ALBERNI CLAYOQUOT REGIONAL DISTRICT

REGIONAL WATER SYSTEMS 2006 ANNUAL REPORT

BAMFIELD
MILLSTREAM
TOFINO UCLUELET AIRPORT

PREPARED BY
ENVIRONMENTAL SERVICES DEPARTMENT

BAMFIELD COMMUNITY WATER SYSTEM
2006 ANNUAL REPORT

Summary

The most significant event was the power outage on December 11 that lasted for 10 days. This was due to a 50 year storm event that affected the entire coastal area with many fallen trees. During this storm event a break occurred in a water line in a remote area and without any power the water reservoirs drained. The Volunteer Fire Department's fire truck was used to pump water into the reservoir until a temporary generator was brought in by BC Hydro. A boil water advisory was implemented December 12 due to the short period that unchlorinated water was pumped into the reservoir.

There has been many water leaks and repairs to the water system for this last year. One of the two chlorine contact chambers had failed and water restrictions were put in place. A bullet hole in the main water line in Grappler Inlet had to be repaired. Dissimilar metals are also causing a significant number of leaks and more expected in coming years.

Introduction

The Bamfield Water System was constructed between 1979 and 1980. The supply system is comprised of a water source and intake structure at Sugsaw Lake, an underwater transmission line to the chlorination and pump house at Port Desire, two storage reservoirs and a distribution system within the specified area. Refer to map.

Water Mandate

Ensure that the businesses and residents have sufficient, safe potable water to drink. Maintain and inspect all the water works facilities and equipment such as: water intake, pump stations, reservoirs, chemical pumps, valves and hydrants, repair water main breaks and services, respond to any water quality/quantity complaints. Co-ordinate and conduct utility locates, maintain comprehensive records as required by all applicable legislation, check all systems 365 days a year, take quarterly water meter readings

Water Quality

The Bamfield Water System has a permit from Vancouver Island Health Authority (VIHA) to operate a water system.

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

Last analysis of water for Potability taken in March 2004 and tested by CANTEST labs in Burnaby, BC. All Aesthetic Criteria and Maximum Acceptable Concentrations were acceptable except for High Colour. The Aesthetic Objective for Colour is 15 CU and the lab result was 35 CU.

During 2007 the water will be tested for the disinfection byproducts caused by the use of chlorine. The disinfection byproducts of chlorine (Trihalomethanes, THM's) are known as a cause of cancer.

Four water samples are taken into VIHA monthly for microbiological analysis. These are taken from: Bamfield Marine Station, Canadian Coast Guard Post, Pump House Grappler Rd. and the Residence of R. Ostrom.

Annually the water system is inspected by VIHA and the last occurred in March of 2006. The only action asked for were enhanced security to restrict access to the reservoirs and to finish interior walls of the chlorination building. A copy of the inspection is included in this report.

Water is tested daily for Free Chlorine and the residual is maintained at 0.2 mg/l.

Description of System

The Bamfield Water System supplies water to the residences and business' of East Bamfield including the Marine Station. Two small water lines cross Bamfield Inlet to service West Bamfield and Burlo Island. It 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 Sugsaw Lake (approximately four kilometers northeast of Bamfield). A transmission line follows a creek down hill to Grappler Bay Inlet where it runs on the ocean floor to Port Desire. At Port Desire there is a pumphouse and a chlorination building where the disinfected water flows to two reservoirs and into the distribution system.

Infrastructure

Water License #55723 from the Ministry of Environment, Lands and Parks for 414,831 cubic meters (91,250,000 gallons) from Sugsaw Lake. Issued in 1981

205 water meters

9 Hydrants

2 Steel Reservoirs

Consumption

54,764 cubic meters of water was consumed in 2006 (14,467,000 gallons)

Winter average water use 110 cubic meters per day (29,000 gallons)

Summer average use up to 303 cubic meters per day (80,000 gallons)

The water systems average winter flows are 110 cubic meters per day. Based on 303 permanent winter residences (2006 Statistics Canada) the water use per person is 360 liters (0.36 cubic meters) per person. The basic household use is well established at about 230 liters per capita per day (Land and Water BC Inc.). The increase in daily use compared to the established consumption rates could represent leaks in the water system.

The design guidelines state that basic in-house use for three months is 21 cubic meters (Land and Water BC Inc.). During the off season months (October, November, December) 39 % of the house holds used less then 10 cubic meters. Based on this lack of consumption these 73 households are considered vacation properties.

Liquid Chlorine used 2,400 liters (120 pails)

Events

All Fire Hydrants serviced by Pacific Fire Hydrant Inspection Service in September.

The Volunteer Fire Department flushed hydrants as part of their exercises. The Fire Department exercises and the annual maintenance of the fire hydrants flush the water mains to help keep them clean and fresh.

The pumps are serviced every three months and the operator carries out regular servicing.

Four water samples taken to VIHA for monthly microbiological analyses, No parameters in excess of the limits in the Safe Water Drinking act were detected.

One of the two chlorine contact chambers had failed and water restriction were put in place January 23 to the 25. The failure was a leak that had grown over time causing substantial erosion of the contact chamber requiring repairs. There were nine known water line breaks that required repairs. The main reason for these leaks is due to dissimilar metals creating a small electrical charge resulting in the weaker metal incurring substantial corrosion.

On December 11 during a storm event a 2-inch water main was broken on the West Side of Bamfield. The water line is in an isolated area so the leak went unnoticed for a long period of time. The result of the leak caused the reservoirs to drain leaving residents without any water. Due to a record amount of trees taking down power lines, Bamfield was out of power for over 10 days. The Bamfield Volunteer Fire Department used their fire truck to pump water into the reservoirs and a small generator was used to power the chlorinators. During the time it had taken to turn on the chlorinators approximately 120 cubic meters of un-chlorinated water entered the system. A Boil Water advisory was put in place until the system was flushed, super chlorinated and tested for microbiological contamination by VIHA.

Repair of the water main in the intertidal in Grappler Inlet was caused by a bullet piercing the line. The majority of the line breaks were caused by dissimilar metals and freezing.

On going Concerns

In order to find any substantial leak there is up to 2 days required reading meters to find unusual flows. Any potential leaks in the water mains under Grappler Inlet from Sugsaw Lake are difficult to determine without the use of qualified industrial divers.

The Bamfield system is suffering from an ongoing issue of dissimilar metals. This causes many water system joints to have significant corrosion causing leaks.

The Bamfield Marine Station uses the systems water for their research 24 hours day 7 days a week during the summer. This creates an increase demand during the peak water use of the year.

The system is available to First Nations in the area when their water system experiences failures. Historically a truck is used to remove water from the Bamfield system and transported to the First Nation's reservoir.

Goals

During 2007 an infrastructure study of the complete water system will be implemented. The study will be performed by ACRD staff to address the location of the infrastructure. The locations of pipelines, fire hydrants, water meters and valves will be record using GPS technology. This digital information will be incorporated into a water system map to assist with daily operations and future upgrades.

