ALBERNI-CLAYOQUOT
REGIONAL DISTRICT

2010 Water Systems Report

June 30, 2011

Environmental Services Department
Alberni-Clayoquot Regional District
3008 Fifth Avenue
Port Alberni, BC

Written by:
John Thomas
Environmental Services Technician

Tofino Airport Water System

Introduction

The Tofino Airport Water System was originally constructed during World War Two 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, pump house, reservoir and a distribution system. The water is supplied to the Community of Esowista (Tla-O-Qui-Aht First Nation), airport service buildings and the Long Beach Golf Course.

Description of System

There are two (six inch diameter) deep wells with submersible pumps that supply water to the pump house. The #2 Well is the primary well due to the better water quality than the water quality of #1 Well. In the pump house a water softener (ion exchange with the use of salt) is used to remove iron, calcium, magnesium and manganese. The treated water is then disinfected with chlorine and stored in the (300,000 gallon) concrete reservoir. The reservoir filling is controlled via a float switch in the reservoir. Water pressure is maintained in the distribution system by centrifugal pumps operating automatically by a pressure switch with pressure tanks.

The system has two chlorination injection pumps to provide primary and secondary disinfection. The first pump chlorinates the water going into the reservoir to provide disinfection and to keep the reservoir clean. This initial chlorination provides a long contact time for the chlorine to oxidize any organics. The operating set point is to always have a free chlorine residual of the reservoir of 0.1 mg/l. The second pump increases the chlorine residual leaving the reservoir so that there is a residual at the end of the distribution system of 0.2 mg/l.

The water main serving the airport is an original 1940's eight-inch cast iron pipe with two operational fire hydrants. The water main serving the Community of Esowista and the golf course is a three-inch PVC pipe. Before the water main enters the Community of Esowista a two-inch line branches off to the golf course. Both the Reserve and golf course have separate water meters recording water use for billing and operational requirements. The 2010 annual water use from the water system was 30,266 cubic meters.

Water Quality

Tofino Airport Water System has a permit from Vancouver Island Health Authority to operate a water system since 2001. The water contractor has the mandatory certification by the Environmental Operators Certificate Program (EOCP) required by the BC Drinking Water Protection Act. All Aesthetic Criteria and Maximum Acceptable Concentrations set by the Guidelines for Canadian Drinking Water Quality are maintained.

On August 29, 2007 the raw water was sampled from Well #2 and sent to CANTEST labs for "43 Parameter Potability" test (see Table 1). Another sample was taken from the treated water and tested for Total Iron, Total Manganese and Total Sodium. The second sample was to determine the effectiveness of the Ion Exchange water softener and the amount of sodium being released into the water. The water quality results of the treated water are Iron at 0.11 mg/l, Manganese at 0.014 mg/l and Sodium at 73.6 mg/l.

The Canadian drinking water quality objective for sodium is an Aesthetic Objective (AO) of 200 mg/L. "Sodium is a principal chemical in bodily fluids, and it is not considered harmful at normal levels of intake from combined food and drinking water sources. However, increased intake of sodium in drinking water may be problematic for people with hypertension, heart disease or kidney problems that require them to follow a low sodium diet. Individuals on sodium restricted diets may want to discuss concerns related to sodium intake from drinking water with their doctor."
http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/library/ground_fact_sheets/pdfs/na(020715)_fin2.pdf

The water quality from the primary water well (Well#2) appears to be increasing in iron and manganese levels. The 2001 water analysis showed manganese levels at 0.22 mg/l and iron at 2.53 mg/l. The 2007 analysis showed levels at 0.37 mg/l and 3.79 mg/l respectively. The differences in these values show a potential increase of fifty percent in five years. The differences could be due to sampling and laboratory procedures or may actually show decreasing water quality.

Two water samples are taken into VIHA monthly for microbiological analysis. These are taken from the water main entering the Esowista Reserve and from the Reservoir Pumphouse. The 2010 bacteriological history has been reported by VIHA to be satisfactory (Figure 4).

Annually the water system is inspected by VIHA and the last occurred in February of 2010. VIHA gave a satisfactory report on the water system at that time and there doesn't appear to be any recent issues. A copy of the 2010 inspection is included in this report (Figure 3).

Water is tested every two weeks for Free Chlorine and the residual is maintained at 0.2 mg/l. This frequency will be reviewed by ACRD and with VIHA to make appropriate changes as needed.

Photo 1. Tofino Airport Water System pump house

Future Improvements

There is currently an increase in demand for water from the Tofino Airport Water System. The airport is seeing the beginnings of development on the airport property due to the ability to create and lease property for development. The Community of Esowista is undergoing a substantial increase in building lot development. The Pacific Rim National Park is also investigating possible water sources for nearby campgrounds. A new dependable water source may need to be found to accommodate the increase in demand. The Ion Exchange water treatment system may need to be replaced or be significantly increased with an increase of water demand. The next scheduled comprehensive testing of the water would be in 2011.

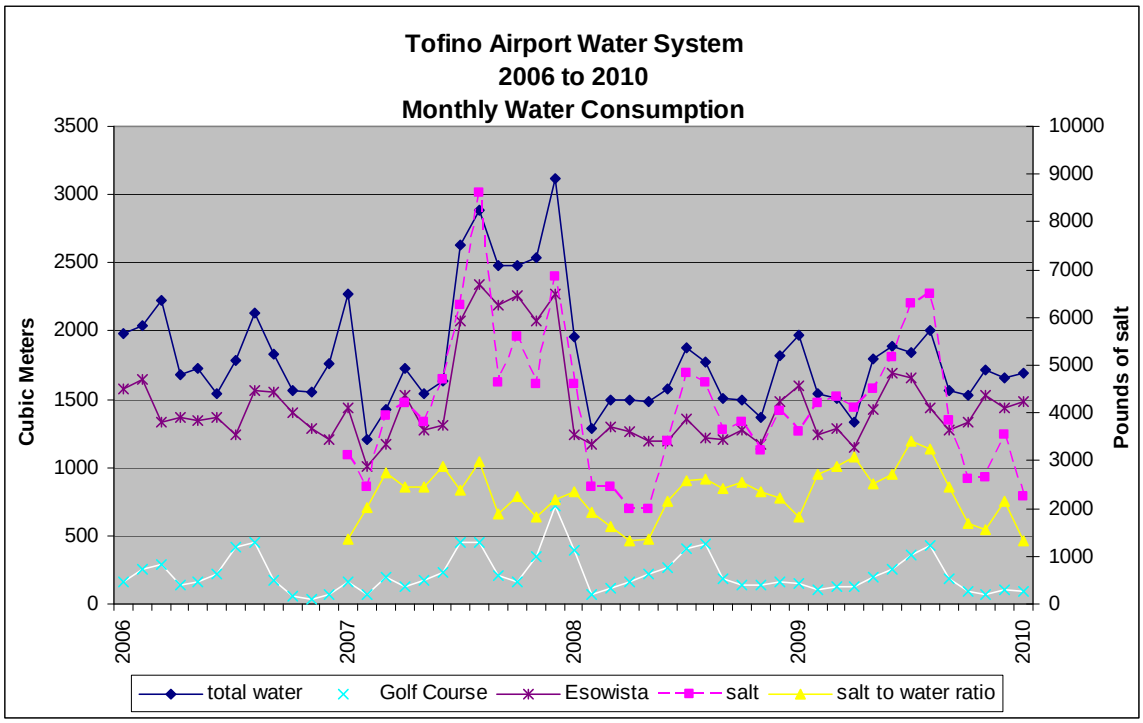
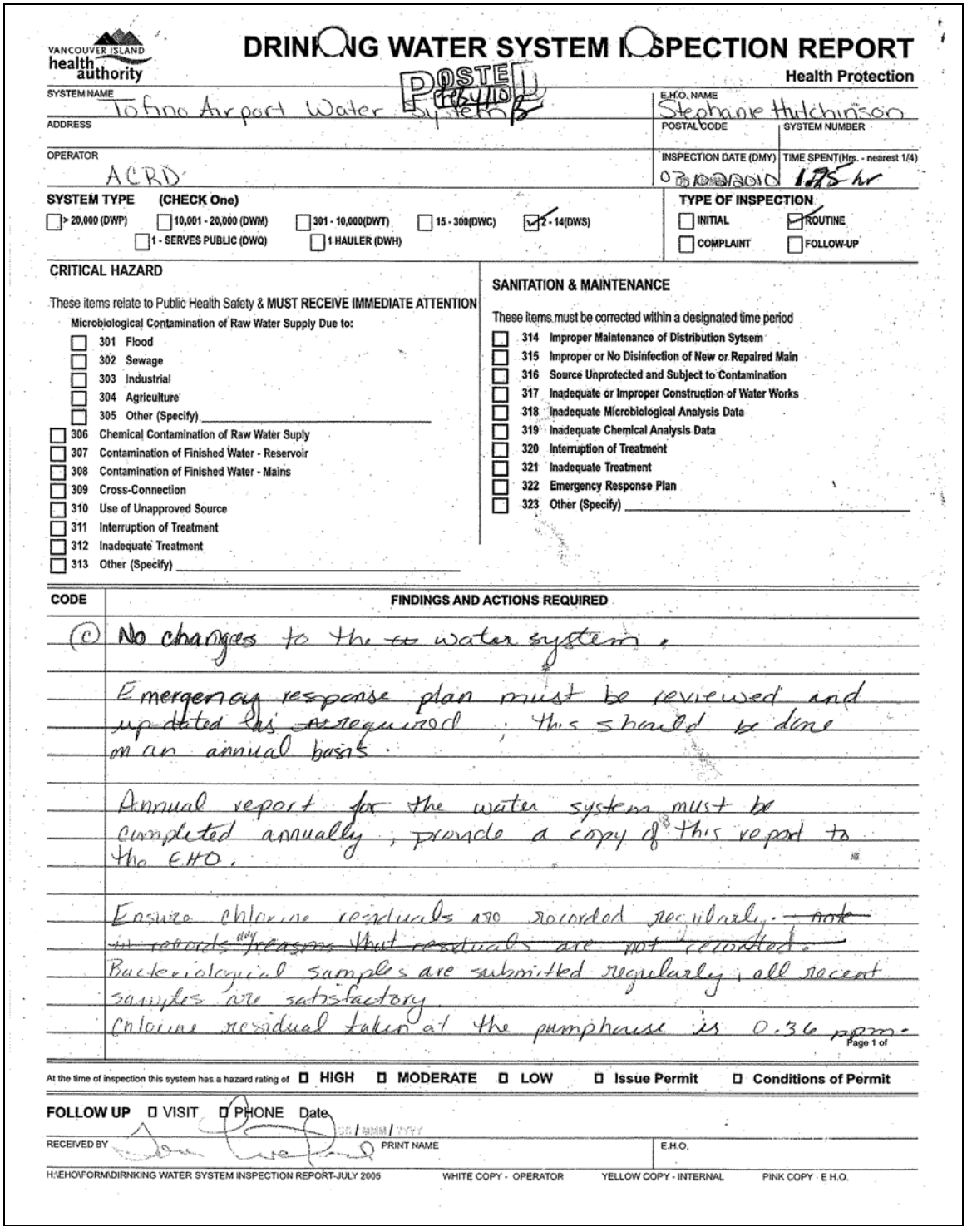


Figure 2. Tofino Airport Water System monthly water consumption

Client:	ACRD		Total Boron B	mg/L	< 0.05
Download Date:	9/10/2007		Total Cadmium Cd	mg/L	< 0.0002
Project Name:			Total Calcium Ca	mg/L	34.5
Project Number:			Total Chromium Cr	mg/L	< 0.001
Chain of Custody:	3000001		Total Cobalt Co	mg/L	< 0.001
Samples received:	8/30/2007		Total Copper Cu	mg/L	0.001
			Total Iron Fe	mg/L	3.79
TABLE: Results of WATER Analyses			Total Lead Pb	mg/L	< 0.001
			Total Lithium Li	mg/L	< 0.005
Sample ID	Tofino Airport Water		Total Magnesium Mg	mg/L	6.6
CANTEST ID		708300228	Total Manganese Mn	mg/L	0.37
Date Sampled		8/29/2007	Total Mercury Hg	ug/L	< 0.02
Parameter	Units		Total Molybdenum Mo	mg/L	< 0.0005
Conventional Parameters			Total Nickel Ni	mg/L	< 0.001
pH, Laboratory	pH units	7.69	Total Phosphorus P	mg/L	< 0.15
Conductivity	uS/cm	285	Total Potassium K	mg/L	1.5
True Color	CU	< 5	Total Selenium Se	mg/L	< 0.001
Turbidity	NTU	43	Total Silicon Si	mg/L	14.8
Hardness (Total) CaCO3	mg/L	113	Total Silver Ag	mg/L	< 0.00025
Total Dissolved Solids	mg/L	203	Total Sodium Na	mg/L	9.49
Total Alkalinity CaCO3	mg/L	128	Total Strontium Sr	mg/L	0.1
Dissolved Fluoride F	mg/L	0.05	Total Tellurium Te	mg/L	< 0.001
Dissolved Chloride Cl	mg/L	11.1	Total Thallium Tl	mg/L	< 0.0001
Nitrate and Nitrite N	mg/L	< 0.05	Total Thorium Th	mg/L	< 0.0005
Dissolved Nitrate N	mg/L	< 0.05	Total Tin Sn	mg/L	< 0.001
Nitrite N	mg/L	< 0.002	Total Titanium Ti	mg/L	< 0.001
Dissolved Sulphate SO4	mg/L	18.9	Total Uranium U	mg/L	< 0.0005
Tannin and Lignin	mg/L	< 0.1	Total Vanadium V	mg/L	< 0.001
Metals Analysis			Total Zinc Zn	mg/L	< 0.005
Total Aluminum Al	mg/L	< 0.005	Total Zirconium Zr	mg/L	< 0.01
Total Antimony Sb	mg/L	< 0.001	Microbiological Analysis		
Total Arsenic As	mg/L	< 0.001	Total Coliforms (Confirmed)	Col./100 mL	< 1
Total Barium Ba	mg/L	0.007	E. coli	Col./100 mL	< 1
Total Beryllium Be	mg/L	< 0.001	Heterotrophic Plate Count	Col./1 mL	6
Total Bismuth Bi	mg/L	< 0.001			

Table 1. Tofino Airport Water System 2007 Analytical Test



VANCOUVER ISLAND health authority

DRINKING WATER SYSTEM INSPECTION REPORT

Health Protection

POSTED Feb 4/10

SYSTEM NAME: Tofino Airport Water System

E.H.O. NAME: Stephanie Hutchinson

ADDRESS

POSTAL CODE | SYSTEM NUMBER

OPERATOR: ACRD

INSPECTION DATE (DMY): 03/02/2010 | TIME SPENT(Hrs. - nearest 1/4): 1.75 hr

SYSTEM TYPE (CHECK One)

☐ > 20,000 (DWP) ☐ 10,001 - 20,000 (DWM) ☐ 301 - 10,000(DWT) ☐ 15 - 300(DWC) ☑ 2 - 14(DWS)

☐ 1 - SERVES PUBLIC (DWQ) ☐ 1 HAULER (DWH)

TYPE OF INSPECTION

☐ INITIAL ☑ ROUTINE

☐ COMPLAINT ☐ FOLLOW-UP

CRITICAL HAZARD

These items relate to Public Health Safety & **MUST RECEIVE IMMEDIATE ATTENTION**

Microbiological Contamination of Raw Water Supply Due to:

- ☐ 301 Flood
- ☐ 302 Sewage
- ☐ 303 Industrial
- ☐ 304 Agriculture
- ☐ 305 Other (Specify) _____
- ☐ 306 Chemical Contamination of Raw Water Suply
- ☐ 307 Contamination of Finished Water - Reservoir
- ☐ 308 Contamination of Finished Water - Mains
- ☐ 309 Cross-Connection
- ☐ 310 Use of Unapproved Source
- ☐ 311 Interruption of Treatment
- ☐ 312 Inadequate Treatment
- ☐ 313 Other (Specify) _____

SANITATION & MAINTENANCE

These items must be corrected within a designated time period

- ☐ 314 Improper Maintenance of Distribution Sytsem
- ☐ 315 Improper or No Disinfection of New or Repaired Main
- ☐ 316 Source Unprotected and Subject to Contamination
- ☐ 317 Inadequate or Improper Construction of Water Works
- ☐ 318 Inadequate Microbiological Analysis Data
- ☐ 319 Inadequate Chemical Analysis Data
- ☐ 320 Interruption of Treatment
- ☐ 321 Inadequate Treatment
- ☐ 322 Emergency Response Plan
- ☐ 323 Other (Specify) _____

CODE	FINDINGS AND ACTIONS REQUIRED
(C)	No changes to the ~~~~ water system.
	Emergency response plan must be reviewed and updated ~~as required~~; this should be done on an annual basis.
	Annual report for the water system must be completed annually, provide a copy of this report to the EHO.
	Ensure chlorine residuals are recorded regularly. ~~note in records dry seasons that residuals are not recorded.~~
	Bacteriological samples are submitted regularly; all recent samples are satisfactory.
	Chlorine residual taken at the pumphouse is 0.36 ppm.

