



Ymir Water System

2022 Quartz Creek Flow and Water Quality Monitoring Report Year End Report

Date of Report:	10 January 2023
Reporting Period:	2022 Year End Report 29 Jun 2022 to 06 Jan 2023
Owner:	Regional District of Central Kootenay
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Quartz Creek Flow Monitoring

Reporting Period

The reporting for this report is for the Third and Fourth Quarter 2022 and includes data from 01 January 2022 to 06 Jan 2023. A Third Quarter 2022 report was not provided due to data loss and level sensor malfunction and data loss.

See prior years reporting for additional data and flow monitoring information.

Flow Monitoring Weir

In 2019 a flow monitoring weir was installed on Quartz Creek at the intake for the Ymir water system with funding provided by BC Timber Sale and the water service. Funding for current monitoring and reporting is provided by ATCO Wood Products Ltd. and the Regional District owned Ymir water service.

The Kindsvater-Carter Formula was adopted to calculate flow through the sharp crested aluminum weir installed in the concrete water system intake weir. Flow depth through the aluminum flow monitoring weir is measured by an ultrasonic level transmitter. The aluminum weir will measure flows up to about 560 mm or 742 L/s, above this level the concrete intake weir will overtop. Wing plates were added to the ends of the concrete weir to accommodate higher peak flows of up to 710 mm or 1,515 L/s. Flows above 710 mm are considered inaccurate as they are influenced by a catwalk and spill over onto the creek banks.