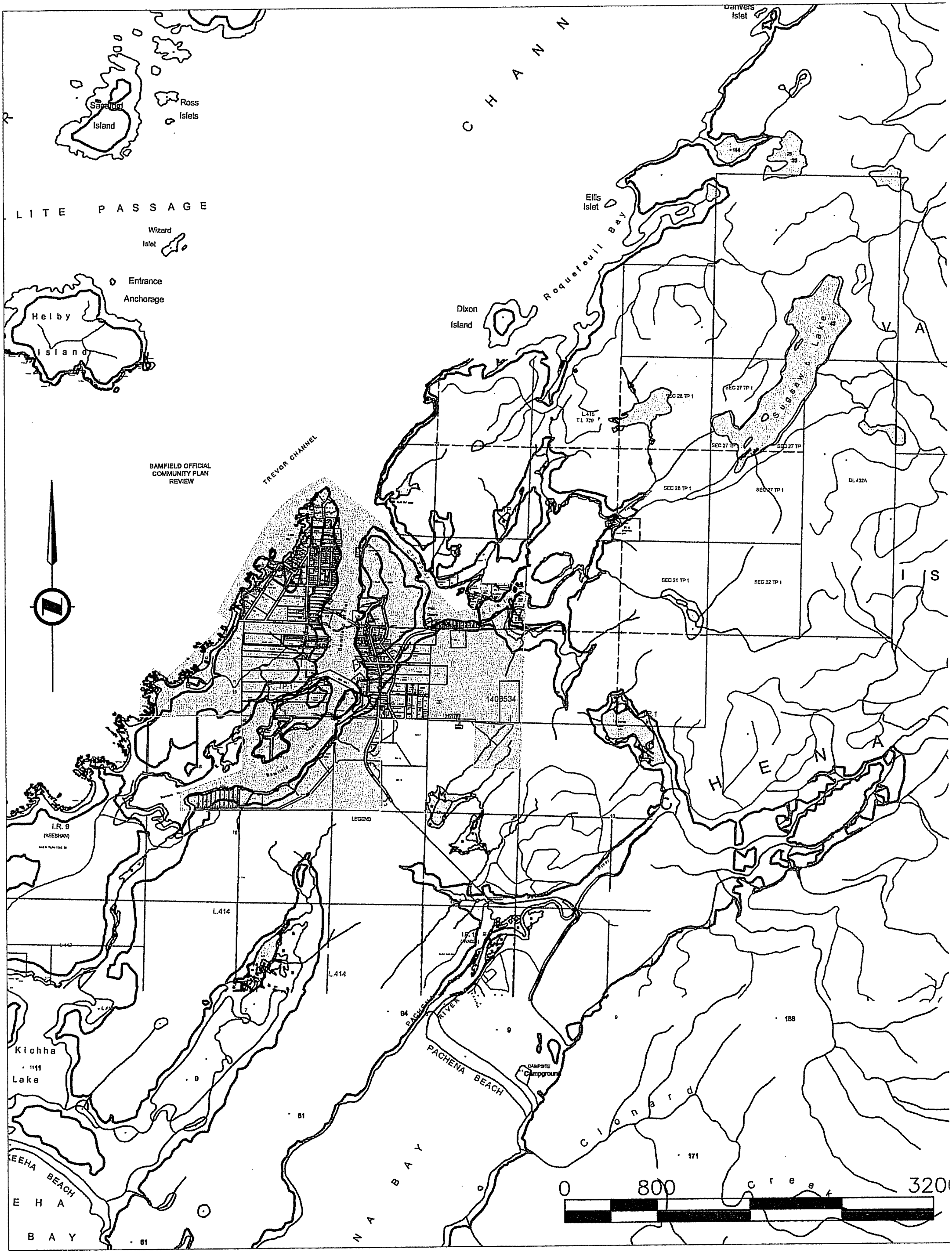
Replace the existing water main from Sugsaw Lake to a land based main. Upgrade the system by replacing portions of the water systems smaller mains with larger diameter pipe to have adequate supply and fire protection for the residences.

Install a water meter in East Bamfield for the water main servicing West Bamfield. Having this meter installed will be a valuable tool in determining suspected water leaks on the west side. This could save valuable time in determining the location of a substantial leak and mitigating water loss.

All the water meters will have ID tags attached to them for easier monitoring and control. At present the water meters serial numbers are being used and cross-referenced with the Folio Number for billing purposes. The ID tags will assist any professional interest that may not be familiar with the locations (Street Address) in Bamfield.

All fire hydrants will be serviced by a fire hydrant inspection service in 2007.

The source water of the system will have a complete Potability test performed in 2007. The last one occurred in 2004 and under recommendation from VIHA the testing should occur every 3 years.



Danvers Islet
Ross Islets
Island
LITE PASSAGE
Wizard Islet
Entrance Anchorage
Helby Island
CHANN
Ellis Islet
Roquefeuil Bay
Dixon Island
Sugsaw Lake
SEC 28 TP 1
SEC 27 TP 1
L.415
SEC 27 TP
DL432A
SEC 21 TP 1
SEC 22 TP 1
TREVOR CHANNEL
BAMFIELD OFFICIAL COMMUNITY PLAN REVIEW
1408534
LEGEND
I.R. 9 (KEESHAN)
L.414
Kichha Lake
PACHENA RIVER
PACHENA BEACH
CAMPSITE
Campground
Clonard creek
188
171
94
61
0
800
3200

BAMFIELD WATER SYSTEM

IMPORTANT NOTICE

TO BAMFIELD RESIDENTS

Because of the system's inability to adequately disinfect water at this time and for your safety, it is recommended that you boil your drinking water prior to consumption. Water should be subject to a rolling boil for at least 3 minutes prior to cooling and consumption.

BOIL WATER ADVISORY

IS EFFECTIVE Dec 12. 06 **UNTIL FURTHER NOTICE**

ENQUIRIES? D. Hadfield , Regional District Alberni Clayquot (250) 720-2714
Richard Zoet, System Operator (250) 728-1237

PLEASE SPREAD THE WORD TO YOUR NEIGHBOURS

POSTED March 10/06 BS

VANCOUVER ISLAND health authority

DRINKING WATER SYSTEM INSPECTION REPORT

Health Protection

SYSTEM NAME: BAMFIELD COMMUNITY WS | E.H.O. NAME: BILL WRATHALL

ADDRESS: C/O 3008 - 5TH AVE. PT. ALBERNI | POSTAL CODE | SYSTEM NUMBER

OPERATOR: ALBERNI - CLAYOQUOT REG. DISTRICT (BOB HARPER) | INSPECTION DATE (DMY): 28/03/2006 | TIME SPENT(Hrs. - nearest 1/4): 1.0

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)

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
	WATER SYSTEM INSPECTED BY RICHARD HICKS, EHO WITH RICHARD ZOET, WATER SYSTEM OPERATOR.
	BACTERIOLOGICAL SAMPLES SUBMITTED MONTHLY WITH SATISFACTORY RESULTS. CHEMICAL ANALYSIS SUBMITTED MAR. 2004 EOCP CERTIFICATION HELD BY OPERATOR. ERP COMPLETED. CHLORINE RESIDUALS MAINTAINED AND DAILY READINGS ARE RECORDED.
	ACTION
323	(1) ENHANCE SECURITY MEASURES AT STORAGE TANK TO PREVENT ACCESS TO TOP OF TANK.
323	(2) REFINISH WALLS IN PUMPHOUSE TO ENCLOSE INSULATION MATERIAL.

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. B. D. Wrathall

Analysis Report

CANTEST®

CANTEST LTD.

Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

Fax: 604 731 2386

Tel: 604 734 7276

1 800 665 8566

RECEIVED
APR 27 2004

REPORT ON: Analysis of Water Sample

REPORTED TO: Vancouver Island Health Authority
4227 6th Avenue
Port Alberni, BC
V9Y 4N1

Att'n: Mr. Bill Wrathall

cc: Central Vancouver Island Health Region 1665 Grant Avenue Nanaimo BC V9S 5K7 Att'n: Mr. Dave Coombe

CHAIN OF CUSTODY: 139567
PROJECT NAME: Survellience

NUMBER OF SAMPLES: 1

REPORT DATE: March 14, 2004

DATE SUBMITTED: March 5, 2004

GROUP NUMBER: 50305024

SAMPLE TYPE: Water

NOTE: Results contained in this report refer only to the testing of samples submitted.

Aesthetic Objective Summary:

Aesthetic Objectives as set by "Guidelines for Canadian Drinking Water Quality, 6th Edition, 1996, including updates to April 1999. Aesthetic objectives apply to certain substances or characteristics of drinking water that can affect its acceptance by consumers or interfere with practices for supplying good quality water. For certain parameters, both aesthetic objectives and health-related guidelines have been derived. Where only aesthetic objectives are specified, these values are below those considered to constitute a health hazard

CLIENT SAMPLE ID	STATUS
Bamfield WS	Unacceptable

Max. Acceptable Concentration Summary:

Maximum Acceptable Concentrations (MAC) are put forth in the "Guidelines for Canadian Drinking Water Quality,(GCDWQ) 6th Edition, 1996", including updates to April 1999. For the parameters tested, results are generally categorized by health concerns. Some parameters have no limit value denoted because: a) currently available data indicates no health risk, b) the compound is not permitted in Canada or is unlikely to occur in drinking water at levels of concern, or c) it refers to a family of compounds (see guideline).

CLIENT SAMPLE ID	HEALTH	HARDNESS
Bamfield WS	Acceptable	Soft

TEST METHODS:

(Continued)

CANTEST LTD.

Richard S. Jornitz
Supervisor, Inorganic Testing

Anions in Water by Ion Chromatography - was determined based on Method 4110 in Standard Methods (20th Edition) and EPA Method 300.0 (Revision 2.1).

Alkalinity in Water - was performed based on Method 2320 in Standard Methods (20th Edition).

Alkalinity in Water - was performed based on Method 2320 in Standard Methods (20th Edition).

Colour (True) in Water - was determined based on Method 2120 in Standard Methods (20th Edition) and Method X321 in the BC Laboratory Manual (1994 Edition).

Conductivity in Water - was performed based on Method 2510 in Standard Methods and Method X322 in the BC Laboratory Manual (1994 Edition).

Nitrite in Water - was determined based on Method 4500-NO3 B in Standard Methods (20th Edition) and Method X327 in the BC Laboratory Manual (1994 Edition).

pH in Water - was determined based on Method 4500-H in Standard Methods (20th Edition) and Method X330 in the BC Laboratory Manual (1994 Edition).

Total Dissolved Solids in Water - was determined based on Method 2540 C in Standard Methods (20th Edition).

Turbidity in Water - was performed based on Method 2130 in Standard Methods (20th Edition) and Method X164 in the BC Laboratory Manual (1994 Edition).

