



VILLAGE OF MONTROSE

2015 ANNUAL REPORT OF WATER MONITORING

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1.0 Introduction

This report has been produced to meet the requirement for water suppliers to produce an annual report on water quality as per Section 15 of the *Drinking Water Protection Act* and Section 11(b) of the Drinking Water Protection Regulation.

The annual report covers the period from January 1, 2015 to December 31, 2015 and uses data that is regularly obtained by the Village of Montrose to highlight water quality issues

This report aims to convey information to residents regarding the overall operation of the maintenance of the water system.

For more detailed information on drinking water health effects, the Village of Montrose recommends the following web sites:

Interior Health Authority

<http://www.interiorhealth.ca/YourEnvironment/DrinkingWater/Pages/default.aspx>

Health Canada:

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

World Health Organization:

http://www.who.int/water_sanitation_health/dwq/en/

2.0 Water System Overview

The Village of Montrose was incorporated in 1956 and is home to approximately 1030 residents. It serves predominantly as a bedroom community to the City of Trail and is located within the Beaver Valley, east of the City of Trail and west of the Village of Fruitvale.

The Village of Montrose is currently classified as a Level II water distribution system. It obtains its domestic water supply from two wells that lay outside the Village boundaries, near the confluence of Beaver Creek and the Columbia River. This source is the most reliable and economical water supply for the Village. Water drawn from the two wells is now chlorinated and pumped up to two reservoirs located within the Village, which gravity feed the distribution system. In times of peak demand, some residents receive water directly from the wells.

In February of 2011, upon IHA recommendation, the Village was placed on a Boil Water Notice. The notice was issued due to routine testing showing a persistent low total coliform presence. The Village was still operating under this notice until June 27, 2013 upon completion of a major Gas Tax funded project which provided the Village with a new well, chlorine treatment facility and back-up power generator.

2.1 Service Area

The current water system supplies domestic water to both residents and businesses located within Village boundaries (Appendix 1). In addition, it acts as the only source of fire protection to the Village. It also acts as a backup system to the Beaver Falls Waterworks District, which supplies water to some 500 residents of the Beaver Valley (the area that lies between the Village of Montrose and Village of Fruitvale).

2.2 Source

As stated above, the Village currently has two production wells located at the confluence of the Beaver Creek and Columbia River. Both wells draw from an unconfined groundwater source.

Well #1 was constructed in 1961 and provided for an estimated safe yield of 47.3 L/s. In 1998, Kala Gonfined n

abandoned upon completion of Well #3 which was commissioned as part of a major project to disinfect the Villages water supply. This well could be used in an emergency situation and will remain capped for this purpose.

Specifics	Well #1		Well #2		Well #3
	<i>Original</i>	<i>Current</i>	<i>Original</i>	<i>Current</i>	<i>Original</i>
1. Year Drilled	1961		1981		2013
2. Total Depth (m)	38.1		36		34.7
3. Diameter (mm)	406		406		305
4. Length of Screen (m)	9.1		10.9		10.4
5. Depth to top of Screen (m)	29		25		24.4
6. Safe Yield (L/s)	47.3	28.4	20.8	21	20.5

In emergency conditions, the Village of Montrose water supply is supplemented by the neighbouring Beaver Falls Water Works District system. As the Beaver Falls water system is not chlorinated, the Village issues Boil Water advisories if and/or when this activity occurs.

2.3 Treatment

2013 saw completion of a \$1.5M supply and treatment project funded almost entirely through the federal Gas Tax Strategic Initiatives program. This project included construction of a chlorine room, a baffled 90m³ chlorine contact chamber, electrical and controls room and a mechanical/pump room.

Chlorine is injected at the Water Treatment Plant at a rate of 0.75 – 1.0 mg/l with the majority of the distribution system seeing concentrations of 0.5 – 0.7mg/l. The injection rates fluctuate during the year with the minimum requirement of 0.2 mg/l residual at distribution system extremities used as a control. There are many challenges in maintaining these limits and dead-end main lines, dual pressure zones, water use and temperatures all affect the required chlorine residual.



The PW department monitors and records residual levels at various locations within the Village generally three times per week. These levels assist the crew in determining the adjustments to the injection rate to maintain the limits in the water distribution system.

A summary of the chlorine concentration monitoring program is found in Appendix 3.

2.4 Storage

The Village of Montrose has two reservoirs that store water pumped from the water source.

Reservoir #1 (lower) was constructed in 1959. It is an elevated steel-finished tank consisting of one cell and has a storage capacity of 455m³. Its full water level elevation is approximately 637 metres.



