ALBERNI CLAYOQUOT REGIONAL DISTRICT

WATER SYSTEMS ANNUAL REPORT 2016

Alberni Clayoquot Regional District Water Systems:

Beaver Creek Water System
Bamfield Community Water System
Alberni Valley Regional Airport
Long Beach Airport Water System
Millstream Community Water System
Cougar Smith Park Water System

Prepared by: John Thomas
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1.0 Introduction to the Alberni Clayoquot Regional District Water System's

This annual water systems report provides an overview of the Alberni-Clayoquot Regional District's (ACRD) water services. It is our responsibility to the community and to the provincial health authority to share this information. This report is for the water consumers to review their individual water system in order to be aware of the service provided and the annual activities.

The Province of British Columbia's Drinking Water Protection Act and the Drinking Water Protection Regulation prescribes the required performance of drinking water suppliers. An example of the performance is that the supplier must all times provide potable water and monitor its sources. Other required performances can be seen in Section 15 of the Act and Section 11 of the Regulation. The provincial governance is distributed to local health authorities. The ACRD falls under the Island Health Authority (IHA), whose mission is to minimize health risks to the public and to assist with providing safe drinking water to our communities. This is looked after by VIHA's Public Health Engineer and the Environmental Health Officer, who evaluates water sources, grants permits and performs inspections. Please see Appendix C for drinking water web links for more information regarding legislative authority and responsibility.

The Alberni-Clayoquot Regional District owns and operates six individually distinct potable water systems. This report will provide an annual review of each systems operation and water quality. The water systems names are in order below with the highest to lowest annual volumes of water produced:

1. Beaver Creek Water System

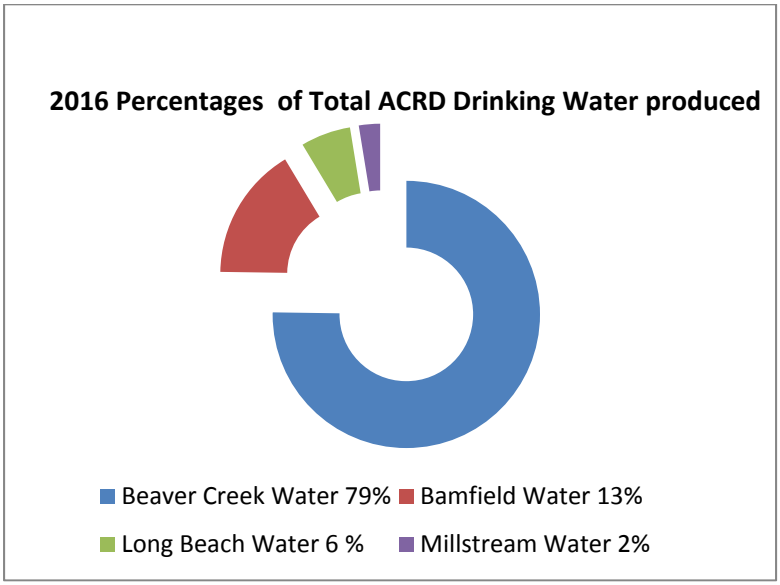
2. Bamfield Community Water System

3. Long Beach Airport Water System

4. Millstream Community Water System

5. Cougar Smith Park Water System

6. Alberni Valley Airport Water System



1.1 Management

The ACRD's Environmental Services Department is responsible for the overall management of the water systems including administrative services. All the water systems are maintained by Environmental Operators Certificate Program's (EOCP) certified operators. "The purpose of the EOCP Facility Classification and Operator Certification policy is to set out the standards and requirements for classifying facilities and certifying operators to ensure that Operator qualifications and experience match the complexities of the facilities they operate." The Drinking Water Protection Act and its Regulation requires persons operating water supply systems to be qualified by the Environmental Operators Certification program for that classification of the facility. Facility classification is to ensure that all facilities are classified based on the size and complexity of the facility in order to establish level of skill and knowledge of the operator(s) of the facility. The Small Water Systems (SWS) facility classification is the least complex classification that increases to a maximum classification of a Water Distribution Level 4 (WD 4).

The following is a list of ACRD Water Distribution systems and operations:

Water System	EOCP Facility #	Level	Operation By:
Alberni Valley Airport	2139	SWS	ACRD employees
Cougar Smith Park	2141	SWS	ACRD employees
Beaver Creek	431	WD2	ACRD employees
Millstream	2143	SWS	Contract employee
Long Beach Airport	2142	SWS	Contract employee
Bamfield	2140	WD2	Contract employee
Bamfield (Water Treatment)	2304	WT2	Contract employee

1.2 Operations

The ACRD regularly performs tests to ensure that the water is meeting all standards. A complete water potability test of the water is performed regularly. The water systems operators regularly check the disinfection and safety of the drinking water. With the systems with chlorine disinfection, the Free Chlorine residual is measured daily. Free Chlorine is defined as the remaining chlorine in the water after initial disinfection that is available for chemical and biological reactions. The operators try to obtain a reading of 0.2 mg/l of Free Chlorine at all the ends of the distribution system. The systems with Ultraviolet Disinfection (UV) lights are checked weekly to make sure the light intensity is adequately disinfecting the water. UV systems disinfect water using radiation to inactivate organisms so that they cannot reproduce and cause health concerns.

Water samples for bacteria are currently taken weekly from the Beaver Creek Water System and monthly from the small water systems. These samples are submitted to the Island Health Authority (VIHA) and are analyzed by the British Columbia Center for Disease Control for bacteria and specifically Total Coliforms and E. Coli.

The Total Coliforms and E.Coli organisms are typically only tested as they are good indicator organisms. Indicator organisms are easy and inexpensive to test for, can be correlated with the potential contamination level and are not present in unpolluted waters.

The VIHA's Environmental Health Officer regularly inspects all permitted drinking water systems. The most current inspection reports for each water system can be found in Appendix D.

To ensure good water quality throughout the distribution system water system mains are regularly flushed. This flushing action removes any accumulated silt in the water mains by creating an increase in velocity to scour the pipes. Flushing also refreshes the mains of any standing water with clean water that has an active Free Chlorine level that ensures disinfection.

Regular sampling of drinking water is conducted for physical, chemical and biological parameters. This sampling is to ensure that the drinking water meets the Health Canada Canadian Drinking Water Guidelines. Each water system is provided with an Operational Certificate by IHA that may outline specific requirements such as individual tests and the frequency. Where the requirements are not outlined, testing is performed at a frequency approved by VIHA and the ACRD Board of Directors.

ALBERNI CLAYOQUOT REGIONAL DISTRICT

BEAVER CREEK WATER SYSTEM

ANNUAL REPORT

2016

Prepared by: John Thomas

Environmental Services Department

3008 Fifth Avenue, Port Alberni, BC, Canada, V9Y 2E3, Phone 250-720-2700

2.1 Beaver Creek Water System Introduction

This is a community of 3,045 (2011 Census) which borders the City of Port Alberni on the south, the Beaufort Electoral Area on the north and east, and the Sproat Lake Electoral Area on the west. The Stamp and Somass Rivers form the western boundary of Beaver Creek. The Beaver Creek Improvement District converted into a local service area of the ACRD on June 1st, 2012. Beaver Creek Water System has an advisory committee made up of the Beaver Creek Electoral Director and volunteer members from the community. This committee provides guidance and advice to the ACRD management regarding infrastructure improvements, bylaws and costs.

2.2. System Overview

The majority of the Beaver Creek Water System (BCWS) was constructed in the 1960's. The water mains were originally constructed with asbestos cement pipe and more recent improvements were with polyvinyl pipe. Historically, the source water was from the Stamp River accessed through an infiltration gallery. In April, 2014 the BCWS changed the primary source water to the City of Port Alberni through the new Strick Road Pump Station. The change in source water allowed the residents of Beaver Creek to feel a sense of security of having uninterrupted safe water. The treated water from the City of Port Alberni prevented any need for any "boil water" orders by eliminating any high turbidity events from the Stamp River. The pump station was built on Strick Road to connect to and boost the pressure from the City to the BCWS. To accommodate the increase in pressure and flow the Strick Road water main was replaced in 2014.

The Beaver Creek Water System has three reservoirs:

- Concrete reservoir on Kitsuksis Road, Volume of 1,135 cubic meters
- Bolted steel reservoir on Beaver Creek Road, Volume of 273 cubic meters
- Glass fused reservoir on Kitsuksis Road, Volume of 1,135 cubic meters

Distribution System:

- Disinfection: Chlorine
- Service connections: 1003
- Length of mains: The distribution system consists of a mixture of 100, 150, 200 and 300 mm diameter piping with a total length of 43,600 meters
- Water main material:
- The majority (67.5%) of the distribution system is Asbestos Cement (AO)
- The remainder is made up of polyvinyl chloride (PVC)
- Average daily flow for 2016: 950 cubic meters

2.3 Water Quality and Consumption

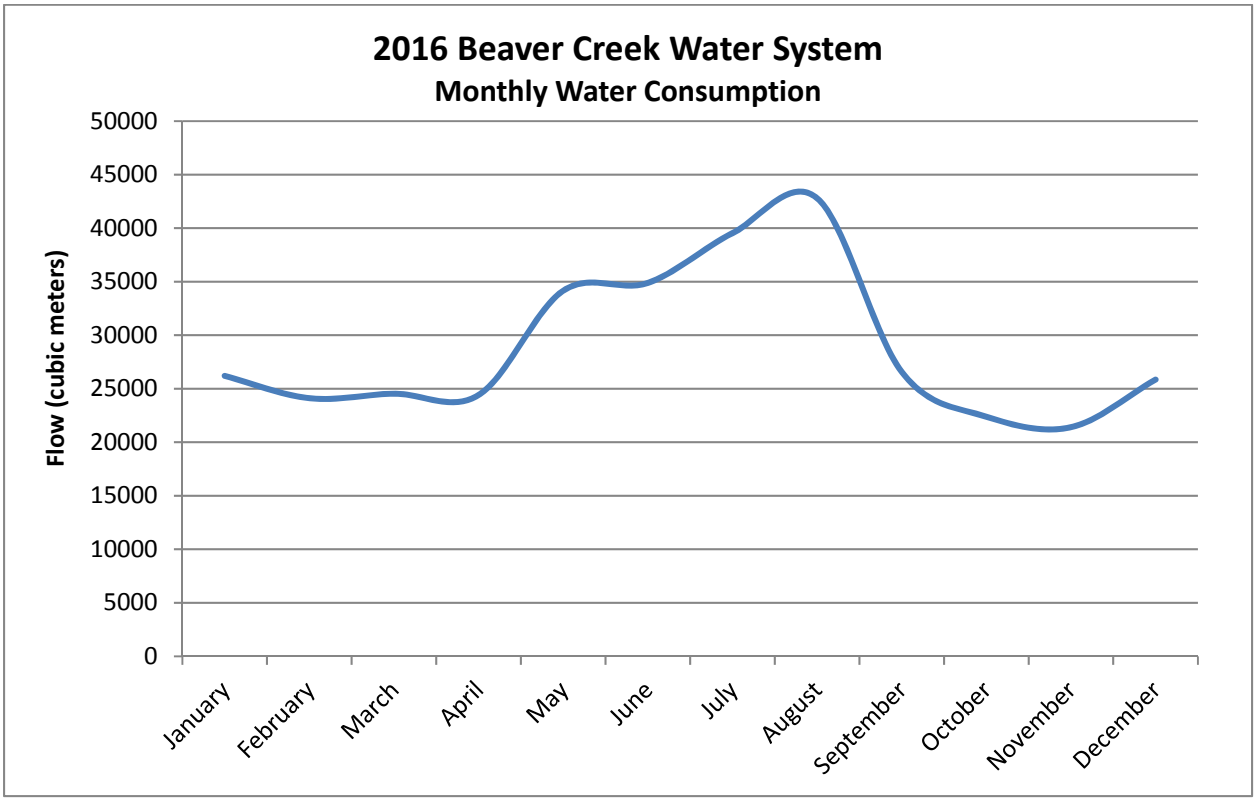
The 2016 total water consumption for the BCWS was 346,876 cubic meters.

The water being received by the BCWS from the City of Port Alberni was tested last on October 30th 2014 for complete potability. The results from this test are in Appendix A. The Operations Permit issued by Island Health requires quarterly testing for chlorine disinfection byproducts which occurred in April, July, October and December of 2015. Disinfection byproducts are created when chlorine (used as a disinfectant) reacts with organic compounds in the water. Typical disinfection byproducts created by the addition of chlorine are Trihalomethanes (THM's) and Haloacetic Acids (HAA's).

The Total Trihalomethanes (THM) maximum acceptable concentrations (MAC) by the Canadian Drinking Water Guidelines are 100 ug/L based on a running average of a minimum quarterly sampling. The values obtained at the pumphouse and the reservoirs were all under the MAC individual testing and the quarterly average. The Total Haloacetic Acids (HAA) maximum acceptable concentrations (MAC) by the Canadian drinking Water Guidelines are 80 ug/L based on a running average of a minimum quarterly sampling. The values obtained at the pump house and the reservoirs were all under the MAC running average but had individual testing above only in March. The results from these tests are in Appendix A.