Conventional Parameters - analyses were performed using procedures based on those described in "British Columbia Environmental Laboratory Manual For the Analysis of Water, Wastewater, Sediment and Biological Materials" (1994 Edition), Province of British Columbia and "Standard Methods for the Examination of Water and Wastewater" 20th Edition, (1998), published by the American Public Health Association.

Mercury in Water - analysis was performed using procedures based on U. S. EPA Method 1631, oxidative digestion using bromination, and analysis using Cold Vapour Atomic Fluorescence Spectroscopy.

Metals in Water - analysis was performed using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP), Inductively Coupled Plasma-Mass Spectroscopy (ICP/MS).

TEST RESULTS:

(See following pages)

REPORTED TO: Vancouver Island Health Authority

REPORT DATE: March 14, 2004

GROUP NUMBER: 50305024

CANTEST®

Potability (Aesthetic Criteria) in Water

CLIENT SAMPLE IDENTIFICATION:		Bamfield WS		
DATE SAMPLED:		Mar 3/04	Aesthetic Objective	UNITS
CANTEST ID:		403050084		
Conventional Parameters				
pH, Laboratory		6.66	6.5 - 8.5	pH units
True Color		**35 X**	15	CU
Turbidity		0.23	5	NTU
Total Dissolved Solids		41	500	mg/L
Total Alkalinity	CaCO3	6.9	-	mg/L
Bicarbonate Alkalinity	HCO3	8.5	-	mg/L
Carbonate Alkalinity	CO3	< 0.5	-	mg/L
Hydroxide Alkalinity	OH	< 0.5	-	mg/L
Dissolved Chloride	Cl	4.0	250	mg/L
Dissolved Sulphate	SO4	1.5	500	mg/L
Total Metals Analysis				
Copper	Cu	< 0.001	1.0	mg/L
Iron	Fe	0.10	0.3	mg/L
Manganese	Mn	0.003	0.05	mg/L
Zinc	Zn	< 0.005	5	mg/L
Dissolved Metals Analysis				
Iron	Fe	< 0.05	0.3	mg/L
Manganese	Mn	0.001	0.05	mg/L
Sodium	Na	3.13	200	mg/L

CU = color units
NTU = nephelometric turbidity units
mg/L = milligrams per liter
< = Less than detection limit
X = Result is outside the Aesthetic Objective

REPORTED TO: Vancouver Island Health Authority

REPORT DATE: March 14, 2004

GROUP NUMBER: 50305024

CANTEST®

Potability (Health Criteria at Point of Use) in Water

CLIENT SAMPLE IDENTIFICATION:		Bamfield WS		
DATE SAMPLED:		Mar 3/04	Max. Acceptable Concentration	UNITS
CANTEST ID:		403050084		
Conventional Parameters				
Conductivity		26	-	µS/cm
Hardness	CaCO3	11	-	mg/L
Dissolved Fluoride	F	0.12	1.5	mg/L
Nitrate and Nitrite	N	< 0.05	10	mg/L
Dissolved Nitrate	N	< 0.05	10.0	mg/L
Nitrite	N	< 0.002	1.0	mg/L
Dissolved Sulphate	SO4	1.5	-	mg/L
Total Metals Analysis				
Aluminum	Al	0.17	-	mg/L
Antimony	Sb	< 0.001	0.006	mg/L
Arsenic	As	< 0.001	0.025	mg/L
Barium	Ba	0.004	1.0	mg/L
Boron	B	< 0.05	5	mg/L
Cadmium	Cd	< 0.0002	0.005	mg/L
Chromium	Cr	< 0.001	0.05	mg/L
Lead	Pb	< 0.001	0.01	mg/L
Magnesium	Mg	0.66	-	mg/L
Mercury	Hg	< 0.02	1	µg/L
Selenium	Se	< 0.001	0.01	mg/L
Uranium	U	< 0.0005	0.02	mg/L
Dissolved Metals Analysis				
Calcium	Ca	3.38	-	mg/L
Magnesium	Mg	0.61	-	mg/L
Potassium	K	0.2	-	mg/L
Silicon	SiO2	3.9	-	mg/L

µS/cm = microsiemens per centimeter
µg/L = micrograms per liter
< = Less than detection limit
mg/L = milligrams per liter

MILLSTREAM COMMUNITY WATER SYSTEM
2006 ANNUAL REPORT

Summary

The unusually dry summer and fall caused the water table to drop in the Millstream Aquifer. The Village of Ucluelet experienced the same situation with the aquifer at the highway junction. When the wells levels dropped the pumps would not operate until the system operator reset the pumps manually and waited until the wells were recharged. To compound the problem of keeping the reservoirs full was the occurrence of leaks in the aging water system. Water restrictions were put in place in October and November requesting people to reduce their consumption.

The water quality in the system is good and is tested regularly by the onsite contractor. Vancouver Island Health Authority performs monthly microbiological tests and annual facility inspections.

Introduction

Millstream is a small residential community located approximately 3.5 km north of the Village of Ucluelet. The area was originally developed by a logging contractor to provide accommodation for employees and their families. The existing 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.

Water Mandate

Ensure that the residents have sufficient, safe potable water to drink. Maintain and inspect all the water works facilities and equipment such as: water intake, pump stations, reservoirs, chemical pumps, valves and hydrants, repair water main breaks and services, respond to any water quality/quantity complaints. Co-ordinate and conduct utility locates, maintain comprehensive records as required by all applicable legislation, check all systems 365 days a year.

Water Quality

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

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

December 2006 the water was tested for the disinfection byproducts caused by the use of chlorine. The disinfection byproducts of chlorine (Trihalomethanes, THM's) are known

as a cause of cancer. The values of Trihalomethanes were below the guidelines. The criteria and concentrations are set by the Guidelines for Canadian Drinking Water Quality

The last analysis of water for potability was taken in March 2004. All Aesthetic Criteria and Maximum Acceptable Concentrations were acceptable with the one exception that hardness was deemed moderate.

Two water samples are taken into VIHA monthly for microbiological analysis.

Annually the water system is inspected by VIHA and the last occurred in June of 2006. A copy of the inspection is included in this report

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

Description of System

There are two shallow dug wells lined with 5-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 the higher area along the Ucluelet-Tofino highway. Typically Well #2 flows through a screen to Well #1. Well #1 is 3.7 meters deep and is the primary well. Well #2 is 3 meters deep and is used occasionally only to exercise the dedicated pump. The centrifugal pumps are located in the pump house and are controlled by the instrumentation (float switches) from the reservoir. The liquid chlorine is injected into the water line before it leaves the pump house. As the chlorinated water leaves the pump house it enters a chlorine contact chamber (400 mm (16 inch) diameter 26-meter long pipeline) to enable the chlorine to have a retention time to facilitate disinfection. The disinfected water fills the reservoir to be used in the water distribution system.

The system has forty-nine connections and serves a population of approximately 150 people.

There is a system operator and an alternate who is responsible for the daily operation of the water system. There is a daily log of flows and water usage and significant events.

Infrastructure

The steel reservoir (18 feet in diameter and 72 feet high) holds 546 cubic meters (144,300 usg.) of disinfected water This storage capacity exceeds the "Water Supply for Public Fire Protection- A guide to Recommended Practice" of 114 cubic meters.

There is 1 Fire hydrant located near the end of the system.

The pump house contains 2 centrifugal pumps, 2 positive displacement chlorine pumps, water meter, valves and an electrical control panel.

The chlorine contact chamber is a 26-meter PVC 400mm pipe.

The water mains consist of 100mm and 150 mm diameter asbestos cement pipes.

Consumption

The total annual water consumed was 16,903 cubic meters.

The water systems average winter flows are 32 cubic meters per day. Based on 150 permanent residences the water use per person is 0.21 cubic meters (210 liters) per person. The basic household use is well established at about 230 liters per capita per day (Land and Water BC Inc.). With the population of Millstream and the established rate at 230 liters we would expect a daily consumption of 34.5 cubic meters.

The water systems average summer flows are 55 cubic meters per day. Based on 150 permanent residences the water use per person is 0.37 cubic meters (370 liters) per person. The summer water consumption is not only from the permanent residences use but also due to the number of bed and breakfast businesses and irrigation of gardens.

With the reservoir at full capacity (which is the normal state) there is 546 cubic meters of stored disinfected water. If there is a breakdown in the pumping system during the summer months we could expect almost ten days supply of water (with decreasing pressure) to be available.

The household consumption is estimated because there is only one water meter in the whole system. Some households would be using more or less then others due to swimming pools, gardening, conservation and the increase in household density because of lack of housing for workers.

Approximately 240 liters of Advance 12 chlorine used for the disinfection of the supplied water.

Work Initiatives and Events

On December 12 the Hydro connection (mast head) at the pump house burnt off. There wasn't any power available for the pumps for most of that day. There was enough water in the reservoir to provide enough pressure and flow during this event. As a precaution on December 15 a Level 1 water restrictions sign was put up at the entrance to Millstream. BC Hydro fixed the problem and installed a new electrical meter at the same time.