Reservoir #2 (upper) was constructed in 1979. It is also an elevated steel-finished tank consisting of one cell and has a storage capacity of 909m³. Its full water level elevation is approximately 689 metres.

2.5 Distribution System

Reservoir #2 services the highest pressure zone, which encompasses the northeast portion of the Village, namely most of 12th Avenue, upper 7th Street and the Golden Acres subdivision properties. Reservoir #1 services the lower pressure zone, which encompasses the rest of the Village.

In total, the Village of Montrose has approximately thirteen (13) kilometers of water main within the Villages boundaries, comprised of mainly asbestos concrete (approximately 90%), ductile iron (5%), and polyvinyl chloride or PVC (5%) pipes. The system also includes 12" and 42" cast iron standpipes, and forty-one (41) fire hydrants for fire protection.

The Village of Montrose distribution system also currently has two connection points with the Beaver Falls Waterworks District distribution system. This allows either system to be used as a backup water supply by the other in emergency and other situations. IHA approved interconnects were installed in 2012 at both the 12th and 10th Avenue connections.

A new sharing procedure will need to be developed due to the recent addition of treatment to the Montrose system.

2.6 Controls and Communications

Programmable Logic Controllers, (PLC) are digital computers used for automation of the water system. The PLC units control the operation of the wells through connected sensors at source, pumping and storage points within the distribution system to maintain adequate supply and fireflow levels. Interpreting the data received, the software is able to automatically turn pumps on and off, and keep the system running smoothly. When any sign of trouble is detected, the system is alerted and the appropriate personnel are notified.

3.0 Water System Maintenance

In 2015, the Village of Montrose employed three utility maintenance workers that oversaw the water system. The Village has numerous maintenance policies in place related to the day-to-day operation and maintenance of the domestic water system. This includes items such as daily routine inspections of all water distribution system components and general maintenance procedures related to specific problems identified during those inspections. In addition, the Village also performs additional maintenance programs to ensure the integrity of the domestic water supply system. The following provides a general overview of these programs.

3.1 Wells Maintenance

Except for major items related to well maintenance (i.e. new screen or casing installations), the Village is able to keep well maintenance activities in-house. Village staff performs routine preventative maintenance service programs related to well maintenance, including pump maintenance, general pump house inspections and record keeping.

3.2 Reservoir Maintenance

Canadian Dewatering out of Edmonton, AB performed inspection and cleaning duties of both Village potable water reservoirs in 2010. Well levels and service was maintained during the works which was completed by divers.

During this cleaning it was noted that the reservoirs did not accumulate debris and recommended cleaning be completed on a ten-year schedule. Canadian Dewatering typically provides the following services when completing maintenance and inspection measures relating to the Village reservoirs:

- Sediment Removal from reservoirs floor using vacuum technique;
- Visual NDT underwater inspection of reservoirs including inspection of wall conditions, outside roof panel, centre support column, overflow pipe, inlet/outlet, bottom/floor, vent, and access hatch/ladder;
- Underwater cleaning using pneumatic tools;
- Recording of CCTV inspection with underwater video system; and
- Summarizing inspection findings.

3.3 Distribution System Maintenance

The distribution system in the Village of Montrose consists of watermains, valves, service connections, fire hydrants and dedicated sampling locations. Proper maintenance of the distribution system allows the Village to monitor both the quality and quantity of water as well as to take a proactive approach to mitigate potential causes for concern.

3.3.1 Valve Inspection

The Village tries to inspect all valves located within the distribution system each year to expose any buried valves, make repairs, and to exercise all valves to determine proper

functioning (opening and closing) of valves in order to ensure that specific watermains can be isolated for repair or to ensure that no restrictions are present that may limit flows.

3.3.2 *Watermain Flushing and Hydrant Maintenance*

In 2011, TRUE Consulting was engaged to provide the Village with a formal unidirectional flushing (UDF) program for the annual flushing of watermains. The 2015 annual flushing program was completed in the spring and fall. The Village also maintains hydrants within the Village where the mains are also exposed to flushing activities.



Hydrants are inspected yearly to determine the Village and to provide adequate fire protection. Village staff performs inspections such as checking the hydrant pressure, exposing any worn parts, and updating service records. In 2009, the Village began a program to include capital funding to allow for any required replacement of older fire hydrants.

3.3.3 *Watermain Breaks*

Unfortunately, municipalities will always have to deal with both unexpected watermain breaks and the disruption of those breaks to the domestic water system. However, most problems associated with breaks can be remedied in a short amount of time and thus, regular service can be quickly restored. The Village experienced no significant watermain breaks in 2015.

