



Drinking Water Annual Report

2021

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INTRODUCTION

The City of Quesnel annual water report describes the water system and provides a summary of water quality testing and water management during 2021. It is a requirement under the British Columbia Drinking Water Regulations Drinking Water Protection Act.

WATER SYSTEM OVERVIEW

The City of Quesnel water system is comprised of 6 groundwater wells, 7 reservoirs, 5 booster pump stations, 2 main pressure reducing valve stations, 7 separate pressure zones, and approximately 100 kilometers of water main with 3620 individual service connections. The City also maintains and operates the bulk-water delivery site where, for a fee, customers may fill containers.

At present, no treatment or disinfection processes are applied to the City of Quesnel drinking water.

Approximately 10,000 residents are serviced by the City water system. In the 2021 calendar year, water usage in the City system resulted in 2,745,935 cubic meters used. This is an increase of 295,338 cubic meters from 2021.

WATER MANAGEMENT

The City utilizes a SCADA (Supervisory Control and Data Acquisition) monitoring system to observe real-time data and monitor for changing water system conditions. This includes well operation and reservoir levels. System operators have the ability to remotely respond to system conditions and demands. This reduces failure of equipment as well as increases pumping efficiency. Upgrades to the SCADA system are ongoing as equipment becomes obsolete and communication between stations require updates to operate effectively. As Telus has discounted the use of copper data lines, the City SCADA has been updating to radio communication between the Utilities Department office and water water/pumping stations.

The Water System Emergency Response Plan is reviewed and updated annually. Operating procedures are also updated in order to improve reliability of the distribution network. It is critical to the system that pumps and equipment be maintained to a high standard in order to avoid costly failures.

Water system operators are certified to operate the City of Quesnel water system under the Environmental Operators Certification Program (EOCP). This is a requirement of the Drinking Water Protection Act. The water system is classified by the EOCP as a Class III Water Distribution System. To be eligible to apply for and write a Level III EOCP exam operators must have:

- Level II Certificate (3 years of operating experience plus passing grade on examination)
- 2 years related post-secondary education (or equivalent of 90 Continuing Education Credits)
- 4 years of operating experience, including 2 years of Direct Responsible Charge designation at a Class II facility (or higher)

The City of Quesnel does not currently employ any Level III Water Distribution Operators. However, in December of 2021 one operator completed work to fulfil the Level III exam requirements and was approved by the EOCP to write the Level III Water Distribution exam. The exam will be scheduled for early 2022.

In order to maintain certification, operators must receive 24 hours of approved training in every two year period and achieve a minimum of 70% on written examinations. This training is not only critical to maintaining certification, it is crucial for operators to stay current and provides opportunity to network with other operators over common challenges faced in field operations.

WATER MONITORING

To ensure the delivery of safe drinking water, the City has a program to monitor water quality at the source.

Historically, drinking water quality within the City has been monitored in consultation with the Provincial Health Inspector. The responsibility to ensure safe drinking water has been assisted by the adoption of the British Columbia Drinking Water Regulations (2003). In accordance with these regulations, the City has developed a drinking water quality monitoring program to follow best practice.

The City sends water samples to an approved lab in Kelowna for all sampling points. Samples have also been received directly by Northern Health. There is direct contact between the City and lab on results and concerns. The Public Health Engineer at the Northern Health authority also has access to these results. From the laboratory, the results are downloaded directly to WaterTrax, a water quality database.

The sampling parameters used to monitor potability are listed in the Guidelines for Canadian Drinking Water Quality (GCDWQ) and the British Columbia Drinking Water Regulations (BCDWR). These sampling parameters are used as indicators for bacteriological, chemical, and physical contaminants.

In May 2019, the GCDWQ updated the parameter regarding Manganese in drinking water. The maximum acceptable concentration (MAC) for total manganese in drinking water is 0.12mg/L (120ug/l). The aesthetic objective (AO) for total manganese in drinking water is 0.02mg/L (20ug/L).