There were 12 power outages over the year with longest outage lasting 30 hours starting on November 15. The whole west coast experienced a severe winter storm the week of November 14 that shut down power to sections of the west coast.

In the beginning of October a large leak occurred in the A.C. water main causing the reservoir level to drop. The pumps ran until the well levels dropped and only could be used when the wells recharged. This event showed the limiting factors of the water

system to be the aquifer being unable to keep up to demand and the aging infrastructure. Average daily flows were 100 cubic meters during this event. This was a significant leak that can be seen on the Monthly Consumption Graph. A Level 1 water restrictions sign was put up at the entrance to Millstream at that time.

There were 2 leaks in copper lines due to corrosion and were found by water coming to the surface.

During the extreme dry months of July and August the wells experienced many low-level alarms and would not pump causing the reservoir levels to drop.

On going concerns

Overflow of reservoir due to float switch's sticking and /or communication system not working properly. Many times the system operator preformed maintenance on the floats switches and eventually replaced the switches. The overflow problem still occurs intermittently and "Telus" was involved to see if this problem might be due to their communication system between the reservoir and the pumphouse. This problem is still intermittent and will be monitored this next year.

Power outages that effectively stop the reservoir from filling during a leak or drought event. This has occurred 12 times and hasn't caused any significant problems except the electrical control system has to be manually reset.

Potential water quality issues due to the industrial property on the highway across from Millstream. The industrial property sits on part of the infiltration zone for the Millstream aquafer. The water quality concerns are fuel spills, chemical leakage and sewage disposal.

There could be water supply issues if the area continues to experience drought like conditions. Water restrictions may have to be implemented and policed on a regular basis. Individual household water metering may have to be used to monitor usage and determine billing rates.

The age and life span of the A.C. piping and the water systems infrastructure requires upgrading. Cracks and breaks in the asbestos cement pipe and corrosion of the copper are creating leaks. The water system may experience difficulties in providing consistent supply of water if there are significant leaks occurring such as the one in October.

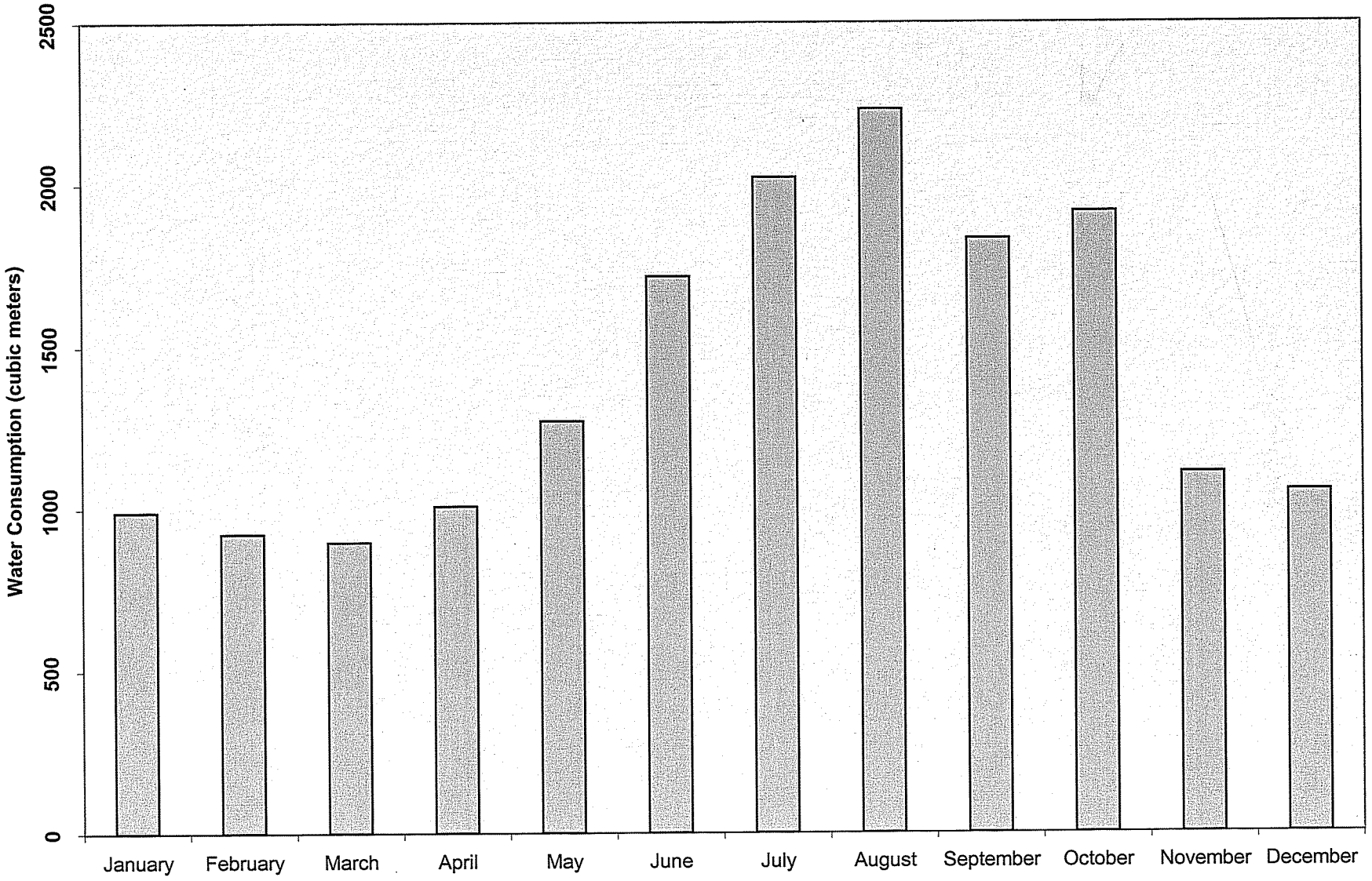
Goals

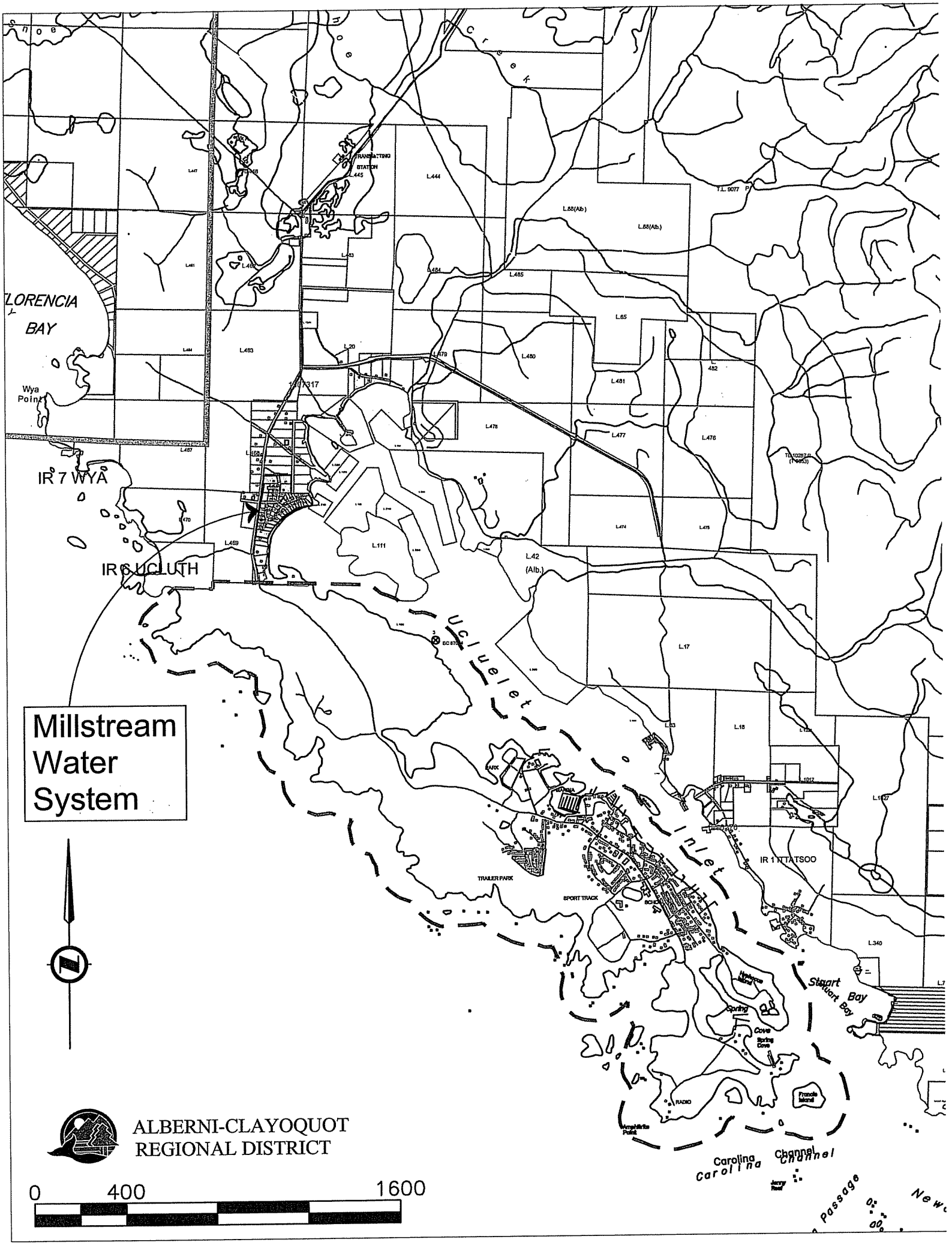
Replacement of sections of the asbestos cement water main piping as well as any copper service lines. During the piping upgrades additional fire hydrants would be installed. A fire hydrant would be positioned so that in an emergency a connection could be made to Ucluelet's fire hydrant located on the highway. Water meters would also be installed at that time and eventually all connections would be metered.
The reservoir will be inspected for corrosion and structural integrity. After the inspection is complete the reservoir will undergo a thorough cleaning and disinfection before being put back in service.

