



MONTHLY REPORTING PERIOD - OCTOBER, 2021

1. SUMMARY

The list below provides a summary of the water quantity information collected by BMID in October 2021. Documentation and figures are provided on the following pages to support this submission.

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	86,704,077	328.17
Well 4	3,127,000	11.84
Well 5	0	0
Scotty Creek (Irrigation Only)	0	0
Total	89,831,077	340.01

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 WTP started on March 21, 2021 and ran throughout the summer including most of October. It will continue to operate until raw water quality improves in the late-fall or early-Winter;
3. The WTP was placed in standby mode between October 18 to October 22 as raw water was of sufficiently good quality to not require chemical addition treatment to reduce the turbidity and colour. Precipitation in the watershed increased in late October and the WTP was restarted to reduce turbidity and colour;
4. Raw water turbidity levels in Mission Creek peaked at 5.22 NTU (average daily turbidity) on October 23. Turbidity levels in Mission creek tend to stabilize in later in the year as the creek's flow drops and BMID's high elevation reservoirs are utilized to supplement flow. Average daily raw water turbidity for October was 1.10 NTU at the Mission Creek intake;
5. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.62 NTU on October 2, 2021. Average clarified water turbidity for October was 0.46 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
6. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.53 NTU on October 18, 2021. Average monthly turbidity at the first customer was 0.38 NTU for October;
7. BMID's Ultraviolet Treatment Facility treated 324,964 m³ of water, none of which was "Off-Spec" (0.000%). Average UV Transmissivity was 93.01%. The average inlet chlorine residual level at the UV site was 1.24 mg/L. The average outgoing chlorine was 1.40 mg/L after the sodium hypochlorite top-up system;
8. BMID's Scotty Creek source, used for irrigation in the north-end, ran from May 25, 2021 until it was placed in bypass on August 21. The Scotty Creek source will remain in bypass mode until flows increase in the summer of 2022;
9. Well #4 resumed operations as a source for domestic water in the north-end of the distribution system on August 24 and will remain in operation until the spring of 2022 when Well #5 will be needed to meet demand;

10. 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 September 1, 2021;
11. Well #6, which supplies irrigation water to the twinned north-end water distribution systems, was placed in standby on August 21. This is a result of reduced irrigation demand in the north-end of the distribution system from the peak flows experienced in early summer. Well #6 will resume operations in 2022;
12. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts for early autumn with a peak count of 24 on October 1, 2021. The average *E.Coli* count was 16.75 for the month based on 4 samples;
13. *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 samples throughout October 2021. The 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;
14. No *E.Coli* or *Total Coliforms* 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 throughout October;
15. Disinfection by-products (Trihalomethanes and Haloacetic acids) were both found to be at acceptable levels on all four samples taken on October 13th. THMs are to be less than 0.10mg/L and HAA are to be less than 0.08mg/L;

1.0 FLOWS - OCTOBER, 2021

The Maximum Daily Flow was on October 4, at 4,332,621 US gallons (16.40 ML)

The Minimum Daily Flow was on October 17, at 2,032,280 US gallons (7.69 ML)

Mission Creek provided 97% of domestic and irrigation flow throughout October.

