



The Municipality of the Village of Lions Bay

DRINKING WATER QUALITY

ANNUAL REPORT

2005



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

DRINKING WATER QUALITY

ANNUAL REPORT

2005



ITEM	Page
General Description	3
Source Water	3
Water Treatment	5
Water Distribution System	6
Significant Events in 2005	11
Maintenance and Upgrading Work in 2005	11
Maintenance and Upgrading Work Planned for 2006	12
Operator Training	12
Appendix A - Water Quality Sampling	
Appendix B - Source / Distribution Water Test Results	
Appendix C - Water Chemistry Test Results	
Appendix D - Emergency Plan	
Appendix E - Sample Boil Water Advisory	
Appendix F - Environmental Operators Certification Program	
Facility Classification	



GENERAL DESCRIPTION

The Village of Lions Bay supplies potable water to approximately 1500 residents with 500 service connections. Water is sourced from three local creeks, treated with chlorine and then distributed via eight storage tanks and thirteen kilometers of water mains to the residents.

This report provides an overview of the water quality at the Village of Lions Bay during 2005.

SOURCE WATER

The community's watershed lands include Magnesia Creek drainage (421 hectares), Alberta Creek drainage (51 hectares), Harvey Creek drainage (635 hectares) and Rundle Creek drainage (20 hectares). Water is normally drawn from the intake on Harvey Creek and Magnesia Creek. Two additional water intakes exist, one at lower Magnesia Creek, and one at Alberta Creek. However, these intakes are considered as 'reserve intakes' and were not used during 2005.

Challenges

The Village draws its water from surface sources that are subject to fluctuating turbidity levels. This fluctuation in raw water turbidity presents a challenge to ensure that distributed water turbidity and residual chlorine levels are not adversely affected. Water intakes are typically checked every second or third day, and several times a day when the weather dictates. Injections sites are checked twice daily from Monday to Friday.

Test Results

The Village tests untreated source water for turbidity twice daily Monday to Friday, and performs more extensive testing half-yearly for general water chemistry, hardness, metals and contaminants including organic compounds. The results for source water during 2005 are presented and discussed below.

Turbidity

	RAW WATER	
	HARVEY CREEK	MAGNESIA CREEK
Count	231	230
Maximum Result (NTU)	4.40	13.30
Minimum Result (NTU)	0.52	0.58
Average (NTU)	0.91	1.17
Number of samples less than 1 NTU	181	143
Number of samples greater than 1 NTU but less than 5 NTU	50	84
Number of samples greater than 5 NTU	0	3
Percentage of samples less than 1 NTU	78.35%	62.17%
Percentage of samp. greater than 1 NTU but less than 5 NTU	21.65%	36.53%
Percentage of samples greater than 5 NTU	0%	1.3%



The Canadian Drinking Water Guidelines (and the US Environmental Protection Agency) state that the turbidity of an unfiltered raw water supply should generally be around 1 NTU, and should not exceed 5 NTU. As can be seen from the above summary table, raw water turbidity during 2005 was generally acceptable for unfiltered source water, and ranged below 1.0 NTU most of the time. During 2005 Magnesia raw water exceeded three times the Canadian Drinking Water Guidelines: On April 11 (7.19 NTU), on October 17 (5.82 NTU), and on December 22 (13.30 NTU). Currently, the Village is testing the raw water on both Harvey and Magnesia sources with Turbidimeters on line located at the chlorinators, in order to evaluate the feasibility of including Filtration Systems as treatment before disinfection.

Metals and General Chemistry

Sample	Raw Water		Canadian Drinking Water Guidelines		Max Level Recorded	Samples Outside Limit
	Harvey Creek	Magnesia Creek	Lower Limit	Upper Limit		
Date collected	22/06/05	22/06/05				
Physical Tests						
Colour	<5	<5		15	<5	0
Conductivity	10.1	21.6			21.6	0
Total Dissolved Solids	12	20		500	20	0
Hardness	3.57	6.96			6.96	0
pH	6.04	6.57	6.5	8.5	6.57	1
Total Suspended Solids	-	-				
Turbidity	0.25	0.26		5	0.26	0
Dissolved Anions						
Alkalinity – Total	3.7	3.9			3.9	0
Chloride	<0.50	<0.50		250	<0.50	0
Fluoride	<0.020	<0.020		1.5	<0.20	0
Sulphate	0.88	5.12		500	5.12	0
Total Metals						
Aluminium	0.044	0.037			0.044	0
Antimony	<0.00050	<0.00050		0.006	<0.00050	0
Arsenic	<0.00010	<0.00011		0.025	<0.00011	0
Barium	<0.020	<0.020		1	<0.020	0
Boron	<0.10	<0.10		5	<0.10	0
Cadmium	<0.00020	<0.00020		0.005	<0.00020	0
Calcium	1.21	2.34			2.34	0
Chromium	<0.0020	<0.0020		0.05	<0.0020	0
Copper	<0.0010	<0.0010		1	<0.0010	0
Iron	<0.030	<0.030		0.3	<0.030	0
Lead	<0.0010	<0.0010		0.01	<0.0010	0
Magnesium	0.13	0.27			0.27	0
Manganese	<0.0020	<0.0020		0.05	<0.0020	0
Mercury	<0.00020	<0.00020		0.001	<0.00020	0
Potassium	<0.10	<0.10			<0.10	0
Selenium	<0.0010	<0.0010		0.01	<0.0010	0
Sodium	<2.0	<2.0		200	<2.0	0
Uranium	<0.00010	<0.00010		0.02	<0.00010	0
Zinc	<0.050	<0.050		5	<0.050	0
Organic Parameters						
BOD-5	-	-				
TOC	0.56	0.69			0.69	0
Nutrients						
Nitrate Nitrogen	<0.10	<0.10		10	<0.10	0
Nitrite Nitrogen	<0.10	<0.10		1	<0.10	0



As can be seen from the above results, raw water general chemistry and metals levels were generally very good during 2005. The only exception was that one sample from Harvey Creek had a pH which was slightly lower than the Canadian Drinking Water Guideline lower pH limit (result 6.04 compared with limit 6.5) on June 22, 2005. However, this is only representative of the sample taken on that time.

WATER TREATMENT

Treatment

Currently no filtration is applied to the water in Lions Bay - disinfection using chlorine is the only treatment applied. The Village maintains two chlorination stations. They include one chlorine gas injector at Harvey Creek intake and one chlorine gas injector at Magnesia Creek intake. Turbidity and residual chlorine tests are performed at these locations and downstream of the treated water tanks. There are also two standby water treatment stations, one liquid Hypochlorite injector at Brunswick Beach and one liquid Hypochlorite injector at Alberta Creek; however, these facilities were not operated during 2005.

Challenges

In times of severe weather, the Village water system operators increase the frequency of testing and adjustments of the injector rates in order to compensate for any fluctuating chlorine demand caused by varying turbidity levels. Residual chlorine levels in treated water exiting the treated water tanks are tested sometimes 4 or 6 times per day to ensure that sufficient chlorine residual levels are maintained in treated water during raw water turbidity variations.

Test Results

The Village tests treated water exiting the treated water tanks for turbidity and residual chlorine daily Monday to Friday. These results are presented and discussed below.

Turbidity

	TREATED WATER	
	HARVEY CREEK	MAGNESIA CREEK
Count	338	293
Maximum Result (NTU)	3.86	3.99
Minimum Result (NTU)	0.56	0.57
Average (NTU)	0.99	1.05
Number of samples less than 1 NTU	231	181
Number of samples greater than 1 NTU but less than 5 NTU	107	112
Number of samples greater than 5 NTU	0	0
Percentage of samples less than 1 NTU	68.34%	61.77%
Percentage of samp. greater than 1 NTU but less than 5 NTU	31.66%	38.23%
Percentage of samples greater than 5 NTU	0%	0%



The Canadian Drinking Water Guidelines (and the US Environmental Protection Agency) state that the turbidity of unfiltered treated water should generally be around 1 NTU, and should not exceed 5 NTU. As can be seen from the above summary table, raw water turbidity during 2005 was generally acceptable for unfiltered treated water, and ranged around 1 NTU most of the time. Peak turbidity reached 3.99 NTU exiting the 100,000 gal. Tank at Magnesia chlorinator on March 29, and 3.86 at PRV-3 (Harvey) on December 22; however, these peak turbidity events did not exceed the Canadian Drinking Water Guideline maximum water turbidity of 5 NTU.

Residual Chlorine

	TREATED WATER	
	HARVEY CREEK	MAGNESIA CREEK
Count	328	296
Maximum Result (mg/l)	1.24	1.15
Minimum Result (mg/l)	0	0
Average (mg/l)	0.57	0.65
Number of Samples Outside Limits	14	4
% Samples Outside Limits	4%	1.4%

(Note: The limits applied in the above analysis are as follows: The generally agreed ‘Minimum Acceptable Residual Chlorine’ level in treated drinking water is 0.2mg/l, as recommended by Vancouver Coastal Health. The generally agreed ‘Maximum Acceptable Residual Chlorine’ level in treated drinking water is 4.0mg/l, as recommended by the US Environmental Protection Agency).

As shown in the above analysis, a small number of samples (around 4% in Harvey and 1.4% in Magnesia) had residual chlorine levels less than 0.2 mg/l. This indicates that 96% of samples in Harvey and 98.6% of samples in Magnesia had acceptable levels of residual chlorine (greater than 0.2 mg/l but less than 4 mg/l).

When 0ppm chlorine residual is noted in the distribution system, some hydrants in the system are flushed until a chlorine residual of 0.2ppm is obtained.

WATER DISTRIBUTION SYSTEM

Storage

Approximately 450,000 imperial gallons of water are consumed per day for the whole system. There are currently 8 water storage tanks throughout the system. These include: Harvey (400,000 IG), Oceanview (100,000 IG), Magnesia (100,000 IG), Upper Bayview Phase 4 (20,000), Upper Bayview Phase 5 (25,000 IG although this tank was out of service during 2005), Highway (21,000 IG), South Sunset (40,000 IG) and Brunswick (35,000).

Distribution

The Village of Lions Bay’s location on the side of a mountain requires that water pressures be controlled with eleven (11) PRV stations.



Approximately 13 kilometers of water mains of a variety of ages and constructed from a variety of materials including asbestos cement, ductile iron, cast iron, and PVC make up the Village's distribution system.

Test Results

Samples are taken daily Monday to Friday from two quality sampling sites in the middle and end of the distribution system and tested for turbidity and residual chlorine.

Samples are taken from five quality sampling sites every Tuesday, and sent them to the laboratory to be tested for Total and Fecal coliforms.

In addition, metals levels and general chemistry are tested half-yearly at up to twelve locations in the distribution system. The results of the testing program are presented and discussed below.

Turbidity

	WATER DISTRIBUTION SYSTEM		
	CAFE	B. BEACH	K. G.
Count	53	51	39
Maximum Result (NTU)	1.43	2.03	3.36
Minimum Result (NTU)	0.60	0.59	0.58
Average (NTU)	0.83	0.87	0.92
Number of samples less than 1 NTU	49	46	31
Number of samples greater than 1 but less than 5 (NTU)	4	5	8
Number of samples greater than 5 NTU	0	0	0
Percentage of samples less than 1 NTU	92.45%	90.20%	79.49%
Percentage of samples greater than 1 but less than 5 (NTU)	7.55%	9.80%	20.51%
Percentage of samples greater than 5 NTU	0%	0%	0%

The Canadian Drinking Water Guidelines (and the US Environmental Protection Agency) state that the turbidity of unfiltered treated water should generally be around 1 NTU, and should not exceed 5 NTU. As can be seen from the above summary table, treated water turbidity during 2005 was generally acceptable for unfiltered treated water, and ranged around 1 NTU most of the time. Peak turbidity reached 1.43 NTU at Store/Cafe on January 25, 3.36 NTU at Kelvin Grove on June 21, and 2.03 NTU at Brunswick Beach on December 13; however, these peak turbidity events did not exceed the Canadian Drinking Water Guideline maximum water turbidity of 5 NTU.



Residual Chlorine and Coliforms

	BAYVIEW RD		OCEANVIEW RD		STORE/CAFE		BRUNSWICK B.		KELVIN GROVE	
	CL Residual (mg/l)	Fecal & Total Coliforms (P/N)	CL Residual (mg/l)	Fecal & Total Coliforms (P/N)	CL Residual (mg/l)	Fecal & Total Coliforms (P/N)	CL Residual (mg/l)	Fecal & Total Coliforms (P/N)	CL Residual (mg/l)	Fecal & Total Coliforms (P/N)
Count	52	52	52	52	52	52	52	39	39	39
Maximum Result (mg/l)	1.00	N	0.93	N	0.81	N	0.84	0.84	0.84	N
Minimum Result (mg/l)	0.21	N	0.20	N	0.00	N	0.08	0.02	0.02	N
Average (mg/l)	0.67	N	0.62	N	0.37	N	0.51	0.32	0.32	N
No. of Samples Outside Limits	0	0	0	0	10	0	1	0	6	0
% Samples Outside Limits	0%	0%	0%	0%	19%	0%	2%	0%	15%	0%

(Note: The limits applied in the above analysis are as follows: The generally agreed 'Minimum Acceptable Residual Chlorine' level in treated drinking water is 0.2mg/l, as recommended by Vancouver Coastal Health. The generally agreed 'Maximum Acceptable Residual Chlorine' level in treated drinking water is 4.0mg/l, as recommended by the US Environmental Protection Agency. In the case of both Total and Fecal Coliform tests, the test result is either Positive (P) or Negative (N), where a Positive result is not acceptable as it indicates the presence of coliforms).

As shown in the above analysis, a number of samples (19% in the case of Lions Bay Café sample point, 2% in the case of Brunswick Beach, and 15% in the case of Kelvin Grove) had residual chlorine levels of less than 0.2 mg/l; however, although residual chlorine levels in these parts of the distribution system were low, there were no Positive Fecal and Total Coliform test results during 2005.

When Oppm chlorine residual is noted in the distribution system, some hydrants in the system are flushed until a chlorine residual of 0.2ppm is obtained.



Metals and General Chemistry

Sample	Distributed Water						Canadian Drinking Water Guidelines			% Samples Outside Limits	
	PRV-3 Oceanview Rd	Store / Cafe	Lions Bay Elementary School	Kiddley Winks Childcare	Community Centre	Magnesia PRV-5 Bayview Rd	Lower Limit	Upper Limit	Maximum Level Recorded		# Samples Outside Limits
	22/06/05	22/06/05	22/06/05	22/06/05	22/06/05	22/06/05					
Physical Tests											
Colour	<5	-	-	-	-	<5.0	15	<5	0	0%	
Conductivity	12.6	-	-	-	-	25.4	500	25.4	0	0%	
Total Dissolved Solids	12	-	-	-	-	20	500	20	0	0%	
Hardness	3.89	-	-	-	-	7.68		7.68	0	0%	
pH	5.87	-	-	-	-	6.38	6.5	8.5	2	100%	
Turbidity	0.21	-	-	-	-	0.39	5	5	0	0%	
Dissolved Anions											
Alkalinity - Total	3.6	-	-	-	-	3.1		3.6	0	0%	
Chloride	1.35	-	-	-	-	1.29	250	1.35	0	0%	
Fluoride	<0.020	-	-	-	-	<0.020	1.5	<0.020	0	0%	
Sulphate	0.96	-	-	-	-	5.74	500	5.74	0	0%	
Total Metals											
Aluminum	0.036	-	-	-	-	0.038		0.038	0	0%	
Antimony	<0.00050	-	-	-	-	<0.00050	0.006	<0.00050	0	0%	
Arsenic	0.0010	-	-	-	-	0.0012	0.025	0.00012	0	0%	
Barium	<0.020	-	-	-	-	<0.020	1	<0.020	0	0%	
Boron	<0.10	-	-	-	-	<0.10	5	0.10	0	0%	
Cadmium	<0.00020	-	-	-	-	<0.00020	0.005	<0.00020	0	0%	
Calcium	1.33	-	-	-	-	2.66		2.66	0	0%	
Chromium	<0.0020	-	-	-	-	<0.0020	0.05	<0.0020	0	0%	
Copper	0.0084	0.0464	1.54	0.702	1.43	0.013	1	1.54	2	33%	
Iron	<0.050	-	-	-	-	<0.030	0.3	<0.030	0	0%	
Lead	<0.0010	0.0032	0.0672	0.0205	0.0192	<0.0010	0.01	0.0205	3	50%	
Magnesium	0.14	-	-	-	-	0.25		0.25	0	0%	
Manganese	<0.0020	-	-	-	-	<0.0020	0.05	<0.0020	0	0%	
Mercury	<0.00020	-	-	-	-	<0.00020	0.001	<0.00020	0	0%	
Potassium	<0.10	-	-	-	-	<0.10		<0.10	0	0%	
Selenium	<0.0010	-	-	-	-	<0.0010	0.01	<0.0010	0	0%	
Sodium	<2.0	-	-	-	-	<2.0	200	<2.0	0	0%	
Uranium	<0.00010	-	-	-	-	<0.00010	0.02	<0.00010	0	0%	
Zinc	<0.050	-	-	-	-	<0.050	5	<0.050	0	0%	
Nutrients											
Nitrate Nitrogen	<0.10	-	-	-	-	<0.10	10	<0.10	0	0%	
Nitrite Nitrogen	0.10	-	-	-	-	<0.10	1	0.10	0	0%	



Sample	Distributed Water										Canadian Drinking Water Guidelines						
	Harvey					Magnesia					Lower Limit	Upper Limit	Maximum Level Recorded	# Samples Outside Limits	% Samples Outside Limits		
	Kelvin Grove 20/07/05	PRV-3 Oceanview Rd 20/07/05	Store / Cafe 20/07/05	Lions Bay Elementary School 20/07/05	Kiddley Winks Childcare 20/07/05	Community Centre 20/07/05	PRV-5 Basyview Rd 20/07/05	Branswick Beach 20/07/05									
Date Collected	20/07/05	20/07/05	20/07/05	20/07/05	20/07/05	20/07/05	20/07/05	20/07/05	20/07/05	20/07/05							
Physical Tests																	
Colour	<5	-	<5	-	-	-	-	-	-	-	-	<5	-	15	<5	0	0%
Conductivity	20.4	-	16.9	-	-	-	-	-	-	-	-	36.2	-	36.2	36.2	0	0%
Total Dissolved Solids	31	-	24	-	-	-	-	-	-	-	-	38	-	500	38	0	0%
pH	8.41	-	5.95	-	-	-	-	-	-	-	-	7.98	-	8.5	8.41	0	0%
Turbidity	0.31	-	0.32	-	-	-	-	-	-	-	-	0.33	-	5	0.33	0	0%
Dissolved Anions																	
Alkalinity - Total	3.6	-	5.5	-	-	-	-	-	-	-	-	3.0	-		5.5	0	0%
Chloride	2.12	-	2.12	-	-	-	-	-	-	-	-	1.61	-	250	2.12	0	0%
Fluoride	<0.020	-	<0.020	-	-	-	-	-	-	-	-	0.021	-	1.5	0.021	0	0%
Sulphate	1.52	-	1.50	-	-	-	-	-	-	-	-	9.38	-	500	9.38	0	0%
Total Metals																	
Copper	0.251	-	0.132	0.135	0.0878	0.143	-	-	-	-	-	0.0163	-	1	0.251	0	0%
Lead	0.0031	-	<0.0010	0.0028	0.0016	0.0019	-	-	-	-	-	<0.0010	-	0.01	0.0028	0	0%
Zinc	0.614	-	0.0054	<0.0050	<0.0050	<0.0050	-	-	-	-	-	<0.0050	-	5	0.614	0	0%
Trihalomethanes																	
Bromochloromethane	<0.0010	<0.0010	<0.0010	-	-	-	-	-	-	-	-	<0.0010	<0.0010		<0.0010	0	0%
Bromoform	<0.0010	<0.0010	<0.0010	-	-	-	-	-	-	-	-	<0.0010	<0.0010		<0.0010	0	0%
Chloroform	0.0416	0.0392	0.0495	-	-	-	-	-	-	-	-	0.0278	0.0289		0.0289	0	0%
Dibromochloromethane	<0.0010	<0.0010	<0.0010	-	-	-	-	-	-	-	-	<0.0010	<0.0010		<0.0010	0	0%
Total Trihalomethanes	0.0416	<0.0392	0.0495	-	-	-	-	-	-	-	-	0.0278	0.0289	0.1	0.0495	0	0%
Halooacetic Acids																	
Bromoacetic Acid	<0.0020	<0.0020	<0.0020	-	-	-	-	-	-	-	-	<0.0020	<0.0020		<0.0020	0	0%
Bromochloroacetic A.	<0.0020	<0.0020	<0.0020	-	-	-	-	-	-	-	-	<0.0020	<0.0020		<0.0020	0	0%
Chloroacetic Acid	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	<0.020	<0.020		<0.020	0	0%
Dibromoacetic Acid	<0.0020	<0.0020	<0.0020	-	-	-	-	-	-	-	-	<0.0020	<0.0020		<0.0020	0	0%
Dichloroacetic Acid	0.0191	0.0223	0.0180	-	-	-	-	-	-	-	-	0.0124	0.0143		0.0223	0	0%
Trichloroacetic Acid	0.0096	0.0076	0.0063	-	-	-	-	-	-	-	-	0.0057	0.0043		0.0096	0	0%
Surrogate Standards																	
Dibromopropanoic A.	113	124	118	-	-	-	-	-	-	-	-	121	114		124	0	0%
Organic Parameters																	
Dis. Org. Carbon	-	0.78	0.74	-	-	-	-	-	-	-	-	0.60	0.56		0.78	0	0%
TOC	-	0.74	2.17	-	-	-	-	-	-	-	-	0.78	0.52		2.17	0	0%
Nutrients																	
Nitrate Nitrogen	<0.10	-	<0.10	-	-	-	-	-	-	-	-	<0.10	<0.10	10	<0.10	0	0%
Nitrite Nitrogen	<0.10	-	<0.10	-	-	-	-	-	-	-	-	<0.10	<0.10	1	<0.10	0	0%



As the above tables show, there was one occasion in which three samples (from the Kiddiley Winks Daycare Centre, Lions Bay Elementary School, and Community Centre) contained levels of Lead which exceeded the Canadian Drinking Water Guidelines maximum level. In addition, on the same occasion, the levels of copper in the sample at the Lions Bay Elementary School and Community Centre also exceeded the Canadian Drinking Water Guidelines maximum level. The Village of Lions Bay notified Vancouver Coastal Health of these 'non-compliant' results.

Due to the fact that tap water might contain higher amount of lead, on March 10, 2005 and July 28, 2005 the Village mailed to the residents an advisory on water flushing, asking them to run their taps for at least one minute first thing in the mornings or any other time water has left standing for a long time.

SIGNIFICANT EVENTS IN 2005

Chlorine Leak at Harvey Chlorinator

On Monday, July 11, 2005 the Village of Lions Bay had a small chlorine leak at the Harvey Creek chlorinator. The leak occurred from an adjustment regulator on the chlorinator. The personnel from the village controlled this leak and it was unnecessary to call the Lions Bay Fire Department.

During the incident, the small quantity of chlorine that was released into the environment was not of concern, and residual chlorine levels were maintained in the drinking water. Hence there was no impact on the drinking water supply.

MAINTENANCE AND UPGRADING WORK IN 2005

The following work was carried out in 2005:

- Replaced water main on Oceanview place, upgraded to a 6" Ductile Iron pipe. One new Fire Hydrant was installed (No. 16)
- Installed additional water inspection stations and increased water inspection rates to twice daily.
- Opened cross valves for improved pressure stabilization and water flow
- Developed and approved Master Infrastructure Plan.
- Reconfigured the water mains at the 100,000 gal. Harvey tank to put it on line
- Started repairs to correct leaks on the 400,000 gal. Harvey tank
- Relocated approximately 10 metres of 6" Ductile Iron main in Kelvin Grove to prevent a failure due to land slippage
- Implemented continual access road repairs
- Repacking of isolate valves on Fire Hydrants No. 54 (Seaview place) and No. 55 (Lions bay Avenue)



- Replaced drain ring on Fire Hydrant No.18 in Highview place
- Rebuilt Pressure Reducer Valves Nos. 4,6,and 7
- Carried out unidirectional water main flushing on 80% of the system
- Replaced Pump and Lid at Timbertop pump station
- Identified and repaired several leaks on water mains and water services.

MAINTENANCE AND UPGRADING WORK PLANNED FOR 2006

The Village has formally accepted the proposed infrastructure plan as presented by the retained engineering firm (Earthtech). Areas requiring improvements and upgrades have been identified and prioritized and the following works are schedule to occur during 2006:

- Installation of automated Turbidity Meters in the Harvey and Magnesia systems.
- Replacement of outdated fire hydrants.
- Continued repair and replacement of existing water lines.
- Continued inspection and cleaning of reservoirs.
- Completion of repairs and sealing of the 400 gal Harvey Tank.
- Looping water lines for improved water flow.
- Continued leak identification and repair.
- Continued unidirectional flushing program.
- Improving intakes for debris removal.
- Begin preliminary water treatment facility construction program.
- Continuing the rock stabilization program.
- Continued maintenance and improvement for access roads.
- Additional water and waste water courses for staff.
- Continued community education regarding water conservation.

OPERATOR TRAINING

The Village's water treatment/distribution system has been evaluated as a level II by the Environmental Operators Certification Program (EOCP). There are two operators for the Village's water system, Alberto Urrutia and Garth Begley.

Alberto Urrutia has completed the following courses:

- Confined space workshop
- Water Treatment I
- Chlorine Handling



- Utility Management
- Water Treatment Plant Operation II
- Water Treatment Plant Operation I
- Water Distribution System Operation and Maintenance
- Small Water Systems Operation and Maintenance
- Small Water systems
- Waterworks Technology.

On July 21, 2004 Alberto Urrutia received his EOCP Water Distribution Operator-in-Training Certificate and on April 6, 2005 he received his EOCP Water Distribution Operator Level I Certificate. Alberto has a B.Sc. Civil Engineering from the Universidad Autonoma de Puebla, Mexico and currently he is studying the Water Treatment Technology Program with the Thompson Rivers University, Kamloops, BC. Alberto is attending his EOCP Water Distribution Operator Level II in July, 2006 once he has completed 4000 hours of practicum and 45 Continuing Education Units (CEU's).

Garth Begley has completed the confined space workshop and the Chlorine Handling course. Garth will begin training towards getting his EOCP certificate as a Level II Operator in 2006.



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

DRINKING WATER QUALITY

ANNUAL REPORT

2005

Appendix A

Water Quality Sampling

LIST OF SAMPLING SITE LOCATIONS

Location	Source	Tests	Frequency
PRV-3 (Hwy Tank)	Harvey Creek	Cl2 Residual and Turbidity	Daily Monday-Friday
Magnesia Chlorinator	Magnesia Creek		
PRV-3 (Hwy Tank)	Harvey Creek	Total and Fecal Coliforms	Every Tuesday
PRV-5	Magnesia Creek	Total and Fecal Coliforms	Every Tuesday
Lions bay Café	Harvey Creek	Total and Fecal Coliforms	Every Tuesday
Brunswick Beach	Magnesia Creek	Total and Fecal Coliforms	Every Tuesday
Kelvin Grove	Harvey Creek	Total and Fecal Coliforms	Every Tuesday
Harvey Intake	Harvey Creek	Raw Water Turbidity	3 x Week on Mon, Wed, Fri
Magnesia Intake	Magnesia Creek	Raw Water Turbidity	3 x Week on Mon, Wed, Fri
Harvey Chlorinator	Harvey Creek	Raw Water Turbidity	32x Week on Tue, Thur
Magnesia Chlorinator	Magnesia Creek	Raw Water Turbidity	32x Week on Tue, Thur
Harvey Intake	Harvey Creek	Metals – lead, copper, zinc	2 x Yearly
Magnesia Intake	Magnesia Creek	Metals – lead, copper, zinc	2 x Yearly
Tide Water	At Tap	Metals – lead, copper, zinc	2 x Yearly
Highway Tank	At Tap	Metals – lead, copper, zinc	2 x Yearly
Brunswick Beach	At Tap	Metals – lead, copper, zinc	2 x Yearly
PRV-5	At Tap	Metals – lead, copper, zinc	2 x Yearly
Cafe	At Tap	Metals – lead, copper, zinc	2 x Yearly
Elementary School	At Tap	Metals – lead, copper, zinc	2 x Yearly
Kiddiley Winks Childcare	At Tap	Metals – lead, copper, zinc	2 x Yearly

Bacteria

Sample collection for monitoring bacteria levels in the Lions Bay water distribution system is performed every Tuesday at four sites. Samples are delivered to the Vancouver Coastal Health Authority for analysis and reporting. Standard bacteriological parameters analyzed are fecal and total coliform. The sampling locations are listed above and include source, mid and end system sites.

In addition, random samples may be taken from areas where water quality complaints have originated or where waterworks construction or maintenance activities are underway.

Bacteriological standards in water distribution systems should meet the requirements of the B.C. Safe Drinking Water Regulation, which stipulates the following criteria for sample tests results:

- Fecal Coliform – 0 fecal coliform/100 mL
- Total Coliform – 10 or less total coliform/100 mL
- Total Coliform – 90% or more of the samples for a given month must have 0 Total coliform/100 mL

Physical Parameters

Treated water in the distribution system is tested for turbidity daily, Monday through Friday, at seven sites. Raw water is tested for turbidity at both the intakes three times per week, on Mondays, Wednesdays and Fridays. Taste, odour and turbidity are monitored on a complaint basis.

The turbidity limit set in the Guidelines for Canadian Drinking Water Quality is 1 NTU (nephelometric turbidity unit).

Chemical Parameters

- Free chlorine residual – measured at all sampling sites when bacteriological samples are collected.
- Haloacetic acids (HAA's) – HAA's are disinfection by-products. HAA's are not regulated in Canada but a maximum contaminant level of 60 ppb (based on a running annual average calculated with quarterly results for different locations within the system) has recently been adopted in the USA.
- Trihalomethanes (THM's) – THM's are disinfection by-products sampled with HAA's. The Guidelines for Canadian Drinking Water Quality (GCDWQ) list an interim maximum acceptable concentration for THM's at 100 ppb (based on a running annual average calculated with quarterly results for different locations within the system).
- pH – measured on samples collected for HAA/THM testing. The GCDWQ recommend an aesthetic objective for pH ranging between 6.5 and 8.5.
- Metals – during 2001, the regional Medical Health Officers developed a strategy for sampling metals “at the tap”. The new 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.



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

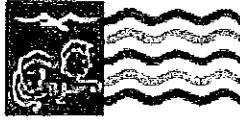
DRINKING WATER QUALITY

ANNUAL REPORT

2005

Appendix B

Source/Distribution Water Test Results



Raw Water Quality Control 2005

January

Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	-----	271,000		-----	121,108	
2	-----	271,000		-----	121,108	
3	7:51	271,000	0.99	8:22	121,108	1.03
4	10:05	307,000		12:00	143,276	
5	7:35	249,000	0.69	7:55	97,000	0.72
6	7:30	281,000	0.62	8:10	123,300	0.89
7	-----	283,500		-----	128,145	
8	-----	283,500		-----	128,145	
9	-----	283,500		-----	128,145	
10	9:25	283,500	1.15	11:25	128,145	0.73
11	14:05	328,000	0.76	14:50	137,518	1.08
12	7:40	197,000	0.97	11:35	116,600	0.97
13	7:40	278,000	0.68	8:20	121,600	0.95
14	7:35	265,000	0.67	8:00	128,400	
15	-----	276,000		-----	131,367	
16	-----	276,000		-----	131,367	
17	9:05	276,000	3.91	9:30	131,367	4.35
18	9:25	274,000	1.96	9:50	137,400	1.7
19	10:35	287,000	1.82	-----	-----	
20	8:08	342,000	1.45	-----	-----	
21	7:25	344,000	1.3	7:40	154,000	1.59
22	14:30	421,000		-----	22,712	
23	-----	329,500		-----	22,712	
24	8:00	329,500	1.22	8:35	22,712	1.6
25	-----	358,000		-----	166,241	
26	7:50	358,000	0.78	8:05	166,241	1.04
27	8:00	360,000	0.89	8:30	8,972	1.07
28	8:05	365,000	1.02	8:40	1,504	1.07
29	-----	290,000		-----	1,728	
30	-----	290,000		-----	1,728	
31	2:30	290,000	0.77	-----	1,728	0.98



Raw Water Quality Control 2005

February

Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	-----	349,000		-----	81,194	
2	9:00	349,000	0.88	8:00	81,194	0.91
3	7:45	294,000	0.8	8:20	77,200	1.39
4	7:35	305,000	1.01	8:15	73,000	1.06
5	9:15	288,000		-----	77,600	
6	-----	257,500		-----	77,600	
7	7:50	257,500	0.88	8:30	77,600	0.93
8	8:35	260,000		9:20	77,600	
9	7:55	338,000	0.97	9:35	74,020	0.62
10	6:15	245,000		7:50	71,380	0.96
11	7:30	252,000	0.8	7:55	75,664	0.95
12	9:30	237,000		-----	81,878	
13	-----	260,500		-----	81,878	
14	9:55	260,500		10:45	81,878	1.06
15	-----	240,000		-----	74,511	
16	7:40	240,000	0.71	8:15	74,511	1.49
17	7:35	250,000	0.83	8:00	76,178	1.16
18	7:48	249,000	0.6	8:25	80,500	0.93
19	-----	236,000		-----	80,167	
20	-----	236,000		-----	80,167	
21	7:50	236,000	0.72	-----	80,167	0.86
22	-----	232,000		-----	77,291	
23	7:35	232,000	0.65	-----	77,291	0.81
24	7:37	243,000	0.83	-----	76,118	0.64
25	7:45	236,000	0.66	-----	79,700	0.7
26	-----	249,000		-----	79,000	
27	-----	249,000		-----	79,000	
28	7:40	249,000	0.67	8:20	79,000	0.67



Raw Water Quality Control 2005

March

Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	13:20	310,000	1.58	13:50	96,100	1.19
2	8:20	192,000	0.79	9:00	60,900	0.82
3	7:50	236,000	0.75	8:10	74,600	0.79
4	7:52	255,000	1.22	8:48	82,955	1.59
5	-----	259,000		-----	78,815	
6	-----	259,000		-----	78,815	
7	7:50	259,000	0.85	8:30	78,815	1.63
8	10:35	283,000	0.91	11:05	84,800	0.94
9	7:50	218,000	0.93	8:25	66,800	1.27
10	7:30	259,000		8:07	76,980	
11	7:50	284,000	0.62	8:25	96,892	0.81
12	-----	266,633		-----	83,833	
13	-----	266,633		-----	83,833	
14	7:42	266,633	0.72	8:20	-----	0.89
15	12:45	327,000		14:10	103,200	
16	7:50	198,000	0.84	8:30	60,600	1.04
17	7:55	278,000		9:20	81,700	0.84
18	7:40	242,000	0.66	8:25	1,700	0.82
19	-----	262,000		-----	107,266	
20	-----	262,000		-----	107,266	
21	8:40	262,000	1	7:58	107,266	1.44
22	-----	243,500		-----	80,350	
23	7:45	243,500	0.54	8:25	80,350	0.76
24	8:45	272,000	0.89	8:05	78,800	0.91
25	-----	257,000		-----	80,640	
26	-----	257,000		-----	80,640	
27	-----	257,000		-----	80,640	
28	-----	257,000		-----	80,640	
29	8:25	257,000	0.81	9:05	80,640	1.01
30	7:30	242,000	1.21	7:56	72,787	0.85
31	7:40	265,000	1.36	8:05	75,913	0.94



Raw Water Quality Control 2005

April

Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	8:25	284,000	1.18	9:02	81,540	0.93
2	-----	271,000		-----	82,277	
3	-----	271,000		-----	82,277	
4	11:19	271,000	0.87	11:40	82,277	
5	8:05	227,000		8:50	72,429	
6	7:35	246,000		8:20	74,900	
7	7:50	264,000	0.88	8:25	88,900	0.88
8	7:55	251,000	0.98	8:45	78,965	1.65
9	-----	265,000		-----	84,067	
10	-----	265,000		-----	84,067	
11	8:25	265,000	0.88	9:50	84,067	7.19
12	7:40	311,000		-----	-----	
13	8:30	311,000	0.87	-----	-----	0.77
14	7:35	291,000	1.1	-----	-----	
15	7:50	302,000	0.98	-----	-----	1.29
16	-----	252,000		-----	81,054	
17	-----	252,000		-----	81,054	
18	7:42	252,000	0.85	8:20	81,054	0.82
19	8:00	235,000	0.79	8:46	85,700	0.79
20	7:55	255,000	0.71	8:30	80,497	0.95
21	7:40	242,000	0.83	8:10	99,203	0.87
22	8:20	250,000	0.69	10:00	93,100	0.96
23	-----	281,600		-----	92,861	
24	-----	281,600		-----	92,861	
25	9:15	281,600	0.95	11:15	92,861	1.44
26	8:05	259,000	1.07	7:45	81,517	1.22
27	7:43	288,000	1.05	8:15	96,286	1.41
28	9:30	329,000	0.82	10:30	108,314	0.95
29	7:36	286,000	1.03	8:03	83,274	1.05
30	-----	-----		-----	-----	



Raw Water Quality Control 2005

May

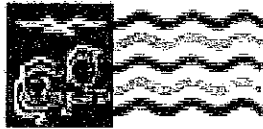
Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	-----	328,600		-----	107,526	
2	7:50	328,600	0.75	8:30	107,526	0.93
3	7:30	288,000	0.85	8:05	84,623	0.97
4	7:35	288,000	0.8	8:05	94,834	1.03
5	7:25	280,000	0.9	7:45	88,504	1.12
6	7:35	338,000	0.89	8:15	99,361	1.05
7	-----	317,333		-----	99,776	
8	-----	317,333		-----	99,776	
9	8:10	317,333	0.96	8:55	99,776	3.59
10	7:47	285,000	0.78	8:05	87,986	0.68
11	7:45	298,000	0.79	8:30	94,914	0.94
12	7:21	318,000	1.11	7:38	92,780	1.25
13	7:27	318,000	0.79	7:50	82,417	1.23
14	-----	308,303		-----	92,525	
15	-----	308,303		-----	92,525	
16	7:35	308,303	0.85	8:06	92,525	1.77
17	6:00	115,000		7:48	84,228	0.83
18	7:45	421,000	1.58	8:20	88,175	1.92
19	7:35	293,000	1.29	8:45	99,525	1.31
20	7:31	279,000	0.97	8:07	85,585	1.77
21	-----	297,750		-----	90,297	
22	-----	297,750		-----	90,297	
23	-----	297,750		-----	90,297	
24	8:30	297,750	0.82	9:10	90,297	0.99
25	8:05	265,000	0.82	8:45	93,185	0.91
26	7:45	262,000	0.72	8:21	93,610	0.96
27	7:45	306,000	0.88	8:31	107,853	0.9
28	-----	351,000		-----	112,013	
29	-----	351,000		-----	112,013	
30	-----	351,000		-----	112,013	
31	8:35	351,000	0.77	9:10	112,013	1.09



Raw Water Quality Control 2005

June

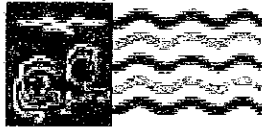
Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	7:48	269,000	0.68	8:15	92,844	0.99
2	7:35	286,000	0.69	8:00	91,216	0.99
3	7:30	290,000	0.77	8:20	97,100	0.83
4	-----	289,700		-----	94,367	
5	-----	289,700		-----	94,367	
6	7:40	289,700	0.71	8:20	94,367	0.77
7	8:45	306,000	0.78	8:31	93,866	0.82
8	7:40	254,000	0.68	8:20	93,914	0.94
9	7:30	284,000	1.36	7:45	89,662	0.93
10	7:40	275,000	0.87	8:10	93,238	1.17
11	-----	277,666		-----	95,545	
12	-----	277,666		-----	95,545	
13	7:40	277,666	0.86	8:13	95,545	0.97
14	7:45	273,000	0.9	8:40	92,963	0.86
15	7:40	231,000	0.86	8:10	93,786	0.96
16	7:45	274,000	0.64	8:15	104,054	0.88
17	7:34	261,000	0.99	9:00	102,840	1.02
18	-----	253,000		-----	92,240	
19	-----	253,000		-----	92,240	
20	7:55	253,000	0.74	8:40	92,240	1.48
21	07:39	249,000	0.86	8:50	97,319	0.96
22	8:45	226,000	0.75	9:35	105,581	1.17
23	8:35	209,000	0.84	8:32	134,345	1.08
24	7:45	204,000	0.82	8:41	93,454	1.54
25	-----	236,666		-----	101,666	
26	-----	236,666		-----	101,666	
27	8:02	236,666	0.82	8:45	101,666	0.89
28	8:00	208,000	0.98	11:30	110,878	0.96
29	8:00	222,000	0.74	9:00	88,224	1.48
30	8:52	225,000	1.56	8:25	138,361	3.2



Raw Water Quality Control 2005

July

Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	-----	251,750		-----	100,010	
2	-----	251,750		-----	100,010	
3	-----	251,750		-----	100.01	
4	8:00	251,750	0.67	9:00	100,010	0.58
5	7:55	247,000	0.77	7:35	99,302	0.9
6	7:50	230,000	0.76	8:40	103,798	1.22
7	7:40	215,000	1.48	8:10	119,600	1.02
8	7:45	226,000	0.96	8:35	101,500	1.26
9	-----	252,000		-----	100,967	
10	-----	252,000		-----	100,967	
11	7:55	252,000	0.73	8:45	100,967	0.88
12	7:37	223,000	1.36	8:00	98,460	1.33
13	7:45	240,000	0.9	8:30	101,040	0.99
14	7:45	281,000	0.88	8:15	103,100	0.95
15	7:45	269,000	0.73	8:35	112,500	2.14
16	-----	261,000		-----	106,833	
17	-----	261,000		-----	106,833	
18	8:05	261,000	0.66	8:50	106,833	1.07
19	8:20	310,000	1.23	7:45	110,000	0.68
20	9:15	319,000	0.74	10:25	129,900	0.75
21	8:15	302,000	0.96	8:00	92,578	1.17
22	8:00	347,000	0.91	8:15	102,188	0.83
23	-----	348,000		-----	108,347	
24	-----	348,000		-----	108,347	
25	8:12	348,000	0.72	9:00	108,347	0.63
26	8:26	383,000	0.78	9:00	103,324	0.75
27	8:58	376,000	0.85	8:12	111,728	0.58
28	7:26	362,000	1.02	7:52	108,626	0.96
29	8:00	406,000	1.4	8:24	127,784	0.77
30	-----	379,500		-----	115,682	
31	-----	379,500		-----	115,682	



Raw Water Quality Control 2005

August

Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	-----	379,500		-----	115,682	
2	8:42	379,500	2.58	8:10	115,682	0.63
3	7:55	409,000	1.19	14:25	141,500	0.89
4	7:55	400,000	0.67	8:20	91,100	0.81
5	7:55	463,000	0.71	8:40	144,200	1.08
6	-----	452,000		-----	133,500	
7	-----	452,000		-----	133,500	
8	9:10	452,000	0.62	10:00	133,500	0.59
9	10:15	445,000	0.76	11:10	146,400	0.86
10	8:25	398,000	0.76	10:00	129,100	0.64
11	8:10	416,000	0.54	8:50	120,700	0.72
12	7:41	398,000	0.87	8:10	114,641	1.05
13	-----	470,000		-----	147,953	
14	-----	470,000		-----	147,953	
15	11:10	470,000	0.81	11:50	147,953	1.05
16	8:53	389,000	0.65	8:28	112,777	1.05
17	8:02	357,000	1.04	8:53	119,946	0.96
18	7:40	320,000	0.66	8:18	100,220	0.9
19	7:50	341,000	0.81	8:45	106,403	1.01
20	-----	365,000		-----	118,284	
21	-----	365,000		-----	118,284	
22	7:55	365,000	0.62	8:35	118,284	0.67
23	7:45	345,000	0.64	8:01	118,241	0.72
24	7:50	397,000	0.69	8:30	122,859	0.77
25	7:45	414,000	0.69	8:10	121,600	0.62
26	7:50	398,000	0.81	8:45	144,200	0.85
27	-----	374,333		-----	113,300	
28	-----	374,333		-----	113,300	
29	7:50	374,333	0.7	8:40	113,300	0.82
30	7:42	318,000	0.75	8:01	98,200	0.74
31	7:35	322,000	0.71	8:15	104,600	0.81



Raw Water Quality Control 2005

September

Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	7:45	321,000	0.59	9:20	105,300	0.74
2	7:50	344,000	0.54	8:38	98,400	0.73
3	-----	310,750		-----	105,975	
4	-----	310,75		-----	105,975	
5	-----	310,750		-----	105,975	
6	8:10	310,750	0.76	9:10	105,975	0.71
7	8:00	315,000	0.68	8:25	94,200	0.61
8	8:05	316,000	0.9	8:35	112,100	0.81
9	4:40	265,000	1.17	6:10	98,566	0.83
10	-----	346,000		-----	110,245	
11	-----	346,000		-----	110,245	
12	8:50	346,000	0.64	9:35	110,245	0.81
13	8:05	306,000	0.57	8:40	94,500	0.78
14	8:25	346,000	0.95	9:10	101,800	0.64
15	8:00	324,000	0.62	8:40	98,500	0.71
16	7:50	327,000	0.77	8:50	104,400	0.65
17	-----	322,333		-----	97,867	
18	-----	322,333		-----	97,867	
19	7:55	322,333	0.69	8:45	97,867	0.87
20	8:15	326,000	0.75	8:50	97,100	0.73
21	8:00	321,000	0.79	8:50	96,400	0.8
22	7:50	270,000	0.65	8:10	94,000	0.6
23	7:55	345,000	0.66	8:45	117,000	0.62
24	-----	345,333		-----	107,100	
25	-----	345,333		-----	107,100	
26	8:15	345,333	0.72	9:00	107,100	0.68
27	8:20	335,000	0.7	8:00	98,408	0.92
28	8:00	318,000	0.58	8:45	99,792	0.61
29	8:45	320,000	4.4	9:50	98,282	4.75
30	10:07	325,000	0.91	8:55	81,129	1.08



Raw Water Quality Control 2005

October

Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	8:30	389,000		-----	88,596	
2	9:17	313,000		-----	88,596	
3	7:50	304,000	1.22	8:40	88,596	0.93
4	8:05	300,000	0.91	7:50	89,150	0.99
5	7:45	302,000	0.81	8:50	87,306	0.86
6	7:31	304,000	1.12	7:50	89,150	1.29
7	7:55	318,000	1.66	8:45	91,833	1.82
8	-----	306,000		-----	84,384	
9	6:50	306,000		7:15	84,384	
10	-----	322,500		-----	92,636	
11	8:10	322,500	0.95	8:50	92,636	0.68
12	7:50	303,000	0.8	8:15	85,927	1.37
13	8:15	309,000	1.22	9:15	90,759	1.04
14	7:50	309,000	0.77	8:35	81,931	1.22
15	10:15	302,000		-----	87,470	
16	-----	323,500		-----	87,470	
17	7:50	323,500	2.03	8:45	87,470	5.82
18	8:00	327,000	0.72	8:30	85,803	1.11
19	8:22	304,000	0.79	9:05	85,494	1.98
20	7:50	285,000	0.72	8:35	116,325	0.89
21	7:50	307,000	0.72	8:30	84,819	1.30
22	-----	306,000		-----	88,769	
23	-----	306,000		-----	88,769	
24	8:00	306,000	0.63	9:05	88,769	1.48
25	8:15	306,000	0.61	9:05	86,286	0.78
26	8:04	296,000	0.86	8:45	83,785	1.50
27	8:00	308,000	0.84	8:50	288,180	0.91
28	8:20	288,000	1.00	9:25	115,900	1.58
29	-----	276,333		-----	88,434	
30	-----	276,333		-----	88,434	
31	7:30	276,333	1.26	8:10	88,434	2.54



Raw Water Quality Control 2005

November

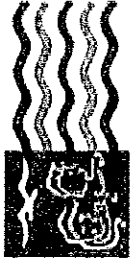
Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	7:40	273,000	0.92	8:15	861,000	0.99
2	7:50	267,000	0.76	8:40	86,400	0.8
3	8:30	249,000	0.98	8:30	83,543	0.99
4	7:30	259,000	1.07	8:31	88,750	1.46
5	-----	271,000		-----	90,562	
6	-----	271,000		-----	90,562	
7	8:25	271,000	0.77	9:10	90,562	0.86
8	8:05	260,000	0.54	9:00	86,000	0.79
9	7:50	271,000	0.83	9:20	90,100	0.82
10	7:55	456,000	0.83	8:45	82,700	0.99
11	-----	290,750		-----	86,950	
12	-----	290,750		-----	86,950	
13	-----	290,750		-----	86,950	
14	7:55	290,750	0.72	8:50	86,950	0.76
15	8:16	318,000	0.65	8:56	90,328	0.76
16	7:45	356,000	0.55	8:40	87,672	0.66
17	7:40	283,000	0.59	8:07	83,100	0.65
18	7:10	281,000	1.05	6:50	78,933	0.9
19	-----	409,000		-----	90,622	
20	-----	409,000		-----	90,622	
21	7:55	409,000	0.77	8:40	90,622	0.91
22	8:15	383,000	0.56	9:05	89,900	0.89
23	7:45	376,000	0.52	8:12	82,700	0.69
24	7:55	385,000	0.79	8:40	87,728	1.18
25	7:55	385,000	0.71	8:45	91,434	1.11
26	-----	339,666		-----	123,434	
27	-----	339,666		-----	123,434	
28	8:20	339,666	1.04	9:07	123,434	1.31
29	-----	334,000		11:10	131,974	
30	8:10	334,000		9:00	113,146	



Raw Water Quality Control 2005

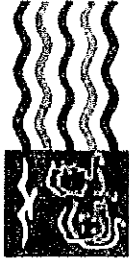
December

Date	HARVEY CREEK			MAGNESIA CREEK		
	Time	24 Hr Flow (Gal)	NTU (ppm)	Time	24 Hr Flow (Gal)	NTU(ppm)
1	8:30	258,000		9:05	119,501	
2	7:46	221,000	1.21	8:40	121,413	0.99
3		268,000			134,500	
4	11:46	268,000	0.61	12:55	134,500	0.63
5	8:00	216,000	0.68	8:45	104,200	0.61
6	7:45	255,000	0.6	8:20	125,500	1.45
7	7:50	253,000	0.78	8:35	126,900	0.71
8	7:35	248,000	0.64	8:05	122,300	0.7
9	8:20	273,000	0.8	9:15	134,190	0.77
10		245,000			124,938	
11		245,000			124,938	
12	8:15	245,000	0.72	8:40	124,938	0.97
13	7:30	232,000	0.74	8:00	176,096	0.73
14	7:40	235,000	0.79	8:10	128,800	1.34
15	7:30	241,000	0.52	8:00	145,600	0.86
16	7:50	241,000	0.63	8:25	145,200	1.91
17		244,000			125,574	
18		244,000			125,574	
19	7:55	244,000	0.69	8:30	125,574	3.29
20	7:45	245,000	2.15	8:25	123,478	2.9
21	7:30	253,000	1.31	8:00	119,600	1.03
22	7:45	261,000	1.71	8:15	123,300	13.3
23	7:30	254,000	0.88	8:10	125,300	1.26
24		265,000			126,300	
25		265,000			126,300	
26		265,000			126,300	
27	7:40	265,000	1.43	8:20	126,300	1.68
28	8:00	269,000	0.76	8:50	105,400	0.7
29	7:45	257,000	0.57	8:30	123,300	0.84
30	8:08	264,000	1.05	7:38	121,350	0.75
31		272,000			126,988	



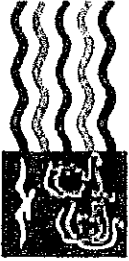
Treated Water Quality Control 2005 January

Date	HARVEY		MAGNESIA		STORE / CAFE		BRUNSWICK	
	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)
1								
2								
3	0.79	0.8	0.82	0.72	0.96	0.41	0.91	0.61
4	1.2	0.81	1.05	0.78				
5	0.9	0.88	0.86	0.79				
6	1.09	0.69	0.72	0.71				
7								
8								
9								
10		0.59		0.64				
11	0.9	0.58	1.06	0.54	0.8	0.37	0.87	0.54
12	0.79		1.13	0.69				
13	0.78	0.64	0.85	0.7				
14	1.15	0.77	1.14	0.69				
15								
16								
17	1.03	0.62	1.77	0.62				
18	2.58	0.2	2.54	0.21	1.34	0.11	1.62	0.25
19	2.68	0.32						
20	2.74	0.49						
21	2.51	0.66	1.89	0.28				
22								
23								
24	1.76	0.66	3.28	0.17				
25	1.55	0.68	1.12	0.65	1.43	0.28	1.34	0.4
26	1.36	0.7	1.23	1.06				
27	1.65	0.83	1.33	0.91				
28	1.44	0.7	1.16	0.84				
29								
30								
31	0.9	0.93	0.88	0.77				



Treated Water Quality Control 2005 February

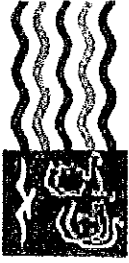
Date	HARVEY		MAGNESIA		STORE / CAFE		BRUNSWICK	
	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)
1	1.13	0.56	1.18	0.62	0.82	0.19	0.91	0.5
2	1.23	0.57	1.01	0.69				
3	1.33	0.6	1.18	0.66				
4	1.2	0.49	0.87	0.58				
5								
6								
7	1.16	0.42	0.78	0.74				
8	1.3	0.67	1.42	0.7	0.94	0.3	0.85	0.55
9	1.03	0.87	1.09	0.84				
10	1.43	1.24	1.8	0.77				
11	1.39	0.85	1.18	0.7				
12								
13								
14	0.87	0.59	0.84	0.71				
15	0.76	0.58	0.85	0.61	0.92	0.31	0.97	0.5
16	1.07	0.61	1.59	0.67				
17	1.01	0.61	0.89	0.66				
18	0.96	0.68	0.89	0.61				
19								
20								
21	0.78	0.94	0.82	0.72				
22	0.75	0.65	0.8	0.66	0.74	0.46	0.93	0.56
23	1.03	0.55	0.95	0.66				
24	1.21	0.46	0.89	0.71				
25	0.83	0.44	0.7	0.71				
26								
27								
28	0.85	0.47	0.77	0.67				



Treated Water Quality Control 2005

March

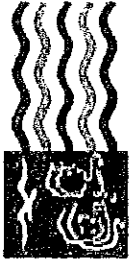
Date	HARVEY		MAGNESIA		STORE / CAFE		BRUNSWICK	
	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)
1	1.24	0.36	0.86	0.6	0.91	0.15	0.65	0.54
2	1.33	0.23	0.97	0.6				
3	0.97	0.37	0.85	0.63				
4	1.7	0.46	1.54	0.74				
5								
6								
7	0.85	0.75	0.82	1	0.82	0.21	0.97	0.7
8	1.02	0.6	1.23	0.71				
9	1.06	0.62	1.01	0.65				
10	1.49	0.6	2.11	0.6				
11	0.97	0.65	0.82	0.6				
12								
13								
14	0.88	0.69	0.75	1.06				
15	0.86	0.67	0.88	0.77	0.61	0.35	0.71	0.84
16	0.86	0.72	0.93	0.75				
17	0.78	0.63	1.01	0.68				
18	1.05	0.71	1.44	0.65				
19								
20								
21	2.97	0.36	2.81	0.18				
22	1.59	0.44	1.85	0.41	1.28	0	1.67	0.08
23	1.06	0.61	1.03	0.69				
24	1.37	0.64	1.04	0.7				
25								
26								
27								
28								
29	0.93	0.66	3.99	0.68	0.74	0.24	0.86	0.59
31	0.94	0.64	0.94	0.79				
31	1.02	0.71	0.73	0.94				



Treated Water Quality Control 2005

May

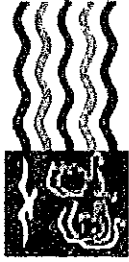
Date	HARVEY		MAGNESIA		STORE / CAFÉ		BRUNSWICK		KELVIN GROVE	
	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)
1										
2	0.83	0.56	0.93	0.77						
3	1.14	0.56	0.97	0.76	0.77	0.17	0.85	0.55	0.8	0.41
4	0.84	0.59	1	0.77						
5	0.99	0.64	0.86	0.81						
6	1.32	0.69	0.89	0.7						
7										
8										
9	0.86	0.56	0.91	0.6						
10	1.05	0.4	0.94	0.57	0.92	0.2	0.89	0.37	1.05	0.38
11	0.81	0.49	0.83	0.68						
12	0.96	0.54	1.02	0.64						
13	1	0.6	0.9	0.79						
14										
15										
16	1.14	0.45	1.32	0.43						
17	1.09	0.56	1.12	0.66	0.89	0.14	0.94	0.23	1.04	0.48
18	1.26	0.69	1.53	0.88						
19	1.3	0.38	1.33	0.61						
20	1.41	0.58	1.34	0.63						
21										
22										
23										
24	0.87	0.87	1.91	0.99	0.83	0.36	0.88	0.65	0.75	0.14
25	0.91	0.77	0.91	0.74						
26	0.98	0.69	1	0.56						
27	1.51	0.76	0.96	0.53						
28										
29										
30										
31	0.76	0.65	0.82	0.59	0.7	0.3	0.77	0.31	1.13	0.44



Treated Water Quality Control 2005

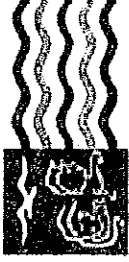
June

Date	HARVEY		MAGNESIA		STORE / CAFÉ		BRUNSWICK		KELVIN GROVE	
	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)
1	0.92	0.66	0.86	0.62						
2	0.86	0.61	0.76	0.79						
3	0.9	0.73	0.85	0.62						
4										
5										
6	0.75	0.69	0.74	0.73						
7	1	0.61	1.13	0.76	0.88	0.21	0.75	0.44	0.97	0.28
8	0.86	0.68	0.85	0.76						
9	0.93	0.56	0.82	0.66						
10	0.75	0.66	0.81	0.76						
11										
12										
13	1.04	0.52	0.89	0.67						
14	0.89	0.46	0.82	0.68	0.73	0.09	0.73	0.45	2.47	0.19
15	0.85	0.61	0.97	0.67						
16	0.69	0.72	0.74	0.73						
17	1.08	0.76	0.95	0.66						
18										
19										
20	0.79	0.6	1.1	0.67						
21	0.76	0.61	2	0.6	0.76	0.25	0.84	0.44	3.36	0.49
22	0.78	0.62	0.98	0.69						
23	0.89	0.56	1.04	0.6						
24	0.91	0.6	1.02	0.8						
25										
26										
27	0.89	0.8	1.23	0.52						
28	0.89	0.78	0.99	0.58	0.65	0.58	0.75	0.41	1.13	0.58
29	0.71	0.79	1.88	0.64						
30	0.9	0.79	0.94	0.76						



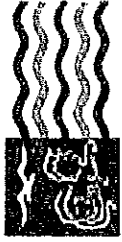
Treated Water Quality Control 2005 August

Date	HARVEY		MAGNESIA		STORE / CAFÉ		BRUNSWICK		KELVIN GROVE	
	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)
1										
2	0.86	0.7	0.76	0.7	0.72	0.46	0.84	0.62	0.89	0.59
3	0.77	0.58	0.97	0.61						
4	0.71	0.49	0.73	0.64						
5	0.66	0.6	0.65	0.65						
6										
7										
8	0.94	0.62	0.75	0.76						
9	0.79	0.69	0.71	0.62	0.64	0.58	0.76	0.55	0.58	0.45
10	0.78	0.67	0.79	0.67						
11	0.76	0.61	0.73	0.68						
12	0.83	0.6	1.1	0.62						
13										
14										
15	1	0.69	0.99	0.68						
16	0.86	0.69	0.97	0.63	0.87	0.4	0.85	0.46	0.64	0.57
17	0.74	0.48	1.1	0.64						
18	0.96	0.31	0.97	0.61						
19	0.88	0.49	1.18	0.8						
20										
21										
22	0.76	0.75	0.72	0.49						
23	0.75	0.7	0.76	0.67	0.77	0.45	0.78	0.56	0.73	0.51
24	0.7	0.75	0.69	1.15						
25	0.82	0.75	0.74	1.04						
26	0.67	0.7	0.83	0.46						
27										
28										
29	0.9	0.6	0.76	0.43						
30	0.79	0.34	0.94	0.55	0.66	0.22	0.73	0.37	0.73	0.35
31	0.74	0.44	0.93	0.69						



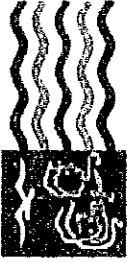
Treated Water Quality Control 2005 September

Date	HARVEY		MAGNESIA		STORE / CAFÉ		BRUNSWICK		KELVIN GROVE	
	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)
1	0.77	0.53	0.81	0.72						
2	0.7	0.68	0.73	0.74						
3										
4										
5										
6	1	0.35	0.81	0.71	0.73	0.21	0.75	0.63	0.85	0.19
7	0.78	0.57	0.7	0.78						
8	0.82	0.63	0.75	0.64						
9	0.81	0.76	0.77	0.56						
10										
11										
12	0.64	0.9	0.73	0.52						
13	0.77	0.91	1.22	0.96	0.74	0.81	0.62	0.45	0.61	0.84
14	0.73	0.84	0.79	0.61						
15	0.74	0.78	0.65	0.52						
16	0.76	0.64	0.97	0.57						
17										
18										
19	0.81	0.61	0.71	0.97						
20	0.95	0.58	1	0.73	0.81	0.48	0.84	0.74	0.79	0.28
21	0.88	0.6	0.78	0.61						
22	0.79	0.65	0.7	0.72						
23	0.83	0.67	1.09	0.76						
24										
25										
26	0.72	0.8	0.75	0.67						
27	0.73	0.73	0.86	0.65	0.78	0.66	0.68	0.52	0.74	0.68
28	0.87	0.72	0.71	0.69						
29	1.22	0.45	1.82	0.62						
30	1.75	0	1.55	0.6						



Treated Water Quality Control 2005 October

Date	HARVEY		MAGNESIA		STORE / CAFÉ		BRUNSWICK		KELVIN GROVE	
	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)
1										
2										
3	0.91	0.57	1.28	0.4						
4	1.07	0.42	1.12	0.7	0.80	0.16	0.78	0.53	0.83	0.03
5	1.24	0.71	0.97	0.84						
6	1.16	0.89	1.04	0.73		0.71				
7	1.68	0.67	2.38	0.54						
8										
9	0.66	0.74	0.79	0.73	0.67	0.47				
10										
11	1.5	0.67	1.00	0.8	0.91	0.44	0.65	0.60	0.64	0.40
12	1.49	0.77	1.19	0.83						
13	1.24	0.65	0.89	0.61						
14	1.1	0.62	1.17	0.62						
15										
16										
17	0.98	0.74	2.04	0.77						
18	1.48	0.64	2.02	0.7	0.72	0.32	0.99	0.45	0.88	0.39
19	1.26	0.7	1.07	0.81						
20	0.77	0.58	0.94	0.73						
21	1.52	0.64	1.16	0.78						
22										
23										
24	0.78	0.73	0.83	0.66						
25	0.77	0.74	0.92	0.63	0.83	0.49	0.68	0.45	0.64	0.51
26	1.03	0.59	0.85	0.67						
27	0.89	0.57	1.17	0.61						
28	0.77	0.55	1.10	0.72						
29										
30										
31	1.40	0.69	1.41	0.74						



Treated Water Quality Control 2005 November

Date	HARVEY		MAGNESIA		STORE / CAFÉ		BRUNSWICK		KELVIN GROVE	
	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)	NTU (ppm)	CL Residual (ppm)
1	1.06	0.85	1.45	0.72	0.92	0.4	0.99	0.49	0.91	0.47
2	1.4	0.72	0.84	0.78						
3	1.41	0.61	1.05	0.77						
4	1.86	0.53	2.3	0.63						
5										
6										
7	0.8	0.61	1.2	0.57						
8	2.62	0.63	1.45	0.58	0.6	0.49	0.71	0.37	0.8	0.36
9	0.56	0.68	1.26	0.68						
10	0.68	0.62	0.87	0.72						
11										
12										
13										
14	0.74	0.67	0.75	0.78						
15	1.01	0.65	0.82	0.71	0.75	0.46	0.7	0.61	0.77	0.48
16	0.83	0.67	0.79	0.63	0.73	0.57			0.62	0.53
17	0.86	0.67	0.82	0.67						
18	0.88	0.6	1.15	0.67						
19										
20										
21	0.88	0.58	0.69	0.77						
22	0.73	0.54	0.88	0.72	0.63	0.42	0.69	0.68	0.65	0.4
23	1	0.61	0.69	0.81						
24	1.09	0.57	1.1	0.63						
25	1.23	0.57	1.04	0.64						
26										
27										
28	1.04	0.66	0.83	0.64						
29										
30		0.68		0.65		0.47		0.54		0.6



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

DRINKING WATER QUALITY

ANNUAL REPORT

2005

Appendix C

Water Chemistry Test Results

File No. V9666

RESULTS OF ANALYSIS - Water



Sample ID	TREATED
	HARVEY
	PRV#3
Sample Date	05-06-22
Sample Time	09:00
ALS ID	5

Physical Tests

Colour	(CU)	<5.0
Conductivity	(uS/cm)	12.6
Total Dissolved Solids		12
Hardness	CaCO3	3.89
pH		5.87

Total Suspended Solids		-
Turbidity	(NTU)	0.21

Dissolved Anions

Alkalinity-Total		CaCO3	3.6
Chloride	Cl		1.35
Fluoride	F		<0.020
Sulphate	SO4		0.96

Nutrients

Nitrate Nitrogen		N	<0.10
Nitrite Nitrogen		N	0.10

Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
< = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water



Sample ID		KIDDLEY WINKS PRESCL	LIONS BAY ELEM SCHOOL	LIONS BAY CAFÉ	CMMUNITY CENTRE	TREATED HARVEY PRV#3
Sample Date		05-06-22	05-06-22	05-06-22	05-06-22	05-06-22
Sample Time		08:00	08:05	08:10	08:15	09:00
ALS ID		1	2	3	4	5
<hr/>						
Total Metals						
Aluminum	T-Al	-	-	-	-	0.036
Antimony	T-Sb	-	-	-	-	<0.00050
Arsenic	T-As	-	-	-	-	0.00010
Barium	T-Ba	-	-	-	-	<0.020
Boron	T-B	-	-	-	-	<0.10
Cadmium	T-Cd	-	-	-	-	<0.00020
Calcium	T-Ca	-	-	-	-	1.33
Chromium	T-Cr	-	-	-	-	<0.0020
Copper	T-Cu	0.702	1.54	0.0464	1.43	0.0084
Iron	T-Fe	-	-	-	-	<0.030
Lead	T-Pb	0.0205	0.0672	0.0032	0.0192	<0.0010
Magnesium	T-Mg	-	-	-	-	0.14
Manganese	T-Mn	-	-	-	-	<0.0020
Mercury	T-Hg	-	-	-	-	<0.00020
Potassium	T-K	-	-	-	-	<0.10
Selenium	T-Se	-	-	-	-	<0.0010
Sodium	T-Na	-	-	-	-	<2.0
Uranium	T-U	-	-	-	-	<0.00010
Zinc	T-Zn	-	-	-	-	<0.050

Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
 < = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water

Sample ID		TREATED MAG PRV#5	RAW HARVEY	RAW MAG	SEWAGE TRTMENT PLANT	
Sample Date		05-06-22	05-06-22	05-06-22		
Sample Time		09:30	09:10	09:40		
ALS ID		6	7	8	9	
Physical Tests						
Colour	(CU)	<5.0	<5.0	<5.0	-	
Conductivity	(uS/cm)	25.4	10.1	21.6	-	
Total Dissolved Solids		20	12	20	-	
Hardness	CaCO3	7.68	3.57	6.96	-	
pH		6.38	6.04	6.57	-	
Total Suspended Solids		-	-	-	7.0	
Turbidity	(NTU)	0.39	0.25	0.26	-	
Dissolved Anions						
Alkalinity-Total		CaCO3	3.1	3.7	3.9	-
Chloride	Cl		1.29	<0.50	<0.50	-
Fluoride	F		<0.020	<0.020	<0.020	-
Sulphate	SO4		5.74	0.88	5.12	-
Nutrients						
Nitrate Nitrogen		N	<0.10	<0.10	<0.10	-
Nitrite Nitrogen		N	<0.10	<0.10	<0.10	-

Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
 < = Less than the detection limit indicated.

File No. V9666

RESULTS OF ANALYSIS - Water



Sample ID	TREATED MAG PRV#5	RAW HARVEY	RAW MAG	SEWAGE TRTMENT PLANT
Sample Date	05-06-22	05-06-22	05-06-22	
Sample Time	09:30	09:10	09:40	
ALS ID	6	7	8	9

Total Metals

Aluminum	T-Al	0.038	0.044	0.037	-
Antimony	T-Sb	<0.00050	<0.00050	<0.00050	-
Arsenic	T-As	0.00012	<0.00010	0.00011	-
Barium	T-Ba	<0.020	<0.020	<0.020	-
Boron	T-B	<0.10	<0.10	<0.10	-
Cadmium	T-Cd	<0.00020	<0.00020	<0.00020	-
Calcium	T-Ca	2.66	1.21	2.34	-
Chromium	T-Cr	<0.0020	<0.0020	<0.0020	-
Copper	T-Cu	0.0013	<0.0010	<0.0010	-
Iron	T-Fe	<0.030	<0.030	<0.030	-
Lead	T-Pb	<0.0010	<0.0010	<0.0010	-
Magnesium	T-Mg	0.25	0.13	0.27	-
Manganese	T-Mn	<0.0020	<0.0020	<0.0020	-
Mercury	T-Hg	<0.00020	<0.00020	<0.00020	-
Potassium	T-K	<0.10	<0.10	<0.10	-
Selenium	T-Se	<0.0010	<0.0010	<0.0010	-
Sodium	T-Na	<2.0	<2.0	<2.0	-
Uranium	T-U	<0.00010	<0.00010	<0.00010	-
Zinc	T-Zn	<0.050	<0.050	<0.050	-

Organic Parameters

Biochem.Oxygen Demand-Tot BOD-5	-	-	-	9.4
---------------------------------	---	---	---	-----

Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
 < = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water



Sample ID	MAGNESIA CREEK	HARVEY CREEK	TIDE WATER	HIWAY TANK PRV 3	BRNSWICK BEACH #17
Sample Date	05-07-20	05-07-20	05-07-20	05-07-20	05-07-20
Sample Time	10:00	09:00	11:15	09:15	10:40
ALS ID	1	2	3	4	5
Physical Tests					
Colour (CU)	-	-	<5.0	-	<5.0
Conductivity (uS/cm)	-	-	20.4	-	36.2
Total Dissolved Solids	-	-	31	-	38
pH	-	-	8.41	-	7.98
Turbidity (NTU)	-	-	0.31	-	0.33
Dissolved Anions					
Alkalinity-Total	CaCO3	-	3.6	-	3.0
Chloride	Cl	-	2.12	-	1.61
Fluoride	F	-	<0.020	-	0.021
Sulphate	SO4	-	1.52	-	9.38
Nutrients					
Nitrate Nitrogen	N	-	<0.10	-	<0.10
Nitrite Nitrogen	N	-	<0.10	-	<0.10
Total Metals					
Copper	T-Cu	-	0.251	-	0.0163
Lead	T-Pb	-	0.0031	-	<0.0010
Zinc	T-Zn	-	0.0614	-	<0.0050
Trihalomethanes					
Bromodichloromethane		-	<0.0010	<0.0010	<0.0010
Bromoform		-	<0.0010	<0.0010	<0.0010
Chloroform		-	0.0416	0.0392	0.0289
Dibromochloromethane		-	<0.0010	<0.0010	<0.0010
Total Trihalomethanes		-	0.0416	0.0392	0.0289
Organic Parameters					
Dissolved Organic Carbon C		0.59	0.80	-	0.78
Total Organic Carbon	C	0.56	0.69	-	0.74

Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
 < = Less than the detection limit indicated.

9/12
File No. W1843

RESULTS OF ANALYSIS - Water



Sample ID	TIDE WATER	HIWAY TANK PRV 3	BRNSWICK BEACH #17
Sample Date	05-07-20	05-07-20	05-07-20
Sample Time	11:15	09:15	10:40
ALS ID	3	4	5

Haloacetic Acids

Bromoacetic Acid	<0.0020	<0.0020	<0.0020
Bromochloroacetic Acid	<0.0020	<0.0020	<0.0020
Chloroacetic Acid	<0.020	<0.020	<0.020
Dibromoacetic Acid	<0.0020	<0.0020	<0.0020
Dichloroacetic Acid	0.0191	0.0223	0.0143
Trichloroacetic Acid (TCA)	0.0096	0.0076	0.0043

Surrogate Standards

2,3-Dibromopropanoic Acid (SS) %	113	124	114
----------------------------------	-----	-----	-----

Results are expressed as milligrams per litre except for pH, Colour (CU),
Conductivity (umhos/cm), and Turbidity (NTU).
< = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water

Sample ID	BAYVIEW RD PRV 5	LIONS BAY CAFÉ	LIONS BAY ELEM	LIONS BAY ELEM FLUSH	KIDLY WINKS
Sample Date	05-07-20	05-07-20	05-07-20	05-07-20	05-07-20
Sample Time	10:25	10:30	13:20	13:20	08:40
ALS ID	6	7	8	9	10

Physical Tests

Colour (CU)	-	<5.0	-	-	-
Conductivity (uS/cm)	-	16.9	-	-	-
Total Dissolved Solids	-	24	-	-	-
pH	-	5.95	-	-	-
Turbidity (NTU)	-	0.32	-	-	-

Dissolved Anions

Alkalinity-Total	CaCO3	-	5.5	-	-
Chloride	Cl	-	2.12	-	-
Fluoride	F	-	<0.020	-	-
Sulphate	SO4	-	1.50	-	-

Nutrients

Nitrate Nitrogen	N	-	<0.10	-	-
Nitrite Nitrogen	N	-	<0.10	-	-

Total Metals

Copper	T-Cu	-	0.132	1.53	0.135	1.23
Lead	T-Pb	-	<0.0010	0.0645	0.0028	0.0527
Zinc	T-Zn	-	0.0054	0.0295	<0.0050	0.123

Trihalomethanes

Bromodichloromethane	<0.0010	<0.0010	-	-	-
Bromoform	<0.0010	<0.0010	-	-	-
Chloroform	0.0278	0.0495	-	-	-
Dibromochloromethane	<0.0010	<0.0010	-	-	-
Total Trihalomethanes	0.0278	0.0495	-	-	-

Organic Parameters

Dissolved Organic Carbon C	0.60	0.74	-	-	-
Total Organic Carbon C	0.78	2.17	-	-	-

Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
 < = Less than the detection limit indicated.

File No. W1843

RESULTS OF ANALYSIS - Water



Sample ID	BAYVIEW RD PRV 5	LIONS BAY CAFÉ
Sample Date	05-07-20	05-07-20
Sample Time	10:25	10:30
ALS ID	6	7

Haloacetic Acids

Bromoacetic Acid	<0.0020	<0.0020
Bromochloroacetic Acid	<0.0020	<0.0020
Chloroacetic Acid	<0.020	<0.020
Dibromoacetic Acid	<0.0020	<0.0020
Dichloroacetic Acid	0.0124	0.0180
Trichloroacetic Acid (TCA)	0.0057	0.0063

Surrogate Standards

2,3-Dibromopropanoic Acid (SS) %	121	118
----------------------------------	-----	-----

Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
< = Less than the detection limit indicated.

File No. W1843

RESULTS OF ANALYSIS - Water



Sample ID	KIDLY WINKS FLUSH	COM. CENTRE	COM. CENTRE FLUSH
Sample Date	05-07-20	05-07-20	05-07-20
Sample Time	08:40	09:45	09:45
ALS ID	11	12	13

Total Metals

Copper	T-Cu	0.0878	1.68	0.143
Lead	T-Pb	0.0016	0.0221	0.0019
Zinc	T-Zn	<0.0050	0.0428	<0.0050

Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
< = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water

File No. W2535

Sample ID	Lions Bay Bch Park	KG Beach Park	STP Treated Wste Wtr
Sample Date	05 08 05	05 08 05	05 08 04
Sample Time	09:00	09:20	14:30

Physical Tests

Total Suspended Solids	-	-	76.0
------------------------	---	---	------

Bacteriological Tests

Coliform Bacteria - Fecal	2.0	4.0	-
Coliform Bacteria - Total	80.0	130	-

Organic Parameters

Biochem.Oxygen Demand-Tot BOD-5	-	-	204
---------------------------------	---	---	-----

Remarks regarding the analyses appear at the beginning of this report.



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

DRINKING WATER QUALITY

ANNUAL REPORT

2005

Appendix D

Emergency Response Plans



ITEM	Page
Boil Water Notification	3 D
Power Failures	3 D
Earthquakes	4 D
Fire in the Watershed	4 D
Water Pump Failure	4 D
Chemical Contamination	4 D
Disinfection Interruption	5 D
Loss of Pressure	5 D
Turbidity Events	6 D
Water Line Breaks With and Without Contamination	6 D
Water Samples Locations	6 D



BOIL WATER NOTIFICATION

If there is a need, or if Vancouver Coastal Health Authority (VCHA) has ordered the Village to issue a Boil Water Advisory (BWA):

- Identify the affected area,
- Report these findings to the person in charge,
- The person in charge will contact the Public Health Inspector (PHI),
- The person in charge will copy and have delivered by hand a printed BWA and post a notice at Lions Bay School, Lions Bay Post Office, Lions Bay General Store & Café, and child care facilities,
- The person in charge will when appropriate, notify the radio and television stations that are listed in the plan,
- When it has been determined that all hazards and problems have been alleviated, the Public Health Inspector (PHI) will lift the BWA,
- The person in charge will the reverse the above actions notifying all those concerned, and
- The person in charge will record all of the pertinent information regarding the event and prepare a report for the Works Manager and the Medical Health Officer.

Note:

The Village will issue a BWA at any time we feel that the water quality has been compromised as a result of organic or bacteriological contamination or if ordered to do so by the Vancouver Coastal Health Authority.

POWER FAILURES

In the event of a power failure:

- Notify the Works Manager or his designate,
- Determine the extent of the outage,
- Notify BC Hydro,
- If an outage of more than 4 hours is suspected, shut down the CL2 and run the system on manual,
- Monitor the tank levels,
- Monitor and record the free CL2 in the system,
- When the power comes back on reset the injector and check its function,
- Reset all alarms, and
- Reset all pumps including the STP.



EARTHQUAKES

In the event of an earthquake:

- Notify the Works Manager or his designate,
- Begin a system wide check for leaks or any other failures,
- Shut down any areas that appear to have problems,
- Notify Vancouver Coastal Health Authority if sections have been shut down and if necessary issue a BWA or No Use Advisory,
- Repair and flush lines with treated water, and
- Retest all zones and monitor.

FIRE IN THE WATERSHED

In the event of a forest fire in the watershed:

- Notify the Works Manager or his designate,
- Notify BC Department of Forests,
- Call 9-1-1 and let them dispatch the affected Fire Department,
- Shut down the system at the affected intake,
- Notify Vancouver Coastal Health Authority,
- Notify Council,
- Monitor raw water for any contaminants, and
- Let BC Forest Service know that we have an intake below and that we need to know if they are going to water bomb with any chemicals.

WATER PUMP FAILURE

In the event of a pump failure:

- Shut down the affected pump,
- Notify the Works Manager or his designate,
- Notify all affected residents, and
- Change or repair pump and flush the affected area with treated water.

CHEMICAL CONTAMINATION

In the event of a chemical contamination such as oil, fuel, pesticides or any other type of substance that gets into or threatens to get into our water system including forest fire fighting activities:

- Shut down the affected intake or line,



- Begin determining the extent of the contamination,
- Notify Vancouver Coastal Health Authority who will issue a 'No Use Order',
- Notify the Works Manager or his designate,
- Call the listed radio and television stations and have them broadcast a 'No Use Order' to the affected area,
- Hand deliver 'Do Not Use Water' notices to the affected areas,
- Remedy the problem to the satisfaction of the Vancouver Coastal Health Authority, and
- Notify all those affected that the water is now safe to use again.

DISINFECTION INTERRUPTION

In the event of an interruption of the CL2 system:

- Check and record the free CL2 in the affected water tank,
- Shut down and make safe the CL2 injector,
- Shut down the intake valve for the water tank,
- Determine the amount of down time that is available before we need to refill the water tank,
- Notify the Works Manager or his designate,
- Begin repairs on the unit,
- If the down time is going to be too long and we have to fill the tank, notify Vancouver Coastal Health Authority and issue a BWA (not necessary if do manual feed), and
- Add chlorine to reservoir manually and check residuals on ongoing basis.

LOSS OF PRESSURE

In the event of a system pressure loss due to high demand from high fire flow or a severe leak:

- Notify the Works Manager or his designate,
- Determine if there was a negative pressure or if there was always positive pressure,
- If you suspect a negative pressure, notify Vancouver Coastal Health Authority who will determine if we need to issue a BWA, and
- Flush the affected area and record the results and give them to the Health Inspector.



TURBIDITY EVENTS

If line turbidity is in the range of 1-3 NTU, increase monitoring. If line turbidity reaches 4 NTU prepare to take off line. If line turbidity reaches 5 NTU:

- Notify the Works Manager or his designate,
- Contact Vancouver Coastal Health Authority and possibly issue a BWA,
- Check and record the free CL2 that is present at the same site as the turbidity sample was taken,
- Adjust the CL2 at the injection point if necessary, and
- Check with other purveys like District of West Vancouver to see at what point high turbidity events correlate with positive water samples.

If line turbidity surpasses 5 NTU turn off intakes until water clears up:

- If Magnesia is contaminated, switch off Magnesia and introduce Harvey
- If Harvey is contaminated, switch off Harvey, bypass reservoirs and introduce Magnesia

WATER LINE BREAKS WITH AND WITHOUT CONTAMINATION

In the event of a water line break, where water pressure has maintained until the leak has been exposed so that there is no danger of any material flowing back into the break, there will be no need for any special conditions to be applied. Flush the repair area with treated water before placing that area back in service.

In the event that the broken line is suspected of having a negative pressure we will:

- Notify the Works Manager or his designate,
- Notify Vancouver Coastal Health Authority for a possible BWA,
- Repair the break and flush the area with treated water, and
- Rescind the BWA if necessary.

WATER SAMPLE LOCATIONS

The Village currently takes samples at the following locations:

Location	Source	Tests	Frequency
PRV-3 (Hwy Tank)	Harvey Creek	Cl2 Residual and Turbidity	Daily Monday-Friday
Magnesia Chlorinator	Magnesia Creek		
PRV-3 (Hwy Tank)	Harvey Creek	Total and Fecal Coliforms	Every Tuesday
PRV-5	Magnesia Creek	Total and Fecal Coliforms	Every Tuesday



Location	Source	Tests	Frequency
Lions bay Café	Harvey Creek	Total and Fecal Coliforms	Every Tuesday
Brunswick Beach	Magnesia Creek	Total and Fecal Coliforms	Every Tuesday
Kelvin Grove	Harvey Creek	Total and Fecal Coliforms	Every Tuesday
Harvey Intake	Harvey Creek	Raw Water Turbidity	3 x Week on Mon, Wed, Fri
Magnesia Intake	Magnesia Creek	Raw Water Turbidity	3 x Week on Mon, Wed, Fri
Harvey Chlorinator	Harvey Creek	Raw Water Turbidity	32x Week on Tue, Thur
Magnesia Chlorinator	Magnesia Creek	Raw Water Turbidity	32x Week on Tue, Thur
Harvey Intake	Harvey Creek	Metals – lead, copper, zinc	2 x Yearly
Magnesia Intake	Magnesia Creek	Metals – lead, copper, zinc	2 x Yearly
Tide Water	At Tap	Metals – lead, copper, zinc	2 x Yearly
Highway Tank	At Tap	Metals – lead, copper, zinc	2 x Yearly
Brunswick Beach	At Tap	Metals – lead, copper, zinc	2 x Yearly
PRV-5	At Tap	Metals – lead, copper, zinc	2 x Yearly
Cafe	At Tap	Metals – lead, copper, zinc	2 x Yearly
Elementary School	At Tap	Metals – lead, copper, zinc	2 x Yearly
Kiddiley Winks Childcare	At Tap	Metals – lead, copper, zinc	2 x Yearly

Once a week, on Tuesdays, the Village takes treated samples to Vancouver Coastal Health Authority for testing from 5 test points in the system. The Village does two (2) metals test per annum.



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

DRINKING WATER QUALITY

ANNUAL REPORT

2005

Appendix E

Sample Boil Water Advisory



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

NOTICE TO RESIDENTS

A water sample from a collection site on the Magnesia Creek water system was analyzed and found to contain a total coliform count of 1-6 per 100 ml and a faecal coliform count of 1-3 per 100 ml.

Consequently North Shore Health Region has placed part of Lions Bay on a

BOIL WATER ADVISORY

until further notice.

**The Boil Water Advisory affects residents on:
Sunset Drive, Mountain Drive from 100 – 300,
Bayview Road from 200 – 249,
Stewart Road and Brunswick Beach.**

Residents can disinfect their water by either:

1. Boiling the water for 2 minutes, or
2. Adding 4 drops of household bleach per gallon of water (8 drops if water is cloudy), stirring and waiting for 20 minutes before consumption.

This includes water used for brushing teeth, cooking, washing dishes, and washing ready-to-eat fruit and vegetables.

The Village is required to have 3 negative samples for fecal and total coliform before the Boil Water Advisory will be lifted. The Village will be sending water samples to the lab to be tested on Thursday, Friday and next Tuesday. If they all come back with acceptable results then the Boil Water Advisory will likely be lifted on Wednesday, October 15, 2003. A notice will be posted in the Post Office when the advisory is lifted.

Should you have any questions or have had any symptoms of diarrhea, stomach cramping or nausea, please contact Rod Schluter at 604-904-6254 at North Shore Health.

Village of Lions Bay
October 8, 2003



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

DRINKING WATER QUALITY

ANNUAL REPORT

2005

Appendix F

EOCP Facility Classification

ENVIRONMENTAL OPERATORS CERTIFICATION PROGRAM
Facility Classification

THIS IS TO CERTIFY THAT

Village of Lions Bay
Water System

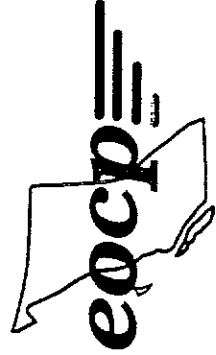
has been classified by the Environmental Operators Certification Program in accordance with the guidelines established in co-operation with the Association of Boards of Certification (A.B.C.) as

Class II

Dated at Burnaby, B.C. on July 28, 2003

Lynne Johnson

Secretary - Certification Board



J. M. Howard

Chairman - Certification Board

CERTIFICATE NO. 675

MEMBER OF ASSOCIATION OF BOARDS OF CERTIFICATION
AFFILIATE OF B.C. WATER AND WASTE ASSOCIATION
A Society incorporated under the Society Act, S.B.C. S-28724