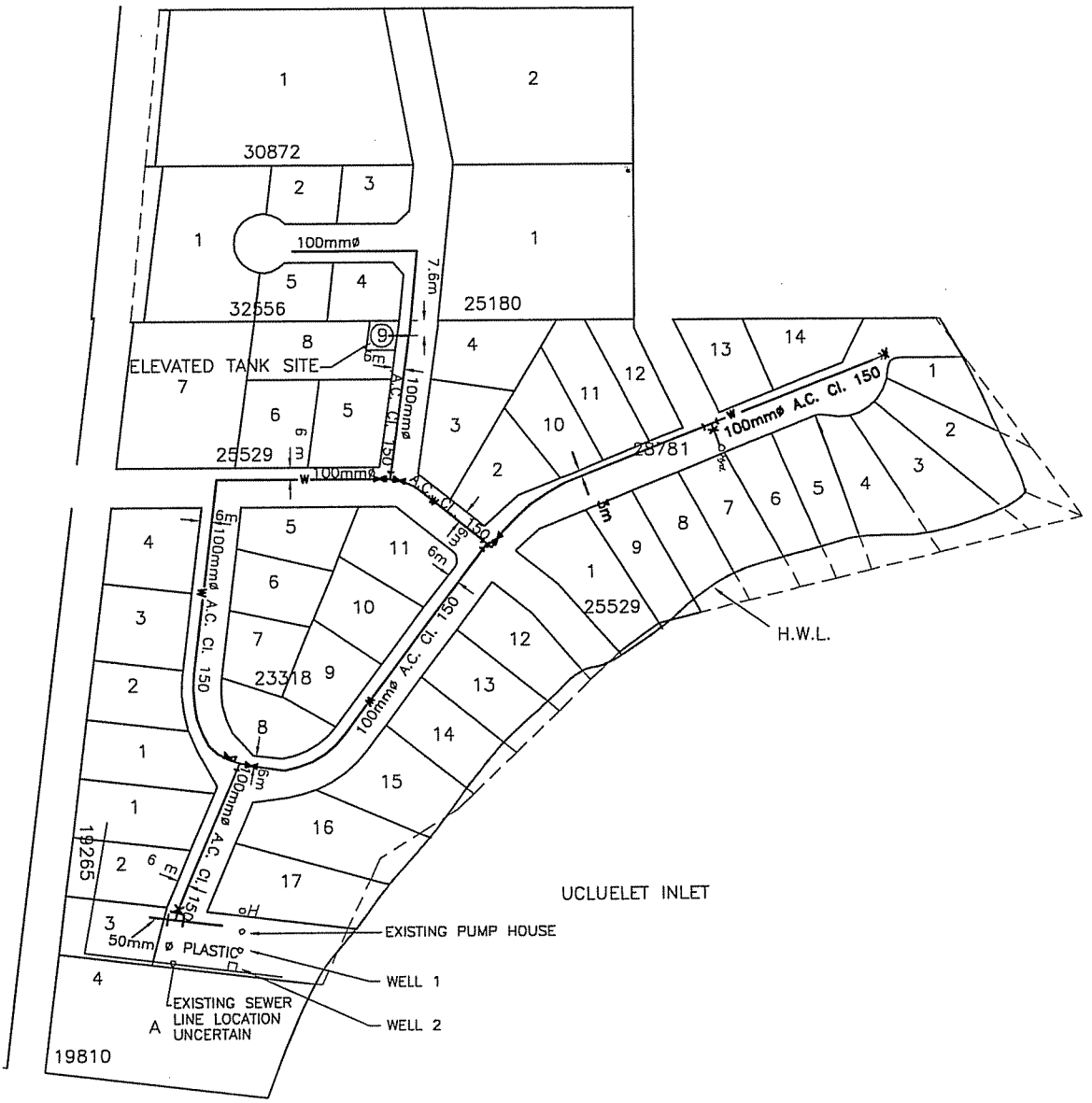
All fire hydrants will be serviced by a fire hydrant inspection service in 2007.

The source water of the system will have a complete Potability test performed in 2007. The last one occurred in 2004 and under recommendation from VIHA the testing should occur every 3 years.

Millstream Monthly Water Consumption 2006




Millstream
Water
System
ALBERNI-CLAYOQUOT
REGIONAL DISTRICT
0
400
1600
IR 7 WYA
IR 6 UCLUTH
Wya
Point
LORENCIA
BAY
Uclulet
Inlet
IR 1 NTATSOO
TRAILER PARK
SPORT TRACK
Stuart Bay
Spring Cove
Carolina Channel
Passage



No.	REVISION DESCRIPTION	DATE	BY
A	REMOVED LOT 18 PL. 1692	10/31/90	LJW

DRAWING No. 1198-00-02-A

DESIGN:	A.McG.
DRAWN:	LJW
SCALE:	1:2500
DATE:	09/20/90

REGIONAL DISTRICT ALBERNI CLAYOQUOT
MILLSTREAM WATER SYSTEM
EXISTING WATER SYSTEM

McGILL & ASSOCIATES ENGINEERING LTD.
5130 ARGYLE STREET
PORT ALBERNI, B.C., V9Y 1V2
TELEPHONE: (604) 724-3400

08/29/10(?)

07/04/10 B

DRINKING WATER SYSTEM INSPECTION REPORT

VANCOUVER ISLAND health authority

Health Protection

SYSTEM NAME: Millstream Community W/S

E.H.O. NAME: Bill Wrathall

ADDRESS: 1358 Ucluelet/Tofino Hwy

POSTAL CODE

SYSTEM NUMBER

OPERATOR: ACRD

INSPECTION DATE (DMY): 23/06/2010

TIME SPENT (Hrs. - nearest 1/4): 0.75

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)

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
	Joe Daley - Operator @ 726.7351
	Mailing Address: Box 816, Ucluelet VOR 3A0
	No alteration/changes to water system
	Reservoir adequately secured - fenced and locked access ladder displaced. Treatment house secured. Sodium hypochlorite used. Records maintained daily (0.5 - 0.6 FAC ppm). Water samples submitted monthly with satisfactory results. ER plan available. Test kits & reagents satisfactory. Operator has EOCP water systems course for small systems
	No hazards noted.
	✓ Issue new permit.

Page 1 of 1

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 / MMM / YYYY

RECEIVED BY: D Daley PRINT NAME

E.H.O.: B. Wrathall

Analysis Report

CANTEST®

CANTEST LTD.
Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

Fax: 604 731 2386

Tel: 604 734 7276

1 800 665 8566

RECEIVED
APR 27 2004

REPORT ON: Analysis of Water Sample

REPORTED TO: Vancouver Island Health Authority
4227 6th Avenue
Port Alberni, BC
V9Y 4N1

Att'n: Mr. Bill Wrathall

cc: Central Vancouver Island Health Region 1665 Grant Avenue Nanaimo BC V9S 5K7 Att'n: Mr. Dave Coombe

CHAIN OF CUSTODY: 141233
PROJECT NAME: Survellience
P.O. NUMBER: 92642

NUMBER OF SAMPLES: 1

REPORT DATE: March 18, 2004

DATE SUBMITTED: March 10, 2004

GROUP NUMBER: 50310015

SAMPLE TYPE: Water

NOTE: Results contained in this report refer only to the testing of samples submitted.