Figure 1.1 - Domestic Water System Flow

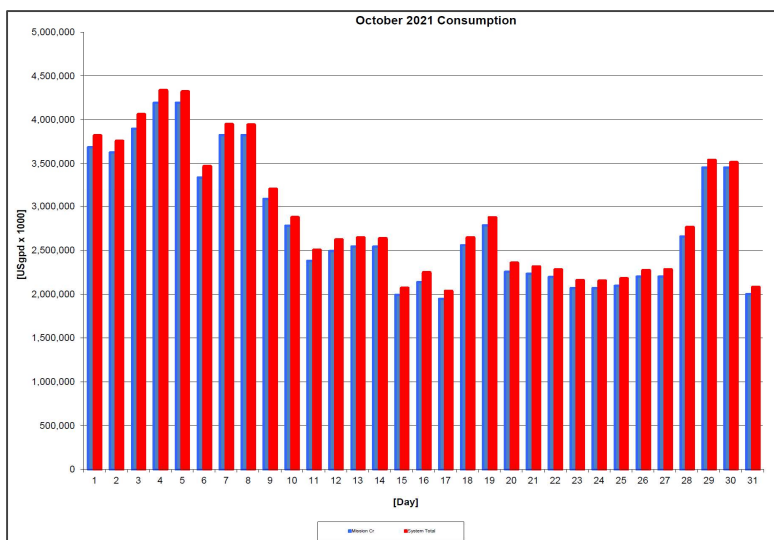


Table 1.2 - October 2021 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	Well # 6	Scotty Crk	System Total	System Total
2021	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Oct	3,687,418	129,000	0.0	0.0	0.0	3,816,418	14.45
2-Oct	3,627,504	128,000	0.0	0.0	0.0	3,755,504	14.21
3-Oct	3,896,352	163,000	0.0	0.0	0.0	4,059,352	15.36
4-Oct	4,192,621	140,000	0.0	0.0	0.0	4,332,621	16.40
5-Oct	4,192,700	126,000	0.0	0.0	0.0	4,318,700	16.35
6-Oct	3,341,987	125,000	0.0	0.0	0.0	3,466,987	13.12
7-Oct	3,825,475	120,000	0.0	0.0	0.0	3,945,475	14.93
8-Oct	3,825,554	115,000	0.0	0.0	0.0	3,940,554	14.91
9-Oct	3,086,718	122,000	0.0	0.0	0.0	3,208,718	12.14
10-Oct	2,782,286	91,000	0.0	0.0	0.0	2,873,286	10.88
11-Oct	2,380,639	120,000	0.0	0.0	0.0	2,500,639	9.46
12-Oct	2,490,772	128,000	0.0	0.0	0.0	2,618,772	9.91
13-Oct	2,542,418	101,000	0.0	0.0	0.0	2,643,418	10.01
14-Oct	2,542,497	89,000	0.0	0.0	0.0	2,631,497	9.96
15-Oct	1,989,559	78,000	0.0	0.0	0.0	2,067,559	7.83
16-Oct	2,134,034	110,000	0.0	0.0	0.0	2,244,034	8.49
17-Oct	1,944,280	88,000	0.0	0.0	0.0	2,032,280	7.69
18-Oct	2,557,872	85,000	0.0	0.0	0.0	2,642,872	10.00
19-Oct	2,784,743	87,000	0.0	0.0	0.0	2,871,743	10.87
20-Oct	2,255,448	98,000	0.0	0.0	0.0	2,353,448	8.91
21-Oct	2,232,729	78,000	0.0	0.0	0.0	2,310,729	8.75
22-Oct	2,194,530	85,000	0.0	0.0	0.0	2,279,530	8.63
23-Oct	2,069,365	85,000	0.0	0.0	0.0	2,154,365	8.15
24-Oct	2,069,391	80,000	0.0	0.0	0.0	2,149,391	8.14
25-Oct	2,094,673	81,000	0.0	0.0	0.0	2,175,673	8.23
26-Oct	2,198,228	72,000	0.0	0.0	0.0	2,270,228	8.59
27-Oct	2,198,307	81,000	0.0	0.0	0.0	2,279,307	8.63
28-Oct	2,656,382	105,000	0.0	0.0	0.0	2,761,382	10.45
29-Oct	3,455,291	82,000	0.0	0.0	0.0	3,537,291	13.39
30-Oct	3,455,396	57,000	0.0	0.0	0.0	3,512,396	13.29
31-Oct	1,998,910	78,000	0.0	0.0	0.0	2,076,910	7.86
Totals Usgpd	86,704,077	3,127,000	0	0	0	89,831,077	340.01
Totals ML	328.17	11.84	0.00	0.00	0.00		
Avg's	2,823,506	10.69				2,925,139	10.97
Max	4,192,700	15.87				4,332,621	16.40
Min	1,944,280	7.36				2,032,280	7.69

