

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

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

Kalamalka Intake screen was cleaned on October 14. Kalamalka Intake was shut off on October 24 due to high algae counts and remains off.

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	MPN/100 mL	4	-----	2	34	14
E.coli ²	GVW	MPN/100 mL	4	-----	2.0	28.8	10.6
Total Coliform	Caro	MPN/100 mL	4	-----	657	2,350	1,454
Total Coliform	GVW	MPN/100 mL	4	-----	200.5	>200.5	>200.5
Turbidity	GVW Grab Sample	NTU	4	-----	1.26	1.54	1.41
Turbidity	SCADA ¹ Hourly Average	NTU	31 Days	-----	0.94	1.33	1.11

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	MPN/100 mL	4 ⁴	----	6	12	9
E.coli ³	GVW	MPN/100 mL	4	----	1.0	12.1	7.1
Total Coliform	Caro	MPN/100 mL	4 ⁴	----	22	48	37
Total Coliform	GVW	MPN/100 mL	4	----	12.4	73.8	44.4
Turbidity ²	GVW Grab Sample	NTU	5	----	1.07	2.06	1.47
Turbidity ²	SCADA ¹ Hourly Average	NTU	23 Days	----	0.84	1.31	1.09

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.

⁴Kalamalka Lake intake was turned off on October 24th. The intake remains on to provide source water for sampling and to the pilot plant.

2. Agriculture/ Irrigation Sources

The Agriculture irrigation supply was turned off September 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 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)	0.98	1.19	0.72	0.38
Average (ML/Day)	0.14	0.07	0.10	0.08
Monthly Total (ML)	4.25	2.03	3.04	2.52

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 Chlorine²	SCADA ¹ Daily Average	mg/L	31 Days	----	1.82	1.91	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
Turbidity²	SCADA ¹ Daily Average	NTU	31 Days	----	0.26	0.40	0.32
UVT (unfiltered)	GVW	%	12	----	87.9	92.5	91.2
Pre UVT³	SCADA ¹	%	31 Days	----	83.1	93.2	90.2

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, 0 m³ off-spec water occurred at DCWTP.

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	23 Days	-----	2.02	2.79	2.13
Free Chlorine (550 Pressure Zone)	SCADA ¹ Daily Average	mg/L	12 Days	-----	0.69	2.01	1.75
E.coli	Caro	CFU/100 mL	3	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	3	-----	A	A	A
Total Coliform	Caro	CFU/100 MI	3	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	3	-----	A	A	A
Turbidity ²	SCADA ¹ Daily Average	NTU	23 Days	-----	0.72	1.21	0.97
Pre UVT	SCADA ¹	%	23 Days	-----	89.26	92.64	90.33

¹SCADA: Supervisory Control and Data Acquisition.

²GVW WQ Deviation Response Plan – Free Chlorine >0.20 mg/L Turbidity < 3.0 NTU.

This month, 0 m³ off-spec water occurred at MHWTP.

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 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)	8.40	0.00
Max (ML/Day)	29.10	16.39
Average (ML/Day)	14.19	11.36
Monthly Total (ML)	439.80	352.09

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 Chlorine¹	GVW grab sample	mg/L	72	14^{2,3}	0.00	2.40	0.95
Total Chlorine	GVW grab sample	mg/L	72	-----	0.00	2.60	1.11
E.coli	Caro	CFU/100 mL	34	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	47	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	34	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	47	-----	A	A	A
Turbidity¹	GVW grab sample	NTU	72	3⁴	0.17	1.56	0.47

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

²Thirteen samples had free chlorine < 0.20 mg/L, see paragraph above, include the 6 sites that are commonly known for low free chlorine, 9007 Aberdeen Rd SS, Boss Creek PH 1 Return, Boss Creek PH 2 Discharge, Boss Creek PH 2 Return, Cosens Bay Rd SS, and O'Keefe Ranch SS. One sample had <0.20 mg/L that is not commonly known for low free chlorine, Kirkland SS. All bacterial results for these sites were non-detect.

³One site had chlorine >2.20 mg/L, Kokanee PS.

⁴Four samples had turbidity >1 NTU: Vernon Jubilee Hospital, OK. Landing SS and Kidston SS.

Table 10 Kalamalka Distribution

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine¹	GVW grab sample	mg/L	72	7²	0.01	2.17	0.94
Total Chlorine	GVW grab sample	mg/L	72	-----	0.14	2.50	1.19
E.coli	Caro	CFU/100 mL	38	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	32	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	38	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	32	-----	A	A	A
Turbidity¹	GVW grab sample	NTU	69	-----	0.34	1.74	0.88

¹Operation Guidelines: Free Chlorine >0.20 mg/L or <2.20 mg/L, Turbidity < 3 NTU.

²Seven sites had free chlorine <0.20 mg/L, include West Kal SS, Brassey Place SS, Amber SS, Longspoon Court SS, 1101 Galiano Road B/O, 6198 Brookside Road B/O.

5. Customer Calls and Notifications

Customer calls within the GVW Service area are tracked and recorded. As of September, customer calls will include water quality inquiries, therefore the number of calls will increase. There were a total of 18 customer calls in October.

NUMBER OF CALLS	TYPE OF CALL	ISSUE	INVESTIGATION	COMMENTS
4	inquiries	-----	-----	-----
5	water quality	taste, odour, particles	1	Algae in Kalamalka Lake
1	water quality	chlorine	1	Water quality investigated; all parameters within guidelines.
1	water quality	irritation	1	customer on lake water
1	water quality	illness	1	recommend customer to seek medical attention; water quality in area within guidelines
1	water quality	coloured water	na	flushing in area
5	water quality	coloured water	na	all were internal issues or strata issues (strata flushing)

6. Operational or Maintenance Activity

The annual water main flushing program began in May and continued through October. There were 4 water main break in the GVW system in October.