



MONTHLY REPORTING PERIOD - JUNE, 2019

1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in June, 2019. Documentation and figures are provided on the following pages to support this submission.

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	527,718,231	1,997.41
Well 4	0	0
Well 5	24,023,221	90.93
Well 6 (Irrigation Only)	14,565	0.06
Scotty Creek (Irrigation Only)	18,449,000	69.83
Total	570,205,017	2,158.23

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 throughout June, continuing the trend seen in the previous months. Groundwater monitoring is showing a steady decline in groundwater levels since the fall. The hillside is being monitored for movement and groundwater movement every second week and on alternate weeks for these two parameters.
2. BMID has 300m of flexible 900mm diameter High-density Polyethylene (HDPE) pipe on-site. As a contingency plan, the pipe has been fused into longer sections and is stored on location where it can be assembled in a fairly short period of time, should a slope failure occur;
3. Turbidity levels at the Distribution Intake peaked at 0.57 NTU on June 1, 2019. Average turbidity for June was 0.30 NTU;
4. The highest monthly turbidity level recorded at the first customer (Booster #1) was 0.71 NTU on June 03. Average monthly turbidity was 0.29 NTU for June;
5. BMID's Ultraviolet Treatment Facility treated 2,428,290.7m³ of water, with only 0.005% being "Off-Spec". Average UVT% was 92.51%. The average inlet chlorine residual was 1.29 mg/L compared to an average of 1.31 mg/L for the outlet after UV treatment;
6. Mission Creek had below average flows for spring freshet during June with below average rainfall contributing to the reduced peak flows. The melting of the upper-elevation snow pack in the watershed began earlier than usual in the spring and water storage will be closely monitored;
7. BMID's Scotty Creek source, used for irrigation in the north-end, was used as a supplementary source throughout June 2019;
8. Well # 5 was the primary source of domestic water for the north-end for most of June;
9. Well #6 which supplies irrigation water to the twinned north-end of the system, was used throughout June to supplement flows from Well 5 and Mission Creek;
10. *E.Coli* levels at Mission Creek's Point of Diversion had average counts throughout June with a peak count of 60 on June 10, 2019. The Point of Diversion had an average

count of 33.25 CFU/100ml per sample based on the 8 samples taken throughout the last month;

11. *E.Coli* levels in the raw water at the distribution system intake, down-stream of the WTP, prior to disinfection, had low counts throughout most of June, 2019 with a peak counts of 4 *E.Coli* on June 17 and 26. Average *E.Coli* counts for the month were 2.25 CFU/100ml based on the 8 samples taken;
12. No *E.Coli* or *Total Coliforms* were found in treated water in the distribution system through third-party analysis;
13. One positive in-house bacterial sample was found during routine in-house presence-absence testing. The sample taken at 260 Campion Rd on June 10 showed bacteria present after the 48hr incubation period. BMID crews thoroughly flushed the water main in the area to increase chlorine residuals and to remove any pre-existing water in the area's water mains. A sample was then tested by CARO analytical and new PA tests were also collected. In all cases, the supplemental samples were found to be free of bacteria;
14. Two new sample locations (2921 Belgo Rd and 3976 Highway 97) were added to the monthly THM scheduled testing. These sites, along with Pearson School, will be tested monthly for THMs;
15. A new sample location (Kirschner Reservoir) was added to the monthly HAA testing schedule. The HAA testing at Pearson School will also continue going forward;
16. The WTP ran throughout June, 2019 as water quality conditions in Mission Creek required chemical treatment to reduce turbidity and colour levels associated with spring runoff.

1.0 FLOWS - JUNE, 2019

Maximum Daily Flow was on June 18, 2019 at 28,840,825 US gallons (109.16 ML)

Minimum Daily Flow was on June 28, 2019 at 8,570,192 US gallons (32.44 ML)

Mission Creek provided 93% of domestic flow throughout June.

