

Water Supply System Construction Permit Guidelines

1 INTRODUCTION

To ensure public health protection regarding drinking water, section 7 of the Drinking Water Protection Act, requires that a Construction Permit is obtained from the Issuing Official before commencing construction, alteration or extension of a water supply system or before a new water source is used. The overall objective is to supply water of a quality that consistently meets the requirements of: a) the Drinking Water Protection Act and Regulations and b) the Guidelines for Canadian Drinking Water Quality from Health Canada, and is of adequate quantity to meet peak demands. Further, an Operating Permit is required by a water supplier to operate a water supply system. The Public Health Engineer of the Health Authority issues the Construction Permits and the local Drinking Water Officers issue the Operating Permits.

The construction permit application form may be downloaded from the following websites or obtained from the local Environmental Health Officers or the local Drinking Water Officers in your area:

Richmond	604-233-3147	HealthProtectionRH@vch.ca
Vancouver	604-675-3800	EnvironmentalHealth@vch.ca
North Shore & Bowen Island	604-983-6793	HealthProtectionNS@vch.ca
Central Coast & Indian Arm	604-983-6793	HealthProtectionNS@vch.ca
Sea to Sky	604-892-2293	HealthProtectionCG@vch.ca
Sunshine Coast	604-885-5164	HealthProtectionCG@vch.ca
Powell River	604-485-3310	HealthProtectionCG@vch.ca

Completed Construction Permit Applications should be submitted to:

Chris Keung
Public Health Engineer
Vancouver Coastal Health – Health Protection

Address #1200 – 601, West Broadway, Vancouver, B.C., V5Z 4C2

office 604-675-3800

e-mail publichealthengineering@vch.ca

These guidelines and the application form may be downloaded from the VCH website at:

- <https://www.vch.ca/en/health-topics/drinking-water>

2 SUBMISSION REQUIREMENTS

2.1 General

An application for a Construction Permit should be of professional quality. For complex municipal water works, all plans must be sealed, signed and dated by a Professional Engineer experienced in waterworks design and registered to practice in British Columbia. At the discretion of the Issuing Official, this requirement may be waived for small systems (those serving fewer than 500 people) and in certain other situations, such as minor modifications to existing works. For small water systems, submissions by non-professionals may be accepted provided the submission package is complete and of reasonable quality, and the PHE is satisfied with the designer's competence to undertake the waterworks design. Submit two complete sets of the application package for new water sources. Submit one complete set of plans for works involving water treatment, watermain extensions or replacements.

The submission should be made at least 30 days before approval is needed. When approval is urgently required, contact the Issuing Official.

Construction Permits are issued to the owners of the water systems. The final Construction Permit will be sent to the owner of the water system, copied to the applicant, engineer, developer, local Drinking Water Officer and the Utilities Regulation Section (if a Utility) as applicable. The developer (or applicant) must submit at the time of application, written confirmation that the existing water system owner will assume ownership of the applicant's proposed water supply system.

Where there is no regional district, municipality, improvement district etc. to assume ownership of the water supply system, the applicant is directed to the Water Stewardship Division, Ministry of Environment, regarding a Certificate of Public Convenience and Necessity (to form a utility). Under the Water Utility Act, a utility may be required to obtain a Certificate of Public Convenience and Necessity prior to commencement of construction.

2.2 Information Required

2.2.1 General Information

The following information should be included in the construction permit application to facilitate the review and expedite the processing of the construction permit:

- A letter explaining the purpose of the proposed waterworks, providing a description including the design capacity of the major components, noting what design and construction standards are being used, and confirming who will be responsible for construction inspections and the post-construction certification of the waterworks;
- A key plan/map to show the location of the proposed waterworks;
- Plans that show all proposed supply, transmission, storage, pumping, treatment and distribution works;
- Treatment schematic (if applicable) showing the sequence of treatment and disinfection processes.
- For watermains, plans and profiles to show high and low spots in the water system and sanitary and storm sewers that are crossed or are nearby; include details to show protection of the watermain where it is nearer than 3m horizontally or has less than 0.5 m clearance vertically from any sanitary or storm sewer;
- Where an existing waterworks is being expanded or improved to include new service connections, confirm that both the water quality and the capacity of the waterworks will be adequate to accommodate existing, committed and proposed new service requirements; Note extension of a water system on Boil Water Notice will not normally be approved;
- Where applicable, confirm that the water system meets all local government bylaws;
- If a water utility is involved, confirm that the design incorporates the requirements of the Comptroller of Water Rights, Ministry of Environment, British Columbia;
- For all new sources of water, submit data on bacteriological and physical/chemical water quality to the PHE and DWO. Provide confirmation that the water will not have offensive taste and odour and comment on the expected seasonal variations in water quality and quantity (water level). Details are discussed in the following sections (s. 2.2.2 and s. 2.2.3). New water sources require consensus approval from both the DWO and the PHE.

2.2.2 Groundwater Source

The following additional information should be included with the application involving a new groundwater source:

- Data on chemical, physical and bacteriological water quality. The raw water must be sampled and analyzed for the parameters identified in the Appendix of these guidelines. Initial samples from groundwater sources should be taken near the conclusion of the pump test, when the water is visually clear of sediment;
- Well log, pump test and a report from a professional engineer or professional geoscientist with expertise in hydrogeology. The hydrogeology report should include an assessment and recommendations on: water quality protection including a description of any risks, confining/protective layers, time of travel radius for existing/expected sources of potential well contamination, maximum discharge rates, wellhead protection, and water quality and quantity monitoring including parameters and frequency, etc. The report should include any available information on historical use of groundwater in the area and area recharge, should confirm that the well is constructed in accordance with the Ground Water Protection Regulation (BC Reg.#91/2009) and the Code of Practice, and should also comment on whether the groundwater source is at risk of containing pathogens;
- Mechanical and instrumentation/control facilities at wellhead, or pumphouse; and
- Method of disinfection, and proposed treatment, if applicable.

2.2.3 Surface Water Source

A surface water source is defined as one being influenced or having the potential of being influenced by surface water conditions. The following should be included with the application:

- Data on chemical, physical and bacteriological water quality (see Appendix of these Guidelines).
- The water license(s) permitting use of the water;
- Mechanical and instrumentation/control facilities at the intake or pumphouse;
- Method of disinfection, and proposed treatment;
- A report giving a description of the watershed, noting any existing or potential sources of contamination, which may affect water quality, flood level, safe yield, hydrological data, etc.

2.3 “Building System” and “System within a System” --- Special Consideration

Special attention must be paid to preventing backflow from these systems into the water supply system. Connection from a water supply system to a *Building System* or a *System within a System* is considered an extension of the water supply system. A Construction Permit is required if the service connection is 3” (75mm) or larger. In the case of connection to a Building System, the water supplier should confirm that plumbing inside the property will comply with the BC Building Code, in particular, regarding backflow prevention. For connection to a System within a System, the water supplier must consider the risks of backflow into the water supply system and take appropriate preventive measures, particularly if there are fire hydrants within the property. In areas where the BC Building Code is not enforceable, or where there is no building inspection authority, the DWO may put in requirements for backflow prevention in the Construction Permit and/or the Operating Permit. The water supplier may be required to install appropriate backflow prevent prevention devices on the water supply side.

2.4 Other Regulatory Agencies

In British Columbia, drinking water regulation and oversight intersect with many different agencies. For reference, Table 1 below shows the officials that might need to be consulted during proposed changes in waterworks based on the type of work being considered.

Table 1 List of Regulatory Officials in Relation to Construction of Drinking Water Infrastructure and Development:

Officials	Watershed	Water Treatment	Water Distribution	Waste Residuals Management
WorkSafe BC	X	X	X	X
Ministry of Environment and Climate Change Strategy (ENV)	X			X
Ministry of Transportation and Infrastructure (MOTI)			X	
First Nations:	X	X	X	X
Environmental Operator's Certification Program (EOCP) is		X	X	
Ministry of Forests (Utility Regulation Section)	X	X	X	X
Technical Safety BC		X	X	

Note that Permits and approvals from other government agencies may be required before construction may begin.

3 HEALTH RELATED DESIGN CONSIDERATIONS

3.1 Engineering Design Standards

Design, material, and construction standards should follow the current "*Design Guidelines for Drinking Water System in British Columbia*" (MOH). Improvements to existing and proposed new small waterworks serving rural residential developments may be designed in accordance with the current Design Guidelines for Rural Residential Community Water Systems.

When making changes in waterworks, in addition to these guidelines, the following standards should be considered during the design phase:

- National Sanitation Foundation (NSF) International standards;
- American Water Works Association (AWWA) standards; and
- Canadian Standards Association (CSA) standards.

Generally, these standards ensure that materials in contact with potable water are acceptable in terms of public health. The Designer should ensure that materials in contact with potable water do not create a risk to public health.

3.2 Water Source

- 3.2.1 The water supply should be obtained from a source that could produce drinking water quality that meets the Drinking Water Protection Act, the Drinking Water Protection Regulation and the Guidelines for Canadian Drinking Water Quality.
- 3.2.2 The source and source location should be chosen to minimize the potential of municipal and industrial contamination, or other types of contamination, resulting from human or animal activities within the watershed or within the aquifer recharge zone. Every effort should be made to prevent contamination of the source.
- 3.2.3 The water system operator should conduct routine quality monitoring of the water source. The monitoring program should attempt to recognize all potential sources of contamination and assess their present and future importance. The monitoring program and any remedial action should be determined in consultation with the DWO.
- 3.2.4 Wells should, in general, follow the AWWA Standard for Water Wells (A100-97) and in accordance with the Water Act, Ground Water Protection Regulation.
- 3.2.5 Acceptable surface water sources include lakes, rivers, springs, rainwater capture, etc. Dug-out ponds that capture surface runoff from snowmelt and storm runoff are strongly discouraged. The design of the intake should reference the Fisheries and Oceans Canada publication: *Fresh Water Intake End of Pipe Fish Screen Guideline*.

3.3 Water Quantity

- 3.3.1 Water supplied must be of sufficient quantity for sanitary purposes.
- 3.3.2 Water for fire fighting, irrigation, or other purposes, is additional to that required for sanitary purposes. For details regarding fire protection requirements, the designer should refer to the most current Fire Underwriters Survey publication entitled *Water Supply for Public Fire Protection* available from the CGI Insurance Business Services 1-800-6655661 or online at:
 - <http://www.scm-rms.ca/docs/Fire%20Underwriters%20Survey%20-%201999%20Water%20Supply%20for%20Public%20Fire%20Protection.pdf>
- 3.3.3 The supply to the distribution system must be adequate to meet reasonable peak demands without development of low pressures that could result in health hazards from cross-connections.
- 3.3.4 Where new servicing and an existing water supply system is involved, confirm that capacity of the existing or proposed expanded or improved water supply system, as applicable, are, or will be, adequate to accommodate existing, already committed and proposed new servicing.

3.4 Water Quality

- 3.4.1 Water supplies for human consumption, food preparation or sanitation and other domestic uses must be free of pathogenic micro-organisms, their indicators and any drinking water health hazards. In addition, the water should have acceptable colour, odour and taste.
- 3.4.2 The Drinking Water Protection Act, the Drinking Water Protection Regulation and the current edition of Guidelines for Canadian Drinking Water Quality should be used as guidance for evaluation of water sources.
- 3.4.3 The raw water must be sampled and analyzed for the parameters shown in the attachment. Initial samples from groundwater sources should be taken near the conclusion of the pump test and after disinfecting and flushing the well as per ANSI/AWWA Standard C654, when the water is visually clear of sediment.
- 3.4.4 Where new servicing and an existing water supply system is involved, confirm that water quality of the existing or proposed expanded or improved water supply system, as applicable, are, or will be, adequate to accommodate existing, already committed and proposed new servicing.

3.5 Treatment and Disinfection

Water sources for new waterworks systems or new sources for existing systems using surface water or groundwater at risk of containing pathogens (GUDI/GARP) need to be disinfected by law. The BC treatment objectives address the following microbiological parameters: enteric viruses, pathogenic bacteria, *Giardia* and *Cryptosporidium* cysts. The generic requirements are:

- 4 log (99.99%) reduction or inactivation of viruses
- 3 log (99.9%) reduction or inactivation of protozoan cysts
- 2 treatment processes for surface water or GUDI/GARP sources
- 1 NTU turbidity maximum
- 0 E. Coli and Total Coliforms.

These requirements may be increased by the Issuing Official in situations where source water is known or suspected to be subject to unusual contamination. Where necessary because of costs, the Issuing Official may consider allowing staging of improvements. Secure groundwater sources must be disinfected if deemed necessary by the DWO for reasons of either bacteriological quality or nuisance biological growths, and may also require other treatment to meet the Canadian Guidelines for chemical and physical constituents. Exceptions to the disinfection and/or other treatment requirements may be considered by the Issuing Official upon receipt of an application from the water supplier.

3.5.1 Treatment Design

- a) Treatment systems should be designed to have sufficient redundancy so if one unit is out of service the remaining unit or units are capable of meeting demand
- b) All components, chemicals etc. in contact with potable water shall be certified for use with potable water, e.g. NSF 60, NSF 61, USFDA, or equivalent for potable and edible liquid contact, etc.
- c) For complex systems, or systems with advanced treatment processes, preliminary or predesign discussions with the Issuing Official will assist in the application process.

3.5.2 Treatment Levels

- a) Water sources for water supply systems using surface water or groundwater at risk of containing pathogens must be disinfected. In accordance with the provincial *Drinking Water Treatment Objectives (Microbiological) for Surface Water Suppliers in BC*. Appropriate reduction in pathogenic viruses, protozoa, turbidity and pathogens must be achieved with at least two forms of treatment. Provincial drinking water treatment objectives recommend minimum pathogen log reduction requirements for protozoa and viruses based on source water type (see Table 2).

Table 2- Recommended Minimum Pathogen Log Reduction Required

Source Water Type	Cryptosporidium Oocysts	Giardia Cysts	Viruses
Surface Water	3	3	4
Rainwater	4	4	4
GARP	3	3	4
GARP – viruses only	0	0	4
Non- GARP	0	0	0

- b) Deep well sources must be disinfected if deemed necessary by the Drinking Water Officer for reasons of either bacteriological quality or nuisance biological growths and may require other treatment to meet the Guidelines for Canadian Drinking Water Quality.
- c) It may be acceptable to phase in the improvements to an existing system over a specified timeframe to achieve the treatment objectives. This is to be discussed with the Drinking Water Officer.
- d) Additional testing or pilot scale studies of treatment processes may be required. Disinfection must not create unacceptable levels of disinfection by-products (trihalomethanes, haloacetic acids, chlorite or bromate). Water must be safe to drink without further treatment.

3.5.3 Treatment Equipment

When proposing water treatment equipment it is helpful for the health risk assessment to include the following information:

- a) Description and supporting data describing the proposed treatment credits the equipment may provide;
- b) Provision of the third party validation documents to support the treatment credits sought;
- c) Equipment specifications and water quality operating range, whether the equipment is right for the water quality;
- d) Control / alarm logic (e.g. if a UV unit requires a warm up period, the control alarm logic should clearly indicate that the water will not flow through the system until the appropriate UV dose is reached or if the UV dose is not met, the flow through the system will stop).

3.5.4 Chlorination

Free residual chlorination is the method of disinfection most commonly practised. The following should be noted:

- a) Water after treatment and disinfection will have a minimum free chlorine residual of 0.2 mg/L.
- b) When there are 15 or more service connections, automated chlorine residual sensing and injection will be expected. The capacity of chlorination equipment must be such that an adequate residual can be maintained when maximum flow rates coincide with anticipated maximum chlorine demands. The equipment must be of such design that it will operate accurately over the entire anticipated flow, including low chlorine demand and low flows.
- c) To ensure reliable, effective and continuous disinfection, additional facilities such as standby equipment, flow pacing, residual monitoring, automated recording and controlling equipment and alarms should be provided.
- d) A chlorine test kit (DPD) suitable for measuring both free and total chlorine residual over a range of 0 to 2.0 mg/L, must be available when chlorine is used. Test kits with either a scale or digital readout are far better than those which rely on visual colour comparison, particularly for measurements below 0.5 mg/L.
- e) Storage of chlorine in whatever form must follow the requirements of WorkSafe BC.

3.5.5 UV Disinfection

Disinfection using ultraviolet light can be an effective technique for controlling pathogenic bacteria, viruses, and protozoa. Systems should include safeguards including a guaranteed minimum dose, intensity monitor, flow restrictor, audible and visual alarms, and solenoid shut-off. Third-party verification per ANSI/NSF Standard 55A, UV Design Guidance Manual (USEPA, 2006), or equivalent is required. Pre-treatment to remove turbidity, hardness, iron, colour, tannins, organics, or other parameters that reduce UV transmittance are often required.

More details on the reduction of pathogenic microorganisms in drinking water using UV disinfection are available in *Drinking Water Officers' Guide 2022 – Part B: Section 16 Guidelines for Ultraviolet Disinfection of Drinking Water*.

3.5.6 Disinfection Credits

There are many different treatment technologies available to produce microbiologically safe drinking water. These technologies are assigned pathogen log reduction credits for *Cryptosporidium*, *Giardia* and viruses based on certain credit assignment criteria being met.

The recommended pathogen log reduction credit assignment is aligned with the *Drinking Water Officers' Guide 2022 – Part B: Section 15 Guidelines for Pathogen Log Reduction Credit Assignment*

By combining the log reduction credits assigned for each treatment technology, the combined total can be used to meet the recommended minimum pathogen log reduction requirements listed in Table 2 for the specified source water type and specified pathogen. Pathogen log reduction credit assignment is based on the treatment processes being fully operational and the applicable recommended pathogen log reduction credit assignment criteria being met.

3.5.7 Treatment Exceptions

Exceptions to the treatment requirements will be considered upon application from the water system owner, based on information regarding that water system's source water characteristics. The application must demonstrate that the source is adequately protected from contamination and that the bacteriological and/or physical and chemical water quality of the source consistently meets the Drinking Water Protection Act, the Drinking Water Protection Regulation and the Guidelines for Canadian Drinking Water Quality. Exceptions are conditional upon continuance of the requirements and that provision is made for the installation and operation of treatment facilities should they be required at a later date. Note that the Canadian Drinking Water Guidelines indicate that secure confined aquifers should be disinfected to achieve 4 log virus removal or inactivation.

3.6 Storage

3.6.1 Impounding Reservoirs

Any earth storage facility for raw water should be designed to minimize contact between the water and organic materials such as grass, peat, trees, etc.

3.6.2 Finished Water Storage

Finished water storage must be adequately protected from contamination, the following design features are to be considered:

- a) Storage structures must have a cover that is watertight, opaque and vermin proof.
- b) Drains or overflows must not have a direct connection to a sewer or storm drain.
- c) Venting of these structures must not be through openings between the sidewall and the roof, but by special vent structures which are designed to exclude birds, vermin, and dust.
- d) Manholes to these structures must be curbed and raised at least 10 cm (4 inches) above the surface of the roof at the opening and the cover should be watertight and extend down around the frame at least 5 cm (2 inches). Access manholes shall have a locking device.
- e) To ensure adequate turnover in the reservoir, water entering should come in at the top, and water leaving the reservoir should exit from the bottom. An alternative to this is to have an approved recirculation system.
- f) Steel storage tanks, and paintings and coatings for steel storage tanks, should comply with the AWWA standards for steel tanks (D100, D102, D103 or D104). Hydropneumatic tanks should be constructed to comply with the BC Boiler and Pressure Vessels Code.

3.7 Pumping Stations and Standby Power

- a) Pumping facilities must be designed to maintain the sanitary quality of the pumped water.
- b) Subsurface pits or pump rooms and inaccessible installations are to be avoided.
- c) No pumping station should be subject to flooding.
- d) A standby pump should normally be provided. Standby power should be provided at least in situations where a power failure could result in complete pressure loss in any area.

3.8 Transmission and Distribution

3.8.1 General

- a) Service connection serving a single property from an approved water system does not usually require a construction permit. Service connections 3" (75mm) diameter or above are considered watermain extensions, Construction Permit is required.
- b) It is recommended that watermains normally be 10 cm (4 inches) in diameter or greater and be looped. This is to eliminate dead ends and to minimize contamination risks and service disruption when there is a watermain break and during repairs or watermain flushing.
- c) Watermain valves should be provided to isolate reasonably sized sections of the system for repair or maintenance or shut-off in the event of watermain breaks. It is recommended that they be placed on property line projections if possible, to make them easier to locate.
- d) Flush-outs or hydrants should be provided for flushing purposes on dead-ends and low points. Air relief valves or other facilities designed to provide air relief should be provided at high points.
- e) The bottom portion of manholes, manhole connections to sewers, service connections to sewers and joints in service connections should all be designed to not leak where the normal separation distances are not possible.
- f) Where new and existing works are involved, current construction practices should be applied to the new works; exiting works may remain as it, if improvement is not feasible.
- g) Newly constructed water systems shall be pressure tested and disinfected in accordance with AWWA standards before use.
- h) The following guidelines are subject to change to meet the provincial guidelines when they are finalized.

3.8.2 Parallel Installation

- a) Horizontal Separation >3m
 - Vertical separation >0.45m: watermain at higher elevation
 - Vertical separation <0.45m: watermain at higher elevation if possible
- b) Horizontal Separation = 1m to 3m
 - Watermain >0.45m above sewer: wrap watermain joints or use jointless pipes
 - Watermain <0.45m above sewer:
 - wrap joints or use jointless pipes, and
 - Provide hydraulic barrier between pipes or encase watermain in casing pipe of the same or greater pressure rating with watertight end seals
 - Watermain crown below sewer crown: not typically accepted
- c) Horizontal Separation <1m: not typically accepted

3.8.3 Pipe Crossing

- a) Watermain above sewer >0.45m: generally accepted
- b) Watermain above sewer = 0.15m to 0.45m: wrap joints or use jointless watermain pipe
- c) Watermain below sewer >0.15m:
 - wrap joints or use jointless pipe for watermain and sewer, and
 - Provide hydraulic barrier between pipes
- d) Watermain below sewer <0.15m: not typically accepted

3.8.4 Cross-Connection and Backflow Prevention

- a) Careful attention during the design and construction stages will ensure there are no cross connections to contaminated water sources and that the potential for future cross-connections is prevented.
- b) Back flow prevention devices are to be installed following the latest CSA Standard CAN/CSA-B64, especially at services that are likely sources of contamination such as hospitals, service stations, and chemical operations, etc.
- c) Cross connection of watermains with any sanitary or storm sewer or other source of non-potable water is prohibited.

4 **GROUND FOR REFUSAL**

Generally, deficiencies in proposed designs are discussed with the water supplier or their representative to see if adjustments are feasible. There may be some situations which preclude the issuance of a Construction Permit, such as:

- The existing/proposed treatment does not provide assurance of safe water quality.
- The existing water source is subject to pollution for which, in the opinion of the Issuing Official adequate protection is not provided.
- Inadequate details of the proposed project are provided for evaluation.
- The design is not based on appropriate design guidelines or standard

Appendix

Chemical, Bacteriological and Physical Parameters to be examined for Water Sources

Bacteriological

E. Coli
Total Coliforms
Heterotrophic Plate Counts (1)
Iron and Sulphate Reducers (2)

Physical/Chemical

Alkalinity
Ammonia (3)
BTEX (4)
Chloride
Colour
Conductivity (5)
Corrosivity (6)
Fluoride
Hardness
Metals Scan (7)
Nitrate (3)
Nitrite (3)
Nitrogen, organic (3)
pH
Sulphate
Sulphide (8)
Total Dissolved Solids
Total Organic Carbon
Turbidity
UV Transmittance (9)

Notes:

- (1) If other growth not present during E.Coli and Total Coliform analysis, just note "*other bacterial growth not present*". HPC if considered appropriate.
- (2) Required only if considered appropriate. Test is done on the crusty or slimy material that builds up inside the well casing or on the system piping etc. Contact laboratory for sampling procedure.
- (3) Required for surface water or groundwater under the direct influence of surface water source.
- (4) Required if hydrocarbon/gasoline type contamination is suspected. BTEX stands for Benzene, Toluene, Ethylbenzene and Xylenes. Contact laboratory for sampling procedure.
- (5) Conductance/Specific Conductance.
- (6) Calcium Carbonate saturation/Langelier's index. Required if considered appropriate.
- (7) Scan to include: Aluminum, Antimony, Arsenic Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Phosphorus, Potassium, Selenium, Silver, Sodium, Zinc (expand scan if mineralised to include Mercury and Uranium).
- (8) Required only if considered appropriate. Analyse on site or preserve sample. Contact laboratory for sampling procedure.
- (9) Required only if UV disinfection is proposed as part of the water treatment process. The test must be conducted on a RAW, UNFILTERED water sample. (Modified version of Standard Method 5910B (APHA et al. 1998) where the water sample is not filtered or pH adjusted).

General Comments

1. Analysis of additional parameters may be required based on the results of the initial analysis and on potential impact by nearby sources of contamination or polluting substances. If industrial pollution, or agricultural or forestry pesticide pollution is suspected, identify what chemicals may have been used and analyse for the most likely indicator parameters. If petroleum pollution is suspected, for example from leaking underground storage tanks, conduct a hydrocarbon scan in addition to BTEX. If parasitic pollution is suspected, Giardia and Crypto analyses may be required.
2. Analyses must be sufficiently accurate, the minimum Detection Limits must be better than 1/10th of the MAC or AO in the Guidelines for Canadian Drinking Water Quality where applicable. Other analyses must provide sufficient information to reasonably assess the water suitability for drinking purposes and to determine what, if any, treatment might be needed. Analyses must be conducted in accordance with the methods prescribed in Standard Methods for the Examination of Water and Wastewater (latest edition).
3. Analyses should be for Total or closely equivalent concentrations, to represent potential quality problems.

FURTHER INFORMATION

The Ministry of Health - Drinking Water Quality Home Page (information and publication related to the Drinking Water Protection Act and Regulation):

<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality>

Ministry of Health - Resources for Water System Operators

<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality/resources-for-water-system-operators>

Ministry of Health - Small Water System Guidebook:

https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/monitoring-water-quality/small_water_system_guidebook_-_january_2017.pdf

Ministry of Health - Drinking Water Officers' Guide:

<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality/drinking-water-officers-guide>

Ministry of Health - Guidance Document for Determining Groundwater at Risk of Containing Pathogens (GARP):

https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/how-drinking-water-is-protected-in-bc/garp_assessment_oct_2017.pdf

BC Ministry of Environment - Design Guidelines for Rural Residential Community Water Systems (design reference document):

https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-rights/water-utilities/design_guidelines_rural_residential_water_mar2012.pdf

Health Canada - Guidelines for Canadian Drinking Water Quality:

<http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/index-eng.php>

Thomson Rivers University - Online Help Centre for BC Small Water Systems:

<https://smallwatersystemsbcc.ca/source-assessment-protection-planning>

Laboratories approved by the Provincial Health Officer for bacteriological analysis:

<http://lmlabs.phsa.ca/find-a-lab>

Laboratories approved for full spectrum chemical analysis:

<http://www.vch.ca/Documents/Testing-Your-Well-Water.pdf>

Vancouver Coastal Health - Testing Your Well Water:

<http://www.vch.ca/Documents/Testing-Your-Well-Water.pdf>