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BMID FILE: 486

MONTHLY REPORTING PERIOD - JUNE, 2022

1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in June 2022. Documentation and figures are provided on the following pages to support this submission.

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	230,420,698	872.14
Well 4	5,323,290	20.15
Well 5	9,695,303	36.70
Well 6 (Irrigation Only)	20,782,000	78.66
Scotty Creek (Irrigation Only)	5,665,200	21.44
Total	271,886,491	1,029.09

1. 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 not moving;
2. The May 30 Kirschner Reservoir sample had background bacterial colonies present. However, there were no detectable *E.Coli* bacteria or *Total Coliform* bacteria. Subsequent resampling on June 6 did not indicate any bacteria at this location;
3. The WTP resumed operation on February 8th and remained in operation throughout June as raw water quality in Mission Creek required treatment to lower both turbidity and colour;
4. Raw water turbidity levels in Mission Creek peaked at 971 NTU based on a single point WTP lab result on June 14. For the on-line turbidity, peak turbidity of 100 NTU (average daily turbidity) was reached on June 14 and 15. However, the on-line analyzers only read up to 100 NTU. Average daily raw water turbidity for June was 34.31 NTU at the Mission Creek intake;
5. Resulting from extremely high and turbid flows on June 14-15 and June 19-20, BMID closed the headgates at Mission Creek, bypassing the Water Treatment Plant. The BMID distribution system relied on reservoir storage to meet domestic and irrigation demands;
6. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.76 NTU on June 3, 2022. Average clarified water turbidity for June was 0.46 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
7. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.56 NTU on June 8. Average monthly turbidity at the first customer was 0.39 NTU for June;
8. The highest monthly turbidity daily average at the UV plant was 0.61 NTU on June 25. Average monthly turbidity at the UV plant was 0.35 NTU throughout June;

9. BMID's Ultraviolet Treatment Facility treated 872,237 m^3 of water, none of which was "Off-Spec" (0.00%);
10. BMID's Scotty Creek source, used for irrigation in the north-end, resumed operations on May 27, 2022. The Scotty Creek source will remain in operation until irrigation demands reduce in the fall of 2022;
11. Well #4, used as a source for domestic water in the north-end of the distribution system during low-flow was placed on stand-by mode on May 28. However, Well #4 resumed operations on June 5 to meet the reduced flows for June resulting from heavy rainfall;
12. 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 activated on April 25 as irrigation demands in the north-end of the system increased. Well #5 was shut-down for the season on June 15 to allow for repairs to the pump motor. Wells #4 and #6 will supply the necessary domestic and irrigation water to the north-end;
13. Well #6, which supplies irrigation water to the twinned north-end water distribution systems, resumed operations for the summer on May 26. Well #6 will continue to operate until flows reduce later in the fall of 2022;
14. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts for late spring. The peak count was on the June 6th sample with a count of 24 coliforms. The average monthly *E.Coli* was 11.25, based on 4 samples;
15. *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 normal counts on all 4 samples. A peak count of 11 was sampled on June 6th. Average *E.Coli* results for the month indicated 3.25 *E.Coli* coliforms based on 4 samples. Reduction in *E.Coli* levels is credited to the clarification process and the further settling of particles in the water in Stevens and Hadden Reservoirs;
16. 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, 2022

The Maximum Daily Flow was on June 28, at 19,905,659 US gallons (75.34 ML)

The Minimum Daily Flow was on June 17, at 4,087,190 US gallons (15.47 ML)

Mission Creek provided 85% of domestic and irrigation flow throughout June.

