

CITY OF PRINCE RUPERT

2020 ANNUAL REPORT ON THE COMMUNITY WATER SYSTEM

This report details the 2020 status of the Prince Rupert water system, providing an overview of the level of servicing, water quality, treatment, and health data associated with the City's water supply.

September 2021

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2020 ANNUAL REPORT ON THE COMMUNITY WATER SYSTEM

The following Annual Report details the 2020 status of the Prince Rupert water system, providing an overview of the level of servicing, water quality, treatment, and health data associated with the City's water supply.

History of Prince Rupert's Water System

When the City was established, the Prince Rupert Water Utility began with just two small dams on Kaien Island. However, these were unacceptable for the longer term and by 1914, the City had secured a much more reliable source of raw water-- two large lakes and watersheds on the Tsimshian Peninsula. Unfortunately, the elevation of Shawatlan Lake was lower than much of Kaien Island, necessitating the construction of a large pump house at the shoreside intake. The new pumping system pushed the water through an undersea or sub-marine supply main across Fern Passage to the Kaien Island townsite where booster pumps moved it on to the Acropolis Reservoir in the City's west end.

Ultimately, the large diameter penstock line from the former BC Hydro Utility dam at Woodworth Lake, higher up in the Coastal Mountain Range, would be extended and form the backbone of a gravity water supply system, leaving the Shawatlan pumping system as a valuable back-up facility to be used in case of emergency or necessary maintenance activity, which is occurring currently as the City replaces critical water infrastructure. However, it was 1996 before key infrastructure improvements finally allowed Woodworth Lake to totally fulfill all of Prince Rupert's potable water and fire protection needs. After over 80 years of continual pumping, the City was finally able to switch to a full gravity-fed supply system, eliminating substantial annual hydroelectric costs.

Water System Description

Today, the Prince Rupert water system feeds approximately 6 million cubic metres of potable water per year to local residents, businesses, and industry, utilizing over 50 kilometres of distribution line and close to 6000 individual service connections. The Community Water System supplies the Port of Prince Rupert and related industries, as well as BC Ferries. The system is also capable of meeting the peak seasonal demand of a number of industrial fish processors, an industry that has declined in recent years with the closure of local canneries, but when active can generate over twice the average daily consumption.

See below for a schematic diagram describing the path that water takes through the Community Water System, currently, due to reliance on our secondary supply at Shawatlan Lake during construction on water supply infrastructure.



Water Quality

Few issues are more important to a municipality than the quality of the drinking water it delivers. It has consequently been Prince Rupert's extreme good fortune to have always had one of the best protected raw water sources in British Columbia. In order to prevent human contamination of the water supply, the City of Prince Rupert maintains restricted access to the watersheds surrounding both Woodworth and Shawatlan Lakes. As noted in the B.C. Auditor General's Report, which reviewed our water protection practices, water source protection is by far the easiest, least expensive, and most practical approach to ensuring the long term safety of the water supply.

Additionally, as a second barrier of defence against the incidence of waterborne disease, the municipality maintains an enduring chlorine residual throughout the water distribution system. Chlorine is the most reliable and widely used drinking water disinfectant in North America. A "residual" is the trace amount of chlorine left in the drinking water after initial disinfection have taken place. As long as a trace of chlorine or residual can be detected, the line is still subject to active disinfection. For greater public safety and adequate contact time, chlorine is added before the water reaches Kaien Island. Chlorine dosage must be constantly trimmed and balanced to maximize disinfection but minimize the production of disinfection by-products (DBPs), such as Trihalomethanes (THMs) and Haloacetic Acids (HAAs). Residual levels are therefore electronically monitored on a constant basis throughout the municipality. To further check that the chlorination process is working properly and that the water system has not been otherwise compromised, various types of water quality samples are taken daily, weekly, or at other regular intervals. The results of the Water Quality Testing Program are reported to the Provincial Ministry of Health and are available on the Northern Health Authority's Public Health Protection website at: http://www.healthspace.ca/nha

This public site lists the following up-to-date information about our water quality monitoring program:

- Drinking Water inspection Reports
- Water Quality Advisory October 2020 April 2021 A Water Quality Advisory was in effect from October 31, 2020 April 8th, 2021 in Prince Rupert primarily due to elevated turbidity readings (greater than 1 NTU) in the raw water being supplied from Shawatlan Lake. In response to this event:
 - City Staff worked with the Public Health Officer from Northern Health to evaluate the City's treatment capabilities when experiencing elevated turbidity;
 - It was determined that the City could adequately treat water with turbidity higher than 1 NTU, but that established processes for monitoring water quality and adjusting treatment processes in the event of turbidity were required;
 - City Staff prepared a dedicated turbidity response plan to accomplish this, which provides clear steps to operators on how to evaluate and respond to elevated turbidity events.
- The Water Quality Advisory was removed fully on April 8th, 2021, once the City had completed its Turbidity Response Plan and had it approved by Northern Health for implementation. At no time

during the advisory were any outbreaks of waterborne pathogen diseases detected in the area served by the City's water system.

- **Current Water Notices / Advisories** There are no current notices in effect with respect to water quality in Prince Rupert.
- Chemical Samples & Results Actual chemical analysis test results for 8 key sampling points going back as far as 1989.
- Water Sample Results Actual bacteriological test results for selected sampling points dating back to 1994. "L1" means "less than one" or no coliform issues detected.

In a drinking water quality concern or emergency, as occurred in 2020, a Water Quality Advisory, Boil Water Notice, or Do Not Use Water Notice is issued by the Northern Health Authority. This notice is placed on the home page of the City's website at <u>www.princerupert.ca</u> as part of a larger media and public notification effort. For further information see the section below regarding "Emergency Planning".

Water Quality Data and Inspection Results

Microbiological sampling requirements are established by Northern Health, and generally follow the Guidelines for Canadian Drinking Water Quality and the British Columbia Drinking Water Protection Regulation. The criteria established for the City's bacteriological sampling are:

- No one sample should contain more than ten Total Coliform per 100ml, so long as less than 10% of samples have detectable coliforms;
- There is to be zero detectable E.Coli per 100m;
- There should be no two consecutive positive samples from the same sample site location that show the presence of coliform indicators;
- Giardia and cryptosporidium concentrations must remain within treatable limits described by the City's Giardia Treatment Monitoring Plan at all times; and,
- o 90% of all samples must have zero detectable Total Coliforms per 100ml sample

In 2020, the City conducted weekly sampling at four sample locations within the City, and monthly sampling at several other sites to meet its permit condition of 20 bacteriological samples each month. The City also conducted monthly protozoology sampling of the source water in accordance with the City's operating permit.

- The total number of potential bacteriological sampling sites in Prince Rupert in 2020 is 11 (Sampling sites are listed online and in the <u>Appendix</u> of this Report)
- 291 bacteriological samples were taken in total during 2020

- There were 0 samples containing detectable e. coli
- The CWS was well within the acceptable range for Total Coliforms, with 96.2% of all samples having zero detectable Total Coliforms per 100ml sample
 - Note that each time a coliform result of greater than one is returned, resampling is conducted to determine whether further action is required
- 13 samples were taken for Cryptosporidium and Giardia, and remained within treatable limits in all instances

The last facility inspection of the City of Prince Rupert's Community Water System was in October of 2020 with further discussion below. This inspection noted several inadequacies to the City's treatment system, and the corrective actions that should be taken until the City's new treatment system can be constructed. A summary of the inspection results and follow-up actions taken by the City immediately following the inspection are listed below.

Inspection Information:

(This information taken directly from Northern Health website)

Facility Type: WS1A Inspection type: Routine Inspection date: October 2nd, 2020 Follow-up Required: No This facility was given a moderate hazard rating.

Violations:

A summary of the violations found during the inspection are listed below.

313 Inadequate treatment

Observation: Provincial surface water treatment objectives are not being met. The present water treatment cannot achieve 3-log inactivation of Cryptosporidium (although disinfection to inactivate Giardia is being performed). Also, there is currently only one treatment process (chlorination), and two independent treatment processes are required for treating surface water sources. Monitoring data also shows that turbidity sometimes exceeds the objective of one nephelometric turbidity unit (NTU) or less. During the last 12 months, two water quality advisories have been issued because of elevated turbidity in the distribution system. A timeframe for proposing and installing adequate

SUMMARY OF CITY RESPONSE

As a component of our water system upgrades, the City has been in discussions with Northern Health regarding the implementation of a system of treatment that includes multiple treatment barriers.

In August of 2018, directly following these Inspection results, the City applied to the Federal/Provincial Investing in Canadian Infrastructure Program (ICIP) Green Infrastructure fund to support the development of a ~\$30 million new water treatment plant with multiple barriers of treatment.

Now that the City has received a significant grant for this project, we will be able to proceed. This facility will ensure that the Citv addresses all noted Northern Health concerns with respect to treatment. In the meantime, the City has enhanced monitoring and abatement efforts with respect to noted violations. specifically monitoring of disinfection byproducts and corrosion, and public education efforts directed towards leaching of lead from within home-plumbing.

treatment has been developed and has been made into a mandatory condition of the water system's operating permit. The City of Prince Rupert ("the water supplier") has been awarded grants to fund the construction of a new water treatment plant and is proceeding through the grants process.

Corrective Action: The water supplier must continue to monitor the source water for Giardia and Cryptosporidium at the frequency specified in the relevant operating permit condition. The water supplier

will also need to design and implement effective water treatment that meets provincial surface water treatment objectives in accordance with the timeline in the operating permit conditions.

City Response: The City has consistently maintained chlorine residual levels to achieve a 3-log inactivation of Giardia following the direction of Northern Health, and has also continued to regularly monitor source water for Giardia cysts and Cryptosporidium oocysts throughout 2020 to ensure that concentrations of these microbiological contaminants remained within treatable limits. In response to the noted turbidity incidents, the City has developed a Turbidity Response Plan as part of its overall Water System Emergency Plan, which has been reviewed and approved by Northern Health, and implemented by the City. Over the longer term, the City's plan is to implement multiple barriers of treatment that will address all drinking water treatment objectives noted above.

313 Inadequate treatment

Observation: Water chemistry data indicates that the water is corrosive, and so on private properties that have older plumbing components, leaching of lead and/or copper into drinking water may occur. The water supplier has provided information on lead in drinking water to users in the past, and information is posted on the City of Prince Rupert's Drinking Water website. The water supplier has also conducted a Household Water Sampling Program to collect data on lead and copper levels from a representative sample of over 60 private residences. The results from the sampling show that centralized corrosion control is appropriate.

Corrective Action: The water supplier will need to communicate the findings of the Household Water Sampling Program to water users once the report has been finalized. Water treatment to reduce the corrosion of lead-containing materials at residential sites will need to be proposed an implemented (in accordance with the timeline in the operating permit conditions).

City Response: The City has shared information regarding initial results of the Household Water Sampling Program, and publicized the results of its 2019 Household Lead Sampling program in 2020. The City has engaged in further household testing to assess the risk of corrosive water on household plumbing systems in 2020, with results to be shared once testing is complete in 2021. Over the longer term, the City's plan is to implement multiple barriers of treatment that will address all drinking water treatment objectives noted above with respect to the corrosiveness of the water supply.

313 Inadequate treatment

Observation: Levels of trihalomethanes (THMs) and haloacetic acids (HAAs) in the water exceed the maximum acceptable concentrations given in Health Canada's Guidelines for Canadian Drinking Water Quality. The water supplier has been measuring the levels of THMs and HAAs every three months.

Corrective Action: The water supplier will need to continue to measure the levels of THMs and HAAs every three months. As the running annual average of quarterly samples shows that the levels of THMs and HAAs exceed maximum acceptable concentrations, the water supplier will need to continue to make these results publically available, as well as providing users with information on how they can reduce their exposure to THMs and HAAs. In the long-term, the implementation of effective water treatment will ultimately address the elevated THM and HAA levels.

City Response: The City has been engaged with Northern Health since 2020 to propose adjustments to the process for determining chlorination requirements, to reduce the minimum chlorination concentrations and the resulting concentrations of THMs and HAA. In the longer term, the City's plan is to implement multiple barriers of treatment that will address all drinking water treatment objectives noted above, including the removal of turbidity related sediment and organics that interact with chlorine to produce byproducts. In addition, multiple treatment barriers will reduce the system's current reliance on chlorination, reducing overall byproduct levels. Monitoring of disinfection by-products is ongoing.