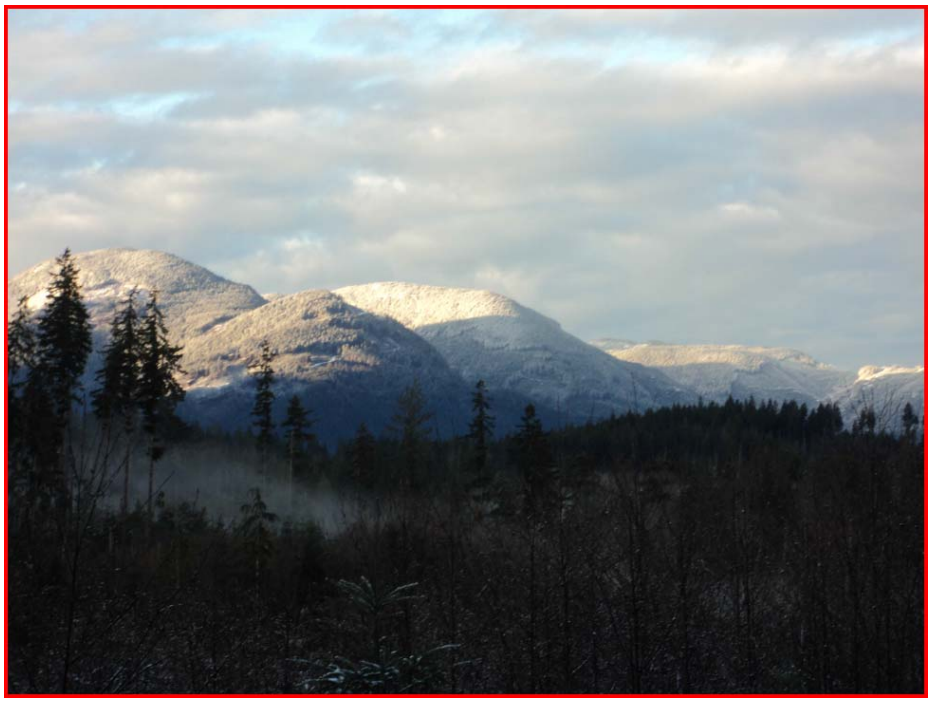
2.4 2017 Projects

Projects planned for Beaver Creek this year will be to perform minor maintenance of all air valves and line valves within the distribution system.


2016 Beaver Creek Water System
Monthly Water Consumption
Flow (cubic meters)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
January
February
March
April
May
June
July
August
September
October
November
December

ALBERNI CLAYOQUOT REGIONAL DISTRICT

BAMFIELD WATER SYSTEM
ANNUAL REPORT
2016



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3.1 Bamfield Community Water System Introduction

Bamfield is nestled quietly in a protected inlet on the south shore of Barkley Sound located on the outer west coast of Vancouver Island. Europeans founded a small outpost for fur trading and a fishing community sometime in the late 1800's. Bamfield is divided into two sides, separated by about 180 meters of the Bamfield Inlet. The west side of Bamfield is linked by a waterfront boardwalk that connects all the homes and docks on the harbor side. The east side of Bamfield contains most of the retail businesses, including a pub, a market and café.

In Bamfield there is a water committee that works with the ACRD in determining the direction and operation of the water system. The committee is made up of the Electoral Area "A" Director and volunteer members of the community. A contracted water operator runs the day to day operations of the Bamfield Water System (BWS). The water operator is certified through the Environmental Operators Certificate Program (EOCP) to operate the Level 2 Water Distribution System.

The Bamfield Water System has a classification of a Water Treatment 2 Classification as well a Level 2 Water Treatment Certification.

3.2 System Overview

- Water Source: Sugsaw Lake
- Treatment: Fine screen and chlorine disinfectant
- Reservoirs: Two bolted steel reservoirs
- Service Connections: 297
- Length of mains: App. 4550 meters of 150mm
  App.1300 meters of 100mm
  App. 5175 meters of 50mm
  App. 325 meters of 25mm
- Water main material: Polyvinyl Chloride (PVC) and Polyethylene (PE)
- Average daily flow: 204 cubic meters

The BWS was constructed in 1979 and 1980. Before then, water was collected from individual wells, local springs and rain water collection systems. The BWS complexity is partially due to the various subsurface water lines crossing the inlets in various locations. These marine water lines are challenging to repair, being underwater and often under layers of sediment.

The BWS has experienced distribution water leaks caused by dissimilar metals and exposed pipes, which are subject to freezing. During a power outage a backup generator provides electricity to prevent any disruption to the water supply.

3.3 Water Quality and Consumption

The 2016 water consumption for Bamfield was 74,430 cubic meters. This is a third consecutive year of an increase in consumption. This increase is attributed to an increase of the population living in Bamfield year round.

Bamfield's water system is wholly supplied with water from Sugsaw Lake. Sugsaw Lake's water quality is typical of most west coast watersheds as the lake is surrounded by forests that produce soluble organics from the decomposition of the trees and vegetation. These natural organic substances are often described as Tannins and Lignins that create a "tea" colour to the water. The addition of chlorine for water disinfection reacts with the organics and colour to create disinfection byproducts. These low levels of disinfection byproducts found in Bamfield's distribution system have exceeded the Canadian Drinking Water Guidelines. The disinfection byproducts that are typically produced with chlorine disinfection are Trihalomethanes (THM) and Total Halo Acetic Acids (HAA). With Bamfield only having exceedance with the THM's that are above the guideline of 100 parts per billion.

A water quality advisory was issued by Island Health in November of 2013. Island Health states there is no immediate risk to your health and any effects are associated with consumption of high levels for many years or decades. Exposure can be reduced by storing water for 24 hours, boiling and cooling, filtering water with activated carbon, or by using bottled water.

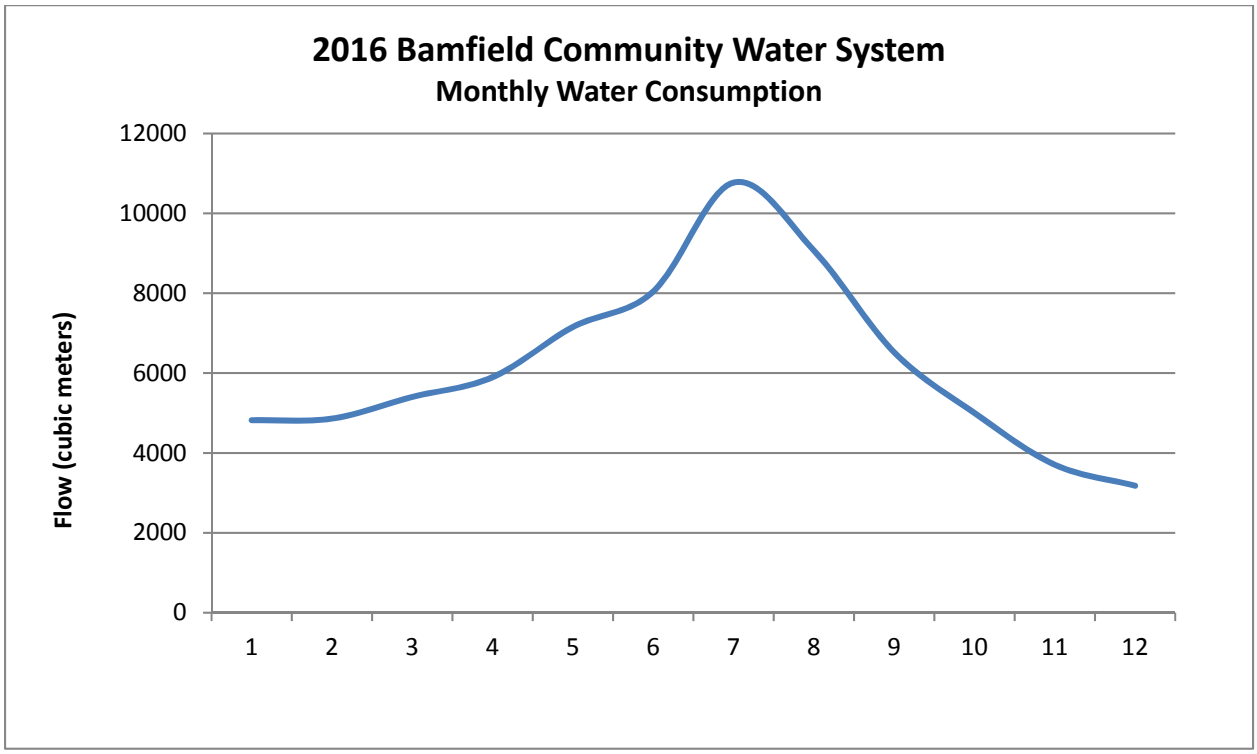
Monitoring the chlorinated water for THM levels continue at quarterly intervals. Sugsaw Lake is also being monitored quarterly for the precursors for disinfection byproducts at three locations. These additional locations are being monitored in order to determine if better quality water can be found at different locations and depths. The results from this testing in Sugsaw Lake and the reservoir can be seen in Appendix A.

In the fall of 2014 a "pilot treatment plant" was successfully operated and determined that a DAF treatment plant (dissolved air floatation) would remove the THM precursors. Preliminary construction costs for a permanent water treatment plant were estimated at 1.5 million.

Appendix B shows the 2016 Bamfield microbiological sampling history provided by Island Health. All the results showed no presence of E. Coli and only one occurrence of total coliforms, that can be attributed to error. In March a parasite test (Giardia and Cryptosporidium) was performed on the source water and none were detected.

3.4 2017 Projects

Construction of the new water treatment plant is scheduled to start in 2017 and have the plant operational in early 2017. The treatment will be a process where dissolve air floats (DAF) out fine particulate matter and colour.


2016 Bamfield Community Water System
Monthly Water Consumption
Flow (cubic meters)
12000
10000
8000
6000
4000
2000
0
1
2
3
4
5
6
7
8
9
10
11
12

ALBERNI CLAYOQUOT REGIONAL DISTRICT

LONG BEACH AIRPORT WATER SYSTEM
ANNUAL REPORT
2016

Prepared by: John Thomas
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4.1 Long Beach Airport Water System Introduction

The Long Beach Airport Water System (LBAWS) is located within the Long Beach Airport across from Long Beach of the Pacific Rim National Park. The airport is located between the Districts of Tofino and Ucluelet, on the west coast of Vancouver Island. The LBAWS was originally constructed during World War 2 to service the military airport and related services. Currently, the supply and treatment system is comprised of a deep well water source, water softener, chlorination, pumphouse, reservoir and a distribution system. The water is supplied to the communities of Ty-Histanis and Esowista (Tla-O-Qui-Aht First Nation), airport service building and the Long Beach Golf Course. A contracted water operator runs the day to day operations of the LBAWS. The water operator is certified through the Environmental Operator Certificate Program (EOCP) to operate small water systems.

4.2 System Overview

Water Source: Deep drilled well
Treatment: Ion exchange (sodium) water softener
Disinfection: Chlorine
Reservoir: One concrete reservoir, 1364 m3
Service connections: 9 connections
Length of mains: 2730 meters of cast iron & 188 meters of PVC
Average daily flow: 76 m3

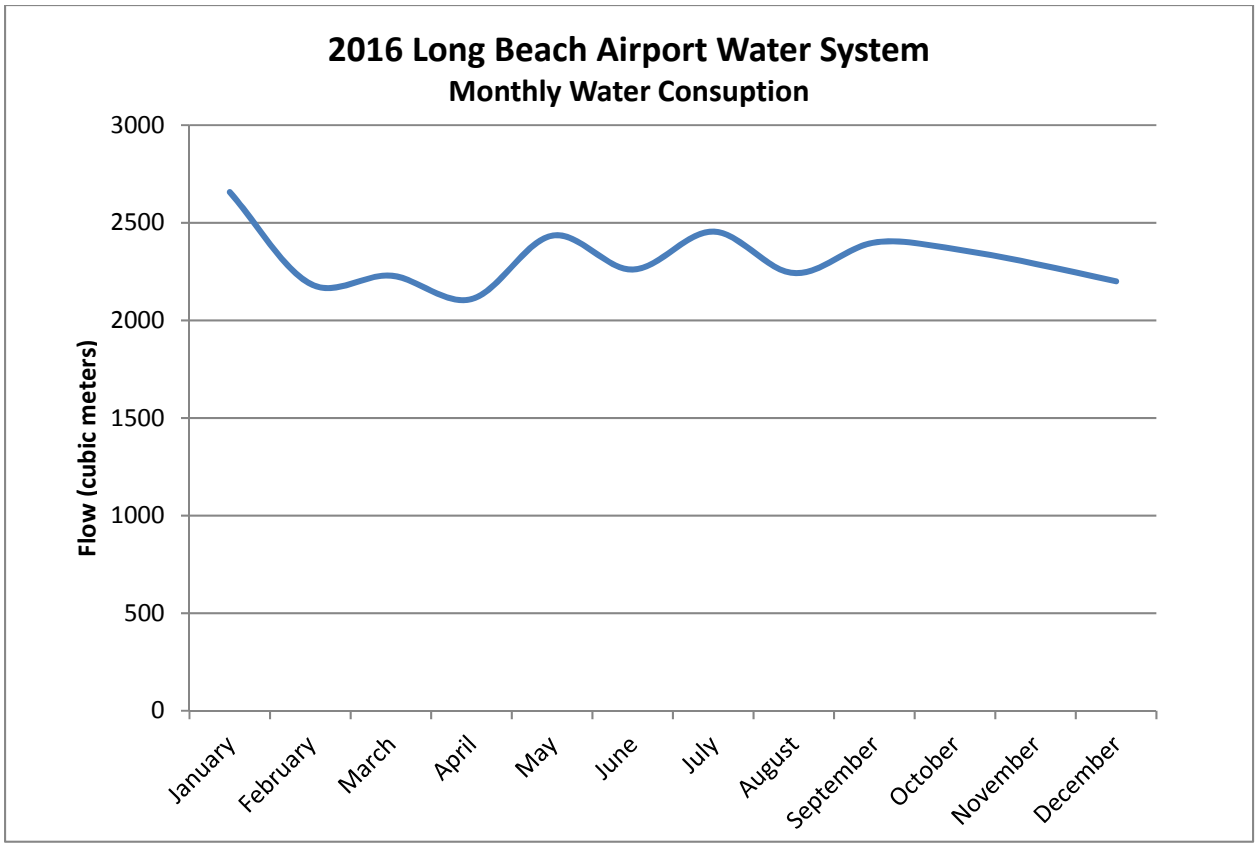
4.3 Water Quality and Consumption

The 2016 water consumption for the Long Beach Airport Water System was 27,826 cubic meters. The majority of the water is supplied to the Tla-O-Qui-Aht First Nations' Esowista and Ty-Histanis community lands.

The Long Beach Airport raw well water is high in iron and manganese, which is typical of ground water in that area (see Appendix A). The ion exchange water treatment removes these metals as well as the turbidity, as can be seen in the filtered water results. In the ion exchange treatment, sodium is released into the water which increased the results to 74 mg/L. This value is still lower than the Canadian Drinking Water Guidelines for aesthetic objectives of 200 mg/L.

Appendix B shows the 2016 Long Beach Airport microbiological sampling history provided by Island Health. All the results show no Total Coliforms or E.Coli.

Island Health performed an inspection of the Long Beach Airport Water System in March 2013, which was given a low hazard rating. Low hazard rating is the lowest rating in Island Health's scale.


2016 Long Beach Airport Water System
Monthly Water Consuption
Flow (cubic meters)
3000
2500
2000
1500
1000
500
0
January
February
March
April
May
June
July
August
September
October
November
December

ALBERNI CLAYOQUOT REGIONAL DISTRICT

MILLSTREAM WATER SYSTEM
ANNUAL REPORT
2016

Prepared by: John Thomas
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5.1 Millstream Community Water System

Millstream is a small residential community located approximately 3.5 km north of the District of Ucluelet. The area was originally developed by a logging contractor to provide accommodation for employees and their families. The existing water system was constructed between July and October in 1969. The type of pipe used was asbestos cement (A.C), which was the current technology at the time. The original wood reservoir was replaced with a metal reservoir in the early 1990's. A contracted water operator runs the day to day operations of the Millstream Community Water System. The water operator is certified through the Environmental operator Certificate program (EOCP) to operate small water systems.

5.2 System Overview

- Water source: Two shallow dug wells, 4.1 and 3.6 meters deep
- Treatment: none
- Disinfection: Chlorine
- Reservoir: Bolted steel, 656 m3
- Service connections: 50
- Length of mains: 725 meters of 100mm & 255 meters of 150mm
- Water main material: asbestos cement (AC) & polyvinyl chloride (PVC)
- Average daily flow: 32.5 m3

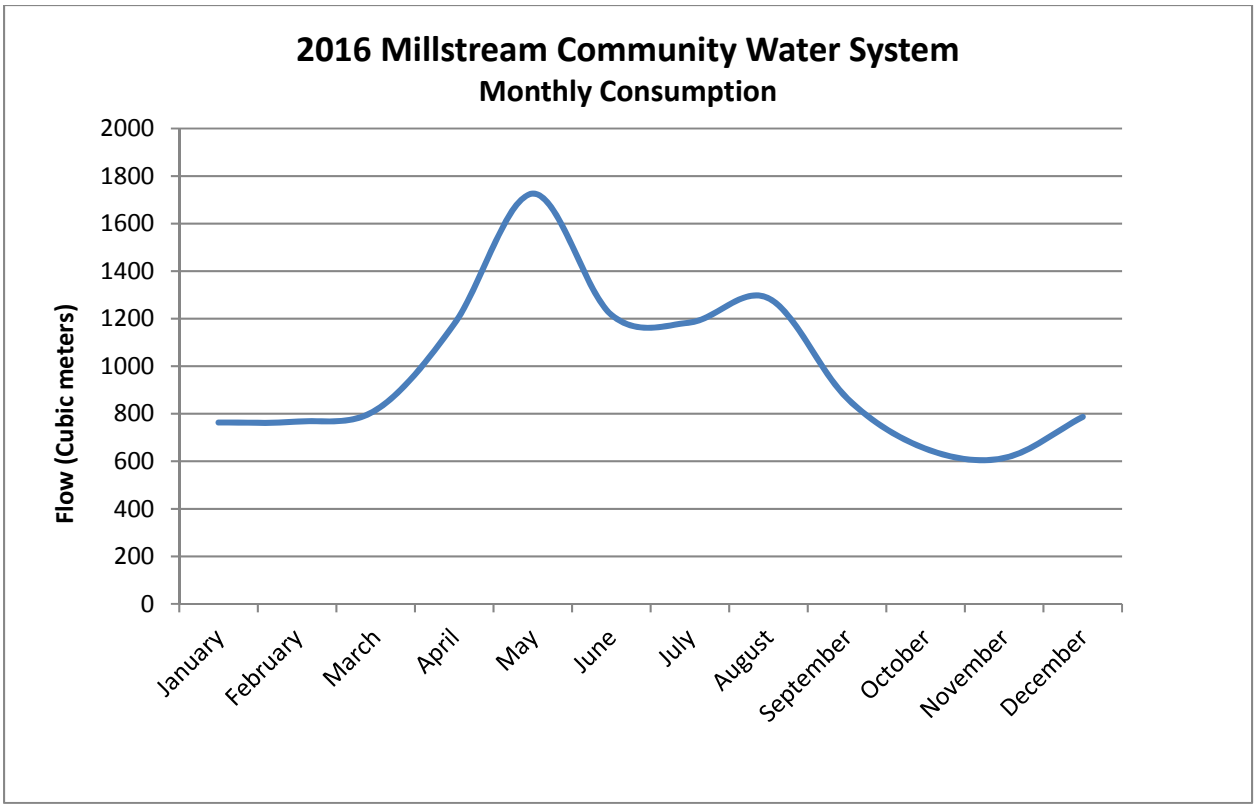
5.3 Water Quality and Consumption

The 2016 water consumption for the Millstream water system was 11,854 cubic meters. The monthly water consumption graph shows a typical community with increasing use during the summer months.

Appendix B shows the 2016 Millstream microbiological monthly sampling history provided by Island Health. All the results show no Total Coliforms or E. coli.

Island Health performed an inspection of the water system in January 2014, which can be found in Appendix A. No violations were reported and the facility was given a low hazard rating. Low Hazard rating is the lowest rating in Island Health's scale.

The most recent potability test was completed on the well water (raw) in December 2013, as can be seen in Appendix A. The water quality is very good with very little bacteria, which shows there is very little surface influence.


2016 Millstream Community Water System
Monthly Consumption
Flow (Cubic meters)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
January
February
March
April
May
June
July
August
September
October
November
December

ALBERNI CLAYOQUOT REGIONAL DISTRICT

COUGAR SMITH PARK WATER SYSTEM

ANNUAL REPORT

2016

Prepared by: John Thomas
Environmental Services Department
3008 Fifth Avenue, Port Alberni, BC, Canada, V9Y 2E3, Phone 250-720-2700

6.1 Cougar Smith Park

Cougar Smith Park is in the Sproat Lake area within the Alberni Valley. The park is located on Faber Road situated approximately 13 km northwest of Port Alberni. It has a bike skills park, baseball diamond, tennis courts and playgrounds.

6.2 System Overview

Water source: Sproat Lake
Treatment: Micro filtration
Disinfection: Ultraviolet (UV)
Reservoir: no reservoir
Service Connections: Two connections
Length of Mains: 144 meters of 31.75 mm
Water main material: Polyethylene (PE)
Average Daily Flow: 5 m3

The water system infrastructure is located within the public building and a private property adjacent to the lake. Within the building is a pressure tank, an ultraviolet light disinfection system and a 5 micron particulate filter. The water system supplies two public washrooms, an irrigation system, a drinking water fountain and the caretaker's residence.

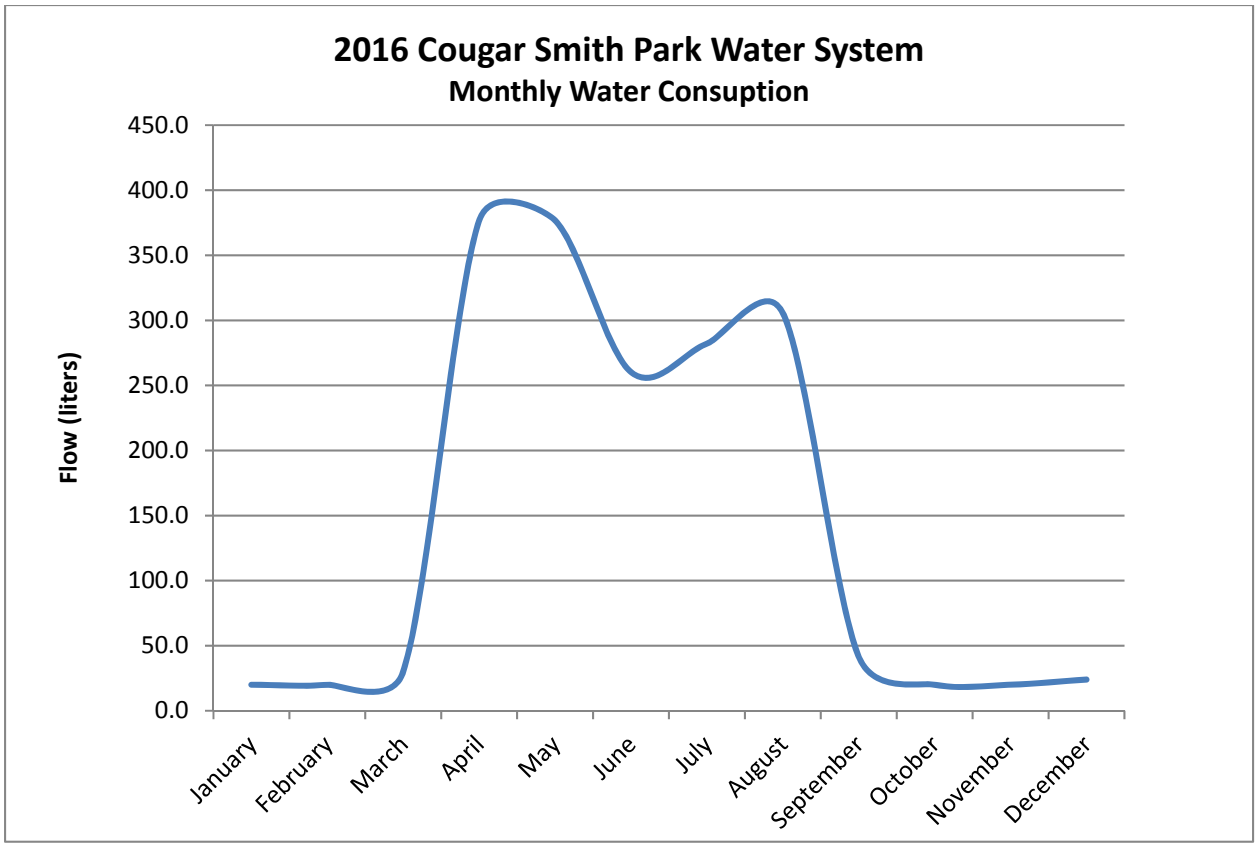
6.3 Water Quality and Consumption

The 2016 water consumption for Cougar Smith Park was 1,737 cubic meters. The monthly consumption graph shows a dramatic seasonal increase due to the irrigation of the baseball diamond and water used for the bike park. The bike park uses water in maintaining the bike runs and jumps.

All sample results show no Total Coliforms or E. coli in the distribution system. Island Health is now providing the bacteria analyses.

Island Health is currently reviewing an application to certify the water system. Once certified, Island Health will provide inspections to ensure the water system is being safely operated. The water system's operation is currently being checked weekly by ACRD staff and by the resident caretaker. The water system has a fail-safe shut off switch if the UV system fails, which prevents untreated water entering the system.

The most recent potability test was completed in December 2013 as can be seen in Appendix A. The water quality is good and there is no concerns indicated from the potability test.


2016 Cougar Smith Park Water System
Monthly Water Consuption
Flow (liters)
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
January
February
March
April
May
June
July
August
September
October
November
December

ALBERNI CLAYOQUOT REGIONAL DISTRICT

ALBERNI VALLEY REGIONAL AIRPORT WATER SYSTEM
ANNUAL REPORT
2016

Prepared by: John Thomas
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7.1 Alberni Valley Regional Airport Small Water System Introduction

The Alberni Valley Regional Airport (AVRA) is located approximately 7 kilometers west of Port Alberni. This small water system at the AVRA was constructed in 1993 to service the caretaker's residence and the airport terminal building. The terminal building has washroom facilities available to the personnel working in the three offices and to the public. There is an exterior hose bib that is used for watering plants and washing of aircraft.