Aesthetic Objective Summary:

Aesthetic Objectives as set by "Guidelines for Canadian Drinking Water Quality, 6th Edition, 1996, including updates to April 1999. Aesthetic objectives apply to certain substances or characteristics of drinking water that can affect its acceptance by consumers or interfere with practices for supplying good quality water. For certain parameters, both aesthetic objectives and health-related guidelines have been derived. Where only aesthetic objectives are specified, these values are below those considered to constitute a health hazard

CLIENT SAMPLE ID	STATUS
Millstream WS	Acceptable

Max. Acceptable Concentration Summary:

Maximum Acceptable Concentrations (MAC) are put forth in the "Guidelines for Canadian Drinking Water Quality,(GCDWQ) 6th Edition, 1996", including updates to April 1999. For the parameters tested, results are generally categorized by health concerns. Some parameters have no limit value denoted because: a) currently available data indicates no health risk, b) the compound is not permitted in Canada or is unlikely to occur in drinking water at levels of concern, or c) it refers to a family of compounds (see guideline).

CLIENT SAMPLE ID	HEALTH	HARDNESS
Millstream WS	Acceptable	Moderate

TEST METHODS:

(Continued)
CANTEST LTD.

Richard S. Jornitz
Supervisor, Inorganic Testing

REPORTED TO: Vancouver Island Health Authority

REPORT DATE: March 18, 2004

GROUP NUMBER: 50310015

Anions in Water by Ion Chromatography - was determined based on Method 4110 in Standard Methods (20th Edition) and EPA Method 300.0 (Revision 2.1).

Alkalinity in Water - was performed based on Method 2320 in Standard Methods (20th Edition).

Alkalinity in Water - was performed based on Method 2320 in Standard Methods (20th Edition).

Colour (True) in Water - was determined based on Method 2120 in Standard Methods (20th Edition) and Method X321 in the BC Laboratory Manual (1994 Edition).

Conductivity in Water - was performed based on Method 2510 in Standard Methods and Method X322 in the BC Laboratory Manual (1994 Edition).

Nitrite in Water - was determined based on Method 4500-NO3 B in Standard Methods (20th Edition) and Method X327 in the BC Laboratory Manual (1994 Edition).

pH in Water - was determined based on Method 4500-H in Standard Methods (20th Edition) and Method X330 in the BC Laboratory Manual (1994 Edition).

Total Dissolved Solids in Water - was determined based on Method 2540 C in Standard Methods (20th Edition).

Turbidity in Water - was performed based on Method 2130 in Standard Methods (20th Edition) and Method X164 in the BC Laboratory Manual (1994 Edition).

Conventional Parameters - analyses were performed using procedures based on those described in "British Columbia Environmental Laboratory Manual For the Analysis of Water, Wastewater, Sediment and Biological Materials" (1994 Edition), Province of British Columbia and "Standard Methods for the Examination of Water and Wastewater" 20th Edition, (1998), published by the American Public Health Association.

Mercury in Water - analysis was performed using procedures based on U. S. EPA Method 1631, oxidative digestion using bromination, and analysis using Cold Vapour Atomic Fluorescence Spectroscopy.

Metals in Water - analysis was performed using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP), Inductively Coupled Plasma-Mass Spectroscopy (ICP/MS).

TEST RESULTS:

(See following pages)

REPORTED TO: Vancouver Island Health Authority

CANTEST®

REPORT DATE: March 18, 2004

GROUP NUMBER: 50310015

Potability (Aesthetic Criteria) in Water

CLIENT SAMPLE IDENTIFICATION:		Millstream WS		
DATE SAMPLED:		Mar 8/04	Aesthetic Objective	UNITS
CANTEST ID:		403100052		
Conventional Parameters				
pH, Laboratory		6.94	6.5 - 8.5	pH units
True Color		< 5	15	CU
Turbidity		0.10	5	NTU
Total Dissolved Solids		140	500	mg/L
Total Alkalinity	$CaCO_3$	102	-	mg/L
Bicarbonate Alkalinity	HCO_3	124	-	mg/L
Carbonate Alkalinity	CO_3	< 0.5	-	mg/L
Hydroxide Alkalinity	OH	< 0.5	-	mg/L
Dissolved Chloride	Cl	12.9	250	mg/L
Dissolved Sulphate	SO_4	5.5	500	mg/L
Total Metals Analysis				
Copper	Cu	0.002	1.0	mg/L
Iron	Fe	< 0.05	0.3	mg/L
Manganese	Mn	0.012	0.05	mg/L
Zinc	Zn	< 0.005	5	mg/L
Dissolved Metals Analysis				
Iron	Fe	< 0.05	0.3	mg/L
Manganese	Mn	0.012	0.05	mg/L
Sodium	Na	11.7	200	mg/L

CU = color units
mg/L = milligrams per liter
< = Less than detection limit

NTU = nephelometric turbidity units

REPORTED TO: Vancouver Island Health Authority

REPORT DATE: March 18, 2004

GROUP NUMBER: 50310015

Potability (Health Criteria at Point of Use) in Water

CLIENT SAMPLE IDENTIFICATION:		Millstream WS		
DATE SAMPLED:		Mar 8/04	Max. Acceptable Concentration	UNITS
CANTEST ID:		403100052		
Conventional Parameters				
Conductivity		247	-	µS/cm
Hardness	CaCO3	108	-	mg/L
Dissolved Fluoride	F	< 0.05	1.5	mg/L
Nitrate and Nitrite	N	0.89	10	mg/L
Dissolved Nitrate	N	0.89	10.0	mg/L
Nitrite	N	< 0.002	1.0	mg/L
Dissolved Sulphate	SO4	5.5	-	mg/L
Total Metals Analysis				
Aluminum	Al	0.007	-	mg/L
Antimony	Sb	< 0.001	0.006	mg/L
Arsenic	As	< 0.001	0.025	mg/L
Barium	Ba	0.002	1.0	mg/L
Boron	B	< 0.05	5	mg/L
Cadmium	Cd	< 0.0002	0.005	mg/L
Chromium	Cr	< 0.001	0.05	mg/L
Lead	Pb	< 0.001	0.01	mg/L
Magnesium	Mg	6.75	-	mg/L
Mercury	Hg	< 0.02	1	µg/L
Selenium	Se	< 0.001	0.01	mg/L
Uranium	U	< 0.0005	0.02	mg/L
Dissolved Metals Analysis				
Calcium	Ca	32.3	-	mg/L
Magnesium	Mg	6.47	-	mg/L
Potassium	K	0.7	-	mg/L
Silicon	SiO2	20.2	-	mg/L

µS/cm = microsiemens per centimeter
µg/L = micrograms per liter
< = Less than detection limit
mg/L = milligrams per liter

TOFINO AIRPORT WATER SYSTEM
2006 ANNUAL REPORT

Summary

The main event of the year was the supplying of water to Tofino during the September Labour Day long weekend. The reason that we could supply our water was that we had a large disinfected supply available in our reservoir without affecting the current users.

The total water consumption was 21,830 cubic meters down from both 2005 and 2004.

There has been many water leaks and repairs to the water system for this last year. Water leaks are frequently found by comparing water meters, isolation and the use of leak detection equipment.

Introduction

The Tofino Airport Water System was originally constructed during World War Two to service the military airport and related services. The supply and treatment system is comprised of a deep well water source, water softener, chlorination, pump house, reservoir and a distribution system within the specified area. Refer to map. The water is supplied Esowista Reserve (Tla-O-Qui-Aht First Nations), airport properties and a golf course.

Water Mandate

Ensure that the businesses and residents have sufficient, safe potable water to drink. Maintain and inspect all the water works facilities and equipment such as: water intake, pump stations, reservoirs, chemical pumps, valves and hydrants, repair water main breaks and services, respond to any water quality/quantity complaints. Co-ordinate and conduct utility locates, maintain comprehensive records as required by all applicable legislation, check all systems weekly and take monthly water meter readings.

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.

December 2006 the water was tested for the disinfection byproducts caused by the use of chlorine. The disinfection byproducts of chlorine (Trihalomethanes, THM's) are known as a cause of cancer. The values of Trihalomethanes were well below the guidelines of 0.1 mg/l. The criteria and concentrations are set by the Guidelines for Canadian Drinking Water Quality.

The last Potability analysis of the water was taken in April 2004 and tested by Norwest Labs in Surrey, BC. All Aesthetic Criteria and Maximum Acceptable Concentrations were acceptable.

Two water samples are taken into VIHA monthly for microbiological analysis. These are taken from: Pumphouse Esowista and the Reservoir Pumphouse. Bacteriological history has been report satisfactory.

Annually the water system is inspected by VIHA and the last occurred in October of 2006. VIHA gave a satisfactory report on the water system. A copy of the inspection is included in this report

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 staff and with VIHA to make appropriate changes as needed.

From 1964 to 2001 no chlorine was added due to the deep well water source. Chlorine was added for disinfection due to the possibility of contamination from the pipes.

Description of System

There are two (6 inch) 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. In the pump house a water softener (ion exchange) is used to remove iron, calcium, magnesium and manganese with the use of salt. From there the water is disinfected with chlorine and stored in the (300,000 galloon) concrete reservoir. The reservoir filling is controlled via a float switch in the reservoir. A pressure tank regulates the water pressure in the system and a pressure switch operates the pump into the system.