Page 1 of

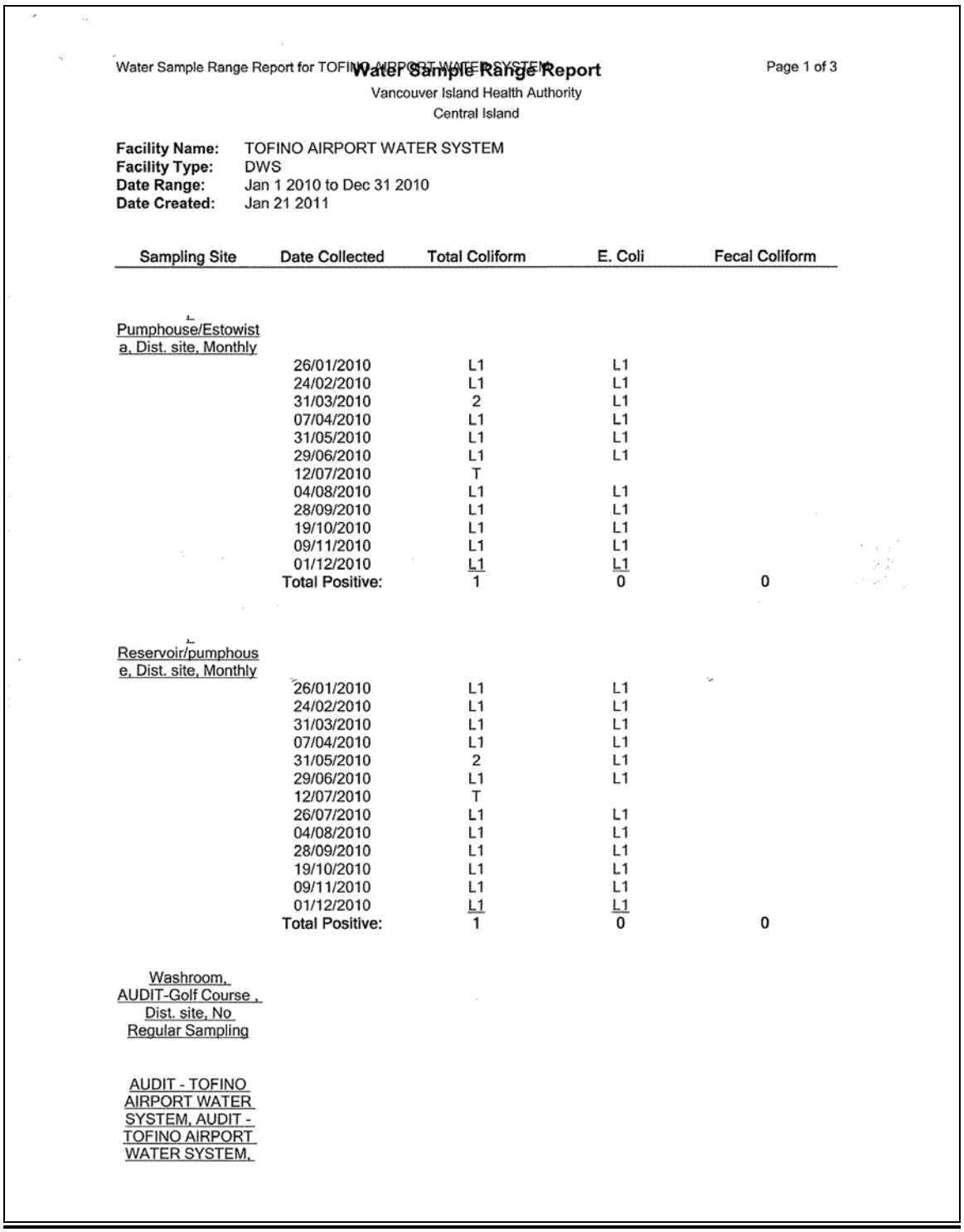
At the time of inspection this system has a hazard rating of ☐ HIGH ☐ MODERATE ☐ LOW ☐ Issue Permit ☐ Conditions of Permit

FOLLOW UP ☐ VISIT ☐ PHONE Date

RECEIVED BY | PRINT NAME | E.H.O.

H:\EHO\FORM\DIRNKING WATER SYSTEM INSPECTION REPORT-JULY 2005 WHITE COPY - OPERATOR YELLOW COPY - INTERNAL PINK COPY - E.H.O.

Figure 3. Tofino Airport Water System 2010 VIHA Inspection Report



Water Sample Range Report for TOFINO AIRPORT WATER SYSTEM

Water Sample Range Report

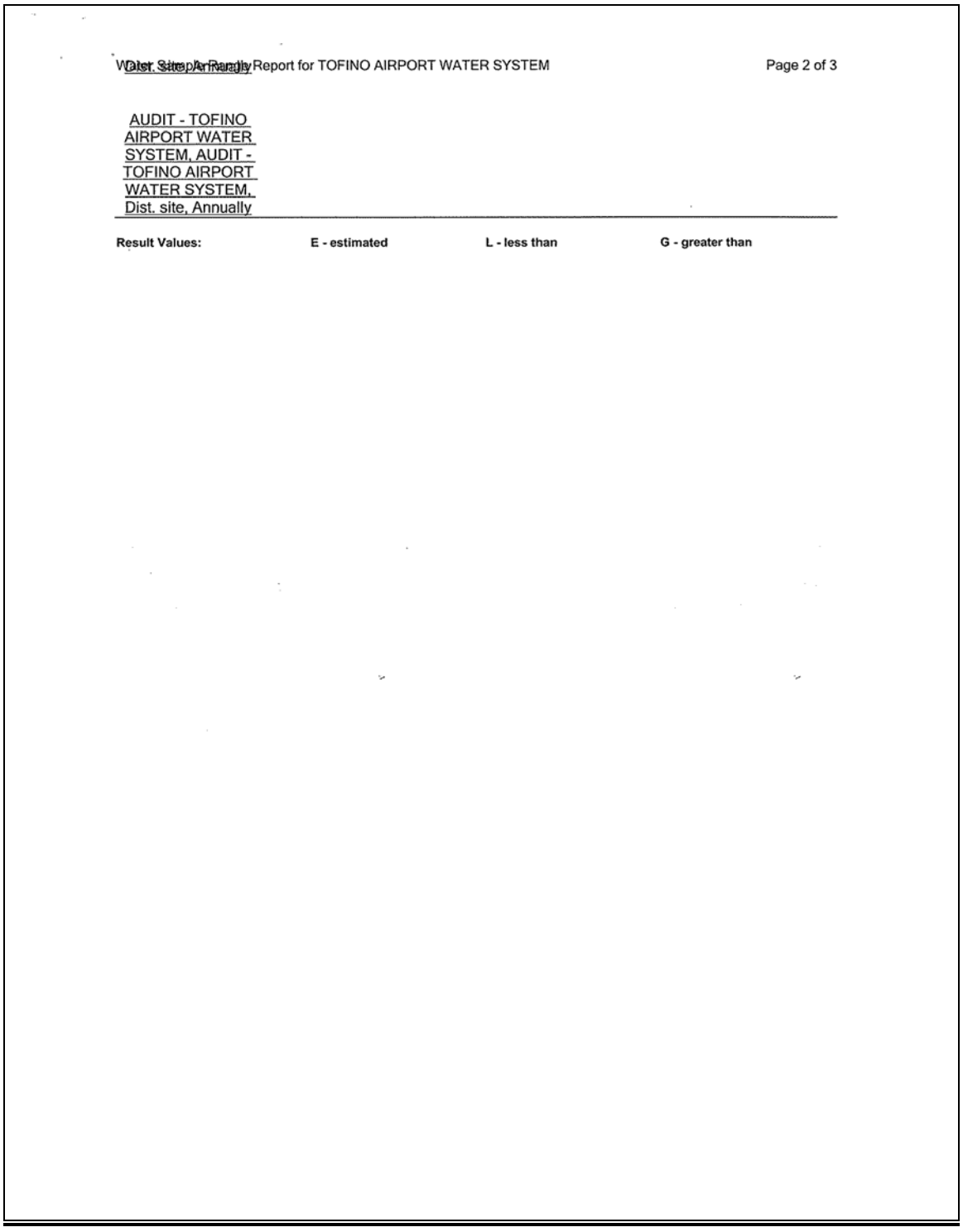
Vancouver Island Health Authority
Central Island

Page 1 of 3

Facility Name: TOFINO AIRPORT WATER SYSTEM
Facility Type: DWS
Date Range: Jan 1 2010 to Dec 31 2010
Date Created: Jan 21 2011

Sampling Site	Date Collected	Total Coliform	E. Coli	Fecal Coliform
Pumphouse/Estowista, Dist. site, Monthly				
	26/01/2010	L1	L1	
	24/02/2010	L1	L1	
	31/03/2010	2	L1	
	07/04/2010	L1	L1	
	31/05/2010	L1	L1	
	29/06/2010	L1	L1	
	12/07/2010	T		
	04/08/2010	L1	L1	
	28/09/2010	L1	L1	
	19/10/2010	L1	L1	
	09/11/2010	L1	L1	
	01/12/2010	L1	L1	
	Total Positive:	1	0	0
Reservoir/pumphouse, Dist. site, Monthly				
	26/01/2010	L1	L1	
	24/02/2010	L1	L1	
	31/03/2010	L1	L1	
	07/04/2010	L1	L1	
	31/05/2010	2	L1	
	29/06/2010	L1	L1	
	12/07/2010	T		
	26/07/2010	L1	L1	
	04/08/2010	L1	L1	
	28/09/2010	L1	L1	
	19/10/2010	L1	L1	
	09/11/2010	L1	L1	
	01/12/2010	L1	L1	
	Total Positive:	1	0	0
Washroom, AUDIT-Golf Course , Dist. site, No Regular Sampling				
AUDIT - TOFINO AIRPORT WATER SYSTEM, AUDIT - TOFINO AIRPORT WATER SYSTEM,				

Figure 4. Tofino Airport Water System 2010 Water Sample Range Report



Water Sample Results Report for TOFINO AIRPORT WATER SYSTEM Page 2 of 3

AUDIT - TOFINO AIRPORT WATER SYSTEM, AUDIT - TOFINO AIRPORT WATER SYSTEM, Dist. site, Annually

Result Values: E - estimated L - less than G - greater than

Figure 4. (continued)

Water Sample Range Report for TOFINO AIRPORT WATER SYSTEM Page 3 of 3

Samples that contain total coliform:	2	8.00% of total
Samples that contain e. coli:	0	0.00% of total
Samples that contain fecal coliform:	0	0.00% of total
Number of positive samples in last 30 days:	0/0	
Total number of samples:	25	

Comments:

Environmental Health Officer
Jan 21 2011

FOR FURTHER INFORMATION PLEASE CALL: Hutchinson, Stephanie (250) 731-1315 Port Alberni

Operator

Regional District of Alberni Clayoquot
3008 5th Avenue
Tofino, BC
V9Y 2E3

(250)

Figure 4. (continued)

Alberni Valley Regional Airport – Small Water System

Introduction

The small water system at the Alberni Valley Regional Airport was constructed to service the site caretaker's residence and the Airport Terminal Building.The Terminal Building has washroom facilities available to the three offices and to the public. There is an exterior water valve for watering plants and for washing.

The source of water for the Alberni Valley Regional Airport is from a shallow well within a local aquifer. The size and area of the aquifer is not known but the local geology is indicative of significant groundwater. There isn't any development or any significant human influence in the immediate area that would adversely affect the aquifer.

Description of System

The water well was dug approximately eighteen feet deep in the natural gravel. The well was then constructed with concrete casing rings and completed with a building enclosing it (Photo 2). The system is supplied with a shallow well and small pump located approximately 200m from the caretakers dwelling in a secure building. The distribution system follows the access road to the terminal building with a branch that goes to the caretaker's residence (see map in appendix iii).

The system operates with one "Novatek" submersible pump controlled by a pressure switch in conjunction with a 40 gallon pressure tank (Photo 3) - (Well-x-Trol by Amtrol, Model WX-350, max pressure 100 psi). The system is contained within a steel pumphouse building (10 by 8 feet & 9 feet high) and the distribution is comprised of approximately 350 meters of 1.5 inch poly ethylene pipe.

Currently there is no water treatment such as disinfection in the water system. On going testing by the Vancouver Island Health Authority has determined that there is no need for treatment. The well water is from a shallow well which may be influenced by surface water and may require disinfection in the future.

Photo 2. Alberni Valley Regional Airport pump house and well

Photo 3. Alberni Valley Regional Airport pressure tank

Water Quality

Alberni Valley Airport Water System has a permit from Vancouver Island Health Authority to operate a water system since 2003 (see appendix x).

Water testing is performed monthly by the Vancouver Island Health Authority (Figure 6). The water is tested for microbiological parameters such as coliforms and E. coli. In November and December of 2010 coliform tests came back with positive results. Subsequently the water well and distribution lines were shocked with high doses of chlorine. Further testing reveled that the shock chlorination was successful and no further tests showed coliforms.

Annually the water system is inspected by VIHA and the last occurred in 2010. VIHA gave a satisfactory report on the water system at that time and there doesn't appear to be any recent issues. A copy of the 2010 inspection is included in this report (Figure 5).

The most recent comprehensive testing of the water was in January of 2007 (Table 2). The test performed was called a "43 Parameter Potability Analysis" performed by CANTEST laboratory. This analysis includes conventional parameters such as pH and alkalinity, Total Metals such as arsenic and uranium as well as microbiological such as coliforms and E. coli.

The test for conventional parameters results showed that the water has a low pH of 5.6. This pH falls below the Aesthetic Criteria in the Guidelines for Canadian Drinking Water Quality. The Guidelines for the Aesthetic Objective for pH are between 6.5 and 8.5.

Future Improvements

The next scheduled comprehensive testing of the water would be in 2011. Comparison of the results may show any potential trends in the water quality. Proposed projects include the addition of disinfection if required by the Vancouver Island Health Authority and installation of a flow measuring device. Flow measurement may be of use to determine water requirements and demands for future airport development.