7.2 System Overview

Water Source: Shallow dug well to 5.5 meters deep
Treatment: Microfiltration
Disinfection: Ultraviolet light (UV)
Reservoir: no reservoir
Service connections: Three
Length of Mains: Approximately 350 meters of 38mm
Water Main Material: Polyethylene (PE)
Average Daily Flow: 0.7 m3

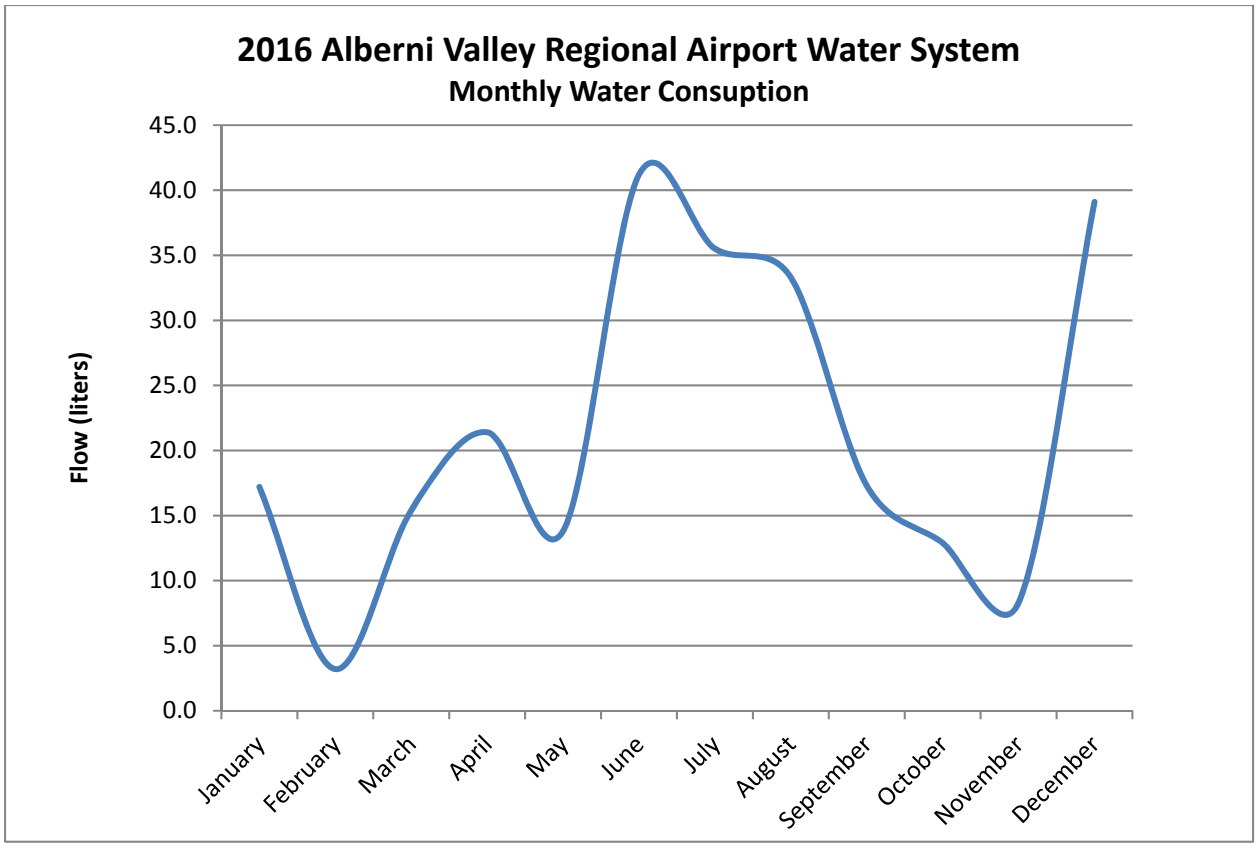
7.3 Water Quality and Consumption

The 2016 water consumption for the AVRA was 259 cubic meters. The monthly water consumption graph shows a significant peak in water demand during the summer months due to the new airport runway expansion project. There is also an increase of water use during the winter months where water has been left running to reduce the risk of freezing pipes.

Appendix B shows the 2016 AVRA microbiological monthly sampling history provided by Island Health. All results show no Total Coliforms or E. coli.

Island Health performed an inspection of the AVRA in February 2014, which can be found in Appendix D. No significant violations were reported and the facility was given a low hazard rating. "Low hazard rating" is the lowest rating in the Island Health's scale. A recommendation was written that the system be monitored frequently to ensure the system is working properly. The water system's operation is currently being checked weekly by ACRD staff and the resident caretaker. The water system has a fail-safe shut off switch if the UV system fails, which prevents untreated water from entering the system.

The most recent potability test was completed in January 2012 as can be seen in Appendix A. Iron (0.626 mg/L) was higher than the Canadian Drinking Water Guidelines Aesthetic Objective of 0.3 mg/L. Higher levels of iron is typical of groundwater in the area and is not a health concern.


2016 Alberni Valley Regional Airport Water System
Monthly Water Consuption
Flow (liters)
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
January
February
March
April
May
June
July
August
September
October
November
December

Appendix A

Certificate of Analysis

Water Chemistry including: Physical, Chemical, Biological

North Island Laboratories

• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

Certificate of Analysis

Report To: Regional District of Alberni & Clayoquot
John Thomas
3008 5th Ave.
Port Alberni, BC V9Y 2E3
V9Y 2E3

Lab Number: 113093
Date Reported: 19 Aug 14
Date Completed: 19 Aug 14
Date Received: 7 Aug 14 13:02

113093-01 Strick Road Pumphouse **Beaver Creek Water System** **Inside tap**

Sampled By: Keith Looker
Sampling Date: 7 Aug 14 10:00

Test	Result	Units	Drinking Water Guideline
Colour - Apparent	<5	Colour Units	15
UV Transmittance	97.9	%/cm	
Fluoride	0.02	mg/L	1.5 MAC
Chloride	6	mg/L	250 AO
Nitrate (N)	0.07	mg/L	10 MAC
Nitrite (N)	<0.01	mg/L	1 MAC
Sulphate	2.8	mg/L	500 AO
T-Aluminium	<0.025	mg/L	0.1 Operational Std.
T-Antimony	<0.0005	mg/L	0.006 MAC
T-Arsenic	0.00117	mg/L	0.010 MAC
T-Barium	0.0167	mg/L	1.0 MAC
T-Beryllium	<0.00025	mg/L	
T-Bismuth	<0.0005	mg/L	
T-Boron	0.018	mg/L	5 IMAC
T-Cadmium	<0.00005	mg/L	0.005 MAC
T-Calcium	29	mg/L	
T-Chromium	<0.0025	mg/L	0.05 MAC
T-Cobalt	<0.0005	mg/L	
T-Copper	0.0042	mg/L	1.0 AO
T-Iron	0.106	mg/L	0.3 AO
T-Lead	<0.0005	mg/L	0.010 MAC
T-Lithium	<0.0025	mg/L	
T-Magnesium	1.3	mg/L	
T-Manganese	<0.0050	mg/L	0.05 AO
T-Molybdenum	<0.00025	mg/L	

Test results are in the results column. Your results should be below or with the values listed in the Drinking Water guidelines column on the right hand side of the report. AO = Aesthetic Objective; MAC = Max. Allowable Concentration; IMAC = Interim MAC > = Greater than; < = Less than

Results relate only to samples as submitted. This certificate must not be reproduced, except in its entirety, without written consent from the laboratory.

Canadian Drinking Water Guidelines as listed on Dec. 5th, 2005 and are subject to change. Method uncertainties for specified analyses are available upon request.

North Island Laboratories

• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

113093-01 Strick Road Pumphouse **Beaver Creek Water System** **Inside tap**

Sampled By: Keith Looker

Sampling Date: 7 Aug 14 10:00

Test	Result	Units	Drinking Water Guideline
T-Nickel	<0.0010	mg/L	
T-Potassium	<0.5	mg/L	
T-Selenium	<0.0005	mg/L	0.01 MAC
T-Silicon	2.29	mg/L	
T-Silver	<0.00025	mg/L	
T-Sodium	3.4	mg/L	200 AO
T-Strontium	0.0636	mg/L	
T-Thallium	<0.00005	mg/L	
T-Tin	<0.0005	mg/L	
T-Titanium	<0.0025	mg/L	
T-Uranium	<0.00005	mg/L	0.02 MAC
T-Vanadium	0.0006	mg/L	
T-Zinc	<0.0025	mg/L	5 AO
Hardness (CaCO3)	78	mg/L	
Tannins & Lignins	<0.1	mg/L	0.4 AO
pH at 25 C	7.9	pH Units	6.5-8.5
Alkalinity	62	mg/L (CaCO3)	
Turbidity	<0.5	NTU's	5 AO
Total Dissolved Solids (conductivity ca	102	mg/L	500 AO
Bromoacetic Acid	<2.0	ug/L	
Bromochloroacetic Acid	<2.0	ug/L	
Chloroacetic Acid	<2.0	ug/L	
Dibromoacetic Acid	<2.0	ug/L	
Dichloroacetic Acid	6.2	ug/L	
Trichloroacetic Acid	7.8	ug/L	
Total Halo Acetic Acids	14	ug/L	
Bromodichloromethane	0.003	mg/L	0.016 MAC
Bromoform	<0.001	mg/L	
Chloroform	0.014	mg/L	
Dibromochloromethane	<0.001	mg/L	
Total Trihalomethanes	0.017	mg/L	0.100 MAC

Test results are in the results column. Your results should be below or with the values listed in the Drinking Water guidelines column on the right hand side of the report. AO = Aesthetic Objective; MAC = Max. Allowable Concentration; IMAC = Interim MAC >= Greater than; <= Less than

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Canadian Drinking Water Guidelines as listed on Dec. 5th, 2005 and are subject to change. Method uncertainties for specified analyses are available upon request.

North Island Laboratories

• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

Certificate of Analysis

Report To: Regional District of Alberni & Clayoquot
John Thomas
3008 5th Ave.
Port Alberni, BC V9Y 2E3
V9Y 2E3

Lab Number: 115491
Date Reported: 12 Nov 14
Date Completed: 12 Nov 14
Date Received: 30 Oct 14 12:03

115491-01 Strick Road Pumphouse Beaver Creek Water System Inside tap

Sampled By: Keith Looker
Sampling Date: 30 Oct 14 9:40

Test	Result	Units	Drinking Water Guideline
Total Coliforms (DES)	<1.0	MPN/100mL	<1
E. coli (DES)	<1.0	MPN/100mL	<1
Colour - Apparent	30	Colour Units	15
UV Transmittance	81.2	%/cm	
Fluoride	<0.05	mg/L	1.5 MAC
Chloride	4.6	mg/L	250 AO
Nitrate (N)	<0.05	mg/L	10 MAC
Nitrite (N)	0.06	mg/L	1 MAC
Sulphate	1.4	mg/L	500 AO
T-Aluminium	0.048	mg/L	0.1 Operational Std.
T-Antimony	<0.0001	mg/L	0.006 MAC
T-Arsenic	0.00048	mg/L	0.010 MAC
T-Barium	0.0128	mg/L	1.0 MAC
T-Beryllium	<0.00005	mg/L	
T-Bismuth	<0.0001	mg/L	
T-Boron	0.014	mg/L	5 IMAC
T-Cadmium	<0.00001	mg/L	0.005 MAC
T-Calcium	10.8	mg/L	
T-Chromium	<0.0005	mg/L	0.05 MAC
T-Cobalt	0.0001	mg/L	
T-Copper	0.0067	mg/L	1.0 AO
T-Iron	0.227	mg/L	0.3 AO
T-Lead	0.0004	mg/L	0.010 MAC
T-Lithium	<0.0005	mg/L	
T-Magnesium	0.86	mg/L	

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North Island Laboratories

• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

115491-01 Strick Road Pumphouse **Beaver Creek Water System** **Inside tap**

Sampled By: Keith Looker

Sampling Date: 30 Oct 14 9:40

Test	Result	Units	Drinking Water Guideline
T-Manganese	0.079	mg/L	0.05 AO
T-Molybdenum	<0.00005	mg/L	
T-Nickel	<0.0002	mg/L	
T-Potassium	0.2	mg/L	
T-Selenium	<0.0001	mg/L	0.01 MAC
T-Silicon	2.16	mg/L	
T-Silver	<0.00005	mg/L	
T-Sodium	1.8	mg/L	200 AO
T-Strontium	0.0265	mg/L	
T-Thallium	<0.00001	mg/L	
T-Tin	<0.0001	mg/L	
T-Titanium	0.0011	mg/L	
T-Uranium	<0.00001	mg/L	0.02 MAC
T-Vanadium	0.0003	mg/L	
T-Zinc	0.0037	mg/L	5 AO
Hardness (CaCO3)	31	mg/L	
Tannins & Lignins	0.3	mg/L	0.4 AO
pH at 25 C	7.0	pH Units	6.5-8.5
Alkalinity	24	mg/L (CaCO3)	
Turbidity	1.8	NTU's	5 AO
Total Dissolved Solids (conductivity ca	46	mg/L	500 AO
Bromoacetic Acid	<2.0	ug/L	
Bromochloroacetic Acid	<2.0	ug/L	
Chloroacetic Acid	<2.0	ug/L	
Dibromoacetic Acid	<2.0	ug/L	
Dichloroacetic Acid	44.1	ug/L	
Trichloroacetic Acid	68.5	ug/L	
Total Halo Acetic Acids	110	ug/L	
Bromodichloromethane	0.003	mg/L	0.016 MAC
Bromoform	<0.001	mg/L	
Chloroform	0.073	mg/L	
Dibromochloromethane	<0.001	mg/L	

Test results are in the results column. Your results should be below or with the values listed in the Drinking Water guidelines column on the right hand side of the report. AO = Aesthetic Objective; MAC = Max. Allowable Concentration; IMAC = Interim MAC > = Greater than; < = Less than

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North Island Laboratories

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115491-01 Strick Road Pumphouse **Beaver Creek Water System** **Inside tap**

Sampled By: Keith Looker

Sampling Date: 30 Oct 14 9:40

Test	Result	Units	Drinking Water Guideline
Total Trihalomethanes	0.076	mg/L	0.100 MAC

Test results are in the results column. Your results should be below or with the values listed in the Drinking Water guidelines column on the right hand side of the report. AO = Aesthetic Objective; MAC = Max. Allowable Concentration; IMAC = Interim MAC >= Greater than; <= Less than

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Canadian Drinking Water Guidelines as listed on Dec. 5th, 2005 and are subject to change. Method uncertainties for specified analyses are available upon request.

