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BMID FILE: 486

MONTHLY REPORTING PERIOD - SEPTEMBER, 2020

1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in September, 2020. Documentation and figures are provided on the following pages to support this submission.

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	419,940,865	1,589.48
Well 4	5,359,000	20.28
Well 5	10,640,083	40.27
Well 6 (Irrigation Only)	13,767,000	52.11
Scotty Creek (Irrigation Only)	3,121,000	11.81
Total	452,827,948	1,713,95

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 has been minimal over the past 12 months. Monitoring has showed minor variations in groundwater levels, but no substantial changes. The hillside is being monitored for surface movement on a monthly basis and groundwater levels as required.
2. The Water Treatment Plant started full operations in April, 2020, and the plant operated throughout September. It is expected that the WTP will continue to run until raw water quality in Mission Creek improves in late fall or early winter;
3. Raw water turbidity levels in Mission Creek peaked at 1.39 NTU on September 24, 2020. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.32 NTU on September 24 and 25, 2020. The WTP ran effectively with average turbidity for September at 0.25 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
4. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.30 NTU on September 29, 2020. Average monthly turbidity at the first customer was 0.20 NTU for September;
5. BMID's Ultraviolet Treatment Facility treated 1,375,025 m^3 of water of which 42.6 m^3 was "Off-Spec" (0.003%). Average UV Transmissivity was 91.41%. The average inlet chlorine residual level at the UV site was 1.25 mg/L. The average outgoing chlorine was 1.32 mg/L after the sodium hypochlorite top-up system;
6. BMID's Scotty Creek source, used for irrigation in the north-end, was used as a supplemental irrigation supply for most of the month as dictated by flows. The Scotty Creek source was turned off for the year on September 24, 2020;
7. Well # 4 resumed operations as the primary domestic water source for the north-end on September 11, 2020;
8. Well #5, used as the primary domestic water source in the north-end of the system for both irrigation and domestic consumption was turned off for the year on September 11, 2020. Well #5 is scheduled for maintenance this fall;

9. Well #6, which supplies irrigation water to the twinned north-end water distribution systems, was in operation for most of the month until it was placed on stand-by mode on September 25, 2020. Well #6 will remain in stand-by mode for fire protection only until flows increase in spring 2021;
10. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts for summer with a peak count of 14 on September 23, 2020. The average *E.Coli* count was 5.86 for the month based on 8 samples;
11. *E.Coli* levels in the raw water at the water distribution system intake down-stream of the WTP, immediately prior to disinfection, had low counts on all samples. Peak *E.Coli* counts of 1 were found on samples throughout September. The remaining samples were found to contain no *E.Coli* Bacteria. The reduction in *E.Coli* levels is credited to the settling of particles in the water in Stevens and Hadden Reservoirs;
12. No *E.Coli* or *Total Coliforms* or were found in treated water in the distribution system through third-party analysis. In addition, no positive samples were detected by BMID's in-house presence/absence testing;
13. Disinfection by-products (Haloacetic acids and Trihalomethanes) were monitored at four sites throughout the distribution system. Both THMs and HAAs were in compliance of the Canadian Drinking Water Guidelines;

1.0 FLOWS - SEPTEMBER, 2020

The Maximum Daily Flow was on September 11, at 22,304,721 US gallons (84.42 ML)

The Minimum Daily Flow was on September 27, at 5,172,541 US gallons (19.58 ML)

Mission Creek provided 93% of domestic and irrigation flow throughout September.