The system has two chlorination injection pumps for primary and secondary disinfection. The first pump chlorinates the water going into the reservoir. The second pump increases the chlorine residual in the distribution system in order that there is Free Chlorine residual at the end of the line 0.2 mg/l.

The water main serving the airport is an eight-inch cast iron pipe with 2 fire hydrants. The water main serving the Esowista Reserve is a three-inch PVC pipe with a water meter before going onto the reserve. A two-inch water line is taken from the three-inch water line to go to the Golf Course, which also has a water meter.

Service and equipment is available through the Tofino works yard, Gibson Brothers or the Ucluelet Works yard. Fyfes Well Drilling Ltd. is a regular contractor and service provider to the Tofino water System.

Infrastructure

Two 6-inch deep wells with submersible pumps.

The pumphouse contains a large water softener, centrifugal pumps, water meter, pressure tank and two positive displacement chlorine pumps.

The water mains consist of the original eight-inch cast iron pipe and the 2 and 3 inch PVC pipe to the Reserve and Golf course. There are two Fire Hydrants and two additional water meters to the reserve and Golf course

There is one original concrete reservoir in service with a capacity of 300,000gallons. Another original concrete reservoir is located near the airport but is in disrepair.

Consumption

The total annual water consumed was 21,830 cubic meters

Esowista consumed 16,862 cubic meters

Golf Course consumed 4,967 cubic meters

Annual use of chlorine is 160 liters (eight, 20-liter pails)

Annual use of salt is 13,346 kg (29,400 lb)

Events

The most significant event occurred on the Labour Day long weekend during the Tofino water crises. The water contractor was busy filling water tankers from the chlorinated reservoir to truck to Tofino. This water crisis occurred due to the unusually hot and dry summer of 2006.

The system operator meet with the Esowista operator John Williams and the Golf Course operator due to water concerns and consumption issues.

Fyfe's Well and Water Services installed a deep well pump and valve in February, replaced a failed electrical control panel in April, and repaired the Water Softener in September.

Water leaks occurred in the airport and golf course service line and the water line to the Hydro building was capped. Gibson Bros. Contractors Ltd. out of Tofino assisted the operator on the larger repairs.

In November power outage occurred and fallen trees were required to be cut from the pump house road.

On Going Concerns

The main concern is that the aging infrastructure is being further eroded due to corrosion. The total extent of the original piping system is unknown and may be potentially leaking. The fill material originally placed under the piping is compressing and could be causing weak areas prone to cracking and then leaking.

At times the golf course and the Esowista Reserve's water meters showed larger then normal water uses. The system operator has then had to communicate with the users to determine where their problems were.

Goals

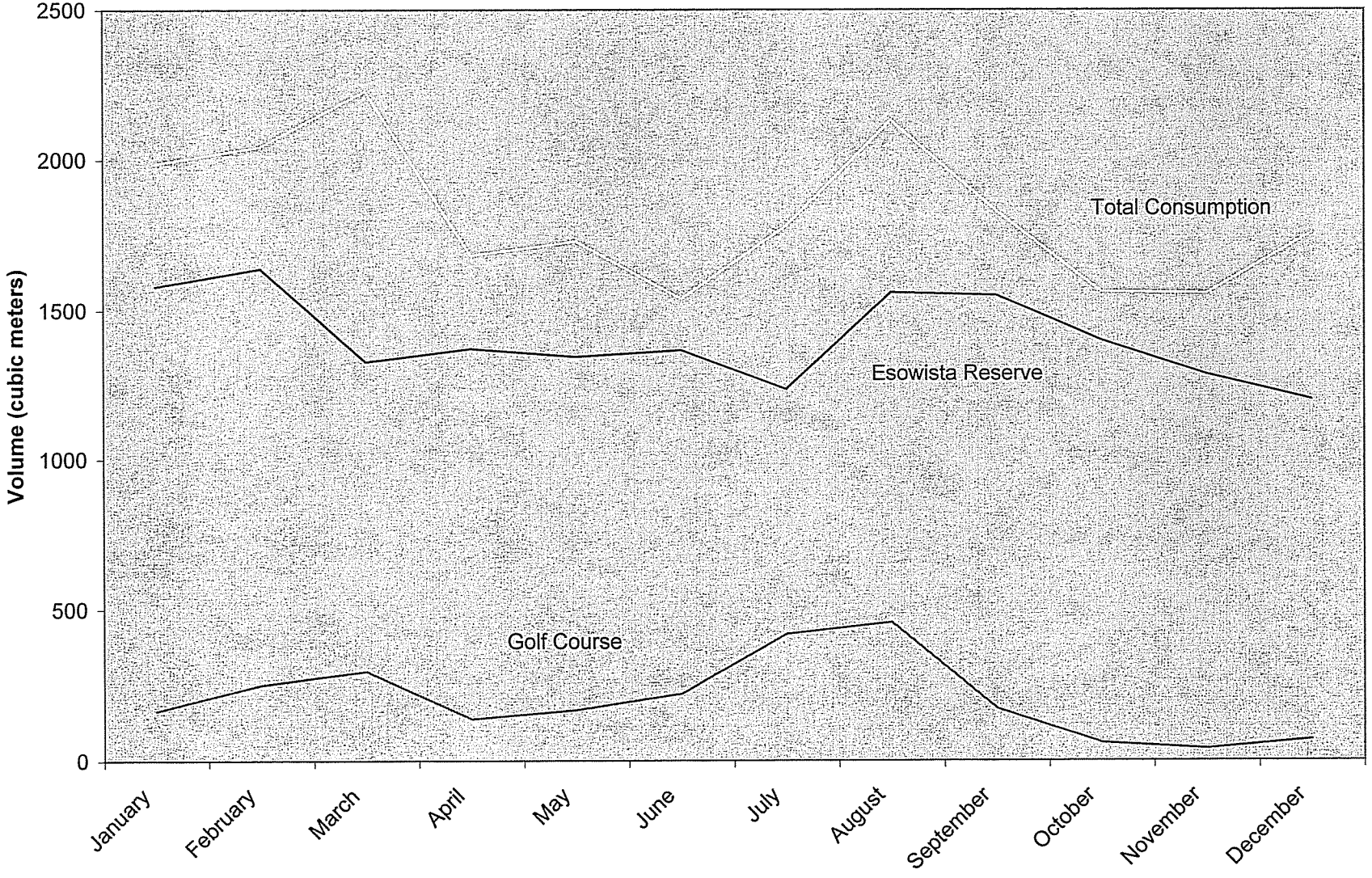
During 2007 an infrastructure study of the complete water system will be implemented. The study will be performed by ACRD staff to address the location of the infrastructure. The locations of pipelines, fire hydrants, water meters and valves will be record using GPS technology. This digital information will be incorporated into a water system map to assist with daily operations and future upgrades.

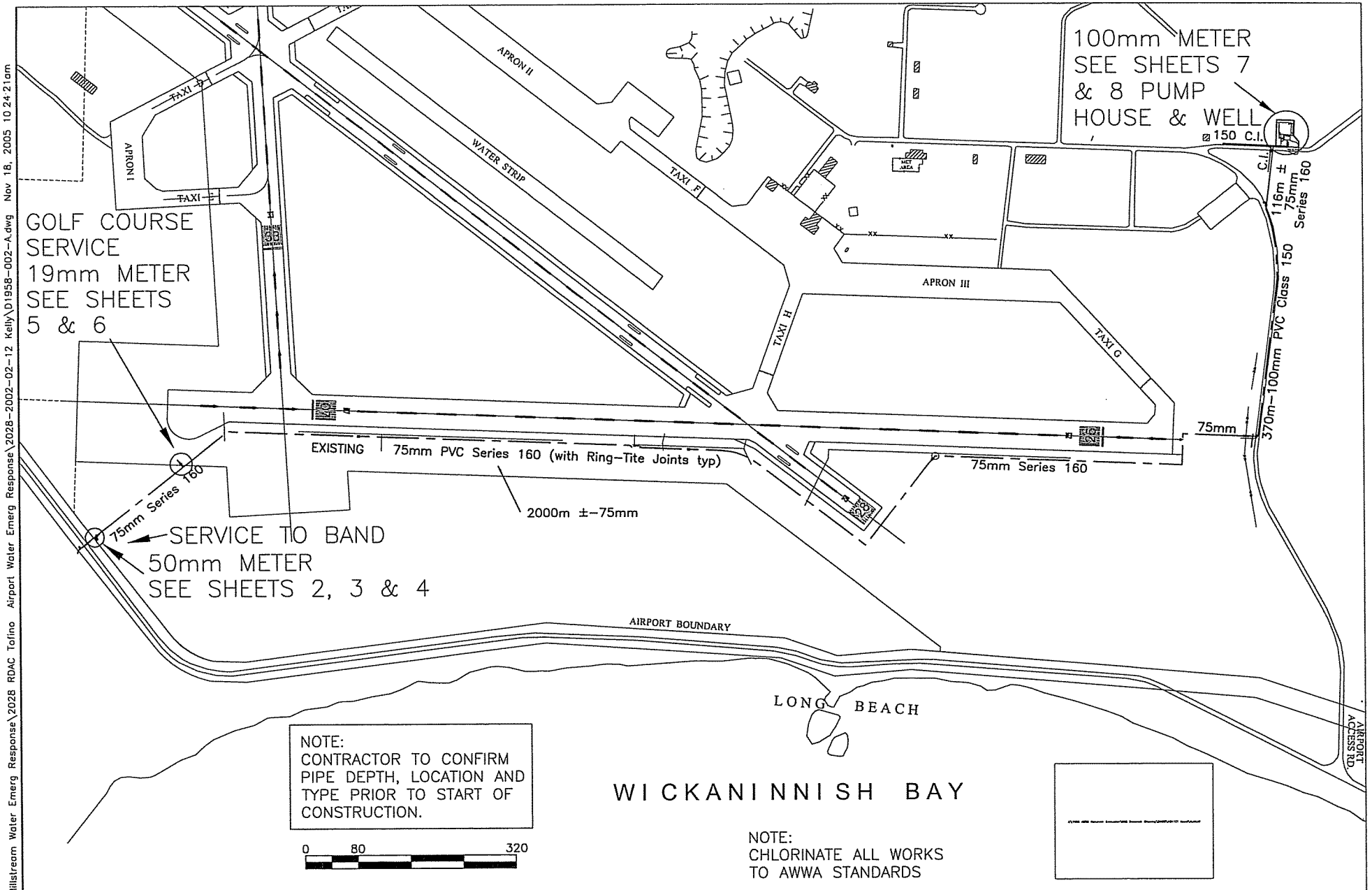
The source water of the system will have a complete Potability test performed in 2007. The last one occurred in 2004 and under recommendation from VIHA the testing should occur every 3 years.