North Island Laboratories

• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

Certificate of Analysis

Report To: Regional District of Alberni & Clayoquot
John Thomas
3008 5th Ave.
Port Alberni, BC V9Y 2E3
V9Y 2E3

Lab Number: 107647
Date Reported: 31 Dec 13
Date Completed: 31 Dec 13
Date Received: 18 Dec 13 9:53

107647-01 Millstream RAW
Sampled By:
Sampling Date: 17 Dec 13 0:00

Test	Result	Units	Drinking Water Guideline
Total Coliforms (DES)	1.0	MPN/100mL	<1
E. coli (DES)	<1.0	MPN/100mL	<1
Colour - Apparent	<5	Colour Units	15
UV Transmittance	99.2	%/cm	
Fluoride	<0.05	mg/L	1.5 MAC
Chloride	13.2	mg/L	250 AO
Nitrate (N)	0.88	mg/L	10 MAC
Nitrite (N)	<0.05	mg/L	1 MAC
Sulphate	5.7	mg/L	500 AO
T-Aluminium	0.009	mg/L	0.1 Operational Std.
T-Antimony	<0.0001	mg/L	0.006 MAC
T-Arsenic	0.00033	mg/L	0.010 MAC
T-Barium	0.00251	mg/L	1.0 MAC
T-Beryllium	<0.00005	mg/L	
T-Bismuth	<0.0001	mg/L	
T-Boron	0.029	mg/L	5 IMAC
T-Cadmium	0.00002	mg/L	0.005 MAC
T-Calcium	32	mg/L	
T-Chromium	<0.0005	mg/L	0.05 MAC
T-Cobalt	<0.0001	mg/L	
T-Copper	0.0008	mg/L	1.0 AO
T-Iron	0.014	mg/L	0.3 AO
T-Lead	0.0001	mg/L	0.010 MAC
T-Lithium	0.0008	mg/L	
T-Magnesium	5.96	mg/L	
T-Manganese	0.0042	mg/L	0.05 AO

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North Island Laboratories

• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

107647-01 Millstream RAW

Sampled By:

Sampling Date: 17 Dec 13 0:00

Test	Result	Units	Drinking Water Guideline
T-Molybdenum	0.00023	mg/L	
T-Nickel	0.0005	mg/L	
T-Potassium	0.7	mg/L	
T-Selenium	0.0003	mg/L	0.01 MAC
T-Silicon	8.65	mg/L	
T-Silver	<0.00005	mg/L	
T-Sodium	11.7	mg/L	200 AO
T-Strontium	0.0802	mg/L	
T-Thallium	<0.00001	mg/L	
T-Tin	0.0002	mg/L	
T-Titanium	<0.0005	mg/L	
T-Uranium	0.00005	mg/L	0.02 MAC
T-Vanadium	0.0008	mg/L	
T-Zinc	0.0015	mg/L	5 AO
Hardness (CaCO3)	100	mg/L	
Tannins & Lignins	<0.1	mg/L	0.4 AO
pH at 25 C	6.9	pH Units	6.5-8.5
Alkalinity	96	mg/L (CaCO3)	
Turbidity	<0.5	NTU's	5 AO
Total Dissolved Solids (conductivity ca	170	mg/L	500 AO

107647-02 Tofino Airport RAW

Sampled By:

Sampling Date: 17 Dec 13 0:00

Test	Result	Units	Drinking Water Guideline
Total Coliforms (DES)	<1.0	MPN/100mL	<1
E. coli (DES)	<1.0	MPN/100mL	<1
Colour - Apparent	430	Colour Units	15
UV Transmittance	78.4	%/cm	
Fluoride	0.07	mg/L	1.5 MAC
Chloride	11.3	mg/L	250 AO
Nitrate (N)	<0.05	mg/L	10 MAC
Nitrite (N)	<0.05	mg/L	1 MAC

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North Island Laboratories

• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

107647-02 Tofino Airport RAW

Sampled By:

Sampling Date: 17 Dec 13 0:00

Test	Result	Units	Drinking Water Guideline
Sulphate	19.2	mg/L	500 AO
T-Aluminium	0.005	mg/L	0.1 Operational Std.
T-Antimony	<0.0001	mg/L	0.006 MAC
T-Arsenic	0.00076	mg/L	0.010 MAC
T-Barium	0.00766	mg/L	1.0 MAC
T-Beryllium	0.00005	mg/L	
T-Bismuth	<0.0001	mg/L	
T-Boron	0.024	mg/L	5 IMAC
T-Cadmium	<0.00001	mg/L	0.005 MAC
T-Calcium	37	mg/L	
T-Chromium	<0.0005	mg/L	0.05 MAC
T-Cobalt	0.001	mg/L	
T-Copper	0.0023	mg/L	1.0 AO
T-Iron	5.37	mg/L	0.3 AO
T-Lead	0.0002	mg/L	0.010 MAC
T-Lithium	0.0036	mg/L	
T-Magnesium	6.17	mg/L	
T-Manganese	0.411	mg/L	0.05 AO
T-Molybdenum	0.00028	mg/L	
T-Nickel	0.0022	mg/L	
T-Potassium	1.4	mg/L	
T-Selenium	0.0001	mg/L	0.01 MAC
T-Silicon	16.1	mg/L	
T-Silver	<0.00005	mg/L	
T-Sodium	11.1	mg/L	200 AO
T-Strontium	0.12	mg/L	
T-Thallium	<0.00001	mg/L	
T-Tin	0.0003	mg/L	
T-Titanium	<0.0005	mg/L	
T-Uranium	<0.00001	mg/L	0.02 MAC
T-Vanadium	<0.0001	mg/L	
T-Zinc	0.0046	mg/L	5 AO
Hardness (CaCO3)	120	mg/L	
Tannins & Lignins	<0.1	mg/L	0.4 AO

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North Island Laboratories

• 9755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

107647-02 Tofino Airport RAW

Sampled By:

Sampling Date: 17 Dec 13 0:00

Test	Result	Units	Drinking Water Guideline
pH at 25 C	7.2	pH Units	6.5-8.5
Alkalinity	100	mg/L (CaCO3)	
Turbidity	57.5	NTU's	5 AO
Total Dissolved Solids (conductivity ca	190	mg/L	500 AO

107647-03 Tofino Airport Filtered

Sampled By:

Sampling Date: 17 Dec 13 0:00

Test	Result	Units	Drinking Water Guideline
Total Coliforms (DES)	<1.0	MPN/100mL	<1
E. coli (DES)	<1.0	MPN/100mL	<1
Colour - Apparent	<5	Colour Units	15
UV Transmittance	99.7	%/cm	
Fluoride	0.07	mg/L	1.5 MAC
Chloride	12.6	mg/L	250 AO
Nitrate (N)	<0.05	mg/L	10 MAC
Nitrite (N)	<0.05	mg/L	1 MAC
Sulphate	19.2	mg/L	500 AO
T-Aluminium	<0.005	mg/L	0.1 Operational Std.
T-Antimony	<0.0001	mg/L	0.006 MAC
T-Arsenic	0.00078	mg/L	0.010 MAC
T-Barium	0.0001	mg/L	1.0 MAC
T-Beryllium	0.00008	mg/L	
T-Bismuth	<0.0001	mg/L	
T-Boron	0.023	mg/L	5 IMAC
T-Cadmium	<0.00001	mg/L	0.005 MAC
T-Calcium	0.28	mg/L	
T-Chromium	<0.0005	mg/L	0.05 MAC
T-Cobalt	<0.0001	mg/L	
T-Copper	0.001	mg/L	1.0 AO
T-Iron	0.009	mg/L	0.3 AO
T-Lead	0.0003	mg/L	0.010 MAC
T-Lithium	0.0006	mg/L	

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North Island Laboratories
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107647-03 Tofino Airport Filtered
Sampled By:
Sampling Date: 17 Dec 13 0:00

Test	Result	Units	Drinking Water Guideline
T-Magnesium	<0.04	mg/L	
T-Manganese	<0.0010	mg/L	0.05 AO
T-Molybdenum	0.00024	mg/L	
T-Nickel	0.0004	mg/L	
T-Potassium	<0.1	mg/L	
T-Selenium	0.0001	mg/L	0.01 MAC
T-Silicon	15.8	mg/L	
T-Silver	<0.00005	mg/L	
T-Sodium	74.3	mg/L	200 AO
T-Strontium	0.001	mg/L	
T-Thallium	<0.00001	mg/L	
T-Tin	<0.0001	mg/L	
T-Titanium	<0.0005	mg/L	
T-Uranium	<0.00001	mg/L	0.02 MAC
T-Vanadium	<0.0001	mg/L	
T-Zinc	0.0011	mg/L	5 AO
Hardness (CaCO3)	0.70	mg/L	
Tannins & Lignins	<0.1	mg/L	0.4 AO
pH at 25 C	7.8	pH Units	6.5-8.5
Alkalinity	120	mg/L (CaCO3)	
Turbidity	<0.5	NTU's	5 AO
Total Dissolved Solids (conductivity ca	200	mg/L	500 AO

107647-04 Cougar Smith Park
Sampled By:
Sampling Date: 17 Dec 13 0:00

Test	Result	Units	Drinking Water Guideline
Total Coliforms (DES)	<1.0	MPN/100mL	<1
E. coli (DES)	<1.0	MPN/100mL	<1
Colour - Apparent	5	Colour Units	15
UV Transmittance	95.7	%/cm	
Fluoride	<0.05	mg/L	1.5 MAC
Chloride	1.4	mg/L	250 AO

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North Island Laboratories

• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

107647-04 Cougar Smith Park

Sampled By:

Sampling Date: 17 Dec 13 0:00

Test	Result	Units	Drinking Water Guideline
Nitrate (N)	<0.05	mg/L	10 MAC
Nitrite (N)	0.05	mg/L	1 MAC
Sulphate	1.1	mg/L	500 AO
T-Aluminium	0.008	mg/L	0.1 Operational Std.
T-Antimony	<0.0001	mg/L	0.006 MAC
T-Arsenic	0.00015	mg/L	0.010 MAC
T-Barium	0.00263	mg/L	1.0 MAC
T-Beryllium	<0.00005	mg/L	
T-Bismuth	<0.0001	mg/L	
T-Boron	0.014	mg/L	5 IMAC
T-Cadmium	<0.00001	mg/L	0.005 MAC
T-Calcium	8.8	mg/L	
T-Chromium	<0.0005	mg/L	0.05 MAC
T-Cobalt	<0.0001	mg/L	
T-Copper	0.0192	mg/L	1.0 AO
T-Iron	0.006	mg/L	0.3 AO
T-Lead	0.0013	mg/L	0.010 MAC
T-Lithium	<0.0005	mg/L	
T-Magnesium	3.52	mg/L	
T-Manganese	<0.0010	mg/L	0.05 AO
T-Molybdenum	0.00018	mg/L	
T-Nickel	0.0003	mg/L	
T-Potassium	<0.1	mg/L	
T-Selenium	<0.0001	mg/L	0.01 MAC
T-Silicon	0.99	mg/L	
T-Silver	<0.00005	mg/L	
T-Sodium	1.2	mg/L	200 AO
T-Strontium	0.0123	mg/L	
T-Thallium	<0.00001	mg/L	
T-Tin	<0.0001	mg/L	
T-Titanium	<0.0005	mg/L	
T-Uranium	<0.00001	mg/L	0.02 MAC
T-Vanadium	0.0002	mg/L	
T-Zinc	0.0114	mg/L	5 AO

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> = Greater than; < = Less than

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North Island Laboratories
• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

107647-04 Cougar Smith Park
Sampled By:
Sampling Date: 17 Dec 13 0:00

Test	Result	Units	Drinking Water Guideline
Hardness (CaCO3)	37	mg/L	
Tannins & Lignins	<0.1	mg/L	0.4 AO
pH at 25 C	9.5	pH Units	6.5-8.5
Alkalinity	34	mg/L (CaCO3)	
Turbidity	<0.5	NTU's	5 AO
Total Dissolved Solids (conductivity ca	49	mg/L	500 AO

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North Island Laboratories

• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

Certificate of Analysis

Report To: Regional District of Alberni & Clayoquot
John Thomas
3008 5th Ave.
Port Alberni, BC V9Y 2E3
V9Y 2E3

Lab Number: 92717
Date Reported: 18 Jan 12
Date Completed: 18 Jan 12
Date Received: 10 Jan 12 10:50

92717-01 Alberni Valley Reg Airport

Sampled By: John
Sampling Date: 9 Jan 12 0:00

Test	Result	Units	Drinking Water Guideline
Fluoride	<0.05	mg/L	1.5 MAC
Chloride	3.0	mg/L	250 AO
Nitrate (N)	0.07	mg/L	10 MAC
Nitrite (N)	<0.05	mg/L	1 MAC
Sulphate	<0.5	mg/L	500 AO
T-Aluminium	0.041	mg/L	0.1 Operational Std.
T-Antimony	<0.0002	mg/L	0.006 MAC
T-Arsenic	<0.0002	mg/L	0.010 MAC
T-Barium	0.001	mg/L	1.0 MAC
T-Beryllium	<0.00004	mg/L	
T-Bismuth	<0.001	mg/L	
T-Boron	0.006	mg/L	5 IMAC
T-Cadmium	<0.00001	mg/L	0.005 MAC
T-Calcium	3.75	mg/L	
T-Chromium	0.0012	mg/L	0.05 MAC
T-Cobalt	0.00006	mg/L	
T-Copper	0.048	mg/L	1.0 AO
T-Iron	0.626	mg/L	0.3 AO
T-Lead	0.0083	mg/L	0.010 MAC
T-Lithium	<0.001	mg/L	
T-Magnesium	0.63	mg/L	
T-Manganese	0.04	mg/L	0.05 AO
T-Molybdenum	<0.0001	mg/L	
T-Nickel	<0.001	mg/L	
T-Phosphorus	<0.01	mg/L	
T-Potassium	<0.1	mg/L	

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Canadian Drinking Water Guidelines as listed on Dec. 5th, 2005 and are subject to

North Island Laboratories

• 2755 B Moray Avenue, Courtenay, B.C. V9N 8M9 Tel: (250) 338-7786 Fax: (250) 338-7553

92717-01 Alberni Valley Reg Airport

Sampled By: John

Sampling Date: 9 Jan 12 0:00

Test	Result	Units	Drinking Water Guideline
T-Selenium	<0.0006	mg/L	0.01 MAC
T-Silicon	3.68	mg/L	
T-Silver	0.00007	mg/L	
T-Sodium	3.3	mg/L	200 AO
T-Strontium	0.014	mg/L	
T-Thallium	<0.00001	mg/L	
T-Tin	0.0012	mg/L	
T-Titanium	0.002	mg/L	
T-Uranium	<0.0004	mg/L	0.02 MAC
T-Vanadium	0.0053	mg/L	
T-Zinc	0.014	mg/L	5 AO
Hardness (CaCO3)	12	mg/L	
Colour - Apparent	6	Colour units	15 AO
Tannins & Lignins	<0.1	mg/L	0.4 AO
UV Transmittance	98.4	%/cm	
pH	6.2	pH Units	6.5-8.5
Alkalinity	<20	mg/L (CaCO3)	
Turbidity	0.9	NTU's	5 AO
Total Dissolved Solids (conductivity ca	29	mg/L	500 AO

AO = Aesthetic Objective; MAC = Max. Allowable Concentration; IMAC = Interim MAC

> = Greater than; < = Less than

Results relate only to samples as submitted. This certificate must not be reproduced, except in its entirety, without written consent from the laboratory.