Figure 1.1 - Domestic Water System Flow

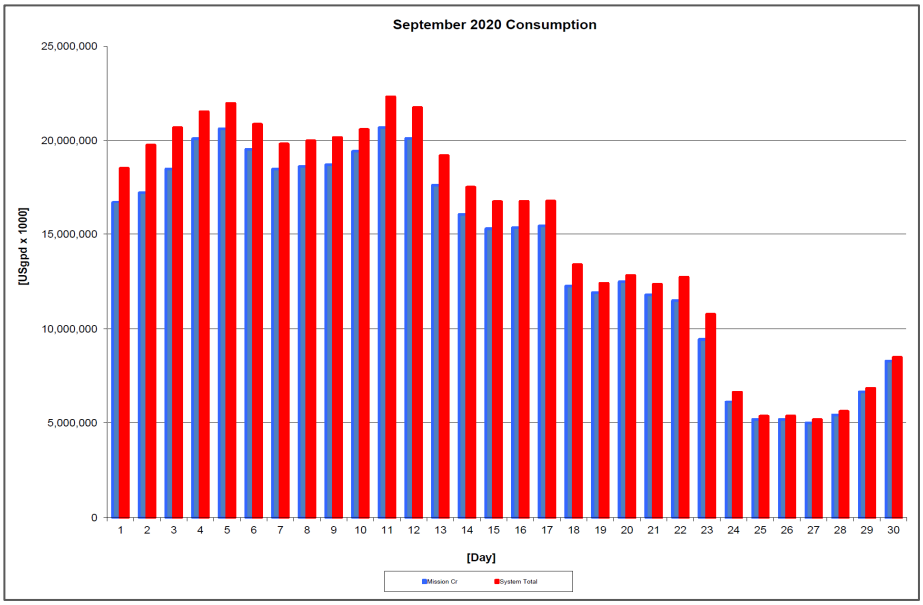


Table 1.2 - September 2020 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	Well #6	Scotty Crk	System Total	System Total
2020	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Sep	16,723,100	0	999,314.0	486,000.0	317,000.0	18,525,414	70.12
2-Sep	17,241,662	0	999,917.0	1,056,000.0	453,000.0	19,750,579	74.76
3-Sep	18,504,117	0	999,507.0	890,000.0	281,000.0	20,674,624	78.25
4-Sep	20,104,266	0	999,036.0	406,000.0	12,000.0	21,521,302	81.46
5-Sep	20,630,656	0	998,389.0	327,000.0	0.0	21,956,045	83.10
6-Sep	19,544,650	0	998,658.0	303,000.0	8,000.0	20,854,308	78.93
7-Sep	18,490,531	0	999,569.0	293,000.0	27,000.0	19,810,100	74.98
8-Sep	18,623,467	0	998,763.0	237,000.0	123,000.0	19,982,230	75.63
9-Sep	18,719,605	0	998,533.0	133,000.0	308,000.0	20,159,138	76.30
10-Sep	19,432,529	0	999,428.0	1,000.0	141,000.0	20,573,957	77.87
11-Sep	20,684,752	194,000	648,969.0	591,000.0	186,000.0	22,304,721	84.42
12-Sep	20,112,900	427,000	0.0	1,075,000.0	130,000.0	21,744,900	82.30
13-Sep	17,642,535	398,000	0.0	1,074,000.0	84,000.0	19,198,535	72.67
14-Sep	16,048,316	355,000	0.0	1,072,000.0	50,000.0	17,525,316	66.33
15-Sep	15,286,752	365,000	0.0	1,060,000.0	44,000.0	16,755,752	63.42
16-Sep	15,341,476	361,000	0.0	1,066,000.0	0.0	16,768,476	63.47
17-Sep	15,436,778	330,000	0.0	1,019,000.0	0.0	16,785,778	63.53
18-Sep	12,268,642	303,000	0.0	810,000.0	0.0	13,381,642	50.65
19-Sep	11,933,224	291,000	0.0	155,000.0	22,000.0	12,401,224	46.94
20-Sep	12,495,882	314,000	0.0	0.0	0.0	12,809,882	48.49
21-Sep	11,807,110	281,000	0.0	260,000.0	0.0	12,348,110	46.74
22-Sep	11,504,853	260,000	0.0	553,000.0	406,000.0	12,723,853	48.16
23-Sep	9,451,232	213,000	0.0	575,000.0	529,000.0	10,768,232	40.76
24-Sep	6,146,165	187,000	0.0	325,000.0	0.0	6,658,165	25.20
25-Sep	5,185,489	162,000	0.0	0.0	0.0	5,347,489	20.24
26-Sep	5,176,403	184,000	0.0	0.0	0.0	5,360,403	20.29
27-Sep	4,991,541	181,000	0.0	0.0	0.0	5,172,541	19.58
28-Sep	5,420,317	178,000	0.0	0.0	0.0	5,598,317	21.19
29-Sep	6,681,815	184,000	0.0	0.0	0.0	6,865,815	25.99
30-Sep	8,310,100	191,000	0.0	0.0	0.0	8,501,100	32.18
Totals Usgpd	419,940,865	5,359,000	10,640,083	13,767,000	3,121,000	452,827,948	1713.95
Totals ML	1,589.48	20.28	40.27	52.11	11.81		
Avg's	13,998,029	52.98				15,094,265	57.13
Max	20,684,752	78.29				22,304,721	84.42
Min	4,991,541	18.89				5,172,541	19.58

