



MONTHLY REPORTING PERIOD - JULY, 2023

SUMMARY

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

WATER SUPPLY & USAGE SUMMARY

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

Source	Total (US Gallons)	Total (Mega Litres)
Mission Creek	648,779,037	2,455.63
Well 4	0	0
Well 5	51,264,678	194.04
Well 6 (Irrigation Only)	8,469,120	32.06
Scotty Creek (Irrigation Only)	2,271,548	8.60
Total	710,785,383	2,690.32

2. July 2023 was considerably hotter and dryer than the historical average. Average daily highs for July are 28° C with an average of 33 mm of precipitation. For July 2023, the average daily high was 31.3° C and only 8.6 mm of rain fell at Kelowna Airport this month;
3. BMID's control gates on the high-elevation reservoirs were opened starting with Belgo Reservoir on July 2nd. BMID's other reservoirs were opened at various stages throughout July. The gates will remain open throughout the remainder of summer;
4. BMID's Scotty Creek source supplying irrigation water to the north-end of the service area, provided water throughout July 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 July 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 July;
7. Well #6, which supplies water to the north-end irrigation distribution system, was in operation throughout most of July. 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 July 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 19.75 NTU on July 11th. However, there were a number of turbidity spikes of over 100 NTU throughout the event. Average daily raw water turbidity for July was 2.19 NTU at the Mission Creek Intake;
3. The highest turbidity level at the Distribution Intake (end of Hadden Reservoir) was 0.46 NTU on July 14th, 2023. Average settled water turbidity for July was 0.35 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
4. The highest turbidity level at the first customer (Booster #1) was 0.37 NTU on July 14th. Average monthly turbidity at the first customer was 0.26 NTU;
5. The highest turbidity at the on-line turbidity meter at the UV plant was 0.78 NTU on July 14th. Average monthly turbidity at the UV plant was 0.53 NTU throughout July;
6. BMID's Ultraviolet Treatment Facility treated 2,451,356.9 m³ of water, 4,539.4 m³ of which was "Off-Spec" (0.18%);
7. The "Off-Spec" readings at the UV plant were a result of a programming issue during the daily reactor switchover. In each case, adequate primary disinfection was maintained throughout each incident;
8. Regarding microbiological readings, the Mission Creek upper and mid-elevation watershed experienced rising temperatures throughout spring which melted the remaining snowpack in the watershed by late 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;
9. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had average counts for July. The July 11th sample had the peak monthly count of 308 coliforms. The average monthly *E.Coli* was 107.8, 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 July 24th and 31st samples with 5 coliforms each. 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 July;
12. Disinfection by-product testing took place at 5 locations throughout the distribution system. All five samples had Trihalomethane (THM) and Haloacetic acids (HAA) results meeting the guidelines as set out by the Guidelines for Canadian Drinking Water Quality;

1.0 FLOWS - JULY, 2023

The Maximum Daily Flow was on July 4th, at 25,973,450 US gallons (98.31 ML)

The Minimum Daily Flow was on July 13th, at 15,437,130 US gallons (58.43 ML)

Mission Creek provided just over 91% of domestic and irrigation flow supplied in July.