Figure 1.1 - Domestic Water System Flow

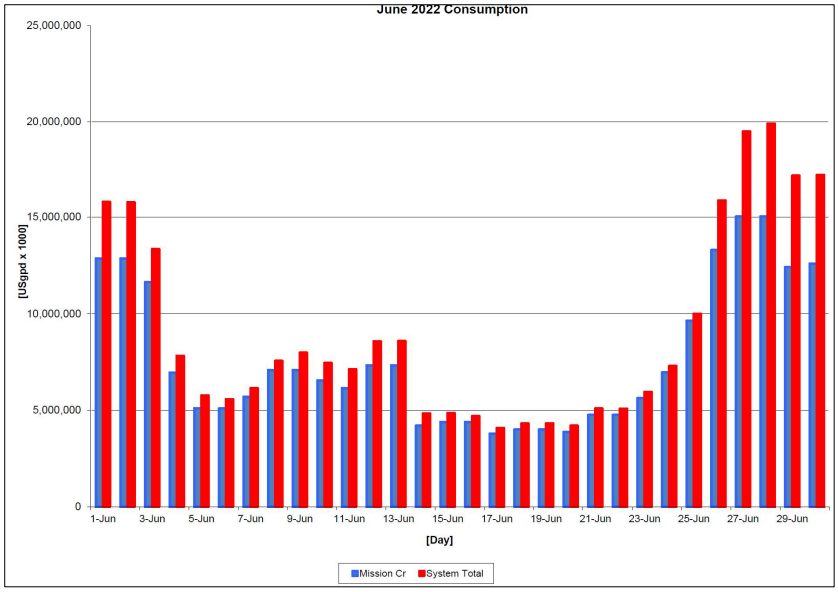


Table 1.2 - June 2022 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	Well #6	Scotty Crk	System Total	System Total
2022	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Jun	12,851,836	0	1,694,386	1,070,000	169,300	15,785,522	59.75
2-Jun	12,852,206	0	1,688,839	1,070,000	154,600	15,765,644	59.67
3-Jun	11,633,580	0	861,194	692,000	153,800	13,340,574	50.49
4-Jun	6,950,312	0	712,466	0	150,400	7,813,179	29.57
5-Jun	5,107,264	84,006	411,313	12,000	149,700	5,764,282	21.82
6-Jun	5,088,190	105,404	212,129	12,000	152,200	5,569,923	21.08
7-Jun	5,688,389	151,369	149,784	0	155,300	6,144,843	23.26
8-Jun	7,086,018	231,413	88,233	0	150,300	7,555,963	28.60
9-Jun	7,086,282	231,413	511,169	0	151,200	7,980,064	30.20
10-Jun	6,540,899	204,732	553,700	0	149,400	7,448,731	28.19
11-Jun	6,148,471	208,958	609,704	0	153,900	7,121,034	26.95
12-Jun	7,330,456	264,434	823,418	0	151,200	8,569,508	32.44
13-Jun	7,330,641	275,529	833,985	0	143,300	8,583,455	32.49
14-Jun	4,200,256	165,106	370,366	0	103,200	4,838,928	18.32
15-Jun	4,393,577	172,503	174,616	0	113,800	4,854,496	18.37
16-Jun	4,393,682	178,315	0	0	127,500	4,699,497	17.79
17-Jun	3,784,158	173,031	0	0	130,000	4,087,190	15.47
18-Jun	4,000,806	179,636	0	0	133,200	4,313,641	16.33
19-Jun	4,000,964	190,995	0	0	137,900	4,329,859	16.39
20-Jun	3,878,785	185,447	0	0	139,200	4,203,432	15.91
21-Jun	4,761,964	193,108	0	0	135,700	5,090,773	19.27
22-Jun	4,762,070	194,957	0	0	129,800	5,086,828	19.25
23-Jun	5,622,901	198,920	0	0	126,400	5,948,221	22.51
24-Jun	6,955,041	209,223	0	1,000	122,300	7,287,564	27.58
25-Jun	9,630,760	241,187	0	1,000	119,600	9,992,547	37.82
26-Jun	13,287,191	299,040	0	2,157,000	116,600	15,859,832	60.03
27-Jun	15,020,741	310,136	0	3,798,000	373,000	19,501,876	73.81
28-Jun	15,030,726	299,833	0	3,970,000	605,100	19,905,659	75.34
29-Jun	12,407,815	182,013	0	4,075,000	539,700	17,204,529	65.12
30-Jun	12,594,717	192,580	0	3,924,000	527,600	17,238,897	65.25
Totals Usgpd	230,420,698	5,323,290	9,695,303	20,782,000	5,665,200	271,886,491	1,029.09
Totals ML	872.14	20.15	36.70	78.66	21.44		
Avg's	7,680,690	29.07				9,062,883	34.30
Max	15,030,726	56.89				19,905,659	75.34
Min	3,784,158	14.32				4,087,190	15.47

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 WTP lowers colour, turbidity and particle counts in the raw water. The *E.Coli* readings are consistent with the reduction in those other parameters. The *E.Coli* readings confirm the WTP's effectiveness in reducing raw water quality risks with coagulation, flocculation, and sedimentation process followed by settling times across Stevens and Hadden Reservoirs.

Figure 2.1 - Raw Water *E.Coli* Readings (CARO Lab results) May 2022 - June 2022

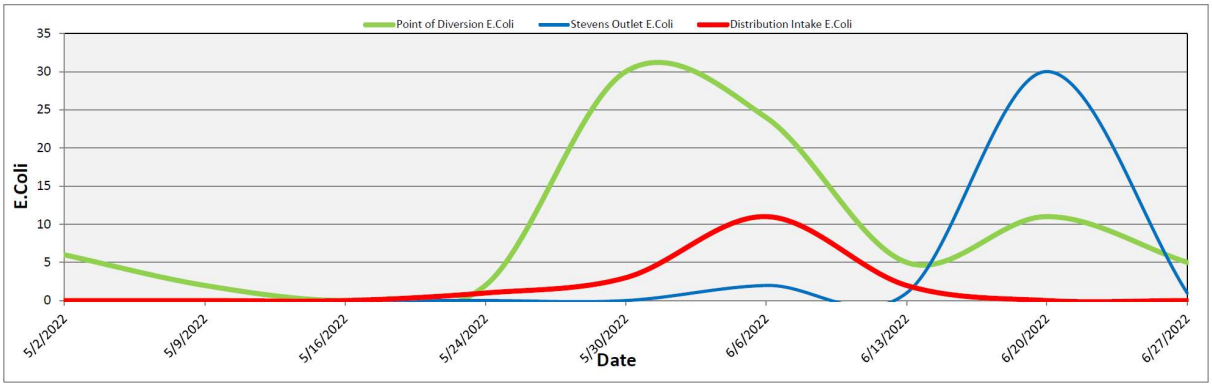


Table 2.1 - *E.Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
2-May-22	6	0	0
9-May-22	2	0	0
16-May-22	0	0	0
24-May-22	2	0	1
30-May-22	30	0	3
6-Jun-22	24	2	11
13-Jun-22	5	1	2
20-Jun-22	11	30	0
27-Jun-22	5	1	0

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 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 0.56 NTU on June 8, 2022.

The distribution intake is where the water leaves Hadden Reservoir. 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)

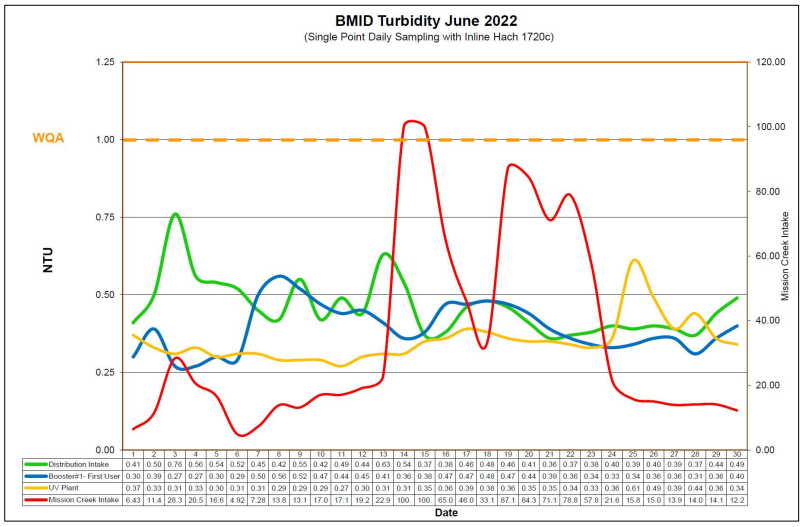


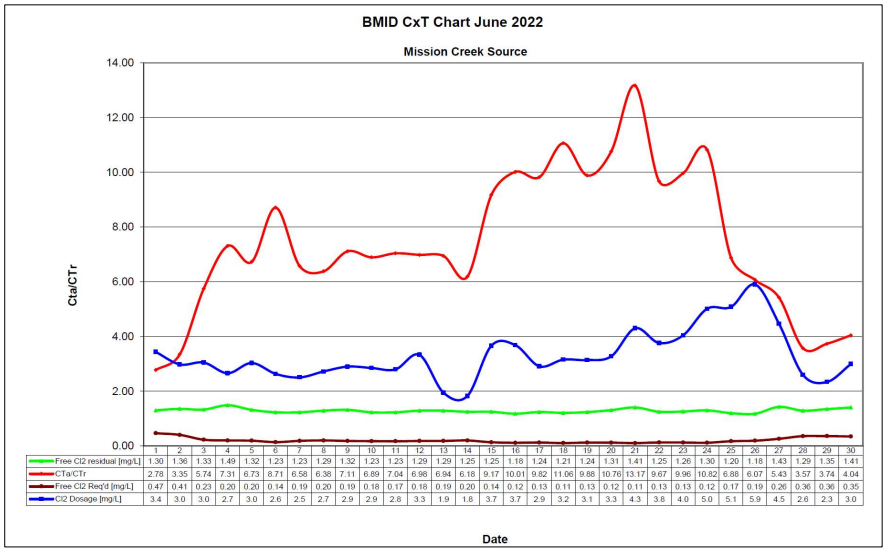
Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for June 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	6.43	0.41	0.30	0.37
2	11.46	0.50	0.39	0.33
3	28.36	0.76	0.27	0.31
4	20.54	0.56	0.27	0.33
5	16.67	0.54	0.30	0.30
6	4.92	0.52	0.29	0.31
7	7.28	0.45	0.50	0.31
8	13.86	0.42	0.56	0.29
9	13.15	0.55	0.52	0.29
10	17.04	0.42	0.47	0.29
11	17.11	0.49	0.44	0.27
12	19.20	0.44	0.45	0.30
13	22.93	0.63	0.41	0.31
14	100.00	0.54	0.36	0.31
15	100.00	0.37	0.38	0.35
16	65.05	0.38	0.47	0.36
17	46.04	0.46	0.47	0.39
18	33.19	0.48	0.48	0.38
19	87.18	0.46	0.47	0.36
20	84.34	0.41	0.44	0.35
21	71.14	0.36	0.39	0.35
22	78.82	0.37	0.36	0.34
23	57.82	0.38	0.34	0.33
24	21.62	0.40	0.33	0.36
25	15.81	0.39	0.34	0.61
26	15.03	0.40	0.36	0.49
27	13.95	0.39	0.36	0.39
28	14.09	0.37	0.31	0.44
29	14.11	0.44	0.36	0.36
30	12.27	0.49	0.40	0.34
AVG	34.31	0.46	0.39	0.35

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, 2022.

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



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Free Cl2 residual [mg/L]	1.30	1.36	1.33	1.49	1.32	1.23	1.23	1.29	1.32	1.23	1.23	1.29	1.29	1.25	1.25	1.18	1.24	1.21	1.24	1.31	1.41	1.25	1.26	1.30	1.20	1.18	1.43	1.29	1.35	1.41
CTa/CTr	2.78	3.35	5.74	7.31	6.73	8.71	6.58	6.38	7.11	6.89	7.04	6.98	6.94	6.18	9.17	10.01	9.82	11.06	9.88	10.76	13.17	9.67	9.96	10.82	6.88	6.07	5.43	3.57	3.74	4.04
Free Cl2 Req'd [mg/L]	0.47	0.41	0.23	0.20	0.20	0.14	0.19	0.20	0.19	0.18	0.17	0.18	0.19	0.20	0.14	0.12	0.13	0.11	0.13	0.12	0.11	0.13	0.13	0.12	0.17	0.19	0.26	0.36	0.36	0.35
Cl2 Dosage [mg/L]	3.4	3.0	3.0	2.7	3.0	2.6	2.5	2.7	2.9	2.9	2.8	3.3	1.9	1.8	3.7	3.7	2.9	3.2	3.1	3.3	4.3	3.8	4.0	5.0	5.1	5.9	4.5	2.6	2.3	3.0

Table 4.2 - CT Table – Mission Creek Source

	BMID June 2022												
	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
	(Average)	(Present)	FLOW	residual	achieved	req'd		Req'd	Dosage	TOTAL		Daily Average	Average
June		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.37	13.8	12,014	1.30	286.7	103.3	2.78	0.47	3.4	2649600	221	9,309	385
2	7.39	13.9	10,348	1.36	348.2	104.0	3.35	0.41	3.0	2649600	256	7,931	284
3	7.04	14.3	6,930	1.33	508.5	88.5	5.74	0.23	3.0	2649600	382	4,432	162
4	7.03	14.0	5,897	1.49	669.4	91.6	7.31	0.20	2.7	2649600	449	3,798	121
5	7.02	14.4	5,966	1.32	586.3	87.1	6.73	0.20	3.0	2649600	444	3,329	121
6	7.00	14.3	4,342	1.23	750.5	86.2	8.71	0.14	2.6	2649600	610	3,309	105
7	7.01	16.5	6,673	1.23	488.4	74.3	6.58	0.19	2.5	2649600	397	4,208	127
8	7.00	16.4	7,138	1.29	478.8	75.0	6.38	0.20	2.7	2649600	371	5,127	168
9	6.97	16.3	6,562	1.32	533.0	74.9	7.11	0.19	2.9	2649600	404	4,524	158
10	7.01	16.5	6,368	1.23	511.8	74.3	6.89	0.18	2.9	2649600	416	3,931	135
11	6.99	16.4	6,240	1.23	522.3	74.2	7.04	0.17	2.8	2649600	425	4,399	148
12	6.98	16.0	6,397	1.29	534.3	76.5	6.98	0.18	3.3	2649600	414	4,400	176
13	6.99	15.9	6,362	1.29	537.2	77.4	6.94	0.19	1.9	2649600	416	4,400	103
14	6.92	15.7	7,047	1.25	470.0	76.0	6.18	0.20	1.8	2649600	376	5,001	110
15	6.88	15.1	4,631	1.25	715.3	78.0	9.17	0.14	3.7	2649600	572	2,945	130
16	6.84	15.2	4,131	1.18	756.8	75.6	10.01	0.12	3.7	2649600	641	2,517	112
17	6.82	15.2	4,428	1.24	742.0	75.6	9.82	0.13	2.9	2649600	598	3,054	107
18	6.87	15.2	3,775	1.21	849.4	76.8	11.06	0.11	3.2	2649600	702	2,710	103
19	6.90	15.1	4,234	1.24	776.0	78.5	9.88	0.13	3.1	2649600	626	2,727	103
20	6.86	15.4	4,228	1.31	820.9	76.3	10.76	0.12	3.3	2649600	627	2,837	112
21	6.83	15.4	3,720	1.41	1004.2	76.3	13.17	0.11	4.3	2649600	712	2,632	136
22	6.85	16.4	4,862	1.25	681.3	70.4	9.67	0.13	3.8	2649600	545	2,880	130
23	6.87	16.7	4,813	1.26	693.6	69.6	9.96	0.13	4.0	2649600	550	3,296	160
24	6.92	16.9	4,525	1.30	761.2	70.3	10.82	0.12	5.0	2649600	586	3,221	194
25	6.92	16.5	6,471	1.20	491.4	71.4	6.88	0.17	5.1	2649600	409	4,333	265
26	6.95	16.9	7,347	1.18	425.6	70.1	6.07	0.19	5.9	2649600	361	5,023	356
27	7.00	17.1	9,623	1.43	393.7	72.6	5.43	0.26	4.5	2649600	275	7,134	383
28	7.06	17.4	13,361	1.29	255.8	71.6	3.57	0.36	2.6	2649600	198	9,863	308
29	7.10	17.7	13,355	1.35	267.8	71.7	3.74	0.36	2.3	2649600	198	10,442	294
30	7.11	16.6	11,817	1.41	316.1	78.2	4.04	0.35	3.0	2649600	224	8,454	304
Averages	6.98	15.77	6,787	1.289	572.549	78.2	7.43	0.202	3.30105	2649600	447	4,739	183

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	872,237 m^3	100.00%
On-Spec Water:	872,237m^3	100.00%
Off-Spec Water:	0 m^3	0.00%

Average monthly chlorine residual before UV Treatment was 1.28 mg/L
The average monthly chlorine residual after UV treatment and re-chlorination was 1.38 mg/L.

