



VILLAGE OF BELCARRA



DRINKING WATER QUALITY ANNUAL REPORT

2016

June 2017

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A. INTRODUCTION

This report is the Fifth Drinking Water Quality Annual Report prepared by the Village of Belcarra (Belcarra) under the Water Quality Monitoring and Reporting Plan for the Metro Vancouver (MV) and Member Municipalities. The purpose of the report is to provide Belcarra water consumers with drinking water sampling test results for 2016, as well as to present background information on Belcarra concerning water supply, treatment, and specific measures being taken to protect and enhance drinking water quality as per requirements under the Drinking Water Protection Act.

B. GENERAL DESCRIPTION

The Village of Belcarra delivers potable water to its customers via a waterworks distribution system incorporating approximately 11 km of water mains, one pressure zone pumping station and one water storage reservoir. From the period January 1, 2016 to December 31, 2016, the water distribution system provided water to **142** of a possible 270 parcels (**53%**).

From January to December 2016, there was 56,127 cubic metres (12,346,268 Imperial gallons) of water consumed by residents or used for flushing and the continual blow offs. All Belcarra's water is purchased from the Greater Vancouver Water District (GVWD), through the District of North Vancouver (DNV).

A map of the overall water system showing the gravity and pressure zones and water quality sampling site locations is included (see Appendix A).

C. WATER DISTRIBUTION SYSTEM – Village of Belcarra

1. General

The Belcarra water distribution system is comprised of four networks, these are further described as:

- Village of Belcarra Marine Crossing Mains
- Reservoir Supply Main
- Village of Belcarra Water Distribution System
- Upper Pressure Zone on Main Avenue and Bedwell Bay Road

For the purposes of water quality monitoring and reporting in Belcarra, the location where water is drawn from the GVWD transmission system into the DNV system are considered "sources" for the Belcarra system.

A map of the overall water system showing the gravity and pressure zones and water quality sampling site locations is included (see Appendix A).

2. Belcarra Water Quality Testing

Sample collection to monitor bacteria levels in the Belcarra water distribution system is performed monthly on conveyance water by Belcarra staff. Four to five of the 13 sample stations are tested monthly, with all 13 sample stations being tested over a three month period (see Appendix B for List of Belcarra Sample Site Stations).

Samples are delivered to the Metro Vancouver lab for analysis and reporting. Standard bacteriological parameters analysed by the Metro Vancouver lab are total coliform, *E. Coli* and heterotrophic plate count (HPC).

Also, the Fraser Health Authority may take random samples from select sites or samples from areas where water quality complaints have originated or where waterworks construction or maintenance activities are underway.

Locations of water quality sampling points in the Belcarra system are based on a guideline provided by the regional Medical Health Officers as follows:

- i. One sampling point at “source” (supply from GVWD/DNV)
- ii. Twelve sampling points at system dead-ends or near dead-ends

Sampling frequency for presence of bacteria was completed in accordance with the recommendations provided by the Fraser Health Authority.

A table showing the Schedule for Sampling and Reporting is included (See Appendix C).

(a) Physical Parameters

Water temperature and turbidity are measured for all samples collected for bacteriological testing and are reported in the overall microbiology test results from the Metro Vancouver lab. Turbidity is measured in Nephelometric Turbidity Units (NTUs). Health Canada Guidelines for Canadian Drinking Water Quality sets the Aesthetic Objective for water temperature at less than or equal to 15 degrees Celsius and an upper limit of 1 NTU for turbidity. Taste, odour and turbidity are monitored on a complaint basis.

(b) Chemical Parameters

In 2016, chemical monitoring in the water distribution system was conducted for the following:

- i. **Free chlorine residual** – The Medical Health Officer has indicated that the minimum concentration for chlorine residual in a water distribution system should be 0.2 mg/L free chlorine. Free chlorine is measured at all sampling sites when bacteriological samples are collected. 2016 results of less than 0.2mg/L free chlorine totalled **10** sample occurrences.
- ii. **Haloacetic acids (HAA’s)** – HAA’s are disinfection by-products. In 2008 a new Canadian standard for HAA concentrations was established in the *Guidelines for Canadian Drinking Water Quality* (GCDWQ). The maximum acceptable concentration (MAC) for HAA’s is 80 ppb (based on a running annual average calculated with quarterly results for different locations within the system). In 2016, eight tests were carried out by the Metro Vancouver lab with a maximum average of 29 ppb or less. (See Appendix G)
- iii. **Trihalomethanes (THM’s)** – THM’s are disinfection by-products. The *Guidelines for Canadian Drinking Water Quality* (GCDWQ) list a maximum acceptable concentration (MAC) for THMs at 100 ppb (based on a running annual average calculated with quarterly results for different locations within the system).sampled

with HAA's. In 2016, eight tests were carried out by the Metro Vancouver lab with a maximum average of 40 or less. (See Appendix G)

- iv. **pH** – pH is a measurement under the Aesthetic Objective (AO) guidelines, with the optimal range of values between 6.5 – 8.5 pH. In 2016, eight tests were carried out by the Metro Vancouver lab with results of 7.2 and 8.1 pH. (See Appendix G)
- v. **Metals** – during 2001, the regional Medical Health Officers developed a strategy for sampling metals “at the tap”. The requirement is to sample 10% of the sample sites twice yearly for lead, copper and zinc, with sample locations consisting of a mixture of private homes and public buildings, including schools. In 2016, four samples were collected.
- vi. **PAHs or BETX** – PAH's (polynuclear aromatic hydrocarbons) and BETX (benzene, ethylbenzene, toluene, xylene) are compounds associated with pipe wall lining materials in steel water mains, and usually they can only be detected in water mains newer in age than approximately five years. (Since there are no significant lengths of PVC water main in the Belcarra System, no testing was performed for vinyl chloride in 2016.)

