

Greater Vernon Water (GVW) Water Quality Report for November 2018

The following is the water quality summary for the Greater Vernon Water (GVW) utility.

1. Sources

GVW has two sources that are used for potable water. The two sources are Duteau Creek and Kalamalka Lake. Raw (untreated) water samples are taken at the intakes of Duteau Creek and Kalamalka Lake once a week. Tables 1 and 2 summarize the results for bacterial, turbidity and UV Transmittance (UVT).

Table 1 Duteau Creek Intake – Headgates

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average	Geometric Mean
E.coli ²	Caro	CFU/100 mL	4	-----	<1	10	3	-----
E.coli ²	GVW	MPN/100 mL	4	-----	<1	6.4	2.1	-----
Total Coliform	Caro	CFU/100 mL	4	-----	≥2	61	21.8	-----
Total Coliform	GVW	MPN/100 mL	4	-----	38.4	59.1	47.1	-----
Turbidity	GVW Grab Sample	NTU	4	-----	1.17	1.76	1.40	-----
Turbidity	SCADA ¹ Hourly Average	NTU	30 Days	-----	0.65	1.81	1.00	-----

¹SCADA: Supervisory Control and Data Acquisition

²Drinking Water Treatment Objectives_ BC (Sec 4.3): Determine number of raw water samples with E. coli >20 CFU. The number of E. coli in raw water does not exceed 20/100 mL in at least 90% of the weekly samples from the previous six months.

Table 2 North Kalamalka Intake

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average	Geometric Mean
E.coli ³	Caro	CFU/100 mL	4	-----	1	8	3	-----
E.coli ³	GVW	MPN/100 mL	4	-----	1.0	19.2	3.3	-----
Total Coliform	Caro	CFU/100 mL	4	-----	3	11	6	-----
Total Coliform	GVW	MPN/100 mL	4	-----	4.2	47.8	12.4	-----
Turbidity ²	GVW Grab Sample	NTU	4	-----	0.58	1.11	0.83	-----
Turbidity ²	SCADA ¹ Hourly Average	NTU	30 Days	-----	0.59	1.43	0.88	-----
UVT (filtered)	GVW	%	4	-----	89.3	90.4	89.9	-----
UVT (unfiltered)	GVW	%	4	-----	88.4	89.6	88.9	-----

¹SCADA: Supervisory Control and Data Acquisition

²Operation Guideline: As outlined in Deviation Response Plan, turbidity < 3 NTU

³Drinking Water Treatment Objectives_ BC (Sec 4.3): Determine number of raw water samples with E. coli >20 CFU. The number of E. coli in raw water does not exceed 20/100 mL in at least 90% of the weekly samples from the previous six months.

2. Agriculture/ Irrigation Sources

The Agriculture Irrigation supply was turned off starting the week of September 17th, 2018. The sources used for irrigation supply include Duteau Creek, King Edward/Deer Creek, Goose Lake, Well #1 and Well #2 located on Coldstream Ranch. Table 5 summarizes the daily flow for each irrigation source.

The majority of the Duteau Creek water (approx. 85%) is still treated but the other sources are separated from the potable system and are not chlorinated.

Table 3 Monthly Flows for Irrigation Sources

Irrigation Sources	DCWTP	Well 1	Well 2	King Ed
Min (ML/Day)	0.00	0.00	0.00	0.00
Max (ML/Day)	0.11	0.00	0.00	0.00
Average (ML/Day)	0.00	0.00	0.00	0.00
Monthly Total (ML)	0.19	0.00	0.00	0.00

3. Treatment Plants

GVW has two treatment plants: Duteau Creek Water Treatment Plant (DCWTP) and Mission Hill Treatment Plant (MHTP). The DCWTP treats water with a coagulant and flocculates using Dissolved Air Flootation (DAF) then chlorine for disinfection. MHTP uses dual disinfection, ultra-violet (UV) and chlorine.

Tables 4, 5, and 6 summarize results for chlorine, bacterial, turbidity, aluminum, UV Transmittance (UVT) and UV Dosage (UVD). Table 5 summarizes the results for the DCWTP Contact Time (CT). The CT is used to measure the chlorine level and time needed to inactivate Giardia cysts before the first customer.

Table 4 Duteau Creek Water Treatment Plant Reservoir

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine ²	SCADA ¹ Daily Average	mg/L	30 Days	-----	1.84	2.19	1.99
Free Chlorine ²	GVW Grab Sample	mg/L	9	-----	1.59	2.02	1.85
Total Chlorine	GVW Grab Sample	mg/L	9	-----	1.90	2.20	2.09
E.coli	Caro	CFU/100 MI	4	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	9	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	4	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	9	-----	A	A	A
Turbidity ²	GVW Grab Sample	NTU	9	-----	0.27	0.48	0.39
Turbidity ²	SCADA ¹ Daily Average	NTU	30 Days	-----	0.23	0.44	0.33
UVT (filtered)	GVW	%	4	-----	89.0	90.3	89.7
UVT (unfiltered)	GVW	%	16 ³	-----	87.1	91.4	89.7
UVT (Unfiltered) DAF Effluent	SCADA ¹	%	14 Days ⁴	-----	85.13	90.94	88.59
UVT (unfiltered) DAF Effluent	GVW	%	1	-----	86.6	86.6	86.6
UVT (unfiltered) DAF Effluent	GVW Operations	%	29 ³	-----	84.0	89.1	87.4

¹SCADA: Supervisory Control and Data Acquisition. UVT is monitored at the DAF Effluent on SCADA.

²GVW WQ Deviation Response Plan – Free Chlorine >0.20 mg/L or <2.20 mg/L Turbidity < 1.0 NTU.

³Operation grab samples are now being tabulated for this report as of January 11, 2018.

⁴The UVT Analyzer was out of service until November 17 when the unit was repaired.

Table 5 DCWTP – Contact Time (CT) 3-log inactivation of Giardia

Parameter	Days Monitored	Days 3-log inactivation ACHIEVED	Days 3-log inactivation NOT ACHIEVED	Min	Max
99.9% Achieved ¹	30	30	0	100.00	100.00

¹99.9%, 3-log inactivation of Giardia; CT is now logged by the minute on SCADA but shows a live value as of September 2016.

Table 6 Mission Hill Treatment Plant

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine (post contact chamber)	SCADA ¹ Daily Average	mg/L	30 Days	13²	1.95	2.29	2.17
Free Chlorine ²	GVW Grab Sample	mg/L	10	-----	1.82	2.4	2.06
Total Chlorine	GVW Grab Sample	mg/L	10	-----	1.51	2.6	2.21
E.coli	Caro	CFU/100 mL	4	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	10	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	4	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	10	-----	A	A	A
Turbidity ²	GVW Grab Sample	NTU	10	-----	0.44	0.92	0.67
Turbidity ²	SCADA ¹ Daily Average	NTU	30 Days	-----	0.42	0.94	0.63
UVT (filtered)	GVW	%	4	-----	91.9	92.8	92.5
UVT (unfiltered)	GVW	%	4	-----	91.2	92.4	91.7
UVT	SCADA ¹	%	30 Days	-----	90.87	92.38	91.63
UVD	SCADA ¹	mJ/cm ²	30 Days	-----	49.06	75.86	59.87

¹SCADA: Supervisory Control and Data Acquisition

²Operation Guideline: As outlined in Deviation Response Plan - Free Chlorine >0.20 mg/L or <2.20 mg/L, turbidity < 3 NTU; UVT> 88%

4. Distribution

GVW has two distribution systems that interconnect: Duteau System supplied by Duteau Creek and Kalamalka System supplied by Kalamalka Lake. GVW has approximately 22,350 service connections.

Table 7 summarizes the daily flow for each distribution system. The Duteau and Kalamalka systems have many locations where they can be interconnected. This means that there are areas where there is a blend of water quality and can be identified by the conductivity of the water.

Table 7 Monthly Flows for GVW Distribution Systems

Distribution Systems	DCWTP	MHTP
Min (ML/Day)	7.23	8.51
Max (ML/Day)	11.02	12.83
Average (ML/Day)	9.12	11.23
Monthly Total (ML)	273.70	336.85

Tables 8 and 9 summarize results for chlorine, bacterial, turbidity, and UV Transmittance (UVT) for each distribution system. These systems are monitored weekly.

Table 8 Duteau Distribution

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine ¹	GVW grab sample	mg/L	45	4 ^{1,2}	0.03	1.90	1.23
Total Chlorine	GVW grab sample	mg/L	45	-----	0.10	2.18	1.46
E.coli	Caro	CFU/100 mL	16	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	26	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	16	-----	<1	>80	4.71
Total Coliform	GVW	MPN/100 mL	26	-----	A	2.0	0.07
Turbidity ¹	GVW grab sample	NTU	45	1 ^{1,3}	0.24	2.00	0.53

¹Operation Guidelines: Free Chlorine >0.20 mg/L or <2.20 mg/L; Turbidity < 1 NTU

²Three samples had the free chlorine <0.20 mg/L, one sample at the O'Keefe Ranch SS, one sample at Lavington Superette, and one sample at Golf View SS. The bacterial samples for the low chlorine sites all had non-detect Total Coliform counts and E.coli.

³One sample at O'Keefe Ranch SS had turbidity >1 NTU. This sample was taken immediately after flushing and the bacterial sample was non-detect for Total Coliforms and E. coli.

Table 9 Kalamalka Distribution

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine ¹	GVW grab sample	mg/L	84	-----	0.22	2.19	1.17
Total Chlorine	GVW grab sample	mg/L	84	-----	0.48	2.6	1.42
E.coli	Caro	CFU/100 MI	60	1²	1	<1	<1
E.coli	GVW	MPN/100 mL	46	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	60	6^{2,3}	<1	≥34	0.7
Total Coliform	GVW	MPN/100 mL	46	2⁴	A	4.2	A
Turbidity ¹	GVW grab sample	NTU	84	14¹	0.25	4.13	0.85

¹Operation Guidelines: Free Chlorine >0.20 mg/L or <2.20 mg/L.; Turbidity < 1 NTU

²One E. coli and one Total Coliform were detected in a Noric House Caro bacterial sample. The area that would be affected was immediately issued a Boil Water Notice (BWN). All subsequent samples in the area were non-detect for E. coli but Total Coliforms were still detected in the DND Reservoir. This area continues to remain on a BWN.

³Five Caro bacterial samples had Total Coliforms detected at the DND Reservoir in November. This area is on a BWN.

⁴Two in-house bacterial samples had Total Coliforms detected in them from the DND Reservoir site.

5. Customer Calls and Notification

Customer calls within the GVW Service area are tracked and recorded. There was one customer call in November.

Notification to the DND/ Noric House area was initiated on November 22, 2018 after a sample was reported with 1 E.coli at the Noric Sample Station.

Table 10 Customer Calls/ Notifications

Date	Types of Concern	Action	Comments	Service Area
November 13 th	Staining in bathroom	Water quality sampling	All test results were within guidelines. The cause of the staining is likely an airborne bacteria.	Vernon
November 22 nd	1 E.coli reported at Noric SS	BWN initiated. Re-sampled at Noric SS, sampled up and downstream of the Noric SS, drained and cleaned DND reservoir.	3 consecutive samples free of Total Coliform and E.coli are needed before BWN is removed. BWN still in effect (Nov 30)	Vernon

6. Operational or Maintenance Activity

The annual water main flushing program started in May of 2018. Flushing usually finishes near the end of October, however due to warmer weather, flushing continued into November.

There were no water main breaks in November.