



MONTHLY REPORTING PERIOD - DECEMBER, 2018

1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in December, 2018. Documentation and figures are provided on the following pages to support this submission.

| Source | Total (US Gals) | Total (Mega Litres) |
|--------------------------------|-----------------|---------------------|
| Mission Creek | 55,488,631 | 210.02 |
| Well 4 | 2,219,000 | 8.40 |
| Well 5 | 0 | 0 |
| Well 6 (Irrigation Only) | 0 | 0 |
| Scotty Creek (Irrigation Only) | 0 | 0 |
| Total | 57,707,631 | 218.42 |

1. The hillside portion of BMID's transmission main west of the Distribution Intake and east of the tunnel has stabilized after a leak was detected and repaired. Groundwater monitoring has shown a sharp decrease in groundwater levels after the repairs, however, the hillside continues to move very slowly and continues to be monitored;
2. Turbidity levels at the Distribution Intake peaked at 0.51 NTU on December 20. Average turbidity for December was 0.44 NTU;
3. The highest monthly turbidity level recorded at the first customer (Booster #1) was 0.44 NTU on December 20 and 27, 2018. Average monthly turbidity was 0.37 NTU for December;
4. Mission Creek had average flows for December as the upper watershed runoff was reduced due to freezing conditions, however the lower watershed had increased turbidity resulting from above normal temperatures for December;
5. BMID's Scotty Creek source, used for irrigation in the north-end, was closed for the year on August 24;
6. Well # 4 is currently the primary source of water for the north-end. Well #5 was placed on stand-by until spring;
7. Well #6 supplies irrigation water and fire flows in the north-end of the system was placed on stand-by until spring;
8. *E.Coli* levels at Mission Creek's Point of Diversion averaged 1.5 counts per sample. The highest raw water *E.Coli* count was 4 on December 3, 2018;
9. *E.Coli* levels at the distribution system intake, down-stream of the WTP, prior to disinfection, had zero counts on all samples throughout December, 2018;
10. No *E.Coli* or *Total Coliforms* were found in treated water in the distribution system through third-party analysis. In addition, no positive bacteria tests were found from the in-house presence-absence tests during routine testing;
11. The WTP remained in use periodically throughout December as high colour and increased turbidity in Mission Creek required treatment during this time. The WTP remains on stand-by mode until required;

1.0 FLOWS - DECEMBER, 2018

Maximum Daily Flow was on December 3, 2018 at 2,159,006 US gallons (8.17 ML)

Minimum Daily Flow was on December 19, 2018 at 1,593,283 US gallons (6.03 ML)

Mission Creek provided 96% of domestic flow throughout December.