Figure 1.1 - Domestic Water System Flow

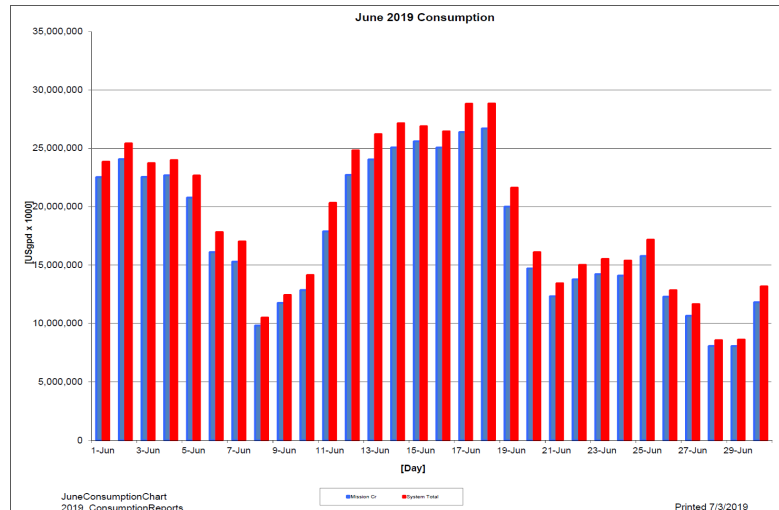


Table 1.2 - June 2019 - Daily Consumption Report

Year	Mission Cr	Well #4	Well #5	Well #6	Scotty Crk	System Total	System Total
2019	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Jun	22,535,129	0	999,370	971	319,000	23,854,470	90.29
2-Jun	24,074,621	0	998,949	1,032	340,000	25,414,602	96.19
3-Jun	22,548,461	0	998,406	976	183,000	23,730,843	89.82
4-Jun	22,689,455	0	999,338	976	300,000	23,989,769	90.80
5-Jun	20,771,789	0	999,765	547	897,000	22,669,101	85.80
6-Jun	16,102,382	0	999,675	547	717,000	17,819,604	67.45
7-Jun	15,284,200	0	999,907	231	734,000	17,018,338	64.41
8-Jun	9,824,934	0	349,735	0	323,000	10,497,669	39.73
9-Jun	11,751,123	0	588,916	0	96,000	12,436,039	47.07
10-Jun	12,858,811	0	998,366	0	290,000	14,147,177	53.55
11-Jun	17,882,502	0	998,701	438	1,445,000	20,326,641	76.94
12-Jun	22,719,930	0	999,040	1,081	1,107,000	24,827,051	93.97
13-Jun	24,047,832	0	999,177	1,074	1,164,000	26,212,083	99.21
14-Jun	25,078,521	0	999,377	1,073	1,071,000	27,149,971	102.76
15-Jun	25,602,979	0	999,285	1,073	291,000	26,894,337	101.80
16-Jun	25,065,477	0	999,290	1,035	390,000	26,455,802	100.14
17-Jun	26,394,969	0	997,922	1,064	1,422,000	28,815,955	109.07
18-Jun	26,708,943	0	999,820	1,062	1,131,000	28,840,825	109.16
19-Jun	20,004,338	0	999,531	1,055	624,000	21,628,924	81.87
20-Jun	14,704,961	0	442,090	330	952,000	16,099,381	60.94
21-Jun	12,325,996	0	433,425	0	680,000	13,439,421	50.87
22-Jun	13,771,174	0	360,771	0	883,000	15,014,945	56.83
23-Jun	14,215,188	0	498,259	0	805,000	15,518,447	58.74
24-Jun	14,085,491	0	396,312	0	893,000	15,374,803	58.19
25-Jun	15,774,713	0	583,622	0	811,000	17,169,335	64.99
26-Jun	12,286,590	0	376,967	0	176,000	12,839,557	48.60
27-Jun	10,649,157	0	998,666	0	9,000	11,656,823	44.12
28-Jun	8,075,226	0	482,966	0	12,000	8,570,192	32.44
29-Jun	8,062,945	0	526,990	0	29,000	8,618,935	32.62
30-Jun	11,820,394	0	998,583	0	355,000	13,173,977	49.86
Totals Usgpd	527,718,231	0	24,023,221	14,565	18,449,000	570,205,017	2158.23
Totals ML	1,997.41	0.00	90.93	0.06	69.83		
Avg's	17,590,608	66.58				19,006,834	71.94
Max	26,708,943	101.09				28,840,825	109.16
Min	8,062,945	30.52				8,570,192	32.44

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 E.Coli readings clearly show the effectiveness in risk reduction from the Water Treatment Plant and extended settling times in Stevens and Hadden Reservoirs.