Figure 1.1 - Domestic Water System Flow

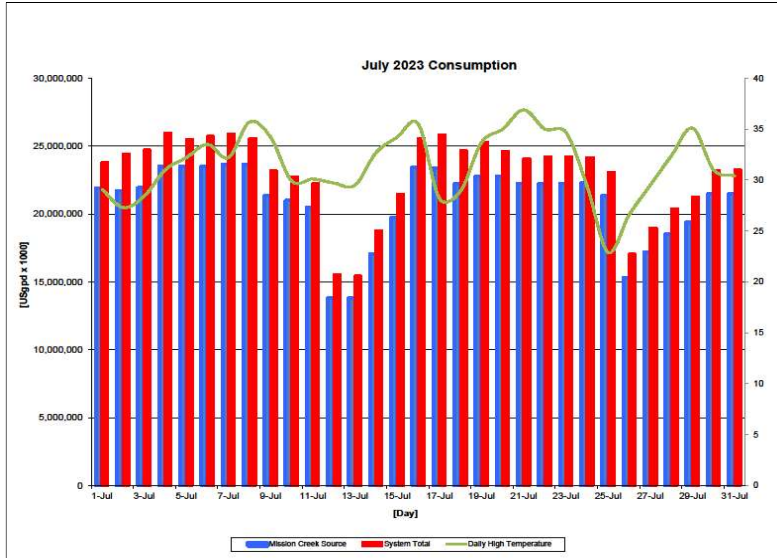


Table 1.2 - July 2023 - Daily Consumption Report

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-Jul	21,874,789	0	1,691,533	160,776	80,431	23,807,529	90.11
2-Jul	21,717,078	0	1,662,184	983,136	53,813	24,416,211	92.42
3-Jul	21,930,661	0	1,683,186	1,016,136	91,759	24,721,742	93.57
4-Jul	23,525,177	0	1,703,447	629,640	115,186	25,973,450	98.31
5-Jul	23,525,864	0	1,695,258	175,824	110,553	25,507,499	96.55
6-Jul	23,497,703	0	1,690,345	428,472	104,650	25,721,170	97.35
7-Jul	23,648,413	0	1,688,786	448,800	87,444	25,873,443	97.93
8-Jul	23,649,179	0	1,687,888	156,552	76,311	25,569,930	96.78
9-Jul	21,323,726	0	1,694,719	61,512	92,168	23,172,125	87.71
10-Jul	20,986,352	0	1,685,088	-	84,745	22,756,185	86.13
11-Jul	20,510,076	0	1,668,947	1,056	48,990	22,229,069	84.14
12-Jul	13,803,753	0	1,666,279	1,848	51,329	15,523,209	58.76
13-Jul	13,804,123	0	1,542,938	66,792	23,277	15,437,130	58.43
14-Jul	17,062,711	0	1,595,560	90,024	20,169	18,768,464	71.04
15-Jul	19,711,643	0	1,625,755	58,080	59,457	21,454,935	81.21
16-Jul	23,428,992	0	1,594,768	473,088	62,368	25,559,216	96.74
17-Jul	23,386,302	0	1,508,622	856,416	72,966	25,824,306	97.74
18-Jul	22,190,924	0	1,506,284	889,152	77,142	24,663,502	93.35
19-Jul	22,790,013	0	1,643,666	797,280	60,989	25,291,948	95.73
20-Jul	22,790,726	0	1,670,030	92,664	79,035	24,632,455	93.23
21-Jul	22,226,138	0	1,674,706	92,664	88,724	24,082,231	91.15
22-Jul	22,226,798	0	1,691,745	213,312	93,891	24,225,745	91.69
23-Jul	22,245,766	0	1,688,575	213,312	91,454	24,239,106	91.75
24-Jul	22,258,948	0	1,687,254	141,240	83,539	24,170,981	91.49
25-Jul	21,317,703	0	1,578,469	125,136	36,234	23,057,542	87.27
26-Jul	15,323,165	0	1,652,225	28,776	35,672	17,039,838	64.50
27-Jul	17,193,133	0	1,679,012	28,776	71,707	18,972,627	71.81
28-Jul	18,508,762	0	1,677,955	105,600	79,714	20,372,031	77.11
29-Jul	19,406,973	0	1,671,958	105,600	71,367	21,255,899	80.45
30-Jul	21,456,393	0	1,675,472	-	74,200	23,206,065	87.83
31-Jul	21,457,054	0	1,683,027	27,456	92,264	23,259,801	88.04
Totals Usgpd	648,779,037	0	51,265,678	8,469,120	2,271,548	710,785,383	2690.32
Totals ML	2,455.63	0.00	194.04	32.06	8.60		
Avg's	20,928,356	79.21				22,928,561	86.78
Max	23,649,179	89.51				25,973,450	98.31
Min	13,803,753	52.25				15,437,130	58.43

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

By July, almost all snow in the upper watershed had melted and much of the creek's flow was supplemented by BMID's high-elevation storage reservoirs. However, Mission creek experienced a significant surge in flow on July 11th leading to a rise in overland flows. The result was increased E.Coli levels compared to the rest of July. 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) June 2023 - July 2023