Canadian Drinking Water Guidelines as listed on Dec. 5th, 2005 and are subject to

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Maxxam Job #: B620149
Report Date: 2016/04/29

Alberni Clayoquot Regional District
Client Project #: BEAVER CREEK WATER SYSTEM

TRIHALOMETHANES (THM) IN WATER

Maxxam ID		OH4360	OH4361		
Sampling Date		2016/03/16	2016/03/16		
COC Number		320109	320109		
	UNITS	BC STRICK ROAD PH	BC RESERVOIR #1	RDL	QC Batch
Volatiles					
Chloroform	ug/L	87	71	1.0	8220928
Chlorodibromomethane	ug/L	<1.0	<1.0	1.0	8220928
Bromodichloromethane	ug/L	2.6	2.7	1.0	8220928
Bromoform	ug/L	<1.0	<1.0	1.0	8220928
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	98	98		8220928
4-Bromofluorobenzene (sur.)	%	97	96		8220928
D4-1,2-Dichloroethane (sur.)	%	103	104		8220928
RDL = Reportable Detection Limit					

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Maxxam Job #: B655916
Report Date: 2016/04/27

Maxxam Analytics
Client Project #: B620149

HALOACETIC ACIDS BY GC-ECD (DRINKING WATER)

Maxxam ID		CBB098	CBB099		
Sampling Date		2016/03/16	2016/03/16		
COC Number		N/A	N/A		
	UNITS	OH4360-02R\BC STRICK ROAD PH	OH4361-02R\BC RESERVOIR #1	RDL	QC Batch
Monochloroacetic Acid (MCAA)	ug/L	<5.0	<5.0	5.0	4427087
Monobromoacetic Acid (MBAA)	ug/L	<5.0	<5.0	5.0	4427087
Dichloroacetic Acid (DCAA)	ug/L	33	40	5.0	4427087
Trichloroacetic Acid (TCAA)	ug/L	76	85	5.0	4427087
Bromochloroacetic Acid (BCAA)	ug/L	<5.0	<5.0	5.0	4427087
Dibromoacetic Acid (DBAA)	ug/L	<5.0	<5.0	5.0	4427087
Total haloacetic acids	ug/L	110	130	5.0	4427087
Surrogate Recovery (%)					
2,3-Dibromopropionic Acid	%	81	96		4427087
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

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Maxxam Job #: B652643
Report Date: 2016/08/09

Alberni Clayoquot Regional District
Client Project #: BEAVER CREEK WATER SYSTEM

TRIHALOMETHANES (THM) IN WATER

Maxxam ID		OY0498		OY0499		
Sampling Date		2016/06/28		2016/06/28		
COC Number		320110		320110		
	UNITS	BC STRICK ROAD PH	QC Batch	BC RESERVOIR #1	RDL	QC Batch
Volatiles						
Chloroform	ug/L	18	8318589	21	1.0	8318585
Chlorodibromomethane	ug/L	<1.0	8318589	<1.0	1.0	8318585
Bromodichloromethane	ug/L	2.8	8318589	2.9	1.0	8318585
Bromoform	ug/L	<1.0	8318589	<1.0	1.0	8318585
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	108	8318589	106		8318585
4-Bromofluorobenzene (sur.)	%	107	8318589	83		8318585
D4-1,2-Dichloroethane (sur.)	%	93	8318589	93		8318585
RDL = Reportable Detection Limit						

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Maxxam Job #: B6D8166
Report Date: 2016/07/18

Maxxam Analytics
Client Project #: B652643

HALOACETIC ACIDS BY GC-ECD (WATER)

Maxxam ID		CQP197	CQP198		
Sampling Date		2016/06/28	2016/06/28		
COC Number		N/A	N/A		
	UNITS	OYO498-02R\BC STRICK ROAD PH	OYO499-02R\BC RESERVOIR #1	RDL	QC Batch
Monochloroacetic Acid (MCAA)	ug/L	<5.0	<5.0	5.0	4574479
Monobromoacetic Acid (MBAA)	ug/L	<5.0	<5.0	5.0	4574479
Dichloroacetic Acid (DCAA)	ug/L	9.9	14	5.0	4574479
Trichloroacetic Acid (TCAA)	ug/L	13	16	5.0	4574479
Bromochloroacetic Acid (BCAA)	ug/L	<5.0	<5.0	5.0	4574479
Dibromoacetic Acid (DBAA)	ug/L	<5.0	<5.0	5.0	4574479
Total haloacetic acids	ug/L	23	30	5.0	4574479
Surrogate Recovery (%)					
2,3-Dibromopropionic Acid	%	106	78		4574479
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

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Maxxam Job #: B682128
Report Date: 2016/10/05

Alberni Clayoquot Regional District
Client Project #: BEAVER CREEK WATER SYSTEM

TRIHALOMETHANES (THM) IN WATER

Maxxam ID		PO2931	PO2932		
Sampling Date		2016/09/20	2016/09/20		
COC Number		320120	320120		
	UNITS	BC STRICK ROAD PH	BC RESERVOIR #1	RDL	QC Batch
Volatiles					
Chloroform	ug/L	14	22	1.0	8407127
Chlorodibromomethane	ug/L	<1.0	<1.0	1.0	8407127
Bromodichloromethane	ug/L	3.8	4.5	1.0	8407127
Bromoform	ug/L	<1.0	<1.0	1.0	8407127
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	106	107		8407127
4-Bromofluorobenzene (sur.)	%	86	85		8407127
D4-1,2-Dichloroethane (sur.)	%	91	90		8407127
RDL = Reportable Detection Limit					

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Maxxam Job #: B6K5778
Report Date: 2016/10/04

Maxxam Analytics
Client Project #: B682128
Site Location: BEAVER CREEK WATER SYSTEM

HALOACETIC ACIDS BY GC-ECD (WATER)

Maxxam ID			DDA064	DDA065		
Sampling Date			2016/09/20	2016/09/20		
COC Number			VB682128-BEDV-01-01	VB682128-BEDV-01-01		
	UNITS	MAC	PO2931-BC STRICK ROAD PH	PO2932-BC RESERVOIR #1	RDL	QC Batch
Monochloroacetic Acid (MCAA)	ug/L	-	<5.0	<5.0	5.0	4677502
Monobromoacetic Acid (MBAA)	ug/L	-	<5.0	<5.0	5.0	4677502
Dichloroacetic Acid (DCAA)	ug/L	-	6.8	7.8	5.0	4677502
Trichloroacetic Acid (TCAA)	ug/L	-	8.3	16	5.0	4677502
Bromochloroacetic Acid (BCAA)	ug/L	-	<5.0	<5.0	5.0	4677502
Dibromoacetic Acid (DBAA)	ug/L	-	<5.0	<5.0	5.0	4677502
Total haloacetic acids	ug/L	**80**	15	24	5.0	4677502
Surrogate Recovery (%)						
2,3-Dibromopropionic Acid	%	-	94	99		4677502

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Maxxam Job #: B6B0285
Report Date: 2016/12/28

Alberni Clayoquot Regional District
Client Project #: Beaver Creek DBP

TRIHALOMETHANES (THM) IN WATER

Maxxam ID		QF6524	QF6525		
Sampling Date		2016/12/08	2016/12/08		
COC Number		512057-01-01	512057-01-01		
	UNITS	Strick Road Pumphouse	Reservoir #1	RDL	QC Batch
Volatiles					
Chloroform	ug/L	44	70	1.0	8499483
Chlorodibromomethane	ug/L	<1.0	<1.0	1.0	8499483
Bromodichloromethane	ug/L	2.7	3.5	1.0	8499483
Bromoform	ug/L	<1.0	<1.0	1.0	8499483
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	105	103		8499483
4-Bromofluorobenzene (sur.)	%	88	84		8499483
D4-1,2-Dichloroethane (sur.)	%	89	91		8499483
RDL = Reportable Detection Limit					

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Maxxam Job #: B6R1722
Report Date: 2016/12/23

Maxxam Analytics
Client Project #: B6B0285
Site Location: BEAVER CREEK DBP

HALOACETIC ACIDS BY GC-ECD (WATER)

Maxxam ID			DPW676	DPW677		
Sampling Date			2016/12/08	2016/12/08		
COC Number			VB6B0285-BEDV-01-01	VB6B0285-BEDV-01-01		
	UNITS	MAC	QF6524-STRICK ROAD PUMPHOUSE	QF6525-RESERVOIR #1	RDL	QC Batch
Monochloroacetic Acid (MCAA)	ug/L	-	<5.0	<5.0	5.0	4797848
Monobromoacetic Acid (MBAA)	ug/L	-	<5.0	<5.0	5.0	4797848
Dichloroacetic Acid (DCAA)	ug/L	-	16	11	5.0	4797848
Trichloroacetic Acid (TCAA)	ug/L	-	35	65	5.0	4797848
Bromochloroacetic Acid (BCAA)	ug/L	-	<5.0	<5.0	5.0	4797848
Dibromoacetic Acid (DBAA)	ug/L	-	<5.0	<5.0	5.0	4797848
Total haloacetic acids	ug/L	**80**	50	76	5.0	4797848
Surrogate Recovery (%)						
2,3-Dibromopropionic Acid	%	-	91	94		4797848

Maxxam Job #: B620159
Report Date: 2016/03/22

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM

RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

Maxxam ID		OH4375		OH4376		
Sampling Date		2016/03/15		2016/03/15		
COC Number		525112		525112		
	UNITS	SUGSAW LK. EXISTING INTAKE	QC Batch	SUGSAW LK. LOCATION #1	RDL	QC Batch
Calculated Parameters						
Filter and HNO3 Preservation	N/A	LAB	8219192	LAB	N/A	8219192
Misc. Inorganics						
Dissolved Organic Carbon (C)	mg/L	3.04	8220823	2.83	0.50	8220823
Total Organic Carbon (C)	mg/L	2.84	8220831	3.09	0.50	8220829
MISCELLANEOUS						
Apparent Colour	Col. Unit	40.0	8220811	40.0	5.0	8220811

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		OH4377		
Sampling Date		2016/03/15		
COC Number		525112		
	UNITS	SUGSAW LK. LOCATION #2	RDL	QC Batch
Calculated Parameters				
Filter and HNO3 Preservation	N/A	LAB	N/A	8219192
Misc. Inorganics				
Dissolved Organic Carbon (C)	mg/L	2.01	0.50	8220823
Total Organic Carbon (C)	mg/L	2.98	0.50	8220831
MISCELLANEOUS				
Apparent Colour	Col. Unit	40.0	5.0	8220811

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B620159
Report Date: 2016/03/22

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID		OH4375	OH4376	OH4377		
Sampling Date		2016/03/15	2016/03/15	2016/03/15		
COC Number		525112	525112	525112		
	UNITS	**SUGSAW LK. EXISTING INTAKE**	**SUGSAW LK. LOCATION #1**	**SUGSAW LK. LOCATION #2**	**RDL**	**QC Batch**
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	141	144	141	3.0	8220349
Dissolved Iron (Fe)	ug/L	55.6	60.7	54.6	5.0	8220349
Dissolved Manganese (Mn)	ug/L	1.9	2.1	1.8	1.0	8220349
RDL = Reportable Detection Limit						

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Maxxam Job #: B620159
Report Date: 2016/03/22

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM

DRINKING WATER PACKAGE (DRINKING WATER)