Figure 5.1 - UV Disinfection – BMID Mission Creek Source – June 2022

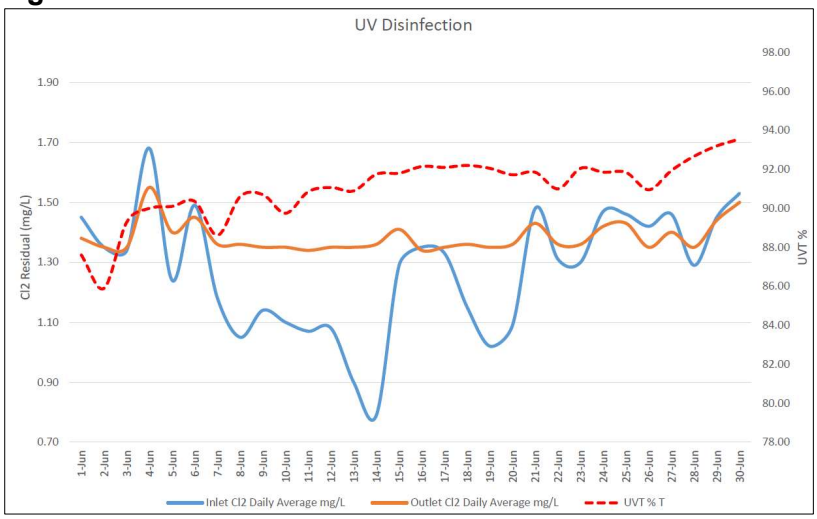


Table 5.2 - UV Disinfection Table – Mission Creek Source

	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	1.45	1.38		87.60	0.37		48,649.5	0	0.00%
2-Jun	1.35	1.35		85.90	0.33		48,650.9	0	0.00%
3-Jun	1.34	1.35		89.30	0.31		44,037.9	0	0.00%
4-Jun	1.68	1.55		90.00	0.33		26,309.8	0	0.00%
5-Jun	1.24	1.40		90.10	0.30		19,333.1	0	0.00%
6-Jun	1.49	1.45		90.35	0.31		19,260.9	0	0.00%
7-Jun	1.18	1.36		88.62	0.31		21,532.9	0	0.00%
8-Jun	1.05	1.36		90.60	0.29		26,823.5	0	0.00%
9-Jun	1.14	1.35		90.70	0.29		26,824.5	0	0.00%
10-Jun	1.10	1.35		89.75	0.29		24,760.0	0	0.00%
11-Jun	1.07	1.34		90.85	0.27		23,274.5	0	0.00%
12-Jun	1.08	1.35		91.07	0.30		27,748.8	0	0.00%
13-Jun	0.90	1.35		90.90	0.31		27,749.5	0	0.00%
14-Jun	0.79	1.36		91.75	0.31		15,899.7	0	0.00%
15-Jun	1.29	1.41		91.80	0.35		16,631.5	0	0.00%
16-Jun	1.35	1.34		92.15	0.36		16,631.9	0	0.00%
17-Jun	1.33	1.35		92.10	0.39		14,324.6	0	0.00%
18-Jun	1.15	1.36		92.20	0.38		15,144.7	0	0.00%
19-Jun	1.02	1.35		92.05	0.36		15,145.3	0	0.00%
20-Jun	1.09	1.36		91.72	0.35		14,682.8	0	0.00%
21-Jun	1.48	1.43		91.85	0.35		18,026.0	0	0.00%
22-Jun	1.31	1.36		91.00	0.34		18,026.4	0	0.00%
23-Jun	1.30	1.36		92.05	0.33		21,285.0	0	0.00%
24-Jun	1.47	1.42		91.85	0.36		26,327.7	0	0.00%
25-Jun	1.46	1.43		91.84	0.61		36,456.4	0	0.00%
26-Jun	1.42	1.35		90.95	0.49		50,297.5	0	0.00%
27-Jun	1.46	1.40		91.94	0.39		56,859.7	0	0.00%
28-Jun	1.29	1.35		92.67	0.44		56,897.5	0	0.00%
29-Jun	1.45	1.44		93.20	0.36		46,968.7	0	0.00%
30-Jun	1.53	1.50		93.55	0.34		47,676.2	0	0.00%
Average	1.28	1.38		90.10		Total	872,237.40	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
- 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

	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
2-May-22	0	0	0	0							0	0					0	0	0	0	0	0
9-May-22			0	0	0	0	0	0	0	0			0	0	0	0	0	0				
16-May-22	0	0	0	0							0	0			0	0	0	0	0	0	0	0
24-May-22			0	0	0	0	0	0	0	0			0	0	0	0	0	0				
30-May-22	0	0	0	0							0	0			0	0			0	0	0	0
6-Jun-22			0	0	0	0	0	0	0	0			0	0	0	0			0	0		
13-Jun-22	0	0	0	0							0	0			0	0			0	0	0	0
20-Jun-22			0	0	0	0	0	0	0	0			0	0	0	0						
27-Jun-22	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

	6/6/2022				6/13/2022				6/21/2022				6/27/2022			
Location	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres									0.76	15.8	-	X				
170 Kneller Rd									0.93	15.6	-	X				
2105 Morrison	0.74	14.6	-	X									1.31	16.0	-	X
Staymen Rd	0.74	14.6	-	X									1.03	18.4	-	X
260 Campion Rd					0.52	16.0	-	X								
Fenwick Rd					0.23	15.4	-	X								
Solly Ct									0.74	16.2	-	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) = 9
- Total tests sampled by BMID and tested by Caro Labs 29
- Total tests sampled in BMID treated distribution system = 38