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Source: For a complete list of Water Quality Data obtained from www.healthspace.ca/nha

Chemical Composition of Community Water Supply

The testing results regarding the chemical composition of the CWS are listed below. Water quality tests have met all Maximum Acceptable Criteria (MAC) specified by the Canadian Drinking Water Guidelines, with the exception of Hal turbidity samples later in 2020. The most noticeable physical property of Prince Rupert's potable water is color. It is noted that there is a greater TCU amount for Prince Rupert's water colour than is ideal according to regulatory guidelines. This discolouration has increased somewhat due to the use of the secondary water source at Shawatlan Lake, and the upstream construction of the Woodworth dam replacement project. While this has a measurable aesthetic value, there have been no observed impacts on human health.

Additionally, the pH levels of the CWS hover below the lower limit of the identified goals for pH, which was updated in 2016 to a range of 7.0 to 10.5 in finished drinking water. This is due to the City's above ground water supply sources, which are subject to slight acidification from rain, as experienced by most coastal communities.

In 2017-2020, there have been impacts to aesthetic objectives to the City's water supply as a result of ongoing construction on our adjacent water supply project. Due to nearby construction, the City has been pumping our water from our secondary source at Shawatlan Lake. Due to the nature of the source, as well as nearby construction, testing shows the water supply has seen increased incidences of turbidity and colour that are above the Canadian Drinking Water Guideline MAC. These elevated turbidity values led to the initiation of a Water Quality Advisory being placed on the water system in October of 2020.

The construction has also had some ripple effects with respect to chemical treatment outcomes. To reduce potential risks of increased pathogens associated with turbidity and local disturbances, the City has increased chlorine levels in the water supply as per Northern Health recommendations. This, in turn, has increased levels of chlorine residual chemicals present in the supply. Trihalomethanes (THMs) and Haloacetic Acids (HAAs) are common disinfection by products. They occur as a result of chlorine reacting with the organic materials in the water (e.g. decaying plants etc.). THMs and HAAs are monitored routinely to ensure that Prince Rupert's CWS makes every effort to maintain their concentrations as low as reasonably achievable without compromising the effectiveness of chlorine disinfection to eliminate harmful microbial pathogens. Currently both THMs and HAAs are above the maximum acceptable concentration (MAC) in our system. The City is currently working with Northern Health to propose adjustments to the way chlorination requirements are established to investigate whether these requirements can be lowered to reduce the generation of these byproducts. At all times however, the need to ensure that adequate treatment for microbial pathogens will take priority over the reduction of chlorination byproducts, an approach which is supported by Northern Health and Health Canada. The extremely low potential risk of developing adverse health effects from long-term exposure to small amounts of chlorine byproducts is outweighed by the value of chlorine in significantly reducing the risks and consequences of water-borne infections. Prince Rupert's CWS will continue to monitor these concentrations routinely. The City is currently considering long term solutions to address this issue such as reducing the level of the precursor natural organic material in the water prior to chlorination through centralized multiple-barrier treatment.

Source: Complete list of Water Quality Data obtained from www.healthspace.ca/nha

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Emergency Planning:

While water system reliability is absolutely essential, all public water systems can be the victims of various types of emergencies from either natural or man-made causes. Some potential emergencies can be averted or have their impact greatly minimized by advance preparation and sound infrastructure planning. These activities reflect the importance of the water system in sustaining a safe and healthy community. Key to emergency planning is the recognition of the need for a certain amount of redundancy in both physical and human resources.

Prince Rupert is extremely fortunate to have two operational water sources – Shawatlan and Woodworth Lakes. In 2009, Prince Rupert's main water source was cut off for a considerable time period when the pipeline from Woodworth Lake was heavily damaged by a landslide. In many communities, this would certainly have qualified as a disaster. In this case however, the Public Works department was utilizing the pumping system already in place at the Shawatlan Lake water source. That system has double power-source redundancy, with BC Hydro power as the primary electrical source, backed up by a diesel-powered generator.

In the case of any serious emergency, the Prince Rupert Public Works Department works hand-in-hand with all other City departments, local Emergency Services, the Provincial Emergency Program (PEP), the Provincial Ministry of Health through the Northern Health Authority, and other utilities and organizations as required. Additionally, City Council would be informed in a timely manner regarding all pertinent aspects of the problem as will the general public through the City's website at <u>www.princerupert.ca</u> and all other available media. The City has also instituted a smartphone application and landline push notification system which has successfully targeted emergency communications to residents in the event of an emergency. All of these available communications avenues were used by the City during the most recent Boil Water Notice in 2018-2019.

The City is also in the process of updating our Emergency Water Plan, which guides emergency response for City personnel and provides notice templates to ensure that communication is consistent and includes relevant precautionary measures that may come into effect, depending on the scenario. A draft of this updated plan was completed in 2020 and is currently under final review by both the City and Northern Health prior and is expected to receive final approval in 2021.

System Improvements Completed and Planned:

In 2020, the City of Prince Rupert conducted major planned and unplanned water service infrastructure improvements. Capital water works replacements were completed in various locations around town, including major replacements at 7th Ave E and Green St, and the intersection of Fulton and 6th Ave E, while major emergency repairs were completed on 11th Ave E, Beach St, and McBride St. In total, an estimated 336 meters of water main was replaced throughout the community.

In terms of large-scale infrastructure replacement, in 2015, the City received matching grants from senior government to replace the raw-water supply line and construct a new access road, which is Phase 1 of the Raw Water Line Replacement Project. The new access road has provided the opportunity to replace and upgrade the Woodworth Lake Dam, which is the City's current priority for improvement. The City finalized the design for the new dam and completed contract negotiations in 2019, and began construction early in 2020, with construction completion expected in early 2022. This is the second phase of the water supply project. In addition, the Operations Department completed a portion of work on a preplanned SCADA improvement Study to improve technological monitoring capacity of the City's water system, which now will be amended as new plans for a treatment facility proceed.

Full replacement of the Woodworth Dam and extension of the access road to the dam provides a number of advantages, including:

- Improved ability to access the dam for operation, maintenance and surveillance;
- A significantly longer design life than the rehabilitated existing Woodworth Dam, which may require high repair costs or replacement in the future.
- Improved access for emergency response.
- Elimination of existing concrete and abutment deficiencies.
- Updated spillway capacity.
- Improved debris removal capability.
- Opportunity to install improved communications systems.
- Accessibility across the top of the dam for maintenance, inspection and future repairs.
- Erosion control to the downstream side of the spillway based on the design of a long spillway

The third and final phase, which may be broken down further into two projects, involves replacement of one of the submarine lines carrying potable water beneath the harbour from the water supply to the community, and the development of a new water treatment facility. As previously noted, the City applied in August of 2018 to the Investing in Canada Infrastructure Program for funding to complete this final phase, and was awarded the funding in August of 2019. The City and the Province are currently collaborating to complete value engineering for the project to ensure the project achieves the greatest possible value for taxpayer dollars.

Again, the principle of redundancy, which will be built into future upgrades as in the past, is key to responsible emergency preparedness. Local water charges reflect the cost of ensuring an appropriate level of reliability and safety, as well as the logistics involved in the delivery of fresh water from "Lake-to-Tap".

Remedial Actions or Assessments undertaken, where applicable

Operational challenges have been encountered over the past several years that have affected water quality and aesthetics (unrelated to the Boil Water Notice in late 2018). These incidents were related to elevated turbidity levels related to construction activities during the ongoing replacement of the raw water supply line and Woodworth Lake Dam. Ongoing monitoring of turbidity in the water supply has been maintained throughout this period, and the City remains in close contact with Northern Health to ensure that adequate water treatment is maintained at all times. Additional chlorine has been added to the water supply, as per Northern Health's recommendations. Unfortunately, this action has resulted in exceedances of chlorine residual elements in the City's supply. These levels are the subject of continued monitoring, however Northern Health has indicated that, "although the chlorination process may create the formation of disinfection byproducts the health risk associated with not having disinfection is a greater risk to public health" (NHA Inspection Report, July 24th, 2018).

Nevertheless, a Water Quality Advisory was put into place beginning in October of 2020 due to persistent elevated turbidity levels in the City's water supply.

Water Quality Advisory Event Details and Improvements to Turbidity Response Planning

In October of 2020, as a result of upstream construction activities on the Woodworth Lake Dam and elevated rainfall levels throughout the summer and into the fall, turbidity levels within Shawatlan Lake rose above 1 NTU and remained above that level for an extended period of time. Though there were no indications that the City's treatment at these turbidity levels was insufficient, out of an abundance of caution, Northern Health placed a Water Quality Advisory on the City's drinking water system.

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In response to the Water Quality Advisory, the City and Northern Health began working together to develop a Turbidity Response Plan to guide how the City's operators would respond to elevated turbidity events in the future. Reviewing the City's existing treatment capacity and historic turbidity levels, a plan was developed which created clear steps to be followed for a turbidity events of varying severity. The plan outlined the increased testing and monitoring steps that would be undertaken when elevated turbidity is encountered, and established clear thresholds for instituting Water Quality Advisories or Boil Water Advisories in future.

Once this plan was reviewed and approved by Northern Health, and implemented by City operators, the Water Quality Advisory was removed, in April of 2021.

Compliance with Operating Permit Requirements

The City is in compliance with Operating Permit Requirements, and has made significant strides towards the implementation of a new treatment system that will employ multiple barriers of treatment – which is the ultimate directive of Northern Health. As noted previously, as a component of requirements, the City implemented a system of public information and education on personal protective measures for metal leaching and corrosion control [due to lead components in interior plumbing]. The City released a flier to households in Spring of 2018 and again in 2019 describing steps residents can take to reduce the leaching of lead into their household water from the outdated pipes in their home or business. In addition, in 2019 we released a free home testing/field sampling program through our online survey portal, Rupert Talks, which housed several informational resources regarding water quality, in both written and video formats. That page was visited 560 times, and 165 people applied to be part of the home testing program. In addition, videos posted to both Youtube and Facebook explaining the potential for lead leaching from home plumbing, and planned upgrades to the City's water treatment system were viewed over 7200 times in 2019.

For Additional Information:

Contact:

Garin Gardiner, Public Works Manager

(250) 624 6795 ext. 206

garin.gardiner@princerupert.ca

For more information regarding water quality standards, the following links may be of interest:

Northern Health website: http://www.healthspace.ca/nha

Guidelines for Canadian Drinking Water Quality: <u>http://www.hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php</u>

For a record of actual rainfall events please navigate to the City Hall Weather Station

Summary

The City of Prince continues to prioritize the replacement of aged water supply infrastructure located across the harbour at the dam site. In 2018, work initiated in 2016-2017 was completed to renew and bury our water supply line and build an associated access road. Greater security and water quality certainty has been achieved through burying the supply line, currently subject to falling trees and landslides. Additionally, an access road will permit quality checks in all weather conditions, and ease of access in case of any incident or emergency.

As noted throughout this Report, the eventual goal for the City is the full replacement of water supply infrastructure – including the dam and submarine lines, and a water treatment plant. Construction on the Woodworth Lake Dam began in 2020, and work is currently underway replacing this historic and significant piece of the community's drinking water infrastructure. In addition, the City has begun taking steps to develop a comprehensive new water treatment facility, having engaged with consultants in 2020 to review the City's water chemistry and begin value engineering towards an eventual design.

APPENDICES



Appendix A: Map of Sampling Locations

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DRAFT FOR APPROVAL

Appendix B: Operating Permit

PERMIT TO OPERATE

A Drinking Water System with 301-10000 Connections

System Name: Physical Location: Prince Rupert CWS 424 3rd Avenue West Prince Rupert BC

City Of Prince Rupert

Owner Name:

Conditions of Permit

>Maintain a minimum of 20 water bacteriology samples per month unless the Environmental Health Officer requests a >Maintain a minimum of 1 water protozoology (Giardia and Cryptosporidium) sample per month, unless the

>Minimum chlorine residual of 0.2 ppm shall be maintained within the distribution system and monitored daily. >Submit water chemistry data every 6 months, unless the Environmental Health Officer requests a greater frequency.

>An up-to-date Emergency Response plan shall be maintained. >Operator must be trained and certified to the level specified by the Environmental Operators Certification Program. >Monitor water quality parameters in accordance with the Giardia Treatment Monitoring Plan and maintain a

sufficient free available chlorine concentration to achieve at least a 3-log inactivation of Giardia cysts. >By 01 January 2022, propose and conduct random daytime sampling for lead and copper at residential sites in accordance with section "3.1.1 Monitoring in residential dwellings" in the Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Lead. The proposal and results from sampling must be submitted to the

>By 01 January, 2022, propose water treatment that: a) meets the 4-3-2-1-0 treatment objectives given in the Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia guidelines, b) includes corrective measure(s) for reducing corrosion of lead-containing materials at residential sites and c) will reduce levels of trihalomethanes and haloacetic acids to below their respective maximum acceptable concentrations given in the Guidelines for Canadian Drinking Water Guality. The proposal must be in the form of construction permit

>By 01 January, 2024 implement water treatment that a) meets the 4-3-2-1-0 treatment objectives given in the Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia guidelines, b) includes corrective measure(s) for reducing corrosion of lead-containing materials at residential sites and c) will reduce levels orrective measure(s) for reducing concision of read-containing materials at residential sites and by win reduce rever of trihalomethanes and haloacetic acids to below their respective maximum acceptable concentrations given in the Guidelines for Canadian Drinking Water Quality.

