

November 28, 2017

File: 5610-55

Environmental Health Officer
Central Vancouver Island Health Region
1665 Grant Avenue
NANAIMO BC V9S 5K7

**Re: Crofton Water System Water Quality Report
Premises Number 1310822
Report for the Period Jan 1/16 to Dec 31/16**

Please find the Municipality of North Cowichan's Water quality report for the Crofton Water System attached.

Sincerely

Clay Reitsma, M. Eng., P. Eng
Manager of Engineering (Infrastructure & Environment)

clay.reitsma@northcowichan.ca



1 General

This report is comprised of two parts.

- The first part provides a summary of the data along with a compliance assessment. This part is provided to the VIHA and is also published on the Municipality's website at www.northcowichan.ca on an annual basis.
- The second part includes all of the relevant data tables and charts that back up the summary report. Any data points that are non-compliant with the Canadian Drinking Water Quality Guidelines (CDWQGs) are flagged in red. This part is provided to the VIHA only but is available to the public upon request.

2 Operator Information

Contact Name	Clay Reitsma, M.Eng. , P.Eng.
Phone	250-746-3100
Email	clay.reitsma@northcowichan.ca

3 System Description

This is a surface water supply. Water is pumped from the Cowichan River to Catalyst's water treatment plant. The water treatment plant consists of a coagulation and flocculation process, followed by sedimentation and filtration. The water is chlorinated at the water treatment plant and pumped to the Robert Street Reservoir where a small amount of additional chlorine is added to ensure adequate reduction of Giardia and Cryptosporidium cysts.

4 Boil Advisories

One – April 13 – 21, 2016.

4.1 *Future Improvements*

No future improvements are contemplated at this time.

