

MONTHLY REPORTING PERIOD - FEBRUARY, 2023

SUMMARY

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

WATER SUPPLY & USAGE SUMMARY

1. Water usage data for February is as follows:

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	57,754,102	218.6
Well 4	2,752,387	10.42
Well 5	0	0
Well 6 (Irrigation Only)	0	0
Scotty Creek (Irrigation Only)	0	0
Total	60,506,489	229.02

- 2. BMID's control gates on the high-elevation reservoirs are closed for the winter. The gates will remain closed until summer of 2023;
- BMID's Scotty Creek source supplying irrigation water to the north-end of the service area, provided water from May 27th, 2022 to September 9th 2022 when irrigation demands in the north-end reduced from peak flows experienced earlier in summer. The Scotty Creek source will resume service in the summer of 2023;
- 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 February;
- 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 2022, 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. The UV plant experienced higher than normal flows on February 15-16. Flows were high on these days due to BMID crews refilling a transmission main after planned maintenance works, and not as a result of increased consumption;
- 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 for 14 days in the middle of February due to increased turbidity in Mission Creek raw water resulting from increased temperatures. The WTP was then placed back in stand-by mode and will remain so until turbidity again rises later in the spring;
- Raw water turbidity levels in Mission Creek peaked at 2.93 NTU (average daily turbidity) on February 8th. Average daily raw water turbidity for February was 1.46 NTU at the Mission Creek intake;
- The highest turbidity level at the Distribution Intake (end of Hadden Reservoir) was 0.68 NTU on February 21st, 2023. Average settled water turbidity for February was 0.49 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
- 4. The highest turbidity level at the first customer (Booster #1) was 0.51 NTU on February 11th. Average monthly turbidity at the first customer was 0.44 NTU;
- 5. The highest turbidity daily average at the UV plant was 0.83 NTU on February 16th. This spike in turbidity is a result of increased flows at the UV plant associated with maintenance works. Average monthly turbidity at the UV plant was 0.44 NTU throughout February;
- 6. BMID's Ultraviolet Treatment Facility treated 218,623 m³ of water, none of which was "Off-Spec" (0.00%);
- 7. Regarding microbiological readings, the Mission Creek watershed was frozen over throughout the month of February resulting in a greater groundwater influence on the raw water quality. There was a notable drop in *E.Coli* and *Total Coliform* levels from prior months readings;
- 8. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had low counts for February. The February 6th sample had the peak monthly count of 3 coliforms. The average monthly *E.Coli* was 1.5, based on 4 samples;
- 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 due to 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 February;

1.0 FLOWS - FEBRUARY, 2023

The Maximum Daily Flow was on February 16th, at 3,273,249 US gallons (12.39 ML) The Minimum Daily Flow was on February 24th, at 2,001,472 US gallons (7.58 ML) Mission Creek provided just over 95% of domestic flow supplied in February.



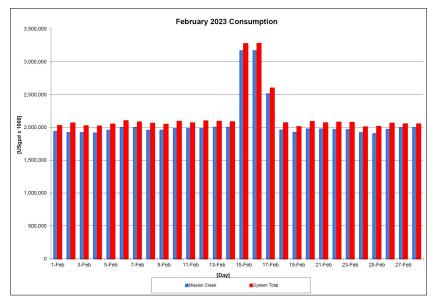


Table 1.2 - February 2023 - Daily Consumption Report

Year	Mission Creek	Well #4	Well #5	Well #6	System Total	System Total
2023	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Feb	1,929,539	92,195	0	0	2,021,734	7.65
2-Feb	1,914,402	145,294	0	0	2,059,695	7.80
3-Feb	1,914,481	104,347	0	0	2,018,828	7.64
4-Feb	1,908,326	106,725	0	0	2,015,050	7.63
5-Feb	1,950,038	95,101	0	0	2,045,140	7.74
6-Feb	1,989,083	106,725	0	0	2,095,808	7.93
7-Feb	1,989,162	87,969	0	0	2,077,131	7.86
8-Feb	1,950,197	106,196	0	0	2,056,393	7.78
9-Feb	1,950,276	92,195	0	0	2,042,472	7.73
10-Feb	1,976,271	108,574	0	0	2,084,845	7.89
11-Feb	1,976,324	87,704	0	0	2,064,028	7.81
12-Feb	1,978,041	113,593	0	0	2,091,634	7.92
13-Feb	1,995,106	90,610	0	0	2,085,717	7.89
14-Feb	1,995,185	83,742	0	0	2,078,927	7.87
15-Feb	3,165,124	107,517	0	0	3,272,641	12.39
16-Feb	3,165,203	108,046	0	0	3,273,249	12.39
17-Feb	2,512,487	86,119	0	0	2,598,606	9.84
18-Feb	1,954,767	110,159	0	0	2,064,926	7.82
19-Feb	1,917,255	89,818	0	0	2,007,073	7.60
20-Feb	1,969,931	113,593	0	0	2,083,524	7.89
21-Feb	1,970,010	94,309	0	0	2,064,319	7.81
22-Feb	1,961,583	112,008	0	0	2,073,591	7.85
23-Feb	1,961,636	108,574	0	0	2,070,209	7.84
24-Feb	1,915,881	85,591	0	0	2,001,472	7.58
25-Feb	1,898,921	109,895	0	0	2,008,816	7.60
26-Feb	1,962,534	95,630	0	0	2,058,163	7.79
27-Feb	1,991,144	55,212	0	0	2,046,355	7.75
28-Feb	1,991,196	54,947	0	0	2,046,144	7.74
Totals Usgpd	57,754,102	2,752,387	0	0	60,506,489	229.02
Totals ML	218.60	10.42	0.00	0.00	229	
Avg's	2,062,646	7.81			2,160,946	8.18
Max	3,165,203	11.98			3,273,249	12.39
Min	1,898,921	7.19			2,001,472	7.58

2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

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

Samples were taken 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) January 2023 - February 2023

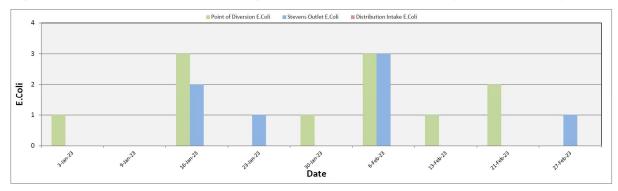


Table 2.1 - E.Coli Readings (CARO Labs)

	Point of Diversion	Stevens Outlet	Distribution Intake
Date	E.Coli	E.Coli	E.Coli
3-Jan-23	1	0	0
9-Jan-23	0	0	0
16-Jan-23	3	2	0
23-Jan-23	0	1	0
30-Jan-23	1	0	0
6-Feb-23	3	3	0
13-Feb-23	1	0	0
21-Feb-23	2	0	0
27-Feb-23	0	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 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 February 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 0.51 NTU on February 11th, 2023. The lowest turbidity level was 0.34 NTU and the average turbidity was 0.44 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)

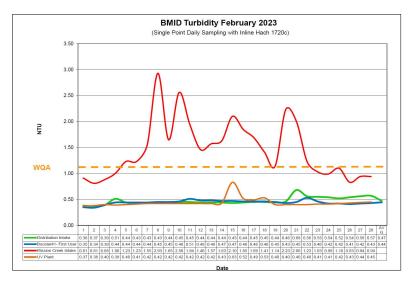


Table 3.1 - Daily Monitoring Record – Turbidity at On-Line Turbidity Analysers

	Turbic	lity Point Sampling	for February 2023	
12.12	Mission Creek Intake	Distribution Intake	Booster#1- First User	UV Plant
Date	Daily Average [NTU]	Daily Average NTU	Daily Average NTU	Daily Average [NTU]
1	0.91	0.38	0.35	0.37
2	0.81	0.37	0.34	0.38
3	0.88	0.39	0.39	0.40
4	1.00	0.51	0.44	0.39
5	1.23	0.44	0.44	0.40
6	1.23	0.43	0.44	0.41
7	1.55	0.43	0.44	0.42
8	2.93	0.43	0.45	0.42
9	1.65	0.44	0.45	0.42
10	2.56	0.45	0.46	0.42
11	1.94	0.45	0.51	0.42
12	1.46	0.44	0.48	0.42
13	1.57	0.44	0.48	0.42
14	1.63	0.44	0.47	0.43
15	2.10	0.43	0.47	0.83
16	1.85	0.44	0.46	0.52
17	1.69	0.45	0.46	0.49
18	1.41	0.45	0.46	0.53
19	1.14	0.44	0.45	0.40
20	2.23	0.46	0.43	0.40
21	2.00	0.68	0.45	0.40
22	1.23	0.56	0.53	0.40
23	1.03	0.55	0.46	0.41
24	0.99	0.54	0.42	0.41
25	1.10	0.52	0.42	0.42
26	0.83	0.54	0.41	0.43
27	0.94	0.56	0.42	0.44
28	0.94	0.57	0.43	0.45
AVG	1.46	0.49	0.44	0.44

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 February, 2023.

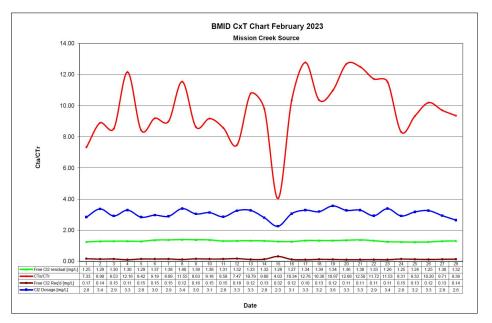


Figure 4.1 - CT Trending – BMID Mission Creek Source – February 2023

Table 4.2 - CT Table – Mission Creek Source

						[BMID Feb	oruary 20	023				
						Ν	lission Ci	reek Sou	urce				
DATE	pН	TEMP	PEAK	Free Cl ₂	CT	CT	CTa/CTr	Free Cl ₂	Cl2	VOLUME	TIME	FLOW	CL2 DOSAGE
DATE	(Average)	(Present)	FLOW	residual	achieved	req'd		Req'd	Dosage	TOTAL		Daily Average	Average
February		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	US Gallons	[PPD]
1	7.72	7.1	2439	1.25	1357.7	185.2	7.33	0.17	2.8	2649600	1086	1471	50
2	7.87	7.8	2057	1.29	1661.3	186.7	8.90	0.14	3.4	2649600	1288	1255	51
3	7.83	9.5	2466	1.30	1396.6	163.8	8.53	0.15	2.9	2649600	1074	1446	51
4	7.83	10.0	1790	1.30	1924.8	158.2	12.16	0.11	3.3	2649600	1481	1257	50
5	7.83	10.4	2639	1.29	1295.1	153.7	8.42	0.15	2.8	2649600	1004	1508	52
6	7.83	9.4	2374	1.37	1528.8	166.3	9.19	0.15	3.0	2649600	1116	1474	53
7	7.75	9.5	2528	1.38	1446.3	160.8	8.99	0.15	2.9	2649600	1048	1473	51
8	7.70	8.9	1946	1.40	1906.5	165.1	11.55	0.12	3.4	2649600	1362	1269	52
9	7.70	8.0	2430	1.39	1515.7	175.5	8.63	0.16	3.0	2649600	1090	1397	51
10	7.70	7.9	2257	1.38	1620.0	176.6	9.18	0.15	3.1	2649600	1174	1371	52
11	7.70	7.5	2246	1.31	1545.4	180.1	8.58	0.15	2.9	2649600	1180	1493	51
12	7.70	8.1	2706	1.32	1292.3	173.0	7.47	0.18	3.3	2649600	979	1341	52
13	7.70	10.0	2152	1.33	1637.2	151.8	10.79	0.12	3.3	2649600	1231	1344	53
14	7.63	9.7	2363	1.32	1479.9	151.1	9.80	0.13	2.8	2649600	1121	1534	52
15	7.52	8.9	5503	1.28	616.3	152.8	4.03	0.32	2.3	2649600	481	1932	52
16	7.52	10.1	2317	1.27	1452.6	140.5	10.34	0.12	3.1	2649600	1144	1406	52
17	7.52	10.8	2059	1.34	1724.4	134.9	12.78	0.10	3.3	2649600	1287	1310	52
18	7.52	10.7	2522	1.34	1407.9	135.8	10.36	0.13	3.2	2649600	1051	1312	50
19	7.52	10.7	2382	1.34	1490.3	135.8	10.97	0.12	3.6	2649600	1112	1188	51
20	7.52	11.1	2145	1.36	1679.7	132.4	12.68	0.11	3.3	2649600	1235	1326	52
21	7.52	11.3	2235	1.38	1636.1	130.9	12.50	0.11	3.3	2649600	1186	1302	52
22	7.56	9.4	1996	1.33	1765.9	150.6	11.72	0.11	2.9	2649600	1328	1474	52
23	7.63	8.0	1715	1.26	1946.6	168.8	11.53	0.11	3.4	2649600	1545	1250	51
24	7.63	7.1	2221	1.25	1491.5	179.4	8.31	0.15	2.9	2649600	1193	1433	50
25	7.63	7.9	2076	1.24	1582.3	169.5	9.33	0.13	3.2	2649600	1276	1312	50
26	7.63	9.3	2108	1.25	1571.1	154.0	10.20	0.12	3.3	2649600	1257	1328	52
27	7.63	9.1	2259	1.30	1525.0	157.1	9.71	0.13	2.9	2649600	1173	1489	53
28	7.63	10.7	2651	1.32	1319.3	140.9	9.36	0.14	2.6	2649600	999	1644	52
Averages	7.66	9.2	2378	1.32	1529.2	158.3	9.76	0.14	3.1		1161	1405	51

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	218,623.1 m ³	100.00%
On-Spec Water:	218,623.1 m ³	100.00%
Off-Spec Water:	0.0 m ³	0.00%

Average monthly chlorine residual before UV Treatment was 1.35 mg/L The average monthly chlorine residual after UV treatment and re-chlorination was 1.45 mg/L.