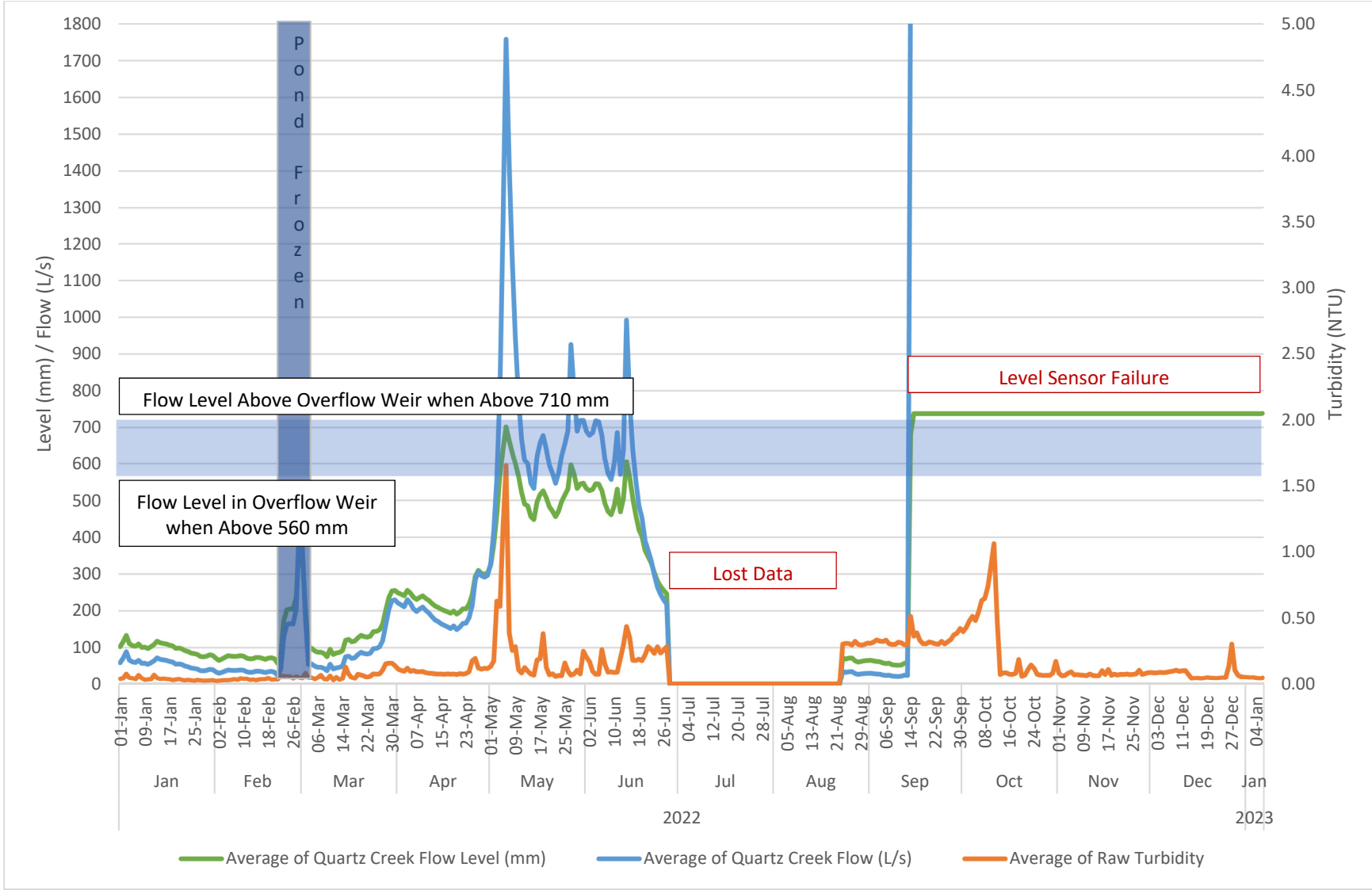
Reporting Period Data Quality

Digitally recorded level data was lost between 28 June 2022 and 22 August 2022. A control upgrade is planned for the Ymir treatment plant in 2023 that will automatically store treatment plant and creek flow data to a backed up central server.