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) September 2021 - October 2021

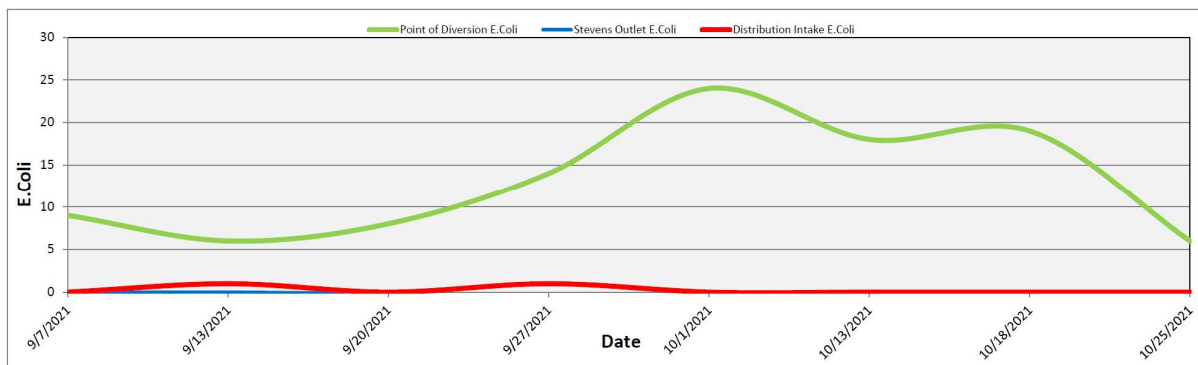


Table 2.1 - *E. Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
7-Sep-21	9	0	0
13-Sep-21	6	0	1
20-Sep-21	8	0	0
27-Sep-21	14	1	1
1-Oct-21	24	0	0
13-Oct-21	18	0	0
18-Oct-21	19	0	0
25-Oct-21	6	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 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 October 2021, 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 0.53 NTU on October 18, 2021.

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)

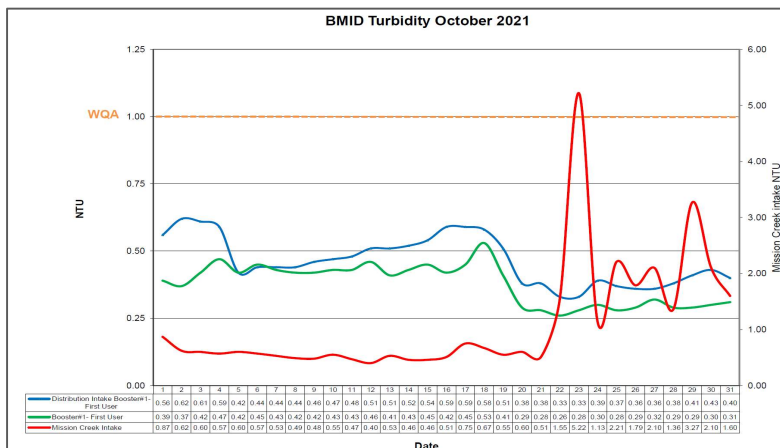


Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for October 2021			
Date	Mission Creek Intake	Distribution Intake	Booster#1- First User
	Daily Average [NTU]	Daily Average [NTU]	Daily Average [NTU]
1	0.87	0.56	0.39
2	0.62	0.62	0.37
3	0.60	0.61	0.42
4	0.57	0.59	0.47
5	0.60	0.42	0.42
6	0.57	0.44	0.45
7	0.53	0.44	0.43
8	0.49	0.44	0.42
9	0.48	0.46	0.42
10	0.55	0.47	0.43
11	0.47	0.48	0.43
12	0.40	0.51	0.46
13	0.53	0.51	0.41
14	0.46	0.52	0.43
15	0.46	0.54	0.45
16	0.51	0.59	0.42
17	0.75	0.59	0.45
18	0.67	0.58	0.53
19	0.55	0.51	0.41
20	0.60	0.38	0.29
21	0.51	0.38	0.28
22	1.55	0.33	0.26
23	5.22	0.33	0.28
24	1.13	0.39	0.30
25	2.21	0.37	0.28
26	1.79	0.36	0.29
27	2.10	0.36	0.32
28	1.36	0.38	0.29
29	3.27	0.41	0.29
30	2.10	0.43	0.30
31	1.60	0.40	0.31
Average	1.10	0.46	0.38

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 October, 2021.

Figure 4.1 - CT Trending – BMID Mission Creek Source – October 2021

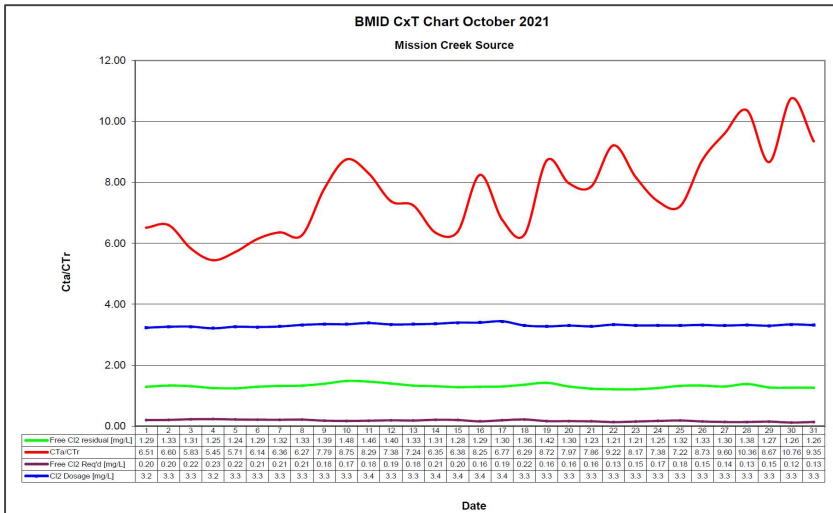


Table 4.2 - CT Table – Mission Creek Source

BMID October 2021													
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
October		[°C]	[Usgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.74	12.5	4,074	1.29	839.1	128.8	6.51	0.20	3.2	2649600	650	2,615	102
2	7.74	12.2	4,042	1.33	871.9	132.1	6.60	0.20	3.3	2649600	656	2,568	101
3	7.75	11.9	4,406	1.31	787.7	135.1	5.83	0.22	3.3	2649600	601	2,742	108
4	7.76	11.8	4,486	1.25	738.4	135.5	5.45	0.23	3.2	2649600	591	2,980	115
5	7.77	11.8	4,232	1.24	776.3	135.8	5.71	0.22	3.3	2649600	626	2,536	99
6	7.78	11.8	4,058	1.29	842.3	137.1	6.14	0.21	3.3	2649600	653	2,378	93
7	7.78	11.9	4,026	1.32	868.7	136.6	6.36	0.21	3.3	2649600	658	2,695	106
8	7.76	11.5	4,026	1.33	875.3	139.7	6.27	0.21	3.3	2649600	658	2,187	87
9	7.77	11.4	3,329	1.39	1106.5	142.1	7.79	0.18	3.3	2649600	796	1,728	70
10	7.78	11.0	3,027	1.48	1295.3	148.0	8.75	0.17	3.3	2649600	875	1,965	79
11	7.79	10.8	3,107	1.46	1245.2	150.2	8.29	0.18	3.4	2649600	853	1,680	68
12	7.81	10.6	3,297	1.40	1125.1	152.4	7.38	0.19	3.3	2649600	804	1,775	71
13	7.81	10.1	3,107	1.33	1134.3	156.6	7.24	0.18	3.3	2649600	853	1,807	73
14	7.82	9.9	3,440	1.31	1009.1	159.0	6.35	0.21	3.4	2649600	770	1,585	64
15	7.83	9.7	3,297	1.28	1028.7	161.2	6.38	0.20	3.4	2649600	804	1,411	58
16	7.84	9.2	2,473	1.29	1382.3	167.6	8.25	0.16	3.4	2649600	1072	1,506	62
17	7.85	9.3	3,043	1.30	1131.8	167.3	6.77	0.19	3.4	2649600	871	1,347	56
18	7.86	9.1	3,344	1.36	1077.5	171.3	6.29	0.22	3.3	2649600	792	1,569	62
19	7.81	9.4	2,599	1.42	1447.4	166.0	8.72	0.16	3.3	2649600	1019	1,633	64
20	7.81	9.1	2,584	1.30	1333.2	167.3	7.97	0.16	3.3	2649600	1026	1,569	62
21	7.82	9.0	2,473	1.23	1318.0	167.6	7.86	0.16	3.3	2649600	1072	1,553	61
22	7.83	8.8	2,045	1.21	1568.0	170.1	9.22	0.13	3.3	2649600	1296	1,395	56
23	7.84	8.8	2,298	1.21	1394.9	170.7	8.17	0.15	3.3	2649600	1153	1,458	58
24	7.85	9.1	2,663	1.25	1243.8	168.6	7.38	0.17	3.3	2649600	995	1,442	57
25	7.82	8.8	2,821	1.32	1239.6	171.8	7.22	0.18	3.3	2649600	939	1,474	59
26	7.84	8.7	2,314	1.33	1522.8	174.4	8.73	0.15	3.3	2649600	1145	1,537	61
27	7.89	8.7	2,029	1.30	1697.8	176.8	9.60	0.14	3.3	2649600	1306	1,395	55
28	7.89	9.4	2,076	1.38	1761.0	169.9	10.36	0.13	3.3	2649600	1276	1,442	58
29	7.83	8.5	2,219	1.27	1516.4	175.0	8.67	0.15	3.3	2649600	1194	1,490	59
30	7.83	8.5	1,775	1.26	1880.6	174.8	10.76	0.12	3.3	2649600	1493	1,331	53
31	7.83	8.4	2,029	1.26	1645.5	176.0	9.35	0.13	3.3	2649600	1306	1,411	56
Averages	7.81	10.05	3056	1.31	1216.27	157.60	7.62	0.18	3.31				

5.0 ULTRAVIOLET DISINFECTION

Total Water Treated: 324,963.5 m³ 100.00%
 On-Spec Water: 324,963.5 m³ 100.00%
 Off-Spec Water: 0.0 m³ 0.00%

Average monthly chlorine residual before UV Treatment was 1.24 mg/L
 The average monthly chlorine residual after UV treatment and re-chlorination was 1.40 mg/L.

Figure 5.1 - UV Disinfection – BMID Mission Creek Source – October 2021

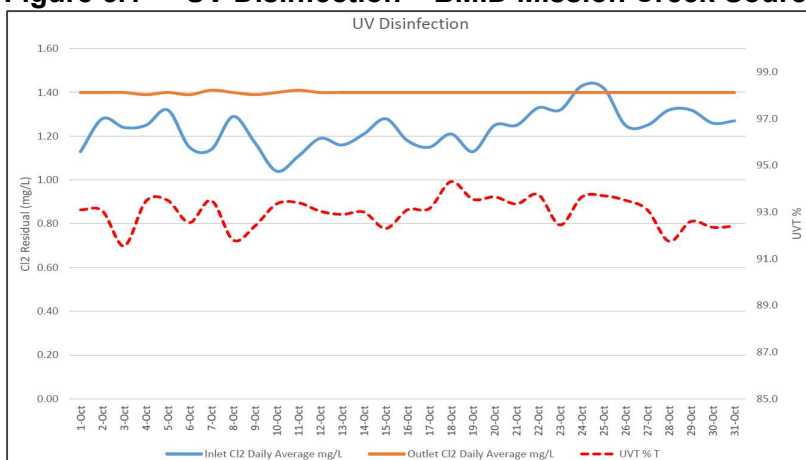


Table 5.2 - UV Disinfection Table – Mission Creek Source

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-Oct	1.13	1.40	93.1	13,958	0	0.00%
2-Oct	1.28	1.40	93.1	13,732	0	0.00%
3-Oct	1.24	1.40	91.6	14,749	0	0.00%
4-Oct	1.25	1.39	93.5	15,871	0	0.00%
5-Oct	1.32	1.40	93.5	15,871	0	0.00%
6-Oct	1.15	1.39	92.6	12,651	0	0.00%
7-Oct	1.14	1.41	93.5	14,481	0	0.00%
8-Oct	1.29	1.40	91.8	14,481	0	0.00%
9-Oct	1.17	1.39	92.4	11,685	0	0.00%
10-Oct	1.04	1.40	93.4	10,532	0	0.00%
11-Oct	1.11	1.41	93.4	9,012	0	0.00%
12-Oct	1.19	1.40	93.0	9,429	0	0.00%
13-Oct	1.16	1.40	92.9	9,624	0	0.00%
14-Oct	1.21	1.40	93.0	9,624	0	0.00%
15-Oct	1.28	1.40	92.3	7,531	0	0.00%
16-Oct	1.18	1.40	93.1	8,078	0	0.00%
17-Oct	1.15	1.40	93.2	7,258	0	0.00%
18-Oct	1.21	1.40	94.3	8,347	0	0.00%
19-Oct	1.13	1.40	93.6	8,818	0	0.00%
20-Oct	1.25	1.40	93.7	8,452	0	0.00%
21-Oct	1.25	1.40	93.4	8,452	0	0.00%
22-Oct	1.33	1.40	93.8	8,307	0	0.00%
23-Oct	1.32	1.40	92.5	7,833	0	0.00%
24-Oct	1.43	1.40	93.7	7,834	0	0.00%
25-Oct	1.42	1.40	93.7	7,929	0	0.00%
26-Oct	1.25	1.40	93.5	8,321	0	0.00%
27-Oct	1.25	1.40	93.1	8,322	0	0.00%
28-Oct	1.32	1.40	91.8	10,056	0	0.00%
29-Oct	1.32	1.40	92.6	13,080	0	0.00%
30-Oct	1.26	1.40	92.4	13,080	0	0.00%
31-Oct	1.27	1.40	92.4	7,567	0	0.00%
Average	1.24	1.40	93.01	Total 324,963.50	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
- 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

Date	2921 Belvo Rd		Booster 1		Elison Blow-Off		Elison School		3976 Highway 97		Prospect Reservoir		Tower Reservoir		Well #4		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
7-Sep-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13-Sep-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Sep-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-Sep-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-Oct-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13-Oct-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Oct-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-Oct-21	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 nine samples were found to be absent of both *Total Coliforms* and *E.Coli*.

Table 6.2 - BMID In-house Testing – Presence Absence

Location	10/1/2021				10/13/2021				10/18/2021				10/25/2021			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres	0.69	16.4	-	X									0.74	15.2	-	X
170 Kneller Rd	0.72	17.2	-	X									0.76	14.4	-	X
2105 Morrison Staymen Rd					0.69	13.4										
260 Campion Rd					0.73	12.8	-	X								
Fenwick Rd									0.18	16.4	-	X				
Solly Ct	0.82	16.2	-	X					0.32	16.8	-	X				
													0.81	13.8	-	X

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

13-Oct-21		
Location	THM (mg/L)	HAA (mg/L)
UV Plant	0.0487	0.0717
Pearson School	0.0714	0.0698

- 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 (Zero Positive Samples)