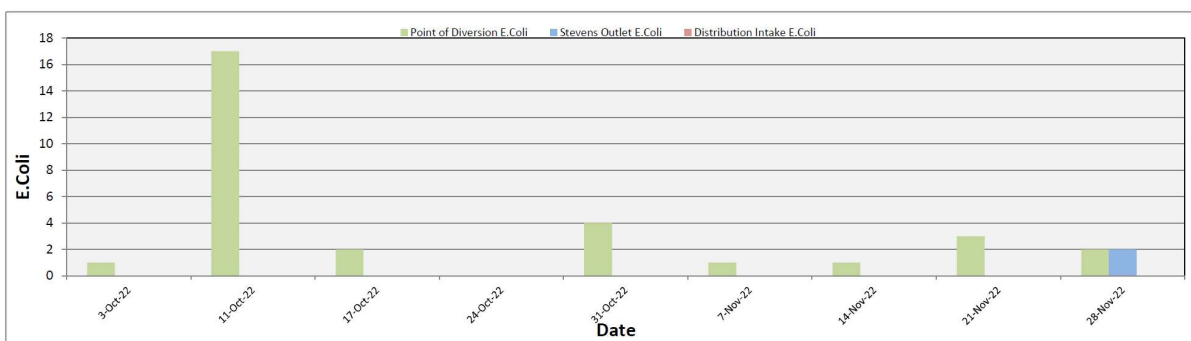


Table 2.1 - *E.Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
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
7-Nov-22	1	0	0
14-Nov-22	1	0	0
21-Nov-22	3	0	0
28-Nov-22	2	2	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 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 0.33 NTU on November 10th and 30th, 2022. The lowest turbidity level was 0.22 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 (Distribution Intake and Booster Station 1)

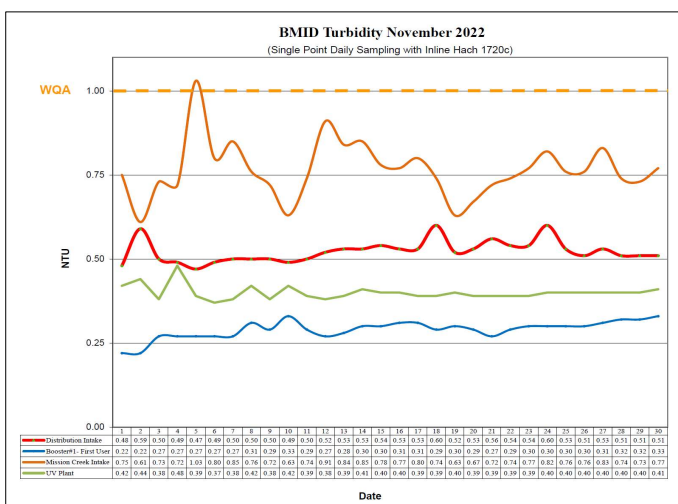


Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for November 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	0.75	0.48	0.22	0.42
2	0.61	0.59	0.22	0.44
3	0.73	0.50	0.27	0.38
4	0.72	0.49	0.27	0.48
5	1.03	0.47	0.27	0.39
6	0.80	0.49	0.27	0.37
7	0.85	0.50	0.27	0.38
8	0.76	0.50	0.31	0.42
9	0.72	0.50	0.29	0.38
10	0.63	0.49	0.33	0.42
11	0.74	0.50	0.29	0.39
12	0.91	0.52	0.27	0.38
13	0.84	0.53	0.28	0.39
14	0.85	0.53	0.30	0.41
15	0.78	0.54	0.30	0.40
16	0.77	0.53	0.31	0.40
17	0.80	0.53	0.31	0.39
18	0.74	0.60	0.29	0.39
19	0.63	0.52	0.30	0.40
20	0.67	0.53	0.29	0.39
21	0.72	0.56	0.27	0.39
22	0.74	0.54	0.29	0.39
23	0.77	0.54	0.30	0.39
24	0.82	0.60	0.30	0.40
25	0.76	0.53	0.30	0.40
26	0.76	0.51	0.30	0.40
27	0.83	0.53	0.31	0.40
28	0.74	0.51	0.32	0.40
29	0.73	0.51	0.32	0.40
30	0.77	0.51	0.33	0.41
AVG	0.77	0.52	0.29	0.40

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, 2022.