Client:	ACRD		Total Boron B	mg/L	< 0.05
Download Date:	January 23, 2007		Total Cadmium Cd	mg/L	< 0.0002
Project Name:			Total Calcium Ca	mg/L	2.96
Project Number:			Total Chromium Cr	mg/L	< 0.001
Chain of Custody:			Total Cobalt Co	mg/L	< 0.001
Samples received:			Total Copper Cu	mg/L	0.029
			Total Iron Fe	mg/L	< 0.05
TABLE: Results of WATER Analyses			Total Lead Pb	mg/L	0.001
			Total Lithium Li	mg/L	< 0.001
Sample ID	Alberni Valley Regional Airport Water		Total Magnesium Mg	mg/L	0.52
CANTEST ID		701240281	Total Manganese Mn	mg/L	0.003
Date Sampled	Jan 23, 2007		Total Mercury Hg	ug/L	< 0.02
Parameter	Units		Total Molybdenum Mo	mg/L	< 0.0005
Conventional Parameters			Total Nickel Ni	mg/L	< 0.001
pH, Laboratory	pH units	**5.6**	Total Phosphorus P	mg/L	< 0.15
Conductivity	uS/cm	19.4	Total Potassium K	mg/L	< 0.1
True Color	CU	< 5	Total Selenium Se	mg/L	< 0.001
Turbidity	NTU	0.12	Total Silicon Si	mg/L	3.8
Hardness (Total) CaCO3	mg/L	10	Total Silver Ag	mg/L	< 0.00025
Total Dissolved Solids	mg/L	16	Total Sodium Na	mg/L	1.11
Total Alkalinity CaCO3	mg/L	9.1	Total Strontium Sr	mg/L	0.009
Dissolved Fluoride F	mg/L	< 0.05	Total Tellurium Te	mg/L	< 0.001
Dissolved Chloride Cl	mg/L	0.81	Total Thallium Tl	mg/L	< 0.0001
Nitrate and Nitrite N	mg/L		Total Thorium Th	mg/L	< 0.0005
Dissolved Nitrate N	mg/L	0.05	Total Tin Sn	mg/L	< 0.001
Nitrite N	mg/L	< 0.002	Total Titanium Ti	mg/L	< 0.001
Dissolved Sulphate SO4	mg/L	< 0.5	Total Uranium U	mg/L	< 0.0005
Tannin and Lignin	mg/L	< 0.1	Total Vanadium V	mg/L	< 0.001
Metals Analysis			Total Zinc Zn	mg/L	0.008
Total Aluminum Al	mg/L	0.012	Total Zirconium Zr	mg/L	< 0.01
Total Antimony Sb	mg/L	< 0.001	Microbiological Analysis		
Total Arsenic As	mg/L	< 0.001	Total Coliforms (Confirmed)	Col./100 mL	< 1
Total Barium Ba	mg/L	0.001	E. coli	Col./100 mL	< 1
Total Beryllium Be	mg/L	< 0.001	Heterotrophic Plate Count	Col./1 mL	62
Total Bismuth Bi	mg/L	< 0.001			

Table 2. Alberni Valley Regional Airport Small Water System 2007 Analytical Test

VANCOUVER ISLAND health authority

POSTED 01·19/10

DRINKING WATER SYSTEM INSPECTION REPORT

Health Protection

SYSTEM NAME: Alberni Valley Regional Airport	E.H.O. NAME: Stephanie Hutchinson
ADDRESS	POSTAL CODE / SYSTEM NUMBER
OPERATOR: Alberni Clayoquot Regional District	INSPECTION DATE (DMY): 19/01/2010 / TIME SPENT (Hrs. - nearest 1/4): 1.5 hr

SYSTEM TYPE (CHECK One)

☐ > 20,000 (DWP) ☐ 10,001 - 20,000 (DWM) ☐ 301 - 10,000(DWT) ☐ 15 - 300(DWC) ☑ 2 - 14(DWS)
☐ 1 - SERVES PUBLIC (DWQ) ☐ 1 HAULER (DWH)

TYPE OF INSPECTION

☐ INITIAL ☑ ROUTINE ☐ COMPLAINT ☐ FOLLOW-UP

CRITICAL HAZARD

These items relate to Public Health Safety & **MUST RECEIVE IMMEDIATE ATTENTION**

Microbiological Contamination of Raw Water Supply Due to:

- ☐ 301 Flood
- ☐ 302 Sewage
- ☐ 303 Industrial
- ☐ 304 Agriculture
- ☐ 305 Other (Specify) ____
- ☐ 306 Chemical Contamination of Raw Water Suply
- ☐ 307 Contamination of Finished Water - Reservoir
- ☐ 308 Contamination of Finished Water - Mains
- ☐ 309 Cross-Connection
- ☐ 310 Use of Unapproved Source
- ☐ 311 Interruption of Treatment
- ☐ 312 Inadequate Treatment
- ☐ 313 Other (Specify) ____

SANITATION & MAINTENANCE

These items must be corrected within a designated time period

- ☐ 314 Improper Maintenance of Distribution Sytsem
- ☐ 315 Improper or No Disinfection of New or Repaired Main
- ☐ 316 Source Unprotected and Subject to Contamination
- ☐ 317 Inadequate or Improper Construction of Water Works
- ☐ 318 Inadequate Microbiological Analysis Data
- ☐ 319 Inadequate Chemical Analysis Data
- ☐ 320 Interruption of Treatment
- ☐ 321 Inadequate Treatment
- ☐ 322 Emergency Response Plan
- ☐ 323 Other (Specify) ____

CODE	FINDINGS AND ACTIONS REQUIRED
-	Monthly water samples must be submitted by
	the water supplier; EHO will no longer be providing
	this service. Sampling to begin in May 2010.
-	Ensure 2009 Annual Report is completed by June 30/10;
	please submit a copy to this office.
-	All recent bacteriological results are good.
-	There have been no changes to the water
	system.
-	Overview: Shallow well, no disinfection,
	3 connections.
-	Ensure contact information on the Emergency Response
	Plan is up to-date.
	Page 1 of

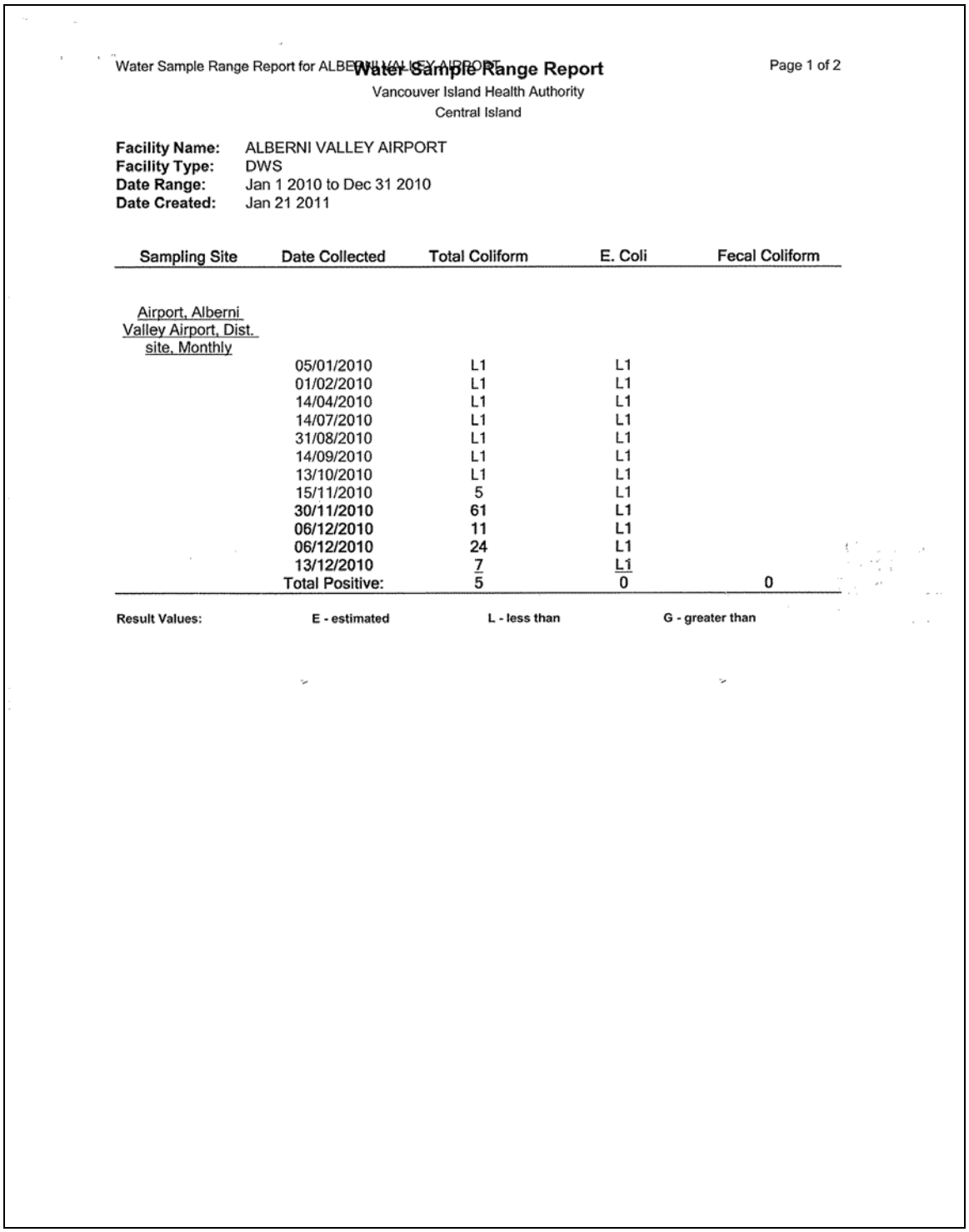
At the time of inspection this system has a hazard rating of ☐ HIGH ☐ MODERATE ☑ LOW ☐ Issue Permit ☐ Conditions of Permit

FOLLOW-UP ☐ VISIT ☐ PHONE Date DD / MM / YYYY

RECEIVED BY PRINT NAME E.H.O.

H:\EHO\FORM\DIRNKING WATER SYSTEM INSPECTION REPORT-JULY 2005 WHITE COPY - OPERATOR YELLOW COPY - INTERNAL PINK COPY - E.H.O.

Figure 5. Alberni Valley Regional Airport 2010 VIHA Inspection Report



Water Sample Range Report for ALBERNI VALLEY AIRPORT

Page 1 of 2

Water Sample Range Report

Vancouver Island Health Authority

Central Island

Facility Name: ALBERNI VALLEY AIRPORT
Facility Type: DWS
Date Range: Jan 1 2010 to Dec 31 2010
Date Created: Jan 21 2011

Sampling Site	Date Collected	Total Coliform	E. Coli	Fecal Coliform
Airport, Alberni Valley Airport, Dist. site, Monthly				
	05/01/2010	L1	L1	
	01/02/2010	L1	L1	
	14/04/2010	L1	L1	
	14/07/2010	L1	L1	
	31/08/2010	L1	L1	
	14/09/2010	L1	L1	
	13/10/2010	L1	L1	
	15/11/2010	5	L1	
	30/11/2010	**61**	**L1**	
	06/12/2010	**11**	**L1**	
	06/12/2010	**24**	**L1**	
	13/12/2010	**7**	**L1**	
	Total Positive:	5	0	0

Result Values: E - estimated L - less than G - greater than

Figure 6. Alberni Valley Regional Airport 2010 Water Sample Range Report

Water Sample Range Report for ALBERNI VALLEY AIRPORT Page 2 of 2

Samples that contain total coliform:	5	41.67% of total
Samples that contain e. coli:	0	0.00% of total
Samples that contain fecal coliform:	0	0.00% of total
Number of positive samples in last 30 days:	3/3	
Total number of samples:	12	

Comments:

Environmental Health Officer
Jan 21 2011

FOR FURTHER INFORMATION PLEASE CALL: Hutchinson, Stephanie (250) 731-1315 Port Alberni

Operator

Regional District of Alberni Clayoquot
ALBERNI CLAYOQUOT REGIONAL DISTRICT
3008 5th Avenue
Port Alberni, BC
V9Y 2E3

(250) 720-2700

Figure 6. (continued)

Cougar Smith Park (9028 Faber Road)

Introduction

Cougar Smith Park is located upland from Sproat Lake and across the road from lake shore properties. This is a Regional Park that is 2.3 ha in size that used to be the site of Faber Road Elementary School. The current water source for Cougar Smith Park was from Sproat Lake until a drilled well was developed in the summer of 2010. The water is used year round for domestic use by the resident caretaker of the park. Other significant user groups are community groups and the general public using the play ground, tennis courts, basketball court and other park amenities.

Description of System

The new water well is located at the south end of the park near the end of the basketball court (see figure 8). The well was drilled 400 feet deep into bedrock with the majority of the water coming in at a gravel seem around the 40 foot level (see Figure 9). A water line runs up the side of the playground and then parallels the park road and into the Cougar Smith Park service building (Photo 4). Within the building are a pressure tank, an ultraviolet light disinfection system and a five micron particulate filter. From the service building the water goes to two public washrooms, an irrigation system, a drinking fountain and the caretaker's residence.

Photo 4. Cougar Smith Park water distribution and disinfection building

Water Quality

The prefiltered water is noticeably high in turbidity with the lab result of 23.4 NTU. After being filtered with a five micron filter the turbidity is reduced significantly to an acceptable level of less than .05 NTU. With the turbidity removed the UV Transmissibility of the water is 97.1 %/cm. This value represents the ability of the UV system to effectively disinfect the drinking water. The ultraviolet light system provides disinfection creating a potable water source. The most recent labs results of the filtered water are in Figure 7.

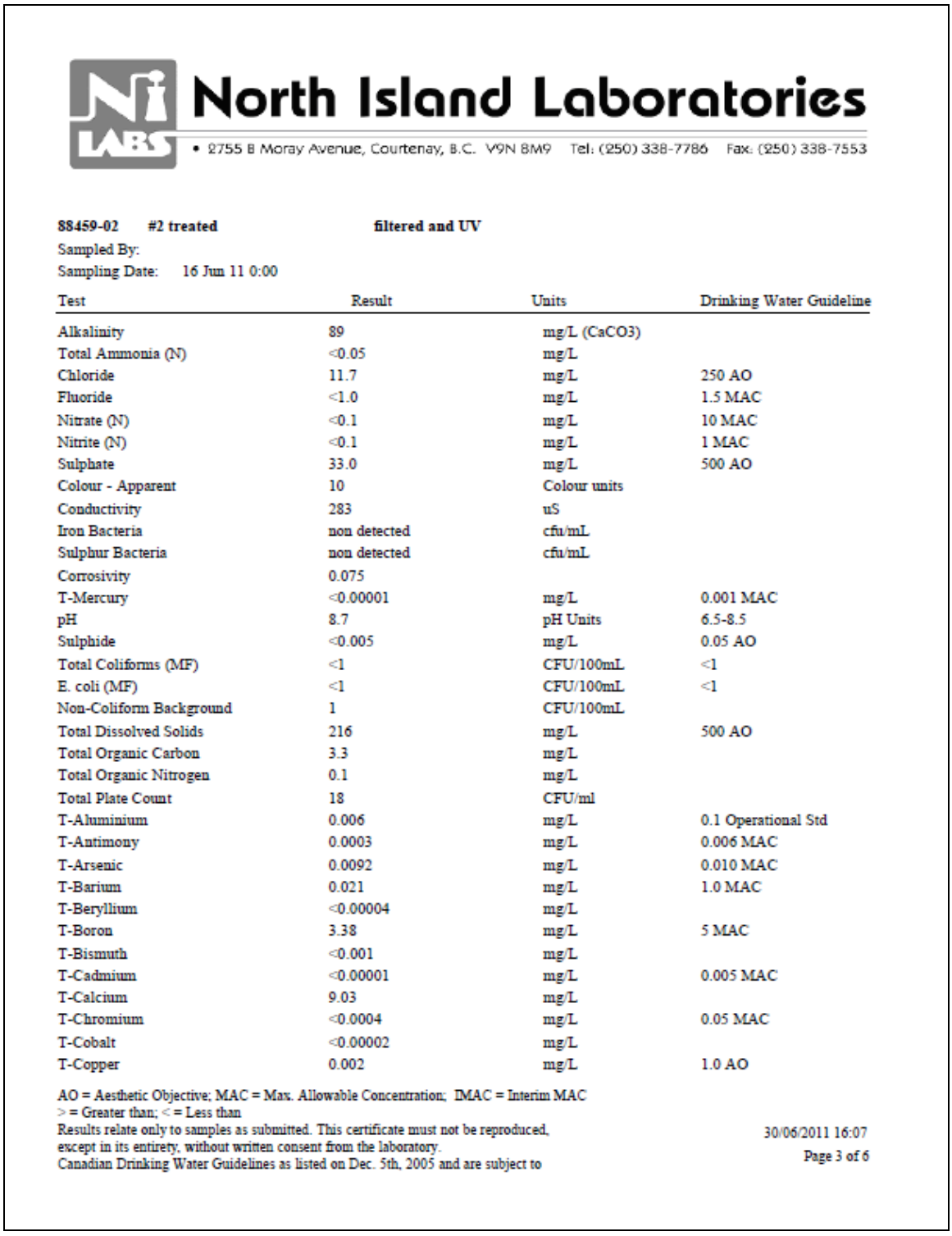
The water contractor has the mandatory certification by the Environmental Operators Certificate Program (EOCP) required by the BC Drinking Water Protection Act.

