

Greater Vernon Water (GVW) Water Quality Report for July 2020

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 bacteria and turbidity.

Table 1 Duteau Creek Intake – Headgates

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
E.coli ²	Caro	CFU/100 mL	4	-----	15	23	18.8
E.coli ²	GVW	MPN/100 mL	4	-----	13.7	30.6	17.3
Total Coliform	Caro	CFU/100 mL	4	-----	1120	1550	1309
Total Coliform	GVW	MPN/100 mL	4	-----	200.5	>200.5	>200.5
Turbidity	GVW Grab Sample	NTU	4	-----	1.28	1.62	1.46
Turbidity	SCADA ¹ Hourly Average	NTU	31 Days	-----	0.79	1.32	0.93

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
E.coli ³	Caro	CFU/100 mL	4	----	<1	1.0	1.0
E.coli ³	GVW	MPN/100 mL	4	----	<1	3.1	1.0
Total Coliform	Caro	CFU/100 mL	4	----	111.0	3870.0	1925.2
Total Coliform	GVW	MPN/100 mL	4	----	88.5	>200.5	172.5
Turbidity ²	GVW Grab Sample	NTU	4	----	0.87	1.06	0.96
Turbidity ²	SCADA ¹ Hourly Average	NTU	31 Days	----	0.51	0.74	0.64

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 on April 15, 2020. The sources used for irrigation supply include Duteau Creek, King Edward/Deer Creek, Goose Lake, Well #1 and Well #2 located on Coldstream Ranch.

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 2 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)	12.64	0.78	1.55	13.58
Average (ML/Day)	5.08	0.08	0.18	5.73
Monthly Total (ML)	157.42	2.50	5.50	177.66

3. Treatment Plants

GVW has two treatment plants: Duteau Creek Water Treatment Plant (DCWTP) and Mission Hill Water Treatment Plant (MHWTP). At the DCWTP water is first treated with a coagulant and mixed to create a floc, next clarification is achieved by Dissolved Air Floatation (DAF). Chlorine is added after treatment to ensure contact time for the removal of viruses, followed by Ultra-violet (UV) disinfection, and finally chlorine is added before entering the distribution system for residual. MHWTP uses a dual disinfection process of UV and chlorine.

Tables 4 and 6 summarize results for chlorine, bacterial, turbidity, UV Transmittance (UVT) and UV Dosage (UVD). Table 5 summarizes the DCWTP contact time (CT) 4-log inactivation of Viruses.

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	31 Days	----	1.88	1.92	1.90
E.coli	Caro	CFU/100 mL	4	----	<1	<1	<1
E.coli	GVW	MPN/100 mL	4	----	A	A	A
Total Coliform	Caro	CFU/100 mL	4	----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	4	----	A	A	A
Turbidity ²	SCADA ¹ Daily Average	NTU	31 Days	----	0.20	0.32	0.25
UVT (unfiltered)	GVW	%	14	----	93.0	94.9	94.1
Pre UVT ³	SCADA ¹	%	31 Days	----	87.6	89.7	88.5

¹SCADA: Supervisory Control and Data Acquisition.

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

³The UV Plant is now operational. UVT is monitored pre-UV treatment which is used to determine UV dosage.

This month, 27.66 m³ off-spec water occurred. 3 minor events 25.53, 23.10 and 2.13 m³ for a total of 50.76 m³, this is 0.00026% or 50.76/1968500m³ of the total treated water produced in July.

Table 5 DCWTP – Contact Time (CT) 4-log inactivation of Viruses

Parameter	Days Monitored	Days 4-log inactivation ACHIEVED	Days 4-log inactivation NOT ACHIEVED
> 4-log Removal of Viruses ¹	31	31	0

¹99.99%, 4-log inactivation of Viruses; CT is logged by the minute on SCADA as of February 2019.

Table 6 Mission Hill Water Treatment Plant

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine (483 Pressure Zone)	SCADA ¹ Daily Average	mg/L	31 Days	-----	1.98	2.22	2.06
Free Chlorine (550 Pressure Zone)	SCADA ¹ Daily Average	mg/L	31 Days	-----	2.07	2.46	2.18
E.coli	Caro	CFU/100 mL	4	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	4	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	4	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	4	-----	A	A	A
Turbidity ²	SCADA ¹ Daily Average	NTU	31 Days	-----	0.47	0.79	0.62
Pre UVT	SCADA ¹	%	31 Days	-----	89.35	91.47	90.55

¹SCADA: Supervisory Control and Data Acquisition.

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

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 Usage for GVW Distribution Systems

Distribution Systems	DCWTP	MHWTP
Min (ML/Day)	6.70	13.94
Max (ML/Day)	92.50	26.46
Average (ML/Day)	50.14	20.02
Monthly Total (ML)	1554.30	620.66

The GVW distribution system contains six sampling sites (Table 8) that frequently have free chlorine < 0.2 mg/L due to the sample sites being located at the end of the distribution line (Tables 9 and 10). Measures are currently in place to mitigate this issue including regular monitoring and flushing. The three sites at Boss Creek represent a localized area.

Table 8 Low Chlorine Sites and Mitigation Measures

Frequent Low Free Chlorine Sites	Mitigation Measures
O'Keefe Ranch SS	On a localized Water Quality Advisory, regular monitoring and flushing
9007 Aberdeen Rd SS	Regular monitoring and flushing
Noble Canyon B/O	Regular monitoring and flushing
Boss Creek PH 1 (Lower) Return/Inlet	Regular monitoring
Boss Creek PH 2 (Upper) Discharge/Outlet	Regular monitoring
Boss Creek PH 2 (Upper) return/inlet	Regular monitoring

Tables 9 and 10 summarize results for chlorine, bacterial, and turbidity for each distribution system. These systems are monitored by handheld instruments weekly.

Table 9 Duteau Distribution

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine ¹	GVW grab sample	mg/L	79	12 ^{1,2}	0.00	2.17	1.05
Total Chlorine	GVW grab sample	mg/L	79	-----	0.02	2.40	1.24
E.coli	Caro	CFU/100 mL	29	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	45	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	29	1 ³	<1	4	<1
Total Coliform	GVW	MPN/100 mL	45	-----	A	A	A
Turbidity ¹	GVW grab sample	NTU	79	9 ⁴	0.19	6.34	0.65

¹Operation Guidelines: Free Chlorine >0.20 mg/L or <2.20 mg/L, Turbidity < 5 NTU

²Twelve samples had free chlorine < 0.20 mg/L, see paragraph above, including 2 sites that are not commonly known for low free chlorine, Kalamalka Secondary and Kidston SS. Kidston SS was resampled the next day and free chlorine concentrations had increased above 0.2 mg/L. Kalamalka Secondary bacterial results were non-detect.

³Venables and Northcott SS had 4 CFU for total coliforms on July 14, 2020, The site was resampled the following week and both in house and CARO bacterial samples came back non detect for total coliforms and E. coli.

⁴Nine sites had turbidity > 1 NTU. All bacterial results for these sites were on detect for total coliforms and E. coli.

Table 10 Kalamalka Distribution

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine ¹	GVW grab sample	mg/L	94	1 ²	0.02	2.40	1.23
Total Chlorine	GVW grab sample	mg/L	94	-----	0.06	2.80	1.49
E.coli	Caro	CFU/100 mL	55	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	46	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	55	3 ^{3,4,5}	<1	71	<1
Total Coliform	GVW	MPN/100 mL	46	4 ^{3,4,5}	A	48	1.25
Turbidity ¹	GVW grab sample	NTU	94	12 ⁶	0.36	13.40	0.95

¹Operation Guidelines: Free Chlorine >0.20 mg/L or <2.20 mg/L, Turbidity < 5 NTU

²Performing Arts Centre had free chlorine <0.2 mg/L. The Performing Arts Centre is currently not being used due to COVID-19 resulting in low free chlorine concentrations.

³Dunsmuir SS had five positive results for total coliforms in July. Dunsmuir Road was put on a Boil Water Notice on July 10th, 2020, which was rescinded on July 27th, 2020 after 6 additional bacterial samples came back non detect for E. coli and total coliforms.

⁴2702 15 St SS had a positive result for total coliforms on July 14th 2020. The site was resampled on July 16th, 2020 and both the in house bacterial sample and CARO sample came back non detect for total coliforms and E. coli.

⁵MHWTP Post Contact Chamber had a positive CARO result for total coliforms on July 14th 2020, the in house bacterial sample was non detect for total coliforms and all subsequent samples were non detect for total coliforms.

⁶Twelve sites had turbidity above 1 NTU, all bacterial samples for these sites were non detect for total coliforms and E. coli.

5. Customer Calls and Notification

Customer calls within the GVW Service area are tracked and recorded. There were no customer calls that required investigations in July.

6. Operational or Maintenance Activity

The annual water main flushing program began in May. There was one water main break in the GVW system in July.