5 Results

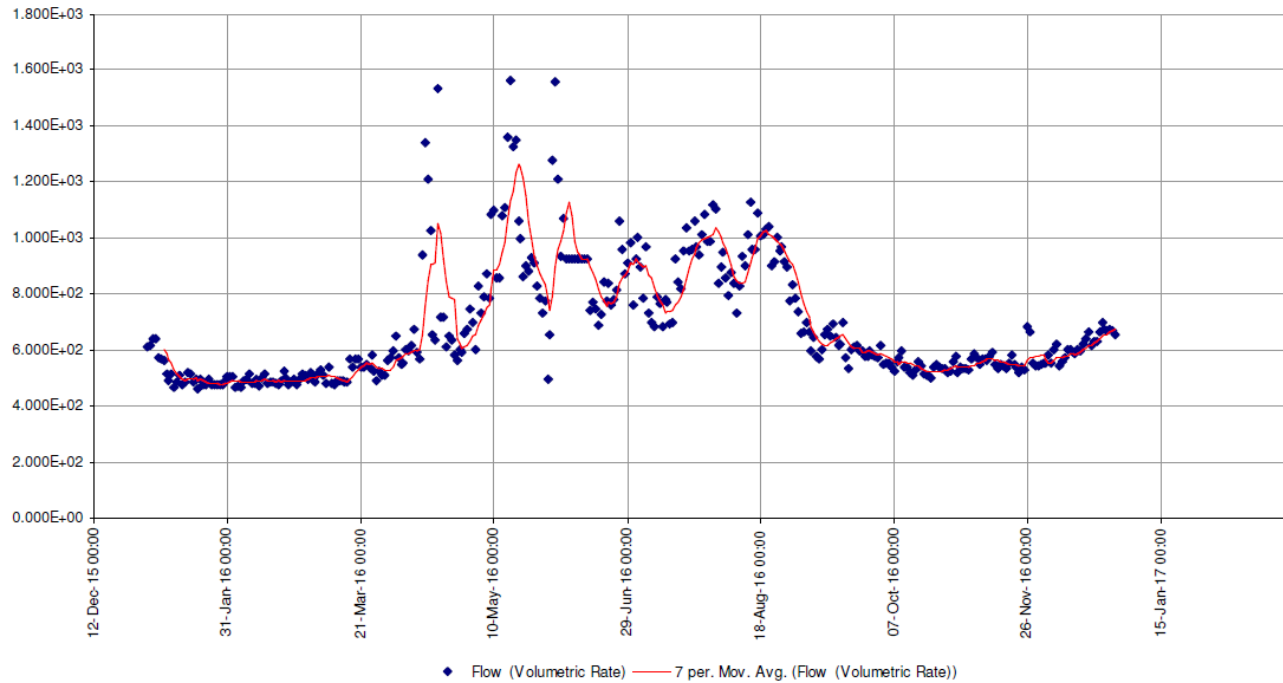
5.1 Water Consumption

Table 1: Average daily water consumption by month and quarter.

Item	Average Daily Consumption (m ³ /d)
Observed	
- Jan	516
- Feb	493
- Mar	521
- Quarter 1	510
Observed	
- Apr	718
- May	923
- Jun	922
- Quarter 2	855
Observed	
- Jul	881
- Aug	928
- Sep	625
- Quarter 3	815
Observed	
- Oct	544
- Nov	560
- Dec	615
- Quarter 4	572
Annual	689

Chart (CH-004)

Start Date: 01-Jan-2016 00:00:00
End Date: 31-Dec-2016 23:59:59
System: Crofton Drinking Water
Parameter Class: Physical
Parameters: Flow (Volumetric Rate) [m3/d]



8/30/2017 1:45:36 PM

Page 1 of 1

Figure 1: Average daily water consumption.

5.2 Residual Chlorine

Table 2: Finished water minimum and maximum free chlorine residual by quarter.

Item	Minimum (mg/L)	Maximum (mg/L)	Percent of Samples in Compliance (%)	
Compliance Requirement			100 % \geq 0.20 mg/L	100 % \leq 4.00 mg/L
Observed				
- Quarter 1	0.808	1.091	100.00	100.00
- Quarter 2	0.277	4.550	100.00	97.65
- Quarter 3	0.637	1.223	100.00	100.00
- Quarter 4	0.604	5.313	100.00	95.65
Annual	0.277	5.313	100.00	98.33

Chart (CH-001)

Start Date: 01-Jan-2016 00:00:00
 End Date: 31-Dec-2016 23:59:59
 System: Crofton Drinking Water
 Treatment Levels: Water - Finished
 Parameter Class: Chlorine
 Parameters: Free Cl2 (Max Day) [mg/L], Free Cl2 (Min Day) [mg/L]

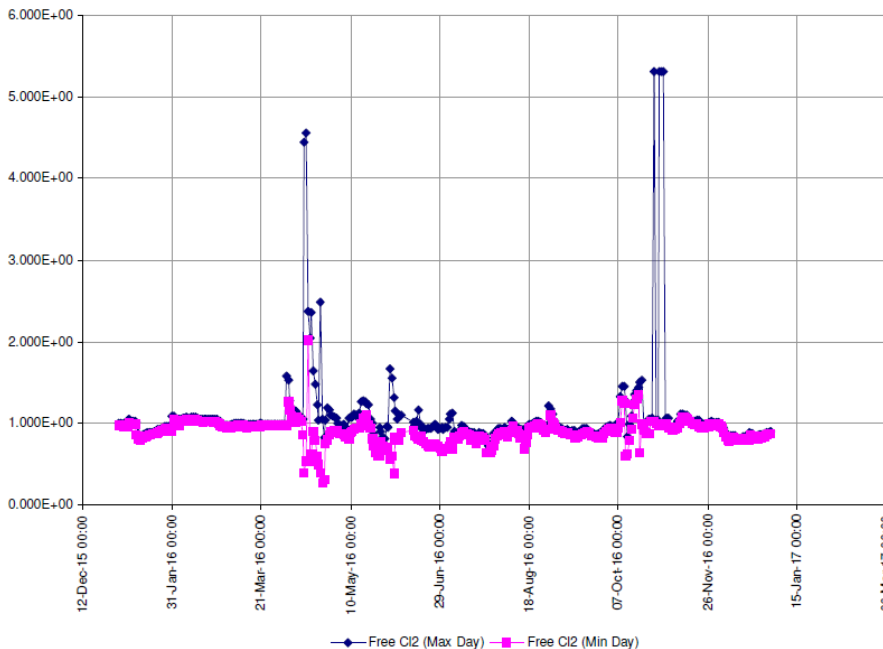


Figure 2: Finished water daily minimum and maximum free chlorine residual [1].