>After implementation of corrective measure(s) for reducing corrosion of lead-containing materials at residential sites, conduct sampling for lead and copper levels to investigate the effectiveness of the measure(s) used to control corrosion. Sampling is to be conducted in accordance with the "option 1 (two-tier protocol)" given in Health Canada's Guidance on Controlling Corrosion in Drinking Water Distribution Systems. The concentration of lead needs to be less than or equal to 0.015 mg/L in at least 90% of the samples collected at residential sites.

1-Jul-1992 Effective Permit Date

mehal **Environmental Health Officer**





10-411-7011 (LC - Appr. - 06/11pc)

DRAFT FOR APPROVAL

Appendix C: Lab Test Results

See following pages.



1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8 Telephone (888) 529-0847 Fax (403) 5290852 hyperion@telusplanet.net







To:	Garin Gardiner	Sample Date: 02-Jan-20	Project #:
	City of Prince Rupert, Public Works	Sample Type: Raw	Upload to DB?:
	424-3 Ave W	LIMS:	Field pH:
	V8I 1L7	Volume Filtered (L): 285.76	Field Temp ^O C:
	(250) 627-0906	Rec'd within 96h?: Yes	Field Turb (NTU):
garin.	gardiner@princerupert.ca	Arrival Temp <20 [°] C?: Yes	Sample Location: Shawtlans Lake

The methodology used to produce this report conforms to USEPA Method 1623 unless indicated otherwise below. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025 standard.

CYSTS/OOCYSTS		Giardia	Crypto.
API+/empty: Probably	y Dead	2	0
API-/Probably Alive		0	0
Detection Limit: 0 e detection limit is calcul st or oocyst observed in t).35 cysts lated assum the Sample	or oocysts/1 iing a minimu Equivalent V	.00L m of 1 olume
RE	SULTS		
<u>RE</u> Giardia	<u>SULTS</u> 0.7	cysts/1	00 L
<u>RE</u> Giardia yptosporidium	SULTS 0.7 0.0	cysts/1 oocysts	00 L /100 L

Processing Data				
Date/Time Received:	1/6/2020 12:20:00 PM			
Sample Temp. on arrival ^o C:	8.2			
Lab ID:	60002			
Filter Type:	Filta-Max			
Date/Time Conc:	1/6/2020 1:45:00 PM			
Concentration Analyst:	CW			
IMS System:	DynaBeads GC Combo			
IMS Lot No:	00745034			
Pellet Vol (mL):	0.3			
Resusp Vol (uL):	100			
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo			
Monoclonal Antibody Lot No:	C36,G34			
Control G:	4			
Control C:	4			
Date/Time Stained:	1/7/2020 11:30:00 AM			
Staining Analyst:	CW			
Microscope Analyst:	KW			
Vol Used (uL):	100			
Sample Equivalent Volume (L):	285.8			

Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2	018-19
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

in whichig

Peter M. Wallis, Ph.D.



1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8 Telephone (888) 529-0847 Fax (403) 5290852 hyperion@telusplanet.net





To:	Garin Gardiner	Sample Date: 06-Feb-20	Project #:
	City of Prince Rupert, Public Works	Sample Type: Raw	Upload to DB?:
	424-3 Ave W	LIMS:	Field pH:
	Prince Rupert BC V8I 1L7	Volume Filtered (L): 250.8	Field Temp ^o C:
	(250) 627-0906	Rec'd within 96h?: No	Field Turb (NTU):
garin.	gardiner@princerupert.ca	Arrival Temp <20 ° C?: Yes	Sample Location: Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623 unless indicated otherwise below. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025 standard.

# CYSTS/OOCYSTS		Giardia	Crypto.
DAPI+/empty: Probably	Dead	2	0
DAPI-/Probably Alive		0	1
Detection Limit: 0	.40 cysts	or oocysts/1	100L
he detection limit is calculated with the detection limit is calculated by the detection of	ated assum ne Sample	ing a minimu Equivalent V	m of 1 olume
RES	SULTS		
Giardia	0.8	cysts/1	00 L
	0.4	oocysts	s/100 L
ryptosporidium	0.4	•	

Processing Data				
Date/Time Received:	2/11/2020 12:30:00 PM			
Sample Temp. on arrival ^o C:	13			
Lab ID:	60073			
Filter Type:	Filta-Max			
Date/Time Conc:	2/11/2020 1:30:00 PM			
Concentration Analyst:	CW			
IMS System:	DynaBeads GC Combo			
IMS Lot No:	00768852			
Pellet Vol (mL):	0.4			
Resusp Vol (uL):	100			
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo			
Monoclonal Antibody Lot No:	C36 G34			
Control G:	4			
Control C:	4			
Date/Time Stained:	2/12/2020 11:20:00 AM			
Staining Analyst:	CW			
Microscope Analyst:	KW			
Vol Used (uL):	100			
Sample Equivalent Volume (L):	250.8			

Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2	2018-19
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

Analyst:

much Clig

Peter M. Wallis, Ph.D.



Hyperion Research Ltd. 1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8





Telephone (888) 529-0847 Fax (403) 5290852 hyperion@telusplanet.net

То:	Garin Gardiner City of Prince Rupert, Public Works 424-3 Ave W Prince Rupert BC V8J 1L7	Sample Date: 18-Feb-20 Sample Type: Raw LIMS: Volume Filtered (L): 250.8	Project #: Upload to DB?: Field pH: Field Temp ^O C:
	(250) 627-0906	Rec'd within 96h?: Yes	Field Turb (NTU):
garin.g	gardiner@princerupert.ca	Arrival Temp <20 ^o C?: Yes	Sample Location: Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623 unless indicated otherwise below. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025

# CYSTS/OOCYSTS		Giardia	Crypto.
DAPI+/empty: Probably Dead 1 0			0
DAPI-/Probably Alive 1 0			0
Detection Limit: 0	.40 cysts	or oocysts/1	.00L
The detection limit is calcul	ated assur	ning a minimu	$\lim_{T \to 0} \operatorname{of} 1$
cyst or oocyst observed in t	he Sample		olume
cyst or oocyst observed in t	be Sample		olume
cyst or oocyst observed in t <u>RES</u> <i>Giardia</i>	60.8	cysts/1	00 L
cyst or oocyst observed in t <u>RES</u> <i>Giardia</i> <i>Cryptosporidium</i>	6 <u>ULTS</u> 0.8 0.0	cysts/1 oocysts	00 L /100 L

Processing Data				
Date/Time Received:	2/20/2020 12:00:00 PM			
Sample Temp. on arrival ^o C:	7			
Lab ID:	60095			
Filter Type:	Filta-Max			
Date/Time Conc:	2/21/2020 12:15:00 PM			
Concentration Analyst:	CW			
IMS System:	DynaBeads GC Combo			
IMS Lot No:	00768852			
Pellet Vol (mL):	0.5			
Resusp Vol (uL):	100			
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo			
Monoclonal Antibody Lot No:	C36,G34			
Control G:	4			
Control C:	4			
Date/Time Stained:	2/24/2020 11:25:00 AM			
Staining Analyst:	CW			
Microscope Analyst:	KW			
Vol Used (uL):	100			
Sample Equivalent Volume (L):	250.8			

Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2018-19	
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

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Peter M. Wallis, Ph.D.









To: Sample Date: **Project #:** Garin Gardiner 04-Mar-20 City of Prince Rupert, Public Works Sample Type: Raw Upload to DB?: 424-3 Ave W Field pH: LIMS: Prince Rupert BC Field Temp ^oC: Volume Filtered (L): 276.3 V8J 1L7 Field Turb (NTU): Rec'd within 96h?: Yes (250) 627-0906 Sample Location: garin.gardiner@princerupert.ca Arrival Temp <20^o C?: Yes Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623 unless indicated otherwise below. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025

# CYSTS/OOCYSTS		Giardia	Crypto.
DAPI+/empty: Probably	Dead	1	0
DAPI-/Probably Alive		0	1
Detection Limit: 0.	.36 cysts	or oocysts/1	00L
The detection limit is calcul	ated assur	ning a minimu	um of 1
yst of obeyst observed in t	ne Sample	Equivalent V	olume
<u>RES</u>	SULTS	Equivalent V	olume
RES Giardia	SULTS 0.4	cysts/1	000 L
<u>RES</u> Giardia ryptosporidium	0.4 0.4	cysts/1 oocysts	00 L /100 L

Comments:

C

Processing Data			
Date/Time Received:	3/6/2020 12:10:00 PM		
Sample Temp. on arrival ^o C:	14		
Lab ID:	60119		
Filter Type:	Filta-Max		
Date/Time Conc:	3/6/2020 1:30:00 PM		
Concentration Analyst:	CW		
IMS System:	DynaBeads GC Combo		
IMS Lot No:	00768852		
Pellet Vol (mL):	0.5		
Resusp Vol (uL):	100		
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo		
Monoclonal Antibody Lot No:	C36 G34		
Control G:	4		
Control C:	4		
Date/Time Stained:	3/9/2020 11:40:00 AM		
Staining Analyst:	CW		
Microscope Analyst:	KW		
Vol Used (uL):	100		

Sample Equivalent Volume (L): 276.3

Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2018-19	
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

1 much clig

Peter M. Wallis, Ph.D.









To: Sample Date: 15-Apr-20 **Project #:** Garin Gardiner City of Prince Rupert, Public Works Sample Type: Raw Upload to DB?: 424-3 Ave W Field pH: LIMS: Prince Rupert BC Field Temp ^oC: Volume Filtered (L): 237.1 V8J 1L7 Field Turb (NTU): Rec'd within 96h?: Yes (250) 627-0906 Sample Location: garin.gardiner@princerupert.ca Arrival Temp <20^o C?: Yes Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623 unless indicated otherwise below. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025

Raw Counts in Sam	ple Eq	uivalent V	olume
# CYSTS/OOCYSTS		Giardia	Crypto.
DAPI+/empty: Probably	Dead	0	0
DAPI-/Probably Alive		1	0
Detection Limit: 0.	42 cysts	or oocysts/1	00L
The detection limit is calculated over the contract of the con	ated assur	ning a minimu Equivalent V	um of 1 Volume
	ie Sample	Equivalent	olume
RES	SULTS		orume
<u>RES</u> Giardia	<u>5ULTS</u> 0.4	cysts/1	00 L
<u>RES</u> Giardia Cryptosporidium	<u>SULTS</u> 0.4 0.0	cysts/10 oocysts	00 L /100 L

Comments:

Processing Data			
Date/Time Received:	4/17/2020 11:00:00 AM		
Sample Temp. on arrival ^o C:	12		
Lab ID:	60189		
Filter Type:	Filta-Max		
Date/Time Conc:	4/17/2020 11:55:00 AM		
Concentration Analyst:	AN		
IMS System:	DynaBeads GC Combo		
IMS Lot No:	00768852		
Pellet Vol (mL):	0.3		
Resusp Vol (uL):	100		
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo		
Monoclonal Antibody Lot No:	C36 G34		
Control G:	4		
Control C:	4		
Date/Time Stained:	4/20/2020 11:30:00 AM		
Staining Analyst:	CW		
Microscope Analyst:	KW		
Vol Used (uL):	100		
Sample Equivalent Volume (L):	237.1		

Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2	018-19
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

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Peter M. Wallis, Ph.D.









To: Sample Date: **Project #:** Garin Gardiner 04-May-20 City of Prince Rupert, Public Works Sample Type: Upload to DB?: Raw 424-3 Ave W Field pH: LIMS: Prince Rupert BC Field Temp ^oC: Volume Filtered (L): 261.1 V8J 1L7 Field Turb (NTU): Rec'd within 96h?: Yes (250) 627-0906 Sample Location: garin.gardiner@princerupert.ca Arrival Temp <20^o C?: Yes Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623 unless indicated otherwise below. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025

Raw Counts in Sam	ple Eq	uivalent V	olume
# CYSTS/OOCYSTS		Giardia	Crypto.
DAPI+/empty: Probably	Dead	2	1
DAPI-/Probably Alive		0	0
Detection Limit: 0	.38 cysts	or oocysts/1	.00L
cyst or oocyst observed in t	he Sample	Equivalent V	Volume
RES	SULTS		
<u>RES</u> Giardia	SULTS 0.8	cysts/1	00 L
<u>RES</u> Giardia Cryptosporidium	<u>SULTS</u> 0.8 0.4	cysts/1 oocysts	00 L /100 L

201	nm	on	te.
201		CII	ιs.