3. Results

Test results for bacteria, temperature, turbidity, and chlorine residual are compiled for each sample site.

(a) Bacteria

A table of results of bacteriological testing of Sample Station Readings of Ecoli, HPC, Total Coliform from January to November is attached (See Appendix D).

Metro Vancouver's analysis of HPC confirmed of the 55 samples, **one** sample exceeded Metro Vancouver's threshold of 500 CFU/ml (see Appendix D). The sample was taken from the Reservoir supply system line and would be heavily dependent on the source water from GVWD\DNV

Metro Vancouver reported that all samples collected in 2016 satisfied the bacteriological requirements of the BC Drinking Water Protection Regulation (see Appendix F).

(b) Physical Parameters

In 2016, all **55** sample test results of turbidity levels in the Belcarra water distribution system and all were less than 1 NTU. Water temperatures ranged from a winter low of **5.7°** C to a summer high of **22.0°** C. Temperature is discussed further in the Challenges section below and measures to improve temperature readings are outlined in the 2016 Work Program below. For Temperature and Turbidity data, (See Appendix D).

There were no reported concerns related to aesthetics

Chemical Parameters

- i. Belcarra's source water from GVWD/DNV water transmission can be impacted by low chlorine residual levels. A real-time chlorine residual monitor is located at the

Tatlow pump station and allows real time analysis and alarming for low chlorine conditions. The Belcarra chlorine residual at the Michael Rosen Water Receiving Building averaged 0.55 mg/L. This shows that the level of chlorination continued to provide good chlorine residual levels throughout the water distribution system.

In Belcarra, **10** of the **55** samples taken throughout the entire system had chlorine residual concentrations below 0.2 mg/L, the lowest two samples being **0.07** mg/L (see Appendix D). This is discussed further in the Challenges section below. Measures to improve chlorine residuals are outlined in the 2017 Work Program below.

- ii. **Haloacetic acids (HAA's)** – Haloacetic acids (HAA) levels in Belcarra, all 2016 samples taken were below the MAC for this parameter (See Appendix G).
- iii. **Trihalomethanes (THMs)** – Trihalomethanes (THMs) The tests, performed by Metro Vancouver, began in 2013. All 2016 samples taken in Belcarra were below the MAC for this parameter (See Appendix G).
- iv. **pH** – All of the samples taken were within the AO of between 6.5 and 8.5 pH (See Appendix G).
- v. **Metals** – a total of four samples for metals, including copper, lead and zinc, were collected in 2016. (See Appendix H) for Metro Vancouver Metals Sampling Program 2016 for Belcarra. All the metals tested were under the recommended maximum allowable concentrations.
- vi. **PAHs or BETX** – as there are no significant lengths of PVC water main in the Belcarra System, no testing was performed for vinyl chloride in 2016.

4. Challenges

Chlorine residual issues, generally related to flow from the Capilano Source during times of high turbidity, have been substantially reduced due to GVWD's operational strategy of the two sources and the performance of the filtration plant.

Maintaining chlorine residuals above the 0.20 mg/L range is supported by cool water temperature and consumption, by moving water through the utility to the consumer. The exchange of water through the reservoir and movement of water through the distribution system ensures the water will remain fresh, cool and with a marginal loss in chlorine residual. Similarly temperature and turbidity can maintain aesthetic objectives by the movement of water through the distribution system. See Appendix D for site specific data on chlorine residuals.

Until such time as all the potential connections are made to the ends of the water main or water main branches, there is the potential for water to be held in suspension. Suspended water will result in higher HPC results. Resident consumption at the dead ends serves to ensure water is moved through the distribution system allowing for lower temperatures and higher chlorine residuals and a higher level of freshness. In the absence of consumers, water sampling ports located at the ends of water mains and branches are opened and allowed to flow water as an operational means to move water through the water mains.

Belcarra Public Works monitor the HPC results and perform additional flushing in areas of HPC greater than 500 CFU/ml. Sampling ports and the continual blow offs are then adjusted to increase flow to improve circulation of the dead ends.

5. Work Program

2016

System maintenance, operational and emergency response refinements were made in 2016 to continue delivering water with optimum water quality. The water main cleaning program focused on unidirectional flushing and Fire Hydrant Maintenance.

The Work Plan implemented a combination of measures to enhance water quality by promoting more consumers to connect to the water system or by increasing spillage rates in “dead end” areas of low or no consumer connections. An amendment to Waterworks No. Bylaw 456, 2012 with No. Bylaw 495, 2015 requiring any transfer of ownership of a property must connect to the Waterworks and be provided with water from the Water Service.

Installation and monitoring of the Seismic valve at the Tatlow Reservoir was initiated and scheduled to go into full service in 2017. The valve is very sensitive and needs to be cautiously calibrated so that it functions only during a seismic event, thereby closing the Reservoir to prevent premature draining, should there be a main failure. This will allow the Public Works Crew to assess the damage and isolate or repair the area so the system can be put back into service with water in the reservoir. This would also retain a source of water in the reservoir that could be used for firefighting, which is commonly associated with seismic events.

Continual routine monitoring testing of generator and fires pump at the Tatlow Building shall be done weekly to ensure they will be available in an emergency. The diesel fuel for the generator and fire pump were scrubbed to ensure the quality of the fuel and to deter fouling. Diesel can go off over time and should be scrubbed on a five year cycle.

Surveillance video cameras have been added to further enhance security for the facilities. Real time visual monitoring of utility equipment and exterior of the buildings complements remote monitoring of the utility.

The purchase of a turbidity meter was essential to reduce flushing time and water usage during annual flushing program. The meter can also be used during sampling and assess any turbidity complaints.

2017

System maintenance, operational and emergency response refinements will continue to be made in 2017 for delivering water with optimum water quality. The 2017 water main cleaning program will focus on unidirectional flushing of Zone 2 and Fire Hydrant Maintenance of Zone 1. All Air valves will be inspected to ensure the function properly and continual purging of the Marine Air Valves in the Midden building.

Inspection of the Marine Crossing of the Burrard Inlet will be conducted by Divers to ensure there are no; leaks, damage to air valves and the two water main rock amour protection.

In addition, there are Water Main extension that may be made to the water distribution system, which could increase water circulation and fire flows by looping dead end mains, as the opportunities present.

D. INCIDENTS/SIGNIFICANT COMPLAINTS

In June of 2016 the filter screen at the Strathcona chamber fouled, drastically reducing source flows. A Public Works Employee was dispatched to the chamber in Deep Cove, taking over one and half hours to arrive, during which time the water distribution system continued to be used. With the help of the Supplier's Representative, the screen was flushed and cleaned and the system returned to normal. A more aggressive schedule of maintenance for this component will be established and high turbidity alerts critically assessed for this concern. Belcarra has made contact with the DNV Water Operators and are establishing protocols on how to work together in an emergency.

In December of 2016, the sampling stations froze during the very cold and heavy snowfall events of late 2016. On consultation with sample station suppliers, it was discovered the sample stations were not the self-draining type as requested. A procedure was developed, in the advance of adverse weather that the sample stations be pumped out to prevent freezing.

E. GENERAL WATER ADVISORIES

There were no water advisories in 2016.

F. OPERATOR TRAINING/QUALIFICATIONS

In 2012 EOCP advised Belcarra, the system would be classified as a Level 1 system based on 270 connections. Belcarra currently has two water distribution system Operators with Level 1 operator's certification from the EOCP, keeping Belcarra in full compliance with the Regulation.

G. SECURITY MEASURES

Some of the security features at Belcarra include:

- Locked access to the reservoir
- Dual locking mechanisms to enter the water receiving and pump buildings
- Exterior lighting and fencing for the water receiving buildings
- iPhone intrusion alarms for the Strathcona Chamber and the Midden building and Tatlow Pump building
- CCTV cameras at Tatlow reservoir and pump station and Midden building

H. NOTIFICATION AND EMERGENCY RESPONSE PLAN

1. Notification Requirements

The notification process for unusual situations that could potentially affect water quality is shown in Appendix I.

2. Response Plans

(a) E. Coli-Positive Samples

If a sample analysed by the Metro Vancouver laboratory or the BC Centre for Disease Control tests positive for *E. Coli*, the following response plan will be put into action:

- i. Results of interim samples, if any, from the site will be examined by the lab. Interim samples are any samples that may have been taken from the site in the period

- between when the *E. Coli* -positive sample was taken and when it was determined to be positive.
- ii. The chlorine residual noted on the sampler's field sheet will be reviewed by the lab and compared to previous readings to determine if there had been a localized loss of disinfectant residual.
 - iii. The Belcarra Water operators or designate and Fraser Health Authority will be notified immediately by the laboratory.
 - iv. Arrangements will be made for the immediate collection of a repeat sample (including, where possible, samples from upstream and downstream of the positive sample location).
 - v. Fraser Health Authority will be contacted and the need for a "boil water" advisory will be evaluated.
 - vi. If a "boil water" advisory is warranted, the public notification process as outlined in the *Water Quality Monitoring and Reporting Plan for the GVRD and Member Municipalities* will be followed.
 - vii. The lab will contact Belcarra with repeat sample results and the results of the species identification tests. Belcarra will contact the Fraser Health Authority to evaluate these results and to determine whether or not the advisory can be lifted.

(b) Chemical Contamination

In the event of chemical contamination in the Belcarra water distribution system, the Fraser Health Authority will be immediately notified. Immediate steps will be taken to isolate the contaminated area and the level of contamination will be determined through water sampling and testing. The chemical will be identified and any public health risk factors associated with the chemical presence will be determined. Through consultation with the Fraser Health Authority, a public advisory will be carried out.

(c) Turbidity Events

Turbidity in the Belcarra water distribution system is monitored on a regular basis through the water sampling program. Water sampling results yielding readings greater than 1 NTU are scrutinized, along with corresponding free chlorine. Any areas from which high turbidity results came will be re-sampled for chlorine residual and turbidity and flushed if necessary.

In 2007, a task force comprised of Metro Vancouver, Vancouver Coastal Health, Fraser Health and member municipalities developed a communications template for source water major turbidity events. The template outlines the responsibilities of Metro Vancouver, the Health Authorities, and municipalities for notification and communications to each other and the public.

(d) GVRD Disinfection Failure

Upon notification by GVWD Operations that an interruption in disinfection has occurred, Belcarra Water Quality personnel will immediately commence monitoring free chlorine residual levels at strategic locations and will contact the Fraser Health Authority if continued loss of residual is observed.

(e) Loss of Pressure Due to High Demand

In the event of adverse pressure loss due to high demand, Belcarra Public Works crew will make adjustments to the system to isolate the section or facility from the system and then take measures to supplement pressure in the affected area. Belcarra will immediately consult with GVWD, DNV and Fraser Health regarding further actions, and all water quality complaints from

the public will be immediately and thoroughly investigated for potential contamination.

(f) Water Main Break Where Contamination is Suspected

For water main breaks where chemical or microbiological contamination of the system is suspected, Belcarra Public Works crew will make adjustments to the system to isolate the section or facility from the system. Belcarra will immediately consult with Fraser Health regarding further actions, and all water quality complaints from the public will be immediately and thoroughly investigated for potential contamination.

For all water main breaks, water samples will be taken from the vicinity of the break and tested for bacteria. If chemical contamination is suspected, the procedures outlined in Appendix I will be carried out.

I. LIST OF APPENDICES

APPENDIX A

Map of Belcarra Water System, Sampling Site Locations and Pressure Zones and Free Chlorine Residual data per Site

APPENDIX C

List of Belcarra Sample Site Locations

APPENDIX C

Schedule for Belcarra Sampling and Reporting

APPENDIX D

Belcarra Sample Station Readings of Temperature, *E. coli*, HPC, Total Coliform, Turbidity and Free Chlorine

APPENDIX E

Belcarra Monthly HPC Counts

APPENDIX F

Metro Vancouver Results of Bacteriological Analysis of Belcarra Potable Water Samples

APPENDIX G

Metro Vancouver Quarterly THMs, HAAs, and Ph

APPENDIX H

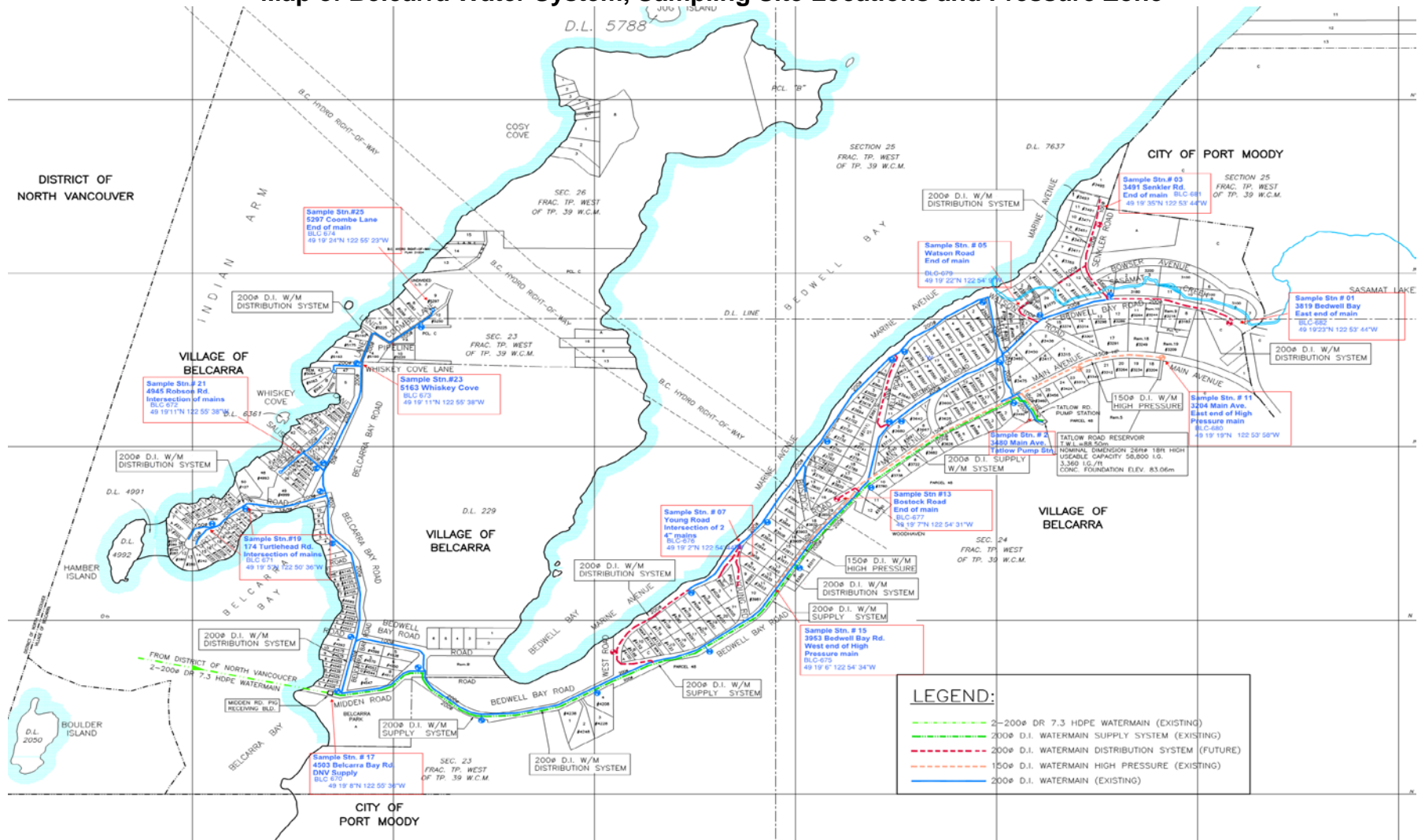
Metro Vancouver Annual Metals Sampling Program

APPENDIX I

Notification for Unusual Situations Potentially Affecting Water Quality

APPENDIX A

Map of Belcarra Water System, Sampling Site Locations and Pressure Zone



APPENDIX B

List of Belcarra Sample Site Locations

StationNo.	Lab BLC No.	Location	Flow Rate	No. of samples taken in 2016
#17	670	4503 Belcarra Bay (Midden Supply GVWD\DNV)	Source	11
#19	671	Turtlehead Road	Low	4
#21	672	Robson Road	Low	4
#23	673	Whiskey Cove Lane	Low	4
#25	674	Coombe Lane	Dead End	4
#15	675	3953 Bedwell Bay Road - High Pressure Zone (West)	Dead End	3
#07	676	Young Road	Low	3
#13	677	Bostock Road	Dead End	4
#02	678	3480 Main Ave (Tatlow Pump Station)	Reservoir	0
#05	679	Watson Road	Dead End	3
#11	680	3204 Main Avenue – High Pressure Zone (East)	Dead End	7
#03	681	Senkler Road	Dead End	4
#01	682	3819 Bedwell Bay Road – East end of Gravity Main	Dead End	4

APPENDIX C

Schedule for Belcarra Sampling and Reporting for 2016

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<u>DISTRIBUTION SYSTEM SAMPLING</u>												
Temperature, Ecoli, HPC, Total Coliform, Turbidity, and Free Chlorine Residuals (Monthly)	X	X	X	X	X	X	X	X	X	X	X	X
HAA's, THM's, pH (Quarterly)			X		X			X		X		
Metals: Copper, Lead, Zinc (Annually)										X		
<u>NOTIFICATION</u>												
2016 Annual Report:												
Annual Report sent to MHO						X						
MHO to send Council response							X					
Staff Report to Council						X						
Posted on Web						X						

APPENDIX D

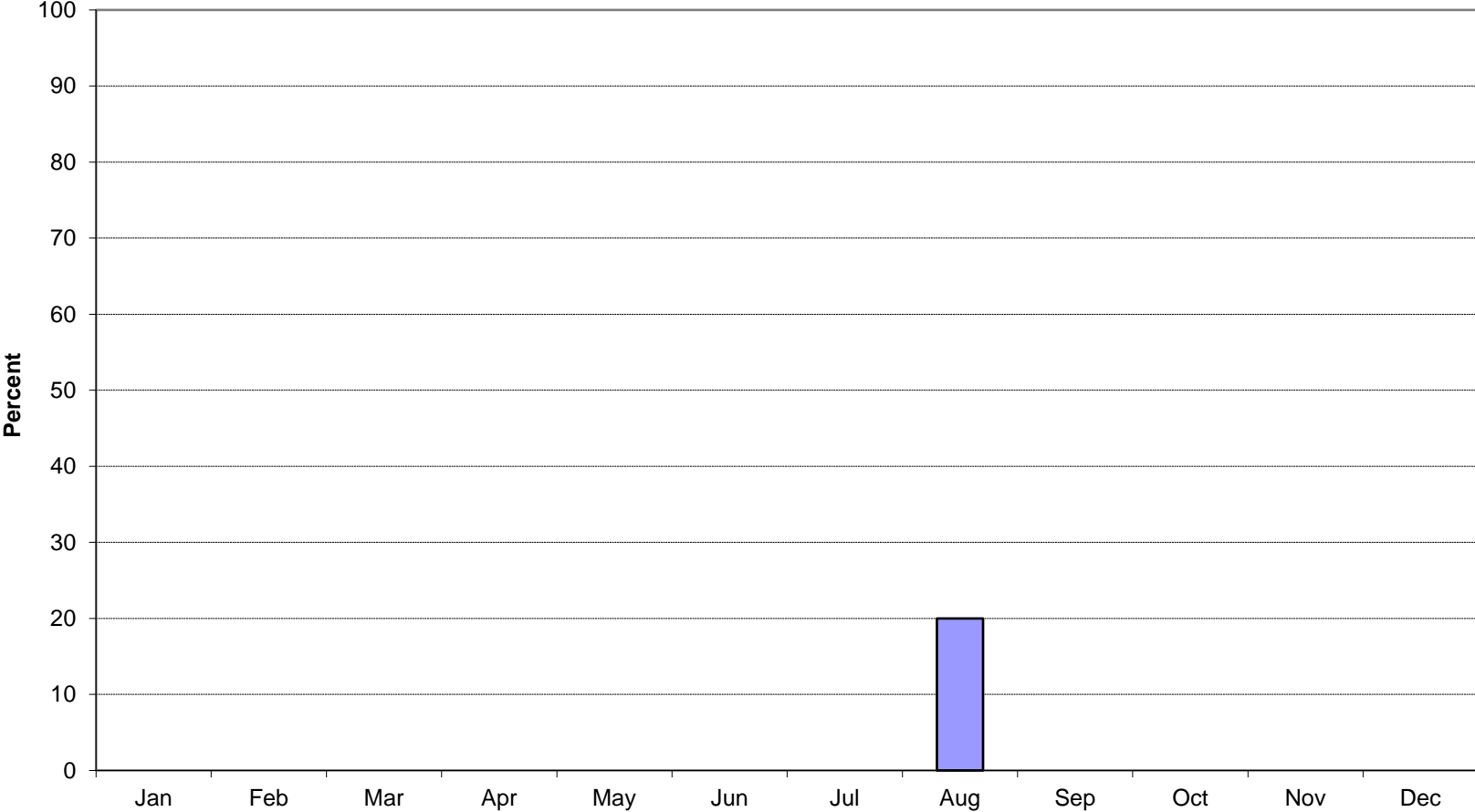
Belcarra Sample Station Readings of; Chlorine Free, Ecoli, HPC, Temperature, Total Coliform, and Turbidity

Sampling point	Sample type	Sample reported name	Sampled date	Chlorine Free mg/L	Ecoli MF/100mLs	HPC CFU/mls	Temperature °C	Total Coliform MF/100mLs	Turbidity NTU
BLC-670	GRAB	4503 Belcarra Bay Road	12-Jan-16	0.68	<1	<2	7.1	<1	0.08
BLC-671	GRAB	174 Turtlehead Road	12-Jan-16	0.40	<1	8	6.2	<1	0.14
BLC-672	GRAB	4945 Robson Road	12-Jan-16	0.58	<1	<2	6.1	<1	0.13
BLC-673	GRAB	5163 Whiskey Cove	12-Jan-16	0.44	<1	<2	5.9	<1	0.21
BLC-674	GRAB	5297 Coombe Lane	12-Jan-16	0.49	<1	<2	5.7	<1	0.17
BLC-670	GRAB	4503 Belcarra Bay Road	9-Feb-16	0.70	<1	<2	8.6	<1	0.11
BLC-677	GRAB	Bostock Road	9-Feb-16	0.47	<1	<2	6.6	<1	0.18
BLC-680	GRAB	3204 Main Avenue	9-Feb-16	0.43	<1	<2	5.9	<1	0.18
BLC-681	GRAB	3491 Senkler Road	9-Feb-16	0.38	<1	<2	6.8	<1	0.17
BLC-682	GRAB	3819 Bedwell Bay	9-Feb-16	0.30	<1	<2	6.9	<1	0.39
BLC-670	GRAB	4503 Belcarra Bay Road	8-Mar-16	0.62	<1	<2	8.5	<1	0.14
BLC-676	GRAB	Young Road	8-Mar-16	0.45	<1	2	8.0	<1	0.24
BLC-675	GRAB	3953 Bedwell Bay Road	8-Mar-16	0.48	<1	<2	7.8	<1	0.32
BLC-680	GRAB	3204 Main Avenue	8-Mar-16	0.45	<1	<2	7.2	<1	0.18
BLC-679	GRAB	Watson Road	8-Mar-16	0.52	<1	<2	7.8	<1	0.27
BLC-670	GRAB	4503 Belcarra Bay Road	13-Apr-16	0.66	<1	<2	10.0	<1	0.11
BLC-671	GRAB	174 Turtlehead Road	13-Apr-16	0.49	<1	<2	12.0	<1	0.16
BLC-672	GRAB	4945 Robson Road	13-Apr-16	0.48	<1	<2	11.0	<1	0.16
BLC-673	GRAB	5163 Whiskey Cove	13-Apr-16	0.46	<1	12	11.0	<1	0.16
BLC-674	GRAB	5297 Coombe Lane	13-Apr-16	0.51	<1	<2	10.0	<1	0.15
BLC-670	GRAB	4503 Belcarra Bay Road	10-May-16	0.65	<1	<2	12.0	<1	0.20
BLC-677	GRAB	Bostock Road	10-May-16	0.49	<1	34	13.0	<1	0.96
BLC-680	GRAB	3204 Main Avenue	10-May-16	0.18	<1	4	17.0	<1	0.34
BLC-681	GRAB	3491 Senkler Road	10-May-16	0.40	<1	<2	16.0	<1	0.36
BLC-682	GRAB	3819 Bedwell Bay	10-May-16	0.20	<1	<2	13.0	<1	0.19

BLC-670	GRAB	4503 Belcarra Bay Road	15-Jun-16	0.66	<1	4	13.3	<1	0.17
BLC-675	GRAB	3953 Bedwell Bay Road	15-Jun-16	0.07	<1	100	14.0	<1	0.20
BLC-680	GRAB	3204 Main Avenue	15-Jun-16	0.29	<1	<2	18.4	<1	0.22
BLC-679	GRAB	Watson Road	15-Jun-16	0.49	<1	<2	15.4	<1	0.18
BLC-676	GRAB	Young Road	15-Jun-16	0.34	<1	24	17.6	<1	0.24
BLC-670	GRAB	4503 Belcarra Bay Road	13-Jul-16	0.71	<1	<2	13.9	<1	0.10
BLC-671	GRAB	174 Turtlehead Road	13-Jul-16	0.33	<1	10	17.0	<1	0.13
BLC-672	GRAB	4945 Robson Road	13-Jul-16	0.3	<1	14	17.9	<1	0.12
BLC-673	GRAB	5163 Whiskey Cove	13-Jul-16	0.28	<1	26	17.1	<1	0.13
BLC-674	GRAB	5297 Coombe Lane	13-Jul-16	0.09	<1	<2	16.6	<1	0.20
BLC-670	GRAB	4503 Belcarra Bay Road	10-Aug-16	0.64	<1	6	15.7	<1	0.08
BLC-677	GRAB	Bostock Road	10-Aug-16	0.48	<1	2	17.7	<1	0.13
BLC-680	GRAB	3204 Main Avenue	10-Aug-16	0.07	<1	440	22.0	<1	0.49
BLC-681	GRAB	3491 Senkler Road	10-Aug-16	0.25	<1	6	20.1	<1	0.14
BLC-682	GRAB	3819 Bedwell Bay	10-Aug-16	0.04	<1	1700	17.1	<1	0.80
BLC-670	GRAB	4503 Belcarra Bay Road	14-Sep-16	0.57	<1	<2	15.3	<1	0.12
BLC-676	GRAB	Young Road	14-Sep-16	0.46	<1	<2	17.4	<1	0.12
BLC-679	GRAB	Watson Road	14-Sep-16	0.35	<1	<2	16.4	<1	0.12
BLC-680	GRAB	3204 Main Avenue	14-Sep-16	0.15	<1	4	18.9	<1	0.10
BLC-675	GRAB	3953 Bedwell Bay Road	14-Sep-16	0.14	<1	2	15.9	<1	0.09
BLC-670	GRAB	4503 Belcarra Bay Road	11-Oct-16	0.54	<1	4	12.9	<1	0.16
BLC-671	GRAB	174 Turtlehead Road	11-Oct-16	0.17	<1	6	14.2	<1	0.19
BLC-672	GRAB	4945 Robson Road	11-Oct-16	0.25	<1	<2	14.6	<1	0.19
BLC-673	GRAB	5163 Whiskey Cove	11-Oct-16	0.16	<1	<2	14.4	<1	0.21
BLC-674	GRAB	5297 Coombe Lane	11-Oct-16	0.14	<1	470	13.2	<1	0.27
BLC-670	GRAB	4503 Belcarra Bay Road	16-Nov-16	0.55	<1	<2	10.8	<1	0.12
BLC-677	GRAB	Bostock Road	16-Nov-16	0.55	<1	<2	11.2	<1	0.40
BLC-682	GRAB	3819 Bedwell Bay	16-Nov-16	0.43	<1	<2	10.7	<1	0.27
BLC-681	GRAB	3491 Senkler Road	16-Nov-16	0.43	<1	<2	11.4	<1	0.20
BLC-680	GRAB	3204 Main Avenue	16-Nov-16	0.28	<1	<2	10.8	<1	0.23