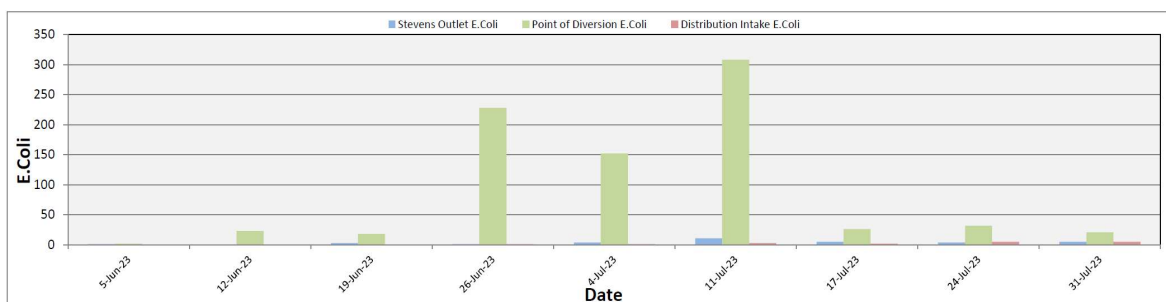


Table 2.1 - *E. Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
5-Jun-23	2	1	0
12-Jun-23	23	0	0
19-Jun-23	18	3	0
26-Jun-23	228	1	1
4-Jul-23	152	4	1
11-Jul-23	308	11	3
17-Jul-23	26	5	2
24-Jul-23	32	4	5
31-Jul-23	21	5	5

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 July 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 0.37 NTU on July 14th, 2023. The lowest turbidity level was 0.19 NTU and the average turbidity was 0.26 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)

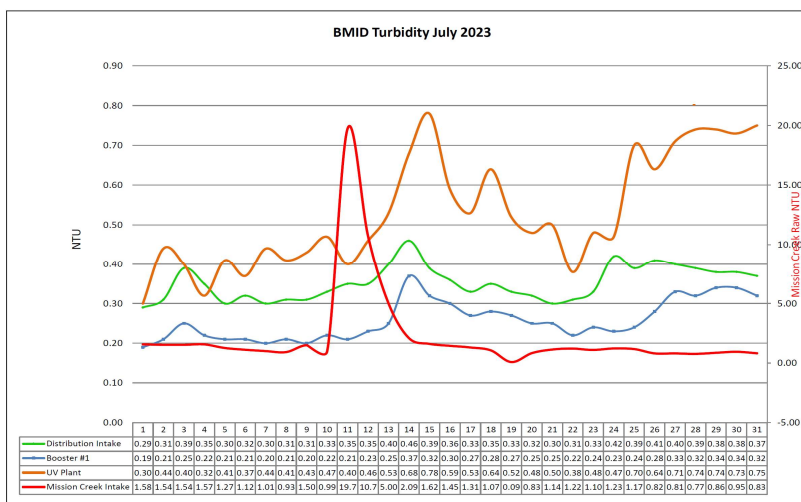


Table 3.1 - Daily Monitoring Record – Turbidity at On-Line Turbidity Analysers

Turbidity Point Sampling for July 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	1.58	0.29	0.19	0.30
2	1.54	0.31	0.21	0.44
3	1.54	0.39	0.25	0.40
4	1.57	0.35	0.22	0.32
5	1.27	0.30	0.21	0.41
6	1.12	0.32	0.21	0.37
7	1.01	0.30	0.20	0.44
8	0.93	0.31	0.21	0.41
9	1.50	0.31	0.20	0.43
10	0.99	0.33	0.22	0.47
11	19.75	0.35	0.21	0.40
12	10.71	0.35	0.23	0.46
13	5.00	0.40	0.25	0.53
14	2.09	0.46	0.37	0.68
15	1.62	0.39	0.32	0.78
16	1.45	0.36	0.30	0.59
17	1.31	0.33	0.27	0.53
18	1.07	0.35	0.28	0.64
19	0.09	0.33	0.27	0.52
20	0.83	0.32	0.25	0.48
21	1.14	0.30	0.25	0.50
22	1.22	0.31	0.22	0.38
23	1.10	0.33	0.24	0.48
24	1.23	0.42	0.23	0.47
25	1.17	0.39	0.24	0.70
26	0.82	0.41	0.28	0.64
27	0.81	0.40	0.33	0.71
28	0.77	0.39	0.32	0.74
29	0.86	0.38	0.34	0.74
30	0.95	0.38	0.34	0.73
31	0.83	0.37	0.32	0.75
AVG	2.19	0.35	0.26	0.53

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 July, 2023.