Processing Data			
Date/Time Received:	5/7/2020 12:30:00 PM		
Sample Temp. on arrival ^o C:	19		
Lab ID:	60236		
Filter Type:	Filta-Max		
Date/Time Conc:	5/7/2020 3:08:00 PM		
Concentration Analyst:	SS		
IMS System:	DynaBeads GC Combo		
IMS Lot No:	00798048		
Pellet Vol (mL):	0.4		
Resusp Vol (uL):	100		
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo		
Monoclonal Antibody Lot No:	C36 G34		
Control G:	4		
Control C:	4		
Date/Time Stained:	5/8/2020 11:27:00 AM		
Staining Analyst:	SS		
Microscope Analyst:	KW		
Vol Used (uL):	100		
Sample Equivalent Volume (L):	261.1		

Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2	2018-19
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

much Clig

Peter M. Wallis, Ph.D.



1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8

Telephone (888) 529-0847 Fax (403) 5290852 hyperion@telusplanet.net

To:	Garin Gardiner	Sample Date: 03-Jun-20	Project #:
	City of Prince Rupert, Public Works	Sample Type: Raw	Upload to DB?:
	424-3 Ave W	LIMS:	Field pH:
	Prince Rupert BC V8I 1I 7	Volume Filtered (L): 181.26	Field Temp ^o C:
	(250) 627-0906	Rec'd within 96h?: Yes	Field Turb (NTU):
garin	.gardiner@princerupert.ca	Arrival Temp <20 [°] C?: Yes	Sample Location: Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025:2017 standard.

Raw Counts in Sample Equivalent Volume

# CYSTS/OOCYSTS	Giardia	Crypto.
DAPI+/empty: Probably Dead	0	0
DAPI-/Probably Alive	0	0
Detection Limit: 0.55 cysts or	oocysts/1	00L
The detection limit is calculated assuming a minimum of 1 cyst or oocyst observed in the Sample Equivalent Volume		

<u>RESULTS</u>

Giardia Cryptosporidium 0.0 cysts/100 L 0.0 oocysts/100 L

A value of '0' really means below the detection limitThese results apply to this sample only.

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Comments:

Processing	Processing Data			
Date/Time Received:	6/8/2020 12:05:00 PM			
Sample Temp. on arrival ^o C:	18			
Lab ID:	60304			
Filter Type:	Filta-Max			
Date/Time Conc:	6/8/2020 2:20:00 PM			
Concentration Analyst:	AN			
IMS System:	DynaBeads GC Combo			
IMS Lot No:	00798048			
Pellet Vol (mL):	0.3			
Resusp Vol (uL):	100			
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo			
Monoclonal Antibody Lot No:	C36 G34			
Control G:	4			
Control C:	4			
Date/Time Stained:	6/9/2020 11:10:00 AM			
Staining Analyst:	CW			
Microscope Analyst:	KW			
Vol Used (uL):	100			
Sample Equivalent Volume (L):	181 3			

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Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2018-19	
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

Analyst:

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1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8

Telephone (888) 529-0847 Fax (403) 5290852 hyperion@telusplanet.net

To:	Garin Gardiner	Sample Date: 10-Jul-20	Project #:
	City of Prince Rupert, Public Works	Sample Type: Raw	Upload to DB?:
	424-3 Ave W	LIMS:	Field pH:
	Prince Rupert BC	Volume Filtered (L): 258.4	Field Temp ^o C:
	(250) 627-0906	Rec'd within 96h?: Yes	Field Turb (NTU):
garin	.gardiner@princerupert.ca	Arrival Temp <20 [°] C?: No	Sample Location: Shawatlans

The methodology used to produce this report conforms to USEPA Method 1623. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025:2017 standard.

Raw Counts in Sample Equivalent Volume

# CYSTS/OOCYSTS	Giardia	Crypto.	
DAPI+/empty: Probably Dead	1	1	
DAPI-/Probably Alive	0	0	
Detection Limit: 0.39 cysts or	oocysts/1	00L	
The detection limit is calculated assuming a minimum of 1 cyst or oocyst observed in the Sample Equivalent Volume			

<u>RESULTS</u>

Giardia Cryptosporidium 0.4 cysts/100 L 0.4 oocysts/100 L

A value of '0' really means below the detection limitThese results apply to this sample only.

Comments:

Processing Data			
Date/Time Received:	7/13/2020 12:10:00 PM		
Sample Temp. on arrival ^o C:	21		
Lab ID:	60370		
Filter Type:	Filta-Max		
Date/Time Conc:	7/15/2020 12:10:00 PM		
Concentration Analyst:	CS		
IMS System:	DynaBeads GC Combo		
IMS Lot No:	00846071		
Pellet Vol (mL):	0.3		
Resusp Vol (uL):	100		
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo		
Monoclonal Antibody Lot No:	C36 G34		
Control G:	4		
Control C:	4		
Date/Time Stained:	7/16/2020 12:30:00 PM		
Staining Analyst:	CS		
Microscope Analyst:	KW		
Vol Used (uL):	100		
Sample Equivalent Volume (L):	258.4		

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Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2018-19	
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

Analyst:

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1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8

Telephone (888) 529-0847 Fax (403) 5290852 hyperion@telusplanet.net

To:	Garin Gardiner	Sample Date: 10-Aug-20	Project #:
	City of Prince Rupert, Public Works	Sample Type: Raw	Upload to DB?:
	424-3 Ave W	LIMS:	Field pH:
	Prince Rupert BC V8I 1I 7	Volume Filtered (L): 272.01	Field Temp ^o C:
	(250) 627-0906	Rec'd within 96h?: Yes	Field Turb (NTU):
garin	.gardiner@princerupert.ca	Arrival Temp <20 [°] C?: Yes	Sample Location: Shawatlans

The methodology used to produce this report conforms to USEPA Method 1623. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025:2017 standard.

Raw Counts in Sample Equivalent Volume

# CYSTS/OOCYSTS	Giardia	Crypto.
DAPI+/empty: Probably Dead	1	0
DAPI-/Probably Alive	0	0
Detection Limit: 0.37 cysts or	oocysts/1	00L
The detection limit is calculated assuming a minimum of 1 cyst or oocyst observed in the Sample Equivalent Volume		

<u>RESULTS</u>

Giardia Cryptosporidium 0.4 cysts/100 L 0.0 oocysts/100 L

A value of '0' really means below the detection limitThese results apply to this sample only.

Comments:

Date/Time Received: 8/13/2020 12:15:00 PM Sample Temp. on arrival ^oC: 17 Lab ID: 60410 Filter Type: Filta-Max Date/Time Conc: 8/13/2020 2:05:00 PM Concentration Analyst: SS IMS System: DynaBeads GC Combo IMS Lot No: 00846071 Pellet Vol (mL): 0.4 Resusp Vol (uL): 100 MAb Conjugate: Giardi-a-Glo; Crypt-a-Glo

Monoclonal Antibody Lot No:

Sample Equivalent Volume (L): 272.0

Control G:

Control C:

Date/Time Stained:

Microscope Analyst: Vol Used (uL):

Staining Analyst:

Processing Data

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Method 1623 Quality Control Data

G34 C36

8/14/2020 11:35:00 AM

4

4

SS

KW

100

	Lab Water Spike 2018		Matrix Spike 2018-19	
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

Analyst:

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1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8

Telephone (888) 529-0847 Fax (403) 5290852 hyperion@telusplanet.net

To:	Garin Gardiner	Sample Date: 18-Aug-20	Project #:
	City of Prince Rupert, Public Works	Sample Type: Raw	Upload to DB?:
	424-3 Ave W	LIMS:	Field pH:
	V8I 1L7	Volume Filtered (L): 190	Field Temp ^O C:
	(250) 627-0906	Rec'd within 96h?: Yes	Field Turb (NTU):
garin	.gardiner@princerupert.ca	Arrival Temp <20 ^o C?: Yes	Sample Location: Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025:2017 standard.

Raw Counts in Sample Equivalent Volume

# CYSTS/OOCYSTS	Giardia	Crypto.	
DAPI+/empty: Probably Dead	1	0	
DAPI-/Probably Alive	0	0	
Detection Limit: 0.79 cysts or	oocysts/1	00L	
The detection limit is calculated assuming a minimum of 1 cyst or oocyst observed in the Sample Equivalent Volume			

<u>RESULTS</u>

Giardia Cryptosporidium 0.8 cysts/100 L 0.0 oocysts/100 L

- A value of '0' really means below the detection limit

- These results apply to this sample only.

Comments:

Processing Data			
Date/Time Received:	8/20/2020 12:30:00 PM		
Sample Temp. on arrival ^o C:	14		
Lab ID:	60426		
Filter Type:	Filta-Max		
Date/Time Conc:	8/20/2020 2:15:00 PM		
Concentration Analyst:	SS		
IMS System:	DynaBeads GC Combo		
IMS Lot No:	00846071		
Pellet Vol (mL):	0.8		
Resusp Vol (uL):	100		
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo		
Monoclonal Antibody Lot No:	C36 G34		
Control G:	4		
Control C:	4		
Date/Time Stained:	8/21/2020 12:00:00 PM		
Staining Analyst:	CS		
Microscope Analyst:	KW		
Vol Used (uL):	67		
Sample Equivalent Volume (L):	127 3		

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Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2018-19	
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

Analyst:

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1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8

Telephone (888) 529-0847 Fax (403) 5290852 hyperion@hyperionlab.ca

To:	Garin Gardiner	Sample Date: 09-Sep-20	Project #:
	City of Prince Rupert, Public Works	Sample Type: Raw	Upload to DB?:
	424-3 Ave W	LIMS:	Field pH:
	Prince Rupert BC V8I 1I 7	Volume Filtered (L): 302.9	Field Temp ^o C:
	(250) 627-0906	Rec'd within 96h?: No	Field Turb (NTU):
garin	.gardiner@princerupert.ca	Arrival Temp <20 [°] C?: Yes	Sample Location: Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025:2017 standard.

Raw Counts in Sample Equivalent Volume

# CYSTS/OOCYSTS	Giardia	Crypto.
DAPI+/empty: Probably Dead	0	1
DAPI-/Probably Alive	1	0
Detection Limit: 0.33 cysts or	oocysts/1	00L
The detection limit is calculated assuming a minimum of 1 cyst or oocyst observed in the Sample Equivalent Volume		

<u>RESULTS</u>

Giardia Cryptosporidium 0.3 cysts/100 L 0.3 oocysts/100 L

A value of '0' really means below the detection limitThese results apply to this sample only.

Comments:

Processing Data			
Date/Time Received:	9/14/2020 1:15:00 PM		
Sample Temp. on arrival ^o C:	16		
Lab ID:	60459		
Filter Type:	Filta-Max		
Date/Time Conc:	9/14/2020 2:15:00 PM		
Concentration Analyst:	CW		
IMS System:	DynaBeads GC Combo		
IMS Lot No:	00846071		
Pellet Vol (mL):	0.2		
Resusp Vol (uL):	100		
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo		
Monoclonal Antibody Lot No:	C36 G34		
Control G:	4		
Control C:	4		
Date/Time Stained:	9/15/2020 11:30:00 AM		
Staining Analyst:	CW		
Microscope Analyst:	KW		
Vol Used (uL):	100		
Sample Equivalent Volume (L):	302.9		

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Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2018-19	
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

Analyst:

much Clig



1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8

Telephone (888) 529-0847 Fax (403) 5290852 hyperion@hyperionlab.ca

To:	Garin Gardiner	Sample Date: 07-Oct-20	Project #:
	City of Prince Rupert, Public Works	Sample Type: Raw	Upload to DB?:
	424-3 Ave W	LIMS:	Field pH:
	Prince Rupert BC V8I 1I 7	Volume Filtered (L): 297.16	Field Temp ^o C:
	(250) 627-0906	Rec'd within 96h?: Yes	Field Turb (NTU):
garin	.gardiner@princerupert.ca	Arrival Temp <20 ^o C?: Yes	Sample Location: Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025:2017 standard.