APPENDIX E
Metro Vancouver Results of HPC counts

VILLAGE OF BELCARRA - MONTHLY HPC COUNTS FOR 2016

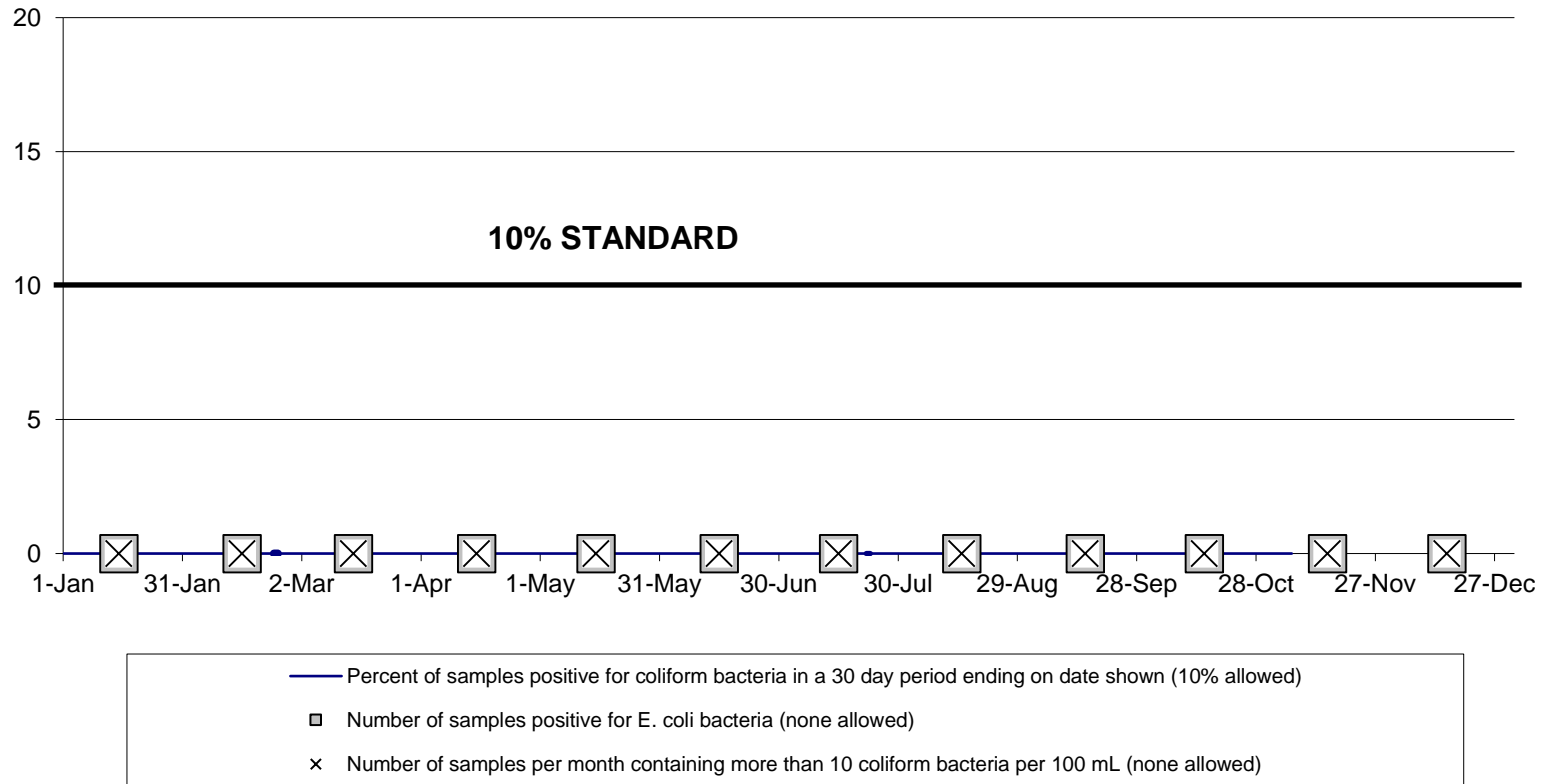


■ Percent of samples per month containing greater than 500 CFU/mL of heterotrophic plate count (HPC) bacteria. High HPC levels are an indication of bacterial regrowth.

APPENDIX F

VILLAGE OF BELCARRA FOR 2016

Results of Bacteriological Analyses of Potable Water Samples Compliance With BC Drinking Water Protection Regulation



APPENDIX G

Metro Vancouver Quarterly THMs, HAAs, and pH Results of Bacteriological Analysis

		Date Sampled	THM (ppb)					HAA (ppb)						Extras
			Bromochloromethane	Bromoform	Chlorodibromomethane	Chloroform	Total Trihalomethanes	Dibromoacetic Acid	Dichloroacetic Acid	Monobromoacetic Acid	Monochloroacetic Acid	Trichloroacetic Acid	Total Haloacetic Acid	pH units
BLC-670	4503 Belcarra Bay Road	Thursday, March 03, 2016	<1	<1	<1	14	14.9	<0.5	8	<1	6	7.5	22.9	7.2
BLC-682	3819 Bedwell Bay	Thursday, March 03, 2016	<1	<1	<1	34	35.6	<0.5	11	<1	<2	12.8	26.0	7.9
BLC-670	4503 Belcarra Bay Road	Tuesday, May 31, 2016	<1	<1	<1	20	20.0	<0.5	7	<1	6	7.2	20.5	7.3
BLC-682	3819 Bedwell Bay	Tuesday, May 31, 2016	<1	<1	<1	36	36.6	<0.5	11	<1	2	11.9	25.1	8.1
BLC-670	4503 Belcarra Bay Road	Tuesday, August 30, 2016	1	<1	<1	23	25	<0.5	9	<1	4	8	22.3	7.5
BLC-682	3819 Bedwell Bay	Tuesday, August 30, 2016	2	<1	<1	34	37	<0.5	13	<1	4	13.6	30.6	7.7
BLC-670	4503 Belcarra Bay Road	Tuesday, October 18, 2016	<1	<1	<1	28	29	<0.5	9	<1	6	12.1	27.7	7.3
BLC-682	3819 Bedwell Bay	Tuesday, October 18, 2016	2	<1	<1	36	38	<0.5	7	<1	3	14.9	24.9	7.6

APPENDIX H

Metro Vancouver Annual Metals Sampling Program

		BLC-670	BLC-682	BLC-670	BLC-682		
	Sample Description	4503 Belcarra Bay Road	3819 Bedwell Bay Road	4503 Belcarra Bay Road	3819 Bedwell Bay Road	<u>Canadian Guideline Limit</u>	<u>Reason Guideline Established</u>
	Sample Date	5/18/2016 8:10	5/18/2016 8:15	10/27/2016 13:03	10/27/2016 13:13		
	Sample Type	GRAB	GRAB	GRAB	GRAB		
Aluminium Total	µg/L	26	22	39	27	200	aesthetic
Antimony Total	µg/L	<0.5	<0.5	<0.5	<0.5	6	health
Arsenic Total	µg/L	<0.5	<0.5	<0.5	<0.5	10	health
Barium Total	µg/L	2.5	3.0	3.3	4.5	1000	health
Boron Total	µg/L	<10	<10	<10	<10	5000	health
Cadmium Total	µg/L	<0.2	<0.2	<0.2	<0.2	5	health
Calcium Total	µg/L	3040	3250	3180	4430	none	
Chromium Total	µg/L	0.24	0.36	0.19	0.23	50	health
Cobalt Total	µg/L	<0.5	<0.5	<0.5	<0.5	none	
Copper Total	µg/L	4.8	9.5	2.0	2.7	≤1000	aesthetic
Iron Total	µg/L	7	14	15	108	≤ 300	aesthetic
Lead Total	µg/L	<0.5	<0.5	<0.5	<0.5	10	health
Magnesium Total	µg/L	146	143	143	176	none	
Manganese Total	µg/L	2.4	0.9	1.3	2.2	≤ 50	aesthetic
Mercury Total	µg/L	<0.05	<0.05	<0.05	<0.05	1.0	health
Molybdenum Total	µg/L	<0.5	<0.5	<0.5	<0.5	none	
Nickel Total	µg/L	<0.5	<0.5	<0.5	<0.5	none	
Potassium Total	µg/L	146	167	186	310	none	
Selenium Total	µg/L	<0.5	<0.5	<0.5	<0.5	50	health
Silver Total	µg/L	<0.5	<0.5	<0.5	<0.5	none	
Sodium Total	µg/L	1340	1300	1590	1590	≤ 200,000	aesthetic
Zinc Total	µg/L	<3	<3	3.3	<3.0	≤ 5000	aesthetic

APPENDIX I

Notification for Unusual Situations Potentially Affecting Water Quality

Situation	Notifying Agency	Agency Notified	Time Frame For Notification
<i>E. Coli</i> -positive sample	MV Laboratory or BC Centre for Disease Control	Belcarra and Fraser Health Authority	Immediate
Total coliform over 10 mg/L and no free chlorine residual	Belcarra	Fraser Health Authority	Immediately upon receipt of sample test results
Chemical Contamination	Belcarra	Fraser Health Authority	Immediate
Turbidity > 5 NTU	MV Laboratory or GVWD Operations	Belcarra and Fraser Health Authority	Immediate
GVWD Disinfection failure	GVWD Operations	Belcarra and Fraser Health Authority	Immediate in any situation in which the BCSDWR or the GCDWQ may not be met
Loss of pressure due to high demand	Belcarra	DNV Operations and Fraser Health Authority	Immediate
Water main break in Belcarra, where contamination is suspected	Belcarra	Fraser Health Authority	Immediate
Water main break in DNV, where contamination is suspected	DNV	Belcarra and Fraser Health Authority	Immediate

REPORT PREPARED BY:

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