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

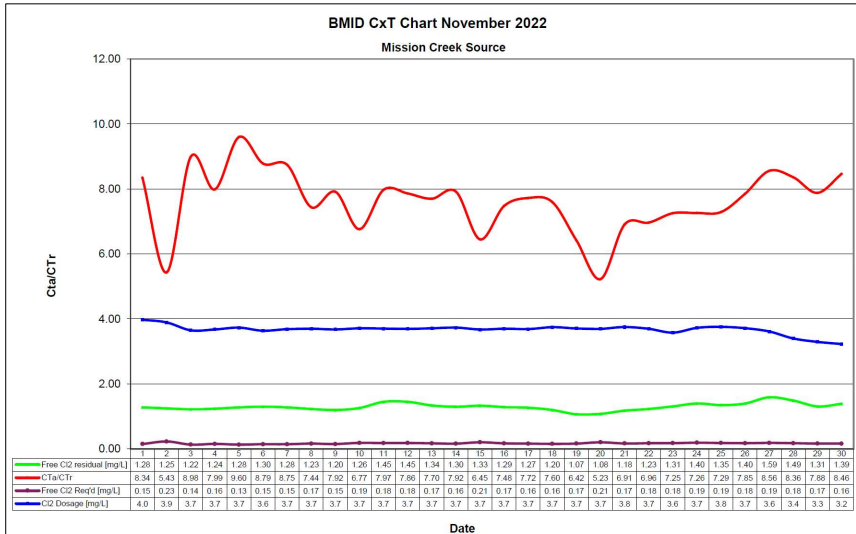


Table 4.2 - CT Table – Mission Creek Source

BMID November 2022													
Mission Creek Source													
DATE	pH	TEMP	PEAK	Free Cl2	CT	CT	CTa/CTr	Free Cl2	Cl2	VOLUME	TIME	FLOW	CL2 DOSAGE
November	(Average)	(Percent)	FLOW	residual	achieved	req'd		Req'd	Dosage	TOTAL	[mins]	Daily Average	Average
		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]		[USGPM]	[PPD]
1	7.65	8.7	2,504.36	1.28	1354.2	162.3	8.34	0.15	4.0	2649600	1058	1,466	70
2	7.68	8.8	3,756.54	1.25	881.7	162.3	5.43	0.23	3.9	2649600	705	1,585	74
3	7.69	8.5	2,171.50	1.22	1488.6	165.7	8.98	0.14	3.7	2649600	1220	1,449	64
4	7.69	8.2	2,425.11	1.24	1354.8	169.6	7.99	0.16	3.7	2649600	1093	1,461	65
5	7.69	8.0	2,044.70	1.28	1658.7	172.8	9.60	0.13	3.7	2649600	1296	1,355	61
6	7.75	7.7	2,171.50	1.30	1586.2	180.5	8.79	0.15	3.6	2649600	1220	1,442	63
7	7.75	7.2	2,079.57	1.28	1630.9	186.5	8.75	0.15	3.7	2649600	1274	1,433	64
8	7.75	6.6	2,266.60	1.23	1437.8	193.2	7.44	0.17	3.7	2649600	1169	1,455	65
9	7.75	6.5	2,071.64	1.20	1534.8	193.9	7.92	0.15	3.7	2649600	1279	1,420	63
10	7.75	5.7	2,390.24	1.26	1396.7	206.4	6.77	0.19	3.7	2649600	1109	1,469	66
11	7.75	5.6	2,269.77	1.45	1692.6	212.3	7.97	0.18	3.7	2649600	1167	1,400	62
12	7.75	5.6	2,301.47	1.45	1669.3	212.3	7.86	0.18	3.7	2649600	1151	1,419	63
13	7.80	5.7	2,174.67	1.34	1632.6	212.0	7.70	0.17	3.7	2649600	1218	1,469	66
14	7.78	5.6	2,060.55	1.30	1671.6	211.0	7.92	0.16	3.7	2649600	1286	1,450	65
15	7.75	5.6	2,605.80	1.33	1352.4	209.6	6.45	0.21	3.7	2649600	1017	1,557	69
16	7.75	5.7	2,206.37	1.29	1549.1	207.2	7.48	0.17	3.7	2649600	1201	1,434	64
17	7.75	5.7	2,108.10	1.27	1596.2	206.7	7.72	0.16	3.7	2649600	1257	1,446	64
18	7.75	5.6	2,027.26	1.20	1568.4	206.4	7.60	0.16	3.7	2649600	1307	1,419	64
19	7.83	5.4	2,089.08	1.07	1357.1	211.4	6.42	0.17	3.7	2649600	1268	1,415	63
20	7.86	5.4	2,559.84	1.08	1117.9	213.9	5.23	0.21	3.7	2649600	1035	1,576	70
21	7.86	5.5	2,101.76	1.18	1487.6	215.3	6.91	0.17	3.8	2649600	1261	1,428	64
22	7.89	5.5	2,138.22	1.23	1524.2	218.9	6.96	0.18	3.7	2649600	1239	1,451	65
23	7.92	5.4	2,128.70	1.31	1630.6	224.8	7.25	0.18	3.6	2649600	1245	1,485	64
24	7.93	5.3	2,226.98	1.40	1665.7	229.4	7.26	0.19	3.7	2649600	1190	1,469	66
25	7.86	5.2	2,187.35	1.35	1635.3	224.3	7.29	0.19	3.8	2649600	1211	1,428	65
26	7.82	5.0	2,093.83	1.40	1771.6	225.6	7.85	0.18	3.7	2649600	1285	1,428	64
27	7.81	4.9	2,133.46	1.59	1974.7	230.7	8.56	0.19	3.6	2649600	1242	1,471	64
28	7.81	4.7	2,038.36	1.49	1936.8	231.7	8.36	0.18	3.4	2649600	1300	1,499	61
29	7.72	4.3	1,944.84	1.31	1784.7	226.4	7.88	0.17	3.3	2649600	1362	1,469	58
30	7.59	4.2	1,979.71	1.39	1860.3	219.8	8.46	0.16	3.2	2649600	1338	1,471	57
Averages	7.77	6.06	2241.93	1.30	1560.10	204.8	7.64	0.17	3.67			1457	64.3

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	236,785 m ³	100.00%
On-Spec Water:	236,785 m ³	100.00%
Off-Spec Water:	0 m ³	0.00%

Average monthly chlorine residual before UV Treatment was 1.32 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 2022

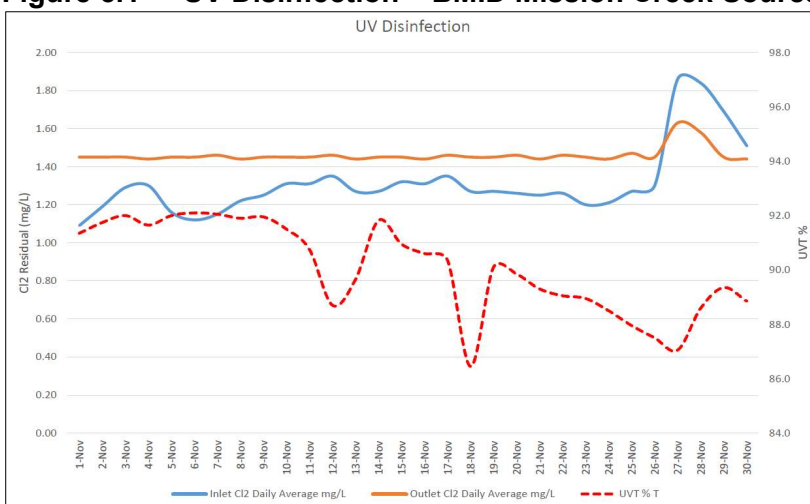


Table 5.2 - UV Disinfection Table – Mission Creek Source

Date	Inlet Cl2	Outlet Cl2	UVT	Turbidity		In Spec	Off Spec	Off Spec %
	Daily	Daily				Water	Water	of Water
	mg/L	mg/L	% T	NTU		Cubic Meters	Cubic Meters	Percentage
1-Nov	1.09	1.45	91.4	0.42		8,100	0	0.00%
2-Nov	1.19	1.45	91.7	0.44		8,563	0	0.00%
3-Nov	1.29	1.45	92.0	0.38		8,563	0	0.00%
4-Nov	1.30	1.44	91.7	0.48		7,862	0	0.00%
5-Nov	1.16	1.45	92.0	0.39		7,862	0	0.00%
6-Nov	1.12	1.45	92.1	0.37		7,704	0	0.00%
7-Nov	1.15	1.46	92.1	0.38		7,658	0	0.00%
8-Nov	1.22	1.44	91.9	0.42		7,833	0	0.00%
9-Nov	1.25	1.45	92.0	0.38		7,798	0	0.00%
10-Nov	1.31	1.45	91.5	0.42		7,897	0	0.00%
11-Nov	1.31	1.45	90.8	0.39		7,520	0	0.00%
12-Nov	1.35	1.46	88.7	0.38		7,548	0	0.00%
13-Nov	1.27	1.44	89.7	0.39		7,930	0	0.00%
14-Nov	1.27	1.45	91.8	0.41		7,807	0	0.00%
15-Nov	1.32	1.45	91.0	0.40		8,342	0	0.00%
16-Nov	1.31	1.44	90.6	0.40		7,707	0	0.00%
17-Nov	1.35	1.46	90.4	0.39		7,715	0	0.00%
18-Nov	1.27	1.45	86.5	0.39		7,679	0	0.00%
19-Nov	1.27	1.45	90.1	0.40		7,626	0	0.00%
20-Nov	1.26	1.46	89.9	0.39		8,444	0	0.00%
21-Nov	1.25	1.44	89.3	0.39		7,764	0	0.00%
22-Nov	1.26	1.46	89.1	0.39		7,769	0	0.00%
23-Nov	1.20	1.45	89.0	0.39		7,730	0	0.00%
24-Nov	1.21	1.44	88.5	0.40		7,926	0	0.00%
25-Nov	1.27	1.47	88.0	0.40		7,810	0	0.00%
26-Nov	1.30	1.45	87.5	0.40		7,737	0	0.00%
27-Nov	1.86	1.63	87.1	0.40		7,970	0	0.00%
28-Nov	1.84	1.58	88.6	0.40		8,105	0	0.00%
29-Nov	1.69	1.45	89.4	0.40		7,902	0	0.00%
30-Nov	1.51	1.44	88.9	0.41		7,915	0	0.00%
Average	1.32	1.40	90.09	0.40	Total	236,785	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
- 24 samples were found to be absent of Coliforms.
- 24 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
3-Oct-22	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
17-Oct-22	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
31-Oct-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-Nov-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Nov-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-Nov-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Nov-22	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 9 samples were found to be absent of both *Total Coliforms* and *E. Coli*.

Table 6.2 - BMID In-house Testing – Presence Absence

Location	11/8/2022				11/14/2022				11/21/2022				11/28/2022				
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	
Sylvania Cres					0.72	11.6	-	X									
170 Kneller Rd					0.78	12.2	-	X									
2105 Morrison	0.51	15.8	-	X									0.38	11.6	-	X	
Staymen Rd	0.32	14.6	-	X									0.63	11.4	-	X	
260 Campion Rd									0.09	15.8	-	X					
Fenwick Rd									0.47	13.4	-	X					
Solly Ct					0.84	15.2	-	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) = 12
- Total tests sampled by BMID and tested by Caro Labs 24
- Total tests sampled in BMID treated distribution system = 9
- 0 Positive *E. Coli* and Total Coliform Samples