2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

Raw water samples were taken at three points at BMID settling ponds before chlorination

Samples were taken twice per week at the Distribution Intake's Point of Disinfection and at the Mission Creek raw water Point of Diversion; one sample is taken per week 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) August 2019 -September 2020

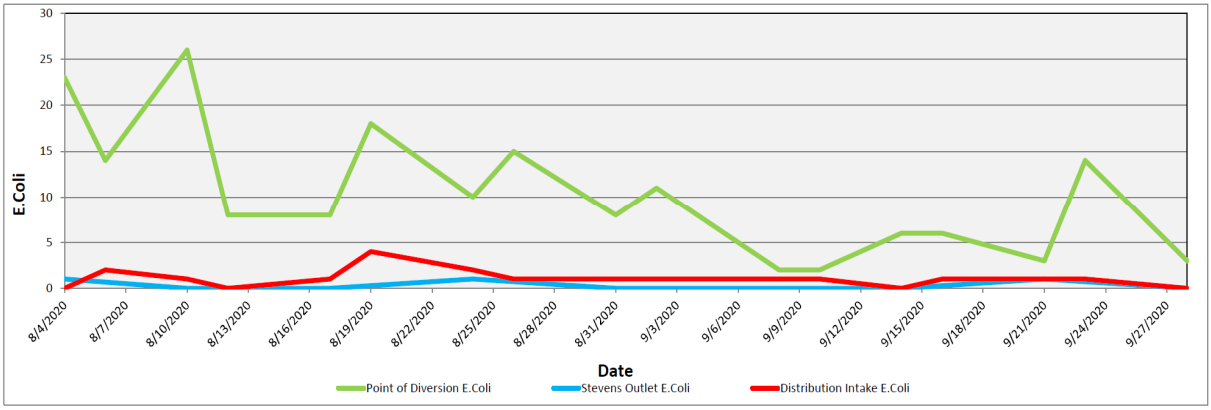


Table 2.1 - *E.Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
4-Aug-20	23	1	0
6-Aug-20	14		2
10-Aug-20	26	0	1
12-Aug-20	8		0
17-Aug-20	8	0	1
19-Aug-20	18		4
24-Aug-20	10	1	2
26-Aug-20	15		1
31-Aug-20	8	0	1
2-Sep-20	11		1
8-Sep-20	2	0	1
10-Sep-20	2		1
14-Sep-20	6	0	0
16-Sep-20	6		1
21-Sep-20	3	1	1
23-Sep-20	14		1
28-Sep-20	3	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 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 September 2020, 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 0.30 NTU on September 29.

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)