Figure 2.1 - Raw Water *E.Coli* Readings (CARO Lab results) May-June 2018/2019

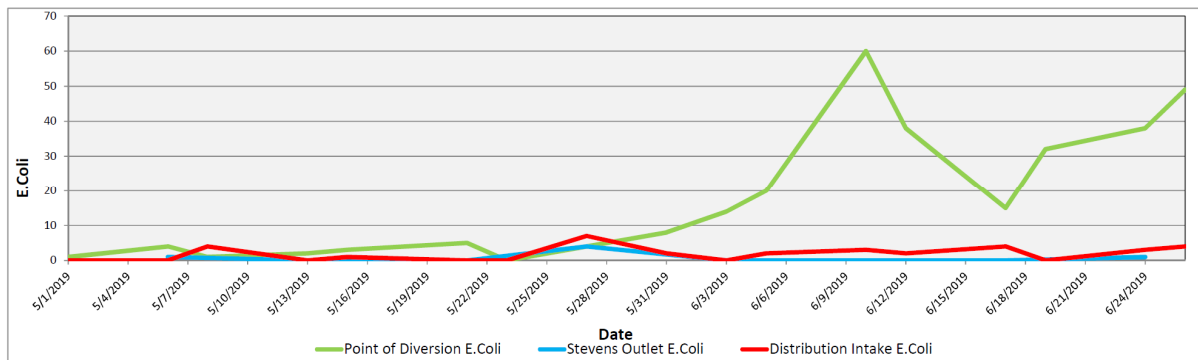


Table 2.1 - *E.Coli* Readings (CARO Labs)

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
1-May-19	1		0
6-May-19	4	1	0
8-May-19	1		4
13-May-19	2	0	0
15-May-19	3		1
21-May-19	5	0	0
23-May-19	0		0
27-May-19	4	4	7
31-May-19	8		2
3-Jun-19	14	0	0
5-Jun-19	20		2
10-Jun-19	60	0	3
12-Jun-19	38		2
17-Jun-19	15	0	4
19-Jun-19	32		0
24-Jun-19	38	1	3
26-Jun-19	49		4

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)

2.0 RAW AND TREATED WATER TURBIDITY

Turbidity for the Mission Creek source was measured at Booster Station No. 1 on Gallagher's Road, the first-customer, through June 2019. The highest turbidity recorded at this location was 0.71 NTU on June 3. The average turbidity for the month was 0.29 NTU during June.

Figure 3.1 – Daily Turbidity Readings (Distribution Intake and Booster Station 1)

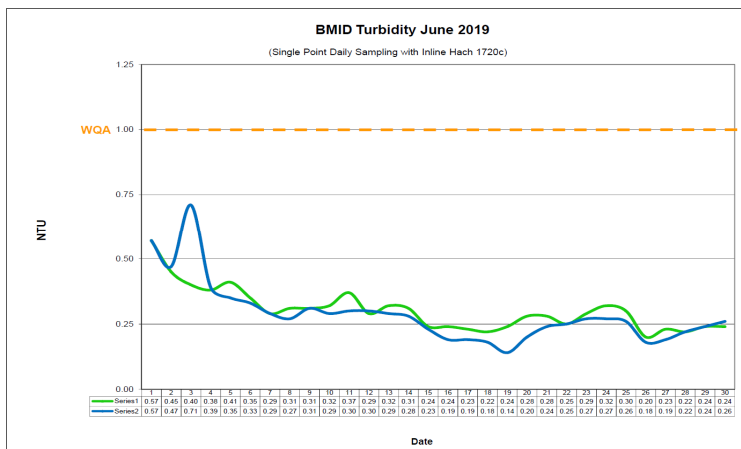


Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

Turbidity Point Sampling for June 2019		
Date	Distribution Intake	Booster#1- First User
	Daily Average [NTU]	Daily Average [NTU]
1	0.57	0.57
2	0.45	0.47
3	0.40	0.71
4	0.38	0.39
5	0.41	0.35
6	0.35	0.33
7	0.29	0.29
8	0.31	0.27
9	0.31	0.31
10	0.32	0.29
11	0.37	0.30
12	0.29	0.30
13	0.32	0.29
14	0.31	0.28
15	0.24	0.23
16	0.24	0.19
17	0.23	0.19
18	0.22	0.18
19	0.24	0.14
20	0.28	0.20
21	0.28	0.24
22	0.25	0.25
23	0.29	0.27
24	0.32	0.27
25	0.30	0.26
26	0.20	0.18
27	0.23	0.19
28	0.22	0.22
29	0.24	0.24
30	0.24	0.26
AVG	0.30	0.29