Raw Counts in Sample Equivalent Volume

# CYSTS/OOCYSTS	Giardia	Crypto.	
DAPI+/empty: Probably Dead	1	0	
DAPI-/Probably Alive	1	0	
Detection Limit: 0.34 cysts or	oocysts/1	00L	
The detection limit is calculated assuming a minimum of 1 cyst or oocyst observed in the Sample Equivalent Volume			

<u>RESULTS</u>

Giardia Cryptosporidium 0.7 cysts/100 L 0.0 oocysts/100 L

A value of '0' really means below the detection limitThese results apply to this sample only.

Comments:

Processing Data			
Date/Time Received:	10/9/2020 9:45:00 AM		
Sample Temp. on arrival ^o C:	12		
Lab ID:	60494		
Filter Type:	Filta-Max		
Date/Time Conc:	10/9/2020 1:45:00 PM		
Concentration Analyst:	CW		
IMS System:	DynaBeads GC Combo		
IMS Lot No:	00864321		
Pellet Vol (mL):	0.5		
Resusp Vol (uL):	100		
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo		
Monoclonal Antibody Lot No:	C36 G34		
Control G:	4		
Control C:	4		
Date/Time Stained:	10/13/2020 11:20:00 AM		
Staining Analyst:	CW		
Microscope Analyst:	KW		
Vol Used (uL):	100		
Sample Equivalent Volume (L):	297.2		

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Method 1623 Quality Control Data

	Lab Water Spike 2018		Matrix Spike 2018-19	
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

Analyst:

1 mulicia



⁷ 1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8

Telephone (888) 529-0847 Fax (403) 5290852 hyperion@hyperionlab.ca

To:	Garin Gardiner	Sample Date: 09-Nov-20	Project #:
	City of Prince Rupert, Public Works	Sample Type: Raw	Upload to DB?:
	424-3 Ave W	LIMC.	Field pH:
	Prince Rupert BC		Field Temp ^o C:
	V8J 1L7	Volume Filtered (L): 229	Field Turb (NTU):
	(250) 627-0906	Rec'd within 96h?: No	
garin	.gardiner@princerupert.ca	Arrival Temp <20 ^o C?: Yes	Sample Location: Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025:2017 standard.

Raw Counts in Sample Equivalent Volume

# CYSTS/OOCYSTS	Giardia	Crypto.
DAPI+/empty: Probably Dead	0	0
DAPI-/Probably Alive	0	0
Detection Limit: 0.44 cysts or	oocysts/1	00L

The detection limit is calculated assuming a minimum of 1 cyst or oocyst observed in the Sample Equivalent Volume

<u>RESULTS</u>

Giardia Cryptosporidium 0.0 cysts/100 L 0.0 oocysts/100 L

A value of '0' really means below the detection limitThese results apply to this sample only.

Comments: Sample delayed by weather.

Processing	<u>g Data</u>
Date/Time Received:	11/16/2020 10:50:00 AM
Sample Temp. on arrival ^o C:	11
Lab ID:	60556
Filter Type:	Filta-Max
Date/Time Conc:	11/16/2020 1:05:00 PM
Concentration Analyst:	CW
IMS System:	DynaBeads GC Combo
IMS Lot No:	00900848
Pellet Vol (mL):	0.5
Resusp Vol (uL):	100
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo
Monoclonal Antibody Lot No:	C36, G34
Control G:	4
Control C:	4
Date/Time Stained:	11/17/2020 11:15:00 AM
Staining Analyst:	CW
Microscope Analyst:	PW
Vol Used (uL):	100
Sample Equivalent Volume (L):	229.0

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Method 1623 Quality Control Data

	Lab Water Spik	e 2018	Matrix Spike 2	018-19
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

Analyst:

1 mulicia



1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8

Telephone (888) 529-0847 Fax (403) 5290852 hyperion@hyperionlab.ca

To:	Garin Gardiner	Sample Date: 07-Dec-20	Project #:
	City of Prince Rupert, Public Works	Sample Type: Raw	Upload to DB?:
	424-3 Ave W		Field pH:
	Prince Rupert BC		Field Temp ^o C:
	V8J 1L7	Volume Filtered (L): 231.8	Field Turb (NTU):
	(250) 627-0906	Rec'd within 96h?: Yes	Sample Location:
garin	.gardiner@princerupert.ca	Arrival Temp <20 [°] C?: Yes	Shawatlans Lake

The methodology used to produce this report conforms to USEPA Method 1623. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025:2017 standard.

Raw Counts in Sample Equivalent Volume

# CYSTS/OOCYSTS	Giardia	Crypto.
DAPI+/empty: Probably Dead	0	0
DAPI-/Probably Alive	0	0
Detection Limit: 0.43 cysts or	oocysts/1	00L
The detection limit is calculated assumin cyst or oocyst observed in the Sample Ed	g a minimu quivalent V	um of 1 Volume

<u>RESULTS</u>

Giardia Cryptosporidium 0.0 cysts/100 L 0.0 oocysts/100 L

A value of '0' really means below the detection limitThese results apply to this sample only.

- These results apply to this sample

Comments:

Processing	<u>g Data</u>
Date/Time Received:	12/9/2020 1:00:00 PM
Sample Temp. on arrival ^o C:	12
Lab ID:	60605
Filter Type:	Filta-Max
Date/Time Conc:	12/11/2020 2:30:00 AM
Concentration Analyst:	CW
IMS System:	DynaBeads GC Combo
IMS Lot No:	00900848
Pellet Vol (mL):	0.5
Resusp Vol (uL):	100
MAb Conjugate:	Giardi-a-Glo; Crypt-a-Glo
Monoclonal Antibody Lot No:	C36 G34
Control G:	4
Control C:	4
Date/Time Stained:	12/11/2020 11:30:00 AM
Staining Analyst:	CW
Microscope Analyst:	KW
Vol Used (uL):	100
Sample Equivalent Volume (L):	231.8

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Method 1623 Quality Control Data

	Lab Water Spik	e 2018	Matrix Spike 2	018-19
	% Recovery	RSD	% Recovery	RSD
Giardia	62.4	22.1	56.0	15.9
Cryptosporidium	51.1	17.7	49.7	20.7

These data indicate ongoing precision and recovery from monthly spiked water samples.

Analyst:

1 mulicia



ANALYTICAL REPORT

Page 1 of 6

City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca

Work Order: N20B129

RECEIVED: 25-Feb-2020

Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 12-Mar-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada,

Environment Canada, the American Public Health Association, or the US EPA.

Northern Laboratories (2010) Ltd.

Dean Browne For Jesse Newton Laboratory Manager



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20B129-01 25-Feb-20 08:34 Frederick Station	N20B129-02 25-Feb-20 08:53 Montreal Circle	N20B129-03 25-Feb-20 10:30 Pillsbury Station	N20B129-04 25-Feb-20 13:59 Shawatlans Lake
	MRL	Units	CDWG		Keservon		
General Parameters (Wa	ter)						
рН	1.0	pH units	7.0-10.5	5.6	5.6	5.6	6.7
Alkalinity (total, as CaCO3) 1	ma/L	-	2	2	2	7
Conductivity	1.0	u\$/cm	-	29.8	29.8	29.2	23.9
Colour	1	PtCo units	AO <= 15	25	29	25	52
Turbidity	0.05	NTU	MAC = 1	0.88	0.71	0.66	0.55
Solids, Total Dissolved / TDS	5 1.0	mg/L	AO <= 500	26	38	24	27
Carbon, Total Organic	0.50	mg/L	-	4.50	4.63	4.36	4.71
Calculated Parameters (Water)						
Nitrate (as N)	0.10	mall	MAC = 10	<0.10	<0.10	<0.10	<0.10
Hardness, Total (as CaCO3)	0.500	mg/L	-	8.26	8.61	8.50	8.36
Anions (Water)							
Chloride	1.0	mg/L	AO <= 250	6.3	6.3	6.1	2.3
Fluoride	0.05	mg/L	MAC = 1.5	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	0.01	mg/L	MAC = 1	< 0.01	< 0.01	< 0.01	< 0.01
Nitrate + Nitrite (as N)	0.10	mg/L	MAC = 10	<0.10	<0.10	<0.10	<0.10
Sulfate	1.0	mg/L	AO <= 500	1.5	1.5	1.5	1.5
Total Metals (Water)							
Aluminum, total	0.0050	ma/L	OG < 0.1	0.116	0.116	0.115	0.114
Antimony total	0.00020	mall	MAC = 0.006	<0.00020	<0.00020	<0.00020	<0.00020
Arsenic total	0.00050	ma/l	MAC = 0.01	<0.00020	<0.00020	<0.00020	<0.00020
Barium, total	0.0050	ma/L	MAC = 1	0.0093	0.0094	0.0093	0.0091
Beryllium, total	0.00010	mg/L	-	<0.00010	< 0.00010	<0.00010	< 0.00010
Bismuth, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010
Boron, total	0.0050	mg/L	MAC = 5	0.0245	0.0272	0.0230	0.0195
Cadmium, total	0.000010	mg/L	MAC = 0.005	<0.000010	<0.000010	<0.000010	<0.000010
Calcium, total	0.20	mg/L	-	2.78	2.90	2.87	2.82
Chromium, total	0.00050	mg/L	MAC = 0.05	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt, total	0.00010	mg/L	-	<0.00010	< 0.00010	<0.00010	< 0.00010
Copper, total	0.00040	mg/L	AO = 1 MAC = 2	0.0357	0.188	0.0626	0.00397
Iron, total	0.010	mg/L	AO <= 0.3	0.256	0.246	0.246	0.243
Lead, total	0.00020	mg/L	MAC = 0.005	<0.00020	0.00043	0.00026	0.00026



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20B129-01 25-Feb-20 08:34 Frederick Station	N20B129-02 25-Feb-20 08:53 Montreal Circle Reservoir	N20B129-03 25-Feb-20 10:30 Pillsbury Station	N20B129-04 25-Feb-20 13:59 Shawatlans Lake
	MRL	Units	CDWG				
Total Metals (continu	ed)						
Lithium, total	0.00010	ma/L	-	0.00022	0.00023	0.00022	0.00022
Magnesium, total	0.010	mg/L	-	0.318	0.332	0.321	0.321
Manganese, total	0.00020	mg/L	AO <= 0.02 MAC = 0.12	0.0155	0.0115	0.0110	0.0121
Mercury, total	0.000010	mg/L	MAC = 0.001	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010
Nickel, total	0.00040	mg/L	-	<0.00040	0.00045	0.00041	<0.00040
Phosphorus, total	0.050	mg/L	-	<0.050	<0.050	<0.050	<0.050
Potassium, total	0.10	mg/L	-	0.33	0.34	0.33	0.33
Selenium, total	0.00050	mg/L	MAC = 0.05	<0.00050	<0.00050	<0.00050	<0.00050
Silicon, total	1.0	mg/L	-	1.1	1.2	1.1	1.1
Silver, total	0.000050	mg/L	-	<0.000050	<0.000050	<0.000050	<0.000050
Sodium, total	0.10	mg/L	AO <= 200	1.03	1.08	1.02	1.02
Strontium, total	0.0010	mg/L	MAC = 7	0.0104	0.0109	0.0107	0.0108
Sulfur, total	3.0	mg/L	-	<3.0	<3.0	<3.0	<3.0
Tellurium, total	0.00050	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050
Thallium, total	0.000020	mg/L	-	<0.000020	<0.000020	<0.000020	<0.000020
Thorium, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010
Tin, total	0.00020	mg/L	-	<0.00020	<0.00020	<0.00020	<0.00020
Titanium, total	0.0050	mg/L	-	<0.0050	<0.0050	<0.0050	<0.0050
Tungsten, total	0.0010	mg/L	-	< 0.0010	<0.0010	<0.0010	<0.0010
Uranium, total	0.000020	mg/L	MAC = 0.02	<0.000020	<0.000020	<0.000020	<0.000020
Vanadium, total	0.0010	mg/L	-	< 0.0010	<0.0010	<0.0010	<0.0010
Zinc, total	0.0040	mg/L	AO <= 5	<0.0040	0.0172	0.0081	<0.0040
Zirconium, total	0.00010	mg/L	-	< 0.00010	< 0.00010	< 0.00010	< 0.00010