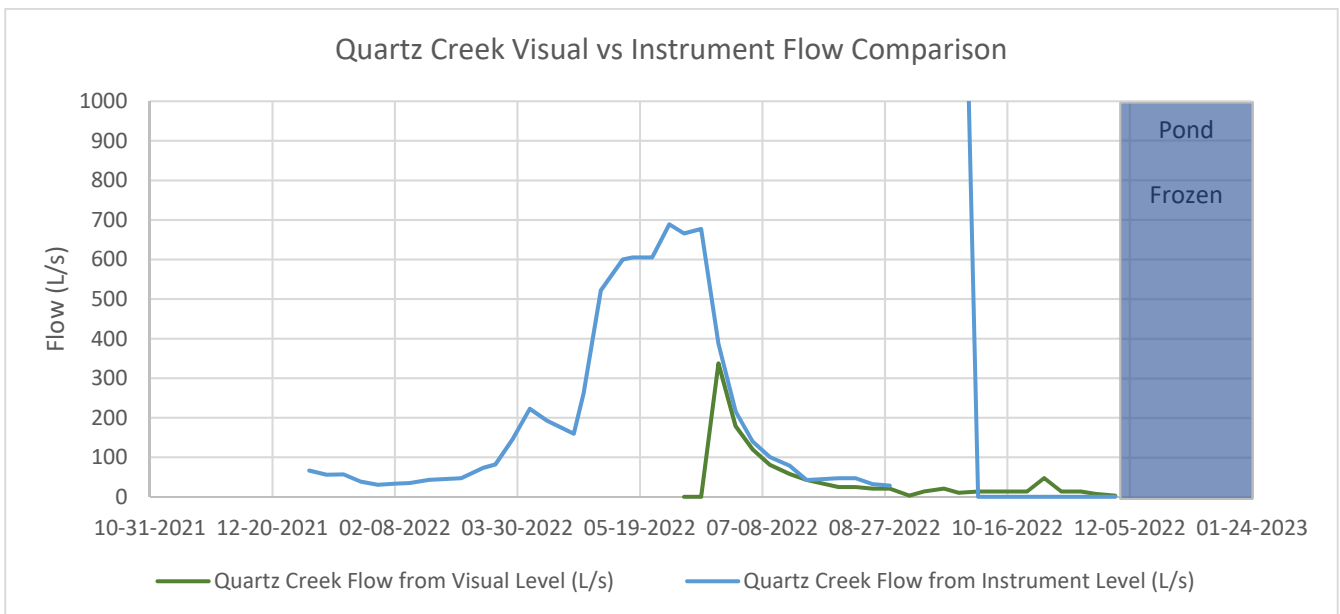
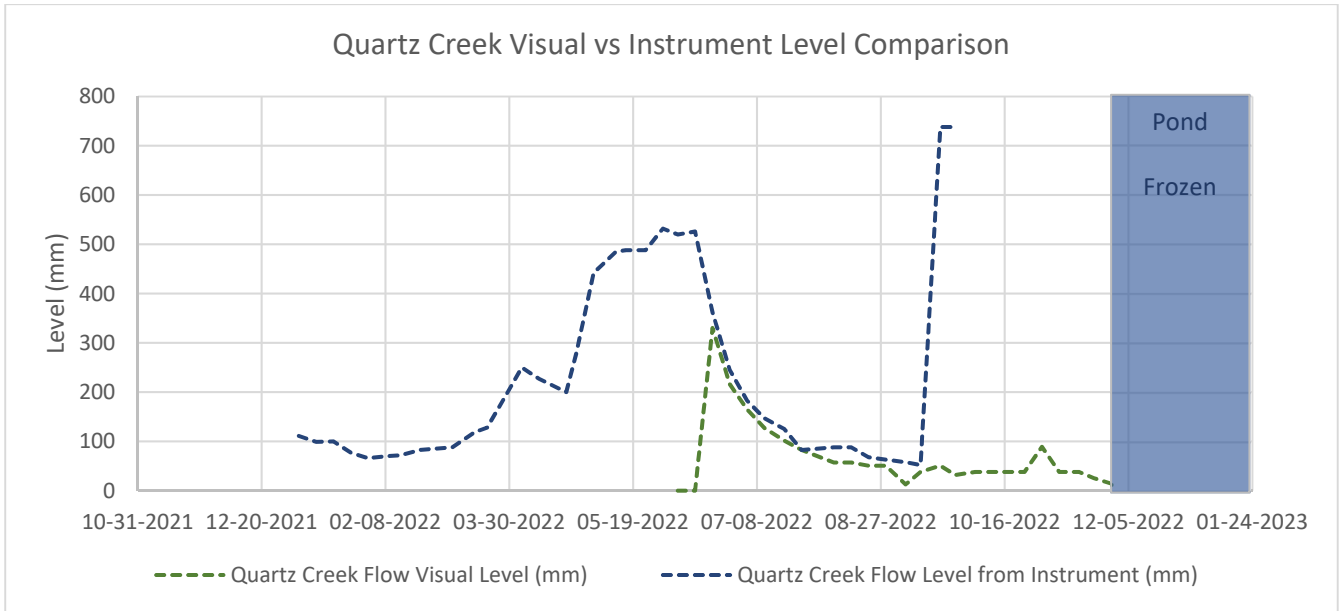
The level sensor failed for a third time on 14 September 2022. The previous failed sensor was warranted by the supplier but the Regional District plans to install a different type of sensor before freshet 2023.

Flow Graphs

The Quartz Creek level and flow data is provided in 15 minute intervals, which is too much data to chart. The digital flow data is provided in a separate Excel file. An Excel pivot table was used to present the following daily average weir flow level, creek flows and turbidity data.



Since automated data recording was lost for a period and the level sensor failed, manually recorded flow levels were reviewed. Water Technicians record digital instrument level and visual flow level readings when they are onsite about once per week. The following charts provide a comparison of instrument level recordings verses visual level recordings, and the associated calculated flows rates.



The following table provides the minimum and maximum average daily weir flow level and creek flow for the reporting period.

	Quartz Creek Flow Level (mm)	Quartz Creek Flow (L/s)	Date
Min	32	10.5	26 Sep 2022 See Note 1
Max	702	1,758	06 May 2022 See Note 2

Note 1: The lowest flow level above was recorded visually during the period the level sensor failed. Lower visual levels of 25 mm on 21 Nov 2022 and 13 mm on 29 November 2022 were also recorded at a time when the intake pond was frozen and are not considered accurate.

Note 2: The 06 May 2022 peak flow event was automatically recorded. This peak flow date was missed in the operator log as no Water Technician was onsite that day. This peak flow level was above the overflow weir height and the calculated peak flow is not considered accurate.

Quartz Creek Water Quality Monitoring

The Regional District is monitoring the following water quality parameters in association with the Quartz Creek Flow and Water Quality Monitoring initiative.

Water Quality Monitoring Parameter	Description	Desired Frequency
Raw Water Turbidity	Online turbidity meter	15 minutes
pH	Manual testing	When Technician on Site
Treated Water Bacteriological	Total Coliforms, E.coli & Fecal Coliform	Weekly
Raw Water Bacteriological	Total Coliforms, E.coli & Fecal Coliform	Bi-weekly
Raw Water Full Comprehensive	Chemical and physical parameters based on Guidelines for Canadian Drinking Water Quality	Quarterly
Treated Water THM & HAA	Trihalomethanes (THMs) and haloacetic acids (HAAs)	Quarterly

Raw Water Turbidity

Raw water turbidity is monitored online in the treatment plant.

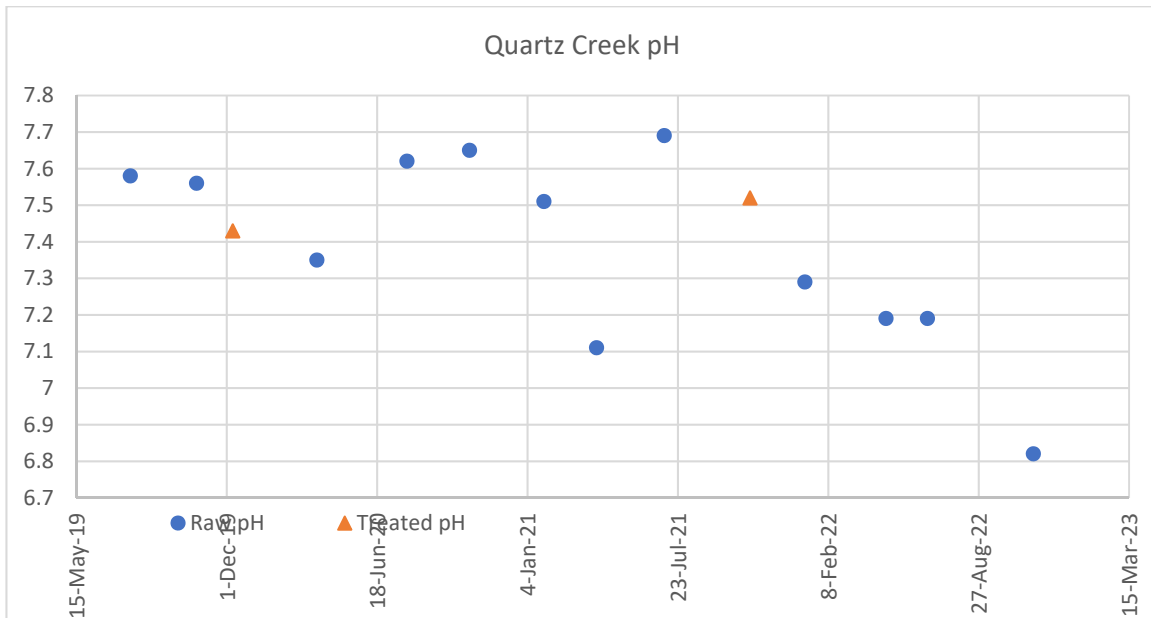
Raw water turbidity is presented on the flow charts in the previous section. The maximum daily average turbidity for the reporting period was 1.65 NTU recorded on 06 May 2022, during freshet. The maximum turbidity coincides with the maximum daily average flow date. A turbidity of 1.65 NTU is considered very low for creek source water.

pH

Health Canada Drinking Water Quality Guidelines identifies a pH range of 7.0 to 10.5 as acceptable for finished (treated) drinking water.

Raw water pH was hand measured when water technicians were onsite at the Ymir water treatment plant. pH varied from 6.2 to 7.4 during the 2022 monitoring period. The variations do not appear to correlate with seasons or flow rates and pH was trending lower in 2022 than previous recorded years for Quartz Creek. The handheld pH meter was compared again a bench meter and was found to not correlate. Upon research, it was determined that handheld pH meters commonly loose accuracy. Handheld meter pH data is no longer considered accurate for Quartz Creek and Water Technicians have since stopped taking handheld pH readings.

pH can be obtained from quarterly full-comprehensive laboratory test results presented as follows:



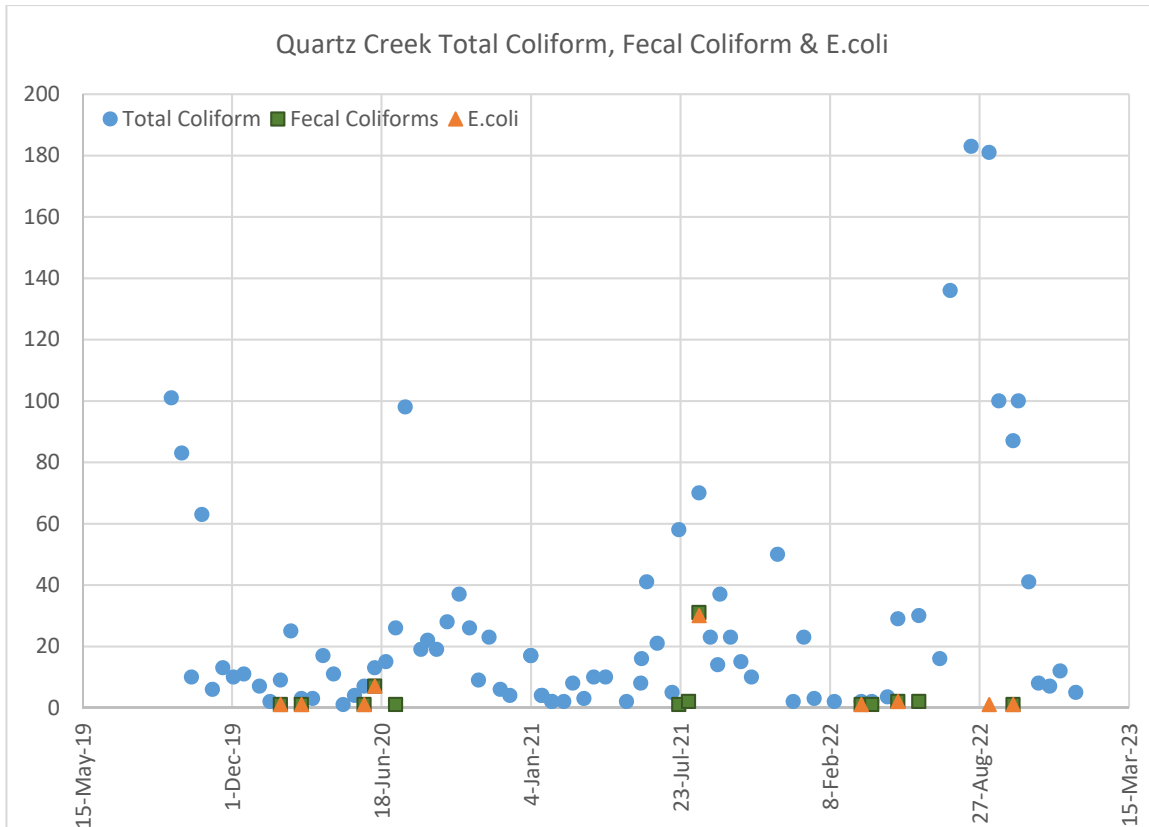
Treated Water Bacteriological

A treated water sample is taken weekly for Total Coliforms, and E.coli bacteria testing. Testing is provided by the BC Centre for Disease Control through Interior Health. Only adverse sample results are reported to the Regional District. There has been no adverse treated water sample results during the monitoring period.

Raw Water Bacteriological

A raw water sample is taken bi-weekly for Total Coliforms, E.coli and Fecal Coliform bacteria testing. Testing is conducted by Passmore Laboratory Ltd.

The following chart provides the historical Quartz Creek Total Coliform, Fecal Coliform and E.coli sample test results.



Raw Water Full Comprehensive

Raw Water Full Comprehensive test results are summarized in the following table.

Sample Date	Comments
2019-07-26	Test results within Canadian Drinking Water Quality Guidelines.
2019-10-22	Total Coliform count of 11. All other test results within Canadian Drinking Water Quality Guidelines.
2019-12-09	Test results within Canadian Drinking Water Quality Guidelines.
2020-03-30	Test results within Canadian Drinking Water Quality Guidelines.
2020-07-28	Total Coliform count of 71. Test results within Canadian Drinking Water Quality Guidelines.
2020-10-19	Test results within Canadian Drinking Water Quality Guidelines.
2021-01-27	Test results within Canadian Drinking Water Quality Guidelines.
2021-04-06	Test results within Canadian Drinking Water Quality Guidelines.
2021-07-05	Test results within Canadian Drinking Water Quality Guidelines.
2021-10-27	Test results within Canadian Drinking Water Quality Guidelines.
2022-01-28	Test results within Canadian Drinking Water Quality Guidelines.
2022-04-26	Total Coliform count of 31. Test results within Canadian Drinking Water Quality Guidelines.
2022-06-20	Test results within Canadian Drinking Water Quality Guidelines.
2022-11-08	Test results within Canadian Drinking Water Quality Guidelines.

Treated Water THM & HAA

Some studies have identified a potential link between disinfection byproducts, primarily trihalomethanes (THMs) and haloacetic acids (HAAs) and certain forms of cancer. Disinfection byproducts can be formed when chlorine reacts with source water that has higher levels of organic material.

Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Trihalomethanes, April 2009 addendum, identifies the maximum acceptable concentration (MAC) for trihalomethanes (THMs) in drinking water as 0.100 mg/L (100 µg/L) based on a locational running annual average of a minimum of quarterly samples taken at the point in the distribution system with the highest potential THM levels. The maximum acceptable concentration (MAC) for bromodichloromethane (BDCM) in drinking water is 0.016 mg/L (16 µg/L) monitored at the point in the distribution system with the highest potential THM levels.

Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Haloacetic Acids, 2008 identifies the maximum acceptable concentration (MAC) for total haloacetic acids in drinking water at 0.08 mg/L (80 µg/L) based on a locational running annual average of a minimum of quarterly samples taken in the distribution system. Sample test results for the monitoring period are summarized in the following table.

Sample Date	Total Trihalomethanes (mg/L)	Bromodichloromethane (mg/L)	Total Haloacetic Acids (mg/L)
2019-01-28	0.0109	< 0.0010	0.00774
2019-07-17	0.0207	< 0.0010	0.0145
2020-06-18	0.0227	< 0.0010	0.0205
2020-09-21	0.0118	< 0.0010	0.0106
2021-01-04	0.0188	< 0.0010	0.0130
2021-04-06	0.0179	< 0.0010	0.0140
2021-06-14	0.0206	< 0.0010	0.0110
2021-09-13	0.0198	< 0.0010	0.0150
2022-06-20	0.0228	< 0.0010	0.0282
2022-10-12	0.0175	< 0.0010	0.0131

Sample results are below Guidelines for Canadian Drinking Water Quality guideline maximum acceptable concentrations.