3.0 CHLORINE CONTACT TIME

Temperature, pH, current 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, 2019.

Figure 4.1 - CT Trending – BMID Mission Creek Source – June 2019

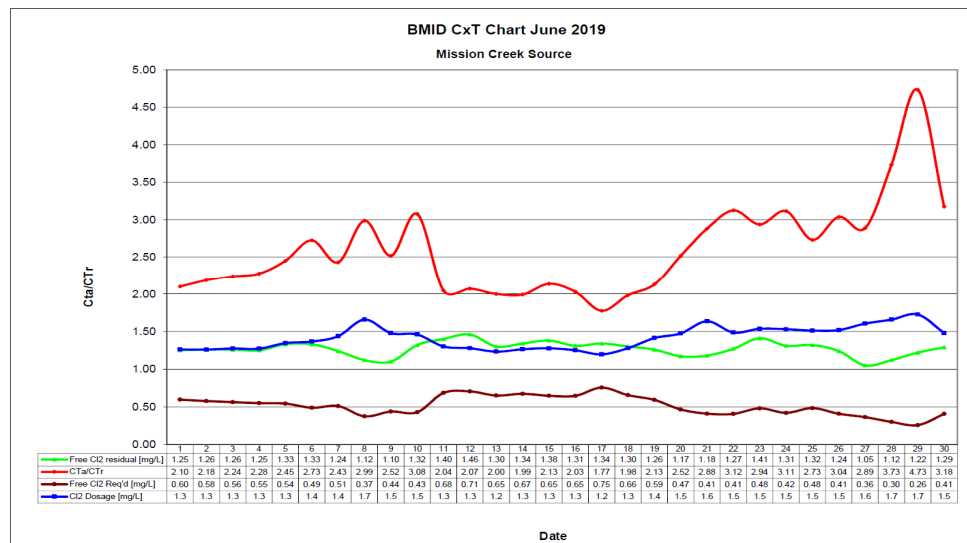


Table 4.2 - CT Table – Mission Creek Source

BMID June 2019 Mission Creek Source													
DATE	pH (Average)	TEMP (Present)	PEAK FLOW	Free Cl2 residual	CT achieved	CT req'd	CTa/CTr	Free Cl2 Req'd	Cl2 Dosage	VOLUME TOTAL	TIME	FLOW Daily Average	CL2 DOSAGE Average
June		[°C]	[USgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	6.97	14.7	19015	1.25	174.2	83.0	2.10	0.60	1.3	2649600	139	15653	237
2	6.92	15.1	19274	1.26	173.2	79.3	2.18	0.58	1.3	2649600	137	16729	253
3	6.85	14.9	19054	1.26	175.2	78.3	2.24	0.56	1.3	2649600	139	15684	240
4	6.91	14.9	18187	1.25	182.1	80.0	2.28	0.55	1.3	2649600	146	15765	241
5	6.98	15.0	17458	1.33	201.9	82.4	2.45	0.54	1.3	2649600	152	14429	233
6	7.06	14.2	14395	1.33	244.8	89.8	2.73	0.49	1.4	2649600	184	11195	184
7	7.14	13.3	13866	1.24	236.9	97.5	2.43	0.51	1.4	2649600	191	10639	184
8	7.17	13.3	10226	1.12	290.2	97.1	2.99	0.37	1.7	2649600	259	6834	136
9	7.18	13.3	11907	1.10	244.8	97.2	2.52	0.44	1.5	2649600	223	8149	145
10	7.20	13.8	11688	1.32	299.2	97.2	3.08	0.43	1.5	2649600	227	8939	157
11	7.21	13.6	18170	1.40	204.2	99.8	2.04	0.68	1.3	2649600	146	12364	193
12	7.23	14.5	19650	1.46	196.9	95.1	2.07	0.71	1.3	2649600	135	15803	243
13	7.23	15.4	19621	1.30	175.6	87.8	2.00	0.65	1.2	2649600	135	16708	247
14	7.28	15.7	20265	1.34	175.2	88.0	1.99	0.67	1.3	2649600	131	17429	265
15	7.30	16.6	20480	1.38	178.5	83.7	2.13	0.65	1.3	2649600	129	17823	274
16	7.34	17.1	21028	1.31	165.1	81.4	2.03	0.65	1.3	2649600	126	17437	262
17	7.38	17.4	24651	1.34	144.0	81.1	1.77	0.75	1.2	2649600	107	18352	264
18	7.34	17.9	22588	1.30	152.5	76.9	1.98	0.66	1.3	2649600	117	18562	285
19	7.32	17.9	20666	1.26	161.5	76.0	2.13	0.59	1.4	2649600	128	13970	237
20	7.30	16.9	15418	1.17	201.1	79.9	2.52	0.47	1.5	2649600	172	10234	181
21	7.30	15.7	12476	1.18	250.6	87.0	2.88	0.41	1.6	2649600	212	8548	168
22	7.28	15.9	12507	1.27	269.0	86.1	3.12	0.41	1.5	2649600	212	9583	171
23	7.26	15.9	14651	1.41	255.0	86.8	2.94	0.48	1.5	2649600	181	9870	182
24	7.25	15.9	13026	1.31	266.5	85.5	3.11	0.42	1.5	2649600	203	9775	180
25	7.24	16.0	15115	1.32	231.4	84.7	2.73	0.48	1.5	2649600	175	10948	199
26	7.22	15.6	12624	1.24	260.3	85.7	3.04	0.41	1.5	2649600	210	8572	156
27	7.19	16.4	12324	1.05	225.7	78.2	2.89	0.36	1.6	2649600	215	7434	143
28	7.21	15.7	9524	1.12	311.6	83.5	3.73	0.30	1.7	2649600	278	5640	112
29	7.18	15.9	8281	1.22	390.4	82.5	4.73	0.26	1.7	2649600	320	5596	116
30	7.16	15.6	12773	1.29	267.6	84.3	3.18	0.41	1.5	2649600	207	8188	146
Averages	7.19	15.47		1.271	223.502	85.9	2.60	0.516	1.41521				

4.0 ULTRAVIOLET DISINFECTION

Total Water Treated: 2,428,290.7 m³ 100%
On-Spec Water: 2,428,164.5 m³ 99.99%
Off-Spec Water: 126.2 m³ 0.005%

Average monthly chlorine residual before UV Treatment was 1.29 mg/L compared to 1.31 mg/L after UV disinfection and re-chlorination.

Figure 5.1 - UV Disinfection – BMID Mission Creek Source – June 2019

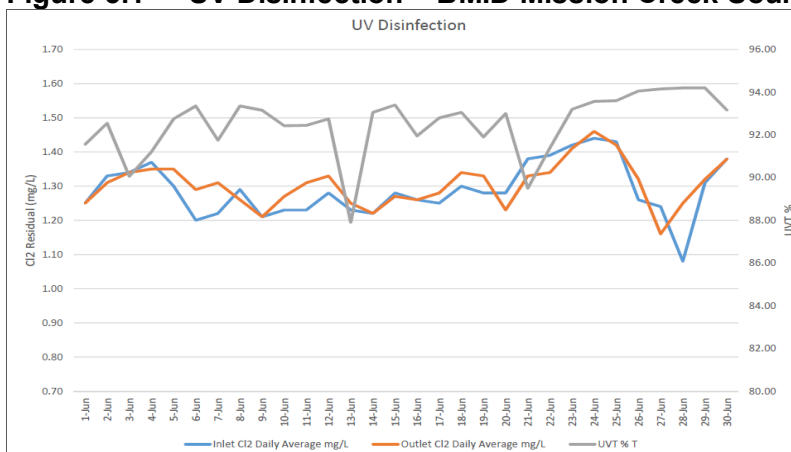


Table 5.2 - UV Disinfection Table – Mission Creek Source

	Inlet Cl2 Daily	Outlet Cl2 Daily	UVT		In Spec Water Volume	Off Spec Water	Off Spec % of Water
Date	mg/L	mg/L	% T		Cubic Meters	Cubic Meters	Percentage
1-Jun	1.25	1.25	91.55		122516.2	0	0.00%
2-Jun	1.33	1.31	92.55		135267.5	0	0.00%
3-Jun	1.34	1.34	90.05		134480.7	33.6	0.02%
4-Jun	1.37	1.35	91.20		106787.7	33.6	0.03%
5-Jun	1.30	1.35	92.75		101153.4	0	0.00%
6-Jun	1.20	1.29	93.35		81848.8	0	0.00%
7-Jun	1.22	1.31	91.75		68861.6	0	0.00%
8-Jun	1.29	1.26	93.35		71990.7	0	0.00%
9-Jun	1.21	1.21	93.15		59395.4	0	0.00%
10-Jun	1.23	1.27	92.43		68600.9	0	0.00%
11-Jun	1.23	1.31	92.45		86143.8	0	0.00%
12-Jun	1.28	1.33	92.75		115707.5	0	0.00%
13-Jun	1.23	1.25	87.90		135237.7	0	0.00%
14-Jun	1.22	1.22	93.05		139430.1	0	0.00%
15-Jun	1.28	1.27	93.40		146764.2	0	0.00%
16-Jun	1.26	1.26	91.95		145389.5	0	0.00%
17-Jun	1.25	1.28	92.79		90803.8	0	0.00%
18-Jun	1.30	1.34	93.05		93238.3	0	0.00%
19-Jun	1.28	1.33	91.90		68248.8	0	0.00%
20-Jun	1.28	1.23	93.00		50404.8	0	0.00%
21-Jun	1.38	1.33	89.50		41902.0	0	0.00%
22-Jun	1.39	1.34	91.40		45956.0	0	0.00%
23-Jun	1.42	1.41	93.20		48145.9	0	0.00%
24-Jun	1.44	1.46	93.57		48282.3	0	0.00%
25-Jun	1.43	1.42	93.60		52763.7	0	0.00%
26-Jun	1.26	1.32	94.05		41738.0	0	0.00%
27-Jun	1.24	1.16	94.15		35011.5	56.2	0.16%
28-Jun	1.08	1.25	94.20		26959.5	2.8	0.01%
29-Jun	1.31	1.32	94.20		26466.8	0	0.00%
30-Jun	1.38	1.38	93.15		38667.4	0	0.00%
Average	1.29	1.31	92.51	Total	2428164.5	126.2	0.005%

5.0 WATER DISTRIBUTION SAMPLING (TREATED)

Third Party Analysis (CARO Analytical Services)

- Samples taken once per week at ten locations around the BMID service area
- 40 samples were found to be absent of Coliforms.
- 40 samples were found to be absent of *E. Coli*.

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

Date	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	
	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
6-May-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
13-May-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
21-May-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
27-May-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
3-Jun-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
10-Jun-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
17-Jun-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0
24-Jun-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6.2 – Disinfection By-Products - THM and HAA Results

3-Jun-19		
Location	THM	HAA
Kirschner Reservoir		0.0455
2921 Belgo Rd	0.0460	
Pearson School	0.0490	0.0318
3976 Highway 97	0.0558	

In-House Analysis (BMID Staff)

- Presence/Absence samples taken on a three week cycle at seven sites around the BMID service area.
- One sample (260 Campion Rd - June 10, 2019) was positive for bacteria.
- 9 were found to be absent of both Total Coliforms and *E. Coli*.

Table 6.3 - BMID In-house Testing – Presence Absence

Location	6/3/2019				6/10/2019				6/17/2019				6/24/2019			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres									1.11	24.0	-	X				
170 Kneller Rd									1.12	22.0	-	X				
2105 Morrison	0.89	18.4	-	X									1.14	17.4	-	X
Staymen Rd	0.69	16.8	-	X									1.00	15.6	-	X
260 Campion Rd					0.33	17.0	X	-								
Fenwick Rd					0.39	17.4	-	X								
Solly Ct									1.24	24	-	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 = 40
- Total tests sampled in BMID treated distribution system = 49 (One Positive Samples)