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20B129-05 25-Feb-20 09:38 Sourdough Bay Flushing Station
	MRL	Units	CDWG	
General Parameters (W	ater)			
рН	1.0	pH units	7.0-10.5	5.7
Alkalinity (total, as CaCO	3) 1	mg/L	-	2
Conductivity	1.0	u\$/cm	-	29.9
Colour	1	PtCo units	AO <= 15	26
Turbidity	0.05	NTU	MAC = 1	0.55
Solids, Total Dissolved / TE	DS 1.0	mg/L	AO <= 500	30
Carbon, Total Organic	0.50	mg/L	-	4.28
Calculated Parameters	(Water)			
Nitrate (as N)	0.10	mg/L	MAC = 10	<0.10
Hardness, Total (as CaCO3)	0.500	mg/L	-	8.60
Anions (Water)				
Chloride	1.0	mg/L	AO <= 250	6.3
Fluoride	0.05	mg/L	MAC = 1.5	<0.10
Nitrite (as N)	0.01	mg/L	MAC = 1	<0.01
Nitrate + Nitrite (as N)	0.10	mg/L	MAC = 10	<0.10
Sulfate	1.0	mg/L	AO <= 500	1.5
Total Metals (Water)				
Aluminum, total	0.0050	mg/L	OG < 0.1	0.111
Antimony, total	0.00020	ma/L	MAC = 0.006	< 0.00020
Arsenic, total	0.00050	mg/L	MAC = 0.01	< 0.00050
Barium, total	0.0050	mg/L	MAC = 1	0.0095
Beryllium, total	0.00010	mg/L	-	< 0.00010
Bismuth, total	0.00010	mg/L	-	<0.00010
Boron, total	0.0050	mg/L	MAC = 5	0.0179
Cadmium, total	0.000010	mg/L	MAC = 0.005	<0.000010
Calcium, total	0.20	mg/L	-	2.92
Chromium, total	0.00050	mg/L	MAC = 0.05	<0.00050
Cobalt, total	0.00010	mg/L	-	<0.00010
Copper, total	0.00040	mg/L	AO = 1 MAC = 2	0.0439
Iron, total	0.010	mg/L	AO <= 0.3	0.260
Lead, total	0.00020	mg/L	MAC = 0.005	0.00055



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20B129-05 25-Feb-20 09:38 Sourdough Bay Flushing
	MRL	Units	CDWG	Station
Total Metals (contin	ued)			
Lithium, total	0.00010	mg/L	-	0.00023
Magnesium, total	0.010	mg/L	-	0.312
Manganese, total	0.00020	mg/L	AO <= 0.02 MAC = 0.12	0.0110
Mercury, total	0.000010	mg/L	MAC = 0.001	<0.000010
Molybdenum, total	0.00010	mg/L	-	<0.00010
Nickel, total	0.00040	mg/L	-	<0.00040
Phosphorus, total	0.050	mg/L	-	<0.050
Potassium, total	0.10	mg/L	-	0.32
Selenium, total	0.00050	mg/L	MAC = 0.05	<0.00050
Silicon, total	1.0	mg/L	-	1.0
Silver, total	0.000050	mg/L	-	<0.000050
Sodium, total	0.10	mg/L	AO <= 200	0.99
Strontium, total	0.0010	mg/L	MAC = 7	0.0106
Sulfur, total	3.0	mg/L	-	<3.0
Tellurium, total	0.00050	mg/L	-	<0.00050
Thallium, total	0.000020	mg/L	-	<0.000020
Thorium, total	0.00010	mg/L	-	<0.00010
Tin, total	0.00020	mg/L	-	<0.00020
Titanium, total	0.0050	mg/L	-	<0.0050
Tungsten, total	0.0010	mg/L	-	<0.0010
Uranium, total	0.000020	mg/L	MAC = 0.02	<0.000020
Vanadium, total	0.0010	mg/L	-	<0.0010
Zinc, total	0.0040	mg/L	AO <= 5	<0.0040
Zirconium, total	0.00010	mg/L	-	<0.00010



ANALYTICAL REPORT

City of Prince Rupert - Drinking Water

Work Order: N20B129

Glossary of Terms	i de la constante de la constan
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
NTU	Nephelometric Turbidity Units
pH units	pH units
PtCo units	Platinum Colbalt colour units
u\$/cm	Micro Siemens per centimeter
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

CDWG Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf



ANALYTICAL REPORT

Page 1 of 7

City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca Project: Drinking Water Project Number: -Project Manager: Public Works Department

Work Order: N20E065 RECEIVED: 12-May-2020

REPORTED: 27-May-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

Northern Laboratories (2010) Ltd.

f Min

Jesse Newton Laboratory Manager


LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID	MRI	Units	CDWG	N20E065-01 12-May-20 08:45 Frederick Station	N20E065-02 12-May-20 09:15 Montreal Circle Reservoir	N20E065-03 12-May-20 09:43 Sourdough Bay Flushing Station	N20E065-04 12-May-20 13:22 Pillsbury Station
		onns	CDIIO				
General Parameters (Wo	iter)		70105				
рн	1.0	pH units	7.0-10.5	5.9	5.8	6.0	5.8
Alkalinity (total, as CaCO3	3) 1	mg/L	-	3	3	4	3
Conductivity	1.0	u\$/cm	-	29.3	29.3	30.9	29.8
Colour	1	PtCo units	AO <= 15	24	24	23	23
Turbidity	0.05	NTU	MAC = 1	0.87	0.91	0.70	0.74
Solids, Total Dissolved / TDS	S 1.0	mg/L	AO <= 500	58	53	32	44
Carbon, Total Organic	0.50	mg/L	-	4.82	4.29	4.51	4.26
Calculated Parameters ((Water)						
Nitrate (as N)	0.10	mg/L	MAC = 10	<0.10	<0.10	<0.10	<0.10
Hardness, Total (as CaCO3)	0.500	mg/L	-	9.83	9.62	10.6	9.91
Anions (Water)							
Chloride	1.0	mg/L	AO <= 250	5.3	5.7	5.8	5.7
Fluoride	0.05	mg/L	MAC = 1.5	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	0.01	mg/L	MAC = 1	< 0.01	<0.01	<0.01	<0.01
Nitrate + Nitrite (as N)	0.10	mg/L	MAC = 10	<0.10	<0.10	<0.10	<0.10
Sulfate	1.0	mg/L	AO <= 500	1.2	1.2	1.2	1.2
Total Metals (Water)							
Aluminum, total	0.0050	mg/L	OG < 0.1	0.101	0.0973	0.0911	0.0956
Antimony, total	0.00020	ma/l	MAC = 0.006	<0.00020	<0.00020	<0.00020	<0.00020
Arsenic, total	0.00050	ma/L	MAC = 0.01	<0.00050	< 0.00050	< 0.00050	< 0.00050
Barium, total	0.0050	mg/L	MAC = 1	0.0104	0.0099	0.0105	0.0100
Beryllium, total	0.00010	mg/L	_	<0.00010	< 0.00010	<0.00010	< 0.00010
Bismuth, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010
Boron, total	0.0050	mg/L	MAC = 5	0.0574	0.0464	0.0432	0.0345
Cadmium, total	0.000010	mg/L	MAC = 0.005	0.000018	0.000013	0.000019	0.000015
Calcium, total	0.20	mg/L	-	3.40	3.32	3.71	3.45
Chromium, total	0.00050	mg/L	MAC = 0.05	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	< 0.00010
Copper, total	0.00040	mg/L	AO = 1 MAC = 2	0.0222	0.194	0.135	0.0803
Iron, total	0.010	mg/L	AO <= 0.3	0.193	0.177	0.221	0.181
Lead, total	0.00020	mg/L	MAC = 0.005	0.00361	0.00062	0.00143	0.00034



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20E065-01 12-May-20 08:45 Frederick Station	N20E065-02 12-May-20 09:15 Montreal Circle Reservoir	N20E065-03 12-May-20 09:43 Sourdough Bay Flushing Station	N20E065-04 12-May-20 13:22 Pillsbury Station
	MRL	Units	CDWG				
Total Metals (continu	ed)						
Lithium, total	0.00010	mg/L	-	0.00037	0.00014	0.00017	0.00016
Magnesium, total	0.010	mg/L	-	0.323	0.320	0.319	0.315
Manganese, total	0.00020	mg/L	AO <= 0.02 MAC = 0.12	0.00636	0.00498	0.00568	0.00476
Mercury, total	0.000010	mg/L	MAC = 0.001	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum, total	0.00010	mg/L	-	<0.00010	0.00015	<0.00010	<0.00010
Nickel, total	0.00040	mg/L	-	0.00051	0.00049	0.00089	0.00043
Phosphorus, total	0.050	mg/L	-	<0.050	<0.050	<0.050	<0.050
Potassium, total	0.10	mg/L	-	0.37	0.38	0.38	0.37
Selenium, total	0.00050	mg/L	MAC = 0.05	<0.00050	<0.00050	<0.00050	<0.00050
Silicon, total	1.0	mg/L	-	1.0	1.1	1.0	1.1
Silver, total	0.000050	mg/L	-	<0.000050	<0.000050	<0.000050	<0.000050
Sodium, total	0.10	mg/L	AO <= 200	1.02	1.02	1.01	1.01
Strontium, total	0.0010	mg/L	MAC = 7	0.0125	0.0120	0.0126	0.0118
Sulfur, total	3.0	mg/L	-	<3.0	<3.0	<3.0	<3.0
Tellurium, total	0.00050	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050
Thallium, total	0.000020	mg/L	-	<0.000020	<0.000020	<0.000020	<0.000020
Thorium, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010
Tin, total	0.00020	mg/L	-	<0.00020	<0.00020	<0.00020	<0.00020
Titanium, total	0.0050	mg/L	-	<0.0050	<0.0050	<0.0050	<0.0050
Tungsten, total	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Uranium, total	0.000020	mg/L	MAC = 0.02	<0.000020	<0.000020	<0.000020	<0.000020
Vanadium, total	0.0010	mg/L	-	< 0.0010	<0.0010	<0.0010	<0.0010
Zinc, total	0.0040	mg/L	AO <= 5	0.0303	0.0201	0.0415	0.0097
Zirconium, total	0.00010	mg/L	-	< 0.00010	< 0.00010	< 0.00010	< 0.00010



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20E065-05 12-May-20 Shawatlans
	MRL	Units	CDWG	Lake
General Parameters (Wat	er)			
рН	1.0	pH units	7.0-10.5	6.8
Alkalinity (total, as CaCO3)	1	ma/L	-	8
Conductivity	1.0	u\$/cm	-	24.3
Colour	1	PtCo units	AO <= 15	41
Turbidity	0.05	NTU	MAC = 1	0.38
, Solids, Total Dissolved / TDS	1.0	mg/L	AO <= 500	27
Carbon, Total Organic	0.50	mg/L	-	4.25
Calculated Parameters ()	Nater)			
Nitrate (as N)	0.10	ma/l	MAC = 10	<0.10
Hardness, Total (as	0.500	ma/L	-	9.53
CaCO3)				
Anions (Water)				
Chloride	1.0	mg/L	AO <= 250	1.8
Fluoride	0.05	mg/L	MAC = 1.5	<0.10
Nitrite (as N)	0.01	mg/L	MAC = 1	<0.01
Nitrate + Nitrite (as N)	0.10	mg/L	MAC = 10	<0.10
Sulfate	1.0	mg/L	AO <= 500	1.2
Total Metals (Water)				
Aluminum, total	0.0050	mg/L	OG < 0.1	0.0997
Antimony, total	0.00020	mg/L	MAC = 0.006	<0.00020
Arsenic, total	0.00050	mg/L	MAC = 0.01	<0.00050
Barium, total	0.0050	mg/L	MAC = 1	0.0099
Beryllium, total	0.00010	mg/L	-	<0.00010
Bismuth, total	0.00010	mg/L	-	<0.00010
Boron, total	0.0050	mg/L	MAC = 5	0.0291
Cadmium, total 0	.000010	mg/L	MAC = 0.005	0.000011
Calcium, total	0.20	mg/L	-	3.28
Chromium, total	0.00050	mg/L	MAC = 0.05	<0.00050
Cobalt, total	0.00010	mg/L	-	<0.00010
Copper, total	0.00040	mg/L	AO = 1 MAC = 2	0.0139
Iron, total	0.010	mg/L	AO <= 0.3	0.189
Lead, total	0.00020	mg/L	MAC = 0.005	<0.00020
Lithium, total	0.00010	mg/L	-	0.00017



LAB #				N20E065-05
SAMPLED DATE				12-May-20
SAMPLE ID				Shawatlans
	MDI	Unite	CDWG	Lake
	MIKL	UTIIIS	CDIIG	
Total Metals (continu	ied)			
Magnesium, total	0.010	mg/L	-	0.320
Manganese, total	0.00020	mg/L	AO <= 0.02 MAC = 0.12	0.00584
Mercury, total	0.000010	mg/L	MAC = 0.001	<0.000010
Molybdenum, total	0.00010	mg/L	-	<0.00010
Nickel, total	0.00040	mg/L	-	0.00043
Phosphorus, total	0.050	mg/L	-	<0.050
Potassium, total	0.10	mg/L	-	0.37
Selenium, total	0.00050	mg/L	MAC = 0.05	<0.00050
Silicon, total	1.0	mg/L	-	<1.0
Silver, total	0.000050	mg/L	-	<0.000050
Sodium, total	0.10	mg/L	AO <= 200	1.01
Strontium, total	0.0010	mg/L	MAC = 7	0.0122
Sulfur, total	3.0	mg/L	-	<3.0
Tellurium, total	0.00050	mg/L	-	<0.00050
Thallium, total	0.000020	mg/L	-	<0.000020
Thorium, total	0.00010	mg/L	-	<0.00010
Tin, total	0.00020	mg/L	-	<0.00020
Titanium, total	0.0050	mg/L	-	<0.0050
Tungsten, total	0.0010	mg/L	-	< 0.0010
Uranium, total	0.000020	mg/L	MAC = 0.02	<0.000020
Vanadium, total	0.0010	mg/L	-	< 0.0010
Zinc, total	0.0040	mg/L	AO <= 5	0.0108
Zirconium, total	0.00010	mg/L	-	<0.00010



City of Prince Rupert - Drinking Water

Work Order: N20E065

Glossary of Terms	
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
NTU	Nephelometric Turbidity Units
pH units	pH units
PtCo units	Platinum Colbalt colour units
u\$/cm	Micro Siemens per centimeter
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf

norlabs

Sampler Name:

Northern Laboratories (2010) Ltd.