Manganese levels found in the source waters (aquifers) for 5 of the 6 groundwater wells operated by the City exceed the allowable MAC. Therefore the drinking water produced by these wells does not meet the standard outlined in the GCDWQ. Distribution system Manganese sampling results have shown levels vary from below the MAC to above, day to day as well as site to site. This is due to mixing and settling out of Manganese at the reservoir and in the distribution system water mains.

In 2020 the City of Quesnel worked with consultants (Urban Systems) to release a "Water Treatment System Conceptual Report" based on findings from the Manganese Removal pilot testing program undertaken in 2019. The conceptual report contained:

- Design requirements based on anticipated water demands and the current drinking water guidelines*
- Evaluation of treatment options that provide best operational and system efficiencies*
- Review of site layout and constraints for each well site*

Water system sampling and consultations are currently taking place to determine the next steps towards compliance with the parameters outlined by the Canadian Guidelines for Drinking Water Quality.

Sampling frequency is also important in obtaining an accurate overview of water quality within the distribution system. As a minimum, the number of samples to be taken from a source and distribution system as required by provincial regulations are based on population. The minimum number of samples to be taken for the City of Quesnel's approximately 10,000 people is 13 per month. The City exceeds that number of monthly samples. The City samples 16 individual sites bi-weekly for total coliforms, E.coli, heterotrophic plate count, and turbidity. As well, all reservoirs and wells are tested on a monthly basis for bacterial contaminates.

In addition to the bacteriological parameters, additional testing is done for chemical and physical parameters. Water chemistry samples are also collected and analyzed in accordance with the parameters and schedule laid out in the Drinking Water Quality Monitoring Program. Production wells are tested annually for the parameters: "Enhanced Potability", Molybdenum, Nickel, Phosphorus, Silver, Aggressive Index Number, and Volatile Organic Compounds. Identified sampling sites within the distribution system are tested on a semi-annual basis for the parameters: Copper, Zinc, Lead, Iron, Vinyl Chloride.

WATER QUALITY

Samples are taken at the start, middle and end of the entire City water distribution system. Lab results are transmitted to the City via email, as well as to the Public Health Engineer at Northern Health. Results are downloaded to the City's water quality database; Water TRAX.

If it is observed during testing that parameters exceed the limits specified in the GCDWQ of BCDWR guidelines, a procedure is in place for retesting and notification of any results or conditions that render or could render the water unfit to drink.

The standard protocol when a water sample is found to contain the presence of coliforms, however minute, is the resample the water immediately at the same location and resubmit for testing. The Provincial Health Officer will determine if and action by the City is necessary only after a second test shows the presence of coliforms.

In accordance with the regulation of our operating permit, the City has a plan in effect to respond to emergencies to ensure the delivery of safe drinking water to all its residents.

In 2021 335 samples were tested for E.coli and total coliforms. There were zero exceedances of E.coli and 10 exceedances for total coliform. In the case an exceedance, the line was flushed and resampled at the same site until coliform was not detected.

Complaints regarding water quality are addressed and followed up on a case by case basis. The majority of customer complaints are of "dirty" or black water. This is due to manganese found in the City water which adheres to pipe walls in the distribution system until it is disturbed or breaks free. Homeowners are advised to run a cold tap until the water clears. In some cases the City will flush the mains through a hydrant or blow off. All mains are flushed each fall to remove mineral scale and buildup in the lines in addition to ensuring proper operation and maintenance of all City fire hydrants.

There are occasional complaints of cold water smelling like rotten eggs or sulfur. This is caused from the City water having a reaction with the small diameter “feed line” tubing which connects the household plumbing to the faucet under the sink. It is most common in homes that have new or recently upgraded taps or plumbing fixtures. A corrective measure for this is suggest homeowners replace the feed lines with metal tubing such as copper or alternatively clean the lines with sodium hypochlorite (household bleach), then rinse and reinstall.

