MUNICIPALITY OF NORTH Cowichan

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December 6, 2018 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 1/17 to Dec 31/17

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

Sincerely

Clay Reitsma, M. Eng., P. Eng
Senior Manager - Engineering

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

None

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	659
- Feb	684
- Mar	649
- Quarter 1	663
Observed	
- Apr	555
- May	718
- Jun	846
- Quarter 2	706
Observed	
- Jul	1159
- Aug	1029
- Sep	724
- Quarter 3	973
Observed	
- Oct	552
- Nov	567
- Dec	563
- Quarter 4	561
Annual	727

Chart (CH-004)

Start Date: 01-Jan-2017 00:00:00
End Date: 31-Dec-2017 23:59:59
System: Crofton Drinking Water
Parameter Class: Physical
Parameters: Flow (Volumetric Rate) [m3/d]

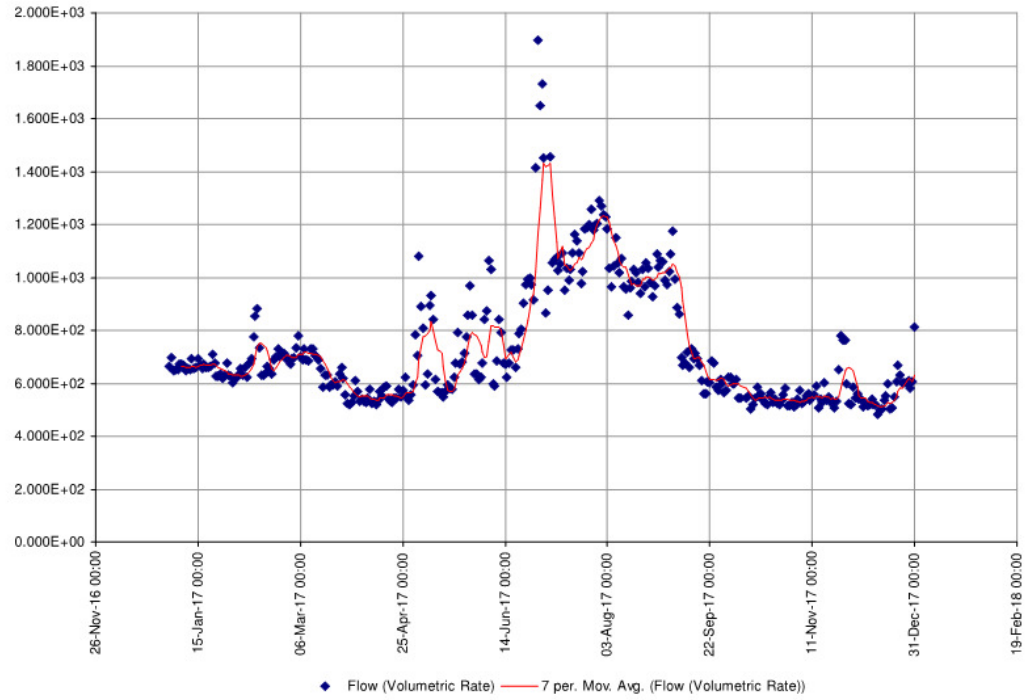

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Figure 1: Average daily water consumption.

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 % >= 0.20 mg/L	100 % <= 4.00 mg/L
Observed				
- Quarter 1	0.775	1.079	100.00	100.00
- Quarter 2	0.073	1.624	98.82	100.00
- Quarter 3	0.010	5.313	96.74	96.74
- Quarter 4	0.948	1.269	100.00	100.00
Annual	0.010	5.313	98.88	99.16

Chart (CH-001)

Start Date: 01-Jan-2017 00:00:00
End Date: 31-Dec-2017 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]

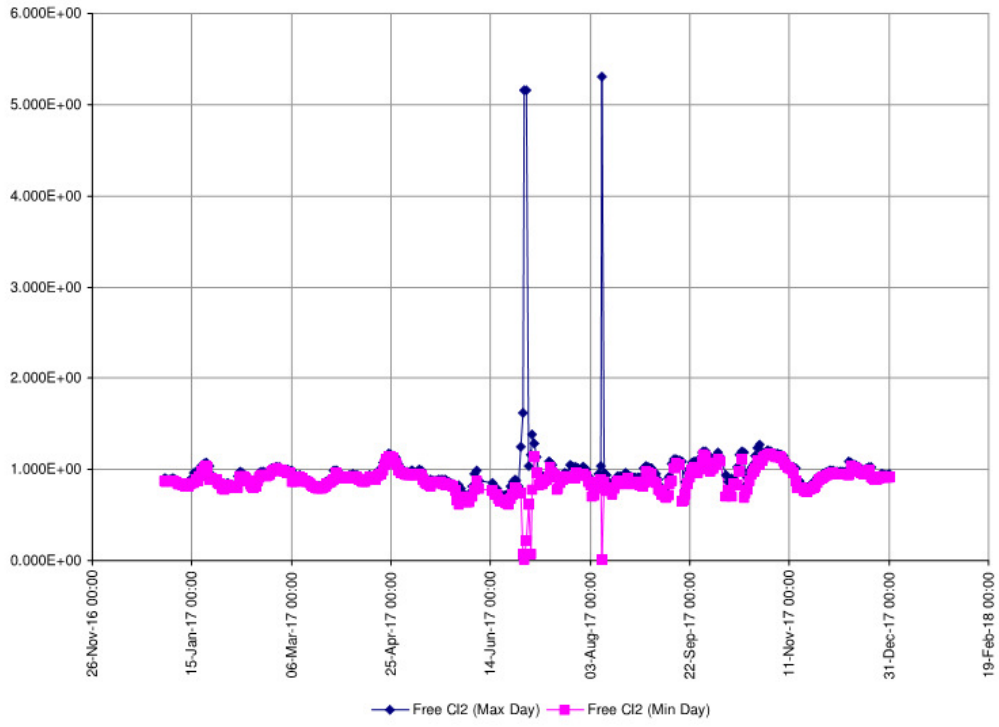

Figure 2: Finished water daily minimum and maximum free chlorine residual [1].

[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	0.380	100.00
- Quarter 2	0.300	100.00
- Quarter 3	0.130	100.00
- Quarter 4	0.210	100.00
Annual	0.130	100.00

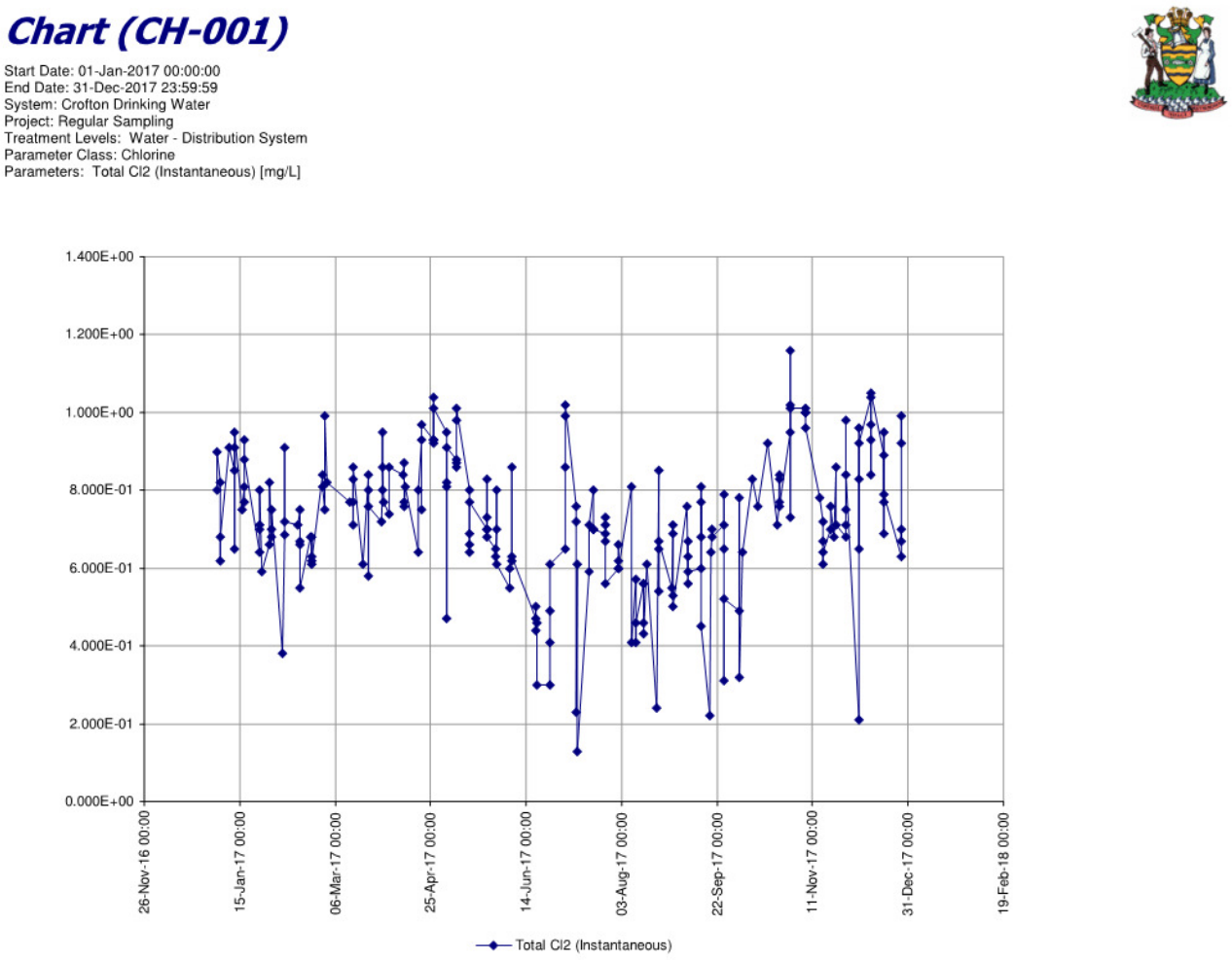

Figure 3: Distribution system minimum total chlorine residual.

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	1.010	100.00
- Quarter 2	0.990	100.00
- Quarter 3	0.850	100.00
- Quarter 4	1.120	100.00
Annual	1.120	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	0.370	100.00
- Quarter 2	0.220	100.00
- Quarter 3	0.100	96.88
- Quarter 4	0.210	100.00
Annual	0.100	99.15

Chart (CH-001)

Start Date: 01-Jan-2017 00:00:00
End Date: 31-Dec-2017 23:59:59
System: Crofton Drinking Water
Project: Regular Sampling
Treatment Levels: Water - Distribution System
Parameter Class: Chlorine
Parameters: Free Cl2 (Instantaneous) [mg/L]

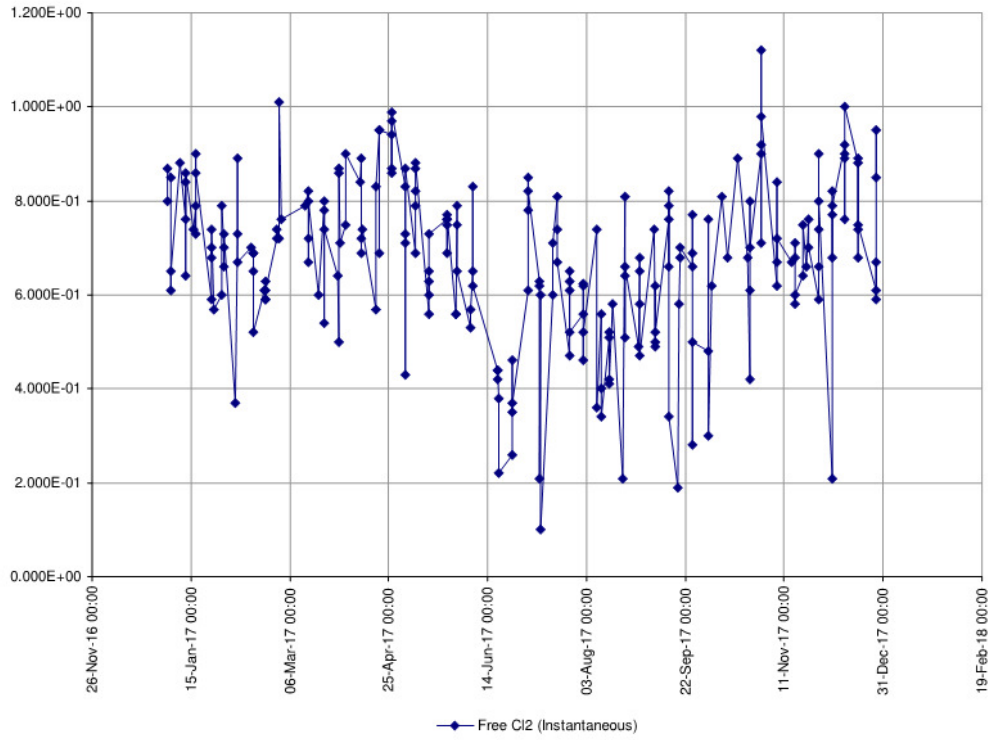

Figure 4: Distribution system maximum free chlorine residual.

5.3 Turbidity

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

Item	Maximum (NTU)	Percent of Samples in Compliance (%)	
Compliance Requirement		100% <= 5 NTU	>95% <= 1 NTU (In A Month)
Observed			
- Jan	0.213	100.00	100.00
- Feb	0.524	100.00	100.00
- Mar	0.367	100.00	100.00
- Quarter 1	0.524	100.00	100.00
Observed			
- Apr	0.141	100.00	100.00
- May	0.287	100.00	100.00
- Jun	1.085	100.00	96.67
- Quarter 2	1.085	100.00	98.89
Observed			
- Jul	1.391	100.00	87.10
- Aug	0.319	100.00	100.00
- Sep	0.445	100.00	100.00
- Quarter 3	1.391	100.00	95.65
Observed			
- Oct	0.209	100.00	100.00
- Nov	0.203	100.00	100.00
- Dec	0.130	100.00	100.00
- Quarter 4	0.209	100.00	100.00
Annual	1.391	100.00	98.62

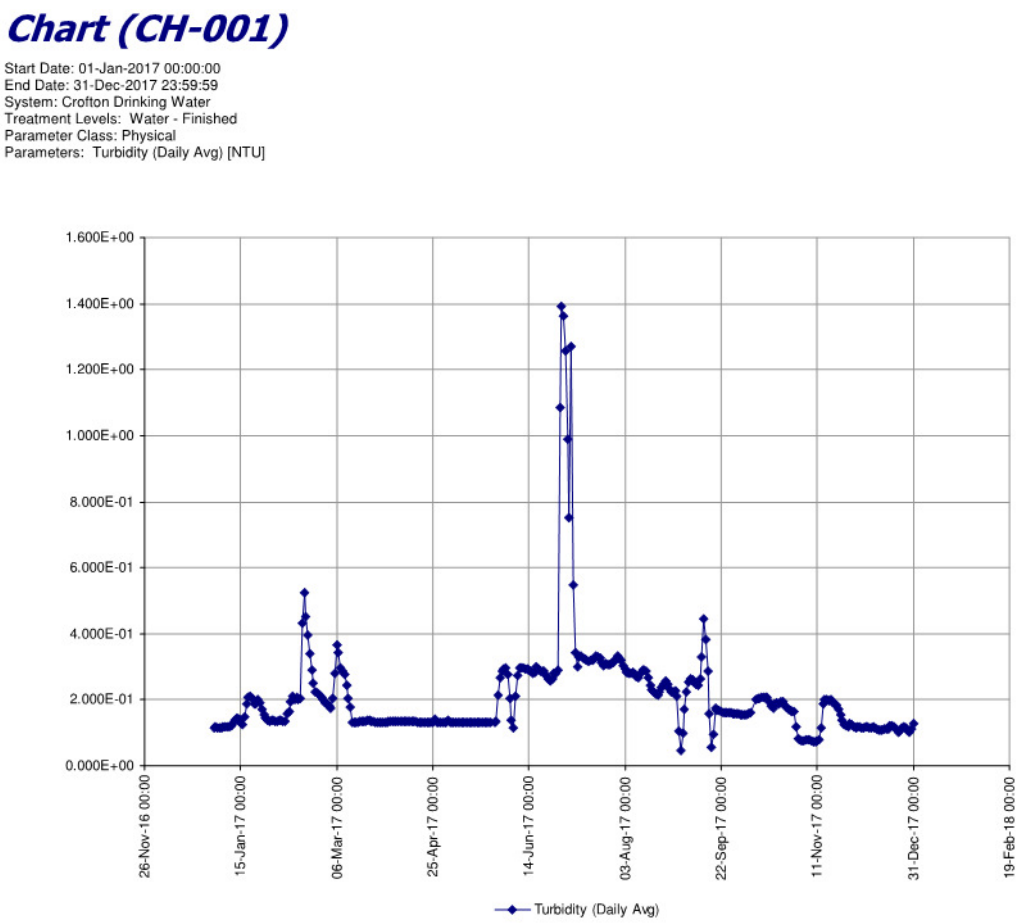

Figure 5: Finished water turbidity.

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	No Data
- Quarter 2	No Data
- Quarter 3	0.000
- 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	No Data
- Quarter 2	No Data
- Quarter 3	0.000
- 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	10.870	100.00
- Quarter 2	2.497	100.00
- Quarter 3	0.570	100.00
- Quarter 4	14.251	100.00
Annual	0.570	100.00

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Chart (CH-005)

Start Date: 01-Jan-2017 00:00:00
End Date: 30-Jun-2017 23:59:59
System: Crofton Drinking Water
Parameter Class: Cyst
Parameters: Giardia (Log Reduction) [Log]

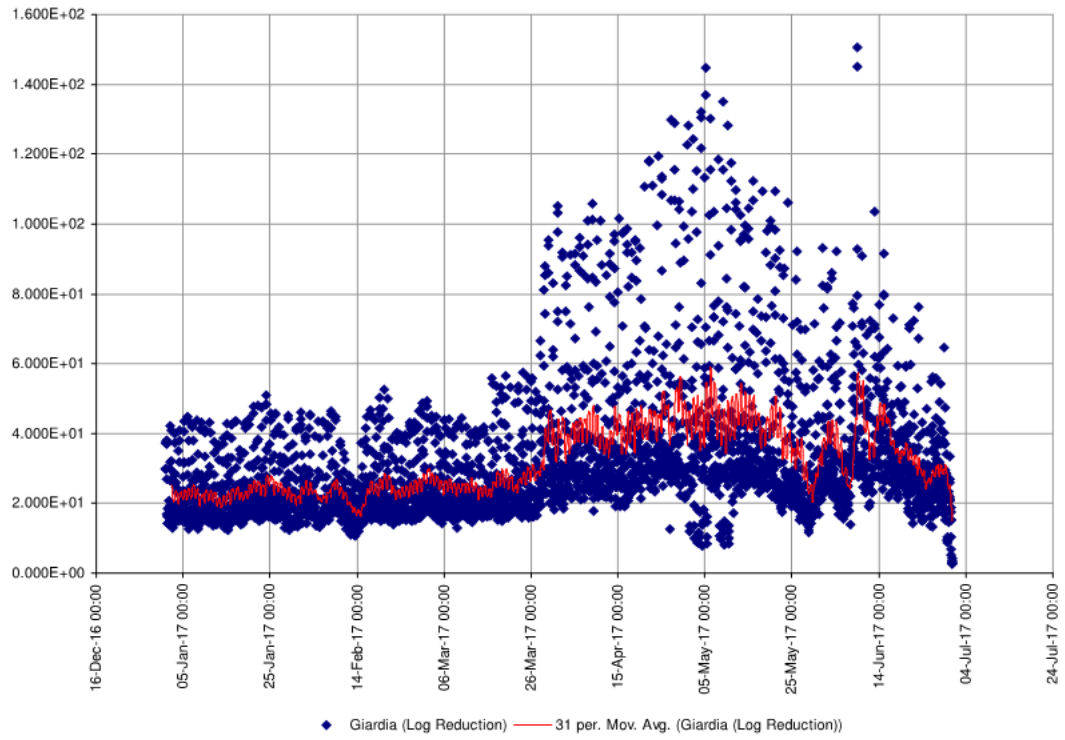

Figure 6: Finished water *Giardia* Log Reduction (Jan 1 to Jun 30).

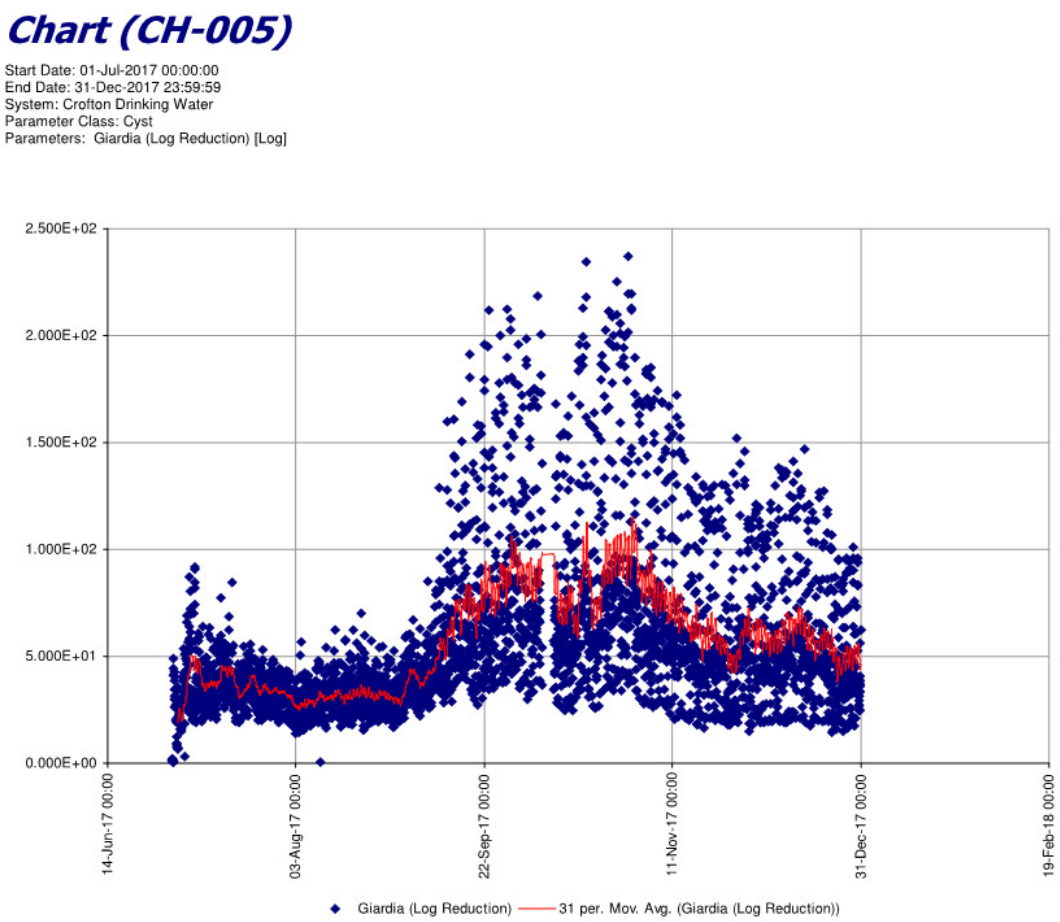

Figure 7: *Giardia* log reduction (July-Dec 31).

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.
Senior Manager of Engineering

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

CR/cr
Enclosures