[1] The analyzer will occasionally register low and high spikes. Chlorine residual data is logged every 1 to 5 minutes continuously. The way the data is processed for this report is as follows: for each day the maximum and minimum free chlorine residuals over a 24 hour period are extracted from the data reported as the maximum or minimum instantaneous free chlorine residual. This is a very stringent application of the compliance criteria since any spike or dip detected will be reported as the maximum or minimum and may differ greatly from the bulk of the data.

When we observe spikes or dips of this nature it is normally caused by instrument error. Spikes and dips can also occur when staff undertakes maintenance on the analyzer equipment. It has been concluded that the spikes and dips reported do not reflect the true concentration of free chlorine in the finished water.

Table 3: Distribution system minimum total chlorine residual by quarter.

Item	Minimum (mg/L)	Percent of Samples in Compliance (%)
Compliance Requirements		100 % >= 0.05 mg/L
Observed		
- Quarter 1	0.540	100.00
- Quarter 2	0.290	100.00
- Quarter 3	0.330	100.00
- Quarter 4	0.360	100.00
Annual	0.290	99.58

Chart (CH-001)



Start Date: 01-Jan-2016 00:00:00
 End Date: 31-Dec-2016 23:59:59
 System: Crofton Drinking Water
 Project: Regular Sampling
 Treatment Levels: Water - Distribution System
 Parameter Class: Chlorine
 Parameters: Total Cl2 (Instantaneous) [mg/L]

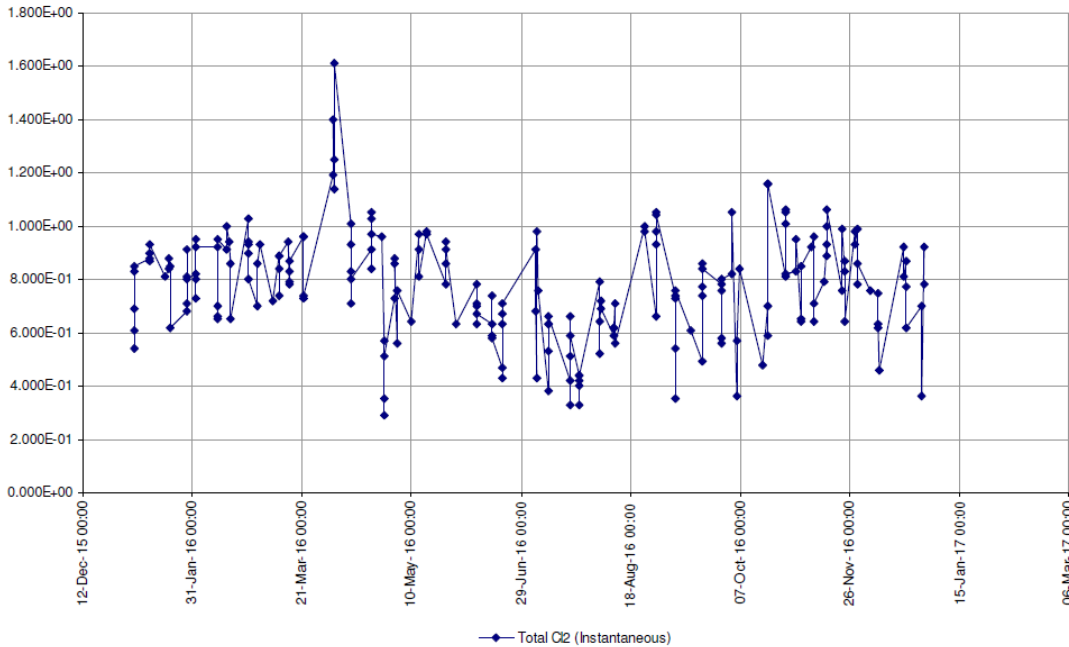


Figure 3: Distribution system minimum total chlorine residual.

Table 4(a): Distribution system maximum free chlorine residual by quarter.

Item	Maximum (mg/L)	Percent of Samples in Compliance (%)
Compliance Requirement	100% <= 4.00 mg/L	
Observed		
- Quarter 1	1.110	100.00
- Quarter 2	1.410	100.00
- Quarter 3	0.990	100.00
- Quarter 4	1.130	100.00
Annual	1.410	100.00

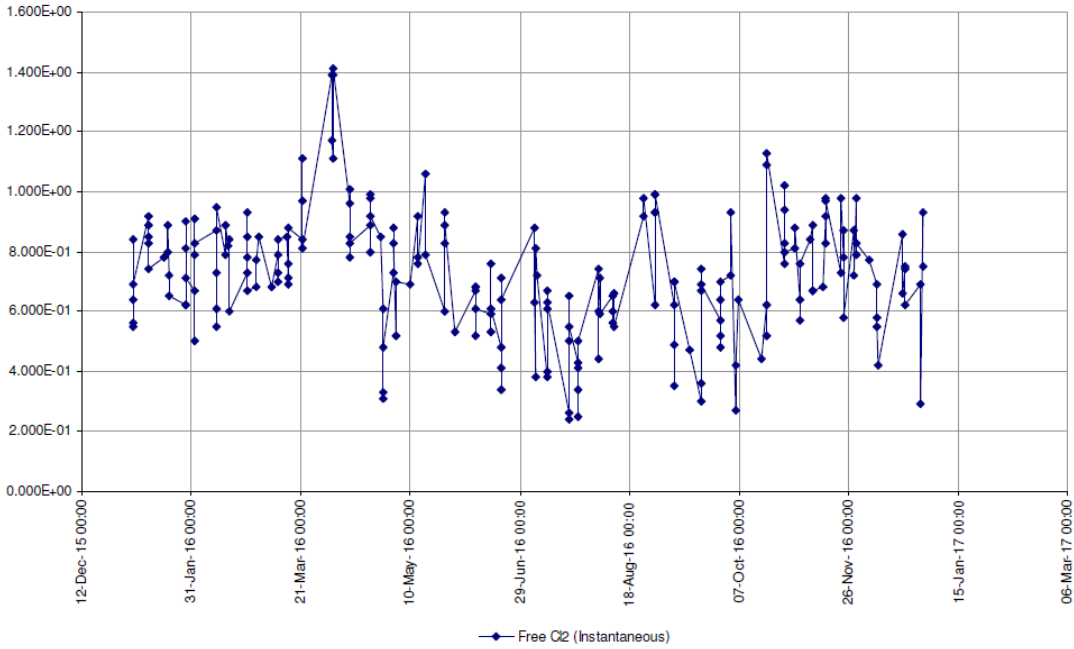
Table 4(b): Distribution system minimum free chlorine residual by quarter (VIHA Proposed Standard).

Item	Minimum (mg/L)	Percent of Samples in Compliance (%)
Compliance Requirements	100 % >= 0.2 mg/L 100% <= 4.0	
Observed		
- Quarter 1	0.500	100.00
- Quarter 2	0.310	100.00
- Quarter 3	0.240	100.00
- Quarter 4	0.270	100.00
Annual	0.240	98.76

Chart (CH-001)



Start Date: 01-Jan-2016 00:00:00
End Date: 31-Dec-2016 23:59:59
System: Crofton Drinking Water
Project: Regular Sampling
Treatment Levels: Water - Distribution System
Parameter Class: Chlorine
Parameters: Free Cl2 (Instantaneous) [mg/L]



8/30/2017 1:34:40 PM

Page 1 of 1

Figure 4: Distribution system maximum free chlorine residual.

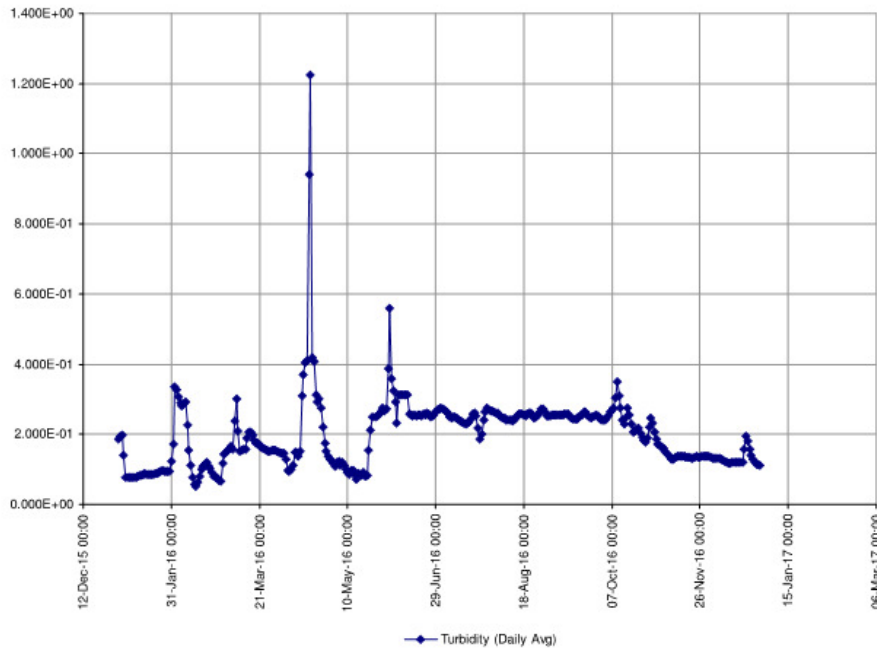
5.3 Turbidity

Table 5: Finished water maximum turbidity by month and quarter.

Item	Maximum (NTU)	Percent of Samples in Compliance (%)	
		100% <= 5 NTU	>95% <= 1 NTU (In A Month)
Compliance Requirement		100% <= 5 NTU	>95% <= 1 NTU (In A Month)
Observed			
- Jan	0.197	100.00	100.00
- Feb	0.337	100.00	100.00
- Mar	0.300	100.00	100.00
- Quarter 1	0.337	100.00	100.00
Observed			
- Apr	1.224	100.00	96.67
- May	0.275	100.00	100.00
- Jun	0.233	100.00	100.00
- Quarter 2	1.224	100.00	98.89
Observed			
- Jul	0.276	100.00	100.00
- Aug	0.273	100.00	100.00
- Sep	0.263	100.00	100.00
- Quarter 3	0.276	100.00	100.00
Observed			
- Oct	0.350	100.00	100.00
- Nov	0.188	100.00	100.00
- Dec	0.194	100.00	100.00
- Quarter 4	0.350	100.00	100.00
Annual	1.224	100.00	99.73

Chart (CH-001)

Start Date: 01-Jan-2016 00:00:00
 End Date: 31-Dec-2016 23:59:59
 System: Crofton Drinking Water
 Treatment Levels: Water - Finished
 Parameter Class: Physical
 Parameters: Turbidity (Daily Avg) [NTU]



11/21/2017 4:25:05 PM

Page 1 of 1

Figure 5: Finished water turbidity.

5.4 Coliforms

Table 6: Distribution system maximum total coliforms by quarter.

Item	Maximum (CFU/100 mL)	Percentage of Samples in Compliance (%)	
CDWQG Requirement		100% < 10 CFU/100 mL	>90% < 1 CFU/100 mL
Observed			
- Quarter 1	0.000	100.00	100.00
- Quarter 2	0.000	100.00	100.00
- Quarter 3	0.000	100.00	100.00
- Quarter 4	0.000	100.00	100.00
Annual	0.000	100.00	100.00

Table 7: Distribution system maximum *Escherichia coliforms* by quarter.

Item	Maximum (CFU/100 mL)	Percentage of Samples in Compliance (%)
CDWQG Requirements		100 % < 1 CFU/100 mL
Observed		
- Quarter 1	0.000	100.00
- Quarter 2	0.000	100.00
- Quarter 3	0.000	100.00
- Quarter 4	0.000	100.00
Annual	0.000	100.00

5.5 Cysts

Table 8: Raw water maximum number of *Giardia* cysts by quarter.

Item	Maximum (Cysts/100 L)
Observed	
- Quarter 1	0.000
- Quarter 2	No Data
- Quarter 3	No Data
- Quarter 4	No Data
Annual	0.000

Table 9: Raw water maximum number of *Cryptosporidium* cysts by quarter.

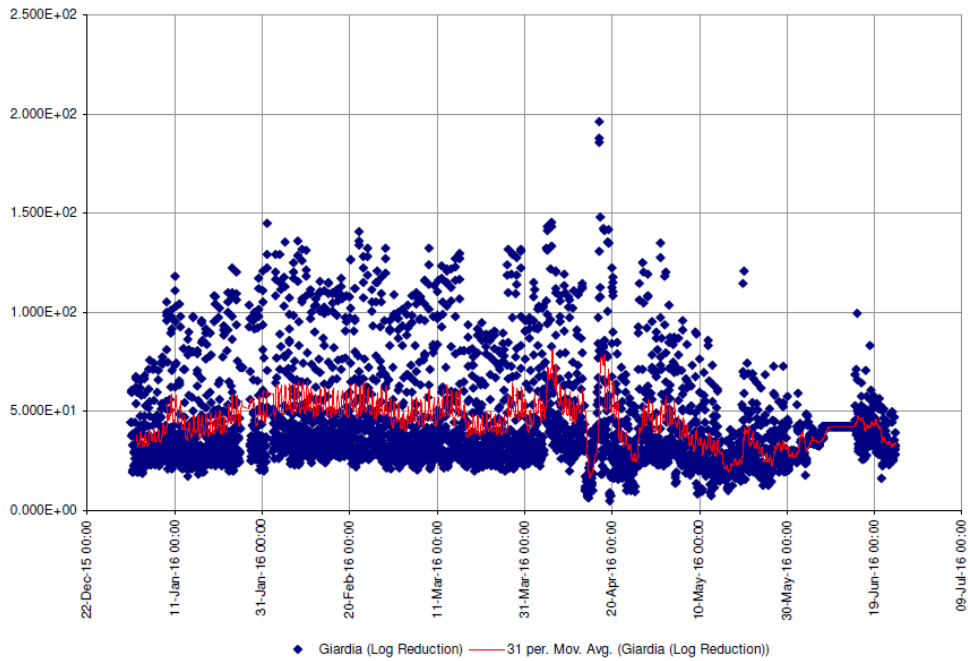
Item	Maximum (Cysts/100 L)
Observed	
- Quarter 1	0.000
- Quarter 2	No Data
- Quarter 3	No Data
- Quarter 4	No Data
Annual	0.000

Table 10: Finished water *Giardia* cysts minimum log reduction by quarter.

Item	Minimum (Log Reduction)	Percent of Samples in Compliance (%)
Compliance Requirement		100 > 1.5 Log
Observed		
- Quarter 1	17.027	100.00
- Quarter 2	4.913	100.00
- Quarter 3	14.335	100.00
- Quarter 4	14.408	100.00
Annual	4.913	100.00

Chart (CH-005)

Start Date: 01-Jan-2016 00:00:00
End Date: 30-Jun-2016 23:59:59
System: Crofton Drinking Water
Parameter Class: Cyst
Parameters: Giardia (Log Reduction) [Log]



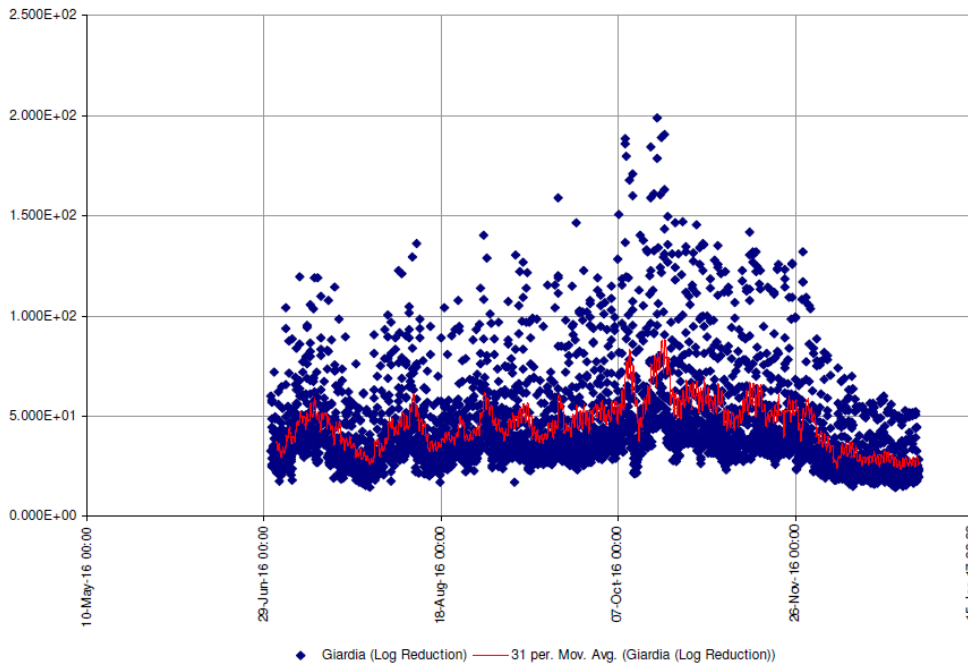
11/21/2017 4:15:30 PM

Page 1 of 1

Figure 6: Finished water *Giardia* Log Reduction (Jan 1 to Jun 30).

Chart (CH-005)

Start Date: 01-Jul-2016 00:00:00
 End Date: 31-Dec-2016 23:59:59
 System: Crofton Drinking Water
 Parameter Class: Cyst
 Parameters: Giardia (Log Reduction) [Log]



11/21/2017 4:16:29 PM

Page 1 of 1

Figure 7: Giardia log reduction (July-Sept 30).

5.7 Total THMs

Table 11: Finished water maximum THMs by quarter [3].

Item	Maximum (ug/L)	Percent of Samples in Compliance (%)
CDWQG Requirements		100 % <= 100 ug/L
Observed		
- Quarter 1	No Data	No Data
- Quarter 2	No Data	No Data
- Quarter 3	No Data	No Data
- Quarter 4	No Data	No Data
Annual	No Data	No Data

[3] THMs are typically not an issue in this system as the water is filtered. THMs were not sampled for this reporting period.

5.8 Miscellaneous Items

Table 12: Finished water miscellaneous parameters [4].

Item	Compliance Assessment
Metals	All parameters meet CDWQG limits. See attached data.
Microorganisms	No limits exist. See attached data.
Algae	No limits exist. See attached data.
PAH	All parameters meet the CDWQG limits. See attached data.
Chemical [5]	All parameters meet the CDWQG limits. See attached data.

[4] Compliance standards for miscellaneous metals and chemicals vary depending on the substance.

[5] pH limits are not minimum or maximum acceptable limits; rather they are aesthetic objectives. The pH can be low, particularly where the water has limited buffering capacity and alum is used as a flocculent, as is the case for this water supply.

6 Additional Comments

Should you have any questions regarding this report, please do not hesitate to contact the Municipality at (250) 746-3100.

Sincerely



Clay Reitsma, M.Eng., P.Eng.
Manager of Engineering (Infrastructure & Environment)

cc: Robert Bell, Assistant Manager of Operations (Utilities)
Brian Houle, Catalyst Paper

CR/cr
Enclosures