530 3rd Ave W, Prince Rupert, BC V8J 1L8

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Tel: 250.627.1906 Fax: 250.627.8214 info@norlabsltd.com www.norlabsltd.com

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Page 1 of 3

City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 27-Aug-2020

 Work Order:
 N20H078

 RECEIVED:
 11-Aug-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

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Jesse Newton Laboratory Manager



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20H078-01 11-Aug-20 09:23 Frederick Station	N20H078-02 11-Aug-20 10:02 Montreal Circle	N20H078-03 11-Aug-20 10:55 Sourdough Bay Flushing Stn	N20H078-04 11-Aug-20 11:40 Pillsbury
	MRL	Units	CDWG			•	
General Parameters (Wate	er)						
рН	1.0	pH units	7.0-10.5	4.1	5.0	5.0	5.1
Alkalinity (total, as CaCO3)	1	mg/L	-	1	2	2	2
Conductivity	1.0	u\$/cm	-	104	134	59.3	64.0
Colour	1	PtCo units	AO <= 15	26	8	38	40
Turbidity	0.05	NTU	MAC = 1	1.33	1.34	1.33	1.50
Solids, Total Dissolved / TDS	1.0	mg/L	AO <= 500	39	42	42	44
Calculated Parameters (W	(ater)						
Nitrate (as N)	0.10	mg/L	MAC = 10	<0.10	<0.10	<0.10	<0.10
Anions (Water)							
Chloride	1.0	mg/L	AO <= 250	6.3	6.7	6.8	6.8
Fluoride	0.05	mg/L	MAC = 1.5	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	0.01	mg/L	MAC = 1	<0.01	<0.01	<0.01	<0.01
Nitrate + Nitrite (as N)	0.10	mg/L	MAC = 10	<0.10	<0.10	<0.10	<0.10



Work Order: N20H078

LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20H078-05 11-Aug-20 13:20 Shawantlan s lake	
	MRL	Units	CDWG		
General Parameters (Wate	er)				
рН	1.0	pH units	7.0-10.5	6.7	
Alkalinity (total, as CaCO3)	1	mg/L	-	9	
Conductivity	1.0	u\$/cm	-	64.0	
Colour	1	PtCo units	AO <= 15	72	
Turbidity	0.05	NTU	MAC = 1	0.91	
Solids, Total Dissolved / TDS	1.0	mg/L	AO <= 500	35	
Calculated Parameters (W	/ater)				
Nitrate (as N)	0.10	mg/L	MAC = 10	0.10	
Anions (Water)					
Chloride	1.0	mg/L	AO <= 250	1.6	
Fluoride	0.05	mg/L	MAC = 1.5	<0.10	
Nitrite (as N)	0.01	mg/L	MAC = 1	<0.01	
Nitrate + Nitrite (as N)	0.10	mg/L	MAC = 10	0.10	

Glossary of Terms

MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
NTU	Nephelometric Turbidity Units
pH units	pH units
PtCo units	Platinum Colbalt colour units
u\$/cm	Micro Siemens per centimeter
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG

Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf



Page 1 of 6

City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca Project: Drinking Water Project Number: -Project Manager: Public Works Department

Work Order: N20K095 **RECEIVED:** 17-Nov-2020

REPORTED: 24-Dec-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

f Min

Jesse Newton Laboratory Manager



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID	MRI	Units	CDWG	N20K095-01 17-Nov-20 09:20 Montreal Circle Reservoir	N20K095-02 17-Nov-20 08:55 Frederick Station	N20K095-03 17-Nov-20 10:20 Pillsbury Station	N20K095-04 17-Nov-20 09:45 Sourdough Bay Flushing Station
Conoral Paramotors (W	ntor)		02110				
pH	1.0	nH units	7 0-10 5	55	5.3	54	54
Alkalinity (total as CaCO)	3) 1	mall	7.0 10.0	5	3	3	3
Conductivity	1.0	usicm	-	30.8	29.1	29.0	28.8
Colour	1.0	PtCo units	$A \cap \leq 15$	70	27.1	27.0	32
Turbidity	0.0.5	NTH	MAC = 1	123	1.58	1.32	1 23
Solids Total Dissolved / TD	s 10	mall	AO <= 500	45	30	29	29
Carbon, Total Organic	0.50	ma/l	-	5.74	4.92	4.89	4.80
				•			
Calculated Parameters	(Water)						
Nitrate (as N)	0.10	mg/L	MAC = 10	<0.10	<0.10	<0.10	<0.10
Hardness, Total (as CaCO3)	0.500	mg/L	-	8.59	8.52	8.69	8.48
Anions (Water)							
Chloride	1.0	mg/L	AO <= 250	5.7	5.5	5.4	5.6
Fluoride	0.05	mg/L	MAC = 1.5	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	0.01	mg/L	MAC = 1	< 0.01	<0.01	<0.01	< 0.01
Nitrate + Nitrite (as N)	0.10	mg/L	MAC = 10	<0.10	<0.10	<0.10	<0.10
Sulfate	1.0	mg/L	AO <= 500	3.5	1.4	1.3	4.1
Total Metals (Water)							
Aluminum, total	0.0050	mg/L	OG < 0.1	0.157	0.153	0.148	0.149
Antimony, total	0.00020	mg/L	MAC = 0.006	<0.00020	<0.00020	<0.00020	< 0.00020
Arsenic, total	0.00050	mg/L	MAC = 0.01	<0.00050	<0.00050	<0.00050	<0.00050
Barium, total	0.0050	mg/L	MAC = 1	0.0103	0.0102	0.0100	0.0101
Beryllium, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010
Boron, total	0.0500	mg/L	MAC = 5	<0.0500	<0.0500	<0.0500	< 0.0500
Cadmium, total	0.000010	mg/L	MAC = 0.005	<0.000010	<0.000010	<0.000010	<0.000010
Calcium, total	0.20	mg/L	-	2.85	2.85	2.93	2.86
Chromium, total	0.00050	mg/L	MAC = 0.05	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010
Copper, total	0.00040	mg/L	AO = 1 MAC = 2	0.192	0.00690	0.0823	0.0460
Iron, total	0.010	mg/L	AO <= 0.3	0.186	0.187	0.204	0.208



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20K095-01 17-Nov-20 09:20 Montreal Circle Reservoir	N20K095-02 17-Nov-20 08:55 Frederick Station	N20K095-03 17-Nov-20 10:20 Pillsbury Station	N20K095-04 17-Nov-20 09:45 Sourdough Bay Flushing Station
	MRL	Units	CDWG	Keeen			
Total Metals (continu	ed)						
Lead, total	0.00020	mg/L	MAC = 0.005	0.00044	0.00024	0.00036	0.00095
Lithium, total	0.00010	mg/L	-	0.00017	0.00014	0.00014	0.00015
Magnesium, total	0.010	mg/L	-	0.358	0.336	0.331	0.324
Manganese, total	0.00020	mg/L	AO <= 0.02 MAC = 0.12	0.0112	0.0119	0.00949	0.00964
Mercury, total	0.000010	mg/L	MAC = 0.001	0.000010	<0.000010	<0.000010	<0.000010
Molybdenum, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010
Nickel, total	0.00040	mg/L	-	0.00059	0.00046	0.00045	0.00043
Phosphorus, total	0.050	mg/L	-	<0.050	<0.050	<0.050	<0.050
Potassium, total	0.10	mg/L	-	0.40	0.39	0.39	0.38
Selenium, total	0.00050	mg/L	MAC = 0.05	<0.00050	<0.00050	<0.00050	<0.00050
Silicon, total	1.0	mg/L	-	<1.0	<1.0	<1.0	<1.0
Silver, total	0.000050	mg/L	-	<0.000050	<0.000050	<0.000050	<0.000050
Sodium, total	0.10	mg/L	AO <= 200	1.69	1.04	1.02	1.00
Strontium, total	0.0010	mg/L	MAC = 7	0.0105	0.0107	0.0109	0.0103
Sulfur, total	3.0	mg/L	-	<3.0	<3.0	<3.0	<3.0
Tellurium, total	0.00050	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050
Thallium, total	0.000020	mg/L	-	<0.000020	<0.000020	<0.000020	<0.000020
Thorium, total	0.00010	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010
Tin, total	0.00020	mg/L	-	<0.00020	<0.00020	<0.00020	0.00024
Titanium, total	0.0050	mg/L	-	0.0050	<0.0050	<0.0050	<0.0050
Tungsten, total	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Uranium, total	0.000020	mg/L	MAC = 0.02	<0.000020	<0.000020	<0.000020	<0.000020
Vanadium, total	0.0010	mg/L	-	0.0013	0.0018	0.0018	0.0022
Zinc, total	0.0040	mg/L	AO <= 5	0.0169	0.0107	0.0389	<0.0040
Zirconium, total	0.00010	mg/L	_	< 0.00010	< 0.00010	< 0.00010	< 0.00010



City of Prince Rupert - Dr	inking \	Nater			Work Order: N20K095
LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID	MRI	Units	CDWG	N20K095-05 17-Nov-20 14:20 Shawatlans Lake	
		01110			
General Parameters (wo	iter)	nH units	70105	4.4	
Alkalinity (total as CaCO)	1.0	pri units mall	7.0-10.5	0.4	
Conductivity	10	IIIG/L	-	0	
Colour	1.0	PtCo units	$A \cap <= 15$	54	
Turbidity	0.05		AO = 1	1 4 9	
Solids Total Dissolved (TD)	c 10	mall	MAC = 1	4.07	
Carbon Total Organic	0 50	mg/L	AO <= 500	27 4 77	
Cubon, Total Organic	0.00	IIIG/L	-	0.77	
Calculated Parameters ((Water)				
Nitrate (as N)	0.10	mg/L	MAC = 10	<0.10	
Hardness, Total (as CaCO3)	0.500	mg/L	-	8.64	
Anions (Water)					
Chloride	1.0	mg/L	AO <= 250	1.7	
Fluoride	0.05	mg/L	MAC = 1.5	<0.10	
Nitrite (as N)	0.01	mg/L	MAC = 1	<0.01	
Nitrate + Nitrite (as N)	0.10	mg/L	MAC = 10	<0.10	
Sulfate	1.0	mg/L	AO <= 500	4.0	
Total Metals (Water)					
Aluminum, total	0.0050	mg/L	OG < 0.1	0.189	
Antimony, total	0.00020	mg/L	MAC = 0.006	<0.00020	
Arsenic, total	0.00050	mg/L	MAC = 0.01	<0.00050	
Barium, total	0.0050	mg/L	MAC = 1	0.0106	
Beryllium, total	0.00010	mg/L	-	<0.00010	
Bismuth, total	0.00010	mg/L	-	<0.00010	
Boron, total	0.0500	mg/L	MAC = 5	<0.0500	
Cadmium, total	0.000010	mg/L	MAC = 0.005	0.000012	
Calcium, total	0.20	mg/L	-	2.89	
Chromium, total	0.00050	mg/L	MAC = 0.05	<0.00050	
Cobalt, total	0.00010	mg/L	-	0.00024	
Copper, total	0.00040	mg/L	AO = 1 MAC = 2	0.0114	
Iron, total	0.010	mg/L	AO <= 0.3	0.270	



