BLACK MOUNTAIN IRRIGATION DISTRICT
285 Gray Road
Kelowna, B.C.
V1X 1W8

Office: (250) 765-5169
Fax: (250) 765-0277
www.bmid.ca

MONTHLY REPORTING PERIOD - JUNE, 2023

SUMMARY

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

WATER SUPPLY & USAGE SUMMARY

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

Source	Total (US Gallons)	Total (Mega Litres)
Mission Creek	543,083,213	2,055.57
Well 4	0	0
Well 5	23,849,365	90.27
Well 6 (Irrigation Only)	1,610,400	6.10
Scotty Creek (Irrigation Only)	1,129,760	4.28
Total	569,672,738	2,156.21

2. June 2023 was considerably hotter and dryer than the historical average. Average daily highs for June are 24° C with an average of 82 mm of precipitation. For June 2023, the average daily high was 27.1 ° C and only 5.1 mm of rain fell at Kelowna Airport this month;
3. BMID's control gates on the high-elevation reservoirs are closed for the spring. The gates will remain closed through the month of June;
4. BMID's Scotty Creek source supplying irrigation water to the north-end of the service area, provided water throughout June as irrigation demands in the north-end increased for the growing season;
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 in operation throughout June as flows in the north-end increased. Well #5 will be utilized throughout the summer until flows reduce in the fall;
6. Well #4, used as a primary source for domestic water in the north-end of the distribution system during low-flow periods, was placed in stand-by mode throughout June;
7. Well #6, which supplies water to the north-end irrigation distribution system, was in operation periodically throughout June. Well #6 will continue to operate until irrigation demand reduces later in the fall;
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. The WTP ran throughout all of June as Mission Creek had increased turbidity and colour in the raw water. The WTP will remain in use until the late-fall/early-winter when raw water quality improves;
2. Raw water turbidity levels in Mission Creek peaked at 5.40 NTU on June 5th. Average daily raw water turbidity for June was 3.60 NTU at the Grit Pond, located downstream of the Mission Creek Intake;
3. The highest turbidity level at the Distribution Intake (end of Hadden Reservoir) was 0.74 NTU on June 24th, 2023. Average settled water turbidity for June was 0.50 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
4. The highest turbidity level at the first customer (Booster #1) was 0.50 NTU on June 1st. Average monthly turbidity at the first customer was 0.27 NTU;
5. The on-line turbidity meter at the UV plant had several days where the turbidity meter would fault and read below the expected results compared to the other on-line turbidity meters in the distribution system. When fully functioning, the highest turbidity daily average at the UV plant was 0.41 NTU on June 1st and 2nd. Average monthly turbidity at the UV plant was 0.30 NTU throughout June;
6. BMID's Ultraviolet Treatment Facility treated 2,051,606 m^3 of water, 2,264 m^3 of which was "Off-Spec" (0.110%);
7. Regarding microbiological readings, the Mission Creek upper and mid-elevation watershed experienced rising temperatures throughout spring which melted most of the snowpack in the watershed by early June. BMID's upper elevation reservoirs are full and spilling which is contributing to the flow of Mission Creek. Mission Creek is expected to have greater variability in microbiological conditions as summer conditions resume in the watershed;
8. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had average counts for June. The June 26th sample had the peak monthly count of 228 coliforms. The average monthly *E.Coli* was 67.75, 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 low counts on all 4 samples. The highest *E.*Coli count was on June 26 with 1 coliform. 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 June;

1.0 FLOWS - JUNE, 2023

The Maximum Daily Flow was on June 29th, at 23,469,079 US gallons (88.83 ML)

The Minimum Daily Flow was on June 20th, at 10,650,801 US gallons (40.31 ML)

Mission Creek provided just over 95% of domestic and irrigation flow supplied in June.

Figure 1.1 - Domestic Water System Flow

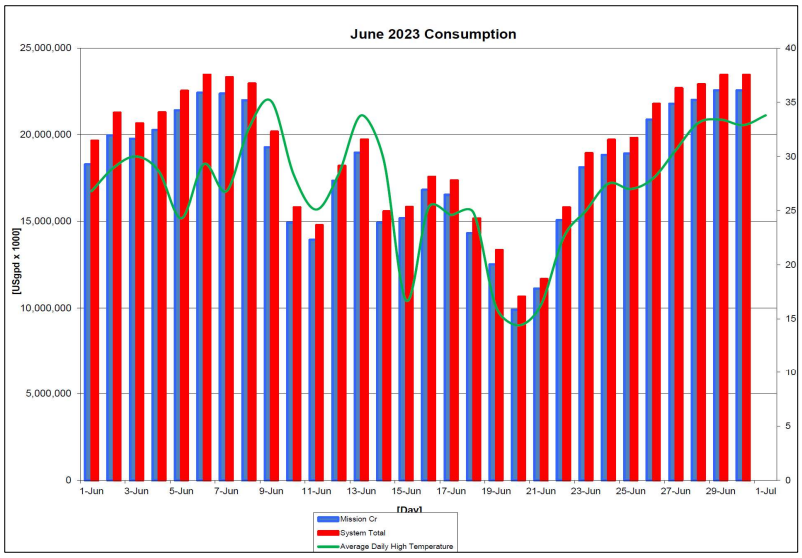

Table 1.2 - June 2023 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	Well #6	Scotty Crk	System Total	System Total
2023	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Jun	18,297,662	0	845,571	471,240	37,900	19,652,374	74.38
2-Jun	19,971,456	0	851,637	404,976	46,686	21,274,755	80.52
3-Jun	19,768,044	0	849,919	0	45,102	20,663,065	78.21
4-Jun	20,270,314	0	852,276	121,440	49,595	21,293,624	80.60
5-Jun	21,421,073	0	848,060	218,328	50,857	22,538,318	85.31
6-Jun	22,435,309	0	756,197	228,888	47,397	23,467,791	88.83
7-Jun	22,377,350	0	797,661	101,904	44,083	23,320,998	88.27
8-Jun	21,994,829	0	858,230	49,368	57,978	22,960,405	86.91
9-Jun	19,276,684	0	853,208	0	49,244	20,179,136	76.38
10-Jun	14,927,514	0	843,270	0	38,226	15,809,011	59.84
11-Jun	13,942,232	0	818,145	0	19,545	14,779,922	55.94
12-Jun	17,342,311	0	828,300	0	39,875	18,210,485	68.93
13-Jun	18,962,425	0	725,059	0	47,203	19,734,687	74.70
14-Jun	14,914,913	0	641,162	0	32,101	15,588,176	59.00
15-Jun	15,179,799	0	634,343	0	17,670	15,831,812	59.92
16-Jun	16,823,292	0	717,782	0	30,290	17,571,364	66.51
17-Jun	16,529,955	0	807,071	0	36,222	17,373,249	65.76
18-Jun	14,317,039	0	821,830	0	27,432	15,166,301	57.40
19-Jun	12,521,092	0	791,340	0	27,481	13,339,913	50.49
20-Jun	9,895,117	0	732,956	0	22,728	10,650,801	40.31
21-Jun	11,128,246	0	528,565	0	7,880	11,664,690	44.15
22-Jun	15,079,308	0	720,429	6,072	8,427	15,814,235	59.86
23-Jun	18,123,679	0	782,236	6,072	22,829	18,934,816	71.67
24-Jun	18,829,256	0	842,985	2,112	37,790	19,712,143	74.61
25-Jun	18,920,923	0	847,489	0	46,261	19,814,673	75.00
26-Jun	20,885,835	0	850,387	0	47,870	21,784,091	82.45
27-Jun	21,784,627	0	850,886	0	54,701	22,690,214	85.88
28-Jun	22,017,732	0	852,503	0	55,399	22,925,635	86.77
29-Jun	22,572,229	0	851,446	0	45,403	23,469,079	88.83
30-Jun	22,572,969	0	848,422	0	35,587	23,456,977	88.78
Totals Usgpd	543,083,213	0	23,849,365	1,610,400	1,129,760	569,672,738	2,156.21
Totals ML	2,055.57	0.00	90.27	6.10	4.28		
Avg's	18,102,774	68.52				18,989,091	71.87
Max	22,572,969	85.44				23,469,079	88.83
Min	9,895,117	37.45				10,650,801	40.31

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

The upper watershed experienced considerable snow melt throughout May/June, resulting in increased E.Coli levels compared to previous months. 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) May 2023 - June 2023

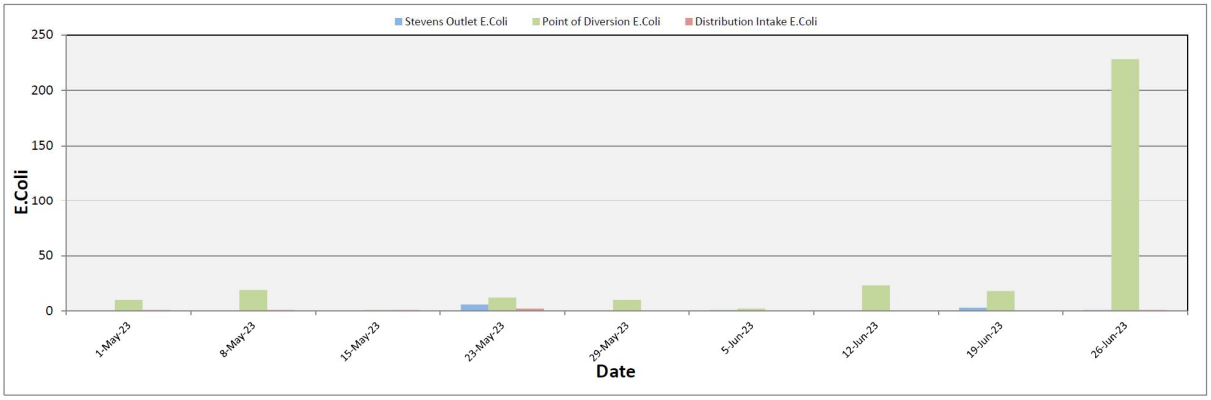

Table 2.1 - *E.Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
1-May-23	10	0	1
8-May-23	19	0	1
15-May-23	1	0	1
23-May-23	12	6	2
29-May-23	10	0	0
5-Jun-23	2	1	0
12-Jun-23	23	0	0
19-Jun-23	18	3	0
26-Jun-23	228	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^3 1st upper balancing reservoir (Stevens Res.)
Hadden Outlet (Raw) - Sampling point after exiting 75,000 m^3 2nd lower balancing reservoir (Hadden Res.)
(*Hadden Outlet = Distribution Intake - Point of Disinfection*)

3.0 RAW AND TREATED WATER TURBIDITY

Through June 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 0.50 NTU on June 1st, 2023. The lowest turbidity level was 0.18 NTU and the average turbidity was 0.27 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)

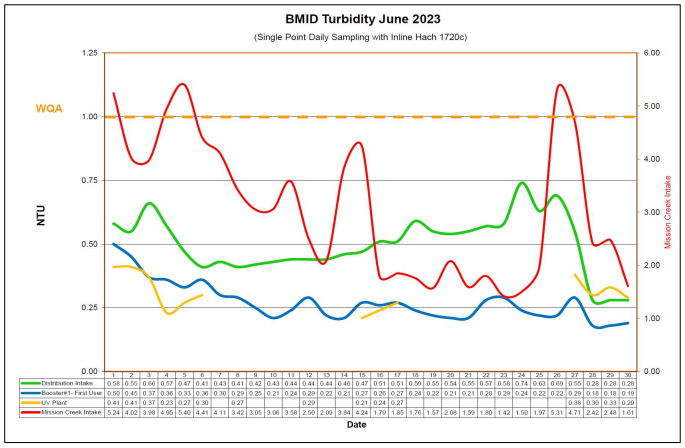

Table 3.1 - Daily Monitoring Record – Turbidity at On-Line Turbidity Analysers

Turbidity Point Sampling for June 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	5.24	0.58	0.50	0.41
2	4.02	0.55	0.45	0.41
3	3.98	0.66	0.37	0.37
4	4.95	0.57	0.36	0.23
5	5.40	0.47	0.33	0.27
6	4.41	0.41	0.36	0.30
7	4.11	0.43	0.30	NA
8	3.42	0.41	0.29	0.27
9	3.05	0.42	0.25	NA
10	3.06	0.43	0.21	NA
11	3.58	0.44	0.24	NA
12	2.50	0.44	0.29	0.29
13	2.09	0.44	0.22	NA
14	3.84	0.46	0.21	NA
15	4.24	0.47	0.27	0.21
16	1.79	0.51	0.26	0.24
17	1.85	0.51	0.27	0.27
18	1.76	0.59	0.24	NA
19	1.57	0.55	0.22	NA
20	2.08	0.54	0.21	NA
21	1.59	0.55	0.21	NA
22	1.80	0.57	0.28	NA
23	1.42	0.58	0.29	NA
24	1.50	0.74	0.24	NA
25	1.97	0.63	0.22	NA
26	5.31	0.69	0.22	NA
27	4.71	0.55	0.29	0.38
28	2.42	0.28	0.18	0.30
29	2.48	0.28	0.18	0.33
30	1.61	0.28	0.19	0.29
AVG	3.06	0.50	0.27	0.30

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 June, 2023.

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

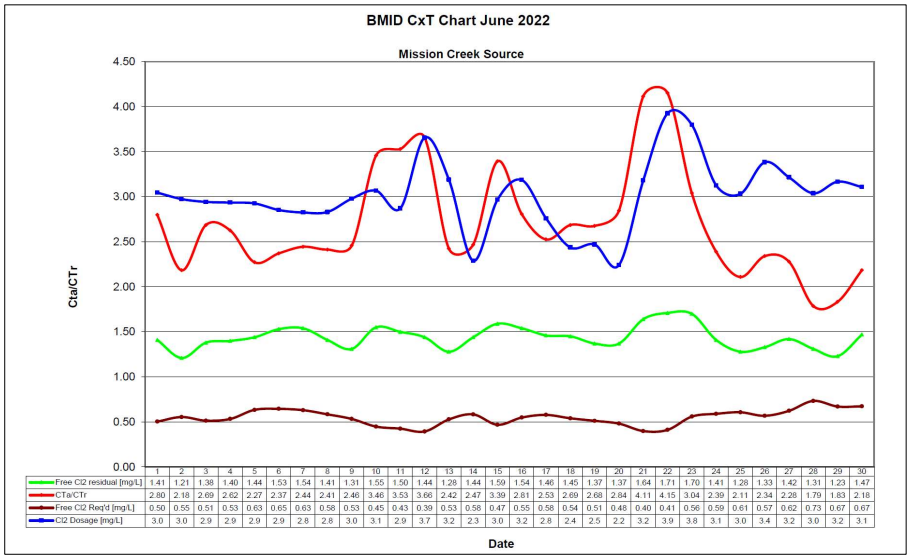

Table 4.2 - CT Table – Mission Creek Source

DATE	BMID June 2023 Mission Creek Source												
	pH (Average)	TEMP (Present)	PEAK FLOW	Free Cl_2 residual	CT achieved	CT req'd	CTa/CTr	Free Cl_2 Req'd	Cl_2 Dosage	VOLUME TOTAL	TIME	FLOW Daily Average	CL_2 DOSAGE Average
June		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.26	16.0	15,484	1.41	241.3	86.2	2.80	0.50	3.0	2649600	171	13,018	477
2	7.29	16.2	17,472	1.21	183.5	84.0	2.18	0.55	3.0	2649600	152	14,154	506
3	7.31	16.4	15,989	1.38	228.7	85.1	2.69	0.51	2.9	2649600	166	14,061	497
4	7.34	16.3	16,268	1.40	228.0	86.9	2.62	0.53	2.9	2649600	163	14,401	508
5	7.35	15.8	18,519	1.44	206.0	90.7	2.27	0.63	2.9	2649600	143	15,214	535
6	7.38	16.1	18,873	1.53	214.8	90.6	2.37	0.65	2.9	2649600	140	15,967	547
7	7.43	16.4	18,459	1.54	221.0	90.4	2.44	0.63	2.8	2649600	144	15,909	540
8	7.45	17.4	18,456	1.41	202.4	83.9	2.41	0.58	2.8	2649600	144	15,619	531
9	7.52	17.3	16,488	1.31	210.5	85.7	2.46	0.53	3.0	2649600	161	13,710	491
10	7.60	17.3	13,147	1.55	312.4	90.4	3.46	0.45	3.1	2649600	202	10,584	390
11	7.60	18.0	13,147	1.50	302.3	85.7	3.53	0.43	2.9	2649600	202	10,584	365
12	7.61	18.5	12,636	1.44	301.9	82.5	3.66	0.39	3.7	2649600	210	9,894	435
13	7.65	17.7	16,097	1.28	210.7	86.9	2.42	0.53	3.2	2649600	165	12,237	469
14	7.64	16.8	16,474	1.44	231.6	93.9	2.47	0.58	2.3	2649600	161	13,493	371
15	7.65	16.9	13,076	1.59	322.2	94.9	3.39	0.47	3.0	2649600	203	10,588	378
16	7.68	16.9	15,224	1.54	268.0	95.5	2.81	0.55	3.2	2649600	174	10,784	413
17	7.67	15.8	15,030	1.46	257.4	101.9	2.53	0.58	2.8	2649600	176	11,970	397
18	7.62	15.2	13,723	1.45	280.0	104.2	2.69	0.54	2.4	2649600	193	11,755	344
19	7.63	15.1	12,984	1.37	279.6	104.4	2.68	0.51	2.5	2649600	204	10,166	302
20	7.67	14.8	11,797	1.37	307.7	108.2	2.84	0.48	2.2	2649600	225	8,892	240
21	7.71	15.5	9,840	1.64	441.6	107.3	4.11	0.40	3.2	2649600	269	7,022	268
22	7.69	15.8	10,388	1.71	436.2	105.1	4.15	0.41	3.9	2649600	255	7,898	373
23	7.67	15.3	13,735	1.70	328.0	107.9	3.04	0.56	3.8	2649600	193	10,717	489
24	7.68	15.8	15,375	1.41	243.0	101.7	2.39	0.59	3.1	2649600	172	12,885	484
25	7.74	16.0	15,929	1.28	212.9	100.9	2.11	0.61	3.0	2649600	166	13,225	482
26	7.83	16.7	15,087	1.33	233.6	99.8	2.34	0.57	3.4	2649600	176	13,312	541
27	7.90	17.2	16,562	1.42	227.2	99.7	2.28	0.62	3.2	2649600	160	14,644	566
28	7.98	17.4	19,466	1.31	178.3	99.8	1.79	0.73	3.0	2649600	136	15,274	558
29	8.02	17.9	18,365	1.23	177.5	96.8	1.83	0.67	3.2	2649600	144	15,652	596
30	7.99	18.4	18,756	1.47	207.7	95.1	2.18	0.67	3.1	2649600	141	16,058	600
Averages	7.62	16.56	15,428	1.4373	256.527	94.9	2.70	0.549	3.01376	2649600	177	12,656	456

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	2,053,870 m^3	100.00%
On-Spec Water:	2,051,606 m^3	99.890%
Off-Spec Water:	2,264 m^3	0.110%

Average monthly chlorine residual before UV Treatment was 1.44 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 – June 2023

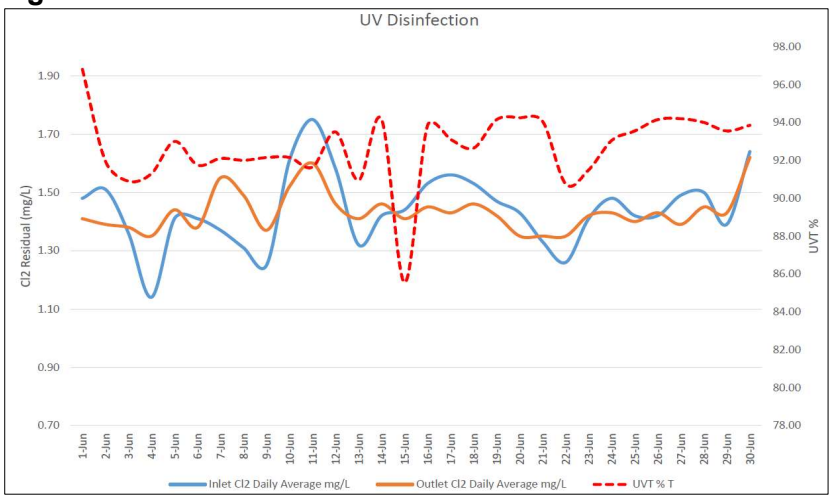

Table 5.2 - UV Disinfection Table – Mission Creek Source

	Inlet Cl2 Daily	Outlet Cl2 Daily		UVT	Turbidity		In Spec Water Volume	Off Spec Water	Off Spec % of Water
Date	mg/L	mg/L		% T	NTU		Cubic Meters	Cubic Meters	Percentage
1-Jun	1.48	1.41		96.80	0.41		69,264.2	0	0.00%
2-Jun	1.51	1.39		91.95	0.41		75,523.5	0	0.00%
3-Jun	1.36	1.38		90.90	0.37		74,826.4	0	0.00%
4-Jun	1.14	1.35		91.30	0.23		76,731.5	0	0.00%
5-Jun	1.41	1.44		93.00	0.27		81,087.6	0	0.00%
6-Jun	1.41	1.38		91.75	0.30		84,926.9	0	0.00%
7-Jun	1.37	1.55		92.10	NA		84,707.5	0	0.00%
8-Jun	1.31	1.49		92.00	0.27		83,259.5	0	0.00%
9-Jun	1.25	1.37		92.15	NA		72,970.2	0	0.00%
10-Jun	1.61	1.52		92.15	NA		56,393.0	68.9	0.12%
11-Jun	1.75	1.60		91.65	NA		52,771.4	3.4	0.01%
12-Jun	1.58	1.46		93.50	0.29		65,181.4	0	0.00%
13-Jun	1.32	1.41		90.95	NA		71,757.3	0	0.00%
14-Jun	1.42	1.46		94.15	NA		56,459.1	0	0.00%
15-Jun	1.44	1.41		85.55	0.21		57,461.8	0	0.00%
16-Jun	1.53	1.45		93.85	0.24		63,683.1	0	0.00%
17-Jun	1.56	1.43		93.10	0.27		62,572.7	0	0.00%
18-Jun	1.53	1.46		92.65	NA		54,195.9	0	0.00%
19-Jun	1.47	1.42		94.15	NA		47,397.5	0	0.00%
20-Jun	1.43	1.35		94.25	NA		37,457.1	0	0.00%
21-Jun	1.33	1.35		94.05	NA		42,125.0	0	0.00%
22-Jun	1.26	1.35		90.75	NA		57,081.4	0	0.00%
23-Jun	1.41	1.42		91.50	NA		68,605.6	0	0.00%
24-Jun	1.48	1.43		93.05	NA		70,548.4	75.1	0.11%
25-Jun	1.42	1.40		93.55	NA		70,895.4	75.1	0.11%
26-Jun	1.42	1.43		94.15	NA		78,040.5	1021	1.31%
27-Jun	1.49	1.39		94.20	0.38		81,442.8	1021	1.25%
28-Jun	1.50	1.45		94.00	0.30		83,346.2	0	0.00%
29-Jun	1.39	1.43		93.55	0.33		85,445.2	0	0.00%
30-Jun	1.64	1.62		93.85	0.29		85,448.0	0	0.00%
Average	1.44	1.43		90.10		Total	2,051,606.10	2264.5	0.110%

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

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

	2921 Belgo Rd		Booster 1		Ellison Blow-Off		Ellison School		3976 Highway 97		Prospect Reservoir		Tower Reservoir		Well #5		Well #4		Kirschner Res		Pearson School	
Date	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
1-May-23	0	0	0	0							0	0					0	0	0	0	0	0
8-May-23			0	0	0	0	0	0	0	0			0	0	0	0						
15-May-23	0	0	0	0							0	0			0	0			0	0	0	0
23-May-23			0	0	0	0	0	0	0	0			0	0	0	0						
29-May-23	0	0	0	0							0	0			0	0			0	0	0	0
5-Jun-23			0	0	0	0	0	0	0	0			0	0	0	0			0	0		
12-Jun-23	0	0	0	0							0	0			0	0			0	0	0	0
19-Jun-23			0	0	0	0	0	0	0	0			0	0	0	0						
26-Jun-23	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

	6/7/2023				6/12/2023				6/20/2023				6/26/2023			
Location	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres					1.11	21.0	-	X								
170 Kneller Rd					1.20	23.6	-	X								
2105 Morrison	0.91	16.2	-	X									1.17	21.0	-	X
Staymen Rd	0.75	17.4	-	X									0.93	17.4	-	X
260 Campion Rd									0.22	16.6	-	X				
Fenwick Rd									0.16	18.4	-	X				
Solly Ct					1.42	24.4	-	X								

- Both THM and HAA results are within the limits as set out in the Guidelines for Canadian Drinking Water Quality at the Well 4 location

- 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) = 9
- Total tests sampled by BMID and tested by Caro Labs 25
- Total tests sampled in BMID treated distribution system = 34
- 0 Positive *E.Coli* and Total Coliform Samples