REGIONAL DISTRICT NORTH OKANAGAN

Greater Vernon Water (GVW) Water Quality Report for June 2022

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	MPN/100 mL	4	-----	4	104	32
E.coli[2]	GVW	MPN/100 mL	5	-----	260.3	689.3	519.1
Total Coliform	Caro	MPN/100 mL	4	-----	261	>2420	599
Total Coliform	GVW	MPN/100 mL	5	-----	260.3	689.3	502.3
Turbidity	GVW Grab Sample	NTU	4	-----	2.6	23.4	8.5
Turbidity	SCADA[1] Hourly Average	NTU	30 Days	-----	0.85	11.91	2.78

[1]SCADA: Supervisory Control and Data Acquisition.
[2]Drinking Water Treatment Objectives_ BC (Sec 4.3): The number of raw water samples should not exceed 20/100 mL in at least 90% of the weekly samples from the previous six months.
[3]GVW uses the MPN method which has a Detection Limit of 200.5 MPN/100 mL.

Table 2 North Kalamalka Intake

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
E.coli[3]	Caro	MPN/100 mL	4	-----	<1	1	0.25
E.coli[3]	GVW	MPN/100 mL	4	-----	<1	1	0.25
Total Coliform	Caro	MPN/100 mL	4	-----	2	11	6.3
Total Coliform	GVW	MPN/100 mL	4	-----	3.1	32.7	11.0
Turbidity[2]	GVW Grab Sample	NTU	4	-----	0.71	1.1	0.89
Turbidity[2]	SCADA[1] Hourly Average	NTU	30 Days	-----	0.41	0.70	0.55

[1]SCADA: Supervisory Control and Data Acquisition.
[2]Operation Guideline: As outlined in Deviation Response Plan, turbidity < 3 NTU.
[3]Drinking Water Treatment Objectives_ BC (Sec 4.3): The number of raw water samples should not exceed 20/100 mL in at least 90% of the weekly samples from the previous six months.
[4]One sample had E.coli results: OG (overgrown) with E.coli; the average is the 5 sites with results.
[5]One sample had Total Coliform results: OG (overgrown) with Total Coliforms; the average is the 5 sites with results.

2. Agriculture/ Irrigation Sources

The sources used for irrigation supply include Duteau Creek, King Edward/Deer Creek, Goose Lake, Coldstream Ranch Well #2 and Well #3. Table 3 summarizes the daily flows for each irrigation system.

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.

The irrigation season is from April 15 to September 15. Irrigation water used during the off season is used mainly for livestock watering. This water comes from Ranch Wells #2 and Ranch Well #3, King Edward and Duteau Creek.

Table 3 Irrigation Volumes for Irrigation Sources over the Month

Irrigation Sources	DCWTP	Well 3	Well 2	King Edward
Min (ML/Day)	0.00	0.00	0.00	0.00
Max (ML/Day)	1.55	0.60	0.96	3.85
Average (ML/Day)	0.39	0.05	0.06	1.55
Monthly Total (ML)	11.83	1.54	1.76	46.53

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 log removal of viruses at the DCWTP.

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	-----	1.89	1.91	1.90
E.coli	Caro	CFU/100 mL	6	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	7	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	6	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	7	-----	A	A	A
Turbidity[2]	SCADA[1] Daily Average	NTU	30 Days	-----	0.22	0.35	0.27
Pre UVT[3]	SCADA[1]	%	30 Days	-----	87.61	90.57	88.91

[1]SCADA: Supervisory Control and Data Acquisition.
[2]GVW WQ Deviation Response Plan – Free Chlorine >0.20 mg/L Turbidity < 1.0 NTU.
[3]UVT is monitored pre-UV treatment which is used to determine UV dosage.

This month, 0 m^3 off-spec water occurred at DCWTP.

Table 5 DCWTP – Log Removal of Viruses

Log Removal of Viruses[1]	
Days Monitored	30
Days 4 Log Removal Achieved	30

[1]4-log virus removal logged by the minute on SCADA.

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	30 Days	-----	1.99	2.22	2.13
Free Chlorine (550 Pressure Zone)	SCADA[1] Daily Average	mg/L	30 Days	-----	1.21	2.12	1.94
E.coli	Caro[4]	CFU/100 mL	4	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	5	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	4	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	5	-----	A	A	A
Turbidity[2]	SCADA[1] Daily Average	NTU	30 Days	-----	0.44	0.76	0.56
Pre UVT	SCADA[1]	%	30 Days	-----	89.78	90.90	90.41

[1]SCADA: Supervisory Control and Data Acquisition.
[2]GVW WQ Deviation Response Plan – Free Chlorine >0.20 mg/L Turbidity <

This month, 0 m^3 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 Volumes for GVW Distribution Systems over the Month

Volumes	DCWTP	MHWTP
Min (ML/Day)	9.00	0.00[1]
Max (ML/Day)	42.60	20.48
Average (ML/Day)	19.76	16.88
Monthly Total (ML)	592.80	506.28

[1]MHWTP was off due to high turbidity.

Tables 8 and 9 summarize results for chorine, bacterial, and turbidity for each distribution system. These systems are monitored by handheld instruments weekly.

Table 8 Duteau Distribution

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine[1]	GVW grab sample	mg/L	49	-----	0.20	2.02	1.05
Total Chlorine	GVW grab sample	mg/L	49	-----	0.24	2.2	1.29
E.coli	Caro	CFU/100 mL	18	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	19	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	18	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	19	-----	A	A	A
Turbidity[1]	GVW grab sample	NTU	49	**2**[2]	0.22	2.52	0.52

*OG: Overgrown without Coliforms or E.coli
[1]Operation Guidelines: Free Chlorine >0.20 mg/L or <2.20 mg/L, Turbidity < 1 NTU.
[2]Two sites had turbidity over 1 NTU: Noble Canyon Road Hydrant and Goose Lake Road PS.

Table 9 Kalamalka Distribution

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine[1]	GVW grab sample	mg/L	73	-----	0.61	1.88	1.22
Total Chlorine	GVW grab sample	mg/L	73	-----	0.86	2.15	1.49
E.coli	Caro	CFU/100 mL	42	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	24	-----	A	A	A
Total Coliform	Caro	CFU/100 mL	42	-----	<1	1	1
Total Coliform	GVW	MPN/100 mL	24	-----	A	A	A
Turbidity[1]	GVW grab sample	NTU	73	**1**[2]	0.24	1.36	0.60

[1]Operation Guidelines: Free Chlorine >0.20 mg/L or <2.20 mg/L, Turbidity < 3 NTU.
[2]One site had turbidity >1 NTU: Weeks Road SS.

The GVW distribution system contains six sampling sites (Table 10) that frequently have free chlorine < 0.2 mg/L due to the sample sites being located at the end of the distribution line. 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 10 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
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

5. Customer Calls and Notifications

Customer calls within the GVW Service area are tracked and recorded. There were a total of 3 customer calls in June.

Table 11 Customer calls for the month

NUMBER OF CALLS	TYPE OF CALL	ISSUE	INVESTIGATION	COMMENTS
1	Inquiry	Information	na	Information about treatment
1	Water Quality	Black Particles	na	Internal Issue
1	Water Quality	Coloured Water / Taste Issues	na	work in area; flush area to improve until customers are switched to the other main

6. Operational or Maintenance Activity

Operational activity within the GVW service area are tracked and recorded using an online database. There were a total of 78 operational activities in June.

Table 12 Monthly operational work and maintenance for the City of Vernon

NUMBER OF LOCATIONS	TYPE OF WORK
33	Hydrant Maintenance
1	Hydrant Maintenance – Corrective
0	New Hydrant Install
11	Water Service GIS Locate
2	Water Main Break Repair
3	Property Damage Repair
1	Water Valve Maintenance
5	Water Valve Repair
3	Water Service Install
19	Water Service Repair
0	Reservoirs Cleaned
0	New Hydrant Sticker Install