Future Improvements

The existing water treatment system will be upgraded to VIHA standards in order to obtain an Operating Permit. The upgrading will involve a redesign of the piping system. The redesign will include shut off valves, pressure gauges and a finer filtration down to one micron. Upon VIHA's recommendations a larger ultraviolet disinfection system may also be installed. A flow meter will also be installed to track water usage and trends in determining future needs.

Regular monthly coliform testing of the water will be performed to ensure disinfection. Annual complete testing of the raw water will also be done to ensure potability. Once the permitting is in place VIHA will perform annual inspections.

With the new deep well water source an Operating Permit may be issued by VIHA. Accompanying the permit will be monthly Water Sample Range Reports showing coliform testing and annual Drinking Water System Inspection Reports. All Aesthetic Criteria and Maximum Acceptable Concentrations set by the Guidelines for Canadian Drinking Water Quality will be maintained.



North Island Laboratories

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

88459-02 #2 treated filtered and UV

Sampled By:

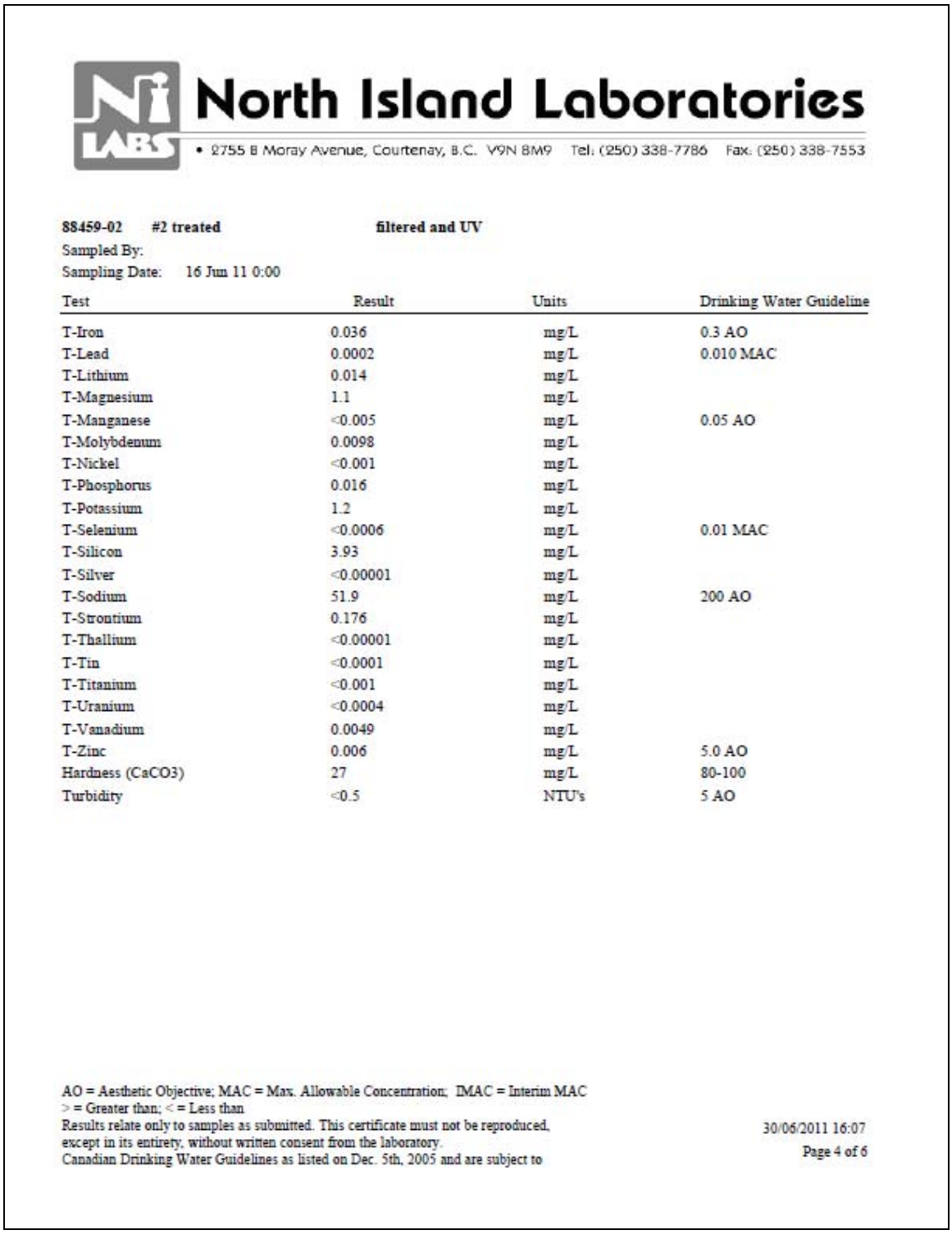
Sampling Date: 16 Jun 11 0:00

Test	Result	Units	Drinking Water Guideline
Alkalinity	89	mg/L (CaCO3)	
Total Ammonia (N)	<0.05	mg/L	
Chloride	11.7	mg/L	250 AO
Fluoride	<1.0	mg/L	1.5 MAC
Nitrate (N)	<0.1	mg/L	10 MAC
Nitrite (N)	<0.1	mg/L	1 MAC
Sulphate	33.0	mg/L	500 AO
Colour - Apparent	10	Colour units	
Conductivity	283	uS	
Iron Bacteria	non detected	cfu/mL	
Sulphur Bacteria	non detected	cfu/mL	
Corrosivity	0.075		
T-Mercury	<0.00001	mg/L	0.001 MAC
pH	8.7	pH Units	6.5-8.5
Sulphide	<0.005	mg/L	0.05 AO
Total Coliforms (MF)	<1	CFU/100mL	<1
E. coli (MF)	<1	CFU/100mL	<1
Non-Coliform Background	1	CFU/100mL	
Total Dissolved Solids	216	mg/L	500 AO
Total Organic Carbon	3.3	mg/L	
Total Organic Nitrogen	0.1	mg/L	
Total Plate Count	18	CFU/ml	
T-Aluminium	0.006	mg/L	0.1 Operational Std
T-Antimony	0.0003	mg/L	0.006 MAC
T-Arsenic	0.0092	mg/L	0.010 MAC
T-Barium	0.021	mg/L	1.0 MAC
T-Beryllium	<0.00004	mg/L	
T-Boron	3.38	mg/L	5 MAC
T-Bismuth	<0.001	mg/L	
T-Cadmium	<0.00001	mg/L	0.005 MAC
T-Calcium	9.03	mg/L	
T-Chromium	<0.0004	mg/L	0.05 MAC
T-Cobalt	<0.00002	mg/L	
T-Copper	0.002	mg/L	1.0 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

30/06/2011 16:07
Page 3 of 6

Figure 7. Cougar Smith Park water results



North Island Laboratories

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

88459-02 #2 treated filtered and UV

Sampled By:

Sampling Date: 16 Jun 11 0:00

Test	Result	Units	Drinking Water Guideline
T-Iron	0.036	mg/L	0.3 AO
T-Lead	0.0002	mg/L	0.010 MAC
T-Lithium	0.014	mg/L	
T-Magnesium	1.1	mg/L	
T-Manganese	<0.005	mg/L	0.05 AO
T-Molybdenum	0.0098	mg/L	
T-Nickel	<0.001	mg/L	
T-Phosphorus	0.016	mg/L	
T-Potassium	1.2	mg/L	
T-Selenium	<0.0006	mg/L	0.01 MAC
T-Silicon	3.93	mg/L	
T-Silver	<0.00001	mg/L	
T-Sodium	51.9	mg/L	200 AO
T-Strontium	0.176	mg/L	
T-Thallium	<0.00001	mg/L	
T-Tin	<0.0001	mg/L	
T-Titanium	<0.001	mg/L	
T-Uranium	<0.0004	mg/L	
T-Vanadium	0.0049	mg/L	
T-Zinc	0.006	mg/L	5.0 AO
Hardness (CaCO3)	27	mg/L	80-100
Turbidity	<0.5	NTU's	5 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

30/06/2011 16:07
Page 4 of 6

Figure 7. (continued)

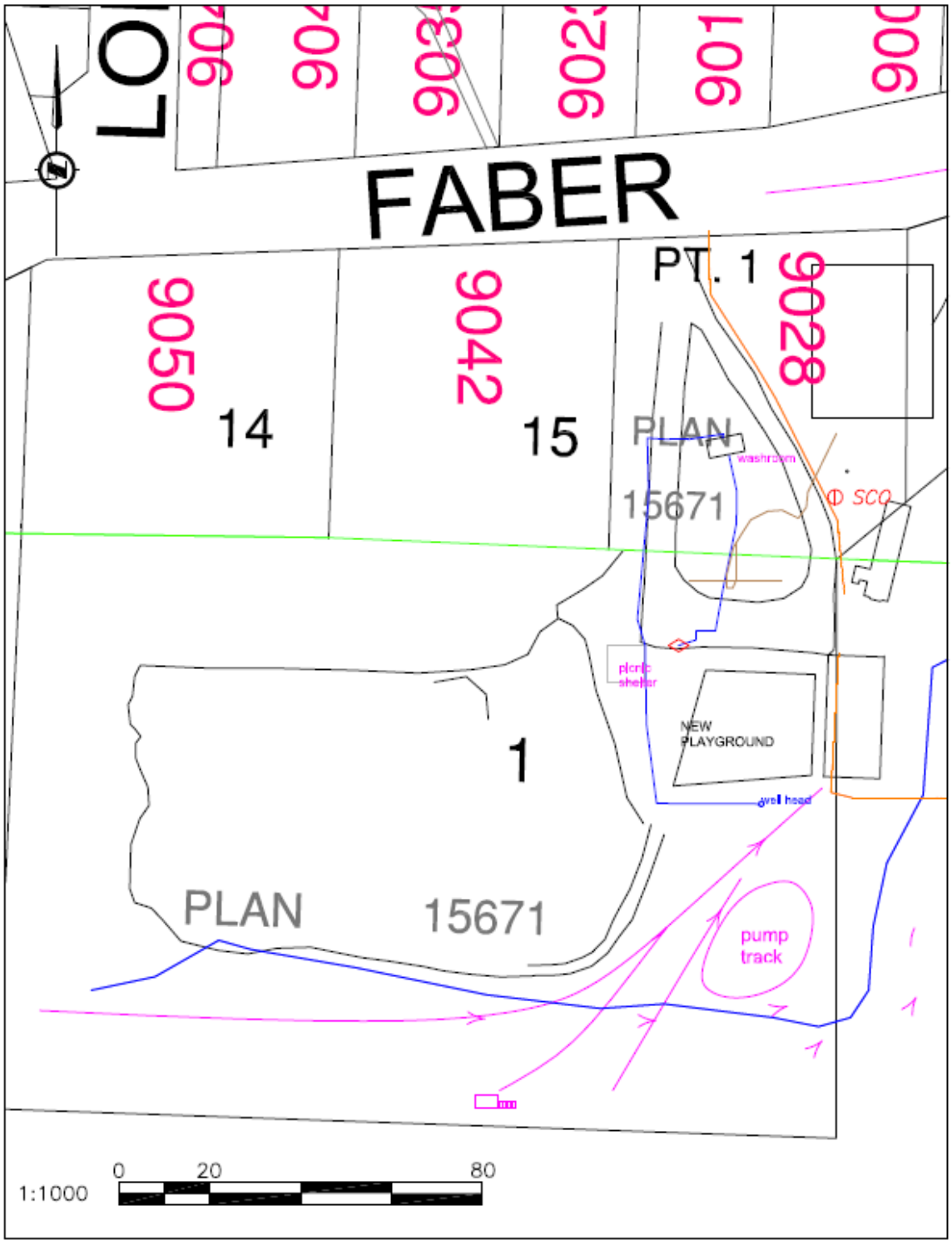


Figure 8. Cougar Smith Park map

Well Record : 117

Fyfe's Well Drilling Ltd.

3331 Alberni Highway, Qualicum Beach, B.C. V9K 1Y5
Phone:1 800 780-FYFE Fax: (250) 752-1274
Email: fyfedrilling@shaw.ca Website: www.fyfedrilling.com
"Clean Water For Canadians"

Client Name:		**Mailing Address:**	3008, Fifth, Port Alberni, BC, CANADA V9Y 2E3
Company/Agency:	Alberni Clayoquot Regional District	**Well Site Address:**	Cougar Smith Park, Port Alberni, BC, CANADA
Telephone No.:	250-720-2713	**Fax No.:**	**Email Address:**

WELL LOCATION

BCGS:		**NTS:**		**Accur:**	
Lon:		**Lat:**		**Elev:**	
UTM X:		**UTM Y:**		**Zone:**	
Lot:	**District Lot:**	**Plan:**		**Part:**	
Section:	**Township:**	**Range:**		**Land District:**	
Block:	**PID:**			**West of Meridian:**	
Legal Misc.:					

CONSTRUCTION INFORMATION

Client Well ID: 14569	**Proposed Use:** WU	
Type Of Work: NEW	**Method:** AIR	**Rig No.:**

WELL DIMENSIONS

Well Dia: 6.0 in	**Depth Drilled:** 402.0 ft	**Bedrock Depth:** 70.0 ft
Liner Type:	**Liner Dia:**	
Liner Installed From:	**To:**	

SURFACE SEAL

Material 1: BEN	**Method:** POR	
Seal From: 0.0 ft	**To:** 15.0 ft	**Depth:** 15.0 ft
Material 2:	**Method:**	
Seal From:	**To:**	**Depth:**
Material 3:	**Method:**	
Seal From:	**To:**	**Depth:**
Reason(s): As per ground water regs		

WELL CASING

Material 1: STL	**Joined By:** WEL	**Dia:** 6.0 in	**Wall:** 219.0 in
Shoe: YES	**Length From:** 0.0 ft	**To:** 73.0 ft	
Material 2:	**Joined By:**	**Dia:**	**Wall:**
Shoe:	**Length From:**	**To:**	
Material 3:	**Joined By:**	**Dia:**	**Wall:**
Shoe:	**Length From:**	**To:**	

GRAVEL PACK INFORMATION

Material Size:	**Length From:**	**To:**

SCREEN INFORMATION

Material: SST	**Type:** TEL	**Joined By:** THR		
Dia 1: 6.0 in	**Slot Size:** 25	**Placed From:** 36.0 ft	**To:** 39.0 ft	
Dia 2:	**Slot Size:**	**Placed From:**	**To:**	
Blank Dia:	**Material:**	**Placed From:**	**To:**	
Riser From: 35.0 ft	**To:** 40.0 ft	**Bottom:**	**Total:** 6.0 ft	

PERFORATIONS

Type:	**Length From:**	**To:**

WELL DEVELOPMENT

Method 1: PMP	**Time:** 4.0 hrs
Method 2:	**Time:**
Method 3:	**Time:**
Notes: water has turbidity	

LITHOLOGY

Stratum (ft)		Material Description
0.0	20.0	Sand and Gravel
20.0	35.0	hard grey clay
35.0	41.0	water bearing sand/gravel formation flow 2-3 gpm
41.0	71.0	blue clay till
71.0	80.0	hard granite rock
80.0	100.0	basalt (black) hard
100.0	150.0	black/green basalt
150.0	200.0	black/green basalt flow check 1 gpm
200.0	250.0	hard basalt black/green
250.0	300.0	black basalt with quartz
300.0	350.0	black basalt with quartz (flow check 2 gpm)
350.0	383.0	black with quartz rock med soft rock
383.0	391.0	fractured rock green rock with lots of quartz
391.0	400.0	black/green rock (flow check 4. gpm)

WELL COMPLETION SUMMARY

Final Depth: 402.0 ft	**Completed In:** BDR	**Est. Yield:** 7.0 USgpm
Method: PMP	**Static Level:** 10.0 ft	**Artesian Yield:**
Sample Collected: YES		**Disinfected:** YES
Notes: a temp pump was installed for water flow testing, a rate of 7 gpm determined. water qualtity showing turbitity and fine sands		

CONSTRUCTION PERSONNEL

Contractor: Fyfe's Well Drilling Ltd.			
Driller: Glen Fyfe		**License:** 06101301	
Consultant: nill			
Date Started: Wednesday, August 25, 2010	**Date Completed:** Friday, July 09, 2010		

Figure 9. Cougar Smith Park well log

West Coast Landfill

Introduction

The West Coast Landfill water system was constructed to service the scale house bathroom and to provide water for washing of trucks. There isn't enough water available to provide adequate fire protection and is not designed for that use. The water is from a nearby well that is influenced by the proximity of the landfill operations. The water is not intended for public use and is considered non potable.