Figure 1.1 - Domestic Water System Flow

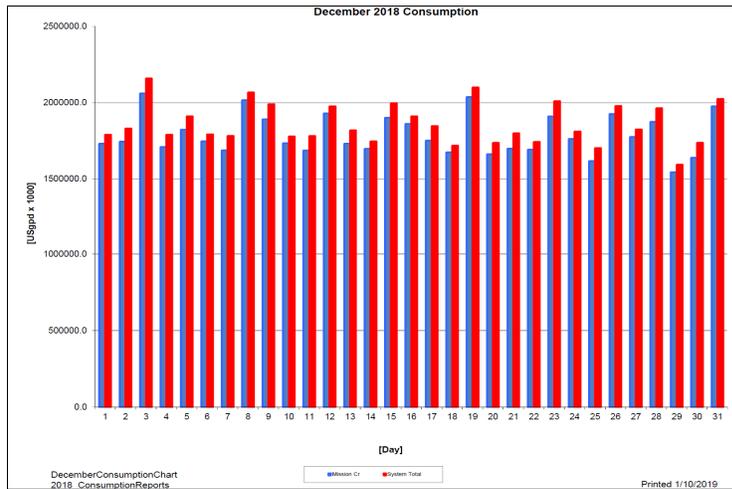


Table 1.2 - December, 2018 Daily Consumption Report

| Year | Mission Cr | Well #4 | Well #5 | System Total | System Total |
|--------------|-------------|------------|---------|--------------|--------------|
| 2018 | Usgpd | Usgpd | Usgpd | Usgpd | ML/Day |
| 1-Dec | 1731010.0 | 59000.0 | 0.0 | 1790010.0 | 6.78 |
| 2-Dec | 1744577.0 | 86000.0 | 0.0 | 1830577.0 | 6.93 |
| 3-Dec | 2061006.0 | 98000.0 | 0.0 | 2159006.0 | 8.17 |
| 4-Dec | 1708905.0 | 81000.0 | 0.0 | 1789905.0 | 6.77 |
| 5-Dec | 1822432.0 | 88000.0 | 0.0 | 1910432.0 | 7.23 |
| 6-Dec | 1746308.0 | 46000.0 | 0.0 | 1792308.0 | 6.78 |
| 7-Dec | 1687027.0 | 95000.0 | 0.0 | 1782027.0 | 6.74 |
| 8-Dec | 2017140.0 | 50000.0 | 0.0 | 2067140.0 | 7.82 |
| 9-Dec | 1891096.0 | 99000.0 | 0.0 | 1990096.0 | 7.53 |
| 10-Dec | 1733245.0 | 45000.0 | 0.0 | 1778245.0 | 6.73 |
| 11-Dec | 1686439.0 | 95000.0 | 0.0 | 1781439.0 | 6.74 |
| 12-Dec | 1929744.0 | 47000.0 | 0.0 | 1976744.0 | 7.48 |
| 13-Dec | 1730921.0 | 88000.0 | 0.0 | 1818921.0 | 6.88 |
| 14-Dec | 1697721.0 | 49000.0 | 0.0 | 1746721.0 | 6.61 |
| 15-Dec | 1901348.0 | 96000.0 | 0.0 | 1997348.0 | 7.56 |
| 16-Dec | 1860626.0 | 50000.0 | 0.0 | 1910626.0 | 7.23 |
| 17-Dec | 1751239.0 | 95000.0 | 0.0 | 1846239.0 | 6.99 |
| 18-Dec | 1674536.0 | 43000.0 | 0.0 | 1717536.0 | 6.50 |
| 19-Dec | 2037051.0 | 63000.0 | 0.0 | 2100051.0 | 7.95 |
| 20-Dec | 1662148.0 | 74000.0 | 0.0 | 1736148.0 | 6.57 |
| 21-Dec | 1698377.0 | 101000.0 | 0.0 | 1799377.0 | 6.81 |
| 22-Dec | 1692141.0 | 50000.0 | 0.0 | 1742141.0 | 6.59 |
| 23-Dec | 1910115.0 | 100000.0 | 0.0 | 2010115.0 | 7.61 |
| 24-Dec | 1762241.0 | 49000.0 | 0.0 | 1811241.0 | 6.86 |
| 25-Dec | 1616950.0 | 85000.0 | 0.0 | 1701950.0 | 6.44 |
| 26-Dec | 1925810.0 | 53000.0 | 0.0 | 1978810.0 | 7.49 |
| 27-Dec | 1774935.0 | 49000.0 | 0.0 | 1823935.0 | 6.90 |
| 28-Dec | 1874596.0 | 89000.0 | 0.0 | 1963596.0 | 7.43 |
| 29-Dec | 1543283.0 | 50000.0 | 0.0 | 1593283.0 | 6.03 |
| 30-Dec | 1638815.0 | 98000.0 | 0.0 | 1736815.0 | 6.57 |
| 31-Dec | 1976849.0 | 48000.0 | 0.0 | 2024849.0 | 7.66 |
| Totals Usgpd | 55488631.00 | 2219000.00 | 0.00 | 57707631.00 | 218.42 |
| Totals ML | 210.02 | 8.40 | 0.00 | | |
| Avg's | 1783726.07 | 6.75 | | 1856092.73 | 7.03 |
| Max | 2061006.00 | 7.80 | | 2159006.00 | 8.17 |
| Min | 1543283.00 | 5.84 | | 1593283.00 | 6.03 |

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 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) November-December 2018