City of Quesnel Bylaw 1567 of 2004 was adopted in 2005 to ensure provisions for the elimination of cross connections between potable water and any non-potable source. The City has two Certified Backflow Assembly Testers on staff that annually tests assemblies in City parks and the City water supply system to protect against potential backflows and cross connections. They also install backflow prevention devices which are a secondary line of defense for backflow prevention.

It is the responsibility of the owner or operator of private buildings to install and test the approved backflow assembly upon installation and annually thereafter by a certified tester. Following the test, a copy of the report is to be forwarded to the City of Quesnel. This program has not been completely implemented as there is a lack of resources and staff to track and account for these assemblies. What staff time is available is focused on communication with contractors/plumbers and high risk users. The main group addressed is industrial, commercial and institutions. Utilities staff communicate and keep a watchful eye out for any potential cross connections.

CONCLUSION

The 2021 City of Quesnel Water System Annual Report is presented to Council as required by the British Columbia Drinking Water Protection Act – Drinking Water Protection Regulation. It has been established as a requirement to ensure accountability to the community for the water service provided. In order to meet the terms and conditions of the City’s Water System Operating Permit issued by the Drinking Water officer, this report is made available to the public.

Additional information may be obtained from the City of Quesnel Utilities Department at 250-992-6330, attention Joseph Law, Utilities Superintendent.

LINKS

The Health Canada website (www.hc-sc.gc.ca) contains "Summary of Guidelines for Canadian Drinking Water Quality", which Health Canada publishes on current guidelines and updates each spring on their website.

ATTACHMENTS

Attachment "A" Contains

- A list of the sampling point sites and the parameters tested for the City of Quesnel

Attachment "B" Contains

- Water sampling result reports for 2021 on the City's water system.

Attachment "A"

City of Quesnel Water Quality Monitoring Program

SITE	LOCATION	PARAMETERS
<i>BI-WEEKLY (Distribution System)</i>		
FIRST WEEK		
Water Trax Locator #		
94 E4	Airport	Parameters: Total coliforms, Ecoli, HPC's, turbidity, temp
94 E5	Mills Rd	
94 E7	Marsh Dr	
94 E8	Graham Avenue	
94 E9	West Fraser Rd	
94 FO	Pederson Rd	
35D91K	Carson Pit	
179 CA	Dennis Road	
THIRD WEEK		
94 E6	Carradice Rd	Parameters: Total coliforms, Ecoli, HPC's, turbidity, temp
94 F1	Dixon St	
94 F2	Front St – Hospital	
94 F3	Nason St	
94 F4	N. Star Dragon Hill	
94 F6	N Star South Hill	
94 F7	Chew Rd	
21 D9B	Bulk Water on North Star	

MONTHLY (Reservoirs)		
94 EA	R-1 Shadow Heights	Parameters: Total coliforms, Ecoli, Temp
94 F9	R-2 Pinecrest	
94 FA	R-3 Sugar Loaf	
94 EB	R-4 Abbott Dr 1	
94 EC	R-4 Abbott Dr 2	
94 FC	R-5 Dragon Hill	
94 FF	R-6 New Tatchell Reservoir	
MONTHLY (Wells)		
94 ED	Well A Sword Rd	Parameters: Total coliforms, Ecoli, Temp
94 D1	Well 3 Rolph at Roddis	
94 DC	Well 6 Rolph at Robertson	
94 EO	Well 7 N. Fraser Dr	
94 E1	Well 8 Hilborn Rd	
94 DF	Well 9 Carson Sub	
28000	Well 10 Hilborn Rd	

SEMI - ANNUALLY (Distribution System) (first week April & Oct)		
94 E5	Mills Rd (94E5)	Parameters: Copper, Zinc, Lead, Iron, Vinyl chloride, Manganese, Temperature
94 FO	Pederson Rd (94F0)	
35D91K	Carson Pit	
ANNUALLY (Wells)		
94 ED	Well A Sword Rd	Parameters: Enhanced Potability, Metals, Langelier saturation index (LSI) Volatile Organic Compounds, Temp.
94 D1	Well 3 Rolph at Roddis	
94 DC	Well 6 Rolph at Robertson	
94 EO	Well 7 N. Fraser Drive	
94 E1	Well 8 Hilborn Rd	
94 DF	Well 9 Carson Sub	
28000	Well 10 Hilborn Rd	

Attachment "B"

Water sample result reports (in pdf format):

- Main System Coliform/Ecoli counts 2021
- Main System Coliform/Ecoli Exceedences 2021
- May Semi-Annual Summary on Main 2021

Escherichia coli / E. coli (counts)

# samples:	335	min:	< 1 CFU/100ml
# detects:	0	max:	< 1.5 CFU/100ml
# non-detects:	335	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	335	min:	< 1 counts/100ml
# detects:	10	max:	72 counts/100ml
# non-detects:	325	Geometric Mean:	4 counts/100ml (based on 9 numerical results)
# of Exceedences:	10		

Result Legend:

P=present, A=absent, PR=presumptive, ND=non-detect, OR=over-range, OG=overgrown, Y=yes, N=no,
TNTC=too numerous to count, NR=no result, NT=not tested, IG=ignore, ER=external report, SC=see comment

- < means less than lower detection limit shown
- > means greater than upper detection limit shown
- « means detected & less than number shown
- » means detected & greater than number shown

* **Indicates Criteria is exceeded**

Facility: Distribution System
Sampling Point: Bulk Water Site #1 (7-15-QC, 21D9B)

Facility: Distribution System
Sampling Point: S- Airport (7-1-MR, 94E4)

Facility: Distribution System
Sampling Point: S- Carradice Rd (7-3-MR, 94E6)

Facility: Distribution System
Sampling Point: S- Chew Rd (7-13-MR, 94F7)

Facility: Distribution System
Sampling Point: S- Dennis Road (7-14-MD, 179CA)

Facility: Distribution System
Sampling Point: S- Dixon (7-8-MR, 94F1)

Facility: Distribution System
Sampling Point: S- Marsh Drive (7-4-MD, 94E7)

Facility: Distribution System
Sampling Point: S- Mills Rd (7-2-MR, 94E5)

Facility: Distribution System
Sampling Point: S- N. Star Dragon Hill (7-11-MD, 94F4)

Facility: Distribution System
Sampling Point: S- N.Star South Hill (7-12-MD, 94F6)

Facility: Distribution System
Sampling Point: S- Nason (7-10-MD, 94F3)

Facility: Distribution System
Sampling Point: S- Pederson Rd (7-7-MD, 94F0)

Total Coliforms (counts)		Criteria	
* 10/19/2021 11:30	10 counts/100ml	<=0, OG, P	User-Defined
* 10/28/2021 09:10	4 counts/100ml	<=0, OG, P	User-Defined
* 11/04/2021 13:30	7 counts/100ml	<=0, OG, P	User-Defined
* 11/15/2021 14:20	> 15 counts/100ml	<=0, OG, P	User-Defined

# samples:	15	min:	< 1 counts/100ml
# detects:	4	max:	> 15 counts/100ml
# non-detects:	11	Geometric Mean:	7 counts/100ml (based on 3 numerical results)
# of Exceedences:	4		

Facility: Distribution System
Sampling Point: S- West Fraser Rd (7-6-MR, 94E9)

Total Coliforms (counts)		Criteria	
* 10/19/2021 09:40	1 counts/100ml	<=0, OG, P	User-Defined

# samples:	12	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	11	Geometric Mean:	1 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		

Facility: Distribution System
Sampling Point: S-Carson Pit (7-16-MR, 35D91)

Facility: Distribution System
Sampling Point: S-Graham Ave (7-5-MD, 94E8)

Total Coliforms (counts)		Criteria	
* 10/19/2021 13:35	1 counts/100ml	<=0, OG, P	User-Defined

# samples:	12	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	11	Geometric Mean:	1 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		



Facility: Distribution System
Sampling Point: S-Hospital (7-9-MD, 94F2)

Total Coliforms (counts)		Criteria	
* 09/28/2021 09:20	1 counts/100ml	<=0, OG, P	User-Defined

# samples:	12	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	11	Geometric Mean:	1 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		

Facility: Reservoirs
Sampling Point: R-1 Shadow Heights (8-1-MR, 94EA)

Facility: Reservoirs
Sampling Point: R-2 Pinecrest (8-4-MR, 94F9)

Total Coliforms (counts)		Criteria	
* 03/23/2021 13:50	1 counts/100ml	<=0, OG, P	User-Defined

# samples:	13	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	12	Geometric Mean:	1 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		

Facility: Reservoirs
Sampling Point: R-3 Sugarloaf (8-5-MR, 94FA)

Facility: Reservoirs
Sampling Point: R-4 Abbott Dr 1 (8-2-MR, 94EB)

Total Coliforms (counts)		Criteria	
* 03/23/2021 09:15	1 counts/100ml	<=0, OG, P	User-Defined

# samples:	13	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	12	Geometric Mean:	1 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		



Facility: Reservoirs
Sampling Point: R-4 Abbott Dr 2 (8-3-MR, 94EC)

Facility: Reservoirs
Sampling Point: R-5 Dragon Hill (8-6-MR, 94FC)

Facility: Reservoirs
Sampling Point: R-6 New Tatchell Reservoir (8-8-MR, 94FF)

Total Coliforms (counts)	Criteria		
* 10/06/2021 13:15	72 counts/100ml	<=0, OG, P	User-Defined

# samples:	12	min:	< 1 counts/100ml
# detects:	1	max:	72 counts/100ml
# non-detects:	11	Geometric Mean:	72 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		

Facility: Well 10 Hilborn Rd.; Well No 10
Sampling Point: Well No 10 Hilborn Rd. (9-1-EP, 28000)

Facility: Well 3 Rolph at Roddis; Well No 3
Sampling Point: Well 3 Rolph at Roddis (1-2-EP, 94D1)

Facility: Well 6 Rolph at Robertson; Well No 6
Sampling Point: Well 6 Rolph at Robertson (3-2-EP, 94DC)

Facility: Well 7 N. Fraser Dr; Well No 7
Sampling Point: Well 7 N. Fraser Dr (4-2-EP, 94E0)

Facility: Well 8 Hilborn Rd; Well No 8
Sampling Point: Well 8 Hilborn Rd (5-1-EP, 94E1)

Facility: Well 9 Carson Sub; Well No 9
Sampling Point: Well 9 Carson Sub (6-2-EP, 94DF)

Result Legend:

P=present, A=absent, PR=presumptive, ND=non-detect, OR=over-range, OG=overgrown, Y=yes, N=no,
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*** Indicates Criteria is exceeded**

Facility: Distribution System
Sampling Point: S- Mills Rd (7-2-MR, 94E5)

Copper (total) **Criteria**
 05/26/2021 11:30 0.00672 mg/L <=1.0 AO

samples: 1 **min:** 0.00672 mg/L
detects: 1 **max:** 0.00672 mg/L
non-detects: 0 **avg:** 0.00672 mg/L (based on 1 numerical results)
of Exceedences: 0

Iron (total) **Criteria**
 05/26/2021 11:30 < 0.010 mg/L <=0.3 AO

samples: 1 **min:** < 0.010 mg/L
detects: 0 **max:** < 0.010 mg/L
non-detects: 1 **avg:** n/a (based on 0 numerical results)
of Exceedences: 0

Lead (total) **Criteria**
 05/26/2021 11:30 < 0.00020 mg/L <=0.005 MAC

samples: 1 **min:** < 0.00020 mg/L
detects: 0 **max:** < 0.00020 mg/L
non-detects: 1 **avg:** n/a (based on 0 numerical results)
of Exceedences: 0

Manganese (total) **Criteria**
 05/26/2021 11:30 0.00528 mg/L <=0.02 AO

samples: 1 **min:** 0.00528 mg/L
detects: 1 **max:** 0.00528 mg/L
non-detects: 0 **avg:** 0.00528 mg/L (based on 1 numerical results)
of Exceedences: 0

Zinc (total) **Criteria**
 05/26/2021 11:30 < 0.0040 mg/L <=5 AO

samples: 1 **min:** < 0.0040 mg/L
detects: 0 **max:** < 0.0040 mg/L
non-detects: 1 **avg:** n/a (based on 0 numerical results)
of Exceedences: 0



Facility: Distribution System
Sampling Point: S- Pederson Rd (7-7-MD, 94F0)

Copper (total) **Criteria**
 05/26/2021 14:45 0.00381 mg/L <=1.0 AO

samples: 1 **min:** 0.00381 mg/L
detects: 1 **max:** 0.00381 mg/L
non-detects: 0 **avg:** 0.00381 mg/L (based on 1 numerical results)
of Exceedences: 0

Iron (total) **Criteria**
 05/26/2021 14:45 < 0.010 mg/L <=0.3 AO

samples: 1 **min:** < 0.010 mg/L
detects: 0 **max:** < 0.010 mg/L
non-detects: 1 **avg:** n/a (based on 0 numerical results)
of Exceedences: 0

Lead (total) **Criteria**
 05/26/2021 14:45 < 0.00020 mg/L <=0.005 MAC

samples: 1 **min:** < 0.00020 mg/L
detects: 0 **max:** < 0.00020 mg/L
non-detects: 1 **avg:** n/a (based on 0 numerical results)
of Exceedences: 0

Manganese (total) **Criteria**
 * 05/26/2021 14:45 0.0605 mg/L <=0.02 AO

samples: 1 **min:** 0.0605 mg/L
detects: 1 **max:** 0.0605 mg/L
non-detects: 0 **avg:** 0.0605 mg/L (based on 1 numerical results)
of Exceedences: 1

Zinc (total) **Criteria**
 05/26/2021 14:45 0.0043 mg/L <=5 AO

samples: 1 **min:** 0.0043 mg/L
detects: 1 **max:** 0.0043 mg/L
non-detects: 0 **avg:** 0.0043 mg/L (based on 1 numerical results)



of Exceedences: 0

Facility: Distribution System
Sampling Point: S-Carson Pit (7-16-MR, 35D91)

Copper (total)
05/26/2021 10:30 0.00562 mg/L **Criteria** <=1.0 AO

samples: 1 **min:** 0.00562 mg/L
detects: 1 **max:** 0.00562 mg/L
non-detects: 0 **avg:** 0.00562 mg/L (based on 1 numerical results)
of Exceedences: 0

Iron (total)
05/26/2021 10:30 < 0.010 mg/L **Criteria** <=0.3 AO

samples: 1 **min:** < 0.010 mg/L
detects: 0 **max:** < 0.010 mg/L
non-detects: 1 **avg:** n/a (based on 0 numerical results)
of Exceedences: 0

Lead (total)
05/26/2021 10:30 < 0.00020 mg/L **Criteria** <=0.005 MAC

samples: 1 **min:** < 0.00020 mg/L
detects: 0 **max:** < 0.00020 mg/L
non-detects: 1 **avg:** n/a (based on 0 numerical results)
of Exceedences: 0

Manganese (total)
05/26/2021 10:30 0.0117 mg/L **Criteria** <=0.02 AO

samples: 1 **min:** 0.0117 mg/L
detects: 1 **max:** 0.0117 mg/L
non-detects: 0 **avg:** 0.0117 mg/L (based on 1 numerical results)
of Exceedences: 0

Zinc (total)
05/26/2021 10:30 0.0194 mg/L **Criteria** <=5 AO

samples: 1 **min:** 0.0194 mg/L



# detects:	1	max:	0.0194 mg/L
# non-detects:	0	avg:	0.0194 mg/L (based on 1 numerical results)
# of Exceedences:	0		

Result Legend:

P=present, A=absent, PR=presumptive, ND=non-detect, OR=over-range, OG=overgrown, Y=yes, N=no,
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