Maxxam ID		OH4375		OH4376	OH4377		
Sampling Date		2016/03/15		2016/03/15	2016/03/15		
COC Number		525112		525112	525112		
	UNITS	SUGSAW LK. EXISTING INTAKE	QC Batch	SUGSAW LK. LOCATION #1	SUGSAW LK. LOCATION #2	RDL	QC Batch
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	6.35	8218869	6.25	6.29	0.50	8218869
Misc. Inorganics							
Alkalinity (Total as CaCO3)	mg/L	3.11	8219723	3.33	2.79	0.50	8219718
Alkalinity (PP as CaCO3)	mg/L	<0.50	8219723	<0.50	<0.50	0.50	8219718
Bicarbonate (HCO3)	mg/L	3.79	8219723	4.06	3.40	0.50	8219718
Carbonate (CO3)	mg/L	<0.50	8219723	<0.50	<0.50	0.50	8219718
Hydroxide (OH)	mg/L	<0.50	8219723	<0.50	<0.50	0.50	8219718
MISCELLANEOUS							
True Colour	Col. Unit	35.5	8220966	32.1	34.0	5.0	8220966
Physical Properties							
pH	pH	6.47	8219720	6.61	6.51		8219714
Physical Properties							
Turbidity	NTU	0.61	8219873	0.61	0.84	0.10	8219873
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	151	8220510	150	153	3.0	8220510
Total Iron (Fe)	ug/L	112	8220510	99.8	95.5	5.0	8220510
Total Manganese (Mn)	ug/L	3.1	8220510	3.2	2.9	1.0	8220510
Microbiological Param.							
Total Coliforms	CFU/100mL	6	8219760	3	<1	1	8219760
E. coli	CFU/100mL	<1	8219760	<1	<1	1	8219760
RDL = Reportable Detection Limit							

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Maxxam Job #: B620159
Report Date: 2016/03/22

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM

TRIHALOMETHANES (THM) IN WATER

Maxxam ID		OH4378		
Sampling Date		2016/03/15		
COC Number		525112		
	UNITS	**BWS RESERVOIR**	**RDL**	**QC Batch**
Volatiles				
Chloroform	ug/L	190	1.0	8220928
Chlorodibromomethane	ug/L	<1.0	1.0	8220928
Bromodichloromethane	ug/L	5.1	1.0	8220928
Bromoform	ug/L	<1.0	1.0	8220928
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	97		8220928
4-Bromofluorobenzene (sur.)	%	92		8220928
D4-1,2-Dichloroethane (sur.)	%	106		8220928
RDL = Reportable Detection Limit				

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Maxxam Job #: B644215
Report Date: 2016/06/13

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM
Site Location: SUGSAW LAKE

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT6085		OT6086		OT6087		
Sampling Date		2016/06/02		2016/06/02		2016/06/02		
COC Number		525112		525112		525112		
	UNITS	SUGSAW LK. EXISTING INTAKE	QC Batch	SUGSAW LK. LOCATION #1	QC Batch	SUGSAW LK. LOCATION #2	RDL	QC Batch
Misc. Inorganics								
Dissolved Organic Carbon (C)	mg/L	3.22 (1)	8292398	3.18 (1)	8297087	4.30 (1)	0.50	8292398
Alkalinity (Total as CaCO3)	mg/L	5.12	8291347	3.82	8291347	3.82	0.50	8291347
Total Organic Carbon (C)	mg/L	2.95	8292404	3.02	8292404	3.85	0.50	8292404
Alkalinity (PP as CaCO3)	mg/L	<0.50	8291347	<0.50	8291347	<0.50	0.50	8291347
Bicarbonate (HCO3)	mg/L	6.25	8291347	4.66	8291347	4.66	0.50	8291347
Carbonate (CO3)	mg/L	<0.50	8291347	<0.50	8291347	<0.50	0.50	8291347
Hydroxide (OH)	mg/L	<0.50	8291347	<0.50	8291347	<0.50	0.50	8291347
MISCELLANEOUS								
Apparent Colour	Col. Unit	30.0 (1)	8291309	30.0 (1)	8291309	30.0 (1)	5.0	8291309
True Colour	Col. Unit	21.2 (1)	8290870	30.0 (1)	8290870	26.1 (1)	5.0	8290870
Physical Properties								
pH	pH	6.96	8291350	6.75	8291350	6.82		8291350
Physical Properties								
Turbidity	NTU	0.44 (1)	8290615	0.40 (1)	8290615	0.38 (1)	0.10	8290615

RDL = Reportable Detection Limit
(1) Sample arrived to laboratory past recommended hold time.

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Maxxam Job #: B644215
Report Date: 2016/06/13

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM
Site Location: SUGSAW LAKE

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT6085		OT6086		OT6087		
Sampling Date		2016/06/02		2016/06/02		2016/06/02		
COC Number		525112		525112		525112		
	UNITS	**SUGSAW LK. EXISTING INTAKE**	**QC Batch**	**SUGSAW LK. LOCATION #1**	**QC Batch**	**SUGSAW LK. LOCATION #2**	**RDL**	**QC Batch**
Total Metals by ICPMS								
Total Aluminum (Al)	ug/L	92.2	8291166	144	8291043	124	3.0	8291166
Total Iron (Fe)	ug/L	30	8291166	65	8291043	44	10	8291166
Total Manganese (Mn)	ug/L	2.3	8291166	4.0	8291043	3.1	1.0	8291166
RDL = Reportable Detection Limit								

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Maxxam Job #: B644215
Report Date: 2016/06/13

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM
Site Location: SUGSAW LAKE

MICROBIOLOGY (WATER)

Maxxam ID		OT6085	OT6086	OT6087		
Sampling Date		2016/06/02	2016/06/02	2016/06/02		
COC Number		525112	525112	525112		
	UNITS	**SUGSAW LK. EXISTING INTAKE**	**SUGSAW LK. LOCATION #1**	**SUGSAW LK. LOCATION #2**	**RDL**	**QC Batch**
Microbiological Param.						
E. coli	CFU/100mL	1	<1	<1	1	8290118
Total Coliforms	CFU/100mL	40	15	32	1	8290115
RDL = Reportable Detection Limit						

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Maxxam Job #: B644215
Report Date: 2016/06/13

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM
Site Location: SUGSAW LAKE

TRIHALOMETHANES (THM) IN WATER

Maxxam ID		OT6088		
Sampling Date		2016/06/02		
COC Number		525112		
	UNITS	**BWS RESERVOIR**	**RDL**	**QC Batch**
Volatiles				
Chloroform	ug/L	200	1.0	8290136
Chlorodibromomethane	ug/L	<1.0	1.0	8290136
Bromodichloromethane	ug/L	8.5	1.0	8290136
Bromoform	ug/L	<1.0	1.0	8290136
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	104		8290136
4-Bromofluorobenzene (sur.)	%	94		8290136
D4-1,2-Dichloroethane (sur.)	%	103		8290136
RDL = Reportable Detection Limit				

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Maxxam Job #: B674651
Report Date: 2016/09/08

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEMS
Site Location: SUGSAW LAKE

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID					PK2104		
Sampling Date					2016/08/29		
COC Number					525112		
	UNITS	**MAC**	**AO**	**OG**	**SUGSAW LK. EXISTING INTAKE**	**RDL**	**QC Batch**
Calculated Parameters							
Filter and HNO3 Preservation	N/A	-	-	-	LAB	N/A	8384538
Misc. Inorganics							
Dissolved Organic Carbon (C)	mg/L	-	-	-	2.96 (1)	0.50	8390148
Alkalinity (Total as CaCO3)	mg/L	-	-	-	5.47	0.50	8385292
Total Organic Carbon (C)	mg/L	-	-	-	3.53	0.50	8390286
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.50	0.50	8385292
Bicarbonate (HCO3)	mg/L	-	-	-	6.67	0.50	8385292
Carbonate (CO3)	mg/L	-	-	-	<0.50	0.50	8385292
Hydroxide (OH)	mg/L	-	-	-	<0.50	0.50	8385292
MISCELLANEOUS							
Apparent Colour	Col. Unit	-	-	-	30.0	5.0	8384561
True Colour	Col. Unit	-	15	-	**22.4 (2)**	5.0	8391505
Physical Properties							
pH	pH	-	6.5:8.5	-	7.03		8385298
Physical Properties							
Turbidity	NTU	see remark	see remark	see remark	0.56	0.10	8383842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Sample preserved to extend hold time.
(2) Sample analysed past recommended hold time.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B674651
Report Date: 2016/09/08

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEMS
Site Location: SUGSAW LAKE

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID					PK2105		
Sampling Date					2016/08/29		
COC Number					525112		
	UNITS	**MAC**	**AO**	**OG**	**SUGSAW LK. LOCATION #1**	**RDL**	**QC Batch**
Calculated Parameters							
Filter and HNO3 Preservation	N/A	-	-	-	LAB	N/A	8384538
Misc. Inorganics							
Dissolved Organic Carbon (C)	mg/L	-	-	-	3.11 (1)	0.50	8390148
Alkalinity (Total as CaCO3)	mg/L	-	-	-	3.41	0.50	8385292
Total Organic Carbon (C)	mg/L	-	-	-	5.19	0.50	8390302
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.50	0.50	8385292
Bicarbonate (HCO3)	mg/L	-	-	-	4.16	0.50	8385292
Carbonate (CO3)	mg/L	-	-	-	<0.50	0.50	8385292
Hydroxide (OH)	mg/L	-	-	-	<0.50	0.50	8385292
MISCELLANEOUS							
Apparent Colour	Col. Unit	-	-	-	40.0	5.0	8384561
True Colour	Col. Unit	-	15	-	**27.3 (2)**	5.0	8391505
Physical Properties							
pH	pH	-	6.5:8.5	-	6.81		8385298
Physical Properties							
Turbidity	NTU	see remark	see remark	see remark	0.32	0.10	8383842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Sample preserved to extend hold time.
(2) Sample analysed past recommended hold time.

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Maxxam Job #: B674651
Report Date: 2016/09/08

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEMS
Site Location: SUGSAW LAKE

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID					PK2106		
Sampling Date					2016/08/29		
COC Number					525112		
	UNITS	**MAC**	**AO**	**OG**	**SUGSAW LK. LOCATION #2**	**RDL**	**QC Batch**
Calculated Parameters							
Filter and HNO3 Preservation	N/A	-	-	-	LAB	N/A	8384538
Misc. Inorganics							
Dissolved Organic Carbon (C)	mg/L	-	-	-	2.95 (1)	0.50	8390148
Alkalinity (Total as CaCO3)	mg/L	-	-	-	3.04	0.50	8385292
Total Organic Carbon (C)	mg/L	-	-	-	3.58	0.50	8390286
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.50	0.50	8385292
Bicarbonate (HCO3)	mg/L	-	-	-	3.71	0.50	8385292
Carbonate (CO3)	mg/L	-	-	-	<0.50	0.50	8385292
Hydroxide (OH)	mg/L	-	-	-	<0.50	0.50	8385292
MISCELLANEOUS							
Apparent Colour	Col. Unit	-	-	-	30.0	5.0	8384561
True Colour	Col. Unit	-	15	-	**35.7 (2)**	5.0	8391505
Physical Properties							
pH	pH	-	6.5:8.5	-	6.75		8385298
Physical Properties							
Turbidity	NTU	see remark	see remark	see remark	0.36	0.10	8383842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Sample preserved to extend hold time.
(2) Sample analysed past recommended hold time.

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Maxxam Job #: B674651
Report Date: 2016/09/08

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEMS
Site Location: SUGSAW LAKE

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID				PK2104	PK2105	PK2106		
Sampling Date				2016/08/29	2016/08/29	2016/08/29		
COC Number				525112	525112	525112		
	UNITS	AO	OG	SUGSAW LK. EXISTING INTAKE	SUGSAW LK. LOCATION #1	SUGSAW LK. LOCATION #2	RDL	QC Batch
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	-	100	44.9	**112**	**113**	3.0	8386896
Dissolved Iron (Fe)	ug/L	300	-	6.7	47.5	48.5	5.0	8386896
Dissolved Manganese (Mn)	ug/L	50	-	<1.0	8.9	9.6	1.0	8386896
Total Metals by ICPMS								
Total Aluminum (Al)	ug/L	-	100	59.4	**130**	**128**	3.0	8386425
Total Iron (Fe)	ug/L	300	-	20	102	86	10	8386425
Total Manganese (Mn)	ug/L	50	-	3.0	16.6	13.7	1.0	8386425

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Maxxam Job #: B674651
Report Date: 2016/09/08

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEMS
Site Location: SUGSAW LAKE

MICROBIOLOGY (WATER)

Maxxam ID			PK2104	PK2105	PK2106		
Sampling Date			2016/08/29	2016/08/29	2016/08/29		
COC Number			525112	525112	525112		
	UNITS	**MAC**	**SUGSAW LK. EXISTING INTAKE**	**SUGSAW LK. LOCATION #1**	**SUGSAW LK. LOCATION #2**	**RDL**	**QC Batch**
Microbiological Param.							
Total Coliforms	CFU/100mL	<1	56	26	11	1	8383666
E. coli	CFU/100mL	<1	6	<1	<1	1	8383666

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Maxxam Job #: B674651
Report Date: 2016/09/08

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEMS
Site Location: SUGSAW LAKE

TRIHALOMETHANES (THM) IN WATER

Maxxam ID		PK2107		
Sampling Date		2016/08/29		
COC Number		525112		
	UNITS	**BWS RESERVOIR**	**RDL**	**QC Batch**
Volatiles				
Chloroform	ug/L	130	1.0	8389013
Chlorodibromomethane	ug/L	<1.0	1.0	8389013
Bromodichloromethane	ug/L	8.2	1.0	8389013
Bromoform	ug/L	<1.0	1.0	8389013
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	106		8389013
4-Bromofluorobenzene (sur.)	%	80		8389013
D4-1,2-Dichloroethane (sur.)	%	94		8389013
RDL = Reportable Detection Limit				

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Maxxam Job #: B6B0064
Report Date: 2016/12/14

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM
Site Location: SUGSAW LAKE

RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

Maxxam ID		QF5210	QF5211	QF5212		
Sampling Date		2016/12/06	2016/12/06	2016/12/06		
COC Number		525113	525113	525113		
	UNITS	SUGSAW LK. EXISTING INTAKE	SUGSAW LK. LOCATION #1	SUGSAW LK. LOCATION #2	RDL	QC Batch
Calculated Parameters						
Filter and HNO3 Preservation	N/A	LAB	LAB	LAB	N/A	8498718
Misc. Inorganics						
Dissolved Organic Carbon (C)	mg/L	2.79	1.64	3.59	0.50	8499524
Alkalinity (Total as CaCO3)	mg/L	3.30	3.22	2.96	0.50	8499630
Total Organic Carbon (C)	mg/L	3.72	4.61	4.35	0.50	8499525
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	<0.50	0.50	8499630
Bicarbonate (HCO3)	mg/L	4.03	3.93	3.61	0.50	8499630
Carbonate (CO3)	mg/L	<0.50	<0.50	<0.50	0.50	8499630
Hydroxide (OH)	mg/L	<0.50	<0.50	<0.50	0.50	8499630
MISCELLANEOUS						
Apparent Colour	Col. Unit	50.0	50.0	50.0	5.0	8498906
True Colour	Col. Unit	41.3	39.6	41.2	5.0	8499227
Physical Properties						
pH	pH	6.41	6.40	6.40		8499631
Physical Properties						
Turbidity	NTU	0.58	0.44	0.45	0.10	8498844

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B6B0064
Report Date: 2016/12/14

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM
Site Location: SUGSAW LAKE

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID		QF5210		QF5211	QF5212		
Sampling Date		2016/12/06		2016/12/06	2016/12/06		
COC Number		525113		525113	525113		
	UNITS	**SUGSAW LK. EXISTING INTAKE**	**QC Batch**	**SUGSAW LK. LOCATION #1**	**SUGSAW LK. LOCATION #2**	**RDL**	**QC Batch**
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	152	8500770	151	154	3.0	8500770
Dissolved Iron (Fe)	ug/L	132	8500770	123	124	5.0	8500770
Dissolved Manganese (Mn)	ug/L	8.6	8500770	8.0	8.3	1.0	8500770
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	204	8499113	172	173	3.0	8501077
Total Iron (Fe)	ug/L	239	8499113	169	188	10	8501077
Total Manganese (Mn)	ug/L	19.5	8499113	19.3	18.3	1.0	8501077
RDL = Reportable Detection Limit							

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Maxxam Job #: B6B0064
Report Date: 2016/12/14

Alberni Clayoquot Regional District
Client Project #: BAMFIELD WATER SYSTEM
Site Location: SUGSAW LAKE

TRIHALOMETHANES (THM) IN WATER

Maxxam ID		QF5213		
Sampling Date		2016/12/06		
COC Number		525113		
	UNITS	**BWS RESERVOIR**	**RDL**	**QC Batch**
Volatiles				
Chloroform	ug/L	280	1.0	8499476
Chlorodibromomethane	ug/L	<1.0	1.0	8499476
Bromodichloromethane	ug/L	7.1	1.0	8499476
Bromoform	ug/L	<1.0	1.0	8499476
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	101		8499476
4-Bromofluorobenzene (sur.)	%	79		8499476
D4-1,2-Dichloroethane (sur.)	%	98		8499476
RDL = Reportable Detection Limit				

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Appendix B

Facility Microbiological Sampling History

Total Coliforms & E.Coli

MILLSTREAM COMMUNITY WATER SYSTEM - Water Sample Range Report

Range Report Information:
Date range: Jan 1 2016 to Dec 31 2016
Total number of samples: 1

Water Sample Details:

Samples that contain coliform:	0 (0% of total)
Samples that contain fecal coliform:	0 (0% of total)
Samples that contain e. coli	0 (0% of total)
Number of consecutive samples that contain total coliform:	0 (0% of total)
Number of samples that contain total coliform in last 30 days:	0 (0% of total)

For more information regarding bacteriological quality guidelines please refer to the Guidelines for Canadian Drinking Water Quality.

ALBERNI VALLEY AIRPORT - Water Sample Range Report

Range Report Information:
Date range: Jan 1 2016 to Dec 31 2016
Total number of samples: 13

Water Sample Details:

Samples that contain coliform:	0 (0% of total)
Samples that contain fecal coliform:	0 (0% of total)
Samples that contain e. coli	0 (0% of total)
Number of consecutive samples that contain total coliform:	0 (0% of total)
Number of samples that contain total coliform in last 30 days:	0 (0% of total)

For more information regarding bacteriological quality guidelines please refer to the Guidelines for Canadian Drinking Water Quality.

BAMFIELD WATER SYSTEM - Water Sample Range Report

Range Report Information:
Date range: Jan 1 2016 to Dec 31 2016
Total number of samples: 60

Water Sample Details:

Samples that contain coliform:	0 (0% of total)
Samples that contain fecal coliform:	0 (0% of total)
Samples that contain e. coli	0 (0% of total)
Number of consecutive samples that contain total coliform:	0 (0% of total)
Number of samples that contain total coliform in last 30 days:	0 (0% of total)

For more information regarding bacteriological quality guidelines please refer to the Guidelines for Canadian Drinking Water Quality.

TOFINO AIRPORT WATER SYSTEM - Water Sample Range Report

Range Report Information:
Date range: Jan 1 2016 to Dec 31 2016
Total number of samples: 1

Water Sample Details:

Samples that contain coliform:	0 (0% of total)
Samples that contain fecal coliform:	0 (0% of total)
Samples that contain e. coli	0 (0% of total)
Number of consecutive samples that contain total coliform:	0 (0% of total)
Number of samples that contain total coliform in last 30 days:	0 (0% of total)

For more information regarding bacteriological quality guidelines please refer to the Guidelines for Canadian Drinking Water Quality.

BEAVER CREEK WATER SYSTEM - Water Sample Range Report

Range Report Information:
Date range: Jan 1 2016 to Dec 31 2016
Total number of samples: 198

Water Sample Details:

Samples that contain coliform:	0 (0% of total)
Samples that contain fecal coliform:	0 (0% of total)
Samples that contain e. coli	0 (0% of total)
Number of consecutive samples that contain total coliform:	0 (0% of total)
Number of samples that contain total coliform in last 30 days:	0 (0% of total)

For more information regarding bacteriological quality guidelines please refer to the Guidelines for Canadian Drinking Water Quality.

Appendix C

Drinking Water Quality Links

Canadian Drinking Water Guidelines

http://www.hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php

Environmental Operators Certificate Program

http://eocp.ca/

Drinking Water Protection Act

http://www.bclaws.ca/civix/document/id/complete/statreg/01009_01

Island Health –Drinking Water

http://www.viha.ca/mho/water/

Appendix D

Island Health Authority Inspection Reports

BAMFIELD COMMUNITY WWS - Inspection Report

Inspection Information:

Facility Type: DWC
Inspection type: Routine
Inspection date: April 03, 2013
Follow-up Required: No

This facility was given a **low** hazard rating.
More information on hazard ratings.

Violations:

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

Code	Description / Observation / Corrective Action
319	Inadequate Chemical Analysis Data Observation: *Samples collected Nov 2012 and Feb 2013 show THM's above the maximum acceptable concentration on the "Guideline's for Canadian Drinking Water Quality"; continue to monitor quarterly.*

Comments: Review of operation of the water system with the operator and ACRD management: - Surface source (Sugsaw Lake); screens are cleaned monthly. Turbidity is taken daily at the pumphouse with a hand-held turbidity meter; results are documented and normal results are <0.5 NTU. Looking at adding signage around the lake and near the submarine line to indicate it is a drinking water source. The Emergency Response Plan is up-to-date and present in the pumphouse; BWA signage is available. - A new chlorine analyzer was installed in 2012 and a new quill has installed at the chlorine injection point. - Operator maintains a chlorine residual of 0.2 ppm at the pumphouse. - Chlorine analyzer is alarmed with a call out to the operator and audible alarm when analyzer goes into alarm mode. - Distribution is flushed quarterly in the winter, operator has recently adjusted this to doing various branches of the system weekly. - System has two reservoirs; one reservoir was cleaned in 2012, the other was pressure-washed. - A new sampling port has been installed at the reservoirs. - Operator has been manually chlorinating at the reservoirs to maintain better residuals throughout the system; reports that this is working. - An automatic rechlorination station is being installed, a construction permit waiver was issued for this work January 2013. - Water system should be classified with the EOCP to ensure that the operator has the appropriate level of certification. - Recent bacteriological water sampling are satisfactory.

BEAVER CREEK WATER SYSTEM - Inspection Report

Inspection Information:

Facility Type: DWT
Inspection type: Routine
Inspection date: September 23, 2015
Follow-up Required: No

This facility was given a **low** hazard rating.
■More information on hazard ratings.

Violations:

No violations were found during the inspection

Comments: A site visit was conducted at the Strick Road pump station and the Stamp River pump station; the Environmental Services Manager and the Lead Water Operator were in attendance. The terms and conditions of the operating permit were reviewed; the water system is operating in compliance with conditions 1-6. Condition number 7 requires the system to be operated and maintained in accordance with BCWWA standards or equivalent. In house procedures for cross-connection control, distribution lines, reservoirs, disinfection equipment, system planning and sampling port are to be reviewed by the new management/staff to ensure appropriate standards are being followed. The 2014 Annual report is complete and available on the ACRD website; a copy must be provided to the EHO. The Emergency Response Plan must be reviewed and up-dated to reflect the recent changes in operation (i.e. new source and pump station) and staff. The ERP should contain procedures to address increases in turbidity and the use of the Stamp River in emergency situations. ERP must be submitted to the DWO when completed; must be completed by October 31, 2015. A regular monitoring programs is in place which includes chemical/physical parameters, bacteriological sampling, turbidity, chlorine residuals and disinfection by-products. Good records are maintained for all testing, monitoring and maintenance that occurs on the system. The concrete reservoir has been repaired (it was leaking) and has been placed back into service. Chlorine gas has been removed from the Stamp River pump station; if this source is needed for emergency purposes, sodium hypochlorite will be used.

ALBERNI VALLEY AIRPORT - Inspection Report

Inspection Information:

Facility Type: DWS
Inspection type: Routine
Inspection date: February 28, 2014
Follow-up Required: No

This facility was given a **low** hazard rating.
More information on hazard ratings.

Violations:

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

Code	Description / Observation / Corrective Action
320	Interruption of Treatment Corrective Action: *UV system was in alarm mode at the time of inspection. Service technician has been called to look at the UV unit. Users have been notified that water should be boiled prior to use.*

Comments: A new UV unit was added to the system in 2012; prior to 2012 the system consisted of a shallow dug well with no disinfection. It is recommended that the treatment be monitored frequently to ensure the UV is working properly (currently only checked monthly). Samples are submitted monthly for bacteriological testing, all recent results are satisfactory. Most recent chemical results are from 2012, results are below the requirement of the Canadian Drinking Water Guidelines. Building that houses the well and treatment is secure and well maintained. Ensure the UV equipment is maintained as recommended by the manufacturer or as required by the operation including filter changes, bulb replacement and sleeve cleaning. An annual flushing and disinfection program is recommended. An emergency response plan is available for this water system and has recently been reviewed. *Information about the filters and UV must be added to the ERP. Follow up March 6th: UV sensor has been fixed and a follow up sample was submitted on March 5th.

TOFINO AIRPORT WATER SYSTEM - Inspection Report

Inspection Information:
Facility Type: DWS
Inspection type: Routine
Inspection date: March 05, 2013
Follow-up Required: No

This facility was given a **low** hazard rating.
■More information on hazard ratings.

Violations:
No violations were found during the inspection

Comments: - Water system includes: two wells (only one in use), treatment for removal of iron and manganese, chlorination of water, reservoir, re-chlorination before entering distribution. Test wells have been drilled; the intent is to bring on an additional source to address concerns with the yield of the existing wells. Prior to wells being used, source approval must be obtained from VIHA. Information on this process has been provided to the operator of the system. Operator is to check with the well driller to ensure the well located next to the pumphouse is properly sealed. - Chemical/physical analysis was conducted on the raw water in 2011. Turbidity, iron, manganese and colour were above the aesthetic objectives of the Guidelines for Canadian Drinking Water Quality; these parameters are addressed with the ion exchange treatment. - Samples are submitted monthly from three sites for bacteriological monitoring; all recent samples are satisfactory. - An Emergency Response Plan is in place, ensure that this is reviewed annually and provide any revisions to the EHO. - Component of the system (wells, pumphouse, reservoir) are secured by means of fencing and locked doors/hatches. - Chlorine residuals are monitored and recorded regularly. - Annual report for 2012 is now posted on the ACRD website.

MILLSTREAM COMMUNITY WATER SYSTEM - Inspection Report

Inspection Information:

Facility Type: DWC
Inspection type: Routine
Inspection date: January 16, 2014
Follow-up Required: No

This facility was given a **low** hazard rating.
■More information on hazard ratings.

Violations:

No violations were found during the inspection

Comments: There has been no recent changes to the system. System consists of two shallow wells, chlorination for disinfection and a storage reservoir. All recent bacteriological samples are good, raw sample to be added. A sample has recently been submitted for chemical analysis; please forward results to the EHO. Water system operator has the appropriate training. An annual report for the system is incorporated into the ACRD report and is available on the ACRD website. The pump house and reservoir are secured. Chlorine residuals are monitored daily; good records are maintained for the system. Chlorine residual was 0.3 mg/L at the pump house and reservoir at the time of inspection. Ensure upgrades to the system are done in consultation with Island Health and that necessary construction permits are obtained.