All fire hydrants will be serviced by a fire hydrant inspection service in 2007.

Develop a more comprehensive water testing and system-checking regime than what the system operator is doing now. This will include more frequent testing for Free Chlorine residuals at the reservoir, golf course and the Esowista Reserve.

Tofino Airport Monthly Water Consumption 2006





DESIGN:	AM
DRAWN:	DAS
SCALE:	N.T.S.
DATE:	Nov 20, 01

ALBERNI CLAYOQUOT REGIONAL DISTRICT

TOFINO AIRPORT WATERMAIN

OVERALL WATER LAYOUT PLAN

McGILL & ASSOCIATES ENGINEERING LTD
5130 Argyle Street,
Port Alberni, B.C. V9Y 1V2
Phone (250) 724-3400
Fax (250) 724-4400

DRAWING No. 1958–002–1 of 8

H:\Salvaged\2000s\2027 RDAC Millstream Water Emerg Response\2028 RDAC Tofino Airport Water Emerg Response\2028-2002-02-12 Kelly\D1958-002-A.dwg Nov 18, 2005 10 24 21am

09/20/06

DRINKING WATER SYSTEM INSPECTION REPORT

VANCOUVER ISLAND health authority

Health Protection

SYSTEM NAME: Tofino Airport Water System		E.H.O. NAME: B. Wera Hall	
ADDRESS	POSTAL CODE	SYSTEM NUMBER	
OPERATOR: Tom Letford	INSPECTION DATE (DMY)	TIME SPENT(Hrs. - nearest 1/4)	0.75

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)

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
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- ☐ 309 Cross-Connection
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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
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- ☐ 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
	Accompanied by Tom Letford. Level 118'
	FAC @ 2.0 ppm. Ecp Certification
	Records maintained daily. Reagent exp 2010
	Security satisfactory
	Water samples submitted monthly with
	satisfactory results
	No hazards noted.

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 / MMM / YYY

RECEIVED BY [signature] PRINT NAME E.H.O. [signature]

H:\EHO\FORM\DIRNKING WATER SYSTEM INSPECTION REPORT-AUG 2002 WHITE COPY - OPERATOR YELLOW COPY - INTERNAL PINK COPY - E.H.O.

NORWEST LABS

Analytical Report

Norwest Labs
#104, 19575-55 A Ave.
Surrey, BC. V3S 8P8
Phone: (604) 514-3322
Fax: (604) 514-3323

Bill to: Fyfe's Well Drilling Ltd.
Report to: Fyfe's Well Drilling Ltd.
3331 Alberni Highway
Qualicum Beach, BC, Canada
V9K 1Y5
Attn: Jim Fyfe
Sampled By:
Company:

Project ID:
Name: Tofino Airport
Location:
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 301866
Control Number:
Date Received: Apr 16, 2004
Date Reported: Apr 22, 2004
Report Number: 539536

NWL Number	301866-1
Sample Description	Tofino Airport (Treated)
Sample Matrix	Water - Potable

Analyte		Units	Result	Detection Limit	Guideline Limit	Guideline Comments
Metals Extractable						
Aluminum	Extractable	mg/L	<0.005	0.005	0.1	Acceptable
Antimony	Extractable	mg/L	<0.0002	0.0002	0.006	Pass
Arsenic	Extractable	mg/L	0.0008	0.0002	0.025	Pass
Barium	Extractable	mg/L	<0.001	0.001	1	Pass
Boron	Extractable	mg/L	0.018	0.002	5	Pass
Cadmium	Extractable	mg/L	<0.00001	0.00001	0.005	Pass
Chromium	Extractable	mg/L	0.0011	0.0005	0.05	Pass
Copper	Extractable	mg/L	<0.001	0.001	1	Acceptable
Lead	Extractable	mg/L	0.0002	0.0001	0.01	Pass
Uranium	Extractable	mg/L	<0.0005	0.0005	0.02	Pass
Zinc	Extractable	mg/L	0.001	0.001	5	Acceptable
Physical and Aggregate Properties						
Colour	Apparent, Potable	Colour units	<5	5	15	Acceptable
Turbidity		NTU	<0.1	0.1	5	Acceptable
Routine Water						
pH			7.99	-	6.5 - 8.5	Acceptable
Sodium	Extractable	mg/L	70.2	0.4	200	Acceptable
Iron	Extractable	mg/L	0.02	0.01	0.3	Acceptable
Manganese	Extractable	mg/L	<0.005	0.005	0.05	Acceptable
Chloride	Dissolved	mg/L	12.4	0.5	250	Acceptable
Fluoride		mg/L	0.13	0.05	1.5	Pass
Nitrate - N		mg/L	<0.1	0.1	10	Pass
Nitrite - N		mg/L	<0.05	0.05	1	Pass
Sulphate (SO4)		mg/L	17.6	0.2	500	Acceptable
T-Alkalinity	as CaCO3	mg/L	131	5		Low
Total dissolved solids		mg/L	179	1	500	Acceptable
Hardness	as CaCO3	mg/L	1.0	-		Soft

Approved by: C William Warning

Bill Warning, B.Sc.
Lab Operations Manager

NORWEST LABS

Norwest Labs
#104, 19575-55 A Ave.
Surrey, BC. V3S 8P8
Phone: (604) 514-3322
Fax: (604) 514-3323

Methodology and Notes

Bill to: Fyfe's Well Drilling Ltd.
Report to: Fyfe's Well Drilling Ltd.
3331 Alberni Highway
Qualicum Beach, BC, Canada
V9K 1Y5
Attn: Jim Fyfe
Sampled By:
Company:

Project ID:
Name: Tofino Airport
Location:
LSD:
P.O.:
Acct. Code:

NWL Lot ID: **301866**
Control Number:
Date Received: Apr 16, 2004
Date Reported: Apr 22, 2004
Report Number: 539536

Method of Analysis:

MethodName	Reference		Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	*	Electrometric Method, 4500-H+ B	19-Apr-04	Norwest Labs Edmonton
Alkalinity, pH, and EC in water	APHA	*	Titration Method, 2320 B	19-Apr-04	Norwest Labs Edmonton
Anions (Routine) by Ion Chromatography	APHA		Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	19-Apr-04	Norwest Labs Edmonton
Chloride in Water	APHA	*	Automated Ferricyanide Method, 4500-Cl- E	20-Apr-04	Norwest Labs Edmonton
Colour (Apparent) in water	APHA	*	Visual Comparison Method, 2120 B	19-Apr-04	Norwest Labs Edmonton
Fluoride in water by ISE	APHA	*	Ion Selective Electrode, 4500-F- C	19-Apr-04	Norwest Labs Edmonton
Metals ICP-MS (Extractable) in water	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	20-Apr-04	Norwest Labs Edmonton
Metals Trace (Extractable) in water	APHA	*	Inductively Coupled Plasma (ICP) Method, 3120 B	20-Apr-04	Norwest Labs Edmonton
Turbidity in Water	APHA	*	Nephelometric Method, 2130 B	20-Apr-04	Norwest Labs Edmonton

* Norwest method(s) is based on reference method

References:

APHA	Standard Methods for the Examination of Water and Wastewater
US EPA	US Environmental Protection Agency Test Methods

Comments:

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted