REGIONAL DISTRICT NORTH OKANAGAN

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

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

Kalamalka Lake source was turned off on April 22 due to high turbidity caused by freshet at the Kal Lake Pump House. As a result, Duteau Creek water was supplied to all GVW customers for the remainder of April and May. Notification will be sent out to customers via the RDNO e-newsletter when Kalamalka Lake will be turned back on. Customers can sign up for this newsletter at www.rdno.ca/subscribe.

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	——	2.0	5.2	2.8
E.coli[2]	GVW	MPN/100 mL	4	——	1.0	5.3	1.8
Total Coliform	Caro	CFU/100 mL	4	___	70.3	140	90.1
Total Coliform	GVW	MPN/100 mL	4	___	38.4	69.7	57.6
Turbidity	GVW Grab Sample	NTU	4	___	4.29	6.22	5.42
Turbidity	SCADA[1] Hourly Average	NTU	31 Days	-----	1.60	9.97	3.77

[1]SCADA: Supervisory Control and Data Acquisition
[2]Drinking 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	3.0	3.0
E.coli[3]	GVW	MPN/100 mL	4	-----	<1	2.0	1.4
Total Coliform	Caro	CFU/100 mL	4	-----	3.1	69.7	9.6
Total Coliform	GVW	MPN/100 mL	4	-----	2.0	13.7	5.7
Turbidity[2]	GVW Grab Sample	NTU	4	1[4]	1.00	3.39	2.14
Turbidity[2]	SCADA[1] Hourly Average	NTU	0 Days[4]	-----	-----	-----	-----
UVT (unfiltered)	GVW	%	0[4]	-----	-----	-----	-----

[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): 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.
[4]Kalamalka Source was turned off due to increasing turbidity on April 22, 2020.

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)	0.01	0.00	0.00	0.00
Max (ML/Day)	2.45	1.07	0.19	1.42
Average (ML/Day)	1.00	0.13	0.02	0.37
Monthly Total (ML)	31.03	4.18	0.63	11.56

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	1.93	1.90
E.coli	Caro	CFU/100 ML	7	-----	<1	<1	<1
E.coli	GVW	MPN/100 Ml	4	-----	A	A	A
Total Coliform	Caro	CFU/100 Ml	7	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	4	-----	A	A	A
Turbidity[2]	SCADA[1] Daily Average	NTU	31 Days	-----	0.28	0.73	0.42
UVT (unfiltered)	GVW	%	13	-----	88.1	95.6	92.6
Pre UVT[3]	SCADA[1]	%	31 Days	-----	87.76	94.23	91.40

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

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

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

[1]99.99%, 4-log inactivation of Viruses; CT is logged by the minute on SCADA as of February 2019.

Table 6 Mission Hill Water Treatment Plant

Kalamalka source was turned off on April 22, 2020 due to high turbidity therefore samples were not taken at the Mission Hill Water Treatment Plant for the month of May.

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)	23.60	0.00
Max (ML/Day)	48.20	0.00
Average (ML/Day)	36.12	0.00
Monthly Total (ML)	1119.60	0.00

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 chorine, 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	135	**13**[1,2]	0.01	2.08	1.10
Total Chlorine	GVW grab sample	mg/L	135	-----	0.04	2.36	1.31
E.coli	Caro	CFU/100 mL	61	-----	<1	<1	<1
E.coli	GVW	MPN/100 mL	63	-----	A	< 1	A
Total Coliform	Caro	CFU/100 mL	61	-----	<1	<1	<1
Total Coliform	GVW	MPN/100 mL	63	-----	A	< 1	A
Turbidity[1]	GVW grab sample	NTU	133	-----	0.25	1.24	0.60

[1]Operation Guidelines: Free Chlorine >0.20 mg/L or <2.20 mg/L, Turbidity < 5 NTU
[2]Thirteen samples had free chlorine < 0.20 mg/L, see paragraph above, including 1 site that is not commonly known for low free chlorine, Kalamalka Secondary. This sample was non-detect for E. coli and Total Coliforms. The low chlorine at this site is likely due to it being at the end of the water main and no school occuring in May, resulting in very low water usage at this site.

Table 10 Kalamalka Distribution

Parameter	Laboratory		# of Samples	# of Deviations	Min	Max	Average
Free Chlorine[1]	GVW grab sample	mg/L	2[2]	-----	0.62	0.94	0.78
Total Chlorine	GVW grab sample	mg/L	2[2]	-----	0.96	1.20	1.08
E.coli	Caro	CFU/100 Ml	2[2]	-----	<1	<1	<1
Total Coliform	Caro	CFU/100 mL	2[2]	-----	<1	<1	<1
Turbidity[1]	GVW grab sample	NTU	2[2]	-----	0.91	0.99	0.95

[1]Operation Guidelines: Free Chlorine >0.20 mg/L or <2.20 mg/L, Turbidity < 5 NTU
[2]Two sites (Commonage PS and Tavistock SS) still had Kalamalka Lake water on May 5, 2020 after the Kalamalka Lake source was turned off April 22, 2020. These sites are at the ends of the Kal distribution and due to the long distance from the treatment plant it can take a longer period for these areas to be impacted by a change in water source.

5. Customer Calls and Notification

Customer calls within the GVW Service area are tracked and recorded. There was one customer call that required investigations in May.

Table 11 Customer Calls/ Notifications

Date	Types of Concern	Action	Comments	Service Area
May 4th	Coloured water	Investigated area for water quality issues.	No water quality concerns in area. On personal property issue.	Vernon

6. Operational or Maintenance Activity

The annual water main flushing program began in May. There were three water main breaks in the GVW system in May.