Description of System

The source water for the West Coast Landfill is from a shallow dug well located near the scale house (Photo 5). The geology of the area has significant amounts of marine clay allowing the well to be heavily influenced by surface water. The water system is comprised of one well with one submerged pump. The water is pumped into a pressure tank located inside the scale house. The pressure tank has a pressure switch which controls the operation of the pump. From the pressure tank the water is distributed to the user demand (Photo 6).

Water Quality

The water quality does not meet the Guidelines for Canadian Drinking Water Quality due to the presence of Fecal Coliforms and E. Coli. The water has a low pH of 6.34 and does not meet the Aesthetic Objectives for pH (Analytical results in Table 3).

Installing a simple water treatment system to provide potable water is not a practical solution due to the low pH of the well water. To raise the pH a treatment system would have to include a chemical addition of either sodium hydroxide (caustic soda) or other chemicals. Due to the proximity of the well to the landfill the quality control would be too exhaustive to maintain a potable water source.

Photo 5. West Coast Landfill Small Water System shallow well

Photo 6. West Coast Landfill Small Water System

Future Improvements

Regular scheduled concentrated chlorination of the well may be initiated to "shock" and create a complete disinfection**.** The purpose of this large dose is to break down the combined chlorine, organic material and contamination. A small chlorination system may also be installed to disinfect the water on demand. This would provide water that could safely be used for washing and emergency showers.

An alternate water source may also be reviewed in conjunction with any significant upgrades to the landfill. One potential source would be to install a reservoir that could be filled with rain water during the rainy season or be filled from trucked in water.

Sample ID		Scale House				
CANTEST ID		812120092		Total Cadmium Cd	mg/L	< 0.0002
Date Sampled		12/11/2008		Total Calcium Ca	mg/L	2.85
Parameter	Units			Total Chromium Cr	mg/L	< 0.001
Conventional Parameters				Total Cobalt Co	mg/L	< 0.001
Temperature	deg C	8.56		Total Copper Cu	mg/L	0.015
pH, Laboratory	pH	6.79		Total Iron Fe	mg/L	0.24
pH, Field	pH	6.34		Total Lead Pb	mg/L	0.002
Conductivity	uS/cm	59		Total Lithium Li	mg/L	< 0.001
Hardness CaCO3	mg/L	-		Total Magnesium Mg	mg/L	0.67
Hardness (Total) CaCO3	mg/L	10		Total Manganese Mn	mg/L	0.027
Total Dissolved Solids	mg/L	62		Total Mercury Hg	ug/L	< 0.02
Total Suspended Solids	mg/L	1		Total Molybdenum Mo	mg/L	< 0.0005
Total Alkalinity CaCO3	mg/L	15.4		Total Nickel Ni	mg/L	< 0.001
Bicarbonate Alkalinity HCO3	mg/L	18.8		Total Phosphorus P	mg/L	< 0.15
Carbonate Alkalinity CO3	mg/L	< 0.5		Total Potassium K	mg/L	0.4
Hydroxide Alkalinity OH	mg/L	< 0.5		Total Selenium Se	mg/L	< 0.001
Dissolved Chloride Cl	mg/L	7.97		Total Silicon Si	mg/L	3
Conductivity, Field	uS/cm	54		Total Silver Ag	mg/L	< 0.00025
ORP, Field	mV	106.1		Total Sodium Na	mg/L	3.84
Dissolved Nitrate N	mg/L	< 0.05		Total Strontium Sr	mg/L	0.018
Dissolved Sulphate SO4	mg/L	1.31		Total Tellurium Te	mg/L	< 0.001
Total BOD	mg/L	-		Total Thallium Tl	mg/L	< 0.0001
Chemical Oxygen Demand	mg/L	-		Total Thorium Th	mg/L	< 0.0005
Ammonia Nitrogen N	mg/L	0.08		Total Tin Sn	mg/L	< 0.001
Total Phosphorus P	mg/L	0.02		Total Titanium Ti	mg/L	0.007
Metals Analysis				Total Uranium U	mg/L	< 0.0005
Total Aluminum Al	mg/L	0.26		Total Vanadium V	mg/L	< 0.001
Total Antimony Sb	mg/L	< 0.001		Total Zinc Zn	mg/L	0.015
Total Arsenic As	mg/L	< 0.001		Total Zirconium Zr	mg/L	< 0.01
Total Barium Ba	mg/L	0.005		Microbiological Analysis		
Total Beryllium Be	mg/L	< 0.001		Total Coliform (Confirmed)	MPN/100mL	140
Total Bismuth Bi	mg/L	< 0.001		Fecal Coliform	MPN/100mL	17
Total Boron B	mg/L	< 0.05		E. Coli	MPN/100mL	13

Table 3. West Coast Landfill Small Water System 2008 Analytical Test

Millstream Water System

Introduction

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 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 (Photo 7).

Description of System

There are two shallow dug wells lined with five-foot diameter concrete rings located at the end of Karn Avenue. The aquifer is a localized aquifer in the discharge zone for groundwater flowing from higher elevations along the Ucluelet-Tofino highway. Typically, the overflow from Well #2 flows through an underground pipe to Well #1. Well #1 is 3.7 meters deep and is the primary well, supplemented by Well #2. Well #2 is 3.0 meters deep and is used occasionally only to exercise the dedicated pump.

The two centrifugal pumps are located in the pump house and are controlled by the water main pressure. Previously, the pumps were controlled by float switches located in the reservoir. The float switches used telephone lines to communicate with the control system located in the pump house. The local telephone company was upgrading the phone lines to fiber optics and gave us notice that our copper wire communication system would not be working. Due to the high costs of a radio communication system an innovative system of communication was installed. The pressure of the water main in the pump house is used to control the pumps starting. Once the pump starts, a timer is used to turn off the pumps when the reservoir is full. A pressure drop in the pump house is noticed when the water in the reservoir drops a know height. A built in delay eliminates frequent false starts from low pressure events due to water use along the water main.

Liquid chlorine is injected into the water line before it leaves the pump house (Photo 8). As the chlorinated water leaves the pump house it enters a chlorine contact chamber (long pipeline) that is 400 mm (16 inch) in diameter and 26-meters long. This gives the chlorine a longer retention time to facilitate disinfection before entering the distribution system.

The system has approximately fifty connections and serves a population of approximately 150 people. As can be seen in the monthly consumption graph there is an increasing trend in consumption since 2006 (Figure 10).

There is a system operator and an alternate who are responsible for the daily operation of the water system. There is a daily log of flows and water usage and a record is kept of all significant events. The 2010 annual water use from the water system was 32,808 cubic meters.

Photo 7. Millstream Community Water System reservoir

Photo 8. Millstream Community Water System pump house

Water Quality

Millstream Water System has a permit from Vancouver Island Health Authority to operate a water system since 1992 (appendix viii).

The system operator has the mandatory certification by the Environmental Operators Certificate Program (EOCP) required by the BC Drinking Water Protection Act.

The last laboratory analysis of Millstream's water for potability was taken in January 2010 (Table 4). All Aesthetic Criteria and Maximum Acceptable Concentrations were acceptable with the one exception that hardness was deemed moderate. There have been a few complaints that the water has had an unusual taste. This was taken seriously as there is light industry at higher ground that may be influencing the aquifer. A complete water test was conducted with VIHA's assistance to rule out any possible negative influence on the water quality. A complete test was performed on the water including metals and for a complete range of Extractable Petroleum Hydrocarbons including Volatile Organic Compounds (grease or oil).

Two water samples are taken into VIHA monthly for microbiological analysis. The annual 2010 Range Report from VIHA shows good results (Figure 12).

Annually the water system is inspected by VIHA and the last occurred in 2010. A full tour of the water system was conducted with a final hazard rating of "Low". A copy of the inspection is included in this report (Figure 11).

Water is tested daily for Free Chlorine and the residual in the reservoir is kept between 0.3 and 0.6 mg/l.

Future Improvements

The 4 inch asbestos cement water main is past its life expectancy and will be needed replacing in the near future. With a complete water main replacement project more fire hydrants could be installed. Household water meters may also be installed to assist in water conservation measures and to provide a more equitable charging method.

The reservoir will require a complete cleaning and mechanical inspection in the near future. A complete interior inspection or cleaning has not occurred since the reservoir was commissioned. In order to accomplish this, a separate supply method will have to be initiated while the reservoir is unavailable.

The District of Ucluelet has a water main running down the side of the highway near the entrance to the Community of Millstream. A connection to the Ucluelet system could be installed to provide an emergency source of water or to provide water during maintenance. A connection would have to include the appropriate valving and safeguards such as a back flow preventer.

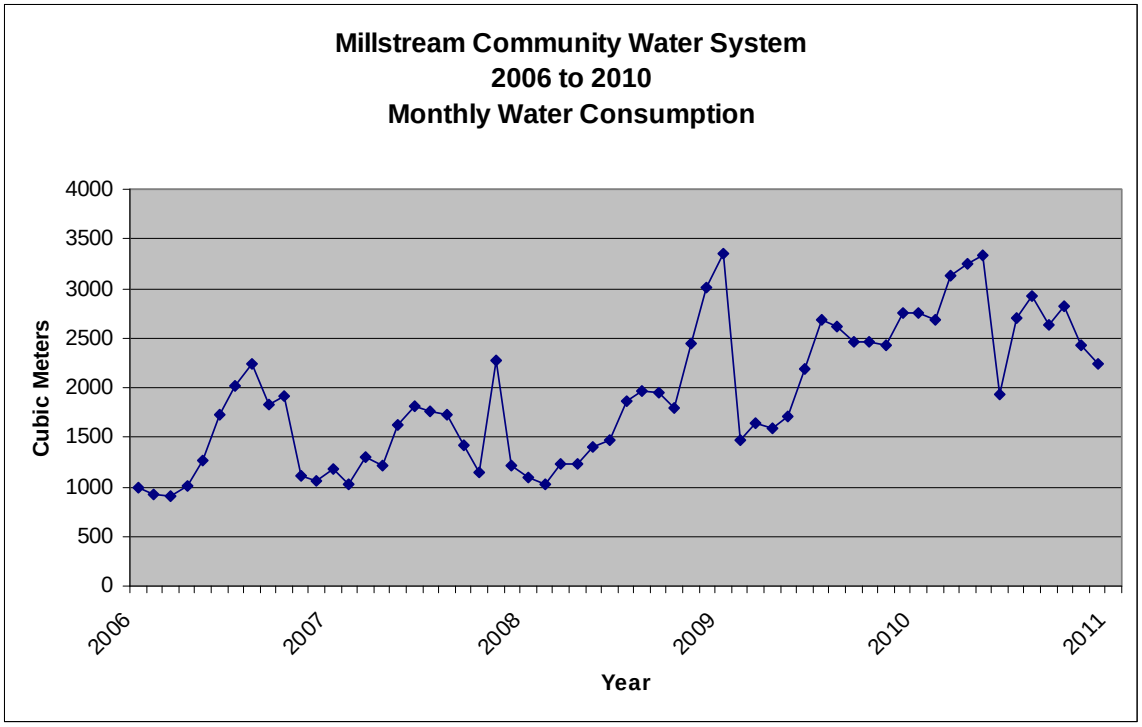
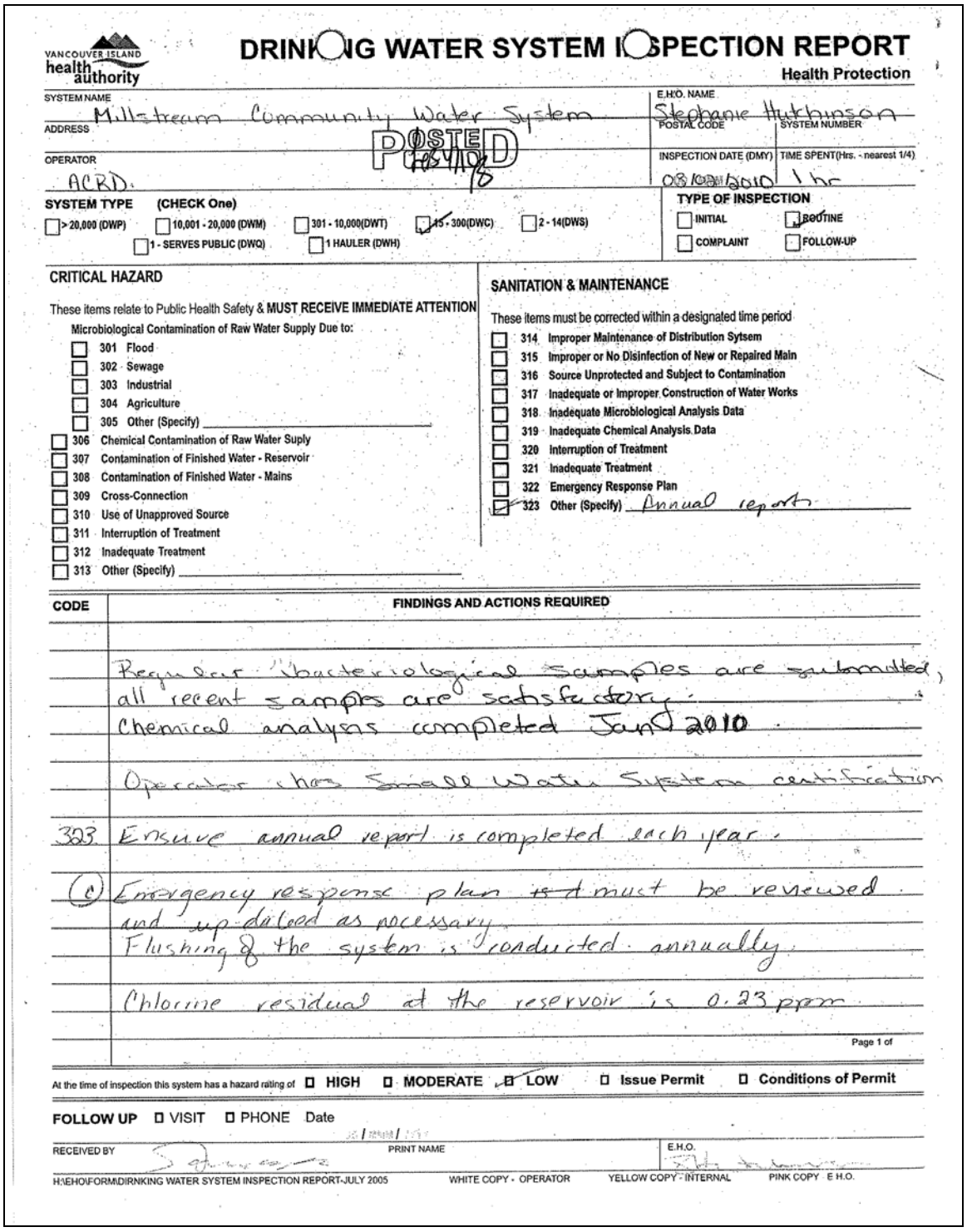