4.0 Water System Operator Training Program

The Water Distribution (WD) system is classed as a Level II water system through the Environmental Operators Certificate Program EOCP. This classification level is based on system complexities and the number of homes serviced. The Conditions of Permit to operate the water system are established and monitored by IHA and call for continual operator training and upgrading as well as the attainment of operator certification levels applicable to the level of classification of the municipal water system.

In 2015 the Village had one certified Level II WD full time water system operator and two Utility Operators containing Level I WD. Each of the water operators take new courses each year and/or keep current their operator certificates and knowledge to provide the Village with safe and efficient water system operations.

It is planned that the Village will soon see a second Level II WD operator through the efforts of our Training Program. Additionally, the Village is fortunate to live in close proximity and have positive working relationships with other local governments which allows for the sharing of knowledge and information between certified operators.

5.0 Water Quality Monitoring and Testing Program

The Drinking Water Protection Regulation sets minimal guidelines that water purveyors must meet in respect to water monitoring analysis. Therefore, the Village of Montrose is required to maintain the following components within its testing program:

1. Monitor the drinking water source, the water in its system and the water it provides;
2. Monitor the above not less than 4 times per month;
3. Monitor for both Total Coliform bacteria and E. Coli;
4. Have the analyses required for monitoring carried out by accredited laboratories that meet the requirements of the Drinking Water Protection Act and Public Health Officer; and
5. Send monthly reports to the Public Health Inspector that summarize the above test results and daily water consumption totals.

In 2015, the regular sampling program of the Village provided samples from four locations per testing week as follows:

- 12th Avenue Sampling Station;
- Community Hall 460 9th Ave;
- Well #1 Wells Property, Highway 22A; and
- Well #3 Wells Property, Highway 22A.

In addition to the sampling above, the Village also completes Comprehensive Drinking Water Analysis. This analysis provides information relating to inorganic parameters and total recoverable metals. This comprehensive water analysis will be done once every three years (minimum) as per the Public Health Inspector, IHA. Well #2 was completed in 2011, Well #1 in 2012, and Well #3 was completed in 2013 upon commissioning of the new treatment facility.

All water analysis on domestic water in the Village of Montrose is performed by CARO Analytical Services, located in Kelowna, BC. CARO Analytical Services employs methods, which are described in the 5th Edition, published by the American Public Health Association, US EPA protocols found in the 5th Edition and protocols published by the British Columbia Ministry of Environment.



5.1 Parameters

A maximum allowable concentration (MAC) has been established by Health Canada for microbiological criteria. Each MAC has been designed to safeguard human health and is based on projecting lifelong consumption of drinking water that contains the substances

at the maximum concentration level. Village Water Protection Regulation as follows:

Water Quality Standards for Potable Water	
Parameter:	Standard:
Fecal coliform bacteria	No detectable fecal coliform bacteria per 100 ml
Escherichia coli	No detectable Escherichia coli per 100 ml
Total coliform bacteria	
(a) 1 sample in a 30 day period	No detectable total coliform bacteria per 100 ml
(b) more than 1 sample in a 30 day period	At least 90% of samples have no detectable total coliform bacteria per 100 ml and no sample has more than 10 total coliform bacteria per 100 ml

5.2 Results

Water quality results for the Village are summarized in Appendix 2. Overall results indicate that the Village falls within the required Maximum Allowable Concentrations specified by Health Canada and the Drinking Water Protection Regulations in respect to both Total Coliform and E. coli concentrations.



However, results indicated that the Village received one E. Coli hit in early August and had Background Colonies of less than 200 in one sample in early June. There were no positive E. coli concentrations found in any samples in 2015.

For comparison, in 2013, the Village fell outside of the required Maximum Allowable Concentrations allowed by Health Canada and the Drinking Water Protection Regulations in respect to Total Coliform concentrations in two of the twelve months.

Overall system sampling results indicate that in 2015, the Village routinely fell well within the required Maximum Allowable Concentrations allowed by Health Canada and the Drinking Water Protection Regulations in respect to E. coli concentrations.

Village of Montrose Water Sampling Results Summary for 2015

Month or Year(s) [mmm-yy]	Distribution System			Wells			Dist. System and Wells Combined		
	Detectable Samples	Total Samples	Non-detectable Samples	Detectable Samples	Total Samples	Non-detectable Samples	Detectable Samples	Total Samples	Non-detectable Samples
	[#]	[#]	[%]	[#]	[#]	[%]	[#]	[#]	[%]
Monthly Totals									
Jan-2015	0	4	100%	0	2	100%	0	6	100%
Feb-2015	0	4	100%	0	4	100%	0	8	100%
Mar-2015	0	4	100%	0	4	100%	0	8	100%
Apr-2015	0	4	100%	0	4	100%	0	8	100%
May-2015	0	4	100%	0	4	100%	0	8	100%
Jun-2015	0	4	100%	0	4	100%	0	8	100%
Jul-2015	0	4	100%	0	4	100%	0	8	100%
Aug-2015	0	4	100%	0	4	100%	0	8	100%
Sep-2015	0	4	100%	0	4	100%	0	8	100%
Oct-2015	0	4	100%	0	4	100%	0	8	100%
Nov-2015	0	4	100%	0	4	100%	0	8	100%
Dec-2015	0	4	100%	0	4	100%	0	8	100%
Annual Totals									
2011	16	102	84%	12	75	84%	28	177	84%
2012	15	72	79%	14	62	77%	29	134	78%
2013	2	64	97%	4	61	93%	6	125	95%
2014	1	48	98%	1	48	98%	2	96	98%
2015	0	48	100%	0	46	100%	0	94	100%
Five-Year Totals									
2011-2015	34	334	90%	31	292	89%	65	626	90%

indicates background colonies detected

12th Avenue Sampling Station & Community Hall

The 12th Avenue Sampling Station and the Community Hall are two primary locations for water sampling of the distribution system within the Village. These samples are generally taken the first and third Tuesday of each month. In 2015, results from both Sampling Stations indicated no abnormal counts in respect to E.coli, Total Coliform or Background Colonies..

Well Pump Houses

The Well Pump Houses are also two primary locations for water sampling, and these samples are also generally taken the first and third Tuesday of each month. In 2015, results from the Well Pump Houses (Well #1 & #3) indicated no abnormal counts in respect to E. coli or Total Coliform; however there was one instance of Background Colonies of less than 200 in March at Well #2.

6.0 Annual Consumption Records

Consumption data in 2015 is now expected to be presented with confidence and accuracy, as the construction of the new treatment plant allowed for a new in-line flow meter to be installed in order to monitor accurate annual flow data. In 2015, the Village consumed an average of approximately 510 L/d (population of 1,030).

In 2011, 58% of Canadian households were equipped with water meters compared to 52% in 1991. Over the same period, average daily water use dropped by 27% from 342 litres per person in 1991 to 251 litres per person in 2011 [Environment Canada Residential Water Use in Canada].

Table 1 - 2014 / 2015 Water Consumption Comparisons

Month	2014		2015	
	ML	ML/day average	ML	ML/day average
Jan	10.980	0.354	7.807	0.252
Feb	8.186	0.292	7.520	0.269
Mar	9.732	0.314	6.610	0.213
Apr	10.533	0.351	7.816	0.261
May	15.220	0.491	21.662	0.699
Jun	24.320	0.811	28.011	0.934
Jul	32.842	1.059	33.588	1.083
Aug	31.030	1.001	30.340	0.979
Sep	22.105	0.737	17.718	0.591
Oct	12.311	0.397	8.833	0.285
Nov	8.320	0.277	7.624	0.254
Dec	8.174	0.264	7.802	0.252
yearly total	193.753		185.331	
monthly avg	16.146		15.444	

The Village of Montrose has been looking to achieve a reduction in the average consumption rate through participation in the Columbia Basin Trust Water Smart program and through enforcement of water usage bylaws, which were originally implemented in 2007 and have been consistently updated and/or refined over the past few years.

7.0 Water Conservation

In 2010, the Village of Montrose became a signatory to the Columbia Basin Water Smart Initiative which has assisted local governments across the region to reduce their local water consumption. The two main ways to achieve this reduction is through

1. reducing the amount of water used on lawns and gardens (Outdoor Irrigation); and
2. reducing the amount of water that leaks out of drinking water systems.

A Village of Montrose Water Smart Action Plan was completed in 2010 as part of this initiative which identified that the most significant use of water in Montrose appears to be for domestic irrigation. This use is negligible because the estimated rate of indoor domestic use is approximately equivalent to the average winter day demand.

Since 2011, the Village has participated in the CBT Water Smart Program. 2011-2013, the Village partnered with neighbouring local governments in the CBT Water Smart Ambassador Program. The Village's duties included public education, municipal park water use audits and free lawn and garden water assessments, which helped residents understand the amount of water their properties need, and how much water is really required. She also educated residents about watering restrictions.

The program was more successful in 2012 and saw a reduction in assessments in 2013. The Ambassador program is a recommended program in the Water Smart Action Plan. The CBT continues to assess the program and it is expected that further improvements will provide a greater utilization of the program by Montrose residents which will reduce water consumption.

Other Water Smart initiatives included water loss management training, completion of ICI metering in the Village and meter pit installation to the Village's WWTP, and completion of Water Service Rates Analysis and Future Revenue Requirements Studies.

8.0 Water Issues in 2015

The Village had no major issues concerning water treatment, supply and/or distribution in 2015; however minor issues continue to present themselves within the water distribution service and are summarized below.

Minor Source and Distribution System Interruptions

General source, pumping and distribution system interruptions occur on an irregular basis due to many factors, including, but not limited to the following:

- Power Supply Outage,
- Power Supply Interruptions or Spikes,
- Controls Communications Loss and/or Failure,
- Water Main Leaks and Repairs, and
- Service Connections Repairs.

9.0 2015 Capital Works and Proposed 2016 Capital Works

The Village has maintained a philosophy of approaching infrastructure related problems in a proactive manner. This is evident by the numerous studies undertaken in regards to the water distribution piping network and an assortment of issues related to water consumption.

2015 Capital Works Projects

Initial Review of Reservoir Structural Components Roof Upgrades

This project aims to reinforce the upper reservoir roof structure through the addition of roof angles to the existing roof support ribs. This project was identified in the 2010 Water Master Plan. The project planning commenced in 2014 with completion of the lower reservoir inspection to determine if the channel members are actually welded to the roof plate or not. Preliminary budget numbers were received to ensure sufficient funds could be allocated for further design and construction activities in 2016.

Fire Hydrant and Valve Replacement Programs

This program saw no replacement activities in respect to either gate valves or fire hydrants, as during routine inspections, all current infrastructure was deemed to be functioning well and in good repair.

Well Site - Valve upgrades

The need for a high pressure valve and blow-off to provide for a flush point for the supply main was determined after design of the wells project. This change did not occur during WTP construction or operational activities in 2014; however, the project was completed in early 2015.

Water Distribution Pipe Assessment

Previous pipe assessments completed by the Village required the physical removal of a 2.4m length of pipe to be shipped to a consultant in the Lower Mainland. From that sample, it was determined that the Village look into conducting an acoustic-based technology to assess the condition of all AC pipe within the distribution system. The final report was received in 2015.

Cross Connection Control Plan Implementation

As per IHA Permit, the Village is required to have a Cross Connection Control Program to identify, eliminate and prevent cross connections with non-potable water sources for the Village of Montrose. Initial contact was made with a consultant to assist the Village in the development of the plan with some of its implementation in 2015 and further implementation in 2016.

Projected 2016 Capital Works

Lower Reservoir Structural Components Roof Upgrades

This project is identified above and in 2016, additional engineering assessment and design work is planned to review the suitability of this project. Additionally, it may be cost effective to inspect the upper reservoir during this project in order to determine if a repairs are required at this stage and if so, if they can be deferred to a future year.

Fire Hydrant and Valve Replacement Programs

This program will continue in 2016 and will plan to incorporate the replacement of some fire hydrants, exercise of main line valves, extension of a gate valve to road surface on 11th Avenue, and locating / accessing valves currently within Village right-of-ways.

Annual review and completion of the work program improves the water service to residents in the Village and will result in a reduction to disruptions during future waterworks projects.

10.0 Emergency Response and Contingency Plan

The Village currently has in place policies that deal with water quality notification (Policy # 5600) and emergency call outs (Policy # 7130). Both policies may be found in Appendix 4. The water quality notification Policy #5600 was revised in early 2009 as per the requirements of the Public Health Inspector, IHA.

When a major emergency occurs with respect to water supply, the Village of Montrose and the Beaver Falls Waterworks District have an agreement in place that allows either water system to act as a back-up system for the other. The process of backing up either system includes the fact that qualified representatives from each water system are present and work together to open the necessary valves for the systems to be properly combined. Further, the Village and Beaver Falls representatives convene regularly to discuss any upgrades to each respective distribution system and

11.0 Conclusion

Since the implementation of the *Drinking Water Protection Act* and Drinking Water Protection Regulations, standards with respect to on-going operator training, water sampling, system monitoring, emergency response plans, long-range planning and public reporting have increased dramatically.

The Village of Montrose looks forward to the continuous implementation of this new initiative relating to the supply and distribution of domestic potable water. Further, as a result of presenting this annual report, the Village hopes that residents understand the current complexities municipalities face in supplying an adequate water source to its residents, and encourages residents to help the Village maintain a safe, reliable water source for both current and future generations.