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20K095-05 17-Nov-20 14:20 Shawatlans	- - - -	- - - -	- - - -
	MRL	Units	CDWG	Luke			
Total Metals (continu	ed)						
Lead, total	0.00020	mg/L	MAC = 0.005	0.00023			
Lithium, total	0.00010	mg/L	-	0.00015			
Magnesium, total	0.010	mg/L	-	0.343			
Manganese, total	0.00020	mg/L	AO <= 0.02 MAC = 0.12	0.0266			
Mercury, total	0.000010	mg/L	MAC = 0.001	<0.000010			
Molybdenum, total	0.00010	mg/L	-	<0.00010			
Nickel, total	0.00040	mg/L	-	0.00060			
Phosphorus, total	0.050	mg/L	-	<0.050			
Potassium, total	0.10	mg/L	-	0.40			
Selenium, total	0.00050	mg/L	MAC = 0.05	<0.00050			
Silicon, total	1.0	mg/L	-	<1.0			
Silver, total	0.000050	mg/L	-	<0.000050			
Sodium, total	0.10	mg/L	AO <= 200	1.03			
Strontium, total	0.0010	mg/L	MAC = 7	0.0108			
Sulfur, total	3.0	mg/L	-	<3.0			
Tellurium, total	0.00050	mg/L	-	<0.00050			
Thallium, total	0.000020	mg/L	-	<0.000020			
Thorium, total	0.00010	mg/L	-	<0.00010			
Tin, total	0.00020	mg/L	-	<0.00020			
Titanium, total	0.0050	mg/L	-	0.0061			
Tungsten, total	0.0010	mg/L	-	<0.0010			
Uranium, total	0.000020	mg/L	MAC = 0.02	<0.000020			
Vanadium, total	0.0010	mg/L	-	0.0024			
Zinc, total	0.0040	mg/L	AO <= 5	0.0147			
Zirconium, total	0.00010	mg/L	-	<0.00010			



City of Prince Rupert - Drinking Water

Work Order: N20K095

Glossary of Tei	rms
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
NTU	Nephelometric Turbidity Units
pH units	pH units
PtCo units	Platinum Colbalt colour units
u\$/cm	Micro Siemens per centimeter
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

CDWG Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf



City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 09-Mar-2020

RECEIVED: 25-Feb-2020

Work Order: N20B132

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

Northern Laboratories (2010) Ltd.

Dean Browne For Jesse Newton Laboratory Manager



Work Order: N20B132

LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20B132-01 25-Feb-20 10:30 Pillsbury Station
	MRL	Units	CDWG	
Haloacetic Acids (Wate	r)			
Monochloroacetic Acid	0.0020	mg/L	-	<0.0020
Monobromoacetic Acid	0.0020	mg/L	-	<0.0020
Dichloroacetic Acid	0.0020	mg/L	-	0.0770
Trichloroacetic Acid	0.0020	mg/L	-	0.109
Dibromoacetic Acid	0.0020	mg/L	-	<0.0020
Total Haloacetic Acids (HAA5)	0.00200	mg/L	MAC = 0.08	0.186
2-Bromopropionic Acid	70-130	[surr]	-	98%

Glossary of Terms	
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf



Page 1 of 2

City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 11-May-2020

 Work Order:
 N20D084

 RECEIVED:
 21-Apr-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

Northern Laboratories (2010) Ltd.

Dean Browne For Jesse Newton Laboratory Manager



Work Order: N20D084

AB # GAMPLED DATE GAMPLED TIME GAMPLE ID				N20D084-01 21-Apr-20 09:50 Pillsbury Stn
	MRL	Units	CDWG	
Haloacetic Acids (Wate	er)			
Monochloroacetic Acid	0.0020	mg/L	-	0.0023
Monobromoacetic Acid	0.0020	mg/L	-	0.0020
Dichloroacetic Acid	0.0020	mg/L	-	0.0682
Trichloroacetic Acid	0.0020	mg/L	-	0.104
Dibromoacetic Acid	0.0020	mg/L	-	<0.0020
Total Haloacetic Acids (HAA5)	0.00200	mg/L	MAC = 0.08	0.176
2-Bromopropionic Acid	70-130	[surr]	-	99%

Glossary of Terms	
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf



Page 1 of 3

City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca

 Work Order:
 N20G026

 RECEIVED:
 07-Jul-2020

Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 21-Jul-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

f Min

Jesse Newton Laboratory Manager



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20G026-01 07-Jul-20 11:30 Pillsbury Station	
	MRL	Units	CDWG		
Haloacetic Acids (Wate	r)				
Monochloroacetic Acid	0.0020	mg/L	-	<0.0020	
Monobromoacetic Acid	0.0020	mg/L	-	<0.0020	
Dichloroacetic Acid	0.0020	mg/L	-	0.0851	
Trichloroacetic Acid	0.0020	mg/L	-	0.124	
Dibromoacetic Acid	0.0020	mg/L	-	<0.0020	
Total Haloacetic Acids (HAA5)	0.00200	mg/L	MAC = 0.08	0.209	
2-Bromopropionic Acid	70-130	[surr]	-	107%	



Work Order: N20G026

Glossary of Terms	
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG

Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf





City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca

Work Order: N20J066 RECEIVED: 13-Oct-2020 Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 01-Dec-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

f Min

Jesse Newton Laboratory Manager



LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20J066-01 13-Oct-20 11:15 Pillsbury Station	
	MRL	Units	CDWG		
Haloacetic Acids (Wate	er)				
Monochloroacetic Acid	0.0020	mg/L	-	0.0059	
Monobromoacetic Acid	0.0020	mg/L	-	<0.0020	
Dichloroacetic Acid	0.0020	mg/L	-	0.122	
Trichloroacetic Acid	0.0020	mg/L	-	0.169	
Dibromoacetic Acid	0.0020	mg/L	-	<0.0020	
Total Haloacetic Acids (HAA5)	0.00200	mg/L	MAC = 0.08	0.297	
2-Bromopropionic Acid	70-130	[surr]	-	105%	



Work Order: N20J066

Glossary of Terms	
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG

Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf



Page 1 of 3

City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca

RECEIVED: 01-Dec-2020

Work Order: N20L012

Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 24-Dec-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

f Min

Jesse Newton Laboratory Manager



LAB #			N20L012-01
SAMPLED DATE			01-Dec-20
SAMPLED TIME			10:40
SAMPLE ID			Pillsbury Stn
	MRL Units	CDWG	
Haloacetic Acids (Wate	r)		
Monochloroacetic Acid	0.0020 mg/L	-	<0.0020
Monobromoacetic Acid	0.0020 mg/L	-	0.0036
Dichloroacetic Acid	0.0020 mg/L	-	0.0759
Trichloroacetic Acid	0.0020 mg/L	-	0.109
Dibromoacetic Acid	0.0020 mg/L	-	<0.0020
Total Haloacetic Acids (HAA5)	0.00200 mg/L	MAC = 0.08	0.189
2-Bromopropionic Acid	70-130 [surr]	-	98%



Work Order: N20L012

Glossary of Terms	
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG

Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf



Page 1 of 2

City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 08-Apr-2020

 Work Order:
 N20C152

 RECEIVED:
 24-Mar-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

f Min

Jesse Newton Laboratory Manager



Work Order: N2	0C152
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LAB #				N20C152-01	N20C152-02	N20C152-03	N20C152-04
SAMPLED DATE				24-Mar-20	24-Mar-20	24-Mar-20	24-Mar-20
SAMPLED TIME				09:00	09:25	08:09	10:07
SAMPLE ID				Montreal Circle	Sourdough Bay Flushing	Frederick Station	Pillsbury Station
	MRL	Units	CDWG	Reservoir	Station		
Calculated Parameters	(Water)						
Total Trihalomethanes	0.00400	mg/L	MAC = 0.1	0.0842	0.105	0.0729	0.0967
Volatile Organic Compo	ounds (\	/OC) (W	/ater)				
Bromodichloromethane	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	0.0010	mg/L	-	0.0842	0.105	0.0729	0.0967
Dibromochloromethane	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Toluene-d8	70-130	[surr]	-	85%	88%	84%	86%
4-Bromofluorobenzene	70-130	[surr]	-	74%	77%	75%	77%

Glossary of Terms	
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
МАС	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG

Canadian Drinking Water Quality Guidelines (2019)

https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf



Page 1 of 3

City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca

Work Order: N20F010 RECEIVED: 02-Jun-2020 Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 26-Jun-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

f Min

Jesse Newton Laboratory Manager



Work Order:	N20F010
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LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20F010-01 02-Jun-20 08:40 Frederick	N20F010-02 02-Jun-20 08:56 Montreal	N20F010-03 02-Jun-20 09:46 Pillsbury	N20F010-04 02-Jun-20 09:22 Sourdough
	MRL	Units	CDWG	Station	Circle Reservoir	Station	Bay Flushing Station
Calculated Parameters	(Water)						
Total Trihalomethanes	0.0130	mg/L	MAC = 0.1	0.0906	0.129	0.153	0.148
Volatile Organic Compo	ounds (\	/OC) (W	ater)				
Bromodichloromethane	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	0.0100	mg/L	-	0.0906	0.129	0.153	0.148
Dibromochloromethane	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Toluene-d8	70-130	[surr]	-	93%	93%	92%	93%
4-Bromofluorobenzene	70-130	[surr]	-	98%	98%	96%	97%



Work Order: N20F010

Glossary of Terms	
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG

Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf



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City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca

Work Order: N20I052

RECEIVED: 08-Sep-2020

Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 16-Oct-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

f Min

Jesse Newton Laboratory Manager



Work Order: N201052

LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N201052-01 08-Sep-20 09:22 Frederick Station	N201052-02 08-Sep-20 09:36 Montreal Circle Reservoir	N201052-03 08-Sep-20 09:54 Sourdough Bay Flushing Station	N201052-04 08-Sep-20 10:20 Pillsbury Station
	MRL	Units	CDWG				
Calculated Parameters ((Water)						
Total Trihalomethanes	0.0130	mg/L	MAC = 0.1	0.0735	0.104	0.108	0.206
Volatile Organic Compo	ounds (V	/OC) (W	ater)				
Bromodichloromethane	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	0.0100	mg/L	-	0.0735	0.104	0.108	0.206
Dibromochloromethane	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Toluene-d8	70-130	[surr]	-	82%	84%	85%	112%
4-Bromofluorobenzene	70-130	[surr]	-	106%	106%	108%	106%



Work Order: N201052

Glossary of Terms	
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG

Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf


ANALYTICAL REPORT

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City of Prince Rupert 424 3rd Avenue West Prince Rupert, BC V8J 1L7 water@princerupert.ca

RECEIVED: 17-Nov-2020

Work Order: N20K094

Project: Drinking Water Project Number: -Project Manager: Public Works Department

REPORTED: 24-Dec-2020

All analyses were performed in accordance with standard procedures published by BC MoE, Health Canada, Environment Canada, the American Public Health Association, or the US EPA.

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Jesse Newton Laboratory Manager



Work Order: N20K094

LAB # SAMPLED DATE SAMPLED TIME SAMPLE ID				N20K094-01 17-Nov-20 09:00 Sourdough Bay Flushing Station	N20K094-02 17-Nov-20 09:20 Montreal Circle Reservoir	N20K094-03 17-Nov-20 08:45 Frederick Station	N20K094-04 17-Nov-20 10:20 Pillsbury Station
	MRL	Units	CDWG				
Calculated Parameters ((Water)						
Total Trihalomethanes	0.0130	mg/L	MAC = 0.1	0.232	0.165	0.130	0.222
Volatile Organic Compo	ounds (\	/OC) (W	'ater)				
Bromodichloromethane	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	0.0100	mg/L	-	0.232	0.165	0.130	0.222
Dibromochloromethane	0.0010	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010
Toluene-d8	70-130	[surr]	-	99%	100%	101%	102%
4-Bromofluorobenzene	70-130	[surr]	-	76%	77%	77%	77%



City of Prince Rupert - Drinking Water

Work Order: N20K094

Glossary of Terms	
MRL	Method Reporting Limit
<	Less than the reported detection limit (RDL)
mg/L	Milligrams per Litre
MAC	Maximum Acceptable Concentration. Values above MAC are formatted with red text and solid outline.
AO	Aesthetic Objective (not health related). Values above AO are formatted with a dashed outline.
OG	Operational guideline (for treated water)

Standards / Guidelines Referenced

CDWG

Canadian Drinking Water Quality Guidelines (2019) https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/watereau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf