



## MONTHLY REPORTING PERIOD - SEPTEMBER, 2023

### SUMMARY

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

### WATER SUPPLY & USAGE SUMMARY

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

Source	Total (US Gallons)	Total (Mega Litres)
Mission Creek	303,834,626	1,150.01
Well 4	729,109	2.76
Well 5	33,221,036	125.74
Well 6 (Irrigation Only)	2,083,224	7.89
Scotty Creek (Irrigation Only)	209,187	0.79
Total	340,077,182	1,287.19

2. BMID's control gates on the high-elevation reservoirs were opened in early July. These reservoirs continued to be utilized by BMID throughout September to maintain adequate flows in Mission Creek;
3. BMID's Scotty Creek source supplying irrigation water to the north-end of the service area, was placed on stand-by mode on September 8<sup>th</sup>. The Scotty Creek source will remain in stand-by until irrigation demands increase in the summer of 2024;
4. 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 most of September. Well #5 was placed in stand-by mode on September 29<sup>th</sup>. Well #5 will resume operations in the summer of 2024 as irrigation demands increase in the north-end;
5. Well #4, used as a primary source for domestic water in the north-end of the distribution system during low-flow periods, was taken out of stand-by mode on September 27<sup>th</sup>. Well #4 will remain in service until the spring/summer of 2024;
6. Well #6, which supplies water to the north-end irrigation distribution system, was placed in stand-by mode on September 24<sup>th</sup>. Well #6 will resume operations in the summer of 2024;
7. 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;

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## WATER QUALITY SUMMARY

1. The turbidity meter at the UV station had highly variable readings throughout September, leading to inaccurately high turbidity results. Turbidity results from both the Distribution Intake, upstream of the UV station, and Booster #1, downstream of the UV station had stable readings throughout September. These turbidity results indicate that BMID had low system turbidity throughout September, including at the UV treatment plant;
2. The WTP ran throughout all of September 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;
3. Raw water turbidity levels in Mission Creek peaked at 1.60 NTU on September 18<sup>th</sup>. Average daily raw water turbidity for September was 1.03 NTU at the Mission Creek Intake;
4. The highest turbidity level at the Distribution Intake (end of Hadden Reservoir) was 0.85 NTU on September 6<sup>th</sup>, 2023. Average settled water turbidity for September was 0.46 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
5. The highest turbidity level at the first customer (Booster #1) was 0.75 NTU on September 2<sup>nd</sup>. Average monthly turbidity at the first customer was 0.40 NTU;
6. Turbidity at the UV station was unavailable for September due to an error in the on-line turbidimeter. BMID will work to address the problem and limit further issues with increased maintenance of the meter;
7. BMID's Ultraviolet Treatment Facility treated 1,150,139.4 m<sup>3</sup> of water, 189.2 m<sup>3</sup> of which was "Off-Spec" (0.016%);
8. 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;
9. Regarding microbiological readings, BMID began withdrawing water from the upper elevation reservoirs in early summer, contributing to the flow of Mission Creek. Mission Creek is expected to have greater variability in microbiological conditions as summer/autumn conditions continue in the watershed;
10. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had average counts for September. The September 4<sup>th</sup> sample had the peak monthly count of 18 coliforms. The average monthly *E.Coli* was 7.75, based on 4 samples;
11. *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 September 2<sup>nd</sup> with a count of 2 coliforms. Average monthly *E.Coli* was 0.75 based on 4 samples. 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;
12. 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 September;

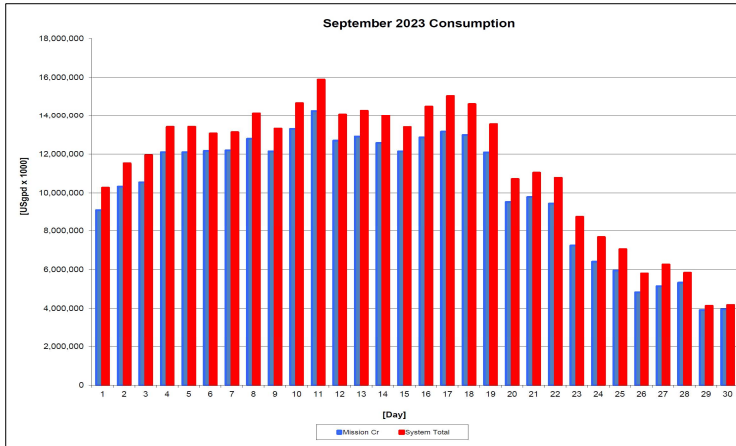
## 1.0 FLOWS - SEPTEMBER, 2023

The Maximum Daily Flow was on September 11<sup>th</sup>, at 15,875,189 US gallons (60.09 ML)

The Minimum Daily Flow was on September 29<sup>th</sup>, at 4,120,342 US gallons (15.60 ML)

Mission Creek provided just over 89% of domestic and irrigation flow supplied in September.

**Figure 1.1 - Domestic Water System Flow**



**Table 1.2 - September 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-Sep	9,112,851	0	1,129,057	0	16,634	10,258,542	38.83
2-Sep	10,319,668	0	1,170,622	3,696	13,841	11,507,827	43.56
3-Sep	10,539,670	0	1,373,990	3,696	16,905	11,934,262	45.17
4-Sep	12,090,386	0	1,267,842	4,224	27,194	13,389,646	50.68
5-Sep	12,090,730	0	1,281,787	4,224	20,117	13,396,858	50.71
6-Sep	12,164,989	0	823,262	2,112	58,059	13,048,422	49.39
7-Sep	12,184,379	0	860,148	18,216	48,713	13,111,455	49.63
8-Sep	12,783,442	0	1,319,265	18,216	7,724	14,128,647	53.48
9-Sep	12,140,130	0	1,151,200	8,184	0	13,299,514	50.34
10-Sep	13,296,279	0	1,206,100	157,344	0	14,659,723	55.49
11-Sep	14,263,729	0	1,454,116	157,344	0	15,875,189	60.09
12-Sep	12,683,188	0	1,312,304	78,408	0	14,073,900	53.27
13-Sep	12,897,907	0	1,246,837	124,344	0	14,269,089	54.01
14-Sep	12,568,089	0	1,306,152	124,344	0	13,998,584	52.98
15-Sep	12,131,095	0	1,169,502	78,936	0	13,379,533	50.64
16-Sep	12,853,130	0	1,311,131	316,536	0	14,480,797	54.81
17-Sep	13,154,154	0	1,542,494	330,264	0	15,026,912	56.88
18-Sep	12,979,246	0	1,419,557	211,992	0	14,610,795	55.30
19-Sep	12,086,979	0	1,228,737	211,992	0	13,527,707	51.20
20-Sep	9,529,978	0	1,147,169	20,592	0	10,697,739	40.49
21-Sep	9,785,750	0	1,200,967	39,600	0	11,026,317	41.73
22-Sep	9,443,066	0	1,265,184	58,344	0	10,766,594	40.75
23-Sep	7,234,905	0	1,449,673	75,504	0	8,760,081	33.16
24-Sep	6,398,616	0	1,227,490	35,112	0	7,661,217	29.00
25-Sep	5,947,119	0	1,090,864	0	0	7,037,983	26.64
26-Sep	4,819,316	0	967,943	0	0	5,787,259	21.90
27-Sep	5,145,648	95,101	1,009,129	0	0	6,249,878	23.66
28-Sep	5,324,175	212,129	288,516	0	0	5,824,820	22.05
29-Sep	3,906,893	213,449	0	0	0	4,120,342	15.60
30-Sep	3,959,119	208,430	0	0	0	4,167,549	15.77
Totals Usgpd	303,834,626	729,109	33,221,036	2,083,224	209,187	340,077,182	1,287.19
Totals ML	1,150.01	2.76	125.74	7.89	0.79		
Avg's	10,127,821	38.33				11,335,906	42.91
Max	14,263,729	53.99				15,875,189	60.09
Min	3,906,893	14.79				4,120,342	15.60

## 2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

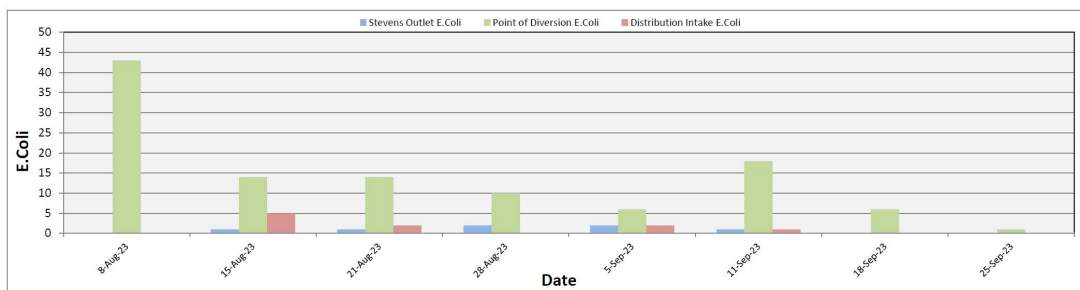
Raw water samples were taken at three points at BMID settling ponds before chlorination.

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

Throughout September, Mission Creek’s flow has been supplemented by BMID’s high-elevation storage reservoirs. 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) August 2023 - September 2023**



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

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
8-Aug-23	43	0	0
15-Aug-23	14	1	5
21-Aug-23	14	1	2
28-Aug-23	10	2	0
5-Sep-23	6	2	2
11-Sep-23	18	1	1
18-Sep-23	6	0	0
25-Sep-23	1	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<sup>3</sup> 1<sup>st</sup> upper balancing reservoir (Stevens Res.)

Hadden Outlet (Raw) - Sampling point after exiting 75,000 m<sup>3</sup> 2<sup>nd</sup> lower balancing reservoir (Hadden Res.)

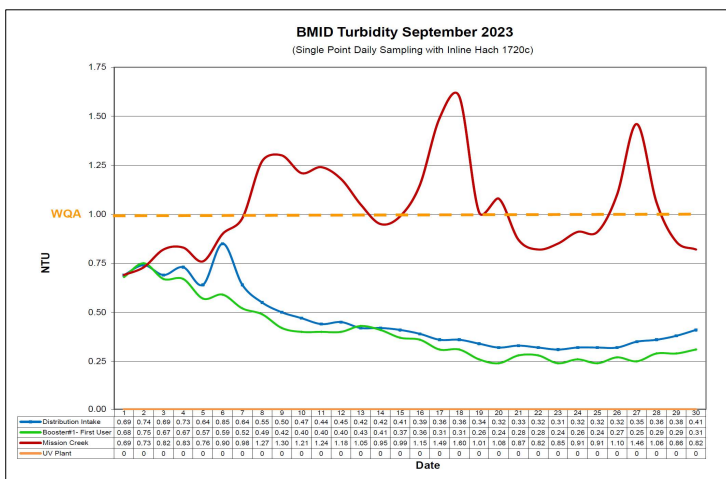
(Hadden Outlet = Distribution Intake - Point of Disinfection)

### 3.0 RAW AND TREATED WATER TURBIDITY

Through September 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 0.75 NTU on September 2<sup>nd</sup>, 2023. The lowest turbidity level was 0.24 NTU and the average turbidity was 0.40 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 September 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	0.69	0.69	0.68	NA
2	0.73	0.74	0.75	NA
3	0.82	0.69	0.67	NA
4	0.83	0.73	0.67	NA
5	0.76	0.64	0.57	NA
6	0.90	0.85	0.59	NA
7	0.98	0.64	0.52	NA
8	1.27	0.55	0.49	NA
9	1.30	0.50	0.42	NA
10	1.21	0.47	0.40	NA
11	1.24	0.44	0.40	NA
12	1.18	0.45	0.40	NA
13	1.05	0.42	0.43	NA
14	0.95	0.42	0.41	NA
15	0.99	0.41	0.37	NA
16	1.15	0.39	0.36	NA
17	1.49	0.36	0.31	NA
18	1.60	0.36	0.31	NA
19	1.01	0.34	0.26	NA
20	1.08	0.32	0.24	NA
21	0.87	0.33	0.28	NA
22	0.82	0.32	0.28	NA
23	0.85	0.31	0.24	NA
24	0.91	0.32	0.26	NA
25	0.91	0.32	0.24	NA
26	1.10	0.32	0.27	NA
27	1.46	0.35	0.25	NA
28	1.06	0.36	0.29	NA
29	0.86	0.38	0.29	NA
30	0.82	0.41	0.31	NA
Average	1.03	0.46	0.40	NA



### 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, 2023.

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

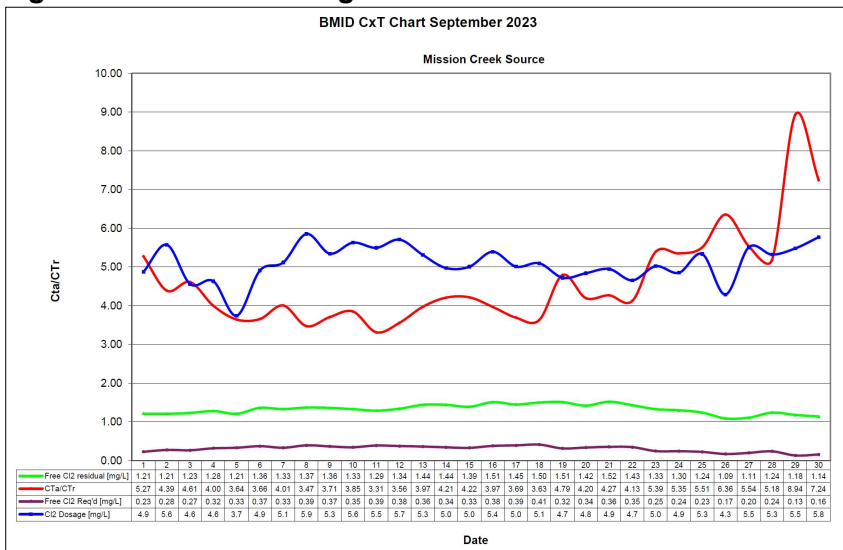


Table 4.2 - CT Table – Mission Creek Source

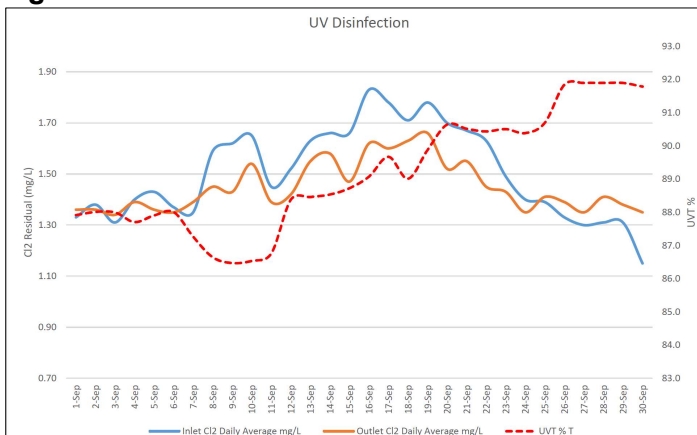
BMID September 2023													
Mission Creek Source													
DATE	pH	TEMP	PEAK	Free Cl <sub>2</sub>	CT	CT	Cta/CTR	Free Cl <sub>2</sub>	Cl <sub>2</sub>	VOLUME	TIME	FLOW	Cl <sub>2</sub> DOSAGE
	(Average)	(Present)	FLOW	residual	achieved	req'd		Req'd	Dosage	TOTAL	[mins]	Daily Average	Average
September		[°C]	[USgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]		[USGPM]	[PPD]
1	7.38	18.5	8208	1.21	390.6	74.0	5.27	0.23	4.9	2649600	323	4836	283
2	7.39	18.3	9689	1.21	330.9	75.4	4.39	0.28	5.6	2649600	273	4779	320
3	7.43	18.8	9549	1.23	341.3	74.0	4.61	0.27	4.6	2649600	277	5969	327
4	7.43	18.3	10999	1.28	308.4	77.1	4.00	0.32	4.6	2649600	241	6930	386
5	7.42	18.0	11312	1.21	283.4	77.8	3.64	0.33	3.7	2649600	234	8137	366
6	7.43	18.0	12405	1.36	290.5	79.4	3.66	0.37	4.9	2649600	214	6579	388
7	7.46	17.6	10688	1.33	329.7	82.3	4.01	0.33	5.1	2649600	248	6827	420
8	7.43	17.2	12437	1.37	291.9	84.1	3.47	0.39	5.9	2649600	213	6382	449
9	7.43	17.4	11738	1.36	307.0	82.8	3.71	0.37	5.3	2649600	226	6942	446
10	7.42	17.4	11133	1.33	316.5	82.2	3.85	0.35	5.6	2649600	238	6748	456
11	7.43	17.4	12553	1.29	272.3	82.2	3.31	0.39	5.5	2649600	211	6920	457
12	7.41	17.2	11991	1.34	296.1	83.2	3.56	0.38	5.7	2649600	221	6123	420
13	7.41	17.8	11909	1.44	320.4	80.7	3.97	0.36	5.3	2649600	222	7044	450
14	7.40	17.0	10673	1.44	357.5	85.0	4.21	0.34	5.0	2649600	248	7061	422
15	7.41	16.8	10160	1.39	362.5	86.0	4.22	0.33	5.0	2649600	261	6542	394
16	7.39	17.0	11826	1.51	338.3	85.2	3.97	0.38	5.4	2649600	224	6699	434
17	7.40	16.6	11903	1.45	322.8	87.4	3.69	0.39	5.0	2649600	223	7449	449
18	7.40	15.7	11703	1.50	339.6	93.5	3.63	0.41	5.1	2649600	226	6822	418
19	6.85	15.5	10822	1.51	369.7	77.1	4.79	0.32	4.7	2649600	245	6502	369
20	7.35	14.8	9244	1.42	407.0	97.0	4.20	0.34	4.8	2649600	287	4622	269
21	7.36	14.2	9207	1.52	437.4	102.5	4.27	0.36	4.9	2649600	288	4785	285
22	7.37	14.7	9324	1.43	406.4	98.5	4.13	0.35	4.7	2649600	284	4910	275
23	7.37	14.5	6619	1.33	532.4	98.8	5.39	0.25	5.0	2649600	400	3056	184
24	7.39	14.7	6585	1.30	523.1	97.8	5.35	0.24	4.9	2649600	402	3133	183
25	7.40	14.5	6040	1.24	544.0	98.8	5.51	0.23	5.3	2649600	439	2551	164
26	7.41	14.0	4514	1.09	639.9	100.7	6.36	0.17	4.3	2649600	587	2864	148
27	7.41	14.5	5444	1.11	540.3	97.5	5.54	0.20	5.5	2649600	487	2074	137
28	7.39	14.5	6439	1.24	510.2	98.4	5.18	0.24	5.3	2649600	411	2434	156
29	7.37	14.9	3709	1.18	843.0	94.3	8.94	0.13	5.5	2649600	714	1755	116
30	7.39	14.8	4382	1.14	689.3	95.2	7.24	0.16	5.8	2649600	605	1549	107
Averages	7.38	16.35	9440	1.33	408.07	87.6	4.60	0.31	5.10				

## 5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	1,150,139.4 m <sup>3</sup>	100.00%
On-Spec Water:	1,149,950.2 m <sup>3</sup>	99.984%
Off-Spec Water:	189.2 m <sup>3</sup>	0.016%

Average monthly chlorine residual before UV Treatment was 1.50 mg/L  
The average monthly chlorine residual after UV treatment and re-chlorination was 1.45 mg/L.  
Due to a faulty turbidity meter at the UV plant, turbidity results read much higher than the actual turbidity results when compared to the other on-line analysers in the system.

**Figure 5.1 - UV Disinfection – BMID Mission Creek Source – September 2023**



**Table 5.2 - UV Disinfection Table – Mission Creek Source**

Date	Inlet Cl2	Outlet Cl2	UVT	Turbidity	In Spec Water Volume	Off Spec Water	Off Spec % of Water
	Daily	Daily					
	mg/L	mg/L	% T	NTU	Cubic Meters	Cubic Meters	Percentage
1-Sep	1.33	1.36	87.9	NA	34,496	0	0.00%
2-Sep	1.38	1.36	88.0	NA	39,064	0	0.00%
3-Sep	1.31	1.34	88.0	NA	39,897	0	0.00%
4-Sep	1.40	1.39	87.7	NA	45,767	0	0.00%
5-Sep	1.43	1.36	87.9	NA	45,768	0	0.00%
6-Sep	1.37	1.35	88.0	NA	46,050	0	0.00%
7-Sep	1.35	1.39	87.3	NA	46,051	72	0.16%
8-Sep	1.59	1.45	86.6	NA	48,391	0	0.00%
9-Sep	1.62	1.43	86.5	NA	45,955	0	0.00%
10-Sep	1.65	1.54	86.5	NA	50,332	0	0.00%
11-Sep	1.45	1.39	86.8	NA	53,994	0	0.00%
12-Sep	1.52	1.42	88.4	NA	47,953	59	0.12%
13-Sep	1.63	1.55	88.5	NA	48,765	59	0.12%
14-Sep	1.66	1.58	88.5	NA	47,575	0	0.00%
15-Sep	1.66	1.47	88.7	NA	45,921	0	0.00%
16-Sep	1.83	1.62	89.1	NA	48,654	0	0.00%
17-Sep	1.78	1.60	89.7	NA	49,794	0	0.00%
18-Sep	1.71	1.63	89.0	NA	49,132	0	0.00%
19-Sep	1.78	1.66	89.9	NA	45,754	0	0.00%
20-Sep	1.70	1.52	90.6	NA	36,075	0	0.00%
21-Sep	1.67	1.55	90.5	NA	37,043	0	0.00%
22-Sep	1.63	1.45	90.4	NA	35,746	0	0.00%
23-Sep	1.49	1.43	90.5	NA	27,387	0	0.00%
24-Sep	1.40	1.35	90.4	NA	24,221	0	0.00%
25-Sep	1.39	1.41	90.7	NA	22,512	0	0.00%
26-Sep	1.33	1.39	91.8	NA	18,243	0	0.00%
27-Sep	1.30	1.35	91.9	NA	19,478	0	0.00%
28-Sep	1.31	1.41	91.9	NA	20,154	0	0.00%
29-Sep	1.31	1.38	91.9	NA	14,789	0	0.00%
30-Sep	1.15	1.35	91.8	NA	14,987	0	0.00%
Average	1.50	1.45	89.18	#DIV/0!	Total 1,149,950.20	189.2	0.016%

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

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

Date	2921 Beigo Rd		Booster 1		Elison Blow-Off		Elison School		3975 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
8-Aug-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Aug-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-Aug-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Aug-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5-Sep-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11-Sep-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Sep-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-Sep-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 10 samples were found to be absent of both *Total Coliforms* and *E. Coli*.

**Table 6.2 - BMID In-house Testing – Presence Absence**

Location	9/5/2023				9/11/2023				9/18/2023				9/25/2023			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres	0.78	22.6	-	X									0.36	19.6	-	X
170 Kneller Rd	0.75	25.6	-	X									0.70	19.8	-	X
2105 Morrison Staymen Rd									1.05	17.6	-	X				
260 Campion Rd					0.03	24.2	-	X	0.73	17.2	-	X				
Fenwick Rd					0.31	21.8	-	X								
Solly Ct	0.87	19.4	-	X									0.78	19.7	-	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 26
- Total tests sampled in BMID treated distribution system = 36
- 0 Positive *E. Coli* and Total Coliform Samples