Figure 10. Millstream Community Water System monthly water consumption

Client:	ACRD		Total Boron B	mg/L	0.033
Download Date:	5/25/2010		Total Cadmium Cd	mg/L	0.00002
Project Name:			Total Calcium Ca	mg/L	28.3
Project Number:			Total Chromium Cr	mg/L	0.0002
Chain of Custody:	3000002		Total Cobalt Co	mg/L	< 0.0001
Samples received:	1/12/2010		Total Copper Cu	mg/L	0.0038
			Total Lanthanum La	mg/L	<0.0001
TABLE: Results of WATER Analyses			Total Iron Fe	mg/L	0.02
			Total Lead Pb	mg/L	0.00016
Sample ID	Millstream Water System		Total Lithium Li	mg/L	0.0006
CANTEST ID		1.00E+09	Total Magnesium Mg	mg/L	5.89
Date Sampled		1/11/2010	Total Manganese Mn	mg/L	0.0018
Parameter	Units		Total Mercury Hg	ug/L	< 0.02
Conventional Parameters			Total Molybdenum Mo	mg/L	< 0.0001
pH, Laboratory	pH units	7.22	Total Nickel Ni	mg/L	< 0.0002
Conductivity	uS/cm	243	Total Phosphorus P	mg/L	< 0.015
True Color	CU		Total Potassium K	mg/L	0.73
Turbidity	NTU	0.11	Total Selenium Se	mg/L	< 0.0002
Hardness (Total) CaCO3	mg/L	95	Total Silicon Si	mg/L	8.35
Total Dissolved Solids	mg/L	160	Total Silver Ag	mg/L	< 0.00004
Total Alkalinity CaCO3	mg/L	94	Total Sodium Na	mg/L	10.7
Dissolved Fluoride F	mg/L	<0.05	Total Strontium Sr	mg/L	0.071
Dissolved Chloride Cl	mg/L	13.2	Total Tellurium Te	mg/L	< 0.0002
Nitrate and Nitrite N	mg/L	0.86	Total Thallium Tl	mg/L	< 0.00002
Dissolved Nitrate N	mg/L		Total Thorium Th	mg/L	< 0.00005
Nitrite N	mg/L		Total Tin Sn	mg/L	< 0.0001
Dissolved Sulphate SO4	mg/L	4.95	Total Titanium Ti	mg/L	0.0005
Tannin and Lignin	mg/L		Total Tungsten W	mg/L	<0.0001
Metals Analysis			Total Uranium U	mg/L	< 0.00005
Total Aluminum Al	mg/L	0.007	Total Cesium Cs	mg/L	<0.001
Total Antimony Sb	mg/L	< 0.001	Total Vanadium V	mg/L	0.0007
Total Arsenic As	mg/L	< 0.002	Total Zinc Zn	mg/L	0.004
Total Barium Ba	mg/L	0.0019	Total Zirconium Zr	mg/L	< 0.0001
Total Beryllium Be	mg/L	< 0.0001			
Total Bismuth Bi	mg/L	< 0.0001			

Volatile Organic Compounds					
Benzene	ug/L	< 0.1	trans-1,2-Dichloroethene	ug/L	< 0.1
Bromodichloromethane	ug/L	< 0.1	1,2-Dichloropropane	ug/L	< 0.1
Bromoform	ug/L	< 0.2	cis-1,3-Dichloropropene	ug/L	< 0.1
Bromomethane	ug/L	< 0.8	trans-1,3-Dichloropropene	ug/L	< 0.1
2-Butanone	ug/L	< 5	Ethylbenzene	ug/L	< 0.1
Carbon Tetrachloride	ug/L	< 0.1	2-Hexanone	ug/L	< 20
Chlorobenzene	ug/L	< 0.1	4-Methyl-2-pentanone	ug/L	< 2
Chloroethane	ug/L	< 0.4	Methylene Chloride	ug/L	< 6
Chloroform	ug/L	2.6	Styrene	ug/L	< 0.1
Chloromethane	ug/L	< 0.4	1,1,2,2-Tetrachloroethane	ug/L	< 0.2
Dibromochloromethane	ug/L	< 0.1	Tetrachloroethene	ug/L	< 0.1
1,2-Dibromoethane	ug/L	< 0.1	Toluene	ug/L	< 0.1
Dibromomethane	ug/L	< 0.2	1,1,1-Trichloroethane	ug/L	< 0.1
Dichlorodifluoromethane	ug/L	< 0.2	1,1,2-Trichloroethane	ug/L	< 0.1
1,2-Dichlorobenzene	ug/L	< 0.1	Trichloroethene	ug/L	< 0.1
1,3-Dichlorobenzene	ug/L	< 0.1	Trichlorofluoromethane	ug/L	< 0.2
1,4-Dichlorobenzene	ug/L	< 0.1	Vinyl Chloride	ug/L	< 0.2
1,1-Dichloroethane	ug/L	< 0.1	Xylenes	ug/L	< 0.1
1,2-Dichloroethane	ug/L	< 0.4	Extractable Petroleum Hydrocarbons (EPH)		
1,1-Dichloroethene	ug/L	< 0.1	EPHw10-19	ug/L	< 250
cis-1,2-Dichloroethene	ug/L	< 0.1	EPHw19-32	ug/L	< 250

Table 4. Millstream Community Water System 2010 Analytical Test



VANCOUVER ISLAND health authority

DRINKING WATER SYSTEM INSPECTION REPORT

Health Protection

SYSTEM NAME: Millstream Community Water System — POSTED

E.H.O. NAME: Stephanie Hutchinson

ADDRESS — POSTAL CODE — SYSTEM NUMBER

OPERATOR: ACRD

INSPECTION DATE (DMY): 08/10/2010 — TIME SPENT(Hrs. - nearest 1/4): 1 hr

SYSTEM TYPE (CHECK One)

☐ > 20,000 (DWP) ☐ 10,001 - 20,000 (DWM) ☐ 301 - 10,000(DWT) ☑ 15 - 300(DWC) ☐ 2 - 14(DWS)

☐ 1 - SERVES PUBLIC (DWQ) ☐ 1 HAULER (DWH)

TYPE OF INSPECTION

☐ INITIAL ☑ ROUTINE

☐ COMPLAINT ☐ FOLLOW-UP

CRITICAL HAZARD

These items relate to Public Health Safety & **MUST RECEIVE IMMEDIATE ATTENTION**

Microbiological Contamination of Raw Water Supply Due to:

- ☐ 301 Flood
- ☐ 302 Sewage
- ☐ 303 Industrial
- ☐ 304 Agriculture
- ☐ 305 Other (Specify) _____
- ☐ 306 Chemical Contamination of Raw Water Suply
- ☐ 307 Contamination of Finished Water - Reservoir
- ☐ 308 Contamination of Finished Water - Mains
- ☐ 309 Cross-Connection
- ☐ 310 Use of Unapproved Source
- ☐ 311 Interruption of Treatment
- ☐ 312 Inadequate Treatment
- ☐ 313 Other (Specify) _____

SANITATION & MAINTENANCE

These items must be corrected within a designated time period

- ☐ 314 Improper Maintenance of Distribution Sytsem
- ☐ 315 Improper or No Disinfection of New or Repaired Main
- ☐ 316 Source Unprotected and Subject to Contamination
- ☐ 317 Inadequate or Improper Construction of Water Works
- ☐ 318 Inadequate Microbiological Analysis Data
- ☐ 319 Inadequate Chemical Analysis Data
- ☐ 320 Interruption of Treatment
- ☐ 321 Inadequate Treatment
- ☐ 322 Emergency Response Plan
- ☑ 323 Other (Specify) Annual reports

CODE	FINDINGS AND ACTIONS REQUIRED
	Required bacteriological samples are submitted, all recent samples are satisfactory.
	Chemical analysis completed Jan 2010.
	Operator has Small Water System certification
323	Ensure annual report is completed each year.
(c)	Emergency response plan ~~is~~ must be reviewed and up-dated as necessary.
	Flushing of the system is conducted annually.
	Chlorine residual at the reservoir is 0.23 ppm

Page 1 of

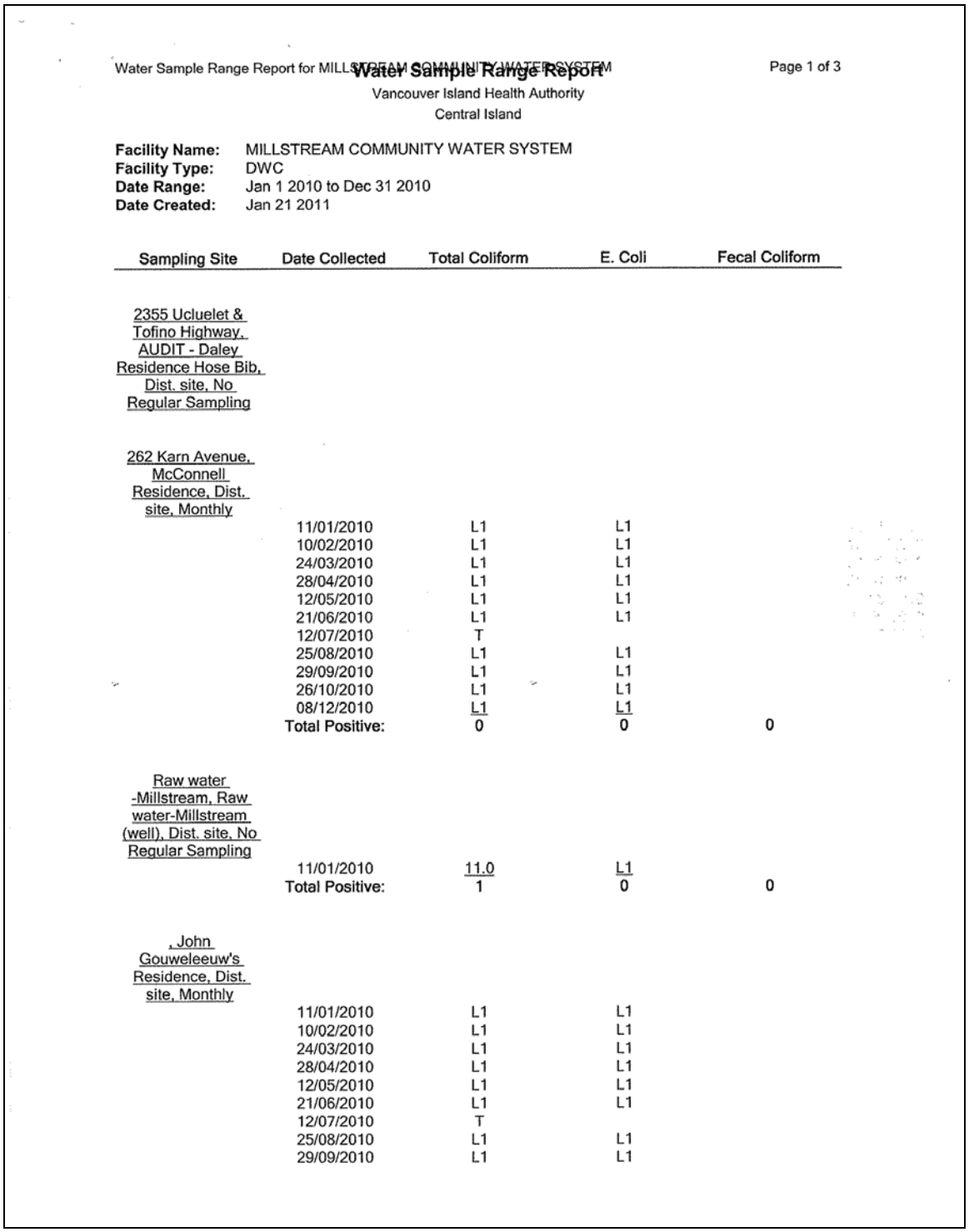
At the time of inspection this system has a hazard rating of ☐ HIGH ☐ MODERATE ☑ LOW ☐ Issue Permit ☐ Conditions of Permit

FOLLOW UP ☐ VISIT ☐ PHONE Date

RECEIVED BY — PRINT NAME — E.H.O.

H:\EHO\FORMS\DIRNKING WATER SYSTEM INSPECTION REPORT-JULY 2005 WHITE COPY - OPERATOR YELLOW COPY - INTERNAL PINK COPY E.H.O.

Figure 11. Millstream Community Water System 2010 VIHA Inspection Report



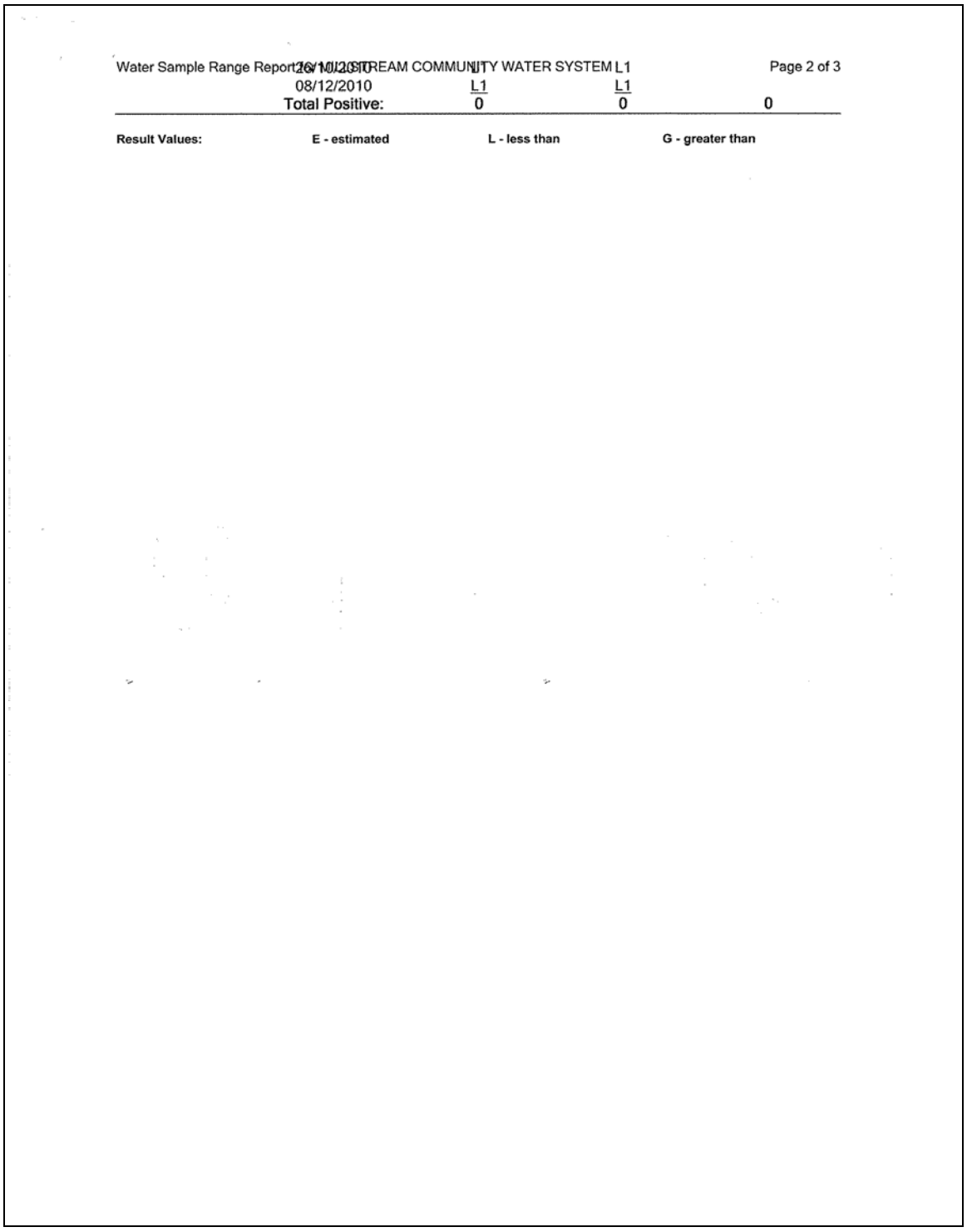
Water Sample Range Report for MILLSTREAM COMMUNITY WATER SYSTEM — Page 1 of 3

Water Sample Range Report
Vancouver Island Health Authority
Central Island

Facility Name: MILLSTREAM COMMUNITY WATER SYSTEM
Facility Type: DWC
Date Range: Jan 1 2010 to Dec 31 2010
Date Created: Jan 21 2011