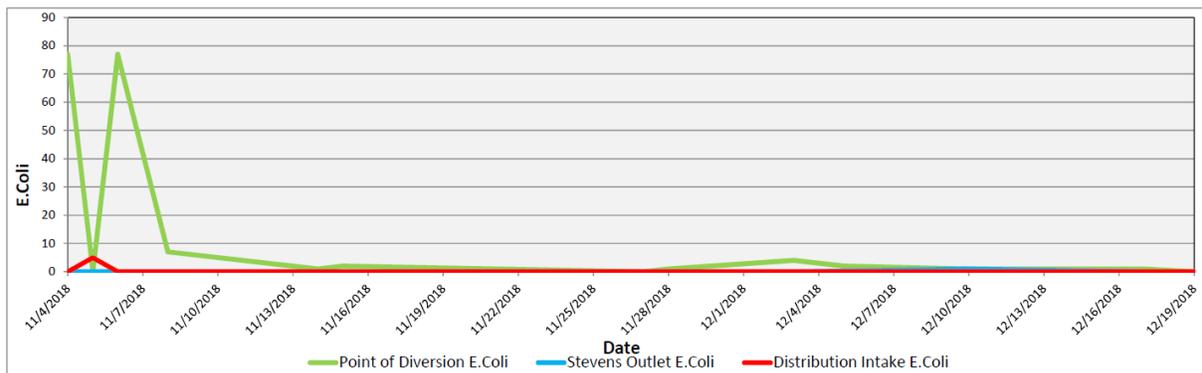


Table 2.1 - E.Coli Readings (CARO Labs)

| Date | Point of Diversion E.Coli | Stevens Outlet E.Coli | Distribution Intake E.Coli |
|-----------|---------------------------|-----------------------|----------------------------|
| 4-Nov-18 | 77 | 0 | 0 |
| 5-Nov-18 | 0 | 0 | 5 |
| 6-Nov-18 | 77 | 0 | 0 |
| 8-Nov-18 | 7 | 0 | 0 |
| 14-Nov-18 | 1 | 0 | 0 |
| 15-Nov-18 | 2 | 0 | 0 |
| 27-Nov-18 | 0 | 0 | 0 |
| 28-Nov-18 | 1 | 0 | 0 |
| 3-Dec-18 | 4 | 0 | 0 |
| 5-Dec-18 | 2 | 0 | 0 |
| 10-Dec-18 | 1 | 1 | 0 |
| 12-Dec-18 | 1 | 0 | 0 |
| 17-Dec-18 | 1 | 0 | 0 |
| 19-Dec-18 | 0 | 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

Turbidity for the Mission Creek source was measured at Booster Station No. 1 on Gallagher's Road, the first-customer, through December 2018. The highest turbidity recorded at this location was 0.44 NTU on December 20 and 27. The average turbidity for the month was 0.37 NTU during December.

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

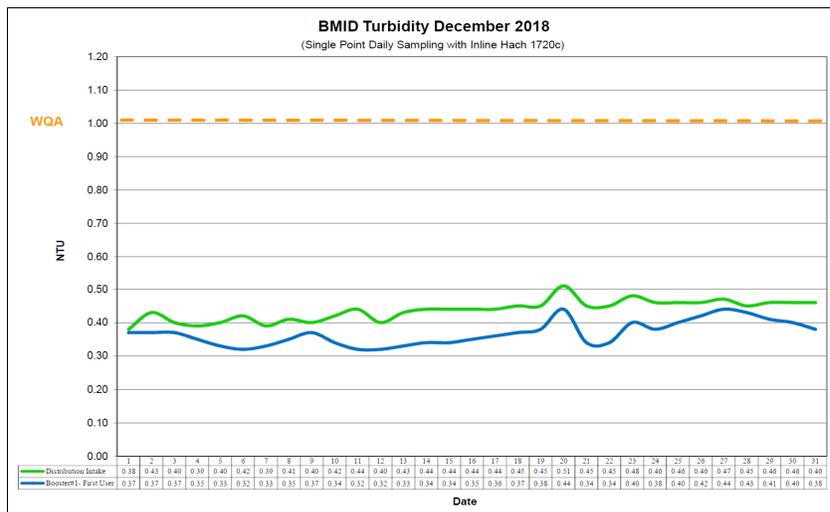


Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1

| Turbidity Point Sampling for December 2018 | | |
|--|---------------------|-----------------------|
| Date | Distribution Intake | Booster#1- First User |
| | Daily Average NTU | Daily Average NTU |
| 1 | 0.38 | 0.37 |
| 2 | 0.43 | 0.37 |
| 3 | 0.40 | 0.37 |
| 4 | 0.39 | 0.35 |
| 5 | 0.40 | 0.33 |
| 6 | 0.42 | 0.32 |
| 7 | 0.39 | 0.33 |
| 8 | 0.41 | 0.35 |
| 9 | 0.40 | 0.37 |
| 10 | 0.42 | 0.34 |
| 11 | 0.44 | 0.32 |
| 12 | 0.40 | 0.32 |
| 13 | 0.43 | 0.33 |
| 14 | 0.44 | 0.34 |
| 15 | 0.44 | 0.34 |
| 16 | 0.44 | 0.35 |
| 17 | 0.44 | 0.36 |
| 18 | 0.45 | 0.37 |
| 19 | 0.45 | 0.38 |
| 20 | 0.51 | 0.44 |
| 21 | 0.45 | 0.34 |
| 22 | 0.45 | 0.34 |
| 23 | 0.48 | 0.40 |
| 24 | 0.46 | 0.38 |
| 25 | 0.46 | 0.40 |
| 26 | 0.46 | 0.42 |
| 27 | 0.47 | 0.44 |
| 28 | 0.45 | 0.43 |
| 29 | 0.46 | 0.41 |
| 30 | 0.46 | 0.40 |
| 31 | 0.46 | 0.38 |
| AVG | 0.44 | 0.37 |

4.0 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 December, 2018.

Figure 4.1 - CT Trending – BMID Mission Creek Source – December 2018

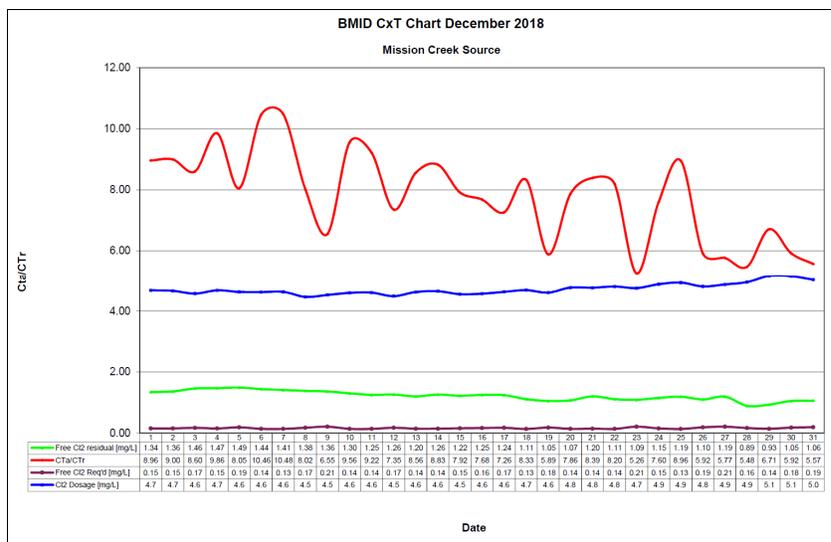


Table 4.2 - CT Table – Mission Creek Source

| BMID December 2018 | | | | | | | | | | | | | |
|----------------------|-----------|------------|---------|----------|----------|--------|---------|----------|--------|---------|--------|---------|------------|
| Mission Creek Source | | | | | | | | | | | | | |
| DATE | pH | TEMP | PEAK | Free Cl2 | CT | CT | CTa/CTr | Free Cl2 | Cl2 | VOLUME | TIME | FLOW | Cl2 DOSAGE |
| | (highest) | Booster #1 | FLOW | residual | achieved | req'd | | Req'd | Dosage | TOTAL | [mins] | AVERAGE | AVERAGE |
| December | | [°C] | [USgpm] | [mg/L] | | | | [mg/L] | [mg/L] | [USgal] | | [USGPM] | [PPD] |
| 1 | 7.49 | 4.3 | 1891 | 1.34 | 1877.6 | 209.5 | 8.96 | 0.15 | 4.7 | 2649600 | 1401 | 1192 | 67 |
| 2 | 7.48 | 4.6 | 1955 | 1.36 | 1843.2 | 204.9 | 9.00 | 0.15 | 4.7 | 2649600 | 1355 | 1236 | 69 |
| 3 | 7.46 | 4.6 | 2187 | 1.46 | 1768.8 | 205.6 | 8.60 | 0.17 | 4.6 | 2649600 | 1212 | 1406 | 77 |
| 4 | 7.47 | 4.4 | 1887 | 1.47 | 2064.1 | 209.4 | 9.86 | 0.15 | 4.7 | 2649600 | 1404 | 1201 | 68 |
| 5 | 7.49 | 4.3 | 2304 | 1.49 | 1713.5 | 212.8 | 8.05 | 0.19 | 4.6 | 2649600 | 1150 | 1256 | 70 |
| 6 | 7.50 | 4.1 | 1693 | 1.44 | 2253.6 | 215.5 | 10.46 | 0.14 | 4.6 | 2649600 | 1565 | 1209 | 67 |
| 7 | 7.50 | 4.1 | 1660 | 1.41 | 2250.6 | 214.8 | 10.48 | 0.13 | 4.6 | 2649600 | 1596 | 1173 | 65 |
| 8 | 7.51 | 4.2 | 2137 | 1.38 | 1711.0 | 213.4 | 8.02 | 0.17 | 4.5 | 2649600 | 1240 | 1418 | 76 |
| 9 | 7.52 | 4.3 | 2591 | 1.36 | 1390.8 | 212.2 | 6.55 | 0.21 | 4.5 | 2649600 | 1023 | 1302 | 71 |
| 10 | 7.52 | 4.4 | 1722 | 1.30 | 2000.3 | 209.3 | 9.56 | 0.14 | 4.6 | 2649600 | 1539 | 1198 | 66 |
| 11 | 7.53 | 4.4 | 1721 | 1.25 | 1924.5 | 208.8 | 9.22 | 0.14 | 4.6 | 2649600 | 1540 | 1174 | 65 |
| 12 | 7.54 | 4.5 | 2179 | 1.26 | 1532.1 | 208.4 | 7.35 | 0.17 | 4.5 | 2649600 | 1216 | 1347 | 73 |
| 13 | 7.55 | 4.4 | 1777 | 1.20 | 1789.3 | 209.0 | 8.56 | 0.14 | 4.6 | 2649600 | 1491 | 1191 | 66 |
| 14 | 7.56 | 4.4 | 1790 | 1.26 | 1865.1 | 211.3 | 8.83 | 0.14 | 4.6 | 2649600 | 1480 | 1180 | 66 |
| 15 | 7.58 | 4.4 | 1928 | 1.22 | 1676.6 | 211.8 | 7.92 | 0.15 | 4.5 | 2649600 | 1374 | 1333 | 73 |
| 16 | 7.59 | 4.3 | 2007 | 1.25 | 1650.2 | 214.8 | 7.68 | 0.16 | 4.6 | 2649600 | 1320 | 1301 | 71 |
| 17 | 7.60 | 4.2 | 2086 | 1.24 | 1575.0 | 216.8 | 7.26 | 0.17 | 4.6 | 2649600 | 1270 | 1204 | 67 |
| 18 | 7.62 | 4.2 | 1644 | 1.11 | 1789.0 | 214.8 | 8.33 | 0.13 | 4.7 | 2649600 | 1612 | 1163 | 65 |
| 19 | 7.62 | 4.1 | 2204 | 1.05 | 1262.3 | 214.5 | 5.89 | 0.18 | 4.6 | 2649600 | 1202 | 1414 | 78 |
| 20 | 7.59 | 4.2 | 1706 | 1.07 | 1661.8 | 211.3 | 7.86 | 0.14 | 4.8 | 2649600 | 1553 | 1147 | 66 |
| 21 | 7.60 | 4.0 | 1732 | 1.20 | 1835.8 | 218.8 | 8.39 | 0.14 | 4.8 | 2649600 | 1530 | 1176 | 67 |
| 22 | 7.59 | 4.4 | 1712 | 1.11 | 1717.9 | 209.6 | 8.20 | 0.14 | 4.8 | 2649600 | 1548 | 1175 | 68 |
| 23 | 7.60 | 4.2 | 2580 | 1.09 | 1119.4 | 212.7 | 5.26 | 0.21 | 4.7 | 2649600 | 1027 | 1345 | 77 |
| 24 | 7.61 | 4.0 | 1838 | 1.15 | 1657.8 | 218.1 | 7.60 | 0.15 | 4.9 | 2649600 | 1442 | 1215 | 71 |
| 25 | 7.62 | 4.1 | 1611 | 1.19 | 1957.2 | 218.5 | 8.96 | 0.13 | 4.9 | 2649600 | 1645 | 1119 | 66 |
| 26 | 7.64 | 4.0 | 2249 | 1.10 | 1295.9 | 219.0 | 5.92 | 0.19 | 4.8 | 2649600 | 1178 | 1339 | 77 |
| 27 | 7.65 | 3.8 | 2424 | 1.19 | 1300.8 | 225.5 | 5.77 | 0.21 | 4.9 | 2649600 | 1093 | 1232 | 72 |
| 28 | 7.67 | 3.7 | 1967 | 0.89 | 1198.9 | 218.9 | 5.48 | 0.16 | 4.9 | 2649600 | 1347 | 1304 | 78 |
| 29 | 7.64 | 3.5 | 1661 | 0.93 | 1483.5 | 221.1 | 6.71 | 0.14 | 5.1 | 2649600 | 1595 | 1073 | 66 |
| 30 | 7.64 | 3.6 | 2101 | 1.05 | 1324.2 | 223.6 | 5.92 | 0.18 | 5.1 | 2649600 | 1261 | 1140 | 70 |
| 31 | 7.64 | 3.7 | 2267 | 1.06 | 1238.9 | 222.4 | 5.57 | 0.19 | 5.0 | 2649600 | 1169 | 1374 | 83 |
| Averages | 7.57 | 4.17 | 1974.55 | 1.22 | 1668.69 | 214.10 | 7.81 | 0.16 | 4.72 | | | | |

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

Table 5.1 - CARO Independent Lab Testing – Total Coliforms – E.Coli

| Date | 2921 Belgo Rd | | Booster 1 | | Elison Blow-Off | | Elison School | | 3976 Highway 97 | | Prospect Reservoir | | Tower Reservoir | | Well #4 | | Kirschner Res | |
|-----------|---------------|--------|-----------|--------|-----------------|--------|---------------|--------|-----------------|--------|--------------------|--------|-----------------|--------|-----------|--------|---------------|--------|
| | 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 |
| 5-Nov-18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6-Nov-18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8-Nov-18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15-Nov-18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 28-Nov-18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3-Dec-18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10-Dec-18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17-Dec-18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 5.2 –THM and HAA Results

| Date | THM Result mg/L | HAA Result mg/L |
|-----------|-----------------|-----------------|
| 19-Nov-18 | 0.132 | 0.0852 |
| 12-Dec-18 | 0.0974 | 0.037 |

In-House Analysis (BMID Staff)

- Presence/Absence samples taken on a three week cycle at ten sites around the BMID service area.
- All samples were found to be absent of both Total Coliforms and *E. Coli*.

Table 5.3 - BMID In-house Testing – Presence Absence

| Location | 12/3/2018 | | | | 12/10/2018 | | | | 12/17/2018 | | | |
|-----------------|-----------|-------|-------|------|------------|-------|-------|------|------------|-------|-------|------|
| | Cl2 | Temp. | Pres. | Abs. | Cl2 | Temp. | Pres. | Abs. | Cl2 | Temp. | Pres. | Abs. |
| Sylvania Cres | 0.91 | 8.0 | - | X | 0.47 | 7.8 | - | X | 0.82 | 6.4 | - | X |
| 170 Kneller Rd | 0.48 | 9.4 | - | X | | | | | | | | |
| 2105 Morrison | 0.62 | 8.4 | - | X | 0.43 | 8.2 | - | X | 0.81 | 6.4 | - | X |
| Pearson School | | | | | | | | | | | | |
| Staymen Rd | 0.15 | 7.6 | - | X | 0.81 | 6.4 | - | X | | | | |
| PRV #10 | | | | | | | | | | | | |
| 260 Champion Rd | 0.81 | 6.4 | - | X | | | | | | | | |
| Fenwick Rd | | | | | | | | | | | | |
| Solly Ct | | | | | | | | | | | | |

- 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) = 8
- Total tests sampled by BMID and tested by Caro Labs = 27
- Total tests sampled in BMID treated distribution system = 35 (Zero Positive Samples)