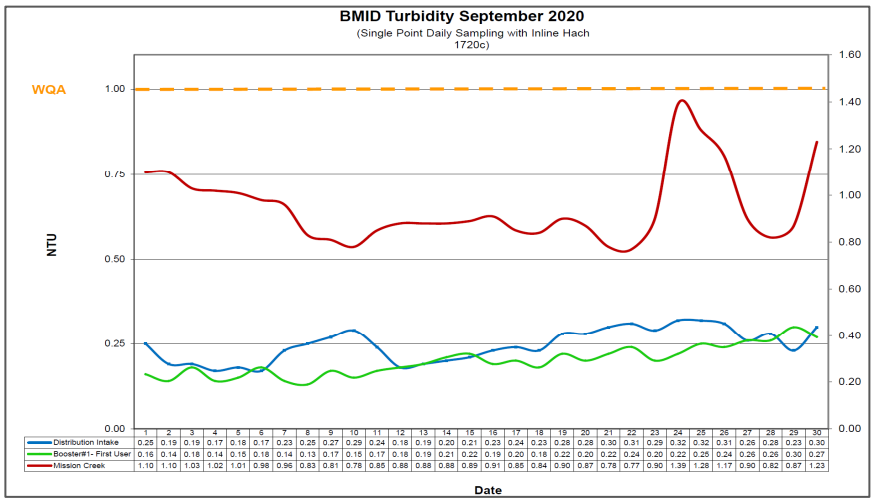


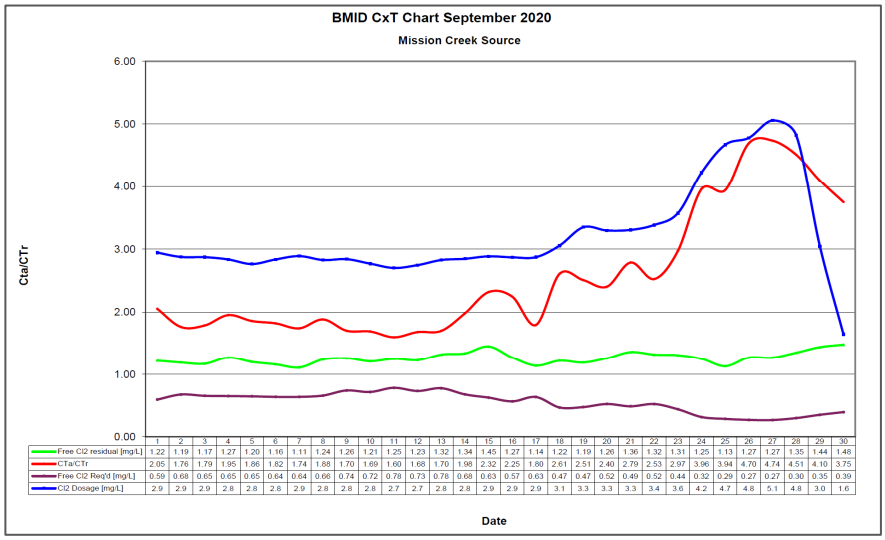
Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for September 2020			
Date	Mission Creek Intake Daily Average [NTU]	Distribution Intake Daily Average [NTU]	Booster#1- First User Daily Average [NTU]
1	1.10	0.25	0.16
2	1.10	0.19	0.14
3	1.03	0.19	0.18
4	1.02	0.17	0.14
5	1.01	0.18	0.15
6	0.98	0.17	0.18
7	0.96	0.23	0.14
8	0.83	0.25	0.13
9	0.81	0.27	0.17
10	0.78	0.29	0.15
11	0.85	0.24	0.17
12	0.88	0.18	0.18
13	0.88	0.19	0.19
14	0.88	0.20	0.21
15	0.89	0.21	0.22
16	0.91	0.23	0.19
17	0.85	0.24	0.20
18	0.84	0.23	0.18
19	0.90	0.28	0.22
20	0.87	0.28	0.20
21	0.78	0.30	0.22
22	0.77	0.31	0.24
23	0.90	0.29	0.20
24	1.39	0.32	0.22
25	1.28	0.32	0.25
26	1.17	0.31	0.24
27	0.90	0.26	0.26
28	0.82	0.28	0.26
29	0.87	0.23	0.30
30	1.23	0.30	0.27
Average	0.95	0.25	0.20

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 September, 2020.

Figure 4.1 - CT Trending – BMID Mission Creek Source – September 2020



	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]	1.22	1.19	1.17	1.27	1.20	1.16	1.11	1.24	1.26	1.21	1.25	1.23	1.32	1.34	1.45	1.27	1.14	1.22	1.19	1.26	1.36	1.32	1.31	1.25	1.13	1.27	1.27	1.35	1.44	1.48
CTa/CTr	2.05	1.76	1.79	1.95	1.86	1.82	1.74	1.88	1.70	1.69	1.60	1.68	1.70	1.98	2.32	2.25	1.80	2.61	2.51	2.40	2.79	2.53	2.97	3.96	3.94	4.70	4.74	4.51	4.10	3.75
Free Cl2 Req'd [mg/L]	0.59	0.68	0.65	0.65	0.65	0.64	0.64	0.66	0.74	0.72	0.78	0.73	0.78	0.68	0.63	0.57	0.63	0.47	0.47	0.52	0.49	0.52	0.44	0.32	0.29	0.27	0.27	0.30	0.35	0.39
Cl2 Dosage [mg/L]	2.9	2.9	2.9	2.8	2.8	2.8	2.9	2.8	2.8	2.8	2.7	2.7	2.8	2.8	2.9	2.9	2.9	3.1	3.3	3.3	3.3	3.4	3.6	4.2	4.7	4.8	5.1	4.8	3.0	1.6

Table 4.2 - CT Table – Mission Creek Source

	BMID September 2020												
	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
September		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.82	15.1	14370	1.22	224.9	109.7	2.05	0.59	2.9	2649600	184	11612	411
2	7.83	15.1	16316	1.19	193.2	109.6	1.76	0.68	2.9	2649600	162	11974	414
3	7.85	15.6	16304	1.17	190.1	106.4	1.79	0.65	2.9	2649600	163	12862	444
4	7.86	16.0	16399	1.27	205.2	105.1	1.95	0.65	2.8	2649600	162	13979	477
5	7.87	16.4	16829	1.20	188.9	101.7	1.86	0.65	2.8	2649600	157	14331	476
6	7.88	16.5	16742	1.16	183.6	100.8	1.82	0.64	2.8	2649600	158	13564	463
7	7.89	16.6	16923	1.11	173.8	99.8	1.74	0.64	2.9	2649600	157	12850	446
8	7.86	15.9	16546	1.24	198.6	105.4	1.88	0.66	2.8	2649600	160	12946	440
9	7.86	15.2	17666	1.26	189.0	111.0	1.70	0.74	2.8	2649600	150	12993	444
10	7.87	14.4	16206	1.21	197.8	117.0	1.69	0.72	2.8	2649600	163	13511	450
11	7.87	14.1	17272	1.25	191.8	120.0	1.60	0.78	2.7	2649600	153	14353	466
12	7.88	14.7	16822	1.23	193.7	115.2	1.68	0.73	2.7	2649600	158	13985	462
13	7.88	14.6	17525	1.32	199.6	117.3	1.70	0.78	2.8	2649600	151	12252	416
14	7.89	14.3	14892	1.34	238.4	120.4	1.98	0.68	2.8	2649600	178	11144	381
15	7.89	14.2	13502	1.45	284.5	122.7	2.32	0.63	2.9	2649600	196	10629	369
16	7.89	14.4	12630	1.27	266.4	118.6	2.25	0.57	2.9	2649600	210	10661	368
17	7.90	14.5	14464	1.14	208.8	116.3	1.80	0.63	2.9	2649600	183	10706	370
18	7.90	14.7	10698	1.22	302.2	115.9	2.61	0.47	3.1	2649600	248	8522	313
19	7.88	14.7	10965	1.19	287.6	114.7	2.51	0.47	3.3	2649600	242	8290	334
20	7.86	14.7	12093	1.26	276.1	114.9	2.40	0.52	3.3	2649600	219	8695	345
21	7.87	14.6	11010	1.36	327.3	117.4	2.79	0.49	3.3	2649600	241	8202	326
22	7.88	14.2	11487	1.32	304.5	120.6	2.53	0.52	3.4	2649600	231	7989	325
23	7.89	14.5	9867	1.31	351.8	118.4	2.97	0.44	3.6	2649600	269	6550	281
24	7.90	14.1	6900	1.25	480.0	121.2	3.96	0.32	4.2	2649600	384	4259	216
25	7.83	13.3	6162	1.13	485.9	123.3	3.94	0.29	4.7	2649600	430	3606	203
26	7.85	12.9	5517	1.27	609.9	129.8	4.70	0.27	4.8	2649600	480	3592	207
27	7.82	12.5	5376	1.27	625.9	132.1	4.74	0.27	5.1	2649600	493	3474	211
28	7.80	12.8	6111	1.35	585.3	129.7	4.51	0.30	4.8	2649600	434	3770	219
29	7.82	12.4	6867	1.44	555.6	135.6	4.10	0.35	3.0	2649600	386	4640	170
30	7.83	12.8	7867	1.48	498.5	132.9	3.75	0.39	1.6	2649600	337	5778	114
Averages	7.86	14.53	12744	1.26	307.299	117	2.57	0.55	3.21				

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	1,375,025 m^3	100.0%
On-Spec Water:	1,374,982 m^3	99.997%
Off-Spec Water:	42.6 m^3	0.003%

Average monthly chlorine residual before UV Treatment was 1.25 mg/L
The average monthly chlorine residual after UV treatment and re-chlorination was 1.32 mg/L.

Figure 5.1 - UV Disinfection – BMID Mission Creek Source – September 2020

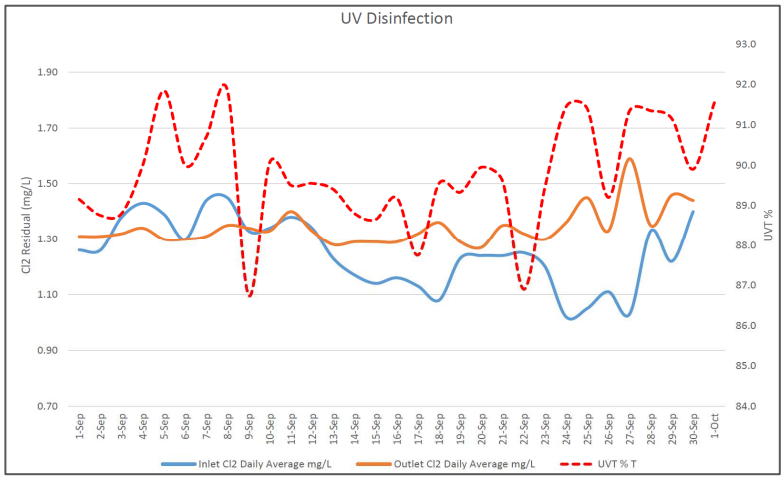


Table 5.2 - UV Disinfection Table – Mission Creek Source

Date	Inlet Cl2 Daily mg/L	Outlet Cl2 Daily mg/L		UVT % T		In Spec Water Volume Cubic Meters	Off Spec Water Cubic Meters	Off Spec % of Water Percentage
1-Sep	1.26	1.29		92.5		55,584	0	0.00%
2-Sep	1.26	1.31		90.4		56,101	0	0.00%
3-Sep	1.38	1.37		93.0		61,518	0	0.00%
4-Sep	1.43	1.43		92.0		67,258	0	0.00%
5-Sep	1.39	1.38		89.9		67,234	0	0.00%
6-Sep	1.30	1.36		92.5		64,800	0	0.00%
7-Sep	1.44	1.31		88.7		61,917	0	0.00%
8-Sep	1.45	1.37		90.7		60,829	0	0.00%
9-Sep	1.33	1.41		88.3		62,385	0	0.00%
10-Sep	1.34	1.40		91.6		64,926	0	0.14%
11-Sep	1.38	1.32		88.5		68,012	0	0.14%
12-Sep	1.34	1.36		91.5		67,213	0	0.85%
13-Sep	1.23	1.38		88.5		58,810	0	0.86%
14-Sep	1.17	1.28		89.1		52,323	0	0.00%
15-Sep	1.14	1.28		90.4		50,002	0	1.68%
16-Sep	1.16	1.30		91.6		49,836	0	1.40%
17-Sep	1.13	1.28		93.0		50,180	0	0.00%
18-Sep	1.08	1.27		92.9		39,306	0	0.00%
19-Sep	1.23	1.32		93.1		38,927	0	0.00%
20-Sep	1.24	1.32		92.3		40,750	0	0.00%
21-Sep	1.24	1.30		91.1		37,656	0	0.01%
22-Sep	1.25	1.29		92.4		37,511	0	0.01%
23-Sep	1.20	1.29		92.7		30,234	41	0.00%
24-Sep	1.02	1.25		92.9		19,053	2	0.00%
25-Sep	1.05	1.28		92.7		15,477	0	0.00%
26-Sep	1.11	1.28		92.2		15,448	0	0.00%
27-Sep	1.03	1.28		92.5		15,471	0	0.00%
28-Sep	1.33	1.29		92.3		16,622	0	0.00%
29-Sep	1.22	1.30		91.6		21,319	0	0.00%
30-Sep	1.40	1.38		92.0		28,283	0	0.00%
Average	1.25	1.32		91.41	Total	1,374,982.00	42.6	0.003%

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
- 47 samples were found to be absent of Coliforms.
- 47 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
4-Aug-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
10-Aug-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
17-Aug-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
24-Aug-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
31-Aug-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
8-Sep-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0			-	-	0	0	0	0
14-Sep-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
21-Sep-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0
28-Sep-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0

Table 6.3 – Disinfection By-Products - THM and HAA Results

8-Sep-20		
Location	THM (mg/L)	HAA (mg/L)
Kirschner Reservoir		0.0502
2921 Belgo Rd	0.0379	
Pearson School	0.0393	0.0388
3976 Highway 97	0.0403	

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 6.4 - BMID In-house Testing – Presence Absence

	9/8/2020				9/15/2020				9/21/2020				9/28/2020			
Location	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres									0.84	19.6	-	X				
170 Kneller Rd									0.81	19.2	-	X				
2105 Morrison					1.06	18.8	-	X								
Staymen Rd					0.86	18.4	-	X								
260 Campion Rd	0.08	20.8	-	X									0.22	21.4	-	X
Fenwick Rd	0.08	21.4	-	X									0.06	24.6	-	X
Solly Ct									0.75	18.8	-	X				

- BMID Population = 25,000

RECOMMENDED TESTS

- Recommended number of samples per month = 25

  (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 = 47
- Total tests sampled in BMID treated distribution system = 56 (Zero Positive Samples)