Sampling Site	Date Collected	Total Coliform	E. Coli	Fecal Coliform
2355 Ucluelet & Tofino Highway, AUDIT - Daley Residence Hose Bib, Dist. site, No Regular Sampling				
262 Karn Avenue, McConnell Residence, Dist. site, Monthly				
	11/01/2010	L1	L1	
	10/02/2010	L1	L1	
	24/03/2010	L1	L1	
	28/04/2010	L1	L1	
	12/05/2010	L1	L1	
	21/06/2010	L1	L1	
	12/07/2010	T		
	25/08/2010	L1	L1	
	29/09/2010	L1	L1	
	26/10/2010	L1	L1	
	08/12/2010	L1	L1	
	Total Positive:	**0**	**0**	**0**
Raw water -Millstream, Raw water-Millstream (well), Dist. site, No Regular Sampling				
	11/01/2010	11.0	L1	
	Total Positive:	**1**	**0**	**0**
, John Gouweleeuw's Residence, Dist. site, Monthly				
	11/01/2010	L1	L1	
	10/02/2010	L1	L1	
	24/03/2010	L1	L1	
	28/04/2010	L1	L1	
	12/05/2010	L1	L1	
	21/06/2010	L1	L1	
	12/07/2010	T		
	25/08/2010	L1	L1	
	29/09/2010	L1	L1	

Figure 12. Millstream Community Water System 2010 Water Sample Range Report



Water Sample Range Report 26/10/2010 STREAM COMMUNITY WATER SYSTEM L1 Page 2 of 3

	08/12/2010	L1	L1	
	Total Positive:	0	0	0

Result Values: E - estimated L - less than G - greater than

Figure 12. (continued)

Water Sample Range Report for MILLSTREAM COMMUNITY WATER SYSTEM Page 3 of 3

Samples that contain total coliform:	1	4.35% of total
Samples that contain e. coli:	0	0.00% of total
Samples that contain fecal coliform:	0	0.00% of total
Number of positive samples in last 30 days:	0/2	
Total number of samples:	23	

Comments:

Environmental Health Officer
Jan 21 2011

FOR FURTHER INFORMATION PLEASE CALL: Hutchinson, Stephanie (250) 731-1315 Port Alberni

Operator

Millstream Community W. S. (A-CRD)
3008 Fifth Street
Port Alberni, BC
V9Y 2E3

(250) 726-7755

Figure 12. (continued)

Alberni Valley Landfill

Introduction

The main purpose of having the water system at the Alberni Valley Landfill is to provide fire protection in event of a landfill fire. Water is also required at the landfill to service the caretaker's residence, maintenance building and scale house. The water is used for bathrooms and to provide water for washing of trucks. The water is not intended for public use and is considered non potable.

Description of System

The Port Alberni Division of Catalyst Paper has a water license for Sproat Lake. The mill is located at the head of the Alberni Inlet and requires water for its operations. The water comes from Sproat Lake through a 1350 mm diameter HDPE water main going to the mill. The water main is located near the main entrance to the Alberni Valley Landfill off of McCoy Lake Road. A service line comes off the water main and into a pump house near McCoy Lake Road. When water is required to fill the reservoir at the landfill the pumps turn on and pump water from the Catalyst water main.

Photo 9. Alberni Valley Landfill Small Water System reservoir

Water Quality

The water for this system comes directly from Sproat Lake. There has not been an analytical test on this water system but it is assumed the parameters would be representative of the lake. The lake water has a low retention time due to the high volumes of water entering the lake. Previous testing has shown counts of fecal coliforms especially in higher density areas of human populations as well as shallow areas.

Future Improvements

A new pump house and new pumping system is being reviewed for an increase in capacity. With a new pump house a disinfection system may be installed. The ideal treatment system would be a chlorination system due to its residue disinfection while being stored in the reservoir. A chlorinated water supply in the reservoir would prevent any build up of organic growth and keep the inside of the reservoir clean. With a disinfection system the water could be used for potable water source if required.

Bamfield Water System

Introduction

The Bamfield Water System was constructed between 1979 and 1980. Before the new water system the community used individual wells and local springs as well as using rain water collection. The Bamfield Water System is the most complex and largest water system within all the ACRD water systems. This complexity is partially due to the many different sized water lines crossing under the ocean in various locations. Marine water lines are also challenging to repair as they are under water and often under layers of sediment.

Description of System

The Bamfield Water System supplies water to the residences and businesses of East and West Bamfield including the Marine Station. Two small water lines cross Bamfield Inlet to service West Bamfield and Burlo Island. The system also services a First Nation Reserve and fish hatchery at the head of Grappler Inlet.

The water supply system is comprised of a water source and intake structure at the south east end of Sugsaw Lake, approximately four kilometers northeast of Bamfield. The intake structure is a floating walkway with the water main and intake screens suspended underneath (Photo 10 &11). The structure is anchored in many places to hold it in the correct position. The ACRD has a water licence from the Ministry of Environment for 91,250,000 gallons per year from Sugsaw Lake. The 2010 annual water use was 56,939 cubic meters.

The main transmission line follows Sugsaw Creek down hill from Sugsaw Lake to Grappler Bay Inlet. From the head of the Inlet the line runs along the ocean floor to Port Desire. At Port Desire there is a pump house and a chlorination building where the disinfected water flows to two reservoirs and into the distribution system. The distribution system continues to experiences significant leaks due to corrosion of water line fittings.

Photo 10. Bamfield Community Water System, Sugsaw Lake intake structure

Photo 11. Bamfield Community Water System, cleaning the intake screens

Water Quality

The Bamfield Water System has a permit from Vancouver Island Health Authority (VIHA) to operate the water system. The water contractor has the mandatory certification by the Environmental Operators Certificate Program (EOCP) required by the BC Drinking Water Protection Act.

Four water samples are taken into VIHA monthly for microbiological analysis. These are taken from: Bamfield Marine Station, Canadian Coast Guard post, Pump House on Grappler Road and the Residence of R. Ostrom (Figure 15).

Annually the water system is inspected by VIHA and the last occurred in 2010. A full tour of the water system was conducted with a final hazard rating of “Low”. A copy of the inspection is included in this report (Figure 14).

Water is tested daily for Free Chlorine and the residual is maintained at 0.2 mg/l. The last laboratory analysis of Bamfield’s raw water from Sugsaw Lake was taken in August 2007 (Table 5). All Aesthetic Criteria and Maximum Acceptable Concentrations were acceptable besides the Microbiological Analysis. The Microbiological Analysis showed a total coliform count of 8 Col./100 mL and E. coli of a count of 1 Col./100. These values are typical of a surface water source and demonstrate the need for disinfection. Monthly water consumption since 2006 does not show an increasing trend but does show regular significant water line leaks (Figure 13).

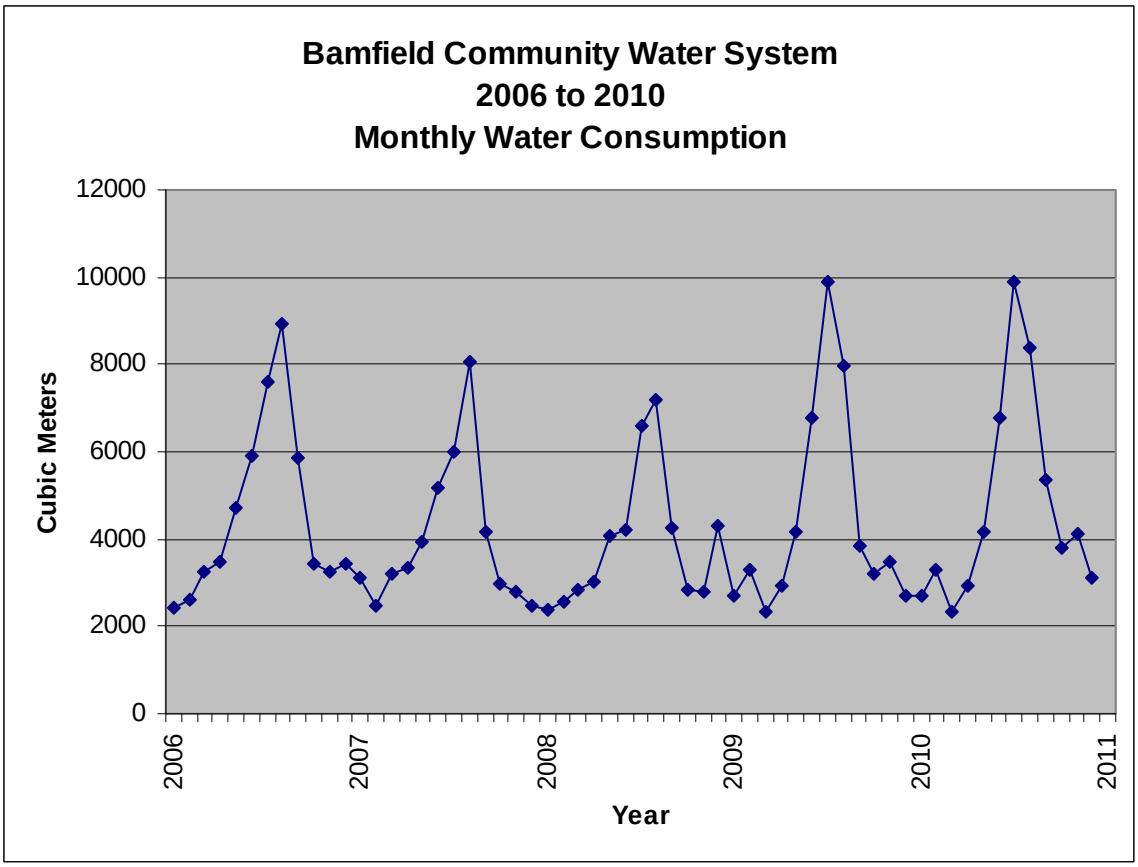


Figure 13. Bamfield Community Water System monthly water consumption

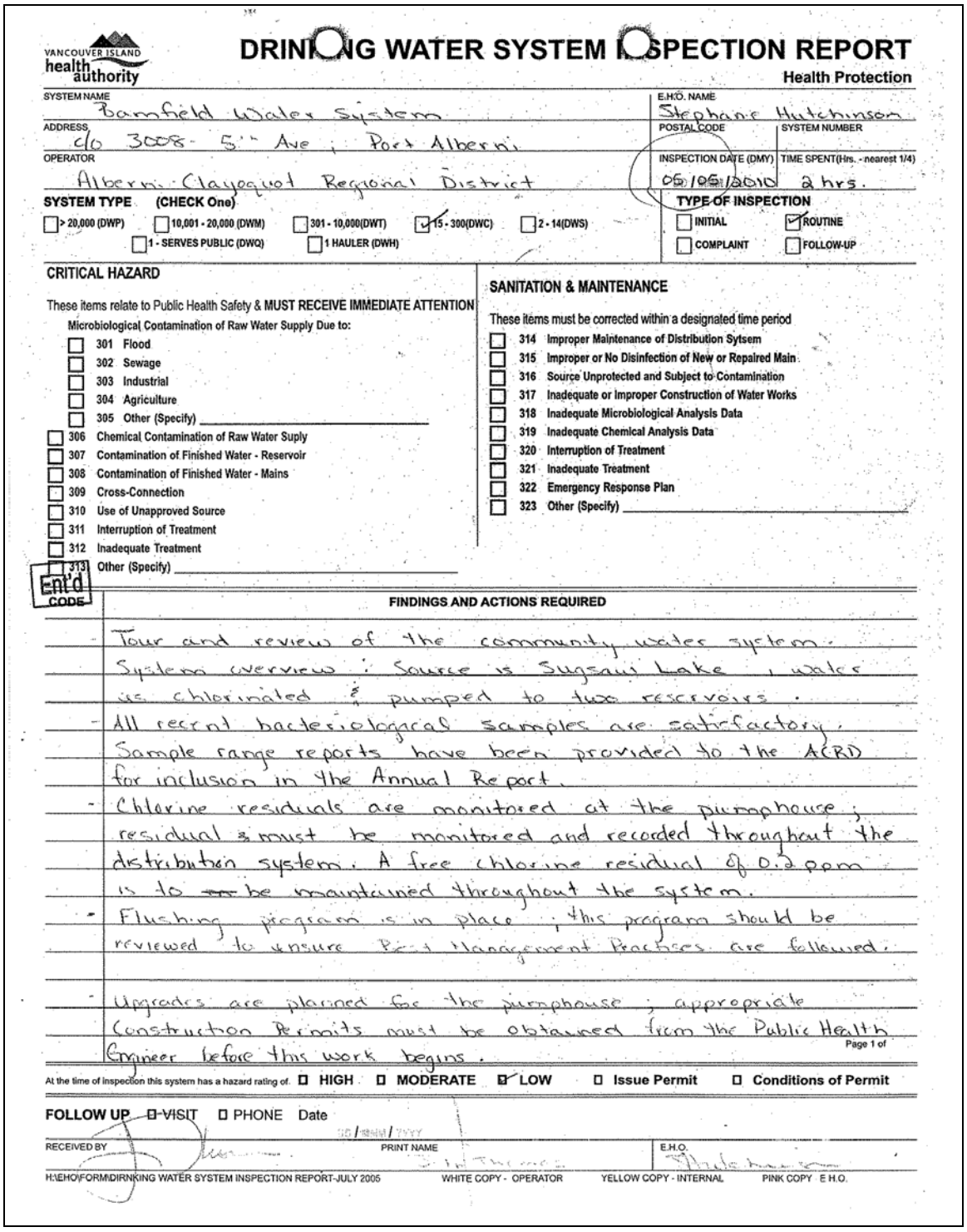
Future Improvements

The water line from Sugsaw Lake to the pump house is a located under Grappler Inlet. Having the water main under the ocean is problematic if repairs are required and for general maintenance. Another problem with this is that since the water main is gravity supplied there is a limited amount of water that can be pumped. An overland route concept has been reviewed that could pump water directly from Sugsaw Lake to the reservoirs. This would be able to supply more water to the community to facilitate growth of the community and supply adequate water for fire protection.

A new reservoir built on the West side of Bamfield would provide an adequate supply and pressure of water to the community. If in event of a water shortage, water could back feed the East side of Bamfield.

Client:	ACRD		Total Boron B	mg/L	< 0.05
Download Date:	8/31/2007		Total Cadmium Cd	mg/L	< 0.0002
Project Name:			Total Calcium Ca	mg/L	2.55
Project Number:	1576		Total Chromium Cr	mg/L	< 0.001
Chain of Custody:	2063149		Total Cobalt Co	mg/L	< 0.001
Samples received:	8/24/2007		Total Copper Cu	mg/L	< 0.001
			Total Iron Fe	mg/L	< 0.05
TABLE: Results of WATER Analyses			Total Lead Pb	mg/L	< 0.001
			Total Lithium Li	mg/L	< 0.005
Sample ID	Sugsaw Lake		Total Magnesium Mg	mg/L	0.45
CANTEST ID		7.08E+08	Total Manganese Mn	mg/L	0.003
Date Sampled	8/23/2007		Total Mercury Hg	ug/L	< 0.02
Parameter	Units		Total Molybdenum Mo	mg/L	< 0.0005
Conventional Parameters			Total Nickel Ni	mg/L	< 0.001
pH, Laboratory	pH units	6.95	Total Phosphorus P	mg/L	< 0.15
Conductivity	uS/cm	31	Total Potassium K	mg/L	0.2
True Color	CU	17	Total Selenium Se	mg/L	< 0.001
Turbidity	NTU	0.28	Total Silicon Si	mg/L	1
Hardness (Total) CaCO3	mg/L	8	Total Silver Ag	mg/L	< 0.00025
Total Dissolved Solids	mg/L	21	Total Sodium Na	mg/L	2.52
Total Alkalinity CaCO3	mg/L	9.6	Total Strontium Sr	mg/L	0.01
Dissolved Fluoride F	mg/L	< 0.05	Total Tellurium Te	mg/L	< 0.001
Dissolved Chloride Cl	mg/L	3.66	Total Thallium Tl	mg/L	< 0.0001
Nitrate and Nitrite N	mg/L	< 0.05	Total Thorium Th	mg/L	< 0.0005
Dissolved Nitrate N	mg/L	< 0.05	Total Tin Sn	mg/L	< 0.001
Nitrite N	mg/L	< 0.002	Total Titanium Ti	mg/L	< 0.001
Dissolved Sulphate SO4	mg/L	1.47	Total Uranium U	mg/L	< 0.0005
Tannin and Lignin	mg/L	1	Total Vanadium V	mg/L	< 0.001
Metals Analysis			Total Zinc Zn	mg/L	< 0.005
Total Aluminum Al	mg/L	0.068	Total Zirconium Zr	mg/L	< 0.01
Total Antimony Sb	mg/L	< 0.001	Microbiological Analysis		
Total Arsenic As	mg/L	< 0.001	Total Coliforms (Confirmed)	Col./100 mL	10
Total Barium Ba	mg/L	0.004	E. coli	Col./100 mL	1
Total Beryllium Be	mg/L	< 0.001	Heterotrophic Plate Count	Col./1 mL	8
Total Bismuth Bi	mg/L	< 0.001			

Table 5. Bamfield Community Water System 2007 Analytical Test



VANCOUVER ISLAND health authority

DRINKING WATER SYSTEM INSPECTION REPORT

Health Protection

SYSTEM NAME: Bamfield Water System
E.H.O. NAME: Stephanie Hutchinson
ADDRESS: c/o 3008 - 5th Ave ; Port Alberni
POSTAL CODE:
SYSTEM NUMBER:
OPERATOR: Alberni-Clayoquot Regional District
INSPECTION DATE (DMY): 05/05/2010
TIME SPENT(Hrs. - nearest 1/4): 2 hrs.

SYSTEM TYPE (CHECK One)

- ☐ > 20,000 (DWP)
- ☐ 10,001 - 20,000 (DWM)
- ☐ 301 - 10,000(DWT)
- ☑ 15 - 300(DWC)
- ☐ 2 - 14(DWS)
- ☐ 1 - SERVES PUBLIC (DWQ)
- ☐ 1 HAULER (DWH)

TYPE OF INSPECTION

- ☐ INITIAL
- ☑ ROUTINE
- ☐ COMPLAINT
- ☐ FOLLOW-UP

CRITICAL HAZARD

These items relate to Public Health Safety & MUST RECEIVE IMMEDIATE ATTENTION

Microbiological Contamination of Raw Water Supply Due to:

- ☐ 301 Flood
- ☐ 302 Sewage
- ☐ 303 Industrial
- ☐ 304 Agriculture
- ☐ 305 Other (Specify) _____
- ☐ 306 Chemical Contamination of Raw Water Suply
- ☐ 307 Contamination of Finished Water - Reservoir
- ☐ 308 Contamination of Finished Water - Mains
- ☐ 309 Cross-Connection
- ☐ 310 Use of Unapproved Source
- ☐ 311 Interruption of Treatment
- ☐ 312 Inadequate Treatment
- ☐ 313 Other (Specify) _____

SANITATION & MAINTENANCE

These items must be corrected within a designated time period

- ☐ 314 Improper Maintenance of Distribution Sytsem
- ☐ 315 Improper or No Disinfection of New or Repaired Main
- ☐ 316 Source Unprotected and Subject to Contamination
- ☐ 317 Inadequate or Improper Construction of Water Works
- ☐ 318 Inadequate Microbiological Analysis Data
- ☐ 319 Inadequate Chemical Analysis Data
- ☐ 320 Interruption of Treatment
- ☐ 321 Inadequate Treatment
- ☐ 322 Emergency Response Plan
- ☐ 323 Other (Specify) _____

Enf'd

CODE	FINDINGS AND ACTIONS REQUIRED
	Tour and review of the community water system. System overview: Source is Sugsaw Lake, water is chlorinated & pumped to two reservoirs.
	- All recent bacteriological samples are satisfactory. Sample range reports have been provided to the ACRD for inclusion in the Annual Report.
	- Chlorine residuals are monitored at the pumphouse; residual must be monitored and recorded throughout the distribution system. A free chlorine residual of 0.2 ppm is to ~~be~~ be maintained throughout the system.
	- Flushing program is in place; this program should be reviewed to ensure Best Management Practices are followed.
	- Upgrades are planned for the pumphouse; appropriate Construction Permits must be obtained from the Public Health Engineer before this work begins.

Page 1 of

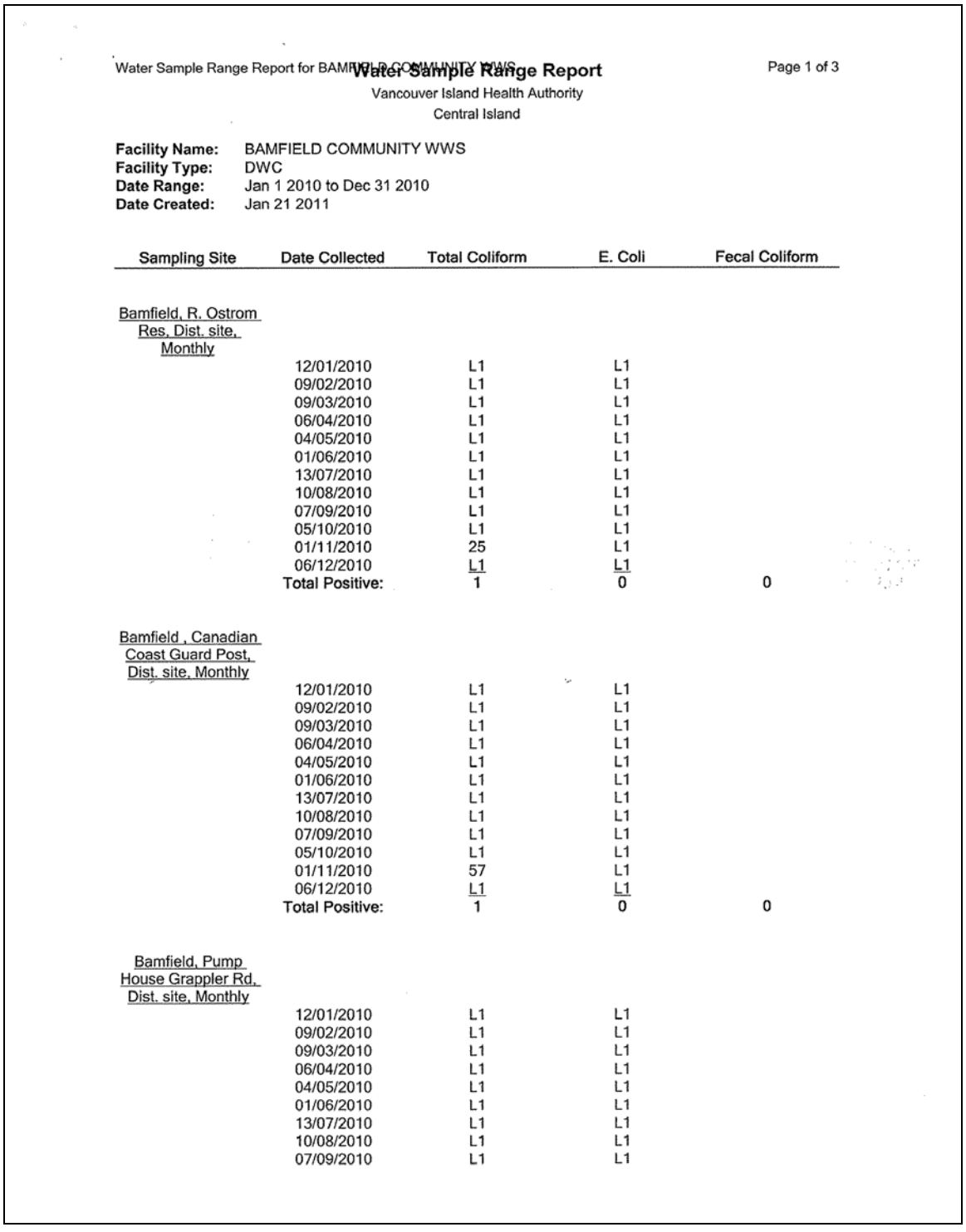
At the time of inspection this system has a hazard rating of: ☐ HIGH ☐ MODERATE ☑ LOW ☐ Issue Permit ☐ Conditions of Permit

FOLLOW UP ☐ VISIT ☐ PHONE Date

RECEIVED BY _____ PRINT NAME _____ E.H.O. _____

H:\EHO\FORM\DIRNKING WATER SYSTEM INSPECTION REPORT-JULY 2005 WHITE COPY - OPERATOR YELLOW COPY - INTERNAL PINK COPY E.H.O.

Figure 14. Bamfield Community Water System 2010 VIHA Inspection Report



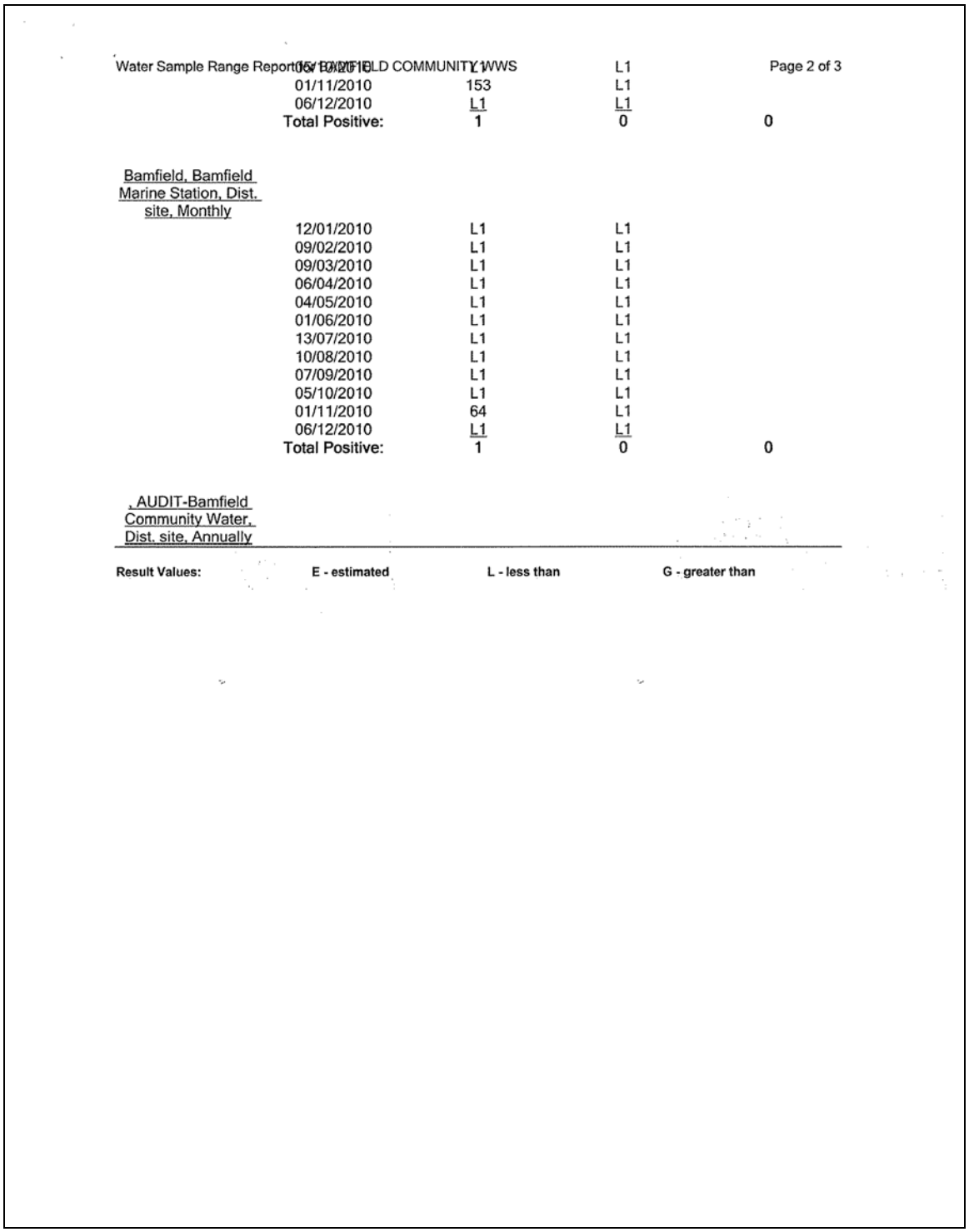
Water Sample Range Report for BAMFIELD COMMUNITY WWS — Page 1 of 3

Water Sample Range Report
Vancouver Island Health Authority
Central Island

Facility Name: BAMFIELD COMMUNITY WWS
Facility Type: DWC
Date Range: Jan 1 2010 to Dec 31 2010
Date Created: Jan 21 2011

Sampling Site	Date Collected	Total Coliform	E. Coli	Fecal Coliform
Bamfield, R. Ostrom Res, Dist. site, Monthly				
	12/01/2010	L1	L1	
	09/02/2010	L1	L1	
	09/03/2010	L1	L1	
	06/04/2010	L1	L1	
	04/05/2010	L1	L1	
	01/06/2010	L1	L1	
	13/07/2010	L1	L1	
	10/08/2010	L1	L1	
	07/09/2010	L1	L1	
	05/10/2010	L1	L1	
	01/11/2010	25	L1	
	06/12/2010	L1	L1	
	Total Positive:	1	0	0
Bamfield , Canadian Coast Guard Post, Dist. site, Monthly				
	12/01/2010	L1	L1	
	09/02/2010	L1	L1	
	09/03/2010	L1	L1	
	06/04/2010	L1	L1	
	04/05/2010	L1	L1	
	01/06/2010	L1	L1	
	13/07/2010	L1	L1	
	10/08/2010	L1	L1	
	07/09/2010	L1	L1	
	05/10/2010	L1	L1	
	01/11/2010	57	L1	
	06/12/2010	L1	L1	
	Total Positive:	1	0	0
Bamfield, Pump House Grappler Rd, Dist. site, Monthly				
	12/01/2010	L1	L1	
	09/02/2010	L1	L1	
	09/03/2010	L1	L1	
	06/04/2010	L1	L1	
	04/05/2010	L1	L1	
	01/06/2010	L1	L1	
	13/07/2010	L1	L1	
	10/08/2010	L1	L1	
	07/09/2010	L1	L1	

Figure 15. Bamfield Community Water System 2010 Water Sample Range Report



Water Sample Range Report for BAMFIELD COMMUNITY WWS — Page 2 of 3

06/12/2010	L1	L1	
01/11/2010	153	L1	
06/12/2010	L1	L1	
Total Positive:	**1**	**0**	**0**

Bamfield, Bamfield Marine Station, Dist. site, Monthly

12/01/2010	L1	L1	
09/02/2010	L1	L1	
09/03/2010	L1	L1	
06/04/2010	L1	L1	
04/05/2010	L1	L1	
01/06/2010	L1	L1	
13/07/2010	L1	L1	
10/08/2010	L1	L1	
07/09/2010	L1	L1	
05/10/2010	L1	L1	
01/11/2010	64	L1	
06/12/2010	L1	L1	
Total Positive:	**1**	**0**	**0**

, AUDIT-Bamfield Community Water, Dist. site, Annually

Result Values: E - estimated L - less than G - greater than

Figure 15. (continued)

Water Sample Range Report for BAMFIELD COMMUNITY WWS Page 3 of 3

Samples that contain total coliform:	4	8.33% of total
Samples that contain e. coli:	0	0.00% of total
Samples that contain fecal coliform:	0	0.00% of total
Number of positive samples in last 30 days:	0/4	
Total number of samples:	48	

Comments:

Environmental Health Officer
Jan 21 2011

FOR FURTHER INFORMATION PLEASE CALL: Hutchinson, Stephanie (250) 731-1315 Port Alberni

Operator

Alberni-Clayoquot Regional District
3008 Fifth Avenue
Port Alberni, BC
V9Y 2E3

(250) 720-2705

Figure 15. (continued)