Figure 4.1 - CT Table – BMID Mission Creek Source – July 2023

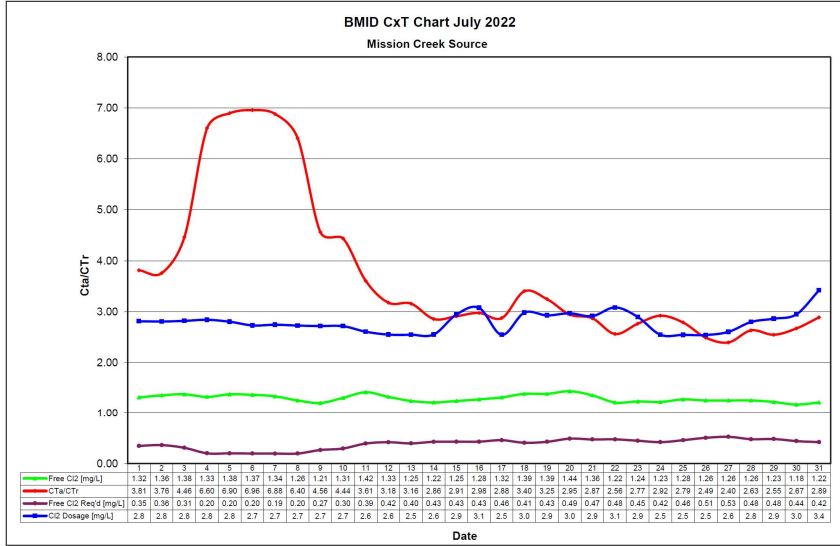


Table 4.2 - CT Table – Mission Creek Source

BMID July 2023													
Mission Creek Source													
DATE	pH	TEMP	PEAK	Free Cl ₂	CT	CT	CTa/CTr	Free Cl ₂	Cl ₂	VOLUME	TIME	FLOW	CL ₂ DOSAGE
July	(Average)	(Present)	FLOW	[mg/L]	achieved	req'd		Req'd	Dosage	TOTAL	[mins]	Daily Average	Average
		[°C]	[USgpm]					[mg/L]	[mg/L]	[USgal]		[USGPM]	[PPD]
1	7.12	16.9	12,046	1.32	290.3	76.1	3.81	0.35	2.8	2649600	220	10,445	353
2	7.04	17.0	13,013	1.36	276.9	73.7	3.76	0.36	2.8	2649600	204	10,921	369
3	7.04	17.3	11,333	1.38	322.6	72.3	4.46	0.31	2.8	2649600	234	8,131	276
4	7.04	16.5	7,022	1.33	501.9	76.0	6.60	0.20	2.8	2649600	377	4,961	170
5	7.02	16.3	6,895	1.38	530.3	76.9	6.90	0.20	2.8	2649600	384	4,914	166
6	6.98	17.1	7,291	1.37	497.9	71.6	6.96	0.20	2.7	2649600	363	4,945	162
7	7.13	17.0	6,784	1.34	523.4	76.0	6.88	0.19	2.7	2649600	391	3,931	130
8	7.33	17.2	6,515	1.26	512.5	80.0	6.40	0.20	2.7	2649600	407	4,708	154
9	7.31	17.8	9,272	1.21	345.8	75.8	4.56	0.27	2.7	2649600	286	6,927	226
10	7.32	18.0	10,303	1.31	336.9	75.9	4.44	0.30	2.7	2649600	257	8,971	293
11	7.24	18.4	14,376	1.42	261.7	72.5	3.61	0.39	2.6	2649600	184	11,571	363
12	7.16	19.0	16,579	1.33	212.5	66.9	3.18	0.42	2.6	2649600	160	13,806	424
13	7.19	20.3	17,118	1.25	193.5	61.2	3.16	0.40	2.5	2649600	155	14,456	443
14	7.26	20.0	17,689	1.22	182.7	63.9	2.86	0.43	2.6	2649600	150	15,296	470
15	7.26	20.0	17,721	1.25	186.9	64.2	2.91	0.43	2.9	2649600	150	13,172	466
16	7.31	20.0	17,372	1.28	195.2	65.6	2.98	0.43	3.1	2649600	153	12,585	466
17	7.35	19.6	17,689	1.32	197.7	68.7	2.88	0.46	2.5	2649600	150	15,882	486
18	7.38	20.0	15,882	1.39	231.9	68.1	3.40	0.41	3.0	2649600	167	11,476	411
19	7.42	20.8	17,340	1.39	212.4	65.4	3.25	0.43	2.9	2649600	153	12,823	452
20	7.43	20.8	19,623	1.44	194.4	66.0	2.95	0.49	3.0	2649600	135	14,313	511
21	7.43	20.6	18,909	1.36	190.6	66.3	2.87	0.47	2.9	2649600	140	14,757	517
22	7.45	20.3	18,783	1.22	172.1	67.1	2.56	0.48	3.1	2649600	141	13,695	508
23	7.46	20.6	17,958	1.24	183.0	66.1	2.77	0.45	2.9	2649600	148	13,473	469
24	7.48	20.8	16,992	1.23	191.8	65.6	2.92	0.42	2.5	2649600	156	15,296	468
25	7.51	21.4	18,989	1.28	178.6	64.0	2.79	0.46	2.5	2649600	140	16,437	503
26	7.50	20.8	20,193	1.26	165.3	66.3	2.49	0.51	2.5	2649600	131	17,974	550
27	7.50	20.3	20,273	1.26	164.7	68.7	2.40	0.53	2.6	2649600	131	17,689	554
28	7.51	21.4	19,845	1.26	168.2	63.9	2.63	0.48	2.8	2649600	134	17,562	591
29	7.50	22.3	21,461	1.23	151.9	59.6	2.55	0.48	2.9	2649600	123	18,466	635
30	7.52	22.3	19,623	1.18	159.3	59.6	2.67	0.44	3.0	2649600	135	16,881	599
31	7.53	22.6	18,989	1.22	170.2	58.9	2.89	0.42	3.4	2649600	140	14,630	602
Averages	7.31	19.46	15286	1.30	261.391	68.5	3.73	0.3863	2.795		200	12,355	412

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	2,455,896.3 m ³	100.00%
On-Spec Water:	2,451,356.9 m ³	99.820%
Off-Spec Water:	4,539.4 m ³	0.180%

Average monthly chlorine residual before UV Treatment was 1.44 mg/L
The average monthly chlorine residual after UV treatment and re-chlorination was 1.41 mg/L.

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

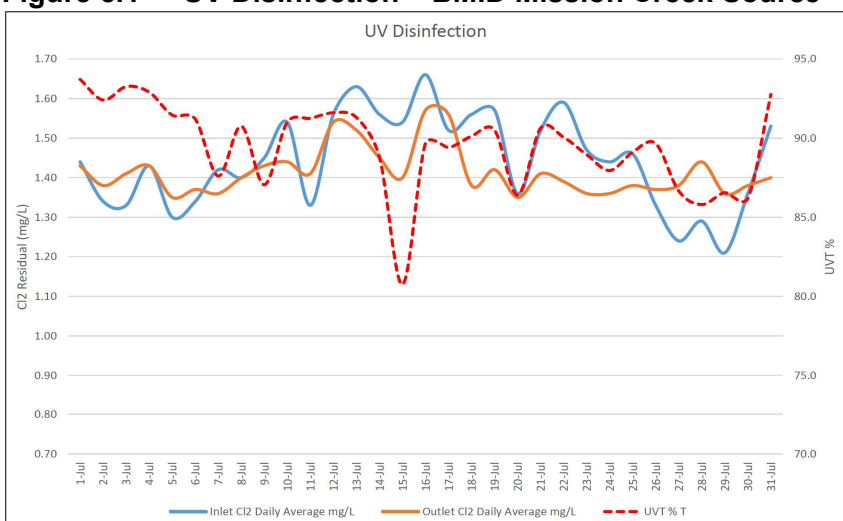


Table 5.2 - UV Disinfection Table – Mission Creek Source

	Inlet Cl2 Daily	Outlet Cl2 Daily		UVT	Turbidity		In Spec Water Volume	Off Spec Water Volume
Date	mg/L	mg/L		% T	NTU		Cubic Meters	Cubic Meters
1-Jul	1.44	1.43		93.7	0.30		82,805.10	0
2-Jul	1.34	1.38		92.4	0.44		82,208.10	0
3-Jul	1.33	1.41		93.3	0.40		83,016.60	0
4-Jul	1.43	1.43		92.9	0.32		89,052.50	0
5-Jul	1.30	1.35		91.5	0.41		89,055.10	0
6-Jul	1.34	1.37		91.2	0.37		88,948.50	0
7-Jul	1.42	1.36		87.6	0.44		88,067.80	1451.2
8-Jul	1.40	1.40		90.8	0.41		88,070.70	1451.2
9-Jul	1.45	1.43		87.1	0.43		80,719.10	0
10-Jul	1.54	1.44		91.0	0.47		79,442.00	0
11-Jul	1.33	1.41		91.3	0.40		77,639.10	0
12-Jul	1.56	1.54		91.6	0.46		51,771.30	481.6
13-Jul	1.63	1.52		91.3	0.53		51,772.70	481.6
14-Jul	1.56	1.45		88.8	0.68		64,589.40	0
15-Jul	1.54	1.40		80.8	0.78		74,452.20	164.5
16-Jul	1.66	1.57		89.7	0.59		88,523.90	164.5
17-Jul	1.52	1.56		89.4	0.53		88,526.80	0
18-Jul	1.56	1.38		90.1	0.64		84,001.80	0
19-Jul	1.57	1.42		90.5	0.52		86,269.60	0
20-Jul	1.36	1.35		86.4	0.48		86,272.30	0
21-Jul	1.52	1.41		90.6	0.50		84,135.10	0
22-Jul	1.59	1.39		90.1	0.38		84,137.60	0
23-Jul	1.47	1.36		89.0	0.48		84,209.40	0
24-Jul	1.44	1.36		88.0	0.47		84,211.70	47.6
25-Jul	1.46	1.38		89.1	0.70		80,617.70	78.6
26-Jul	1.33	1.37		89.7	0.64		57,925.90	78.6
27-Jul	1.24	1.38		86.7	0.71		65,013.10	70
28-Jul	1.29	1.44		85.8	0.74		69,993.30	70
29-Jul	1.21	1.36		86.6	0.74		73,463.40	0
30-Jul	1.36	1.38		86.2	0.73		81,221.30	0
31-Jul	1.53	1.40		92.7	0.75		81,223.80	0
Average	1.44	1.41		89.53		Total	2,451,356.90	4539.4

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
- 29 samples were found to be absent of Coliforms.
- 29 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		Ellison Blow-Off		Ellison School		3976 Highway 97		Prospect Reservoir		Tower Reservoir		Well #5		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-Jun-23	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0
19-Jun-23	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0
4-Jul-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11-Jul-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17-Jul-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-Jul-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-Jul-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 12 samples were found to be absent of both *Total Coliforms* and *E. Coli*.

Table 6.2 - BMID In-house Testing – Presence Absence

Location	7/3/2023				7/12/2023				7/17/2023				7/25/2023				7/31/2023			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres	0.90	21.8	-	X									0.86	22.2	-	X				
170 Kneller Rd	0.91	21.4	-	X									0.94	22.4	-	X				
2105 Morrison Staymen Rd									0.89	22.2	-	X								
260 Campion Rd					0.24	20.6	-	X									0.18	20.2	-	X
Fenwick Rd					0.18	20.2	-	X									0.44	20.5	-	X
Solly Ct	1.04	17.2	-	X									1.06	21.8	-	X				

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

4-Jul-23		
Location	THM (mg/L)	HAA (mg/L)
Kirschner Reservoir	0.0653	0.0595
Pearson School	0.0556	0.0457
2921 Belgo Rd	0.0558	0.0469
Ellison School*	0.00986	0.00519
3976 Hwy 97 N	0.0583	0.0501

*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) = 12
- Total tests sampled by BMID and tested by Caro Labs 29
- Total tests sampled in BMID treated distribution system = 41
- 0 Positive *E. Coli* and Total Coliform Samples