



2022 ANNUAL DRINKING WATER REPORT

PANORAMA MOUNTAIN RESORT



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Introduction

In order to fill its obligations to the Interior Health Authority, Corix is required to complete an annual report detailing the operations of the water treatment and distribution process at Panorama Mountain Resort. This report is also intended to be viewed by the public and is available on Corix's website.

Panorama Mountain Resort is located approximately 18km west of Invermere, British Columbia. Corix owns and operates all the utility infrastructure associated with the water treatment and water distribution network. The distribution network serves 304 residential and 43 commercial connections.

Panorama's water treatment system and water distribution system are both classified as Level II facilities by the EOCP (Environmental Operators Certification Program). In 2022, Corix had five full time water treatment and distribution operators working on site. This ensured that at least one operator was on site every day, while also providing twenty-four-hour emergency on call coverage.

Providing clean, potable and aesthetically pleasing drinking water to its customers is at the forefront of Corix's responsibilities. This is accomplished by maintaining a regular monitoring, sampling and maintenance schedule as outlined below.

System Overview

Source Water

Panorama's source water is from two, 10-inch diameter production wells in close proximity to the Toby Creek. In 2020, Corix transitioned from a surface water source to a clean groundwater source in order to alleviate the high levels of turbidity in the water during spring runoff. Well 15-02 has a total depth of 106.5 ft (32.5m) and well 20-03 has a total depth of 124.5 ft (37.9m). Both wells have been drilled into the same semi-confined sand and gravel aquifer system. This system is overlain by sediments containing silt and clay, while it is underlain by bedrock.

Please refer to Appendix A for a full potability report which was completed on August 4, 2022. This testing is completed prior to any treatment, therefore it provides a very accurate representation of the water quality coming from the aquifer.



Panorama Well Site

Treatment

Panorama's source water is continuously pumped to a treatment station located at 2130 Trappers Way. There is continuous online turbidity monitoring for all water entering the treatment station. The first stage of disinfection is UV. Corix operates two Trojan UV Swift SC units. This UV disinfection process provides 99.99% inactivation of pathogens such as Cryptosporidium and Giardia. The next stage of disinfection is accomplished with chlorine. Corix administers a dosage using 12% Sodium Hypochlorite. The level of chlorine leaving the treatment station is continuously monitored, and is usually around 0.80 mg/L. The combination of using UV technology and chlorine disinfection creates a very efficient disinfection process by inactivating a large number of microorganisms.



Panorama UV disinfection units

After disinfection is accomplished, the water is pumped into a clear well, which is located underneath the treatment station. This acts as a holding tank, as two booster pumps then move the water from the treatment station to the main resort reservoir. As water demands increase and decrease all tank levels remain constant as well pumps and booster pumps act in unison and modulate their flow rate accordingly.



Treatment Station Booster Pumps

The main reservoir can hold approximately one million gallons. It is located partway up the ski hill near the top of the Discovery chair. The strategic location of the reservoir at that elevation allows the entire distribution system to maintain adequate pressure via gravity only.

Water Distribution

In 2022, Corix treated and distributed approximately 256,000 cubic meters of water (256,000,000L). Figure 1 below illustrates the amount of water that was treated daily over the course of the year. As can be seen, there are fluctuations throughout the year. This is due to the fact that Panorama is a seasonal resort destination. Higher flows can be expected through winter months (Dec – Apr) and summer months (Jul – Sept) due to higher occupancy rates. Summer irrigation also factors into a higher demand during summer months.