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

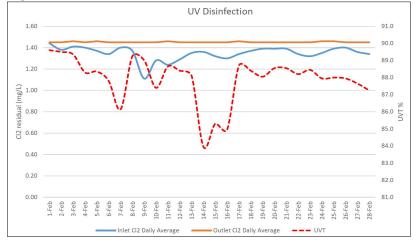


Table 5.2 - UV Disinfection Table – Mission Creek Source

	Inlet Cl2 Daily	Outlet Cl2		0		In Spec Water	Off Spec
	Average	Daily Average	UVT	Turbidity		Volume	Water
Date	mg/L	mg/L	% T	NTU		Cubic Meters	Cubic Meters
1-Feb	1.44	1.45	89.6	0.37		<mark>7304.1</mark>	0
2-Feb	1.38	1.45	89.5	0.38		7246.8	0
3-Feb	1.41	1.46	89.4	0.40		7247.1	0
4-Feb	1.40	1.45	88.3	0.39		7223.8	0
5-Feb	1.37	1.46	88.4	0.40		7381.7	0
6-Feb	1.34	1.45	87.8	0.41		7529.5	0
7-Feb	1.40	1.45	86.1	0.42		7529.8	0
8-Feb	1.37	1.45	89.3	0.42		7382.3	0
9-Feb	1.11	1.45	89.0	0.42		7382.6	0
10-Feb	1.28	1.45	87.4	0.42		7481	0
11-Feb	1.24	1.46	88.7	0.42		7481.2	0
12-Feb	1.29	1.45	88.4	0.42		7487.7	0
13-Feb	1.35	1.45	88.1	0.42		7552.3	0
14-Feb	1.36	1.45	84.0	0.43		7552.6	0
15-Feb	1.32	1.45	85.3	0.83		11981.3	0
16-Feb	1.30	1.45	85.0	0.52		11981.6	0
17-Feb	1.34	1.46	88.7	0.49		9510.8	0
18-Feb	1.37	1.45	88.4	0.53		7399.6	0
19-Feb	1.39	1.45	88.1	0.40		7257.6	0
20-Feb	1.39	1.45	88.6	0.40		7457	0
21-Feb	1.39	1.45	88.6	0.40		7457.3	0
22-Feb	1.34	1.45	88.2	0.40		7425.4	0
23-Feb	1.32	1.45	88.5	0.41		7425.6	0
24-Feb	1.35	1.46	88.0	0.41		7252.4	0
25-Feb	1.39	1.46	88.0	0.42		7188.2	0
26-Feb	1.40	1.45	88.0	0.43		7429	0
27-Feb	1.36	1.45	87.7	0.44		7537.3	0
28-Feb	1.34	1.45	87.3	0.45		7537.5	0
Average	1.35	1.45	87.9		Total	218623.1	0

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

	2921 B	elgo Rd	Boos	ster 1	Ellison B	Blow-Off	Ellison	Ellison School		3976 Highway 97		Prospect Reservoir		/oir Tower Reservoir		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	
3-Jan-23			0	0	0	0	0	0	0	0			0	0	0	0					
9-Jan-23	0	0	0	0							0	0			0	0	0	0	0	0	
16-Jan-23			0	0	0	0	0	0	0	0			0	0	0	0			0	0	
23-Jan-23	0	0	0	0							0	0			0	0	0	0	0	0	
30-Jan-23			0	0			0	0	0	0			0	0	0	0					
6-Feb-23	0	0	0	0				1			0	0			0	0	0	0	0	0	
13-Feb-23			0	0	0	0	0	0	0	0			0	0	0	0					
21-Feb-23	0	0	0	0							0	0			0	0	0	0	0	0	
27-Feb-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 samples were found to be absent of both *Total Coliforms* and *E.Coli*.

Table 6.2 - BMID In-house Testing – Presence Absence

		2/6/2	2023		2/13/2023				2/21/2023				2/27/2023			
Location	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	CI2	Temp.	Pres.	Abs.	CI2	Temp.	Pres.	Abs.
Sylvania Cres	0.91	10.8	-	X									0.83	10.6	-	X
170 Kneller Rd	0.86	11.6	Ξ	X									0.85	9.6	-	X
2105 Morrison									0.50	8.8	-	Х				
Staymen Rd									0.83	10.6	<u></u>	X				
260 Campion Rd					0.83	12.8	-	Х								
Fenwick Rd					0.77	11.4	12	X								
Solly Ct	0.99	11.4	-	Х									0.93	8.8	-	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) = 10
- Total tests sampled by BMID and tested by Caro Labs 24
- Total tests sampled in BMID treated distribution system = 34
- 0 Positive *E.Coli* and Total Coliform Samples