Filtration of Greater Victoria Water Supply System

Mike Benusic, Medical Health Officer
Special Meeting, Regional Water Supply Commission
1 March 2024

- Roles & responsibilities
- Drinking water treatment objectives & filtration exemption
- Future of Greater Victoria Water Supply System
- Requirements & recommendations

DRINKING WATER PROTECTION ACT

[SBC 2001] CHAPTER 9

Drinking water officers

3 (1) Unless another person is appointed under subsection (2), the drinking water officer for an area is

(a) the person appointed by the medical health officer as the drinking water officer, or

(b) if no appointment is made under paragraph (a), the medical health officer.

(2) The minister may, by order, appoint persons, by name or by title, as drinking water officers and establish the area of their jurisdiction.

(3) In determining the qualifications for appointments under subsection (2), the minister must consult with the Provincial health officer.

(4) Subject to the regulations, a drinking water officer may, in writing, delegate to any person a power or duty of the drinking water officer under this or another enactment.

Water supply systems must provide potable water

6 Subject to the regulations, a water supplier must provide, to the users served by its water supply system, drinking water from the water supply system that

(a) is potable water, and

(b) meets any additional requirements established by the regulations or by its operating permit.

Operating permits and requirements for water supply systems

8 (1) In the case of a prescribed water supply system, the water supplier

(a) must not operate the water supply system unless the water supplier holds a valid operating permit issued in accordance with the regulations,

(b) must comply with all terms and conditions of its operating permit, and

(c) must operate the water supply system in accordance with any applicable regulations.

(2) An issuing official may include in an operating permit terms and conditions the official considers advisable respecting the water supply system.

(3) As examples, but without limiting the authority under this section, terms and conditions respecting the following may be included in an operating permit:

(a) treatment requirements;

(b) equipment, works, facilities and operating requirements;

(c) qualifications and training of the persons operating, maintaining or repairing the water supply system;

(d) monitoring of the drinking water source and the water in the water supply system;

(e) standards applicable to the water in the water supply system;

(f) reporting and publication of monitoring results or other information respecting the water supply system.

(4) The drinking water officer or an issuing official may change the terms and conditions of an operating permit if the officer or issuing official considers this advisable, but must first consult with the water supplier respecting the proposed changes and must consider any comments of the water supplier in response.

island health

PUBLIC HEALTH ACT

[SBC 2008] CHAPTER 28

(3) A medical health officer must advise, in an independent manner, authorities and local governments within the designated area

(a) on public health issues, including health promotion and health protection,

(b) on bylaws, policies and practices respecting those issues, and

(c) on any matter arising from the exercise of the medical health officer's powers or performance of the medical health officer's duties under this or any other enactment.

https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/08028_01#section70

island health

A WATER SUPPLY SYSTEM

Water System Name:	**CAPITAL REGIONAL DISTRICT GREATER VICTORIA DRINKING WATER SYSTEM, JAPAN GULCH PLANT SERVICE AREA**
Premises Number:	6030391
Premises Address:	3195 Niagara Main Road Victoria, BC V9B 1H7
Water System Owner:	Capital Regional District

Capital Regional District is hereby permitted to operate the above potable water supply system and is required to operate this system in accordance with the Drinking Water Protection Act and in accordance with the conditions set out in this operating permit and conditions established as part of any construction permit.

The water supply system for which this operating permit applies is generally described as:

Service Delivery Area:	Greater Victoria Municipalities except Sooke and East Sooke
Source Water:	Sooke Lake Reservoir and Goldstream System Reservoirs
Water Treatment methods are:	None (Exemption provided by MHO)
Water Disinfection methods are:	Ultraviolet, chlorination and chloramination
Number of Connections	> 20,000 Connections - DWP

Operating conditions specific to this water supply system are in Appendix A.

Date: April 2, 2013

Issued By: _____
Rory Beise, Environmental Health Officer

APPENDIX A

WATER SYSTEM OPERATING CONDITIONS FOR

CAPITAL REGIONAL DISTRICT GREATER VICTORIA DRINKING WATER SYSTEM, JAPAN GULCH PLANT SERVICE AREA

3195 Niagara Main Road

Victoria, BC, V9B 1H7

Provide continuous monitoring of turbidity and dual disinfection processes to ensure compliance with VIHA's 4321 standards for Surface Water Treatment.

April 2, 2013
Effective Date

_____
Environmental Health Officer

island health

Drinking Water Officers' Guide

Consolidated Version

March 23 2023

Ministry of Health

Drinking water officials must consider this Guide in the exercise of their duties and discretion. They are, however, able to depart from the Guide in any case where sound reason exists to do so (as discussed further below).

Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia

Version 1.2 / First Published November 2012

Ministry of Health

4. Treatment Objectives

These objectives provide treatment requirements that address the following microbiological parameters: enteric viruses, pathogenic bacteria, *Giardia* cysts and *Cryptosporidium* oocysts. The general objectives are as follows and described in more detail below:

- 4-log reduction or inactivation of viruses.
- 3-log reduction or inactivation of *Giardia* and *Cryptosporidium.*
- Two treatment processes for surface water.
- Less than or equal to (≤) one nephelometric turbidity unit (NTU) of turbidity.
- No detectable *E. Coli*, fecal coliform and total coliform.

As most disinfection systems require clear water to ensure maximum efficiency, it may be necessary to combine multiple specific treatment technologies. To provide the most effective protection, the *Guidelines for Canadian Drinking Water Quality* recommend that filtration and one form of disinfection be used to meet the treatment objectives.

Alternatively, two forms of disinfection (for example, chlorination and UV disinfection) may be considered if certain criteria are met.

Filtration Exemption

A water supply system may be permitted to operate without filtration if the following conditions for exemption of filtration are met, or a timetable to implement filtration has been agreed to by the drinking water officer:

1. Overall inactivation is met using a minimum of two disinfections, providing 4-log reduction of viruses and 3-log reduction of *Cryptosporidium* and *Giardia*.
2. The number of *E. coli* in raw water does not exceed 20/100 mL (or if *E. coli* data are not available less than 100/100 mL of total coliform) in at least 90% of the weekly samples from the previous six months. Treatment target for all water systems is to contain no detectable *E. coli* or fecal coliform per 100 ml. Total coliform objectives are also zero based on one sample in a 30-day period. For more than one sample in a 30-day period, at least 90% of the samples should have no detectable total coliform bacteria per 100 ml and no sample should have more than 10 total coliform bacteria per 100 ml.
3. Average daily turbidity levels measured at equal intervals (at least every four hours) immediately before the disinfectant is applied are around 1 NTU, but do not exceed 5 NTU for more than two days in a 12-month period.
4. A watershed control program is maintained that minimizes the potential for fecal contamination in the source water. (Health Canada, 2012b)

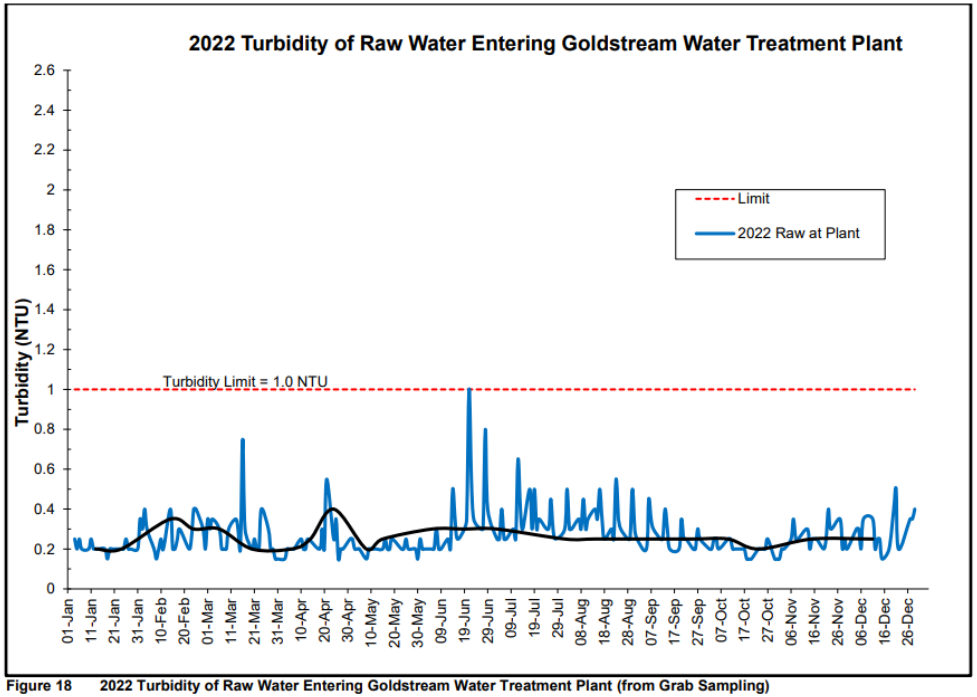


Figure 18 2022 Turbidity of Raw Water Entering Goldstream Water Treatment Plant (from Grab Sampling)

Applying the filtration exemption criteria does not mean filtration will never be needed in the future. A consistent supply of good source water quality is critical to the approach, but source quality can change. Therefore, the exemption of filtration must be supported by continuous assessment of water supply conditions.

Changing source water quality can occur with changes in watershed conditions. Increased threats identified through ongoing assessment and monitoring may necessitate filtration. Maintaining the exemption condition relies on known current and historic source water conditions, and provides some level of assurance to water suppliers that a filtration system may not be necessary unless the risk of adverse source water quality increases.

Table 31 Summary Statistics for Physiochemical Parameters at LR-US-WLR

Parameter	Min	Max	Mean*	Median*	Unit	Sample Size (N)	Water Quality Threshold (WQTH)	% N Exceeding WQTH
Alkalinity	2.84	16.6	6.68	5.18	mg/L	18	N/A	N/A
Conductivity	15.6	108.0	35.78	24.05	µS/cm	18	N/A	N/A
Hardness	4.22	26.70	8.72	6.14	mg/L	19	N/A	N/A
DO	10.55	15.34	12.66	12.66	mg/L	43	N/A	N/A
FPH	6.00	7.80	6.71	6.70	N/A	45	[7.0-10.5] (AO)	78
True Colour	3.0	67.0	20.2	17.5	TCU	55	≤ 15 (AO)	58
Turbidity (Manual)	0.15	3.6	0.40	0.25	NTU	29	≤ 1.0 (MAC)	3
Turbidity (Sensor)	0.00	1571.6	1.31	0.70	NTU	86657	≤ 1.0 (MAC)	25
Water Temp.	1.40	12.90	7.29	6.85	°C	58	≤ 15	0

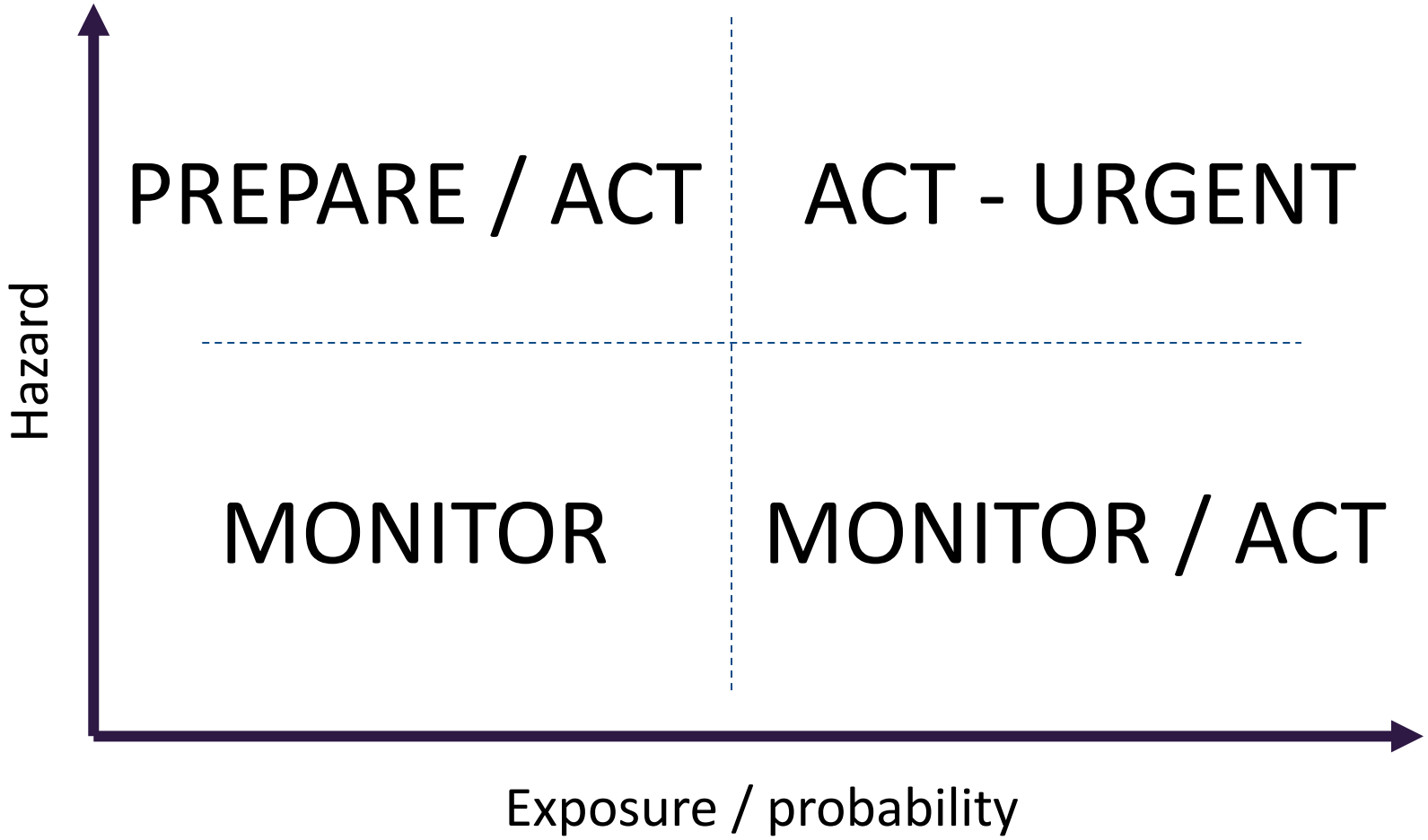
require *filtration of the Greater Victoria Water Supply System if the Leech River is introduced*

Short duration, high intensity rainfall events are projected to increase in both frequency and severity in the future. Depending on a storm's return period and duration, discrete storm events are expected to increase in intensity by approximately 13% to 52% in the eastern portion of the CRD and by 13% to 42% in the western portion of the CRD.

With increased water volumes during and following high intensity rainfall events, there will also be increases in the movement of sediments, organic materials, and associated nutrients carried into water supply reservoirs by streams and adjacent slope failures. Increased turbidity levels could impact disinfection processes at water treatment plants, affecting water quality or chemical dosing.

Landslides ultimately pose an issue to water quality by increasing the quantity of suspended solids and organic material in the source water.

Increased algal blooms or populations of invasive species will require CRD to consider pre-treatment and filtration requirements for water along with increased complaints or concerns for water quality due to colour, taste and odour, as well as clogging of household water filters at the point of consumption. Excess biological material can also introduce potentially harmful toxins (e.g., cyanotoxins).



recommend *filtration of the Greater Victoria Water Supply System*

island health

Conclusions: Greater Victoria Water Supply System

- Filtration exemption is currently appropriate
- Recommend planning for filtration in advance of increasing risk of turbidity-causing events
- Require filtration if the Leech River is introduced

island health