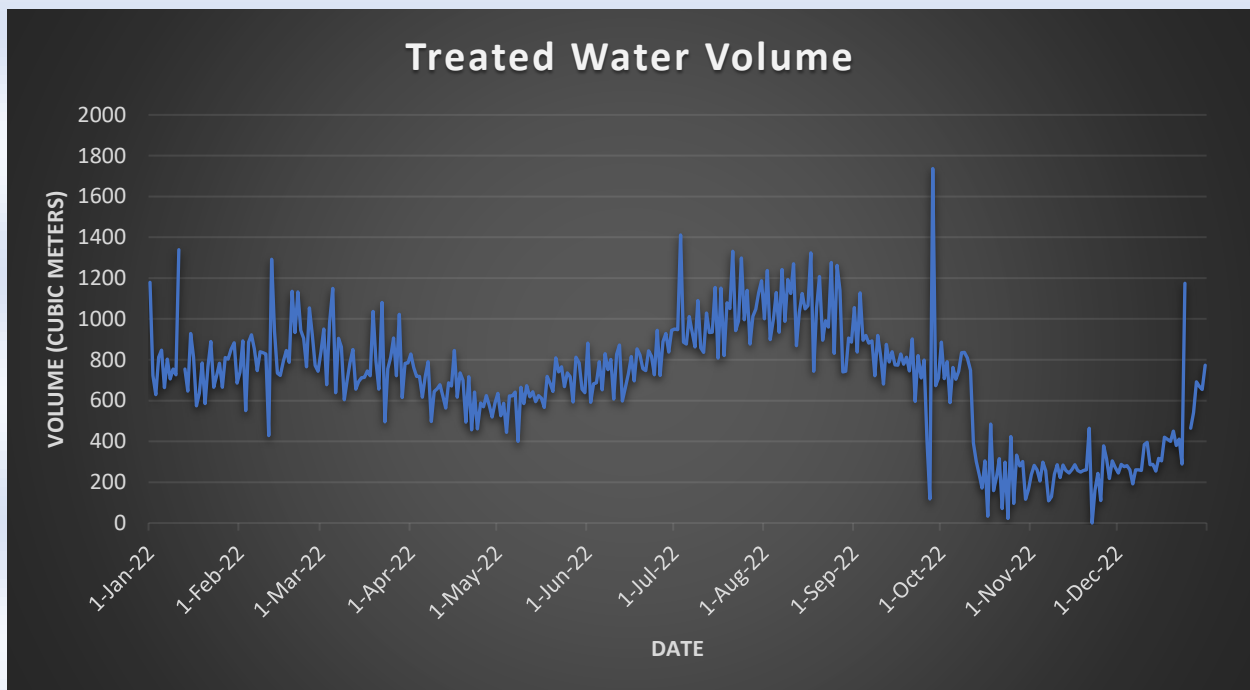


Figure 1

Due to the elevation of the reservoir, the distribution system is divided into multiple pressure zones. These pressure zones are controlled by PRV's (pressure reducing valves) located underground throughout the resort. These PRV's act to maintain a constant water pressure through all areas of the resort, regardless of water usage. Corix employees record operating pressure of these valves and conduct visuals on them on a monthly basis to ensure there are no leaks and proper operation is maintained.

Water Quality Control

Everyday, Corix operators perform a set of daily rounds consisting of operational checks of the well site and booster station. Turbidity and residual chlorine checks are also completed everyday by an operator. Please refer to Figure 2 and Figure 3 for a snap shot of chlorine and turbidity levels found at the start and at the end of the distribution system through out 2022. By completing these checks at both the start and end of line, this ensures an adequate chlorine residual and turbidity level throughout the entire system.

Chlorine residual concentrations usually range from 0.20 to 2.0 mg/L in many Canadian drinking water distribution systems. Corix operators try to keep the residual around 0.80 mg/L through the system so as to ensure proper disinfection while minimizing the taste of chlorine for the customer.

Turbidity is one of the most important measurements a water operator conducts. Turbidity is a measurement of the clarity of the water and gives an indication on the number of particles in the water that can't be seen by the naked eye. A rise in turbidity can help alert an operator to changes in raw water quality. Higher turbidity (more particles) can harbor microorganisms, shielding them from disinfection. For a water system that uses ground water, turbidity levels should never exceed 1.0 NTU. As noted below in Table 1, the highest turbidity level recorded in the Panorama distribution system was 0.30 NTU.

	Start of Line		End of Line	
	Chlorine (mg/L)	Turbidity (NTU)	Chlorine (mg/L)	Turbidity (NTU)
Min.	0.58	0.04	0.53	0.08
Max.	0.96	0.30	0.93	0.30
Average	0.79	0.14	0.74	0.14

Table 1

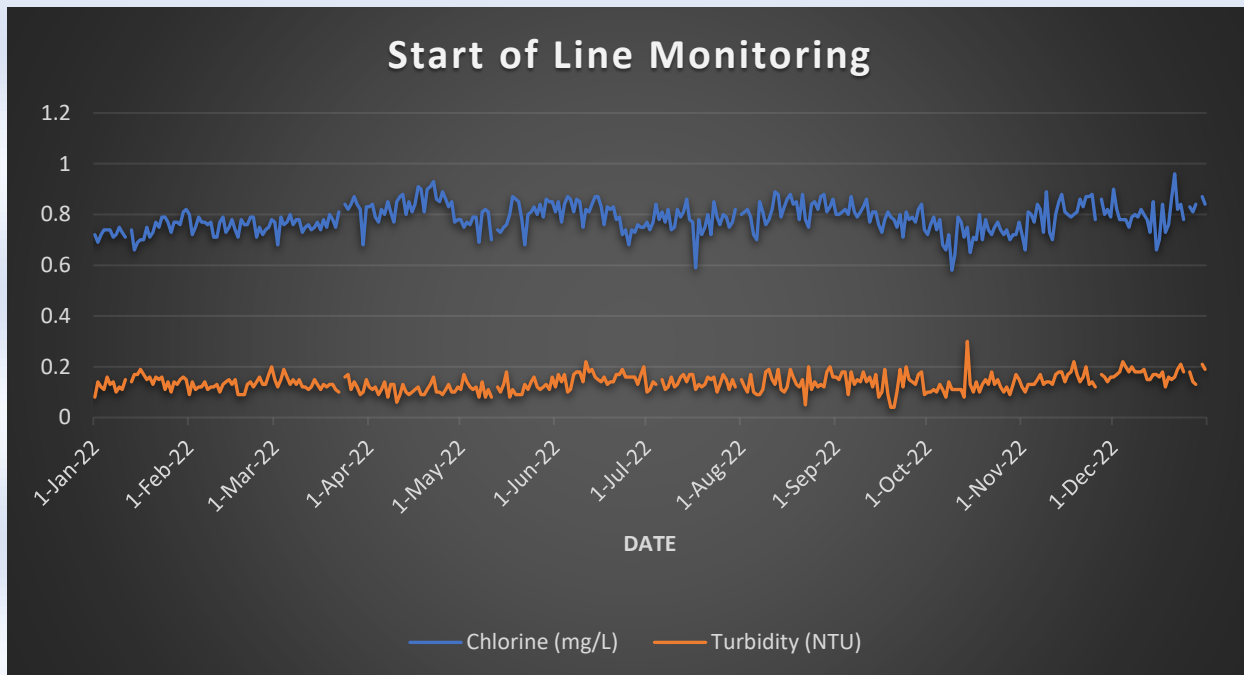


Figure 2

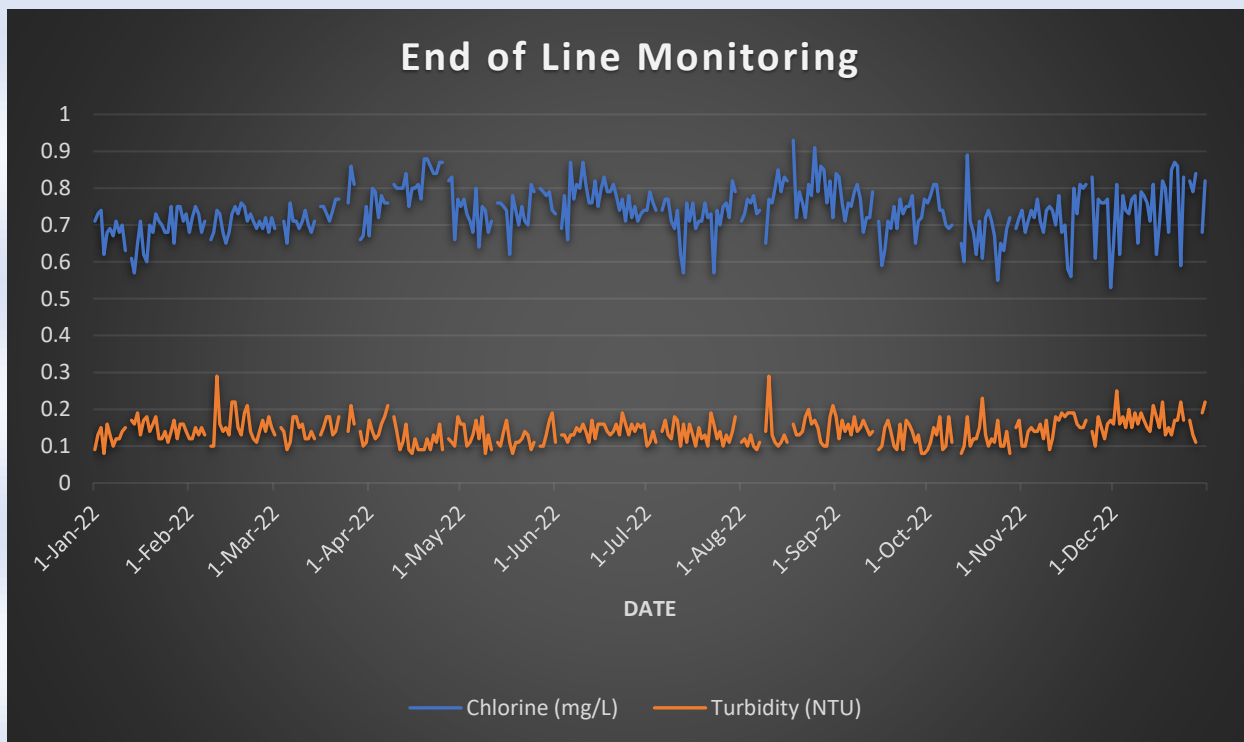


Figure 3

Bacteriological sampling was completed every week at three different locations. These samples were sent to ALS Laboratories in Calgary where E. Coli bacteria and total coliforms were tested for. Forty-eight sets of bacteriological samples were taken in 2022. Corix received zero reports of any positive test results.

Sampling for trihalomethanes (THM's) and Haloacetic acids (HAA's) was also completed in 2022. Both THM's and HAA's are formed when chlorine reacts with organic material in water. The results found that the water treated at Panorama was well below the maximum acceptable concentration (MAC) dictated by Canada's "Guidelines for Canadian Drinking Water Quality". Please see Appendix B for details of these results.

As mentioned above, please refer to Appendix A for a full potability report which was conducted on the raw water source.

System Maintenance/Upgrades

On October 13, 2022 a major leak on a service line for a residence on Greywolf drive was repaired. This effected service to approximately 40 houses on Greywolf Dr and the Wildwood subdivision. This area of the distribution system was isolated and the repair was completed successfully. Due to the isolation, a boil water advisory was placed on this section of the distribution system. The Interior Health Authority was notified, and tests were taken and submitted on October 17 and 18, 2022. Both results came back negative for coliforms and the water advisory was lifted.

In 2022, Corix began the process of commissioning a new well (Well 20-03). Prior to this year, Corix did not have a secondary well to draw from. Having a second well provides extra pumping capacity during periods of high demand as well as an emergency backup source. Well 20-03 was initially drilled in the summer of 2020. Between April 25 & 27, 2022 Western Water Associates Ltd. conducted their final phase of water testing for the well. On August 16, 2022 CS McLean Contracting excavated the site, installed an isolation valve and tied well 20-03 into the distribution system.

In July 2022 it was discovered that Booster Pump #2 at the Treatment Station was exhibiting excessive vibrations while running. It was determined that the pump shaft had a slight deflection and pump impellers were badly worn. This pump and motor were then locked out until a repair took place. Later in the year, Mechanical Advantage was contracted to remove the pump and motor, complete the necessary repairs and replace the pump shaft. This entire assembly was reinstalled and the pump was put back into use at the end of December, 2022.

SCADA system

Corix utilizes a SCADA (Supervisory control and data acquisition) system in order to monitor all critical components and operations of the water treatment system. The SCADA system allows Corix operators to monitor alarms, adjust treatment processes and accumulate data. This allows the operator to respond to events or look at data trends, regardless of location. Below (Figure 3) is screen shot of the Panorama water treatment process on SCADA. Pump controls, reservoir levels and crucial parameters such as chlorine and turbidity are all displayed.

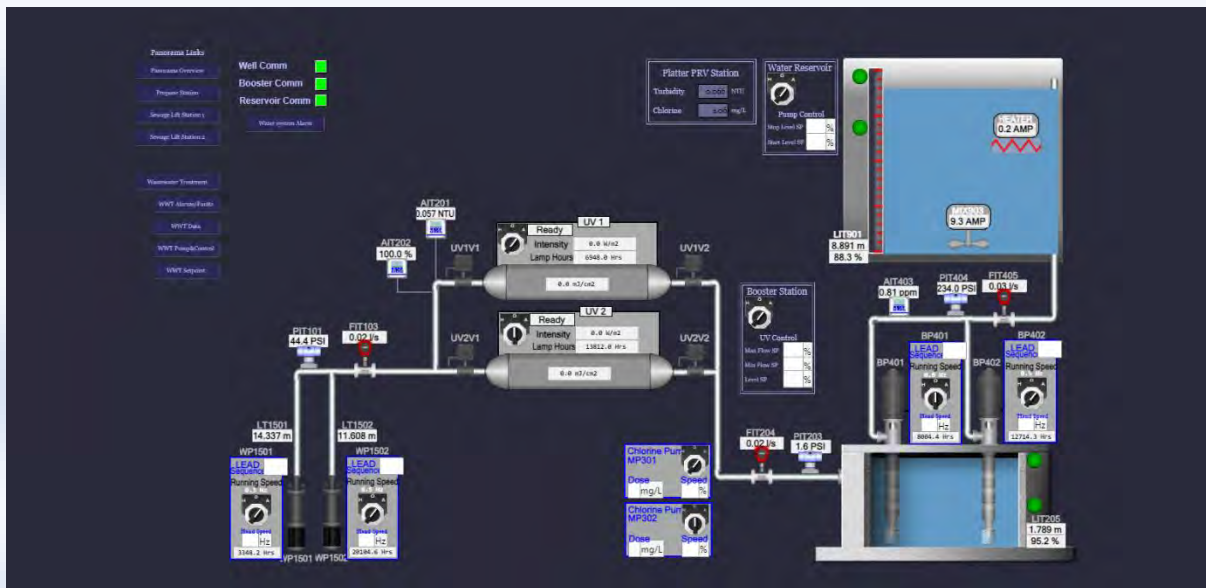


Figure 4

Appendix A



CERTIFICATE OF ANALYSIS

Work Order	: CG2210325	Page	: 1 of 4
Client	: Corix Group of Companies	Laboratory	: Calgary - Environmental
Contact	: Christina Bucci	Account Manager	: Lyudmyla Shvets
Address	: Corix Multi-Utility Services Inc. #5, 108 Industrial Rd 2 Invermere BC Canada V0A 1K5	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 250 341 6158	Telephone	: +1 403 407 1800
Project	: 3088JOB000010	Date Samples Received	: 05-Aug-2022 11:55
PO	: ----	Date Analysis Commenced	: 05-Aug-2022
C-O-C number	: ----	Issue Date	: 12-Aug-2022 16:25
Sampler	: ----		
Site	: PMV WD		
Quote number	: CG20-CORI100-002		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Maria Tuguinay	Lab Assistant	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sunil Palak		Microbiology, Calgary, Alberta

Page : 2 of 4
 Work Order : CG2210325
 Client : Corix Group of Companies
 Project : 3088JOB000010



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key - CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
 LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
%	percent
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
MPN/100mL	most probable number per 100 mL
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Page : 3 of 4
 Work Order : CG2210325
 Client : Corix Group of Companies
 Project : 3088JOB000010



Analytical Results

Sub-Matrix: Water					Client sample ID	LOCATION #1	---	---	---	---
(Matrix: Water)					Client sampling date / time	04-Aug-2022 10:30	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	CG2210325-001	-----	-----	-----	-----	
					Result	---	---	---	---	
Physical Tests										
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	264	---	---	---	---	
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	<1.0	---	---	---	---	
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	---	---	---	---	
alkalinity, total (as CaCO3)	---	E290	1.0	mg/L	217	---	---	---	---	
conductivity	---	E100	1.0	µS/cm	614	---	---	---	---	
hardness (as CaCO3), from total Ca/Mg	---	EC100A	0.50	mg/L	292	---	---	---	---	
pH	---	E108	0.10	pH units	8.14	---	---	---	---	
solids, total dissolved [TDS], calculated	---	EC103.B	1.0	mg/L	379	---	---	---	---	
turbidity	---	E121	0.10	NTU	0.30	---	---	---	---	
Anions and Nutrients										
chloride	16887-00-6	E235.Cl	0.50	mg/L	33.0	---	---	---	---	
fluoride	16984-48-8	E235.F	0.020	mg/L	0.033	---	---	---	---	
nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	4.95	---	---	---	---	
nitrate + nitrite (as N)	---	EC235.N+N	0.0032	mg/L	4.95	---	---	---	---	
nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.010	---	---	---	---	
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	62.8	---	---	---	---	
Microbiological Tests										
coliforms, total	---	E010	1	MPN/100mL	<1	---	---	---	---	
coliforms, Escherichia coli [E. coli]	---	E010	1	MPN/100mL	<1	---	---	---	---	
Ion Balance										
ion balance (cations/anions)	---	EC101A	0.010	%	98.0	---	---	---	---	
Total Metals										
calcium, total	7440-70-2	E420	0.100	mg/L	66.0	---	---	---	---	
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	---	---	---	---	
magnesium, total	7439-95-4	E420	0.0050	mg/L	30.8	---	---	---	---	
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00146	---	---	---	---	
potassium, total	7440-09-7	E420	0.050	mg/L	1.66	---	---	---	---	
sodium, total	7440-23-5	E420	0.050	mg/L	21.2	---	---	---	---	

Please refer to the General Comments section for an explanation of any qualifiers detected.

Appendix B



CERTIFICATE OF ANALYSIS

Work Order	: CG2209874	Page	: 1 of 3
Client	: Corix Group of Companies	Laboratory	: Calgary - Environmental
Contact	: Christina Bucci	Account Manager	: Lyudmyla Shvets
Address	: Corix Multi-Utility Services Inc. #5, 108 Industrial Rd 2 Invermere BC Canada V0A 1K5	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 250 341 6158	Telephone	: +1 403 407 1800
Project	: 3088.JOB000010	Date Samples Received	: 27-Jul-2022 11:00
PO	: ----	Date Analysis Commenced	: 29-Jul-2022
C-O-C number	: ----	Issue Date	: 04-Aug-2022 14:36
Sampler	: chad cochrane		
Site	: Kootenays		
Quote number	: CG20-COR100-002		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Adam Boettger	Team Leader - LCMS	LCMS, Waterloo, Ontario
Joshua Stessun	Laboratory Analyst	Organics, Calgary, Alberta

Page : 2 of 3
 Work Order : CG2209874
 Client : Corix Group of Companies
 Project : 3088JOB000010



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

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Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
 LOR: Limit of Reporting (detection limit)

<i>Unit</i>	<i>Description</i>
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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Page : 3 of 3
 Work Order : CG2209874
 Client : Corix Group of Companies
 Project : 3088JOB000010



Analytical Results

Sub-Matrix: **Water**

Client sample ID

Platter PRV

Greywolf

(Matrix: **Water**)

Client sampling date / time

26-Jul-2022 10:20

26-Jul-2022 10:00

Analyte	CAS Number	Method	LOR	Unit	CG2209874-001	CG2209874-002	---	---	---
					Result	Result	---	---	---
Volatile Organic Compounds [THMs]									
bromodichloromethane	75-27-4	E611B	1.0	µg/L	1.0	1.3	---	---	---
bromoform	75-25-2	E611B	1.0	µg/L	<1.0	<1.0	---	---	---
chloroform	67-66-3	E611B	1.0	µg/L	1.2	1.3	---	---	---
dibromochloromethane	124-48-1	E611B	1.0	µg/L	1.4	1.9	---	---	---
trihalomethanes [THMs], total	---	E611B	2.0	µg/L	3.6	4.5	---	---	---
Volatile Organic Compounds [THMs] Surrogates									
bromofluorobenzene, 4-	460-00-4	E611B	1.0	%	82.4	85.3	---	---	---
difluorobenzene, 1,4-	540-36-3	E611B	1.0	%	95.7	94.2	---	---	---
Haloacetic Acids									
bromochloroacetic acid	5589-96-8	E750	1.00	µg/L	<1.00	<1.00	---	---	---
dibromoacetic acid	631-64-1	E750	1.00	µg/L	<1.00	<1.00	---	---	---
dichloroacetic acid	79-43-6	E750	1.00	µg/L	<1.00	<1.00	---	---	---
monobromoacetic acid	79-08-3	E750	1.00	µg/L	<1.00	<1.00	---	---	---
monochloroacetic acid	79-11-8	E750	1.00	µg/L	<1.00	<1.00	---	---	---
trichloroacetic acid	76-03-9	E750	1.00	µg/L	<1.00	<1.00	---	---	---
haloacetic acids, total [HAA5]	---	E750	5.00	µg/L	<5.00	<5.00	---	---	---

Please refer to the General Comments section for an explanation of any qualifiers detected.